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Model 2000

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.... MAINTENANCE

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.... PRINTED CIRCUIT BOARD

...... STRUCTURAL REPAIR

... WIRING DIAGRAM

P/N 122-590013-21B

Volume 1 of 2

STARSHIP

NOTE: PRINTING

The default on most print commands from Adobe Reader is ALL -- the entire CD in this case.

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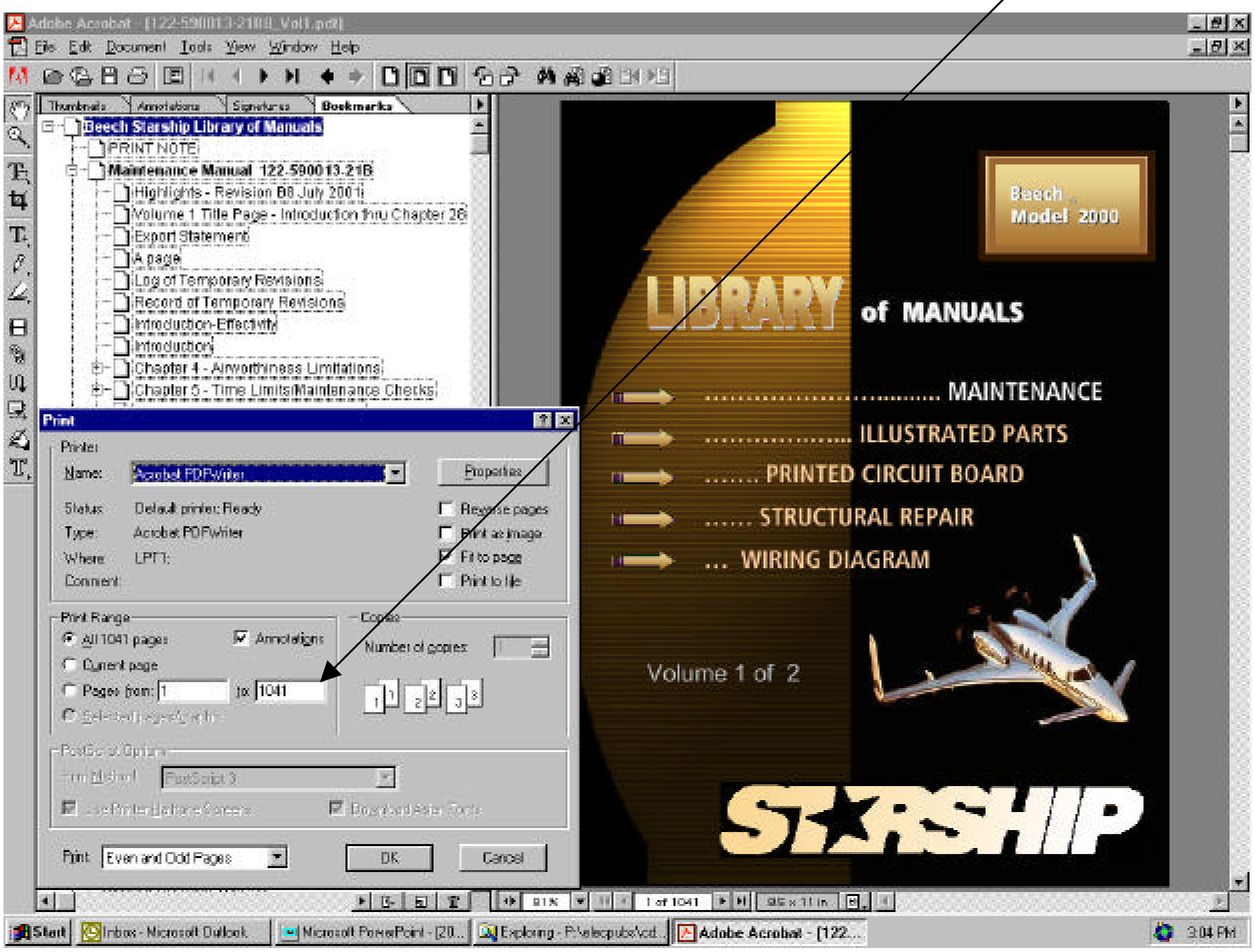

Raytheon Aircraft

BEECH STARSHIP 1 MAINTENANCE MANUAL

P/N 122-590013-21B, REVISION B9, July 31, 2002

The chapters which have been revised or added are listed below with the Highlights of each change. Remove the affected pages and insert the B9 Revision in accordance with the attached Instruction Page. Enter the revision number and the date inserted on the Record of Revisions page of this manual. The Highlight Page may be retained with the manual for future reference.

HIGHLIGHTS

Chapter/Section	Description of Change
4-10-00	Added limitations for flying aircraft with cracked windshield.
5-10-00	Added inspection intervals for ULD on the CVR.
5-11-00	Added inspection criteria for ULD on the CVR.
5-20-00	Revised Inspection Intervals.
10-00-00	Update PD680 in materials list.
11-20-00	Incorporated Service Bulletin No. 52-3096.
20-00-00	Revised Special Tools and Equipment chart.
23-00-00	Updated Recommended Materials list to change banned materials.
25-10-00	Added inspection information on seat belts.
25-20-00	Added inspection information on seat belts.
25-60-00	Added information for ULD on CVR.
25-60-10	Added information for ULD on CVR.
30-40-00	Added maintenance procedures on Windshield Wipers.
32-40-00	Updated Brake Wear Limits.
56-10-00	Added note on flights with cracked windshield.
71-00-00	Removed note on eight hour soak period.
79-00-00	Added Chart for Recommended Materials.
79-30-00	Added procedure to remove and install Low oil pressure warning switch.

Raytheon Aircraft

BEECH

STARSHIP 1®

Model 2000

NC-4 and after

Maintenance Manual

Volume 1 of 2
Introduction thru Chapter 28

This manual includes the maintenance information required to be available by FAR Part 23.

Note: This manual was formerly called the Beechcraft Starship Maintenance Manual.

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NOTE

Where Beech Aircraft Corporation is referred to in this publication, it will be taken to read Raytheon Aircraft Company.

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Raytheon Aircraft

BEECH STARSHIP 1 MAINTENANCE MANUAL

LIST OF EFFECTIVE REVISIONS

Always destroy superseded pages when you insert revised pages.

Title Page (Volume 1) .... July 31, 2002

"A" Page B9

Title Page (Volume 2) .... July 31, 2002

PART NUMBER	DATE	CHAPTERS AFFECTED
122-590013-21B	February 25, 1994	Reissue
122-590013-21B1	May 13, 1994	4, 23 and 39
122-590013-21B2	August 1, 1994	12
122-590013-21B3	December 23, 1994	10, 21, 23, 24, 33 and 34
122-590013-21B4	June 30, 1995	4, 11, 25, 26 and 33
122-590013-21B5	April 11, 1997	5, 7, 12, 30, 32 and 73
122-590013-21B6	December 22, 2000	4, 5, 12, 20, 25, 27, 32, 56 and 73
122-590013-21B7	March 16, 2001	5
122-590013-21B8	June 20, 2001	61
122-590013-21B9	July 31, 2002	4, 5, 10, 11, 20, 23, 25, 30, 32, 56, 71 and 79

NOTE: A List of Effective pages will be in the front of each chapter.

B9

Basic publications are assigned a part number which appears on the title page with the date of the issue. Subsequent revisions are identified by the addition of a revision code after the part number. A1 after a part number denotes the first revision to the basic publication, A2 the second, etc. Occasionally, it is necessary to completely reissue and reprint a publication for the purpose of obsoleting a previous issue and outstanding revisions thereto. As these replacement reissues are made, the code will also change to the next successive letter of the alphabet at each issue. For example, B for the first reissue, C for the second, etc.

When ordering a handbook, give the basic number, and the reissue code when applicable, if a complete up-to-date publication is desired. Should only revision pages be required, give the basic number and revision code for the particular set of revision pages you desire.

LOG OF TEMPORARY REVISIONS

Revision No.	Revision Date	Subject	Revision Incorporated
5-1	Feb 29/96	Revise Landing Gear Warning & Caution	B5
73-1	Feb 29/96	Revise text under Main Fuel Filter Servicing	B5
5-2	Jan 29/99	Revise the Fuel Purge System Inspection	B6
73-2	Jan 29/99	Add Fuel Purge System Check Valve Inspection, Cleaning and Leakage Test	B6

NOTE: Insert this Log ofTemporary Revisions after the Record of Revisions page. Previous Log of Temporary Revisions may be discarded.

Beechcraft
STARSHIP 1
MAINTENANCE MANUAL

RECORD OF TEMPORARY REVISIONS

REVISION NUMBER	CHAPTER/ PAGE AFFECTED	DATE INSERTED	INSERTED BY	DATE REMOVED	REASON REMOVED	REMOVED BY
5-1	5-20-00/4, 6	2/28/96	Tom Wichman		B5	
73-1	73-10-00/8, 9	2/28/96	Tom Wichman		B5	
5-2	5-20-00/6, 8	1/29/99	Todd [illegible]		~~B6~~	
73-2	73-10-00/12	1/29/99	Todd [illegible]		~~B6~~	

NOTE: Insert this Record of Temporary Revisions after the Record of Revisions page.

LIST OF PAGE EFFECTIVITY

INTRODUCTION

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

NOTE

Service Publication reissues or revisions are not automatically provided to the holder of this manual. For information on how to obtain reissues or revisions applicable to this manual, refer to the latest revision of the Raytheon Aircraft Service Bulletin No. 2001.

The Raytheon Aircraft Starship 1 Maintenance Manual is prepared in accordance with the GAMA (General Aviation Manufacturers Association) Specification No. 2 format. It also meets the intent of the requirements of the ATA Specification 100 (Air Transport Association of America) with respect to the arrangement and content of the System/ Chapters within the designated chapter-numbering system. This maintenance manual is supplemented by the following publications:

NOTE

It shall be the responsibility of the owner/operator to ensure that the latest revision of publications referenced in this handbook are utilized during operation, servicing, and maintenance of the airplane.

- The Raytheon Aircraft Starship 1 Parts Catalog, P/N 122-590013-11
- The Raytheon Aircraft Starship 1 Wiring Diagram Manual, P/N 122-590013-13
- The Raytheon Aircraft Starship 1 Component Maintenance Manual, P/N 122-590013-9
- The Raytheon Aircraft Starship 1 Structural Repair Manual, P/N 122-590013-7
- The Raytheon Aircraft Starship 1 Printed Circuit Board Manual, P/N 122-590013-49

NOTE

Raytheon Aircraft Company expressly reserves the right to supersede, cancel and/or declare obsolete any part, part numbers, kits or publication that may be referenced in this manual without prior notice.

WARNING

Use only genuine Raytheon Aircraft or Raytheon Aircraft approved parts obtained from Raytheon Aircraft approved sources, in connection with the maintenance and repair of Beech airplanes.

Genuine Raytheon Aircraft parts are produced and inspected under rigorous procedures to insure airworthiness and suitability for use in Beech airplane applications. Parts purchased from sources other than Raytheon Aircraft, even though outwardly identical in appearance, may not have had the required tests and inspections performed, may be different in fabrication techniques and materials, and may be dangerous when installed in an airplane.

Salvaged airplane parts, reworked parts obtained from non-Raytheon Aircraft approved sources, or parts, components or structural assemblies, the service history of which is unknown or cannot be authenticated, may have been subjected to unacceptable stresses or temperatures or have other hidden damage, not discernible through routine visual or usual nondestructive testing techniques. This may render the part, component or structural assembly, even though originally manufactured by Raytheon Aircraft, unsuitable and unsafe for airplane use.

Raytheon Aircraft expressly disclaims any responsibility for malfunctions, failures, damage or injury caused by use of non-Raytheon Aircraft approved parts.

CORRESPONDENCE

If a question should arise concerning the care of your airplane, it is important to include the airplane serial number in any correspondence. The serial number appears on the model designation placard (see Chapter 11-00-00 for placard location).

ASSIGNMENT OF SUBJECT MATERIAL

The content of this publication is organized at four levels. The four levels are:

GROUP - Identified by different colored divider tabs. These are the primary divisions of the manual that enable broad separation of content. Typical of this division is the separation between Airframe Systems and the Power Plant.

SYSTEM/CHAPTER - The various groups are broken down into major systems such as Environmental Systems, Electrical Power, Landing Gear, etc. The systems are arranged more or less alphabetically rather than by precedence or importance. They are assigned a number, which becomes the first element of the standardized numbering system. Thus, the element " 28" of the number 28-40-01 refers to the chapter "FUEL". Everything concerning the fuel system will be covered in this chapter.

SUB-SYSTEM/SECTION - The major systems/chapters of an airplane are broken down into sub-systems. These sub-systems are identified by the second element of the standard numbering system. The element " 40" of the number 28- 40-01 concerns itself with the indicating section of the fuel system.

UNIT/SUBJECT - The individual units within a sub-system/section may be identified by the third element of the standard numbering system. The element " 01" of the number 28-40- 01 is a subject designator. This element is assigned at the option of the manufacturer and may or may not be used.

APPLICATION

Any publication conforming to the GAMA or ATA format will use the same basic numbering system. Thus, whether the manual be a Raytheon Aircraft Starship 1 Maintenance Manual or a Raytheon Aircraft Starship 1 Wiring Diagram Manual, the person wishing information concerning the indication portion of the fuel system, would refer to the System/Chapter Tab "28-FUEL". The table of contents in the front of this chapter will provide a list of sub-systems covered in this chapter. For example, the fuel system chapter with a full index would contain:

28-00	General
28-10	Storage (Tanks, Cells, Necks, Caps, Instruments, Etc.)
28-20	Distribution (Fuel Lines, Pumps, Valves, Controls, Etc.)
28-30	Dump (If In-flight Dumping System is installed, it would appear here.
28-40	Indicating (Quantity, Temperature, Pressure, Etc., does not include Engine Fuel Flow or Pressure.

The material is arranged within the chapter in ascending numerical sequence. The Chapter-Section-Subject number and page number are found at the lower outside corner of each page.

LIST OF EFFECTIVE REVISIONS

The List of Effective Revisions following the title page of the manual lists the revisions currently effective for the manual.

RECORD OF REVISIONS PAGE

A Record of Revisions page is provided following the List of Effective Revisions ("A") page. When a revision is inserted, the revision number, the date the revision is inserted into the manual, and the initials of the person(s) inserting the revision should be recorded on this page.

LIST OF EFFECTIVE PAGES

The list of effective pages following each Chapter-Divider-Tab lists the issue date of each page that is effective for that chapter.

REVISED TEXT AND ILLUSTRATIONS

That portion of text or illustration which has been revised by the addition or deletion of, or a change in, information is denoted by a solid revision bar along the outside margin of the page.

SYSTEM/CHAPTER INDEX GUIDE

The following System/Chapter, Sub-System Section Index Guide is prepared in accordance with both GAMA Specification No. 2 and ATA Specification No. 100 for use with maintenance manuals, parts catalogs and wiring diagram manuals. The following chapters are not applicable to this maintenance manual: 29, 37, 49, 60, 70, 81, 83, 91 and 95.

CHAPTER/SYSTEM INDEX GUIDE

System/Chapter	Subsystem/Section	Title
INTRODUCTION		
	AIRWORTHINESS LIMITATIONS	
4	00	Limitations
5	TIME LIMITS/MAINTENANCE CHECKS	
	10	Time Limits - Maintenance Checks
	11	Time Limits - Overhaul and Replacement
	20	Scheduled maintenance Checks
	50	Unscheduled Maintenance Checks
6	DIMENSIONS AND AREAS	
	10	Airplane Dimensions
	20	Airplane Areas
	30	Airplane Stations
	40	Airplane Zones
	50	Airplane Access Panels
7	LIFTING AND SHORING	
	00	General
	10	Jacking and Hoisting
8	LEVELING AND WEIGHING	
	00	General
	10	Leveling
	20	Weighing
9	TOWING AND TAXING	
	00	General
	10	Towing
	20	Taxing

CHAPTER/SYSTEM INDEX GUIDE (CONTINUED)

System/Chapter	Subsystem/Section	Title
10	PARKING AND MOORING	
	00	General
	10	Parking
	20	Mooring
11	PLACARDS AND MARKINGS	
	00	General
	10	Exterior Color Schemes and Markings
	20	Exterior Placards and Markings
12	SERVICING	
	00	Servicing
	10	Replenishing
	20	Scheduled Servicing
	30	Unscheduled Servicing
20	STANDARD PRACTICES - AIRFRAME	
	00	Standard Practices
	01	Torque Application
	02	Electrostatic Discharge Sensitivity
	03	Electrical Bonding
	04	Control Cables and Pulleys
	05	Bearings
	06	Tubing, Hoses and Fittings
	07	Locking Devices
	08	Airplane Finish Care
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	00	General
	20	Air Distribution
	21	Nose Avionics Cooling Systems
	30	Pressurization Control

CHAPTER/SYSTEM INDEX GUIDE (CONTINUED)

System/Chapter	Subsystem/Section	Title
	40	Heating
	50	Cooling
	60	Temperature Control
22	AUTO-FLIGHT	
	10	Autopilot
23	COMMUNICATIONS	
	00	General
	10	Speech Communications
	11	VHF Communications
	12	Radiophone System
	40	Ground Interphone System
	50	Audio Integrating
	60	Static Discharging
24	ELECTRICAL POWER	
	00	General
	30	DC Generation and Control
	31	Battery Power
	32	Auxiliary Battery Power
	40	External Power
	50	Electrical Load Distribution
25	EQUIPMENT/FURNISHINGS	
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	20	Passenger Compartment
	60	Emergency
26	FIRE PROTECTION	
	00	General

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CHAPTER/SYSTEM INDEX GUIDE (CONTINUED)

System/Chapter	Subsystem/Section	Title
	50	Central Warning System
32	LANDING GEAR	
	00	General
	10	Main Gear and Doors
	20	Nose Gear and Doors
	30	Extension and Retraction
	40	Wheels and Brakes
	50	Nose Landing Gear Steering
	60	Landing Gear Position and Warning
33	LIGHTS	
	00	General
	10	Cockpit Lights
	20	Cabin Lights
	30	Baggage Compartment Lights
	40	Exterior Lights
34	NAVIGATION AND PITOT/STATIC	
	00	General
	10	Flight Environment Data
	20	Attitude and Direction
	30	Landing Systems
	40	Independent Position Determining
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35	OXYGEN	
	00	General
36	PNEUMATIC	
	00	General
	10	Distribution

CHAPTER/SYSTEM INDEX GUIDE (CONTINUED)

System/Chapter	Subsystem/Section	Title
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	00	General
	30	Waste Disposal
39	ELECTRICAL PANELS	
	10	Instrument and Control Panels
	20	Electrical and Electronic Equipment Panels
	60	Printed Circuit Boards
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	00	General
	10	Passenger/Crew
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	40	Service Doors
	70	Door Warning
	80	Landing Gear Doors
53	FUSELAGE	
	00	General
	10	Main Frame
	20	Auxiliary Structure
	30	Access Doors and Skin
	40	Attach Fittings
	50	Aerodynamic Fairings
54	NACELLES	
	00	General

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	20	Elevator
	30	Tipsails
	40	Rudder
	60	Ventral Stabilizer
56	WINDOWS	
	00	General
	10	Cockpit
	20	Cabin
57	WINGS	
	00	General
	50	Eleven
61	PROPELLERS	
	00	General
	10	Propeller Assembly
	20	Controlling
	21	Autofeathering
	22	Synchrophasing
	40	Indicating
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	10	Engine Cowling
	20	Engine Mounts
	50	Electrical HArness
	60	Engine Air Intakes
	70	Engine

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73	ENGINE FUEL SYSTEMS	
	00	General
	10	Fuel Distribution
74	IGNITION	
	00	General
75	AIR	
	20	Accessory Cooling
76	ENGINE CONTROLS	
	00	General
77	ENGINE INDICATING	
	00	General
	40	Integrated Engine Instrument Systems
78	EXHAUST	
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79	OIL	
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	00	General

CHAPTER 4 - AIRWORTHINESS LIMITATIONS

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CHAPTER 4 - AIRWORTHINESS LIMITATIONS

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AIRWORTHINESS LIMITATIONS

NOTE

The Airworthiness Limitations Section is FAA approved and specifies maintenance required under Parts 43.16 and 91.163 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

The following Airworthiness Limitations related to the airplane and its components have been established with respect to the Starship 1.

Refer to LIMITATIONS in the FAA Approved Airplane Flight Manual for a detailed delineation of the flight limitations of the airplane.

STRUCTURAL LIMITATIONS

COMPONENT	INTERVALS	
	Initial	**Subsequent**
AIRFRAME		
a. Perform routine visual inspections of the composite structure as detailed in Chapter 51-00-00.	600 Hours	600 Hours
b. Perform significant structural items inspection using visual, tap test, feeler gage, borescope and dye penetrant methods as detailed in Chapter 51-00-00.	4,800 Hours	2,400 Hours
c. Perform major inspection of airframe as detailed in Chapter 51-00-00.	20,000 Hours	TBD
d. All structural repairs must be made in accordance with the BEECHCRAFT Starship 1 Structural Repair Manual.		
FORWARD WING PIVOT ASSEMBLY		
a. Check and adjust free play as detailed in Chapter 55-10-00.	2,400 Hours	2,400 Hours
b. Replace forward wing pivot pin.	20,000 Hours	20,000 Hours
COCKPIT AND CABIN SEATS	The seats may not be structurally altered or replaced with seats having a different Part Number without prior approval from Raytheon Aircraft Company.	
EXTERIOR PAINT	Refer to Chapter 11-10-00 for the allowed exterior paints and colors.	

MISCELLANEOUS LIMITATIONS

COMPONENT	INTERVALS
ENGINE FIRE EXTINGUISHER BOTTLE (CHAPTER 26)	Hydrostatically test bottle every 5 years in accordance with Title 49 CFR Chapter 1, Section 173.34 or replace with a new bottle.
ENGINE FIRE EXTINGUISHER CARTRIDGE (SQUIB)	Total cartridge life is 10 years from the date of manufacture with the exceptions stated in Chapter 26-20-00.
OXYGEN BOTTLE (COMPOSITE)	Hydrostatically test 3 years after manufacture and every 3 years thereafter.
CABIN FIRE EXTINGUISHER	Check pressure every 12 months. Recharge every 6 years. Hydrostatically test every 12 years.
CRT DISPLAYS	Perform a brightness inspection on each CRT at the first 5,000 hours and every 5,000 hours thereafter, or anytime a CRT's brightness seems questionable. The brightness inspection must be performed at a qualified Collins Service Center.
ELECTRICAL GROUND PLANE JOINTS	Every 600 hours or 18 months, whichever occurs first, check for evidence of corrosion as detailed in Chapter 20-00-03.
DIRECT LIGHTNING STRIKE	Prior to further flight in Instrument Meteorological Conditions (IMC) or within 10 hours in Visual Meteorological Conditions (VMC) after a direct lightning strike, accomplish the following: a. Perform functional check of all items on the Kinds of Operation Equipment List (Section 2, FAA Approved Airplane Flight Manual). b. Perform operational check on all circuit breakers and transient suppression devices as detailed in Chapter 20-00-03. c. Perform ground plane electrical bond check as detailed in Chapter 20-00-03. d. Perform a routine visual inspection of the flight control cables, pulleys and bearings for evidence of electrical arc caused damage (fraying, pitting, etc.) as detailed in Chapter 20-00-04.

MISCELLANEOUS LIMITATIONS

COMPONENT	INTERVALS
SURFACE DE-ICE SYSTEM CROSSFEED VALVE	Every 600 hours inspect the crossfeed valve as detailed in Chapter 5-10-00.
TRIM MONITORS	Every 100 hours inspect the trim monitors as detailed in Chapter 5-10-00.
LANDING GEAR CUT-OUT RELAY	Inspect landing gear cut-out relay every 1,200 hours as detailed in Chapter 32-30-00.
PITOT/STATIC MASTS	Every 100 hours check that both pitot/static mast heaters are operational.
DEICE BOOT SURFACE COATING	Every 100 hours inspect the forward and aft wing deice boot surface coating as detailed in Chapter 30-10-00.
FLAP/FORWARD WING	Every 100 hours perform the FLAP/FORWARD WING OPERATIONAL TEST detailed in Chapter 27-50-00.
SELF-LUMINOUS CABIN SIGNS	Inspect 5 years and annually thereafter from manufacturer's date stamped on sign. Replace when brightness level drops below 160 microlamberts. Refer to Chapter 33-20-00 for the locations of the signs.

MISCELLANEOUS LIMITATIONS

COMPONENT	INTERVALS
Cracked or Shattered Windshield	The following limitations apply when continued flight is required with a cracked outer or inner ply of any windshield.

1. Continued flight with a cracked windshield is limited to 25 flight hours.
2. Windshields which have a shattered inner ply will have numerous cracks which will obstruct forward vision and may produce small particles or flakes of glass that can break free of the windshield and interfere with the crew's vision. These windshields must be replaced prior to the next flight unless a special flight permit is obtained from the local FAA Flight Standards District Office.
3. Crack(s) must not impair visibility.
4. Crack(s) must not interfere with the use of windshield wipers for flights requiring the use of the wipers.
5. Windshield anti-ice must be operational for flights in icing conditions.
6. The following placard must be installed in plain view of the pilot:

MAXIMUM AIRPLANE ALTITUDE LIMITED TO 31,000 FT. CABIN ΔP MUST BE MAINTAINED BETWEEN 6.0 AND 7.9 PSI DURING FLIGHT

Windshields that have cracks in both the inner and outer plies must be replaced prior to the next flight unless a special flight permit is obtained from the local FAA Flight Standards District Office.

FAA Approved: ____________________

John Tigue
Raytheon Aircraft Company
DOA-230339-CE

CHAPTER 5 - TIME LIMITS/MAINTENANCE CHECKS

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CHAPTER 5 - TIME LIMITS/MAINTENANCE CHECKS

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5-50-00	1	Feb 25/94
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CHAPTER 5 - TIME LIMITS/MAINTENANCE CHECKS

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CHAPTER 5 - TIME LIMITS/MAINTENANCE CHECKS

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TIME LIMITS - MAINTENANCE CHECKS

WARNING

When an airplane has experienced abnormal landing gear procedures of any type, as a safety precaution, place the airplane on jacks prior to performing any inspection or maintenance. Ensure that all three landing gears are down and locked prior to removing the airplane from jacks.

CAUTION

Jacking of an airplane for the purpose of landing gear operation inspection, servicing or maintenance, should be accomplished within an enclosed building or hangar. In the interest of safety, should it become necessary to jack the airplane in the open, wind velocity in any direction and terrain variations, must be compensated for prior to jacking the airplane.

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lockpin installation procedures.

TIME LIMITED INSPECTION REQUIREMENTS

This section consists of components that are subject to a thorough inspection based on calendar time, operating hours or cycles. The inspections should be done with reference to this maintenance manual and the Beech Starship 1 Component Maintenance Manual. When disassembly is required to accomplish these inspections, reassembly should be accomplished in accordance with applicable component manuals. Discrepancies noted during these inspections should be noted on work sheets for corrections.

The first inspection must be performed not later than the recommended period. The condition of the item at the end of the first period can be used as a criterion for determining subsequent periods applicable to the individual airplane or fleet operation, provided the operator has an approved condition monitoring system.

The time periods for inspections noted in this manual are based on average usage and average environmental conditions.

NOTE

The recommended periods do not constitute a guarantee the item will reach the period without malfunction as the aforementioned factors cannot be controlled by the manufacturer.

SPECIAL CONDITIONS CAUTIONARY NOTICE

Airplanes operated for Air Taxi, or other than normal operation, and airplanes operated in humid tropics, cold and damp climates, etc., may need more frequent inspections for wear, corrosion and/or lack of lubrication. In these areas, periodic inspections should be performed until the operator can set his own inspection periods based on experience or an approved condition monitoring system.

NOTE

The date on the "ORIGINAL STANDARD AIRWORTHINESS CERTIFICATE", FAA Form No. 8100-2, which is issued with a new airplane, is to be used as the basis for all inspected components listed in the following schedule.

NOTE

Items not listed in Chart 1 do not require specific inspections other than those required under an approved scheduled inspection program.

CHART 1
INSPECTION REQUIREMENTS

ITEM	INSPECTION REQUIREMENTS
Landing Gear	
Main and Nose Gear Shock Absorber Assemblies, Main and Nose Gear Drag Brace Assemblies, Axle Assemblies and Torque Knees (Chapter 32)	Inspect for cracks, wear and internal and external corrosion every 4,800 hours or 10 years, whichever occurs first (disassembly required).
Landing Gear Cut-Out Relay	Inspect landing gear cut-out relay every 1200 hours as detailed in Chapter 32-30-00.
Power Plant	
Engine	Inspect in accordance with the Pratt & Whitney PT6A-67A Engine Maintenance Manual.
Engine	Perform hot section inspection as required. Refer to the Pratt & Whitney PT6A-67A Engine Maintenance Manual.
Pedestal Throttle Lever Stop Pin (Chapter 76)	Inspect every 1,200 hours. Maximum wear is 1/3 of pin diameter.
Engine vibration isolator mounts (Chapter 71)	Inspect at engine TBO or 4,000 flight hours, which ever occurs first (disassembly required). Replace rubber cushion at engine overhaul.
P_3 Air Filter	Clean or replace every 1000 hours or less. Refer to Pratt & Whitney PT6A-67A engine maintenance manual.
Propellers	Dynamically balance every 600 hours as detailed in Chapter 61-10-00.

CHART 1 (CONTINUED) INSPECTION REQUIREMENTS

ITEM	INSPECTION REQUIREMENTS
Avionics System	
Altimeter and Pitot and Static System	Every 24 Months Per FAA Regulation.
VHF Navigation Receiver	Every 30 days perform a VOR equipment check for IFR operations. Refer to the latest revision of the Collins Starship 1 Avionics System Manual P/N 523-0774076-00111A
ATC Transponders	Every 2 years perform an ATC transponder test and inspection. Refer to the latest revision of the Collins Starship 1 Avionics System Manual P/N 523-0774076-00111A.
Air Data Computers	Every 2 years recertify the air data computers. Refer to the latest revision of the Collins Starship 1 Avionics System Manual P/N 523-00774076-00111A.
Weather Radar Antenna	At least once a year, clean and lubricate the mechanical portion of the antenna. Refer to the latest revision of the Collins Starship 1 Avionics System Manual P/N 523-0774076-00111A.
Flight Controls	
Autopilot Servos and Servo Mounts	Inspect the servos and servo mounts as detailed in the latest revision to the Collins Starship 1 Avionics System Manual P/N 523-0774076-00111
	Every 10,000 hours remove each servo mount from the airplane and have the mounts completely tested by a Collins General Aviation Division authorized service agency.
Forward Wing Control Actuator and Hydraulic Lock Solenoid Valve	Every 200 hours check the control actuator for no-backs and the hydraulic lock solenoid valve for proper operation as detailed in Chapter 27-50-00.
Flap Flexible Shaft (Chapter 27)	Inspect every 4,800 hours for wear (remove and lubricate).

CHART 1 (CONTINUED)
INSPECTION REQUIREMENTS

ITEM	INSPECTION REQUIREMENTS
Trim Monitors	Every 100 hours check all three axes of airplane trim (pitch, yaw and roll) as follows: A. With the airplane's electrical power on, depress and hold the FLAP/TRIM-PUSHER-INTR-AP/YD DISC button located on the pilot's and co-pilot's control wheels. B. Operate the pitch trim in both directions, the PITCH TRIM FAIL warning annunciator on the glareshield should illuminate after 2 seconds. C. Operate the roll trim in both directions, the ROLL TRIM FAIL warning annunciator on the glareshield should illuminate after 2 seconds. D. Operate the rudder trim in both directions, the RUD TRIM FAIL warning annunciator on the glareshield should illuminate after 2 seconds.
Utility Systems	
Cabin Fire Extinguisher	Hydrostatically test every 12 years. (DOT Regulation)
Engine Fire Extinguisher Bottle (Chapter 26)	Hydrostatically test bottle at the intervals specified in Chapter 4-00-00.
Oxygen Cylinder (Lightweight) DOT 3HT 1850 (Chapter 35)	Hydrostatically test every 3 years (DOT Regulation). Replace after 24 years or 4,380 refills.
All Weather Systems	
Surface Deice System Crossfeed Valve	Every 600 hours, check the crossfeed valve as follows: A. Start and run engines. B. Set BLEED AIR VALVES switch to L ENG or R ENG. C.Press SURF DEICE - MAIN test switch (make sure minimum engine N_1 speed of 85% is maintained). System is OK if no failure annunciations are present.
Pitot/Static Masts	Every 100 hours check that both pitot/static mast heaters are operational.

CHART 1 (CONTINUED)
INSPECTION REQUIREMENTS

ITEM	INSPECTION REQUIREMENTS
Emergency Equipment	
Underwater Locator Device (ULD)	Every 24 months perform operational check per Chapter 25-60-10 and manufacturers maintenance manual.
ULD Battery	Every 24 months check battery per Chapter 25-60-10 and manufacturers maintenance manual.
ULD Water Switch	Clean every 24 months per Chapter 25-60-10 and manufacturers maintenance manual.
Electrical Ground Plane	
Electrical Ground Plane Joints	Every 600 hours or 18 months, whichever occurs first, check for evidence of corrosion as detailed in Chapter 20-00-03.
Electrical Ground Plane	Every 600 hours or 18 months, whichever occurs first, perform a ground plane bond check as detailed in Chapter 20-00-03.

TIME LIMITS - OVERHAUL AND REPLACEMENT

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lockpin installation procedures.

OVERHAUL AND REPLACEMENT SCHEDULE

The first overhaul and replacement must be performed not later than the recommended period. The condition of the item at the end of the first period can be used as a criterion for determining subsequent periods applicable to the individual airplane or fleet operation, provided the operator has an approved condition-monitoring system.

The time periods for overhaul and replacement noted in this manual are based on average usage and average environmental conditions.

NOTE

The recommended periods do not constitute a guarantee the item will reach the period without malfunction as the aforementioned factors cannot be controlled by the manufacturer.

SPECIAL CONDITIONS CAUTIONARY NOTICE

Airplanes operated for Air Taxi, or other than normal operation, and airplanes operated in humid tropics, cold and damp climates, etc., may need more frequent inspections for wear, corrosion and/or lack of lubrication. In these areas, periodic inspections should be performed until the operator can set his own inspection periods based on experience or an approved condition monitoring system.

NOTE

The date on the "ORIGINAL AIRWORTHINESS CERTIFICATE", FAA Form No. 8100-2, which is issued with each new airplane, is to be used as the basis for all TBO or replacement components listed in the following schedule.

NOTE

Raytheon Aircraft Company recommends that operators record the number of cycles used on individual components for purposes of complying with inspections based on cycle count.

For purposes of establishing the intervals listed in Chart 1, the experience of Raytheon Aircraft Company indicates that each component experiences approximately one cycle per airplane flight hour in normal operation.

NOTE

Items not listed in Chart 1 are to be overhauled or replaced "On Condition". If "On Condition" items are worn, inoperative, inaccurate, intermittent and are not repairable through normal maintenance practices, they must be overhauled or replaced.

CHART 1
OVERHAUL AND REPLACEMENT SCHEDULE

ITEM	OVERHAUL OR REPLACE
Landing Gear	
Landing Gear Brake Hoses (Exposed) (Chapter 32)	10 years of time and service.
Landing Gear Brake Hoses (Exposed) (Chapter 32)	10 years of time and service.
Electrical System	
Emergency Locator Transmitter Battery (Chapter 25)	Replace at 50% of useful life as stated on the battery or anytime the transmitter is used more than one cumulative hour.
Underwater Locator Device (ULD)	Replace at date marked on the device (approx. every 6 years)
Power Plant	
Engine TBO	Refer to Pratt & Whitney Service Bulletin Number 14603 or subsequent for TBO. NOTE: A TBO (Time Between Overhaul) recommendation is in no way to be construed as a warranty or engine life proporation basis. The TBO recommendation is based on the projected time for most advantageous initial overhaul. The individual operator's experience may indicate a departure in either direction from the recommended TBO for the particular operation.
Oil Cooler (Chapter 79)	When contaminated
Flammable-Liquid-Carrying Hoses (Raytheon Aircraft supplied hoses only, which include all hoses between the airframe and the engine or its components, such as torque and oil pressure sensors, and the engine.)	5 years from date of delivery and every 5 years thereafter or at engine overhaul, whichever occurs first.

CHART 1 (CONTINUED)
OVERHAUL AND REPLACEMENT SCHEDULE

ITEM	OVERHAUL OR REPLACE
Engine-Driven Fuel Pump	Refer to Pratt & Whitney Service Bulletin Number 14603 or subsequent.
Overspeed Governor	Refer to Woodward Service Bulletin 33580 or subsequent.
Propeller Governor	Refer to Woodward Service Bulletin 33580 or subsequent.
Starter/Generator (Chapter 24)	Every 1,200 hours.
Propeller	
Propeller	Refer to McCauley Service Bulletin Number 137 or subsequent.
Fuel System	
Firewall Shutoff Valve (Chapter 28)	When the leakage rate reaches 2.0 c.c. per minute.
Engine-Driven Fuel Boost Pump (Chapter 73)	Refer to the applicable manual in the Beech Starship Component Maintenance Manual.
Utility Systems	
Windshield Wiper Blade Assembly (Chapter 30)	When the blade does not clear wipe area effectivity.
When the blade does not clear wipe area effectivity.	Every 24 months.
Engine Fire Extinguisher Cartridge (Squib) (Chapter 26)	Total cartridge life is 10 years from the date of manufacture with the exceptions stated in Chapter 26-20-00.
Self-Luminous Cabin Signs	Inspect 5 years from manufacturer's date stamped on sign and annually thereafter. Replace when brightness level drops below 160 microlamberts. Refer to Chapter 33-20-00 for the locations of the signs.

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

The time periods for the inspections noted in this schedule are based on normal usage under average environmental conditions. Airplanes operated in humid tropics, or in cold, damp climates, etc., may need more frequent inspections for wear, corrosion, lubrication, and/or lack of maintenance. Under these adverse conditions, perform periodic inspections in compliance with this guide at more frequent intervals until the owner or operator can set his own inspection periods based on the contingencies of field experience. Airplanes operated less than 600 hours in 36 months must have a "C" Inspection performed no later than 36 months following the date of the preceding "C" Inspection.

NOTE

Ascertain that all placards are in place and legible whenever the airplane has been repainted or touched up after repairs. Replace any placards that have been inadvertently defaced or removed.

NOTE

Raytheon Aircraft Company's Recommended Inspection Program in accordance with FAR 91.409 (f)(3) consists of, but is not limited to, inspection items listed in this Inspection Guide, any applicable Airworthiness Directives issued against the airframe or any equipment installed therein, conformity to Type Certificate Data Sheet and Maintenance Manual Chapter 4 as applicable.

The owner or operator is primarily responsible for maintaining the airplane in an airworthy condition, including compliance with all applicable Airworthiness Directives as specified in Part 39 of the Federal Aviation Regulations. It is further the responsibility of the owner or operator to ensure that the airplane is inspected in conformity with the requirements of Parts 43 and 91 of the Federal Aviation Regulations. Raytheon Aircraft Company has prepared this inspection guide to assist the owner or operator in meeting the foregoing responsibilities. This inspection guide is not intended to be all-inclusive, for no such guide can replace the good judgment of a certified airframe and power plant mechanic in the performance of his duties. As the one primarily responsible for the airworthiness of the airplane, the owner or operator should select only qualified personnel to maintain the airplane.

While this guide may be used as an outline, detailed information of the many systems and components in the airplane will be found in the various sections/chapters of the maintenance manual and the pertinent vendor publications. It is also recommended that reference be made to the applicable Maintenance Handbooks, Raytheon Aircraft Service Bulletins, applicable FAA Regulations and Publications, Suppliers Bulletins and Specifications for torque values, clearances, settings, tolerances, and other requirements. It is the responsibility of the owner or operator to ensure that the airframe and power plant mechanic inspecting the airplane has access to the previously noted documents as well as to this inspection guide.

Raytheon Aircraft Company issues service information for the benefit of owners and operators in the form of two classes of Service Bulletins. MANDATORY (Red Border) Service Bulletins are changes, inspections or modifications that could affect safety. The factory considers compliance with these Service Bulletins mandatory. OPTIONAL (No Border) Service Bulletins cover changes, modifications, improvements or inspections which may benefit the owner. Due to the wide range of information covered by the OPTIONAL Service Bulletin, each owner or operator is responsible for conducting a thorough review of each Optional Service Bulletin to determine if compliance is required based on the applicability of the OPTIONAL Service Bulletin to his particular set of operating conditions.

In the final analysis it is the responsibility of the owner or operator to ensure that all previously issued Class I and II Service Bulletins which are pertinent to his particular operation are complied with.

NOTE

In addition to the inspections prescribed by this schedule, the altimeter instrument and static system and all ATC transponders MUST be tested and inspected at 24-month intervals in compliance with the requirements specified in FAR Part 91.

NOTE

Owners or Operators wishing to utilize Inspection Intervals less than 100 hours may do so without obtaining Raytheon Aircraft Company's concurrence. Refer to the latest revision of this form for inspection procedure details to meet FAR 91.409 (f)(3).

Inspection timetables are as follows:

Inspection A	To be performed every 100 hours.
Inspection B	To be performed every 200 hours concurrent with "A" check.
Inspection C	To be performed every 600 hours concurrent with "A" and "B" checks.
Inspection D	To be performed every 2400 hours concurrent with "A", "B" and "C" checks. This inspection is not required at the first 2400 hour interval, the first "D" check is to be performed at 4800 hours.
Inspection E	Reserved for future use.

NOTE

Inspections that are asterisk noted, must also be performed at the first "A" inspection after manufacture.

SCHEDULED INSPECTION GENERAL INFORMATION

INSPECTION INTERVAL TOLERANCE

To facilitate scheduling inspections, Raytheon Aircraft Company authorizes the following inspection interval tolerances:

LETTER INSPECTIONS (HOURLY INTERVAL)

A tolerance of ±10 hours is allowed. Each letter inspection must be completed with 10 hours of the prescribed time.

EXAMPLE: A “B” CHECK INSPECTION, due at 200 hours, may be accomplished anytime between 190 hours and 210 hours. The subsequent “A” INSPECTION, due at 300 hours may be accomplished anytime between 290 hours and 310 hours, etc.

SPECIAL INSPECTION ITEMS - CALENDAR DATE LIMITED

A tolerance of ±12 days per 12 calendar months is allowed, not to exceed a total of 60 calendar days.

INSPECTION TIMETABLE (Effectivity: All)

HOUR INTERVAL	INSPECTION				
	A	B	C	D	E
100	X	*	*		
200	X	X			
300	X				
400	X	X			
500	X				
600	X	X	X		
700	X				
800	X	X			
900	X				
1000	X	X			
1100	X				
1200	X	X	X		
1300	X				
1400	X	X			
1500	X				
1600	X	X			
1700	X				
1800	X	X	X		
1900	X				
2000	X	X			
2100	X				
2200	X	X			
2300	X				
2400	X	X	X	#	
2500	X				

HOUR INTERVAL	INSPECTION				
	A	B	C	D	E
2600	X	X			
2700	X				
2800	X	X			
2900	X				
3000	X	X	X		
3100	X				
3200	X	X			
3300	X				
3400	X	X			
3500	X				
3600	X	X	X		
3700	X				
3800	X	X			
3900	X				
4000	X	X			
4100	X				
4200	X	X	X		
4300	X				
4400	X	X			
4500	X				
4600	X	X			
4700	X				
4800	X	X	X	X	
4900	X				
5000	X	X			

* - On first "A" check after manufacture, comply with all "A" check items and all "B" and "C" check items that are asterik noted within the inspection form.

- This inspection is not required at the first 2400 hour interval, the first inspection occurs at 4800 hours.

BT04504

STARHIP 1 INSPECTION FORM

A. LEFT POWER PLANT (ZONE 411)	A	B	C	D	E	MECH	INSP
1. COWLING - Remove cowling and clean. Inspect and repair as necessary. (Chapter 71)		X					
2. ENGINE OIL FILTER - Inspect the oil filter for metal particles as described in the Pratt & Whitney PT6A-67A Engine Maintenance Manual. Replace as required. (Chapter 79)		X					
3. DRAIN PLUGS - Check all drain plugs for security and leaks. (Chapter 79)		X					
*4. FUEL FILTERS AND SCREENS - Inspect the filter and screens for evidence of foreign matter, corrosion, or microbiological growth in the fuel system. Clean the firewall filter and check that the bypass valve piston is free to move. (Chapter 73)		X					
5. SPARK IGNITER PLUGS - Inspect the igniter plugs and clean, if necessary. (Chapter 74)		X					
6. ENGINE EXHAUST SYSTEM - Examine the exhaust system, and visible portions of the power turbine for burning, distortion, damage, and cracks. If any are found, refer to the Pratt & Whitney PT6A-67A Engine Maintenance Manual for corrective action. (Chapter 78)		X					
*7. INDUCTION SYSTEM - Check air intake duct and engine inlet screen for obstruction and damage. (Chapter 71)		X					
8. OIL COOLER - Check cooler and plumbing for condition and attachment. (Chapter 79)		X					
9. FIRE DETECTORS - Check for proper routing, condition, and attachment. (Chapter 26)		X					
10. ENGINE AND PROPELLER CONTROLS - Check controls and associated equipment for condition, attachment, full travel and proper friction lock.		X					
*11. ENGINE ACCESSORIES - Inspect all accessories, plumbing and associated equipment for condition, attachment and leakage.		X					
12. ENGINE MOUNTS - Inspect for condition and attachment. Replace or repair the vibration isolator mount as required. All mounts on an engine must be of the same part number. The mount may be rebuilt by replacement of the rubber cushion. (Chapter 71)		X					
13. ENGINE TRUSS - Inspect the tube intersections for cracks and condition. Inspect the insulation blankets for damage, security and missing sections and tears.		X					
14. ELECTRICAL WIRING AND EQUIPMENT - Inspect wiring and associated equipment and accessories for condition and attachment. (Chapter 71)		X					

STARHIP 1 INSPECTION FORM (Continued)

A. LEFT POWER PLANT (ZONE 411) *(Continued)*	**A**	**B**	**C**	**D**	**E**	**MECH**	**INSP**
15. PROPELLER - Clean and inspect blades per McCauley Operating Manual MPC-15.	X						
16. PROPELLER - Check for condition, attachment, and operation. Check the condition of the mechanical feedback ring, stop rods and springs. Inspect the carbon block pin for freedom of movement. Check for no metal-to-metal contact between the brass ring and the reversing lever. Check the reversing linkage for proper adjustment, operation, evidence of binding and security of attachment. Check for proper operation of all pedestal controls and switches.		X					
17. PROPELLER - Dynamically balance as instructed in Chapter 61-10-00.			X				
18. INERTIAL ANTI-ICER - Check the inertial vane and bypass doors for freedom of movement. Check linkage for condition and attachment.			X				
19. AUTOFEATHER RELAYS, DUMP SOLENOIDS, AND AUTOFEATHER/AUTO-IGNITION PRESSURE SWITCHES - Check for condition, security of attachment, and proper electrical connections.		X					
20. PROPELLER SYNCHROPHASER - Check for proper gap between sensors and targets. Refer to Chapter 61-22-00.		X					
21. STARTER-GENERATOR - Inspect one set of brushes for indication of excessive wear or damage (determine wear by observing diagonal groove on brush). Inspect inlet duct and blast cap for cracks or obstruction. Inspect QAD attachment flange. (Chapters 24 and 75)		X					
22. IGNITION EXCITER - Check exciter and electrical harness for condition and security of attachment. (Chapter 74)		X					
23. FUEL PURGE SYSTEM - Check plumbing and tank for security of attachment. (Chapter 73)		X					
24. FUEL PURGE SYSTEM - Remove filter, check for rust or corrosion and clean. Remove tank and clean. Remove the check valve and inspect, pressure flush and conduct an internal leakage test. Replace the check valve as required. (Chapter 73-10-00)			X				
*25. COMPRESSOR INLET - Remove the air inlet screen and check the compressor inlet area, struts, first stage blades and vanes for dirt deposits, corrosion, erosion, cracks, and damage by foreign objects.		X					
26. MAGNETIC CHIP DETECTOR - Check detector. (Chapter 79-30-00)		X					
27. NACELLE THERMAL INSULATION BLANKETS AND ALUMINUM TAPE - Inspect as outlined in Chapters 54 and 57.			X				

STARHIP 1 INSPECTION FORM (Continued)

B. RIGHT POWER PLANT (ZONE 421)	A	B	C	D	E	MECH	INSP
1. COWLING - Remove cowling and clean. Inspect and repair as necessary. (Chapter 71)		X					
2. ENGINE OIL FILTER - Inspect the oil filter for metal particles as described in the Pratt & Whitney PT6A-67A Engine Maintenance Manual. Replace as required. (Chapter 79)		X					
3. DRAIN PLUGS - Check all drain plugs for security and leaks. (Chapter 79)		X					
*4. FUEL FILTERS AND SCREENS - Inspect the filter and screens for evidence of foreign matter, corrosion, or microbiological growth in the fuel system. Clean the firewall filter and check that the bypass valve piston is free to move. (Chapter 73)		X					
5. SPARK IGNITER PLUGS - Inspect the igniter plugs and clean, if necessary. (Chapter 74)		X					
6. ENGINE EXHAUST SYSTEM - Examine the exhaust system, and visible portions of the power turbine for burning, distortion, damage, and cracks. If any are found, refer to the Pratt & Whitney PT6A-67A Engine Maintenance Manual for corrective action. (Chapter 78)		X					
*7. INDUCTION SYSTEM - Check air intake duct and engine inlet screen for obstruction and damage. (Chapter 71)		X					
8. OIL COOLER - Check cooler and plumbing for condition and attachment. (Chapter 79)		X					
9. FIRE DETECTORS - Check for proper routing, condition, and attachment. (Chapter 26)		X					
10. ENGINE AND PROPELLER CONTROLS - Check controls and associated equipment for condition, attachment, full travel and proper friction lock.		X					
*11. ENGINE ACCESSORIES - Inspect all accessories, plumbing and associated equipment for condition, attachment and leakage.		X					
12. ENGINE MOUNTS - Inspect for condition and attachment. Replace or repair the vibration isolator mount as required. All mounts on an engine must be of the same part number. The mount may be rebuilt by replacement of the rubber cushion. (Chapter 71)		X					
13. ENGINE TRUSS - Inspect the tube intersections for cracks and condition. Inspect the insulation blankets for damage, security and missing sections and tears.		X					
14. ELECTRICAL WIRING AND EQUIPMENT - Inspect wiring and associated equipment and accessories for condition and attachment. (Chapter 71)		X					

STARHIP 1 INSPECTION FORM (Continued)

B. RIGHT POWER PLANT (ZONE 421) *(Continued)*	**A**	**B**	**C**	**D**	**E**	**MECH**	**INSP**
15. PROPELLER - Clean and inspect blades per McCauley Operating Manual MPC-15.	X						
16. PROPELLER - Check for condition, attachment, and operation. Check the condition of the mechanical feedback ring, stop rods and springs. Inspect the carbon block pin for freedom of movement. Check for no metal-to-metal contact between the brass ring and the reversing lever. Check the reversing linkage for proper adjustment, operation, evidence of binding and security of attachment. Check for proper operation of all pedestal controls and switches.		X					
17. PROPELLER - Dynamically balance as instructed in Chapter 61-10-00.			X				
18. INERTIAL ANTI-ICER - Check the inertial vane and bypass doors for freedom of movement. Check linkage for condition and attachment.			X				
19. AUTOFEATHER RELAYS, DUMP SOLENOIDS, AND AUTOFEATHER/AUTO-IGNITION PRESSURE SWITCHES - Check for condition, security of attachment, and proper electrical connections.		X					
20. PROPELLER SYNCHROPHASER - Check for proper gap between sensors and targets. Refer to Chapter 61-22-00.		X					
21. STARTER-GENERATOR - Inspect one set of brushes for indication of excessive wear or damage (determine wear by observing diagonal groove on brush). Inspect inlet duct and blast cap for cracks or obstruction. Inspect QAD attachment flange. (Chapters 24 and 75)		X					
22. IGNITION EXCITER - Check exciter and electrical harness for condition and security of attachment. (Chapter 74)		X					
23. FUEL PURGE SYSTEM - Check plumbing and tank for security of attachment. (Chapter 73)		X					
24. FUEL PURGE SYSTEM - Remove filter, check for rust or corrosion and clean. Remove tank and clean. Remove the check valve and inspect, pressure flush and conduct an internal leakage test. Replace the check valve as required. (Chapter 73-10-00)			X				
*25. COMPRESSOR INLET - Remove the air inlet screen and check the compressor inlet area, struts, first stage blades and vanes for dirt deposits, corrosion, erosion, cracks, and damage by foreign objects.		X					
26. MAGNETIC CHIP DETECTOR - Check detector. (Chapter 79-30-00)		X					
27. REFRIGERANT COMPRESSOR - Check for condition, attachment, and oil leaks. (Chapter 21-50-00)		X					

STARHIP 1 INSPECTION FORM (Continued)

B. RIGHT POWER PLANT (ZONE 421) *(Continued)*	**A**	**B**	**C**	**D**	**E**	**MECH**	**INSP**
28. COMPRESSOR DRIVE BELT - Check for condition. Check adjustment. (Chapter 21-50-00)		X					
29. NACELLE THERMAL INSULATION BLANKETS AND ALUMINUM TAPE - Inspect as outlined in Chapters 54 and 57.			X				
30. COMPRESSOR DRIVE QUILL SHAFT - Check for condition. (Chapter 21-50-00)			X				
C. ENVIRONMENTAL SYSTEMS	**A**	**B**	**C**	**D**	**E**	**MECH**	**INSP**
1. REFRIGERANT LINES AND SERVICE VALVES - Inspect lines and valves for condition and attachment.		X					
2. AIR FILTERS - Replace the evaporator filters. Check filter in return air inlet of the forward and aft vent blowers for blockage and replace as necessary. (Chapter 21)		X					
3. FLOW CONTROL UNIT - Inspect unit and associated equipment, electrical wiring and ducts for condition and attachment.		X					
4. OUTFLOW VALVES - Check for condition and attachment. Clean valves and filter. (Chapter 21)		X					
5. OUTFLOW VALVES - Perform functional test. (Chapter 21-30-00)			X				
6. PRESSURIZATION CONTROLLER - Inspect for security of attachment and condition. Check wiring for condition and security. Check plumbing for condition and attachment.		X					
7. PRESSURIZATION CONTROL SYSTEM FILTER - Replace the filter.			X				
D. NOSE SECTION (F.S. 0 TO F.S. 95)	**A**	**B**	**C**	**D**	**E**	**MECH**	**INSP**
1. SKIN - Visually inspect surface for condition. (Chapter 51)			X				
2. STRUCTURE - Routine Inspection. (Chapter 51)			X				
3. RADIO EQUIPMENT - Inspect radio rack structure; check security of units in their mounts.		X					
4. STANDBY POWER SUPPLY BATTERY (JET MODEL PS835) - Check, load test and recharge if necessary. (Chapter 24-32-00)		X					
*5. BRAKE RESERVOIR - Inspect reservoir and fill as needed.		X					
*6. BRAKE SYSTEM - Replace main hydraulic filter and inspect finger screens (p/n 20666-4-10) located at the bypass solenoid valve.			X				

STARHIP 1 INSPECTION FORM (Continued)

D. NOSE SECTION (F.S. 0 TO F.S. 95) *(Continued)*	**A**	**B**	**C**	**D**	**E**	**MECH**	**INSP**
*7. BRAKE RESERVOIR PRESSURE EQUALIZATION LINE - Replace filter and clean orifice. (Chapter 32-40-00)			X				
8. DOORS, FASTENERS AND SEALS - Inspect seal for deterioration, doors and latches for proper adjustment.		X					
9. OXYGEN BOTTLE - Check oxygen bottle for condition and attachment. Check push/pull cable for freedom of movement and security of attachment.		X					
10. FORWARD WINGS - Routine Inspection. (Chapter 51)			X				
11. FORWARD WING CONTROL ACTUATOR AND HYDRAULIC LOCK SOLENOID VALVE - Inspect actuator for condition and attachment. Check bellcranks, pushrods and associated components for condition, attachment, alignment, clearance and proper operation. Perform the FORWARD WING HYDRAULIC SOLENOID LOCK VALVE AND ACTUATOR INSPECTION procedure. (Chapter 27-50-00)		X					
12. DEICE BOOTS - Visually inspect boots for cracks, tears, or delamination from the wing. Visually inspect leading edge of boots for erosion of surface coating. (Chapter 30-10-00)		X					
13. ELEVATORS - Check for proper position and travel.			X				
14. ELEVATORS - Visually inspect elevators and surrounding area for condition. Check for attachment and freedom of movement. Check for condition and attachment of electrical bonding straps.		X					
15. ELEVATOR TABS - Inspect tabs for condition, proper attachment and freedom of movement. Check tab actuator for proper operation, smoothness, and attachment. Check for condition and attachment of electrical bonding straps. (Chapter 27)		X					
16. ELEVATOR TABS - Inspect for proper travel and free play. (Chapter 27)			X				
17. AOA TRANSMITTERS - Check for condition and attachment.			X				
18. ICE DETECTORS - Check for condition and attachment.			X				
19. PITOT/STATIC MASTS - Check for condition and attachment.			X				
20. GROUND PLANE FLASHINGS - Inspect visually for proper attachment. (Chapter 20)			X				
21. SIGNIFICANT STRUCTURAL ITEMS - Inspect for condition as outlined in Chapter 51.				X			

STARHIP 1 INSPECTION FORM (Continued)

E. COCKPIT (F.S. 95 TO F.S. 163)	A	B	C	D	E	MECH	INSP
1. BRAKE SYSTEM - Check brake system components for leakage. Inspect brake master cylinder for proper operation, brake line plumbing for condition and attachment, brake pedals and linkage for condition, attachment and proper operation. Check for proper pedal travel and parking brake release.		X					
2. RUDDER PEDALS - Check rudder pedals for condition, clearance and attachment. Remove the two pivot bolts of each pedal and thoroughly examine the pivot holes and adjacent area.			X				
*3. INSTRUMENT PLUMBING AND WIRING - Inspect instrument panel, subpanels, placards, instruments, and displays for condition and attachment. Inspect instrument panel plumbing and wiring for condition, attachment, chafing, etc.		X					
4. CONTROL COLUMN - Check for condition, attachment and operation. Check flight control lock for condition, positive locking and alignment. Check coil cord connector and control wheel switches. (Chapter 27-30-00)		X					
5. COLUMN SHAKER/PUSHER SYSTEM - Check "G" switch. (Chapter 27)			X				
6. ELECTRICAL EQUIPMENT - Check operation of all lights. Check switches, knobs and circuit breakers for looseness and operation.			X				
*7. ELECTRICAL EQUIPMENT - Check all wiring for chafing, security, etc.			X				
8. ENGINE AND PROPELLER CONTROLS - Check for freedom of movement, full travel and proper friction lock operation.		X					
9. SEAT BELTS - Check seat belts for condition and attachment (Chapter 25-10-00).	X						
10. SEATS - Check seats for condition and attachment.		X					
11. SEAT COMPONENT WEAR LIMITS - Inspect for wear. (Chapter 25-10-00)			X				
12. WINDOWS - Inspect the windows and seals for general condition.		X					
13. PITOT AND STATIC LINES - Drain off all moisture.			X				
14. WINDSHIELDS - Inspect windshields for anti-static coating. (Chapter 56-10-00)			X				
15. WIRE TRAY COVERS - Ensure that all wire tray covers are properly installed in the pilot's and copilot's consoles.			X				
16. SIGNIFICANT STRUCTURAL ITEMS - Inspect for condition as outlined in Chapter 51.				X			

STARHIP 1 INSPECTION FORM (Continued)

F. CABIN SECTION (F.S. 163 TO F.S. 357)	**A**	**B**	**C**	**D**	**E**	**MECH**	**INSP**
1. SKIN - Routine Inspection. (Chapter 51)			X				
*2. FLIGHT CONTROL COMPONENTS, CABLES AND PULLEYS - Replace control system components (push rod turnbuckles, end fittings, castings, etc.) that have bulges, splits, bends, or cracks. Check control cables, pulleys and associated equipment for condition, attachment, alignment, clearance, and proper operation. Replace cables that have broken strands or evidence of corrosion.		X					
*3. FLIGHT CONTROL CABLES - Check cables for proper tension. Inspect and record elevon and rudder cable tension: Temperature: ____ degrees F. Elevon Cable Tension: Left ____ Right ____ Rudder Cable Tension: Left ____ Right ____			X				
4. LANDING GEAR HYDRAULIC LINES - Check for leaks and security of attachment.		X					
5. BRAKE SYSTEM HYDRAULIC LINES - Check for leaks and security of attachment.		X					
6. BELLY DRAIN VALVES - Inspect for possible obstructions and operation. (Chapter 53)		X					
7. OVERBOARD DRAIN - With the airplane on jacks, check overboard drain for proper operation of heating element. (Chapter 30-70-00)		X					
8. WINDOWS - Inspect windows and window seals for general condition. Chips, excessive crazing or other damage is basis for replacement of outer windows. (Chapter 56)		X					
9. CABIN ENTRANCE DOOR - Inspect door, seal, and latching mechanism for condition and security of attachment. Check door seal and solenoid valve for security and electrical connection. Check solenoid valve exit port for obstructions. Check cabin door lock switch adjustment. (Chapter 52)		X					
10. EMERGENCY EXIT - Check emergency release handle and latch mechanisms for proper operation. Check that hatch opens and closes freely. Check hatch for condition and all moving parts for proper operation. Check for proper latch adjustment and seal of closed hatch. (Chapter 52)		X					
11. ELECTRICAL WIRING AND EQUIPMENT - Inspect wiring and electrical equipment for condition and attachment.		X					
12. LIGHTS - Check cabin and compartment lights for condition and attachment, replace bulbs as necessary. (Chapter 33)		X					

STARHIP 1 INSPECTION FORM (Continued)

F. CABIN SECTION (F.S. 163 TO F.S. 357) *(Continued)*	**A**	**B**	**C**	**D**	**E**	**MECH**	**INSP**
13. PNEUMATIC SYSTEM PLUMBING - Check plumbing for condition and attachment.		X					
14. SEATS - Check seats for condition and attachment. (Chapter 25-20-00)		X					
15. SEAT BELTS - Check seat belts for condition and attachment. (Chapter 25-20-00)	X						
16. CABINETRY AND PARTITIONS - Check for fit and attachment.		X					
17. CONTROL CABLE SEALS - Check for condition, security and cleanliness.			X				
*18. OXYGEN SYSTEM - Functionally test all masks. Passenger masks must drop free and ready for use.			X				
19. ENGINE CONTROL CABLES - Check feed through bellcranks for condition and attachment.			X				
20. SIGNIFICANT STRUCTURAL ITEMS - Inspect for condition as outlined in Chapter 51.				X			
G. AFT FUSELAGE (F.S. 357 and AFT)	**A**	**B**	**C**	**D**	**E**	**MECH**	**INSP**
1. SKIN - Routine Inspection (Chapter 51)			X				
2. STRUCTURE - Routine Inspection (Chapter 51)			X				
3. PLUMBING - Inspect plumbing for condition and attachment.		X					
4. NAVIGATION LIGHT - Check for cracked or broken lenses. Replace bulb as necessary. (Chapter 33)		X					
5. ACCESS DOORS - Check for fit and attachment. Check condition of fasteners and seals.		X					
6. VENTRAL STABILIZER - Check the drain holes in the stabilizer for obstructions, condition and attachment.		X					
7. SIGNIFICANT STRUCTURAL ITEMS - Inspect for condition as outlined in Chapter 51.				X			
H. AFT WING	**A**	**B**	**C**	**D**	**E**	**MECH**	**INSP**
1. SKIN - Routine Inspection (Chapter 51)			X				

STARHIP 1 INSPECTION FORM (Continued)

H. AFT WING *(Continued)*	**A**	**B**	**C**	**D**	**E**	**MECH**	**INSP**
*2. FLIGHT CONTROL COMPONENTS, CABLES AND PULLEYS - Replace control system components (push rods, turnbuckles, end fittings, castings, etc.) that have bulges, splits, bends or cracks. Check control cables, mixer assembly, pulleys and associated equipment for condition, attachment, alignment, clearance and proper operation. Replace cables that have broken strands or evidence of corrosion.		X					
*3. FLIGHT CONTROL CABLES - Check cables for proper tension. Inspect and record elevon and rudder cable tension: Temperature: ____ degrees F. Elevon Cable Tension: Left ____ Right ____ Rudder Cable Tension: Left ____ Right ____			X				
4. ELEVONS - Visually inspect elevons and surrounding area for condition. Check surfaces for proper attachment. Check for condition and attachment of electrical bonding straps.		X					
5. ELEVONS - Check surfaces for proper travel and freedom of movement.			X				
6. ELEVON TABS - Visually inspect tabs for condition. Check surfaces for proper attachment and freedom of movement. Check trim tab actuator for proper operation, smoothness and attachment. Check for condition and attachment of electrical bonding straps. (Chapter 27)		X					
7. ELEVON TABS - Check for proper travel and free play. (Chapter 27)			X				
8. RUDDERS - Visually inspect rudders and surrounding area for condition. Check surfaces for proper attachment. Check for condition and attachment of electrical bonding straps.		X					
9. RUDDERS - Check surfaces for proper travel and freedom of movement.			X				
10. RUDDER TABS - Visually inspect tabs for condition. Check surfaces for proper attachment and freedom of movement. Check trim tab actuator for proper operation, smoothness and attachment. Check for condition and attachment of electrical bonding straps.		X					
11. RUDDER TABS - Check for proper travel and freeplay. (Chapter 27)			X				
12. FLAPS AND ACTUATORS - Inspect flap drive and actuator for condition and attachment.		X					
13. FLAP ROLLERS - Check for condition and operation.			X				
14. LIGHTS - Check navigation, recognition, and landing lights for broken lenses and replace bulbs as necessary. (Chapter 33)		X					
15. STROBE LIGHTS - Check for proper operation, cracked or broken lenses, and replace flash tubes as necessary. (Chapter 33)		X					

STARHIP 1 INSPECTION FORM (Continued)

H. AFT WING *(Continued)*	**A**	**B**	**C**	**D**	**E**	**MECH**	**INSP**
16. FUEL TANKS AND VENTS - Inspect fuel tanks for leaks and vents for obstruction. Check heated vents for proper operation.		X					
17. FORWARD FUEL TANK - Check the tank access plates for leaks, condition and attachment.		X					
*18. ELECTRICAL WIRING AND EQUIPMENT - Check for security, chafing, damage and attachment.			X				
19. PLUMBING - Check for leaks, chafing or damage, and proper attachment.		X					
20. ACCESS DOORS - Check for fit and attachment.		X					
21. DEICE BOOTS - Visually inspect boots for cracks, tears, or delamination from the wing. Visually inspect leading edge of boots for erosion of surface coating (Chapter 30-10-00)		X					
*22. NACELLE PLUMBING AND WIRING - Check plumbing for damage, security and leaks. Check the wiring for chafing and security of attachment.		X					
23. BATTERY - Remove battery. Inspect battery, cables, and vent tubes for general condition. With the battery in a fully charged state, check the battery water level. (Chapter 24)		X					
24. EXTERNAL POWER RELAY - Check the external power relay for proper operation. (Chapter 24)		X					
25. LANDING GEAR POWER PACK AND MOTOR - Inspect all plumbing line attachment points for leaks and security of attachment. Check hydraulic fluid and service as required (Chapter 12-10-00).		X					
26. ENGINE FIRE EXTINGUISHER - Check pressure of supply cylinder; check plumbing for leakage and security of attachment.		X					
27. SIGNIFICANT STRUCTURAL ITEMS - Inspect for condition as outlined in Chapter 51.				X			
I. LEFT MAIN GEAR AND BRAKES	**A**	**B**	**C**	**D**	**E**	**MECH**	**INSP**
1. BRAKES - Check brake discs, linings and lines for wear, damage, corrosion and security of all units.		X					
2. WHEELS AND TIRES - Check wheels for condition and tires for wear, condition and proper inflation.		X					
3. RETRACT ACTUATOR - Check actuator for visible damage, leakage and condition. Check attach point for condition.		X					

STARHIP 1 INSPECTION FORM (Continued)

I. LEFT MAIN GEAR AND BRAKES *(Continued)*	A	B	C	D	E	MECH	INSP
4. UPLOCK ACTUATOR - Check actuator and support brackets (including hook and springs) for visible damage, leakage and condition.		X					
5. LANDING GEAR STRUT - Inspect shock strut and components for condition, attachment, proper inflation and leakage. Deflate and check fluid level if signs of leakage are apparent (Chapter 12-10-00)		X					
6. SIDE BRACE - Check security of attach fittings. Check condition of lock links and springs.		X					
7. ELECTRICAL - Check for proper operation of switches. Clean dirt from terminals and connectors, as required. Check wiring for damage.		X					
J. RIGHT MAIN GEAR AND BRAKES	**A**	**B**	**C**	**D**	**E**	**MECH**	**INSP**
1. BRAKES - Check brake discs, linings and lines for wear, damage, corrosion and security of all units.		X					
2. WHEELS AND TIRES - Check wheels for condition and tires for wear, condition and proper inflation.		X					
3. RETRACT ACTUATOR - Check actuator for visible damage, leakage and condition. Check attach point for condition.		X					
4. UPLOCK ACTUATOR - Check actuator and support brackets (including hook and springs) for visible damage, leakage and condition.		X					
5. LANDING GEAR STRUT - Inspect shock strut and components for condition, attachment, proper inflation and leakage. Deflate and check fluid level if signs of leakage are apparent (Chapter 12-10-00)		X					
6. SIDE BRACE - Check security of attach fittings. Check condition of lock links and springs.		X					
7. ELECTRICAL - Check for proper operation of switches. Clean dirt from terminals and connectors, as required. Check wiring for damage.		X					
K. NOSE GEAR	**A**	**B**	**C**	**D**	**E**	**MECH**	**INSP**
1. WHEEL AND TIRE - Check wheel for condition and tire for wear, condition and proper inflation.		X					
2. SHIMMY DAMPER - Inspect for condition and attachment. Refill if necessary. (Chapter 32-50-00)		X					
3. RETRACT ACTUATOR - Check actuator and support brackets for visible damage, leakage and condition. Inspect bracket for loose or missing fasteners.		X					

STARHIP 1 INSPECTION FORM (Continued)

K. NOSE GEAR *(Continued)*	**A**	**B**	**C**	**D**	**E**	**MECH**	**INSP**
4. UPLOCK ACTUATOR - Check actuator and support brackets (including hook and springs) for visible damage, leakage and condition.		X					
*5. HYDRAULIC PRIORITY VALVE - Check valve for visible damage, leakage and condition.		X					
6. NOSE GEAR DOOR ACTUATOR - Check actuator and support brackets for visible damage, leakage, and condition.		X					
7. STEERING LINKAGE - Check nose steering mechanism for condition, attachment and correct adjustment.		X					
8. NOSE GEAR STRUT - Inspect strut and components for condition and attachment.		X					
9. STRUT FLUID LEVEL - Inspect strut for proper inflation and leakage. Deflate and check fluid level if signs of leakage are apparent. (Chapter 12-10-00)		X					
10. ELECTRICAL - Check for proper operation of switches; clean dirt from terminals and connectors, as required; Check wiring for damage.		X					
11. DRAG BRACE - Check the drag brace for condition, attachment, and security. Check condition of lock links and springs.		X					
12. LANDING AND TAXI LIGHTS - Check for broken lenses or bulbs and proper focus. Replace bulbs as necessary.		X					
L. LANDING GEAR RETRACTION	**A**	**B**	**C**	**D**	**E**	**MECH**	**INSP**
NOTE Since battery voltage is not sufficient to properly cycle the landing gear, use only an external power source capable of delivering and maintaining 28.25 ± .25 vdc throughout the extension and retraction cycles when performing the landing gear retraction inspection.							
*1. RETRACT MECHANISM - Check hydraulic power pack and motor for proper operation. Check retraction system for proper operation of all components through at least two complete cycles. Check for unusual noises and evidence of binding.		X					
CAUTION *To prevent serious damage to the pump, never operate the power pack without supplying 18 to 20 psi of regulated dry air to the power pack reservoir during ground operation of the power pack. Refer to Chapter 32-30-00.*							

STARHIP 1 INSPECTION FORM (Continued)

L. LANDING GEAR RETRACTION *(Continued)*	**A**	**B**	**C**	**D**	**E**	**MECH**	**INSP**
*2. DOORS AND LINKAGE - Check door operation, fit and rig.		X					
*3. POSITION INDICATORS - Check for security and adjustment of switches, loose wires and proper indication.		X					
*4. WARNING HORN - Check for proper operation.		X					
*5. LOCK LINKS - Check over-center mechanism for positive positioning in extended position. Check downlock switch for proper adjustment. (Chapter 32)		X					
*6. UPLOCKS - Check locking mechanism for positive engagement in retracted position. Check uplock switch for proper adjustment. (Chapter 32)		X					
*7. SAFETY SWITCH - Check for security and proper operation. (Chapter 32-60-00)		X					
*8. ACTUATORS - Check for noise, binding and proper rigging.		X					
*9. EMERGENCY EXTENSION - Check system for freedom of operation and positive engagement of downlocks. Check for correct indication, including EICAS messages.		X					
CAUTION *Do not continue operation after receiving a gear-down indication for all gears.*							
M. OPERATIONAL INSPECTION	**A**	**B**	**C**	**D**	**E**	**MECH**	**INSP**
The following Operational Inspection procedures are to be applied during start and run of the engines.							
CAUTION *Do not operate the engines with the propeller spinners removed. Damage will result to the spinner bulkhead blade cuffs and to the lower aft engine cowling.*							
1. BOOST PUMP, CROSS TRANSFER VALVE, FIREWALL SHUTOFF VALVES - Check for proper operation.		X					
2. STARTER-GENERATORS - Check for proper operation.		X					
3. IGNITION - Check EICAS messages.		X					
4. OIL - Check for proper pressure and temperature limits.		X					
5. FUEL QUANTITY GAGES - Check for proper operation.		X					

STARHIP 1 INSPECTION FORM (Continued)

M. OPERATIONAL INSPECTION *(Continued)*	**A**	**B**	**C**	**D**	**E**	**MECH**	**INSP**
6. INTERSTAGE TURBINE TEMPERATURE - Check for proper limits on engine start.		X					
7. STANDBY GYRO HORIZON INDICATOR - Check for erratic or noisy operation.		X					
8. PROPELLERS - Check for proper operation. Perform flight idle torque check.		X					
9. AUTOFEATHERING CHECK - Refer to Chapter 61-21-00.		X					
10. PROPELLER SYNCHROPHASER - Check for proper operation. (Chapter 61-22-00)		X					
11. PROPELLER GOVERNOR - Check for proper governor operation and feathering.		X					
12. POWER CHECK (Without Jetcal) - Refer to Chapter 77-00-00 for the procedure covering this check.		X					
13. IDLE RPM - Check for correct rpm (both high and low rpm).		X					
14. DEICER (SURFACE AND WINDSHIELD) - Check for proper operation and cycling.		X					
15. AIR CONDITIONING SYSTEM - Check for proper operation in manual heat, manual cool and all automatic modes.		X					
16. AUTOPILOT - Check for proper operation.		X					
17. STALL WARNING - Check for proper operation.		X					
18. PRESSURIZATION SYSTEM - Check for proper operation.		X					
19. CONDITION LEVER - Check for clean shutdown at IDLE-CUT-OFF.		X					
20. GENERATOR CONTROL UNIT - Perform overvoltage circuit check. Adjust voltage as necessary. (Chapter 24-30-00)			X				
21. TRIPLE-FED BUS DIODE - Perform operational check. (Chapter 24-50-00)			X				
NOTE The following OPERATIONAL CHECKS are to be made with the engine shut down.							
22. BRAKES (TOE AND PARKING) - Check for proper travel, ease of operation and proper release of the parking brake.		X					

STARHIP 1 INSPECTION FORM (Continued)

M. OPERATIONAL INSPECTION *(Continued)*	**A**	**B**	**C**	**D**	**E**	**MECH**	**INSP**
23. ENGINE INERTIAL ANTI-ICER - Check for proper operation and rigging of main and standby systems.		X					
24. PITOT HEAT - Check for proper heating at the unit.		X					
25. POWER CABLE HEAT - Check for proper operation of power cable heaters as detailed in Chapter 76-00-00.		X					
26. SURFACE DEICE VALVE HEAT - Check for proper heating at valves.		X					
27. FLAPS/FORWARD WING - Check for noisy or erratic operation.		X					
28. EMERGENCY LOCATOR TRANSMITTER - Check for proper operation and ensure ELT is ARMED before returning airplane to service.		X					
29. CABIN ENTRANCE LIGHT - Check for proper operation with battery switch OFF; if unit fails to operate, check the circuit breaker. (Chapter 33)		X					
30. LANDING GEAR POWER PACK FLUID LEVEL SENSOR - Check operation of sensor as detailed in Chapter 32-30-00.		X					
N. POST INSPECTION ITEMS	**A**	**B**	**C**	**D**	**E**	**MECH**	**INSP**
1. Airplane cleaned and serviced, as required. (Chapter 12)							
2. Lubricate as necessary. Refer to Lubrication Schedule in Chapter 12-20-00.	X						
3. Engines inspected after ground run-up or flight test - Check for oil leaks, security and attachment of all components.		X					
4. Insure all placards are installed and legible. (Chapter 11)							
5. Airworthiness Directives and Service Bulletins reviewed and complied with as required.	X						
* Inspection must also be performed at the first "A" inspection after manufacture.							

UNSCHEDULED MAINTENANCE CHECKS - MAINTENANCE PRACTICES (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

OPERATION IN ATMOSPHERES OF HIGH SALT CONTENT (Effectivity: All)

ITEM	INSPECTION REQUIREMENT	INSPECTION INTERVAL
1. Engine Compressor Wash	Engines operated in a salty atmosphere must be washed with demineralized water as instructed in the Pratt & Whitney Engine Maintenance Manual. Inspect for corrosion.	Daily

BT01017

OPERATION IN ATMOSPHERES OF HIGH INDUSTRIAL POLLUTION (Effectivity: All)

ITEM	INSPECTION REQUIREMENT	INSPECTION INTERVAL
1. Engine Compressor Wash	When there is a loss of engine performance attributed to ingestion of air pollution deposits, wash in accordance with instructions in the Pratt & Whitney PT6A-67A Engine Maintenance Manual. Inspect for corrosion.	As required

BT01018

OPERATION IN AREAS OF HIGH DUST CONTENT (Effectivity: All)

ITEM	INSPECTION REQUIREMENT	INSPECTION INTERVAL
1. Landing Gear Shock Struts	Clean off and wipe dry exposed polished surfaces.	Routine
2. Pitot and Static Lines	Check for obstructions by applying reverse air pressure (not to exceed 20 psi.) to the ends of the pitot and static lines. **CAUTION** All instruments and components connected to the pitot and static lines must be disconnected before reverse air pressure is applied to prevent damage to the instruments.	As required
3. Environmental Air Filter	Inspect for obstruction of air flow. Replace if necessary.	As required

BT01019

OPERATING FROM VERY SOFT OR UNUSUAL TERRAIN (Effectivity: All)

ITEM LANDING GEAR	INSPECTION REQUIREMENT	INSPECTION INTERVAL
1. Tires	Check for cuts, wear, deterioration and inflation (visual).	Routine
2. Main Landing Gear		
a. Wheels	Remove and clean; inspect for abrasions, cracks and chipped rims, bearings for wear, corrosion, fretting and blueing; check seals for distortion, deterioration, proper fit, security and obvious damage.	Every 100 hours or as required
b. Brake Units	Check cylinders and associated lines for obvious damage and leaks.	Routine
	Check for evidence of overheating	Every 100 hours or as required
	Check discs for scoring, distortion, and evidence of overheating.	Every 100 hours or as required
c. Shock Strut	Check for obvious damage and leaks, clean exposed surface of shock strut piston with a clean cloth moistened with hydraulic fluid. Check strut inflation as noted in Chapter 12-10-00.	Routine
	Check for correct extension as noted in Chapter 12-10-00.	Every 100 hours or as required
	Thoroughly clean and inspect for leaks, damage and security; service as necessary.	Every 100 hours or as required
d. Wheel Wells	Clean foreign material (dirt, etc.) from wheel wells. Inspect supports between main landing gear and forward spars in upper wheel well and the side brace attach bracket at the spar for deformation, cracks, loose fasteners, etc.	As required
3. Nose Landing Gear		
a. Wheel	Check for obvious damage.	Routine
	Remove and clean, inspect for abrasions, cracks and chipped rims, bearings for wear, corrosion, fretting and blueing; check seals for distortion, deterioration, proper fit and security.	Every 100 hours or as required
b. Shock Strut	Check for obvious damage and leaks, clean exposed surface of shock strut piston with a clean cloth moistened with hydraulic fluid. Check strut inflation as noted in Chapter 12-10-00.	Routine
	Check for correct extension as noted in Chapter 12-10-00.	Every 100 hours or as required
	Thoroughly clean and inspect for leaks, damage and security; service as necessary.	Every 100 hours or as required
c. Fork Assembly	Check for cleanliness and obvious damage.	Routine
d. Nose Wheel Steering	Check for obvious damage. Check associated rods and connections for damage.	Every 100 hours or as required

OPERATING FROM VERY SOFT OR UNUSUAL TERRAIN (Effectivity: All) *(Continued)*

ITEM LANDING GEAR	INSPECTION REQUIREMENT	INSPECTION INTERVAL
e. Actuator Linkage	Check for excessive play and security.	Every 100 hours or as required
f. Actuator	Check actuator and attach point for visible damage and condition.	Every 100 hours or as required

BT01020

INSPECTION AFTER HARD LANDING (Effectivity: All)

ITEM	INSPECTION REQUIREMENT	INSPECTION INTERVAL
1. General Appearance	This inspection must be carried out after a hard landing and before the airplane is ready for further flight. **WARNING** Fractures/delamination in the wing or fuselage skin surface may indicate internal damage. A closer inspection must be accomplished to evaluate complete damage. Inspect tires for excessive wear, splits in the tread, bottoming out or folding over the sidewalls. Check the wheels for flat spots or cracks. Check shock struts and attachment lugs for cracks. Check piston and axle for cracks or deformation. Inspect hydraulic brake lines for leaks. Inspect downlock, side brace and gear door retract linkage for damage. Inspect landing gear actuator attachment lugs. Inspect supports between main landing gear and forward spars in upper wheel well and the side brace attach bracket at the spar for deformation, cracks, etc. Inspect wheel well structure for damage or cracks. Check area surrounding the landing gear attachment points. Inspect the main landing gear side brace support structure as follows: a. Place the airplane on jacks. b. Disconnect the upper side brace from the airplane structure in both the LH and RH wheel wells. c. Using a flashlight and mirror, inspect all of the side brace support structure for possible cracks. d. If cracks are suspected, but not clearly defined in any landing gear component, the suspect area must be dye penetrant inspected using procedures as outlined in AC43.13-1A.	After hard landing **NOTE** A hard landing is defined as a descent rate exceeding approximately 600 FPM.

INSPECTION AFTER HARD LANDING (Effectivity: All) *(Continued)*

ITEM	INSPECTION REQUIREMENT	INSPECTION INTERVAL
	e. If cracks are found, contact the Customer Support Dept., Beech Aircraft Corp, Wichita, Kansas, 67201, and report the findings for evaluation. f. If no cracks are found, reinstall the side brace. Beech Aircraft Corporation recommends that airplanes having experienced severe or hard landings or other abnormal landing incidents, which may have placed undue stress on the landing gears, are to have the landing gear disassembled and inspected within the first 100 service hours after such hard landing. Airplanes having received repairs in this area, upon Beech Aircraft Corporation recommendations, are exempt from this inspection except in the event of a future hard or abnormal landing incident.	
2. Nacelles	Inspect external skin surfaces for distortion, loose or missing fasteners. Check cowling attachment fittings for alignment or damage. Inspect engine control cables for smooth operation and check plumbing and wiring for security and attachment. Inspect engine support mounts for cracks or structural failure. Check tips of propellers for damage. Check propeller spinner and backplate for evidence of interference with cowling.	After hard landing
3. Wing Center Section	Inspect external surface (upper and lower) for cracks, or abnormal fractures/delamination and loose or cracked paint. Inspect plumbing, wiring and actuators for damage and security of attachment.	After hard landing
4. Aft Wing	Inspect external wing surface for cracks, abnormal fractures/delamination and loose or cracked paint. Inspect plumbing and wiring for security of attachment.	After hard landing
5. Fuselage, Nose	Check external skin surface for cracks, abnormal fractures/delamination and cracked paint. Check wheel well structure and area surrounding gear attach point for damage. Inspect avionics, radar antenna, wiring and plumbing for security and attachment. Inspect nose shelves for damage.	After hard landing

INSPECTION AFTER HARD LANDING (Effectivity: All) *(Continued)*

ITEM	INSPECTION REQUIREMENT	INSPECTION INTERVAL
6. Forward Wing	Check for condition and attachment. Inspect pivot pin installation for condition. Perform operational check.	After hard landing
7. Fuselage Center Section	Inspect external skin surface for cracks, abnormal fractures/delamination and loose or missing fasteners. Inspect around cabin windows for structural cracks.	After hard landing
8. Fuselage, Aft	Check external skin surface the entire length for cracks, stress fractures/delamination and cracked paint. **NOTE** Because shock loading may be transmitted along one structural member to another, carefully inspect the surrounding and supporting structure in any damaged area found.	After hard landing
	REPAIR OF DAMAGE AFTER HARD LANDING Due to the variety and degree of structural damage which may be involved, the best repair or replacement procedure must be based on the inspection findings of the individual airplane. If the hard landing inspection indicates that serious structural damage has occurred, contact the Customer Support Department, Beech Aircraft Corporation, Wichita, Kansas, 67201 for assistance.	
	LOG BOOK ENTRY AFTER HARD LANDING Following a hard landing inspection, an entry covering the extent of inspection, the damage and the repair (if applicable) must be noted in the airplane permanent records.	

BT01021

INSPECTION AFTER ENCOUNTERING TURBULENT AIR (Effectivity: All)

ITEM	INSPECTION REQUIREMENT	INSPECTION INTERVAL
1. General Appearance	This inspection must be carried out after the airplane has been subjected to high G loading while flying through turbulent air and before the airplane is returned to service. The inspection consists of determining if any external damage has occurred and evidence of internal structural failure. **WARNING** Fractures/delamination in the wing or fuselage surface may indicate internal damage. A closer inspection must be accomplished to evaluate complete damage. **NOTE** Because G loading may be transmitted along one structural member to another, carefully inspect the surrounding and supporting structure in any damaged area that may be found. Determine that the airframe components (nacelles, wings, fuselage and empennage) are in their normal configuration.	After encountering turbulent air
2. Wing Center Section	Inspect the external skin surface (upper and lower) for cracks, fractures/delamination and loose or missing fasteners.	After encountering turbulent air
	Inspect plumbing, wiring and actuators for damage and security of attachment.	After encountering turbulent air
3. Nacelles	Inspect the external skin surfaces for fractures/delamination and loose or missing fasteners. Check cowling attachment fittings for alignment or damage. Inspect the engine support mounts for cracks or deformation or structural failure. Inspect engine control cables for smooth operation and check plumbing and wiring for security and attachment.	After encountering turbulent air
4. Aft Wing	Inspect the top and bottom wing surface for fractures/deformation, cracked paint, and loose or missing fasteners. Inspect elevon, elevon tab and flaps for fractures/deformation or cracks. Inspect internal structure and fuel cells through access panels (defueling may be required). Inspect plumbing and wiring for security of attachment.	After encountering turbulent air

INSPECTION AFTER ENCOUNTERING TURBULENT AIR (Effectivity: All) *(Continued)*

ITEM	INSPECTION REQUIREMENT	INSPECTION INTERVAL
	Check controls for freedom of movement. Inspect the wing attach area for structural damage. Check rudder for freedom of movement and attachment.	
5. Fuselage, Nose	Check external skin surface for cracks, fractures/ deformation and loose or missing fasteners. Inspect area forward of windshield for evidence of structural deformation or failures. Inspect avionics, antenna and components for security and attachment.	After encountering turbulent air
6. Forward Wing	Inspect elevator pushrods, torque tubes and bell crank for damage. Inspect skin surfaces for condition and loose or cracked paint. Check structure for cracks, loose fasteners and/or concealed damage. Check elevator for freedom of movement and attachment. Check trim tab actuators for smoothness of operation and attachment. Check the wiring of the electrical trim tab actuator for connection, security of attachment and condition. Check the electrical trim tab actuator for full travel and security of attachment.	After encountering turbulent air
7. Fuselage, Cockpit	Remove the floorboard and inspect components for condition and attachment. Inspect the keel structure and supporting members for damage. Examine any fixed equipment for loose, broken or cracked mountings. Operational test the avionics, radar antenna, plumbing and wiring.	After encountering turbulent air
8. Fuselage, Center Section	Inspect external skin surface for cracks, fractures/ delamination and loose or missing fasteners.	After encountering turbulent air
9. Fuselage, Aft	Inspect the entire length of the external skin surface for cracks, stress fractures/delamination and cracked paint. Inspect for skin fractures/delamination at the juncture of the fuselage and aft section.	After encountering turbulent air

INSPECTION AFTER ENCOUNTERING TURBULENT AIR (Effectivity: All) *(Continued)*

ITEM	INSPECTION REQUIREMENT	INSPECTION INTERVAL
	REPAIR OF DAMAGE AFTER ENCOUNTERING TURBULENT AIR Due to the variety and degree of structural damage which may be involved, the best repair or replacement procedure must be based on the inspection findings of the individual airplane. If the turbulent air inspection indicates that serious structural damage has occurred, contact the Customer Support Department, Beech Aircraft Corporation, Wichita, Kansas, 67201 for assistance.	
	LOG BOOK ENTRY AFTER ENCOUNTERING TURBULENT AIR Following a turbulent air inspection, an entry covering the extent of inspection, the damage and the repair (if applicable) must be noted in the permanent records.	

BT01022

INSPECTION AFTER LIGHTNING STRIKE (Effectivity: All)

ITEM	INSPECTION REQUIREMENT	INSPECTION INTERVAL
1. Propeller	**CAUTION** Propellers must be overhauled or replaced prior to return to service following any lightning strikes or other impact damage. A darkened area in the proximity of the propeller tip may be noticeable after a lightning strike. Damage after a lightning strike must be corrected utilizing the McCauley procedure applicable. Blade overhaul must be accomplished by a Propeller Certified Mechanic. Damages beyond the limits specified by McCauley for propellers may require the blade to be returned to the factory or to a designated repair facility for evaluation.	After Lightning strikes
2. Engine	Inspect as instructed in the appropriate Engine Maintenance Manual.	After lightning strikes
3. Airframe	Check for disbonding in area of lightning attachment. Check for delamination of skin. Check for evidence of arcing and heat damage along the current path. **NOTE** If evidence of structure damage is found, contact Customer Support Department, Beech Aircraft Corporation, Wichita, Kansas, 67201 for assistance. Check all transient suppression devices and circuit breakers (Refer to Chapter 20). **NOTE** Check engines and propellers only if they were in the lightning strike path. Check engines in accordance with Pratt & Whitney PT6A-67A Engine Maintenance Manual. Check propellers in accordance with the McCauley Maintenance Manual. Check bearings and attachments if strike path is through a movable joint.	After lightning strikes

BT01023

ENGINE INSPECTION AFTER SUDDEN STOPPAGE (Effectivity: All)

ITEM	INSPECTION REQUIREMENT	INSPECTION INTERVAL
1. Engine	Inspect as instructed in the Pratt & Whitney PT6A-67A Engine Maintenance Manual.	After sudden engine stoppage
2. Propeller Governor	The propeller governor must be overhauled or replaced as instructed in Woodward Maintenance Manual P/N 33048E or subsequent.	After sudden engine stoppage
3. Propeller	The propeller must be overhauled or replaced.	After sudden engine stoppage

BT01024

SPECIAL INSPECTIONS (Effectivity: All)

ITEM	INSPECTION REQUIREMENT	INSPECTION INTERVAL
1. Engines	Perform hot section inspection.	As established by the current issue of the appropriate Pratt and Whitney service and maintenance data

BT01025

6 - DIMENSIONS AND AREAS

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6 - DIMENSIONS AND AREAS

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CHAPTER 6 - DIMENSIONS AND AREAS

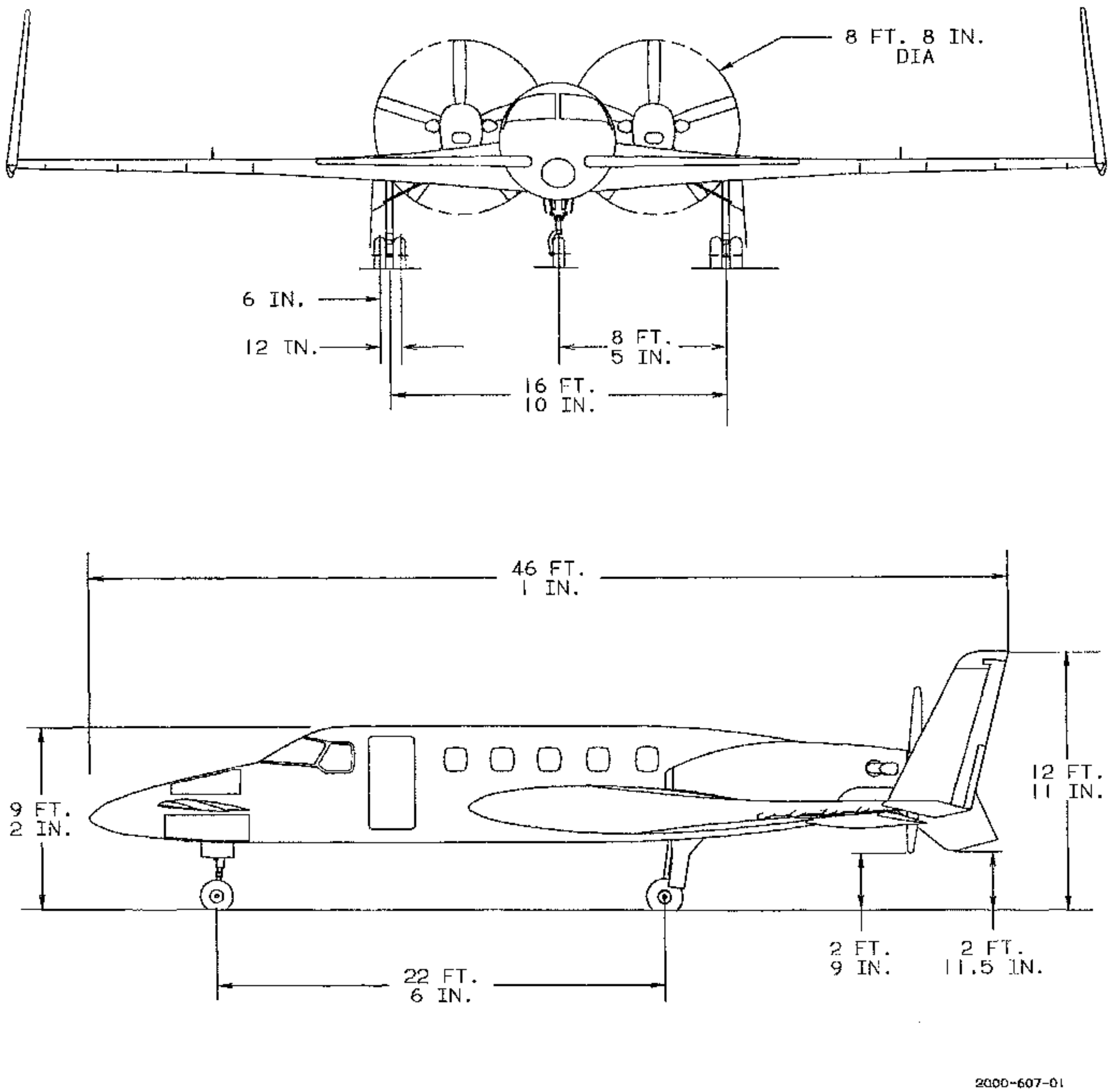
TABLE OF CONTENTS

SUBJECT *PAGE*

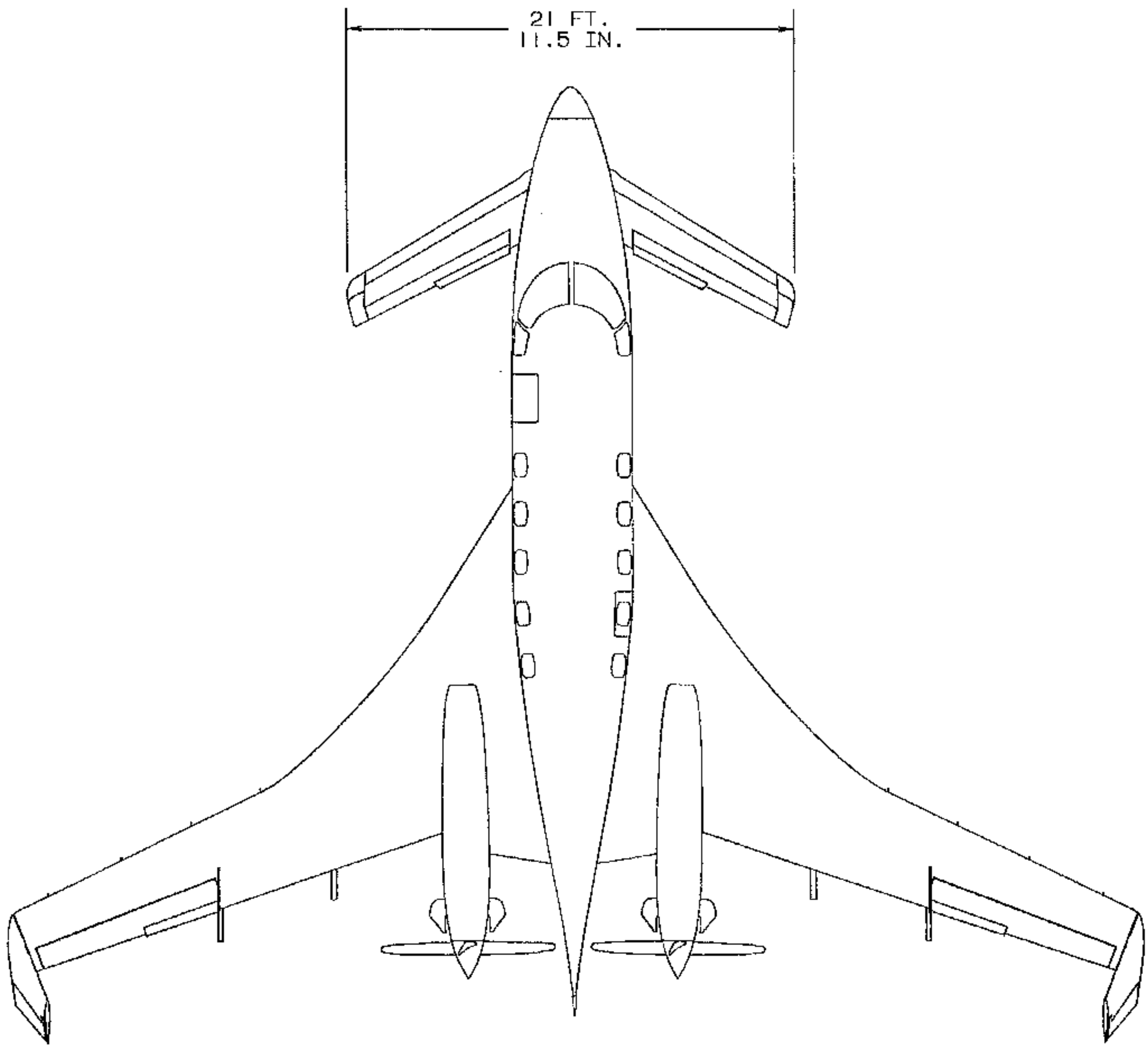
AIRPLANE DIMENSIONS - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.



Airplane Dimensions (Effectivity: All)
(Sheet 1 of 3)
Figure 1

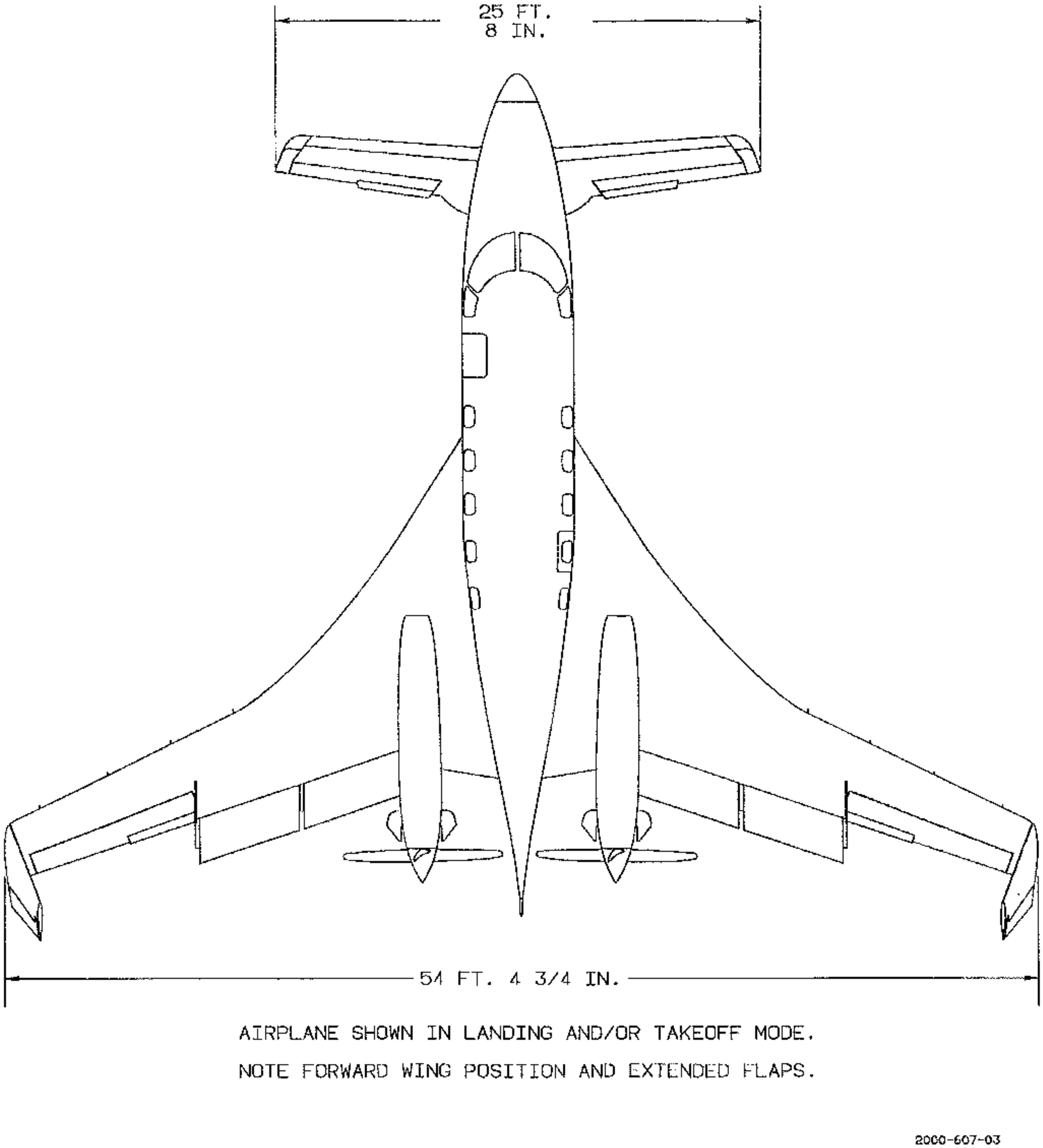


AIRPLANE SHOWN IN CRUISE MODE.

NOTE FORWARD WING POSITION AND RETRACTED FLAPS.

2000-607-02

Airplane Dimensions (Effectivity: All)
(Sheet 2 of 3)
Figure 1

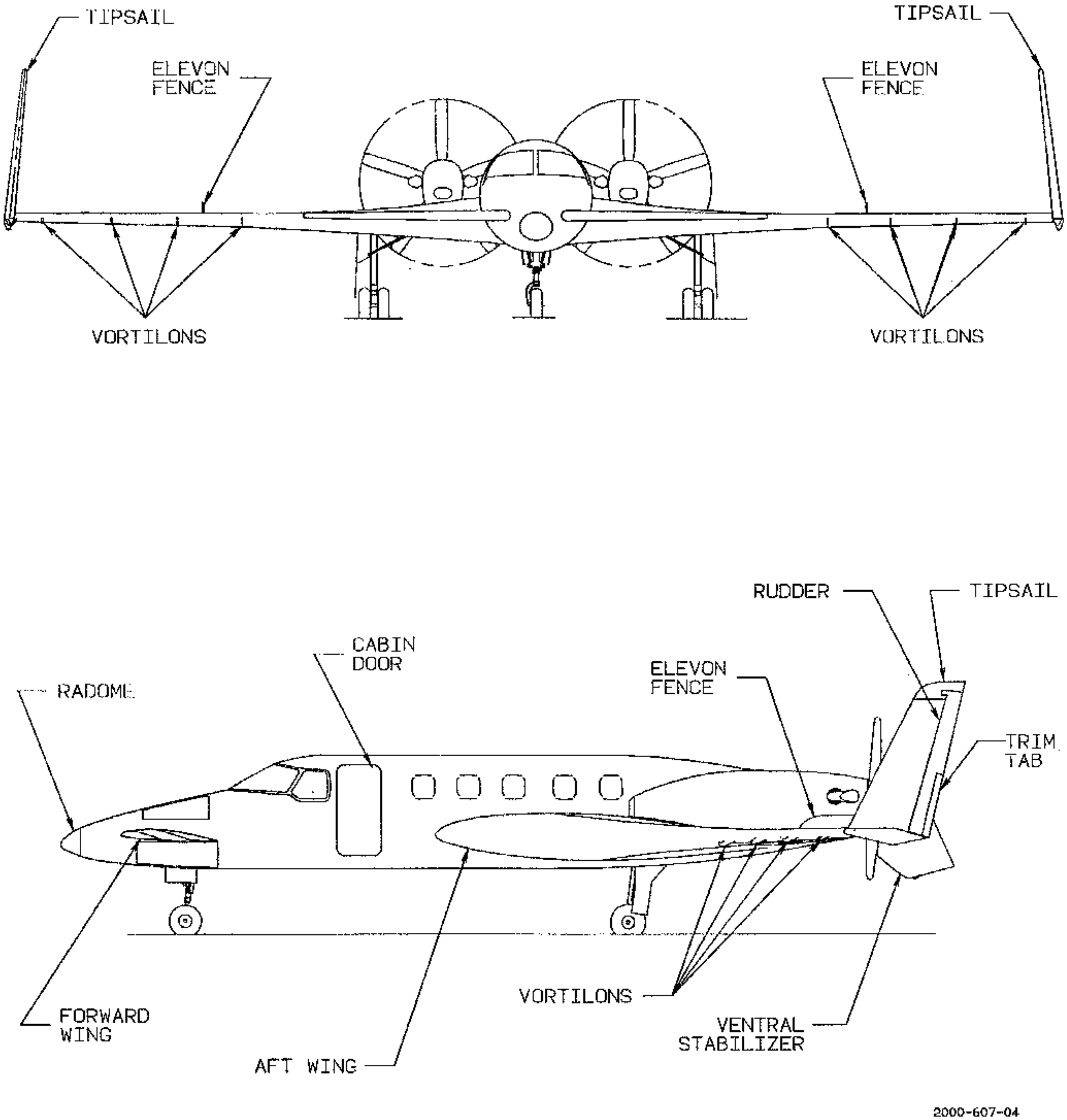


Airplane Dimensions (Effectivity: All)
(Sheet 3 of 3)
Figure 1

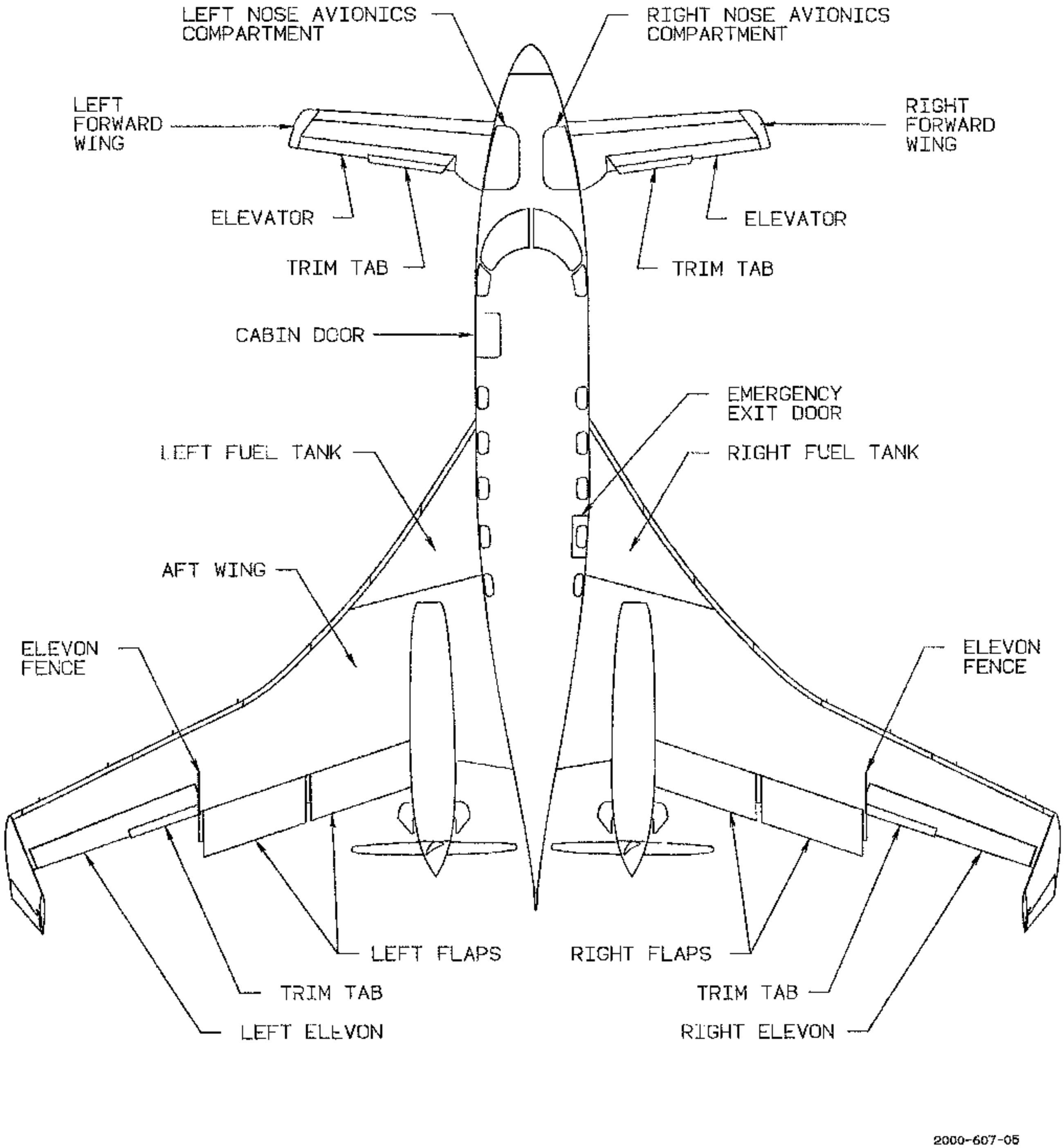
AIRPLANE AREAS - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.



Airplane Areas (Effectivity: All)
(Sheet 1 of 2)
Figure 1



Airplane Areas (Effectivity: All)
(Sheet 2 of 2)
Figure 1

AIRPLANE STATIONS - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

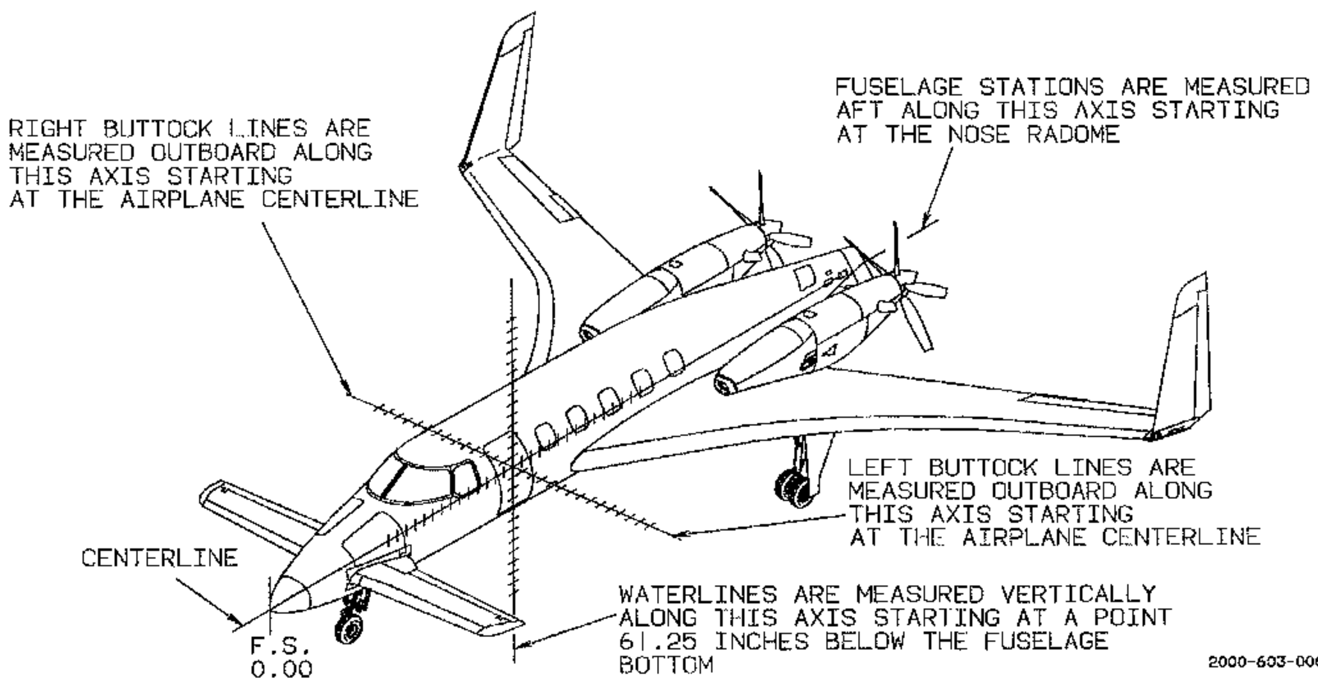
To facilitate the location of various assemblies, components, areas and structural members of the airplane, reference points are measured in inches along three axes as shown in Figure 1. When a specific component, assembly or structure is located in this manual by reference points it can be easily found by measuring from known points on the airplane. The stations diagrams shown in Figures 2 through 5 illustrate the position of these points on the airplane. The following reference points are used in this manual:

CENTERLINE: An imaginary vertical plane dividing the airplane in half longitudinally.

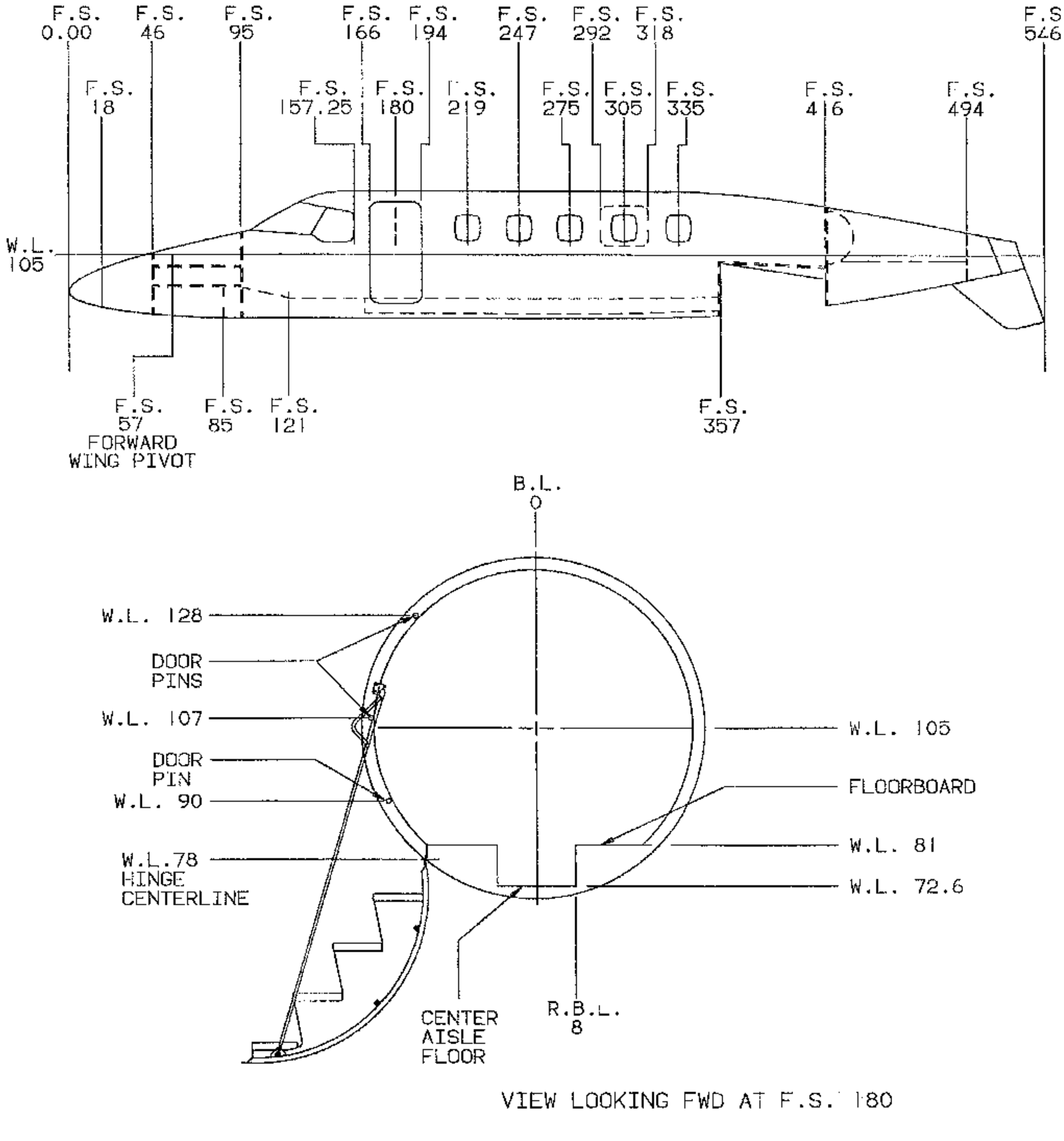
FUSELAGE STATION (F.S.): A length measurement along and perpendicular to the centerline of the airplane. Fuselage Station 0.00 is located at the forward end of the nose radome.

WATERLINE (W.L.): A vertical measurement from a horizontal plane located below the fuselage bottom. Waterline 0.00 is located 61.25 inches below the fuselage bottom.

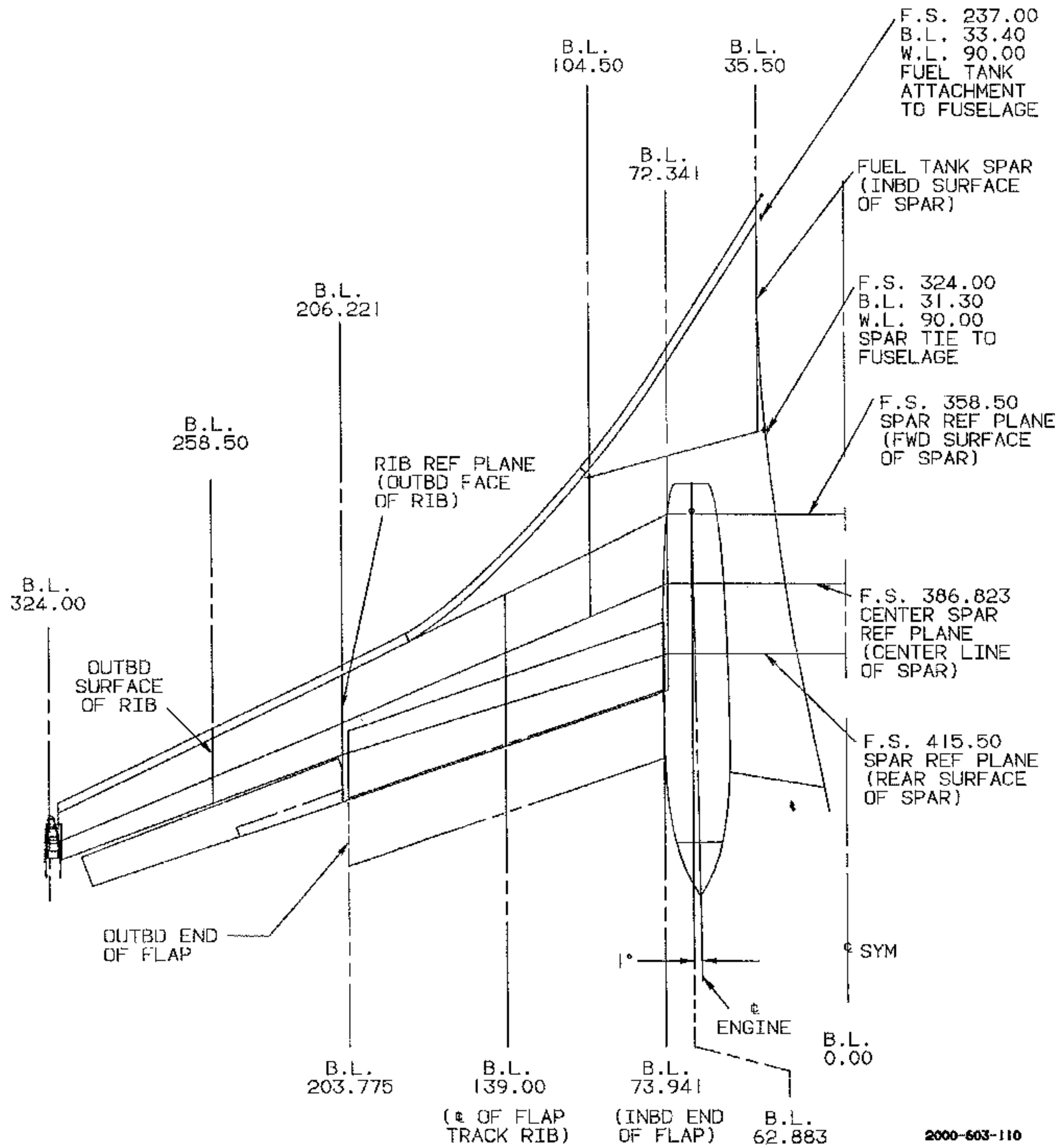
BUTTOCK LINE (B.L.): A width measurement left or right of and parallel to the centerline. Right or Left is added to indicate the direction from the centerline (L.B.L. or R.B.L.). Buttock Line 0.00 is the centerline of the airplane.



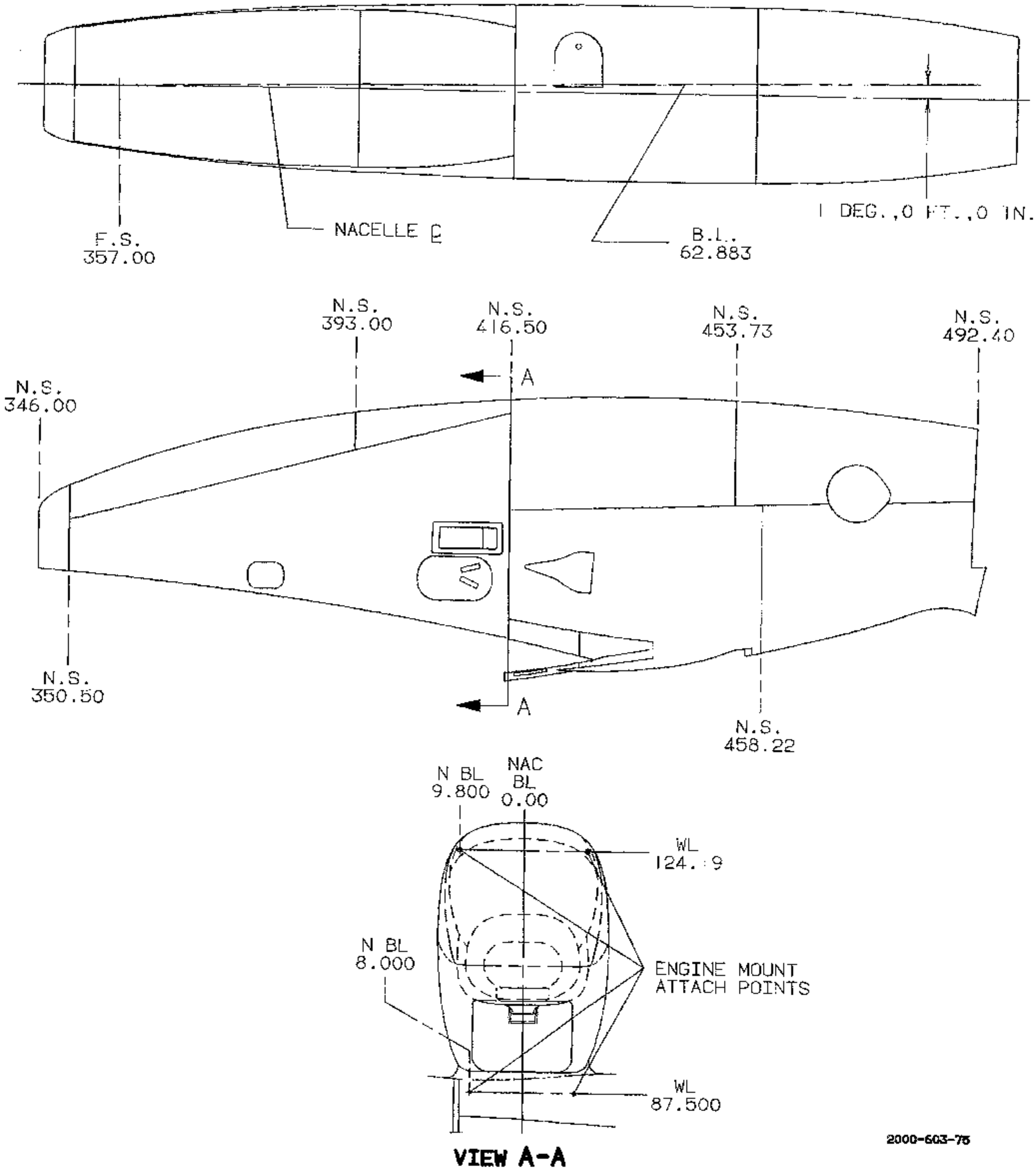
Airplane Reference Stations (Effectivity: All)
Figure 1



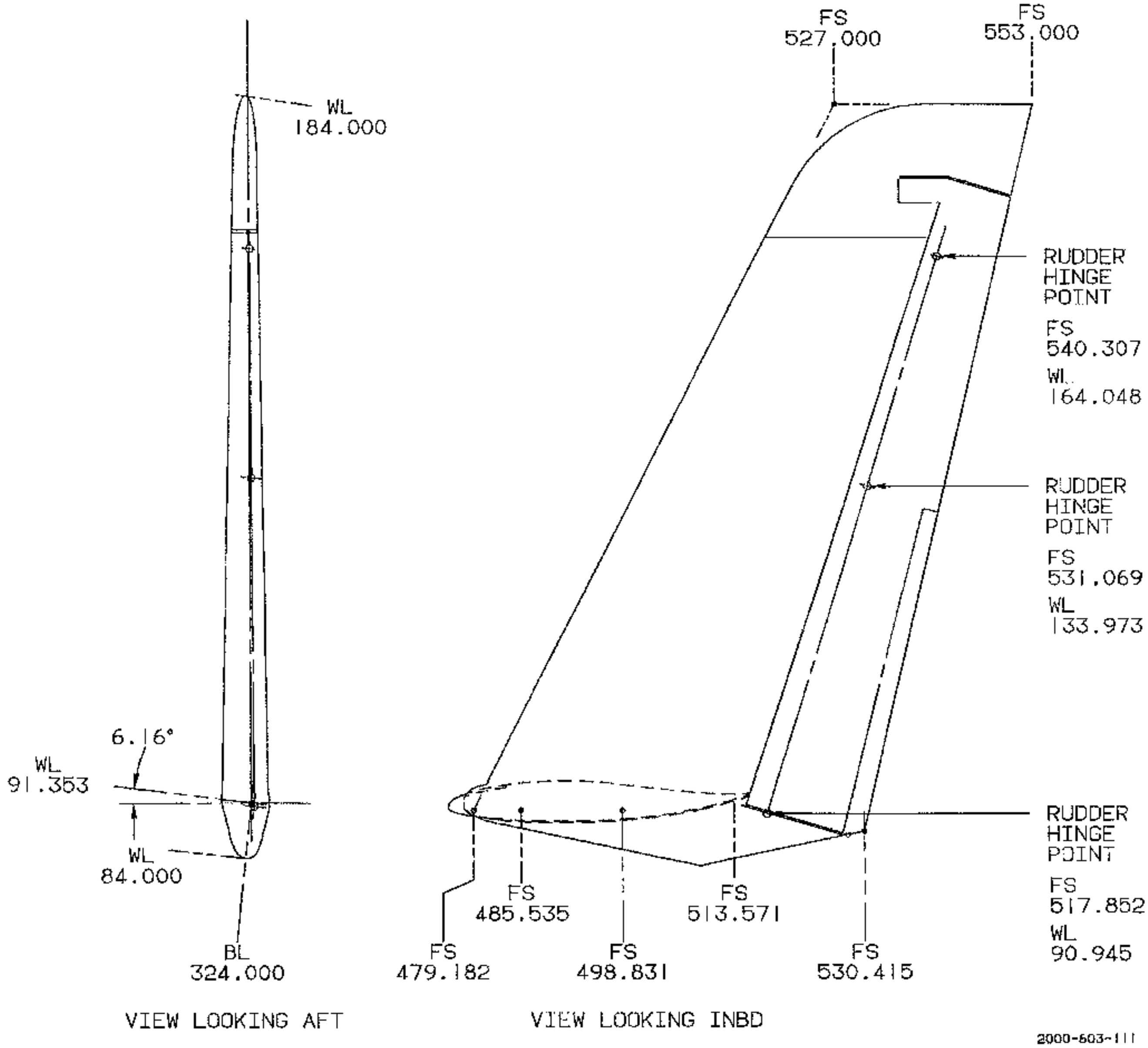
Fuselage Stations Diagram (Effectivity: All)
Figure 2



Aft Wing Stations Diagram (Effectivity: All)
Figure 3



Nacelle Stations Diagram (Effectivity: All)
Figure 4



Tipsail Stations Diagram (Effectivity: All)
Figure 5

AIRPLANE ZONES - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

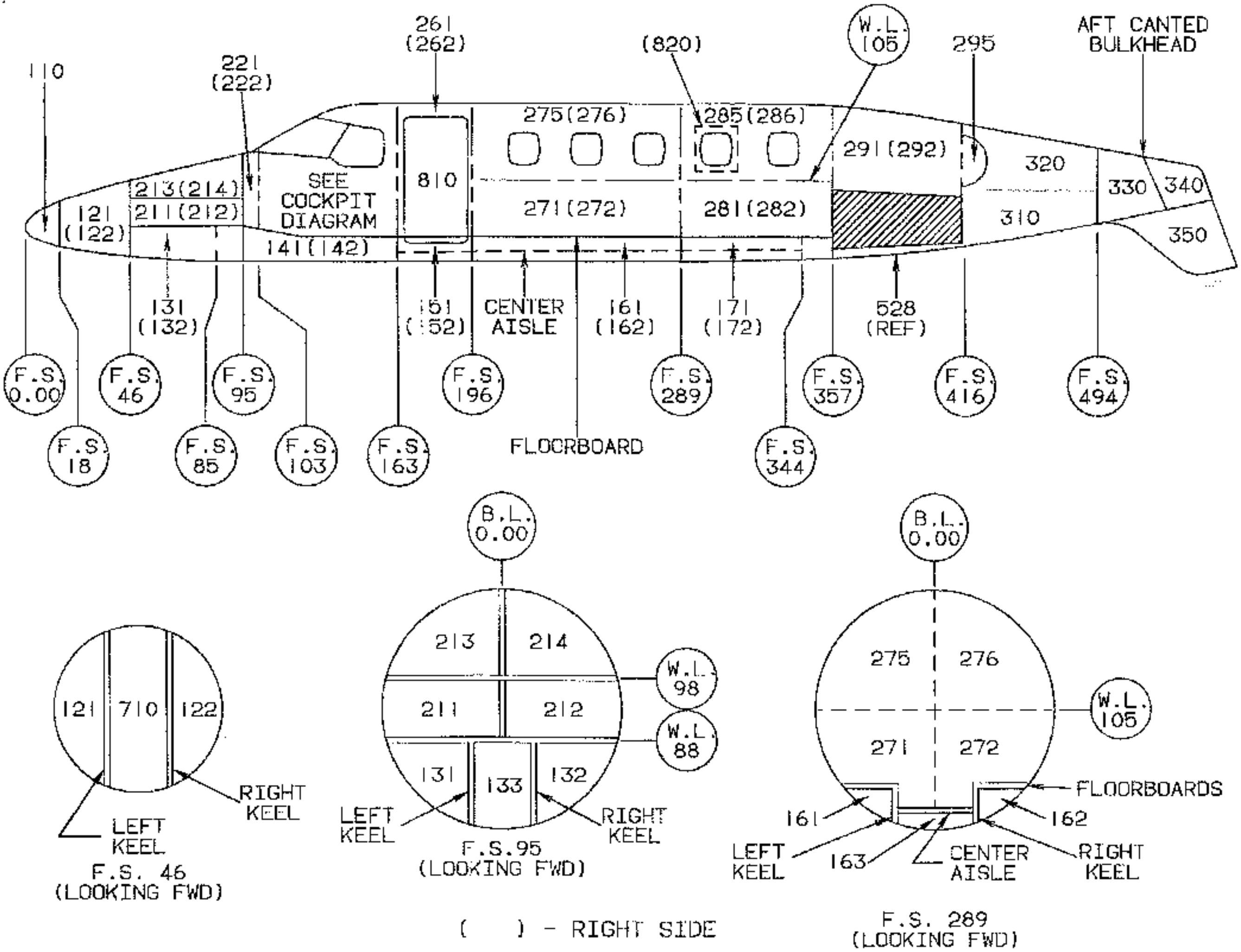
In order to simplify the location of airplane components, aid in maintenance planning and provide a simple way of identifying access doors and panels, the airplane has been divided into easily identifiable areas referred to as zones.

These zones follow a logical arrangement with boundaries generally defined by major structural components of the airplane, i.e. bulkheads, wing spars, ribs, major partitions, cabin floor, control surface boundaries, etc.

Zone identification is provided by a three-digit number that adheres to a standardized major zone description. The numbering sequence within these major zones will, in most instances, conform to the following order: front to back, left to right (within the fuselage), bottom to top and inboard to outboard (pertaining to the wing).

CHART 1
AIRPLANE ZONES (Effectivity: All)

ZONE	DESCRIPTION
100	Lower half of fuselage (radome, side nose avionics compartments, compartments under the lower nose shelf, area below cockpit floor, cabin floor and cabin seat decks) to the aft pressure bulkhead.
200	Upper half of fuselage (compartments above the lower nose shelf, area above cockpit floor, cabin floor and cabin seat decks) to the aft pressure bulkhead including the aft baggage compartments.
300	Tail section
400	Engine compartments, spinners and props
500	Left forward and aft wings
600	Right forward and aft wings
700	Landing gear, wheel wells and doors
800	Doors



ZONE
100 - F.S. 0.00 TO F.S. 357
(BELOW THE FLOORBOARDS
AND CENTER AISLE)
110 F.S. 0.00 TO F.S. 18
120 F.S. 18 TO F.S. 46
130 F.S. 46 TO F.S. 95
140 F.S. 95 TO F.S. 163
150 F.S. 163 TO F.S. 196
160 F.S. 196 TO F.S. 289
170 F.S. 289 TO F.S. 357

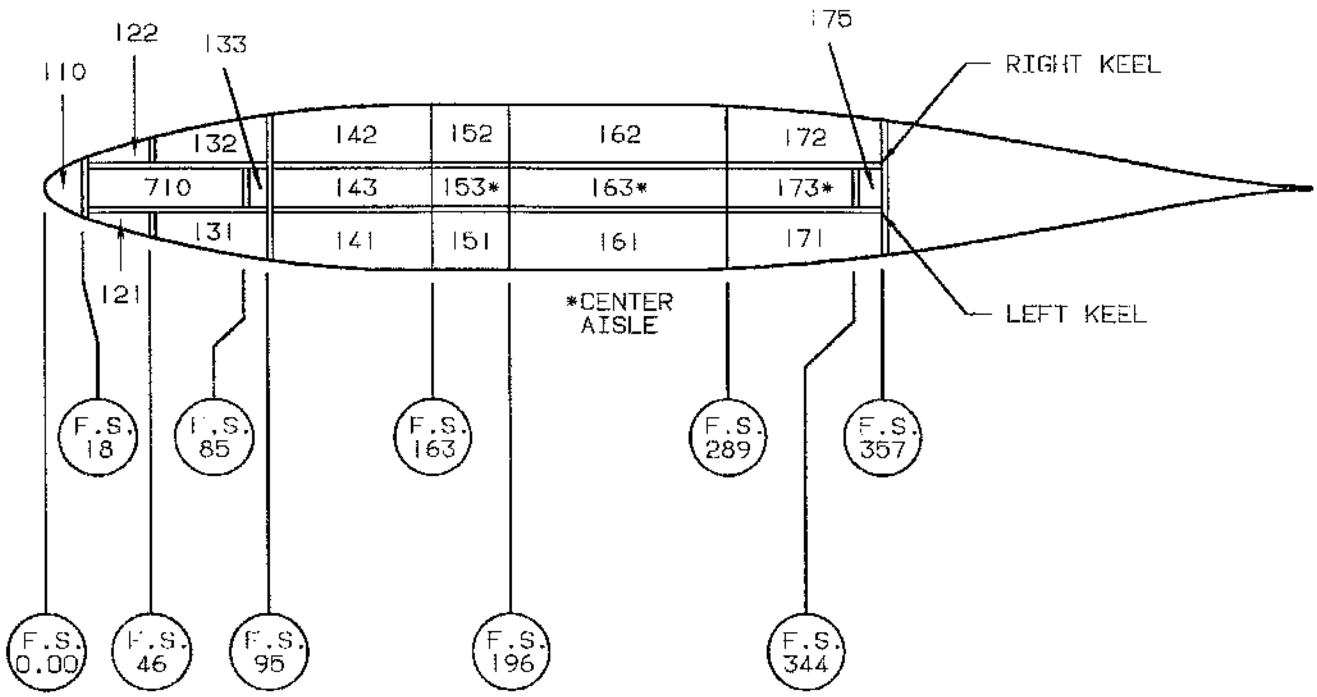
ZONE
200 - F.S. 46 TO F.S. 416
INCLUDING THE ENVIRONMENTAL
DOME (ABOVE THE FLOORBOARDS)
210 F.S. 46 TO F.S. 95
220 F.S. 95 TO F.S. 103
230 SEE COCKPIT DIAGRAM
240 SEE COCKPIT DIAGRAM
250 SEE COCKPIT DIAGRAM
260 F.S. 163 TO F.S. 196
270 F.S. 196 TO F.S. 289
280 F.S. 289 TO F.S. 357
290 F.S. 357 TO F.S. 416

ZONE 300 - F.S. 416 TO AFT END OF AIRPLANE
310 F.S. 416 TO F.S. 494 (BELOW SHELF)
320 F.S. 416 TO F.S. 494 (ABOVE SHELF)
330 F.S. 494 TO AFT CANTED BULKHEAD
340 TAIL CONE
350 VENTRAL STABILIZER

ZONE 800 - DOORS
810 CABIN ENTRANCE DOOR (LEFT SIDE)
820 EMERGENCY HATCH (RIGHT SIDE)

2000-369-02

Fuselage Zone Diagrams (Effectivity: All)
(Sheet 1 of 2)
Figure 1



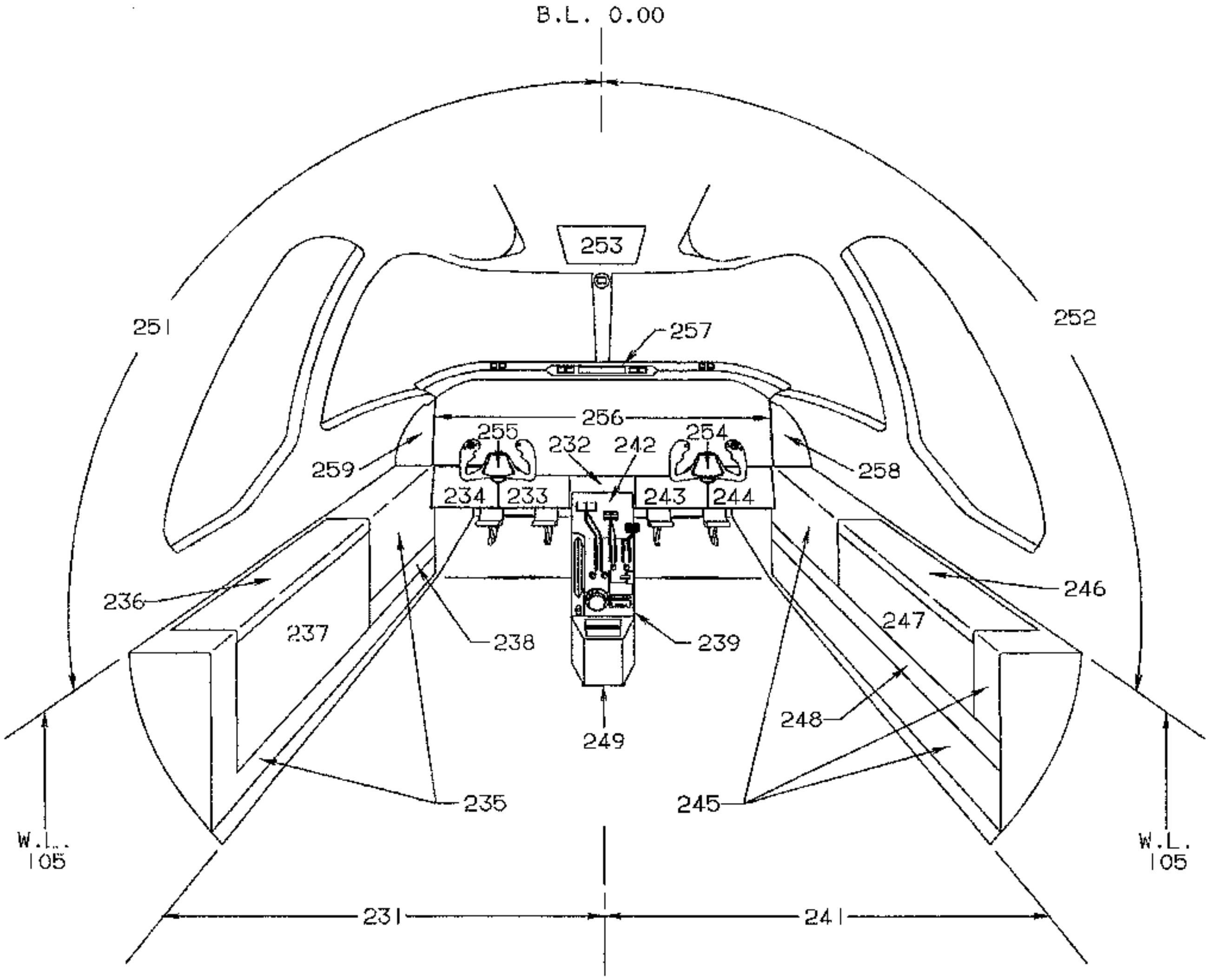
TOP VIEW
(BELOW FLOORBOARDS AND CENTER AISLE)

ZONE 100 - F.S. 0.00 TO F.S. 357
(BELOW FLOORBOARDS AND CENTER AISLE)
110 - F.S. 0.00 TO F.S. 18
120 - F.S. 18 TO F.S. 46
130 - F.S. 46 TO F.S. 95
140 - F.S. 95 TO F.S. 163
150 - F.S. 163 TO F.S. 196
160 - F.S. 196 TO F.S. 289
170 - F.S. 289 TO F.S. 357

ZONE 700 - LANDING GEAR, WHEEL WELLS AND DOORS
710 - NOSE LANDING GEAR, WHEEL WELL AND DOORS
720 - LEFT MAIN LANDING GEAR, WHEEL WELL AND DOORS
(SEE WING DIAGRAM)
730 - RIGHT MAIN LANDING GEAR, WHEEL WELL AND DOORS
(SEE WING DIAGRAM)

2000-369-03

Fuselage Zone Diagrams (Effectivity: All)
(Sheet 2 of 2)
Figure 1



ZONE 230-COCKPIT
F.S. 103 TO F.S. 163
(BELOW W.L. 105)

231 LEFT COCKPIT
232 CENTER SUBPANEL
233 LEFT INBOARD SUBPANEL
234 LEFT OUTBOARD SUBPANEL
235 LEFT CONSOLE
236 LEFT CIRCUIT BREAKER PANEL
237 LEFT CONSOLE CIRCUIT BREAKER PANEL ACCESS
238 LEFT CONSOLE WIRE TRAY ACCESS
239 PEDESTAL

ZONE 240-COCKPIT
F.S. 103 TO F.S. 163
(BELOW W.L. 105)

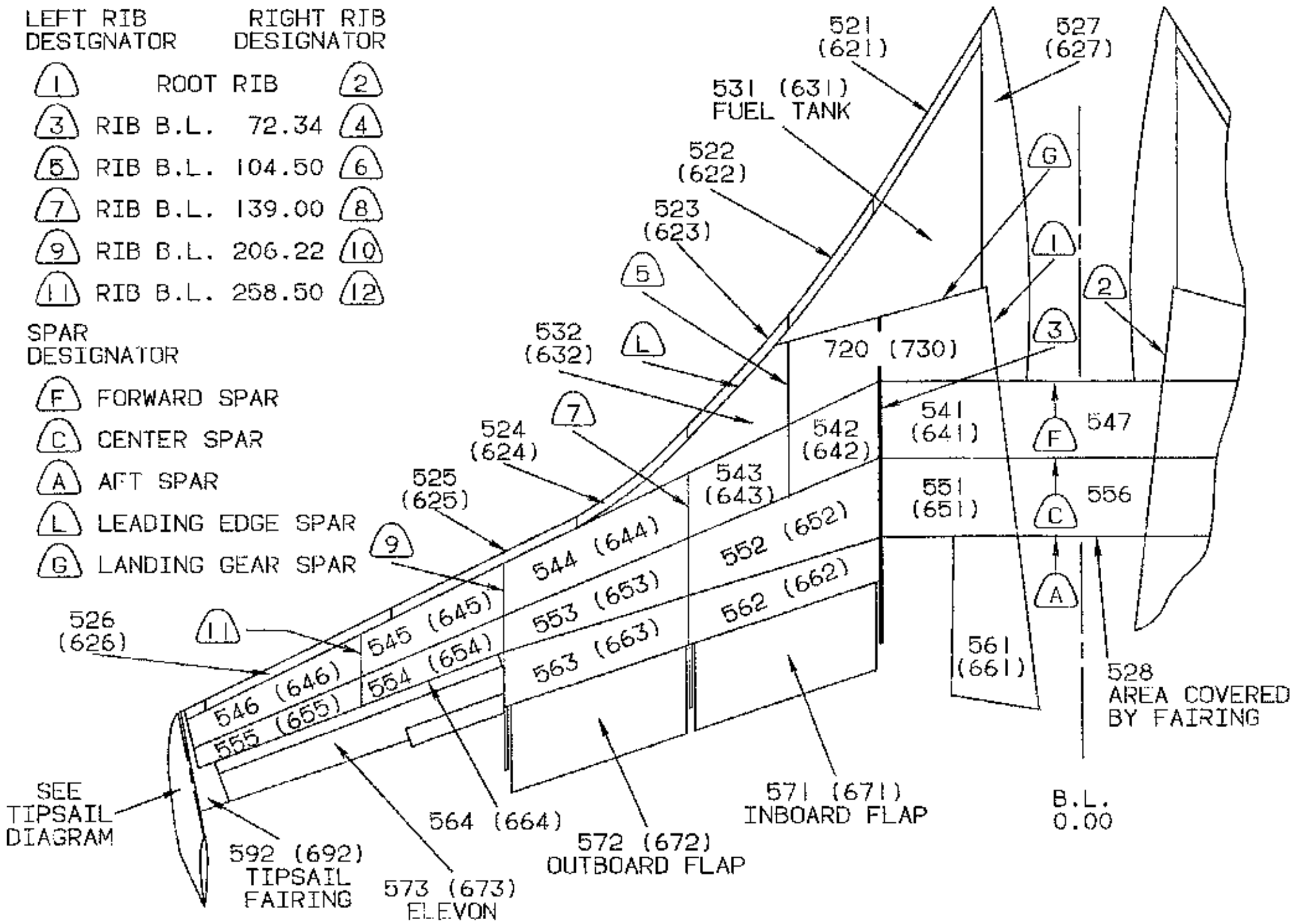
241 RIGHT COCKPIT
242 PEDESTAL SUBPANEL
243 RIGHT INBOARD SUBPANEL
244 RIGHT OUTBOARD SUBPANEL
245 RIGHT CONSOLE
246 RIGHT CIRCUIT BREAKER PANEL
247 RIGHT CONSOLE CIRCUIT BREAKER PANEL ACCESS
248 RIGHT CONSOLE WIRE TRAY ACCESS
249 PEDESTAL EXTENSION

ZONE 250-COCKPIT
F.S. 103 TO F.S. 163
(ABOVE W.L. 105)

251 LEFT SIDEWALL
252 RIGHT SIDEWALL
253 OVERHEAD PANEL
254 COPILOT'S CONTROL WHEEL
255 PILOT'S CONTROL WHEEL
256 INSTRUMENT PANEL
257 CLARESHIELD
258 RIGHT SIDEWALL INSTRUMENT PANEL
259 LEFT SIDEWALL INSTRUMENT PANEL

2000-369-01

Cockpit Zone Diagram (Effectivity: All)
Figure 2



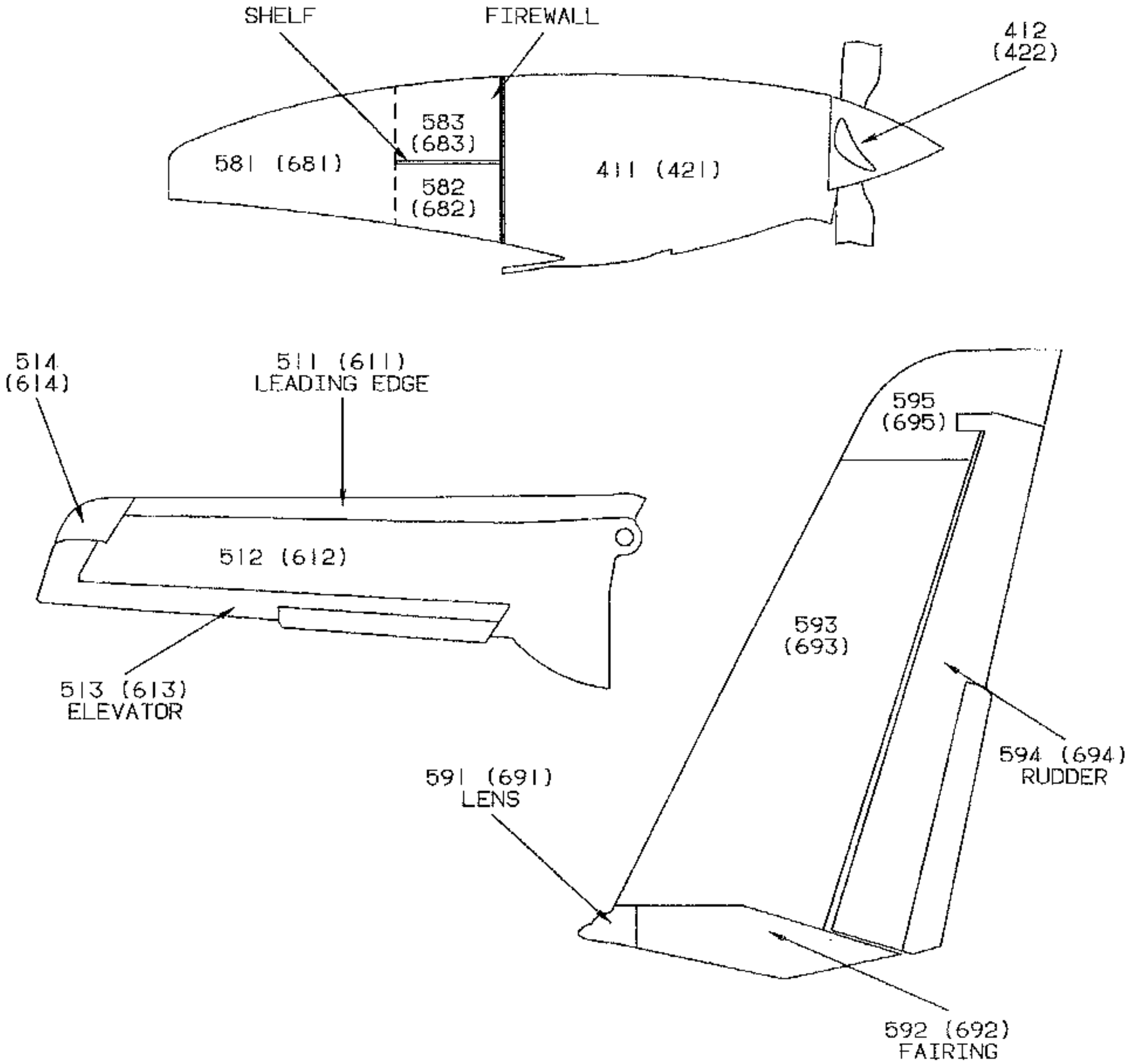
ZONE 500- LEFT FORWARD WING, AFT WING, TIPSAIL AND NACELLE (FORWARD OF THE FIREWALL)
- 510 SEE FORWARD WING DIAGRAM
- 520 AFT WING (LEADING EDGE)
- 527 AFT WING (WING TO FUSELAGE)
- 528 AREA COVERED BY FAIRING
- 530 AFT WING (LEADING EDGE TO FORWARD SPAR)
- 540 AFT WING (FORWARD SPAR TO CENTER SPAR)
- 550 AFT WING (CENTER SPAR TO AFT SPAR)
- 560 AFT WING (AFT OF AFT SPAR)
- 570 AFT WING (ELEVON AND FLAPS)
- 580 SEE NACELLE DIAGRAM
- 590 SEE TIPSAIL DIAGRAM

ZONE 600- RIGHT FORWARD WING, AFT WING, TIPSAIL AND NACELLE (FORWARD OF THE FIREWALL)
- 610 SEE FORWARD WING DIAGRAM
- 620 AFT WING (LEADING EDGE)
- 627 AFT WING (WING TO FUSELAGE)
- 630 AFT WING (LEADING EDGE TO FORWARD SPAR)
- 640 AFT WING (FORWARD SPAR TO CENTER SPAR)
- 650 AFT WING (CENTER SPAR TO AFT SPAR)
- 660 AFT WING (AFT OF AFT SPAR)
- 670 AFT WING (ELEVON AND FLAPS)
- 680 SEE NACELLE DIAGRAM
- 690 SEE TIPSAIL DIAGRAM

ZONE 700 LANDING GEAR, WHEEL WELLS AND DOORS
- 710 NOSE LANDING GEAR, WHEEL WELLS AND DOORS (SEE FUSELAGE DIAGRAM)
- 720 LEFT MAIN LANDING GEAR, WHEEL WELL AND DOORS
- 730 RIGHT MAIN LANDING GEAR, WHEEL WELL AND DOORS

2000-369-04

Wing Zone Diagrams (Effectivity: All)
(Sheet 1 of 2)
Figure 3



ZONE 400 - ENGINE COMPARTMENT, SPINNER AND PROP
(AFT OF FIREWALL)
410 - LEFT ENGINE COMPARTMENT, SPINNER AND PROP
420 - RIGHT ENGINE COMPARTMENT, SPINNER AND PROP

ZONE 510 - LEFT FORWARD WING
610 - RIGHT FORWARD WING

ZONE 580 - LEFT NACELLE (FORWARD OF THE FIREWALL)
680 - RIGHT NACELLE (FORWARD OF THE FIREWALL)

ZONE 590 - LEFT TIPSAIL
690 - RIGHT TIPSAIL

2000-369-05

Wing Zone Diagrams (Effectivity: All)
(Sheet 2 of 2)
Figure 3

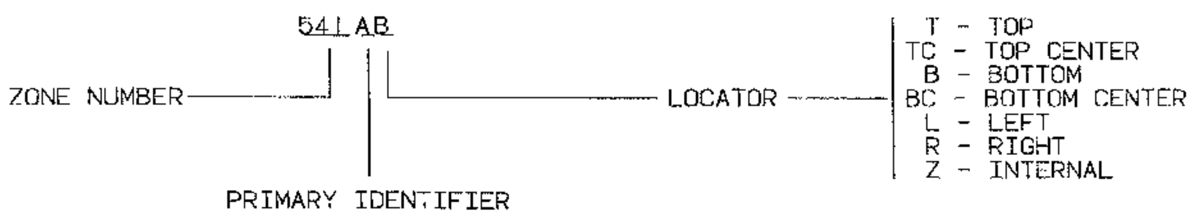
AIRPLANE ACCESS PANELS - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

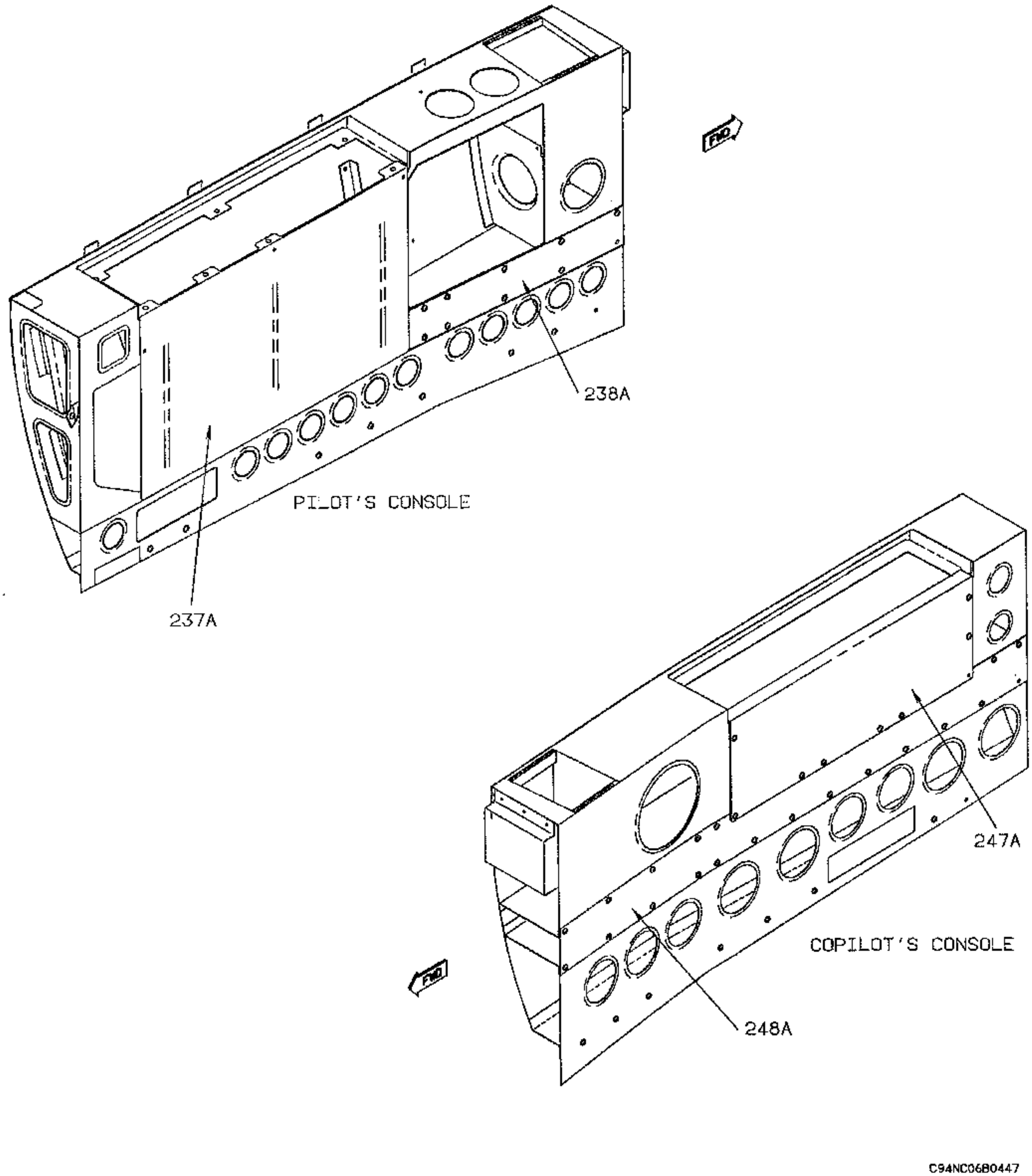
Various panels are located throughout the airplane to allow entry into enclosed areas for maintenance and servicing purposes. These consist of access panels, floorboard panels, service doors and fairings. Figures 1 through 12 locate the panels and list the components and areas accessible through each panel. Each access panel is located and indexed with an identifying number. The identifying number is composed of two parts: a three-digit airplane zone number designating the smallest zone in which the panel is located (refer to Chapter 6-40-00) and a one or two-letter suffix. The first letter or primary identifier in the suffix identifies the panels in sequence, i.e., inboard to outboard, front to rear, bottom to top, starting with "A" within each zone. The second letter or locator, locates the panels in relation to the airplane, i.e., top, bottom, left, right, etc. Panels on the boundary between two airplane zones are identified by the zone from which they are removed. Areas such as the landing gear wheel wells, wing leading edges, nose radome, etc. are identified by the zone number only since each of these areas is a zone in itself. For removal and installation of the individual panels refer to the appropriate chapter (28, 52, 53, 54, 55 and/or 57).

EXAMPLE:



PANEL 541AB IS LOCATED ON THE BOTTOM SURFACE OF THE LH WING IN AIRPLANE ZONE 541.

2000-602-03



Cockpit Console Access Panels (Effectivity: All)
(Sheet 1 of 2)
Figure 1

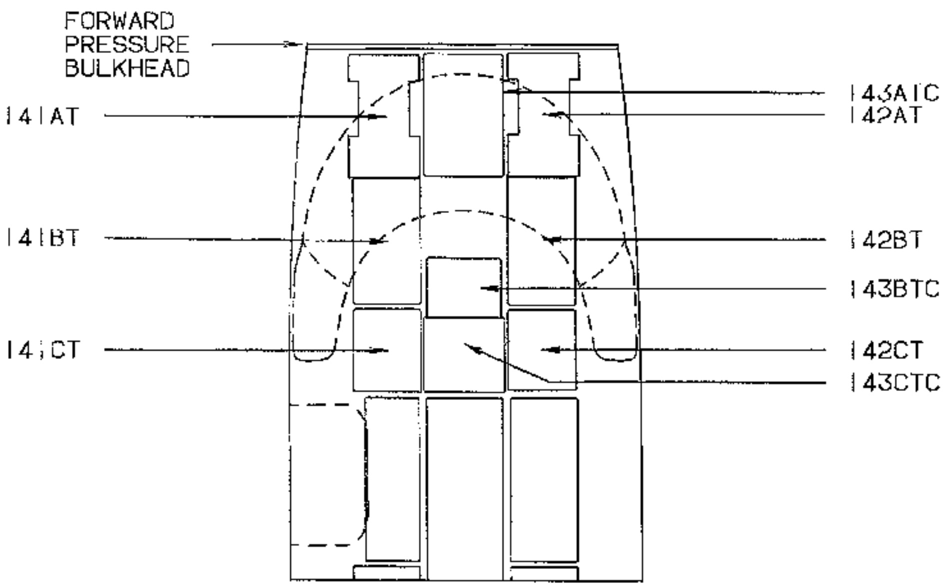
237A - COVER: Logic relay PCB's; Battery monitor PCB; N_1 speed and ice vane PCB; Lighting control PCB; Annunciator fault detection PCB; Annunciator and fire extinguisher test PCB; Annunciator control PCB and transzorb; Landing gear indication PCB; Brake deice and time delay PCB; Landing gear control PCB; Windshield anti-ice and external power monitor PCB; Power distribution control PCB and transzorbs; Flap/forward wing controller and annunciation PCB; LH flap/forward wing monitor and monitor test PCB and transzorb; RH flap/forward wing monitor and monitor test PCB and transzorb.

238A - COVER: Electrical wire bundles.

247A - COVER: Circuit breaker panel; IAPS cooling duct and air flow sensor; Oxygen system plumbing.

248A - COVER: Electrical wire bundles.

Cockpit Console Access Panels (Effectivity: All)
(Sheet 2 of 2)
Figure 1



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Cockpit Floorboard Panels (Effectivity: All)
(Sheet 1 of 2)
Figure 2

141AT - FLOORBOARD: Landing gear hydraulic system plumbing; Brake system plumbing; Pilot's brake master cylinders; Nose gear steering pushrods; Rudder controls; Parking brake valve.

141BT - FLOORBOARD: Landing gear hydraulic system plumbing; Brake system plumbing; Cabin door seal plumbing; Overboard drain plumbing; Nose gear steering pushrod and disconnect actuator; Rudder controls; Elevon controls.

141CT - FLOORBOARD: Brake system plumbing; Flight control cables; Landing gear hydraulic system plumbing; Cabin door seal plumbing; Overboard drain plumbing; LH engine prop, condition and power control cables; Fuselage moisture drain.

142AT - FLOORBOARD: Pneumatic system plumbing; Brake system plumbing; Copilot's brake master cylinders; Rudder controls; Oxygen system cabin shutoff valve and cabin barometric pressure switch.

142BT - FLOORBOARD: Pneumatic system plumbing; A/C refrigerant lines; Rudder controls.

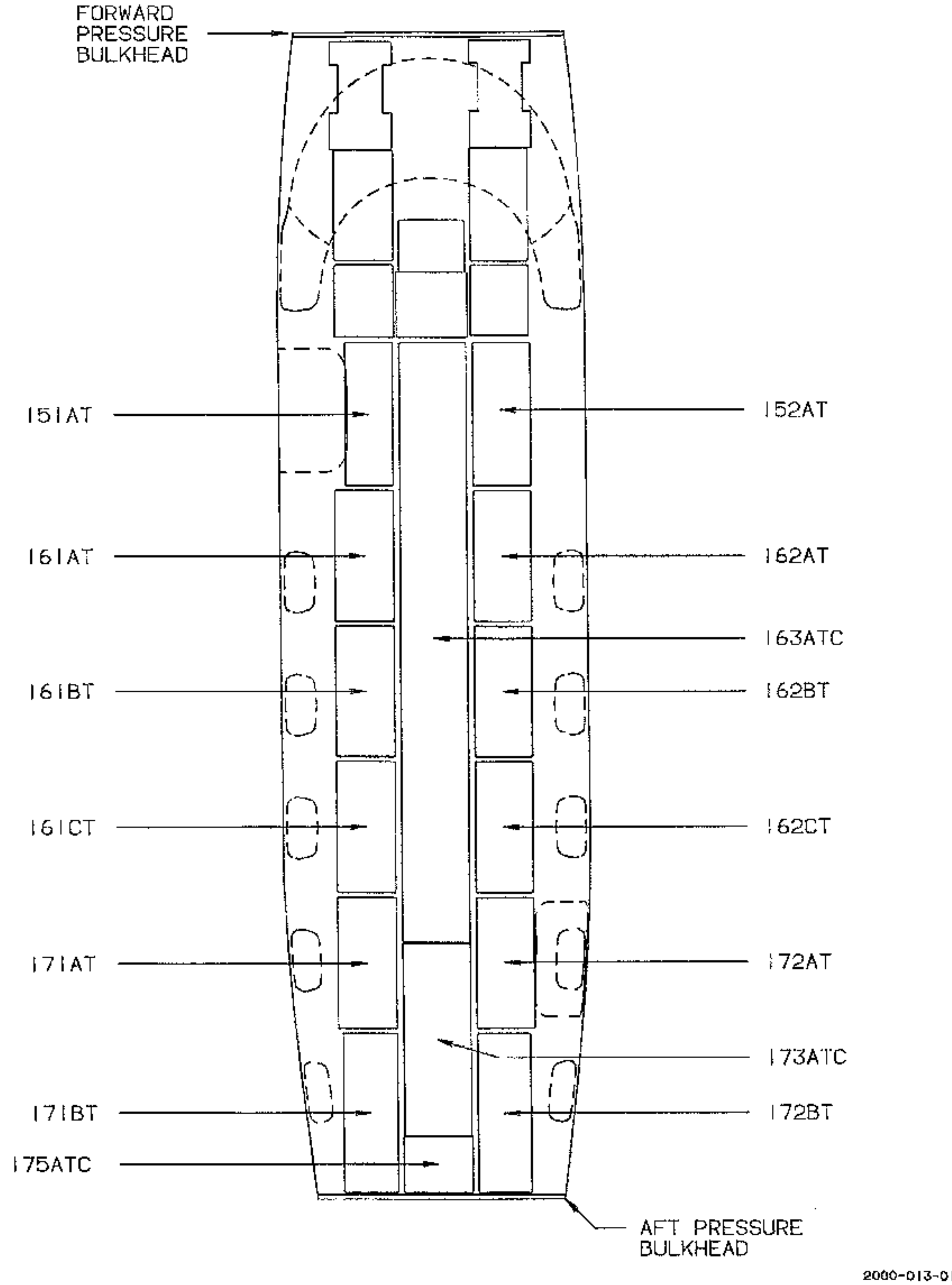
142CT - FLOORBOARD: Pneumatic system plumbing; Bleed air plumbing; A/C refrigerant lines; Bleed air leak detection sensing elements; 0verboard drain plumbing; Fuselage moisture drain. RH engine prop, condition and power control cables.

143ATC - SHROUD PANEL: Forward vent blower assembly, speed control and EMI filter.

143BTC - PEDESTAL EXTENSION FLOOR PANEL: Overhead and CB panel electroluminescent panel power supply; Instrument panel electroluminescent panel power supply; Subpanel electroluminescent panel power supply; Glareshield electroluminescent light panel power supply; Landing gear alternate extension handpump; LH and RH prop control cables; LH and RH engine condition control cables; LH and RH engine power control cables.

143CTC - FLOORBOARD: Overboard drain plumbing; LH and RH prop control cables; LH and RH engine condition control cables; LH and RH engine power control cables; Landing gear alternate extension handpump; Data Aquisition Unit; Stall warning system G-switch; Cabin altitude warning switch; Nose and wing landing light relays; Nose taxi light relay; LH and RH pitot heat relays; Pilot and copilot side window heat circuit breakers; Pilot's and copilot's windshield anti-ice low heat relays; Pilot's and copilot's windshield anti-ice high heat relays; Fuselage moisture drain.

Cockpit Floorboard Panels (Effectivity: All)
(Sheet 2 of 2)
Figure 2



Cabin Floorboard Panels (Effectivity: All)
(Sheet 1 of 2)
Figure 3

151AT - FLOORBOARD: Flight control cables and turnbuckles; Landing gear hydraulic system plumbing; Brake system plumbing; Overboard drain plumbing; LH prop control cable; LH engine condition control cable; LH engine power control cable; Cabin door seal plumbing and solenoid valve; Fuselage moisture drain.

152AT - FLOORBOARD: Pneumatic system plumbing; Bleed air plumbing; Electrical wire tray; A/C refrigerant lines; Bleed air leak detection sensing elements; Overboard drain plumbing; RH prop control cable; RH engine condition control cable; RH engine power control cable; Fuselage moisture drain.

161AT - FLOORBOARD: Flight control cables; Landing gear hydraulic system plumbing; Brake system plumbing; Overboard drain plumbing; LH prop control cable; LH engine condition control cable; LH engine power control cable; Cabin temperature transducer.

161BT - FLOORBOARD: Flight control cables; Landing gear hydraulic system plumbing; Brake system plumbing; Overboard drain plumbing; LH prop control cable; LH engine condition control cable; LH engine power control cable; Elevon and rudder control cable fairleads.

161CT - FLOORBOARD: Flight control cables; Landing gear hydraulic system plumbing; Brake system plumbing; Overboard drain plumbing; LH prop control cable; LH engine condition control cable; LH engine power control cable; Elevon and rudder control cable fairleads; Roll and yaw flight control cable interconnection; Fuselage moisture drain.

162AT - FLOORBOARD: Pneumatic system plumbing; Bleed air plumbing; Electrical wire tray; A/C refrigerant lines; Bleed air leak detection sensing elements; RH prop control cable; RH engine condition control cable; RH engine power control cable.

162BT - FLOORBOARD: Pneumatic system plumbing; Bleed air plumbing; Electrical wire tray; A/C refrigerant lines; Bleed air leak detection sensing elements; RH prop control cable; RH engine condition control cable; RH engine power control cable;

162CT - FLOORBOARD: Pneumatic system plumbing; Bleed air plumbing; Electrical wire tray; A/C refrigerant lines; Bleed air leak detection sensing elements; RH prop control cable; RH engine condition control cable; RH engine power control cable; Fuselage moisture drain.

163ATC - FLOORBOARD: DME No. 1 antenna; Radiophone antenna (if installed); Transponder No. 1 and No. 2 antennae; ADF antenna; Radio Altimeter antenna; Fuselage moisture drains.

171AT - FLOORBOARD: Flight control cables; Landing gear hydraulic system plumbing; Brake system plumbing; Overboard drain plumbing; LH prop control cable; LH engine condition control cable and bell crank; LH engine power control cable; Roll and yaw flight control cable interconnection.

171BT - FLOORBOARD: Pneumatic system plumbing; Flight control cables; Landing gear hydraulic system plumbing; Brake system plumbing; Overboard drain plumbing; LH prop control cable and bell crank; Flight control cable pressure seals; Overboard drain.

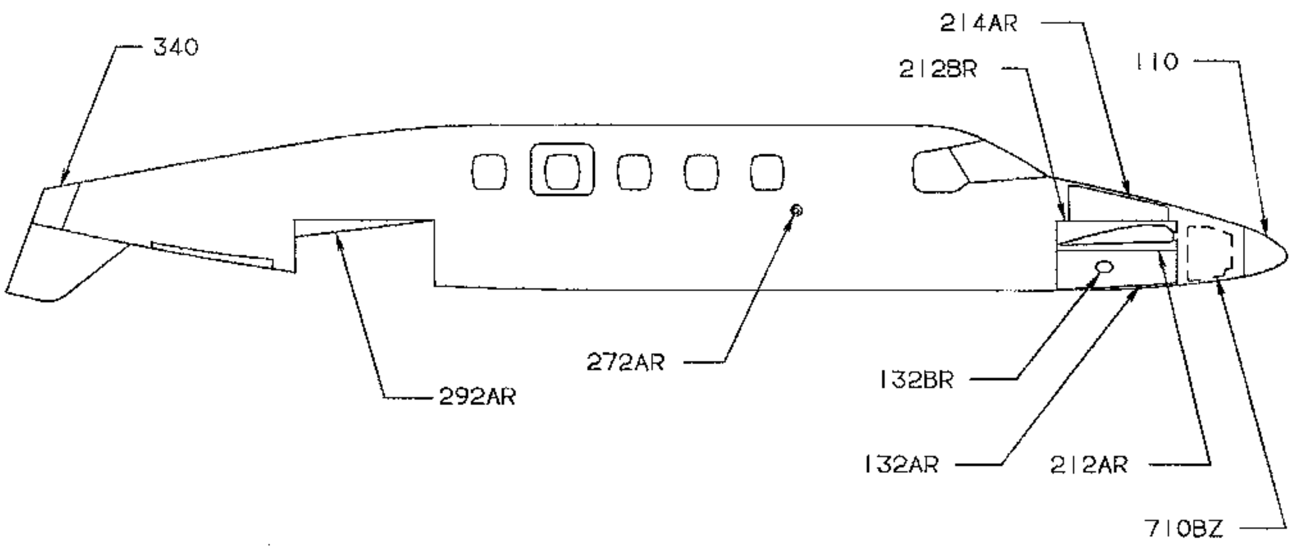
172AT - FLOORBOARD: Pneumatic system plumbing; Bleed air plumbing; Electrical wire tray; A/C refrigerant lines; Bleed air leak detection sensing elements; RH prop control cable; RH engine condition control cable and bell crank; RH engine power control cable.

172BT - FLOORBOARD: Pneumatic system plumbing; Landing gear hydraulic system plumbing; Brake system plumbing; Bleed air plumbing; Electrical wire tray; A/C refrigerant lines; Bleed air leak detection sensing elements; Bleed air plumbing thermal isolator and check valve; RH prop control cable and bell crank.

173ATC - Floorboard: DME No. 2 antenna; Radio Altimeter antenna.

175ATC - AFT STEP: Landing gear hydraulic system plumbing; Brake system plumbing; A/C refrigerant lines; Prop synchrophaser control box; Flap/forward wing monitor box; LH and RH aisle lights' power supplies.

Cabin Floorboard Panels (Effectivity: All)
(Sheet 2 of 2)
Figure 3



Fuselage Access Panels (Effectivity: All)
(Sheet 1 of 6)
Figure 4

110 - RADOME: Weather radar receiver, transmitter and antenna; Glideslope antenna.

132AR - PANEL: Oxygen system supply cylinder, plumbing, cylinder low pressure switch and cylinder pressure transducer, Surface deice system plumbing, crossfeed valve, check valves, ejector assemblies and varistors; Standby ice detector; Main and standby ice detector test relays and shunts; Nose landing gear door hinge.

132BR - PANEL: Oxygen system service panel (oxygen cylinder fill port, pressure gage and oxygen system grounding jack).

212AR & 212BR - FAIRINGS: RH forward wing pivot point, hydraulic lock, and position sensor; LH and RH forward wing control actuator; Oxygen system arm switch and plumbing; LH and RH forward wing surface deice system plumbing, distributor valves, pressure switches and vacuum switches;

214AR - PANEL: Attitude Heading Computer No. 2; DME No. 2 transceiver and metal oxide varistor; Air Data Computer No. 2; ATC No. 2 transponder and metal oxide varistor; ATC No. 2 transponder control adapter (NC-4 thru NC-25); Audio amplifier No. 1; Audio amplifier No. 2; Aural warning tone generator; Paging/stereo amplifier; Interphone amplifier; EICAS auxiliary battery; AHRS standby power relay; EICAS standby power relay; Audio bus connector; Audio ground connector; Nose avionics compartment cooling blower, thermostat and test switch; Elevator torque tube and push-pull rods; Elevator position sensor; Pitot/static system plumbing; Airspeed pressure differential switch; Oxygen system plumbing; Autopilot pitch servo/column pusher transfer relay.

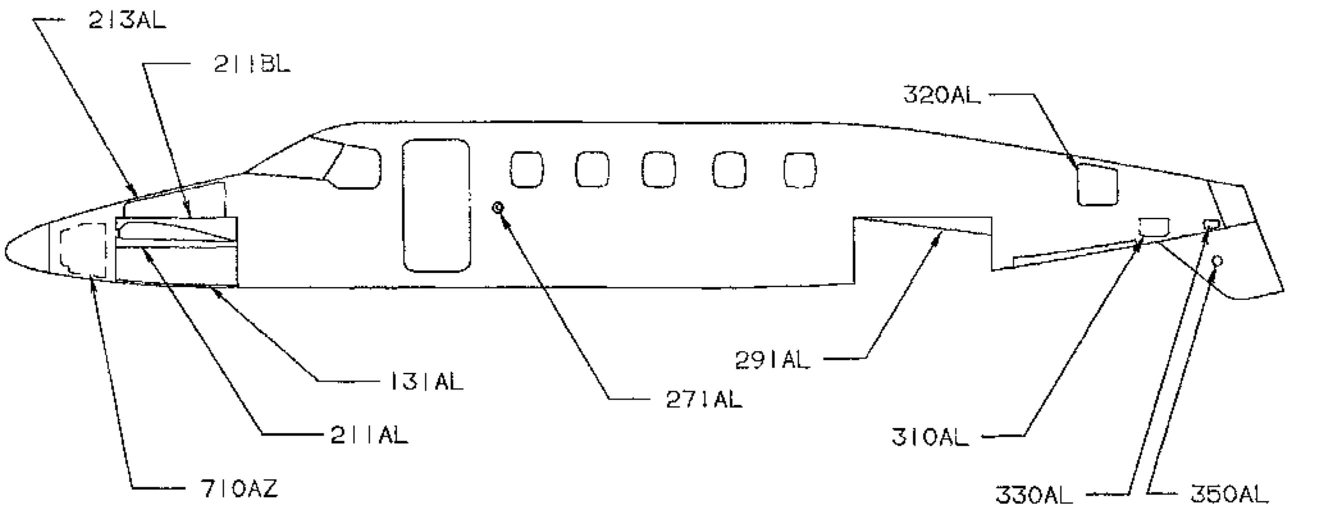
272AR - PANEL: Wing inspection light.

292AR - FAIRING: Aft wing RH drag shear fitting;

340 - TAIL CONE: ELT antenna.

710BZ - PANEL: NAV 2 receiver and metal oxide varistor; COMM 2 transceiver; ADF receiver and metal oxide varistor; Nav antenna coupler; Glideslope antenna coupler; AOA transmitter; Pitot/static system plumbing and solenoid valve; RH pitot tube metal oxide varistor; Nose landing gear door hinge.

Fuselage Access Panels (Effectivity: All)
(Sheet 2 of 6)
Figure 4



Fuselage Access Panels (Effectivity: All)
(Sheet 3 of 6)
Figure 4

131AL - PANEL: Brake system pallet (pump and motor, system filter, high and low pressure switches, power brake valve, relief valve); Brake system pump motor relay, solenoid valves, accumulator, accumulator charging valve, plumbing, reservoir overboard line; Landing gear hydraulic system plumbing; Nose gear steering components; Main ice detector; Nose landing gear door hinge.

211AL & 211BL - FAIRINGS: LH forward wing pivot point, hydraulic lock, and position sensor; LH and RH forward wing control actuator; Brake system reservoir, maintenance switch and reservoir overboard line; LH forward wing surface deice system plumbing; Surface deice system fuse panel and PCB assembly.

213AL - PANEL: Attitude Heading Computer No. 1; DME transceiver No. 1 and metal oxide varistor; Air Data Computer No. 1; VLF Omega receiver and metal oxide varistor; ATC transponder No. 1 and metal oxide varistor; ATC transponder No. 1 control adapter (NC-4 thru NC-25); Sensor Display Driver, transzorb and metal oxide varistors; Electric trim control assembly; Attitude Heading Computer No. 2 transzorb; Standby gyro auxiliary battery, remote control circuit breaker, metal oxide varistors and transzorb; Radio junction box; Autopilot/trim system relays and transzorbs; Nose avionics compartment cooling blower, thermostat and test switch; Elevator torque tube; Elevator position sensor; Pitot/static system plumbing. Oxygen system plumbing.

271AL - PANEL: Wing inspection light.

291AL - FAIRING: Aft wing LH drag shear fitting.

310AL - PANEL: Air conditioning system service panel (sight glass, high and low pressure service valves, over- and underpressure lockout reset switches, test jacks).

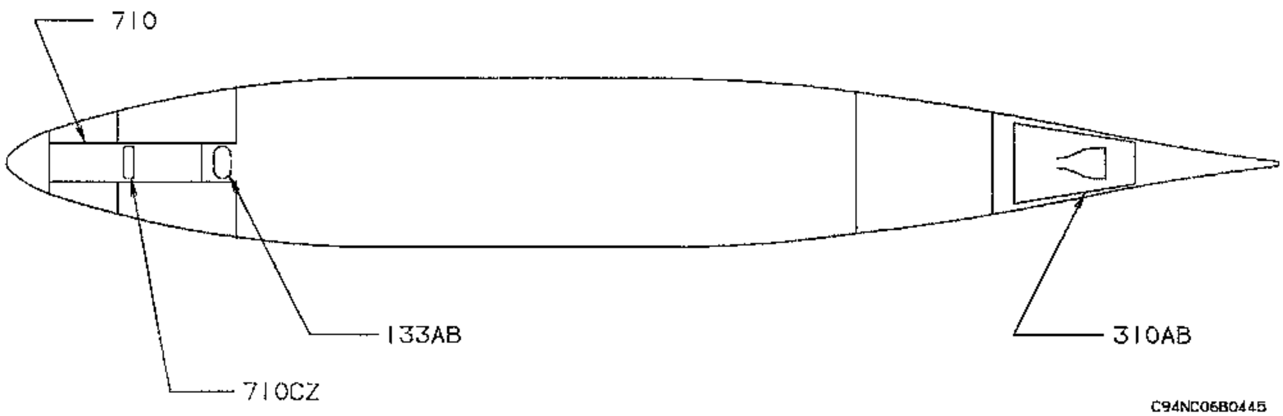
320AL - PANEL: Aft circuit breaker panel; Avionics power relay panel; Logic relay panel; Bleed air leak detection controller; Emergency Locator Transmitter; Environmental System Controller.

330AL - PANEL: Ventral stabilizer attachment fitting; VHF navigation antennae coupler and cable; ELT antenna cable; Navigation light electrical wiring.

350AL - PANEL: VHF navigation antennae cable.

710AZ - PANEL: NAV 1 receiver, transzorb and metal oxide varistor; COMM 1 transceiver and transzorb; Marker beacon antenna coupler; Automatic Trim Coupler; AOA transmitter; Pitot/static system plumbing and solenoid valve; LH pitot tube metal oxide varistor; OAT sensor; Nose landing gear door hinge.

Fuselage Access Panels (Effectivity: All)
(Sheet 4 of 6)
Figure 4



Fuselage Access Panels (Effectivity: All)
(Sheet 5 of 6)
Figure 4

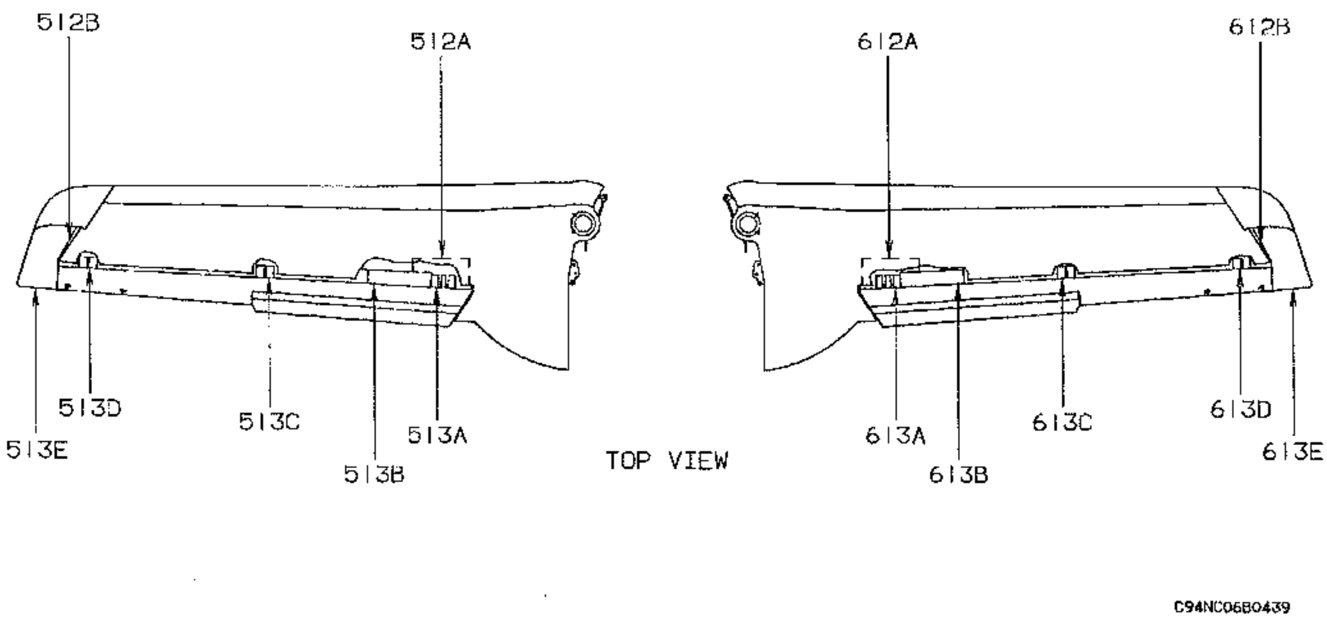
133AB - PANEL: Outflow valves; A/C forward evaporator, forward expansion valve, forward low temperature switch, forward evaporator condensation drain assembly; A/C refrigerant lines; Pressurization control system plumbing, altitude limit regulators and jet pump ejector.

310AB - PANEL: Aft wing attach bolts, Bleed air heat exchanger, emergency air valve, bypass valve, diverter valve, thermal isolator and bleed air plumbing; Aft bleed air transducer and thermal switch; Heat exchanger exit duct temperature sensor; 10° F OAT A/C compressor cutout switch; Bleed air leak detection sensing element; A/C receiver/dryer, pre-condenser coil, condenser coil, condenser high pressure switch, underpressure lockout switch, overpressure lockout switch, and refrigeration lines; Vane axial blower.

710 - NOSE WHEEL WELL: Nose landing gear; Nose landing gear actuator, uplock actuator, door actuator, shimmy damper, and steering components; Landing gear hydraulic system plumbing; Hydraulic priority valve; Brake system hydraulic plumbing and accumulator charge gage; Pitot/static system plumbing; Wheel well speaker; Pressurization control system jet pump exhaust port.

710CZ - PANEL: Forward wing actuator hydraulic lock solenoid valve.

Fuselage Access Panels (Effectivity: All)
(Sheet 6 of 6)
Figure 4



Forward Wing Access Panels (Effectivity: All)
(Sheet 1 of 2)
Figure 5

512A - COVER: Elevator torque tube and pushrod.

512B - COVER: Wing interior structure.

513A - COVER: Trim tab pushrod attach point.

513B - COVER: Elevator trim tab actuator.

513C - COVER: Elevator hinge.

513D - COVER: Elevator hinge.

513E - ELEVATOR TIP: Elevator balance weights.

612A - COVER: Elevator torque tube and pushrod.

612B - COVER: Wing interior structure.

613A - COVER: Trim tab pushrod attach point.

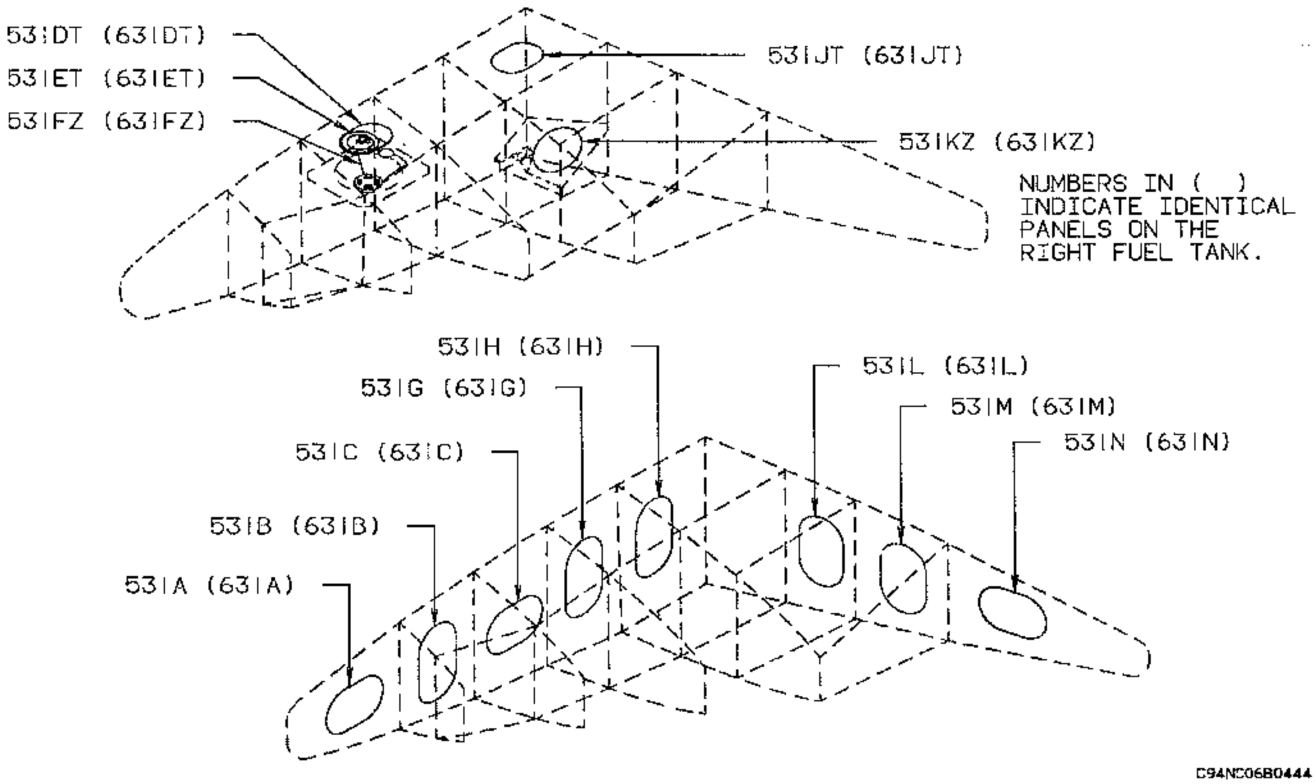
613B - COVER: Elevator trim tab actuator.

613C - COVER: Elevator hinge.

613D - COVER: Elevator hinge.

613E - ELEVATOR TIP: Elevator balance weights.

Forward Wing Access Panels (Effectivity: All)
(Sheet 2 of 2)
Figure 5



Fuel Tank Access Panels (Effectivity: All)
(Sheet 1 of 2)
Figure 6

531A (631A) - DOOR: Float vent valve; Vent line; Tank structure and baffles.

531B (631B) - DOOR: Vent line; Tank structure and baffles.

531C (631C) - DOOR: Vent line; Forward fuel quantity probe; Tank structure and baffles.

531DT (631DT) - ACCESS PLATE: 531FZ (631FZ) cover; Vent line; Tank structure and baffles.

531ET (631ET) - FILLER CAP:

531FZ (631FZ) - COVER: Gravity feed line; Forward fuel quantity probe; Tank structure and baffles.

531G (631G) - DOOR: Adapter/check valve; Gravity feed line; Vent line; Float vent valve; Aft fuel quantity probe; Tank structure and baffles.

531H (631H) - DOOR: Standby boost pump; Primary jet pump; Forward tank transfer jet pump; Manifold check valve assembly; Hopper compartment manifold; Drain valve; Rapid drain valve; Flapper check valve; Fuel lines; Hopper compartment fuel quantity probe; Tank structure and baffles.

531JT (631JT) - DOOR: 531KZ (631KZ) cover; Hopper compartment manifold; Hopper compartment fuel quantity probe; Tank structure and baffles.

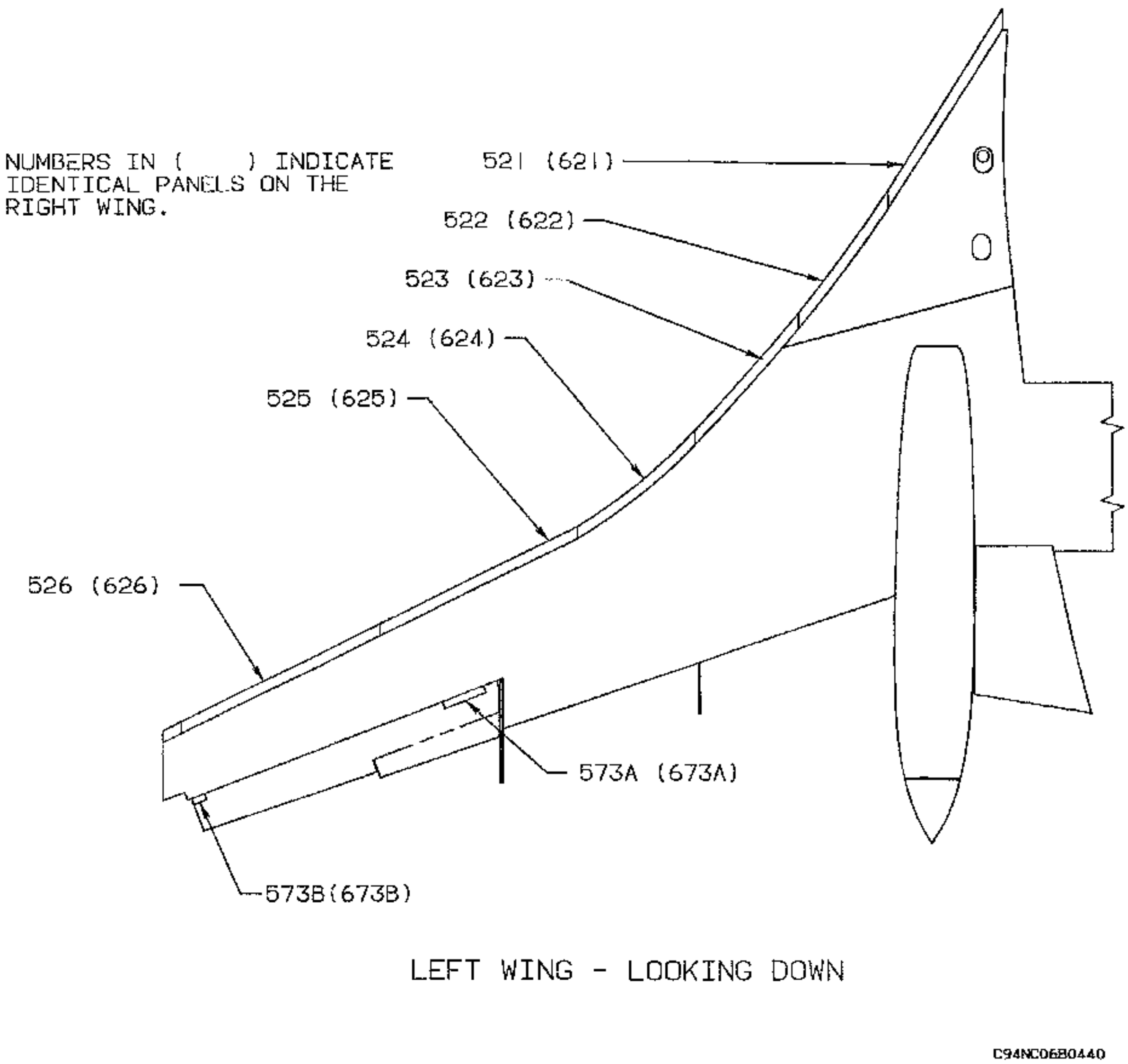
531KZ (631KZ) - COVER: Drain valve; Forward tank transfer jet pump pickup adapter; Tank structure and baffles.

531L (631L) - DOOR: Vent line; Tank structure and baffles.

531M (631M) - DOOR: Vent line; Tank structure and baffles.

531N (631N) - DOOR: Vent line; Tank structure and baffles.

Fuel Tank Access Panels (Effectivity: All)
(Sheet 2 of 2)
Figure 6



Aft Wing Access Panels - Top Surface (Effectivity: All)
(Sheet 1 of 2)
Figure 7

521 (621) - #1 LEADING EDGE: Surface deice system plumbing.

522 (622) - #2 LEADING EDGE: Surface deice system plumbing; Fuel system vent line.

523 (623) - #3 LEADING EDGE: Surface deice system plumbing; Fuel system vent line.

524 (624) - #4 LEADING EDGE: Surface deice system plumbing.

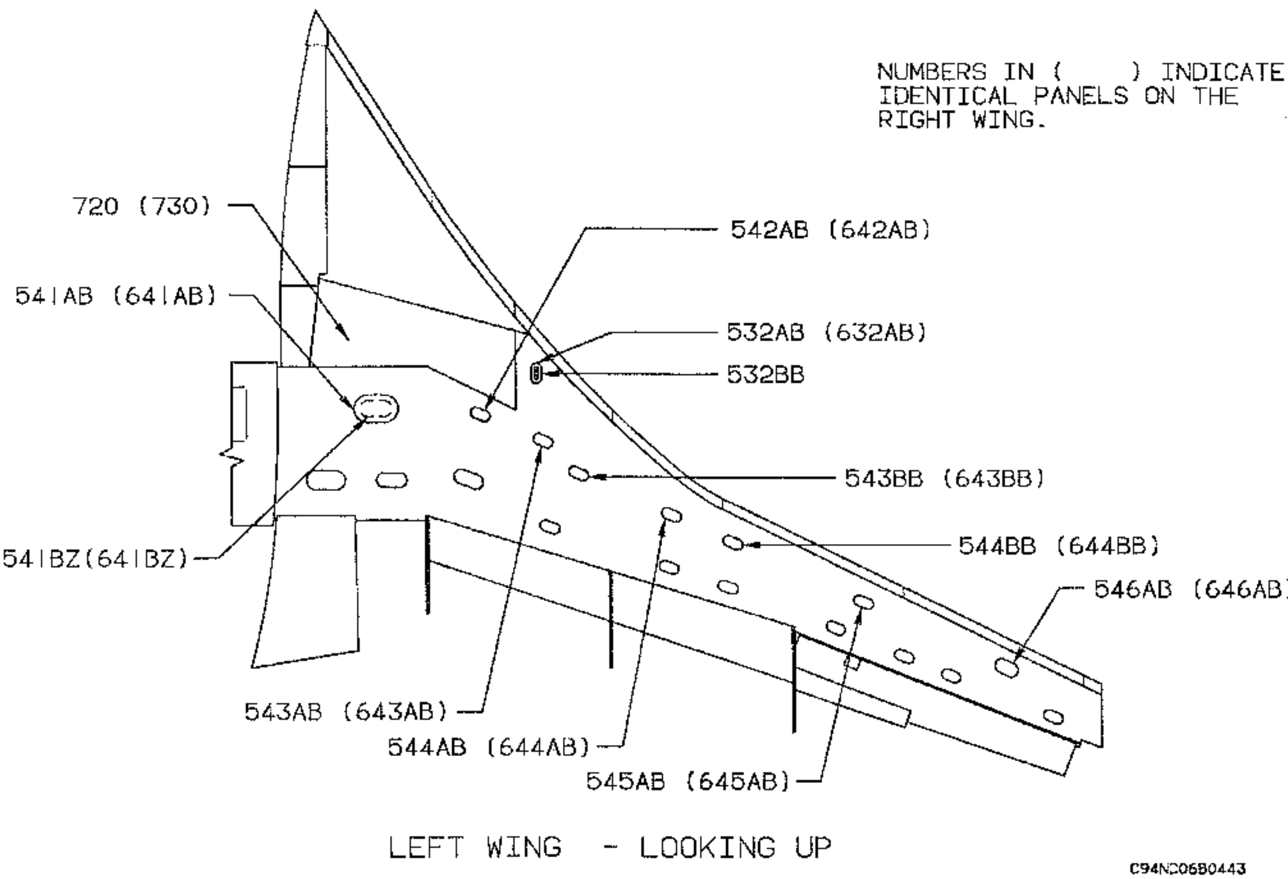
525 (625) - #5 LEADING EDGE: Surface deice system plumbing.

526 (626) - #6 LEADING EDGE:

573A (673A) - COVER: Elevon trim tab actuator; Elevon hinge.

573B (673B) - COVER: Elevon hinge.

Aft Wing Access Panels - Top Surface (Effectivity: All)
(Sheet 2 of 2)
Figure 7



Aft Wing Access Panels - Lower Surface (Effectivity: All)
(Sheet 1 of 4)
Figure 8

532AB (632AB) - DOOR: Main landing gear door hinges; Fuel vent system plumbing; Wing structure; Forward fuel tank attach point; External power receptacle and external power sense and control circuit breakers (NC-4 thru NC-29 with BEECHCRAFT Kit No. 122-3002 installed; NC-30 and after).

532BB - DOOR (NC-4 thru NC-29 with BEECHCRAFT Kit No. 122-3002 installed; NC-30 and after): External power receptacle.

541AB (641AB) - DOOR: Aft fuel tank access panel 541BZ(641BZ); Wing structure when fuel tank is removed.

541BZ (641BZ) - PANEL: Interior of aft fuel tank (fuel quantity probe, vent adaptor/check valve, fuel system plumbing).

542AB (642AB) - DOOR: Wing structure.

543AB (643AB) - DOOR: Forward fuel tank vent system plumbing and components; Wing structure.

543BB (643BB) - DOOR: Fuel system vent scoop assembly; Wing structure.

544AB (644AB) - DOOR: Wing structure.

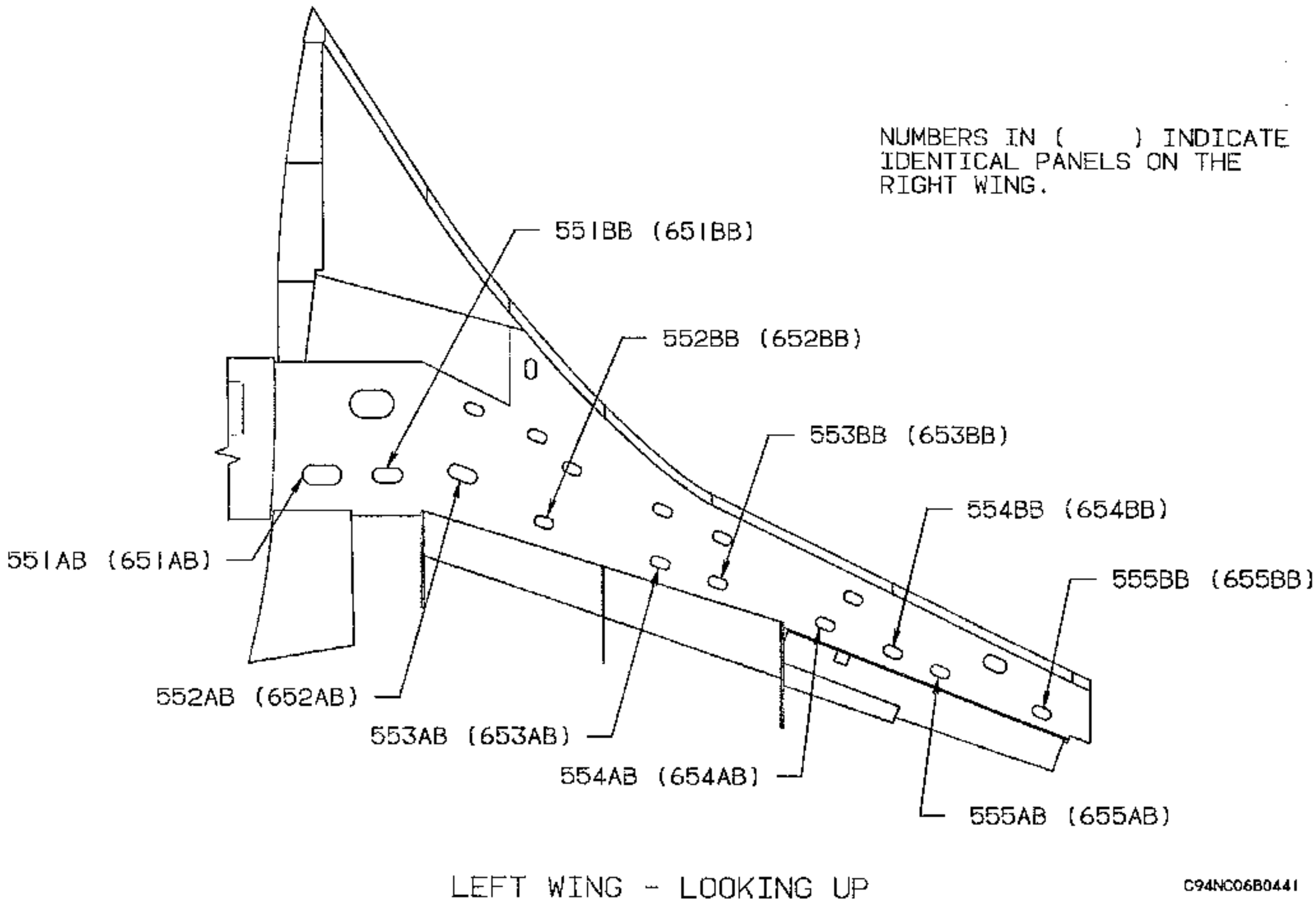
544BB (644BB) - DOOR: Wing structure.

545AB (645AB) - DOOR: Wing structure.

546AB (646AB) - DOOR: Magnetic flux detector; Wing structure.

720 (730) - WHEEL WELL: Fuel system plumbing, vent adaptor/check valve assembly, low level sensor; Aft fuel tank transfer jet pump; Fuel system cross transfer valve (720 only); Hydraulic landing gear system plumbing; Main landing gear assembly, actuator and uplock actuator; Pneumatic system plumbing and pressure regulator; Brake system plumbing.

Aft Wing Access Panels - Lower Surface (Effectivity: All)
(Sheet 2 of 4)
Figure 8



Aft Wing Access Panels - Lower Surface (Effectivity: All)
(Sheet 3 of 4)
Figure 8

551AB (651AB) - DOOR: Fuel System Concentrator; Engine Data Concentrator; Elevon and rudder control cables; Engine control cables; Electrical conduit; Fuel system plumbing and purge valve; Fuel motive flow line check valve; Flap drive cable; Wing interior.

551BB (651BB) - DOOR: Electrical conduit; Elevon and rudder control cables; Rudder control cable turnbuckles; Power pack drain line; Flap drive cable; Wing interior.

552AB (652AB) - DOOR: Elevon and rudder control cables; Electrical conduit; Wing interior.

552BB (652BB) - DOOR: Elevon and rudder control cables; Elevon and rudder control cable fairleads; Electrical conduit; Wing interior.

553AB (653AB) - DOOR: Elevon and rudder control cables; Electrical conduit; Wing interior.

553BB (653BB) - DOOR: Elevon and rudder control cables; Elevon control cable fairleads; Electrical conduit; Wing interior.

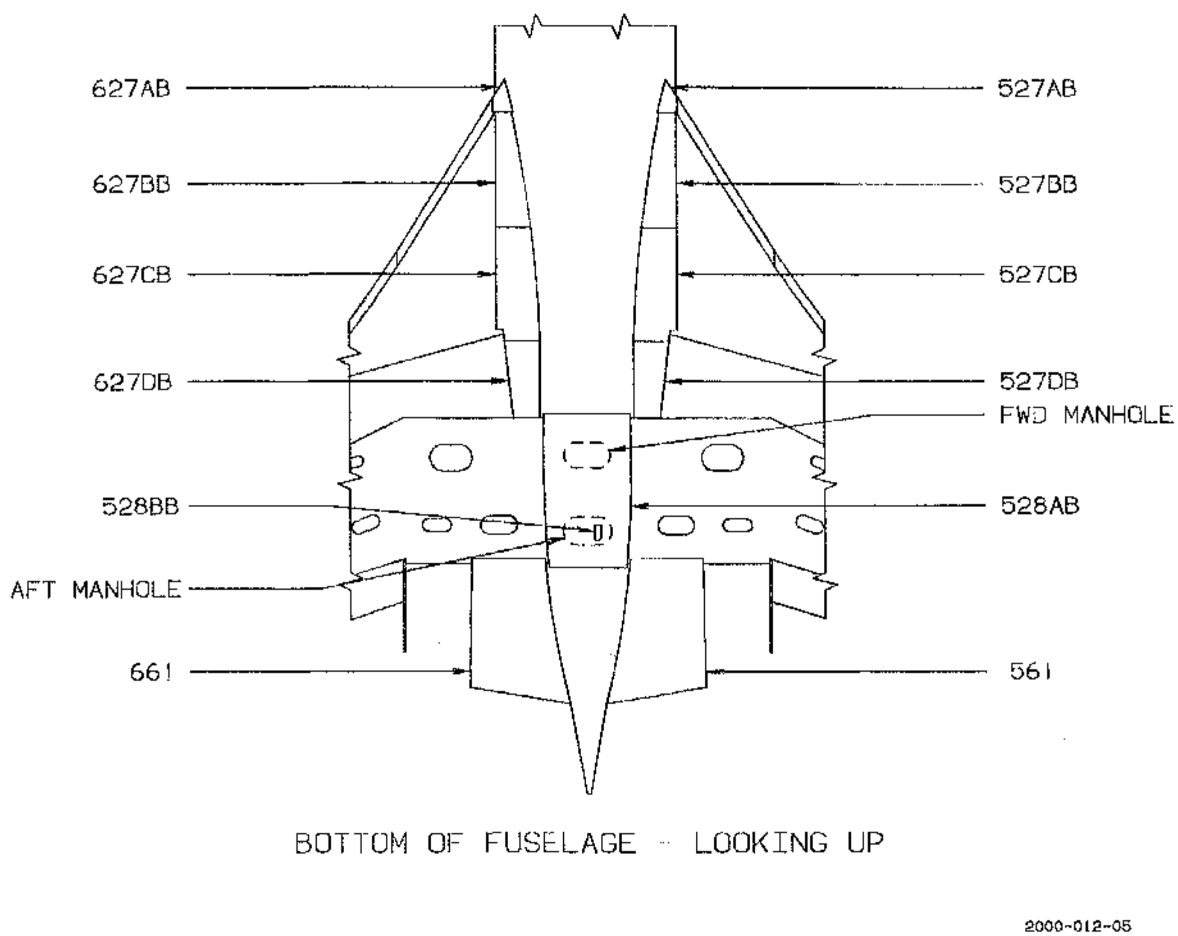
554AB (654AB) - DOOR: Elevon and rudder control cables; Elevon control cable turnbuckle; Electrical conduit; Wing interior.

554BB (654BB) - DOOR: Elevon and rudder control cables; Elevon control cable turnbuckle; Electrical conduit; Wing interior.

555AB (655AB) - DOOR: Elevon and rudder control cables; Electrical conduit; Elevon sector; Wing interior.

555BB (655BB) - DOOR: Rudder control cables; Electrical conduit; Wing interior.

Aft Wing Access Panels - Lower Surface (Effectivity: All)
(Sheet 4 of 4)
Figure 8



Aft Wing-To-Fuselage Access Panels (Effectivity: All)
(Sheet 1 of 2)
Figure 9

527AB (627AB) - LEADING EDGE COLLAR: Surface deice system plumbing; Forward fuel tank attach fitting.

527BB (627BB) - FORWARD PANEL: Surface deice system distributing valve, plumbing, pressure switches, and vacuum switch; Forward fuel tank access panels; Grounding jack.

527CB (627CB) - CENTER PANEL: Forward fuel tank access panels, aft attach point and rapid drain valve; Fuel system plumbing; Surface deice system plumbing and separator; Pneumatic system plumbing and check valve; Engine prop, condition and power control cables; Engine prop and condition control cable bell cranks; Fuel temperature sensor (527CB only).

527DB (627DB) - PANEL: Pneumatic system plumbing and check valve; Surface deice system plumbing and ejector; Fuel system plumbing and gravity feed line check valve; Engine prop, condition and power control cables; Brake system plumbing; Landing gear hydraulic system plumbing.

528AB - SHEAR PANEL: External power receptacle (NC-4 thru NC-29 without BEECHCRAFT Kit No. 122-3002 installed); External power sense and control circuit breakers (NC-4 thru NC-29 without BEECHCRAFT Kit No. 122-3002 installed); VLF, Marker Beacon and FM (if installed) antennae; Refrigeration lines.

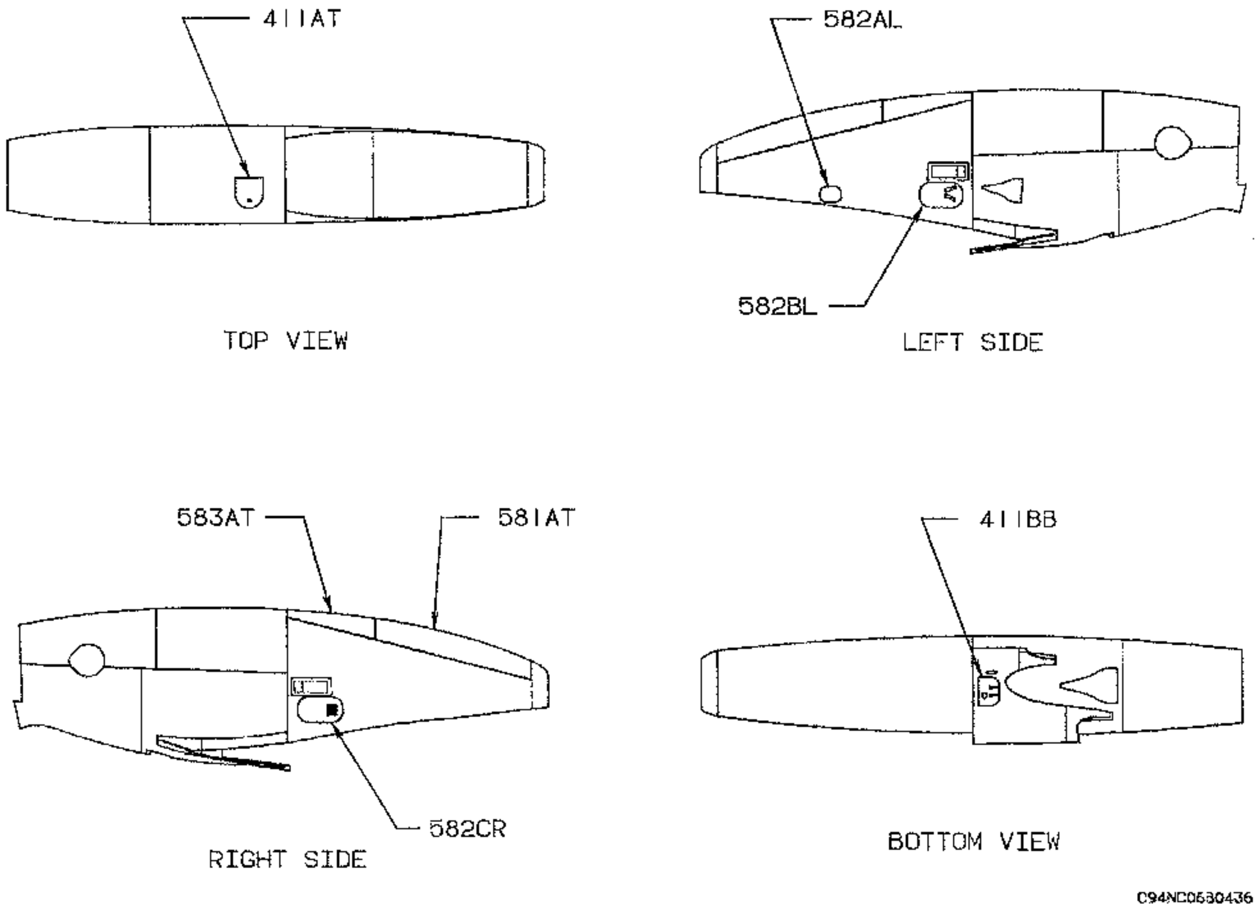
FORWARD MANHOLE (Zone 547) - Flight control cables; Elevon autopilot servo and servo mount; LH and RH generator control units; LH and RH field and sense relays; Triple fed bus; Center bus, Triple fed bus diode and heat sink assembly; Forward wing power relay; LH and RH flap monitor relays; Bleed air plumbing, thermal isolator and leak detection sensing elements; Fuel system cross transfer line; Radio Altimeter and converter; Radiophone transceiver (if installed).

AFT MANHOLE (Zone 556) - Bleed air plumbing and leak detection sensing elements; External power relay (NC-4 thru NC-29); Flap motor and control box; Elevon control mixer assembly; Electrical conduit; Rudder quadrant; Rudder autopilot servo and servo mount; Flight control cables; Brake system anti-skid control box; Electrical wire trays.

528BB - DOOR (NC-4 thru NC-29 without BEECHCRAFT Kit No. 122-3002 installed): External power receptacle.

561 (661) - TRAILING EDGE COVE: Engine condition, prop and power control cables; Bleed air plumbing, check valve and leak detection sensing elements; Fuel system plumbing; Firewall fuel shutoff valve; Low fuel pressure switch; Aft wing attach bolt; A/C refrigerant lines and low pressure switch (661 only).

Aft Wing-To-Fuselage Access Panels (Effectivity: All)
(Sheet 2 of 2)
Figure 9



LH Nacelle Access Panels (Effectivity: All)
(Sheet 1 of 2)
Figure 10

411AT - DOOR: Engine oil tank filler neck and dipstick.

411BB - DOOR: Fuel filter and drain; Engine oil quantity OK light and test switch.

581AT - PANEL: Hydraulic landing gear system plumbing; Hydraulic power pack bleed air regulator; Bleed air plumbing; Bleed air leak dectection sensing elements; Pressurization flow control valve; Engine fire extinguisher bottle and discharge lines.

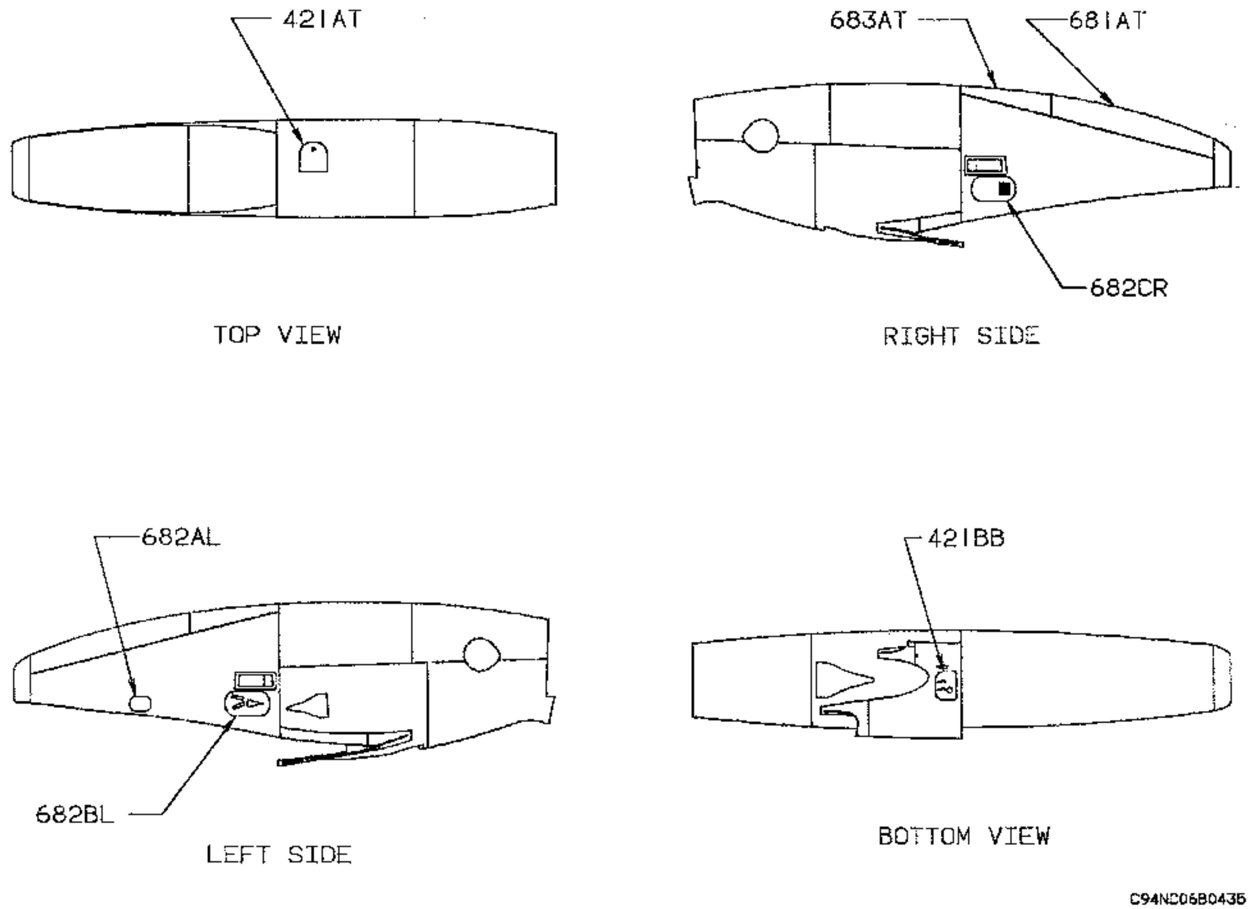
582AL - PANEL: Ice vane linkage retract and extend sense switches.

582BL - PANEL: Ice vane linkage.

582CR - PANEL: Ice vane actuator and linkage.

583AT - PANEL: Landing gear hydraulic power pack; Hydraulic landing gear system plumbing; LH generator power relay panel; LH generator limiter panel; Bleed air firewall shutoff valve; Bleed air plumbing; Bleed air leak detection sensing elements; Engine fire extinguisher bottle discharge lines; Landing gear power circuit breaker and relay; Forward vent blower relay; External power relay (NC-30 and after).

LH Nacelle Access Panels (Effectivity: All)
(Sheet 2 of 2)
Figure 10



RH Nacelle Access Panels (Effectivity: All)
(Sheet 1 of 2)
Figure 11

421AT - DOOR: Engine oil tank filler neck and dipstick.

421BB - DOOR: Fuel filter and drain; Engine oil quantity OK light and test switch.

681AT - PANEL: Bleed air plumbing; Bleed air leak detection sensing elements; Pressurization flow control valve; Engine fire extinguisher bottle and discharge lines.

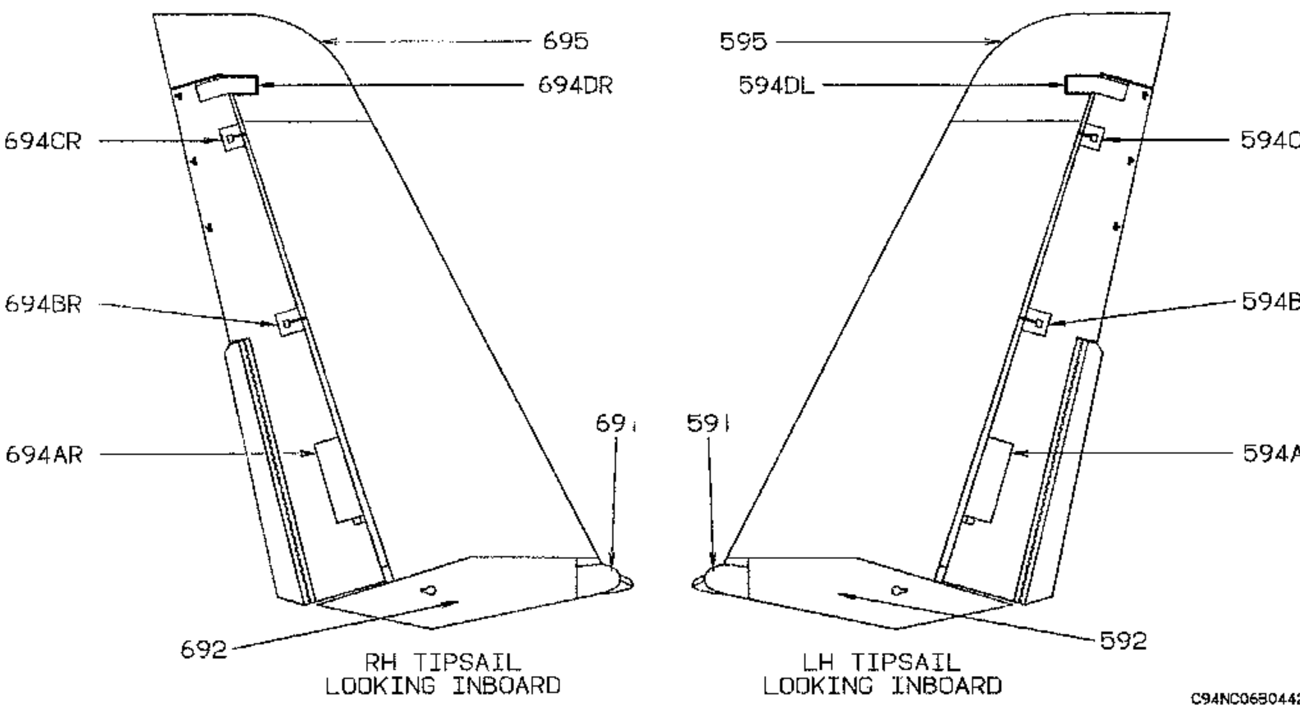
682AL - PANEL: Ice vane linkage retract and extend sense switches.

682BL - PANEL: Ice vane linkage.

682CR - PANEL: Ice vane actuator and linkage.

683AT - PANEL: Battery; Battery power relay panel; Battery vent valve and plumbing; Battery bus circuit breaker panel; RH generator power relay panel; RH generator limiter panel; Bleed air firewall shutoff valve; Bleed air plumbing; Bleed air leak detection sensing elements; Engine fire extinguisher bottle discharge lines.

RH Nacelle Access Panels (Effectivity: All)
(Sheet 2 of 2)
Figure 11



Tipsail Access Panels (Effectivity: All)
(Sheet 1 of 2)
Figure 12

591 - LENS: Landing light.

592 - FAIRING: Rudder sector and pushrod; Lower rudder hinge; Strobe light power supply.

594AL - COVER: Rudder trim tab actuator.

594BL - COVER: Rudder hinge.

594CL - COVER: Rudder hinge.

594DL - FAIRING: Rudder balance weights.

595 - TIP: Tipsail structure.

691 - LENS: Landing light.

692 - FAIRING: Rudder sector and pushrod; Lower rudder hinge; Strobe light power supply.

694AR - COVER: Rudder trim tab actuator.

694BR - COVER: Rudder hinge.

694CR - COVER: Rudder hinge.

694DR - FAIRING: Rudder balance weights.

695 - TIP: Tipsail structure.

Tipsail Access Panels (Effectivity: All)
(Sheet 2 of 2)
Figure 12

CHAPTER 7 - LIFTING AND SHORING

LIST OF PAGE EFFECTIVITY

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CHAPTER 7 - LIFTING AND SHORING

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SUBJECT *PAGE*

GENERAL - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

When an airplane has experienced abnormal landing gear procedures of any type, as a safety precaution, place the airplane on jacks prior to performing any inspection or maintenance. Ensure that all three landing gears are down and locked prior to removing the airplane from jacks.

CAUTION

Jacking of an airplane for the purpose of landing gear operation inspection, servicing or maintenance should be accomplished within an enclosed building or hangar. In the intrest of safety, should it become necessary to jack the airplane in the open, wind velocity in any direction and terrain variations must be compensated for prior to jacking the airplane.

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lockpin installation procedures.

This chapter contains information about jacking the airplane for maintenance purposes. If the main landing gear are to be raised off the ground, the fuel in the wings should be evenly distributed. If possible all jacking of the airplane should be accomplished in an enclosed building or hangar.

When jacking the airplane in the open, wind velocity in any direction must be considered. Never jack more than one gear clear of the ground when winds are in excess of 35 knots.

SPECIAL TOOLS AND EQUIPMENT (Effectivity: All)

Each tool listed in Chart 1 is provided as an example of the equipment designed to perform a specific function. Generic or locally manufactured tools that are the equivalent with respect to accuracy, function and craftsmanship may be used in lieu of those listed.

CHART 1
SPECIAL TOOLS AND EQUIPMENT (Effectivity: All)

TOOL NAME	PART NO.	SUPPLIER	USE
1. Jack, Small Hydraulic (Capacity 7,000 Pounds)		Commercially available.	For single point lifting.
2. Tripod Jack (Nose)	02-0532-0100	TronAir Corp. South 1740 Eber Road Holland, Ohio 43528	To raise airplane.
3. Tripod Jack (Wing) (2 Req.)	02-0544-0100	TronAir Corp. South 1740 Eber Road Holland, Ohio 43528	To raise airplane.
4. Jack Fitting (3 Req.)	122-100072-7	Raytheon Aircraft Company Wichita, Kansas	Adapt jack to jack fittings on airplane.

JACKING AND HOISTING - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

THREE-POINT JACKING (Effectivity: All)

There are three jack points on the airplane for lifting with tripod type jacks: the nose jack point is on the underside of the fuselage aft of the nose gear wheel well at FS 86.16; the two wing jack points are on the underside of the aft wing in line with the main gear wheel well outboard ribs at FS 398.34. Each location is placarded JACK POINT & TIE DOWN.

SINGLE-POINT JACKING (Effectivity: All)

For single-point jacking, a reinforced point on the underside of each landing gear strut is provided. A hydraulic jack is placed under the landing gear to lift the airplane. Single-point jacking is used for tire removal or similar maintenance practices where a single wheel must be off the ground. This practice is not intended to replace three-point lifting.

CAUTION

Do not use tripod jacks for single-point lifting of the airplane. Single-point lifting should only be accomplished through the use of floor jacks under the reinforced points provided. Attempting to lift the airplane through the use of a single tripod jack at a jack point may seriously damage the airplane.

JACKING AND HOISTING - MAINTENANCE PRACTICES (Effectivity: All)

WARNING

When jacking the airplane in an unsheltered area where winds in excess of 35 kts may be encountered, never jack more than one gear clear of the ground at a time. For safety of personnel and the airplane, wind velocity in any direction must be considered prior to jacking the airplane in the open.

Jacking for landing gear operation should only be accomplished within an enclosed building or hangar.

THREE-POINT JACKING (Effectivity: All) (Figure 1)

CAUTION

The fuel must be evenly distributed in both wings to ensure stability while the airplane is on jacks.

a. Remove the plugs from the nose and wing jack points.

b. Install a jack fitting (4, Chart 1, 7-00-00) into each jack point.

NOTE

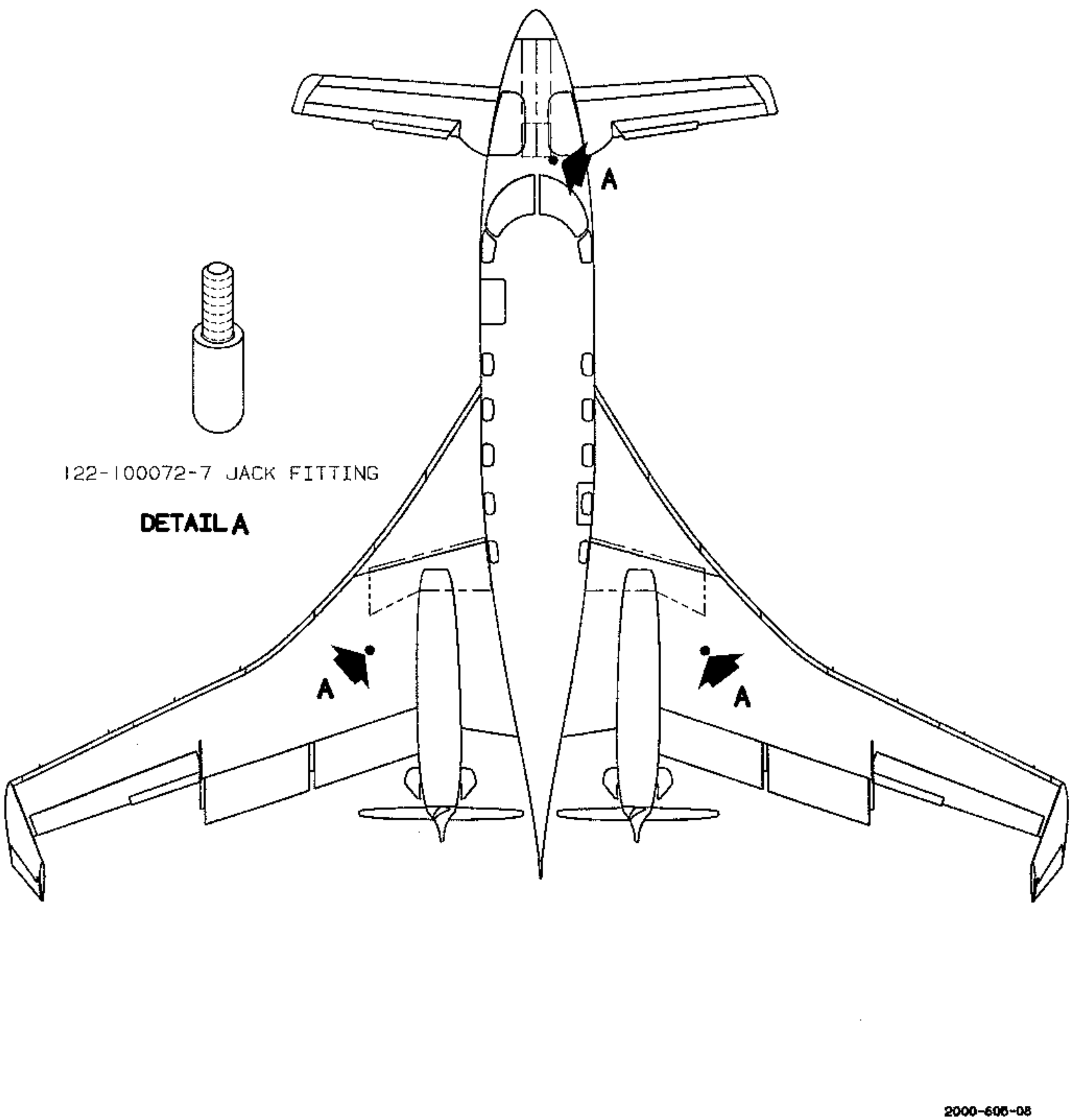
If the airplane must be leveled, refer to Chapter 8-10-00.

c. Place the tripod jack (2, Chart 1, 7-00-00) in position under the nose jack fitting

d. Place a tripod jack (3, Chart 1, 7-00-00) in position under each wing jack fitting.

WARNING

Lift the wings simultaneously to prevent side loads on the jacks and structure.



Jack Pad Location (Effectivity: All)
Figure 1

e. Lift the airplane as necessary.

f. After maintenance is completed, lower the the jacks simultaneously until the landing gear is on the ground.

g. Lower the jacks and remove them from under the airplane.

h. Remove the jack fittings from the jack point locations.

i. Install the plugs into the jack points.

SINGLE-POINT JACKING (Effectivity: All) (Figure 2)

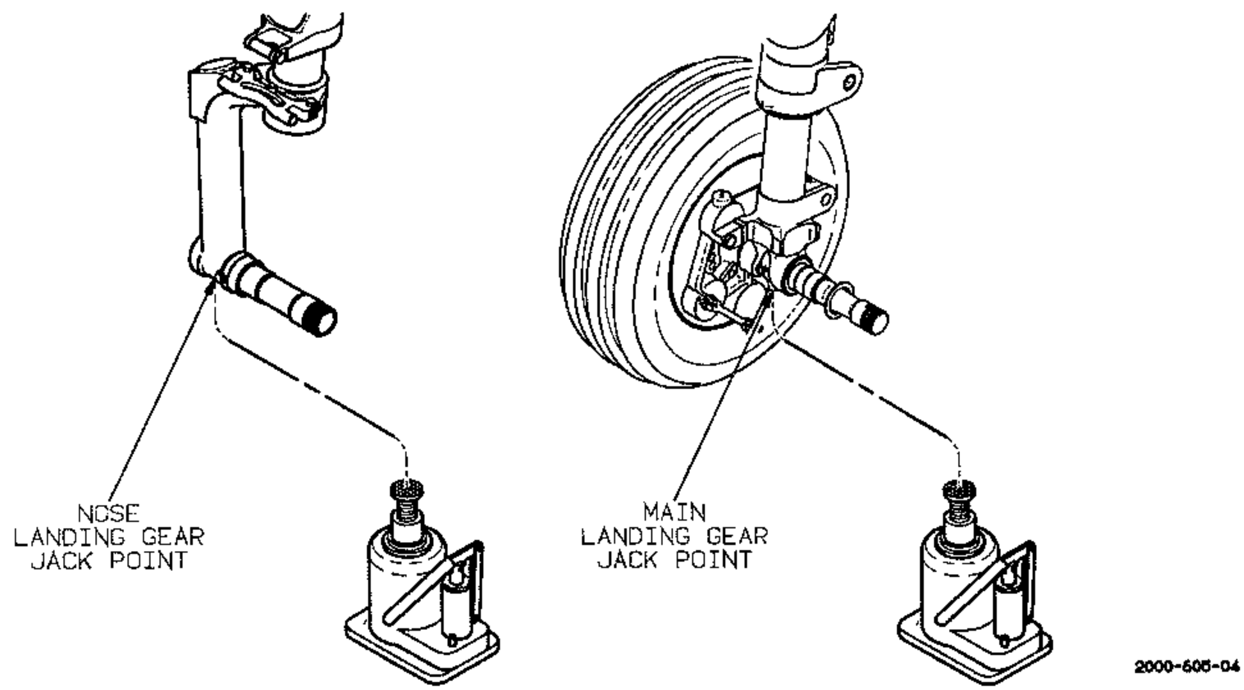
If maintenance is required on one wheel only, special jack points are provided on the bottom of the landing gear struts. Lift the airplane with a hydraulic jack (1, Chart 1, 7-00-00).

a. When lifting the nose, set the parking brakes and chock the main gear wheels fore and aft.

b. When lifting either of the main wheels, place chocks under the other main wheels and the nose wheel.

c. Place an upright jack (1, Chart 1, 7-00-00) under the landing gear jack point and lift the airplane to the necessary height.

d. After maintenance is completed, lower the airplane and remove the jack.



Single-Point Jacking (Effectivity: All)
Figure 2

8 - LEVELING AND WEIGHING

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CHAPTER 8 - LEVELING AND WEIGHING

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GENERAL - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

This chapter provides information to properly level the airplane for any of the various maintenance, overhaul, or major repairs that might become necessary during the life of the airplane. It also includes those maintenance practices necessary to prepare the airplane for weighing.

SPECIAL TOOLS AND EQUIPMENT (Effectivity: All)

Each tool listed in Chart 1 is provided as an example of the equipment designed to perform a specific function. Generic or locally manufactured tools that are the equivalent with respect to accuracy, function and craftsmanship may be used in lieu of those listed.

CHART 1
SPECIAL TOOLS AND EQUIPMENT (Effectivity: All)

TOOL NAME	PART NO.	VENDOR	USE
1. Plumb Bob Support Assy.	114-590025-1	Beech Aircraft Corp. Wichita, Kansas	To level airplane
2. Tie-Down Ring	122-590014-1	Beech Aircraft Corp. Wichita, Kansas	As plumb bob support while measuring wheel reaction locations.

LEVELING - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

The process of leveling the airplane is through the use of a plumb bob support assembly (1, Chart 1, 8-00-00) and plumb bob attached to the upper cabin door frame. A permanent leveling screw in the cabin door threshold marks the plumb bob target.

At the top of the cabin door frame, the leveling point is at FS 176.40, about 3.6 inches forward of the striker plate. The lower leveling point is directly below on the cabin door threshold. Figure 1 shows the location of the leveling points.

LEVELING - MAINTENANCE PRACTICES (Effectivity: All)

LEVELING ON TRIPOD JACKS (Effectivity: All)

a. Place the airplane on tripod jacks according to instructions given in THREE-POINT JACKING in Chapter 7-10-00.

b. Remove the 10-32 set screw from the upper level point in the upper cabin door frame.

c. Insert the plumb bob support assembly (1, Chart 1, 8-00-00) into the location that the set screw was removed from and tighten finger-tight.

d. Adjust the cord through the plumb bob support assembly until the plumb bob is as close to the lower leveling point screw as possible without touching. Secure the cord with the thumbscrew on the support assembly.

e. Adjust the jacks until the plumb bob is centered over the leveling screw in the cabin door threshold. This will level the airplane laterally and longitudinally.

f. Remove the plumb bob support assembly and install the set screw in the upper leveling point.

LEVELING ON LANDING GEAR (Effectivity: All)

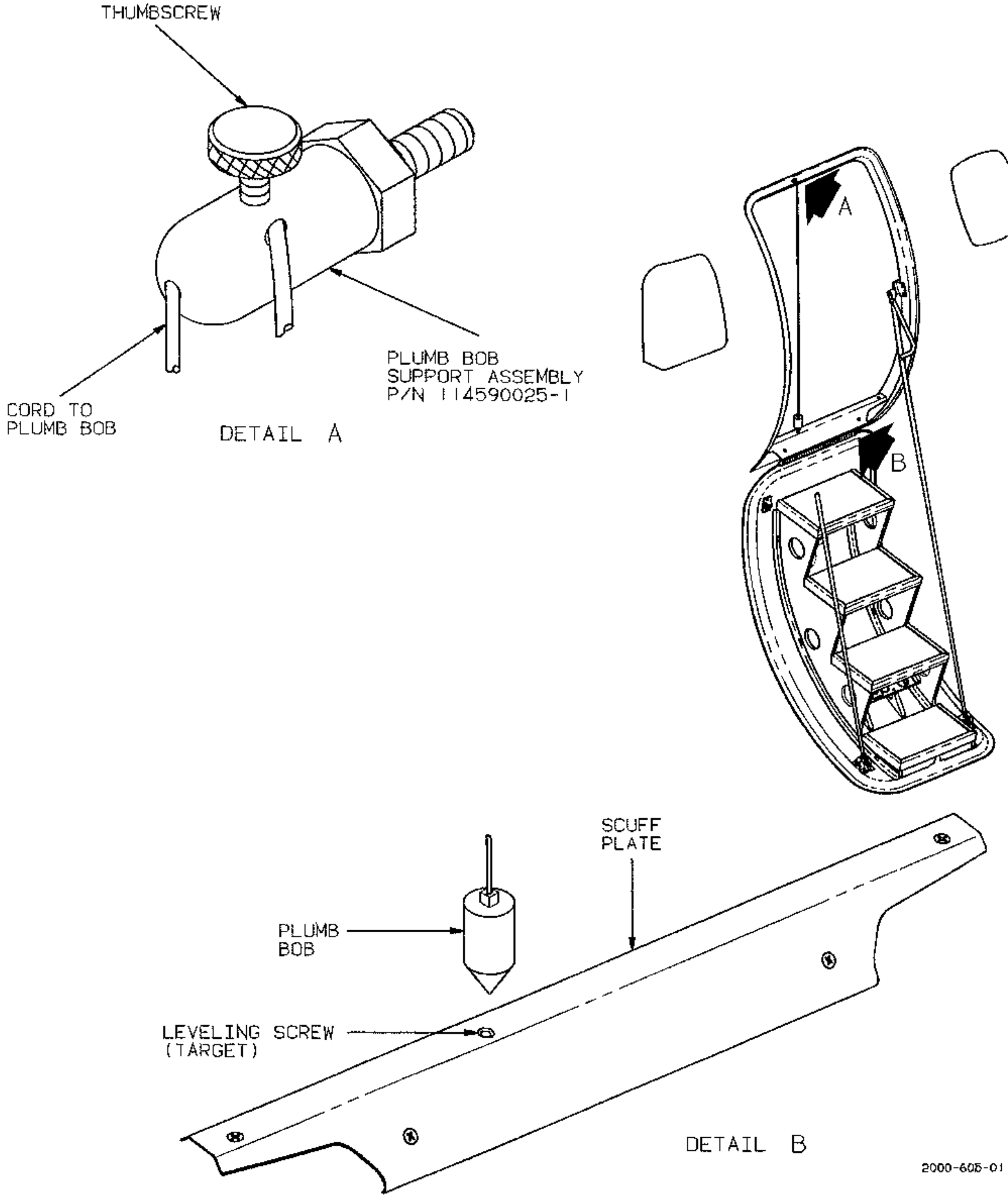
If the airplane is leveled while on the landing gear, leveling is accomplished by adjusting the pressure in the struts and/or tires. The leveling procedure must be performed on a relatively level surface. Raising or lowering of the tires and struts is not intended to compensate for an uneven surface. This leveling procedure will not allow gross leveling corrections and is only intended to provide for small changes in airplane attitude.

a. To level the airplane laterally, deflate the main tire and/or the main shock strut on the appropriate side until the plumb bob is in line laterally with the leveling screw. It is simpler and preferable to use the tire rather than the shock strut for leveling.

CAUTION

Do not completely deflate any shock strut or tire. Do not inflate the main gear shock strut to more than 1200 pounds psi or beyond full extension. Full extension of the main landing gear shock strut is 11 inches. Do not exceed the maximum tire inflation pressure of 120 psi.

b. To level the airplane longitudinally when the nose of the airplane is too high, deflate the nose landing gear shock strut and/or the nose tire. If the nose is too low, add air pressure to the nose landing gear shock strut or to the nose wheel tire until the plumb bob is in line longitudinally with the leveling screw. It is simpler and preferable to use the tire rather than the shock strut for leveling.



Airplane Leveling (Effectivity: All)
Figure 1

CAUTION

Do not completely deflate any shock strut or tire. Do not inflate the nose landing gear shock strut to more than 400 pounds psi or beyond full extension. Full extension of the nose landing gear shock strut occurs when it is extended 10 inches. Do not exceed the maximum tire inflation pressure of 120 psi.

NOTE

Do not move the airplane after it has been leveled. Doing so may cause the airplane to be out of level and provide incorrect weight and balance calculations.

c. Before returning the airplane to service, bring the tires and/or struts back to recommended pressures according to the servicing procedures in Chapter 12-10-00.

d. Remove the plumb bob support assembly from the upper cabin door frame and install the set screw.

WEIGHING - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

Periodic weighing of the airplane may be required to keep the Basic Empty Weight Chart current when new or updated equipment is installed. Frequency of weighing and all changes to the airplane affecting weight and/or balance are the responsibility of the airplane operator and must be recorded in the Basic Empty Weight Chart in Section VI of the Airplane Flight Manual (AFM).

The airplane may be weighed on the wheels or on the jack points. The nose jack point on the underside of the fuselage, aft of the nose gear wheel well at FS 86.16, is used as a jig point for measuring the wheel reaction locations. Refer to Figure 1 for the location of the jig point. Basic information regarding the measuring of the wheel reaction locations is also provided in this section.

WEIGHING - MAINTENANCE PRACTICES (Effectivity: All)

Perform the following before the airplane is weighed:

a. Drain the fuel from the airplane as indicated in Chapter 12-10-00. If the airplane fuel system is properly drained, the airplane basic empty weight includes the undrainable fuel.

b. Engine oil must be at the full level in each tank.

c. Retract the flaps and forward wing (wing swept aft).

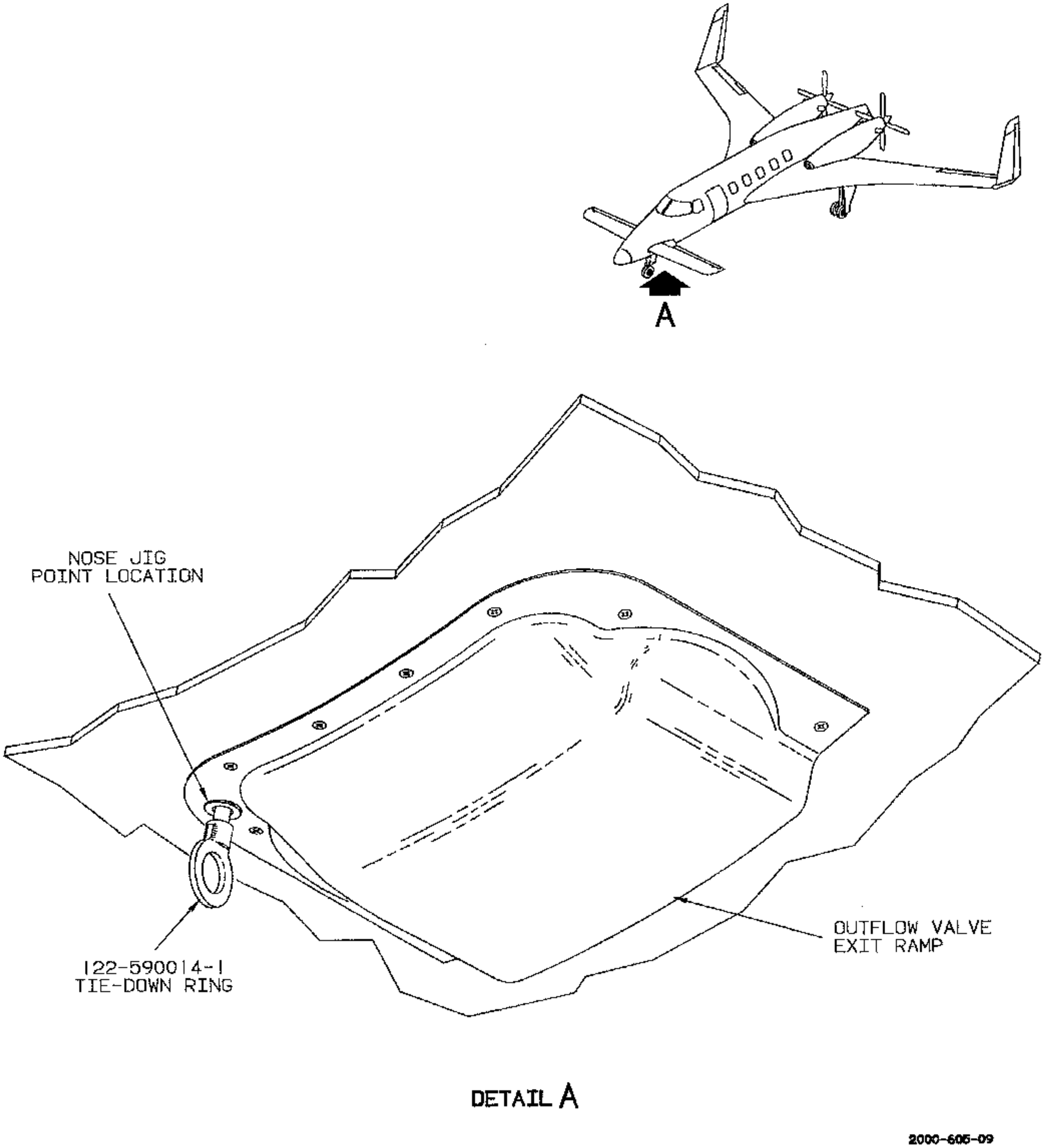
d. To determine the airplane configuration at the time of weighing, installed equipment is to be checked against the airplane equipment list. Put all equipment in its proper place during weighing.

e. Level the airplane on the scales as described in 8-10-00.

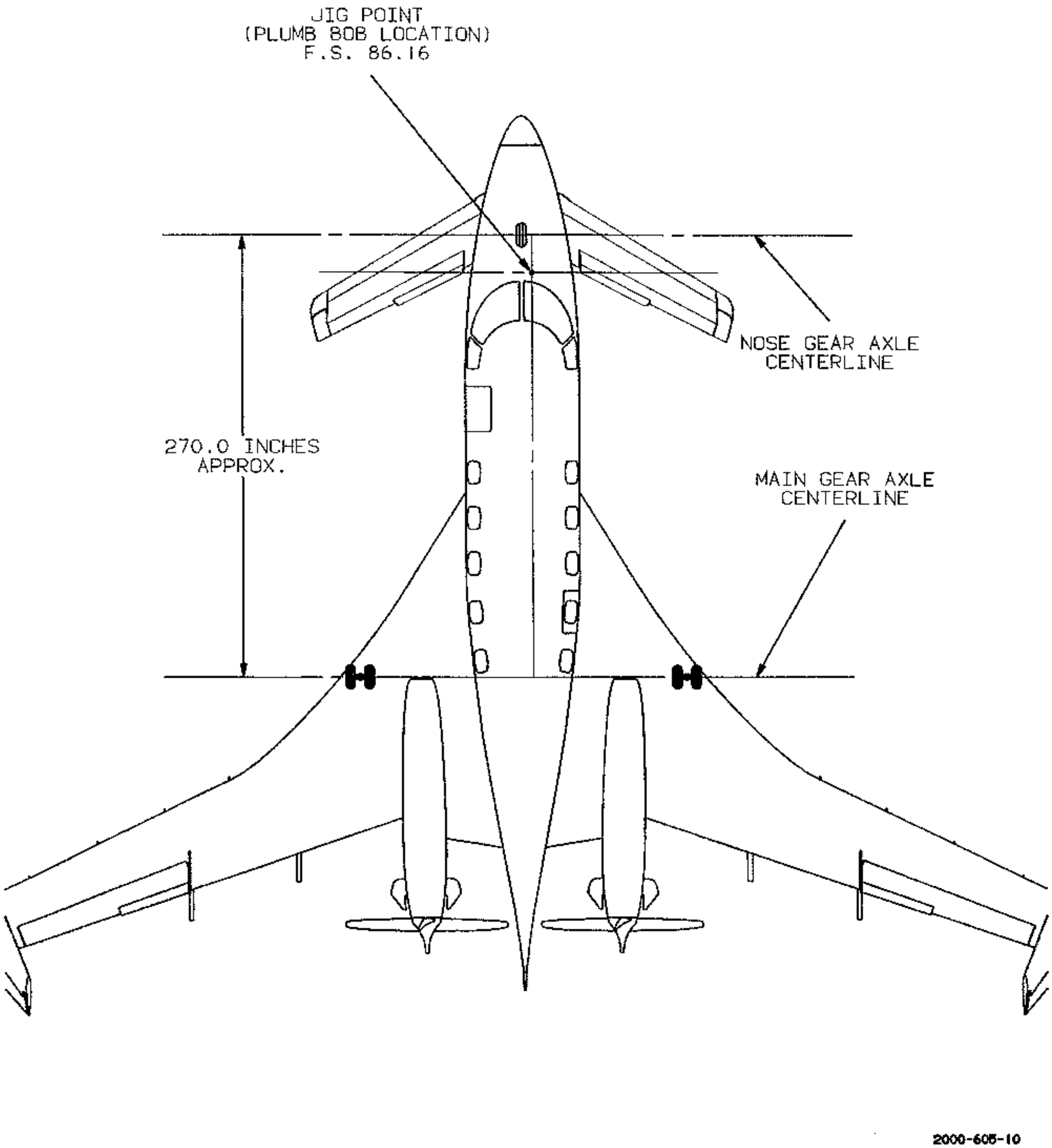
f. Measurement of the reaction arms is made by using the nose jack point on the underside of the fuselage aft of the nose gear wheel well as a jig point. After the airplane is leveled by using the procedure described in Chapter 8-10-00, remove the plug from the nose jack point. Install a tie-down ring (2, Chart 1, 8-00-00) into the jack point. Hang a plumb bob from the tie-down ring and mark the target on the floor. Using a steel measuring tape, measure from this point to the nose wheel axle centerline, then from the nose wheel axle centerline to the main wheel axle centerline. The main wheel axle centerline is best located by stretching a string across from one main wheel axle to the other. All measurements are to be taken with the tape level with the hangar floor, and parallel to the fuselage centerline. Refer to Figure 2.

g. Weighing should always be done in an enclosed area free of air currents. The scales should be calibrated and certified in accordance with basic tolerance values of the National Bureau of Standards.

h. All information pertaining to weight and balance must be recorded in Section VI of the Airplane Flight Manual (AFM).



Jig Point Location (Effectivity: All)
Figure 1



Wheel Reaction Location Measurement (Effectivity: All)
Figure 2

CHAPTER 9 - TOWING AND TAXIING

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CHAPTER 9 - TOWING AND TAXIING

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GENERAL - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

CAUTION

Before taxiing or moving the airplane, ensure that the lower nose panels (131AL, 132AR) are installed and secure, the nose avionics compartment doors (213AL, 214RL) are installed and secure, and the cabin door is closed and latched.

Towing the airplane with a tow vehicle and tow bar allows ground movement without engine operation. Towing is the preferred method of ground movement since it provides greater safety and control when the proper procedures are followed. Refer to Chapter 9-10-00 for detailed towing procedures.

Taxiing is accomplished with the airplane engines, brakes and steering by properly trained and qualified personnel. Refer to Chapter 9-20-00 for additional information on taxiing the airplane.

CAUTION

Do not tow or taxi the airplane with a deflated shock strut or tire. Even brief towing or taxiing with a deflated shock strut or tire may severely damage the airplane. Do not tow the airplane with the steering linkage disengaged.

SPECIAL TOOLS AND EQUIPMENT (Effectivity: All)

Each tool listed in Chart 1 is provided as an example of the equipment designed to perform a specific function. Generic or locally manufactured tools that are the equivalent with respect to accuracy, function and craftsmanship may be used in lieu of those listed.

CHART 1
SPECIAL TOOLS AND EQUIPMENT (Effectivity: All)

TOOL NAME	PART NO.	VENDOR	USE
1. Tractor Tow Bar	50-590017	Beech Aircraft Corp., Wichita, Ks	Tow airplane
2. Hand Tow Bar	50-590001	Beech Aircraft Corp., Wichita, Ks	Tow airplane

TOWING - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

Towing the airplane with a tow vehicle and tow bar allows ground movement without engine operation. Towing is the preferred method of ground movement since it provides greater safety and control when the proper procedures are followed. The tow fitting on the airplane has fuse pins that will allow the tow bar to break loose from the nose gear strut if excessive pull is applied to the fitting. The nose gear assembly is also equipped with stops to prevent excessive turn inputs from damaging the nose gear. However, neither of these measures will prevent damage from towing vehicle operations that exceed the placarded turn limits (marked on the lower fuselage outboard of the nose landing gear wheel well), abrupt towing maneuvers, or excessive speed. Therefor, always anticipate turn clearance, tow carefully, and slowly to prevent the possibility of damage to the airplane.

CAUTION

Never exceed the turn limits marked on the nose during ground handling. The nose gear steering is designed to hold loads imposed through steering from the cockpit. It is possible to exceed the stops during towing operations causing damage to the steering linkage and nose strut.

CAUTION

Do not tow the airplane with a deflated shock strut or tire. Even brief towing with a deflated shock strut or tire may severely damage the airplane. Do not tow the airplane with the steering linkage disengaged.

TOWING - MAINTENANCE PRACTICES (Effectivity: All)

Observe the following safety precautions during any towing operations.

a. Ensure that the lock pins are installed in the landing gear. Refer to Chapters 32-10-00 and 32-20-00 for the proper pin installation procedures.

b. When moving the airplane, do not push on the propeller or control surfaces.

c. Ensure that the lower nose access panels (131AL, 132AR) are installed and secured before towing, or moving the airplane by hand.

d. Close and latch the cabin door.

e. Do not exceed the turning limits marked on the lower nose section of the airplane. Refer to Figure 2 for the ground turning radius.

f. Position personnel in the cockpit to operate the brakes in the event of an emergency. The brakes are to be used only in the event of an emergency.

g. Wing walkers must be stationed in sight of the towing personnel when moving the airplane in congested areas. Ensure that the personnel are familiar with parking hand signals.

h. Do not scrub the tires. Always allow sufficient clearance to turn the airplane without using the minimum turning radius.

NOSE GEAR TOWING PROCEDURE (Effectivity: All) (Figure 1)

CAUTION

Before towing or moving the airplane by hand, ensure that the lower nose panels (131AL, 132AR) are installed and secured, and that the cabin door door is closed and latched. Failure to follow these instructions may severely damage the airplane.

a. Loosen the tow bar thumbscrew and place the locking tube in the unlocked position. Connect the tow bar (1, Chart 1, 9-00-00) to the tow bar fitting as shown in Figure 1.

b. Slide the locking tube toward the nose gear to lock the arms, then tighten the thumbscrew.

c. Connect the tow bar to the towing vehicle.

d. Position a person familiar with the airplane inside the cockpit to operate the brakes in the event of an emergency.

e. Station wing walkers at the wingtips, especially in congested areas.

f. Tow the airplane using as large a turning radius as possible. Figure 2 illustrates the minimum turning clearance required with the use of a tow bar.

CAUTION

Do not exceed the turning limits placarded on the nose of the airplane at any time during ground handling operations. Exceeding these turning limits may damage the steering mechanism.

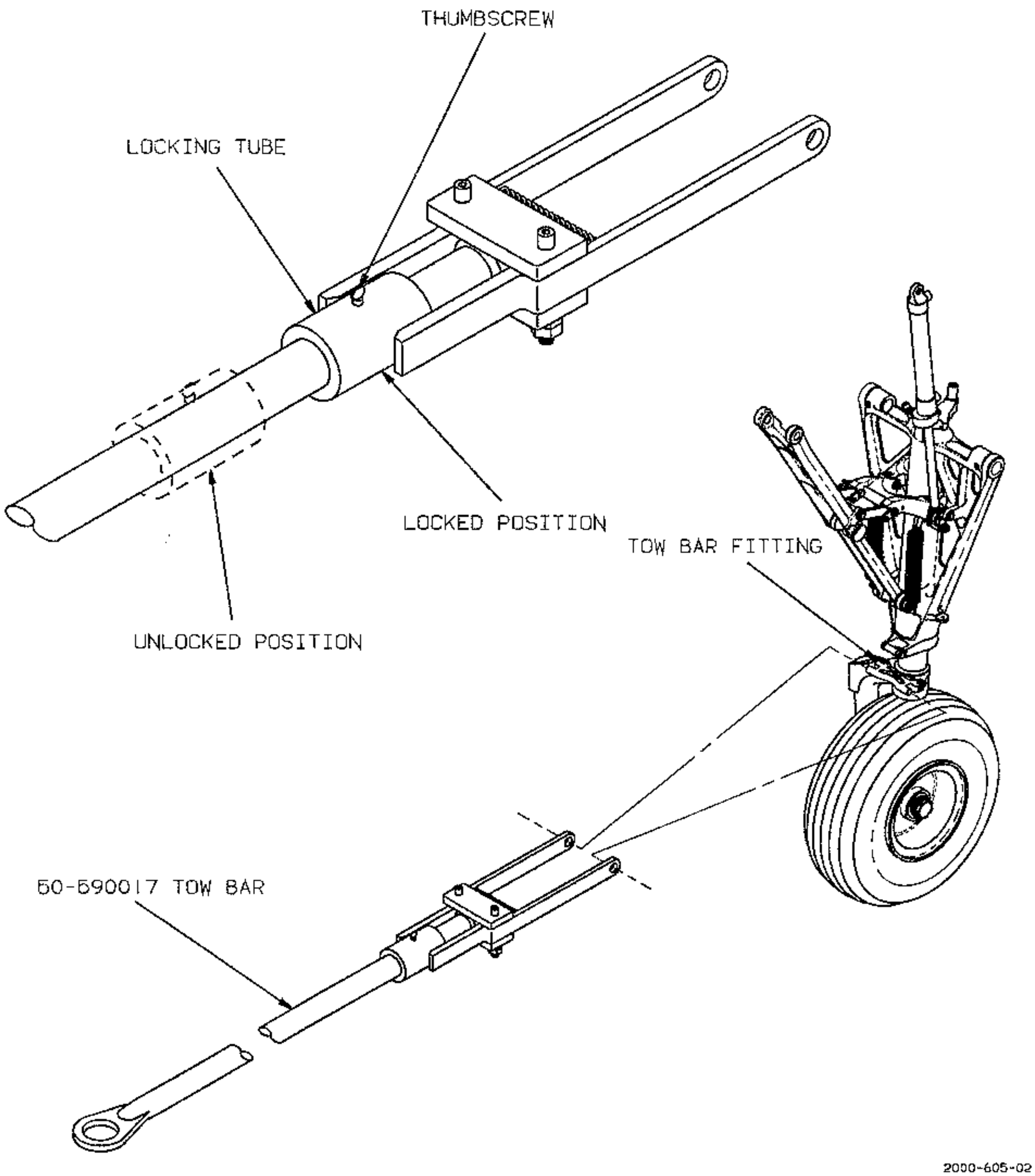
g. When towing is completed, park the airplane according to the procedure outlined in Chapter 10.

WARNING

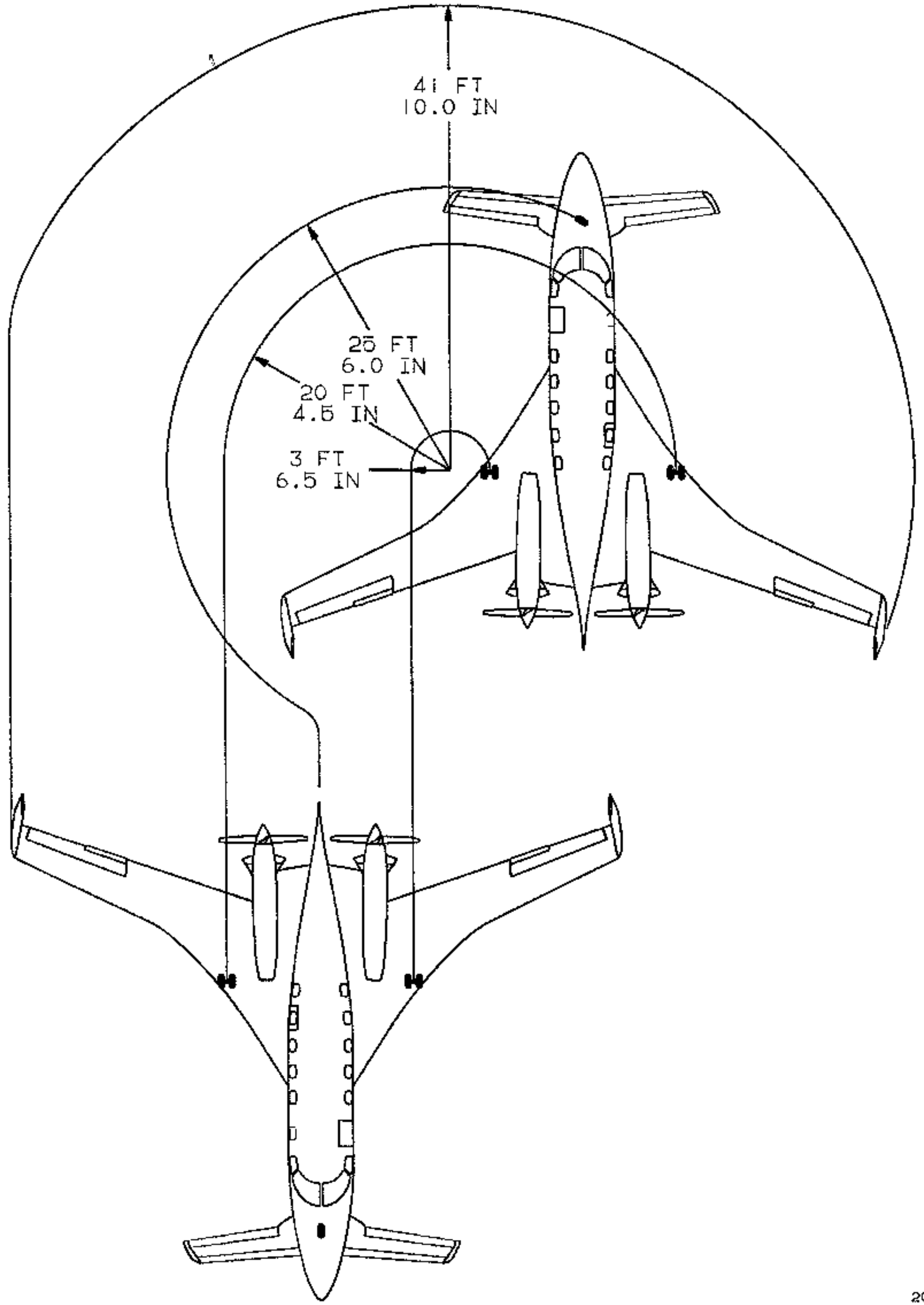
Ensure that the wheels are chocked before disconnecting the tow bar. Failure to chock the wheels may allow the airplane to move and endanger personnel working near the airplane.

h. Loosen the tow bar thumbscrew and slide the locking tube away from the nose gear to unlock the arms.

i. Open the tow bar arms and disconnect them from the nose gear.



Nose Gear Towing (Effectivity: All)
Figure 1



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Ground Turning Clearances (Effectivity: All)
Figure 2

TAXIING - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

Taxiing is accomplished with the airplane engines, brakes and steering by properly trained and qualified personnel. Steering during taxi operation is accomplished by using the rudder pedals to turn the nose wheel. The nose gear steering has stops to prevent excessive turn inputs, but the best protection against landing gear damage is to avoid putting the airplane into areas requiring difficult taxi maneuvers. Read and comply with all safety precautions and operating instructions provided in the Pilot's Operating Handbook.

TAXIING - MAINTENANCE PRACTICES (Effectivity: All)

Prepare for taxiing by observing all safety precautions. Refer to the Pilot's Operating Handbook for starting and operating procedures.

CAUTION

Do not taxi the airplane with a deflated shock strut or tire. Even brief taxiing with a deflated shock strut or tire may severely damage the airplane. Do not taxi the airplane with the steering disengaged. Close all access doors and brief taxi personnel regarding the destination and their responsibilities. Roll forward before making any turns. After parking the airplane, shut down the engines, install chocks, and/or tie the airplane down. Refer to Chapter 10, PARKING AND MOORING.

CAUTION

Before taxiing or moving the airplane by hand, ensure that the lower nose panels (131AL, 132AR) are installed and secure, the nose avionics compartment doors (213AL, 214 AR) are installed and secure, and the cabin door is closed and latched. Failure to follow these instructions may severely damage the airplane.

Personnel must be familiar with the airplane and observe the following safety precautions when the airplane is taxied.

a. Do not exceed the turning limits of the airplane (refer to Chapter 9-10-00, Figure 2).

b. Ensure that the hydraulic system and brakes are in good working order prior to taxiing.

c. Use only the engine thrust required to begin taxiing and maintain the necessary speed. Do not use continuous braking.

d. Do not taxi in a congested area or where propeller blast will strike other airplanes.

e. Ensure adequate clearance for tipsails and wings. Use observers outside the airplane to direct it and ensure adequate clearance when taxiing near obstructions. The observers must be continuously in sight of the cockpit and be familiar with taxi and parking hand signals.

f. Spotty ice cover is hard to see. Taxi slowly and allow more clearance in maneuvering the airplane.

g. When possible, taxiing in deep snow or slush should be avoided since the snow and slush can be forced into the brake assemblies. Keep the flaps retracted during taxiing to avoid throwing snow or slush into the flap mechanisms and to minimize damage to the flap surfaces.

h. Obtain tower clearance before taxiing onto or across active taxiways or runways.

i. Do not scrub the tires. Allow sufficient space to turn the airplane without locking the brakes.

j. Ensure that all loose articles such as cowlings, ladders and tools are secured before engine start.

k. Clear the area of all personnel not required for the operation.

l. Close and latch the cabin door.

m. Avoid areas of debris to prevent propeller damage.

CHAPTER 10 - PARKING AND MOORING

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GENERAL - MAINTENANCE PRACTICES

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

SPECIAL TOOLS AND RECOMMENDED MATERIALS

The special tools and recommended materials listed in Charts 1 and 2 as meeting federal, military or supplier specifications are provided for reference only and are not specifically prescribed by Raytheon Aircraft Company. Any product conforming to the specification listed may be used. The products included in these charts have been tested and approved for aviation usage by Raytheon Aircraft Company, by the supplier, or by compliance with the applicable specifications. Generic or locally manufactured products which conform to the requirements of the specification listed may be used even though not included in the charts. Only the basic number of each specification is listed. No attempt has been made to update the listing to the latest revision. It is the responsibility of the technician or mechanic to determine the current revision of the applicable specification prior to usage of the product listed. This can be done by contacting the supplier of the product to be used.

CHART 1
SPECIAL TOOLS AND EQUIPMENT

TOOL NAME	PART NO.	SUPPLIER	USE
1. TIE-DOWN RING (3 REQUIRED)	122-590014-1	Raytheon Aircraft Co., Wichita, Kansas	Moor Airplane
2. Pitot/Static Tube Covers	114-590024-7/-8	Raytheon Aircraft Co., Wichita, Kansas	Protect Pitot/Static Tubes
3. Gust Lock Assy.	122-590011-21	Raytheon Aircraft Co., Wichita, Kansas	Control Surface Lock
4. Propeller Sling	122-590016-3	Raytheon Aircraft Co., Wichita, Kansas	Restrain Propeller
5. Engine Inlet Cover	122-590016-57	Raytheon Aircraft Co., Wichita, Kansas	Cover Engine Air Inlet Opening
6. Inlet Cover Extraction Handle	122-590018-1	Raytheon Aircraft Co., Wichita, Kansas	Assist In Removal of Air Inlet Covers
7. Exhaust Stack Covers	122-590016-61/62	Raytheon Aircraft Co., Wichita, Kansas	Cover Exhaust Stacks
8. AOA Transmitter Probe Cover Assembly	123-149	Avionics Specialties Inc., P.O. Box 6400 Charlottesville, Virginia, 22906	Protect AOA Transmitters

CHART 2
RECOMMENDED MATERIALS

MATERIAL	SPECIFICATION	PRODUCT	SUPPLIER
1. Desiccant Bags	MIL-D-3464	Desiccant 99.6 Silica Dioxide S102	VWR Scientific, P.O. Box 23037, Kansas City, MO 64141
2. Oil, Preserving	MIL-L-6081	460	Bray Oil Co., 1925 Marianna Ave., Los Angeles, CA 90032
		Turbine Oil 2	Royal Lubricants Co., River Road, Hanover, NJ 07936
3. Barrier Material	MIL-B-121, Type 1, Grade C, Class 1		Mid Continent Paper Co., 2904 South Spruce, Wichita, KS 67216
4. Tape, Polyethelene		Number 483	Minnesota Mining & Mfg. Co., 900 Bush Ave., St. Paul. MN 55144
5. Oil, Lubrication	MIL-L-22851	Grade 1100	Obtain Locally
6. Corrosion Preventive Compound	MIL-C-16173, Grade 2	Braycote 137	Bray Oil Co., 1925 Marianna Ave., Los Angeles, CA 90032
		Shell Fluid 4	Shell Oil Co., 50 W. 50th St., New York, NY 10020
		PED 337	Standard Oil of California, 225 Bush St., San Francisco, CA 94120
		Mobilube SHC	Mobil Oil Corp., P.O. Box 1031, Princeton, NJ 08540
7. Preservative, Hydraulic Fluid	MIL-H-6083	Averx 904	Mobil Oil Corp., 150 E. 42nd St., New York, NY 10017
		Royco 783C	Royal Lubricants Co., River Road, Hanover, NJ 07936
8. Solvent, Dry Cleaner or White Spirit	PD680 Type III or British Spec. 245	Stoddard Solvent (Mineral Spirits)	Obtain Locally
9. Humidity Indicator	MIL-I-8835	MS20003-2	Humidial Corp., Colton, CA

PARKING - MAINTENANCE PRACTICES (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

PARKING (Effectivity: All) (Figure 1)

Parking the airplane is accomplished as follows:

a. To set the parking brakes, depress the toe portion of either the pilot's or copilot's rudder pedals several times to build pressure in the brake lines, then pull out the parking brake handle located on the center pedestal below the power levers. Do not attempt to set the parking brake by applying force to the parking brake handle without depressing the brakes; the parking brake handle only controls a valve that holds brake pressure. To release the brakes, depress the rudder pedals briefly, then push the parking brake handle in.

CAUTION

Do not set the parking brake when the brakes are hot from use to prevent warping the brake discs. Do not set the parking brake after exposure to low ambient temperature; trapped moisture may cause the brakes to freeze.

b. Install the gust lock (3, Chart 1, 10-00-00) according to the procedures provided in Chapter 27-70-00.

c. Chock the wheels, install tie-down rings (1, Chart 1, 10-00-00), and tie the airplane down with approved mooring cables (refer to Chapter 10-20-00 for tie-down ring location and tie-down procedure).

d. Install propeller slings (4, Chart 1, 10-00-00), engine inlet covers (5, Chart 1, 10-00-00) and exhaust stack covers (7, Chart 1, 10-00-00).

e. Install the AOA transmitter probe covers (8, Chart 1, 10-00-00).

f. Install the pitot/static tube covers (2, Chart 1, 10-00-00).

STORAGE (Effectivity: All) (Figure 1)

ENGINE (Effectivity: All)

The following inspections and actions are recommended according to the number of days the airplane is to be stored.

CAUTION

Do not spray preservative oil onto the engine compressor or turbine blades. Dirt particles that adversely affect engine efficiency will collect on the blades and vanes.

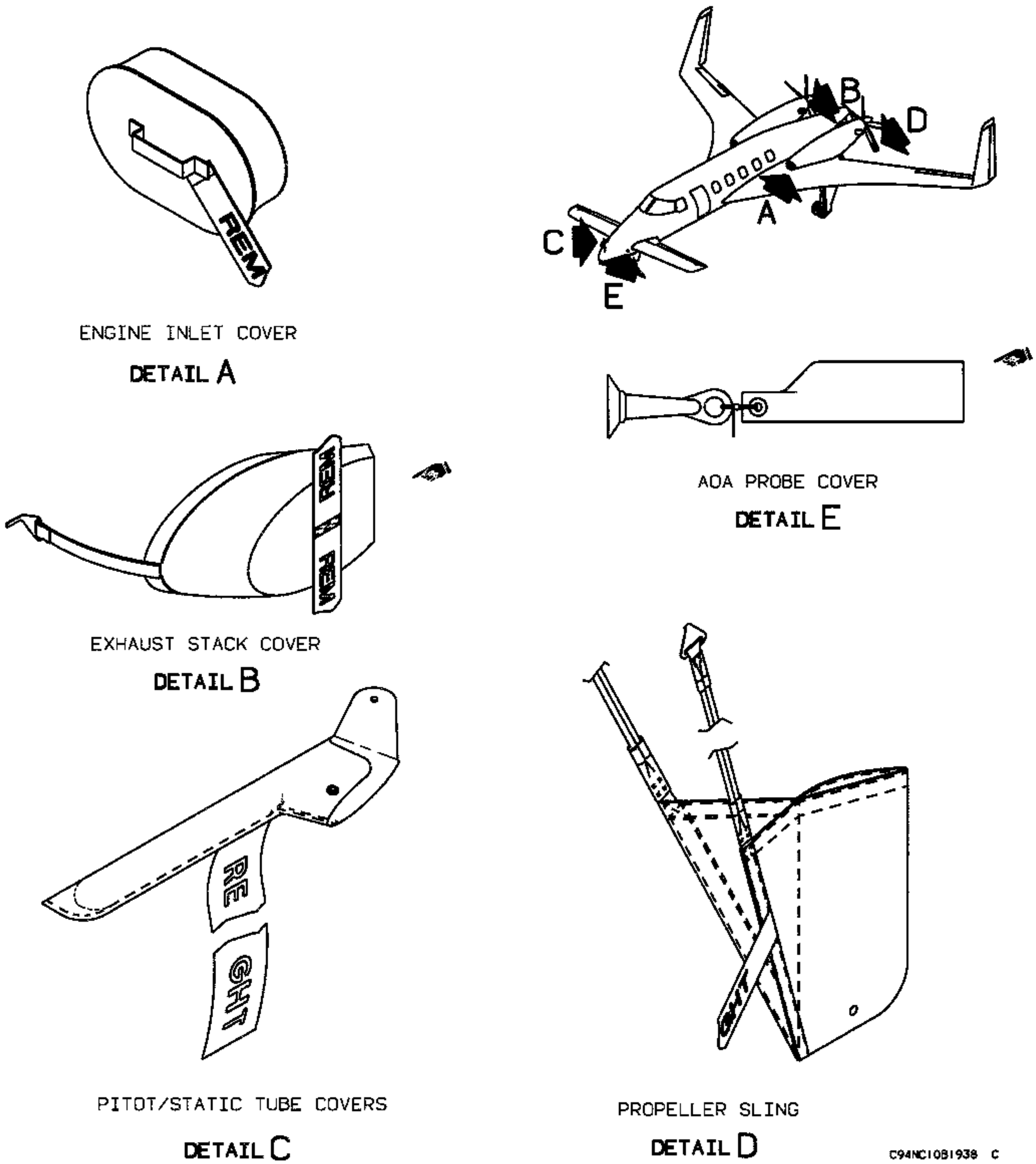
a. **0 to 7 days** - The engines may be left in an inactive state without preservation protection. Install propeller slings (4, Chart 1, 10-00-00), engine inlet covers (5, Chart 1, 10-00-00) and exhaust stack covers (7, Chart 1, 10-00-00).

b. **8 to 28 days** - Engines that are inactive up to 28 days require no preservation if the engine openings are sealed off and the relative humidity in the engine is maintained at or below 40 percent. The humidity can be controlled and checked by placing humidity indicators (9, Chart 2, 10-00-00) and desiccant bags (1, Chart 2, 10-00-00) in the engine exhaust duct.

NOTE

Ensure that the desiccant bags are kept off all engine parts by placing the bags on wooden racks. Provide suitable windows in the exhaust closures for observation of the humidity indicators.

c. **29 to 90 days** - In addition to the preservation requirements for 8 to 28 days, engines inactive for period exceeding 28 days need only have the fuel system preserved as noted in the following paragraphs:



Parking and Storage Equipment (Effectivity: All)
Figure 1

CAUTION

Extreme care must be taken to prevent foreign material from being drawn into the engine fuel system. Equipment should be fitted with suitable filters or strainers no coarser than a 10-micron rating.

1. Close the firewall shutoff valve. Disconnect the fuel inlet line from the oil-to-fuel heater. Refer to Chapter 73-10-00, ENGINE-DRIVEN FUEL BOOST PUMP REMOVAL for the procedure to disconnect the fuel inlet line. Connect a suitable oil supply line to the oil-to-fuel heater fuel inlet port. Cap off the disconnected fuel supply line.

2. To prevent oil from entering the fuel manifold, disconnect the fuel line at the inlet to the flow divider. Refer to the latest revision of the Pratt and Whitney PT6A-67A Engine Maintenance Manual for instructions on disconnecting this fuel line. Loosen the line to permit drainage into a suitable container.

CAUTION

Do not permit preservative oil to enter the engine where it may come in contact with the thermocouple probe assembly. Oil contamination of probes may cause complete failure of the thermocouple system.

3. Supply preservative oil (2, Chart 2, 10-00-00) at 5 to 25 psig with a temperature of at least 60° F (16° C).

4. With the condition lever in the START position and the power lever at full power, place the ignition/start switch in the STARTER ONLY position and motor the engine with the starter. During the motoring run, the power lever should be moved from full power to IDLE, then returned to full power. The condition lever should be moved from START to FUEL CUT-OFF and returned to START to displace fuel from the system.

CAUTION

Do not exceed the starter operating limits of 30 seconds ON, 5 minutes OFF, 30 seconds ON, 5 minutes OFF, 30 seconds ON, then 30 minutes OFF.

5. After motoring the engine, determine that preservative oil is flowing from the opened fuel line. If required, repeat the motoring cycle until oil is flowing from the fuel line.

6. Following the motoring cycle, return the power lever to IDLE and the condition lever to FUEL CUT-OFF. Reconnect the fuel supply line to the oil-to-fuel heater. Refer to Chapter 73-10-00, ENGINE-DRIVEN FUEL BOOST PUMP INSTALLATION for instructions regarding connection of the fuel line. Reconnect the fuel line to the inlet flow divider. Refer to the latest revision of the Pratt and Whitney PT6A-67A Engine Maintenance Manual for the reconnection of this line.

d. Ensure that all shipping plugs, caps and covers are installed, that all of the engine openings are covered with barrier material (3, Chart 2, 10-00-00) and secured by tape (4, Chart 2, 10-00-00) and that dessicant bags (1, Chart 2, 10-00-00) and humidity indicators (9, Chart 2, 10-00-00) are installed.

NOTE

Ensure that the desiccant bags are kept off of all engine parts by placing the bags on wooden racks. Provide suitable windows in the exhaust closures for observation of the humidity indicators.

e. **91 days and over** - In addition to the preservation procedures required for 29 to 90 days of storage, engines inoperative in excess of 90 days or engines removed from long term storage must have the engine oil drained and have unused accessory drive pads lubricated as directed by the following instructions:

1. Close the firewall fuel shutoff valve and motor the engine with the starter only until oil pressure and compressor speed (N_1) are indicated. Disengage the starter.

CAUTION

Do not exceed the starter operating limits of 30 seconds ON, 5 minutes OFF, 30 seconds ON, 5 minutes OFF, 30 seconds ON, and 30 minutes OFF.

2. Drain the engine oil as instructed in Chapter 79-00-00.

3. Remove the oil filter element and permit oil to drain to a slow drip for approximately one-half hour. Reinstall the filter and close the drains. Refer to the Pratt and Whitney PT6A-67A Engine Maintenance Manual for the oil filter installation procedure.

4. Remove cover plates from unused pads of the accessory gearbox and spray the exposed surfaces and gearshafts with engine lubricating oil (refer to the latest revision of Pratt and Whitney Service Bulletin No. 14001 for specified oil). Reinstall cover plates.

5. Ensure that all shipping plugs, caps and covers are installed, that all of the engine openings are covered with barrier material (3, Chart 2, 10-00-00) secured by tape (4, Chart 2, 10-00-00) and that desiccant bags (1, Chart 2, 10-00-00) are placed inside the engine. Install humidity indicators (9, Chart 2, 10-00-00) in the air inlets and the exhaust nozzles of the engines. Provide inspection windows through the barrier material to permit inspection of the humidity indicators.

NOTE

Ensure that the desiccant bags are kept off of all engine parts by placing the bags on wooden racks. Provide suitable windows in the exhaust closures for observation of the humidity indicators.

6. Tag the oil filler cap with the date of preservation and enter date and type of preservation in the engine log book.

NOTE

Inspection of a preserved engine should be performed every two weeks if the airplane is stored outside, or every 30 days if the airplane is stored inside. If the relative humidity indicator shows less than 40 percent, no further action is required. If the humidity indicated is in excess of 40 percent, the desiccant bags must be replaced with freshly activated bags.

AIRPLANE (Effectivity: All)

Whenever an airplane is out of service over seven days, the following should be accomplished for the protection and preservation of the airplane:

NICKEL-CADMIUM BATTERY (Effectivity: All)

The nickel-cadmium battery may be stored in a charged or discharged state for an unlimited period without damage to the battery. Storage should be in a room that is free of acid or other corrosive liquids or gases. It should also be free of dust or dampness. The temperature may range from -75°F to +140°F without harm to the battery. For long term storage, the most desirable temperature is from +32°F to +86°F.

a. **0 to 30 days** - No action is necessary.

b. **Over 30 days** - Disconnect and remove the nickel-cadmium battery from the airplane and place in a suitable storage area. Refer to Chapter 24-31-00 for battery removal instructions.

1. If the battery is to be stored ready for service, standby (trickle) charging is required. The nickel-cadmium battery will automatically discharge at about 0.25 percent per day at a temperature of 68°F. Charge at a rate of 1 milliampere per ampere-hour of rated capacity (an example would be, 34 milliamperes for a 34 ampere-hour battery). Check the electrolyte level at regular intervals to prevent corrosion from accumulating while on standby charge.

CAUTION

It is extremely important that nickel-cadmium and lead-acid batteries be stored in separate areas (different buildings if possible) so that there is no possibility of contamination even from fumes.

2. If the battery is to be stored in a discharged condition, discharging the battery may be accomplished with a 10-watt variable resistance load to provide a constant current drain of 85 percent of the rated ampere hours of the battery (an example would be 28.9 amperes for a 34 ampere-hour battery). To exceed an 85 percent discharge rate would risk overheating and warping the cases. When the battery is completely discharged, shunt across the positive and negative terminals until the battery is ready to be taken out of storage and serviced.

NOTE

For more complete information regarding battery storage, refer to Chapter 24-31-00 and to the BEECHCRAFT Starship 1 Component Maintenance Manual.

STANDBY POWER SUPPLIES (Effectivity: All)

Over 90 days - Remove the power supplies from the airplane and place in a storage area that will not exceed a temperature of 85°F. Recharge the batteries every 90 days for one hour at 28 to 30 vdc.

FUEL CELLS (Effectivity: All)

a. **Less than 90 days** - Fill to capacity to minimize fuel vapor and to protect the inner liners.

b. **Over 90 days** - Drain the fuel cells, then spray a thin coating of lubricating oil (5, Chart 2, 10-00-00) on the inner walls of the liners.

CAUTION

Do not treat the interior of the forward tanks. Damage to the sealer on the composite structure could result.

LANDING, STROBE, AND TAXIING LIGHTS (Effectivity: All)

For storage 90 days or longer, cover with barrier material (3, Chart 2, 10-00-00) and secure with tape (4, Chart 2, 10-00-00).

FLIGHT CONTROL SURFACES (Effectivity: All)

a. **For storage up to 90 days**, install the gust lock (3, Chart 1, 10-00-00) as detailed in Chapter 27-70-00.

b. **Storage over 90 days**, lubricate all hinge pins, bearings, bellcranks, and chains in accordance with the Lubrication Schedule (Chapter 12-20-00) and coat lightly with corrosion preventive compound (6, Chart 2, 10-00-00). The corrosion preventive is a light lubricant that remains on parts when the airplane is removed from storage.

WING FLAP ROLLERS (Effectivity: All)

a. **Over 90 days**, coat the flap rollers with corrosion preventive compound (6, Chart 2, 10-00-00).

b. Place flaps in retracted position.

LANDING GEAR (Effectivity: All)

a. **Over 90 days**, cover or wrap the tires with barrier material (3, Chart 2, 10-00-00) and secure with tape (4, Chart 2, 10-00-00).

b. Check the tire pressure periodically and inflate as necessary.

c. Coat the exposed surfaces of the shock strut pistons, the nose gear shimmy damper piston, the nose door actuator piston, the retract actuator piston, and the uplock actuator pistons with preservative hydraulic fluid (7, Chart 2, 10-00-00) and protect with barrier material (3, Chart 2, 10-00-00).

CAUTION

Do not apply corrosion preventive to exposed surfaces of the landing gear strut piston or to extended polished surfaces of the hydraulic cylinders.

LOOSE TOOLS AND EQUIPMENT (Effectivity: All)

For storage over 90 days - Remove and store in an area of low humidity.

TOILET (Effectivity: All)

Drain and clean thoroughly.

REFRESHMENT CABINETS (Effectivity: All)

Drain all liquid containers and clean thoroughly.

AIRFRAME (Effectivity: All)

a. In dusty conditions or if the airplane is to be tied down for two or more days, install the pitot/static tube covers (2, Chart 1, 10-00-00) and AOA transmitter probe covers (8, Chart 1, 10-00-00).

b. Remove the windshield wipers and blades, then wrap, tag and store in the airplane.

c. Clean all exposed antennas and connections.

d. Cover the windshield and windows with barrier material (3, Chart 2, 10-00-00) and secure with tape (4, Chart 2, 10-00-00).

e. Whenever the airplane is parked, turn the polarized windows to allow the most light into the airplane.

CAUTION

When the airplane is parked in an area exposed to direct sunlight, the polarized windows should be left in the position that allows the entrance of sunlight to prevent deterioration of window polarization. The windows are designed to provide sufficient ultraviolet protection while in this position to prevent fading of interior fabric and upholstery.

AVIONICS AND INSTRUMENTS (Effectivity: All)

Clean and cover any equipment sensitive to dust and moisture, and take any additional precautions recommended by the manufacturer of such equipment.

SEATS (Effectivity: All)

Clean and install protective covers.

LANDING GEAR HYDRAULIC SYSTEM (Effectivity: All)

Refer to Chapter 12-10-00 and fill the hydraulic reservoir to operational level, and inspect the system for leaks; repair as necessary prior to storage.

PROPELLER (Effectivity: All)

a. Remove dirt, oil, and insect accumulation from propellers with solvent (8, Chart 2, 10-00-00).

CAUTION

Solvent should not be allowed to collect or puddle in the cavity between the blade and the hub. Prolonged exposure or saturation for a short time could cause performance degradation of the O-rings. Sparing use and short exposure to solvents in the area next to the hub is recommended.

b. Coat the propeller blades with corrosion preventive compound (6, Chart 2, 10-00-00).

c. Wrap the propeller blades with barrier material (3, Chart 2, 10-00-00) and secure with tape (4, Chart 2, 10-00-00).

MOORING (Effectivity: All)

If the airplane cannot be placed in a hangar, tie it down securely by using the three points provided. When mooring the airplane, use chain or cable that is adequate to secure the airplane in extremely high winds. Do not use hemp or manila rope. Refer to Chapter 10-20-00.

GROUNDING (Effectivity: All)

Statically ground the airplane from the grounding jacks to permanent ground points. A grounding jack is located on each aft wing-to-fuselage fairing on the underside of the airplane. The grounding jacks are placarded GROUND HERE.

REMOVAL FROM STORAGE (Effectivity: All)

Removing the airplane from storage basically requires reversing all of the procedures performed in storing the airplane. When removing the airplane from storage, be certain that the airplane is fully and carefully inspected (preflighted). In addition to the usual checks, be alert to the possibility of accumulations from insects, birds, and animals.

DEPRESERVATION OF ENGINE (Effectivity: All)

a. Schedule:

1. **0 to 7 days** - No depreservation required.

2. **8 to 28 days** - Desiccant and moisture barriers must be removed. Ensure that all previously sealed engine openings are reopened and are unobstructed. The engine inlet cover extraction handle (6, Chart 1, 10-00-00) may be used to assist in removal of the engine air inlet covers.

3. **29 to 90 days** - Remove engine intake and exhaust covers and associated desiccant bags and humidity indicators. The engine inlet cover extraction handle (6, Chart 1, 10-00-00) may be used to assist in removal of the engine air inlet covers. Depreserve engine fuel system as provided in the depreservation procedure that follows this procedure.

4. **91 days and over** - Remove engine intake and exhaust covers and associated desiccant bags and humidity indicators. The engine air inlet cover extraction handle (6, Chart 1, 10-00-00) may be used to assist in removal of the engine air inlet covers. Depreserve the engine fuel system and service the lubrication system.

b. Procedure:

1. Fill the engine oil tank per the procedure provided in Chapter 12-10-00, ENGINE OIL SYSTEM SERVICING.

NOTE

The lubricating oil system does not require any depreservation other than returning engine oil to the required level.

CAUTION

Do not permit preservative oil to enter the engine where it may come in contact with the thermocouple probe assembly. Oil contamination of probes may cause complete failure of the indicating system.

2. Disconnect the fuel line at the flow divider inlet and loosen the line to permit drainage into a suitable container.

3. With the condition lever at START and the power lever at full power, place the ignition/start switch in the STARTER ONLY position and motor the engine with the starter until all the preservative oil is displaced. During the motoring run, the power lever should be moved from full power to IDLE, then returned to full power. The condition lever should be moved from START to FUEL CUTOFF and returned to START until clean fuel flows from the line.

CAUTION

Do not exceed the starter operating limits of 30 seconds ON, 5 minutes OFF, 30 seconds ON, 5 minutes OFF, 30 seconds ON, then 30 minutes OFF.

4. Reconnect the fuel inlet line to the flow divider; tighten all connections and safety wire.

5. Return the power control lever to IDLE and the condition lever to FUEL CUTOFF.

DEPRESERVATION OF AIRPLANE (Effectivity: All)

a. Check the battery and bring it up to full charge before installing it in the airplane. Refer to the BEECHCRAFT Starship 1 Component Maintenance Manual for specific procedures.

b. Ensure that the standy power supplies are fully charged; remove them from storage and install in the airplane as indicated in Chapter 24-30-00.

c. Remove all covers, tape, control locks, tie-downs, and tags from the airplane.

d. Install the windshield wipers and blades.

e. Corrosion preventive compound must be thoroughly cleaned off of the flap rollers with solvent (8, Chart 2, 10-00-00).

f. Remove the loose tools and equipment from storage and place in the airplane.

g. Ensure that the oil tank is at operating level. Refer to Chapter 12-10-00.

NOTE

For the various engine oils approved by Pratt and Whitney, refer to the latest revision of Pratt and Whitney Service Bulletin No. 14001.

h. Fill the fuel tanks with specified fuel. Refer to Chapter 12-10-00.

i. Start the engine, observing normal start procedure, and operate for approximately three minutes.

j. Stop the engine.

k. Inspect all lubrication lines and fuel lines and connection points for evidence of leakage.

l. Remove the fuel filter element and inspect, clean and reinstall. Refer to ENGINE FUEL FILTERS AND SCREENS, Chapter 73-00-00.

m. Remove the oil filter element and inspect, clean and reinstall. Refer to Chapter 79-00-00.

n. Give the airplane a thorough cleaning, inspection, and test flight.

MOORING - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

When mooring the airplane, use chain or cable of sufficient strength to secure the airplane in extremely high winds. Do not use hemp or manila rope for an airplane of this weight. Three tie-down points, placarded JACK POINT & TIE DOWN, are provided at the following locations: on the underside of the fuselage aft of the nose gear wheel well at FS 86.16, and on the underside of each aft wing in line with the outboard ribs of the main gear wheel well at FS 398.34. Before mooring the airplane, tie-down rings (1, Chart 1, 10-00-00) will need to be screwed into each tie-down point.

MOORING - MAINTENANCE PRACTICES (Effectivity: All) (Figure 1)

The following procedures are recommended for mooring the airplane:

a. Park the airplane where adequate permanent mooring points are available.

b. Set the parking brake, refer to Chapter 10-10-00.

c. Chock both main gear wheels in front and behind.

d. Remove the plugs from the three tie-down points and replace them with tie-down rings (1, Chart 1, 10-00-00). Retain the plugs for use when the tie-down rings are removed from the airplane. Refer to Figure 1.

e. Point the airplane into the wind and arrange the tie-down in as nearly a symmetrical pattern as possible with sufficient distance from other aircraft. Use chain or cable adequate to secure the airplane in extremely high winds. Do not use hemp or manila rope.

f. Install protective covers (2, Chart 1, 10-00-00) on the pitot/static masts.

g. Install the engine inlet covers (5, Chart 1, 10-00-00).

h. Secure the propellers with the propeller slings (4, Chart 1, 10-00-00) and install the engine exhaust stack covers (7, Chart 1, 10-00-00).

i. Install the AOA transmitter probe covers (8, Chart 1, 10-00-00).

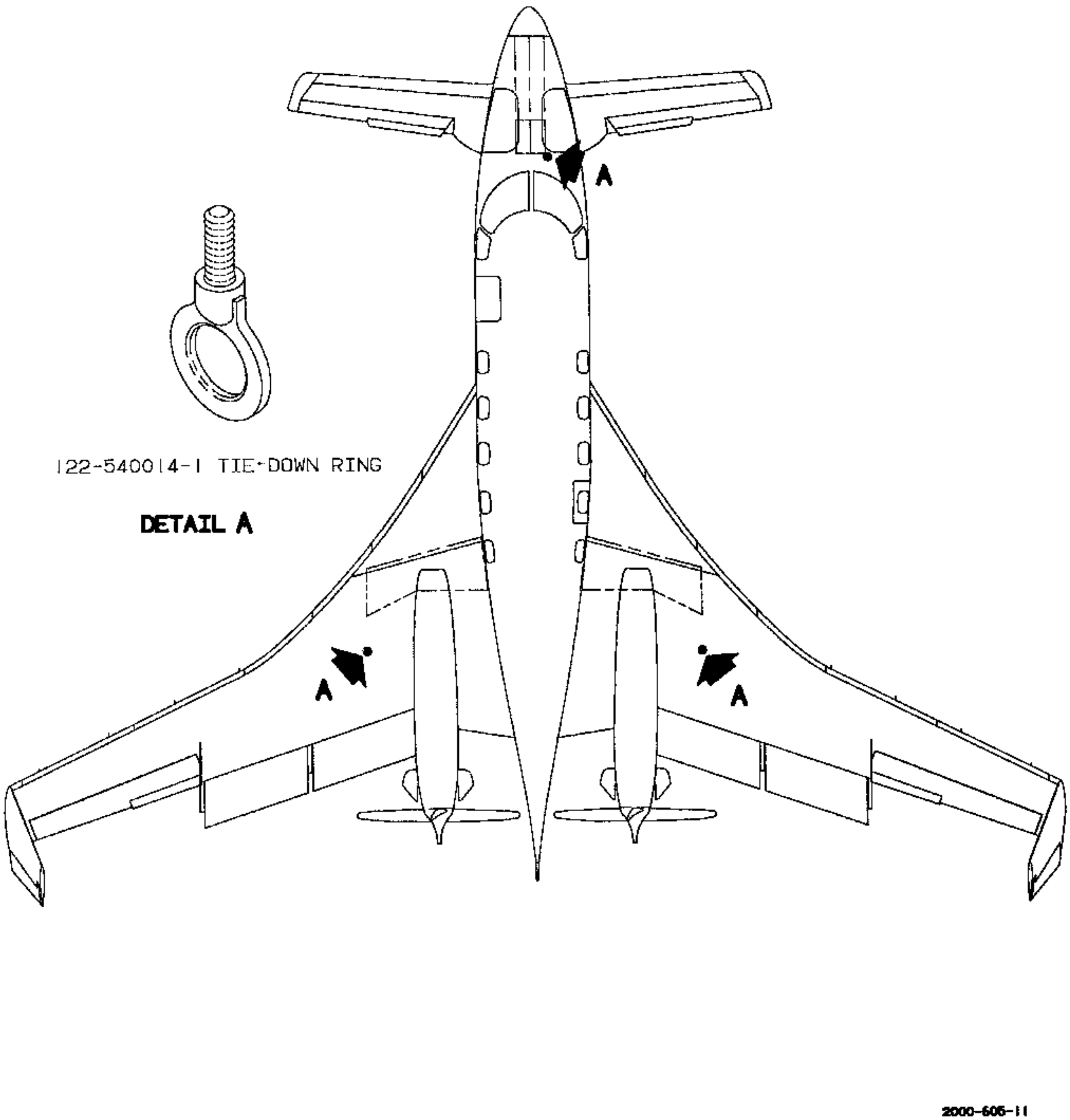
j. Ground the airplane with static lines to the two grounding points on the aft wing-to-fuselage fairings. The locations are placarded GROUND HERE.

k. Install the gust lock (3, Chart 1, 10-00-00). Refer to Chapter 27-70-00.

l. Turn the polarized cabin windows to the lightest position (the position allowing the most light to enter the airplane).

CAUTION

When the airplane is parked in an area exposed to direct sunlight, the polarized windows should be turned to permit the entrance of sunlight to prevent deterioration of window polarization. The windows are designed to provide sufficient ultraviolet light protection while in the clear position to prevent fading of the interior fabric and upholstery.



Mooring Points (Effectivity: All)
Figure 1

CHAPTER 11 - PLACARDS AND MARKINGS

LIST OF PAGE EFFECTIVITY

CHAPTER 11 - PLACARDS AND MARKINGS

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GENERAL - DESCRIPTON AND OPERATION (Effectivity: All) (Figure 1)

WARNING

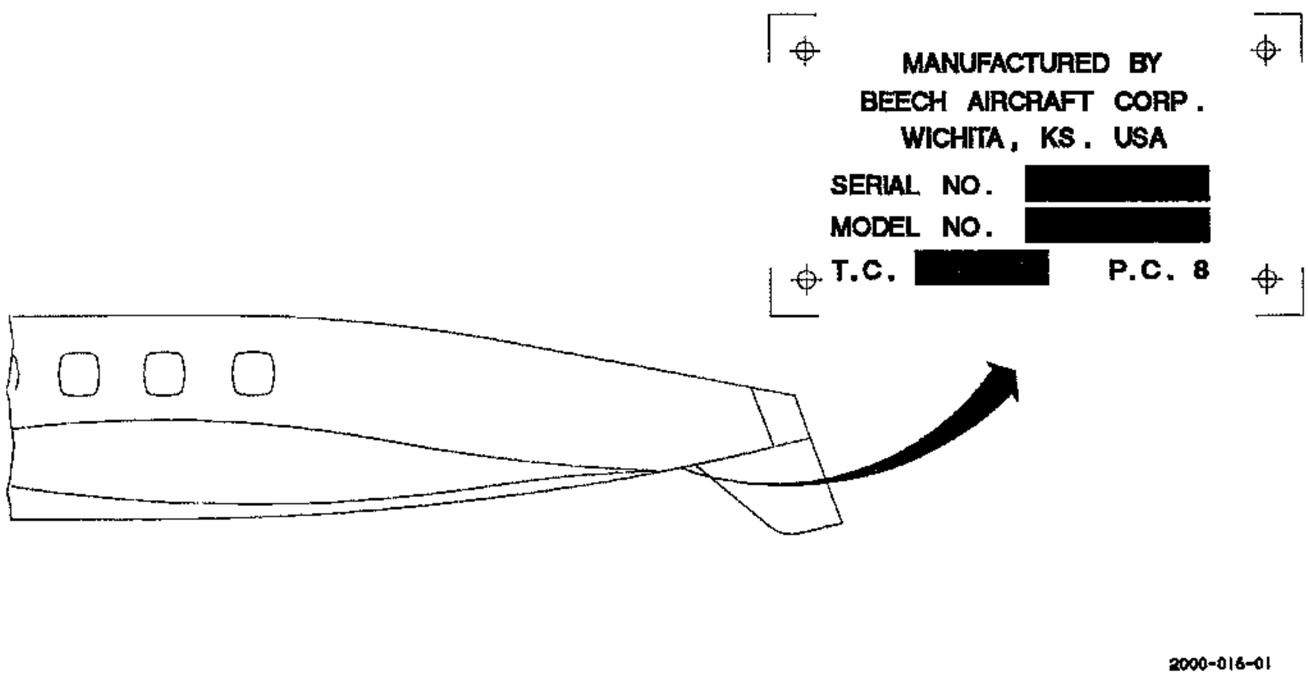
Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

This chapter provides information regarding the approved exterior paint colors and color schemes, and the exterior and interior placards and markings. All required interior placards and limitation markings are listed in "Section II Limitations" of the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

NOTE

Any time an airplane is repainted or touched up, inspect all placards to ensure that they are not covered with paint, are legible, and are securely attached.

The model designation placard is located on the underside of the aft fuselage just forward of the ventral stabilizer as shown in Figure 1. This placard identifies the airplane by its model and serial number. Should a question arise concerning the care of the



Model Designation Placard (Effectivity: All)
Figure 1

airplane, it is important to include the airplane serial number in any correspondence with Beech Aircraft Corporation.

EXTERIOR COLOR SCHEMES AND MARKINGS - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

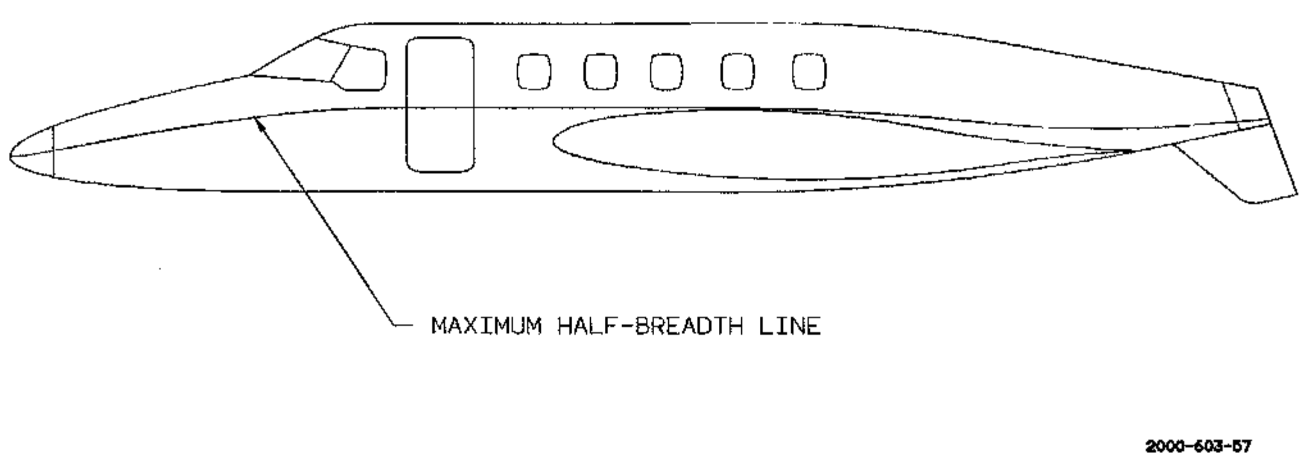
Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

For continued airworthiness of the airplane, the paint colors applied to the airplane must conform to the limitations in this chapter.

NOTE

Refer to Chapter 20 for the proper procedures to follow for paint removal, surface preparation, and primer and topcoat application.

The only colors that may be used on the upper exterior surfaces of the airplane are those colors listed in Chart 1 or colors resulting from the mixture of those colors listed. The upper exterior surfaces are defined as the fuselage area above the maximum half-breadth line (shown in Figure 1); the forward and aft wings (including the nacelles) above the maximum chord line; all surfaces of the tipsails and rudders; all surfaces of the ventral stabilizer; and the top surfaces of the elevons, elevators and flaps. There are no restrictions on the paint colors used on the lower surface of the airplane. If the paint color used on the lower surface is different from that used on the upper surface, the two paint coats must not overlap more than five inches.



Fuselage Maximum Half-Breadth Line (Effectivity: All)
Figure 1

Stripes of any color may be added to the airplane, but the following limitations must be complied with when applying the stripes. If the stripe color chosen for use on the upper exterior surface of the airplane is one not listed in Chart 1, the stripes are limited to a maximum overall width of 12 inches; for example, twelve 1-inch stripes, six 2-inch stripes, four 3-inch stripes, etc. Any stripe that is greater than twelve inches in width must not overlap the base topcoat more than three inches. No stripes may be painted over two overlapping coats of paint; for example, where the upper surface paint coat overlaps the lower surface paint coat.

CHART 1
ALLOWABLE UPPER SURFACE EXTERIOR POLYURETHANE PAINT COLORS*
(Effectivity: All)

Name	U.S. Paint Number	Sterling Number
Ethereal Blue	6312	U4330
Gray Stone	7324	U4318
Matterhorn White	6160	U4315
Moon Dust	4321	U4171
New Tender Yellow	5342	U4331
Whisper Gray	6311	U4170

*The allowed paint colors also include those colors resulting from a mixture of the colors listed in this chart.

EXTERIOR PLACARDS AND MARKINGS - DESCRIPTION AND OPERATION

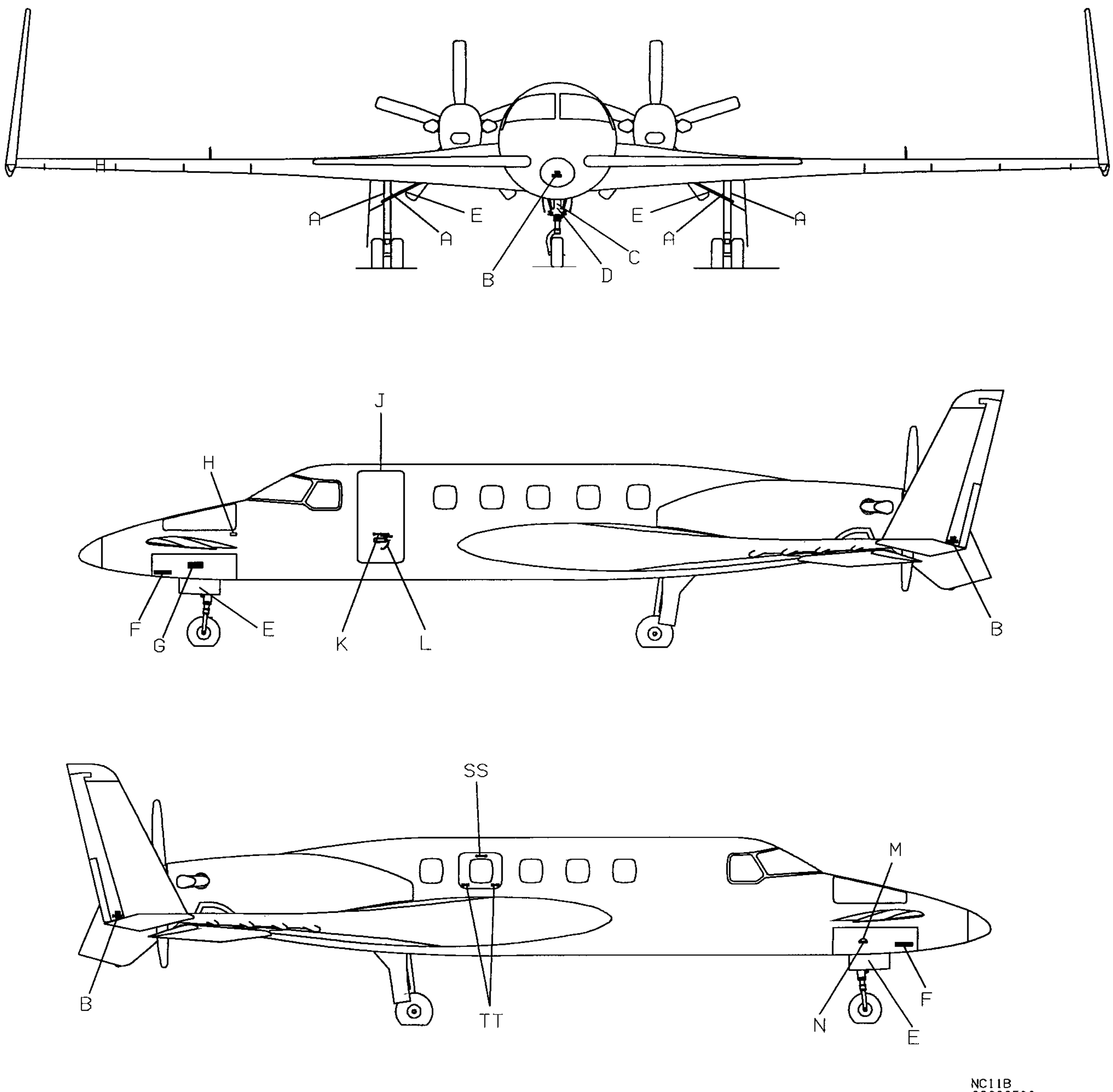
Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

The exterior placards included in this chapter are those located outside of the pressurized portion of the airplane. This includes the landing gear wheel wells, avionics compartments, nacelles, and the exterior surface of the airplane. The opening of access panels or doors may be necessary to view some of the placards. These placards provide operation instructions, servicing instructions, safety precautions and identify areas or components on the airplane.

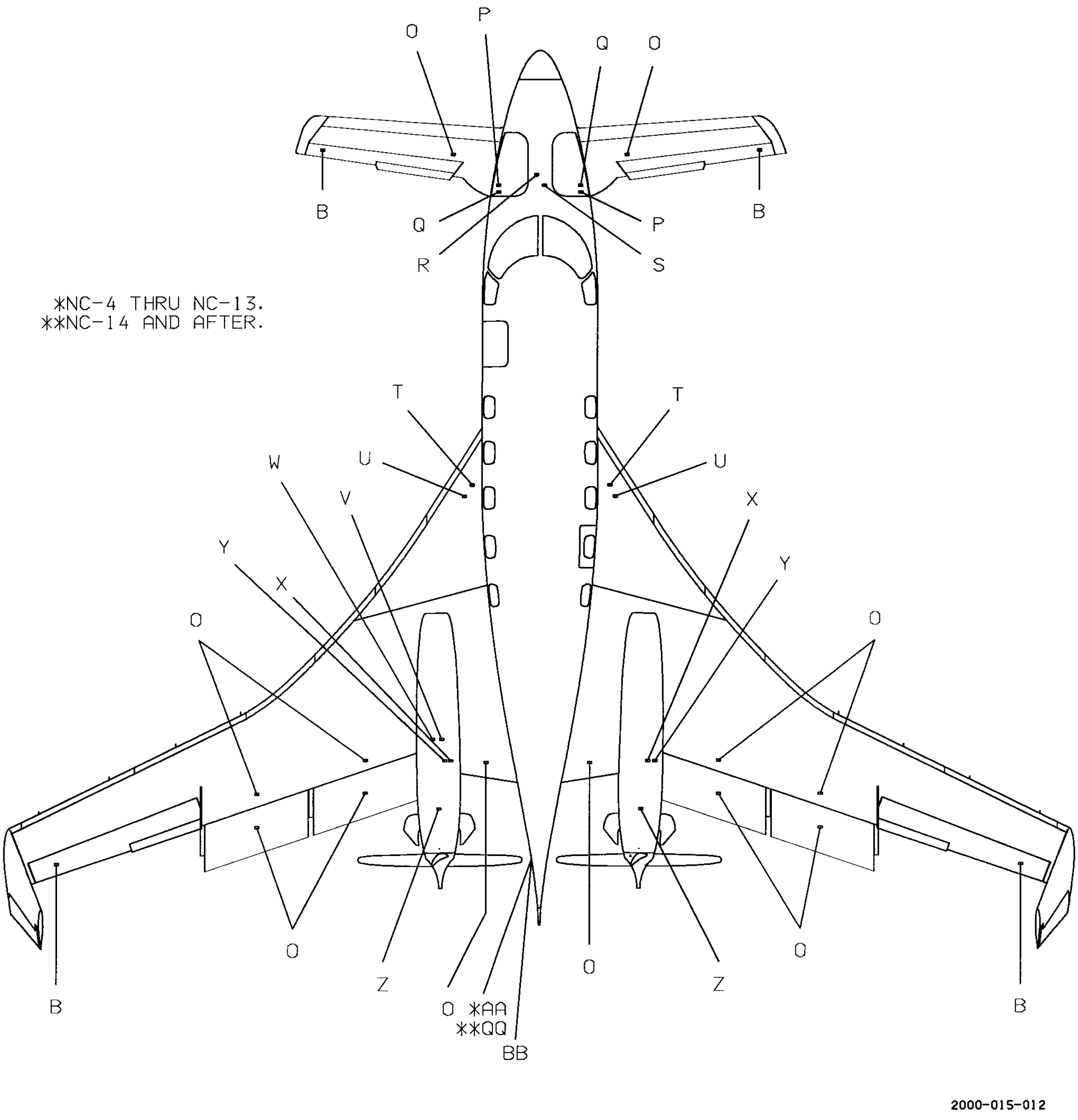
NOTE

Any time an airplane is repainted or touched up, inspect all placards to ensure that they are not covered with paint, are legible, and are securely attached.

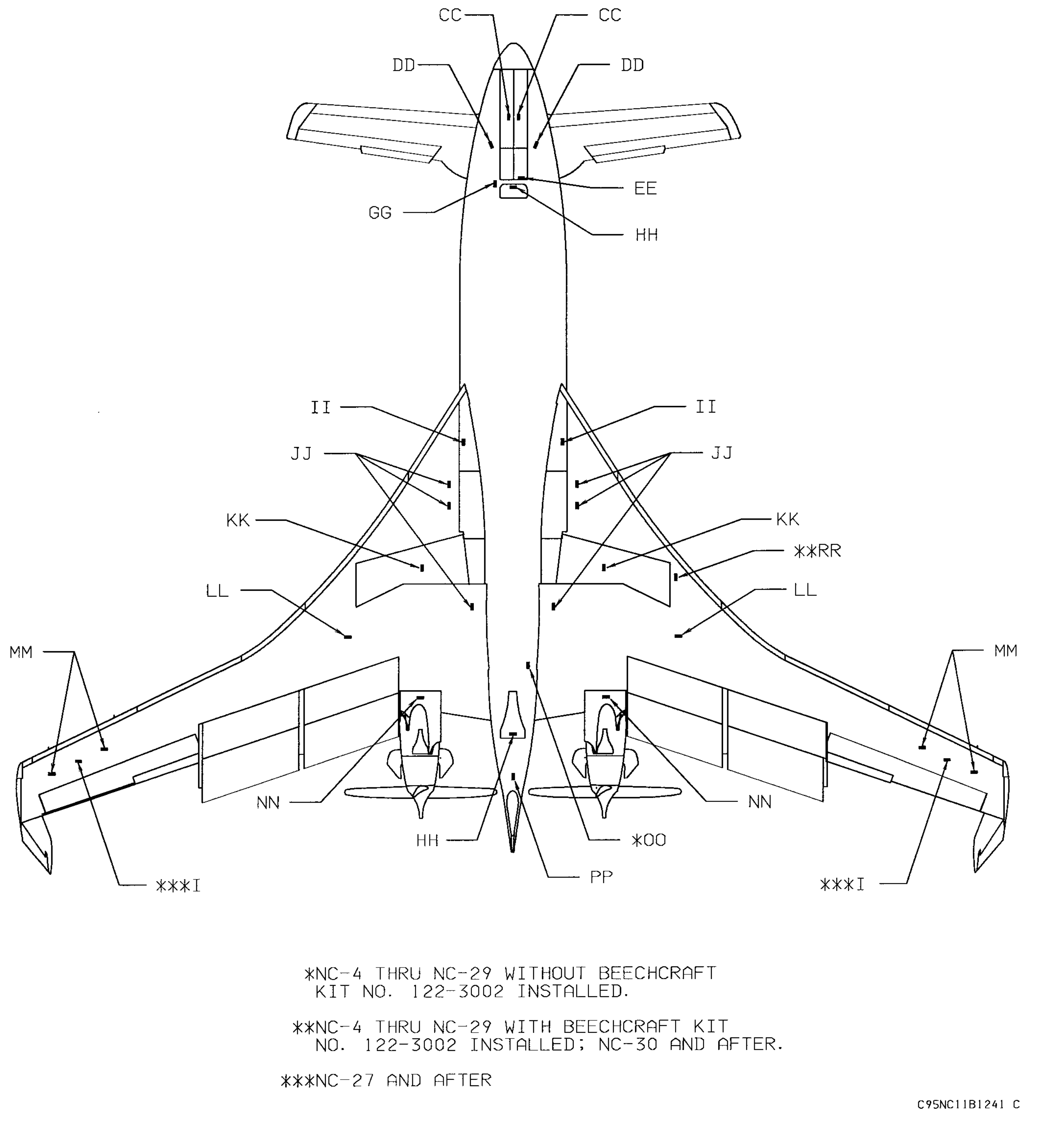
Figure 1 illustrates the approximate locations of the exterior placards and includes a facsimile of each placard. Those placards that identify electrical equipment (circuit breakers, limiters, etc.) are not depicted.



Exterior Placards and Markings (Sheet 1 of 15)
Figure 1



Exterior Placards and Markings (Sheet 2 of 15)
Figure 1



Exterior Placards and Markings (Sheet 3 of 15)
Figure 1

Beechcraft
OIL AIR STRUT
PART NO. 122-810001
BEECH AIRCRAFT CORPORATION
WICHITA, KANSAS USA
INSTRUCTIONS
FILL WITH
MIL-H-5606 HYDRAULIC FLUID
TO CHECK FLUID AND FILL
REMOVE VALVE CAP, OPEN VALVE AND ALLOW STRUT TO FULLY COMPRESS. CONNECT ONE END OF A 1/4 INCH HOSE TO VALVE STEM AND SUBMERGE OTHER END IN HYDRAULIC FLUID. SLOWELY EXTEND STRUT TO FILL, THEN COMPRESS STRUT TO EXPELL EXCESS FLUID. RECYCLE AS NECESSARY TO EXPEL ALL AIR. REMOVE HOSE END FROM FLUID AND EXTEND GEAR ONE FINAL TIME: THEN SLOWLY COMPRESS GEAR FULLY TO EXPELL EXCESS FLUID. WITH STRUT COMPRESSED, CLOSE VALVE AND RELACE VALVE CAP. WITH AIRCRAFT EMPTY EXCEPT FOR FULL FUEL AND OIL KEEP STRUT INFLATED TO 4.00 TO 4.50 INCHES OF PISTON SHOWING.
WARNING
RELEASE AIR IN STRUT BEFORE DISASSEMBLING

DETAIL A: LOCATED ON THE INBOARD AND OUTBOARD SIDES OF EACH MAIN LANDING GEAR ASSEMBLY. (4 PLACES.)

NO
PUSH

DETAIL B: LOCATED ON THE UPPER SURFACE OF EACH ELEVATOR AND ELEVON, THE OUTBOARD AND INBOARD SURFACES OF EACH RUDDER, AND THE NOSE RADOME. (9 PLACES.)

Beechcraft
OIL AIR STRUT
PART NO. 122-820001
BEECH AIRCRAFT CORPORATION
WICHITA, KANSAS USA
INSTRUCTIONS
FILL WITH
MIL-H-5606 HYDRAULIC FLUID
TO CHECK FLUID AND FILL
REMOVE VALVE CAP. OPEN VALVE AND ALLOW STRUT TO FULLY COMPRESS. CONNECT ONE END OF A 1/4 INCH HOSE TO VALVE STEM AND SUBMERGE OTHER END IN HYDRAULIC FLUID. SLOWELY EXTEND STRUT TO FILL, THEN COMPRESS STRUT TO EXPELL EXCESS FLUID. RECYCLE AS NECESSARY TO EXPEL ALL AIR. REMOVE HOSE END FROM FLUID AND EXTEND GEAR ONE FINAL TIME; THEN SLOWLY COMPRESS GEAR FULLY TO EXPELL EXCESS FLUID. WITH STRUT COMPRESSED. CLOSE VALVE AND RELACE VALVE CAP. WITH AIRCRAFT EMPTY EXCEPT FOR FULL FUEL AND OIL KEEP STRUT INFLATED TO 5.75 TO 6.25 INCHES OF PISTON SHOWING.
WARNING
RELEASE AIR IN STRUT BEFORE DISASSEMBLING

DETAIL C: LOCATED ON THE FORWARD SIDE OF THE NOSE LANDING GEAR ASSEMBLY. (1 PLACE.)

TOW
TURN LIMITS REACHED WHEN TOW BAR ALIGNS WITH RED STRIPES ON LOWER FUSELAGE
DO NOT EXCEED
CAUTION DO NOT TOW WITH STEERING DISENGAGED

DETAIL D: LOCATED ON THE FORWARD SIDE OF THE NOSE LANDING GEAR ASSEMBLY. (1 PLACE.)

2000-15-001

Exterior Placards and Markings (Sheet 4 of 15)
Figure 1

WARNING
DO NOT PUSH

DETAIL E: LOCATED ON NOSE AND MAIN LANDING GEAR LOCK LINKS. (6 PLACES.)

AIRCRAFT NOT TO BE TOWED OR TAXIED UNLESS SKIN PANEL IS INSTALLED

DETAIL F: LOCATED ON THE OUTBOARD SURFACES OF THE NOSE LANDING GEAR WHEEL WELL KEELS. (2 PLACES.)

PRECHARGE PRESSURE-600 PSI
MAX. OPERATING PRESSURE-1575 PSI

WARNING
RELEASE GAS & FLUID PRESSURE BEFORE DISASSEMBLY, STORING OR SHIPPING

DETAIL G: LOCATED ON THE BRAKE SYSTEM ACCUMULATOR. (1 PLACE.)

Beechcraft
POWER BRAKE RESERVOIR
BEECH AIRCRAFT CORP.
WICHITA KANSAS USA
SERVICE INSTRUCTIONS

1. REMOVE FORWARD WING UPPER FAIRING
2. MASTER SWITCH "ON"
3. ANTI-SKID CIRCUIT BREAKER PULLED
4. PARKING BRAKE "OFF"
5. DEPRESS BRAKE PEDALS 15-20 TIMES TO DEPLETE BRAKE ACCUMULATOR
6. FILL TO LOWER EDGE OF FILLER NECK WITH MIL-H-5605 HYD FLUID

FLUID SUPPLY IS ADEQUATE IF VISIBLE IN SIGHT GAGE

DETAIL H: LOCATED ON THE OUTBOARD SIDE OF THE BRAKE FLUID RESERVOIR. (1 PLACE.)

2000-015-002

Exterior Placards and Markings (Sheet 5 of 15)
Figure 1

USE ONLY NONMAGNETIC HARDWARE IN PROXIMITY OF FLUX VALVE

DETAIL I: LOCATED ON THE FLUX DETECTOR ACCESS PANEL ON THE LOWER SURFACE OF THE OUTBOARD AFT WING. (NC-27 AND AFTER.) (2 PLACES.)

LEVEL POINT

DETAIL J: LOCATED ON THE CABIN DOOR UPPER DOOR FRAME. (1 PLACE.)

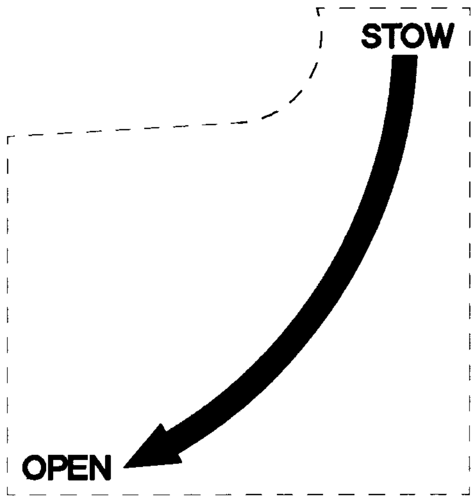
PUSH BUTTON FIRMLY AND HOLD

THEN PULL AND TURN HANDLE FIRMLY TO OPEN

DETAIL K: LOCATED ABOVE THE CABIN DOOR HANDLE. (1 PLACE.)

NC11B
022287AA

Exterior Placards and Markings (Sheet 6 of 15)
Figure 1



DETAIL L: LOCATED BELOW CABIN DOOR HANDLE. (1 PLACE.)

OXYGEN

DETAIL M: LOCATED ON THE EXTERIOR SURFACE OF THE OXYGEN SYSTEM SERVICE DOOR. (1 PLACE.)

NOTICE: AVIATORS BREATHING OXYGEN
KEEP FILL AREA CLEAN, DRY & FREE FROM OIL
PRESSURIZE TO 1850 PSI @ 14.7 PSIA & 70°F

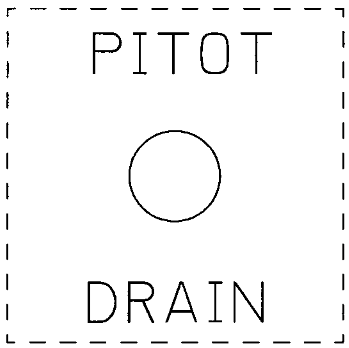
DETAIL N: LOCATED ON THE FACE OF THE OXYGEN SYSTEM SERVICE BOX. (1 PLACE.)

NO
STEP

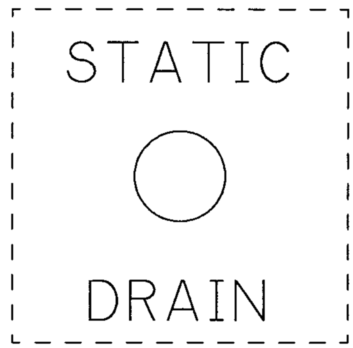
DETAIL O: LOCATED ON THE UPPER SURFACE OF EACH FORWARD WING, EACH FLAP, EACH AFT WING INBOARD TRAILING EDGE COVE AND EACH AFT WING FLAP COVE. (12 PLACES.)

NC11B
022288AA

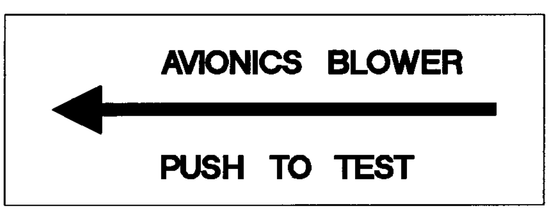
Exterior Placards and Markings (Sheetr 7 of 15)
Figure 1



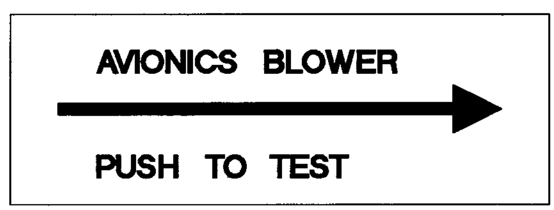
DETAIL P: LOCATED ADJACENT TO THE PITOT SYSTEM DRAIN VALVES IN THE LH AND RH NOSE AVIONICS COMPARTMENTS. (2 PLACES.)



DETAIL Q: LOCATED ADJACENT TO THE STATIC SYSTEM DRAIN VALVES IN THE LH AND RH NOSE AVIONICS COMPARTMENTS. (2 PLACES.)



DETAIL R: LOCATED ADJACENT TO THE LH AVIONICS COOLING BLOWER TEST SWITCH IN THE LH NOSE AVIONICS COMPARTMENT. (1 PLACE.)



DETAIL S: LOCATED ADJACENT TO THE RH AVIONICS COOLING BLOWER TEST SWITCH IN THE RH NOSE AVIONICS COMPARTMENT. (1 PLACE.)

2000-015-005

Exterior Placards and Markings (Sheet 8 of 15)
Figure 1

FUEL

JET A JET A-1

ANTI ICING ADDITIVE PER
MIL-I-27686A REQUIRED
SEE PILOTS OPERATING
HANDBOOK

DETAIL T: LOCATED ON THE UPPER SURFACE OF EACH MAIN FUEL TANK, FORWARD OF THE FUEL FILLER. (2 PLACES.)

GROUND POINT

LOCATED LOWER
WING SURFACE

DETAIL U: LOCATED ON THE UPPER SURFACE OF EACH MAIN FUEL TANK, OUTBOARD OF THE FUEL FILLER. (2 PLACES.)

\- FOR GROUND OPERATION -

APPLY 18-20 PSIG AIR PRESSURE TO HYDRAULIC POWER PACK-SEE SERVICE MANUAL

DETAIL V: LOCATED ON THE LH NACELLE UPPER AFT ACCESS PANEL. (1 PLACE.)

HYDRAULIC
LANDING GEAR

FILL

MAINTAIN OIL AT
INDICATED OIL
TEMPERATURE MARK
ON DIP STICK

USE MIL-H-5606
HYDRAULIC FLUID

DETAIL W: LOCATED ON THE LH NACELLE UPPER AFT ACCESS PANEL. (1 PLACE.)

2000-015-006

Exterior Placards and Markings (Sheet 9 of 15)
Figure 1

ENGINE OIL SERVICE INSTRUCTIONS

FILL WITH APPROVED OIL TO MAX MARK ON DIPSTICK
SEE PILOT'S OPERATING HANDBOOK FOR APPROVED OILS
CHECK AND FILL WITH ENGINE SHUT DOWN
ENGINE OIL CAPACITY=14 U.S. QUARTS
DIPSTICK GRADUATED IN U.S. QUARTS

DETAIL X: LOCATED ON THE INSIDE SURFACE OF EACH ENGINE OIL FILLER ACCESS DOOR. (2 PLACES.)

OIL

DETAIL Y: LOCATED ON THE OUTSIDE SURFACE OF EACH ENGINE OIL FILLER ACCESS DOOR. (2 PLACES.)

CAUTION

DO NOT ALLOW CARBON COMPOUNDS OF ANY TYPE TO COME IN CONTACT WITH EXHAUST CASE, EXHAUST STACKS, OR COMBUSTION CHAMBER HOUSING. THIS INCLUDES MOLYBDENUM DISULFIDE LUBRICANTS. IN EVENT PARTS BECOME CONTAMINATED CLEAN THROUGHLY WITH SUITABLE SOLVENTS PRIOR TO OPERATING ENGINE.

DETAIL Z: LOCATED ON THE TOP SURFACE OF EACH POWER PLANT AIR INTAKE PLENUM. (2 PLACES.)

EMERGENCY LOCATOR TRANSMITTER
SWITCH

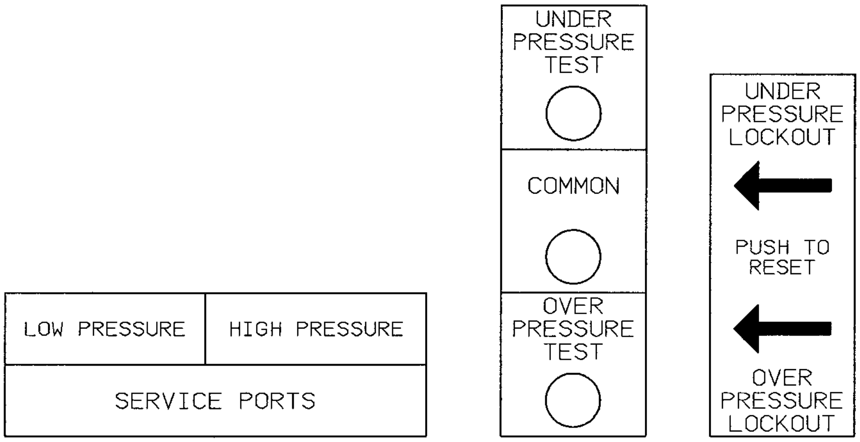
TEST AUTO XMIT

FOR AVIATION EMERGENCY USE ONLY.
UNLICENSED OPERATION UNLAWFUL.
OPERATION IN VIOLATION OF FCC
RULES SUBJECT TO FINE OR LICENSE
REVOCATION

DETAIL AA: LOCATED ON THE LH SIDE OF THE AFT FUSELAGE ADJACENT TO THE ELT SWITCH ACCESS DOOR (NC-4 THRU NC-13). (1 PLACE.)

2000-015-007

External Placards and Markings (Sheet 10 of 15)
Figure 1



DETAIL BB: LOCATED ON THE FACE OF THE AIR CONDITIONING SYSTEM SERVICE BOX IN THE LH AFT FUSELAGE. (1 EACH.)

DETAIL CC: LOCATED ON THE INSIDE SURFACE OF BOTH FORWARD NOSE LANDING GEAR DOORS. (2 PLACES.)

DETAIL DD: LOCATED ON THE LOWER SURFACE OF THE FUSELAGE OUTBOARD OF THE NOSE LANDING GEAR WHEEL WELL TO MARK THE TOW BAR TURNING LIMITS. (2 PLACES.)

2000-015-008

External Placards and Markings (Sheet 11 of 15)
Figure 1

EJECTOR
EXHAUST
DO NOT
OBSTRUCT

DETAIL EE: LOCATED ON THE FORWARD SIDE OF THE BULKHEAD ADJACENT TO THE PRESSURIZATION SYSTEM VACUUM EJECTOR EXHAUST PORT. (1 PLACE.)

DETAIL FF NOT USED

JACK POINT
& TIE
DOWN

DETAIL GG: LOCATED ON THE UNDERSIDE OF THE FUSELAGE AFT OF THE NOSE GEAR WHEEL WELL. (1 PLACE.)

NO SPRAY

DETAIL HH: LOCATED ON THE AFT END OF THE OUTFLOW VALVE EXIT RAMP AND ON THE AIR INLET DUCT IN THE UNDER-SIDE OF THE AFT FUSELAGE. (2 PLACES.)

C95NC11B1242 C

Exterior Placards and Markings (Sheet 12 of 15)
Figure 1

DETAIL II: CENTERED OVER THE GROUNDING JACK LOCATED ON EACH AFT WING-TO-FUSELAGE FORWARD FAIRING. (2 PLACES.)

FUEL DRAIN

DETAIL JJ: LOCATED ON THE LOWER SURFACE OF THE MAIN FUEL TANKS FORWARD OF THE MAIN GEAR WHEEL WELLS AND ON THE BOTTOM SURFACE OF THE AFT WING AFT OF THE MAIN GEAR WHEEL WELLS ADJACENT TO THE FUEL SYSTEM DRAINS. (6 PLACES.)

WARNING

GROUND LOCK PINS MUST BE INSERTED IN SIDE BRACE AND LANDING GEAR CIRCUIT BREAKER PULLED BEFORE ENTERING GEAR WELL AREA

DETAIL KK: LOCATED ON INSIDE SURFACE OF MAIN LANDING GEAR DOORS. (2 PLACES.)

JACK POINT
& TIE DOWN

DETAIL LL: LOCATED ON THE LOWER SURFACE OF THE AFT WING ADJACENT TO THE JACK POINTS AFT OF THE MAIN GEAR WHEEL WELLS. (2 PLACES.)

2000-015-010

Exterior Placards and Markings (Sheet 13 of 15)
Figure 1

DO NOT USE FERROUS SCREWS
OR MAGNETIC TOOLS
SEE MAINTENANCE MANUAL

DETAIL MM: LOCATED ON THE LOWER SURFACE OF THE AFT WING ADJACENT TO THE FLUX VALVE ACCESS PANELS. (4 PLACES.)

LIGHT
ON

OIL LEVEL
OK

PRESS
TO CHECK
OIL LEVEL

DETAIL NN: LOCATED ON THE AFT SIDE OF THE FIREWALL ADJACENT TO THE OIL LEVEL OK INDICATOR LIGHT AND SWITCH (2 PLACES.)

EXTERNAL POWER
RECEPTACLE
28 VDC

DETAIL OO: LOCATED ON THE EXTERIOR SURFACE OF THE EXTERNAL POWER RECEPTACLE ACCESS DOOR (NC-4 THRU NC-29 WITHOUT BEECHCRAFT KIT NO. 122-3002 INSTALLED). (1 PLACE.)

MANUFACTURED BY
BEECH AIRCRAFT CORP.
WICHITA, KS. USA
SERIAL NO. [redacted]
MODEL NO. [redacted]
T. C. [redacted] **P. C. 8**

DETAIL PP: LOCATED ON THE LOWER SURFACE OF THE AFT FUSELAGE JUST FORWARD OF THE VENTRAL STABILIZER. (1 PLACE.)

2000-015-011

Exterior Placards and Markings (Sheet 14 of 15)
Figure 1

EMERGENCY LOCATOR TRANSMITTER
SWITCH

ARMED/
RESET

ON

FOR AVIATION EMERGENCY USE ONLY
UNLICENSED OPERATION UNLAWFUL
OPERATION IN VIOLATION OF FCC
RULES SUBJECT TO FINE OR LICENSE
REVOCATION

DETAIL QQ: LOCATED ON THE LH SIDE OF THE AFT FUSELAGE ADJACENT TO THE ELT SWITCH ACCESS DOOR (NC-14 AND AFTER). (1 PLACE.)

EXTERNAL
POWER
28 VOLT

DETAIL RR: LOCATED ON THE EXTERIOR SURFACE OF THE EXTERNAL POWER RECEPTACLE ACCESS DOOR (NC-4 THRU NC-29 WITH BEECHCRAFT KIT NO. 122-3002 INSTALLED; NC-30 AND AFTER). (1 PLACE.)

EMERGENCY EXIT

DETAIL SS: LOCATED ON THE EMERGENCY EXIT DOOR ABOVE THE WINDOW. (1 PLACE.)

FOR RESCUE
KICK IN HERE

DETAIL TT: LOCATED ON THE EMERGENCY EXIT DOOR BELOW THE WINDOW. (2 PLACE.)

NC11B
022289AA

Exterior Placards and Markings (Sheet 15 of 15)
Figure 1

CHAPTER 12 - SERVICING

LIST OF PAGE EFFECTIVITY

CHAPTER 12 - SERVICING

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TABLE OF CONTENTS (CONTINUED)

CHAPTER 12 - SERVICING

TABLE OF CONTENTS **(CONTINUED)**

SERVICING - DESCRIPTION AND OPERATION (EFFECTIVITY: ALL)

WARNING

When an airplane has experienced abnormal landing gear procedures of any type, as a safety precaution, place the airplane on jacks prior to performing any inspection or maintenance. Ensure that all three landing gears are down and locked prior to removing the airplane from jacks.

CAUTION

Jacking of an airplane for the purpose of landing gear operation, inspection, servicing or maintenance, should be accomplished within an enclosed building or hangar. In the interest of safety, should it become necessary to jack the airplane in the open, wind velocity in any direction and terrain variations, must be compensated for prior to jacking the airplane.

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

Servicing information contained in this chapter is limited to the types of servicing that are of a general nature concerned with servicing of the overall airplane. Servicing procedures for specific components of the airplane are in the chapter applicable to the component. Chapter 12-10-00 covers information pertinent to the replenishing of fuel, oil, hydraulic fluid, tire pressures, etc. Chapter 12-20-00 contains information concerning lubrication of components and cleaning of the airplane exterior and interior parts. These servicing procedures are normally performed according to time schedules. Chapter 12-30-00 contains information pertaining to servicing of an unscheduled nature such as the removal of ice and snow.

Servicing time limits for parts or components that must be serviced according to a specific time schedule will be found in Chapter 5, TIME LIMITS - MAINTENANCE CHECKS.

Lubrication necessary for the performance of maintenance procedures, such as packing of gearboxes or lubrication of spline drives, will be covered in the chapter applicable to the system or component being maintained.

SPECIAL TOOLS AND RECOMMENDED MATERIALS (EFFECTIVITY: ALL)

The special tools and recommended materials listed in Charts 1 and 2 as meeting federal, military or supplier specifications are provided for reference only and are not specifically prescribed by Raytheon Aircraft Company. Any product conforming to the specification listed may be used. The products included in these charts have been tested and approved for aviation usage by Raytheon Aircraft Company, by the supplier, or by compliance with the applicable specifications. Generic or locally manufactured products which conform to the requirements of the specification listed may be used even though not included in the charts. Only the basic number of each specification is listed.

No attempt has been made to update the listing to the latest revision. It is the responsibility of the technician or mechanic to determine the current revision of the applicable specification prior to usage of the product listed. This can be done by contacting the supplier of the product to be used.

CHART 1
SPECIAL TOOLS AND EQUIPMENT (EFFECTIVITY: ALL)

TOOL NAME	PART NO.	MANUFACTURER	USE
1. Defueling Hose (end fitting per MS33656E12)	None	Fabricate	To drain fuel from forward fuel tank through the rapid drain valve.
2. Fuel Sump Drain Wrench	122-590015-1	Raytheon Aircraft Co., Wichita, Kansas	Remove plugs from lightning shields to gain access to drain valves.
3. Air Conditioning System Service Gages	None	Obtain locally	Service air conditioning system.
4. Grease Nozzle	314150 or MS24203-1	Alemite or obtain locally	Lubricate main landing gear torque knee grease fittings.
5. Oxygen Service Adapter	1737484	Raytheon Aircraft Co., Wichita, Kansas	Service oxygen system.

CHART 2
RECOMMENDED MATERIALS (EFFECTIVITY: ALL)

MATERIAL	SPECIFICATION	PRODUCT	SUPPLIER
1. Jet Fuel Anti-icing Inhibitor	MIL-I-85470A	Jet Fuel Additive 98-2	Dow Chemical Co., Bennington, VT 05201
		Anti-icing Agent 20	Houston Solvents and Chemical Co., 1010 W Loop Road, Houston, TX 77055
		UCAR Fuel Additive 500	Union Carbide Corp., Chemicals and Plastics Division, Bound Brook, NJ 08805
		Hi-Flo Prist	Van Dusen Aircraft Supplies, Div of Van Dusen Aircraft Inc., Teterboro Airport, 500 Industrial Ave. Teterboro, NJ 07608

CHART 2
RECOMMENDED MATERIALS (EFFECTIVITY: ALL) (CONTINUED)

MATERIAL	SPECIFICATION	PRODUCT	SUPPLIER
	MIL-I-85470A	High Flash Prist	Van Dusen Aircraft Supplies, Div of Van Dusen Aircraft Inc., Teterboro Airport, 500 Industrial Ave. Teterboro, NJ 07608
2. Hydraulic Fluid	MIL-H-5606	2126 Hydraulic Oil	Exon Company U.S.A P.O. Box 2108 Houston, TX 77001
		PED 3337	Standard Oil of California, 225 Bush St San Francisco, CA 94210
3. Cleaner		Anhydrous Ethyl Alcohol	
4. Cleaner	TT-I-735 or MIL-I-10428	Isopropyl Alcohol	
5. Oxygen, Aviator's Breathing	MIL-O-27210		
6. Polytetrafluoro-ethylene Anti-seize Tape	MIL-T-27730		
7. Air Conditioner Refrigerant		Racon 12	Racon Inc., 6040 S. Ridge Road, Wichita, Ks 67215
		Genetron 12	Allied Chemicals, Speciality Chemicals Div., Morristown, NJ 07960
		Freon 12	Dupont Inc., Freon Products Div., Wilmington, DE 19898
8. Tire Sealant		Tire Life (Gal.)	Raytheon Aircraft Services
9. Kerosene	VV-K-211		Obtain Locally
10. Plexiglass Polish and Cleaner	Fed Spec P-P-560	Part No. 403D	Permatex Inc., Kansas City, Ks 66115
		Parko Anti-Static Polish	Park Chemical Co., 8094 Military Ave Detroit, MI 48204
		Meguiars MGH-10	Mirror Bright Polish Co. Inc., P.O. Box 17177 Irvine, CA 92714
11. Solvent, Cleaning (Mineral Spirits)	PD680, Type III		Obtain Locally

CHART 2
RECOMMENDED MATERIALS (EFFECTIVITY: ALL) (CONTINUED)

MATERIAL	SPECIFICATION	PRODUCT	SUPPLIER
12. Lubricating Grease		Lubriplate No. 130AA	Fiske Bros. Refining Co., 129 Lockwood Newark, NJ 07105
13. Grease, Aircraft and Instrument, Gear and Actuator Screw	MIL-G-23827	Super Mil Grease No. A72832	American Oil Co., 165 N. Canal Chicago, IL 60606
		Royco 27A	Royal Lubricants Co., River Road Hanover, NJ 07936
		Aeroshell Grease 7	Shell Oil Co One Shell Plaza P.O. Box 2463 Houston, TX 77001
14. Grease	MIL-G-81322	Mobilgrease 28	Mobil Oil Corp., Shoreham Bldg Washington, D.C. 20005
		Royco 22	Royal Lubricants Co., River Rd & Merry Ln East Hanover, NJ 07936
		Aeroshell Grease 22	Shell Oil Co., One Shell Plaza P.O. Box 2463, Houston, TX 77001
15. Grease	MIL-G-21164	Castrolease MSA (C)	Castrol Oil, Inc., 254-256 Doremus Ave Newark, NJ 07105
		Electro-Moly/11	Electrofilm Inc., P.O. Box 3930 7116 Laurel Canyon Blvd North Hollywood, CA 91605
		Everlube 211-G Moly Grease	Everlube Corp., 6940 Farmdale Ave, North Hollywood, CA 91605
		Royco 64C	Royal Lubricants, River Road Hanover, NJ 07963
		Aeroshell Grease 17	Shell Oil Co., 50 West 50th St New York, NY 10020

CHART 2
RECOMMENDED MATERIALS (EFFECTIVITY: ALL) (CONTINUED)

MATERIAL	SPECIFICATION	PRODUCT	SUPPLIER
		Chevron Aviation Grade 44	Standard Oil Co. of California, 225 Bush Street San Francisco, CA 94120
16. Lubricating Oil, General Purpose Low Temperature	MIL-L-7870	Caltex Low Temp Oil	Caltex Oil Products Co., New York, NY
17. Lubricating Oil		Brayco 300	Bray Oil Co., 1925 N. Mariana Ave Los Angeles, CA 90032
18. Corrosion Preventive		LPS-1	Holt Lloyd Corp., 4647 Hugh Howel Rd Tucker, GA 30084
19. Wheel Bearing Grease		Amsoil Heavy Duty (GHD)	AMS/OIL 2206 Winter Street Superior, Wisconsin
20. Toilet Antifreeze		Clean Flush	Alamo Accessories Inc., 10843 Vandale San Antonio, TX 78216
21. Petrolatum, Technical	VV-P-236	Vasoline or Pharmaceutical Grade Petroleum Jelly	Obtain Locally
22. Toilet Chemical		Clean Flush	Alamo Accessories Inc., 10843 Vandale San Antonio, TX 78216
23. Lysol Spray			Obtain Locally
24. Fluid, Deicing/Anti-icing, Airplane	Type I per SAE AMS 1424 and ISO 11075	UCAR ADF Concentrate	Union Carbide Customer Center, 10235 W. Little York Rd. Houston, TX 77040
	Type I per SAE AMS 1424 and ISO 11075	UCAR ADF 50/50	Union Carbide Customer Center, 10235 W. Little York Rd. Houston, TX 77040
	Type II per SAE AMS 1428 and ISO 11078	UCAR AAF UC5.1	Union Carbide Customer Center, 10235 W. Little York Rd. Houston, TX 77040
	Type I per SAE AMS 1424 and ISO 11075	Arcoplus	Arco Chemical Co. 3801 West Chester Pike, New Town Square, PA 19073-2387

CHART 2
RECOMMENDED MATERIALS (EFFECTIVITY: ALL) (CONTINUED)

MATERIAL	SPECIFICATION	PRODUCT	SUPPLIER
	Type I per SAE AMS 1424 and ISO 11075	Kilfrost DF	Arco Chemical Co. 3801 West Chester Pike, New Town Square, PA 19073-2387
	Type II per SAE AMS 1428 and ISO 11078	Kilfrost ABC-3	Arco Chemical Co. 3801 West Chester Pike, New Town Square, PA 19073-2387
25. Spray	MIL-G-81322	D5922NS	Zip Chem Products 1-800-648-2661

REPLENISHING - MAINTENANCE PRACTICES (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

Servicing procedures included in this chapter pertain to systems and components using fluids or gases that can be replenished, such as the engine oil system, oxygen system, fuel system, the landing gear hydraulic system, etc.

FUEL HANDLING PRACTICES (Effectivity: All)

All hydrocarbon fuels contain some dissolved and some suspended water. The quantity of water contained in the fuel depends upon the temperature and type of fuel. Jet fuel, with its higher aromatic content, tends to absorb and suspend more water than aviation gasoline. Along with the water, it will suspend rust, lint and other foreign materials longer. Given sufficient time, these suspended contaminants will settle to the bottom of the tank. However, the settling time for jet fuel is five times that of aviation gasoline. Due to this fact, jet fuels require good fuel handling practices to ensure that the airplane is serviced with clean fuel. If recommended fuel handling procedures are carefully followed, solid contaminants will settle and free water can be reduced to 30 parts per million (ppm), a value that is currently accepted by the major airlines.

Since most suspended materials can be removed from the fuel by sufficient settling time and proper filtration, they are not a major problem. Suspended water has been found to be the major fuel contamination problem. Its effects are multiplied in airplanes operated primarily in humid regions and warm climates.

Suspended water cannot be filtered from the fuel by micronic filters, but can be released by lowering the fuel temperature, such as will occur in flight. For example, a jet fuel may contain 65 ppm (8 ounces per 1000 gallons) of suspended water at 80°F. When the fuel temperature is lowered to 14°F only about 25 ppm will remain in solution. The difference of 40 ppm will have been released as super cooled water droplets which need only a piece of solid contaminant or an impact shock to convert them to ice crystals. Tests indicate that these water droplets will not settle during flight and are pumped freely through the system. If they become ice crystals in the tank, they will not settle since the specific gravity of ice is approximately equal to that of jet fuel. Although 40 ppm of suspended water seems like a very small quantity, when it is added to the suspended water in the fuel at the time of delivery, it is sufficient to ice a filter. While the critical fuel temperature range is from 0° to -20°F, which produces severe system icing, water droplets can freeze at any temperature below 32°F.

Water in jet fuel also creates an environment favorable to the growth of a microbiological "sludge" in the settlement areas of the fuel cells. This sludge, plus other contaminants in the fuel, can cause corrosion of metal parts in the fuel system as well as clogging of the fuel filters. Although all metal parts, except the standby boost pumps and jet transfer pumps, are mounted above the settlement areas, the possibility of filter clogging and corrosive attacks on fuel pumps exists if contaminated fuels are introduced.

Since fuel temperature and settling time affect total water content and foreign matter suspension, contamination can be minimized by keeping equipment clean, using adequate filtration equipment and careful water drainage procedures, storing the fuel in the coolest areas possible, and allowing adequate settling time. Underground storage is recommended for fuels. Filtering the fuel each time it is transferred will minimize the quantity of suspended contaminants carried by the fuel.

The primary means of fuel contamination control by the owner/operator is "good housekeeping". This applies not only to the fuel supply, but to keeping the airplane system clean. The following are preventive steps that may be taken to prevent and recognize contamination problems:

- Know your fuel supplier. It is impractical to assume that fuel free from contaminants will always be available, but it is feasible to exercise precaution and be watchful for signs of fuel contamination.
- Assure, as much as possible, that the fuel obtained has been properly stored, that it is filtered as it is pumped to the truck and again as it is pumped from the truck to the airplane.
- Perform filter inspections to determine if sludge is present.
- Maintain good housekeeping by periodically flushing the fuel tankage system. The frequency of flushing will be determined by the climate and presence of sludge.
- Use only clean fuel servicing equipment.
- After refueling an airplane, allow a three hour settling period whenever possible, then drain a small amount of fuel from each drain valve.

CAUTION

Remove spilled fuel from the ramp area immediately to prevent the surface thus contaminated from causing tire damage.

FUEL GRADES AND TYPES (Effectivity: All)

WARNING

Switch fueling is the practice of mixing fuels with a flash point of less than 100° F (38° C) with fuels having a flash point of more than 100° F or vice versa. Mixing kerosene base JP-5, Jet A or Jet A-1 fuels with wide-cut petroleum distillates JP-4 and Jet B is considered switch fueling. Switch fueling changes the fuel/air mixture flammability characteristics. When switch fueling must be performed, the fueling rates must be reduced to one-half the normal rates.

Refer to FAA Order 8110.34, dated March 31/80, "Procedures For The Use Of Alternate Fuels For Turbine-Powered Aircraft".

Chart 1 gives fuel refiners' brand names, along with the corresponding designations established by the American Petroleum Institute (API) and the American Society of Testing Material (ASTM). The brand names are listed for ready reference and are not specifically recommended by Beech Aircraft Corporation. Any product conforming to the recommended specification may be used.

Jet A, Jet A-1, Jet B, JP-4, JP-5 and JP-8 fuels may be mixed in any ratio. Commercial aviation gasoline grades 80 Red (formerly 80/87), 100LL Blue and 100 Green (formerly 100/130) and military aviation gasoline grades 80/87 Red, 100/130 and 115/145 Purple are emergency fuels and may be mixed in any ratio with normal fuels when necessary. However, use of the lowest octane rating available is suggested due to its lower lead content.

CAUTION

The use of aviation gasoline shall be limited to 150 hours of operation during each Time Between Overhaul (TBO) period.

NOTE

In some countries 100LL Blue is colored Green and designated 100L.

The use of aviation gasoline as a jet fuel should be minimized whenever possible due to adverse effects on the hot section parts and the corrosion of turbine vanes.

CAUTION

Any fuel not containing an anti-icing additive meeting the requirements of MIL-I-27686 must have the additive blended during refueling of the airplane. Check with the fuel supplier to determine if the fuel contains the additive.

CHART 1
FUEL BRANDS AND TYPE DESIGNATIONS (Effectivity: All)

PRODUCT NAME	DESIG
AMERICAN OIL	
American Jet Fuel Type A	Jet A
American Jet Fuel Type A-1	Jet A-1
ATLANTIC REFINING COMPANY	Jet A
Arcojet-A	Jet A-1
Arcojet-A-1	Jet B
Arcojet-B	
BP TRADING COMPANY	
BP A.T.K.	Jet A-1
BP A.T.G.	Jet B
CALIFORNIA TEXAS COMPANY	
Caltex Jet A-1	Jet A-1
Caltex Jet B	Jet B
CITIES SERVICE COMPANY	
Turbine Type A	Jet A
CONTINENTAL OIL COMPANY	
Conoco Jet-40	Jet A
Conoco Jet-50	Jet A
Conoco Jet-60	Jet A-1
Conoco Jet JP-4	Jet B
GULF OIL COMPANY	
Gulf Jet A	Jet A
Gulf Jet A-1	Jet A-1
Gulf Jet B	Jet B
EXXON OIL COMPANY	
Exxon Turbo Fuel A	Jet A
Exxon Turbo Fuel 1-A	Jet A-1
Exxon Turbo Fuel 4	Jet B
MOBIL OIL COMPANY	
Mobil Jet A	Jet A
Mobil Jet A-1	Jet A-1
Mobil Jet B	Jet B
PHILLIPS PETROLEUM COMPANY	
Philjet A-50	Jet A
Philjet JP-4	Jet B
PURE OIL COMPANY	
Purejet Turbine Fuel Type A	Jet A
Purejet Turbine Fuel Type A-1	Jet A-1

PRODUCT NAME	DESIG
RICHFIELD PETROLEUM COMPANY	
Richfield Turbine Fuel A	Jet A
Richfield Turbine Fuel A-1	Jet A-1
SHELL OIL COMPANY	
Aeroshell Turbine Fuel 640	Jet A
Aeroshell Turbine Fuel 650	Jet A-1
Aeroshell Turbine Fuel JP-4	Jet B
SINCLAIR OIL COMPANY	
Sinclair Superjet Fuel	Jet A
Sinclair Superjet Fuel	Jet A-1
STANDARD OIL OF CALIFORNIA	
Chevron TF-1	Jet A-1
Chevron JP-4	Jet B
STANDARD OIL OF KENTUCKY	
Standard JF A	Jet A
Standard JF A-1	Jet A-1
Standard JF B	Jet B
STANDARD OIL OF OHIO	
Jet A Kerosene	Jet A
Jet A-1 Kerosene	Jet A-1
TEXACO	
Texaco Avjet K-40	Jet A
Texaco Avjet K-58	Jet A-1
Texaco Avjet JP-4	Jet B
UNION OIL COMPANY	
76 Turbine Fuel	Jet A-1
Union JP-4	Jet B

NOTE

Jet A - aviation kerosene-type fuel with -40°F (-40°C) freeze point

Jet A-1 - aviation kerosene-type fuel with -58°F (-50°C) freeze point

Jet B - a low grade, kerosene-type fuel with a freeze point of -60°F (-51°C), similar to MIL-T-5624 grade JP-4, which has a freeze point of -76°F (-60°C)

BT04354

MIL-I-27686 JET FUEL ANTI-ICING INHIBITOR (Effectivity: All)

CAUTION

Any fuel not containing an anti-icing additive meeting the requirements of MIL-I-27686 must have the additive blended during refueling of the airplane. Check with the fuel supplier to determine if the fuel contains the additive.

MIL-I-27686 jet fuel anti-icing inhibitor (1, Chart 2, 12-00-00) is primarily an anti-icing agent, but also has excellent microbiological sludge deterrent characteristics. An MIL-I-27686 anti-icing inhibitor is adequate protection against microbiological contamination and Beech Aircraft Corporation does not recommend the use of Biobor JF or similar fuel additives.

The anti-icing inhibitor is very soluble in water but only slightly soluble in fuel, which mandates that the blending with fuel be done in a precise manner, using a device which permits injection of the agent into a flowing stream of fuel to ensure even disbursement. Fuel distributors may tank or batch blend, or blend at the airplane when fueling. If the tanker truck is not equipped with the proper metering device, it may be necessary to carry the anti-icing agent and the blending device in the airplane. When blending the anti-icing agent with fuel, the concentration of additive should not be less than 20 fluid ounces per 260 gallons of fuel nor more than 20 fluid ounces per 104 gallons of fuel. When adding previously blended fuel, the additive concentration should not be less than 0.06 percent by volume or more than 0.15 percent by volume.

FILLING THE FUEL TANKS (Effectivity: All)

WARNING

Switch fueling is the practice of mixing fuels with a flash point of less than 100° F (38° C) with fuels having a flash point of more than 100° F or vice versa. Mixing kerosene base JP-5, Jet A or Jet A-1 fuels with wide-cut petroleum distillates JP-4 and Jet B is considered switch fueling. Switch fueling changes the fuel/air mixture flammability characteristics. When switch fueling must be performed, the fueling rates must be reduced to one-half the normal rates. Refer to FAA Order 8110.34, dated March 31/80, "Procedures For The Use Of Alternate Fuels For Turbine-Powered Aircraft".

The left and the right fuel tanks are serviced with fuel separately through over-the-wing fuel fillers located on top surface of each forward fuel tank. The single point filler will fill the aft tank first and then the forward tank.

a. Confirm that the servicing unit contains the proper fuel and fuel additive, refer to FUEL GRADES AND TYPES and MIL-I-27686 JET FUEL ANTI-ICING INHIBITOR in this chapter.

NOTE

An anti-icing additive conforming to MIL-I-27686 MUST be added to any fuel that is used in the Starship 1 airplanes.

b. Make sure the airplane is statically grounded to the service unit and to an approved ramp ground. The servicing unit must also be statically grounded to the approved ramp ground. Two grounding jacks are located on the underside of the airplane at the aft wing-to-fuselage fairings. The grounding jacks are placarded GROUND HERE.

c. Prior to opening the fuel tank filler cap, connect the servicing unit fuel nozzle grounding cable to the airplane grounding jack.

CAUTION

Use a nonabrasive protective pad on the deicer boot to prevent contact with the fuel hose. Do not allow any fuel to come into contact with the deicer boot.

d. Fill the tanks full or service the amount of fuel desired.

e. Remove the fuel nozzle and install the filler cap. Confirm that the filler cap is properly secured.

f. Disconnect the fuel nozzle grounding cable from the airplane grounding receptacle.

g. Repeat the procedure for servicing the opposite wing fuel tanks.

h. Remove the servicing unit grounding cable from the airplane.

i. Check for total fuel quantity (in pounds of fuel) on the left and right fuel quantity indicators, located on the Fuel Management section of the center subpanel in the cockpit.

j. Allow a three hour settling period when possible, then drain a small amount of fuel from each sump drain valve located on the lower inboard surface of each wing.

NOTE

If a fuel sample is to be taken, catch the sample in a clean container that can be sealed closed.

DRAINING THE FUEL TANKS (Effectivity: NC-4 thru NC-25) (Figure 1)

The left and right fuel tanks are defueled separately through a rapid drain valve located in each forward fuel tank root rib. The fuel in the aft fuel tank will flow to the forward fuel tank through the gravity feed line as the fuel level lowers in the forward fuel tank.

WARNING

Observe all fire precautions and safety practices when handling fuel. Ensure that the airplane is parked in an area unobstructed for access of emergency fire fighting equipment.

a. Confirm that the defueling vehicle/holding tank is identified for the fuel to be off-loaded from the airplane. Do not mix incompatible fuels, contaminated fuel with clean fuel, or anti-icing additive blended fuel with nonblended fuel.

b. Ensure the airplane and defueling vehicle/holding tank are grounded together and to an approved grounding point. Two grounding jacks are located on the underside of the airplane at the aft wing-to-fuselage fairings. The grounding jacks are placarded GROUND HERE.

c. Remove the left and/or right center aft wing-to-fuselage fairing as outlined in Chapter 53-50-00.

d. Remove the filler cap from the side of the airplane to be defueled.

e. Assemble a defueling hose to carry the fuel from the fuel tank to the defueling vehicle or holding tank. To properly mate with the rapid drain valve, the hose must have an end fitting per (1, Chart 1, 12-00-00).

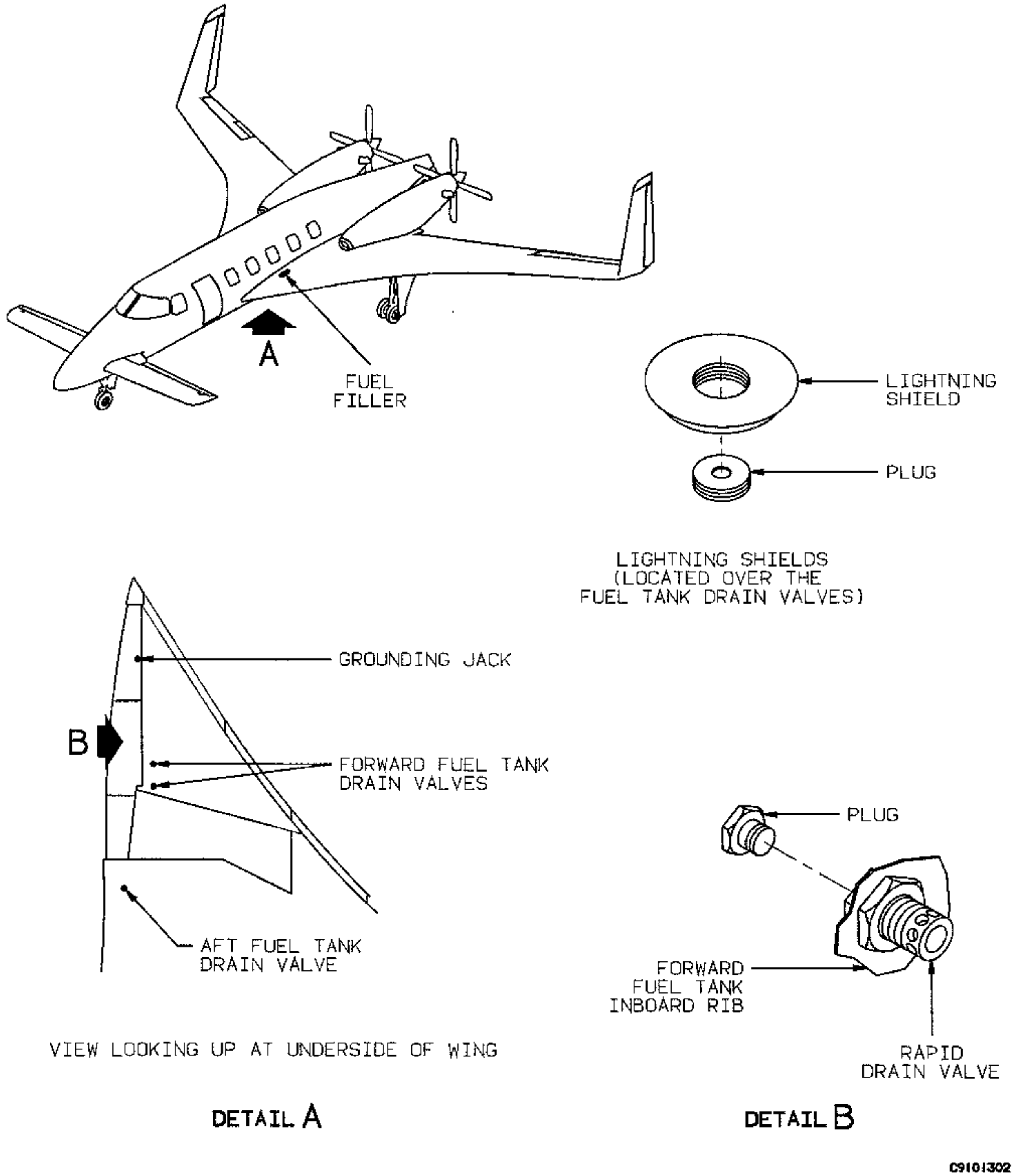
f. Cut the safety wire and remove the rapid drain valve plug.

g. Connect the hose fitting (1, Chart 1, 12-00-00) to the rapid drain valve. As the fitting is threaded into the rapid drain valve, it unseats (opens) the drain valve poppet to allow the fuel to flow.

h. The fuel may be gravity drained or, to defuel the tanks at a faster rate, the defueling vehicle/holding tank equipment pump may be utilized.

i. At completion of the defueling operation, disconnect the hose fitting from the rapid drain valve (the rapid drain valve poppet will reseat when the fitting is removed). Install and safety wire the plug to the rapid drain valve.

j. Install the left and/or right aft wing-to-fuselage fairing as outlined in Chapter 53-50-00.



Draining the Fuel Tanks (Effectivity: NC-4 thru NC-25)
Figure 1

CAUTION

Observe safety precautions during residual fuel draining. Confirm that the airplane is grounded to an authorized ground, and that the metal container to catch the fuel is grounded to the airplane and the same ground as the airplane.

NOTE

Each fuel drain valve is protected by a lightning shield and plug. The plugs must be removed to access the fuel drain valves.

k. Use a sump drain wrench (2, Chart 1, 12-00-00) to remove the plugs from the drain valves.

l. To drain the residual fuel from the left or right forward and aft fuel tanks, position a suitable container directly under the applicable fuel drain valve(s). There are two fuel drain valves located under each forward fuel tank and one located under each aft fuel tank.

m. Open the desired drain valve(s) by fully depressing the poppet and turning it approximately 90° in either direction with a crosspoint tool (Phillips screwdriver). Allow adequate time for the fuel tank to drain.

n. Using a crosspoint tool, rotate the poppet approximately 90° in the opposite direction, then release. Spring pressure should return the poppet to the closed position.

o. Verify that the poppet is properly seated and reinstall the lightning shield plugs over the drain valves.

p. Install the filler cap.

DRAINING THE FUEL TANKS (Effectivity: NC-26 and After) (Figure 2)

The left and right fuel tanks are defueled separately through a rapid drain valve located in each forward fuel tank root rib. The fuel in the aft fuel tank will flow to the forward fuel tank through the gravity feed line as the fuel level lowers in the forward fuel tank.

WARNING

Observe all fire precautions and safety practices when handling fuel. Ensure that the airplane is parked in an area unobstructed for access of emergency fire fighting equipment.

a. Confirm that the defueling vehicle/holding tank is identified for the fuel to be off-loaded from the airplane. Do not mix incompatible fuels, contaminated fuel with clean fuel, or anti-icing additive blended fuel with nonblended fuel.

b. Ensure the airplane and defueling vehicle/holding tank are grounded together and to an approved grounding point. Two grounding jacks are located on the underside of the airplane at the aft wing-to-fuselage fairings. The grounding jacks are placarded GROUND HERE.

c. Remove the left and/or right center aft wing-to-fuselage fairing as outlined in Chapter 53-50-00.

d. Remove the filler cap from the side of the airplane to be defueled.

e. Assemble a defueling hose to carry the fuel from the fuel tank to the defueling vehicle or holding tank. To properly mate with the rapid drain valve, the hose must have an end fitting per (1, Chart 1, 12-00-00).

f. Cut the safety wire and remove the rapid drain valve plug.

g. Connect the hose fitting (1, Chart 1, 12-00-00) to the rapid drain valve. As the fitting is threaded into the rapid drain valve, it unseats (opens) the drain valve poppet to allow the fuel to flow.

h. The fuel may be gravity drained, or to defuel the tanks at a faster rate, the defueling vehicle/holding tank equipment pump may be utilized.

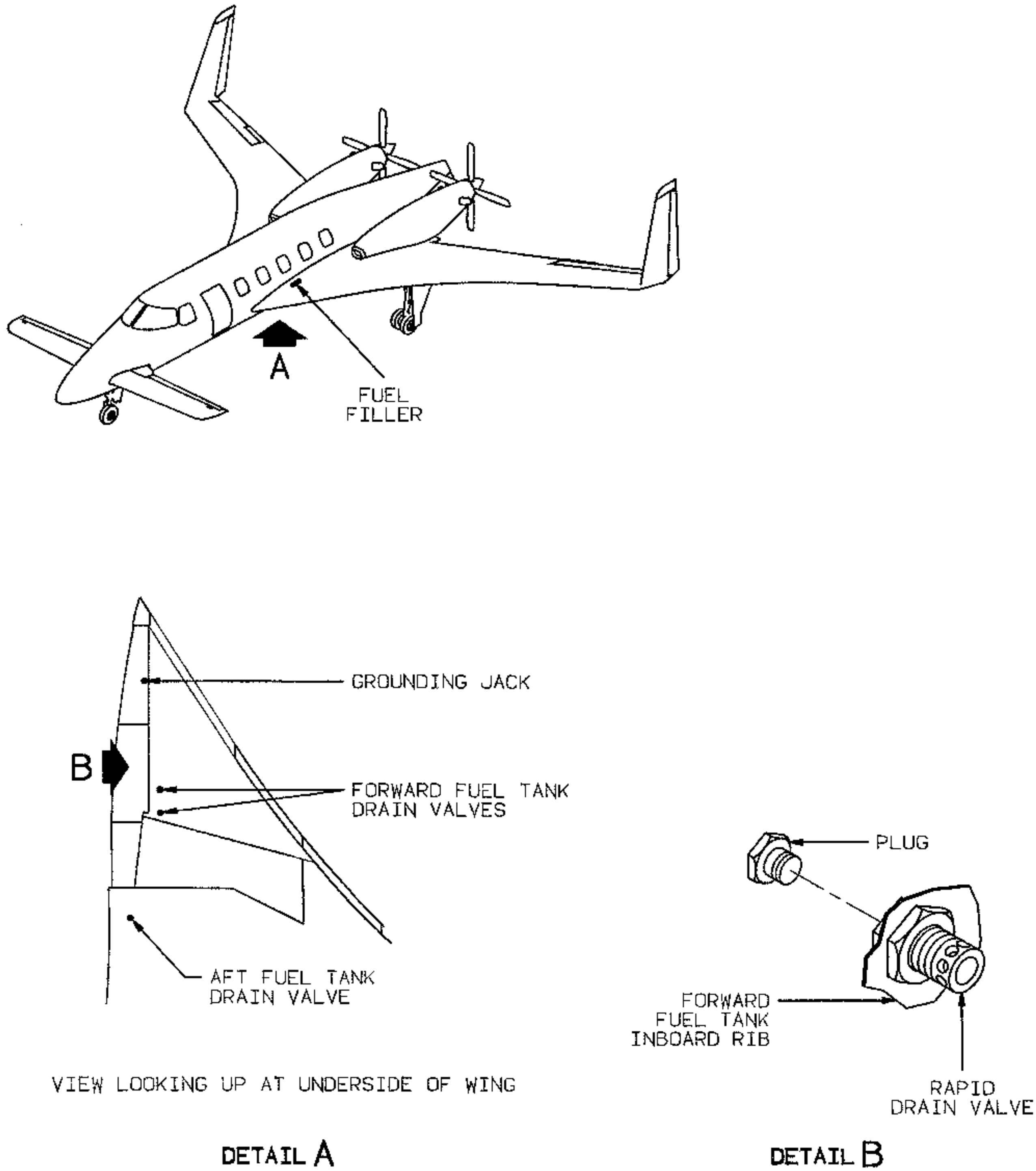
i. At completion of the defueling operation, disconnect the hose fitting from the rapid drain valve (the rapid drain valve poppet will reseat when the fitting is removed). Install and safety wire the plug in the rapid drain valve.

j. Install the left and/or right aft wing-to-fuselage fairing as outlined in Chapter 53-50-00.

CAUTION

Observe fire safety precautions during residual fuel draining. Confirm that the airplane is grounded to an authorized ground, and that the metal container to catch the fuel is grounded to the airplane and the same ground as the airplane.

k. To drain the residual fuel from the left or right forward and aft fuel tanks, position a suitable container directly under the applicable fuel drain valve(s). There are two fuel drain valves located under each forward fuel tank and one located under each aft fuel tank.



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Draining the Fuel Tanks (Effectivity: NC-26 and After)
Figure 2

l. Insert an 1/8-inch allen wrench into the poppet recess and unlock the poppet by rotating it clockwise approximately 35°.

CAUTION

Use care not to apply more than 4 inch-pounds of counterclockwise torque to the drain valve poppet. The internal spring should provide enough torque to lock the poppet in the open position.

m. Apply upward pressure to the poppet (approximately 7 pounds of force is required to fully depress the poppet) and rotate it counterclockwise until it stops (approximately 25° to 35°). Release upward pressure on the poppet and allow it to lock in the open position.

n. When fuel draining is complete, insert the allen wrench in the poppet recess and rotate it approximately 35° to 45° clockwise until the valve spring forces the poppet down. The spring should also provide enough counterclockwise torque to return the poppet to its closed and locked position.

o. Verify that the poppet is locked in the closed position by applying a 3 to 5 pound upward force to the poppet. The poppet must not move.

p. Install the filler cap.

OIL SYSTEM SERVICING (Effectivity: All) (Figure 3)

Servicing the engine oil system primarily involves maintaining the engine oil at the proper level.

An oil level indicating system installed in the airplane allows maintenance personnel to determine from the ground if oil needs to be added to the engine. The system consists of an OIL LEVEL OK light, a test switch and an electric oil-level indicator (dipstick) for each engine. If the engine oil level is adequate for safe operation of the engine, the OIL LEVEL OK light will illuminate when the test switch is actuated. The green press-to-test OIL LEVEL OK light and the momentary push-button test switch are mounted on a bracket attached to the engine fuel filter bracket on the aft side of the firewall. The light and switch are accessible through a door in the lower surface of the lower forward engine cowling. The electric dipstick is located in the engine oil tank filler neck at the eleven o'clock position on the accessory gearbox housing and is accessible through a door in the upper surface of the upper forward engine cowling. The electric dipstick is also marked in US quarts to indicate the amount of oil required to fill the engine oil tank to the full mark under both hot and cold conditions. Since the OIL LEVEL OK light does not indicate the amount of oil in the engine, only that the level is within the normal range, the electric dipstick should be used as a conventional dipstick when adding oil to the engine. Service the oil system with oil as specified in the latest revision of Pratt & Whitney Service Bulletin No. 14001.

CAUTION

Any time the oil system has been contaminated by metal particles, the oil cooler must be replaced and the oil system flushed to prevent engine damage. In addition, all airplane components and associated plumbing utilizing the engine oil system, such as propeller governors, must be flushed until free of contamination.

OIL LEVEL CHECKING (Effectivity: All)

Within ten minutes after the engine has been shutdown, check the engine oil level as follows:

NOTE

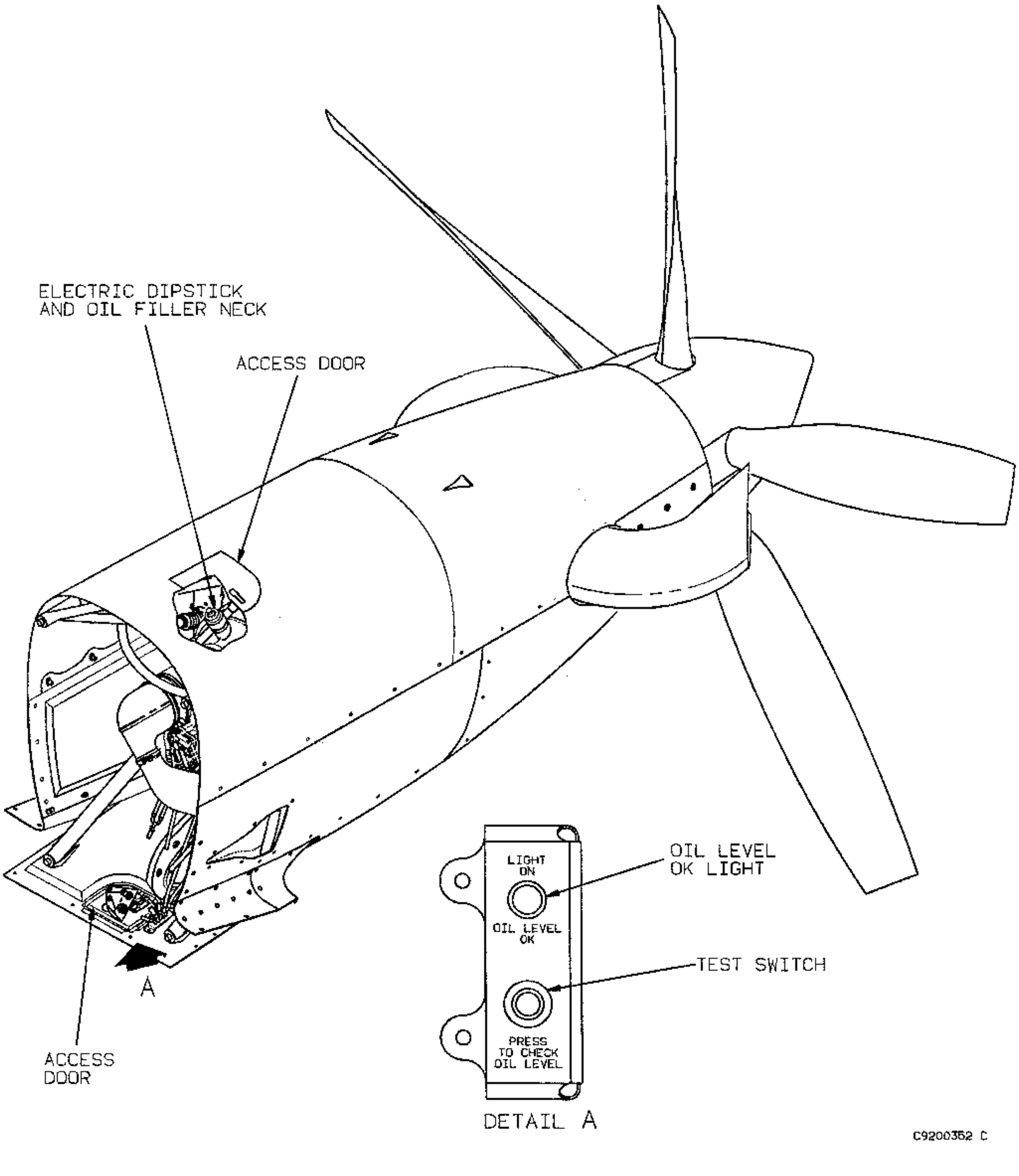
If more than ten minutes has elapsed, place the ignition/start switch in the STARTER ONLY position and motor the engine with the starter prior to checking the oil level. If the engine has remained stationary for 12 hours or more, start the engine and run at idle speed for a minimum of two minutes, then feather the propeller and shutdown the engine.

CAUTION

Do not exceed the starter operating limits of 30 seconds ON, 5 minutes OFF, 30 seconds ON, 5 minutes OFF, 30 seconds ON, and 30 minutes OFF.

a. Open the access door in the lower surface of the lower forward engine cowling to gain access to the OIL LEVEL OK light and test switch.

b. Press the light lens to check the condition of the light bulb. If the light illuminates, continue to the next step; if not, correct the circuit or replace the light bulb as necessary before continuing.



Oil System Servicing (Effectivity: All)
Figure 3

c. Actuate the test switch and check for illumination of the OIL LEVEL OK light indicating that the engine oil level is ok.

d. If the OIL LEVEL OK light failed to illuminate, open the access door in the upper surface of the upper forward engine cowling to gain access to the dipstick and filler neck.

e. Remove the electrical connector from the dipstick and remove the dipstick from the oil filler neck.

f. Check the oil level against the markings on the dipstick.

NOTE

If the oil level is too low to register on the dipstick due to possible excessive consumption, or if low or fluctuating pressures have been recorded, refer to the Pratt & Whitney PT6A-67A Engine Maintenance Manual to determine the probable cause and correct.

g. Add oil (type specified in the latest revision of Pratt & Whitney Service Bulletin No. 14001) through the filler neck until the proper level is reached. The normal oil level is at the one quart mark. Overfilling the engine with oil may cause a discharge of oil through the breather until a satisfactory level is reached.

CAUTION

Do not mix different brands of oil when adding oil between oil changes; different brands of oil may be incompatible because of the differences in their chemical structure.

h. Install the dipstick in the filler neck and install the electrical connector. Ensure that the dipstick is correctly installed and locked securely.

CAUTION

Remove any spilled oil immediately to prevent tire deterioration.

BRAKE SYSTEM SERVICING (Effectivity: All) (Figure 4)

Brake system servicing is limited primarily to maintaining the proper fluid level in the brake fluid reservoir and to maintaining a precharge of 600 ± 50 psi in the accumulator. Check the fluid level and charge the accumulator as follows:

a. Open the ANTI SKID circuit breaker on the LH circuit breaker panel.

b. Ensure that the No. 3 ANNUNCIATOR circuit breaker on the avionics circuit breaker panel is engaged.

c. Place the BATT MASTER SWITCH in the ON position.

d. Ensure that the parking brake is off.

e. Remove the LH forward wing upper fairing to gain access to the brake fluid reservoir.

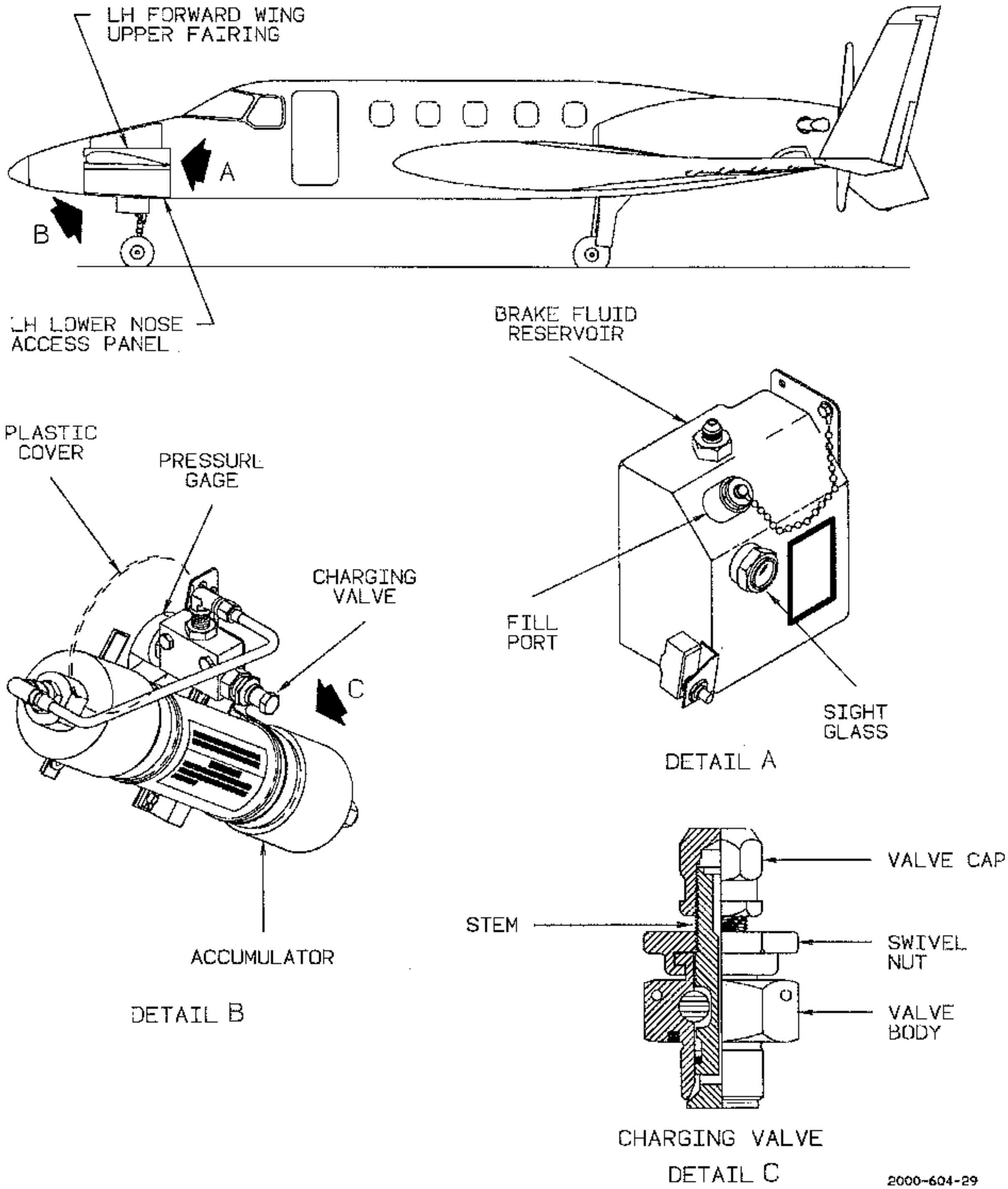
f. Using the alternate extension hand pump in the cockpit, pump the forward set of nose gear doors open. Refer to Chapter 32-20-00 and lock the doors in the open position.

g. Depress the brake pedals 15 to 20 times to deplete the brake fluid pressure of the accumulator. While pumping the pedals, have an assistant observe the accumulator pressure gage. The pressure gage is visible through a plastic cover in the nose landing gear wheel well. When the reading on the gage reaches 600 ± 50 psi (or less if the accumulator is not fully charged) and remains stationary, the fluid pressure has been depleted.

h. If no fluid is visible in the reservoir sight glass, add a sufficient quantity of MIL-H-5606 hydraulic fluid (2, Chart 2, 12-00-00) to raise the fluid level to the lower edge of the filler neck.

i. Check the pressure in the accumulator by observing the pressure level on the gage. If the pressure is not 600 ± 50 psi, charge the accumulator with dry compressed nitrogen as follows:

1. Gain access to the accumulator and charging valve by removing the the LH lower nose access panel.
2. Remove the valve cap from the charging valve.
3. Connect a regulated nitrogen source to the stem.
4. Open the charging valve by turning the swivel nut counterclockwise. Do not allow the valve body to turn while loosening the swivel nut. Two and one-fourth turns will open the valve completely.
5. Open the valve on the nitrogen supply.
6. When 600 ± 50 psi is indicated on the gage, close the charging valve by turning the swivel nut clockwise. Tighten the swivel nut to a torque of 50 to 70 inch-pounds.



Brake System Servicing (Effectivity: All)
Figure 4

7. Shut off the nitrogen supply.

8. Slowly bleed off the pressure in the line between the charging valve and the nitrogen supply valve.

9. Disconnect the nitrogen supply line from the charging valve.

10. Install the valve cap finger tight.

11. Replace the LH lower nose access panel and the LH forward wing upper fairing.

OXYGEN SYSTEM SERVICING (Effectivity: All)

SAFETY GUIDELINES FOR SERVICING THE OXYGEN SYSTEM (Effectivity: All)

The following information provides general servicing procedures and safety guidelines that must be followed when handling pressurized oxygen equipment.

Prior to servicing the airplane's oxygen system, servicing personnel must always refer to OXYGEN SYSTEM SERVICING found in this chapter and FAA Advisory Circular 43.13-1A/3 or subsequent.

The greatest safety hazard associated with handling oxygen equipment is the possibility of fire and explosion. Gaseous oxygen, under the right conditions, will cause oil and grease to ignite spontaneously and either burn or explode. It is extremely important to keep all types of oil and grease away from oxygen equipment. Oxygen servicing tools and equipment must be cleaned regularly with anhydrous ethyl alcohol (3, Chart 2, 12-00-00), isopropyl alcohol (4, Chart 2, 12-00-00) or other approved cleaning agents. After cleaning, they must be dried and kept in a clean storage area, protected with plugs, caps and covers when applicable.

Before servicing the oxygen system, all clothing and oxygen equipment contaminated with oil, grease, fuel, hydraulic fluid, etc. must be cleaned or changed; all lip creams and suntan oils must also be removed. It is highly recommended that a thorough washing of the hands and face be adopted as a standard procedure before handling any kind of oxygen equipment.

The following list contains additional general safety precautions that must be adhered to during the servicing process.

- Always ground the system and the servicing equipment before connecting the fill adapter (5, Chart 1, 12-00-00) to the oxygen servicing cart.
- Close the shutoff valve on the oxygen supply cylinder regulator by pushing in the OXYGEN SYS READY control knob in the cockpit and securing the regulator's control lever in the off position.
- Remove all electrical power from the airplane. Do not operate electrical switches, or connect or disconnect the ground auxiliary power unit during the oxygen charging operation.
- Do not service the oxygen system if fueling or other flammable fluid servicing is in process.
- Do not charge the system too fast. Rapid charging can create a dangerous overheating condition.

SERVICING THE OXYGEN SYSTEM (Effectivity: All) (Figure 5)

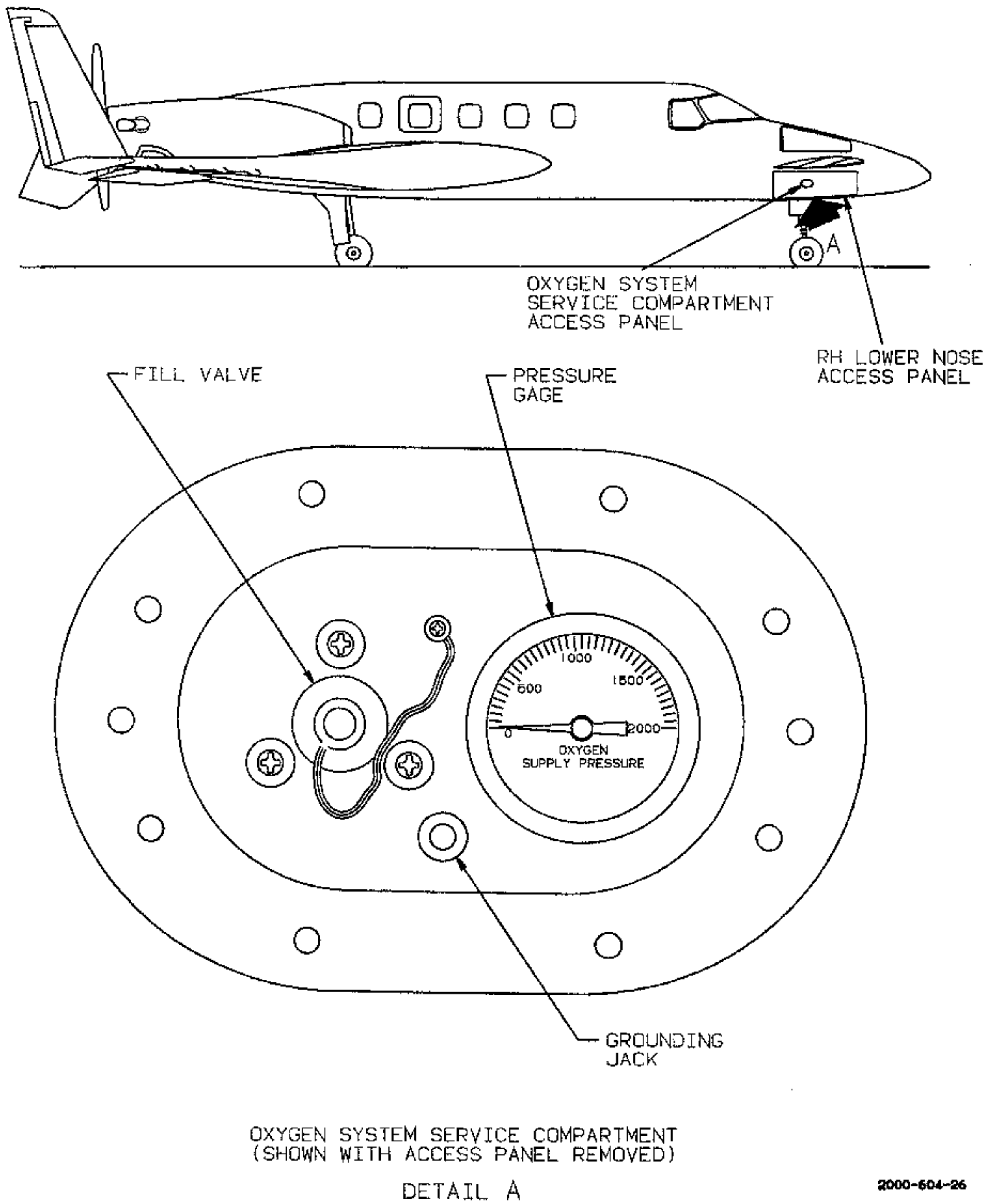
WARNING

Refer to SAFETY GUIDELINES FOR SERVICING THE OXYGEN SYSTEM before attempting any servicing on the oxygen system.

Access to the oxygen system's fill valve, dial pressure gage and grounding jack is gained through a service access panel located on the RH lower nose access panel. To gain access, loosen the captive screws located around the edge of the oxygen service compartment access panel and remove the panel.

WARNING

Avoid making sparks and keep fire and all burning cigarettes away from the vicinity of the airplane. Make certain that the OXYGEN SYS READY control knob in the cockpit is pushed in. Inspect the fill connection for cleanliness before attaching it to the fill valve. Make certain that your hands, tools and clothing are clean, particularly of grease or oil. These contaminants, under the right conditions, will ignite upon contact with pure oxygen under pressure. As a further precaution against fire, open and close all oxygen valves slowly.



Oxygen System Servicing (Effectivity: All)
Figure 5

Before performing any servicing on the airplane's oxygen system, ground the airplane's oxygen system by connecting a grounding cable from the oxygen recharging cart to the oxygen system's grounding jack, located in the oxygen service compartment, making sure the recharging cart is properly grounded.

To recharge the oxygen cylinder, remove the protective cap from the oxygen fill valve and attach the hose from the oxygen recharging cart to it.

When filling the oxygen cylinder, use only MIL-0-27210 aviator's breathing oxygen (5, Chart 2, 12-00-00).

WARNING

Do not use oxygen intended for medical purposes or industrial uses such as welding. Such oxygen may contain excessive moisture that could cause the oxygen system's valves and lines to freeze up.

To prevent overheating, fill the oxygen cylinder slowly by adjusting the recharging rate with the pressure regulating valve on the service cart. Fill the cylinder until a pressure of 1850 ± 50 psig is achieved. This is a steady state condition after the cylinder has cooled to a temperature of 70° F from the recharging heat buildup. This pressure may be increased an additional 3.5 psig for each degree of increase in temperature above 70° F; conversely, for each degree of decrease in temperature below 70° F, reduce the cylinder pressure by 3.5 psig.

EXAMPLE A

Outside Temperature of 85°F

1,800.0	± 50	psig 70°F
+ 52.5		psig (3.5 x 15° temp difference)
1,852.5	± 50	psig 85°F (adjusted cylinder press)

EXAMPLE B

Outside Temperature of 60°F

1,800.0	± 50	psig 70°F
- 35.0		psig (3.5 x 10° temp difference)
1,765.0	± 50	psig 60°F (adjusted cylinder press)

BT04243

When the oxygen cylinder is properly charged, turn off the oxygen charging cart, disconnect the fill hose from the fill valve and install the protective cap on the fill valve.

Remove the grounding plug from the grounding jack in the oxygen system servicing compartment.

Install the oxygen service compartment access panel and secure with the captive screws located around the edge of the panel.

If in the process of servicing it becomes necessary to disconnect a tapered fitting, the threads must be lubricated with anti-seize tape (6, Chart 2, 12-00-00). Do not use any lubrication on straight fittings. A swagelock fitting should be tightened one and a quarter turns from the finger-tight position.

NOTE

Refer to Advisory Circular 43.13-1A/3 for additional servicing precautions recommended by the FAA for the oxygen system.

NOSE LANDING GEAR SHOCK ABSORBER SERVICING (Effectivity: All) (Figure 6)

WARNING

Never remove the charging valve from the landing gear assembly until all of the pressure is released from the strut. Check the fluid level and fill the landing gear shock absorber as follows:

a. Loosen the valve cap about one turn to release the trapped air, then remove the cap from the charging valve.

b. Release the air pressure in the strut by slowly turning the swivel nut counterclockwise. Do not allow the valve body to turn while loosening the swivel nut. Two and one-fourth turns will open the valve completely. Allow the strut to fully compress.

WARNING

Stand to one side of the valve while releasing the air pressure.

c. Connect one end of a 1/4-inch hose to the charging valve and submerge the other end in a container of clean hydraulic fluid (2, Chart 2, 12-00-00).

d. Slowly extend the strut to draw hydraulic fluid into the strut. When the strut is fully extended, slowly compress the strut to expel any excess fluid and air. Recycle the strut as many times as necessary to expel all of the air.

e. Remove the hose end from the container of hydraulic fluid and extend the strut one final time, then slowly compress the strut fully to expel any excess fluid.

f. Remove the hose from the charging valve.

g. With the airplane on the ground and empty except for full fuel and oil, inflate the strut with dry filtered air until the piston is extended 5.75 to 6.25 inches.

h. After filling to the proper pressure, tighten the swivel nut to a torque of 50 to 70 inch-pounds.

i. Install the valve cap finger tight.

MAIN LANDING GEAR SHOCK ABSORBER SERVICING (Effectivity: All) (Figure 7)

WARNING

Never remove the charging valve from the landing gear assembly until all of the pressure is released from the strut. Check the fluid level and fill the landing gear shock absorber as follows:

a. Loosen the valve cap about one turn to release the trapped air, then remove the cap from the charging valve.

b. Release the air pressure in the strut by slowly turning the swivel nut counterclockwise. Do not allow the valve body to turn while loosening the swivel nut. Two and one-fourth turns will open the valve completely. Allow the strut to fully compress.

WARNING

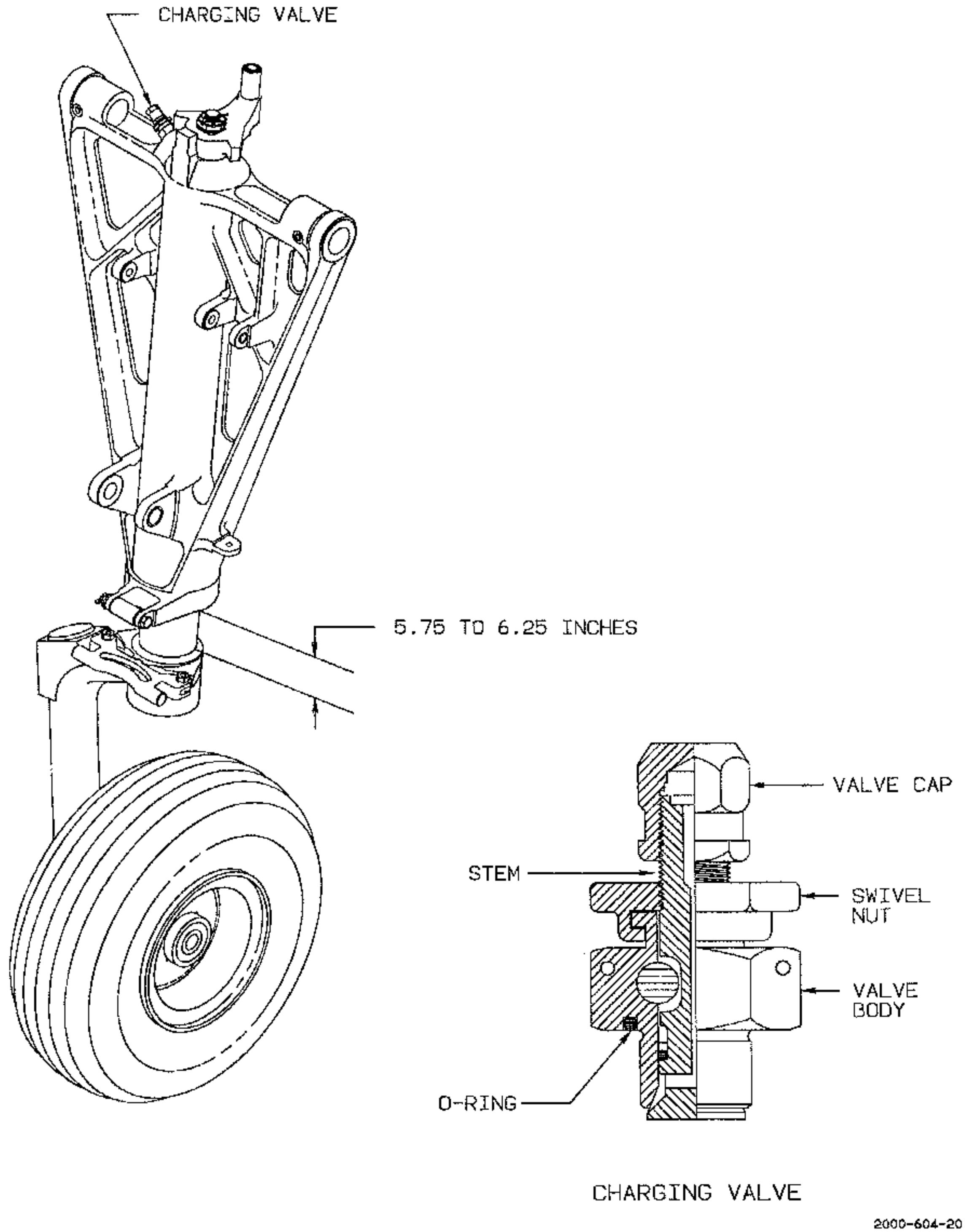
Stand to one side of the valve while releasing the air pressure.

c. Connect one end of a 1/4-inch hose to the charging valve and submerge the other end in a container of clean hydraulic fluid (2, Chart 2, 12-00-00).

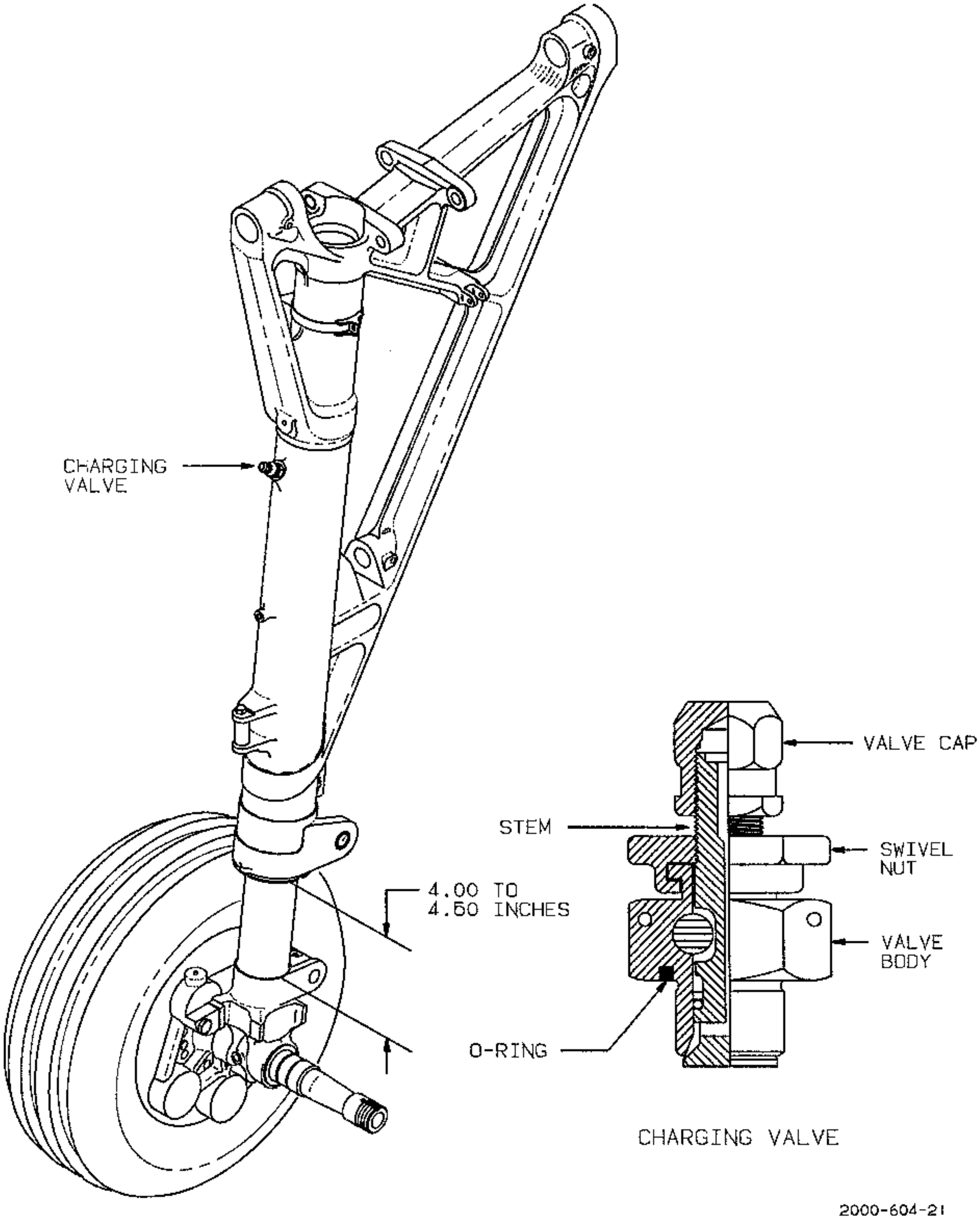
d. Slowly extend the strut to draw hydraulic fluid into the strut. When the strut is fully extended, slowly compress the strut to expel any excess fluid and air. Recycle the strut as many times as necessary to expel all of the air.

e. Remove the hose end from the container of hydraulic fluid and extend the strut one final time, then slowly compress the strut fully to expel any excess fluid.

f. Remove the hose from the charging valve.



Nose Landing Gear Shock Absorber Servicing (Effectivity: All)
Figure 6



Main Landing Gear Shock Absorber Servicing (Effectivity: All)
Figure 7

g. With the airplane on the ground and empty except for full fuel and oil, inflate the strut with dry filtered air until the piston is extended 4.00 to 4.50 inches.

h. After filling to the proper pressure, tighten the swivel nut to a torque of 50 to 70 inch-pounds.

i. Install the valve cap finger tight.

LANDING GEAR HYDRAULIC POWER PACK SERVICING (Effectivity: All) (Figure 8)

Servicing the hydraulic landing gear system consists of maintaining the correct fluid level in the power pack reservoir. To gain access to the power pack, the upper access panels must be removed from the LH nacelle. The power pack reservoir port contains a cap and dipstick assembly marked FILL WARM - COLD. Add MIL-H-5606 hydraulic fluid (2, Chart 2, 12-00-00) as required to fill the system.

AIR CONDITIONING SYSTEM SERVICING (Effectivity: All)

SAFETY GUIDELINES FOR SERVICING THE AIR CONDITIONING SYSTEM (Effectivity: All)

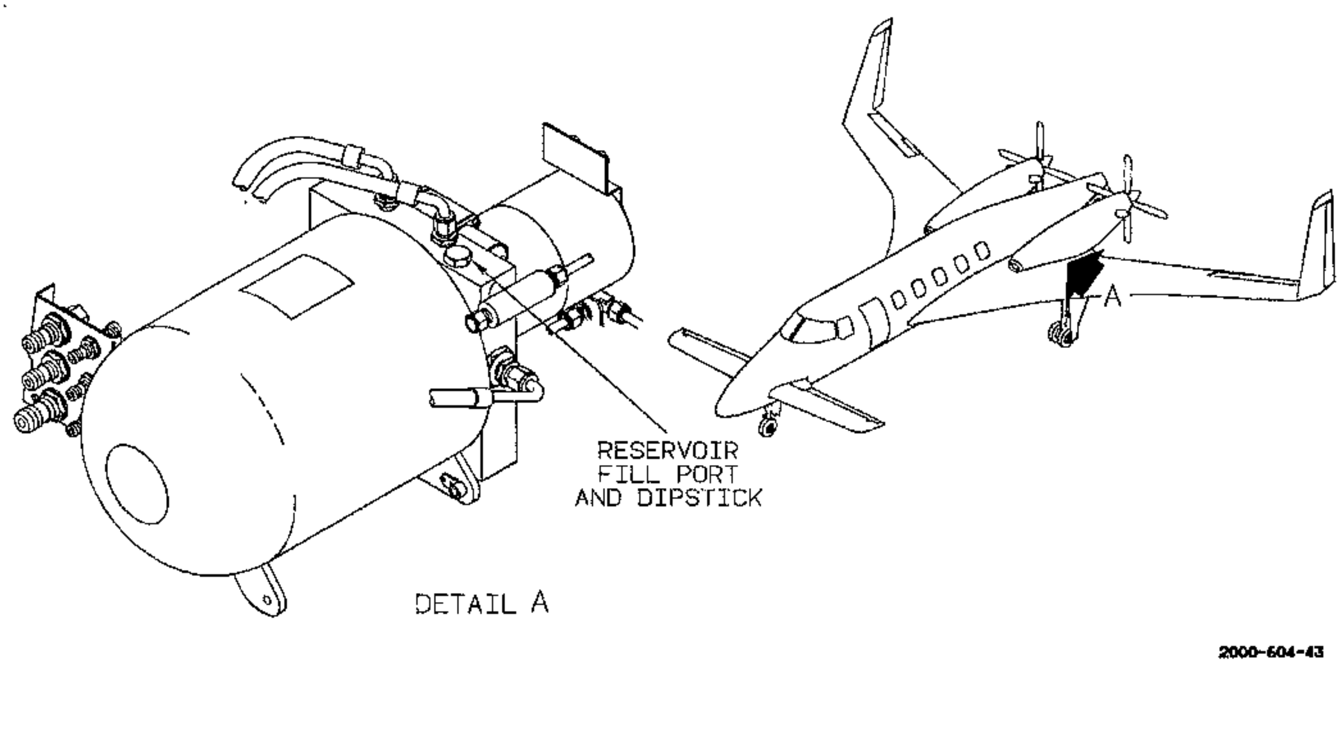
Prior to servicing the air conditioning system, servicing personnel must be thoroughly familiar with these instructions and experienced in servicing R-12 refrigerant air conditioning systems.

The following information provides general servicing procedures and safety guidelines that must be followed when working on the air conditioning system.

a. A face shield should be worn anytime servicing or maintenance is performed in order to protect servicing personnel from having refrigerant coming in contact with the eyes.

b. Use ONLY R-12 refrigerant (7, Chart 2, 12-00-00) when charging the air conditioning system.

c. DO NOT smoke when servicing the air conditioning system or expose the refrigerant to fire, for R-12



Landing Gear Hydraulic Power Pack Servicing (Effectivity: All)
Figure 8

refrigerant converts to a highly toxic gas when exposed to an open flame.

d. Always add refrigerant to the low pressure (suction) side of the system when the system is operating. Adding refrigerant to the high pressure side of the system during operation could cause the refrigerant supply cylinder to explode.

e. Refrigerant added to the system while the system is operating must be in vapor form to prevent possible damage to the compressor.

f. Whenever the system is opened and exposed to the atmosphere, evacuate the entire system down to an absolute pressure of 125 microns or less with a vacuum pump.

g. Exercise care in handling all fittings and connections to prevent damage to them. Even minute damage could result in a leak.

AIR CONDITIONING SYSTEM CHARGING
(Effectivity: All)
(Figure 9)

WARNING

Refer to SAFETY GUIDELINES FOR SERVICING THE AIR CONDITIONING SYSTEM before attempting any service on the air conditioning system.

The following instructions are provided as a guide when charging the air conditioning system.

a. Remove the air conditioning service compartment access panel (secured with captive fasteners).

b. Connect air conditioning service gages (3, Chart 1, 12-20-00) to the service valves (located in the air conditioning service compartment).

NOTE

If the air conditioning system is completely discharged, refer to Chapter 21-50-00 for the proper procedures to charge the system.

c. Start the RH engine (engine speed must be at least 65% N1 and the outside air temperature at least 10° F). Manually turn on the air conditioning system by placing the TEMP MODE control knob in the MAN position. Start air conditioning compressor operation by toggling the MAN TEMP switch to the DECR position until the compressor starts operating.

WARNING

When adding refrigerant to the system with the compressor operating, the refrigerant must be in vapor form and added to the system's low pressure (suction) side ONLY.

d. Add refrigerant (7, Chart 2, 12-00-00) to the low pressure (suction) side of the system until all the bubbles visible in the sight glass have disappeared, then add approximately an additional 8 ozs. of refrigerant. Do not add refrigerant oil to the system.

NOTE

During approximately the first 30 seconds of compressor operation, bubbles will be visible in the sight glass and then disappear if the system is correctly charged.

e. When the system has been properly charged, shut off the the refrigerant supply and disconnect the air conditioning service gages from the service valves.

f. Turn the air conditioning system off by turning the TEMP MODE control knob to the OFF position.

g. Shut down the RH engine.

h. Install the air conditioning service compartment access panel (secured with captive fasteners).

TIRE SERVICING (Effectivity: All)

Inflate the nose gear tire to 65 ± 2 psi and the main gear tires to between 80 and 87 psi with the airplane unloaded or to 95 ± 4 psi when loaded.

CAUTION

Tires that have picked up a fuel or oil film should be washed down as soon as possible with a detergent solution to prevent contamination of the rubber.

Maintaining the proper tire inflation will help to avoid damage from landing shock and contact with sharp stones and ruts, and will minimize tread wear. When inflating the tires, inspect them for cuts, cracks, breaks, and tread wear. The pressure of a serviceable tire that is fully inflated should not drop more than 4 percent over a 24-hour period.

CAUTION

Raytheon Aircraft Company cannot recommend the use of recapped tires. Recapped tires may swell due to increased temperature at takeoff. Increased tire size may damage the landing gear and the retract mechanism during retraction or extension of the landing gear.

NOTE

While Raytheon Aircraft Company cannot recommend the use of recapped tires, tires retreaded by an FAA approved repair station with a specialized service-limited rating for TSO-C62c may be used.

Check the tires daily for proper inflation on airplanes performing more than one flight a day. Other airplanes should be checked before each flight and at least once a week. Tire pressure should be checked only when the tires are cool; consequently, wait at least two hours (three hours in hot weather) after a flight before checking tire pressure.

Pair together on dual wheels only tires that are equally inflated. Such tires should have inflated diameters within 0.25 inch of matching to ensure equal load distribution on the tires. If the inflated diameter of the tires on dual wheels are not identical, the tire with the larger diameter should be installed on the outside wheel. It is further recommended that the same tire brand and tread style be used on a set of dual wheels.

SEALING MINOR LEAKS IN RIM-INFLATED TUBELESS TIRES (Effectivity: All)

"Tire Life" tire sealant (8, Chart 2, 12-00-00) is recommended as an effective means of controlling the gradual loss of tire inflation pressure when the leakage rate does not exceed 5 percent over a 24-hour period.

NOTE

Refer to instructions provided with the sealant for sealing the tire.

ALAMO TOILET SERVICING (Effectivity: All)

NOTE

During cold weather operation, add "Clean-Flush" antifreeze (20, Chart 2, 12-00-00) to the waste container and the flushing liquid reservoir as instructed on the antifreeze container.

a. Initial charge of the flushing liquid reservoir is approximately two quarts of water mixed with 2 oz. of "Clean-Flush" chemical (22, Chart 2, 12-00-00) per each quart of water. The reservoir should be filled to the line marked "Fill To Here" on the inner wall of the reservoir.

NOTE

The flushing liquid needs changing only occasionally, depending upon toilet usage. Usually, once to every 5 to 10 times that the waste container is serviced. If the flushing liquid has been changed recently and appears to have correct chemical balance, it does not necessarily need changing.

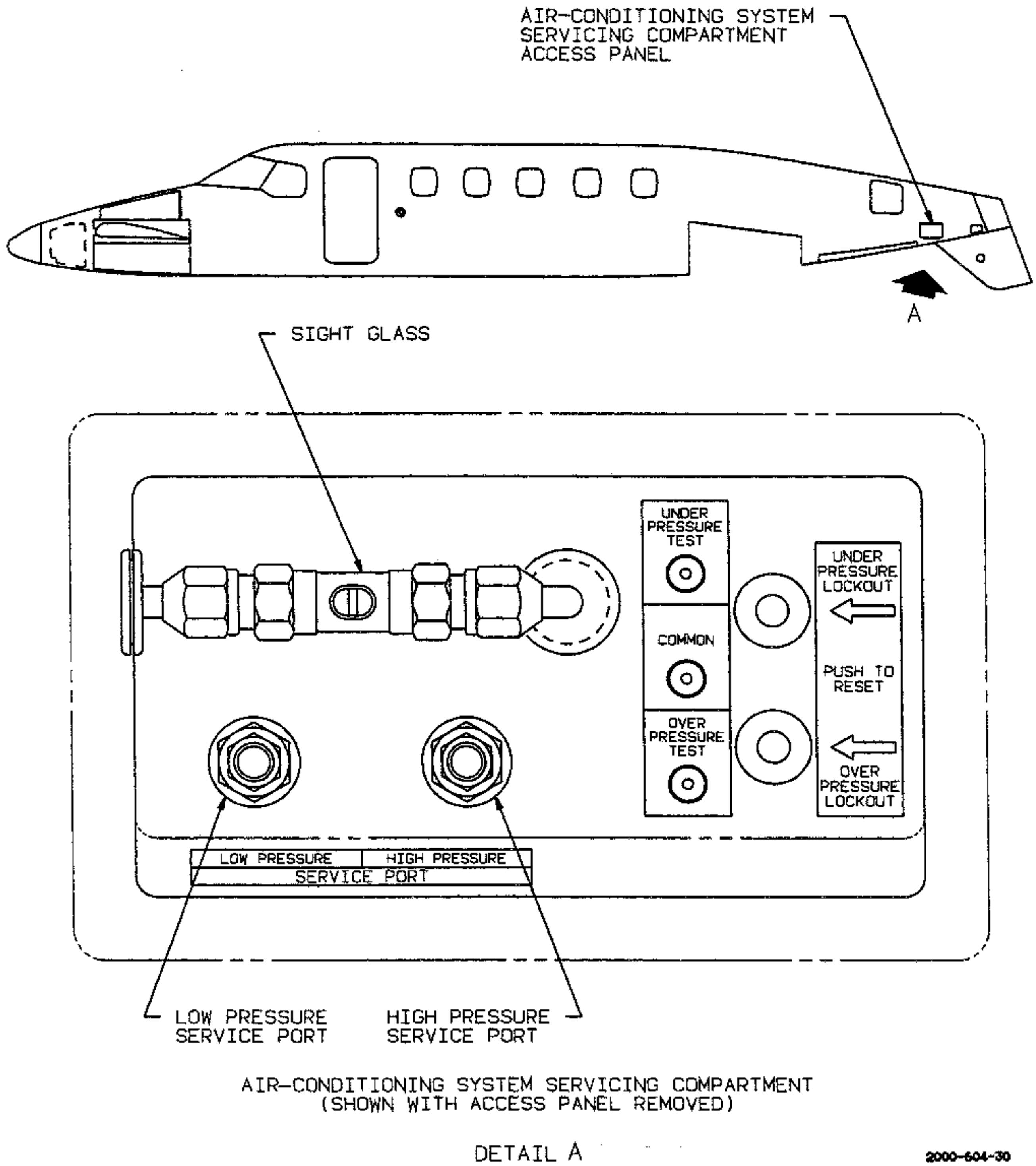
b. To change the flushing liquid, activate the toilet pump by inserting a small object (such as a coin or similar metal object) into the hole marked "Service Switch". Maintain contact for several seconds until the flushing liquid has been pumped into the waste container.

c. Empty the waste container as directed under ALAMO WASTE CONTAINER SERVICING.

d. Clean the toilet assembly inside and out with Lysol spray (23, Chart 2, 12-00-00) or equivalent to provide a disinfected, more hygienic and odor-free toilet.

e. Reinstall the waste container as directed under ALAMO WASTE CONTAINER SERVICING and recharge the flushing fluid reservoir as instructed in step a above.

f. Close the bowl assembly and press the fastener in place. Stow the hanger bracket when applicable and close the upholstered seat assembly onto the toilet assembly.



Air-Conditioning System Servicing (Effectivity: All)
Figure 9

ALAMO WASTE CONTAINER SERVICING (Effectivity: All)

a. Raise the upholstered toilet seat and secure it in the fully raised position.

b. Lift the strap at the rear of the lid assembly. This will release the friction lock allowing the lid to open fully and rest against the retaining strap.

c. Remove the waste container cap from its stowage position in the toilet assembly and snap it into place in the opening in the top of the waste container.

d. Raise the two handles on the waste container and firmly lift the waste container from its position in the toilet assembly. A steady pull will release the container from the perimeter seal.

e. Remove the container cap and empty the waste container contents into a commode or a sanitary disposal station.

f. Rinse the container thoroughly prior to precharging and clean the entire toilet assembly with Lysol spray (23, Chart 2, 12-00-00) or equivalent.

g. Mix 2 oz. of "Clean-Flush" chemical (22, Chart 2, 12-00-00) or equivalent with one quart of water and pour the mixture into the waste container as a precharge.

h. Position the waste container in the toilet assembly and press down firmly on all corners to assure proper placement of the seal in the groove to prevent leakage of the flushing liquid into the waste receptacle. Return the bail to the periphery of the waste container.

NOTE

The seal should be lubricated occasionally with Vasoline (21, Chart 2, 12-00-00) prior to inserting the container.

i. Lower the toilet bowl assembly and snap it into place.

j. With electrical power on, press the operating switch and check for proper flushing cycle (approximately 6 to 10 seconds).

k. Check for freedom of movement of the waste container gate valve. (No binding of moving parts such as might occur if the waste container was not properly seated.)

l. Stow the hanger bracket (when applicable) and lower the seat cushion into place.

NOTE

If the toilet is to remain inactive for an extended period of time, empty the water chemical solution and thoroughly flush the system with fresh water, then drain the system.

SCHEDULED SERVICING - MAINTENANCE PRACTICES (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

ENGINE EXTERNAL WASHING PROCEDURES (Effectivity: All)

If the exterior surface of the engine is contaminated with salt, it should be washed thoroughly with water prior to flight of the airplane. Demineralized water is not required for this purpose. At no time should an engine be left in a contaminated (salted) condition for any extended period of time, such as overnight.

CAUTION

Never wash an engine while it is running or hot. After the engine has been shut down, allow it to cool for at least one hour prior to washing. Electrical components and plugs on the engine and in the engine compartment should be covered/ protected during the engine wash. Use dry shop air to dry all components after washing. Do not allow water into the engine air inlet or the exhaust. Do not direct high pressure water or solvent directly into mechanical parts having air vent holes, such as the fuel control units.

The fire extinguishing agent bromotrifluoromethane can cause severe corrosive attacks on HOT or COLD section components. The severity of the corrosive attack depends largely on the temperature of the chemical when it is exposed to the engine. If the engine becomes contaminated with the fire extinguishing agent, the following cleaning procedures should be initiated immediately:

a. Motor the engine with the starter only to blow out any residual chemical deposits.

b. Wash the engine with water only.

Because the various extinguishing agents cannot be positively neutralized by cleaning an engine on the wing, the Pratt & Whitney Company recommends that after the engine has been washed as outlined above, the engine should be removed and routed to an approved overhaul facility for disassembly, cleaning and repair.

CLEANING AIRPLANE EXTERIORS (Effectivity: All)

Prior to washing, attach the pitot/static mast covers securely and plug or mask off all other openings. Use special care to avoid washing away grease from any lubricated area. Prior to cleaning, cover such areas as wheels, brakes, etc., and relubricate after cleaning as necessary. Always be sure all maskings and coverings are removed before returning the airplane to service.

The urethane finish undergoes a curing process for a period of time after application. During the first month after paint application, some special care is required. Airplane owners should observe the following recommendations in order to preserve the durability and appearance of the airplane paint.

CLEANING EXTERIORS DURING CURING PERIOD (ONE MONTH) (Effectivity: All)

a. Avoid prolonged flights in heavy rain or sleet. Avoid any operating conditions which might cause abrasion or premature finish deterioration.

b. Clean the airplane with mild detergents and water only. Use a clean soft rag, keeping it free from dirt and grime. Rinse with clear water thoroughly.

c. Use no waxes, polishes, rubbing compounds, or abrasive cleaners of any type. The use of such items can permanently damage the surface finish.

d. Stubborn oil or soot deposits on cowlings, etc. may be removed gently with automotive tar removers.

CLEANING EXTERIORS AFTER CURING PERIOD (Effectivity: All)

a. Continue to wash the airplane regularly. Use mild detergents and water only. Rinsing thoroughly with clear water prevents detergent residue buildup that can dull the paint appearance.

b. Normally, waxing is not necessary; however if waxing is desired, select a high quality automotive or airplane waxing product. Never use rubbing compounds or abrasive cleaners of any type. Do not use a wax containing silicone because silicone polishes are difficult to remove from surfaces.

CLEANING LANDING GEAR (Effectivity: All)

The landing gear (nose and main) should be washed with low pressure water and mild detergent as soon as is practical following operation on salty or muddy runways. Using low pressure air, blow off all water before flight or storage of the airplane.

PLACARD REPLACEMENT (Effectivity: All)

Ascertain that all placards are in place and legible whenever the airplane has been repainted or touched up after repairs. Replace any placards that have been inadvertently defaced after such repainting or repairs.

CLEANING ANTIFOG COATED SURFACES ON CABIN WINDOWS (Effectivity: All)

CAUTION

The use of cleaning materials other than those specified in the following procedure will attack, remove or cloud the antifog chemical coating. Do not wax or use acrylic polish on the antifog coating surface as this will coat the antifog surface and render it ineffective.

The intersurface of the cabin windows have a urethane antifog coating. Windex window cleaner should be used for cleaning lightly soiled, antifog-coated surfaces. Shake the bottle well, spray on and remove with a clean, soft cloth using light pressure. The antifog coating may also be cleaned using a liquid detergent dissolved in warm water. This solution may be applied, then rinsed with clean water and wiped dry with a damp chamois or soft cloth.

CLEANING ACRYLIC SURFACES OF CABIN WINDOWS (Effectivity: All)

The outer surface of the cabin windows, and both sides of the polarized or tinted windows are acrylic. Ensure that these surfaces are clean and waxed at all times. When removing or installing the polarized or tinted windows for cleaning, wear clean white gloves to avoid leaving fingerprints on the windows. Carefully wash the windows with mild detergent and water. Avoid using water from a bucket or pail. Sand, dirt particles or other debris may collect in the standing water and cause scratches in the acrylic. Use the palm of the hand to feel and gently dislodge mud and dirt. A soft cloth, chamois or sponge may be used, but only to carry water to the window surface. After throughly rinsing a window, dry the surface with a clean, moist chamois (blow dry the polarized or tinted windows with filtered air). Rubbing the surface of a window with a dry cloth has a tendency to build up an electrostatic charge that attracts dust. Oil and grease may be removed with a kerosene-moistened (9, Chart 2, 12-00-00) cloth. Rinse the window with clear water to remove any residue.

After cleaning the window with soap and water, apply a good grade of commercial wax on the window to fill in minor scratches and help prevent additional scratches or chemical damage. Apply a thin, even coat of wax and bring it to a high polish by rubbing lightly with a clean, dry, soft flannel cloth. Change the cloth frequently to avoid a buildup of gritty particles. Never use a power buffer; the heat generated by the buffing pad may soften the acrylic.

If it is desirable to use a commercial cleaner to clean the acrylic windows, use only cleaners that are approved by Beech Aircraft Corporation. There are several cleaners available commercially that state that they are approved for use on acrylic surfaces. However, it has been discovered that some of these cleaners cause acrylic to craze. Therefore, only the following products are approved as cleaners for acrylic windows: Meguiar's MGH-10, Permatex 403D or Parko Anti-Static Polish (10, Chart 2, 12-00-00). If the windows are cleaned with one of these commercial cleaners, it will not be necessary to apply wax. Each of these cleaners contains wax, as well as cleaning agents. Follow the instructions on the container.

Do not use any of the following solvents on acrylic or allow such solvents to come in contact with acrylic when used in its vicinity.

a. Ketones such as Acetone or Methyl Ethyl Ketone (MEK).

b. Aromatic Hydrocarbons such as Benzene, Toluol or Xylol.

c. Organic Chlorides such as Carbon Tetrachloride, Trichloroethylene, or Ethylene Dichloride.

d. Fire extinguisher fluid.

e. Lacquer thinners or solvents of a related nature.

f. Gasolene.

g. Alcohol.

Acrylic windows are extremely susceptible to damage during painting, stripping, and fuselage cleaning operations. Improper protection of the acrylic windows can cause severe chemical damage which will result in reduced service life and structural failure of the acrylic. Functional fluids, such as deicing, hydraulic, etc., are also detrimental to acrylic windows. Depending on the type of chemical involved, damage to a window which results from such contacts may not be evident for months; therefore, it must be stressed that all recommended cleaning procedures be complied with and that only the approved window cleaning products be utilized.

CLEANING WINDSHIELDS (Effectivity: All)

a. Wash excessive dirt and other substances from the glass with clean water.

b. Clean the windshield with mild soap and water or with a 50/50 solution of isopropyl alcohol (4, Chart 2, 12-00-00) and water. Wipe the glass surface in a straight rubbing motion with a soft cloth or sponge. Never use any abrasive materials or any strong acids to clean the glass.

CAUTION

When washing the windshield, do not use water from a bucket or pail. Sand, dirt particles or other debris may collect in the standing water and cause scratches in the glass.

c. Rinse the glass thoroughly and dry, but do not apply wax.

NOTE

It is essential that the windshield wipers be kept thoroughly clean. Grit trapped by the wipers is the most common source of scratches in the glass. Do not attempt to polish such nicks or scratches out of the the glass surface.

CLEANING AIRPLANE INTERIORS (Effectivity: All)

The seats, carpet, upholstery panels and headlining should be vacuum-cleaned frequently to remove as much surface dust as possible.

Experience has shown that commercial, foam-type cleaners or shampoos can be used to condition the surfaces of rugs, carpets and upholstered materials. The upholstery should be vacuum-cleaned, and the stains should be removed. A solution of the cleaner can be prepared by mixing a small amount in a bucket of water and beating the solution until a heavy foam forms.

Apply the foam uniformly with a brush over the surface to be cleaned, then remove the suds with a vacuum cleaner or by wiping the surface with a brush or cloth. Because there is very little moisture in this foam, wetting of the fabric or retention of moisture in the warp does not occur. Unlacquered metal fittings and furnishings within the airplanes can be cleaned using most commercial metal polishes. Use a soft, clean rag for application; then polish to a brilliant gloss with a dry cloth. Protect the finish with a good grade of wax.

CLEANING UPHOLSTERY (Effectivity: All)

The most effective method of cleaning upholstery is directly dependent on the type of upholstery involved. For instance, a fabric- type upholstery that has been flameproofed should never be treated by the application of cleaners with a water base. The reason for this is that the natural capillary action of the water in the fabric will cause the salts from the flame proofing to rise to the surface, resulting in unsightly faded spots. The most effective way to clean fabric upholstery is as follows:

NOTE

The manufacturers of wool and wool-blended upholstery fabrics recommend that these materials be dry-cleaned.

a. Using a stiff bristled brush, brush the upholstery along the weave. (A nylon-bristled, fingernail brush can be used.)

b. Vacuum the entire surface to remove any salt residue or dirt stains.

c. Using a lint-free cloth moistened with PD680 solvent (11, Chart 2, 12-00-00), apply the solvent sparingly and do not install the upholstery until completely dry.

Leather upholstery should be waxed for maximum protection. For cleaning, a nonabrasive, chemically neutral, nonreactive, emulsion-type cleaner of cream-like consistency is recommended. Dilute the cleaner with water and apply it over the dirty surface using a sponge or soft cloth (use a gentle, wiping motion; do not scrub). The solution should not be allowed to stand and should be wiped off before it drys.

CLEANING INTERIOR CABIN TRIM (Effectivity: All)

Using soap and water, wash the plastic interior trim. Scrubbing with a brush and detergent soap will usually provide adequate cleansing; however, alcohol may be used to remove contaminants that are soluble in alcohol.

CAUTION

To prevent damage to the plastic interior trim, never use MEK, naptha, Mufti, standard solvent, gasoline, lacquer thinner, or other types of paint cleaners as cleaning agents.

CLEANING COCKPIT CRT DISPLAYS (Effectivity: All)

Clean the displays periodically as follows:

a. Apply Windex or warm water and mild soap to a soft low-lint cloth and clean the display. To prevent excess liquid from running under the display bezel, apply the cleaning solution to the cloth, not to the display.

CAUTION

Always use a very soft cloth when cleaning a display, a hard cloth could cause damage to the surface coating on the display.

CLEANING PROPELLERS (Effectivity: All)

The propeller blades need to be cleaned at the intervals specified in the McCauley Operator's Manual MPC-15. Remove dirt, oil, and insect accumulation from propellers with solvent (11, Chart 2, 12-00-00).

CAUTION

Solvent should not be allowed to collect or puddle in the cavity between the blade and the hub. Prolonged exposure or saturation for a short time could cause performance degradation of the O-ring. Sparing use and short exposure to solvents in the area next to the hub are recommended.

Exhaust gas contamination (soot), if not regularly removed, can combine with moisture in the air to form an acid which finds its way through the paint and attacks the base metal of the propeller blade. Should the corrosion not be removed and the affected area treated, damage to the blades may exceed repair limits, necessitating blade replacement.

LUBRICATION (Effectivity: All)

The following lubrication schedule is organized so that related items requiring lubrication are grouped together. Each lubrication point is identified and indexed for location on the accompanying illustration. Lubrication time intervals are incremented to occur only at times coincident with the detailed inspection intervals listed in Chapter 5-20-00.

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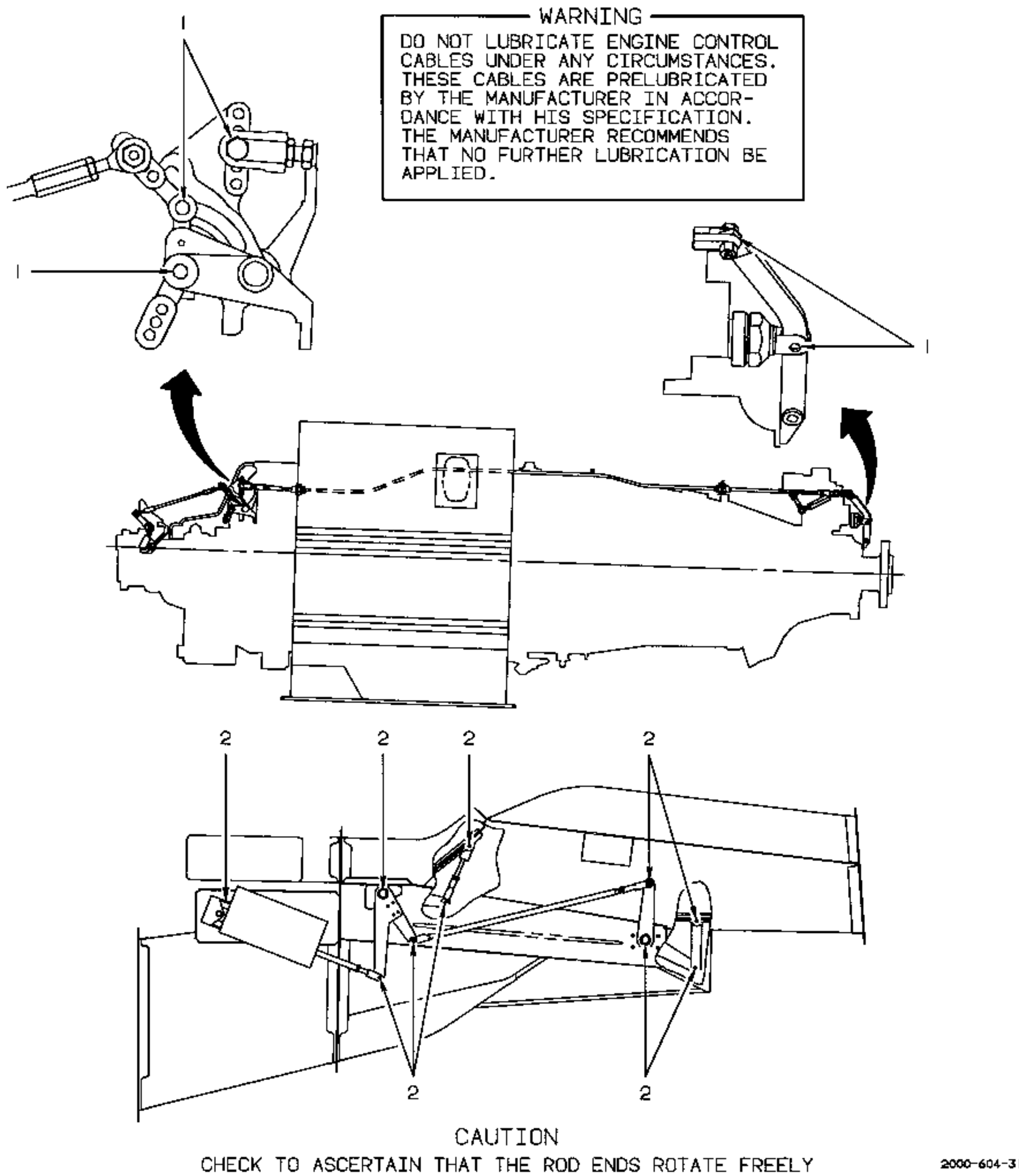


Lubrication Schedule (Sheet 1 of 14)
Figure 1

INDEX NO.	LOCATION	LUBRICANT	HOUR INTERVAL
	ENGINE CONTROLS (NACELLE)		
1.	Cam Plate and Pins	Lubriplate No. 130AA (12, Chart 2, 12-00-00)	200

CAUTION

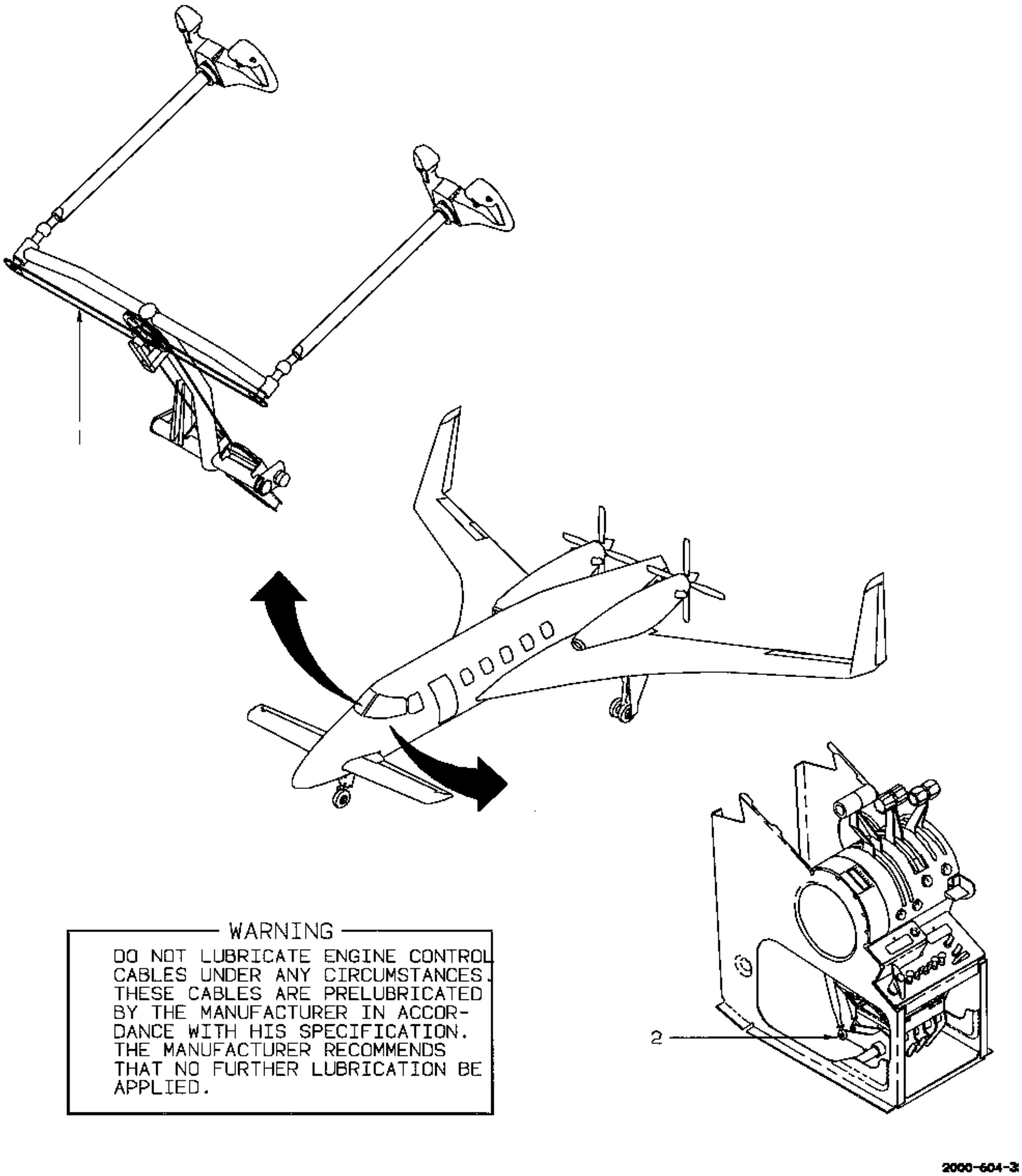
Check to ascertain that the rod ends rotate freely.

WARNING

Do not lubricate the engine control cables under any circumstances. These cables are prelubricated by the manufacturer in accordance with his specifications. The manufacturer recommends that no further lubrication be applied.

	INERTIAL ANTI-ICE SYSTEM		
2.	Rod Ends and Hinge Points	MIL-G-23827 Grease (13, Chart 2, 12-00-00). Do not lubricate with oil.	600

Lubrication Schedule (Sheet 2 of 14)
Figure 1



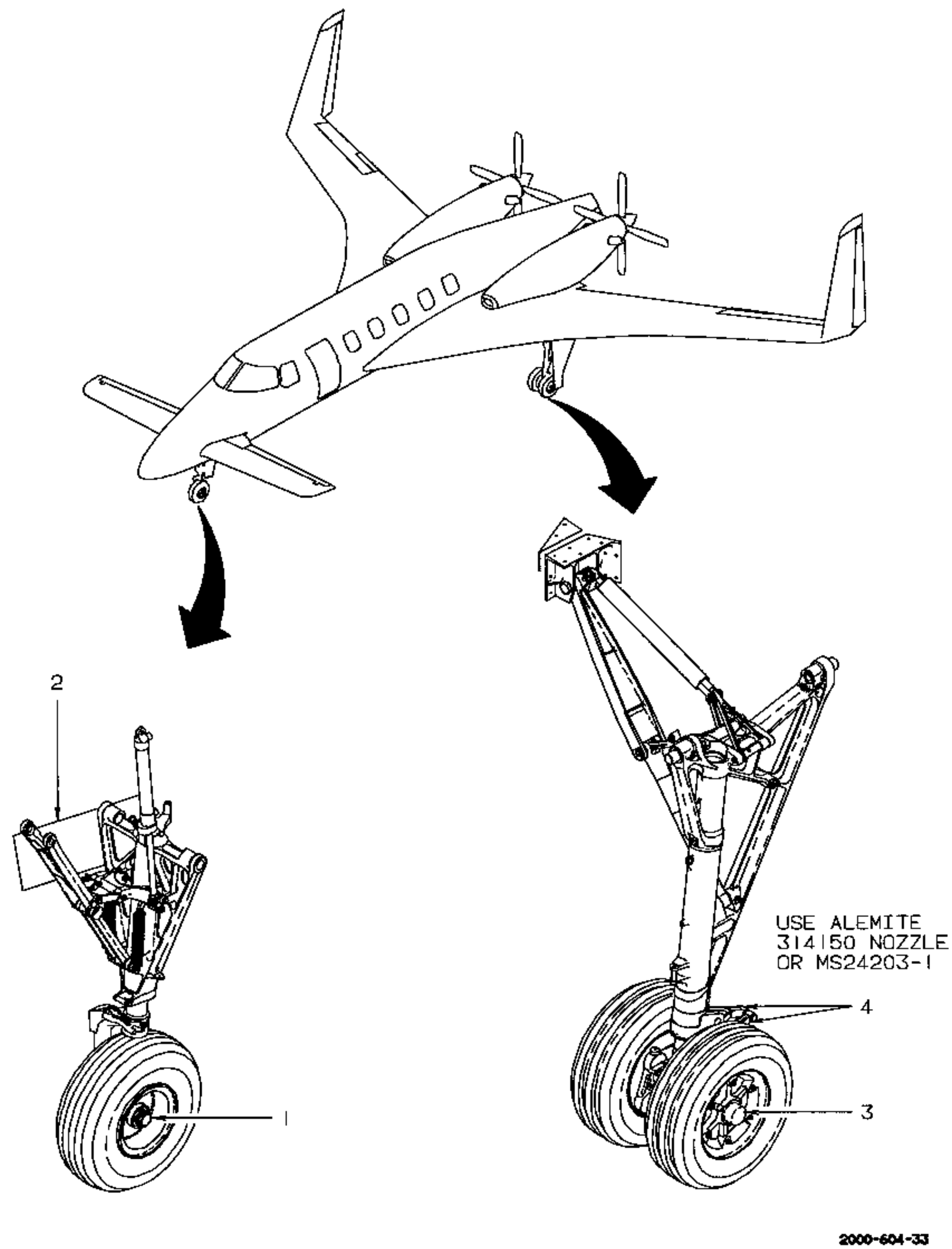
Lubrication Schedule (Sheet 3 of 14)
Figure 1

INDEX NO.	LOCATION	LUBRICANT	HOUR INTERVAL
	CONTROL COLUMN		
1.	Chain	Clean with a cloth dampened in Solvent (Mineral Spirits) (11, Chart 2, 12-00-00). Lubricate with SAE 30W Mineral Oil and wipe off excess.	600
	ENGINE CONTROLS (COCKPIT)		
2.	Linkage (All Moving Parts)	MIL-G-21164 Grease (15, Chart 2, 12-00-00)	600

WARNING

Do not lubricate the engine control cables under any circumstances. These cables are pre-lubricated by the manufacturer in accordance with his specifications. The manufacturer recommends that no further lubrication be applied.

Lubrication Schedule (Sheet 4 of 14)
Figure 1



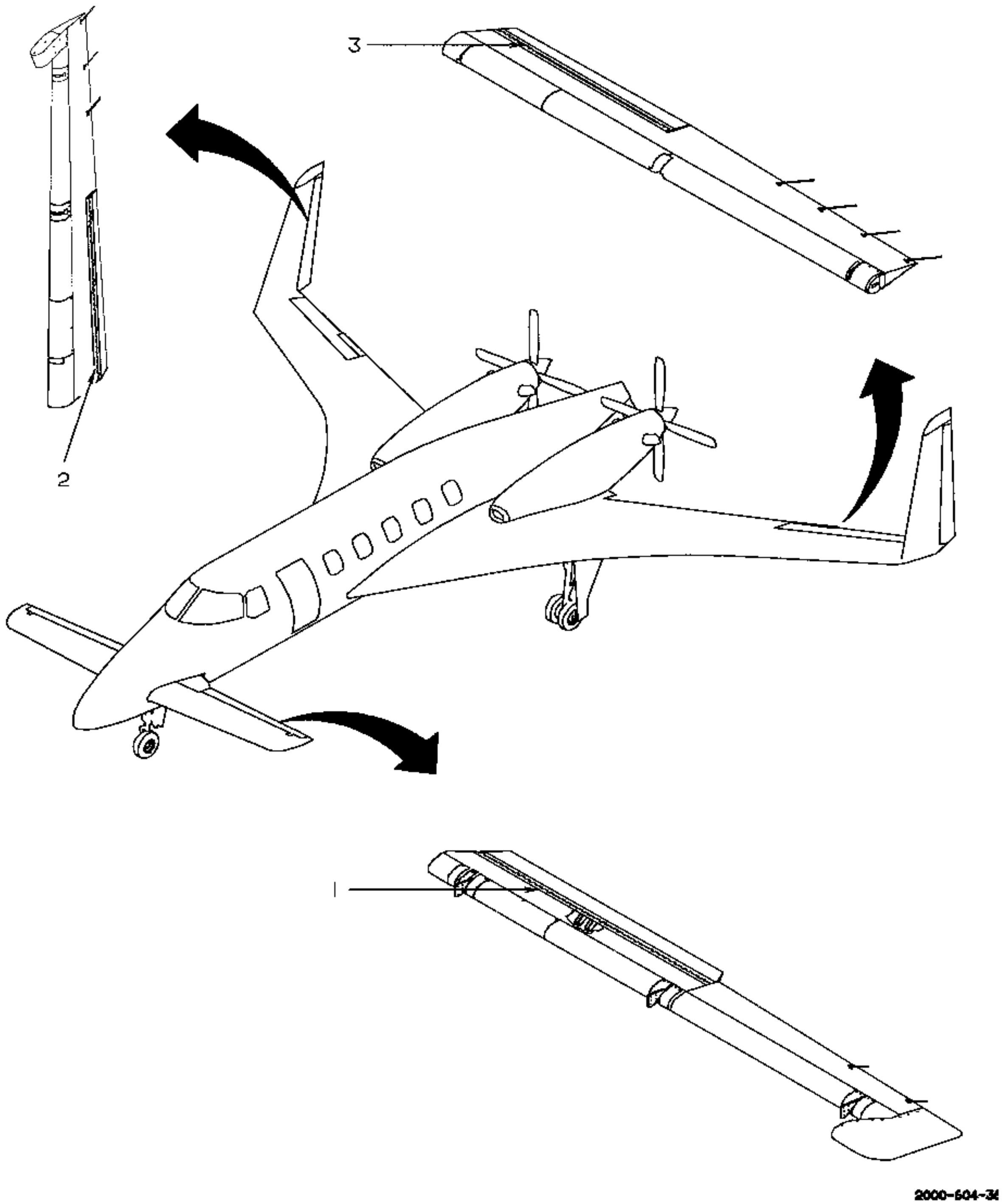
Lubrication Schedule (Sheet 5 of 14)
Figure 1

INDEX NO.	LOCATION	LUBRICANT	HOUR INTERVAL
	NOSE LANDING GEAR		
1.	Wheel Bearings	Grease (19, Chart 2, 12-00-00).	100
2.	Aft Door Hinges	MIL-L-7870 Oil (16, Chart 2, 12-00-00),	200
	MAIN LANDING GEAR		
3.	Wheel Bearings	Grease (19, Chart 2, 12-00-00),	100
4.	Torque Knee Grease Fittings	MIL-G-81322 Grease (14, Chart 2, 12-00-00)	200

NOTE

After washing the airplane, lubricate all lubrication points.

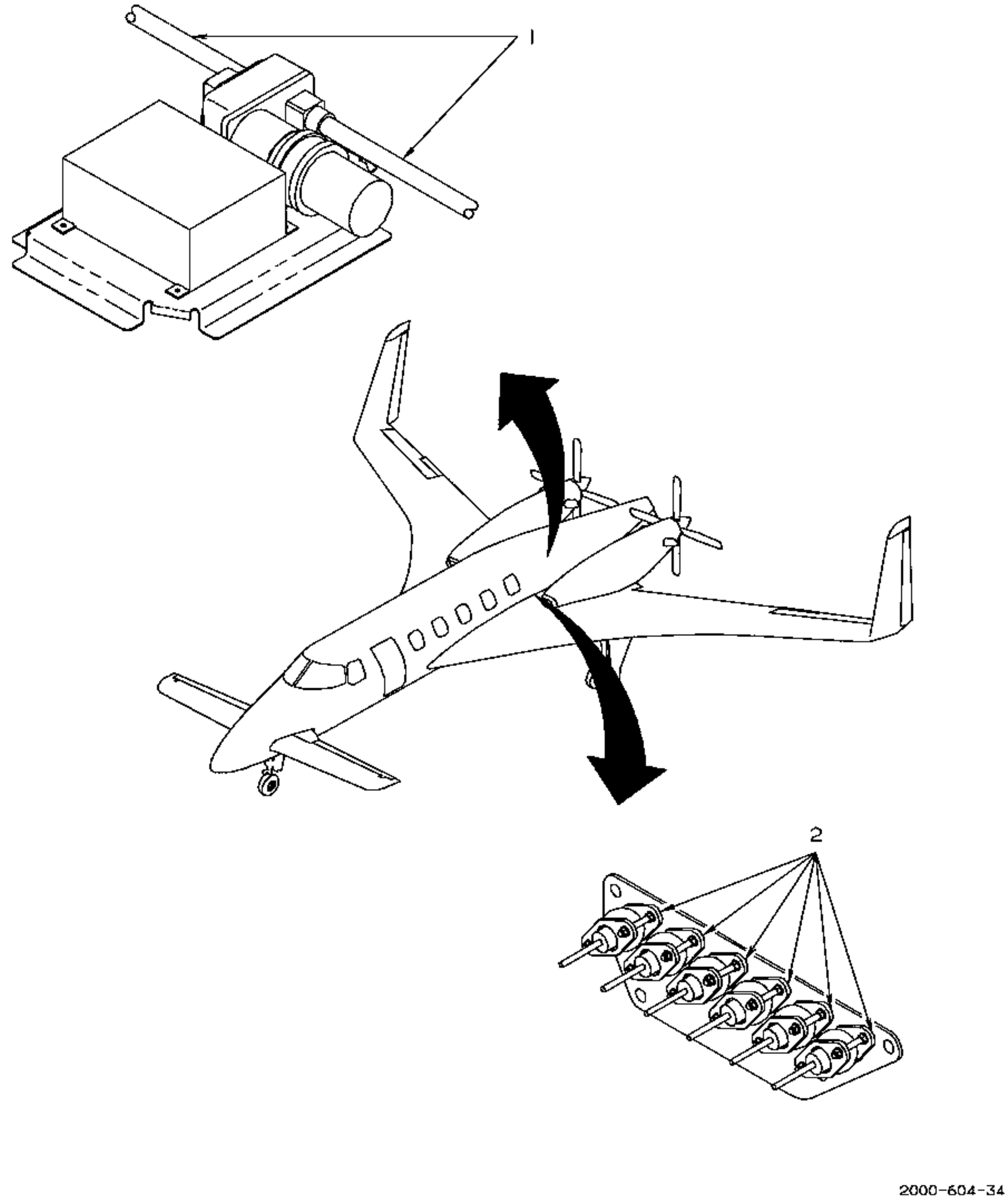
Lubrication Schedule (Sheet 6 of 14)
Figure 1



Lubrication Schedule (Sheet 7 of 14)
Figure 1

INDEX NO.	LOCATION	LUBRICANT	HOUR INTERVAL
	ELEVATOR CONTROL SYSTEM		
1.	Elevator Trim Tab Hinges	Apply Brayco 300 Oil (17, Chart 2, 12-00-00) with a brush or squirt can.	200
	RUDDER CONTROL SYSTEM		
2.	Rudder Trim Tab Hinges	Apply Brayco 300 Oil (17, Chart 2, 12-00-00) with a brush or squirt can.	200
	ELEVON CONTROL SYSTEM		
3.	Elevon Trim Tab Hinges	Apply Brayco 300 Oil (17, Chart 2, 12-00-00) with a brush or squirt can.	200

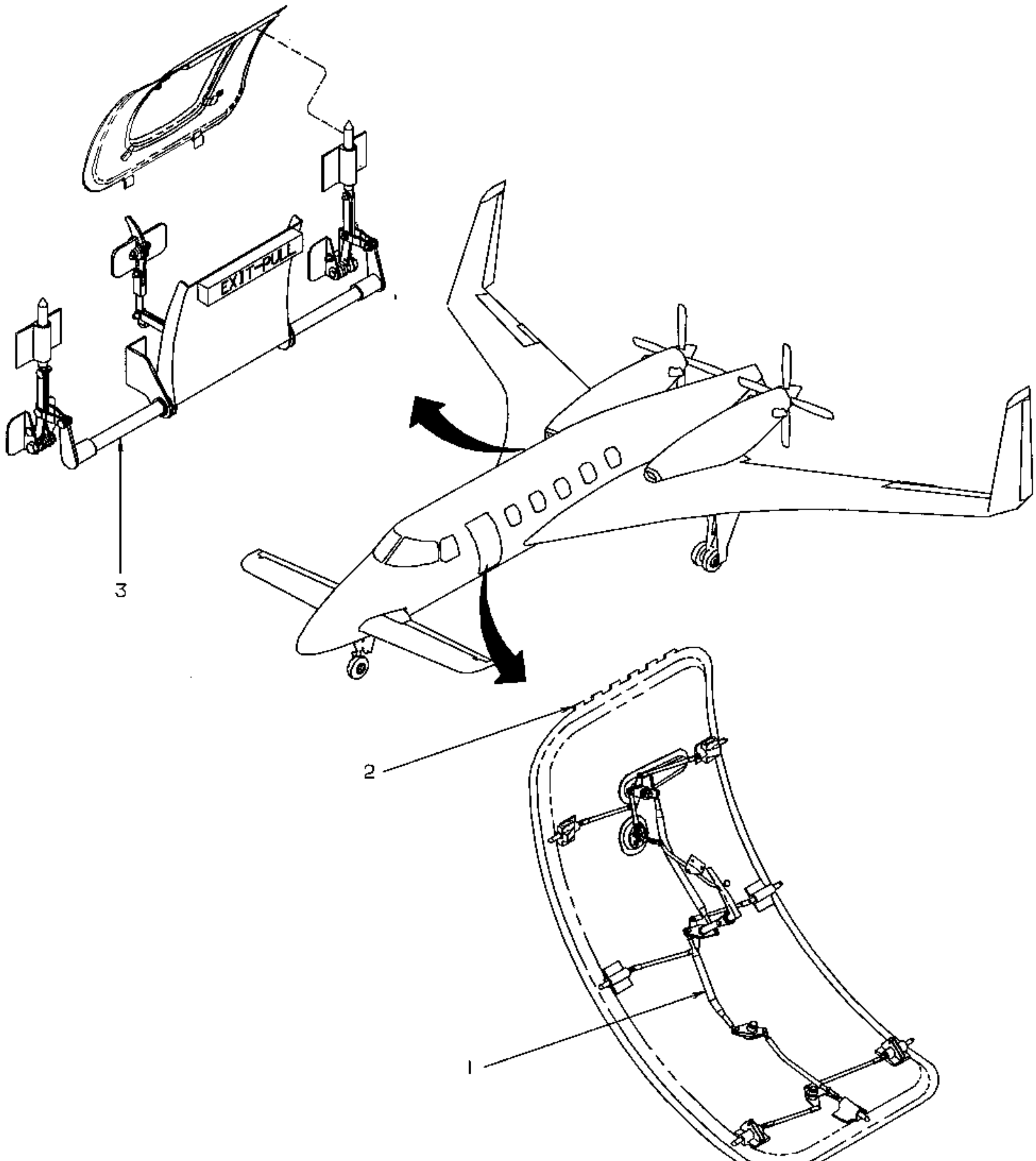
Lubrication Schedule (Sheet 8 of 14)
Figure 1



Lubrication Schedule (Sheet 9 of 14)
Figure 1

INDEX NO.	LOCATION	LUBRICANT	HOUR INTERVAL
	FLAP CONTROL SYSTEM		
1.	Flap Cable Drive Assemblies	Remove Shaft from housing, wipe clean with a cloth (no solvent to be used) and recoat with MIL-G-81322 Grease (14, Chart 2, 12-00-00).	5000
	FLIGHT CONTROL SYSTEM		
2.	Flight Control Cable Pressure System	Clean cables the full length of travel through the seals using PD680 Solvent (11, Chart 2, 12-00-00). Fill the seal and lubricate the cleaned areas of the cables with MIL-G-23827 Grease (13, Chart 2, 12-00-00). When lubricating the cables, the grease must overlap the cleaned areas by one inch.	600

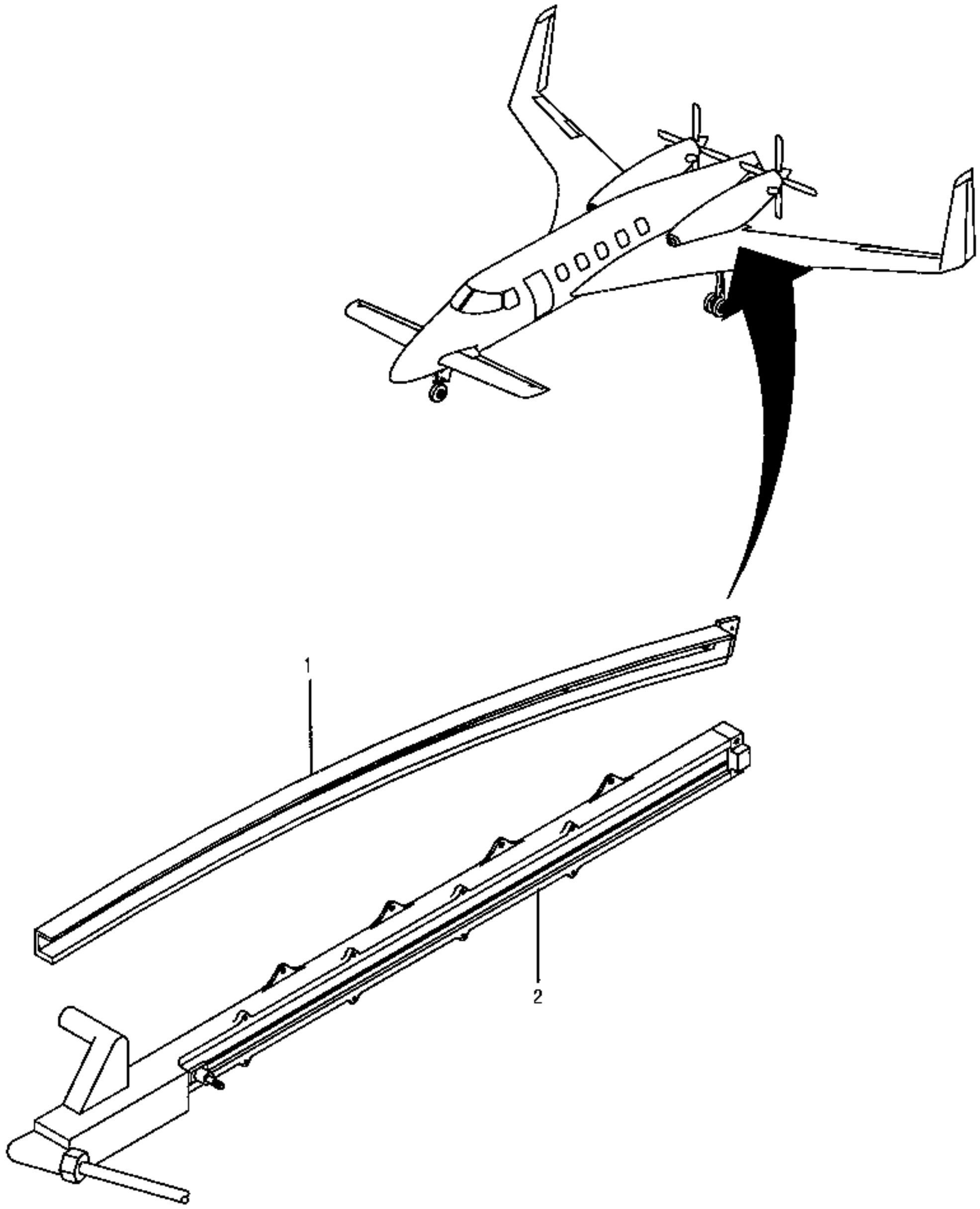
Lubrication Schedule (Sheet 10 of 14)
Figure 1



Lubrication Schedule (Sheet 11 of 14)
Figure 1

INDEX NO.	LOCATION	LUBRICANT	HOUR INTERVAL
	CABIN DOOR		
1.	All moving or rotating parts	Lubricate with LPS-1 (18, Chart 2, 12-00-00).	600
2.	Door Hinge	Apply Brayco 300 Oil (17, Chart 2, 12-00-00) with a brush or squirt can.	200
	EMERGENCY EXIT DOOR		
3.	All moving or rotating parts	Lubricate with LPS-1 (18, Chart 2, 12-00-00).	600

Lubrication Schedule (Sheet 12 of 14)
Figure 1



Lubrication Schedule (Sheet 13 of 14)
Figure 1

INDEX NO.	LOCATION	LUBRICANT	HOUR INTERVAL
	FLAP TRACKS		
1.	Full length of each flap track	Clean the full length of flap tracks using PD680 Solvent (11, Chart 2, 12-00-00). Lubricate the cleaned tracks with MIL-G-81322 Spray (25, Chart 2, 12-00-00).	As required
	FLAP ACTUATOR		
2.	Flap actuator	Clean the jack screw on the flap actuators using PD680 Solvent (11, Chart 2, 12-00-00). Lubricate the cleaned areas of the jack screws with MIL-G-81322 Grease (14, Chart 2, 12-00-00).	As required

Lubrication Schedule (Sheet 14 of 14)
Figure 1

UNSCHEDULED SERVICING - MAINTENANCE PRACTICES (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

DEICING AND ANTI-ICING OF AIRPLANES ON THE GROUND (Effectivity: All)

Deicing is the removal of ice, frost and snow from the airplane's exterior after it has formed. Anti-icing is a means of keeping the surface clear of subsequent accumulations of ice, snow and frost.

Snow and ice on an airplane will seriously affect its performance. Ice formations on the wing, even a smooth covering of it, will change the contour of the wing, producing an increase in drag and a reduction in effective lift coefficient. Frost or frozen snow may present an even greater hazard since the surface texture is rough and will seriously disrupt the smooth flow of air across the wing.

SNOW REMOVAL (Effectivity: All)

The best way to remove snow is to brush it off with a squeegee, soft brush or mop. Exercise care so as not to damage any components that may be attached to the outside of the airplane, such as antennas, vents, stall warning devices, etc. Remove loose snow from the fuselage before heating the airplane interior; otherwise, at low temperatures, the snow may melt and refreeze to build up a considerable depth of ice. Never attempt to chip or break frozen snow from the airplane. If the airplane has been hangared and snow is falling, coat the airplane surfaces with an anti-icing solution; snow falling on the warm surface will have a tendency to melt, then refreeze.

After snow has been removed from the airplane, inspect the airplane for evidence of residual snow, particularly in the area of flight control surface gaps and in the hinge areas. Carefully inspect the pitot/static masts for evidence of obstruction. Check the exterior of the airplane for damage to external components that may have occurred during the snow removal operations.

Flight control surfaces should be moved to ascertain that they have full and free movement. The landing gear mechanism, doors, wheel wells and microswitches should be checked for ice deposits that may impair function.

When the airplane is hangared to melt snow, any melted snow may freeze again if the airplane is subsequently moved into subzero temperatures. Any measures taken to remove frozen deposits while the airplane is on the ground must also prevent the possible refreezing of the liquid.

Should freezing precipitation continue following snow removal, the airplane surface should be treated for anti-icing.

FROST REMOVAL (Effectivity: All)

Heavy frost that cannot be removed by wiping with a gloved hand or soft towel must be removed by placing the airplane in a warm hangar or by the application of a deicing fluid.

After removal of all frost from the airplane exterior, check all external components for damage that may have occurred during frost removal.

ICE REMOVAL (Effectivity: All)

Moderate or heavy ice and residual snow deposits should be removed with a deicing fluid. No attempt should be made to remove ice deposits or break an ice bond by force.

After completing the deicing process, the airplane should be inspected to insure that its condition is satisfactory for flight. All external surfaces should be examined for residual ice or snow, particularly in the vicinity of flight control surface gaps and hinges. Pitot/static masts should be carefully inspected for any signs of obstruction.

Flight control surfaces should be moved to ascertain that they have full and free movement. The landing gear mechanism, doors, wheel wells and microswitches should be checked for ice deposits that may impair function.

When the airplane is hangared to melt ice, any melted ice may freeze again if the airplane is subsequently moved into subzero temperatures. Any measures taken to remove frozen deposits while the airplane is on the ground must also prevent the possible refreezing of the liquid.

Following ice removal, should freezing precipitation continue, the airplane surface should be treated for anti-icing.

SAE TYPE I ANTI-ICING FLUID (UNTHICKENED-TYPE FLUID) (Effectivity: All)

SAE Type I fluids mainly provide protection against refreezing when there is no precipitation.

SAE TYPE II ANTI-ICING FLUIDS (THICKENED-TYPE FLUIDS) (Effectivity: All)

SAE Type II fluids provide protection against refreezing when precipitation occurs.

All approved Type I and Type II fluids may be used for either deicing or anti-icing at any dilution as allowed by the fluid manufacturer's recommendations.

DEICING (Effectivity: All)

Deicing is a procedure by which frost, ice or snow are removed from the airplane. To preserve holdover time, the process should be continuous and as brief as possible. It shall be carried out at the last possible moment prior to takeoff. The deicing agent should be applied in a heated state to assure maximum efficiency.

ONE-STEP DEICING (Effectivity: All)

One step deicing is done with a heated mixture of anti-icing fluid/water formulated to provide a freezing point buffer at least 10°C below the ambient temperature.

TWO-STEP DEICING (Effectivity: All)

The first step of deicing is done with hot water or a hot mixture of anti-icing fluid/water formulated to provide a fluid freezing point of no more than 7°C above ambient temperature. This is followed by the second step of anti-icing: an overspray with a mixture of anti-icing fluid/water or of 100% anti-icing fluid formulated to provide a fluid freezing point of at least 10°C below ambient temperature. The second step MUST BE performed within three minutes of the beginning of step 1 and, if necessary, area-by-area.

ANTI-ICING (Effectivity: All)

Anti-icing is a precautionary measure which prevents frost, ice or snow from forming or accumulating on the protected surface of the airplane.

CAUTION

If an additional treatment after deicing/anti-icing is required before the next flight, anti-icing alone is not recommended. ALWAYS PERFORM A COMPLETE DEICING.

HOLDOVER TIME (Effectivity: All)

Holdover time is the estimated duration of the time that anti-icing fluid will prevent frost, ice or snow from forming or accumulating on the protected surfaces of an airplane under average weather conditions. Holdover-time tables shall only be used as part of an approved ground-deicing program.

PRECAUTIONS (Effectivity: All)

All reasonable precautions must be taken to minimize the entry of fluid into engines, intakes and control surface cavities.

a. Deicing/anti-icing must not be directed into the orifices of pitot heads or static vents; these fluids must not be applied directly onto airstream-direction detectors, probes, angle-of-attack airflow sensors, or on windows.

b. The engines must be shut down during deicing/anti-icing.

c. The aft and forward wings must receive the same treatment.

d. Any traces of deicing/anti-icing fluid on cockpit windows must be removed prior to departure. Pay particular attention to windows fitted with wipers. In addition, any forward area from which the fluid may flow back onto windscreens during taxi and takeoff must be clean prior to departure.

e. After prolonged periods of deicing/anti-icing, it is advisable to check for residues of thickened deicing/anti-icing fluids in aerodynamical cove areas and cavities like balance bays, and rear spars of the aft and forward wings.

CHECKS FOR THE NEED TO DEICE (Effectivity: All)

The aft and forward wings and fuselage have to be checked for possible ice, snow and frost accumulation.

If frost or ice has formed on the lower surface of the wing in the fuel tank area while the airplane is being exposed to precipitation (rain, drizzle, or fog), the upper surface of the wing must be carefully examined for the formation of clear ice. In conclusion, it should be noted that heavy freezing has been reported as forming at temperatures up to +15°C/+ 59°F (caused by cold fuel).

CAUTION

It must always be remembered that clear ice, which is very difficult to detect, may underlie a layer of snow/slush.

FINAL CHECKS AFTER AIRPLANE DEICING (Effectivity: All)

CHECK OF COMPLETE DEICING (Effectivity: All)

The forward and aft wings must be free of frost, ice and snow as well as water accumulation. During snowfall, freezing rain and drifting snow, snow and melting ice could penetrate and refreeze in slots, balance bays, drainage openings, hinges and operating linkage. Consequently, the areas just mentioned have to be checked with special attention when airplanes have been parked outside for a long period of time under inclement conditions. The same precautions apply to inlet scoops and landing gear areas, including the landing gear, latching mechanism and electrical switching elements.

If ice was found on the wing upper surface, recheck the entire wing through all accessible openings to ensure that all deposits of ice have been removed after deicing/ anti-icing has been accomplished.

CAUTION

In some cases the presence of ice can only be determined by touch.

Fuselage areas in front of the flight compartment windows must be free of ice and snow. This is also valid for all air inlet and outlet openings of the air conditioning at the aft end of the fuselage and adjacent areas.

FUNCTIONAL TEST OF FLIGHT CONTROLS (Effectivity: All)

In a case where an airplane has been extremely iced or snow-covered, a flight control check should be performed. This check should be repeated after deicing.

CHECK OF ENGINE INLETS AND PROBES (Effectivity: All)

Engines that have been exposed to heavy snowfall and/or freezing rain during cold temperatures and strong winds must be checked prior to start-up for accumulation of snow and/or ice in the inlet area.

DEICING AND ANTI-ICING FLUIDS (Effectivity: All)

Beech Aircraft has evaluated and approved Type I deice/anti-ice fluid per SAE AMS 1424 and ISO 11075. Beech Aircraft has also evaluated and approved Type II deice/anti-ice fluid per SAE AMS 1428 and ISO 11078. These fluids are authorized for use on the Beech Starship.

Beech Aircraft cannot accept responsibility for damage to the airplane finish, windows, rubber seals, etc. resulting from the use of deicing fluids produced by other manufacturers.

These fluids (24, Chart 2, 12-00-00) were chosen according to the following specifics:

a. Noncorrosive.

b. Does not deteriorate rubber, painted surfaces, or plastics.

c. Has a high flash point.

d. Nontoxic.

e. Good self-wetting and antifoaming characteristics.

These deicing fluids are a specially inhibited, glycol-based solution that leave a fairly tough, viscous coating on the surface. Each drop is capable of absorbing at least its own weight of water. As moisture is absorbed, it becomes soluble with the deicing fluid. While the fluid remains liquid, snow and ice will not adhere to it. This protection will remain until the fluid becomes overly diluted by falling snow or freezing rain.

HANDLING PRECAUTIONS (Effectivity: All)

The following precautions should be taken when using deicing and anti-icing fluids:

a. Do not permit glycol solution to come in contact with the skin. It may cause serious frostbite.

b. If the solution is spilled on gloves or clothing, remove immediately. Rapid evaporation of the solution can lower temperature of material and destroy insulating qualities.

c. Avoid contact with skin or eyes.

d. Stay on the windward side during application. Prolonged exposure to heavy concentrations of glycol vapors are to be avoided.

e. Don't let solution contact bearings. It may dilute the grease.

f. Avoid applying the solution on windows because it may reduce visibility.

g. Take care when walking on surfaces that are coated with glycol. The mixture leaves a slippery film that is hazardous to walk upon.

h. Take precautions to keep the solution from entering air ducts or cabin heater and ventilator ducts, because of toxic fumes entering the cabin or cockpit during taxi or takeoff.

FLUID APPLICATION (Effectivity: All)

Aircraft deicing fluids may be used diluted or undiluted according to the manufacturer's recommendations for deicing. Deicing fluids may be applied either heated or unheated.

General recommendations for deicing and anti-icing treatments may be summarized as follows:

a. Cold application of deicing fluid is achieved with normal spray equipment, operating at about 60-80 psig air pressure.

b. Hot application must be carried out with a temperature of 180-200° F.

c. Remove as much heavy snow as possible before applying deicing fluids.

d. Use a stream or spray of fluid sufficiently coarse to float away loose pieces of ice.

e. Anti-icing of ice-free airplanes does not require heated fluid. Use only the appropriate spray equipment for the type of fluid being applied. The spray must be fine and applied in a uniformly thin coating. If a sprayer is not available, brush or paint the deicing fluid onto the airplane's surface.

CAUTION

Inhalation of glycol mists, aerosols, or high concentration of heated vapors poses a hazard to humans; Thus, workers must apply deicing fluid only in well-ventilated areas, and must avoid inhaling vapors or mists. If adequate ventilation, designed to keep mists or vapors below harmful levels, is not present, workers must wear approved respiratory protective devices.

FLUID SPILLS (Effectivity: All)

Glycol-based deicing fluids are biodegradable in water. Only gross contamination of slow moving or restricted bodies of water would be likely to cause any serious environmental impact. Typical field-use concentrations of deicing fluids, particularly when diluted by snow, ice or water, causes little or no injury to most broadleaf plants, grasses, perennial ground cover, and woody plants.

Minor leaks or spills of deicing fluid in storage areas must be soaked up with an absorbent material, such as sawdust, vermiculite, an all-purpose commercial oil absorbent, or sand. Carefully shovel the absorbent/deicing fluid into an appropriate container for disposal.

Spilled, leaked, or contaminated deicing fluid must be disposed of in strict compliance with all applicable federal, state, and local regulations and ordinances.

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STANDARD PRACTICES - AIRFRAME

WARNING

Any maintenance requiring the disconnection and reconnection of flight control cables, plumbing, electrical connectors or wiring requires identification of each side of the components being disconnected to facilitate correct reassembly. At or prior to disassembly, components should be color coded, tagged or properly identified in a way that it will be obvious how to correctly reconnect the components. After reconnection of any component, remove all identification tags. Check all associated systems for correct function prior to returning the airplane to service.

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

This chapter describes the standard maintenance practices used in maintaining the airplane in an airworthy condition. The information in this chapter is applicable during maintenance in several chapters of this maintenance manual. Maintenance procedures in a particular chapter supersede the general information in this chapter.

The information is broken down in several unit/subjects. The following is a list of the information contained in each chapter.

20-00-01 - NUT AND BOLT TORQUE INFORMATION

This unit/subject contains the general information for installation of torqued fasteners. It has information on the use of torque adapters and torque charts showing the torque of different types of nuts and bolts.

20-00-02 - ELECTROSTATIC DISCHARGE SENSITIVITY INFORMATION

This unit/subject contains the general information for maintenance of components that are subject to electrostatic damage. Information is included for electrostatic free workstations, symbols, packaging requirements, storage and transit requirements, static charge buildup and humidity and dust effects.

20-00-03 - ELECTRICAL BONDING INFORMATION

This unit/subject contains the general information for installation of electrically bonded components and the procedures used to check resistance of these electrical bonds. Information also includes procedures for a post lightning strike inspection.

20-00-04 - CONTROL CABLE INFORMATION

This unit/subject contains the general information for maintenance and inspection of control cables and pulleys.

20-00-05 - BEARING REMOVAL AND INSTALLATION INFORMATION

This unit/subject contains the general information for installation and removal of bearings. The removal is described by the use of the hydraulic and mechanical press method. The installation is described by use of the retaining compound and the staking method.

20-00-06 - TUBING INFORMATION

This unit/subject contains the general information for maintenance of hoses, tubing and fittings. Components are not identified, but the information is basic and applies to most applications. Any specific information on the system is contained in the applicable system chapter (for example, hydraulic tubing for the landing gear is covered in Chapter 32). Includes information on tube mismatch and bend radii also.

20-00-07 - FASTENER LOCKING INFORMATION

This unit/subject contains the general information for the installation of cotter pins, lockwire, tab and cup type keywashers, retaining rings and turnbuckle locking clips.

20-00-08 - AIRPLANE FINISHING INFORMATION

This unit/subject contains the general information for maintenance of the finishes used on the airplane. Preparation of composite surfaces for painting is also included.

SPECIAL TOOLS AND RECOMMENDED MATERIALS

The special tools and recommended materials listed in Charts 1 and 2 as meeting federal, military or vendor specifications are provided for reference only and are not specifically prescribed by Raytheon Aircraft Company. Any product conforming to the specification listed may be used. The products included in these charts have been tested and approved for aviation usage by Raytheon Aircraft Company, by the vendor or by compliance with the applicable specifications. Generic or locally manufactured products which conform to the requirements of the specification listed may be used even though not included in the charts. Only the basic number of each specification is listed. No attempt has been made to update the listing to the latest revision. It is the responsibility of the technician or mechanic to determine the current revision of the applicable specification prior to usage of the produce listed. This can be done by contacting the vendor of the product to be used.

CHART 1
SPECIAL TOOLS AND EQUIPMENT

TOOL NAME	PART NO.	SUPPLIER	USE
1. Biddle low resistance ohmmeter	TK-2146	Raytheon Aircraft Co., Wichita, KS	Perform resistance checks on the ground plane.
2. Multimeter (2 req.)	8060A or equivalent	John Fluke Manufacturing, Everett, WA	Perform resistance checks.
3. Bonding meter	4328A or equivalent	Hewlett Packard, Wichita, KS	Perform resistance checks below 1 ohm.
4. Multimeter	77 or equivalent	John Fluke Manufacturing, Everett, WA	Perform resistance checks above 1 ohm.

CHART 1
SPECIAL TOOLS AND EQUIPMENT

TOOL NAME	PART NO.	SUPPLIER	USE
5. MOV test Box	TK-2209/935 or fabricate per Figure 13 of Chapter 20-00-03.	Raytheon Aircraft Co., Wichita, KS	Perform MOV functional test.
6. Power supply, 0-300 vdc	6209B or equivalent	Hewlett Packard, Wichita, KS	Perform MOV functional test.
7. Kelvin Bridge type meter			Perform resistance checks below 0.2 ohms.

CHART 2
RECOMMENDED MATERIALS

MATERIALS	SPECIFICATION	PRODUCT	SUPPLIER
1. CLEANER		Methyl Propyl Ketone	Locally available
2. Corrosion Preventive	MIL-C-5541	Alodine 1200	Amchem Products Inc., Spring Garden Street, Amber, PA 19002
3. Sealer	MIL-I-46058	Electrical Insulating Compound	Conap, Inc., 1405 Buffalo St., Olean, NY 14706
4. Primer	MIL-P-23377	1-1Y-12/1-1H-7	Advanced Coatings & Chemicals, 4343 Temple City Blvd., Temple City, CA 91780
5. Sealer	MIL-S-8802	PR1422	Products Research and Chemical Corp., 5426 San Fernando Road, Glendale, CA 91203
6. Cleaner	TT-N-95	Naphtha	Locally available
7. Sandpaper, 180 Grit	P-P-105		Locally available
8. Cleaner	TT-I-735 or MIL-I-10428	Isopropyl Alcohol	Locally available
9. Epoxy Primer	MIL-P-23377	Primer	Sterling Lacquer Mfg. Co., 3150 Brannon Ave., St. Louis, MO
10. Grease	MIL-G-23827	Super Mil Grease No. A27823	American Oil Co., 165 North Canal, Chicago, IL 60606

CHART 2
RECOMMENDED MATERIALS

MATERIALS	SPECIFICATION	PRODUCT	SUPPLIER
		Aeroshell Grease 7	Shell Oil Co., P.O. Box 2463, One Shell Plaza, Houston, TX 77001
11. Primer		Locquic Primer "T"	Loctite Corp., 705 N. Mountain Rd., Newington, CT 06111
12. Retaining Compound		Retaining Compound 609	Loctite Corp., 705 N. Mountain Rd., Newington, CT 06111
13. Cryofit Couplings			Raychem Corp., 300 Constitution Drive, Menlo Park, CA 94045
14. Lubricant	VV-P-236	Vaseline	Locally available
15. Paste Wax		Johnson's J-Wax Paste	S.C. Johnson & Son, Inc., 1521 Howe Street, Racine, WI 53403
16. Scotchbrite			Locally available
17. Sandpaper, 180 grit			Locally available
18. Pinhole Filler		467-9/CA41B	AZKO, 434 W. Meats Ave., Orange, CA 93665
19. Sanding Surfacer		P900 Epoxy Sanding Surfacer	Ameritex, 810 Lee Street, Irving, TX 75060
20. Sandpaper, 280 Grit			Locally available
21. Sandpaper, 320 to 400 Grit			Locally available
22. Urethane Primer		Alumigrip Corrosion Resistant Primer 83-Y3	U.S. Paint & Lacquer St. Louis, MO
23. Kraft Paper	UU-P-268		Locally available
24. Nylon Scratch Pad			Locally available
25. Aluminum Wool	FF-W-1825		Locally available
26. BonAmi, Ajax, Comet		BonAmi, Ajax, Comet	Locally available
27. Corrosion Preventive Compound	MIL-C-16173, Grade 2	Braycote 137	Bray Oil Co., 1925 Mariana St., Los Angeles, CA 90032

CHART 2
RECOMMENDED MATERIALS

MATERIALS	SPECIFICATION	PRODUCT	SUPPLIER
		Valvaline TECYL 890	Ashland Oil Co., 1409 Winchester Ave., Ashland, KY 41101
28. Oakite No. 6			Locally available
29. 29. Black Lacquer No. 37038	TT-L-20		Locally available

TORQUE APPLICATION - DESCRIPTION AND OPERATION (Effectivity: All) (Figures 1 and 2)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

When an adapter that changes distance from the torque wrench drive to the adapter drive is used (Figure 2), compensation must be made for lost or gained leverage. The following formula allows computation of an apparent torque value, which is used in place of the actual torque value to ensure that actual torque is applied regardless of the adapter used.

Basic Torque Formula: $T \times L \div L \pm E = Y$

LEGEND:	T = Actual (Desired) Torque
	Y= Apparent (Indicated) Torque
	L= Effective Lever Length
	E= Effective Length of Extension
EXAMPLE:	T= 135 inch-pounds
	Y= Unknown
	L= 10.0 inches
	E= 1.5 inches

Formula for increased effective length:

$Y = 135 \times 10 \div 10+1.5=1350 \div 11.5=117.39$

Y = 117 inch-pounds

Formula for decreased effective length:

$Y = 135 \times 10 \div 10-1.5=1350 \div 8.5=158.82$

Y = 159 inch-pounds

If a torque wrench is not available, an acceptable method of checking the torque involves attaching a spring scale to a conventional flex or "T" handle inserted in an adapter (Figure 1). Force should be applied in a direction perpendicular to an imaginary line extending from the center of the bolt through the spring scale attaching point.

To convert the actual torque value to pounds for use with the spring scale, divide the torque in inch-pounds by the distance in inches between the center of the bolt and the spring scale attaching point. For example, if the specified torque is 200 inch-pounds and the distance is 15 inches, a pull of 13.3 pounds must be applied.

Threads of nuts and bolts to be torqued must be clean and free of all lubricants unless otherwise specified; otherwise, loss of normal friction allowed for establishing the torque values may result in overtorquing of the bolt. A measurable torque may be required to turn some locknuts. A reading must be taken to determine how much additional torque is involved, and that number added to the desired torque. For example; a locknut that requires 20 inch-pounds of force to turn freely should be torqued at 20 inch-pounds above the desired torque. If the desired torque is 80 inch-pounds, the torque wrench must indicate 100 inch-pounds to achieve the desired torque. This method compensates for the friction of the locknut or fastener.

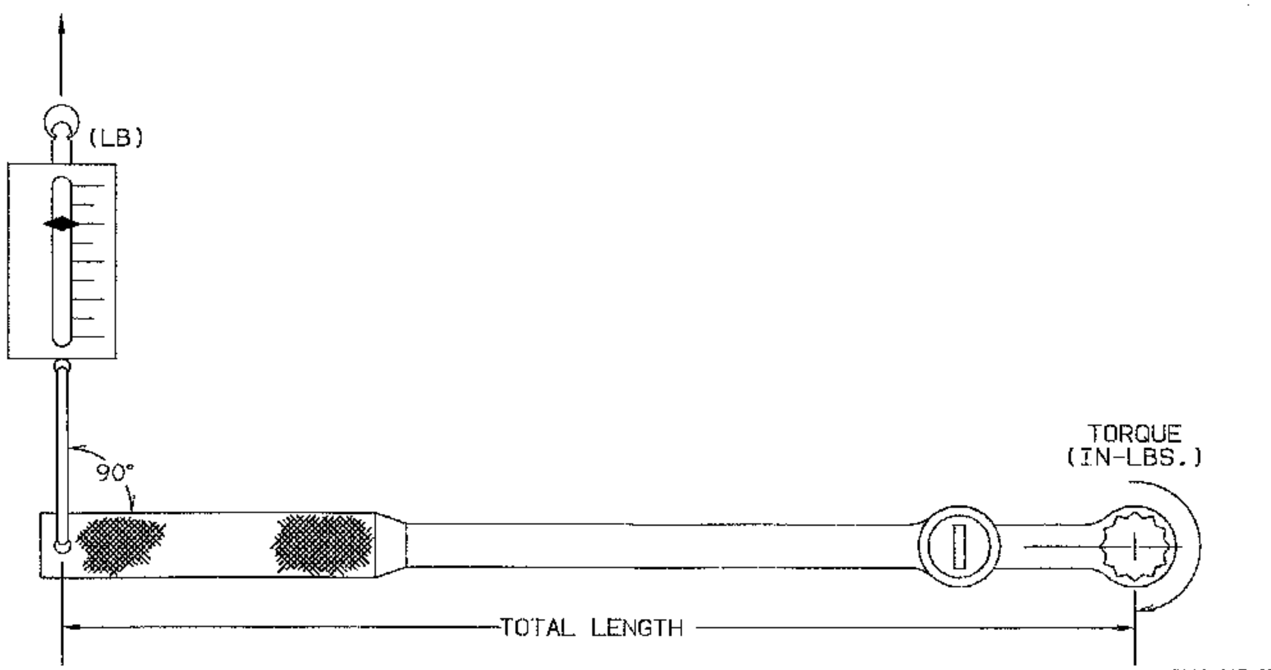
NOTE

Torque wrenches should be exercised before they are used.

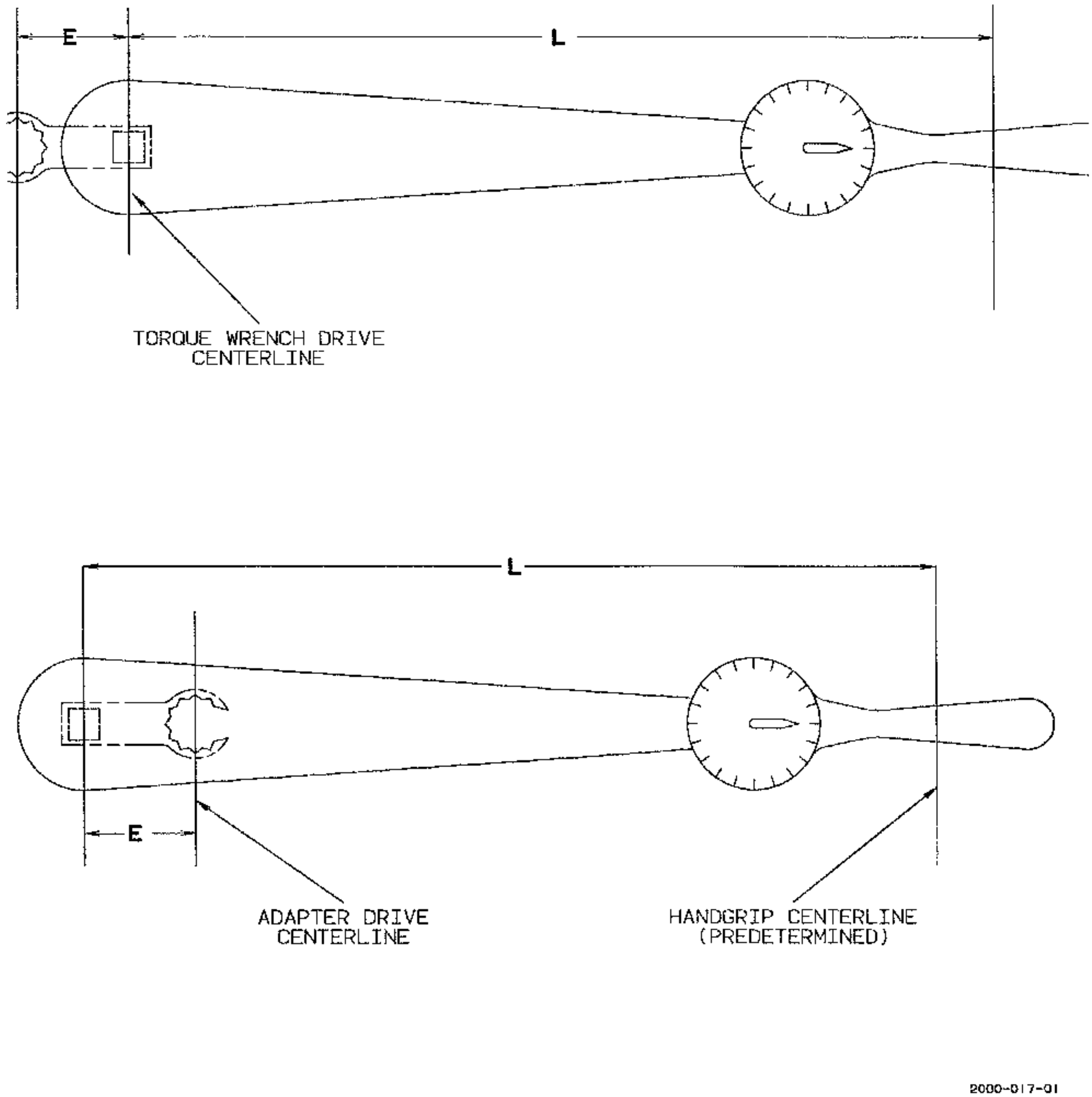
When a torque wrench adapter is used, the length of the adapter must be added to the length of the flex or "T" handle wrench and a value calculated for that particular combination. The following is a typical example for finding a desired value:

Effective length of flex or "T"
handle wrench ....12 inches
Length of adapter..3 inches
Total length ....15 inches
Desired torque on bolt ....2000 inch-pounds

(2000 inch-pounds) divided by (15 inches)=133.3 pounds



Computing Torque With Spring Scale (Effectivity: All)
Figure 1



Torque Wrench and Adapter (Effectivity: All)
Figure 2

CHART 1
TORQUING FINE THREAD SERIES, CLASS 3, CADMIUM PLATED AND NONLUBRICATED (EXCEPT AS NOTED)
(Effectivity: All)

	Torque Limits Recommended for Installation (Inch-Pounds)				Maximum Allowable Tightening Torque (Inch-Pounds)			
	Column 1		Column 2		Column 3		Column 4	
Size	MS20365 & AN310 Nuts	MS21042 Dry-Film Lub Nut	MS20364 & AN320 Nuts	MS21245 Dry-Film Lub Nut	MS20365 & AN310 Nuts	MS21042 Dry-Film Lub Nut	MS20364 & AN320 Nuts	MS21245 Dry-Film Lub Nut
5/32-36	12-15	*	7-9	---	20	*	12	---
3/16-32	20-25	15-19	12-15	---	40	30	25	---
1/4-28	50-70	37-47	30-40	---	100	70	60	---
5/16-24	100-140	56-78	60-85	---	225	135	140	---
3/8-24	160-190	72-108	95-110	---	390	200	240	---
7/16-20	450-500	---	270-300	---	840	---	500	---
1/2-20	480-690	---	290-410	210-230	1100	---	660	415
9/16-18	800-1000	---	480-600	310-430	1600	---	960	660
5/8-18	1100-1300	---	660-780	485-605	2400	---	1400	1060
3/4-16	2300-2500	---	1300-1500	1090-1250	5000	---	3000	2500
7/8-14	2500-3000	---	1800-2400	1640-2100	7000	---	4200	3740

BT04492

* This is a coarse thread (.1640-32) with recommended torque limits of 9-11 inch-pounds and a maximum allowable tightening torque of 14 inch-pounds.

CHART 2
TORQUING COARSE THREADED BOLTS LOADED IN SHEAR
(Effectivity: All)

	Torque Limits Recommended (Inch-Pounds)		Maximum Allowable Torque (Inch-Pounds)	
SIZE	AN365 & AN310 Nuts	AN364 & AN320 Nuts	AN365 & AN310 Nuts	AN364 & AN320 Nuts
8-32	12-15	7-9	20	12
10-24	20-25	12-15	35	21
1/4-20	40-50	25-30	75	45
5/16-18	80-90	48-55	160	100
3/8-16	160-185	95-110	275	170
7/16-14	235-255	140-155	475	280
1/2-13	400-480	240-290	880	520
9/16-12	500-700	300-420	1100	650
5/8-11	700-900	420-540	1500	900
3/4-10	1150-1600	700-950	2500	1500
7/8-9	2200-3000	1300-1800	4600	2700
1-8	3700-5000	2200-3000	7600	4500
1 1/8-8	5500-6500	3300-4000	12000	7200
1 1/4-8	6500-8000	4000-5000	16000	10000

BT04491

The above values apply to Class 3 threads, cadmium plated and nonlubricated.

ELECTROSTATIC DISCHARGE SENSITIVITY - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

Some types of electronic components are easily damaged by electrostatic discharge (ESD), and require special handling and storage procedures. ESD is a release of stored electrostatic charge which has been generated by actions such as contact, rubbing, or separating of materials. A charge of this type can damage electrical and electronic equipment installed in the airplane. In some instances, the damage may not be immediate, but progressive. Components and items of equipment that can be damaged by electrostatic discharge are considered to be electrostatic discharge sensitive (ESDS). Electronic components that are considered to be electrostatic discharge sensitive include CMOS integrated circuits, transistors and diodes, monolithic and hybrid microelectronics, MOS capacitors, thin film resistors, and piezoelectric crystals. Any circuit or piece of equipment, that contains ESDS components, is subject to ESD damage if certain handling precautions are not observed.

Personnel who remove, inspect, test or install instruments and equipment that contain ESDS components must be aware of the possibility of ESD damage, and should handle ESDS components in accordance with procedures covered in this chapter. Proper procedures and policies for the handling of ESDS components and equipment should be adhered to for the following reasons:

- Control of ESD damage, from time of component manufacture to time of actual installation, must be verifiable and must be maintained by use of established industry standards.
- Established policy dictates that all personnel follow certain procedures to prevent damage to ESDS components and equipment.
- Personnel in areas of interacting responsibility must be aware of their obligation to maintain a proper ESD-controlled environments.

Chart 1 lists several materials and the associated electrostatic charge polarity and magnitude for each. Materials at the top of the list are capable of producing the greatest amount of positive electrostatic charge, while materials at the bottom of the list are capable of producing a similar negative electrostatic charge. Items of dissimilar polarity provide the greatest potential for electrostatic discharge. Numeric values have not been assigned to the listed materials, as static charge levels are not constant, and will vary with ambient conditions. A greater possibility of ESD exists when the positions of listed items in Chart 1 are farther apart. For example, an individual using his/her hands to pick up a PVC pipe has more potential for producing ESD than does an aluminum part contacting a steel part.

Chart 2 identifies some typical electrostatic charge levels and the actions that can produce the electrostatic charge.

CHART 1
ELECTROSTATIC CHARGE LEVELS
(Effectivity: All)

MATERIALS	CHARGE (Relative Magnitude and Polarity)
Air	Positive
Human Hands	Positive
Asbestos	Positive
Rabbit Fur	Positive
Glass	Positive
Mica	Positive
Human Hair	Positive
Nylon	Positive
Wool	Positive
Fur	Positive
Lead	Positive
Silk	Positive
Aluminum	Positive
Paper	Positive
Cotton	--Neutral--
Steel	Negative
Wood	Negative
Amber	Negative
Sealing Wax	Negative
Hard Rubber	Negative
Nickle, Copper	Negative
Brass, Silver	Negative
Gold, Platinum	Negative
Sulfur	Negative
Acetate, Rayon	Negative
Polyester	Negative
Celluloid	Negative
Orlon	Negative
Saran	Negative
Polyurethane	Negative
Polyethylene	Negative
Polypropylene	Negative
Pvc (Vinyl)	Negative
Kel-f (CTFE)	Negative
Silicon	Negative
Teflon	Negative

ELECTROSTATIC DISCHARGE SENSITIVITY - MAINTENANCE PRACTICES (Effectivity: All)

REMOVAL/INSTALLATION OF ESDS EQUIPMENT (Effectivity: All)

Observe the following procedures when removing or installing ESDS equipment at the airplane:

CAUTION

Tools with plastic or insulated handles should not be used around ESDS devices. These tools can carry a static charge which does not readily discharge during the grounding process. Insulated tools should be used only during power-on testing of aircraft systems to prevent electrical shock to maintenance personnel performing the tests.

Some circuit board assemblies may be protected by plastic covers. These covers can store an electrostatic charge. Use a static control workstation to neutralize any electrostatic charge on the covers before touching a printed circuit board. Store the covers a safe distance from the work area.

a. When using test equipment, discharge all test leads to ground prior to connection to the ESDS circuit under test.

b. Use a portable static control workstation when removing ESDS circuit boards from card cages and enclosures at the airplane.

c. Place removed ESDS equipment on the workstation static dissipative work surface before opening the static shielding container holding the replacement ESDS equipment.

d. Just prior to engaging a cable connector with its mating receptacle, touch the connector shell to the receptacle shell to neutralize any electrostatic charge on the connector or the installer's body.

e. Maintain protective coverings on stored ESDS equipment.

HANDLING OF ESDS COMPONENTS AND EQUIPMENT (Effectivity: All)

All personnel that handle ESDS components and equipment should receive instruction in the proper handling of such items. Observe the following handling rules to prevent damage to ESDS components and equipment:

a. Keep ESDS components and equipment inside ESD protective packaging until opened at a static control workstation.

CHART 2
TYPICAL ELECTROSTATIC VOLTAGES (Effectivity: All)
This data based on an ambient relative humidity of 15 to 36 percent.

Action of person	Most Common Reading (Volts)	Highest Reading (Volts)
1. Walking across carpet	12,000	39,000
2. Walking across vinyl tile floor	4,000	13,000
3. Seated in polyurethane foam chair	1,800	18,000
4. Picking up polly bag	1,500	20,000
5. Inserting paperwork into vinyl envelopes	800	7,000

b. Before unsealing ESD protective packs, place the packs on the work surface of a static control workstation.

c. Do not use pressure air nozzles to remove dust from ESDS printed circuit boards. Rapid movement of air, combined with airborne dust particles, can create an electrostatic charge that will destroy ESDS components.

d. Always wear a grounding wrist strap when opening any ESD protective package.

e. Avoid touching circuit components or connector pins when handling ESDS components or equipment.

f. Never place any ESDS component, before or after assembly, on a non-conductive surface or in a container not specifically designed for storage of ESDS devices.

g. Protect ESDS components and equipment with protective containers, conductive caps, and/or pin shorting devices.

h. Store and transport ESDS components and equipment in ESD protective containers. Seal all protective containers with an ESD warning label prior to shipment.

i. Place all loose ESDS components and equipment into ESD protective containers BEFORE removing a grounding wrist strap.

j. Keep the workstation free of any material not required to accomplish the assigned task.

k. Follow established ESD protection rules and procedures.

l. Always use a static control workstation, either permanent or portable, when removing ESDS components and equipment from protective packaging.

m. Use only grounded, electrically isolated, and temperature controlled soldering irons that have been rated for use with ESDS components and equipment. Use only hand tools that have conductive or static dissipative handles or grips. Test equipment, such as scopes and meters, must be rated for use around ESDS components and equipment.

n. Avoid exposing ESDS components and equipment to large electromagnetic or electrostatic fields such as transformers or transmitting antennas.

CONTROLLING STATIC CHARGE BUILDUP (Effectivity: All)

Four basic techniques are employed in ESD control. These are:

a. Minimize The Charge Buildup - Minimize electrostatic charge buildup by using conductive or static dissipative flooring and static-dissipative work surfaces. Wear leather shoes, cotton socks, and a grounding ankle strap to dissipate body charge buildup. Wear cotton clothing instead of wool or synthetics. Use an ionized air blower to dissipate charges from nonconductive items.

b. Drain Off The Charge To Ground - The human body is a good electrical conductor and for that reason electrostatic charges on the body can be dissipated by skin contact with a grounding device such as a wrist or ankle strap. Always wear a grounding wrist strap when opening ESD containers or handling exposed ESDS components and equipment.

c. Neutralize The Charge - Non-conductors, such as polystyrene coffee cups, plastic bags, and some clothing develop electrostatic charges that cannot be neutralized by grounding. Ionized air flow will neutralize an electrostatic charge on a non-conductor as long as the ionized air blower puts out both positive and negative ions.

d. Minimize The Effects Of Electrostatic Fields - The immediate environment surrounding ESDS components and equipment must be free of electrostatic fields or must have suitable static shielding to minimize induced effects from electrostatic fields.

PERMANENT STATIC CONTROL WORKSTATION (Effectivity: All) (Figure 1)

A static control workstation provides for static-free handling of ESDS components and equipment by diverting, to ground, electrostatic charges on conductive objects.

A permanent static control workstation consists of the following items:

CAUTION

Never wear a grounding wrist strap over clothing. The strap must be in contact with the wearer's skin to adequately dissipate any electrostatic charge. Under certain conditions, personnel using a grounding wrist strap may need to use a lotion-type skin moisture enhancer to provide a low-resistance connection between the wrist and the wrist strap.

a. Grounding Wrist Strap - Each person that handles ESDS components and equipment must wear a grounding wrist strap to dissipate bodily electrostatic charges. The wrist strap must fit snugly against the skin and should release quickly in case of an emergency. The wrist strap incorporates a 1 megohm current-limiting resistor, in series with the ground cord, to protect the wearer from electrical shock hazards.

b. Static-Dissipative Work Surface - Conductive mats, on the work bench surface, are designed to remove electrostatic charges from conductive items placed on the mat.

c. Conductive Flooring - Conductive flooring is used when additional control of ESD is required. To maintain total control over ESD, use conductive chairs, a grounding heel strap, and conductive shoes. Conductive flooring in ESD control areas must be free of all wax or other non-conductive coatings.

d. Hard Ground Connection - Grounding of the static control workstation is accomplished through one or more copper ground rods driven into moist earth to a depth sufficient to provide a low resistance path from the workstation to ground. All workstation connections to ground are made through a one megohm resistor to protect workstation personnel from electrical shock hazards by limiting current flow to ground.

NOTE

Some building grounds need to be checked to ensure that there is no current looping from other nearby grounds.

Ensure that the source of current is external and not static.

e. Ionized Air Blower - The ionized air blower provides a constant flow of positive and negative ions over the workstation surface to neutralize electrostatic charges on non-conductive materials in the air flow path. The use of an ionized air blower, in combination with a static control workstation, provides additional protection for ESDS components and equipment. Since it is not always possible to eliminate all static charge accumulators (styrofoam, plastic, etc.) from a work area, the ionized air blower is used to provide additional protection by flooding the work area with balanced negative/positive ionized air. Static charge accumulators should always be kept away from static-free areas, but inadvertent static is hard to control, especially when developed by such common items as clothing, footwear, combs, and pens. An ionized air blower will help control some of this inadvertent buildup.

f. Static Dissipative Seating - Chairs used at ESD protected workstations must be conductive, and if padded, must be covered with static dissipative material.

g. Conductive Containers - ESDS devices must be transported in approved containers to prevent ESD damage. These special containers are made of metal or special conductive plastic. Before static-sensitive components and equipment are removed from a static control workstation, they must be packaged in containers that provide at least as much protection as that provided by the workstation. Conductive boxes, kitting trays, and similar types of approved containers provide complete ESD protection to ESDS components and equipment while in transit.

h. Grounding Heel Strap - A grounding heel strap can provide additional ESD protection. The heel strap makes contact with the wearer's skin at the ankle, and extends to the bottom of footwear to make contact with a conductive mat or conductive flooring. The grounding heel strap can be used in combination with a grounding wrist strap to provide maximum ESD protection.

i. Antistatic/Conductive Clothing - Many types of clothing generate electrostatic charges. To remove some of this buildup, workstation personnel should wear outer garments that help dissipate electrostatic charges. Cotton ranks among the best fabrics for antistatic protection. Do not wear synthetic or wool fabrics around ESDS devices, as these fabrics retain electrostatic charges.

PORTABLE STATIC CONTROL WORKSTATION (Effectivity: All) (Figure 2)

A portable static control workstation provides for static-free handling of ESDS components and equipment during maintenance operations at the airplane. The typical portable workstation is available as a field service kit that is used to dissipate electrostatic charges before the charges can damage ESDS components and equipment.

A typical portable static control workstation consists of the following items:

a. Grounding Wrist Strap - Each person that handles ESDS components and equipment must wear a grounding wrist strap to dissipate bodily electrostatic charges. The wrist strap must fit snugly against the skin and should release quickly in case of emergency. The wrist strap incorporates a 1 megohm current-limiting resistor, in series with the ground cord, to protect the wearer from electrical shock hazards.

b. Static-Dissipative Work Surface - A conductive mat is an integral part of the portable workstation, and is designed to remove electrostatic charges from conductive items when those items contact the mat.

c. Hard Ground Connection - Ground the portable workstation to the airframe or to a common ground as shown in Figure 2. All portable workstation connections to ground are made through 1 megohm current-limiting resistors to protect maintenance personnel from electrical shock hazards.

HUMIDITY AND DUST EFFECTS ON ESDS COMPONENTS AND EQUIPMENT (Effectivity: All)

Humidity is a factor in the control of ESD. The lower the humidity, the greater the chance of damage to ESDS components and equipment. Humidity, at the workstation, should be maintained between 30 and 65 percent.

Repair of ESDS circuit boards, including replacement of ESDS components, should be performed in a dust-free environment.

PACKAGING OF ESDS COMPONENTS AND EQUIPMENT (Effectivity: All)

All ESDS components and equipment require special ESD protective packaging. Seal all ESDS packages with an appropriate cautionary label as shown in Figures 3 through 5.

CAUTION

Do not use clips or staples when sealing any ESDS package.

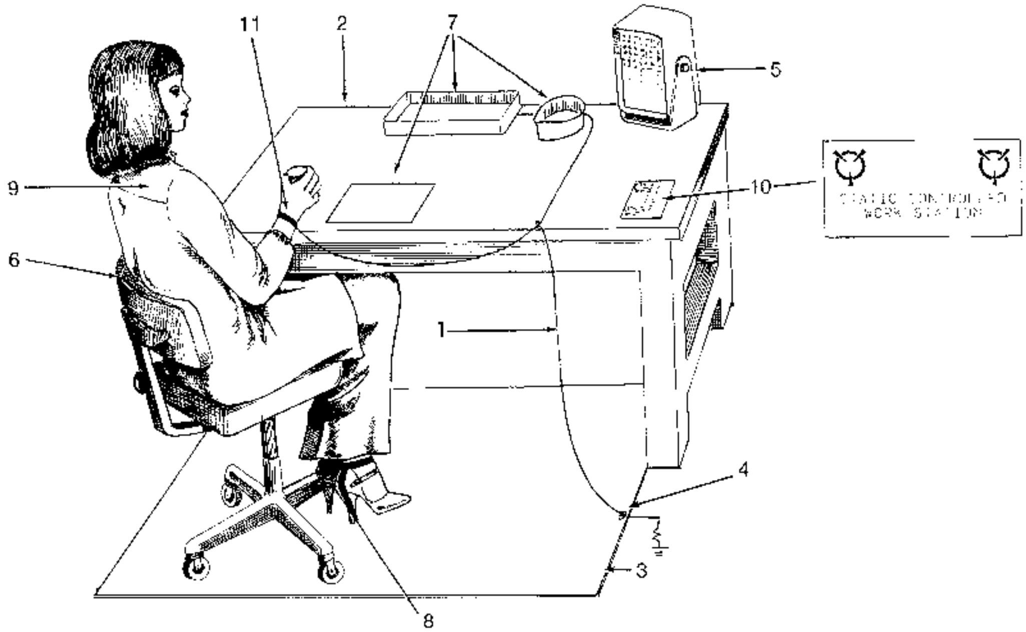
Do not use carbon-filled, conductive bags.

Remove ESDS components and equipment from protective, static-shielded containers ONLY at a static control workstation after attaching a grounding wrist strap and verifying that ESD producing items are not on the static dissipative work surface.

ESD protective packaging requirements, unless otherwise defined by specification, shall conform to the following:

- Class 1 - Package in multi-layer conductive type bags consisting of an inner and outer layer of antistatic (surface resistivity of 10^9 to 10^{14} ohms per square inch) or static dissipative (surface resistivity of 10^5 to 10^9 ohms per square inch) material with a middle layer of conductive material (surface resistivity of 10^5 ohms or less).

- Class 2 - Package in a static dissipative material possessing a surface resistivity of 10^5 to 10^9 ohms per square inch. Materials specified for Class 1 may also be used.



* 1. GROUND CORD ASSEMBLY

* 2. STATIC DISSIPATIVE MAT OR WORK BENCH SURFACE

3. STATIC DISSIPATIVE/CONDUCTIVE FLOOR OR MAT

* 4. GROUND CONNECTION

* 5. IONIZED AIR BLOWER

6. STATIC CONTROLLED CHAIR

* 7. CONDUCTIVE CONTAINERS AND CONDUCTIVE BAGS

8. HEEL GROUNDING STRAP

9. ANTISTATIC/CONDUCTIVE CLOTHING OR OUTER GARMENT

*10. SIGN - ESD CONTROLLED WORK STATION

*11. SNUG-TO-SKIN PERSONNEL WRIST STRAP TO GROUND

NOTE

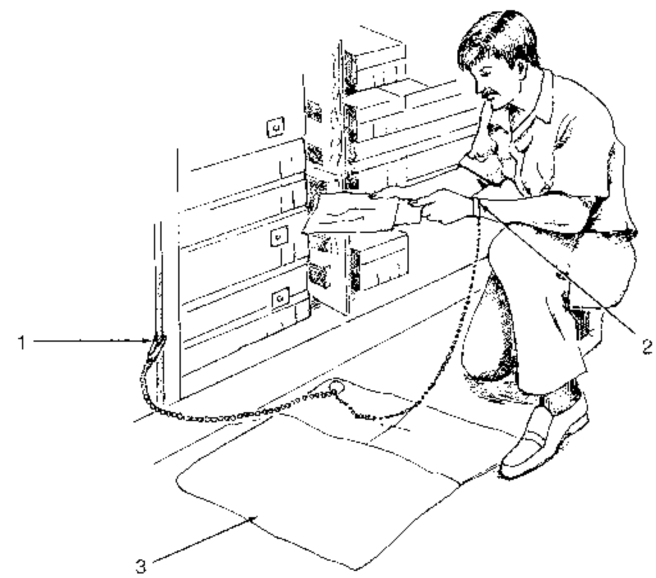
ITEMS MARKED WITH AN (*) ARE REQUIRED FOR A STATIC CONTROLLED WORK STATION. ALL OTHER ITEMS ARE OPTIONAL, BUT PROVIDE ADDED PROTECTION OR ENHANCE WORKER MOBILITY.

NOTE

KEEP STATIC GENERATORS, SUCH AS PLASTIC CUPS, CIGARETTE WRAPPERS, SURPLUS CLOTHING, HANDBAGS, LUNCH CONTAINERS, PLASTIC BAGS, FOAM PACKING, READING MATERIAL, ETC. AWAY FROM STATIC CONTROL WORK STATIONS.

AP014188

Permanent Static Control Workstation (Effectivity: All)
Figure 1



1. ALLIGATOR CLIP TO RELIABLE GROUND CONNECTION
2. SNUG-TO-SKIN PERSONNEL WRIST STRAP
3. STATIC DISSIPATIVE WORK SURFACE

Portable Static Control Workstation (Effectivity: All)
Figure 2

- Class 3 - Package in an antistatic material possessing a surface resistivity of 10^9 to 10^{14} ohms per square inch.

Place all ESDS devices in approved static shielding containers before packing in shipper's normal exterior containers. Use antistatic cushioning or fill materials. Do not use static generating materials, such as polyethylene, styrofoam, or paper.

Antistatic packaging is generally pink or blue in color. The material differs from common plastic in that an antistatic compound is incorporated into the material during the manufacturing process. This type of packaging DOES NOT provide static shielding, and is generally used to package instruction sheets, data sheets, and other non-ESDS materials prior to introduction into a static-free environment. All non-ESDS items, that are to enter an ESD workstation, require repackaging in antistatic materials.

Conductive static shielding packaging differs from antistatic packaging, in that it has the ability to shield devices, contained within, from external static charges. Conductive static shielding packaging is available in the form of bags and rigid containers.

MARKING OF ESDS COMPONENTS AND EQUIPMENT (Effectivity: All)

All ESDS components and equipment should be marked appropriately with an ESDS symbol as shown in Figure 4.

NOTE

ESDS symbols are yellow on a black background or black on a yellow background.

Mark unit containers with the ESDS caution label on the outside of the package. Mark exterior containers with an ESD caution label as shown in Figure 5. Apply marks directly to each ESDS printed circuit board, assembly cover, equipment enclosure, or access door that would expose ESDS devices, if removed. Mark appropriately using decal transfer, stencil, silk screen, or any other method that meets permanency and legibility requirements.

Display ESDS symbols in a prominent package location to alert all personnel to the presence of ESDS devices and equipment. The ESDS symbol should be at least 1/4" in diameter. ESDS symbols that are attached to circuit boards should contrast with the circuit board base color. Enclosures that contain ESDS circuit boards should be identified by bright orange paint on the outer face of the enclosure.

STORAGE AND TRANSIT OF ESDS COMPONENTS AND EQUIPMENT (Effectivity: All)

CAUTION

NEVER use ordinary plastic containers or packing materials when transporting ESDS components or equipment.

When preparing ESDS devices for shipment, ensure that all assemblies and equipment have been protected against ESD through appropriate handling at static controlled workstations.

ESDS packages, which have been properly enclosed in protective packages, require proper storage and transfer in conductive static-dissipative, or static-free containers. Shipping information and other instructions, accompanying ESD-protected packages, shall be contained in anti-static materials. ESDS components, that are received in damaged or opened packing containers, are not acceptable, and should be returned for replacement.

CAUTION THIS EQUIPMENT CONTAINS DEVICES SENSITIVE TO DAMAGE BY ELECTROSTATIC DISCHARGE (ESD). USE ESD PRECAUTIONARY PROCEDURES WHEN TOUCHING, REMOVING, OR INSERTING PARTS OR ASSEMBLIES.

CAUTION

ELECTROSTATIC DISCHARGE
SENSITIVE ELECTRONIC DEVICES.
SPECIAL HANDLING REQUIRED.

CAUTION SENSITIVE ELECTRONIC DEVICES. SPECIAL HANDLING REQUIRED. DO NOT OPEN EXCEPT AT AN APPROVED WORK STATION.

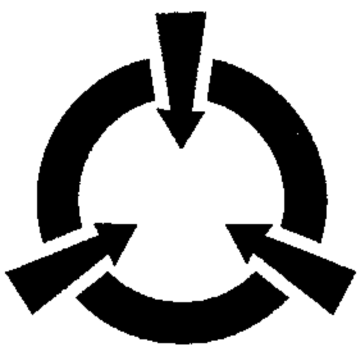
(PREFERRED)

ATTENTION CONTENTS STATIC SENSITIVE HANDLING PRECAUTIONS REQUIRED CONTENTS ____________ ____________ ____________

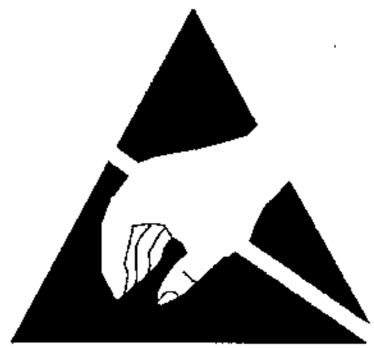
(ACCEPTABLE)

C94NC20B0200

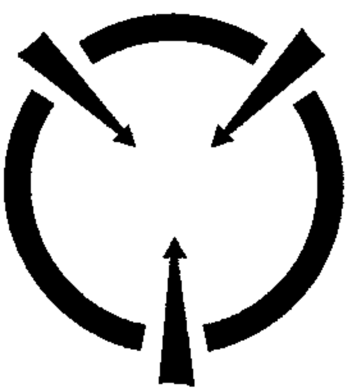
ESD Sensitive Placards (Effectivity: All)
Figure 3



MIL-STD-1285 ESD SYMBOL



RS-471 ESD SYMBOL



MIL-STD-129H ESD SYMBOL

AP014193 C

ESD Symbols (Effectivity: All)
Figure 4

C94NC20B0201 C

ESD Sensitive Container Labels (Effectivity: All)
Figure 5

ELECTRICAL BONDING - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

The following terms are defined as used in the system description:

- ELECTRICAL BOND: A reliable electrical connection between conductive parts which provides electrical conductivity.
- ELECTRICAL BONDING: Conductive parts are considered electrically bonded when they are mechanically interconnected to maintain a common electrical potential.
- GROUND: A conducting connection, whether intentional or accidental, by which an electrical current or equipment maintains a common electrical potential.
- GROUND PLANE: A plane which, for all practical purposes, is assumed to be at true ground reference or zero potential.
- EQUIPOTENTIAL: For all practical purposes, an identical state of electrical potential for conducting items.

GROUND PLANE (Effectivity: All)

The basic properties of graphite composites used extensively in the construction of a composite airframe tend to create a structure markedly higher in resistance than a conventional metal airplane. To counter the resistive nature of composite materials, a metallic ground plane is incorporated as an integral part of the airplane structure. Expanded aluminum-foil mesh is electrically bonded to the airplane composite structural parts, which include keels, shelves, bulkheads and floorboards in the nose, cockpit, cabin and aft fuselage. The following are also considered part of the ground plane: cockpit sidewall consoles, instrument panel and pedestal sheet metal, seat tracks, wire trays, conduit, fire walls, nacelle and aft fuselage equipment shelves and the nose avionics bays.

LIGHTNING CONSIDERATIONS (Effectivity: All)

A lightning attachment causes an extremely large current flow through the airframe. Aluminum wire is interwoven in the outer ply of the airplane skin. Lightning current, at the point of attachment, is dispersed over a larger area by the aluminum wire, thereby decreasing the probability of severe structural damage at the lightning attach point.

NOTE

The aluminum wire is not considered a part of the ground plane and should not be confused with the expanded aluminum foil mesh used on other airplane structures.

During a lightning attachment, the resistance of the airplane structure determines what voltage will appear at electrical circuits and to the passengers and/or crew. Since lightning normally enters the airplane at one extremity and leaves at another, the ground plane provides a low impedance path for lightning-induced current to flow between the extremities. Nose to tail or wing tip to wing tip are typical examples of a lightning current path through the airframe.

By achieving an equipotential on the ground plane through electrical bonding, the airplane, passengers and crew are protected from the adverse affects of a lightning attachment. All components installed in or on the airplane that are potentially susceptible to lightning transients must be electrically bonded to the ground plane. These electrical devices are designed to withstand temporary voltage surges. Transient suppression devices are installed on electrical power buses and provide protection for electrical devices on the bus by diverting voltage transients back to the ground plane. This configuration helps to isolate the internal circuitry of all electrical devices, preventing component damage and transients from entering the airplane wiring. Metal Oxide Varistors (MOV) and Transorbs are the two basic types of transient suppression devices used for this purpose. After a lightning attachment, all transient suppression devices must be functionally checked. Refer to Chapter 4 for Airworthiness Limitations concerning a lightning attachment.

ELECTRICAL BONDING METHODS (Effectivity: All)

There are two basic types of electrical bonding, direct and indirect. Both are accomplished by using mechanical methods to attach the electrical conductors. Bolts, studs, rivets, conductive laminates, flashing and bonding jumpers are commonly used.

Whether direct or indirect, all electrical bonding must reflect high maintenance standards to maintain the integrity of the ground plane. Many times, an ill-prepared surface may initially provide sufficient grounding properties, but experience a rapid deterioration in conductivity when corrosion from contaminants or moisture appears on the bonding surface. All electrical bonding surfaces should be free of primer or coatings not compatible with electrical conductance. This includes, but is not limited to, all protective films such as anodization, grease, oil, paint, lacquer, or other finishes with high-resistance properties. Once the electrical bonding surface is cleaned, and the necessary protective coatings applied, the component is installed and a resistance check is performed to verify continuity of the electrical bond.

DIRECT ELECTRICAL BONDING (Effectivity: All)

Direct electrical bonds are frequently used where the ground plane is an integral part of the airplane structure, because they are permanent, metal-to-metal joints. Before assembly, the joints are treated with a conductive film that prevents corrosion of the electrical bonding surface. An example of a direct electrical bond is the use of a flashing to provide continuity between the expanded aluminum-foil mesh of the keel and the expanded aluminum-foil mesh of the avionics shelf. Most ground-plane electrical bonds involving the attachment of composite structures, or installation of components on an aluminum shelf, use direct electrical bonding methods.

INDIRECT ELECTRICAL BONDING (Effectivity: All)

When direct electrical-bonding methods are impractical, indirect electrical-bonding methods are used. Indirect electrical bonding is most commonly accomplished by using bonding jumpers to make the desired connection. These flexible metal straps are attached to a prepared metal surface using screws, studs, nuts and washers. The connection is always as short as possible and uses a single jumper. Two bonding jumpers connected in series is unacceptable, as this can double the resistance between the ground plane and electrically bonded component. Bonding jumpers are frequently used to connect components on composite shelving to a common point on the ground plane. Bonding jumpers are also used to electrically connect conduit between joints and to the wire trays.

CAUTION

Anytime maintenance is performed on or around these flexible bonding jumpers, the wire should not be bent or damaged as this has a tendency to weaken the jumper and reduce its effectiveness. Wiggling the bonding jumper to see if the end terminations are tight is unacceptable as this may also induce fatigue on the crimped portion of the bonding jumper.

Indirect electrical bonding is also used to connect the airplane wire-harness shielding terminations to the ground plane. The tubular braiding attaches to the electrical connectors with clamps and shields the airplane wire harness for its entire length.

ELECTRICAL BONDING OF PIPES, TUBING AND CONDUIT (Effectivity: All)

All metallic pipes, tubes and hoses that carry petroleum products or other fluids, including gases, must have a mechanically secure connection to the ground plane or airplane structure for static dissipation purposes. Plumbing sections must be electrically bonded to each other to eliminate a potential electrical charge on the individual segments. Continuity between the plumbing segments is achieved with electrical bonding clamps or jumpers. Electrical bonding clamps, used in some applications, have a wire that contacts the plumbing on either side of the clamp, ensuring continuity across the joint. Normally, all plumbing is referenced to the ground plane or airplane structure through bonding jumpers or plumbing grounding blocks. Conduit is electrically bonded at the individual joints and referenced to the ground plane or airplane structure with bonding jumpers. All ground plane attachments should be returned to their original configuration after any maintenance is performed.

CAUTION

All conductive sections of the fuel system plumbing are referenced to the ground plane or airplane structure in one location only. This allows dissipation of static, but prevents current flow through the fuel system plumbing should a lightning attachment occur.

ELECTRICAL BONDING OF EXTERIOR ELECTRICAL COMPONENTS (Effectivity: All)

The importance of electrically bonding antennas to the graphite structure, and exterior lights or other exterior electrical equipment to the ground plane, should be noted. Due to their exterior locations, these electrical components can become an ideal conductor of lightning transients into the electrical system. Proper electrical bonding during installation provides a low resistance path to the ground plane, preventing the conduction of harmful transients into the electrical system.

ELECTRICAL POWER RETURNS (Effectivity: All)

Electrical power returns should be direct with the shortest possible path from the operating equipment to ground when practical. Current return leads of 4 AWG or larger should not be connected directly to the ground plane structure, but should be connected to a stud or doubler attached to the structure. This method prevents damage to the ground plane should a faulty connection induce high current flow through the terminal. A maximum of four wire terminals may be installed on an individual ground stud. If two or more wires are grounded to an individual stud, each wire must form a mechanically sound connection and meet the applicable maximum resistance values specified in Chart 2. Component-case electrical bonding and current return bonding are separate, with the connections made to separate ground studs. As a general rule and precaution, note the power return configuration before removal of a component and ensure that the right configuration is used during installation.

ELECTRICAL BONDING - MAINTENANCE PRACTICES (Effectivity: All)

METAL SURFACE PREPARATION AND ELECTRICAL BONDING (Effectivity: All)

Surface preparation for electrical bonding requires the complete removal of anodic film, grease, oil, paint, lacquer, metal finishes and other resistive coatings from an area slightly larger than the electrical bonding surface. A clean, smooth, properly contoured electrical bonding surface should be obtained, while removing the least amount of metal possible.

NOTE

Do not use emery cloth or iron oxide sandpaper. Use only aluminum oxide or silicon carbide sandpaper.

WARNING

When working in an enclosed area with solvents, cleaners or finishes, provide a means of adequate ventilation to prevent a concentration of harmful vapors.

Use the following procedures to prepare metal surfaces for electrical bonding:

ALUMINUM SURFACES (Effectivity: All)

a. Remove any nonsoluble protective finishes or corrosion from an area slightly larger than the area to be electrically bonded (minimum of .25 inches) by sanding with fine sandpaper.

NOTE

A stainless steel brush with a pilot may be used to clean small areas (Figure 1).

b. Clean the electrical bonding surface thoroughly with cleaner (1, Chart 2, 20-00-00) to remove any oils or contaminants.

NOTE

Do not touch the electrical bonding surface with bare hands. Body oils or acids may prevent adhesion of the alodine film or cause corrosion.

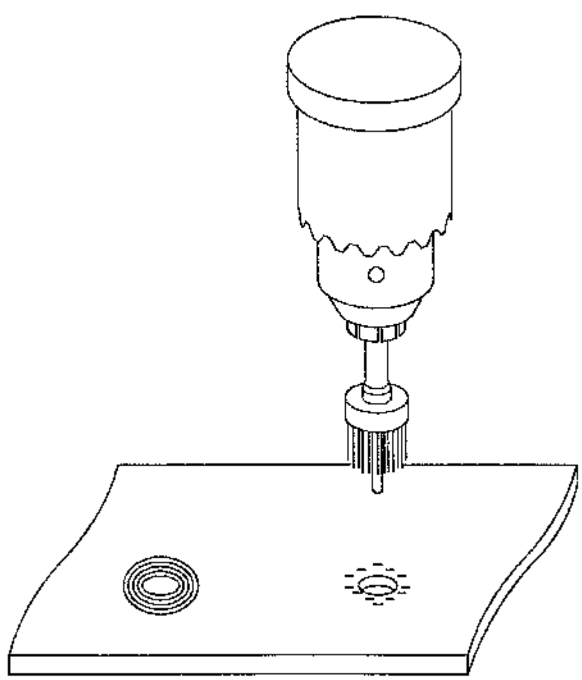
c. Shake the corrosion preventive (2, Chart 2, 20-00-00) vigorously just prior to application, then apply to the electrical bonding surface with a clean Scotch-brite, sponge, brush or cloth.

NOTE

The alodine solution should have an amber color. If the solution is coffee colored, it has been contaminated. Repeat the cleaning procedure if contaminated alodine has been applied to the electrical bonding surface.

d. Keep the treated area wet with alodine for approximately 3 to 5 minutes until a yellow color develops. Should the alodine not change color, it is an indication that the surface was not properly cleaned.

e. After the alodine has changed color, rinse the area with clean, deionized water. Touch up any areas where the alodine does not cover the electrical bonding surface. Do not wipe dry. Care must be taken not to damage the alodine coating while it is still soft when bonding.



Use of Stainless Steel Brush On Aluminum (With Pilot) (Effectivity: All)
Figure 1

NOTE

The electrical bonding surfaces must be assembled within one hour of alodine treatment. Once dried, alodine must be softened before it can be effectively used in electrical bonding. If more than an hour has passed, soften the alodine by applying wet alodine to the dried surface.

f. Install the component being electrically bonded.

g. Refer to ELECTRICAL BOND RESISTANCE CHECK in this chapter, and perform a resistance check across the electrical bond.

h. After a good electrical bond has been verified with the resistance check procedures, seal around the edges of the electrical bond with sealer (3, Chart 2, 20-00-00). If the assembly was originally protected by primer, reprime the assembly with primer (4, Chart 2, 20-00-00) and reapply the original finish as required.

NOTE

The electrical bond area must be refinished within 24 hours of electrical bonding to preserve the integrity of the electrical bond. If the electrical bond involves a structural part, it must be fillet sealed at the edges or seams with sealer (5, Chart 2, 20-00-00) to prevent moisture from entering and deteriorating the electrical bonding surfaces. Refer to Chapter 20-00-08 for detailed information on airplane finishes.

CORROSION-RESISTANT (CRES) STEEL SURFACES (Effectivity: All)

a. Remove all grease and oil from the electrical bonding surface with cleaner (6, Chart 2, 20-00-00).

b. Remove all paint or lacquer from the electrical bonding surface with cleaner (1, Chart 2, 20-00-00).

NOTE

Use care not to remove any zinc or cadmium plating from the steel surfaces.

c. Allow the electrical bonding surfaces time to thoroughly dry.

d. Install the component being electrically bonded.

e. Refer to ELECTRICAL BOND RESISTANCE CHECK in this chapter, and perform a resistance check across the electrical bond.

NOTE

The electrical bond area must be refinished within 24 hours of electrical bonding to preserve the integrity of the electrical bond. If the electrical bond involves a structural part, it must be fillet sealed at the edges or seams with sealer (5, Chart 2, 20-00-00) to prevent moisture from entering and deteriorating the electrical bonding surfaces. Refer to Chapter 20-00-08 for detailed information on airplane finishes.

STAINLESS STEEL AND TITANIUM SURFACES (Effectivity: All)

a. Remove all oil and grease from the electrical bonding surface with cleaner (6, Chart 2, 20-00-00).

b. Remove all paint or lacquer from the electrical bonding surface with cleaner (1, Chart 2, 20-00-00).

c. Allow the electrical bonding surfaces time to thoroughly dry.

d. Lightly sand the electrical bonding surfaces as necessary.

e. Use cleaner (6, Chart 2, 20-00-00) to clean the electrical bonding surfaces and wipe dry with a clean rag.

f. Install the component being electrically bonded.

g. Refer to ELECTRICAL BOND RESISTANCE CHECK in this chapter, and perform a resistance check across the electrical bond.

h. After a good electrical bond has been verified with the resistance check procedures, it must be fillet sealed at the edges or seams with sealer (5, Chart 2, 20-00-00) to prevent moisture from entering and deteriorating the electrical bonding surfaces.

COMPOSITE SURFACE PREPARATION FOR ELECTRICAL BONDING (Effectivity: All)

NOTE

Environmental conditions must be between 60° F and 90° F with the humidity less than 75 percent.

a. Use 180-grit or finer sandpaper to remove resin or other resistive coatings and expose the aluminum wire or foil mesh for electrical bonding.

NOTE

When exposing the aluminum wire on the fuselage outer surface, care should be taken to extend the prepared surface no more than 0.5 inch beyond the electrical bonding surface.

b. Use a vacuum to remove loose dust and particles from the electrical bonding surface.

c. Clean the area using a lint-free cheesecloth saturated with cleaner (1 or 8, Chart 2, 20-00-00). Wipe the composite electrical bonding surface in one direction until the cheesecloth is free of all contaminants and particles, indicating a clean surface. The surface must be wiped dry rather than the solvent or alcohol being allowed to evaporate.

NOTE

Do not touch the electrical bonding surface with bare hands. Body oils or acids may initiate corrosion and deteriorate the electrical bond.

d. Install the component or structure being electrically bonded.

e. Refer to ELECTRICAL BOND RESISTANCE CHECK in this chapter, and perform a resistance check across the electrical bond.

f. After a good electrical bond has been verified with the resistance check procedures, seal around the edges of the electrical bond with sealer (3, Chart 2, 20-00-00). If the assembly was originally protected by primer, reprime the assembly with primer (9, Chart 2, 20-00-00) and reapply the original finish as required.

NOTE

The electrical bond area must be refinished within 24 hours of electrical bonding to preserve the integrity of the electrical bond. If the electrical bond involves a structural part, it must be fillet-sealed at the edges or seams with sealer (5, Chart 2, 20-00-00) to prevent moisture from entering and deteriorating the electrical bonding surfaces. Refer to Chapter 20-00-08 for detailed information on airplane finishes.

ELECTRICAL BONDING EXAMPLES
(Effectivity: All)

TYPICAL BLIND GROUND STUD (Effectivity: All)
(Figure 2)

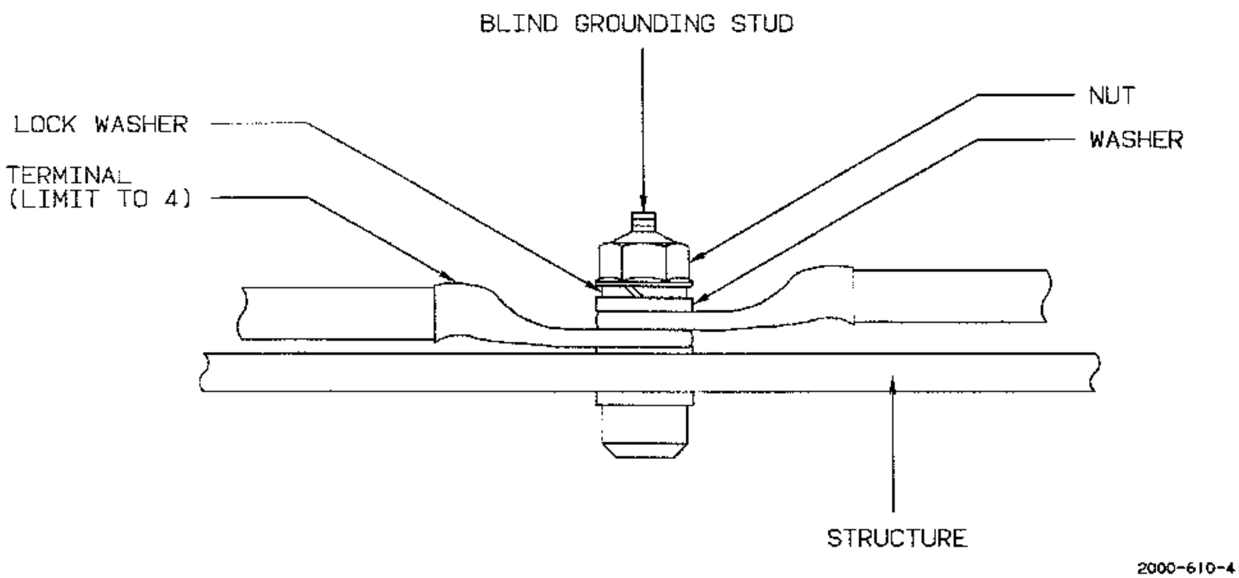
Installation of a typical blind ground stud may be accomplished as follows:

NOTE

MS35338 lock washers of the proper size shall be used on all bolted electrical bonding/grounding connections. Their function is to ensure a tight connection with plain or self-locking nuts under conditions where thermal expansion of the bolt may occur.

a. The sidewalls of the mounting hole must be clean and free of all chemical films, grease and paint (cleaning of the upper and lower surfaces is not required).

b. Ensure the blind ground stud is the same size as the one it replaces to allow proper distribution of the current it will be subjected to.



Typical Blind Ground Stud (Effectivity: All)
Figure 2

CRES STEEL OR TITANIUM ELECTRICAL BONDING (Effectivity: All)
(Figure 3)

Electrical bonding of CRES steel or Titanium may be accomplished as follows:

a. Prepare the electrical bonding surfaces as outlined under METAL SURFACE PREPARATION AND ELECTRICAL BONDING in this chapter.

b. Bolt size: Use a No. 10 screw where edge distance will permit. A No. 8 or No. 6 may be substituted for the No. 10 if necessary to meet edge distance requirements.

c. Use the same size fastener as the one being replaced to allow proper distribution of the current it will be subjected to.

d. An MS35206 cad-plated steel screw of the proper size is used for applications below 330° F.

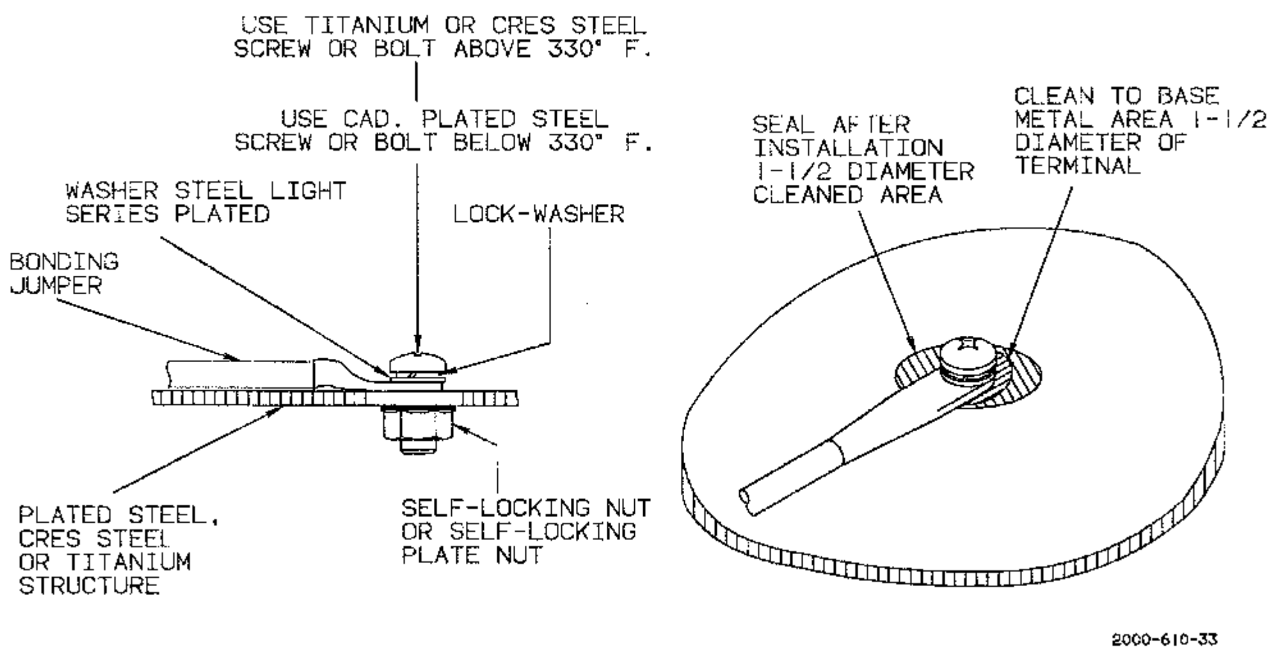
e. An MS35206 CRES steel or titanium screw of the proper size is used for applications above 330° F.

NOTE

MS35338 lock washers of the proper size shall be used on all bolted electrical bonding/grounding connections. Their function is to ensure a tight connection with plain or self-locking nuts under conditions where thermal expansion of the bolt may occur.

f. An MS21042L self-locking nut, or an MS21047L or MS21069L self-locking nutplate of the proper size should be used to retain the screw.

g. No sealing is required where the maximum temperature exceeds 600° F.



CRES Steel or Titanium Electrical Bonding (Effectivity: All)
Figure 3

ALUMINUM ELECTRICAL BONDING
(Effectivity: All)
(Figure 4)

Electrical bonding of aluminum may be accomplished as follows:

a. Prepare the electrical bonding surfaces as outlined under METAL SURFACE PREPARATION AND ELECTRICAL BONDING in this chapter.

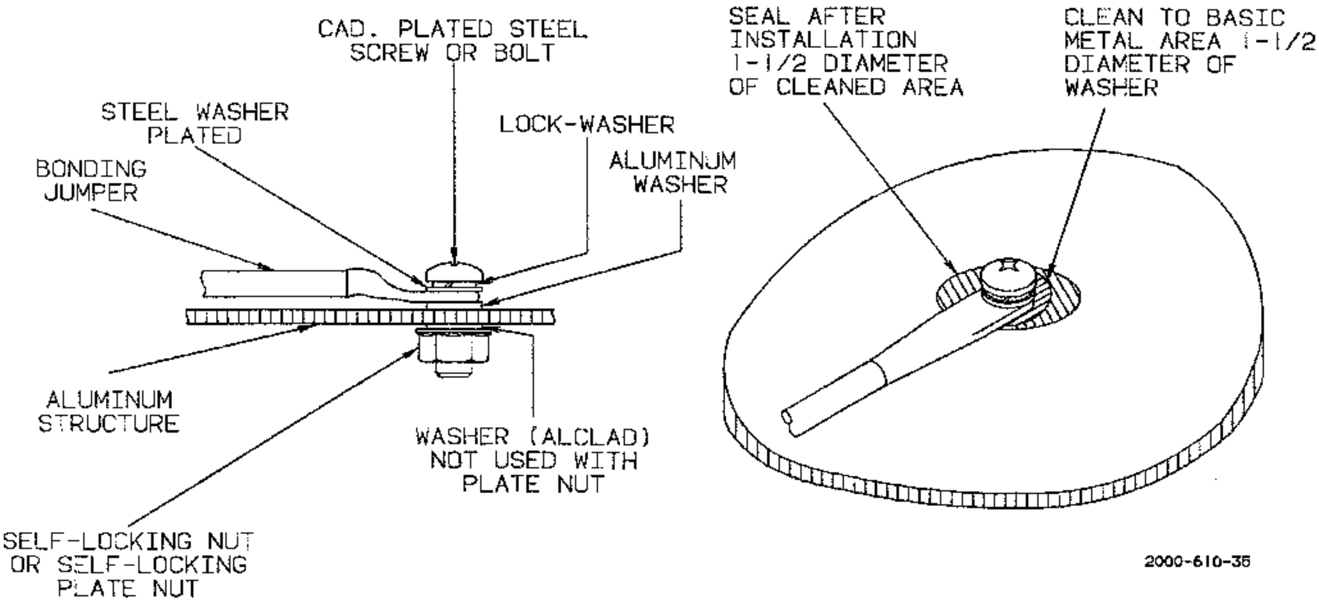
b. Bolt size: Use a No. 10 screw where edge distance will permit. A No. 8 or No. 6 may be substituted for the No. 10 if necessary to meet edge distance requirements.

c. Use the same size fastener as the one being replaced to allow proper distribution of the current it will be subjected to.

NOTE

MS35338 lock washers of the proper size shall be used on all bolted electrical bonding/grounding connections. Their function is to ensure a tight connection with plain or self-locking nuts under conditions where thermal expansion of the bolt may occur.

d. An MS21042L self-locking nut, or an MS21047L or MS21069L self-locking nutplate of the proper size should be used to retain the screw.



Aluminum Electrical Bonding (Effectivity: All)
Figure 4

TUBING CLAMP-TO-BONDING JUMPER ELECTRICAL BONDING (Effectivity: All) (Figure 5)

Electrical bonding of tubing clamps using bonding jumpers may be accomplished as follows:

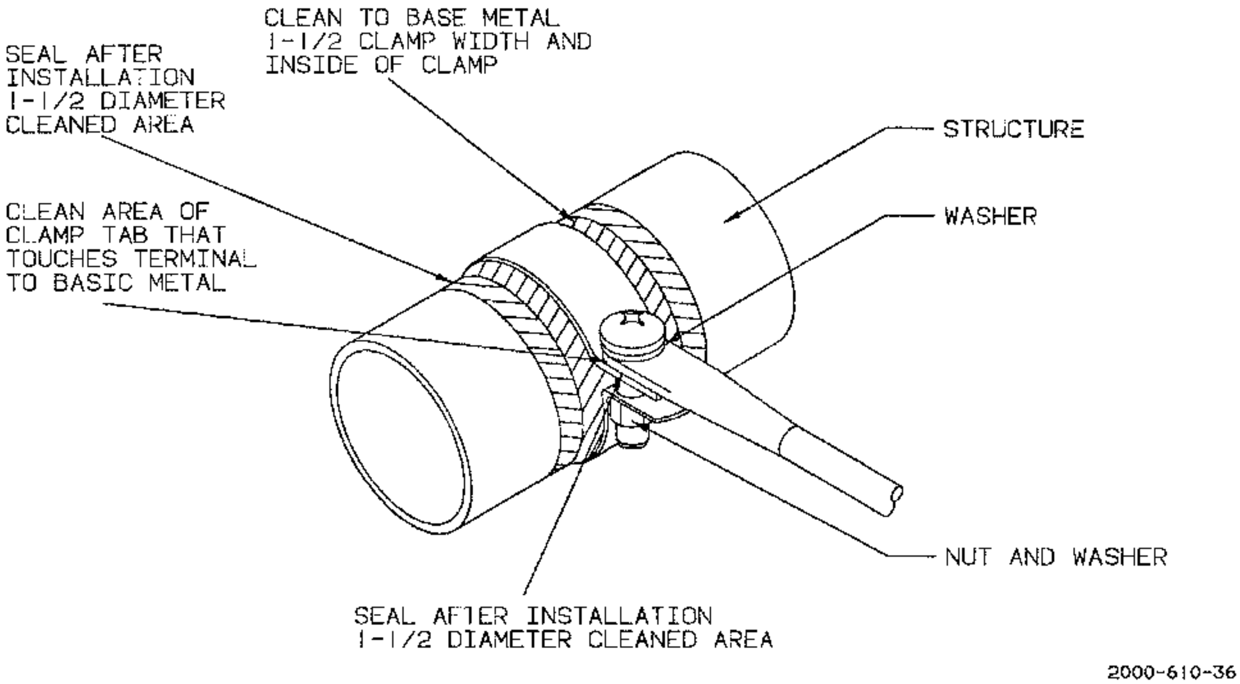
a. Prepare the electrical bonding surfaces as outlined under METAL SURFACE PREPARATION AND ELECTRICAL BONDING in this chapter.

b. An MS35206 cad-plated steel screw of the proper size is used below 330° F.

c. An MS35206 CRES steel screw of the proper size is used above 330° F.

d. The bonding jumper shown is not necessary if the clamp is grounded to the ground plane.

e. Clamps of the same material as the tubing should be used to avoid dissimilar metal contact which causes corrosion.



Tubing Clamp-to-Bonding Jumper Electrical Bonding (Effectivity: All)
Figure 5

BONDING JUMPER-ACROSS-TUBING CLAMP ELECTRICAL BONDING (Effectivity: All) (Figure 6)

Electrical bonding of tubing segments using bonding jumpers across clamps is accomplished as follows:

a. Prepare the electrical bonding surfaces as outlined under METAL SURFACE PREPARATION AND ELECTRICAL BONDING in this chapter.

b. An MS35206 cad-plated steel screw of the proper size is used below 330° F.

c. An MS35206 CRES steel screw of the proper size is used above 330° F.

d. An AN960 cad-plated washer of the proper size is installed under the screw or bolt head and nut.

e. An MS21042L self-locking, cad-plated steel nuts of the proper size are used.

ELECTRICAL BONDING OF ADHESIVE-ISOLATED PANELS (Effectivity: All) (Figure 7)

Electrical bonding of adhesive-isolated panels and installation of current-carrying fasteners is accomplished as follows:

a. Electrically bond assemblies isolated by non-conductive surfaces to conductive surfaces by using rivets or steel screws.

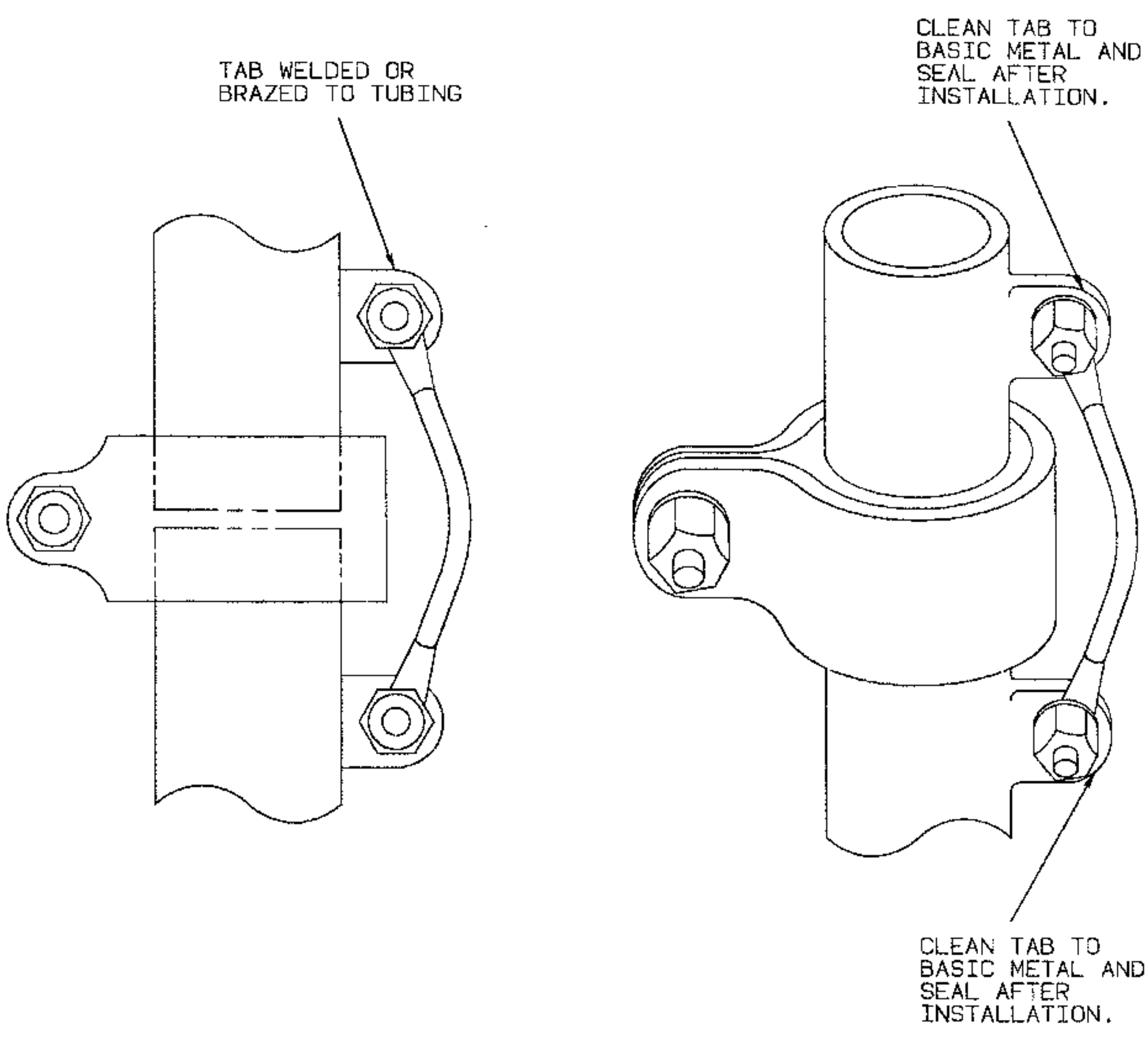
b. Use at least three fasteners for each connection.

c. Fasteners should be compatible with the composite installation.

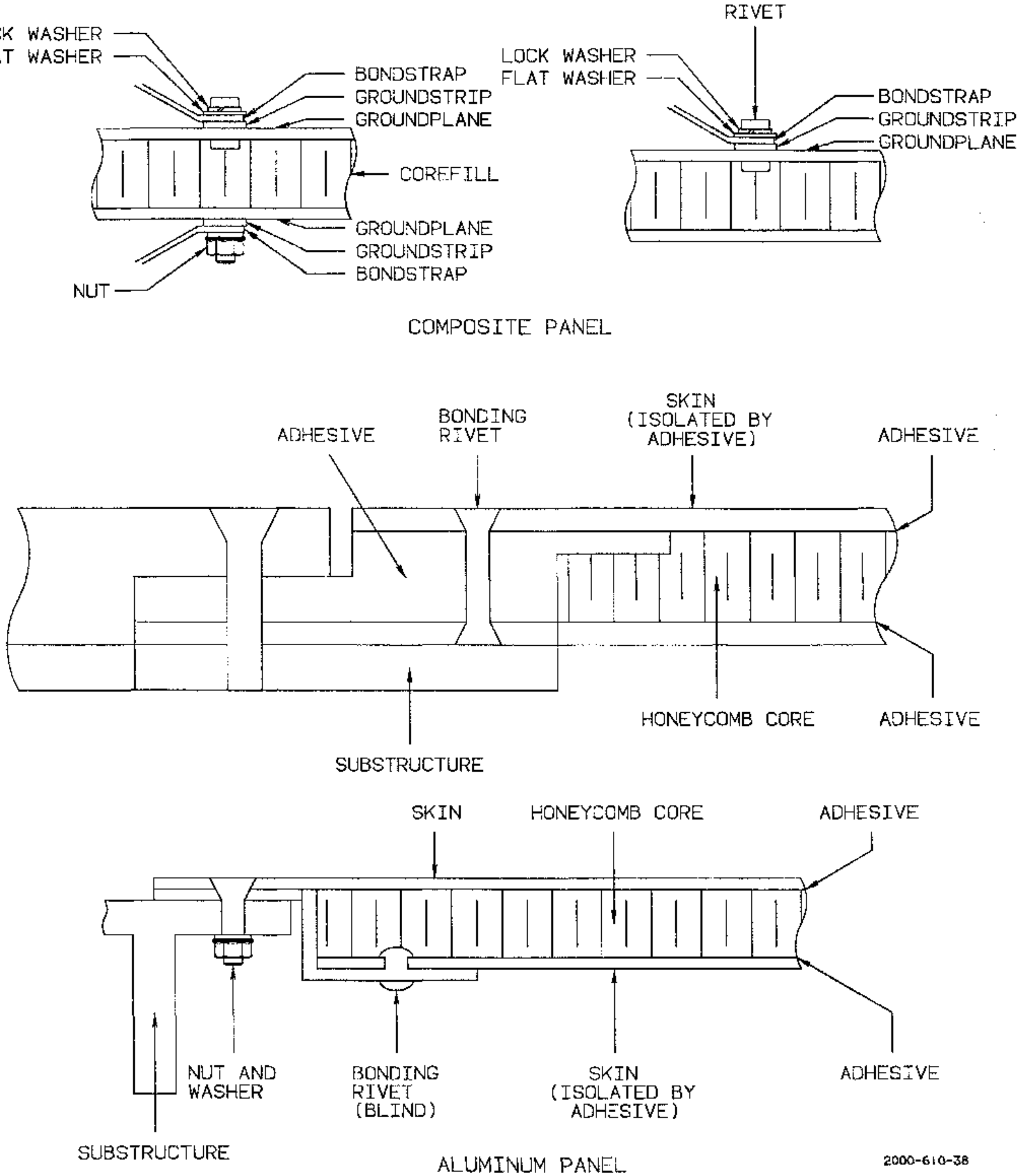
d. All fasteners should be installed after the adhesives have cured.

NOTE

Fasteners responsible for carrying current shall not be installed wet. After fastener installation the fastener shall be sealed by brushing sealer (5, Chart 2, 20-00-00) on the head of the fastener for pressure seals, or apply sealer (3, Chart 2, 20-00-00) for moisture seals.



Bonding Jumper-Across-Tubing Clamp Electrical Bonding (Effectivity: All)
Figure 6



Electrical Bonding of Adhesive-Isolated Panels (Effectivity: All)
Figure 7

TYPICAL GROUND STUD ELECTRICAL BONDING (Effectivity: All) (Figure 8)

Electrical bonding of ground studs for current returns may be accomplished as follows:

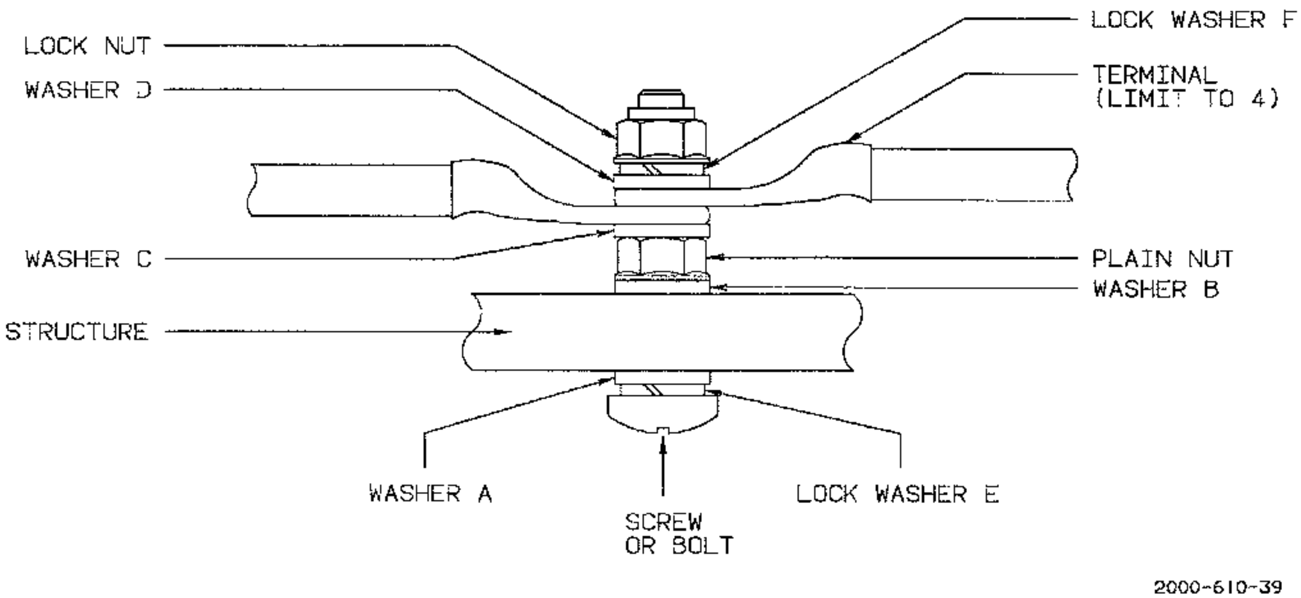
a. Bolt size: Use a No. 10 screw where edge distance will permit. A No. 8 or No. 6 may be substituted for the No. 10 if necessary to meet edge distance requirements.

b. Use the same size fastener as the one being replaced to allow proper distribution of the current it will be subjected to.

NOTE

MS35338 lock washers of the proper size shall be used on all bolted electrical bonding/grounding connections. Their function is to ensure a tight connection with plain or self-locking nuts under conditions where thermal expansion of the bolt may occur.

c. Refer to Chart 1 for a listing of compatible hardware used with grounding studs.



Typical Ground Stud Electrical Bonding (Effectivity: All)
Figure 8

CHART 1
HARDWARE USED WITH GROUND STUD
(TINNED COPPER TERMINAL AND JUMPER)
(Effectivity: All)

Structure	Screw, bolt Locknut	Plain nut	Washer A	Washer B	Washer C & D	Lock Washer E MS35338	Lock Washer F MS35338
Aluminum Alloys	Cad. Plated Steel	Cad Plated Steel	Alum. Alloy	Alum. Alloy	Cad Plated Steel	Cad Plated Steel	Cad. Plated Steel
Steel Cadmium Plated	Cad. Plated Steel	Cad. Plated Steel	None	None	Cad. Plated Steel	Cad. Plated Steel	Cad. Plated Steel
Steel, CRES (Corrosion Resistant)	CRES Steel	CRES Steel	None	None	Cad. Plated Steel	Cad. Plated Steel	CRES Steel

NOTE 1: Magnesium Alloys - Avoid Connecting Copper to Magnesium

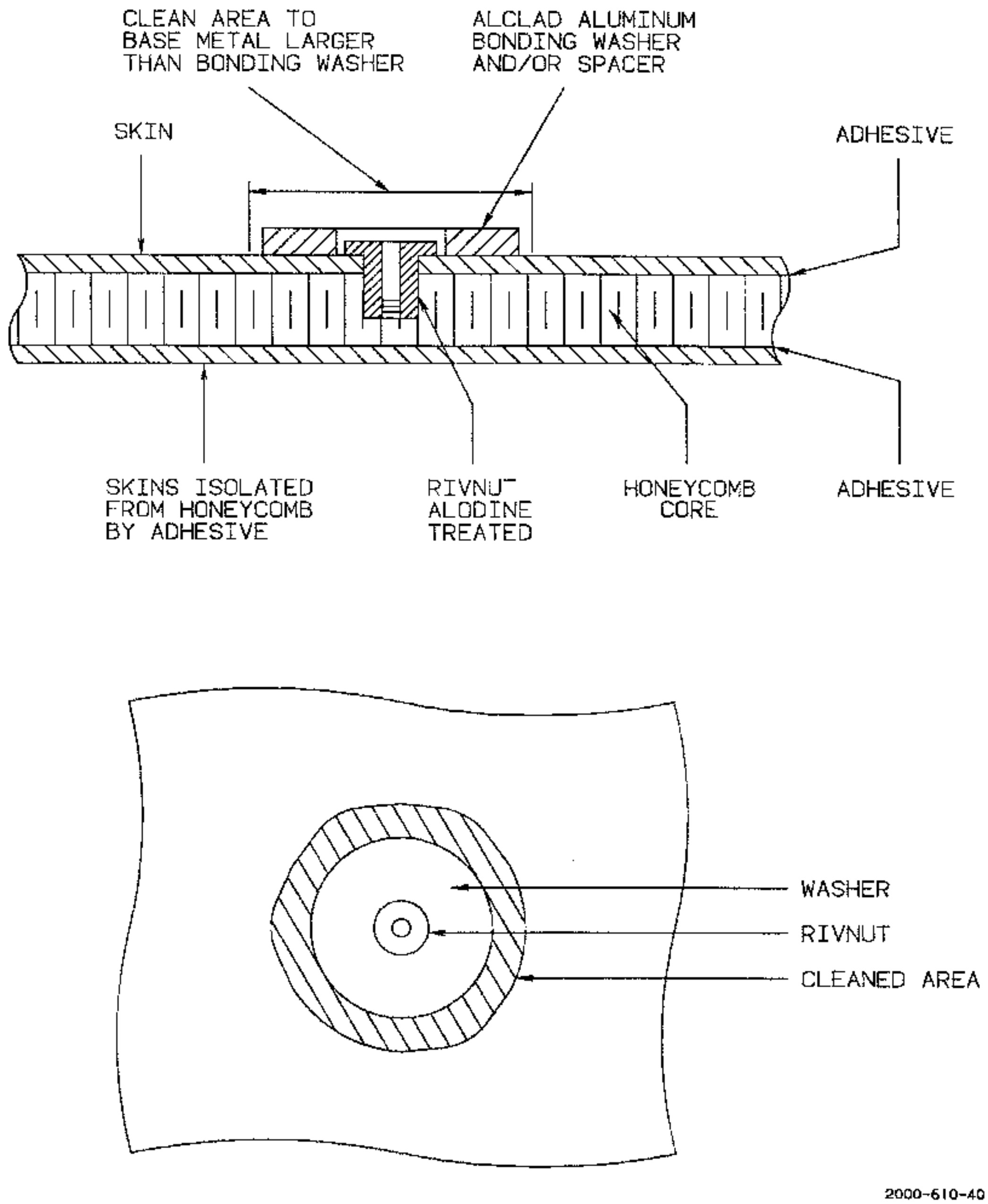
TYPICAL CURRENT RETURN ELECTRICAL BOND USING A RIVNUT (Effectivity: All)
(Figure 9)

Typical current return electrical bonding using rivnuts is accomplished as follows:

a. Prepare the electrical bonding surfaces as outlined under METAL SURFACE PREPARATION AND ELECTRICAL BONDING in this chapter.

b. Bolt size: Use a No. 10 screw where edge distance will permit. A No. 8 or No. 6 may be substituted for the No. 10 if necessary to meet edge distance requirements.

c. Use the same size fastener as the one being replaced to allow proper distribution of the current it will be subjected to.



Typical Current-Return Electrical Bond Using A Rivnut (Effectivity: All)
Figure 9

ELECTRICAL BONDING OF GROUND TABS
(Effectivity: All)
(Figure 10)

Electrical bonding of ground tabs may be accomplished as follows:

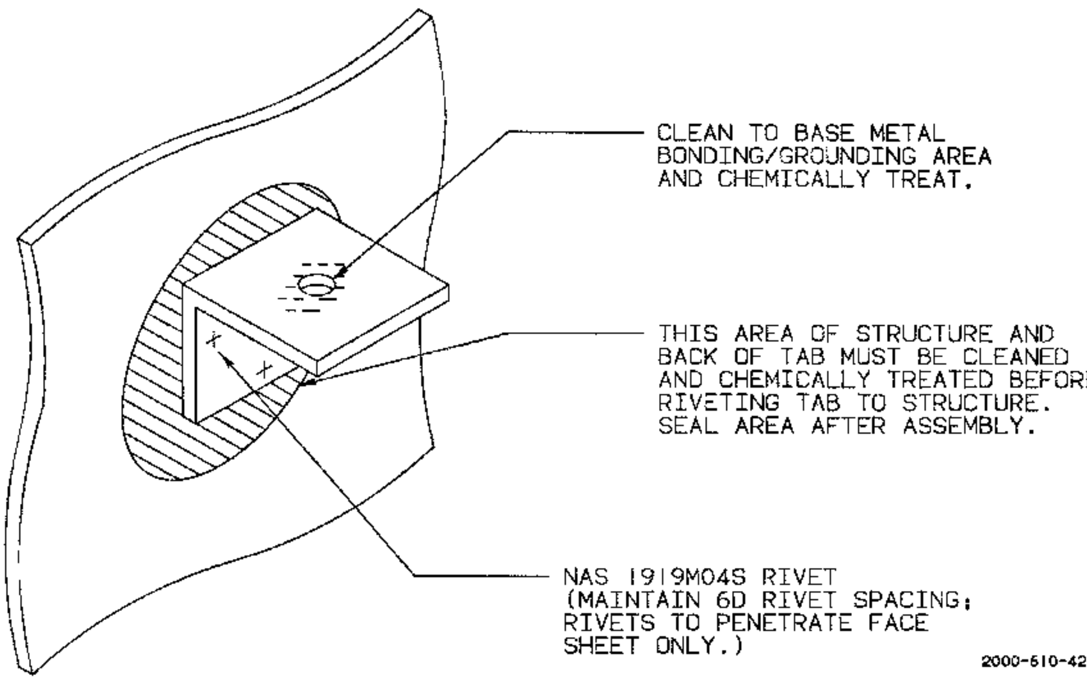
a. NAS1919M04S rivets of the proper size should be used to attach the ground tab.

b. Prepare the electrical bonding surfaces as outlined under METAL SURFACE PREPARATION AND ELECTRICAL BONDING in this chapter.

c. A minimum of three rivets must be used to attach the ground tab.

NOTE

If it is necessary to remove the tab for any reason, the surface must be recleaned to remove all films.



Electrical Bonding of Ground Tabs (Effectivity: All)
Figure 10

ELECTRICAL BONDING OF EQUIPMENT INSTALLED WITH MOUNTING FEET (Effectivity: All) (Figure 11)

NOTE

If the item is secured with bolts or screws more than 6 inches apart, it is only necessary to clean an area 2 inches on each side of the attaching hardware.

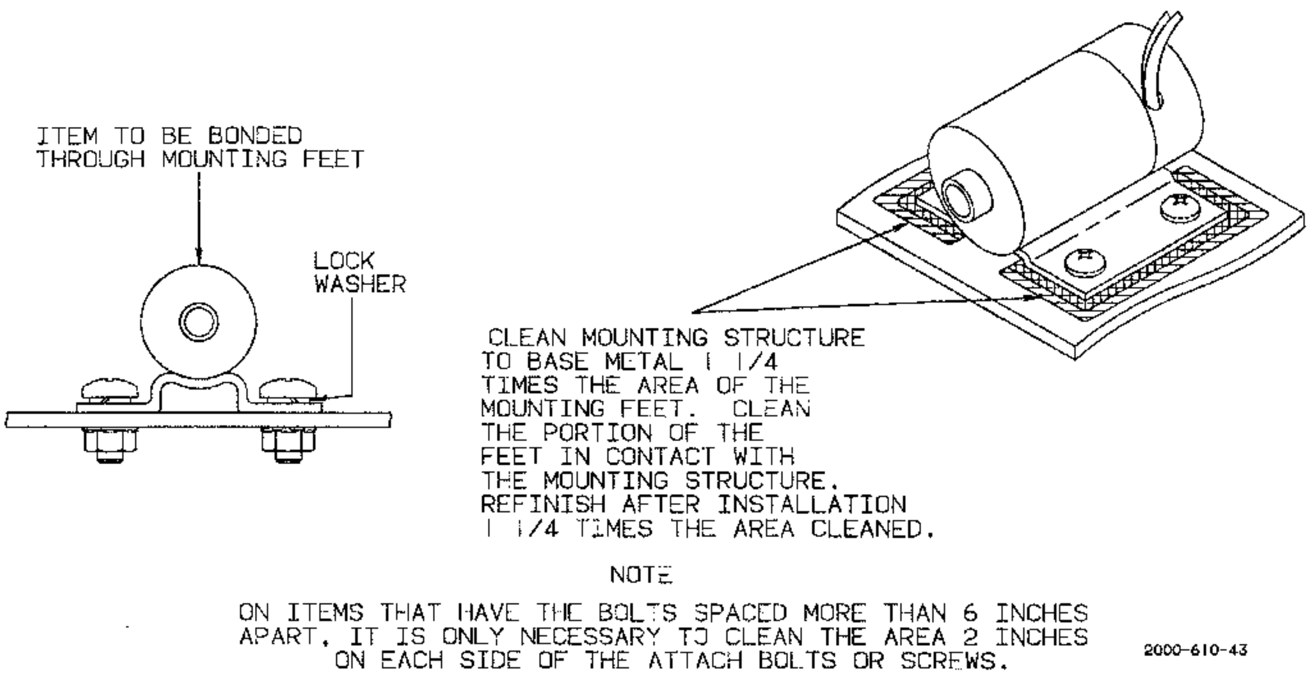
a. Clean the structure where the item will be mounted down to the base metal. The area cleaned should be 1 1/4 times the area of the mounting feet.

b. Clean the portion of the mounting feet that will be in contact with the structure.

c. Install the item.

d. Check the electrical bond.

e. Refinish the installation to an area 1 1/4 times the area cleaned.



Electrical Bonding of Equipment Installed With Mounting Feet (Effectivity: All)
Figure 11

ELECTRICAL BONDING OF EQUIPMENT INSTALLED WITH SHOCK MOUNTS (Effectivity: All) (Figure 12)

NOTE

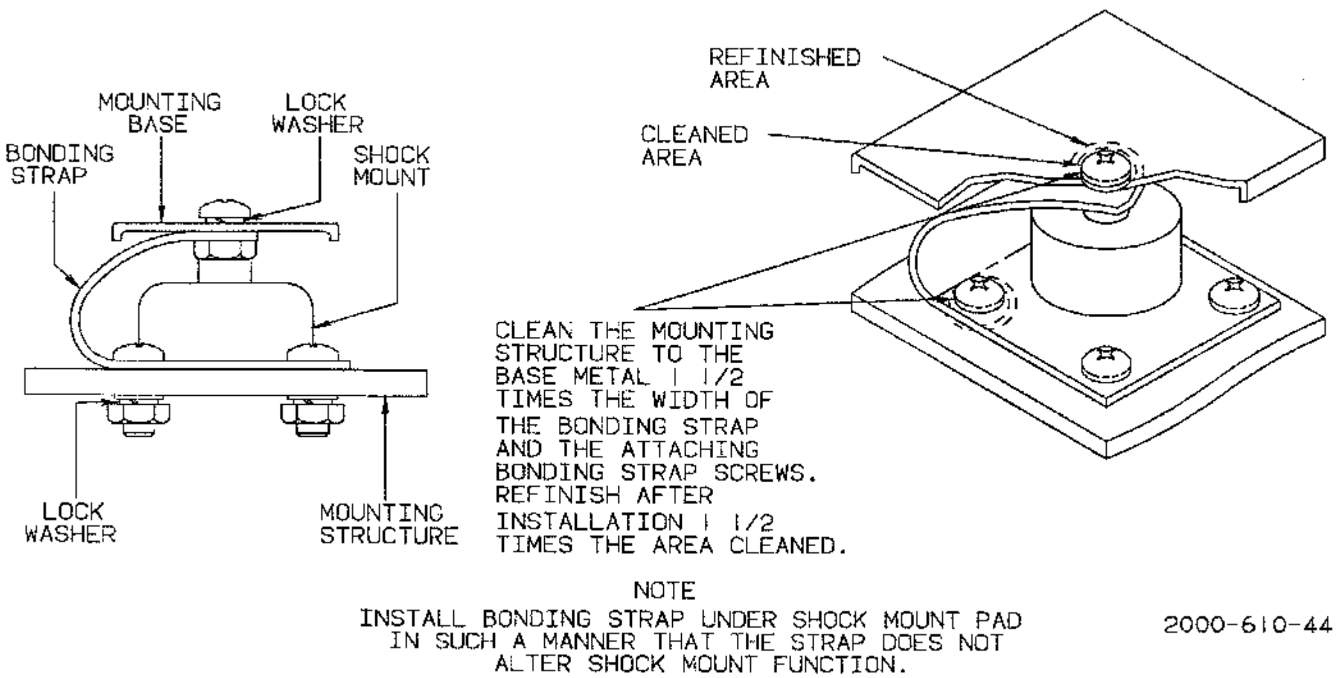
Install the bonding strap under the shock mount pad in such a manner that the strap does not alter the function of the shock mount.

a. Clean the structure where the item will be mounted down to the base metal. The area cleaned should be 1 1/2 times the area of the bonding strap and the attaching screws.

b. Install the item.

c. Check the electrical bond.

d. Refinish the installation to an area 1 1/2 times the area cleaned.



Electrical Bonding of Equipment Installed With Shock Mounts (Effectivity: All)
Figure 12

GROUND-PLANE ELECTRICAL-BOND VISUAL INSPECTION FOR CORROSION (Effectivity: All)

NOTE

This inspection should be performed in accordance with the interval specified in Chapter 5 or when signs of corrosion are evident.

a. Refer to Chapter 53 and remove all access panels and doors restricting view of the ground plane electrical bonds.

b. Refer to Chapter 71-10-00 and remove the engine cowling.

c. With an inspection mirror and flashlight, inspect all electrical bonds for evidence of corrosion.

d. Disassemble any electrical bonds that show evidence of corrosion.

e. Perform all necessary cleaning and electrical bonding as outlined under METAL SURFACE PREPARATION AND ELECTRICAL BONDING in this chapter.

f. Refer to Chapter 53 and install the access panels and doors.

g. Refer to Chapter 71-10-00 and install the engine cowling.

POST-LIGHTNING-ATTACHMENT GROUND-PLANE INSPECTION (Effectivity: All)

NOTE

Each item in this inspection should be performed after a lightning attachment as specified by Airworthiness Limitations in Chapter 4.

a. Visually inspect the ground plane for evidence of arcing or other damage along the lightning conduction path through the ground plane.

NOTE

If arcing or other damage is evident, determine any ground-plane components that require replacement, and perform surface preparation, installation and resistance check procedures as outlined in this chapter. Minor arcing may only require a resistance check of the affected electrical bonds to determine if any conductivity loss has occurred.

b. Perform CIRCUIT BREAKER OPERATIONAL CHECK, TRANSIENT-SUPPRESSION-DEVICE FUNCTIONAL CHECKS and a GROUND PLANE ELECTRICAL BOND CHECK as outlined in this chapter to determine any adverse affect on the the protection devices and ground plane from lightning transients.

CIRCUIT BREAKER OPERATIONAL CHECK (Effectivity: All)

This check may be performed without removing the circuit breakers from the airplane, but every circuit breaker on the airplane must be checked.

NOTE

Identify the circuit breakers that have been tripped. A tripped circuit breaker is an indication that an overcurrent was present, and may help isolate damaged transient suppression devices.

a. Refer to Chapter 24-40-00 and connect external power to the airplane. All buses must be powered.

b. Ensure that the circuit breaker is closed.

c. Operate the equipment powered through the circuit breaker. The circuit breaker should provide sufficient current flow to operate the component or system.

d. Pull the circuit breaker. Electrical power should be removed from the component or system of the circuit breaker being tested.

e. Close the circuit breaker. Electrical power should be restored and the component or system should be operational.

f. Refer to Chapter 24-50-00 and replace any circuit breakers that do not pass the operational test.

g. Repeat steps b thru f for the remaining circuit breakers.

TRANSIENT-SUPPRESSION-DEVICE FUNCTIONAL CHECK (Effectivity: All)

Transorbs and Metal Oxide Varistors (MOV) are the two main types of transient suppression devices installed on electrical panels throughout the airplane. Both types of devices operate in much the same way by shunting a current path to the ground plane when voltage exceeds a preset threshold specific to the individual suppression device. It should be noted that these transient suppression devices tend to short circuit as they initially clamp the transient voltage, then fail open or experience an open at an internal solder point if the threshold is continually exceeded. Devices in series with a circuit breaker are protected when the circuit breaker trips, providing the circuit breaker rating is less than the amount of current required to fail the transorb or MOV on its power bus. Refer to the BEECHCRAFT STARSHIP 1 Wiring Diagram Manual to identify the transient suppression devices by designator and to Chapter 39 to approximate their individual locations. The MOV's located on printed circuit boards do not require testing after lightning strikes and so should not be removed. All other MOV's may be removed for functional testing.

NOTE

It is acceptable to disconnect the MOV's for testing by unsoldering both leads. This allows testing without removal of the device. Certain MOV's may still have to be removed for functional testing due to the nature of the installation. Any MOV's installed on the Collins avionics equipment assemblies must be removed and installed according to procedures obtained from an authorized Collins Avionics Service Center.

TRANSORBS (Effectivity: All)

Many times a damaged transorb may be isolated by locating a tripped circuit breaker and tracing the wiring to the damaged transorb. Refer to the BEECHCRAFT Starship 1 Wiring Diagram Manual to identify which transorbs are protected by circuit breakers. Another method of identifying failed transorbs is to visually inspect them for signs of heat damage. Transorbs that show signs of heat damage should be replaced. If the transorb is mounted on a printed circuit board, refer to Chapter 39 to remove or install the affected printed circuit board.

METAL OXIDE VARISTORS (Effectivity: All)
(Figure 13)

a. The following items are needed to perform a functional check of the Metal Oxide Varistors (MOV):

1. Hewlett Packard 6209B, 0-300 vdc power supply or equivalent.

2. Fluke 8060A multimeter or equivalent (2 ea.).

3. MOV test tool TK-2209/935 or fabricate per Figure 13 in this chapter.

b. Remove all electrical power from the airplane.

c. Refer to the BEECHCRAFT Starship 1 Wiring Diagram Manual to identify the MOV's being tested. Refer to Chapter 39 to approximate their locations.

d. Identify, tag and disconnect wiring at the MOV's.

e. Remove the MOV's from the airplane.

f. Connect the MOV and the test equipment to the MOV test box as shown on the test set-up schematic in Figure 13.

g. Set the power supply output control to the minimum setting and turn the power supply on.

NOTE

The test set power on indicator is not required during the test and is not required to be operative. The indicator is not required on user-fabricated test sets.

h. Set the power switch on the test set to ON.

i. Increase output from the power supply until 1 volt is read at DVM-1. At this time .001 amp is being applied to the circuit.

j. Immediately record the reading on DVM-2.

k. Reduce the power supply output to zero vdc and turn the power supply off. Set the test box power switch to OFF. Disconnect the MOV from the test box.

l. The reading recorded on DVM-2 will vary with respect to the size and rating of the MOV being checked. Reference the following to determine the proper voltage readings for each type of MOV being tested:

1. General Electric MOV's with part number V47ZA1 shall have a reading between 42 and 52 vdc.

2. General Electric MOV's with part number V130LA10A shall have a reading between 232 and 254 vdc.

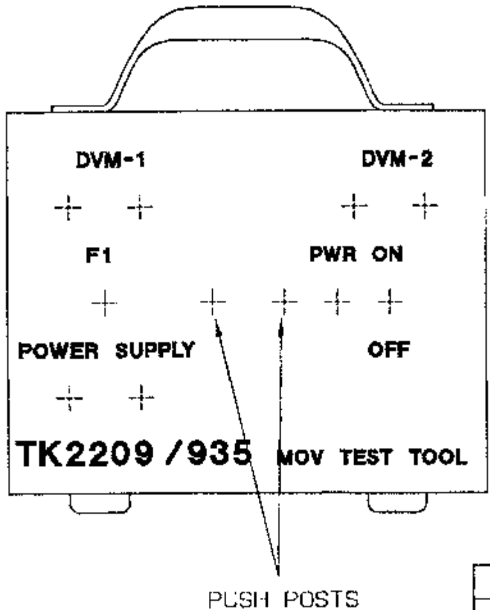
3. Lightning Diversion Systems MOV's with part number 50-50-20-1 shall have a reading between 62 and 82 vdc.

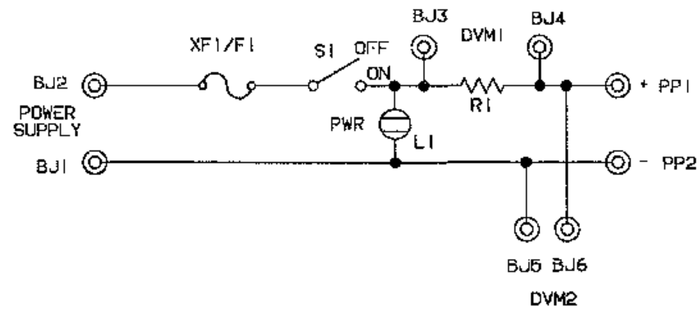
4. General Semiconductor MOV's with part number 75001A shall be tested with .01 amp applied to the circuit and shall have a reading between 36.9 and 37.4 vdc.

m. Discard any MOV's that do not pass the functional test.

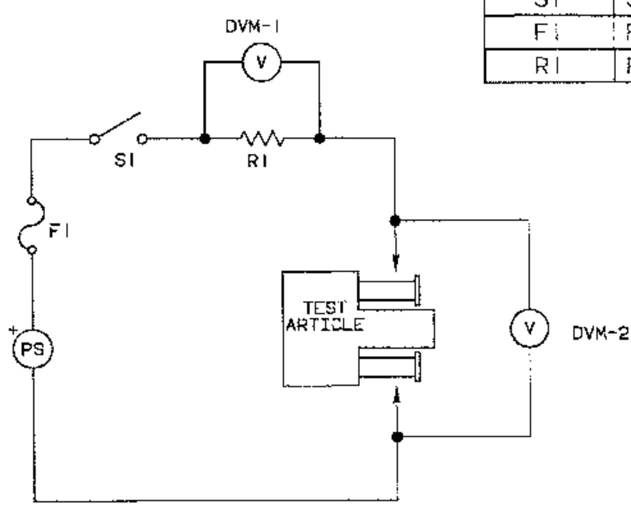
CAUTION

All MOV's must meet electrical bonding requirements as specified in this chapter.





PP2	PUSH POST - BLACK H.H. SMITH #2809-103
L1	LAMP - SHELLEY #BEP-WA07-RBP (RED)
XF1	FUSE HOLDER - BUSS - #HKP
	BUD BOX - 5"X4"X3" #CU-2105B
BJ5,BJ6	BANANA JACK - ORANGE E.F. JOHNSON #111-106
BJ3,BJ4	BANANA JACK - YELLOW E.F. JOHNSON #111-107
BJ2	BANANA JACK - RED E.F. JOHNSON #111-102
BJ1	BANANA JACK - BLACK E.F. JOHNSON #111-103
PP1	PUSH POST - RED H.H. SMITH #2809-102
S1	SWITCH - MFT106D
F1	FUSE - BUSS 1/8 AMP .0625 AGC
R1	RESISTOR - 1000Ω RCR20G1001JS



TEST SET-UP

USE #22 A.W.G. STRANDED, INSULATED WIRE FOR ALL HOOKUP.

SUBSTITUTION OF PARTS & MATERIAL TO BE FUNCTIONALLY AND (WHERE NECESSARY) PHYSICALLY INTERCHANGEABLE.

NOTE: SCHEMATIC FOR REFERENCE ONLY

C94NC20B0522

Metal Oxide Varistor Functional Test Circuit Schematic (Effectivity: All)
Figure 13

n. Reinstall the MOV's and connect the wiring.

o. Restore electrical power to the airplane.

ELECTRICAL BOND RESISTANCE CHECK (Effectivity: All)

As a general rule, all electrical bonds with a maximum acceptable resistance value of 1.0 ohm or greater may be checked with a Fluke 77 multimeter or equivalent. These electrically bonded items include plumbing, metal ductwork and flight control surfaces. Where very small conductors and/or joints are involved for resistance values between 0.2 and 1.0 ohm, an HP bonding meter may be used instead of the Biddle low-resistance ohmmeter. If the HP bonding meter is not available, an ordinary ohmmeter accurate within 0.05 ohm should be used, providing current flow is under 0.2 amp and the measurement points are within 5 feet of each other. Use the Biddle low-resistance ohmmeter for measuring electrical bonds with a maximum allowable resistance under 0.2 ohms. If a Biddle is not available, any Kelvin-Bridge-type meter limited to 15 amps maximum output current and accurate within 0.0001 ohm may be used in its place. Electrical bonds checked with this type meter normally include antennas, ground plane joints, and some electrical components bonded to shelving or panels.

WARNING

Never perform electrical bond resistance checks on the fuel system plumbing unless the system is completely free of all fuel and fuel vapors. Ignition of fuel vapors from sparks caused by arcing across the plumbing joints may otherwise result.

CAUTION

Avoid using the Kelvin Bridge method of measuring resistance for "black boxes" containing sensitive electronic circuits. The current used to check resistance of the electrical bond may cause internal damage to the component.

NOTE

Antennas must be periodically removed from the airplane and treated for corrosion before they are rebonded and resistance checked. Resistance of antenna electrical bonds shall be measured from the metal base or antenna connector to the ground plane. Inspection intervals are specified in Chapter 5.

Perform the electrical bond resistance check as follows:

a. Remove all electrical power from the airplane when making resistance checks around electrical equipment.

NOTE

Reference Chart 2 to determine the type of resistance check being made, the test lead placement for that resistance check, and the maximum allowable resistance for that particular electrical bond.

b. Select the appropriate ohmmeter for the resistance check being performed.

c. Connect the test leads to the ohmmeter and turn it on.

d. Select the desired range.

e. Firmly place the test leads on either side of the electrical bond (as specified in Chart 2) and record the meter reading.

f. Refer to METAL SURFACE PREPARATION AND ELECTRICAL BONDING in this chapter and electrically rebond any substandard electrical bond.

g. Perform the resistance check again to verify conductivity of the electrical bond.

h. Turn off the ohmmeter and disconnect the test leads.

i. Restore electrical power to the airplane.

NOTE

A record of all resistance measurements made on the ground plane should be kept with the maintenance records for future reference.

CHART 2
DIRECT CURRENT RESISTANCE LIMITS FOR ELECTRICAL BONDING
(Effectivity: All)

Component	Recommended Maximum Value in Ohms	Reference Point
Support bracket and electrical/electronic cabinets(GP, S)	0.005	AGP
Access or inspection doors (S)	5	AS
Control surfaces (Electrically Bonded (S)	5	AS
Fuel, oil, hydraulic, brake and air lines and fittings (metallic) (S)	5	AS
Bearings (roller and ball) (S)	5	AS
Static dischargers - Base to central point (S)	20	CGP
Flight control cables (S)	5	AS
Filters (RFI) (EG)	0.005	CGP
Conductive composite tanks with fuel filler prov. (no electrical provision)	1000	CGP
Metallic tanks containing no flammable material	10	AS
Other electrical devices attached to enclosures (EG)	0.005	AJ
Metal-cased switches, circuit breakers and potentiometers in circuits exceeding 50 v (EG)	0.005	CGP
Metal Instrument panels with rotating or vibrating electrical equipment (GP, EG)	0.005	CGP
Radiators:and heat exchangers(S)	5	AS
Metal ducts(nonelectrical: rigid and flexible (S)	5	AS
Engine supports(S)	5	AS
Antennas (grounded type) (EG)	0.1	AGP
Structural joints or breaks in metallic structure (S, GP)	0.05	AJ
Equipment enclosures (Metallic)		
(a) Cabinet seams	0.0025	AJ
(b) Drawers	0.0025	AS
(c) Panels	0.0025	AJ
(d) Access doors (GP, EG, S)	0.01	AJ
Any single metal-to-metal joint which is part of the airplane ground plane system (GP)		

REFERENCE POINT CODE

CGP = Central ground point

AGP = Adjacent ground plane

AJ = Across joint

AS = Adjacent structure

PURPOSE NOTATION CODE

GP = Ground plane

EG = Electrical ground

S = Static charge

Most critical resistance requirements listed first inside parenthesis in component column.

GROUND-PLANE ELECTRICAL BOND CHECK (EFFECTIVITY: ALL) (FIGURES 14 THRU 26)

NOTE

The kelvin-bridge method of measuring resistance is used for this check. A certified Biddle low-resistance ohmmeter (TK-2146) is preferred for all resistance checks involving the 11 test points in this procedure.

a. Attach an electrical bonding clamp to the end of one of the test leads of the ohmmeter.

b. Remove all electrical power from the airplane.

c. Unlatch and open the protective cover on the Biddle ohmmeter to expose the meter face.

NOTE

The Biddle ohmmeter internal power supply should be sufficiently charged to perform the required test. An inadequately charged power supply may affect the accuracy of resistance readings. The BATTERY LOW LED illuminates to indicate when the internal power supply requires charging.

d. Align the test lead connector keyway with the receptacle placarded TEST LEADS on the face of the ohmmeter and connect the test leads.

e. Select the display range by rotating the RANGE knob to the 20-milliohm position.

f. Place the READ switch in the CONT position to select the continuous reading mode.

g. Place the ON-OFF switch in the ON position.

NOTE

It is normal for the Biddle ohmmeter to sporadically display numbers when the test leads are not in firm contact with the structure being checked.

CAUTION

The test leads must have excellent contact with the test points to minimize any added resistance, but care must be used to prevent damage to braiding or component surfaces.

h. Identify the eleven test points listed in Chart 3.

NOTE

The test points and the maximum resistance measurements for all of the ground plane are listed in the table in Figure 14. The table is arranged for convenience, if followed from the top down. The top two rows in the table show that the test lead with the bonding clamp is attached to test point 2, while resistance is measured first between points 1 and 2, then between points 2 and 3. This pattern is followed throughout the resistance tests.

i. Make a copy of the blank table in Figure 15 and enter the resistance measurements in the "Reading" column. Start at the top of the table and proceed as indicated. Allow the resistance reading to stabilize within ±.03 milliohms.

NOTE

Ensure that the bonding clamp is securely attached to it's test point. Position the test lead with the pin at the applicable test point and press down until the spring-loaded pin recesses in the handle.

j. If the test results indicate an area of high resistance (as compared to the values specified in Figure 14), isolate any areas of high resistance using guidelines specified under ELECTRICAL BOND RESISTANCE CHECK in this chapter. Follow METAL SURFACE PREPARATION AND ELECTRICAL BONDING procedures outlined in this chapter as needed to restore ground plane integrity.

k. Place the Biddle ohmmeter ON-OFF switch in the OFF position.

l. Disconnect the TEST LEADS wire harness connector.

m. Charge the Biddle ohmmeter if required.

n. Restore electrical power to the airplane.

NOTE

A record of all resistance measurements made on the ground plane should be kept with the maintenance records for future reference.

CHART 3
GROUND PLANE ELECTRICAL BOND CHECK TEST POINTS (EFFECTIVITY: ALL)

1. Radar nose attach bracket at F.S. 18 bulkhead. (Figure 16)
2. RH forward nose avionics compartment ground strip at F.S. 46 bulkhead. (Figure 17)
3. RH upper avionics shelf just forward of F.S. 95 bulkhead. (Figure 18)
4. Copilot's outboard subpanel sheet metal. (Figure 19)
5. Integrated avionics processing system (IAPS) bond plate at F.S. 163 bulkhead. (Figure 20)
6. Cockpit RH inboard seat track. (Figure 21)
7. Wire tray in the wing center section behind F.S. 357 bulkhead. (Figure 22)
8. Bond strip on F.S. 416 bulkhead in environmental area. (Figure 23)
9. Aft fuselage equipment shelf forward aluminum strip. (Figure 24)
10. Nacelle equipment shelf. (Figure 25)
11. Wire harness conduit at the wing tip. (Figure 26)

From Test Point	To Test Point	Maximum Reading	Clamp On Point
1	2	8.0	2
2	3	2.0	2
3	4	2.4	4
4	5	1.0	4
5	6	1.0	6
6	7	2.0	6
7	8	2.8	8
8	9	3.0	8
8	10 (L)	6.4	8
8	10 (R)	6.4	8
10	11 (L)	14.2	10
10	11 (R)	14.2	10

Maximum Allowable Resistance Between Test Points (Milliohms) (Effectivity: All)
Figure 14

From Test Point	To Test Point	Reading	Clamp On Point
1	2		2
2	3		2
3	4		4
4	5		4
5	6		6
6	7		6
7	8		8
8	9		8
8	10 (L)		8
8	10 (R)		8
10	11 (L)		10
10	11 (R)		10

Resistance Between Test Points (Milliohms) (Blank) (Effectivity: All)
Figure 15

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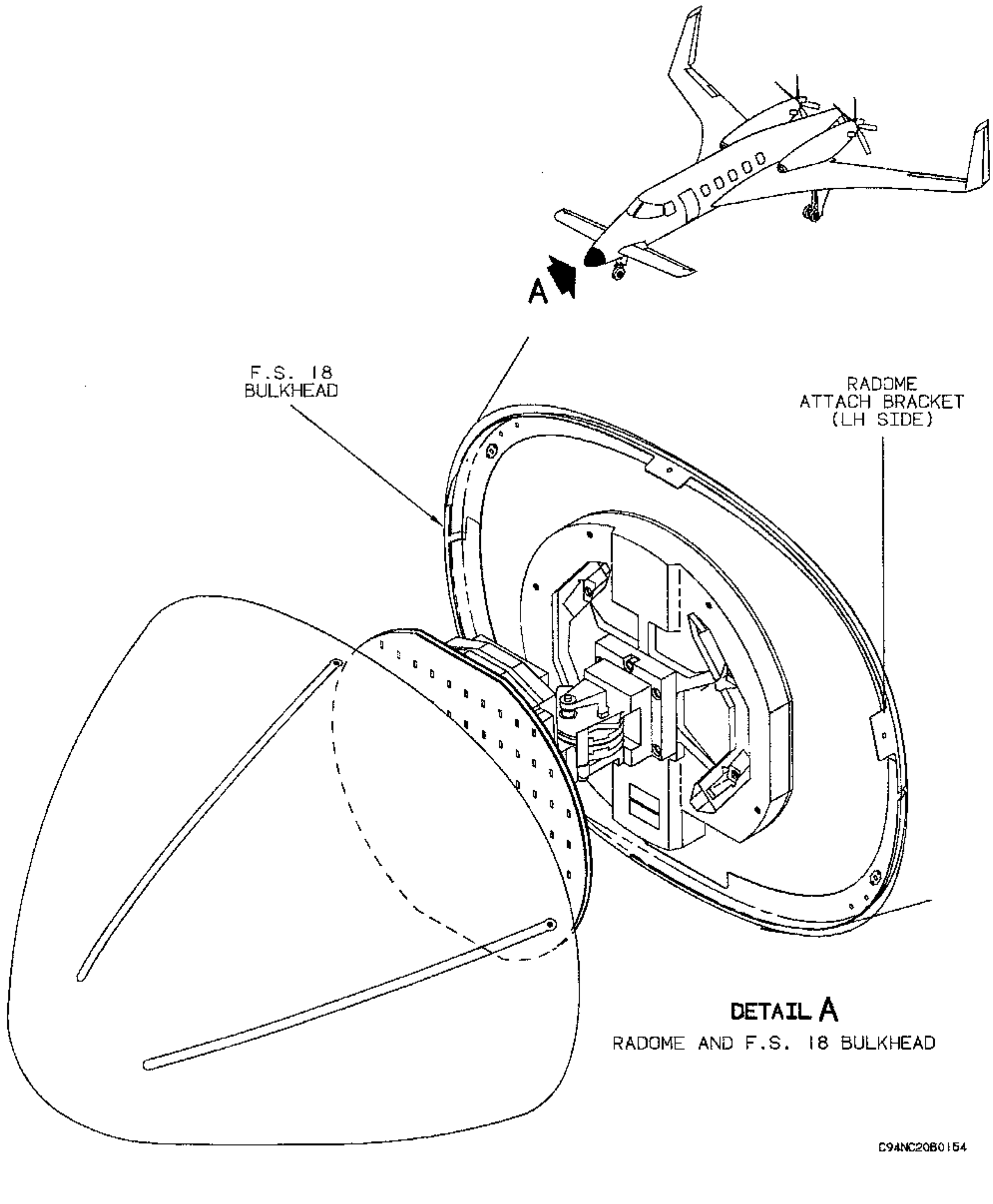
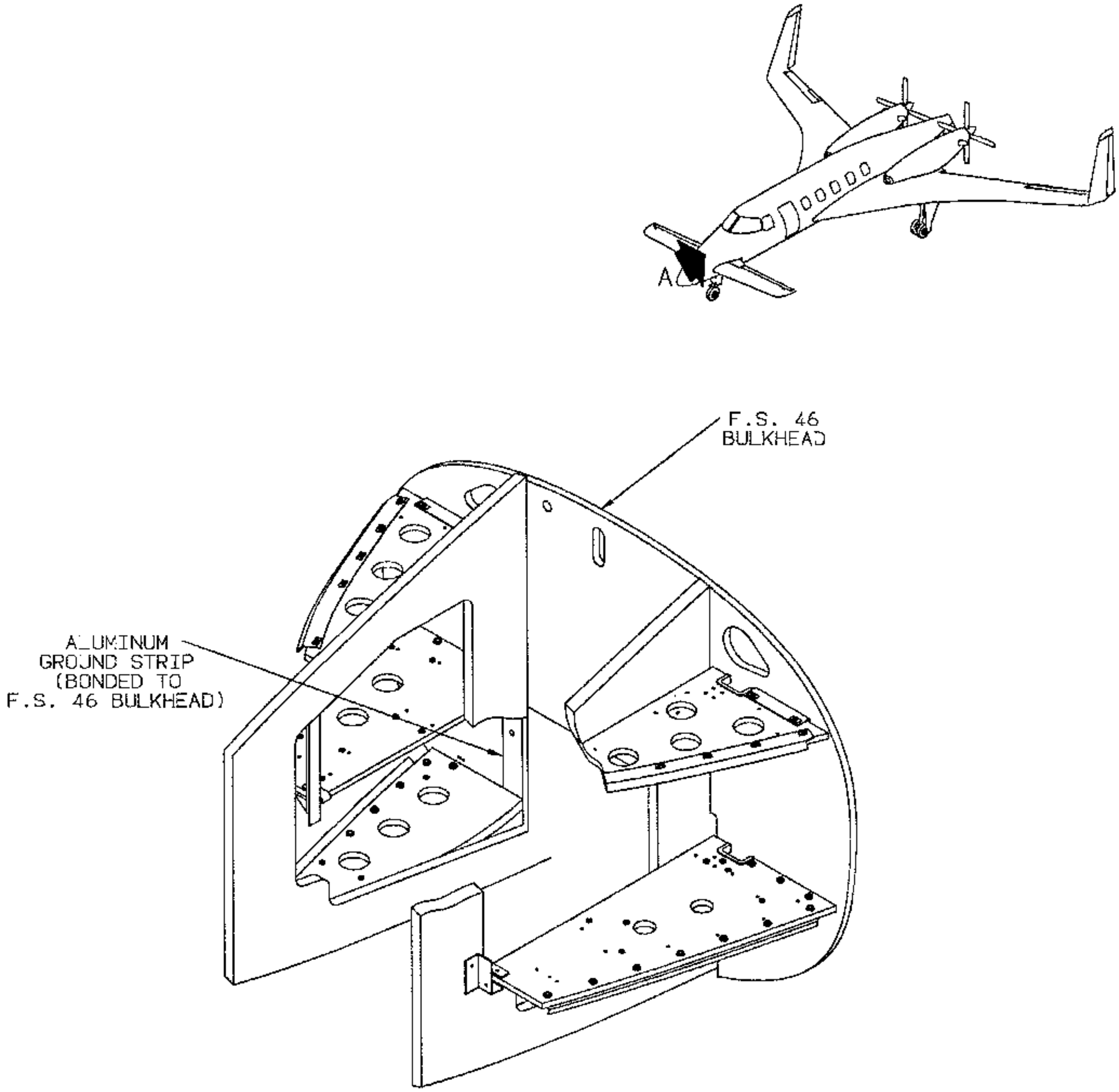


Ground-Plane Electrical-Bond-Check Test Point 1 (Effectivity: All)
Figure 16



DETAIL A

RH FORWARD NOSE AVIONICS COMPARTMENT

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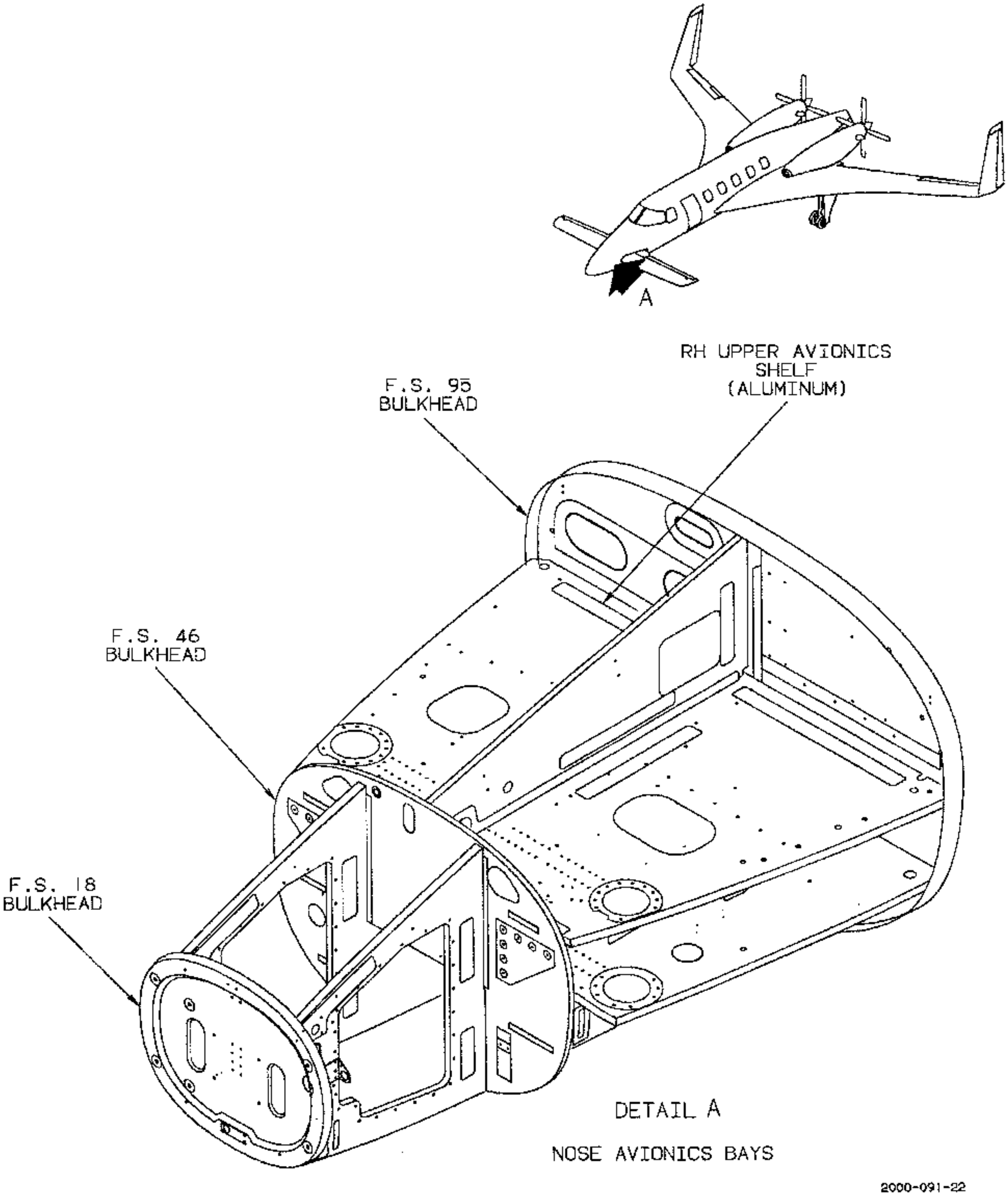
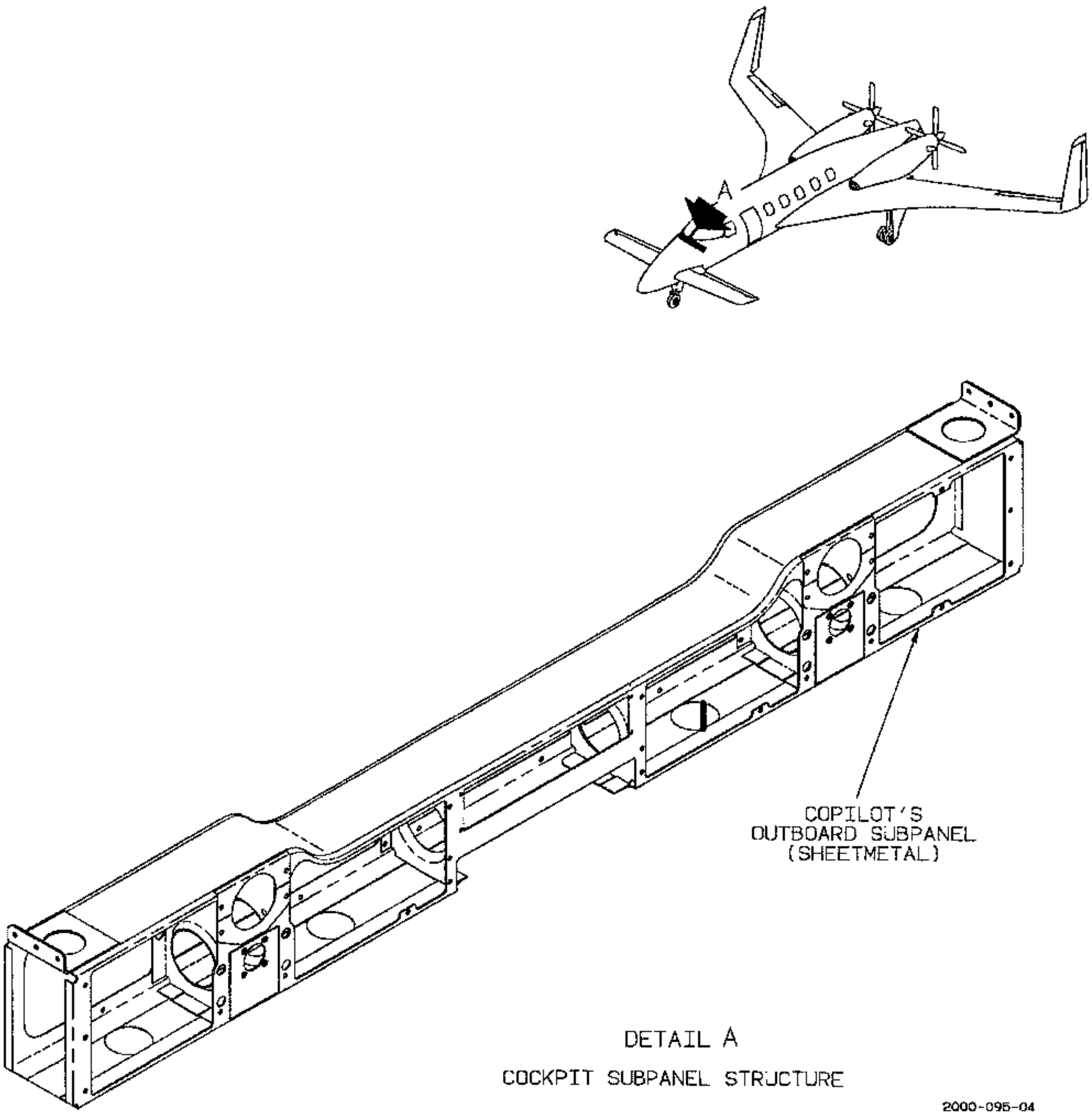
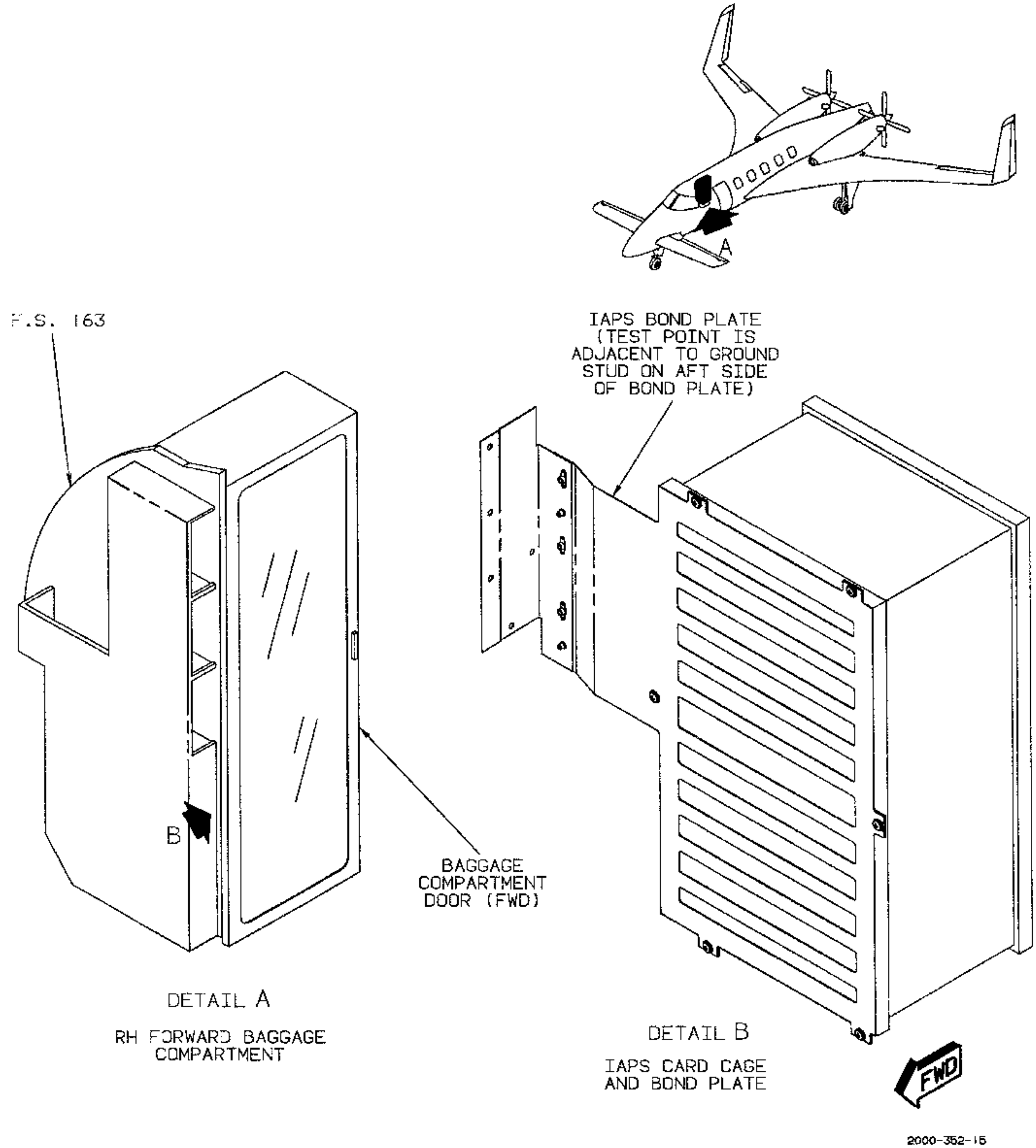
Ground-Plane Electrical-Bond-Check Test Point 2 (Effectivity: All)
Figure 17



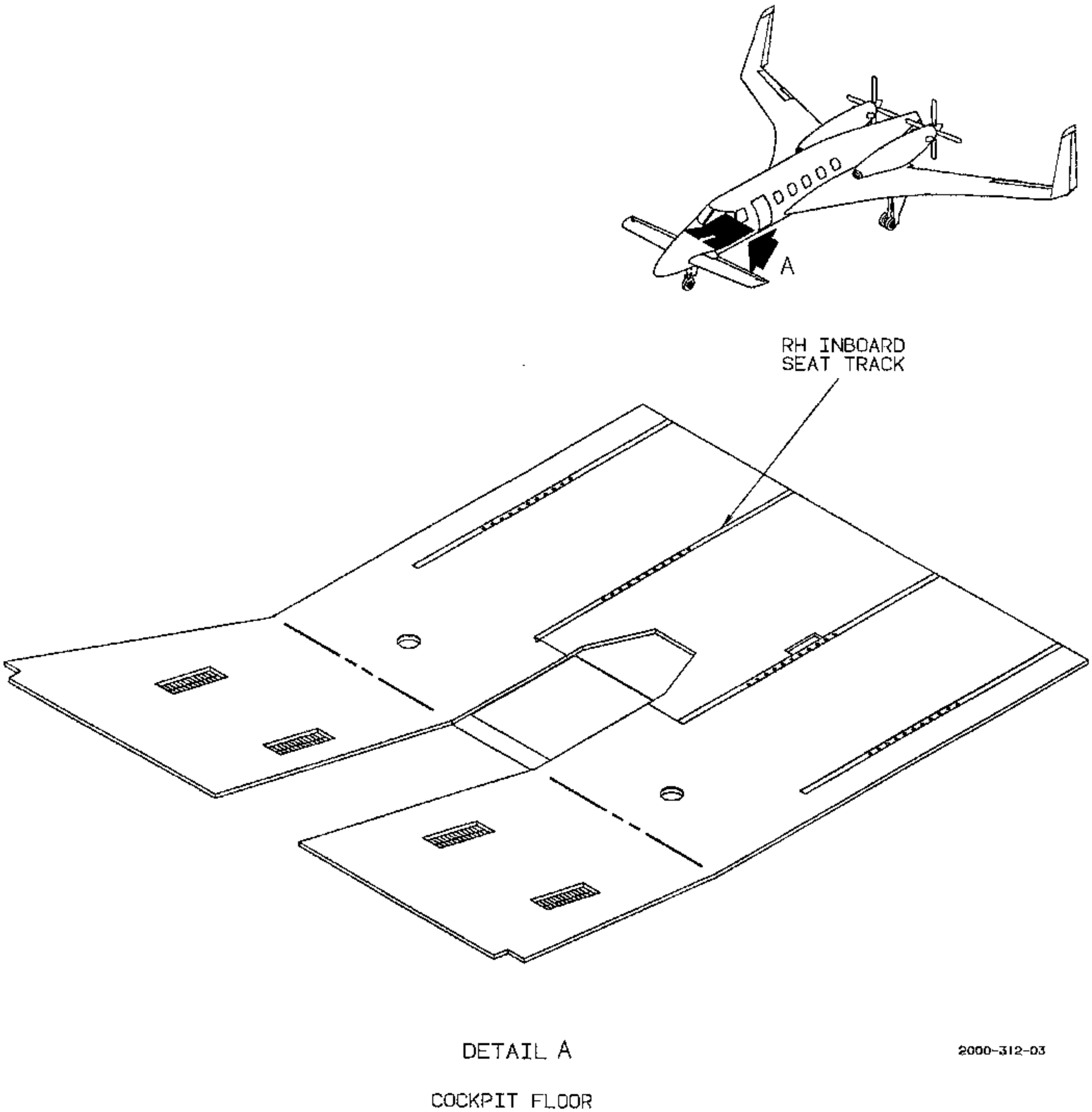
Ground-Plane Electrical-Bond-Check Test Point 3 (Effectivity: All)
Figure 18



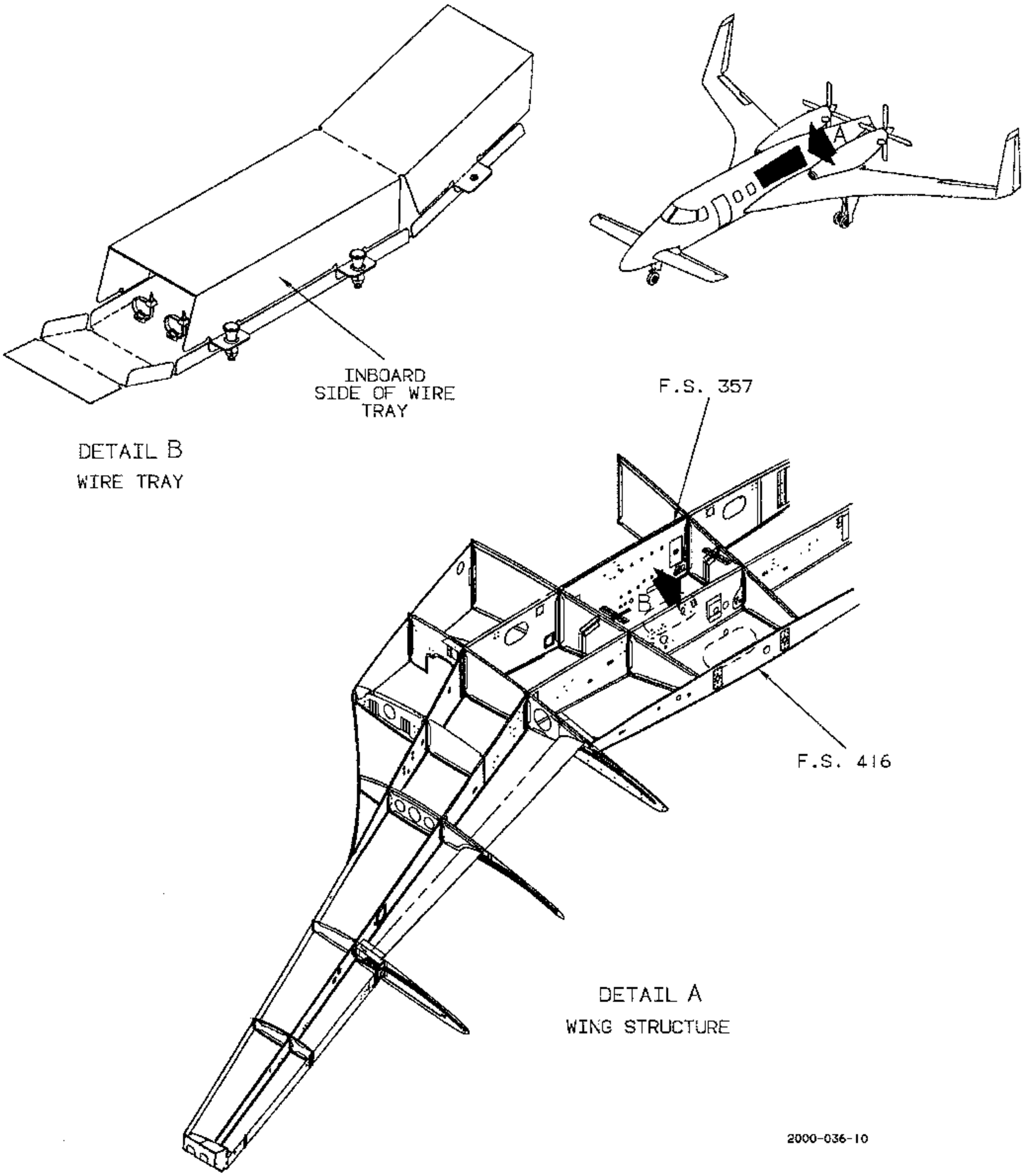
Ground-Plane Electrical-Bond-Check Test Point 4 (Effectivity: All)
Figure 19



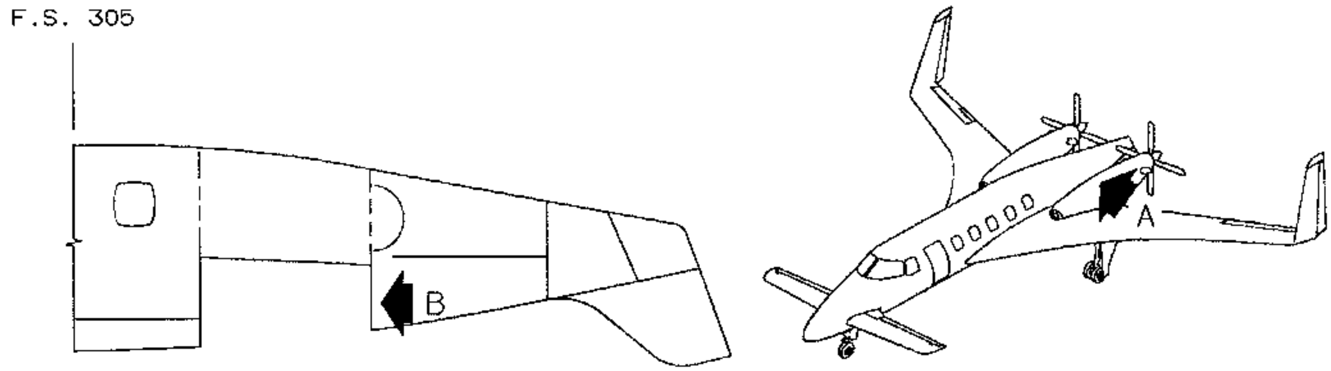
Ground-Plane Electrical-Bond-Check Test Point 5 (Effectivity: All)
Figure 20



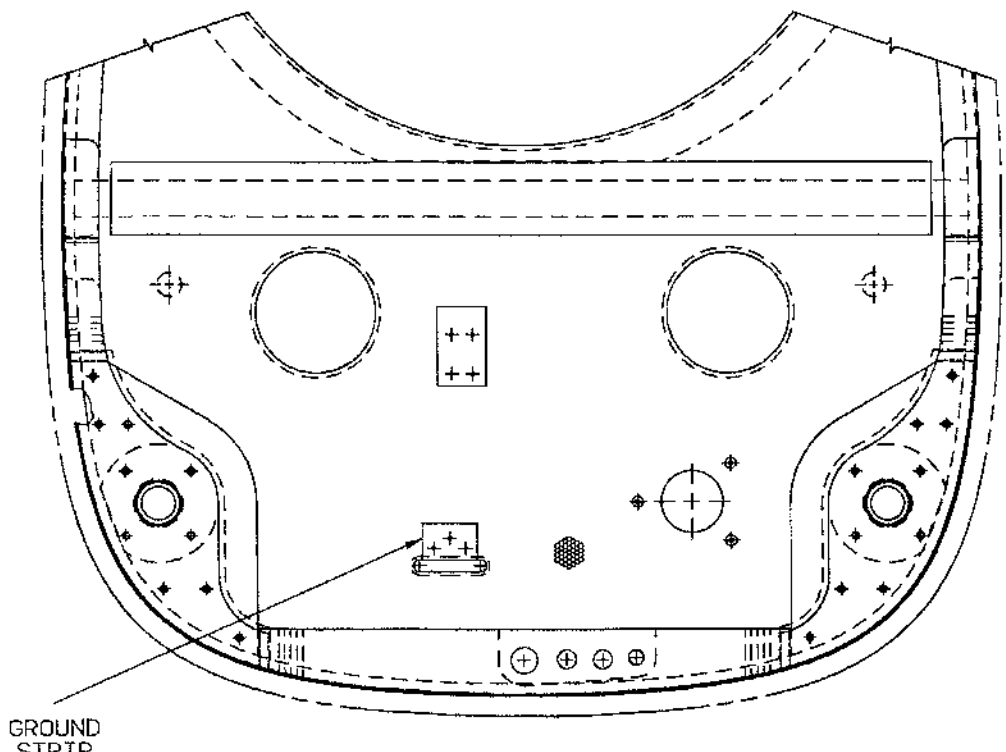
Ground-Plane Electrical-Bond-Check Test Point 6 (Effectivity: All)
Figure 21



Ground-Plane Electrical-Bond-Check Test Point 7 (Effectivity: All)
Figure 22



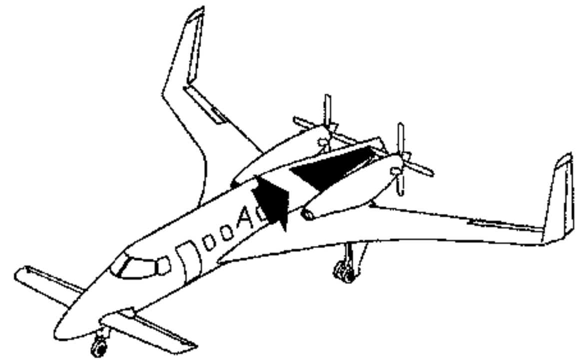
DETAIL A
FUSELAGE FROM F.S. 305 AFT
(WING REMOVED)

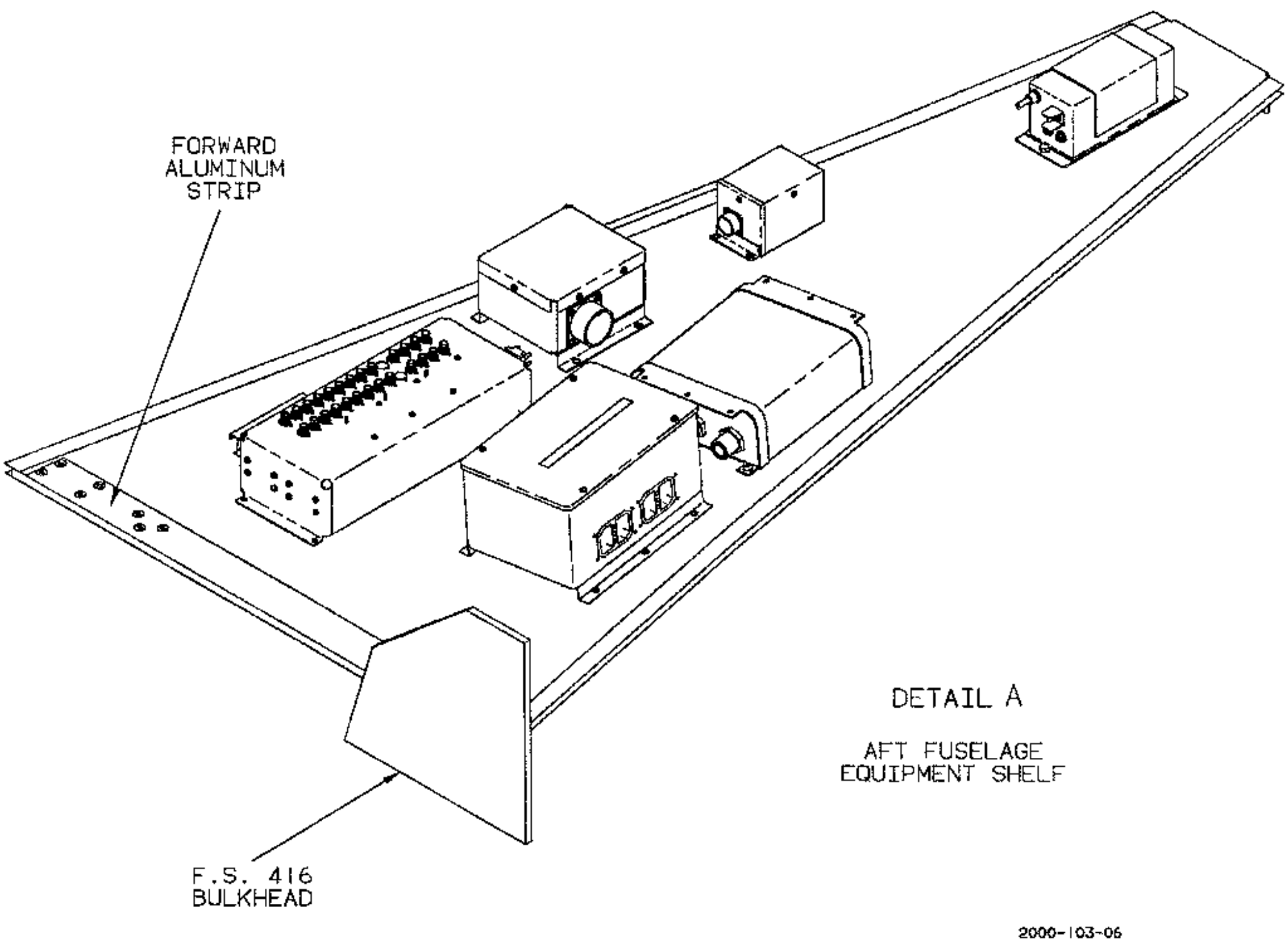


DETAIL B
F.S. 416 BULKHEAD
(WING AND PLUMBING REMOVED)

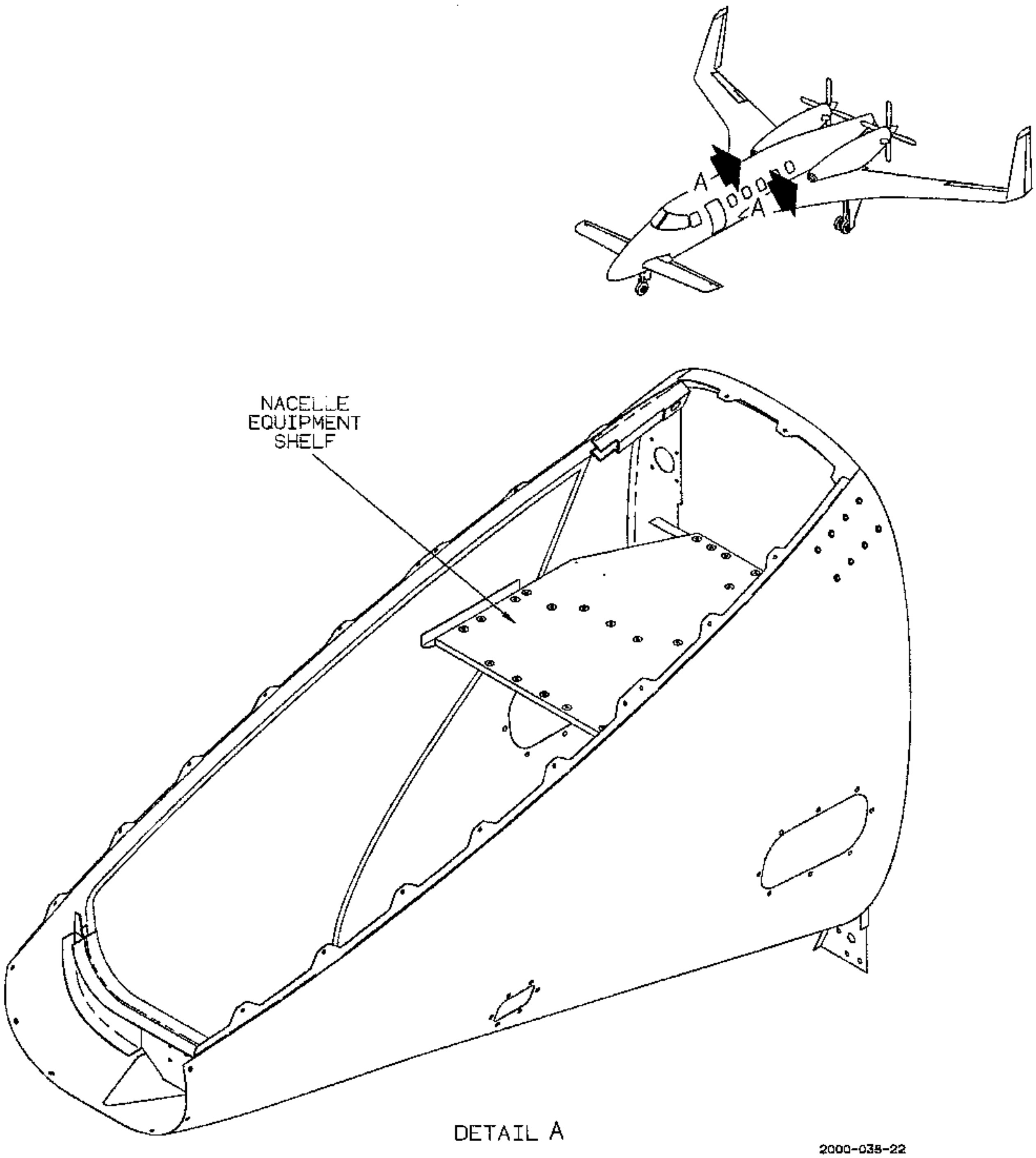
C9101668 C

Ground-Plane Electrical-Bond-Check Test Point 8 (Effectivity: All)
Figure 23



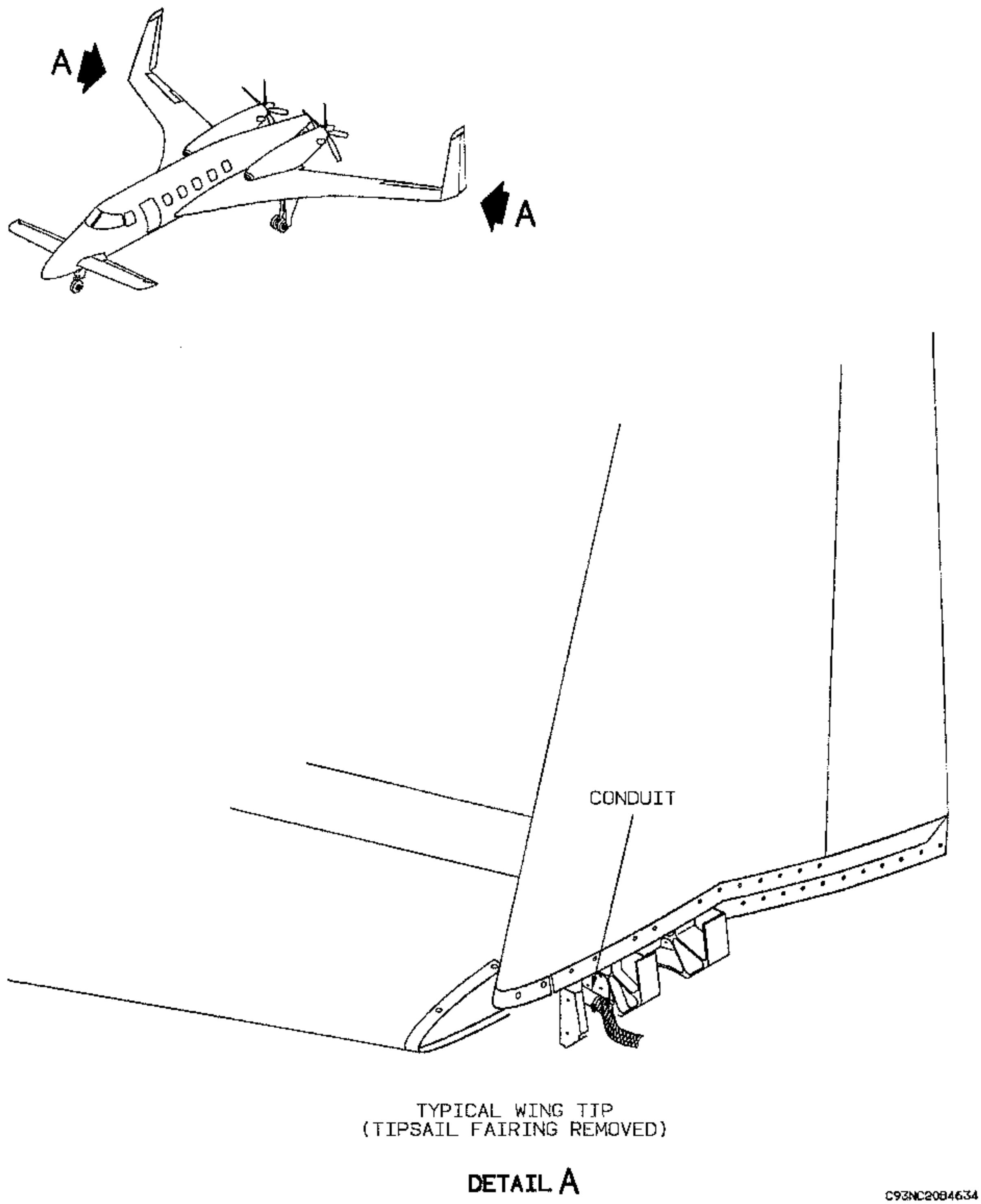


Ground-Plane Electrical-Bond-Check Test Point 9 (Effectivity: All)
Figure 24



TYPICAL NACELLE

Ground-Plane Electrical-Bond-Check Test Point 10 (Effectivity: All)
Figure 25



Ground-Plane Electrical-Bond-Check Test Point 11 (Effectivity: All)
Figure 26

CONTROL CABLES AND PULLEYS - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

The airplane uses stainless steel control cables for the outer rudder cables and carbon steel control cables for all other flight control cable applications. The control cables are of multiple wire construction with the number of strands varying according to the diameter of the cable. The steel wire is helically twisted into strands and the strands wound about other strands forming the flexible steel cable.

Control cable pressure seals are installed on the control cables where they pass from a pressurized area to a nonpressurized area. The pressure seal is molded synthetic rubber and is split to the center permitting removal of the pressure seal without disturbing the control cable. A light grease (10, Chart 2, 20-00-00) is packed into the pressure seals to maintain minimum friction between the control cables and pressure seals and improve the cabin pressure retention seal. Grease should be visible on the section of the control cables which passes through the pressure seals. Refer to Chapter 27 for detailed information on the control cable pressure seals.

CONTROL CABLES AND PULLEYS - MAINTENANCE PRACTICES (Effectivity: All)

CONTROL CABLE SYSTEM INSPECTION (Effectivity: All) (Figure 1)

WARNING

When inspecting cables, always wear gloves to avoid injury from frayed or broken wires.

Inspect the control cable system as follows:

a. Inspect the control cables for incorrect routing, fraying and twisting. Look for interference with adjacent airplane structure, equipment, wiring, plumbing and other control cables.

b. Monitor control cable movement for freedom, looseness and full travel.

c. Visually inspect all swaged fittings for distortion, cracks or broken wires at the fitting.

d. Turnbuckles should have the proper thread exposure and be correctly safety wired.

e. Locate any broken or corroded control cable wires as follows:

1. Inspect the control cables near fairleads and pulleys by passing a cloth along the length of the cable. If a snag is found, closely examine the cable to determine the extent of the damage as shown in Figure 1.

2. Any suspect cable should be removed and placed in a loop position and checked for additional broken wires as shown in Figure 1.

NOTE

Individual broken wires are acceptable in primary and secondary control cables at random locations when there are no more than three broken wires on any given 36-inch cable length.

3. Inspect the control cables that have broken wires for evidence of corrosion. If necessary, remove

the control cable, form it into a loop, and check the center strand for corrosion. Replace any control cable that shows evidence of corrosion.

CONTROL CABLE STORAGE (Effectivity: All)

Control cables should be stored straight or in a coil. When stored in coil form, the coil inside diameter must not be less than 150 times the control cable diameter, nor bent in a radius less than 75 times the control cable diameter. Coils must not be flattened, twisted or folded during storage. Storage requirements should apply until the control cable is installed in its normal position in the airplane. If only a part of the control cable is installed in an assembly, control cable storage requirements apply to the uninstalled portion of the control cable.

PULLEY INSPECTION (Effectivity: All) (Figure 2)

Inspect all pulleys as follows:

NOTE

Pulleys are installed along the control cables where a change of direction is needed.

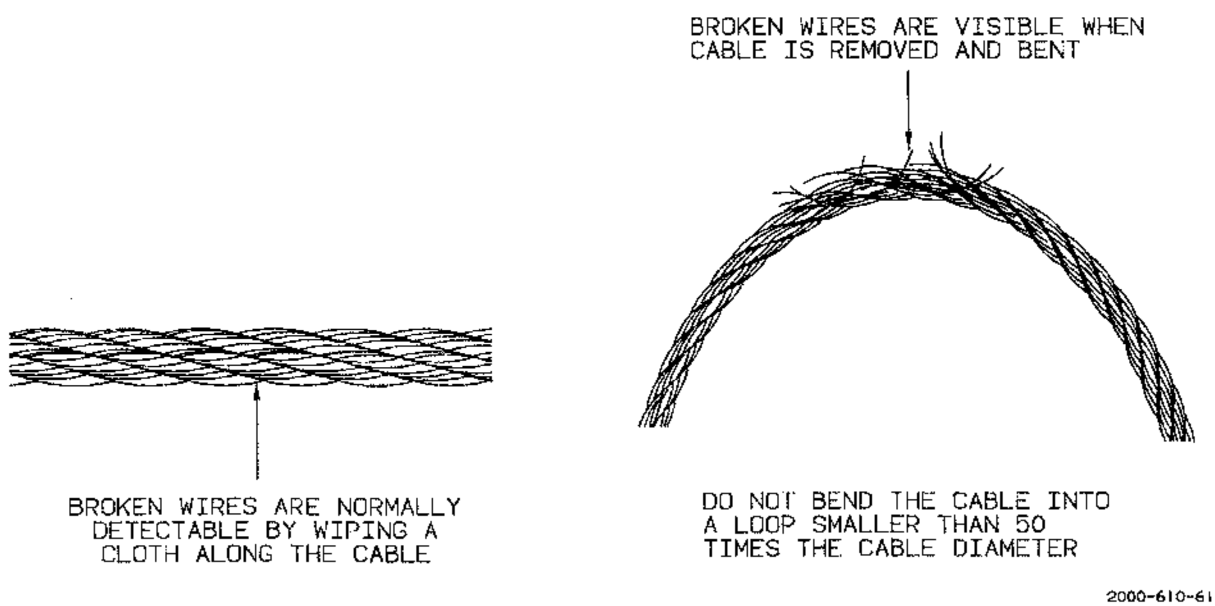
a. Inspect all pulleys for roughness, sharp edges and the presence of foreign material embedded in the grooves.

b. Inspect all pulley bushings or bearings for smooth rotation, freedom from flat spots and foreign material.

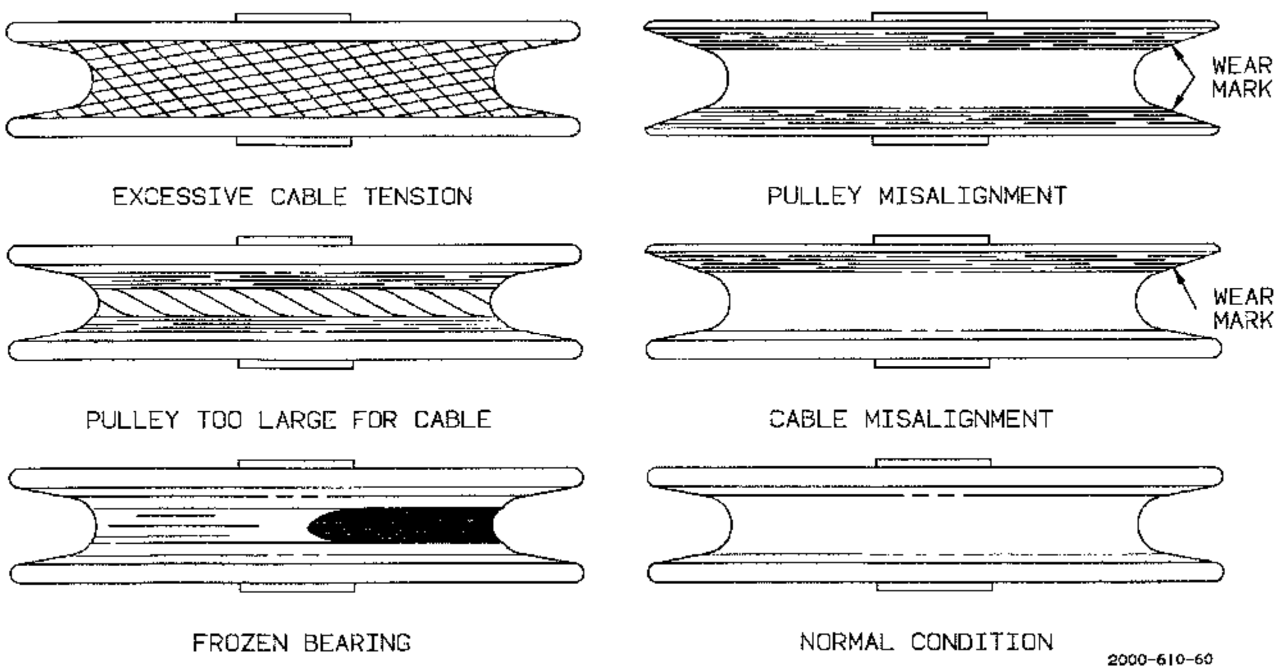
c. Inspect all pulleys for proper alignment.

d. Inspect the pulley brackets and guards for damage, misalignment and looseness.

e. Pulleys which only turn a short distance must be rotated periodically to provide a new bearing surface for the control cable.



Typical Control Cable With Broken Wires (Effectivity: All)
Figure 1



Pulley Wear Patterns (Effectivity: All)
Figure 2

BEARINGS - MAINTENANCE PRACTICES (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

BEARING REMOVAL (Effectivity: All) (Figure 1)

Remove the bearing housing from the airplane and remove the bearing from its housing using one of the following methods:

HYDRAULIC PRESS METHOD (Effectivity: All)

a. Place two supports under the bearing housing as shown in Figure 1. The supports should be at least 1/2 inch thicker than the bearing housing.

b. Center a bearing removal tool on the bearing race. The removal tool should be approximately 1/8 inch smaller than the outside diameter of the bearing race.

CAUTION

The hydraulic press plunger and bearing removal tool should remain directly in alignment with the bearing being removed at all times.

c. Align the bearing and removal tool with the hydraulic press plunger and apply enough pressure to force the bearing out of the bearing housing.

MECHANICAL PRESS METHOD (Effectivity: All)

a. Center a bearing removal tool on the bearing housing.

b. Center a bearing removal tool on the bearing race.

NOTE

A socket may be used for a bearing removal/installation tool.

c. Install a washer and bolt through the center of the bearing and both removal tools as shown in Figure 1.

d. Install a washer and nut on the bolt.

e. Tighten the nut until the pressure is sufficient to release the bearing from its housing.

BEARING SUPPORT INSPECTION (Effectivity: All)

Inspect the bearing housing for any grooves, cracks, warpage or hole elongation. The bearing housing sides should be smooth and uniform.

BEARING INSTALLATION (Effectivity: All)

Bearings may be installed as follows:

CAUTION

When cleaning bearing surfaces never allow solvent to enter the bearing. Never touch the bearing or bearing housing surfaces with bare hands, and always use a clean cloth to cover bearing parts to prevent contamination after they have been cleaned.

a. Clean the outer surface of the bearing with cleaner (1, Chart 2, 20-00-00) and wipe dry.

b. A bearing may be secured in its housing by staking or by using a retaining compound. Secure the bearing in its housing by performing one of the following procedures:

SECURED WITH RETAINING COMPOUND (Effectivity: All)

CAUTION

Ensure that no primer is applied to the bearing oil grooves or lubrication ports.

a. Coat the surfaces where a retaining compound is to be applied with primer (11, Chart 2, 20-00-00). This includes the bearing outer surface, bearing housing mating surface and the bearing housing retention flange if applicable.

NOTE

All cadmium, zinc, corrosion-resistant and anodized steel, including plastic items, must be primed to assure proper adhesion of the retaining compound.

b. Allow primer to air dry for at least 30 minutes at room temperature.

c. Apply a thin coat of retaining compound (12, Chart 2, 20-00-00) to the bearing and bearing housing mating surfaces where primer was applied.

d. Center the bearing on the bearing housing.

e. Using the hydraulic or mechanical pressure method shown in Figure 1, apply pressure to the bearing until it is firmly seated in the bearing housing. Pressure must be applied with the bearing and bearing housing directly in alignment with each other.

f. Apply additional retaining compound (12, Chart 2, 20-00-00) to the seam where the bearing and bearing housing meet.

g. The retaining compound must cure before the bearing is put into service. Curing may be accomplished by one of the following:

1. Allow the bearing and bearing housing to remain at room temperature for 24 hours without any movement of the parts.

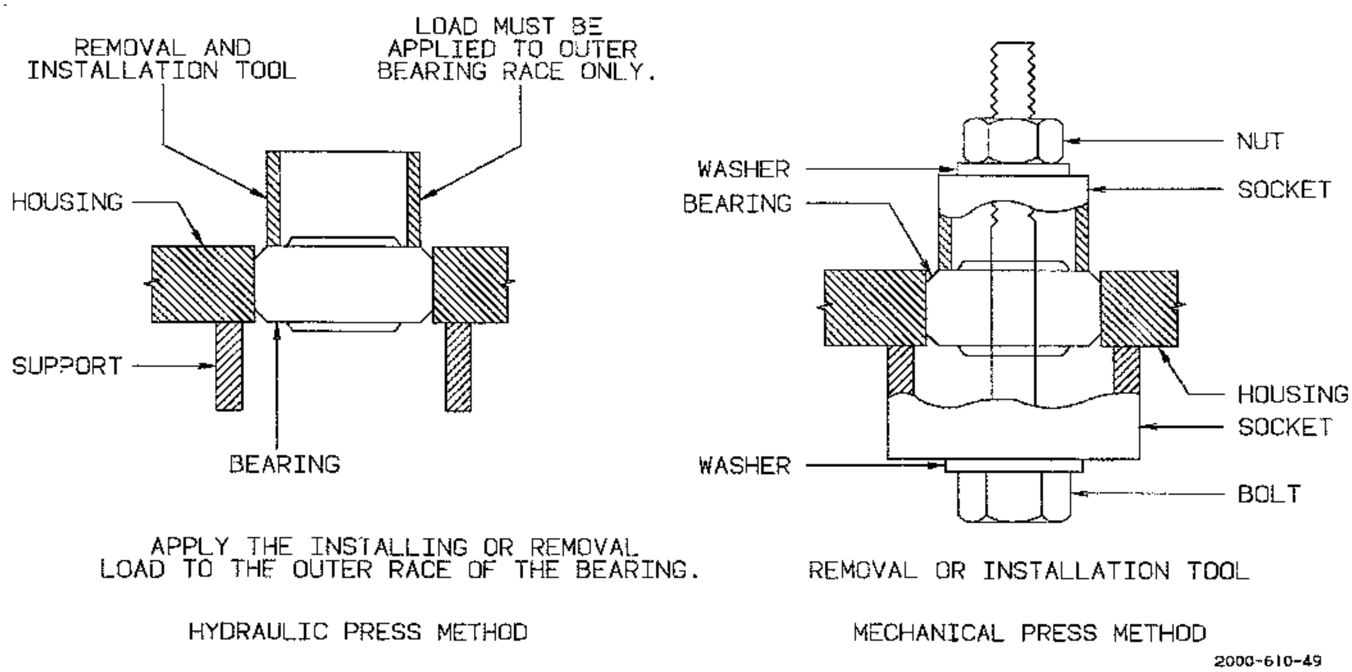
2. Heat the bearing and bearing housing to 275° ±10° F. and maintain that temperature for 15 minutes only.

SECURED BY STAKING (Effectivity: All) (Figure 2)

a. Center the bearing on the bearing housing.

b. Using the hydraulic or mechanical pressure method shown in Figure 1, apply pressure to the bearing until it is firmly seated in the bearing housing. Pressure must be applied with the bearing and bearing housing directly in alignment with each other.

c. Place the bearing and bearing housing on two supports, as shown in Figure 2, if both sides of the



Bearing Removal (Effectivity: All)
Figure 1

bearing are to be staked. The center bearing race must not touch the supports.

d. If the bearing housing was previously staked, the new stakes should be centered between the existing stakes. If a new bearing housing is being used, the stake pattern should be the same as the one on the old bearing housing.

NOTE

When a ring stake is used, the ring stake total length should be 25 percent of the bearing circumference.

e. Pin stakes should be located .030 ±.010 inch from the outer diameter of the bearing on the housing.

f. Pin stakes should be .010 to .032 inch deep to retain the bearing.

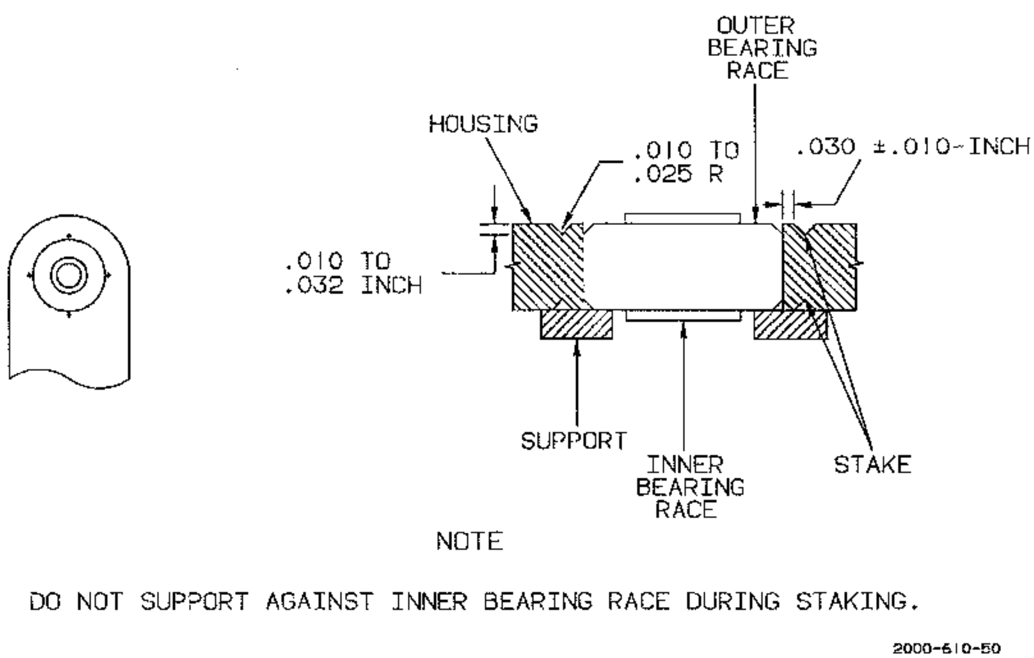
After the bearing has been secured in the housing by staking or by the use of a retaining compound, relubricate with the proper lubrication and reinstall in the airplane.

CAUTION

If the bearing should slip from its installed position in the bearing housing, the bearing must be removed, cleaned and reinstalled. Examine the bearing for any damage before reinstallation into the bearing housing.

CHART 1
RECOMMENDED STAKES FOR BEARINGS
(Effectivity: All)

Bearing O.D.	Number of Stakes
up to .734 inch	4
.735 inch to .984 inch	6
.985 inch to 1.234 inches	8



Bearing Staking (Effectivity: All)
Figure 2

TUBING, HOSES AND FITTINGS - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

The following information should be used to remove, maintain and install hoses, tubing and fittings. Although all hoses and tubing may not be specifically identified herein, the standard practices normally apply. Any handling and installation of individual system hoses, tubing and fittings is identified in the appropriate system chapter.

The majority of tubing assemblies used in the airplane are aluminum or steel machine-formed tubing assemblies and utilize "Permaswage" type fittings.

Effective repair of damaged hydraulic plumbing lines used on the airplane landing gear retraction and extension system may be a accomplished using "Cryofit" couplings, (13, Chart 2, 20-00-00). Should such repair be required, contact the Commercial Service Department, Beech Aircraft Corporation, Wichita KS, 67201. You will be advised of procedures for obtaining repair parts and personnel to train and guide your service staff in the correct technique for installation of the "Cryofit" couplings.

Hoses are used in areas of the airplane where a flexible line is more suitable for the installation and where freedom to move is necessary.

TUBING, HOSES AND FITTINGS - MAINTENANCE PRACTICES (Effectivity: All)

WARNING

Never perform maintenance on tubing, hoses or fittings while the system is under pressure. Ensure that all pressure is removed before disconnecting any fittings on that system.

Observe the following when performing maintenance on systems with tubing and hoses.

a. Cap or plug all tubing, hoses and fittings immediately upon disconnection to prevent any contamination of the system.

b. Visually check for cleanliness and evidence of contamination prior to connecting tubing or hoses.

c. Any hoses and tubing that did not have a protective cover installed upon disconnection should be cleaned and checked for obstruction prior to installation.

d. When connecting tubing assemblies, do not force the assembly to the installed position. If a mismatch between the male and female connection should result, see Figure 1 for the allowable mismatch.

NOTE

If the mismatch is such that a bend is required, refer to Chart 2 and Figure 2 for acceptable bend radii limits.

e. Never stretch a hose to make a connection.

f. The hose material must be compatible with the applicable system fluids. Substitution of a hose that is not compatible with the system fluid will contaminate the system.

CHART 1
FLARED FITTING TORQUE CHART (INCH-POUNDS)
(Effectivity: All)

Hose Size	Tubing O.D. (inches)	Aluminum Tubing Flare Min. Max.	Steel Tubing Flare Min. Max.	Aluminum Tubing Flareless Min. Max.	Steel Tubing Flareless Min. Max.	Oxygen line Fitting (Aluminum) Min. Max.	Hose End Fitting Min. Max.
-3	3/16	--- ---	90 100	75 90	90 100	--- ---	70 100
-4	1/4	40 65	135 150	80 100	135 150	--- ---	70 120
-5	5/16	60 80	180 200	100 130	180 120	100 125	85 180
-6	3/8	75 125	270 300	100 130	270 300	--- ---	100 250
-8	1/2	150 250	450 500	200 240	450 500	--- ---	210 420
-10	5/8	200 350	700 800	360 400	700 800	--- ---	300 480
-12	3/4	300 500	1100 1150	390 430	1100 1150	--- ---	500 850
-16	1	500 700	1200 1400	600 900	1200 1400	--- ---	700 1150
-20	1 1/4	600 900	1300 1450	600 900	1300 1450	--- ---	--- ---
-24	1 1/2	600 900	1350 1500	600 900	1350 1500	--- ---	--- ---

REMOVAL OF TUBING AND HOSE ASSEMBLIES (Effectivity: All)

Tubing and hose assemblies may be removed as follows:

a. Relieve all system pressure.

b. Disconnect both ends of the hose or tubing assembly and cap or plug the lines and fittings.

c. Remove all clamps securing the hose or tubing assembly.

d. Remove the tubing or hose assembly and tag identify to aid in reinstallation.

NOTE

Always note the locations of all bonding jumpers and clamps to aid in reinstallation.

HOSE ASSEMBLY INSTALLATION (Effectivity: All)

Hose assemblies may be installed as follows:

NOTE

If a new hose assembly is to be installed, the hose assembly must be clean, the correct length and manufactured of the correct material.

a. Observe the procedures outlined under maintenance practices in this chapter.

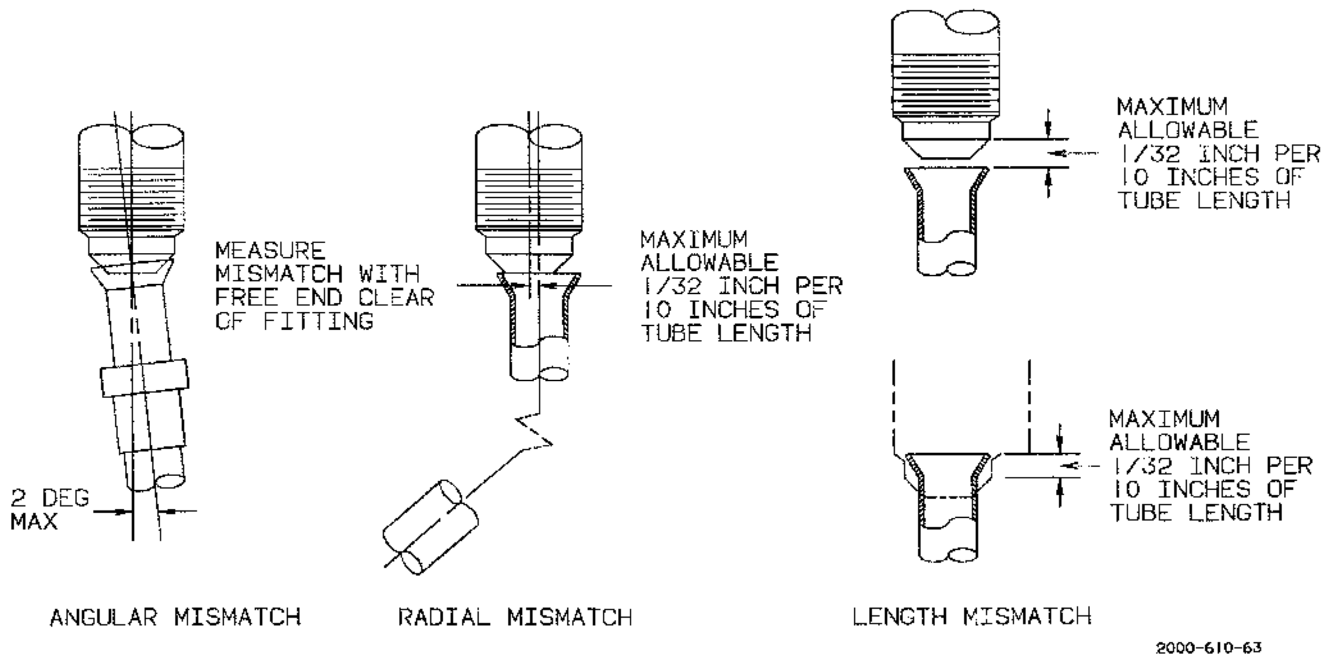
b. Connect the two B-nuts to the proper fittings.

c. Torque the B-nuts to the torque specified in Chart 1.

d. After the B-nuts are torqued, inspect the hose to ensure that it is not twisted or under tension in any way.

e. Ensure the hose is of adequate length to allow freedom of movement and room to expand and contract.

f. Inspect the hose for clearance to all structure. If inadequate clearance exists between the hose and structure, protection must be provided to prevent hose damage from chafing.



Tubing Installation Mismatch (Effectivity: All)
Figure 1

CHART 2
TUBING BENDING LIMITS (Effectivity: All)

TUBE OUTSIDE DIAMETER (D)		RECOMMENDED BEND RADII				ADDITIONAL BEND RADII	
		3D		4D		6D	
INCH	MILLIMETER	INCH	MILLIMETER	INCH	MILIMETER	INCH	MILLIMETER
1/8	3.175	.375	9.525	.500	12.700	.750	19.050
3/16	4.762	.563	14.286	.750	19.048	1.125	28.572
1/4	6.350	.750	19.050	1.000	25.400	1.500	38.100
5/16	7.937	.938	23.811	1.250	31.748	1.875	47.622
3/8	9.525	1.125	28.575	1.500	38.100	2.250	57.150
7/16	11.112	1.312	33.336	1.750	44.448	2.625	66.672
1/2	12.700	1.500	38.100	2.000	50.800	3.000	76.200
5/8	15.875	1.875	47.625	2.500	63.500	3.750	95.250
3/4	19.050	2.250	57.150	3.000	76.200	4.500	114.300
7/8	22.225	2.625	66.675	3.500	88.900	5.250	133.350
1	25.400	3.000	76.200	4.000	101.600	6.000	152.400
1-1/8	28.575	3.375	85.725	4.500	114.300	6.750	171.450
1-1/4	31.750	3.750	95.250	5.000	127.000	7.500	190.500
1-3/8	34.925	4.125	104.775	5.500	139.700	8.250	209.550
1-1/2	38.100	4.500	114.300	6.000	152.400	9.000	228.600
1-5/8	41.275	4.875	123.825	6.500	165.100	9.750	147.650
1-3/4	44.450	5.250	133.350	7.000	177.800	10.500	266.700
1-7/8	47.625	5.625	142.875	7.500	189.500	11.250	285.750
2	50.800	6.000	152.400	8.000	203.200	12.000	304.800
2-1/4	57.150	6.750	171.450	9.000	228.600	13.500	342.900
2-1/2	63.500	7.500	190.500	10.000	254.000	15.000	381.000
3	76.200	9.000	228.600	12.000	304.800	18.000	457.200

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TUBING INSTALLATION (Effectivity: All) (Figure 1)

Tube assemblies may be installed as follows:

NOTE

> If a new tubing assembly is to be installed, the tubing assembly must be clean, the correct length and manufactured of the correct material.

a. Observe procedures outlined under maintenance practices in this chapter.

b. Inspect the tubing for damage, particularly at the tubing ends, fittings and bends. Tubing which is damaged should be replaced or repaired.

c. Make certain that the fittings are properly aligned and secured before installation of the tubing assembly.

d. Check alignment and fit of the tubing assembly before installation as follows:

1. Place the tubing assembly in the proper installation position and tighten one coupling nut at one end of the tubing assembly.

2. The free tubing end must be within two degrees parallel with the fitting as shown in Figure 1.

3. The free tubing end must be within 1/32 inch per 10 inches of tubing length in line with the fitting as shown in Figure 1.

4. The free tubing end must match the fitting cone lengthwise within 1/32 inch per 10 inches of tubing length as shown in Figure 1.

e. Apply the proper antiseize compound to fittings as specified.

f. Install tubing on fittings, and tighten B-nuts to torque values specified in Chart 1.

g. Install all clamps and bonding jumpers as tagged to ensure that electrical bonding requirements outlined in Chapter 20-00-03 are met.

FLUID LINE FITTING INSTALLATION (Effectivity: All)

Fluid line fittings may be installed as follows:

a. Lubricate the male threads of the fitting, backup ring and packing sparingly with the applicable system fluid or lubricant (14, Chart 2, 20-00-00).

b. Install the nut on the fitting until the nut is clear of the thread relief.

c. Install the teflon backup ring in the counterbore of the nut.

d. Install the packing (O-ring) on the thread relief.

NOTE

The packing must be compatible with the applicable system fluid.

e. Turn the nut down until the packing is pushed firmly against the lower threaded section of the fitting.

f. Install the fitting into the boss with the nut turning with the fitting until the packing contacts the boss.

NOTE

This point can be detected by a sudden increase in torque.

g. Hold the nut with a wrench to prevent it from turning, and rotate the fitting 1-1/2 turns in. Position the fitting by turning in not more than one full turn.

h. Holding the fitting, turn the nut down tightly against the boss. Slight extrusion of the ring around the backup ring is acceptable.

NONPOSITIONING TYPE FITTING INSTALLATION (Effectivity: All)

Nonpositioning type fittings may be installed as follows:

a. Lubricate the packing with the applicable system fluid or lubricant (14, Chart 2, 20-00-00).

b. Install the packing in the fitting thread relief.

c. Thread the fitting into the boss and tighten it until it bottoms tightly on the boss.

PIPE THREAD FITTING INSTALLATION (Effectivity: All)

Pipe thread fittings may be installed as follows:

a. Apply teflon tape to the threads as follows:

1. Start tape at or close to narrow end of threads. Wrap tape around fitting in the direction of the threads, clockwise for right hand thread fittings or counterclockwise for left hand thread fittings.

2. Apply tension to the tape to conform the tape to the shape of the threads.

3. The tape should overlap the previous wrap of tape by up to 1/2-inch for sealing pipe thread fittings up to two inches in diameter.

b. Thread the fitting into the boss and tighten it until it bottoms tightly on the boss.

TUBING DAMAGE LIMITS (Effectivity: All)

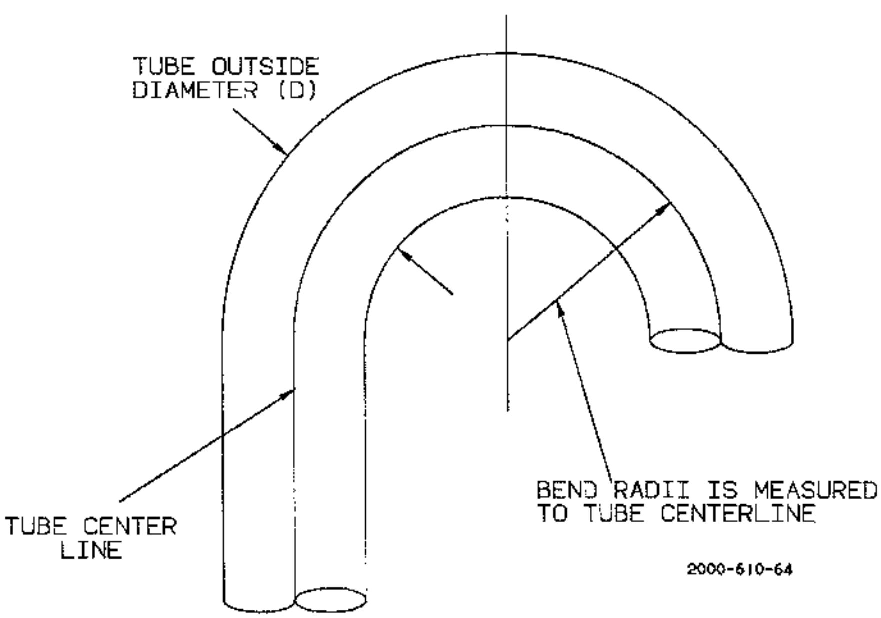
NOTE

Nicks and scratches not exceeding the following limitations may be repaired by polishing out the damaged area with a fine grade of emery cloth and oil. Finish polishing with crocus cloth and oil. Flush and clean all grit from line assembly.

a. Replace steel tubing with nicks or scratches deeper than 10 percent of tubing-wall thickness.

b. Replace any aluminum tubing with nicks or scratches deeper than 20 percent of tubing-wall thickness.

c. Replace any pressure and return tubes with dents deeper than 5 percent of the tubing outside diameter.



Tube and Hose Bend Radii (Effectivity: All)
Figure 2

LOCKING DEVICES - MAINTENANCE PRACTICES (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

Except where specific instructions are required to satisfy certain applications, the following procedures are standard methods used to install the various locking devices used in conjunction with bolts, screws, nuts and studs.

SELF-LOCKING NUTS (Effectivity: All)

Where self-locking nuts are used, the following procedure applies:

a. Self-locking nuts shall be new for each application.

b. For each item, note the torque necessary to turn the nut on the bolt before seating the nut.

c. Add the above torque to the value detailed in the assembly instruction for the application. Use this new value as the total applied torque.

SLOTTED, STEEL LOCKNUTS (PREVAILING TORQUE TYPE) (Effectivity: All)

Effective locking of slotted, steel locknuts on bolts or studs requires full engagement of all locknut threads. The chamfered section of the locknut ID does not exert force on the bolt or stud; therefore, it is not necessary that the bolt or stud be flush with, or protrude from the outer face of the locknut.

LOCKWIRE AND COTTER PIN REQUIREMENTS (Effectivity: All)

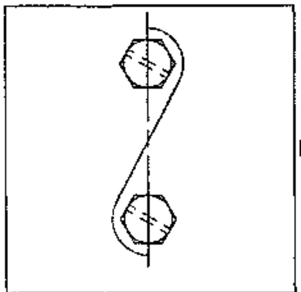
When tightening a castellated nut, alignment of the slot must be obtained without exceeding the maximum torque. If this is not possible, replace the nut with another one. After tightening the nut to the recommended torque, the nut must not be loosened to permit insertion of lockwire or a cotter pin. If the slot in the nut or lockwire hole in the bolt or screw is not correctly aligned at the minimum torque value given, the nut, screw or bolt should be further tightened to the next alignment position, but the maximum torque value given must not be exceeded. Should alignment still be impossible without exceeding the maximum torque, back off the nut, screw or bolt one-half turn and retorque.

Lockwire must never be reused. All lockwire must fit snugly into the drilled holes in the bolts and studs for locking purposes. Bushings and plugs must be lockwired to the adjacent boss or casing. Never lockwire bushing to plug. Cotter pins should be installed so that the head fits into the slot of the castellated nut and, unless otherwise specified, one end of the pin should be bent over the stud or bolt and the other end flat against the flat on the nut.

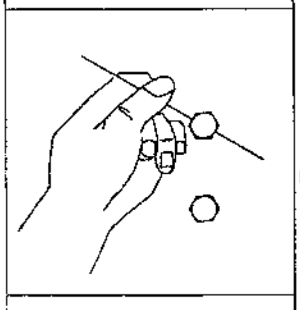
LOCKWIRE INSTALLATION PROCEDURES (Effectivity: All) (Figures 1 and 2)

NOTE

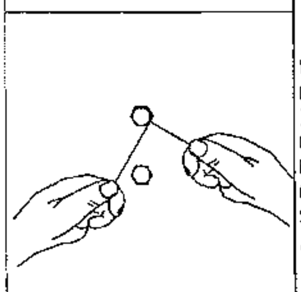
Figure 1 illustrates a typical RH lockwiring procedure. The LH lockwiring procedure is exactly opposite of the RH. Although there are numerous lockwiring operations performed on the airplane, practically all are derived from the basic examples shown in Figure 2.



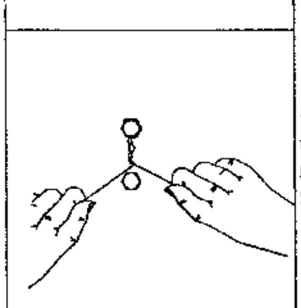
POSITION THE HOLES.



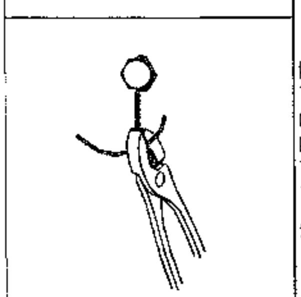
INSERT PROPER GAGE WIRE.



WRAP UPPER END OF WIRE AND BEND IT AROUND THE HEAD OF THE BOLT. THEN UNDER THE OTHER END OF THE WIRE. BE SURE WIRE IS TIGHT AROUND HEAD.

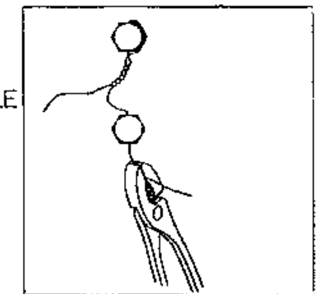


TWIST WIRE UNTIL WIRE IS JUST SHORT OF HOLE IN THE SECOND BOLT.

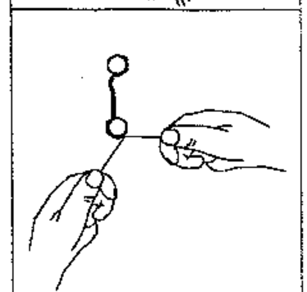


KEEPING WIRE UNDER TENSION, TWIST IN A CLOCKWISE DIRECTION UNTIL THE WIRE IS TIGHT. WHEN TIGHTENED THE WIRE SHALL HAVE APPROXIMATELY 7 TO 10 TWISTS PER INCH.

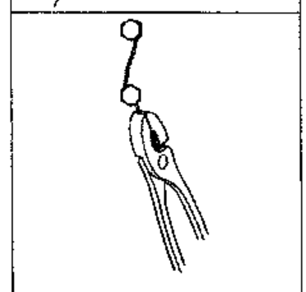
INSERT THE UPPERMOST WIRE, WHICH POINTS TOWARD THE SECOND BOLT, THROUGH THE HOLE WHICH LIES BETWEEN THE NINE AND TWELVE O'CLOCK POSITIONS. GRASP THE END OF THE WIRE WITH A PAIR OF PLIERS AND PULL THE WIRE TIGHT.



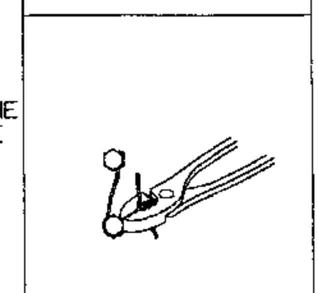
BRING THE FREE END OF THE WIRE AROUND THE BOLT HEAD IN A COUNTERCLOCKWISE DIRECTION AND UNDER THE END PROTRUDING FROM THE BOLT HOLE. TWIST THE WIRE IN A COUNTERCLOCKWISE DIRECTION.



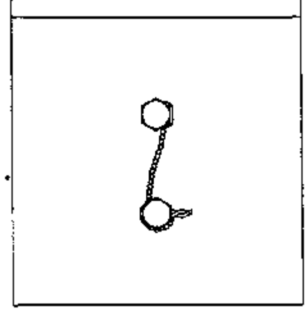
GRASP THE WIRE BEYOND THE TWISTED PORTION AND TWIST THE WIRE ENDS COUNTERCLOCKWISE UNTIL TIGHT.



DURING THE FINAL TWISTING MOTION OF THE PLIERS, BEND THE WIRE DOWN AND UNDER THE HEAD OF THE BOLT.



CUT OFF EXCESS WIRE WITH DIAGONAL CUTTERS.



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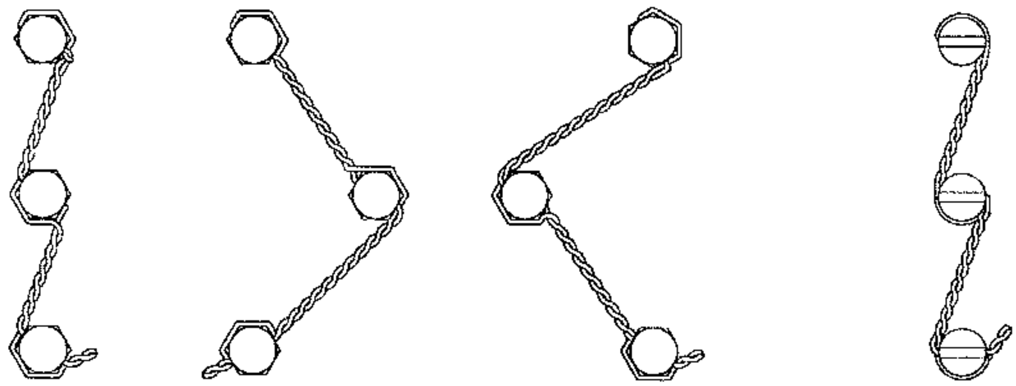
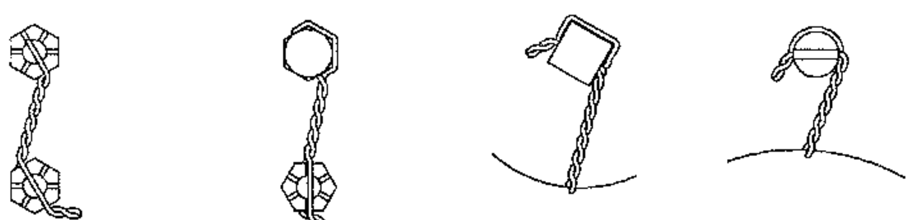
Lockwiring Procedure (RH) (Effectivity: All)
Figure 1



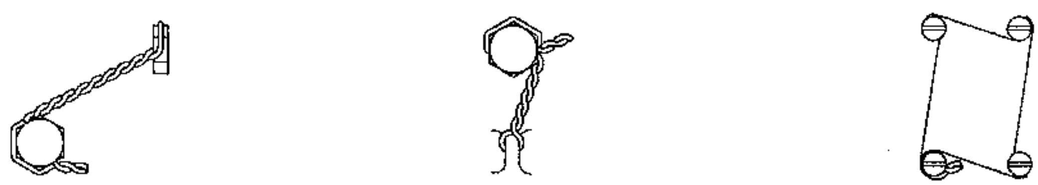
EXAMPLE 1 EXAMPLE 2 EXAMPLE 3 EXAMPLE 4

BOLTS, FILLISTER HEAD SCREWS, SQUARE HEAD PLUGS, AND OTHER SIMILAR PARTS ARE WIRED SO THAT THE LOOSENING TENDENCY OF EITHER PART IS COUNTERACTED BY THE TIGHTENING OF THE OTHER PART. THE DIRECTION OF TWIST FROM THE SECOND TO THE THIRD UNIT IS COUNTERCLOCKWISE TO KEEP THE LOOP IN POSITION AGAINST THE HEAD OF THE BOLT. THE WIRE ENTERING THE HOLE IN THE THIRD UNIT WILL BE THE LOWER WIRE AND BY MAKING A COUNTERCLOCKWISE TWIST AFTER IT LEAVES THE HOLE, THE LOOP WILL BE SECURED IN PLACE AROUND THE HEAD OF THAT BOLT.



EXAMPLE 5 EXAMPLE 6 EXAMPLE 7 EXAMPLE 8

METHODS FOR WIRING VARIOUS STANDARD ITEMS. WIRE MAY BE WRAPPED OVER THE UNIT RATHER THAN AROUND IT WHEN WIRING CASTELLATED NUTS OR ON OTHER ITEMS WHEN THERE IS A CLEARANCE PROBLEM.



EXAMPLE 9

THE METHOD FOR WIRING BOLTS IN DIFFERENT PLANES. NOTE THAT WIRE SHOULD ALWAYS BE APPLIED SO THAT TENSION IS IN THE TIGHTENING DIRECTION.

EXAMPLE 10

HOLLOW HEAD PLUGS WIRED WITH THE TAB BENT INSIDE THE HOLE TO AVOID SNAGS AND POSSIBLE INJURY TO PERSONNEL.

EXAMPLE 11

CORRECT APPLICATION OF SINGLE WIRE TO CLOSELY SPACED MULTIPLE GROUP.

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Lockwiring Examples (Effectivity: All)
Figure 2

CHART 1
COTTER PIN INFORMATION (Effectivity: All)

Material	Temperature	Service
MS24665 Cotter Pins Carbon Steel	Ambient Temperature up to 460°F	Normal atmosphere cotter pins contacting cadmium plated bolts or nuts
MS24665 Cotter Pins Corrosion-Resistant Steel	Ambient Temperature up to 800°F	Nonmagnetic requirements cotter pins contacting corrosion-resistant steel bolts or nuts in a corrosive atmosphere.

Observe the following guidelines when installing lockwire:

a. Use the same type and diameter of lockwire as that employed during the initial assembly. Except where otherwise specified, the wire used on the airplane power plant is heat and corrosion resistant steel wire of 0.025-inch diameter.

b. Lockwire must be tight after installation to prevent failure due to rubbing or vibration.

c. Lockwire must be installed in a manner that tends to tighten and keep a part locked in place, thus counteracting the natural tendency of the part to loosen.

d. Lockwire must never be overstressed. It will break under vibrations if twisted too tightly. The lockwire shall be pulled taut when being twisted, but shall have minimum tension, if any, when secured.

e. Lockwire ends must be bent toward the engine, or structure, to avoid sharp or projecting ends which might present a safety hazard or vibrate in the air stream.

f. Internal wiring must not cross over or obstruct a flow passage when an alternate method can be used.

LOCKWIRE HOLE ALIGNMENT (Effectivity: All)

Check the units to be lockwired to make sure that they have been correctly torqued and that the wiring holes are properly positioned in relation to each other. When there are two or more units, it is desirable that the holes in the units be in the same relationship to each other. Never overtorque or loosen units to obtain proper alignment of the holes. It should be possible to align the wiring holes when the units are torqued within the specified limits. However, if it is impossible to obtain a proper alignment of the holes without either over or under torquing, select another unit which will permit proper alignment within the specified torque limits.

LOCKWIRE TWISTING (Effectivity: All)

To prevent mutilation of the twisted section of the wire when using pliers, grasp the wire at the ends or at a point that will not be twisted. Lockwire must not be nicked, kinked or mutilated. Never twist the ends off with pliers. When cutting off ends, leave at least three complete turns after the loop, exercising extreme care to prevent the wire ends from falling into areas where they might create a hazard or damage.

COTTER PIN INSTALLATION (Effectivity: All) (Figure 3)

Use the following to select and install cotter pins for the desired application:

a. Cotter pins should be new upon each application.

b. Select cotter pin material in accordance with temperature, atmosphere and service limitations as specified in Chart 1.

c. When nuts are to be secured to the fastener with cotter pins, tighten the nut to the low side (minimum) of the applicable specified or selected torque range, unless otherwise specified, and if necessary, continue tightening until the slot aligns with the hole. In no application should the high side (maximum) torque range be exceeded.

d. Castellated nuts mounted on bolts may be safetied with cotter pins or lockwire. The preferred method is with the cotter pin bent parallel to the axis of the bolt. The alternate method, where the cotter pin is mounted normal to the axis of the bolt, may be used when the cotter pin in the preferred method is apt to become a snag.

e. If 50 percent or more of the cotter pin diameter is above the nut castellation, a washer should be used under the nut or a shorter fastener should be used. A maximum of two washers may be permitted under a nut.

f. Use the largest nominal diameter cotter pin listed in MS24665 which the hole and slots will accommodate. No application of a cotter pin to any nut, bolt or screw is permitted if the pin size is less than the sizes illustrated in Figure 3.

g. Install the cotter pin with the head firmly in the slot of the nut with the axis of the eye at right angles to the bolt shank. Bend prongs so that the head and upper prong are firmly seated against the bolt.

h. In the pin applications, install the cotter pin with the axis of the eye parallel to the shank of the clevis pin or rod end. Bend the prongs around the shank of the pin or rod end.

i. Cadmium plated cotter pins should not be used in applications bringing them in contact with fuel, hydraulic fluid or synthetic lubricants.

KEYWASHERS (TAB AND CUP TYPES) (Effectivity: All)

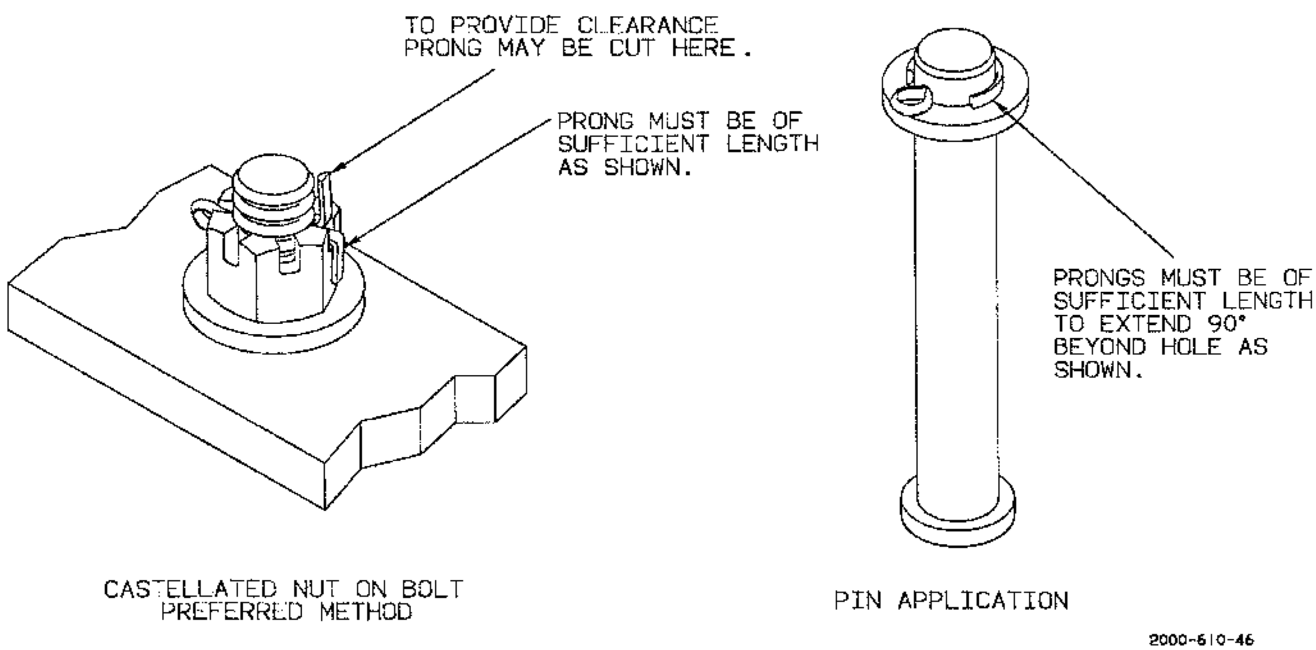
The terms keywasher, tabwasher and cupwasher are interchangeable.

CAUTION

Always use new washers for each assembly, as these washer types may only be used once. When bending or setting the tabs, do not use sharp pointed tools. Use of such tools can lead to subsequent failure of the locking tabs which, upon becoming detached, can cause extensive damage.

RETAINING RINGS (SPIROLOX, ETC.) (Effectivity: All)

Retaining rings must be installed using approved retaining ring pliers. Internal rings must not be compressed beyond the point where ends of the ring meet. External type rings must be expanded only enough to allow installation without becoming bent. After installation, ensure each retaining ring is completely seated in its groove, without looseness or distortion.



Cotter Pin Installation (Effectivity: All)
Figure 3

TURNBUCKLE LOCK CLIP INSTALLATION
(Effectivity: All)
(Figure 4)

NOTE

Turnbuckles must be filled with grease (10, Chart 1, 20-00-00) before threaded terminals are screwed into the turnbuckle barrel.

Safety turnbuckles with lock clips as follows:

a. Prior to safetying, both threaded terminals should be screwed an equal distance into the turnbuckle barrel and should be screwed in at least so far that not more than three threads of any terminal are exposed outside the body.

b. After the turnbuckle has been adjusted to its locking position (groove on terminals and slot indicator notch on barrel aligned), insert the end of the locking clip into the terminal and barrel until the "U" curved end of the locking clip is over the hole in the center of the barrel as follows:

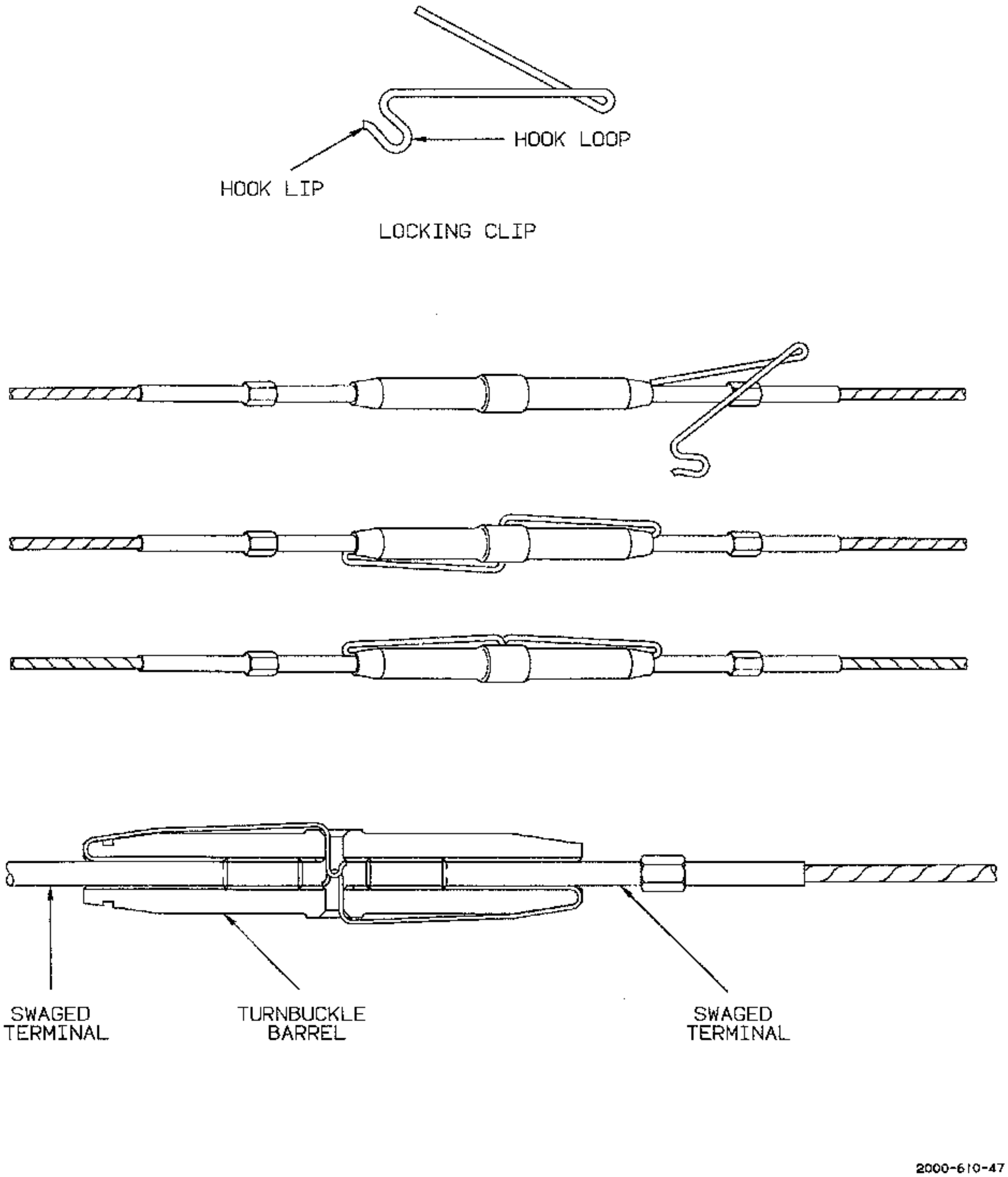
1. Press the locking clip into the hole to its full extent.

2. The curved end of the locking clip will latch in the hole in the barrel.

3. To check proper seating of locking clip, attempt to remove pressed "U" end from barrel hole with fingers only. Do not use a tool as the locking clip could be distorted.

c. Locking clips are for one time use only and should not be reused.

d. Both locking clips may be inserted in the same hole of the turnbuckle barrel or in opposite holes of the turnbuckle barrel.



Turnbuckle Safetying (Effectivity: All)
Figure 4

AIRPLANE FINISH CARE - MAINTENANCE PRACTICES (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

URETHANE PAINT CARE (Effectivity: All)

CAUTION

Prior to washing, attach the pitot covers securely and plug or mask off all other openings. Use special care to avoid washing away grease from any lubricated area. Prior to cleaning, cover such areas as wheels, brakes, etc., and relubricate after cleaning as necessary. Ensure all maskings and coverings are removed before returning the airplane to service.

DURING THE CURING PERIOD (ONE MONTH) (Effectivity: All)

a. Avoid prolonged flights in heavy rain or sleet. Avoid any operating conditions which might cause abrasion or premature finish deterioration.

b. Clean the airplane with mild detergents and water only. Use a clean soft rag, keeping it free from dirt and grime. Rinse thoroughly with clean water.

c. Use no waxes, polishes, rubbing compounds or abrasive cleaners of any type. The use of such items can permanently damage the surface finish.

d. Stubborn oil or soot deposits on cowlings, wheel wells, etc. may be removed gently with automotive tar removers.

AFTER THE CURING PERIOD (Effectivity: All)

a. Continue to wash the airplane regularly. Use mild detergents and water only. Rinsing thoroughly with clear water prevents detergent residue buildup that can dull the paint appearance.

b. Normally, waxing is not necessary; however, if waxing is desired, select a high quality automotive or airplane waxing product. Never use rubbing compounds or abrasive cleaners of any type. Do not use a wax containing silicone because silicone polishes are difficult to remove from surfaces. A good coat of paste wax (15, Chart 2, 20-00-00) will protect the surface from the sun's rays and prevent the paint from oxidizing as fast.

PLACARDS (Effectivity: All)

Ascertain that all placards are in place and legible. Refer to Chapter 11 for detailed information on exterior placards.

COMPOSITE SURFACE PREPARATION FOR FINISHING (Effectivity: All)

PAINT REMOVAL (Effectivity: All)

CAUTION

Never use strippers on composite surfaces. Damage may occur when the stripper reacts with the resin.

Unless otherwise specified, all composite surfaces shall have paint removed by using the following procedure:

a. Remove all paint from an area slightly larger than the damaged area by sanding with sandpaper (7, Chart 2, 20-00-00).

NOTE

When removing paint from composite surfaces, use care not to sand away the resin and expose any fibers.

b. When all paint has been removed, lightly abrade the composite surface using a fine or very fine grade of Scotchbrite or sandpaper (16, 21, Chart 2, 20-00-00) until the resin surface has a smooth, dull appearance. The prepared area should be slightly larger than the damaged area with the edges faired with the existing paint.

CAUTION

Do not apply Devcon, body putty or other plastics having a different coefficient of expansion than the original resin. Refer to the BEECHCRAFT Starship 1 Structural Repair Manual for approved repair procedures.

c. Use a vacuum to remove dust and paint particles.

d. Thoroughly rinse the affected area with clean water and allow to air dry. Compressed air may be blown across the surface to accelerate drying time.

e. Remove all remaining dust from the prepared surface using MEK (1, Chart 2, 20-00-00) and a lint-free cloth.

f. Apply the required filler, surfacer, primer and paint to the prepared composite surface as outlined by procedures in this chapter.

FIBERGLASS AND ARAMID FIBER SURFACES (Effectivity: All)

CAUTION

Radar operation can be adversely affected by abrupt variations in the thickness of the material used to finish radomes, which could be caused by excessive and/or uneven buildup of the finishes and coatings during refinishing. Therefore, it is recommended that a damaged radome be replaced rather than repaired. When a new radome is needed, refer to URETHANE PAINT PROCEDURES in this chapter to apply the finish coat of urethane paint (no more than three coats). New radomes already have the anti-static coating applied.

APPLICATION OF PINHOLE FILLER (Effectivity: All)

NOTE

Pinhole filler is normally only used to fill pinholes on new composite surfaces and may not be needed in some instances.

a. Fill pinholes by wiping pinhole filler (18, Chart 2, 20-00-00) on the surface. Use a circular motion to cover the entire area. A squeegee may be used to force the filler into the pinholes.

b. After the pinhole filler has dried, lightly sand with a fine or very fine grade of Scotchbrite or sandpaper (16 or 21, Chart 2, 20-00-00). Excess pinhole filler may be wiped from the prepared area.

c. Remove dust from the prepared area by wiping with a clean lint-free cloth or by using compressed air to blow away particles.

NOTE

Avoid using solvents to clean the prepared surface after pinhole filler has been applied.

APPLICATION OF SANDING SURFACER (Effectivity: All)

After all pinholes have been filled, apply the epoxy sanding surfacer as follows:

a. Use a tack rag to tack the surface immediately before applying the surfacer.

b. Apply two coats of surfacer (19, Chart 2, 20-00-00) to the area being painted. Dry film thickness of the surfacer should be 2.0 ±0.5 mils.

c. Allow the surfacer 24 to 36 hours of drying time, depending upon ambient conditions.

d. Abrade the surface with a fine or very fine grade of Scotchbrite or sandpaper (16 or 20, Chart 2, 20-00-00) of 280 grit or finer. The surfacer should be a different color than the top coat and nominal thickness shall not exceed 2.5 mils after sanding.

e. A pinhole filler may be applied after the use of sanding the surfacer if necessary.

NOTE

The combined thickness of the surfacer and topcoat must not exceed 5.0 mils.

URETHANE PAINT PROCEDURES
(Effectivity: All)

CAUTION

Refer to Chapter 11-10-00 for detailed information on approved paint formulas and colors used on the exterior of the airplane.

NOTE

The time normally required for urethane paint to cure must be extended at temperatures below 70° F. The paint will not cure at temperatures below 60° F.

CAUTION

Never use aluminum foil to mask electrothermal windshields during painting. The metal brighteners used on the aluminum foil and the stannous oxide used as an anti-static coating on electrothermal windshields may combine to form lead oxide, producing a mirror-like glaze on the windshield surface. Cover the windshield with pasteboard or paper masking material only.

After pinhole filler and epoxy sanding surfacer (if required) have been applied, the prepared surface should receive a coat of urethane primer and the topcoat of urethane enamel. Careful observance of the following primer and paint application procedures will result in a smooth, hard, glossy finish with firm adhesion for maximum life.

NOTE

Precut stripe, numeral, and letter patterns are available through Modagrafics of Kansas Inc., 1720 S. 151 Street West, Goddard, Kansas 67052.

APPLICATION OF EPOXY-POLYMIDE PRIMER (Effectivity: All)

Epoxy-polymide chemical and solvent resistant primer may be used as an alternate intermediate primer to prepare composite surfaces for urethane topcoats, or as a general purpose primer for all other epoxy painted surfaces.

a. Mix the primer (9, Chart 2, 20-00-00) and catalyst in accordance with the manufacturer's instructions.

NOTE

To obtain the best results, the manufacturer's mixing instructions must be followed carefully. Failure to mix the base and catalyst at the proper ratio may prevent the primer from curing properly. Epoxy-polymide primer has a pot life of about 12 hours at 77° F. and 50 percent relative humidity. This primer has a one hour induction period after it is mixed.

b. Use the following techniques to apply epoxy-polymide primers:

1. Always apply a uniform wet coat of primer. A dappled or spotted surface indicates the surface is not completely covered. Coverage must be complete for proper paint adhesion.

2. Never try to achieve a hiding coat. A hiding coat will make the film too thick. Dry film thickness of the epoxy-polymide primer shall be between 0.4 and 0.7 mils.

3. Regulate the air supply at the spray gun to 25 to 40 psi. Low air pressure will prevent the epoxy primer mixture from atomizing too fast.

4. Hold the spray gun nozzle perpendicular 8 to 12 inches from the surface being painted and use smooth, even strokes which overlap. This should prevent the primer from landing dry, and will help prevent excess buildup or uncovered areas.

c. When properly mixed and applied, epoxy-polymide primer normally cures within 6 hours at 70° F. If the primer does not cure within the specified time, the material was improperly mixed. Remove primer roughness and overspray by sanding with sandpaper (21, Chart 2, 20-00-00). When the primer coat cannot be scratched by fingernail or when sandpapering does not cause the primer to ball up, the primer is cured well enough for applying paint. Use compressed air to blow dust from the primed area and lightly use a tack cloth to pick up any remaining dust or particles. Apply the original finish as required.

APPLICATION OF URETHANE PRIMER (Effectivity: All)

a. Mix the urethane primer (22, Chart 2, 20-00-00) and catalyst in accordance with the manufacturer's instructions.

NOTE

To obtain the best results, the manufacturer's mixing instructions must be followed carefully. Failure to mix the base and catalyst at the proper ratio will seriously impair the quality of the film. Urethane primer has a pot life of about 8 hours. Whenever possible, the primer should be applied immediately after mixing.

b. Use the following techniques to apply the urethane primer:

1. Always apply a uniform wet coat of primer. A dappled or spotted surface indicates the composite surface is not completely covered. Coverage must be complete for proper paint adhesion.

2. Never try to achieve a hiding coat. A hiding coat will make the film too thick. Dry film thickness of the urethane primer shall be between 0.5 and 0.7 mils.

3. Regulate the air supply at the spray gun to 25 to 40 psi. Low air pressure helps prevent the urethane primer mixture from atomizing too fast.

4. Hold the spray gun nozzle perpendicular 8 to 12 inches from the surface being painted and use smooth, even strokes which overlap. This should prevent the primer from landing dry, and will help prevent excess buildup or uncovered areas.

c. When properly mixed and applied, urethane primer normally cures for recoating in 20 to 40 minutes. Recoating of the urethane primer should be accomplished only after the initial coat is completely cured. Remove overspray or roughness by sanding with wrinkled Kraft paper or sandpaper (21, Chart 2, 20-00-00). Use compressed air to blow dust from the primed area and lightly use a tack cloth to pick up any remaining dust or particles.

NOTE

The minimum drying time for urethane primer is approximately 2 hours under conditions of low humidity at temperatures of 85° to 90° F. When the primer coat cannot be scratched by fingernail or when sandpapering does not cause the primer to ball up, the urethane topcoat may be safely applied.

APPLICATION OF URETHANE PAINT (Effectivity: All)

CAUTION

Refer to Chapter 11-10-00 for detailed information on approved paint formulas and colors used on the exterior of the airplane.

NOTE

When interior or exterior paint is required, refer to the airplane log book for the part number of the paint used on the airplane before it was first delivered.

a. Mix the urethane paint and catalyst in accordance with the manufacturer's instructions.

NOTE

To obtain the best results, the manufacturer's mixing instructions must be followed carefully. Failure to mix the base and catalyst at the proper ratio will seriously impair the quality of the film. Urethane paint has a pot life of about 6 to 8 hours at 77° F. and 50 percent relative humidity. A 30-minute induction period should be observed after the paint is mixed.

b. Use the following techniques to apply urethane paint:

1. Application of a topcoat should consist of at least 2 coats. The first coat, referred to as the tack coat, shall be applied as a uniform wet film thin enough to allow the primer to show through.

2. Regulate the air supply at the spray gun to 45 to 55 psi. Minimum air pressure increases the quality of the spray pattern and final topcoat appearance; therefore, avoid using high air pressure.

3. Hold the spray gun nozzle perpendicular and 8 to 12 inches from the surface being painted while using smooth, even strokes which overlap.

4. Allow sufficient time (normally 20 to 30 minutes) between the tack coat and successive coats to achieve a tack. This will allow a successive coat to adhere to the previous coat without running or sagging.

5. The final coat shall be applied as a full wet coat sufficient to flow out to a smooth glossy finish.

6. Avoid practices that encourage orange peel. Orange peel is normally caused by one of the following:

- Paint not sufficiently thinned.
- Paint temperature to low.
- Not depositing a wet coat.
- Paint gun stroked too rapidly or too far from the surface resulting in a dry coat.
- Insufficient air pressure.
- Too much air pressure.

7. Dry film thickness of the urethane paint shall be from 1.4 to 2.5 mils.

c. When properly mixed and applied, urethane paint will normally cure within 16 hours. Cure time may be accelerated by applying heat (not to exceed 130° F.) to the paint. Allow the paint at least 25 minutes to set before applying heat. This will prevent solvent popping and blisters. If scuff sanding is required for the application of strips or markings, use sandpaper (21, Chart 2, 20-00-00).

NOTE

Anytime an airplane is repainted or touched up, inspect all placards to ensure that they are not covered with paint, are easily readable and are securely attached. Refer to Chapter 11 and replace any defaced placards.

NOTE

Allow the finished assembly at least 24 hours before exposure to inclement weather conditions. Urethane finishes are normally at 85 percent of full hardness within 24 hours when cured at temperatures above 80° F.

CAUTION

The urethane finish undergoes a curing process for a period of time after application. During the first month after paint application, some special care is required. Airplane owners should observe the finish care recommendations set forth under URETHANE FINISH CARE in this chapter to ensure a quality lasting airplane finish.

SPECIAL PAINT PROCEDURES (Effectivity: All)

The following procedures are general guidelines to be used when finishing components on the airplane which require a special coating or procedure peculiar to a component's finish requirements.

AREAS SUSCEPTIBLE TO MUD AND SPRAY (Effectivity: All)

Areas of the airplane that are susceptible to mud and spray are listed as follows:

- Main and nose landing gear
- Cadmium plated areas of the main and nose landing gear
- Landing gear fork and wheels
- Main landing gear and nose landing gear wheel wells
- The surface of the landing gear doors that would be inside the wheel well when the gear doors are closed

Perform the following to prepare the surface for painting:

CAUTION

Beech Aircraft Corporation does not recommend the use of any type of paint stripper to remove paint from the landing gear components or wheel wells. Paint stripper may cause the start of corrosion on the dissimilar metal types used for landing gear and wheel well components. Touch-up painting is recommended.

a. Mask the area around the paint-damaged area to be touched up.

b. Remove any loose edges of the existing damaged paint using a high-tack adhesive tape.

CAUTION

Use care not to remove any metal from the landing gear components while fairing the paint edges.

c. Using a coarse grade of sandpaper (7, Chart 2, 20-00-00) fair the edges of the paint to the metal.

When the paint is faired to the metal, use a fine grade of sandpaper (21, Chart 2, 20-00-00) to remove any scratches left by the coarse grade of sandpaper.

d. Apply one coat of matterhorn white epoxy paint to the prepared areas of the landing gear. Nominal paint thickness is 1 mil.

CLEANING OF EPOXY PAINTED AREAS WITH STRIPPER (Effectivity: All)

Areas of the airplane are finished with epoxy paints because they require a lustrous paint with a tougher film than normal enamels. Use the following procedures to clean and strip epoxy paint from METAL SURFACES ONLY:

NOTE

At temperatures below 70° F., the amount of time required to cure epoxy paint is extended. At temperatures below 60° F. epoxy paint will not cure and should not be applied. Stripping should be accomplished only when environmental conditions will allow the new finish to dry.

CAUTION

Strippers are approved for use on metal surfaces only. Refer to COMPOSITE SURFACE PREPARATION FOR FINISHING in this chapter for procedures to remove epoxy paint from composite surfaces.

Epoxy paints and primer are difficult to strip because of their resistance to chemicals and solvents; therefore, a paint stripper made specifically for epoxy paints should be used. If an epoxy stripper is not available, use a good enamel stripper. Removing the finish with such a substitute will require several applications and working the stripper with a stiff brush or wooden scraper.

a. Mask around the edge of the area to be painted if necessary. Use a double thickness of heavy paper to prevent accidental splashes of paint stripper from penetrating the masking.

WARNING

Epoxy strippers usually contain acids that will irritate or burn the skin. Wear rubber gloves and eye protection when using the stripper. Also ensure that the area is adequately ventilated.

CAUTION

Never use any type of stripper to remove paint from composite surfaces. Chemicals in the stripper may react with and damage the composite material.

b. Apply epoxy stripper in accordance with the manufacturer's instructions. Try to stay approximately 1/8-inch away from the masking tape. This will necessitate a little more cleanup upon finishing, but will prevent any damage to the adjacent finish. The stripper will not attack aluminum during the stripping process and can be neutralized by rinsing the affected area with water.

c. Rinse the area with water and dry.

d. Clean the stripped area carefully with MEK (1, Chart 2, 20-00-00) to prevent tiny particles of loose paint from adhering to the stripped area.

e. Using a nylon scratch pad or aluminum wool (25, Chart 2, 20-00-00) dipped in clean water, clean the metal surface with a cleanser such as Bon Ami, Ajax or Comet. A good scouring will provide a completely clean surface.

f. Rinse thoroughly with clean water and dry the stripped area carefully. Drying may be accelerated by blowing compressed air across the surface. Wet masking should be replaced.

g. Refer to APPLICATION OF EPOXY-POLYMIDE PRIMER in this chapter and apply the primer to the prepared surface.

h. Apply the original finish as outlined in this chapter.

ALUMINUM (Effectivity: All)

Alodine (2, Chart 2, 20-00-00), when mixed 2 ounces per gallon of water, is an acceptable treatment material for aluminum. Mix only in rubber, plastic or stainless steel containers. Alodine series products contain flourides that should not be mixed in glass containers.

Coat the area with the Alodine solution and allow the coating to dwell for approximately five minutes. After the dwell time has elapsed, wash the area with water and blow (do not wipe dry) dry. Install the component and prime with epoxy-polyamide primer (9, Chart 2, 20-00-00).

CAUTION

Keep solution confined to the affected area. Mask or seal all cracks and crevices, all steel parts and any mechanical components. Wash all brushes and clothes immediately after use to prevent inadvertent contact with the acid solution and to eliminate a possible fire hazard from any such materials that dry without being washed.

WARNING

Brushes and cloths should not be left in the solution. They should be washed immediately after use. If such items are left to dry in open air, they could create a fire hazard.

STEEL (Effectivity: All)

All untreated steel parts should be coated with corrosion preventive compound (27, Chart 2, 20-00-00) before installation.

RUBBER SEALS (Effectivity: All)

Apply one coat of a thoroughly dissolved solution of one part Oakite No. 6 (28, Chart 2, 20-00-00) and two parts water to all rubber surfaces that are to come in contact with either metal or other rubber surfaces.

ENVIRONMENTAL AREA BEHIND THE AFT PRESSURE BULKHEAD (Effectivity: All)

The entire air conditioner condenser compartment shall be painted with quick-drying black lacquer (29, Chart 2, 20-00-00). The only exceptions are those items referenced under PAINT FREE AREAS in this chapter.

CONTROL CABLES AND CHAINS (Effectivity: All)

All control cables and chains without protective coating shall be protected by a dip coating of corrosion preventative compound (27, Chart 2, 20-00-00) prior to installation. The control cables and chains may be touched-up as needed after they have been installed. All control cables and chains are to be paint free.

ENGINE COMPARTMENT (Effectivity: All)

All unplated, unprotected steel parts used for interior surfaces of the engine compartment shall be protected by two coats of primer (9, Chart 2, 20-00-00).

PAINT FREE AREAS (Effectivity: All)

The following areas shall be kept free from paint:

a. Engine controls.

b. Cowl heat shields.

c. Flight control cables and chains including the following:

1. Cables, cable fittings, and cable grooves in pulleys, sectors and drums.
2. Chains and sprockets.
3. Bearings, bearing or cam surfaces and cam rods.
4. Control column sliding tube and solid film lubed surfaces.
5. Fairleads.
6. Actuators - flap, forward wing, rudder trim, elevon trim, elevator trim and nose gear steering disconnect.
7. Elevon trim mixer.
8. Servos - autopilot pitch and trim.
9. Flap tracks.

d. Control pedals.

e. Exhaust stacks.

f. Firewalls and wrought aluminum parts aft of the firewall, with the exception that aluminum parts attached directly to the firewall shall be primed and painted in detail, except for mating surfaces of parts used as electrical grounding connectors.

g. Engine air inlet lip (stainless steel).

h. Engine inlet air duct, bypass air ducts, vane and oil cooler

i. All tubing with the following exceptions:

1. Unplated steel, which shall receive two coats of primer on the exterior.
2. As noted for the interior of the engine compartment.

3. Interiors where the color scheme must be maintained.

j. Interior of all fluid lines, including oxygen lines and instrument lines.

k. Chromium-plated portions of the landing gear/ piston tubes, axles and gear placards.

l. Rubber and rubber-like surfaces.

m. Electrical wiring, unless otherwise noted as a specific requirement.

n. Glideslope antenna.

o. The following air conditioning system items:

1. Air conditioner condenser fan.

2. Air conditioner compressor.

3. Air conditioner service sight glass, service valves and reset switches.

p. Air circulation blowers.

q. Avionics cooling blowers.

r. Bleed air heat exchanger.

s. Oxygen service valves, gage and cylinder.

t. Pressurization outflow valves.

u. Cabin entrance door:

1. Surface of slide pins, striker plates and carrier rods.

2. Insert threads and fastener threads.

3. Buffed damper.

4. Buffed door handle.

5. All internal bearing journal surfaces.

6. All internal springs.

7. All shaft bearing surfaces.

8. All solid film lubrication surfaces.

9. Aluminum flexible conduit.

10. Vinyl coated cable.

11. Buffed scuff plate - door threshold.

12. Airstair door steps and E.L. panel retainers.

v. The fasteners, washers and grommets attaching the following parts to the airframe:

1. Nose avionics compartment panels (213AL and 214AR).

2. Nose access panels (131AL and 132AR).

3. Forward wing fairings (211AL, 211BL, 212AR and 212BR).

4. Tipsail fairings (592 and 692).

5. Landing light lens.

6. Engine cowling, upper aft.

7. Engine cowling, upper forward.

8. Engine cowling, lower aft.

9. Engine cowling, lower forward.

10. Engine cowling access doors (411AT, 411BB, 421AT and 421BB).

11. Nacelle panels (581AT and 681AT).

12. Nacelle panels (582CR, 682CR, 582BL and 682BL).

13. Oxygen system service panel access panel (132BR).

w. Segmented diverter strip buttons on radome (mask diverter strip buttons only, paint to edge of buttons).

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GENERAL - DESCRIPTION AND OPERATION (Figure 1)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

The Starship 1 environmental system maintains flight crew and passenger comfort through the computerized monitoring and control of the pressurization, heating, cooling and air distribution systems. Refer to Figure 1 for the system schematic

Engine compressor discharge air (P3) is routed from each engine to the forward and aft ventilation blowers, where it is circulated throughout the airplane interior for heating and pressurization. Bleed air mass flow and temperature are monitored by the Environmental System Controller (ESC) through several transducers and sensors. The ESC is loacated on the aft fuselage electrical equipment shelf. The ESC exercises automatic control over the flow control, bypass, diverter and emergency air valves in relation to bleed air control settings selected by the crew. Refer to Chapter 21-40-00 for detailed information on the bleed air heating system. Pressurization control is accomplished with two outflow valves and the pressurization controller. Refer to Chapter 21-30-00 for detailed information on pressurization.

Cooling is provided by an R-12 refrigerant air conditioner system. The system consists of an engine driven compressor (RH engine), pre-condenser, condenser, forward and aft evaporators, and the associated plumbing, valves and controls. An air conditioning service compartment containing a sight glass and service valves is located on the LH side of the aft fuselage. Refer to Chapter 21-50-00 for detailed information on the cooling system.

The conditioned air is circulated throughout the airplane distribution ducts by two split impeller ventilation blowers. The aft ventilation blower circulates cool air through the cabin overhead duct and warm air through the cabin sidewall ducts. The forward ventilation blower circulates cool air to the instrument panel CRT display units and warm air to the cockpit defrost and floor outlets. An alternate avionics blower is mounted on the cockpit crossover duct to provide sufficient cooling air to the avionics should the forward ventilation blower fail. Refer to Chapter 21-20-00 for detailed information on the air distribution system. Cooling air for the avionics equipment located in the airplane nose is provided by two avionics blowers. Refer to Chapter 21-21-00 for detailed information on the nose avionics cooling system.

The temperature control system is designed to maintain cabin and cockpit temperature between 65° and 85° F. A LCD CABIN TEMP display located on the copilot's inboard subpanel indicates cabin temperature as sensed by the ESC. The ESC monitors several transducers and sensors in the cockpit, cabin and lower aft fuselage to determine temperature and airflow. Automatic or manual temperature control modes are selected by the crew. Refer to Chapter 21-60-00 for detailed information on temperature sensing and control.

SPECIAL TOOLS AND RECOMMENDED MATERIALS (Effectivity: All)

The special tools and recommended materials listed in Charts 1 and 2 as meeting federal, military or vendor specifications are provided for reference only and are not specifically prescribed by Beech Aircraft Corporation. Any product conforming to the specification listed may be used. The products included in these charts have been tested and approved for aviation usage by Beech Aircraft Corporation, by the vendor, or by compliance with the applicable specifications. Generic or locally manufactured products which conform to the requirements of the specification listed may be used even though not included in the charts. Only the basic number of each specification is listed. No attempt has been made to update the listing to the latest revision. It is the responsibility of the technician or mechanic to determine the current revision of the applicable specification prior to usage of the product listed. This can be done by contacting the vendor of the product to be used.

CHART 1
SPECIAL TOOLS AND EQUIPMENT (Effectivity: All)

TOOL NAME	PART NO.	MANUFACTURER	USE
1. Cabin Pressurization Unit	15-7600-1000 (50 Hz) 15-7600-1000 (60 Hz)	Tronair 1740 S. Eber Road Holland, Ohio 43528	Pressurize cabin for leak testing.
2. Safety Net (Cabin Door)	97-000000/939-1	Beech Aircraft Wichita, KS	Secure cabin door during pressure testing.
3. Compressor alignment tool	N/A	Fabricate per instructions in this chapter.	To facilitate compressor alignment.
4. Air conditioner recovery/recycle servicing unit	N/A	Obtain locally.	For charging the air conditioner system.
5. Belt deflection gage	N/A	Obtain locally.	To check tension on compressor drive belt.
6. Pitot Static Tester	1811-F-D	Barfield	To check outflow valves.

CHART 2
RECOMMENDED MATERIALS (Effectivity: All)

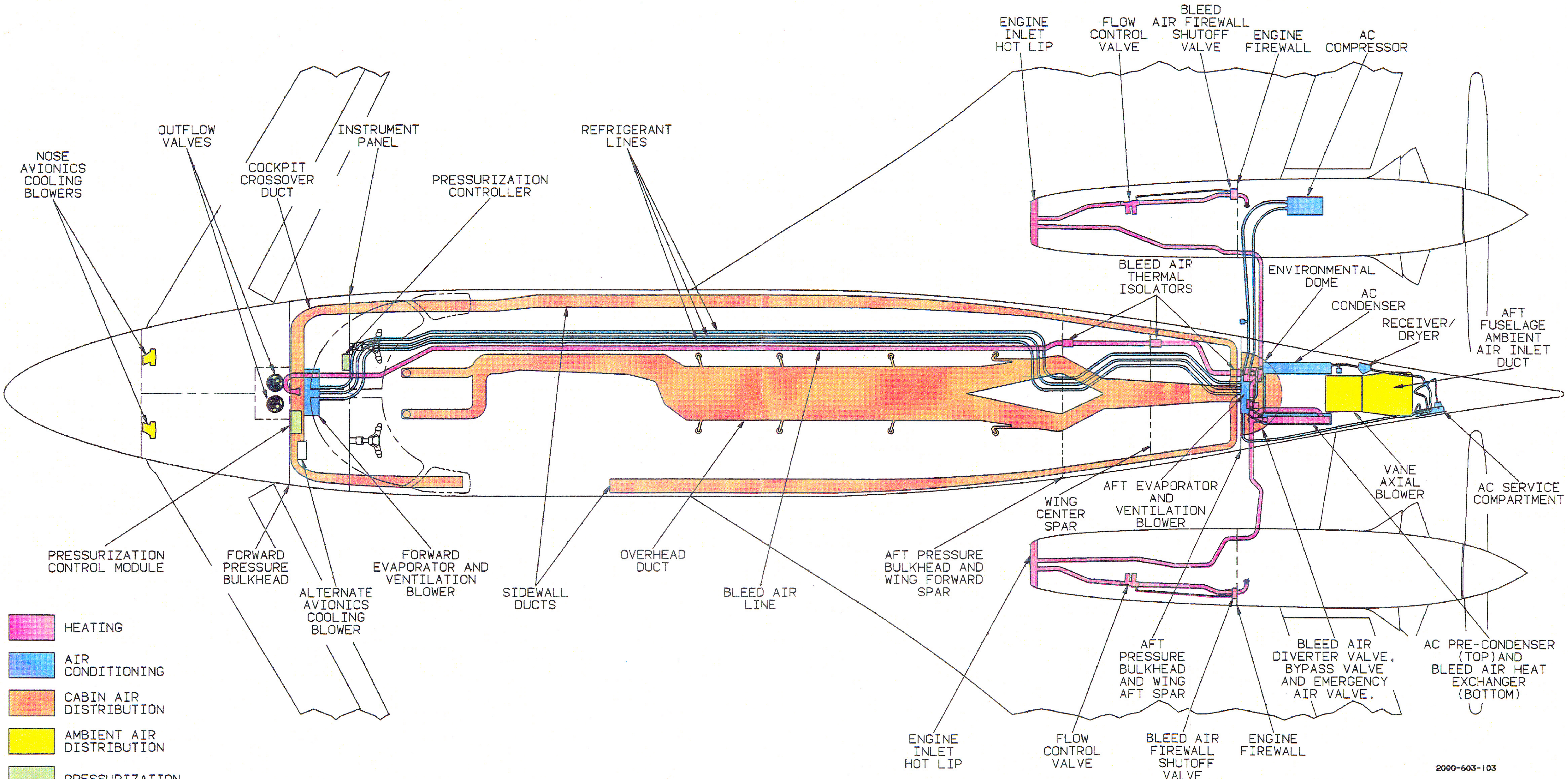
MATERIALS	SPECIFICATION	PRODUCT	VENDOR
1. Cleaner	TT-I-735 or MIL-I-10428	Isopropyl Alcohol	
2. Cleaner	TT-M-261	MEK	
3. Sealant	MIL-S-8802, Type II	Pro Seal 890	Pro-Seal Corp., Div. of Essex Chemical Corp., Aerospace Products Compton, CS 90220
4. Solvent, Dry Cleaner or White spirit	PD680 or British Specification 245	Stoddard Solvent (Mineral Spirits)	
5. Adhesive	MMM-A-121	EC1300L	Minnesota Mining Manufacturing Co., 900 Bush Ave., St. Paul, MN 55144
6. Adhesive		Dapcotac #3300	D Aircraft Products Co., 1191 Hawk Circle, Anaheim, CA 92708
7. Adhesive		Uralane 8089	Shell Chemical Corp., 2001 Kirby Drive Houston, TX 77019

CHART 2
RECOMMENDED MATERIALS (Effectivity: All) *(Continued)*

MATERIALS	SPECIFICATION	PRODUCT	VENDOR
8. Sealant		EC750	Minnesota Mining & Manufacturing Co., 900 Bush Ave. St. Paul, MN 55144
9. Primer		Locquic Primer "T"	Loctite Corporation, 705 N. Mountain Rd. Newington, CT 06111
10. Primer		Locquic Primer "N"	Loctite Corporation, 705 N. Mountain Rd. Newington, CT 06111
12. Retaining Compound		Retaining Compound 620	Loctite Corporation, 705 N. Mountain Rd. Newington, CT 06111
13. Air Conditioner Refrigerant Oil		Capela WF-100	Texaco, Inc., 135 E. 42nd New York, NY 10017
14. Air Conditioner Refrigerant		Racon 12	Racon Inc., 6040 S. Ridge Road Wichita, KS 67215
		Genetron 12	Allied Chemicals, Speciality Chemicals Div., Morristown, NJ
		Freon 12	Dupont Inc., Freon Products Div., Wilmington, DE 19898
15. Air Conditioner Leak Detection Dye		Trace	Highside Chemicals Inc., 10-12 Colfax Ave. Clifton, NJ 07013
16. Tape		#838 Tedlar 2-inches wide	Minnesota Mining and Manufacturing Co., 900 Bush Ave. St. Paul, MN 55144
17. Lubricant		G322L Silicone Lube	General Electric Inc., Schenectady, NY
18. Insulation		BS272-WV	Beech Aircraft Corp., Wichita, KS
19. Insulation		BS272-WW	Beech Aircraft Corp., Wichita, KS
20. Tape		1520CW	Venture Tape Corp., 123 Moore Road Rockland, MA 02189
21. Insulation		BS272-HHJ-C	Beech Aircraft Corp., Wichita, KS
22. Insulation		BS272-HH	Beech Aircraft Corp., Wichita, KS
23. Adhesive/Sealer		RTV-108	General Electric, Schenectady, NY

CHART 2
RECOMMENDED MATERIALS (Effectivity: All) *(Continued)*

MATERIALS	SPECIFICATION	PRODUCT	VENDOR
24. Pipe Sealant with Teflon		Loctite 592	Loctite Corporation, 705 N. Mountain Rd. Newington, CT 06111



Environmental System Functional Schematic (Effectivity: All)
Figure 1

AIR DISTRIBUTION - DESCRIPTION AND OPERATION (Effectivity: All) (Figure 1)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

The air distribution system consists of two ventilation blowers (fwd and aft), an alternate cockpit avionics blower, the ventilation blower speed controllers and EMI/RFI filters, and all associated ductwork installed for distributing the conditioned air throughout the cockpit and cabin. The forward and aft ventilation blowers are of the brushless DC type and each is wired to an electronic speed controller to allow for a variable selection of blower speeds. The speed controllers sense air flow from the blowers through exit tubes and adjust blower speed as directed by the Environmental System Controller (ESC) or cockpit blower controls. A rotary switch placarded CKPT/ CABIN BLOWERS, HIGH-LOW on the copilot's inboard subpanel enables the pilot to select blower speeds for the desired air flow rates and minimize the sound level. The ESC can override the cockpit controls and automatically increase ventilation blower speed to offset a duct overtemperature condition.

NOTE

The forward ventilation blower is automatically enabled when any one of the three avionics master switches is placed in the ON position. The switches are placarded INTEGRATED AVIONICS, EICAS-PILOT-COPILOT, OFF on the center subpanel in the cockpit.

The aft ventilation blower is located in the environmental dome on the aft pressure bulkhead at F.S. 416. The impeller on the aft ventilation blower is split into two sections by a flow divider, allowing the separate, but simultaneous distribution of both warm and cool conditioned air through the distribution ducts. Cabin air is drawn through the aft air return vent, across the aft evaporator coil and across the upper impeller on the aft ventilation blower, where the air is recirculated into the cabin via the cabin overhead duct. The cabin overhead duct distributes the cool conditioned air through several outlets positioned behind the cabin overhead light grills adjacent to the cabin headliner. The cool conditioned air is also routed from the cabin overhead duct to the eyeball outlets in the cockpit.

Bleed air is routed from the diverter valve to the lower impeller on the aft ventilation blower. The warm air is then circulated through the two cabin sidewall ducts (one on each cabin sidewall), which run the full length of the cabin. Each cabin sidewall duct has several small vents which open below the cabin windows and above the cabin floor. The RH cabin sidewall duct attaches to one of the forward ventilation blower warm air ducts located in the copilot's console.

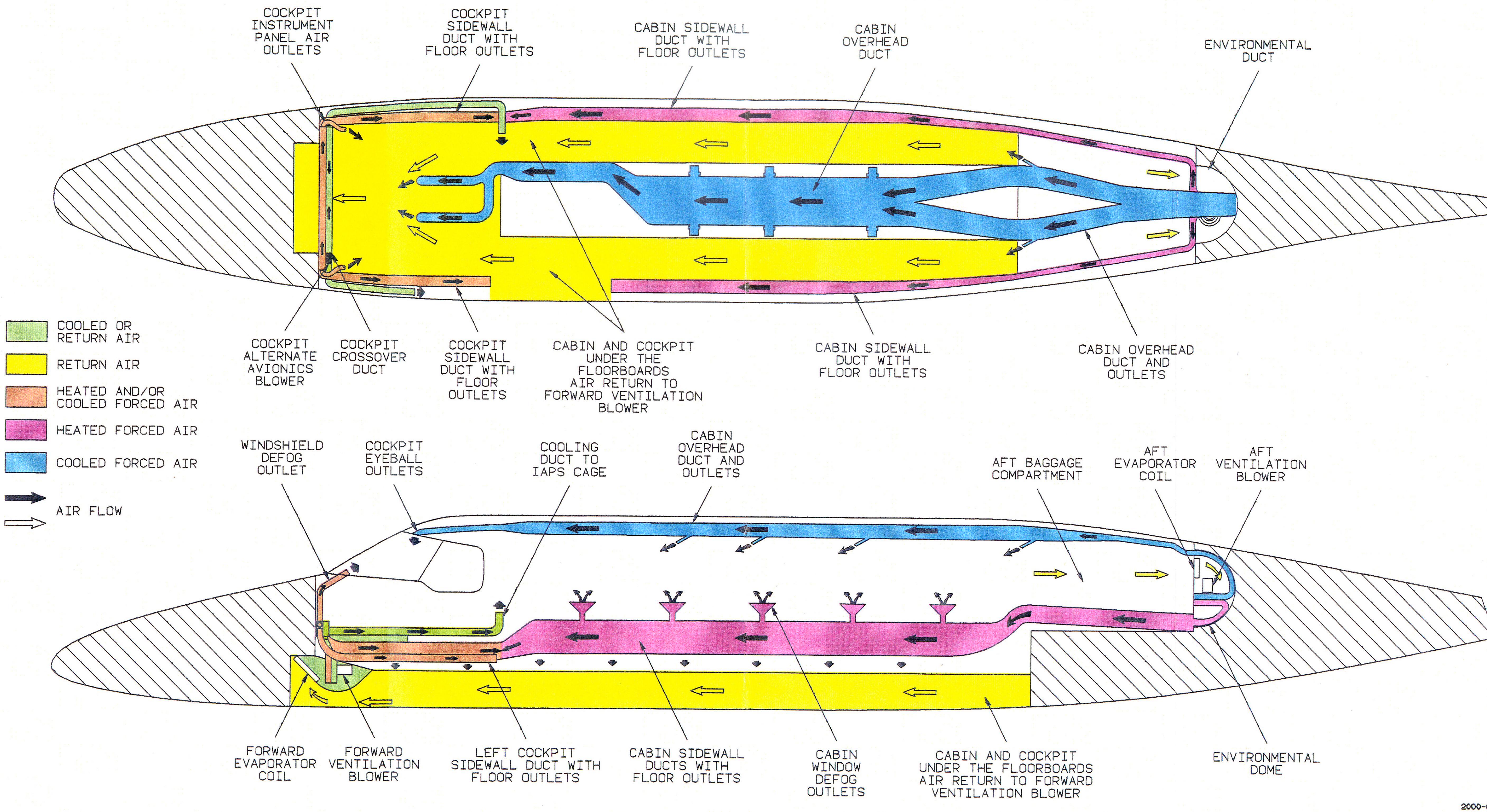
The forward ventilation blower is mounted with a pan assembly between the two keels in the cockpit just aft of the forward pressure bulkhead. The impeller on the forward blower is split by a flow divider. The aft impeller draws cabin return air from the area underneath the cabin and cockpit floorboards, across the forward evaporator coil and across the aft impeller where it is forced into the aft section of the cockpit crossover duct. The cockpit crossover duct is located directly behind the instrument panel and consists of a forward and aft section. The aft section of the cockpit crossover duct distributes cabin return air (evaporator cooled or recirculated) through several cooling ducts to the CRT display units in the instrument panel, the Integrated Avionics Processing System (IAPS) components in the RH forward baggage compartment, and to the printed circuit card rack in the pilot's console.

Bleed air is routed directly from the diverter valve to the forward impeller on the forward ventilation blower, where it is mixed with cabin return air drawn across the forward evaporator coil. The mixture of cabin return and bleed air is then forced into the forward section of the cockpit crossover duct where it is distributed to several outlets for cockpit warming and windshield defogging. Ductwork on the RH side of the cockpit attaches to the RH cabin sidewall duct, merging air flow between the forward and aft ventilation blowers.

An alternate cockpit avionics blower is installed on the LH end of the aft section of the cockpit crossover duct. It functions as a backup blower for avionics cooling. When air flow in the avionics cooling duct is disrupted, an air flow sensor sends a signal to the Engine Instrument, Crew Alerting System (EICAS), which displays the EICAS yellow "AVIONIC AIR FAIL" caution message on the EICAS display. The switch placarded AVIONICS ALTN BLOWER, OFF on the center subpanel is used to turn on the alternate cockpit avionics blower. When the alternate avionics blower is turned on, the EICAS green "AV ALTN BLWR ON" advisory message is displayed on the EICAS display.

CHART 1
AIR DISTRIBUTION SYSTEM COMPONENT LOCATION (Effectivity: All)

ITEM	LOCATION	ZONE
Forward Vent Blower	Located below the cockpit floor, aft of the forward pressure bulkhead and between the keels.	143
Forward Vent Blower Speed Controller	Located just aft of the forward vent blower.	143
Forward Vent Blower EMI/RFI Suppression Filter	Located to the RH side of the forward vent blower speed controller.	143
Aft Vent Blower	Located in the environmental dome and attached to the shelf	295
Aft Vent Blower Speed Controller	Located on the RH side of the environmental dome shelf.	295
Aft Vent Blower EMI/RFI Suppression Filter	Located in the environmental dome attached to the mounting bracket installed over the aft vent blower speed controller.	295
Cockpit Avionics Cooling Blower	Located in the LH cockpit, mounted on the aft side of the forward pressure bulkhead.	221
Cockpit Avionics Cooling Air Ducts	Located in the lower half of the LH sidewall console.	235
	Located about half way up the aft side of the forward pressure bulkhead.	221 and 222
	Located in the RH sidewall console and in the forward wall of the RH forward baggage compartment.	245, 247, and 262
Cockpit Avionics Cooling Controls	Located in the LH outboard subpanel.	234



Air Distribution Functional Schematic
(Effectivity: All)
Figure 1

AIR DISTRIBUTION - MAINTENANCE PRACTICES (Effectivity: All)

FORWARD VENTILATION BLOWER REMOVAL (Effectivity: All)

NOTE

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Remove the cockpit seats and pedestal side upholstery kick panels as outlined in Chapter 25-10-00.

c. Reach under the instrument panel into the area forward of the pedestal and tag and disconnect all wiring from the forward ventilation blower pressure switch.

d. Tag and disconnect the air tubes from the pressure switch.

e. Disconnect the air duct from the forward ventilation blower (attached to the blower with screws and washers).

f. Remove the blower shroud (secured with captive fasteners at the corners).

g. Tag and disconnect the blower electrical connector from the forward ventilation blower speed controller.

h. Disconnect the flexible hose from the blower (secured with a tie strap).

i. Remove the blower mounting bracket from the isolators (secured with screws, lock washers and washers).

j. Remove the blower from the mounting bracket (secured with screws, lock washers and washers).

FORWARD VENTILATION BLOWER INSTALLATION (Effectivity: All)

CAUTION

The forward ventilation blower must meet electrical bonding requirements as outlined in Chapter 20-00-03.

a. Install the forward ventilation blower in the blower mounting bracket (secured with washers, lock washers and screws).

b. Secure the blower mounting bracket to the isolators with washers, lock washers and screws.

c. Connect the flexible hose to the blower (secured with a tie strap).

d. Reconnect the blower wiring to the forward ventilation blower speed controller according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

e. Install the blower shroud (secured with captive fasteners at the corners).

f. Attach the air duct to the forward ventilation blower (secure with washers and screws).

g. Connect the air tubes to the forward ventilation blower pressure switch as tagged.

h. Connect all electrical wiring to the pressure switch according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

i. Install the pedestal side upholstery kick panels and the cockpit seats as outlined in Chapter 25-10-00.

j. Restore electrical power to the airplane.

FORWARD VENTILATION BLOWER SPEED CONTROLLER REMOVAL (Effectivity: All)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Remove the cockpit seats and pedestal side upholstery kick panels as outlined in Chapter 25-10-00.

c. Reach into the area forward of the pedestal to access wiring. Tag and disconnect all wiring from the forward ventilation blower pressure switch.

d. Tag and disconnect the air tubes from the pressure switch.

e. Disconnect the air duct from the forward ventilation blower (attached to the blower with screws and washers).

f. Remove the blower shroud (secured with captive fasteners at the corners).

g. Tag and disconnect both the forward ventilation blower wiring and forward ventilation blower EMI/RFI suppression filter wiring from the forward ventilation blower speed controller.

h. Remove the flexible hose from the controller (secured with a tie strap).

i. Remove the controller from the forward evaporator pan assembly (secured with screws and washers).

FORWARD VENTILATION BLOWER SPEED CONTROLLER INSTALLATION (Effectivity: All)

CAUTION

The forward ventilation blower speed controller must meet electrical bonding requirements outlined in Chapter 20-00-03.

a. Secure the the forward ventilation blower speed controller to the forward evaporator pan assembly with washers and screws.

b. Reconnect the flexible hose to the controller (secured with a tie strap).

c. Reconnect the forward ventilation blower EMI/RFI suppression filter wiring, forward ventilation blower wiring, and all other wiring to the controller according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

d. Install the blower shroud (secured with captive fasteners at the corners).

e. Attach the air duct to the blower (secure with washers and screws).

f. Reconnect the air tubes to the forward ventilation blower pressure switch according to tags.

g. Reconnect wiring to the pressure switch electrical connector according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

h. Install the pedestal side upholstery kick panels and cockpit seats as outlined in chapter 25-10-00.

i. Restore electrical power to the airplane.

FORWARD VENTILATION BLOWER EMI/ RFI SUPPRESSION FILTER REMOVAL (Effectivity: All)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Remove the cockpit seats and pedestal side upholstery kick panels as outlined in Chapter 25-10-00.

c. Reach under the instrument panel into the area forward of the pedestal to access wiring. Tag and disconnect wiring from the forward vent pressure switch electrical connector.

d. Tag and disconnect the air tubes from the pressure switch.

e. Disconnect the air duct from the forward ventilation blower (attached with screws and washers).

f. Remove the blower shroud (secured with captive fasteners at the corners).

g. Tag and disconnect the forward ventilation blower EMI/RFI suppression filter wiring from the forward ventilation blower speed controller.

h. Remove the filter from the forward evaporator pan assembly (secured with screws and washers).

FORWARD VENTILATION BLOWER EMI/ RFI SUPPRESSION FILTER INSTALLATION (Effectivity: All)

CAUTION

The forward ventilation blower EMI/RFI suppression filter must meet electrical bonding requirements outlined in Chapter 20-00-03.

a. Secure the forward ventilation blower EMI/RFI suppression filter to the forward evaporator pan assembly with washers and screws.

b. Reconnect the filter wiring to the forward ventilation blower speed controller according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

c. Install the blower shroud (secured with captive fasteners at the corners).

d. Attach the air duct to the forward ventilation blower with screws and washers.

e. Connect the air tubes to the forward ventilation blower pressure switch as tagged.

f. Reconnect wiring to the pressure switch according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

g. Install the pedestal side upholstery kick panels and the cockpit seats as outlined in Chapter 25-10-00.

h. Restore electrical power to the airplane.

AFT VENTILATION BLOWER REMOVAL (Effectivity: NC-4)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Fold down the aft couch back and open the aft baggage compartment door (the door is hinged at the bottom and middle, and opens forward).

c. Remove the aft baggage compartment side and top upholstery panels (secured to the interior surface of the fuselage with Velcro fasteners).

d. Remove the environmental dome transducer assembly attached to the aft air return cover and the aft bulkhead upholstery panel (secured with screws, washers and spacers).

e. Remove the aft air return cover (secured with screws, washers and spacers).

f. Remove the aft bulkhead upholstery panel (secured with screws and washers around the air return opening and Velcro fasteners along the bottom edge of the panel).

g. Disconnect and remove the coupling, gasket, clamps, sleeve and interior bleed air tube from the environmental dome thermal isolators.

h. Tag and disconnect the aft ventilation blower wiring from the aft ventilation blower speed controller.

i. Unfasten the the blower electrical wiring from the environmental dome shelf mounts.

j. Disconnect the flexible hose from the blower (secured with a tie strap).

k. Disconnect the environmental dome air duct from the blower (attached with screws and washers).

l. Remove the screws, lock washers and washers securing the aft ventilation blower mounting bracket to the isolators.

m. Remove the blower assembly by turning the mounting bracket and allowing it to drop through the triangular opening in the environmental dome shelf.

n. Remove the blower from the mounting bracket (secured with screws, lock washers and washers).

AFT VENTILATION BLOWER INSTALLATION (Effectivity: NC-4)

CAUTION

The aft ventilation blower must meet electrical bonding requirements outlined in Chapter 20-00-03.

a. Install the blower in the mounting bracket (secured with washers, lock washers and screws).

b. Install the aft ventilation blower assembly in the environmental dome by inserting it up through the triangular opening in the environmental dome shelf and turning it to line up the mounting bracket attach holes over the isolators (secure with washers, lock washers and screws).

c. Attach the environmental dome air duct to the blower (secure with washers and screws).

d. Connect the flexible hose to the blower (secure with a tie strap).

e. Reconnect the blower wiring to the aft ventilation blower speed controller according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

f. Secure the blower wiring to the environmental dome shelf mounts.

g. Install the interior bleed air tube, gasket, coupling, sleeve and clamps to the environmental dome thermal isolators. Torque the coupling to 45 to 55 inch-lbs.

h. Install the aft bulkhead upholstery panel (secured with washers and screws around the air return opening and Velcro fasteners along the bottom edge of the panel).

NOTE

The environmental dome transducer assembly wiring is routed through the air return opening.

i. Install the aft air return cover (secured with spacers, washers and screws).

j. Attach the environmental dome transducer assembly to the aft air return cover and the aft bulkhead upholstery panel with spacers, washers and screws.

k. Install the aft baggage compartment top and side upholstery panels (secured to the interior surface of the fuselage with Velcro fasteners).

l. Close the aft baggage compartment door (the door is hinged at the bottom and middle, and opens forward) and fold up the aft couch back.

m. Restore electrical power to the airplane.

AFT VENTILATION BLOWER REMOVAL (Effectivity: NC-5 and After)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Fold down the aft couch back and open the aft baggage compartment door (the door is hinged at the bottom and middle, and opens forward).

c. Remove the aft baggage compartment side and top upholstery panels (secured to the interior surface of the fuselage with Velcro fasteners).

d. Remove the aft air return cover (secured with screws, washers and spacers).

e. Remove the aft bulkhead upholstery panel (secured with screws and washers around the air return opening and Velcro fasteners along the bottom edge of the panel).

f. Disconnect and remove the coupling, gasket, clamps, sleeve and interior bleed air tube from the environmental dome thermal isolators.

g. Tag and disconnect the aft ventilation blower wiring from the aft ventilation blower speed controller.

h. Unfasten the blower wiring from the mounts on the environmental dome shelf.

i. Remove the flexible hose from the blower (secured with a tie strap).

j. Disconnect the blower from the environmental dome air duct (attached with screws and washers).

k. Remove the screws, lock washers and washers securing the blower mounting bracket to the isolators.

l. Remove the blower assembly by turning the mounting bracket and allowing it to drop through the triangular opening in the environmental dome shelf.

m. Remove the blower from the mounting bracket (secured with screws, lock washers and washers).

AFT VENTILATION BLOWER INSTALLATION (Effectivity: NC-5 and After)

CAUTION

The aft ventilation blower must meet electrical bonding requirements outlined in Chapter 20-00-03.

a. Install the aft ventilation blower in the mounting bracket (secured with washers, lock washers and screws).

b. Install the aft ventilation blower assembly in the environmental dome by inserting it up through the triangular opening in the environmental dome shelf and turning it to line up the mounting bracket attach holes over the isolators (secure with washers, lock washers and screws).

c. Attach the environmental dome air duct to the blower with washers and screws.

d. Connect the flexible hose to the blower (secured with a tie strap).

e. Reconnect the blower wiring to the aft ventilation blower speed controller according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

f. Fasten the blower wiring to the mounts on the environmental dome shelf.

g. Connect the interior bleed air tube, gasket, coupling, clamps and sleeve to the environmental dome thermal isolators. Torque the coupling to 45 to 55 inch-lbs.

h. Install the aft bulkhead upholstery panel (secured with washers and screws around the air return opening and Velcro fasteners along the bottom edge of the panel).

i. Install the aft air return cover (secured with spacers, washers and screws).

j. Install the aft baggage compartment top and side upholstery panels (secured to the interior surface of the fuselage with Velcro fasteners).

k. Close the aft baggage compartment door (the door is hinged at the bottom and middle, and opens forward) and fold up the aft couch back.

l. Restore electrical power to the airplane.

AFT VENTILATION BLOWER SPEED CONTROLLER REMOVAL (Effectivity: NC-4)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Fold down the aft couch back and open the aft baggage compartment door (the door is hinged at the bottom and middle, and opens forward).

c. Remove the aft baggage compartment side and top upholstery panels (secured to the interior surface of the fuselage with Velcro fasteners).

d. Remove the environmental dome transducer assembly from the aft air return cover and the aft bulkhead upholstery panel (secured with screws, washers and spacers).

e. Remove the aft air return cover (secured with screws, washers and spacers).

f. Remove the aft bulkhead upholstery panel (secured with screws and washers around the air return opening and Velcro fasteners along the bottom edge of the panel).

g. Tag and disconnect both the aft ventilation blower wiring and the aft ventilation blower EMI/RFI suppression filter wiring from the aft ventilation blower speed controller.

h. Disconnect the flexible hose from the controller (secured with a tie strap).

i. Remove the screws, washers and nuts securing the filter mounting bracket and the controller to the environmental dome shelf and remove the controller.

AFT VENTILATION BLOWER SPEED CONTROLLER INSTALLATION (Effectivity: NC-4)

CAUTION

The aft ventilation blower speed controller must meet electrical bonding requirements outlined in Chapter 20-00-03.

a. Install the aft ventilation blower speed controller and the filter mounting bracket to the environmental dome shelf (secure with screws, washers and nuts).

b. Connect the flexible hose to the controller (secured with a tie strap).

c. Reconnect both the aft ventilation blower wiring and the aft ventilation blower EMI/RFI suppression filter wiring to the controller according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

d. Install the aft bulkhead upholstery panel (secured with washers and screws around the air return opening and Velcro fasteners along the bottom edge of the panel).

NOTE

The environmental dome transducer assembly wiring is routed through the air return opening.

e. Install the aft air return cover (secured with spacers, washers and screws).

f. Attach the environmental dome transducer assembly to the air return cover and the aft bulkhead upholstery panel (secure with spacers, washers and screws).

g. Install the aft baggage compartment top and side upholstery panels (secured to the interior surface of the fuselage with Velcro fasteners).

h. Close the aft baggage compartment door (the door is hinged at the bottom and middle, and opens forward) and fold up the aft couch back.

i. Restore electrical power to the airplane.

AFT VENTILATION BLOWER SPEED CONTROLLER REMOVAL (Effectivity: NC-5 and After)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Fold down the aft couch back and open the aft baggage compartment door (the door is hinged at the bottom and middle, and opens forward).

c. Remove the aft baggage compartment side and top upholstery panels (secured to the interior surface of the fuselage with Velcro fasteners).

d. Remove the aft air return cover (secured with screws, washers and spacers).

e. Remove the aft bulkhead upholstery panel (secured with screws and washers around the air return opening and Velcro fasteners along the bottom edge of the panel).

f. Tag and disconnect all wiring to include both the aft ventilation blower wiring and the aft ventilation blower EMI/RFI suppression filter wiring from the aft ventilation blower speed controller.

g. Disconnect the flexible hose from the controller (secured with a tie strap).

h. Remove the screws, washers and nuts securing the filter mounting bracket and the controller to the environmental dome shelf and remove the controller.

AFT VENTILATION BLOWER SPEED CONTROLLER INSTALLATION (Effectivity: NC-5 and After)

CAUTION

The aft ventilation blower speed controller must meet electrical bonding requirements outlined in Chapter 20-00-03.

a. Install the aft ventilation blower speed controller and the filter mounting bracket to the environmental dome shelf (secure with screws, washers and nuts).

b. Connect the flexible hose to the controller (secured with a tie strap).

c. Reconnect all wiring including the aft ventilation blower wiring and the aft ventilation blower EMI/RFI suppression filter wiring to the controller according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

d. Install the aft bulkhead upholstery panel (secured with washers and screws around the air return opening and Velcro fasteners along the bottom edge of the panel).

e. Install the aft air return cover (secured with spacers, washers and screws).

f. Install the aft baggage compartment top and side upholstery panels (secured to the interior surface of the fuselage with Velcro fasteners).

g. Close the aft baggage compartment door (the door is hinged at the bottom and middle, and opens forward) and fold up the aft couch back.

h. Restore electrical power to the airplane.

AFT VENTILATION BLOWER EMI/RFI SUPPRESSION FILTER REMOVAL (Effectivity: NC-4)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Fold down the aft couch back and open the aft baggage compartment door (the door is hinged at the bottom and middle, and opens forward).

c. Remove the aft baggage compartment side and top upholstery panels (secured to the interior surface of the fuselage with Velcro fasteners).

d. Remove the environmental dome transducer assembly from the aft air return cover and the aft bulkhead upholstery panel (secured with screws, washers and spacers).

e. Remove the aft air return cover (secured with screws, washers and spacers).

f. Remove the aft bulkhead upholstery panel (secured with screws and washers around the air return opening and Velcro fasteners along the bottom edge of the panel).

g. Tag and disconnect the aft ventilation blower EMI/RFI suppression filter electrical wiring from the aft ventilation blower speed controller.

h. Remove the filter from the filter mounting bracket (secured with screws and washers).

AFT VENTILATION BLOWER EMI/RFI SUPPRESSION FILTER INSTALLATION (Effectivity: NC-4)

CAUTION

The aft ventilation blower EMI/RFI suppression filter must meet electrical bonding requirements outlined in Chapter 20-00-03.

a. Install the aft ventilation blower EMI/RFI suppression filter on the filter mounting bracket and secure with washers and screws.

b. Reconnect the filter wiring to the aft ventilation blower speed controller according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

c. Install the aft bulkhead upholstery panel (secured with washers and screws around the air return opening and Velcro fasteners along the bottom edge of the panel).

NOTE

The environmental dome transducer assembly wiring is routed through the air return opening.

d. Install the aft air return cover (secured with spacers, washers and screws).

e. Attach the environmental dome transducer assembly to the aft air return cover and the aft bulkhead upholstery panel (secure with spacers, washers and screws).

f. Install the aft baggage compartment top and side upholstery panels (secured to the interior surface of the fuselage with Velcro fasteners).

g. Close the aft baggage compartment door (the door is hinged at the bottom and middle, and opens forward) and fold up the aft couch back.

h. Restore electrical power to the airplane.

AFT VENTILATION BLOWER EMI/RFI SUPPRESSION FILTER REMOVAL (Effectivity: NC-5 and After)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Fold down the aft couch back and open the aft baggage compartment door (the door is hinged at the bottom and middle, and opens forward).

c. Remove the aft baggage compartment side and top upholstery panels (secured to the interior surface of the fuselage with Velcro fasteners).

d. Remove the aft air return cover (secured with screws, washers and spacers).

e. Remove the aft bulkhead upholstery panel (secured with screws and washers around the air return opening and Velcro fasteners along the bottom edge of the panel).

f. Tag and disconnect the aft ventilation blower EMI/RFI suppression filter wiring from the aft ventilation blower speed controller.

g. Remove the filter from the filter mounting bracket (secured with screws and washers).

AFT VENTILATION BLOWER EMI/RFI SUPPRESSION FILTER INSTALLATION (Effectivity: NC-5 and After)

CAUTION

The aft ventilation blower speed controller must meet electrical bonding requirements outlined in Chapter 20-00-03.

a. Install the aft ventilation blower EMI/RFI suppression filter on the filter mounting bracket (secured with washers and screws).

b. Reconnect the filter wiring to the aft ventilation blower speed controller according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

c. Install the aft bulkhead upholstery panel (secured with washers and screws around the air return opening and Velcro fasteners along the bottom edge of the panel).

d. Install the aft air return cover (secured with spacers, washers and screws).

e. Install the aft baggage compartment top and side upholstery panels (secured to the interior surface of the fuselage with Velcro fasteners).

f. Close the aft baggage compartment door (the door is hinged at the bottom and middle, and opens forward) and fold up the aft couch back.

g. Restore electrical power to the airplane.

COCKPIT ALTERNATE AVIONICS BLOWER REMOVAL (Effectivity: All)

a. Remove all electrical power from the airplane.

b. Refer to Chapter 25-10-00 and remove the pilot's seat.

c. Tag and disconnect all wiring from the cockpit alternate avionics blower.

d. Remove the tie strap and tape securing the blower to the crossover duct.

e. Remove screws, washers and spacers attaching the blower mount to the forward pressure bulkhead.

f. Remove the bolts and lock washers securing the blower to its mount and remove the blower from the airplane.

COCKPIT ALTERNATE AVIONICS BLOWER INSTALLATION (Effectivity: All)

CAUTION

Do not electrically ground or bond the cockpit alternate avionics blower mount or housing to the airplane.

a. Align the cockpit alternate avionics blower with its mount and install the lock washers and bolts.

b. Align the blower mount with the forward pressure bulkhead and install spacers, washers and screws.

c. Secure the blower to the crossover duct with 1 1/2 wraps of tape (16, Chart 1, 21-00-00) and a tie strap.

d. Reconnect wiring to the blower according to tags or the Starship 1 Wiring Diagram Manual.

e. Refer to Chapter 25-10-00 and install the pilot's seat.

f. Restore electrical power to the airplane.

NOSE AVIONICS COOLING SYSTEM - DESCRIPTION AND OPERATION (Effectivity: All) (Figures 1 and 2)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

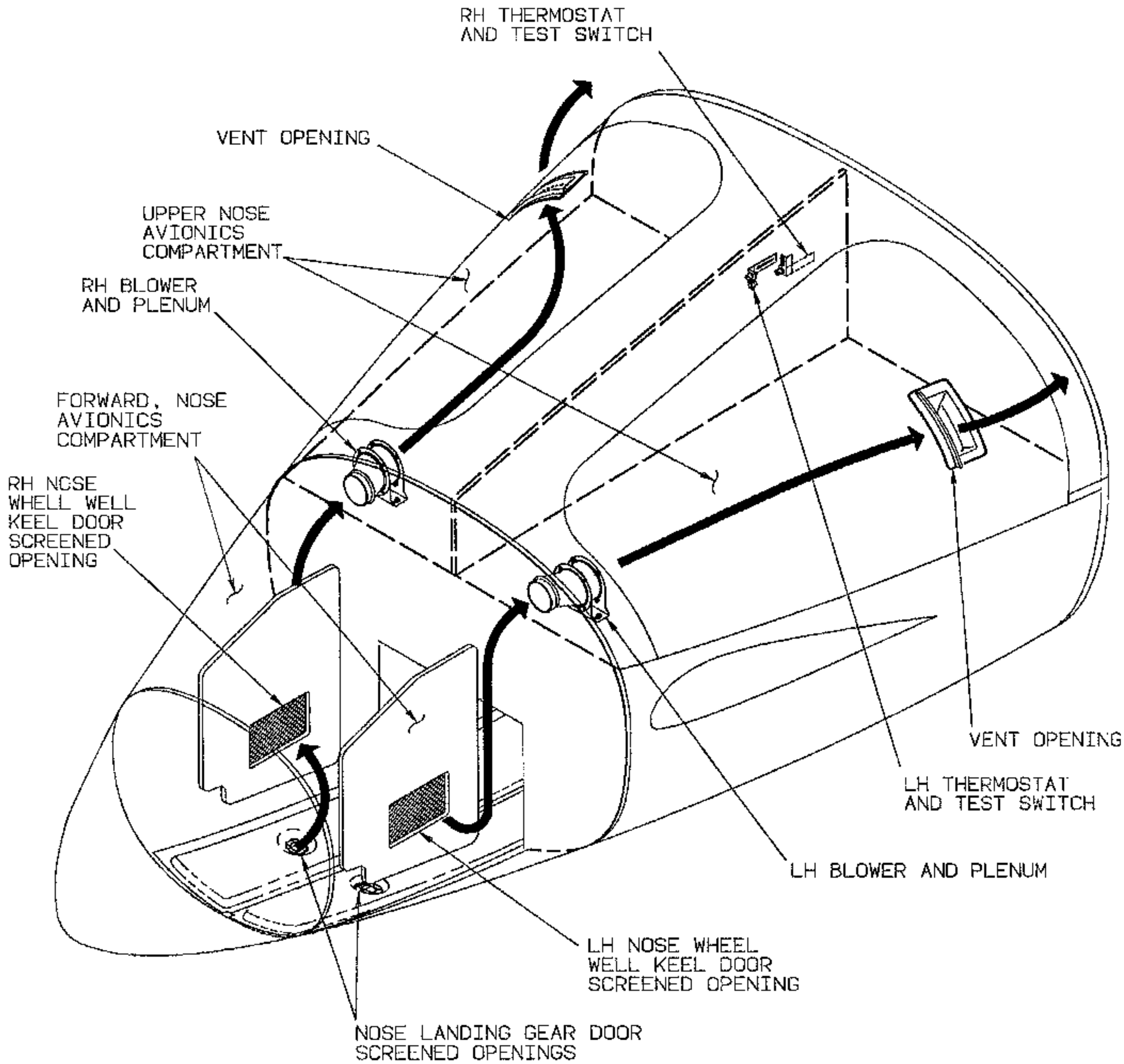
The nose avionics cooling system is provided to remove excess heat generated by the avionics equipment located forward of the forward pressure bulkhead in the nose avionics compartments.

Two independent blowers, located at the forward end of each upper nose avionics compartment, draw ambient air into the nose wheel well via the open aft nose landing gear doors during ground operation and through screened openings in the closed forward nose landing gear doors during flight operation. The air is then drawn from the nose wheel well through screened openings in the LH and RH wheel well keel doors into the respective forward avionics compartments. Openings in the avionics equipment shelves, found in the forward avionics compartments, permit air to flow to the plenums and blowers which direct the air over the avionics equipment in the upper nose avionics compartments and out the vents in the upper nose avionics compartments access doors.

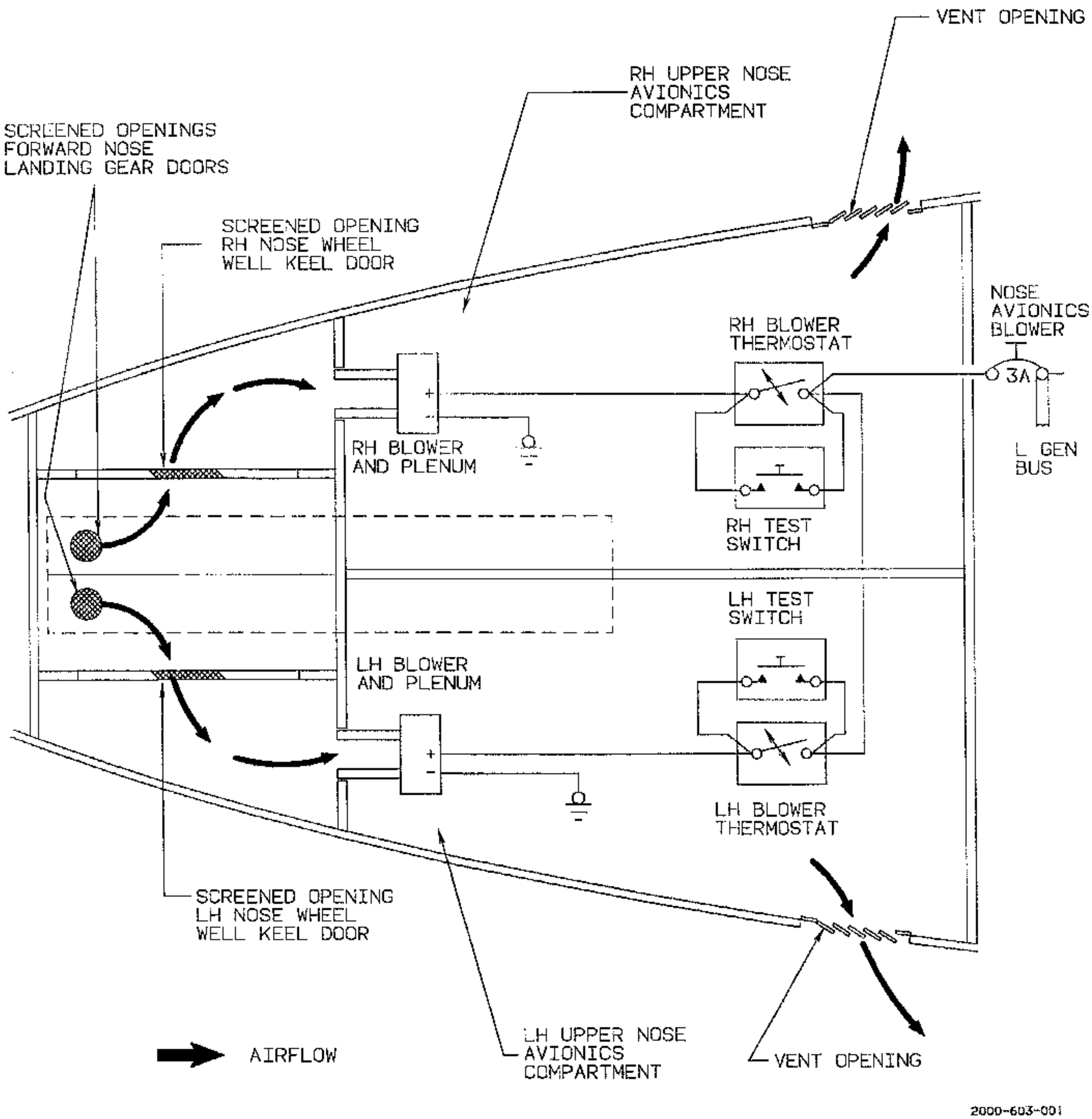
Blower operation is controlled by two thermostats, one in each upper nose avionics compartment. Each thermostat closes, starting blower operation, when rising air temperature in the respective compartment reaches 85° ±5° F. and opens, stopping blower operation, when decreasing air temperature reaches 76° ±5° F.

A test switch for each blower is mounted on the bracket with the thermostat, and when engaged, bypasses the thermostat, allowing blower operation.

Electrical power to the blower is provided by a circuit breaker located on the cockpit avionics circuit breaker panel placarded NOSE AVION BLOWER.



Nose Avionics Cooling System (Effectivity: All)
Figure 1



Nose Avionics Cooling System Functional Schematic (Effectivity: All)
Figure 2

CHART 1
TROUBLESHOOTING - NOSE AVIONICS COOLING SYSTEM (Effectivity: All)

CONDITION	PROBABLE CAUSE	REMEDY
1. Excessive heat buildup in the nose avionics compartments.	a. Screened openings in the nose landing gear doors obstructed.	a. Clear the openings.
	b. Screened openings in the nose wheel well keel doors obstructed.	b. Clear the openings.
	c. Air flow through the blower and plenum is obstructed.	c. Clear the blower and plenum airflow path.
	d. Exit vent in each upper nose avionics compartment door is obstructed.	d. Clear the vent.
	e. Nose avionics blower circuit breaker tripped.	e. Reset the circuit breaker.
	f. Thermostat not functioning.	f. Replace the Thermostat.
	g. Blower not functioning.	g. Replace the blower.
2. Blower doesn't operate when the test switch is pressed.	a. Nose avionics blower circuit breaker tripped.	a. Reset the circuit breaker.
	b. Test switch not functioning.	b. Replace the test switch.
	c. Blower not functioning.	c. Replace the blower.

NOSE AVIONICS COOLING SYSTEM - MAINTENANCE PRACTICES (Effectivity: All)

THERMOSTAT REMOVAL (Effectivity: All) (Figure 3)

a. Remove all electrical power from the airplane.

b. Loosen the captive screws located around the edge of the LH or RH upper nose avionics compartment access door and remove the access door.

c. Disconnect the electrical wiring from the thermostat.

d. Remove the screws and nuts that hold the thermostat to the mounting bracket.

e. Remove the thermostat from the mounting bracket.

THERMOSTAT INSTALLATION (Effectivity: All) (Figure 3)

a. Position the thermostat on the mounting bracket.

b. Secure the thermostat to the mounting bracket using the screws and nuts.

c. Connect the electrical wiring to the thermostat.

d. Install the LH or RH upper nose avionics compartment access door and secure with the captive screws located around the edge of the access door.

e. Reconnect all electrical power to the airplane.

TEST SWITCH REMOVAL (Effectivity: All) (Figure 3)

a. Remove all electrical power from the airplane.

b. Loosen the captive screws located around the edge of the LH or RH upper nose avionics compartment access door and remove access door.

c. Disconnect the electrical wiring from the switch.

d. Remove the face nut and lock washer which secure the test switch to the mounting bracket.

e. Remove the test switch from the mounting bracket.

TEST SWITCH INSTALLATION (Effectivity: All) (Figure 3)

a. Place the test switch in the mounting bracket.

b. Secure the test switch to the mounting bracket with the lock washer and face nut.

c. Connect the electrical wiring to the switch.

d. Install the LH or RH upper nose avionics compartment access door and secure with the captive screws located around the edge of the access door.

e. Reconnect all electrical power to the airplane.

BLOWER REMOVAL (Effectivity: All) (Figure 3)

a. Remove all electrical power from the airplane.

b. Loosen the captive screws located around the edge of the LH or RH upper nose avionics compartment access door and remove the access door.

c. Disconnect the electrical wiring from the blower.

d. Remove the nuts and washers which secure the mounting bracket to the mounting studs.

e. Remove the mounting bracket, blower and plenum.

f. Remove the screws and clamps which secure the blower and plenum to the mounting bracket.

g. Remove the blower and plenum from the mounting bracket.

BLOWER INSTALLATION (Effectivity: All) (Figure 3)

a. Position the blower in the mounting bracket with the airflow arrow pointing aft.

b. Position the plenum to the forward side of the mounting bracket (orient the plenum to fit in the opening in the bulkhead at the forward end of the upper nose avionics compartment) and secure it and the blower to the mounting bracket with the screws and clamps.

c. Install the mounting bracket, blower and plenum assembly in the upper nose avionics compartment by positioning the slotted holes of the mounting bracket on the mounting studs. Slide the mounting bracket assembly forward and seat the rib on the plenum to the opening in the bulkhead at the forward end of the upper nose avionics compartment. Secure the mounting bracket to the mounting studs with the washers and nuts.

d. Connect the electrical wiring to the blower.

e. Install the LH or RH upper nose avionics compartment access door and secure with the captive screws located around the edge of the access door.

f. Reconnect all electrical power to the airplane.

PLENUM REMOVAL (Effectivity: All) (Figure 3)

a. Remove all electrical power from the airplane.

b. Loosen the captive screws located around the edge of the LH or RH upper nose avionics compartment access door and remove the access door.

c. Disconnect the electrical wiring from the blower.

d. Remove the nuts and washers which secure the mounting bracket the mounting studs.

e. Remove the mounting bracket, blower and plenum.

f. Remove the screws and clamps which secure the plenum to the forward side of the blower and mounting bracket.

g. Remove the plenum.

PLENUM INSTALLATION (Effectivity: All) (Figure 3)

a. Position the plenum to the forward side of the mounting bracket (orient the plenum to fit in the opening in the bulkhead at the forward end of the upper nose avionics compartment) and secure it to the blower and the mounting bracket with the screws and clamps.

b. Install the mounting bracket, blower and plenum assembly in the upper nose avionics compartment by positioning the slotted holes of the mounting bracket on the mounting studs. Slide the mounting bracket assembly forward and seat the rib on the plenum to the opening in the bulkhead at the forward end of the upper nose avionics compartment. Secure the mounting bracket to the mounting studs with the washers and nuts.

c. Connect the electrical wiring to the blower.

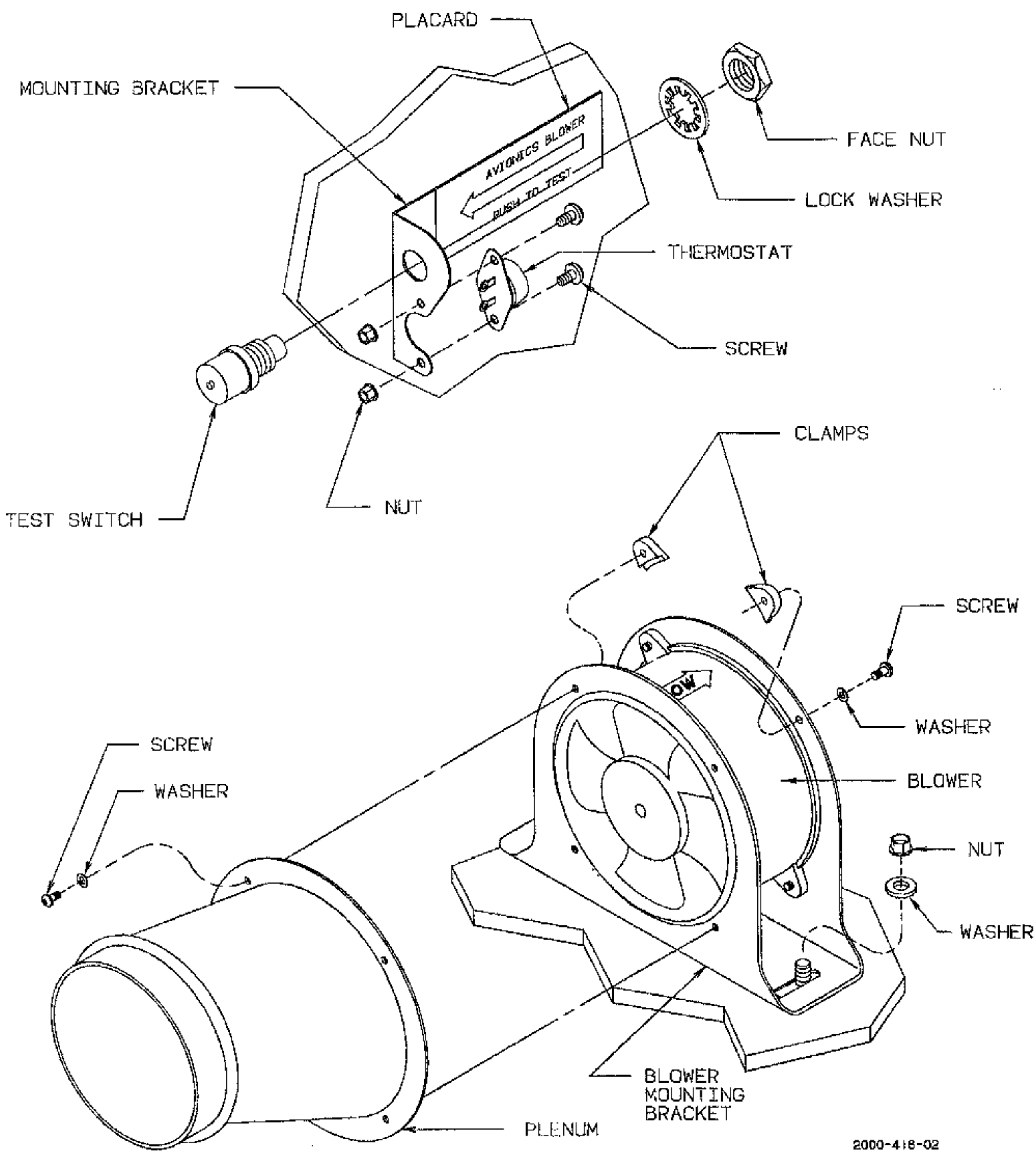
d. Install the LH or RH upper nose avionics compartment access door and secure with the captive screws located around the edge of the access door.

e. Reconnect all electrical power to the airplane.

MOUNTING BRACKET REMOVAL (Effectivity: All) (Figure 3)

a. Remove all electrical power from the airplane.

b. Loosen the captive screws located around the edge of the LH or RH upper nose avionics compartment access door and remove the access door.



Blower, Plenum, Thermostat and Test Switch Installation (Effectivity: All)
Figure 3

c. Disconnect the electrical wiring from the blower.

d. Remove the nuts and washers which secure the mounting bracket to the mounting studs.

e. Remove the mounting bracket, blower and plenum.

f. Remove the screws and clamps which secure the blower and plenum to the mounting bracket.

g. Remove the blower and plenum from the mounting bracket.

MOUNTING BRACKET INSTALLATION (Effectivity: All) (Figure 3)

a. Position the blower in the mounting bracket with the airflow arrow pointing aft.

b. Position the plenum to the forward side of the mounting bracket (orient the plenum to fit in the opening in the bulkhead at the forward end of the upper nose avionics compartment) and secure it and the blower to the mounting bracket with the screws and clamps.

c. Install the mounting bracket, blower and plenum assembly in the upper nose avionics compartment by positioning the slotted holes of the mounting bracket on the mounting studs. Slide the mounting bracket assembly forward and seat the rib on the plenum to the opening in the bulkhead at the forward end of the upper nose avionics compartment. Secure the mounting bracket to the mounting studs with the washers and nuts.

d. Connect the electrical wiring to the blower.

e. Install the LH or RH upper nose avionics compartment access door and secure with the captive screws located around the edge of the access door.

f. Reconnect all electrical power to the airplane.

NOSE AVIONICS COOLING SYSTEM OPERATIONAL TEST (Effectivity: All)

a. Loosen the captive screws around the edge of both upper nose avionics compartment access doors and remove the access doors.

b. Place the battery master switch in the ON position and the generator bus tie switch, placarded GEN TIES, IN THE MAN CLOSED position.

c. Press the test switch in each upper nose avionics compartment, placarded AVIONICS BLOWER PUSH TO TEST, to initiate blower operation.

d. Reference NOSE AVIONICS COOLING SYSTEM - TROUBLESHOOTING if the blower does not operate.

e. After testing, place the battery master switch in the OFF position and the generator bus tie switch in the NORM position.

f. Install both upper nose avionics compartment access doors and secure with the captive screws around the edge of the access doors.

THERMOSTAT FUNCTIONAL TEST (Effectivity: All)

a. The following equipment is needed to perform this test:

- Regulated Environmental Chamber
- Continuity Tester

b. Disconnect and remove the thermostat from its mounting bracket as instructed under THERMOSTAT REMOVAL in this chapter.

c. Connect the continuity tester to the thermostat's terminals.

d. Place the thermostat in the environmental chamber and set the temperature in the chamber at 70° F. Allow the thermostat to remain at this temperature for a minimum of five minutes and then verify that the thermostat's contacts are open (no continuity).

e. Increase the temperature in the environmental chamber and verify that the thermostat's contacts close (continuity) at an increasing temperature of 85° ±5° Allow the thermostat to remain at this increased temperature for a minimum of five minutes.

f. Reduce the temperature in the environmental chamber and verify that the thermostat's contacts open (no continuity) at a decreasing temperature of 76° ±5° F. Allow the thermostat to remain at this reduced temperature for a minimum of five minutes.

g. Replace the thermostat if it does not meet the above specifications.

h. Install the thermostat on its mounting bracket as instructed under THERMOSTAT INSTALLATION in this chapter.

PRESSURIZATION CONTROL - DESCRIPTION AND OPERATION (Effectivity: All) (Figure 1)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

The pressurization control system is designed to control cabin altitude and cabin rate-of-change. The system utilizes two outflow valves, two altitude limit regulators, a jet pump ejector, manual shutoff valve, manual rate control valve, auxiliary volume tank, air filters, the cabin pressurization controller and the cabin pressurization control module assembly. The cabin pressurization control module assembly is mounted on the aft side of the forward pressure bulkhead behind the rudder pedals on the pilot's side. It consists of a pneumatic relay, vacuum regulator, the "B" and "C" solenoid valves and the associated plumbing and test ports. The pressurization control system continuous flow air filter and auxiliary volume tank are mounted on top of the cabin pressurization control module assembly.

The cabin altitude/differential pressure indicator and cabin climb indicator are located on the copilot's inboard subpanel. The actual cabin altitude pressure differential is continuously indicated by the cabin altitude/differential pressure indicator. Rate of cabin pressure change is continuously indicated by the cabin climb indicator.

The cabin pressurization controller and manual rate control valve are located on the pressurization control panel in the lower center of the instrument panel. The manual rate control valve provides manual control of the pressurization system. It is connected to the regulated vacuum source with the pneumatic relay and cabin pressurization controller, and to the outflow valves reference pressure line. When the manual rate control valve is in the NORM position, the pressurization system is automatically controlled according to crew selected settings. Full rotation of the manual rate control valve clockwise selects the DUMP position, and will depressurize the cabin.

The cabin pressurization controller controls modulation of the outflow valves through a compensated type pneumatic relay, and is capable of controlling rate-of-change from a minimum of approximately 50 feet-per-minute up to 3000 feet-per-minute. The cabin pressurization controller is connected to the regulated vacuum source, the pneumatic relay (control pressure), and to actual cabin pressure. The control pressure referenced by the pressurization controller and pneumatic relay is stabilized by the auxiliary volume tank to prevent momentary fluctuations from affecting the system and to allow for smooth operation.

When the cabin altitude select knob on the cabin pressurization controller is rotated, an interconnecting actuator actuates the bellows inside the controller. The cabin rate control select knob is connected to the rate control valve position actuator. When rotated, the rate control valve position actuator controls the position of the rate control valve in the rate pressure chamber. The rate pressure chamber contains a rate spring, rate control valve and check valve. When cabin pressure decreases below the rated pressure, the check valve opens to allow air flow to the cabin pressure chamber from the rate pressure chamber. A reference chamber in the cabin pressurization controller contains the pressure metering valve, metering follower spring and the necessary pneumatic connections to influence the pneumatic relay. The "A" solenoid is connected to the reference chamber, and when energized (closed), renders the cabin climb change rate function inoperative.

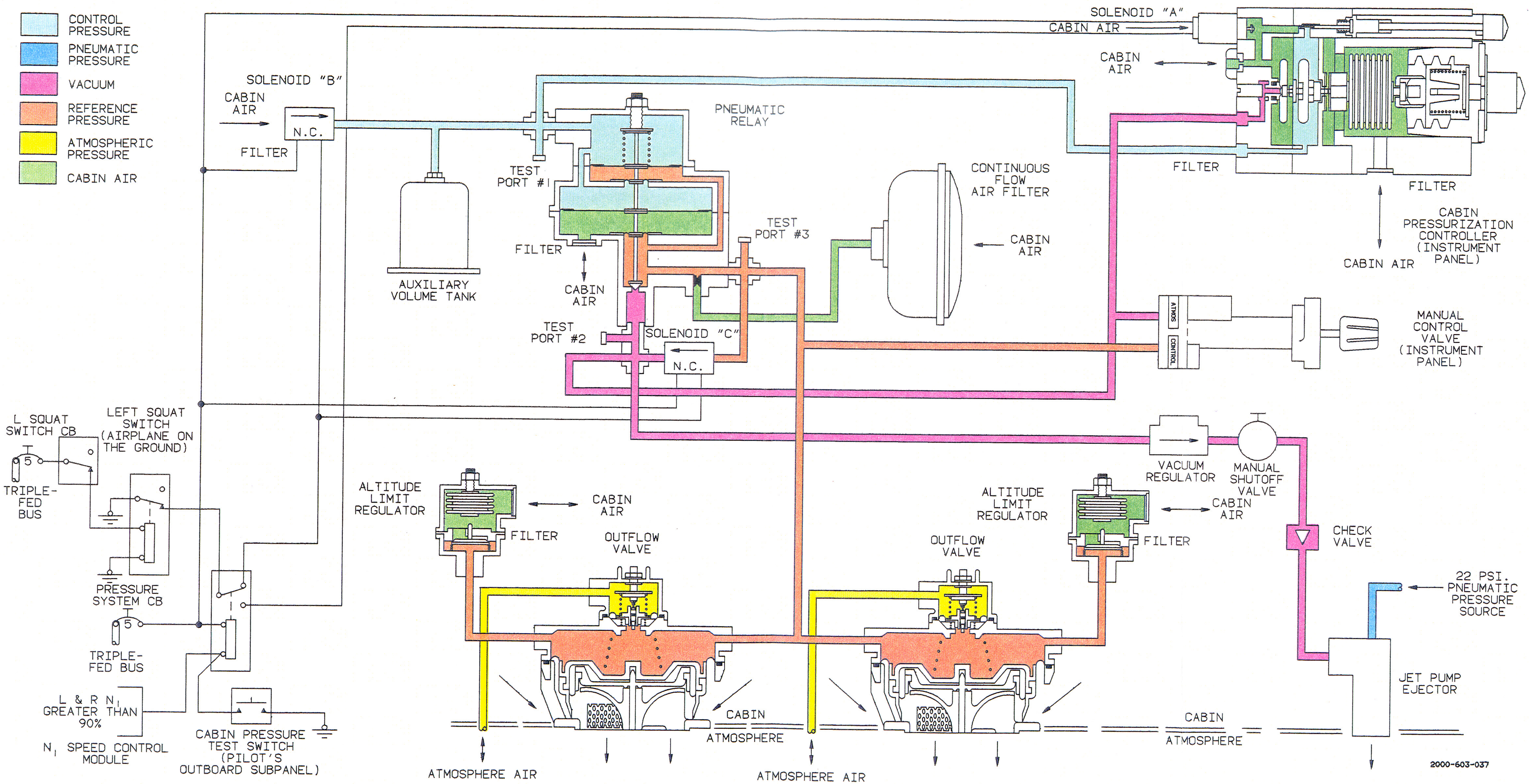
Vacuum is generated by engine bleed air passing through the jet pump ejector. The vacuum is plumbed through a check valve and manual shutoff valve to the vacuum regulator, where it is regulated to 4.75 inches Hg less than cabin pressure. The regulated vacuum is then plumbed to the VACUUM ports on the cabin pressurization controller and pneumatic relay. Raw cabin air is filtered by the pressurization system continuous flow air filter before entering the FILTER port on the pneumatic relay. The filtered air flows through an orifice in the pneumatic relay and contaminates the regulated vacuum. Once contaminated, the regulated vacuum creates a reference pressure. This reference pressure is plumbed from the pneumatic relay to each outflow valve diaphragm to unseat the poppet in each outflow valve. One or both outflow valves open according to the reference pressure applied to the diaphragms. The reference pressure is split by a T-fitting at the outflow valves so that equal reference pressure is applied to each diaphragm. Should cabin air pressure differential exceed 8.4 psid, the outflow valves will automatically open and discharge enough air into the atmosphere to prevent the pressure differential from increasing above 8.4 psid. The outflow valves provide positive or negative pressure relief by modulating air flow discharge from the cabin during normal operation.

Two altitude limit regulators installed above the outflow valves prevent cabin altitude from exceeding 14,500 feet in the event of a system failure or dump command at high altitude. A valve in each altitude limit regulator opens and allows cabin air to contaminate the reference pressure applied to each outflow valve diaphragm. When the vacuum on each outflow valve diaphragm is relieved, the valve springs seat the poppets, and cabin pressure stabilizes before cabin pressure altitude increases above the limit. The altitude limit regulator valves will open anytime cabin pressure altitude exceeds 13,000 ±1,500 feet.

Flight operation of key components in the pressurization control system is disabled by the solenoid valves when the airplane is on the ground. The N1 speed control module, left landing gear squat switch and PRESS test switch exercise control over the three pressurization control system solenoid valves ("A", "B" and "C") through two relays. When the airplane is on the ground and N1 speed is below 90%, solenoid valve "C" is energized (opened), allowing regulated vacuum to lower the reference pressure on each outflow valve diaphragm. Since solenoid valve "B" is also energized (opened), the rate control pressure from the cabin pressurization controller is vented and therefore removed from the pneumatic relay. In this configuration the rate pressure becomes the same as actual cabin pressure. Since regulated vacuum is being applied to the reference pressure connection on the outflow valves, the reference pressure on each outflow valve diaphragm is lower than cabin pressure. The outflow valve poppets are held open and pressurization of the cabin is prevented while the airplane is on the ground. Before takeoff, when the power levers are advanced far enough to increase N1 speed above 90%, solenoid valve "A" is energized (closed) to deactivate the rate control mechanism in the cabin pressurization controller. At the same time, solenoid valves "B" and "C" are de-energized (closed), removing regulated vacuum from the outflow valves and restoring the rate control pressure from the pressurization controller to the pneumatic relay. Because solenoid valve "A" is closed, the rate control mechanism maintains the existing pressurization controller output signal at the cabin pressure level that existed just prior to the increase above 90% N1 speed. This prevents a sudden change in airplane pressurization during takeoff. After takeoff, the "A" solenoid valve opens and the pressurization control system reverts to flight control of cabin pressurization.

A test switch placarded PRESS on the pilot's outboard subpanel is used by the crew to self-test the pressurization control system. When PRESS is pressed, the cabin is pressurized to a maximum of 120 feet below actual airplane altitude at a cabin rate of descent of 400-450 feet-per-minute. When PRESS is released, the cabin is depressurized at the same rate.

There are two red warning annunciators for the cabin pressurization control system. If cabin pressure altitude exceeds 10,000 +000 -500 ft., the cabin altitude warning pressure switch closes and connects triple-fed bus voltage from the cabin altitude warning circuit breaker to an input on the annunciator fault detection PCB. The annunciator fault detection PCB illuminates the red "CABIN ALT HI" warning annunciator in the warning annunciator panel. When cabin pressure altitude drops below 10,000 ft. the switch opens and the red "CABIN ALT HI" annunciator extinguishes. If cabin pressure differential increases above 8.6 ±.1 psid, the cabin pressure differential warning switch closes and connects triple-fed bus voltage from the cabin differential pressure warning circuit breaker to an input on the annunciator fault detection PCB. The annunciator fault detection PCB illuminates the red "CABIN DIFF HI" warning annunciator in the warning annunciator panel. When cabin pressure differential drops below 7.8 psid, the switch opens and the red "CABIN DIFF HI" warning annunciator extinguishes. Refer to Chapter 31-50-00 for detailed information on the warning annunciator system.



Pressurization Control System Functional Schematic
(Effectivity: All)
Figure 1

CHART 1
PRESSURIZATION CONTROL SYSTEM COMPONENT LOCATION (EFFECTIVITY: ALL)

ITEM	LOCATION	ZONE
Outflow Valves	Mounted in the belly compartment aft of the nose wheel well on the outflow valve access door.	133
Altitude Limit Regulators	Located above the outflow valves in the belly compartment aft of the nose wheel well.	133
Jet Pump Ejector	Located aft of the outflow valves in the belly compartment aft of the nose wheel well.	133
Pressurization Control Module	Mounted on the aft side of the forward pressure bulkhead in the LH side of the cockpit at floor level.	221
Pneumatic Relay	Part of the pressurization control module assembly.	221
Vacuum Regulator	Part of the pressurization control module assembly.	221
Test Ports (3)	Located on the outside of the pressurization control module assembly.	221
Solenoid Valves "B" and "C"	Part of the pressurization control module assembly.	221
Volume Tank	Mounted on top of the pressurization control module assembly.	221
Continuous Flow Air Filter	Mounted on top of the pressurization control module assembly.	221
Manual Shutoff Valve	Mounted inboard of the pressurization control module assembly on the aft side of the aft pressure bulkhead.	221
Check Valve	Mounted adjacent to the manual shutoff valve.	221
Cabin Pressurization Controller	Located in the lower center of the instrument panel below the Radio Tuning Units.	256
Solenoid Valve "A"	Located on the aft side of the cabin pressurization controller.	256
Manual Rate Control Valve	Adjacent to the cabin pressurization controller on the instrument panel.	256
Cabin Pressure Differential/Altitude Gage	Located on the copilot's inboard subpanel.	243
Cabin Rate-of-Climb Gage	Located on the copilot's inboard subpanel.	243
PRESS System Test Switch	Located on the pilot's outboard subpanel.	234
Cabin Pressure Differential Warning Switch	Mounted on a panel between the instrument panel and forward pressure bulkhead, immediately right of center.	222
Cabin Altitude Warning Pressure Switch	Mounted on a bracket below the center cockpit floorboard, immediately aft of the pedestal.	143

PRESSURIZATION CONTROL - MAINTENANCE PRACTICES (Effectivity: All)

CAUTION

While performing maintenance on the pressurization system, NEVER use teflon tape on tube fittings as a thread seal. Teflon tape may have a tendency to shred and possibly contaminate the components of the pressurization system.

OUTFLOW VALVE REMOVAL (Effectivity: All)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the outflow valve exit ramp.

c. Loosen the captive fasteners on the outflow valve access door and pull the door out far enough to access the pneumatic lines.

CAUTION

Do not remove the outflow valve access door until the pneumatic lines are disconnected from the outflow valves.

d. Tag and disconnect the pneumatic lines from the outflow valves.

e. Remove the outflow valve access door.

f. Remove safety wire from the outflow valves.

g. Remove the nuts securing the outflow valves and seals to the outflow valve access door and remove the outflow valves and seals.

h. Carefully remove the reducer and O-ring from the outflow valve altitude limiter port and discard the O-ring.

OUTFLOW VALVE INSTALLATION (Effectivity: All)

CAUTION

The outflow valves must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Carefully install the reducer and O-ring in the outflow valve altitude limiter port. Torque the reducer to 10 inch-ozs. maximum.

NOTE

There must be a .010-inch to .020-inch gap between the valve body and the reducer hex. Reducers that contact the valve body have been overtorqued.

b. Align the outflow valves and seals with studs on the outflow valve access door and secure with nuts. Torque the nuts to 10-20 inch-ozs and safety wire.

CAUTION

When installing pneumatic lines, hold the reducer stationary to prevent the transmission of excessive torque through the reducer to the outflow valve body. Torque on the reducer shall not exceed 10 inch-ozs.

c. Reconnect the pneumatic lines to the outflow valves according to tags.

CAUTION

Ensure that the pneumatic lines are connected to the proper fittings and ports on the outflow valves or the system will not operate properly.

d. Install the outflow valve access door and secure with captive fasteners.

e. Install the outflow valve exit ramp and secure with captive fasteners.

f. Restore electrical power to the airplane.

ALTITUDE LIMIT REGULATOR REMOVAL (Effectivity: All)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the outflow valve exit ramp.

c. Loosen the captive fasteners on the outflow valve access door and pull the door out far enough to access the pneumatic lines.

CAUTION

Do not remove the outflow valve access door until the pneumatic lines are disconnected from the outflow valves.

d. Tag and disconnect the pneumatic lines from the outflow valves.

e. Remove the outflow valve access door.

f. Remove the hose assembly from the reducer installed in the altitude limit regulator.

g. Remove the screws and washers securing the altitude limit regulator to its mounting bracket and remove the regulator.

h. Remove the reducer and O-ring from the altitude limit regulator. Discard the O-ring.

ALTITUDE LIMIT REGULATOR INSTALLATION (Effectivity: All)

CAUTION

The altitude limit regulator must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Install the O-ring and reducer in the altitude limit regulator.

b. Align the altitude limit regulator with its mounting bracket and secure with washers and screws.

c. Reconnect the hose assembly to the altitude limit regulator reducer.

d. Reconnect the pneumatic lines to the outflow valves according to tags.

CAUTION

Ensure that the pneumatic lines are connected to the proper fittings and ports on the outflow valves or the system will not operate properly.

e. Install the outflow valve access door and secure with captive fasteners.

f. Install the outflow valve exit ramp and secure with captive fasteners.

g. Restore electrical power to the airplane.

JET PUMP EJECTOR REMOVAL (Effectivity: All)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the outflow valve exit ramp.

c. Loosen the captive fasteners on the outflow valve access door and pull the door out far enough to access the pneumatic lines.

CAUTION

Do not remove the outflow valve access door until the pneumatic lines are disconnected from the outflow valves.

d. Tag and disconnect the pneumatic lines from the outflow valves.

e. Remove the outflow valve access door.

f. Remove the nut, washer, spacer and clamp securing the jet pump ejector to its mounting stud.

g. Tag and disconnect the pressurization control system plumbing from all three jet pump ejector ports and remove the ejector.

h. Remove the reducer from the CONTROL PORT of the jet pump ejector. Remove and discard the O-ring.

JET PUMP EJECTOR INSTALLATION (Effectivity: All)

CAUTION

The jet pump ejector must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Install the O-ring and reducer in the CONTROL PORT of the jet pump ejector.

b. Reconnect the pressurization control system plumbing to the jet pump ejector ports according to tags.

c. Position the clamp on the jet pump ejector and align it with the mounting stud. Secure the clamp to the mounting stud with the spacer, washer and nut.

d. Reconnect the pneumatic lines to the outflow valves according to tags.

CAUTION

Ensure that the pneumatic lines are connected to the proper fittings and ports or the system will not operate properly.

e. Install the outflow valve access door and secure with captive fasteners.

f. Install the outflow valve exit ramp and secure with captive fasteners.

g. Restore electrical power to the airplane.

MANUAL SHUTOFF VALVE REMOVAL (Effectivity: All)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Remove the pilot's seat.

c. Remove the nut and washer securing the manual shutoff valve upper clamp to its mounting stud on the forward pressure bulkhead.

d. Remove the control module assembly mounting screw and washer securing the manual shutoff valve lower clamp to the forward pressure bulkhead.

e. Tag and disconnect the pneumatic plumbing from the adapters on the manual shutoff valve and remove the manual shutoff valve.

f. Remove the adapters from the manual shutoff valve.

MANUAL SHUTOFF VALVE INSTALLATION (Effectivity: All)

CAUTION

The manual shutoff valve must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Apply primer (10, Chart 1, 21-00-00) and sealant (24, Chart 1, 21-00-00) to the adapter threads to be installed in the manual shutoff valve and install the adapters in the manual shutoff valve.

b. Reconnect the pneumatic plumbing to the manual shutoff valve adapters according to tags.

c. Position the lower clamp on the manual shutoff valve and secure with the control module assembly mounting screw and washer.

d. Position the upper clamp on the manual shutoff valve and secure to the mounting stud with washer and nut.

e. Install the pilot's seat.

f. Restore electrical power to the airplane.

CHECK VALVE REMOVAL (Effectivity: All)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Remove the pilot's seat.

c. Remove the nut and washer securing the check valve clamp to the mounting stud and remove the clamp.

d. Disconnect the pneumatic plumbing from the check valve and remove the check valve.

CHECK VALVE INSTALLATION (Effectivity: All)

CAUTION

The check valve must meet electrical bonding requirements specified in Chapter 20-00-03.

CAUTION

The check valve is installed down stream from the manual shutoff valve with the directional flow arrow pointing down. Improper installation will prevent proper system operation.

a. Reconnect the pneumatic plumbing to the check valve.

b. Position the check valve clamp on the check valve and secure to the mounting stud on the pressure bulkhead with the washer and nut.

c. Install the pilot's seat.

d. Restore electrical power to the airplane.

CABIN PRESSURE DIFFERENTIAL WARNING SWITCH REMOVAL (Effectivity: All)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Remove the copilot's seat.

c. Tag and disconnect wiring from the pressure switch mounted on a panel between the instrument panel and the forward pressure bulkhead, immediately right of center.

d. Disconnect the static air hose from the pressure switch.

e. Remove the screws, lock washers and washers securing the pressure switch to the mounting bracket and remove the pressure switch.

CABIN PRESSURE DIFFERENTIAL WARNING SWITCH INSTALLATION (Effectivity: All)

CAUTION

The cabin pressure differential warning switch must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the pressure differential warning switch with the mounting bracket and secure with washers, lock washers and screws.

b. Reconnect the static air hose to the pressure switch.

c. Reconnect wiring to the pressure switch according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

d. Install the copilot's seat.

e. Restore electrical power to the airplane.

CABIN ALTITUDE WARNING PRESSURE SWITCH REMOVAL (Effectivity: All)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Remove the center cockpit carpet aft of the pedestal.

c. Loosen the captive fasteners and remove the cockpit center floorboard panel.

d. Tag and disconnect wiring from the cabin altitude warning pressure switch.

e. Remove the screws and washers securing the cabin altitude warning pressure switch to the mounting bracket and remove the pressure switch.

CABIN ALTITUDE WARNING PRESSURE SWITCH INSTALLATION (Effectivity: All)

CAUTION

The cabin altitude warning pressure switch must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the cabin altitude warning pressure switch with the mounting bracket and secure with washers and screws.

b. Reconnect wiring to the cabin altitude warning pressure switch according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

c. Install the cockpit center floorboard panel and secure with captive fasteners.

d. Install the center cockpit carpet.

e. Restore electrical power to the airplane.

AUXILIARY VOLUME TANK REMOVAL (Effectivity: All)

CAUTION

When removing components, note locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Remove the pilot's seat.

c. Disconnect the pneumatic line from the auxiliary volume tank.

d. Remove the two screws and washers securing the auxiliary volume tank to the top of the pressurization control module assembly and remove the auxiliary volume tank.

AUXILIARY VOLUME TANK INSTALLATION (Effectivity: All)

CAUTION

The auxiliary volume tank must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the auxiliary volume tank with mounting holes on top of the pressurization control module assembly and secure with two washers and screws.

b. Reconnect the pneumatic line to the auxiliary volume tank.

c. Install the pilot's seat.

d. Restore electrical power to the airplane.

PRESSURIZATION CONTROL SYSTEM CONTINUOUS FLOW AIR FILTER REMOVAL (Effectivity: All)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Remove the pilot's seat.

c. Disconnect the pneumatic hose from the elbow at the back of the air filter housing.

d. Loosen the jam nut securing the air filter to the mounting bracket and remove the air filter housing.

e. Remove and discard the filter cartridge from the air filter housing.

NOTE

If the air filter housing is to be replaced, remove the elbow, jam nut, washer and O-ring from the filter housing boss. Discard the O-ring.

PRESSURIZATION CONTROL SYSTEM CONTINUOUS FLOW AIR FILTER INSTALLATION (Effectivity: All)

CAUTION

The air filter housing must meet electrical bonding requirements specified in Chapter 20-00-03.

NOTE

If a new filter housing is being installed, install the O-ring, washer, jam nut and elbow in the air filter housing boss before installing the new filter cartridge.

a. Install the new filter cartridge in the air filter housing.

b. Align the air filter housing with the mounting bracket on top of the pressurization control module assembly and secure with the jam nut and washer.

c. Reconnect the pneumatic hose to the air filter housing elbow.

d. Install the pilot's seat.

e. Restore electrical power to the airplane.

PRESSURIZATION CONTROL MODULE ASSEMBLY REMOVAL (Effectivity: All)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Remove the pilot's seat, carpeting and pedestal side upholstery kick panel.

c. Loosen the captive fasteners and remove the LH cockpit floorboard panel (extending forward to the forward pressure bulkhead between the rudder pedals).

d. Tag and disconnect wiring from the pressurization control module assembly.

e. Tag and disconnect all pneumatic lines from the pressurization control module assembly.

f. Remove the screws and washers securing the control module assembly to the forward pressure bulkhead and carefully remove it from the airplane.

NOTE

The lower clamp on the manual shutoff valve is secured with one of the control module assembly mounting screws and washers. Note the clamp location to aid in reinstallation.

PRESSURIZATION CONTROL MODULE ASSEMBLY INSTALLATION (Effectivity: All)

CAUTION

The pressurization control module assembly must be electrically bonded to the forward pressure bulkhead and LH cockpit floorboard panel. Electrical bonding requirements are specified in Chapter 20-00-03.

a. Carefully align the pressurization control module assembly with the mounting holes in the forward pressure bulkhead and secure with washers and screws.

NOTE

Secure the manual shutoff valve lower clamp with the control module mounting screw and washer as noted during removal.

b. Reconnect the pneumatic lines to their respective ports on the pressurization control module assembly according to tags.

CAUTION

Ensure that the pneumatic lines are connected to the proper ports and connections or the system will not operate properly.

c. Reconnect wiring to the control module assembly according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

d. Install the LH cockpit floorboard panel and secure with captive fasteners.

e. Install the LH pedestal side upholstery panel, carpet and pilot's seat.

f. Restore electrical power to the airplane.

PNEUMATIC RELAY REMOVAL (Effectivity: All)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Refer to PRESSURIZATION CONTROL MODULE ASSEMBLY REMOVAL in this chapter and remove the control module assembly.

CAUTION

When working around the control module assembly, extra care must be taken to ensure that no pneumatic lines and connections, except those being disconnected, are accidentally loosened. Leaks may develop and prevent proper system operation.

c. Tag and disconnect all pneumatic lines from the pneumatic relay and remove the pneumatic relay from the control module assembly.

d. Remove the reducer and O-ring from the CONTROL port of the pneumatic relay. Discard the O-ring.

PNEUMATIC RELAY INSTALLATION (Effectivity: All)

CAUTION

The pneumatic relay must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Install the reducer and a new O-ring in the CONTROL port of the pneumatic relay.

CAUTION

When working around the control module assembly, extra care must be taken to ensure that no pneumatic lines and connections are accidentally loosened. Leaks may develop and prevent proper system operation.

b. Position the pneumatic relay in the control module assembly and reconnect the pneumatic lines according to tags.

CAUTION

Ensure that the pneumatic lines are connected to the proper fittings and ports on the pneumatic relay or the system will not operate properly.

c. Refer to PRESSURIZATION CONTROL MODULE ASSEMBLY INSTALLATION in this chapter and install the control module assembly.

d. Restore electrical power to the airplane.

VACUUM REGULATOR REMOVAL (Effectivity: All)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Refer to PRESSURIZATION CONTROL MODULE ASSEMBLY REMOVAL in this chapter and remove the control module assembly.

CAUTION

When working around the control module assembly, extra care must be taken to ensure that no pneumatic lines and connections, except those being disconnected, are accidentally loosened. Leaks may develop and prevent proper system operation.

c. Tag and disconnect all pneumatic lines from the vacuum regulator.

d. Remove the vacuum regulator from the restrictor assembly and discard the O-ring.

e. Remove the nut, elbow and O-ring from the vacuum regulator. Discard the O-ring.

f. Remove the union and O-ring from the vacuum regulator. Discard the O-ring.

VACUUM REGULATOR INSTALLATION (Effectivity: All)

CAUTION

The vacuum regulator must meet electrical bonding requirements as specified in Chapter 20-00-03.

CAUTION

When working around the control module assembly, extra care must be taken to ensure that no pneumatic lines and connections are accidentally loosened. A leak may develop and prevent proper system operation.

a. Install a new O-ring on the elbow and secure the elbow to the vacuum regulator with the nut.

b. Install a new O-ring on the union and install the union in the vacuum regulator.

c. Place an O-ring on the restrictor assembly and carefully install the vacuum regulator on the restrictor assembly.

d. Reconnect the pneumatic lines to the vacuum regulator according to tags.

e. Refer to PRESSURIZATION CONTROL MODULE ASSEMBLY INSTALLATION in this chapter and install the control module assembly.

f. Restore electrical power to the airplane.

"B" SOLENOID VALVE REMOVAL (Effectivity: All)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Refer to PRESSURIZATION CONTROL MODULE ASSEMBLY REMOVAL in this chapter and remove the control module assembly.

CAUTION

When working around the control module assembly, extra care must be taken to ensure that no pneumatic lines and connections, except those being disconnected, are accidentally loosened. Leaks may develop and prevent proper system operation.

c. Tag and disconnect the "B" solenoid valve wiring from the control module assembly.

d. Carefully remove the "B" solenoid valve from the union at the bottom side of the control module assembly. Remove and discard the O-ring from the union.

e. Remove the screened filter from the "B" solenoid valve. Remove and discard the O-ring from the screened filter.

"B" SOLENOID VALVE INSTALLATION (Effectivity: All)

CAUTION

The "B" solenoid valve must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Install a new O-ring on the screened filter and install the screened filter in the inflow port of the "B" solenoid valve.

CAUTION

When working around the control module assembly, extra care must be taken to ensure that no pneumatic lines and connections are accidentally loosened. Leaks may develop and prevent proper system operation.

b. Install a new O-ring on the union and carefully install the "B" solenoid valve on the union.

c. Reconnect the "B" solenoid wiring to the pressurization control module assembly according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

d. Refer to PRESSURIZATION CONTROL MODULE ASSEMBLY INSTALLATION in this chapter and install the control module assembly.

e. Restore electrical power to the airplane.

"C" SOLENOID VALVE REMOVAL (Effectivity: All)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Refer to PRESSURIZATION CONTROL MODULE ASSEMBLY REMOVAL in this chapter and remove the control module assembly.

CAUTION

When working around the control module assembly, extra care must be taken to ensure that no pneumatic lines and connections, except those being disconnected, are loosened. A leak may develop and prevent proper system operation.

c. Tag and disconnect the "C" solenoid wiring from the control module assembly.

d. Carefully disconnect the pneumatic line from the union in the inflow port of the "C" solenoid valve.

e. Carefully remove the "C" solenoid valve from the restrictor assembly. Remove and discard the O-ring from the restrictor assembly.

f. Remove the union from the "C" solenoid valve. Remove and discard the O-ring from the union.

"C" SOLENOID VALVE INSTALLATION (Effectivity: All)

CAUTION

The "C" solenoid valve must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Install a new O-ring on the union and install the union in the inflow port of the "C" solenoid valve.

CAUTION

When working around the control module assembly, extra care must be taken to ensure that no pneumatic lines or connections are accidentally loosened. A leak may develop and prevent proper system operation.

b. Place an O-ring on the restrictor assembly and carefully install the "C" solenoid valve on the restrictor assembly.

c. Carefully reconnect the pneumatic line to the union installed in the "C" solenoid valve.

d. Reconnect the "C" solenoid wiring to the control module assembly according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

e. Refer to PRESSURIZATION CONTROL MODULE ASSEMBLY INSTALLATION in this chapter and install the control module assembly.

f. Restore electrical power to the airplane.

CABIN PRESSURIZATION CONTROLLER REMOVAL (Effectivity: All)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Refer to Chapter 31-10-00 and pull the cabin pressurization control panel away from the instrument panel enough to access wiring and plumbing.

c. Tag and disconnect all wiring from the cabin pressurization controller.

d. Tag and disconnect the pneumatic plumbing from the cabin pressurization controller.

e. Refer to Chapter 33-10-00 and remove the electroluminescent panel from the cabin pressurization control panel.

f. Remove the screws securing the cabin pressurization controller to cabin pressurization control panel and remove the controller.

g. Remove the adapters from the cabin pressurization controller pneumatic ports.

CABIN PRESSURIZATION CONTROLLER INSTALLATION (Effectivity: All)

CAUTION

The cabin pressurization controller must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Install the adapters in the cabin pressurization controller pneumatic ports.

b. Align the cabin pressurization controller with the cabin pressurization control panel and secure with screws.

c. Refer to Chapter 33-10-00 and install the electroluminescent panel on the control panel.

d. Reconnect pneumatic plumbing to the cabin pressurization controller according to tags.

e. Reconnect wiring to the cabin pressurization controller according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

f. Refer to Chapter 31-10-00 and install the cabin pressurization control panel.

g. Restore electrical power to the airplane.

MANUAL RATE CONTROL VALVE REMOVAL (Effectivity: All)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Refer to Chapter 31-10-00 and pull the cabin pressurization control panel away from the instrument panel enough to access plumbing and wiring.

c. Tag and disconnect wiring from the manual rate control valve.

d. Tag and disconnect the pneumatic plumbing from the manual rate control valve.

e. Refer to Chapter 33-10-00 and remove the electroluminescent panel from the pressurization control panel.

f. Remove the screws securing the manual rate control valve to the panel assembly and remove the control valve.

MANUAL RATE CONTROL VALVE INSTALLATION (Effectivity: All)

CAUTION

The manual rate control valve must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the manual rate control valve with the cabin pressurization control panel and secure to the panel with screws.

b. Refer to Chapter 33-10-00 and install the electroluminescent panel on the cabin pressurization control panel.

c. Reconnect the pneumatic plumbing to the manual rate control valve according to tags.

d. Reconnect wiring to the manual rate control valve according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

e. Refer to Chapter 31-10-00 and install the cabin pressurization control panel in the instrument panel.

f. Restore electrical power to the airplane.

CABIN CLIMB INDICATOR REMOVAL (Effectivity: All)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Remove the copilot's seat.

c. Refer to Chapter 33-10-00 and remove the copilot's inboard subpanel electroluminescent panel.

d. Remove the screws securing the copilot's inboard subpanel to the subpanel structure and pull the subpanel out far enough to access wiring.

e. Tag and disconnect wiring from the cabin climb indicator.

f. Tag and disconnect the static air plumbing from the cabin climb indicator.

g. Remove the screws attaching the cabin climb indicator to the copilot's inboard subpanel and remove the cabin climb indicator.

CABIN CLIMB INDICATOR INSTALLATION (Effectivity: All)

CAUTION

The copilot's inboard subpanel must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the cabin climb indicator with the copilot's inboard subpanel and secure to the subpanel with screws.

b. Reconnect the static air plumbing to the cabin climb indicator according to tags.

c. Reconnect wiring to the cabin climb indicator according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

d. Align the copilot's inboard subpanel with the subpanel structure and secure with screws.

e. Refer to Chapter 33-10-00 and install the copilot's inboard subpanel electroluminescent panel.

f. Install the copilot's seat.

g. Restore electrical power to the airplane.

CABIN ALTITUDE/DIFFERENTIAL PRESSURE INDICATOR REMOVAL (Effectivity: All)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Remove the copilot's seat.

c. Refer to Chapter 33-10-00 and remove the copilot's inboard subpanel electroluminescent panel.

d. Remove the screws securing the copilot's inboard subpanel to the subpanel structure and pull the subpanel out far enough to access wiring.

e. Tag and disconnect wiring from the pressure indicator.

f. Tag and disconnect the static air plumbing from the pressure indicator.

g. Remove the screws securing the pressure indicator to the copilot's inboard subpanel and remove the pressure indicator.

CABIN ALTITUDE/DIFFERENTIAL PRESSURE INDICATOR INSTALLATION (Effectivity: All)

CAUTION

The copilot's inboard subpanel must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the cabin altitude/differential pressure indicator with the copilot's inboard subpanel and secure with screws.

b. Reconnect the static air plumbing to the pressure indicator according to tags.

c. Reconnect wiring to the pressure indicator according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

d. Align the copilot's inboard subpanel with the subpanel structure and secure with screws.

e. Refer to Chapter 33-10-00 and install the copilot's inboard subpanel electroluminescent panel.

f. Install the copilot's seat.

g. Restore electrical power to the airplane.

PRESSURIZATION TESTING (Effectivity: All)

CABIN LEAK RATE GROUND TEST EQUIPMENT (Effectivity: All)

Test units used to ground test the cabin for pressurization leaks must include air inlet filters and a pressure relief valve to prevent damage to the airplane. The typical test unit used to check the cabin leak rate will consist of an air blower, a dry filter, pressure relief valve, aircraft pressure indicator, climb rate indicator, air flow indicator, unit pressure indicator, unit air temperature indicator, unit air control/dump valve, shop air regulator and a shop air pressure indicator. It is recommended that the unit specified in 21-00-00, Chart 2, be used whenever possible.

CABIN LEAK RATE GROUND TEST (Effectivity: All)

WARNING

Carefully review the technical data provided with the test unit (1, Chart 2, 21-00-00) prior to initiating the test procedure.

a. Refer to Chapter 53-30-00 and remove the aft wing box shear panel.

b. Connect the test unit pressure hose to the fitting on the bleed air line located between the diverter valve and F.S. 416 bulkhead.

c. Connect the cabin sense port line to the #4 bulkhead fitting on the F.S. 95 bulkhead. Ensure that the fitting is not capped or plugged on the inside.

d. Plug the relief port on the cabin door solenoid.

e. Plug the atmospheric vent on both outflow valves. The vents are located on the outboard side of the keels directly outboard of the outflow valves, and may be accessed from the nose wheel well area.

f. Turn the cabin rate select knob on the cabin pressurization controller fully clockwise and turn the manual rate select knob fully counterclockwise.

g. Reach behind the pilot's rudder pedals and place the manual shutoff valve in the OFF position.

h. Ensure that the emergency exit door is secure.

i. Exit all personnel from the airplane.

j. Close and latch the cabin door and any access panels that contribute to pressurization.

NOTE

Secure heavy-strength, nylon safety straps to the cabin door. The straps should have a minimum breaking strength of 26,000 pounds. If making structural repairs to the pressure vessel, attach a safety net (2, Chart 2, 21-00-00) large enough to cover the fuselage.

k. Attach a sign on the outside of the the cabin door that reads: "DANGER - AIRCRAFT IN PRESSURE TEST".

WARNING

DO NOT, under any circumstances, open the cabin door, emergency exit door, or access panels while the cabin has ANY pressure applied during this test. DO NOT leave the test area during this test.

l. Connect shop air to the test unit (1, Chart 2, 21-00-00).

m. Adjust the shop air on the test unit (1, Chart 2, 21-00-00) to 15 psi.

n. Turn the test unit (1, Chart 2, 21-00-00) ON to start the blower.

o. Open the pressure hose shutoff valve.

CAUTION

Ensure that the cabin door is closed and secured before inflating the cabin door seal.

p. Set the bleed air pressure between 44 and 50 psi and allow the pressure system to inflate the cabin door seal.

CAUTION

DO NOT exceed a 2000 ft/min climb rate, as damage to the airplane cabin pressurization controller will result.

CAUTION

Do not pressurize the cabin over 8.4 psi.

q. Slowly open the airflow valve on the test unit (1, Chart 2, 21-00-00) and monitor the climb rate and pressure indicators. Do not allow the climb rate to exceed 2000 feet-per-minute. The climb rate indicator will initially show a descent as the cabin pressure increases. As the cabin pressure reaches 8.0 ±.1 psi, the cabin will begin to peak and the cabin climb indicator will show a climb.

NOTE

If the rated pressure cannot be reached, determine the source of excess leakage, de-pressurize the cabin, and repair the leaks.

r. When 8.0 ±.1 psi is reached, decrease the air flow to the cabin by adjusting the air flow valve until the climb rate indicator reads zero. At this point the amount of airflow into the cabin is equal to the amount of air escaping the cabin.

NOTE

Standard cubic feet-per-minute (SCFM) is the true value of cubic feet-per-minute taking into consideration the effects of temperature and pressure on a gas; in this case, air.

s. Read the air flow indicator and convert the reading to SCFM by using temperature and pressure conversions supplied with the test unit technical data. If there are no conversion graphs provided with the test unit, and the air flow indicator reads cubic feet-per-minute directly, use the Flow Rate Correction Graph (Figure 2) to compensate for ambient temperature and pressure in the cabin, and obtain a SCFM reading.

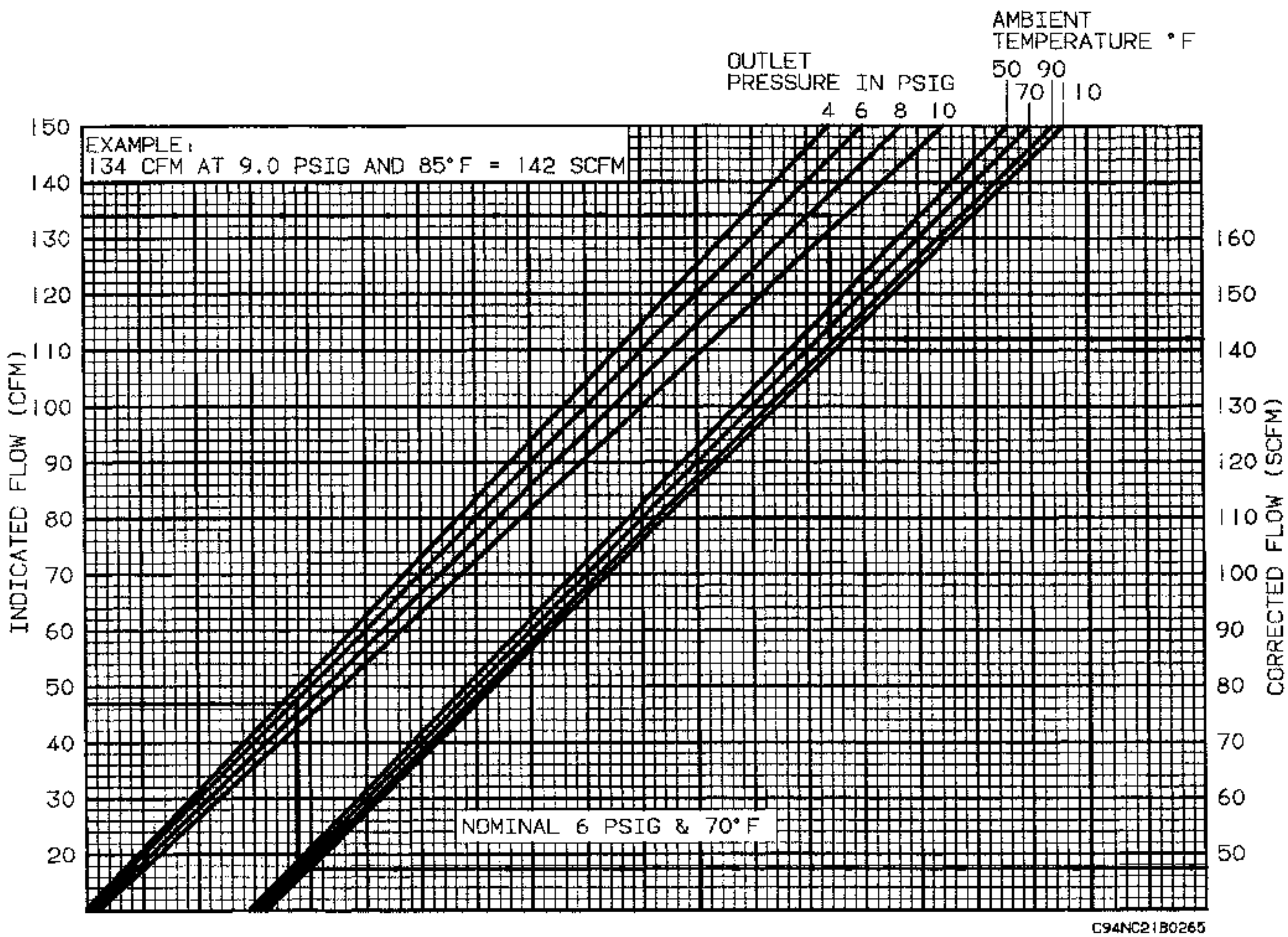
t. If 8.0 ±.1 psi is maintained with a maximum flow rate of 55 SCFM, the pressure vessel of the airplane is satisfactorily air tight.

u. If the flow rate is exceeded, listen for pressure leaks in the following areas:

NOTE

Leaks can be detected by sound and pinpointed by feel. It may be necessary to attain maximum pressure, then shutdown the test unit (1, Chart 2, 21-00-00) so that the sound of the blower will not interfere with the detection of leaks in the pressure vessel.

1. Nose wheel well.
2. Hoses, plumbing and wire bundles piercing the pressure vessel.
3. Windshield seal and attachment hardware.
4. Seal around emergency exit door.
5. Seal around the cabin door.
6. Access panel seals.
7. Outflow valve mounting seals.



Flow Rate Correction Graph (Effectivity: All)
Figure 2

8. Control cable seals in the pressure bulkheads.
9. Fuselage belly drain plugs.
10. Antenna doublers and mounting areas.

v. After reaching an acceptable leakage, quickly close the inlet valve and record the rate-of-climb after the indicator stabilizes. The reading should be less than or equal to 2600 feet-per-minute.

w. Perform the OUTFLOW VALVES FUNCTIONAL TEST as outlined in this chapter.

x. Close the airflow valve on the test unit (1, Chart 2, 21-00-00).

y. Close the shutoff valve on the test unit (1, Chart 2, 21-00-00).

WARNING

DO NOT, under any circumstances, open the cabin door, emergency exit door, or access panels while the cabin has ANY pressure applied.

z. Depressurize the airplane completely. On the TRONAIR Cabin Pressurization Unit (1, Chart 2, 21-00-00), turn the air control valve to the full decrease position to dump pressure. When the rate-of-climb indicator is at the horizontal position and the pressure gauge reads zero, the cabin is depressurized.

aa. Disconnect the pressure hose from the bleed air line fitting.

ab. Refer to Chapter 53-30-00 and install the aft wing box shear panel.

ac. Disconnect the sense line from the fitting on the forward pressure bulkhead.

ad. Remove the plugs from the outflow valve atmospheric vents if not already removed.

ae. Unlatch the cabin door before removing the safety net (2, Chart 2, 21-00-00).

af. Remove the warning sign and safety net (2, Chart 2, 21-00-00) from the cabin door.

OUTFLOW VALVES FUNCTIONAL TEST
(Effectivity: All)
(Figure 3)

The regulating function of the outflow valves can be tested by observing that the outflow valves can maintain the cabin pressure at a differential of 8.3 ±.1 psig.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the outflow valve exit ramp (4).

c. Loosen the captive fasteners on the outflow valve access door (3) and pull the door out far enough to access the pneumatic lines.

d. Remove the atmospheric sense line (6) from the left outflow valve (2).

e. Remove the hose connecting the right outflow valve to the control line tee (5). Cap the exposed leg of the tee.

f. Connect a pitot-static tester (6, Chart 1, 21-00-00) or equivalent, to the atmospheric sense line port (1) on the left outflow valve dome.

g. Set the pitot-static tester altitude to 29.92 in. hg. Record this altitude and using Chart 2 convert this altitude to the equivalent pressure.

h. Increase the altitude setting on the pitot-static tester to evacuate the outflow valve and pressure control plumbing.

i. Continue increasing the altitude setting until the poppet of the outflow valve is fully open (movement stops). Record the altitude reading on the pitot-static tester and convert this altitude to the equivalent pressure using Chart 2.

j. Subtract the fully open pressure recorded in step i from the starting pressure recorded in step g. This difference in pressure is the safety point of the outflow valve under test. The Starship 1 maximum differential pressure is 8.3 ±0.1 psi.

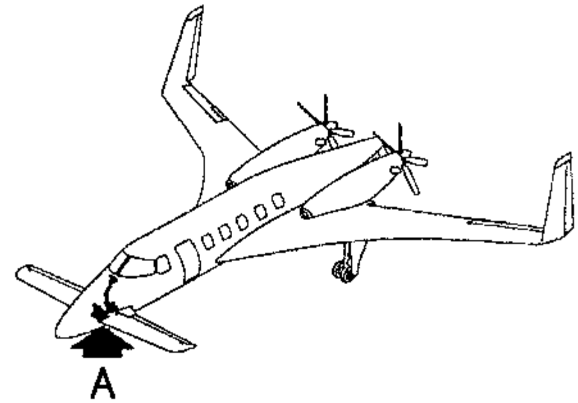
k. Repeat steps a thru j for the other outflow valve.

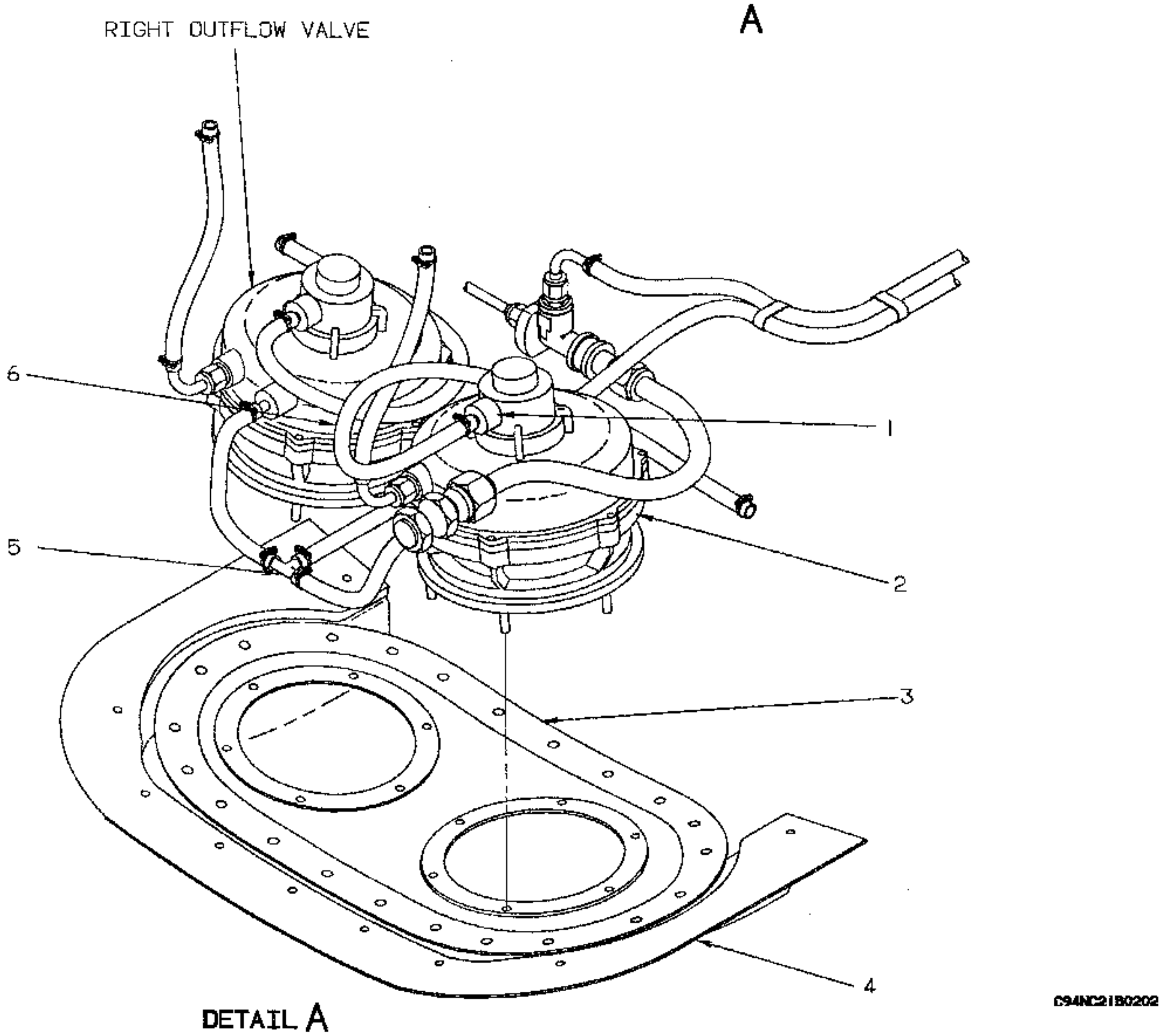
l. Upon completion of testing the outflow valves, remove the pitot-static tester and reconnect all disconnected lines.

m. Install the outflow valve access panel (3) and secure with the captive fasteners.

n. Install the outflow valve exit ramp (4) and secure with the captive fasteners.

1. LEFT ATMOSPHERIC SENSE LINE PORT
2. LEFT OUTFLOW VALVE
3. OUTFLOW VALVE MOUNT PANEL
4. OUTFLOW VALVE EXIT RAMP
5. CONTROL LINE TEE
6. ATMOSPHERIC SENSE LINE





Outflow Valve Functional Test Diagram (Effectivity: All)
Figure 3

CHART 2
ALTITUDE TO PRESSURE CROSS REFERENCE (Effectivity: All)

ALTITUDE	PRESSURE		ALTITUDE	PRESSURE	
Feet	In. Hg	Psi	Feet	In. Hg	Psi
-1000	31.02	15.24	18500	14.65	7.19
-500	30.47	14.96	19000	14.35	7.05
0	29.92	14.70	19500	14.05	6.90
500	29.38	14.43	20000	13.76	6.76
1000	28.86	14.17	20500	13.48	6.62
1500	28.33	13.92	21000	13.20	6.48
2000	27.82	13.67	21500	12.92	6.35
2500	27.32	13.42	22000	12.65	6.21
3000	26.82	13.17	22500	12.38	6.08
3500	26.33	12.93	23000	12.12	5.95
4000	25.84	12.69	23500	11.86	5.83
4500	25.37	12.46	24000	11.61	5.70
5000	24.90	12.23	24500	11.36	5.58
5500	24.43	12.00	25000	11.17	5.46
6000	23.98	11.78	25500	10.88	5.34
6500	23.53	11.56	26000	10.64	5.23
7000	23.09	11.34	26500	10.41	5.11
7500	22.66	11.13	27000	10.18	5.00
8000	22.23	10.92	27500	9.96	4.89
8500	21.81	10.71	28000	9.74	4.78
9000	21.39	10.51	28500	9.53	4.68
9500	20.98	10.31	29000	9.31	4.58
10000	20.58	10.11	29500	9.11	4.47
10500	20.19	9.91	30000	8.96	4.37
11000	19.80	9.72	30500	8.70	4.27
11500	19.41	9.54	31000	8.51	4.18
12000	19.03	9.35	31500	8.31	4.08
12500	18.66	9.17	32000	8.12	3.99
13000	18.30	8.99	32500	7.94	3.90
13500	17.94	8.81	33000	7.76	3.81
14000	17.58	8.64	33500	7.58	3.72
14500	17.24	8.47	34000	7.40	3.64
15000	16.89	8.30	34500	7.23	3.55
15500	16.56	8.13	35000	7.06	3.47
16000	16.22	7.97	36000	6.73	3.31
16500	15.90	7.81	37000	6.42	3.15
17000	15.58	7.65	38000	6.17	3.00
17500	15.26	7.50	39000	5.83	2.86
18000	14.95	7.34	40000	5.56	2.73

EXAMPLE:

BT04494

FIELD ALTITUDE....................1,500 FT ....13.92 PSI
VALVE OPEN ALTITUDE....................24,750 FT ....5.52 PSI
PSID = 8.40 PSI

OUTFLOW VALVE SERVICING (Effectivity: All)

Fluctuation of cabin pressure often indicates a dirty poppet or seat in one or both of the outflow valves. The seats and poppets should be cleaned at the intervals specified in Chapter 12 or as necessary to allow for proper system operation.

a. Refer to OUTFLOW VALVE REMOVAL in this chapter and remove the outflow valves from the airplane.

b. Inspect the each outflow valve poppet, seat and noise suppression screen for accumulation of dust and tobacco smoke residue.

c. Using a suitable liquid dispenser filled with a mild liquid detergent and water, or with alcohol (1, Chart 1, 21-00-00), flush the valve poppets, seats and noise suppression screens. It may be necessary to remove the noise suppression screens and wipe the poppets and seats with a clean rag dampened with a mild liquid detergent or alcohol (1, Chart 1, 21-00-00).

CAUTION

Use only the products listed. Unapproved products may have a damaging effect on the components of the valve or may leave a residue which will interfere with the valve action.

d. Refer to OUTFLOW VALVE INSTALLATION in this chapter and install the outflow valves.

CABIN PRESSURIZATION CONTROLLER FILTER CLEANING (Effectivity: All)

The cabin pressurization controller filter should be cleaned anytime an excess of dust or tobacco residue is evident. This condition may be indicated by erratic operation of the cabin pressurization controller.

a. Refer to CABIN PRESSURIZATION CONTROLLER REMOVAL in this chapter and remove the cabin pressurization controller from the instrument panel.

b. Remove the screen and filter element from the cabin pressurization controller housing.

c. Wash the screen and filter element in solvent (4, Chart 1, 21-00-00). Dry the parts by blowing compressed air across their surfaces.

d. Ensure that the orifice in the controller housing is free of foreign material.

CAUTION

Use care not to damage the orifice in the housing. Proper system operation is dependant on the size of the orifice.

e. Install the filter element and screen in the cabin pressurization controller housing.

f. Refer to CABIN PRESSURIZATION CONTROLLER INSTALLATION in this chapter and install the cabin pressurization controller in the instrument panel.

HEATING - DESCRIPTION AND OPERATION (Effectivity: All) (Figures 1 and 2)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

BLEED AIR SYSTEM (Effectivity: All)

Engine compressor discharge air (P3) is routed from the engines to the firewall bleed air shutoff valves. Bleed air flows from each firewall shutoff valve to the respective flow control valve and mass air flow sensor in the forward section of each nacelle. Bleed air mass flow is normally regulated between 3 and 5 lbs. per minute, per engine by the flow control valves, which are controlled by the Environmental System Controller (ESC). The ESC determines the necessary mass air flow rate in relation to crew selected environmental settings. Actual environmental conditions are monitored with inputs from several temperature sensors and transducers throughout the environmental system. The ESC automatically adjusts the flow control valves as the crew manually controls temperature and pressurization.

The rotary switch placarded BLEED AIR VALVES, EMER-OFF-L ENG-BOTH-R ENG-HIGH FLOW provides the crew with manual control over the bleed air firewall shutoff valves and emergency air valve. The emergency air valve is installed between the LH and RH bleed air supply lines in the lower aft fuselage. It allows a manual bypass of the heat exchanger, bypass valve and diverter valve during an emergency. When the BLEED AIR VALVES switch EMER position is selected, the LH bleed air firewall shutoff valve is closed, the emergency air valve opened and the cabin is dependent upon the RH engine for its supply of bleed air. The Engine Instrument, Crew Alerting System (EICAS) yellow "L BLEED OFF" caution message is displayed on the EICAS display to indicate that the LH bleed air firewall shutoff valve is closed. The EICAS white "EMER BLEED ON" status message is also displayed to indicate that the emergency air valve is open. In this configuration, bleed air flow from the RH engine is routed directly through the emergency air valve to the aft ventilation blower. A check valve prevents bleed air flow to the diverter valve when the emergency air valve is open. The ESC increases aft ventilation blower speed to 100 percent, and will maintain that speed even if a low-flow signal is sent to the ESC indicating blower failure.

NOTE

Five check valves are installed in the bleed air system to prevent pressurization loss. Refer to Chart 1 and Figure 2 for their approximate locations.

CHART 1
HEATING SYSTEM COMPONENTS AND LOCATIONS (Effectivity: All)

ITEM	LOCATION	ZONE
RH Flow Control Valve	Located in the RH nacelle, between the RH bleed air firewall shutoff valve and the engine inlet hot lip.	681
LH Flow Control Valve	Located in the LH nacelle, between the LH bleed air firewall shutoff valve and the engine inlet hot lip.	581
Bypass Valve	Located in the lower aft fuselage below the environmental dome just aft of the aft pressure bulkhead.	310
Diverter Valve	Located on the RH side in the lower aft fuselage below the environmental dome just aft of the aft pressure bulkhead.	310
Heat Exchanger	Located in the lower aft fuselage on the LH side below the pre-condenser.	310
Emergency Air Valve	Located in the lower aft fuselage below the environmental dome and just aft of the aft pressure bulkhead.	310
Aft Thermal Isolator	Installed on the aft pressure bulkhead/wing aft spar in the lower aft fuselage.	310 & 556
Middle Thermal Isolator	Installed on the wing center spar in the wing center section.	556 & 547
Forward Thermal Isolator	Installed on the aft pressure bulkhead/wing forward spar.	172 & 547
Environmental Dome Thermal Isolators	Installed in the lower half of the environmental dome.	295 & 310
Bleed Air System Pressurization Test Port	Located in the wing center section between the wing center spar and the wing aft spar on the bleed air plumbing.	556
Check Valves (5 total)	Installed in the aft connection of both environmental dome thermal isolators.	310
	Installed in the lower LH connection of the alternate air valve.	310
	Installed in the bleed air plumbing, in the LH main wing trailing edge cove at the connection adjacent to the fuselage.	561
	Installed in the bleed air plumbing, below the RH cabin floorboard just forward of the aft pressure bulkhead at the connection adjacent the fuselage.	172

After the engine bleed air has been flow-regulated, it flows through the engine inlet anti-ice hot lip on each nacelle. The LH and RH bleed air lines are routed from each nacelle to the lower aft fuselage via the main wing trailing edge coves. The bleed air lines join at the lower aft fuselage before reaching the bypass valve and heat exchanger. Under automatic control (AUTO TEMP MODE), the ESC modulates the bleed air between the bypass valve and heat exchanger by varying bypass valve position. Under manual control

(MAN TEMP MODE), the crew determines bypass valve position with the switch placarded MAN TEMP, INCR-DECR on the copilot's inboard subpanel. Bleed air temperature should not exceed 400° F. downstream of the bypass valve, as sensed by the ESC through the bleed air duct temperature sensor. If the bypass valve reaches the full heat exchange position and bleed air duct temperature is above 400° F., the ESC operates the vane axial blower to improve heat exchanger capability and lower bleed air temperature. A 415° F. temperature sensor in the bleed air duct and two additional temperature sensors in the distribution ducts will cause the EICAS to display the yellow "DUCT OVERTEMP" caution message on the EICAS display when they sense an overtemperature condition. Refer to Chapter 21-60-00 for detailed information on temperature sensing and control.

The bleed air leak detection box and three leak detection sensors monitor the left, right and center sections of the bleed air system for leaks. If a leak is present, the applicable red warning annunciator in the warning annunciator panel will illuminate, informing the crew of the fault. A momentary pushbutton test switch, placarded BLEED AIR on the pilot's outboard subpanel, is used to test the leak detection box circuitry and associated sensors. When pressed, the "L BLEED FAIL", "R BLEED FAIL" and "FUS BLEED FAIL" warning annunciators should illuminate. When released, the warning annunciators should extinguish. If an annunciator is illuminated before the test is performed, or remains illuminated afterwards, it is an indication of a fault in the system. Certain faults will be displayed as a three-digit fault code on the CABIN TEMP display on the copilot's inboard subpanel. Refer to the troubleshooting section of this chapter to interpret the fault codes. For more detailed information about the bleed air warning system refer to Chapter 26-11-00.

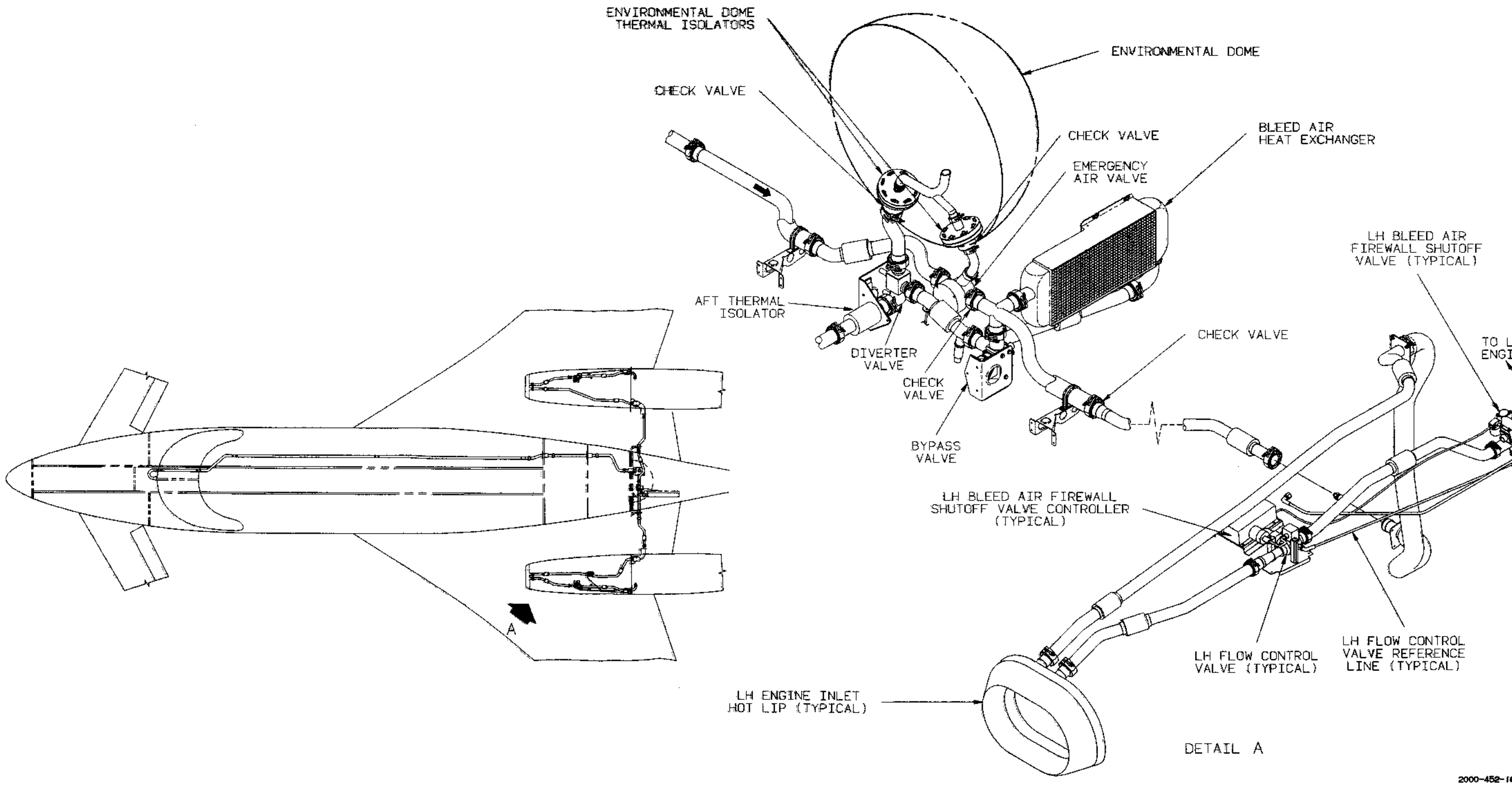
When bleed air temperature has been stabilized by the heat exchanger and bypass valve, it flows to the diverter valve. The diverter valve divides bleed air flow between the cabin and cockpit. Normally, diverter valve position is manually controlled by the crew through the rotary switch placarded CKPT/CABIN AUTO TEMP, DECR-INCR on the copilot's inboard subpanel. If a duct overtemperature condition is sensed by the ESC, diverter valve position will be automatically adjusted by the ESC to correct the condition.

Warm air outlets are located under the instrument panel for crew comfort. These outlets are regulated by the PILOT AIR, PULL ON knob and the COPILOT AIR, PULL ON knob located on the pilot's and copilot's outboard subpanels. The warm air supply for windshield defrost is controlled by the DEFROST AIR, PULL ON knob just below the PILOT AIR knob on the pilot's outboard subpanel.

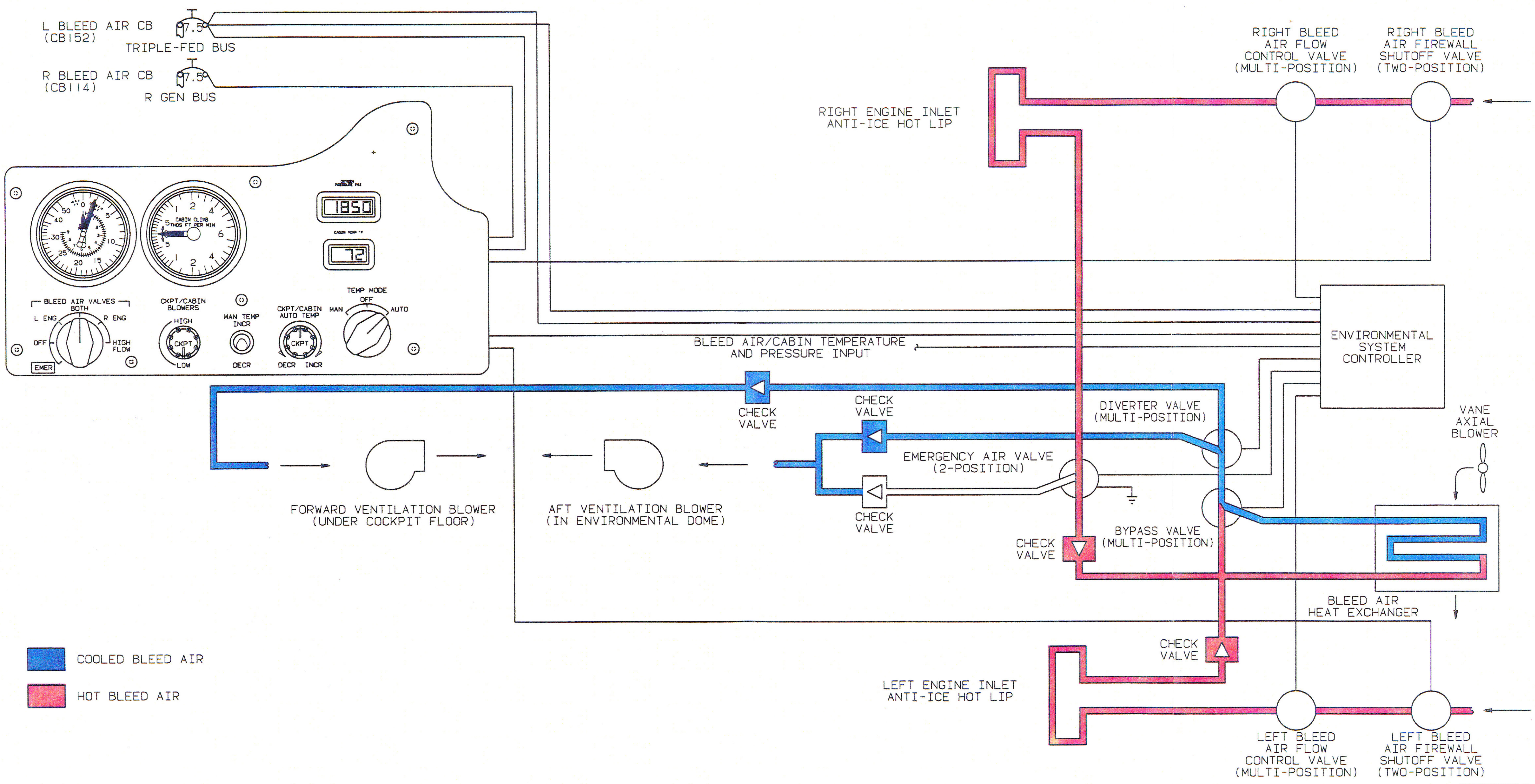
HEATING - TROUBLESHOOTING (Effectivity: All)

FAULT CODE ANALYSIS (Effectivity: All)

Transducers, temperature sensors and control valves used in the bleed air heating system are monitored by the ESC self-diagnostic system. When a fault occurs in a monitored component, the ESC signals the CABIN TEMP display (located on the copilot's inboard subpanel) to display a three digit fault code. Chart 2 provides a list of fault codes and the associated faults to aid in troubleshooting the bleed air control system.



Bleed Air Heating System (Effectivity: All)
Figure 1



Bleed Air Heating System Functional Schematic
(Effectivity: All)
Figure 2

CHART 2
BLEED AIR SYSTEM FAULT CODES (Effectivity: All)

ITEM	LOCATION	ZONE
930	Left Flow Control Valve Pressure Transducer Failed	1
931	Left Flow Control Valve Temperature Sensor Failed	1
940	Right Flow Control Valve Pressure Transducer Failed	1
941	Right Flow Control Valve Temperature Sensor Failed	1
950	Bypass Valve Failed	2
952	Diverter Valve Failed	2
953	Power Source to ESC Failed	3
955	Processor Failed	4
957	Emergency Valve Failed	5

NOTE 1 The ESC continuously monitors the pressure transducer and temperature sensor signals for operation outside their normal operating ranges, including open or shorted circuits. Inputs not in the normal operating range cause the ESC to declare an appropriate sensor fault and generate the fault code for display. To provide minimally compromised flow control during such a fault, the ESC assumes 50 PSIA for pressure or 500°F for temperature and continues uninterrupted operation.

NOTE 2 The ESC continuously monitors the valve for failure to respond to command. Should the ESC determine that valve operation is defective, it will generate the fault code for display. Defective valve operation does not block the ESC's access to further sequentially controlled events for purposes of duct temperature limiting, such as heat exchanger blower initiation.

NOTE 3 The two separate electrical power sources for the ESC are continuously monitored for loss of either. On sensing a loss of either source, the ESC generates the fault code for display and continues uninterrupted normal operation.

NOTE 4 The ESC has a self-check capability to monitor its own internal failures. On sensing the loss of a processor, the ESC generates the fault code for display and continues operation with a minimum of operational degradation. This alerts the crew to loss of backup control capability.

NOTE 5 The ESC monitors the emergency air valve for failure to achieve or maintain emergency position when selected. Should the valve fail to reach, or remain in, the full emergency air position, the ESC generates the fault code for display; but, otherwise, continues uninterrupted operation as prescribed for the EMERGENCY AIR selection.

HEATING - MAINTENANCE PRACTICES (Effectivity: All)

GENERAL GUIDELINES FOR SERVICING THE BLEED AIR HEATING SYSTEM (Effectivity: All)

Prior to performing any maintenance and service on the bleed air heating system, servicing personnel should be thoroughly familiar with the following instructions.

a. Since engine bleed air temperature can reach several hundred degrees fahrenheit, care should be taken to allow ample cooling time for the system before performing maintenance.

b. Exercise care when handling the bleed air warning sensing elements. Kinks and bends, or loops in an element with a radius smaller than a 1.5-inch will cause damage to the element. Refer to Chapter 26-11-00 for detailed information on handling the sensing elements.

c. Bleed air lines and tubes are to be covered with insulation (21, Chart 1, 21-00-00) and secured with tape (20, Chart 1, 21-00-00). Maintain the insulation as thick as possible around the lines or tubes, except in close clearance areas, to prevent heat damage to the adjacent structure.

d. All check valves must be properly oriented and installed in the correct locations to ensure proper system operation.

e. When removing components from the system, note the locations of all bonding jumpers to aid in reinstallation. All bonding jumpers must be reinstalled in their previous configuration to conform with electrical bonding requirements. Refer to Chapter 20-00-03 for detailed information on electrical bonding.

f. When securing the system couplings, ensure that they are properly torqued.

1. Torque small couplings (1 or 1.25 inch diameter) to 45-55 inch-lbs.

2. Torque large couplings (1.5 inch diameter) to 50-60 inch-lbs.

g. All support brackets and clamps are to be reinstalled or replaced if damaged. Proper spacing of the bleed air heating system components from the surrounding structure is extremely important to prevent heat damage.

BLEED AIR FLOW CONTROL VALVE REMOVAL (LH AND RH) (Effectivity: All) (Figure 3)

WARNING

Refer to GENERAL GUIDELINES FOR SERVICING THE BLEED AIR HEATING SYSTEM before attempting any service on the bleed air heating system.

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the nacelle upper aft access panel.

c. Tag and disconnect wiring from the bleed air flow control valve.

d. Carefully move the bleed air warning sensing element out of the way of the bleed air flow control valve and its couplings. Refer to Chapter 26-11-00 for information on handling the sensing elements.

CAUTION

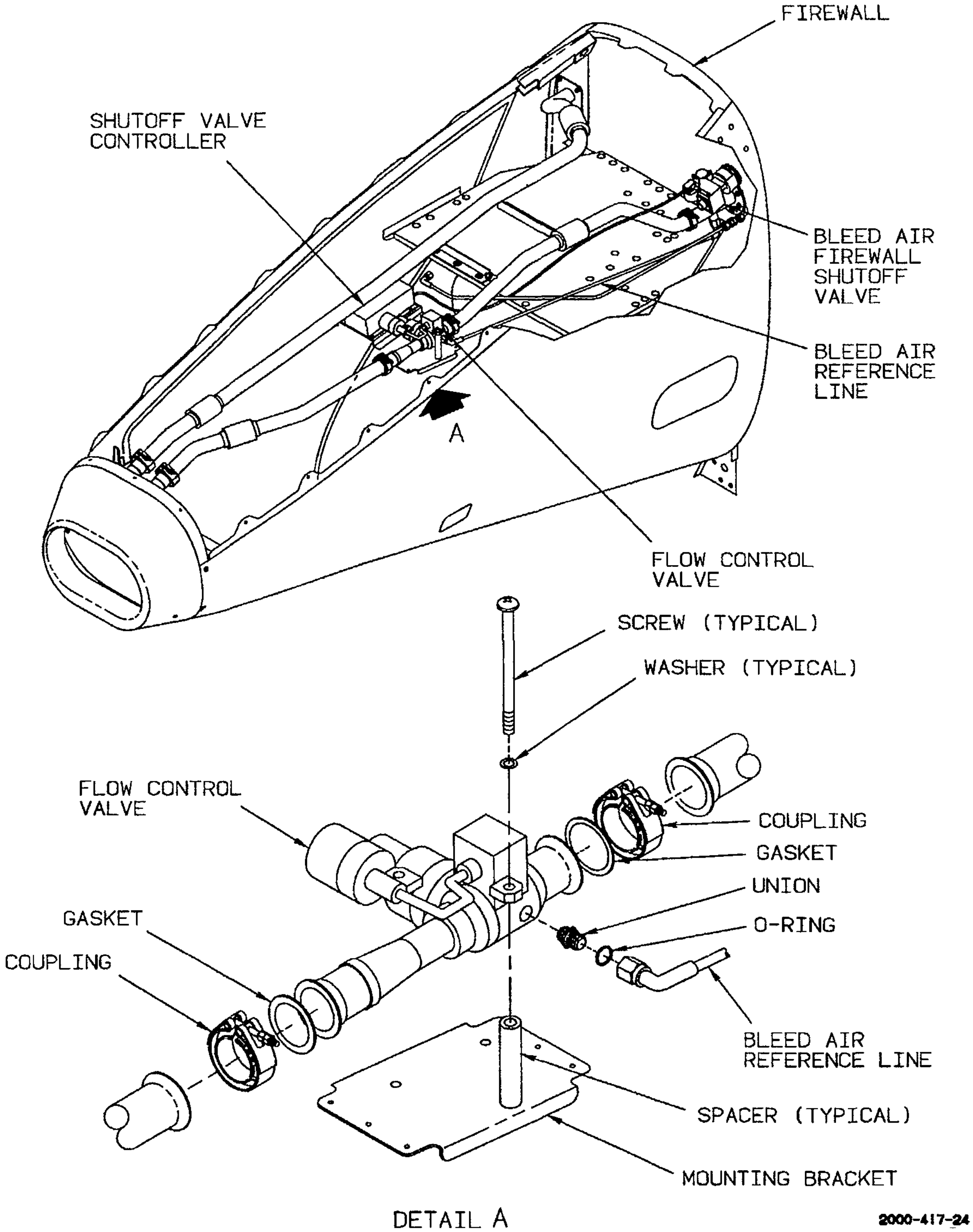
Do not kink or form bends or loops with a radius smaller than 1.5-inch in the sensing element, or damage to the element will result.

e. Remove insulation from plumbing and connections adjacent to the bleed air flow control valve.

f. Remove safety wire from the bleed air flow control valve.

g. Disconnect the small bleed air reference line from the bleed air flow control valve union and remove the union and O-ring from the bleed air flow control valve.

h. Disconnect couplings securing the bleed air flow control valve to the bleed air plumbing.



Bleed Air Flow Control Valve Installation
(Effectivity: All)
Figure 3

i. Remove the screws, washers and spacers securing the bleed air flow control valve to the mounting bracket, and remove the bleed air flow control valve, gaskets and couplings.

BLEED AIR FLOW CONTROL VALVE INSTALLATION (LH AND RH)
(Effectivity: All)
(Figure 3)

CAUTION

The bleed air flow control valve must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Attach the bleed air flow control valve to its mounting bracket with spacers, washers and screws, then safety wire.

b. Align the bleed air plumbing, gaskets and couplings with the bleed air flow control valve plumbing connections.

c. Secure the bleed air plumbing connections with the couplings and torque to the following specifications:

1. Torque small couplings (1 or 1.25 inch diameter) to 45-55 inch-lbs.

2. Torque large couplings (1.5 inch diameter) to 50-60 inch-lbs.

d. Install the union and a new O-ring in the bleed air flow control valve and install the bleed air reference line on the union.

e. Insulate the couplings and bleed air plumbing adjacent to the bleed air flow control valve with insulation (21, Chart 1, 21-00-00) and secure with tape (20, Chart 1, 21-00-00).

CAUTION

Maintain uniform insulation thickness around the bleed air plumbing, except in close clearance areas, or heat damage to the surrounding structure will result.

NOTE

Insulation (22, Chart 1, 21-00-00) may be used as a substitute, but must be entirely wrapped with tape (20, Chart 1, 21-00-00).

f. Reposition the bleed air warning sensing element around the bleed air flow control valve and adjacent plumbing. Refer to Chapter 26-11-00 for detailed information on handling and positioning the sensing element.

CAUTION

Do not kink or form bends or loops with a radius smaller than 1.5-inch in the sensing element, or damage to the element will result.

g. Reconnect wiring to the bleed air flow control valve according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

h. Install the nacelle upper aft access panel and secure with captive fasteners.

i. Restore electrical power to the airplane.

BLEED AIR BYPASS VALVE REMOVAL
(Effectivity: All)
(Figure 4)

WARNING

Refer to GENERAL GUIDELINES FOR SERVICING THE BLEED AIR HEATING SYSTEM before attempting any service on the bleed air heating system.

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the lower aft fuselage ambient air inlet door.

c. Remove screws and washers attaching the condenser plenum lower and forward closeouts, and remove the closeouts.

d. Tag and disconnect wiring from the bleed air bypass valve.

e. Carefully move the bleed air warning sensing element out of the way of each bleed air bypass valve coupling. Refer to Chapter 26-11-00 for detailed information on handling the sensing element.

CAUTION

Do not kink or form bends or loops with a radius smaller than 1.5-inch in the sensing element, or damage to the element will result.

f. Remove insulation from the bleed air bypass valve plumbing connections.

g. Remove safety wire from the bleed air bypass valve.

h. Disconnect the couplings securing the bleed air bypass valve to the bleed air plumbing.

i. Remove the bolts and washers securing the bleed air bypass valve to the mounting bracket and remove the valve, gaskets and couplings from the airplane.

BLEED AIR BYPASS VALVE INSTALLATION (Effectivity: All) (Figure 4)

CAUTION

The bleed air bypass valve must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Attach the bleed air bypass valve to its mounting bracket with washers and bolts, then safety wire.

b. Align the bleed air plumbing, couplings and gaskets with the bleed air bypass valve plumbing connections.

c. Secure the bleed air bypass valve plumbing connections with couplings and torque to the following specifications:

1. Torque small couplings (1 or 1.25 inch diameter) to 45-55 inch-lbs.

2. Torque large couplings (1.5 inch diameter) to 50-60 inch-lbs.

d. Insulate the couplings and bleed air plumbing adjacent to the bleed air bypass valve with insulation (21, Chart 1, 21-00-00) and secure with tape (20, Chart 1, 21-00-00).

CAUTION

Maintain uniform insulation thickness around the bleed air plumbing, except in close clearance areas, or heat damage to the surrounding structure will result.

NOTE

Insulation (22, Chart 1, 21-00-00) may be used as a substitute, but must be entirely wrapped with tape (20, Chart 1, 21-00-00).

e. Reposition the bleed air warning sensing element around the bleed air bypass valve. Refer to in Chapter 26-11-00 for detailed information on handling and positioning the sensing element.

CAUTION

Do not kink or form bends or loops with a radius smaller than 1.5-inch in the sensing element, or damage to the element will result.

f. Reconnect wiring to the bleed air bypass valve according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

g. Align the condenser plenum forward and lower closeouts with the condenser plenum, and secure with washers and screws.

h. Install the lower aft fuselage ambient air inlet door and secure with captive fasteners.

i. Restore the electrical power to the airplane.

BLEED AIR DIVERTER VALVE REMOVAL (Effectivity: All) (Figure 4)

WARNING

Refer to GENERAL GUIDELINES FOR SERVICING THE BLEED AIR HEATING SYSTEM before attempting any service on the bleed air heating system.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the lower aft fuselage ambient air inlet door.

c. Remove the screws and washers securing the lower and forward closeouts to the condenser plenum, and remove the closeouts.

d. Tag and disconnect wiring from the bleed air diverter valve.

e. Carefully move the bleed air warning sensing element out of the way of the bleed air diverter valve and couplings. Refer to Chapter 26-11-00 for detailed information on handling the sensing element.

CAUTION

Do not kink or form bends or loops with a radius smaller than 1.5-inch in the sensing element, or damage to the element will result.

f. Remove the insulation from the bleed air diverter valve plumbing and connections.

g. Remove the couplings securing plumbing to the bleed air diverter valve and disconnect plumbing from the diverter valve.

h. Remove safety wire from the bleed air diverter valve.

i. Remove the bolts, washers and spacers securing the bleed air diverter valve to the mounting bracket, and remove the diverter valve, gaskets and couplings.

BLEED AIR DIVERTER VALVE INSTALLATION (Effectivity: All) (Figure 4)

CAUTION

The bleed air diverter valve must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Secure the bleed air diverter valve to its mounting bracket with spacers, washers and bolts, then safety wire.

b. Align the bleed air plumbing, couplings and gaskets with the bleed air diverter valve plumbing connections.

c. Secure the bleed air plumbing to the bleed air diverter valve with couplings and torque to the following specifications:

1. Torque small couplings (1 or 1.25 inch diameter) to 45-55 inch-lbs.
2. Torque large couplings (1.5 inch diameter) to 50-60 inch-lbs.

d. Insulate the couplings and bleed air plumbing adjacent to the bleed air diverter valve with insulation (21, Chart 1, 21-00-00) and secure with tape (20, Chart 1, 21-00-00).

CAUTION

Maintain uniform insulation thickness around the bleed air plumbing, except in close clearance areas, or heat damage to the surrounding structure will result.

NOTE

Insulation (22, Chart 1, 21-00-00) may be used as a substitute, but must be entirely wrapped with tape (20, Chart 1, 21-00-00).

e. Reposition the bleed air warning sensing element around the bleed air diverter valve. Refer to Chapter 26-11-00 for detailed information on handling and positioning the sensing element.

CAUTION

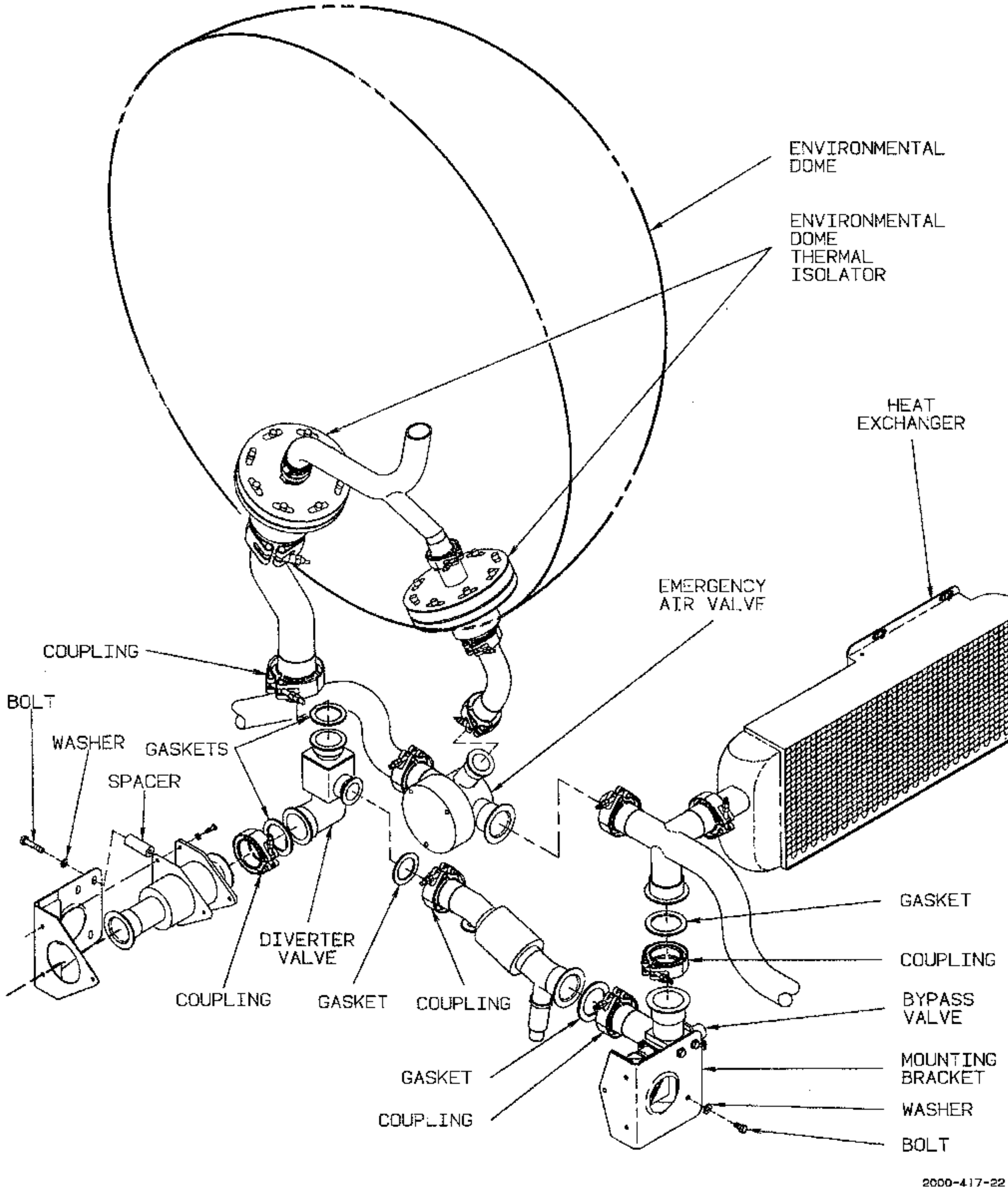
Do not kink or form bends or loops with a radius smaller than 1.5-inch in the sensing element, or damage to the element will result.

f. Reconnect wiring to the bleed air diverter valve according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

g. Align the lower and forward closeouts with the condenser plenum and secure with washers and screws.

h. Install the lower aft fuselage ambient air inlet door and secure with captive fasteners.

i. Restore electrical power to the airplane.



Bleed Air Bypass Valve and Diverter Valve Installation (Effectivity: All)
Figure 4

ENVIRONMENTAL DOME THERMAL ISOLATOR REMOVAL (Effectivity: NC-4) (Figure 5)

WARNING

Refer to GENERAL GUIDELINES FOR SERVICING THE BLEED AIR HEATING SYSTEM before attempting any service on the bleed air heating system.

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Fold down the aft couch back and open the aft baggage compartment door (the door is hinged at the bottom and middle, and opens forward).

c. Remove the aft baggage compartment side and top upholstery panels (secured to interior surface of the fuselage with Velcro fasteners).

d. Remove the spacers, washers and screws securing the environmental dome transducer assembly to the aft false bulkhead air return cover and aft false bulkhead upholstery panel, then remove the transducer assembly.

e. Tag and disconnect wiring from the environmental dome transducer assembly.

f. Remove the screws and washers securing the aft false bulkhead air return cover to the aft false bulkhead upholstery panel and remove the return cover.

g. Remove the aft false bulkhead upholstery panel (secured with screws and washers around the air return opening and Velcro fasteners along the bottom edge of the panel).

h. Loosen the captive fasteners and remove the aft lower fuselage ambient air inlet door.

i. Remove the screws and washers securing the lower and forward closeouts to the condenser plenum, and remove the closeouts.

j. Carefully move the bleed air warning sensing element out of the way of each environmental dome thermal isolator and the adjacent plumbing. Refer to Chapter 26-11-00 for detailed information on handling the sensing element.

CAUTION

Do not kink or form bends or loops with a radius smaller than 1.5-inch in the sensing element, or damage to the element will result.

k. Remove insulation from the thermal isolators and adjacent plumbing.

l. Disconnect and remove the couplings and check valves securing the thermal isolators to the bleed air plumbing in the aft fuselage.

m. Disconnect and remove the coupling, gasket, clamps, sleeve and interior bleed air tube from the environmental dome thermal isolators.

n. Remove the screws and washers in the aft fuselage that secure the thermal isolators to the environmental dome, then remove the thermal isolators, seals and seal plates.

ENVIRONMENTAL DOME THERMAL ISOLATOR INSTALLATION (Effectivity: NC-4) (Figure 5)

CAUTION

The thermal isolators must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Attach the inner seals to the environmental dome thermal isolators with adhesive/sealer (23, Chart 1, 21-00-00).

b. Align the thermal isolators (with inner seals attached), outer seals and seal plates with the environmental dome, and secure with the washers and screws.

c. Align the bleed air plumbing, couplings and check valves with the thermal isolator plumbing connections in the aft fuselage.

WARNING

Ensure that all check valves are properly oriented and installed to allow proper system operation (check valves are installed outside the dome with the flappers opening inward).

d. Align the interior bleed air tube, gasket, coupling, clamps and sleeve with the environmental dome thermal isolators.

e. Secure the bleed air plumbing connections with couplings and torque to the following specifications:

1. Torque small couplings (1 or 1.25 inch diameter) to 45-55 inch-lbs.

2. Torque large couplings (1.5 inch diameter) to 50-60 inch-lbs.

f. Insulate the couplings, bleed air plumbing and thermal isolators aft of the environmental dome with insulation (21, Chart 1, 21-00-00) and secure with tape (20, Chart 1, 21-00-00).

CAUTION

Maintain uniform insulation thickness around the bleed air plumbing, except in close clearance areas, or heat damage to the surrounding structure will result.

NOTE

Insulation (22, Chart 1, 21-00-00) may be used as a substitute, but must be entirely wrapped with tape (20, Chart 1, 21-00-00).

g. Reposition the bleed air warning sensing element around the thermal isolators and adjacent plumbing. Refer to Chapter 26-11-00 for detailed information on handling and positioning the sensing element.

CAUTION

Do not kink or form bends or loops with a radius smaller than 1.5-inch in the sensing element, or damage to the element will result.

h. Align the lower and forward closeouts with the condenser plenum and secure with screws and washers.

i. Install the lower aft fuselage ambient air inlet door and secure with captive fasteners.

j. Install the aft false bulkhead upholstery panel (secured with screws and washers around the air return opening and Velcro fasteners along the bottom edge of the panel).

NOTE

The environmental dome transducer assembly wiring is routed through the aft false bulkhead air return opening.

k. Align the aft false bulkhead air return cover with the aft false bulkhead upholstery panel and install spacers, washers and screws with the exception of those already used to attach the transducer assembly.

l. Reconnect wiring to the environmental dome transducer assembly according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

m. Align the environmental dome transducer assembly with the with the aft false bulkhead air return cover and aft false bulkhead upholstery panel and secure with remaining spacers, washers and screws.

n. Install the aft baggage compartment top and side upholstery panels (secured to the interior surface of the fuselage with Velcro fasteners).

o. Close the aft baggage compartment door (the door is hinged at the middle and bottom, and opens forward) and fold up the aft couch back.

p. Restore electrical power to the airplane.

ENVIRONMENTAL DOME THERMAL ISOLATOR REMOVAL (Effectivity: NC-5 and After) (Figure 5)

CAUTION

Refer to GENERAL GUIDELINES FOR SERVICING THE BLEED AIR HEATING SYSTEM before attempting any service on the bleed air heating system.

a. Remove all electrical power from the airplane.

b. Fold down the aft couch back and open the aft baggage compartment door (the door is hinged at the bottom and middle, and opens forward).

c. Remove the aft baggage compartment side and top upholstery panels (secured to interior surface of the fuselage with Velcro fasteners).

d. Remove the screws, washers and spacers securing the aft false bulkhead air return cover to the aft false bulkhead upholstery panel, and remove the air return cover.

e. Remove the aft bulkhead upholstery panel (secured with screws and washers around the air return opening and Velcro fasteners along the bottom edge of the panel).

f. Loosen the captive fasteners and remove the lower aft fuselage ambient air inlet door

g. Remove the screws and washers securing the lower and forward closeouts to the condenser plenum and remove the closeouts.

h. Carefully move the bleed air warning sensing element out of the way of each environmental dome thermal isolator and the adjacent plumbing. Refer to Chapter 26-11-00 for detailed information on handling the sensing element.

CAUTION

Do not kink or form bends or loops with a radius smaller than 1.5-inch in the sensing element, or damage to the element will result.

i. Remove insulation from the thermal isolators and adjacent plumbing.

j. Disconnect and remove the couplings and check valves securing the thermal isolators to the bleed air plumbing in the aft fuselage.

k. Disconnect and remove the coupling, gasket, clamps, sleeve and interior bleed air tube from the environmental dome thermal isolators.

l. Remove the screws and washers securing the thermal isolators to the environmental dome in the aft fuselage and remove the thermal isolators, seals and seal plates.

ENVIRONMENTAL DOME THERMAL ISOLATOR INSTALLATION (Effectivity: NC-5 and After) (Figure 5)

CAUTION

The environmental dome thermal isolators must meet electrical bonding requirements specified Chapter 20-00-03.

a. Attach the inner seals to the environmental dome thermal isolators with adhesive/sealer (23, Chart 1, 21-00-00).

b. Align the thermal isolators (with inner seals attached), with the outer seals and seal plates on the environmental dome, and secure with the washers and screws.

c. Align the bleed air plumbing, couplings and check valves with the thermal isolator plumbing connections in the aft fuselage.

WARNING

Ensure that the check valves are properly oriented and installed to allow proper system operation (check valves are installed outside the dome with the flappers opening inward).

d. Install the interior bleed air tube, gasket, coupling, clamps and sleeve on the environmental dome thermal isolators.

e. Secure the bleed air plumbing connections with couplings and torque to the following specifications:

1. Torque small couplings (1 or 1.25 inch diameter) to 45-55 inch-lbs.

2. Torque large couplings (1.5 inch diameter) to 50-60 inch-lbs.

f. Insulate the couplings, bleed air plumbing and thermal isolators aft of the environmental dome with insulation (21, Chart 1, 21-00-00) and secure with tape (20, Chart 1, 21-00-00).

CAUTION

Maintain uniform insulation thickness around the bleed air plumbing, except in close clearance areas, or heat damage to the surrounding structure will result.

NOTE

Insulation (22, Chart 1, 21-00-00) may be used as a substitute, but must be entirely wrapped with tape (20, Chart 1, 21-00-00).

g. Reposition the bleed air warning sensing element around the thermal isolators and adjacent plumbing. Refer to Chapter 26-11-00 for detailed information on handling and positioning the sensing element.

CAUTION

Do not kink or form bends or loops with a radius smaller than 1.5-inch in the sensing element, or damage to the element will result.

h. Align the lower and forward closeouts with the condenser plenum, and secure with screws and washers.

i. Install the lower aft fuselage ambient air inlet door and secure with captive fasteners.

j. Install the aft false bulkhead upholstery panel (secured with screws and washers around the air return opening and Velcro fasteners along the bottom edge of the panel).

k. Align the aft false bulkhead air return cover with the mounting holes in the aft false bulkhead upholstery panel and secure with spacers, washers and screws.

l. Install the aft baggage compartment top and side upholstery panels (secured to the interior surface of the fuselage with Velcro fasteners).

m. Close the aft baggage compartment door (the door is hinged at the middle and bottom, and opens forward) and fold up the aft couch back.

n. Restore electrical power to the airplane.

BLEED AIR HEAT EXCHANGER REMOVAL (Effectivity: All) (Figure 6)

WARNING

Refer to GENERAL GUIDELINES FOR SERVICING THE BLEED AIR HEATING SYSTEM before attempting any service on the bleed air heating system.

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the lower aft fuselage ambient air inlet door

c. Remove the screws and washers securing the lower and forward closeouts to the condenser plenum and remove the closeouts.

d. Remove the screws and washers securing the bypass duct to the heat exchanger and remove the bypass duct.

e. Remove insulation from the heat exchanger bleed air plumbing connections.

f. Disconnect the bleed air plumbing couplings at the heat exchanger.

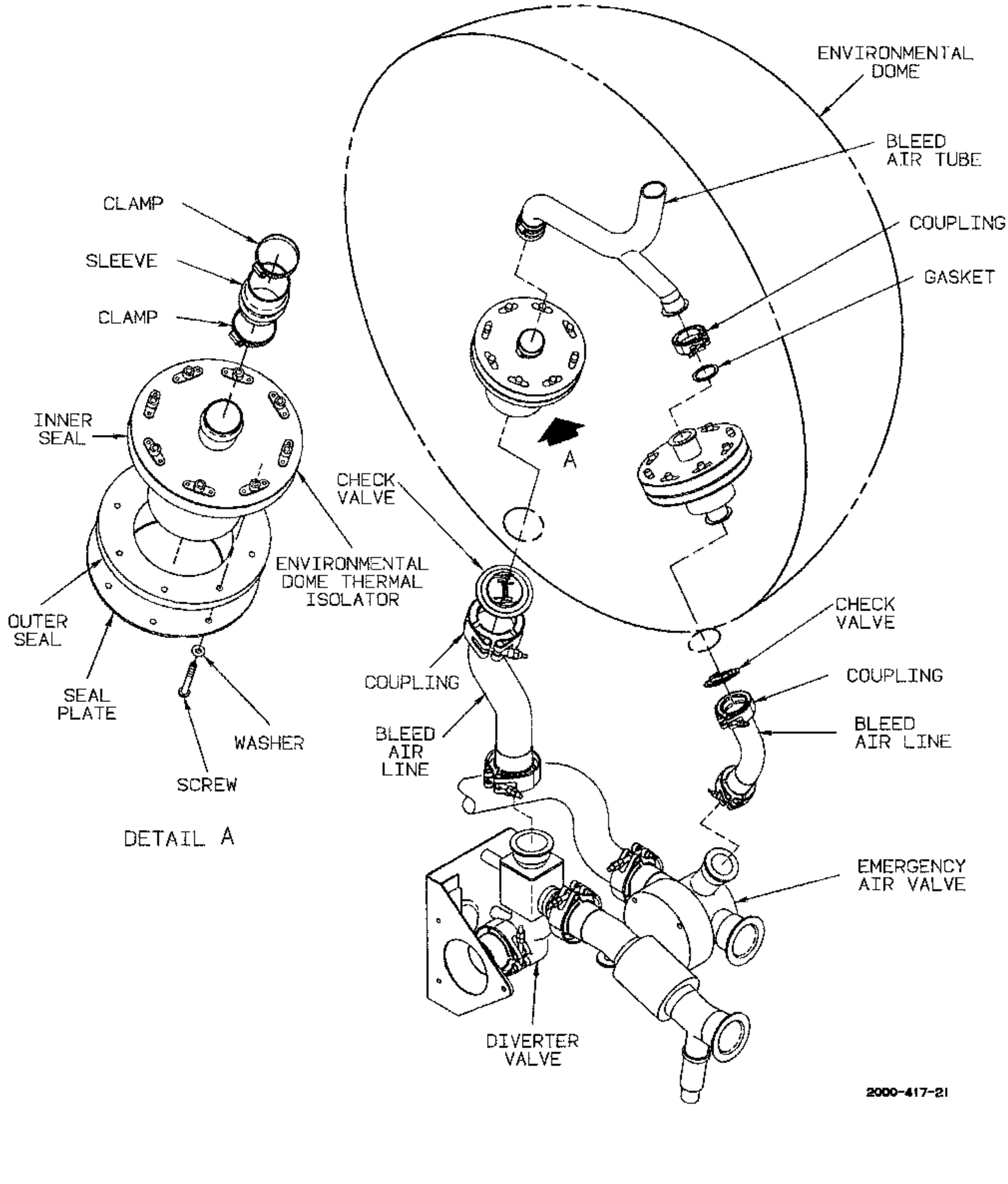
g. Remove the screws and washers securing the heat exchanger to the heat exchanger mounting frame.

h. Remove the heat exchanger, gaskets, couplings and grommets from the mounting frame.

BLEED AIR HEAT EXCHANGER INSTALLATION (Effectivity: All) (Figure 6)

CAUTION

The bleed air heat exchanger must meet electrical bonding requirements specified in Chapter 20-00-03.



Environmental Dome Thermal Isolator Installation (Effectivity: All)
Figure 5

a. Align the gaskets, grommets and heat exchanger with the heat exchanger mounting frame, and secure with washers and screws.

NOTE

Replace the grommets if they show signs of deterioration or age.

b. Align the gaskets, couplings and bleed air plumbing with the heat exchanger plumbing connections.

c. Secure the bleed air plumbing connections with couplings and torque to the following specifications:

1. Torque small couplings (1 or 1.25 inch diameter) to 45-55 inch-lbs.

2. Torque large couplings (1.5 inch diameter) to 50-60 inch-lbs.

d. Insulate the couplings and bleed air plumbing adjacent to the heat exchanger frame with insulation (21, Chart 1, 21-00-00) and secure with tape (20, Chart 1, 21-00-00).

CAUTION

Maintain uniform insulation thickness around the bleed air plumbing, except in close clearance areas, or heat damage to the surrounding structure will result.

NOTE

Insulation (22, Chart 1, 21-00-00) may be used as a substitute, but must be entirely wrapped with tape (20, Chart 1, 21-00-00).

e. Align the heat exchanger bypass duct with the heat exchanger and secure with screws and washers.

f. Align the lower and forward closeouts with the condenser plenum and secure with screws and washers.

g. Install the lower aft fuselage ambient air inlet door and secure with captive fasteners.

h. Restore electrical power to the airplane.

EMERGENCY AIR VALVE REMOVAL (Effectivity: All) (Figure 6)

WARNING

Refer to GENERAL GUIDELINES FOR SERVICING THE BLEED AIR HEATING SYSTEM before attempting any service on the bleed air heating system.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the lower aft fuselage ambient air inlet door

c. Remove the screws and washers securing the lower and forward closeouts to the condenser plenum and remove the closeouts.

d. Tag and disconnect wiring from the emergency air valve.

e. Carefully move the bleed air warning sensing element out of the way of the emergency air valve and couplings. Refer to Chapter 26-11-00 for detailed information on handling the sensing element.

CAUTION

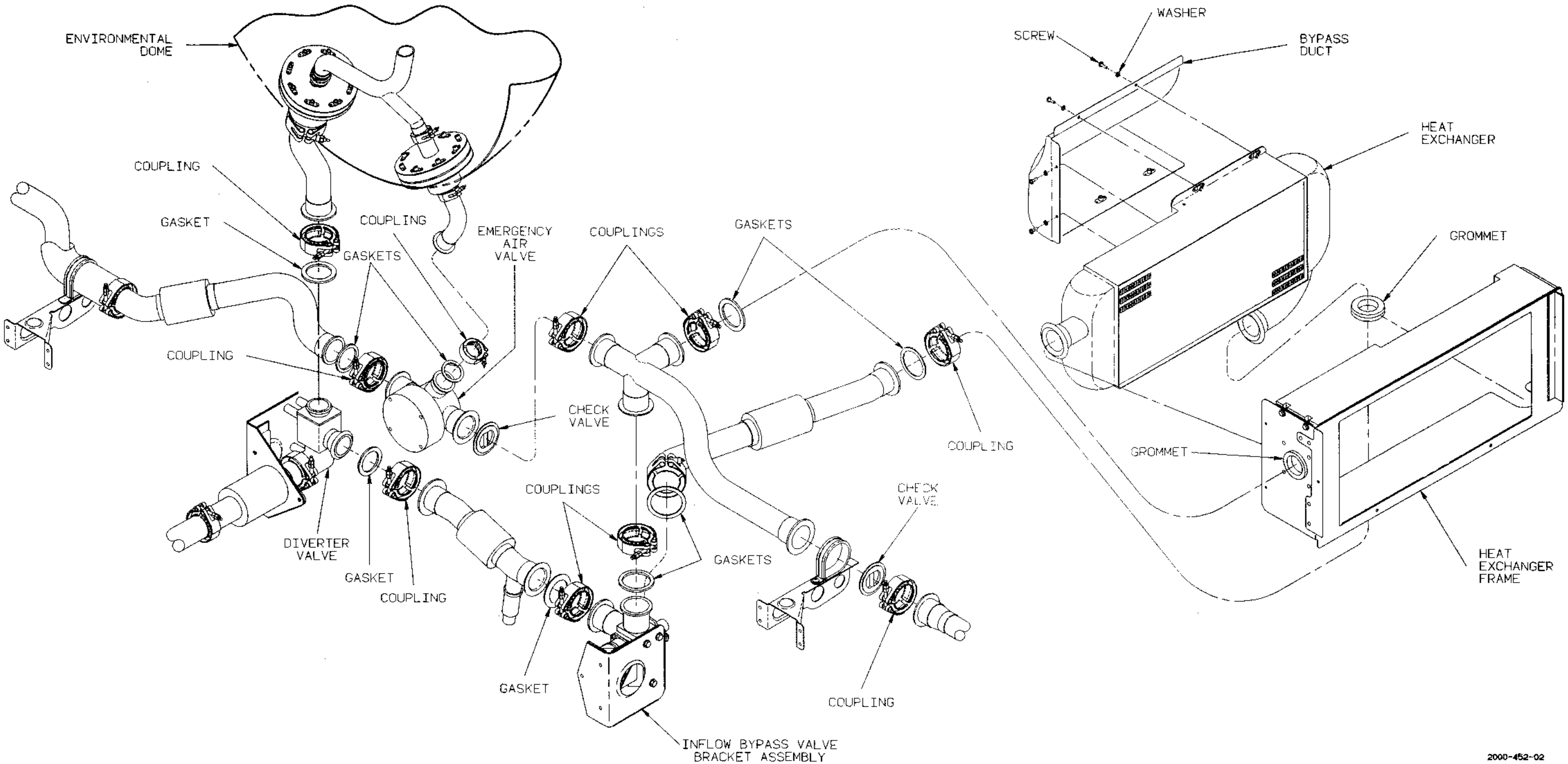
Do not kink or form bends or loops with a radius smaller than 1.5-inch in the sensing element, or damage to the element will result.

f. Remove insulation from bleed air plumbing connections adjacent to the emergency air valve.

g. Disconnect the bleed air plumbing couplings from the emergency air valve, and remove the valve, gaskets, check valve and couplings.

EMERGENCY AIR VALVE INSTALLATION (Effectivity: All) (Figure 6)

a. Align the emergency air valve, gaskets, check valve and couplings with the bleed air plumbing couplings.



Bleed Air Heat Exchanger and Emergency Air Valve Installation (Effectivity: All)
Figure 6

WARNING

Ensure that the check valve is properly oriented and installed in the system to allow proper system operation (outflow port leading to the bypass valve with flappers opening toward the bypass valve).

b. Secure the bleed air plumbing to couplings on the emergency air valve and torque to the following specifications:

1. Torque small couplings (1 or 1.25 inch diameter) to 45-55 inch-lbs.

2. Torque large couplings (1.5 inch diameter) to 50-60 inch-lbs.

c. Insulate the couplings and bleed air plumbing adjacent to the emergency air valve with insulation (21, Chart 1, 21-00-00) and secure with tape (20, Chart 1, 21-00-00).

CAUTION

Maintain uniform insulation thickness around the bleed air plumbing, except in close clearance areas, or heat damage to the surrounding structure will result.

NOTE

Insulation (22, Chart 1, 21-00-00) may be used as a substitute, but must be entirely wrapped with tape (20, Chart 1, 21-00-00).

d. Reposition the bleed air warning sensing element around the emergency valve. Refer to Chapter 26-11-00 for detailed information on handling and positioning the sensing element.

CAUTION

Do not kink or form bends or loops with a radius smaller than 1.5-inch in the sensing element, or damage to the element will result.

e. Reconnect wiring to the bleed air emergency air valve according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

f. Align the lower and forward closeouts with the condenser plenum and secure with washers and screws.

g. Install the lower aft fuselage ambient air inlet door and secure with captive fasteners.

h. Restore electrical power to the airplane.

BLEED AIR HEAT EXCHANGER MOUNTING FRAME REMOVAL (Effectivity: All) (Figure 7)

WARNING

Refer to GENERAL GUIDELINES FOR SERVICING THE BLEED AIR HEATING SYSTEM before attempting any service on the bleed air heating system.

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Remove the bleed air heat exchanger as outlined under BLEED AIR HEAT EXCHANGER REMOVAL in this chapter.

c. Remove the heat exchanger mounting frame and insulation by removing the screws and washers securing it to the LH ambient air exit duct, and the bolts and washers securing it to the pre-condenser coil and condenser plenum aft closeout.

d. Use cleaner (2, Chart 1, 21-00-00) to remove gasket and seal deposits from the heat exchanger mounting frame.

BLEED AIR HEAT EXCHANGER MOUNTING FRAME INSTALLATION (Effectivity: All) (Figure 7)

a. Apply adhesive (6, Chart 1, 21-00-00) to the gasket and seal mating surfaces on the heat exchanger mounting frame, then align the gaskets and seal over the adhesive.

b. Align the heat exchanger mounting frame with the pre-condenser coil and condenser plenum aft close-out. Install bolts and washers to secure the assembly. Secure the mounting frame to the LH ambient air exit duct with washers and screws.

c. Install the heat exchanger in the mounting frame as outlined under BLEED AIR HEAT EXCHANGER INSTALLATION in this chapter.

d. Restore electrical power to the airplane.

BLEED AIR AFT THERMAL ISOLATOR ASSEMBLY REMOVAL (Effectivity: All) (Figure 8)

WARNING

Refer to GENERAL GUIDELINES FOR SERVICING THE BLEED AIR HEATING SYSTEM before attempting any service on the bleed air heating system.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the aft wing box shear panel.

c. Loosen the captive fasteners and remove the lower aft fuselage ambient air inlet door.

d. Remove the screws and washers securing the lower and forward closeouts to the condenser plenum and remove the closeouts.

e. Carefully move the bleed air warning sensing element out of the way of the aft thermal isolator assembly, diverter valve and attached bleed air plumbing. Refer to Chapter 26-11-00 for detailed information on handling the sensing element.

CAUTION

Do not kink or form bends or loops with a radius smaller than 1.5-inch in the sensing element, or damage to the element will result.

f. Remove insulation from the aft thermal isolator assembly, diverter valve and adjacent plumbing.

g. Remove the couplings securing the aft thermal isolator assembly to the bleed air plumbing and diverter valve.

h. Remove the couplings securing the diverter valve to the bleed air plumbing.

i. Remove safety wire from the diverter valve.

j. Remove the bolts, washers and spacers securing the diverter valve to the diverter valve mounting bracket, and remove the valve, gaskets and couplings.

k. Remove the screws and washers securing the aft thermal isolator assembly and diverter valve mounting bracket to the aft side of the aft pressure bulkhead, then remove the aft thermal isolator assembly, gasket and mounting bracket.

BLEED AIR AFT THERMAL ISOLATOR ASSEMBLY INSTALLATION (Effectivity: All) (Figure 8)

a. Align the diverter valve mounting bracket, isolator gasket and aft thermal isolator assembly with the aft side of the aft pressure bulkhead, then secure with washers and screws.

b. Align the couplings, gasket and diverter valve with the thermal isolator.

c. Secure the diverter valve to the mounting bracket with spacers, washers and bolts, then safety wire.

d. Align bleed air plumbing, gaskets and couplings with the diverter valve and thermal isolator assembly bleed air plumbing connections.

e. Secure the bleed air plumbing connections with couplings and torque to the following specifications:

1. Torque small couplings (1 or 1.25 inch diameter) to 45-55 inch-lbs.
2. Torque large couplings (1.5 inch diameter) to 50-60 inch-lbs.

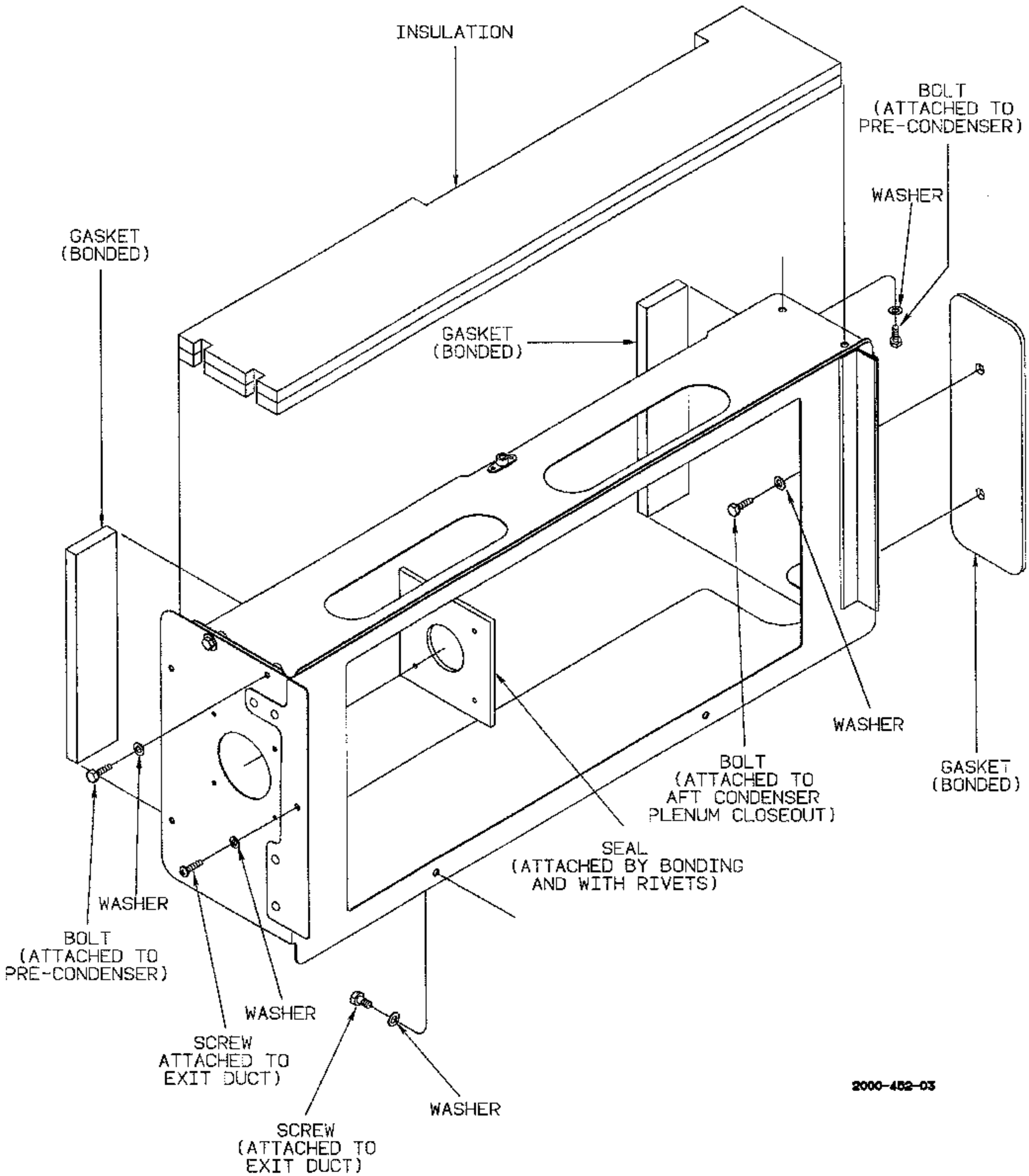
f. Pressure seal the full interior circumference of the thermal isolator around the bleed air line with sealant (3, Chart 1, 21-00-00).

g. Pack the interior area of the thermal isolator with insulation (22, Chart 1, 21-00-00).

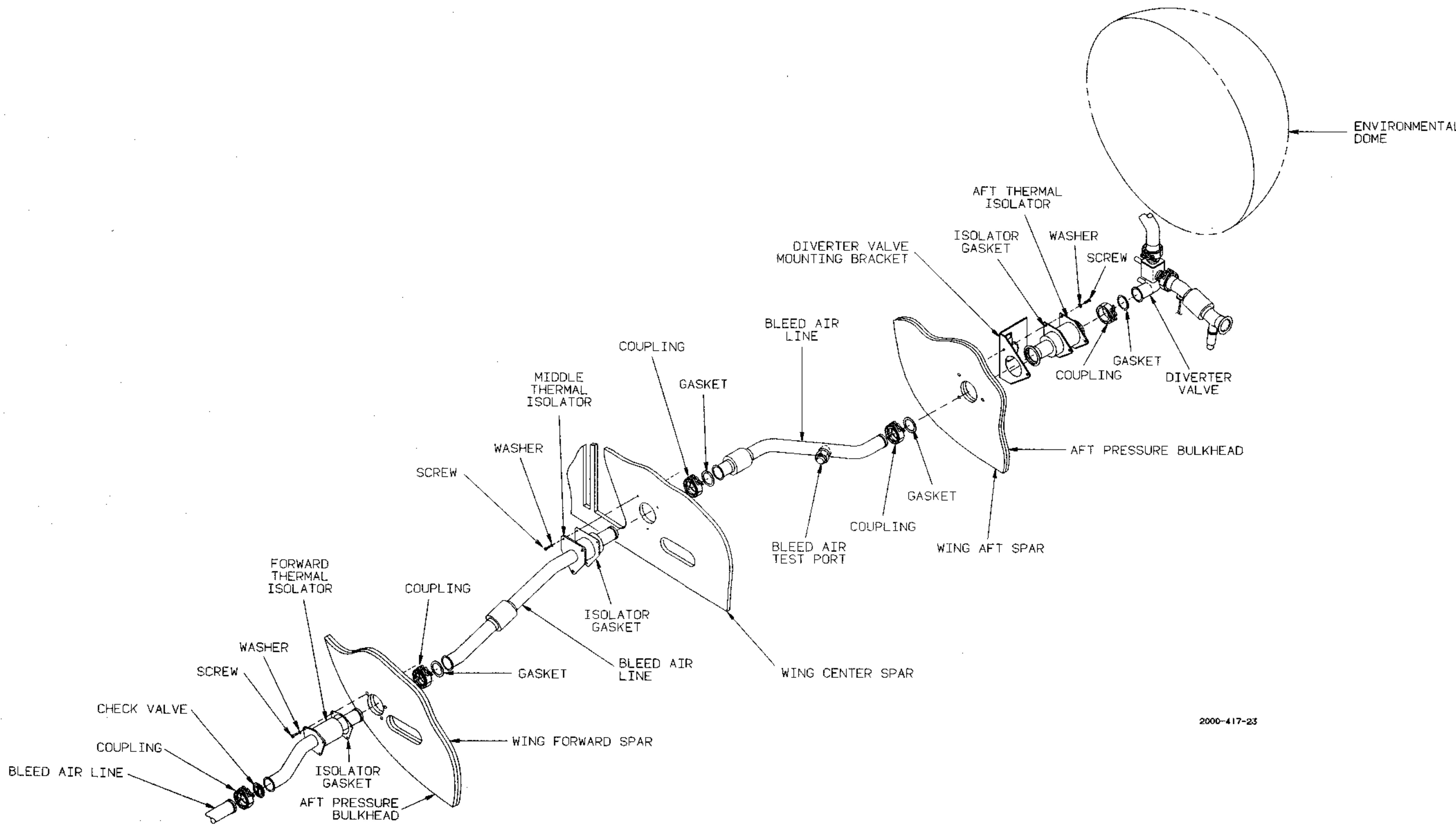
CAUTION

DO NOT substitute insulation (21, Chart 1, 21-00-00) for insulation (22, Chart 1, 21-00-00) when packing the thermal isolator.

h. Insulate the couplings and bleed air plumbing with insulation (21, Chart 1, 21-00-00) and secure with tape (20, Chart 1, 21-00-00).



Bleed Air Heat Exchanger Mounting Frame Installation (Effectivity: All)
Figure 7



Bleed Air Aft, Middle and Forward Thermal Isolator Installation (Effectivity: All)
Figure 8

CAUTION

Maintain uniform insulation thickness around the bleed air plumbing, except in close clearance areas, or heat damage to the surrounding structure will result.

NOTE

Insulation (22, Chart 1, 21-00-00) may be used as a substitute, but must be entirely wrapped with tape (20, Chart 1, 21-00-00).

i. Reposition the bleed air warning sensing element around the aft thermal isolator assembly, diverter valve and adjacent bleed air plumbing. Refer to Chapter 26-11-00 for detailed information on handling and positioning the sensing element.

CAUTION

Do not kink or form bends or loops with a radius smaller than 1.5-inch in the sensing element, or damage to the element will result.

j. Align the lower and forward closeouts with the condenser plenum and secure with screws and washers.

k. Install the aft lower fuselage ambient air inlet door and secure with captive fasteners.

l. Install the aft wing box shear panel and secure with captive fasteners.

m. Restore electrical power to the airplane.

BLEED AIR MIDDLE THERMAL ISOLATOR REMOVAL (Effectivity: All) (Figure 8)

WARNING

Refer to GENERAL GUIDELINES FOR SERVICING THE BLEED AIR HEATING SYSTEM before attempting any service on the bleed air heating system.

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the aft wing box shear panel.

c. Carefully move the bleed air warning sensing element out of the way of the middle thermal isolator and adjacent bleed air plumbing. Refer to Chapter 26-11-00 for detailed information on handling the sensing element.

CAUTION

Do not kink or form bends or loops with a radius smaller than 1.5-inch in the sensing element, or damage to the element will result.

d. Remove insulation from the thermal isolator and adjacent plumbing.

e. Disconnect the couplings securing the thermal isolator to the bleed air plumbing.

f. Remove the screws and washers securing the thermal isolator to the forward side of the wing center spar, and remove the thermal isolator, isolator gasket, couplings and gaskets.

BLEED AIR MIDDLE THERMAL ISOLATOR INSTALLATION (Effectivity: All) (Figure 8)

CAUTION

The bleed air thermal isolator must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Install the isolator gasket and middle thermal isolator on the forward side of the wing center spar and secure with screws and washers.

b. Align the bleed air plumbing, couplings and gaskets with the thermal isolator.

c. Secure the bleed air plumbing connections with couplings and torque to the following specifications:

1. Torque small couplings (1 or 1.25 inch diameter) to 45-55 inch-lbs.

2. Torque large couplings (1.5 inch diameter) to 50-60 inch-lbs.

d. Pressure seal the full interior circumference of the thermal isolator around the bleed air line with sealant (3, Chart 1, 21-00-00).

e. Pack the interior area of the thermal isolator with insulation (22, Chart 1, 21-00-00).

CAUTION

DO NOT substitute insulation (21, Chart 1, 21-00-00) for insulation (22, Chart 1, 21-00-00) when packing the thermal isolator.

f. Insulate the couplings and bleed air plumbing with insulation (21, Chart 1, 21-00-00), and secure with tape (20, Chart 1, 21-00-00).

CAUTION

Maintain uniform insulation thickness around the bleed air plumbing, except in close clearance areas, or heat damage to the surrounding structure will result.

NOTE

Insulation (21, Chart 1, 21-00-00) may be used as a substitute, but must be entirely wrapped with tape (20, Chart 1, 21-00-00).

g. Reposition the bleed air warning sensing element around the thermal isolator and adjacent bleed air plumbing. Refer to Chapter 26-11-00 for detailed information on handling and positioning the sensing element.

CAUTION

Do not kink or form bends or loops with a radius smaller than 1.5-inch in the sensing element, or damage to the element will result.

h. Install the aft wing box shear panel and secure with captive fasteners.

i. Restore electrical power to the airplane.

BLEED AIR FORWARD THERMAL ISOLATOR REMOVAL (Effectivity: All) (Figure 8)

WARNING

Refer to GENERAL GUIDELINES FOR SERVICING THE BLEED AIR HEATING SYSTEM before attempting any service on the bleed air heating system.

a. Remove all electrical power from the airplane. Remove the aft couch and RH aft cabin carpet.

b. Loosen the captive fasteners and remove the right aft floorboard panel.

c. Loosen the captive fasteners and remove the aft wing box shear panel.

d. Carefully move the bleed air warning sensing element out of the way of the forward thermal isolator and adjacent bleed air plumbing. Refer to Chapter 26-11-00 for detailed information on handling the sensing element.

CAUTION

Do not kink of form bends or loops with a radius smaller than 1.5-inch in the sensing element, or damage to the element will result.

e. Remove insulation from the bleed air forward thermal isolator and adjacent plumbing.

f. Remove the couplings securing the bleed air forward thermal isolator to adjacent plumbing.

g. Remove the screws and washers securing the bleed air forward thermal isolator to the forward side of the aft pressure bulkhead, then remove the thermal isolator, isolator gasket, couplings, check valve and gasket.

BLEED AIR FORWARD THERMAL ISOLATOR INSTALLATION (Effectivity: All) (Figure 8)

a. Install the isolator gasket and forward thermal isolator assembly on the forward side of the aft pressure bulkhead, and secure with the washers and screws.

b. Align the bleed air plumbing, couplings, check valve and gasket with the thermal isolator assembly.

WARNING

Ensure that the check valve is properly oriented and correctly installed to allow for proper system operation (installed in downstream port of thermal isolator with flappers opening downstream).

c. Secure the bleed air plumbing connections with couplings and torque to the following specifications:

1. Torque small couplings (1 or 1.25 inch diameter) to 45-55 inch-lbs.

2. Torque large couplings (1.5 inch diameter) to 50-60 inch-lbs.

d. Pressure seal the full interior circumference of the thermal isolator around the bleed air tube with sealant (3, Chart 1, 21-00-00).

e. Pack the interior area of the thermal isolator with insulation (22, Chart 1, 21-00-00).

CAUTION

DO NOT substitute insulation (21, Chart 1, 21-00-00) for insulation (22, Chart 1, 21-00-00) when packing the thermal isolator.

f. Insulate bleed air plumbing and couplings with insulation (21, Chart 1, 21-00-00) and secure with tape (20, Chart 1, 21-00-00).

CAUTION

Maintain uniform insulation thickness around the bleed air plumbing, with the exception of close clearance areas, or heat damage to the surrounding structure will result.

NOTE

Insulation (22, Chart 1, 21-00-00) may be used as a substitute, but must be entirely wrapped with tape (20, Chart 1, 21-00-00).

g. Reposition the bleed air warning sensing element around the thermal isolator and adjacent bleed air plumbing. Refer to Chapter 26-11-00 for detailed information on handling and positioning the sensing element.

CAUTION

Do not kink or form bends or loops with a radius smaller than 1.5-inch in the sensing element, or damage to the element will result.

h. Install the aft wing box shear panel and secure with captive fasteners.

i. Install the right aft floorboard panel and secure with captive fasteners.

j. Install the RH aft cabin carpet and aft couch.

k. Restore electrical power to the airplane.

BLEED AIR PLUMBING (Effectivity: All) (Figure 9)

WARNING

Refer to GENERAL GUIDELINES FOR SERVICING THE BLEED AIR HEATING SYSTEM before attempting any service on the bleed air heating system.

CAUTION

When removing plumbing, note the locations of all bonding jumpers so that they may be reinstalled in their original locations.

a. Access to bleed air plumbing in specific areas is gained as follows:

1. Engines - Refer to Chapter 71-10-00 and remove the engine cowling.

2. Nacelles - Loosen the captive fasteners and remove the nacelle upper aft access panels.

3. Area between the engine and fuselage - Loosen the captive fasteners along the mating edges and remove the main wing trailing edge cove.

4. Aft Fuselage Environmental Section (aft of the aft pressure bulkhead/wing aft spar) - Loosen the captive fasteners and remove the lower aft fuselage ambient air inlet door.

5. Aft Wing Box (area between the aft pressure bulkhead/wing aft spar and the aft pressure bulkhead/ wing forward spar) - Loosen the captive fasteners and remove the aft wing box shear panel.

6. Fuselage/Cabin - Remove the RH cabin furnishings, carpet floorboards and pedestal.

NOTE

Carefully move the bleed air warning sensing element out of the way of the bleed air plumbing and any adjacent sections. Refer to Chapter 26-11-00 for detailed information on handling and positioning the sensing element.

CAUTION

Do not kink or form bends or loops with a radius smaller than 1.5-inch in the sensing element, or damage to the element will result.

b. All couplings securing the bleed air plumbing and associated components shall be torqued to the following specifications:

1. Torque small couplings (1 or 1.25 inch diameter) to 45-55 inch-lbs.

2. Torque large couplings (1.5 inch diameter) to 50-60 inch-lbs.

c. All bleed air lines and tubes are to be covered with insulation (21, Chart 1, 21-00-00) and secured with tape (20, Chart 1, 21-00-00).

CAUTION

Maintain uniform insulation thickness around the bleed air plumbing, with the exception of close clearance areas, or heat damage to the surrounding structure will result.

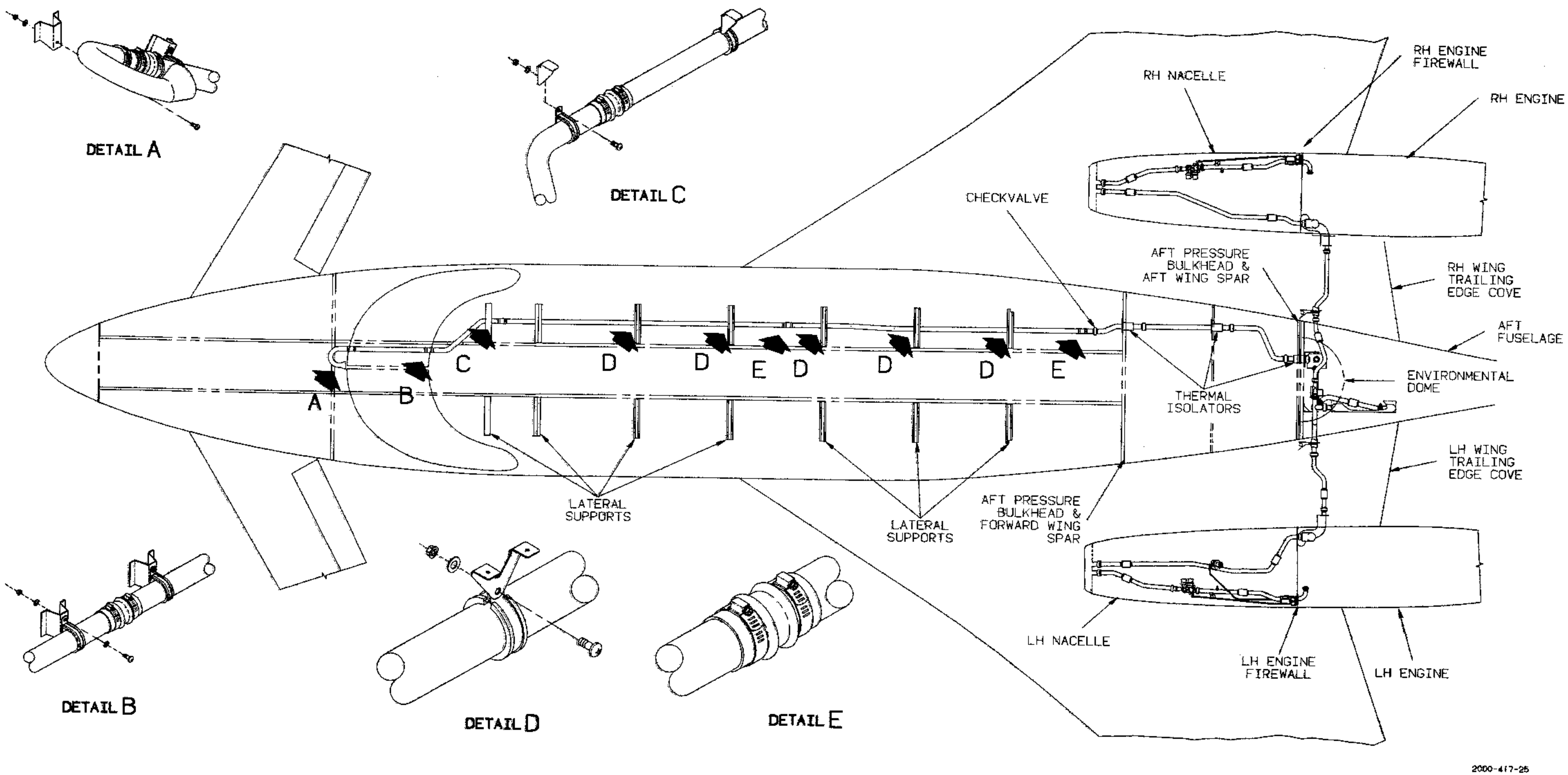
NOTE

Insulation (22, Chart 1, 21-00-00) may be used as a substitute, but must be entirely wrapped with tape (20, Chart 1, 21-00-00).

d. Support brackets and clamps removed during removal procedures are to be reinstalled. If these brackets or clamps are damaged they must be replaced.

CAUTION

The bleed air plumbing must be insulated and clearances to surrounding structures maintained, with the exception of close clearance areas, or heat damage to the adjacent structure will result.



Bleed Air Plumbing Installation (Effectivity: All)
Figure 9

COOLING - DESCRIPTION AND OPERATION (Effectivity: All) (Figures 1 and 2)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

A vapor cycle refrigeration system that utilizes R-12 refrigerant is installed on the airplane to provide cooling for the cabin and cockpit. The system consists of a compressor, pre-condenser, condenser, forward and aft evaporators, and the associated switches, valves, sensors and plumbing.

The air conditioner compressor is an engine driven unit mounted on an engine accessory gearbox mounting pad at the forward end of the RH engine. An electric clutch engages the compressor when the cool command is received and no over pressure or under pressure conditions are sensed.

NOTE

A circuit has been incorporated to prevent the compressor clutch from engaging when engine speed is below 64 percent N1 (engine compressor) speed. Since engine idle speed is normally above 64 percent N1 speed, this circuit does not function under normal conditions. The discharge line of the compressor is connected directly to both hot gas bypass valves and the high pressure gas side of the pre-condenser. The hot gas bypass valves monitor refrigerant temperature at the low pressure side of the evaporators through the hot gas bypass sense switches. If refrigerant temperature is too low, the hot gas bypass valves will increase hot gas flow to the high pressure side of the evaporators. Refrigerant temperature is increased enough to prevent ice build-up on the evaporator coils.

The majority of refrigerant from the discharge line of the compressor is cycled through the pre-condenser and condenser coils, where it is transformed from high pressure gas to a high pressure liquid during cooling. After being cooled, the refrigerant flows to the receiver/dryer where moisture is removed. The refrigerant then flows through a sight glass in the air conditioning service compartment and to the expansion valves in the high pressure side of the forward and aft evaporators. The refrigerant converts to a low pressure liquid at the expansion valves, and to a low pressure gas as heat is absorbed from the evaporator coils. The low pressure gas flows from the evaporators to the suction line of the air conditioner compressor to complete the cycle.

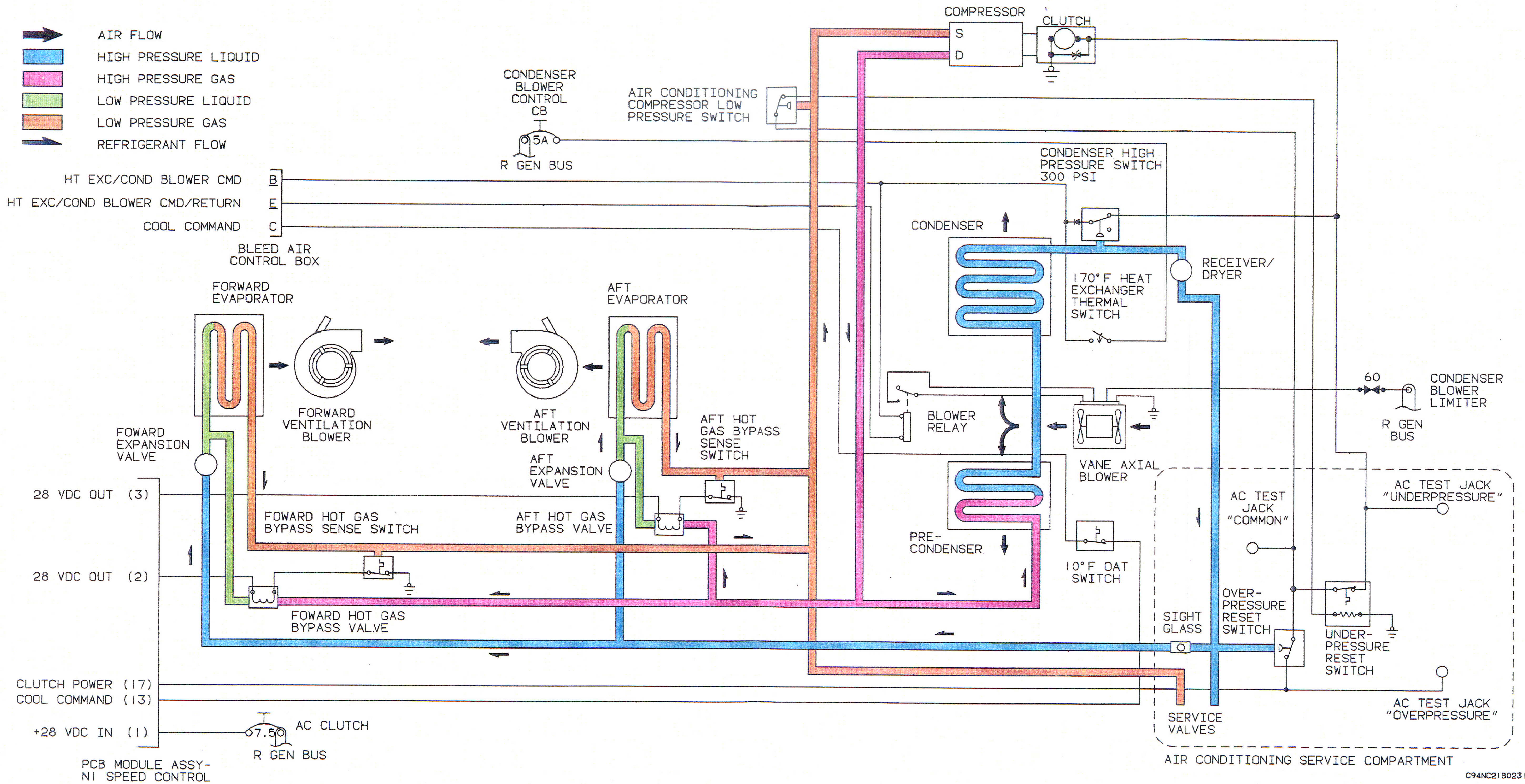
The vane axial blower, mounted in the environmental section of the lower aft fuselage, receives outside air through the lower aft fuselage access panel ambient air inlet and aft turning duct. The outside air is blown across the pre-condenser, condenser and heat exchanger coils, then out the screened exit vents in the aft fuselage. Operating voltage is applied through a 60-ampere limiter to the vane axial blower anytime the right generator bus is powered. The vane axial blower is enabled by a blower relay which is energized through the bleed air thermal switch. The bleed air thermal switch allows operation of the vane axial blower providing bleed air temperature at the thermal switch is above 170° F.

When the bleed air bypass valve is regulated to the full heat exchange position by the Environmental System Controller (ESC), the air conditioner compressor clutch is automatically engaged and refrigerant begins to cycle through the system to lower cabin temperature. The ESC is located on the aft fuselage electrical equipment shelf. As cabin temperature lowers, the ESC continually adjusts the bleed air bypass valve to decrease bleed air flow to the heat exchanger. When the bypass valve position reaches 30 percent bleed air flow to the diverter valve, and 70 percent bleed air flow to the heat exchanger, the ESC disengages the air conditioner compressor clutch until cooling is needed again. If the bypass valve is manually regulated to the full heat exchange position, the air conditioner compressor clutch will engage, and the cooling system will operate to reduce cabin temperature. Refer to Chapter 21-40-00 for detailed information on bleed air system control.

If ambient temperature outside the airplane falls below 10° F. the Outside Air Temperature (OAT) switch will interrupt the cool command and prevent engagement of the compressor clutch. If the air conditioner low or high pressure switch senses an abnormal pressure in the system, it will not allow compressor clutch engagement. When a pressure switch has shutdown the system, it must be manually reset by pressing the applicable pressure reset switch in the air conditioning service compartment. The air conditioning service compartment is located on the LH side of the aft fuselage and accessible by removing the access panel. It contains the sight glass, the low and high pressure service valves, and the under pressure and over pressure lockout reset switches.

Cabin and cockpit temperature sensing and control is accomplished by the ESC through the monitoring of temperature sensors, transducers and pressure switches. Refer to Chapter 21-60-00 for detailed information on the temperature control system.

Cabin return air is drawn across the forward evaporator by the forward ventilation blower to provide conditioned air to the cockpit and cool the avionics. The aft ventilation blower draws cabin return air across the aft evaporator to provide conditioned air to the cabin. Refer to Chapter 21-20-00 for detailed information on the air distribution system.



Air Conditioning System Functional Schematic
(Effectivity: All)
Figure 1

CHART 1
AIR CONDITIONING SYSTEM COMPONENTS AND LOCATIONS (Effectivity: All)

ITEM	LOCATION	ZONE
Air Conditioning Compressor	Located in the RH engine compartment mounted on the RH engine	421
Receiver/Dryer	Located on the RH side in the aft lower fuselage, aft of the condenser coil	310
Low Pressure Switch	Installed in the refrigerant line located under the RH wing trailing edge cove	661
High Pressure Switch	Installed in the aft lower side of the condenser coil	310
Condenser	Located in the RH side of the aft lower fuselage	310
Pre-Condenser	Located in the LH side of the aft lower fuselage above the bleed air heat exchanger	310
Service Compartment	Located on the RH side of the aft lower fuselage skin	310
Service Valves	Located in the service compartment	310
Sight Glass	Located in the service compartment	310
Under Pressure Lockout Switch	Located on the back of the service compartment in the aft lower fuselage	310
Over Pressure Lockout Switch	Located on the back of the service compartment in the aft lower fuselage	310
Vane Axial Blower	Mounted to the shelf located in the aft lower fuselage compartment	310
Forward Evaporator	Located in the cockpit forward of the pedestal and under the floor	133 & 143
Forward Expansion Valve	Located in the cockpit forward of the pedestal and under the floor	133 & 143
Forward Low Temperature Switch	Located in the cockpit forward of the pedestal and under the floor	133 & 143
Forward Evaporator Condensation Drain Assembly	Located in the cockpit forward of the pedestal, under the floor and penetrates the fuselage skin	133 & 143
Forward Hot Gas Bypass Valve	Located in the cockpit forward of the pedestal and under the floor	143
Environmental Dome	Located adjacent to the aft pressure bulkhead	295
Aft Evaporator	Located in the environmental dome	295
Aft Evaporator Expansion Valve	Located in the environmental dome	295
Aft Low Temperature Switch	Located in the environmental dome	295
Aft Hot Gas Bypass Valve	Located in the environmental dome	295
Aft Evaporator Condensation Drain Assembly	Located in the environmental dome, enters the LH baggage compartment, moving to the LH fuselage outer wall, passes through the shelf and connects to the drain under the main wing LH trailing edge cove	291, 295 & 561

CHART 1
AIR CONDITIONING SYSTEM COMPONENTS AND LOCATIONS (Effectivity: All) *(Continued)*

ITEM	LOCATION	ZONE
N1 Speed PCB Assembly	Located in the pilot's console	237

COOLING - MAINTENANCE PRACTICES (Effectivity: All)

Servicing the air conditioning system consists of periodically checking the compressor oil level, checking compressor oil level and changing the system air filters. Charge the system whenever the refrigerant level is low, air has entered the system or components carrying refrigerant are replaced. Refrigerant leaks may be detected by inspection with a flameless leak detector.

WARNING

Due to the air quality control regulations enacted in the United States, you are not permitted to vent refrigerant R-12 into the atmosphere. When performing maintenance on the air conditioning system where refrigerant R-12 can escape from the system, evacuate the system with a recovery/ recycle servicing unit (4, Chart 1, 21-00-00) that will salvage the refrigerant.

The air conditioning system is a high pressure system. Before disconnecting a refrigerant line, the system must be discharged with a recovery servicing unit. Purge the entire system to a 125-micron level.

PRECAUTIONARY SERVICE PROCEDURES (Effectivity: All)

Before attempting maintenance that requires opening of refrigeration lines or compressor fittings, maintenance personnel should be thoroughly familiar with the pertinent instructions. These instructions should be followed carefully to insure that the system functions properly. If moisture is allowed to enter refrigerant lines, ice and hydrofluoric acid can form, causing damage to system components. Contamination of the system with dirt can cause damaging wear in the compressor.

All replacement subassemblies for the air conditioning system are sealed and dehydrated. They should remain sealed until immediately prior to making connections. Refrigerant lines and other components should be at room temperature before uncapping to prevent the moisture condensation from entering the system. If a connection is not made immediately after uncapping a component, it should not remain unsealed for more than 15 minutes. If the time period is longer, reseal the connections.

Care should be taken to prevent damage to all fittings and connections. Minute damage to a connection could cause it to leak. Any fittings contaminated with grease or dirt should be cleaned with a cloth dampened with alcohol (1, Chart 2, 21-00-00). Do not use a chlorinated solvent, such as trichloroethylene, as a cleaning agent because it adds contaminants. If dirt, grease or moisture inside lines cannot be removed, the line must be replaced. Apply a small amount of clean refrigeration oil (13, Chart 2, 21-00-00) to all line connections and dip O-rings in the oil to help make a leak-resistant connection.

When removing components from the system, note the locations of all bonding jumpers to aid in reinstallation. All bonding jumpers must be reinstalled in the correct configuration to conform to electrical bonding requirements. Refer to Chapter 20-00-03 for detailed information on electrical bonding.

AIR CONDITIONING SYSTEM CHARGING (Effectivity: All)

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.

Use the following instructions as a general guide for checking the system for leaks, and performing the charging procedure.

a. Loosen the captive fasteners and remove the air conditioning service compartment access panel.

b. Connect air conditioning service gages or a recovery/recycle servicing unit (4, Chart 1, 21-00-00) to the service valves in the air conditioning service compartment.

c. Add 2 to 3 lbs. of refrigerant to the suction side of system and check for leaks using one of the following methods:

1. Using a commercially available R-12 refrigerant leak detection dye (15, Chart 2, 21-00-00), check all fittings and connections for a colored film indicating a leak.

2. Large leaks are normally detected by the presence of oil in areas where escaping refrigerant deposits the oil residue.

3. Smaller leaks can be detected by using a detergent test or an electronic R-12 refrigerant leak detector (capable of sensing a refrigerant leak of 1/2 oz. or less per year). Either method requires the system to have a partial charge.

a) DETERGENT TEST - Liberally apply soap solution to the suspected leak area and watch for signs of air bubbles forming around the leak. Rinse the area to remove the soap solution when done.

b) ELECTRONIC R-12 REFRIGERANT LEAK DETECTOR - Move the leak detector probe along the air conditioning plumbing and components, preferably below the line or connection, to detect escaping refrigerant (R-12 refrigerant is heavier than air). The detector will emit a flashing light or a high pitched sound when refrigerant is detected.

NOTE

Leakage of 2 oz. or less per year at the compressor shaft seal is permissible.

d. After the air conditioning system has been checked for leaks and the necessary repairs made, connect a vacuum pump or recovery/recycle servicing unit (4, Chart 1, 21-00-00) to the system and evacuate it to 125 microns or less absolute pressure. The system is ready for charging when it has been completely evacuated.

e. Disconnect the vacuum pump and pre-charge the air conditioning system with the system not operating. This is done by adding 12 ozs. refrigerant oil (13, Chart 2, 21-00-00) and approximately 10 lbs. of refrigerant (14, Chart 2, 21-00-00) to the system.

f. Start the RH engine (engine speed must be at least 65% N1 and outside air temperature 10° F. or greater) and manually turn on the air conditioning system by placing the TEMP MODE control knob in the MAN position. Start air conditioning compressor operation by toggling the MAN TEMP switch to the DECR position until the compressor starts operating.

WARNING

When adding refrigerant to the system with the compressor operating, the refrigerant must be in vapor form and added to the suction side of the system ONLY.

g. Add refrigerant (14, Chart 2, 21-00-00) to the suction side of the system until all the bubbles visible in the sight glass have disappeared, then add approximately an additional 8 ozs. of refrigerant.

NOTE

During approximately the first 30 seconds of compressor operation, bubbles will be visible in the sight glass and then disappear if the system is properly charged.

h. When the system has been properly charged, shutoff the the refrigerant supply and disconnect the AC service gages or the recovery/recycle servicing unit (4, Chart 1, 21-00-00) from the service valves.

i. Turn the air conditioning system off by rotating the TEMP MODE control knob to the OFF position.

j. Shut down the RH engine.

k. Install the air conditioning service compartment access panel and secure with captive fasteners.

AIR CONDITIONER COMPRESSOR REMOVAL (Effectivity: All) (Figure 3)

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Refer to Chapter 71-10-00 and remove the engine cowling from the RH engine.

c. Loosen the captive fasteners and remove the air conditioner service compartment access panel.

d. Connect recovery/recycle servicing unit (4, Chart 1, 21-00-00) to the service valves located in the air conditioning service compartment, and slowly bleed the refrigerant from the air conditioning system.

e. When all refrigerant has been bled from the system, tag and disconnect the refrigerant lines from the compressor (11).

CAUTION

Cap all open refrigeration tubes, lines, ports and connectors to prevent contamination of the air conditioning system.

f. Tag and disconnect wiring from the air conditioner compressor (11).

g. Remove the screws and washers that secure the larger belt guard to the compressor mount (1) and remove the guard.

h. Loosen the compressor adjustment rod nuts (7 and 9).

i. Reduce the tension on the belt by turning the compressor adjustment rod (4) counterclockwise.

j. Remove the belt from the sprocket assembly (17 and 18).

k. While providing support for the compressor (11), remove the compressor adjustment rod (4), washers (6 and 8), nuts (7 and 9) and bushings (5 and 10) from the link assembly (3) and brackets on the compressor mount (1).

l. Remove the nuts (41), washers (40, 42 and 44), shim (43) and bolts (39 and 45) securing the compressor lugs to the pivot plate (12).

m. Remove the compressor (11) from the compressor mount (1).

n. Loosen the pivot bolt jam nuts (25, 35, 36 and 38).

o. Remove the pivot bolt (23), washers (24 and 37) and nuts (25, 35, 36 and 38), and remove the link assembly (3) from from the compressor lugs.

AIR CONDITIONER COMPRESSOR INSTALLATION (Effectivity: All) (Figure 3)

CAUTION

The air conditioner compressor must meet electrical bonding requirements specified in Chapter 20-00-03.

NOTE

A compressor alignment tool (3, Chart 1, 21-00-00) may be used to facilitate alignment of the compressor. Figure 2 gives the necessary dimensions to manufacture the alignment tool (3, Chart 1, 21-00-00).

a. Align the link assembly (3) with the compressor lugs, and install the pivot bolt (23), washers (24 and 37) and nuts (25, 35, 36 and 38). Do not tighten the nuts until the link assembly (3) has been aligned with the compressor mount (1).

b. Use the compressor alignment tool (3, Chart 1, 21-00-00) as a lever to position the compressor (11) in line with the compressor mount (1).

c. Attach the compressor lugs to the pivot plate (12) with bolts (39 and 45), washers (40, 42 and 44), shim (43) and nuts (41).

d. Align the link assembly (3) with the brackets on the compressor mount (1) and attach with the compressor adjustment rod (4), bushings (5 and 10), washers (6 and 8) and nuts (7 and 9). Do not tighten the nuts.

e. Place the belt on the sprockets (17 and 18). Do not force the belt onto the sprockets.

f. Tighten the belt by rotating the adjustment rod (4) clockwise until a 2.5 ±0.5 lb. force applied at the outside center of the belt span deflects the belt 0.11-inch. Use a belt deflection gage (5, Chart 1, 21-00-00) to check the belt tension.

g. Once the belt has been properly adjusted, tighten the adjustment rod jam nuts (7 and 9) and safety wire.

h. Tighten the compressor lug/pivot plate bolts (39) and nuts (45). Torque to 50-70 inch-lbs. and safety wire.

i. Tighten the pivot bolt (23) and nuts (25, 35, 36 and 38), and safety wire.

j. Align the large belt guard with the compressor mount (1) and secure with screws and washers.

k. Reconnect the refrigerant lines to the compressor (11) according to tags (the line with the 90° elbow connects to the suction port).

l. Reconnect wiring to the air conditioner compressor (11) according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

m. Restore electrical power to the airplane.

n. Check the installation for leaks and charge the system as outlined under AIR CONDITIONING SYSTEM CHARGING in this chapter.

o. Install the air conditioning service compartment access panel and secure with captive fasteners.

p. Refer to Chapter 71-10-00 and install the RH engine cowling.

AIR CONDITIONER COMPRESSOR CLUTCH/SPROCKET ASSEMBLY REMOVAL (Effectivity: All) (Figure 3)

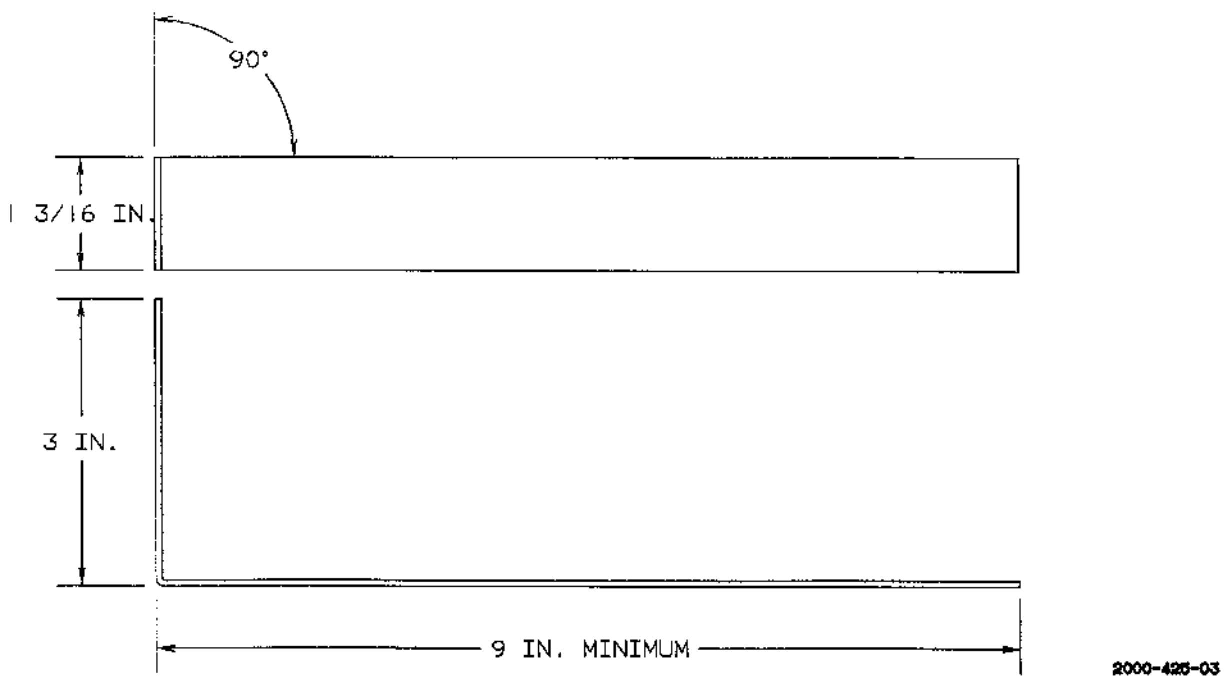
WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.



Air Conditioner Compressor Alignment Tool (Effectivity: All)
Figure 2

b. Remove the air conditioner compressor (11) as outlined under AIR CONDITIONER COMPRESSOR REMOVAL in this chapter.

c. Refer to the BEECHCRAFT Starship 1 Component Maintenance Manual and remove the compressor clutch/sprocket assembly (18) from the compressor (11).

AIR CONDITIONER COMPRESSOR CLUTCH/SPROCKET ASSEMBLY INSTALLATION (Effectivity: All) (Figure 3)

CAUTION

The air conditioner compressor clutch/sprocket assembly must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Refer to the BEECHCRAFT Starship 1 Component Maintenance Manual and install the compressor clutch/sprocket assembly (18) on the compressor (11).

b. Install the air conditioner compressor (11) in the compressor mount (1) as outlined under AIR CONDITIONER COMPRESSOR INSTALLATION in this chapter.

c. Restore electrical power to the airplane.

AIR CONDITIONING COMPRESSOR BELT REMOVAL (Effectivity: All) (Figure 3)

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.

a. Remove all electrical power from the airplane.

b. Refer to Chapter 71-10-00 and remove the engine cowling from the RH engine.

c. Remove the screws and washers that secure the larger belt guard to the compressor mount (1) and remove the guard.

d. Loosen the compressor adjustment rod nuts (7 and 9).

e. Reduce the tension on the belt by turning the compressor adjustment rod (23) counterclockwise.

f. Remove the belt from the compressor clutch/sprocket (18) and drive sprocket assembly (17).

AIR CONDITIONING COMPRESSOR BELT INSTALLATION (Effectivity: All) (Figure 3)

a. Place the belt on the compressor clutch/sprocket (18) and the drive sprocket assembly (17). Do not force the belt onto the sprockets (17 and 18).

b. Tighten the belt by rotating the adjustment rod (23) clockwise until a 2.5 ±0.5 lb. force applied at the outside center of the belt span deflects the belt 0.11-inch. Use a belt deflection gage (5, Chart 1, 21-00-00) to check the belt tension.

c. Once the belt has been properly tightened, tighten the adjustment rod nuts (7 and 9) and safety wire.

d. Align the large belt guard with the compressor mount (1) and secure with the washers and screws.

e. Refer to Chapter 71-10-00 and install the RH engine cowling.

f. Restore electrical power to the airplane.

AIR CONDITIONER COMPRESSOR MOUNT REMOVAL (Effectivity: All) (Figure 3)

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Remove the air conditioner compressor (11) from the compressor mount (1) as outlined under AIR CONDITIONER COMPRESSOR REMOVAL in this chapter.

c. Remove the bolts and washers that secure the compressor mount to engine pads B and C, then remove the compressor mount (1) from the engine.

d. Remove and discard the compressor mount O-rings (20) from the compressor mount (1).

e. Remove the quill shaft (22) from the drive sprocket assembly (17).

f. Remove the pivot plate (12) by removing the bolts (13), washers (14 and 15) and nuts (16) securing it to the compressor mount (1). Note which pivot plate bolt holes were used to attach to the compressor mount (1).

AIR CONDITIONER COMPRESSOR MOUNT INSTALLATION (Effectivity: All) (Figure 3)

CAUTION

The air conditioner compressor mount must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the pivot plate (12) with the compressor mount (1) and attach with bolts (13), washers (14 and 15) and nuts (16). Use the same bolt attach holes noted during removal. Torque to 50-70 inch-lbs. and safety wire.

b. Ensure that the oil seal carriers, located in engine accessory pads C and B, are installed properly.

c. Ensure that the spring (21) is installed on the gearshaft of engine accessory pad C.

d. Install the quill shaft (22) in the drive sprocket assembly (17).

NOTE

DO NOT lubricate the quill shaft and splines as they do not require lubrication.

e. Install new compressor mount O-rings (20) in the compressor mount (1).

f. Align the compressor mount (1) and quill shaft (22) with engine accessory pads B and C (the quill shaft (22) slides into pad C), then secure the compressor mount (1) to the engine accessory pad with bolts and washers. Torque the bolts to 40-50 inch-lbs. and safety wire.

g. Install the compressor (11) in the compressor mount (1) as instructed under AIR CONDITIONER COMPRESSOR INSTALLATION in this chapter.

h. Restore electrical power to the airplane.

AIR CONDITIONER QUILL SHAFT REMOVAL (Effectivity: All) (Figure 3)

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.

a. Remove all electrical power from the airplane.

b. Remove the bolts and washers securing the compressor mount (1) to the engine and pull it away from the engine.

NOTE

It is not necessary to remove the compressor (11) from the compressor mount (1) for this procedure.

c. Remove and discard the compressor mount O-rings (20) from the compressor mount (1).

d. Remove the quill shaft (22) from the compressor mount (1).

AIR CONDITIONER QUILL SHAFT INSTALLATION (Effectivity: All) (Figure 3)

a. Ensure that the oil seal carriers, located in the engine accessory pads C and B, are installed properly.

b. Ensure that the spring (21) is installed on the gearshaft of engine accessory pad C.

c. Install new compressor mount O-rings (20) in the compressor mount (1).

d. Install the quill shaft (22) in the compressor mount (1).

NOTE

Do not lubricate the quill shaft (22) and splines as they do not require lubrication.

e. Align the compressor mount (1) and quill shaft (22) with the engine accessory pads B and C (the quill shaft (22) slides into pad C), and secure the compressor mount to the engine accessory pad with bolts and washers. Torque the bolts to 40-50 inch-lbs. and safety wire.

f. Restore electrical power to the airplane.

AIR CONDITIONER COMPRESSOR MOUNT DRIVE SPROCKET REMOVAL (Effectivity: All) (Figure 4)

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Remove the air conditioner compressor mount (11) and compressor (1) as outlined under AIR CONDITIONER COMPRESSOR MOUNT REMOVAL in this chapter.

NOTE

It is not necessary to bleed refrigerant from the system to perform this operation.

c. Remove the drive sprocket retainer ring (7).

d. Remove the drive sprocket (4) from the compressor mount mount assembly (1).

e. Remove the bearing retainer ring (5).

f. Remove the bearing (6) from the compressor mount assembly (1).

g. Remove the drive sprocket plug retainer ring (2) and plug (3).

AIR CONDITIONER COMPRESSOR MOUNT DRIVE SPROCKET INSTALLATION (Effectivity: All) (Figure 4)

CAUTION

The air conditioner compressor mount assembly must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Place the plug (3) in the drive sprocket (4) and secure with the plug retainer ring (2).

b. Press the bearing (6) into the air conditioner compressor mount assembly (1) and secure with the bearing retainer ring (5).

NOTE

The bearing does not require lubrication.

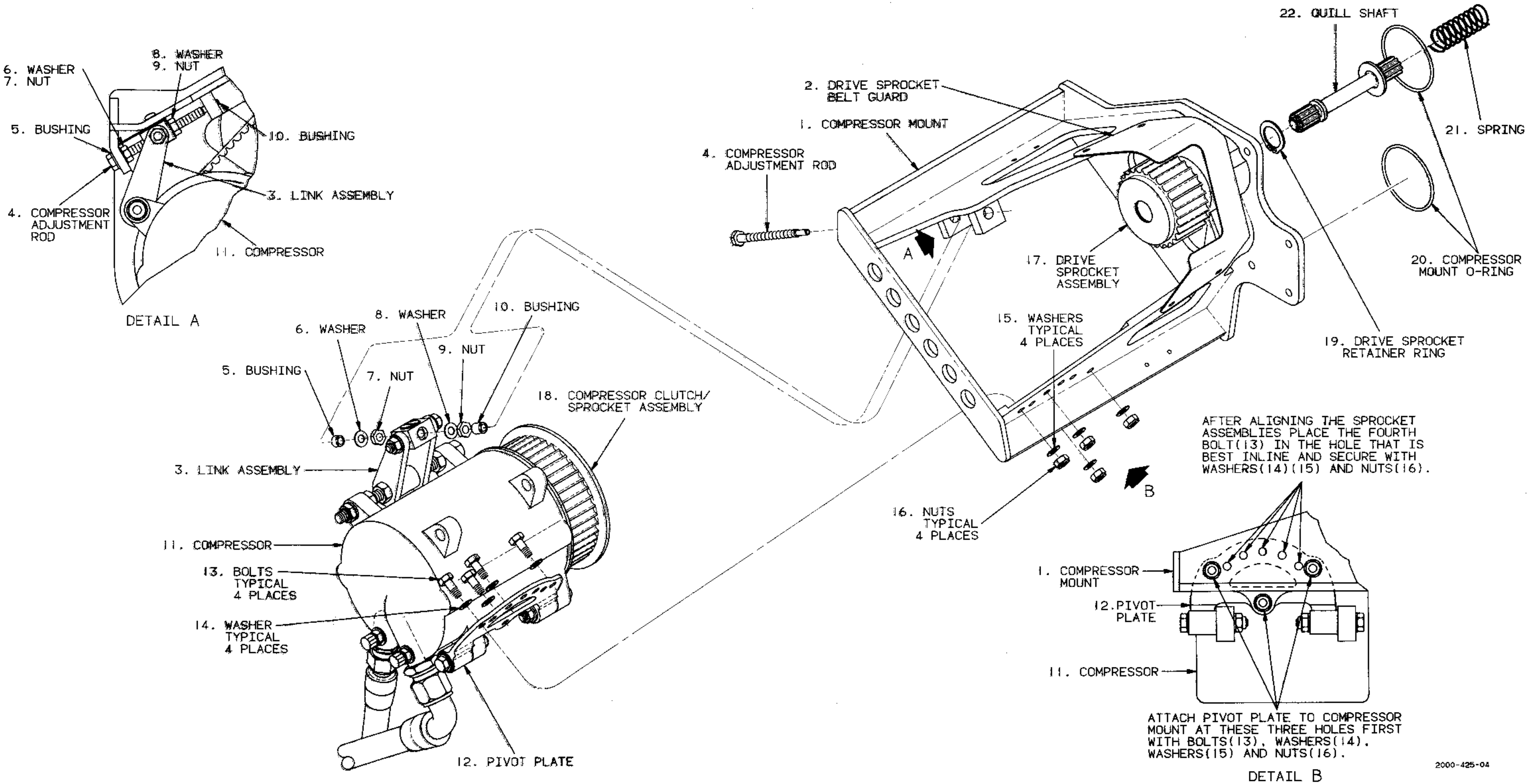
c. Clean the inside surface of the bearing, and the drive sprocket's bearing mating surface thoroughly with solvent (2, Chart 2, 21-00-00).

d. Carefully apply an adhesive primer (9, Chart 2, 21-00-00) or (10, Chart 2, 21-00-00) to the drive sprocket's bearing mating surface ONLY (the surface just cleaned on the drive sprocket) and allow to dry in accordance with the manufacturer's recommendations.

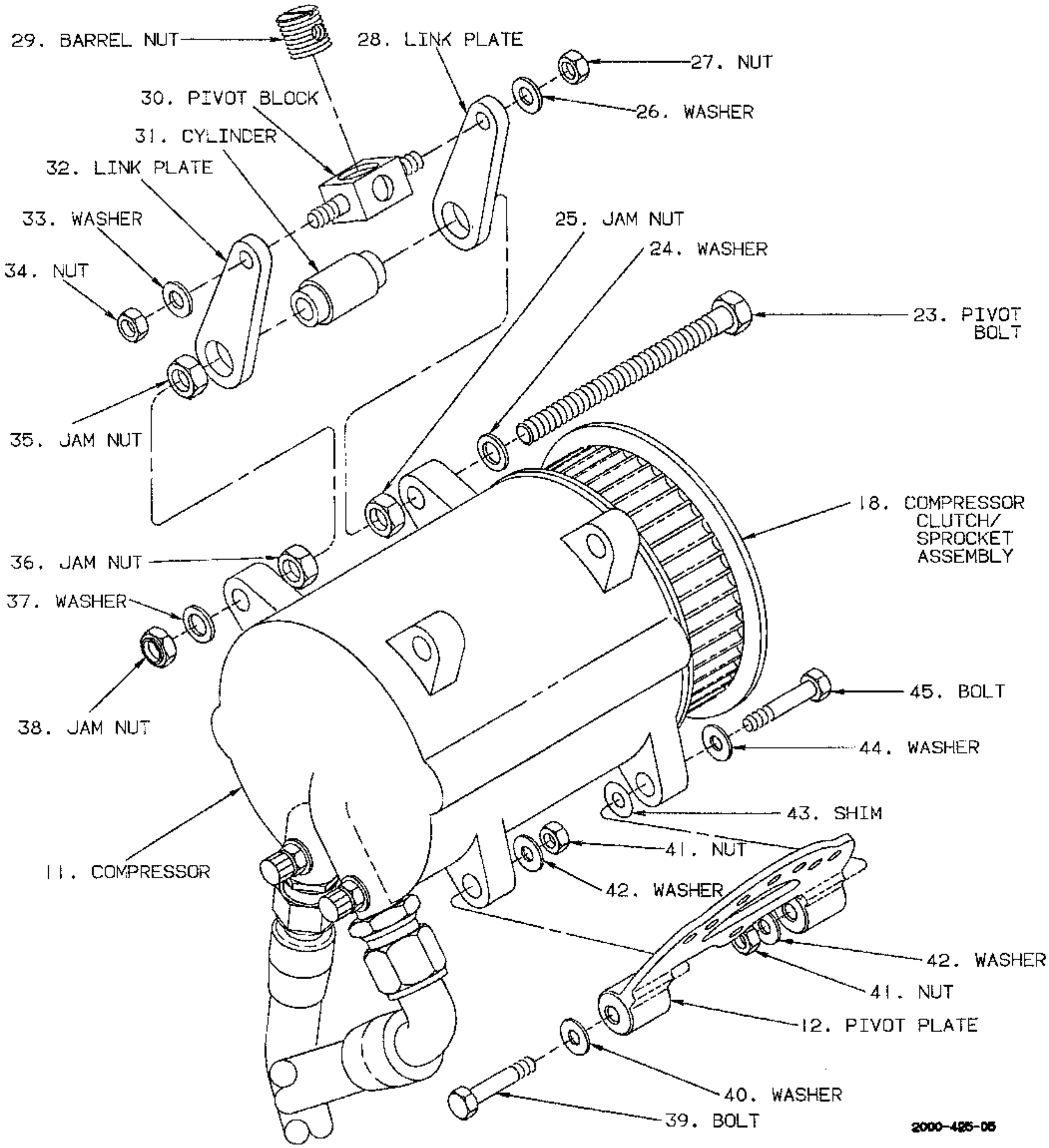
CAUTION

Do not apply adhesive primer to any surface other than the sprocket mating surface.

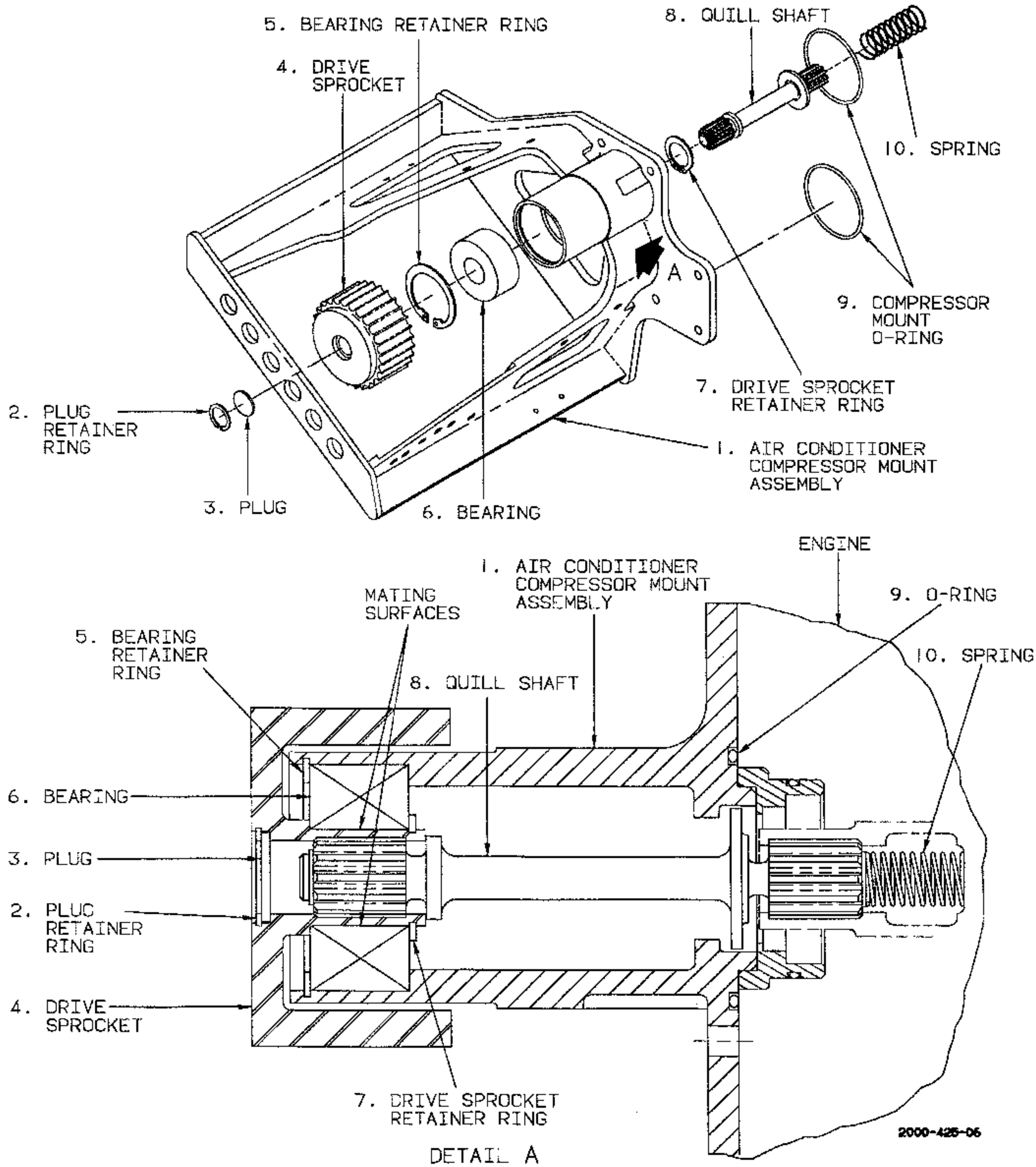
e. Carefully apply retaining compound (12, Chart 2, 21-00-00) to the bearing inside surface and immediately install the drive sprocket (4) into the bearing (6) and compressor mount assembly (1). Install the drive sprocket retainer ring (7) to secure the drive sprocket (4) in place.



Air Conditioner Compressor and Mount Installation (Effectivity: All) (Sheet 1 of 2) Figure 3



Air Conditioner Compressor and Mount Installation (Effectivity: All)
(Sheet 2 of 2)
Figure 3



Air Conditioner Compressor Mount Drive Sprocket Installation (Effectivity: All)
Figure 4

CAUTION

Do not allow the adhesive to get on any surface other than the bearing inside surface and the drive sprocket mating surface when assembling.

f. Allow the assembly to fully cure undisturbed for 12 hours before proceeding to the next step.

g. Install the air conditioner compressor and compressor mount (1) as outlined under AIR CONDITIONER COMPRESSOR MOUNT INSTALLATION in this chapter.

h. Restore electrical power to the airplane.

AIR CONDITIONER RECEIVER/DRYER REMOVAL (Effectivity: All) (Figure 5)

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Remove the vane axial blower as outlined under VANE AXIAL BLOWER REMOVAL in this chapter.

c. Loosen the captive fasteners and remove the air conditioner service compartment access panel.

d. Connect recovery/recycle servicing unit (4, Chart 1, 21-00-00) to the service valves in the air conditioning service compartment, and slowly bleed the refrigerant from the air conditioning system.

e. When all the refrigerant has been bled from the system, disconnect the refrigerant line (11) from the union (9) in the aft port of the receiver/dryer.

CAUTION

Cap all open refrigeration tubes, lines, ports and connectors to prevent contamination of the air conditioning system.

f. Disconnect the refrigerant line (3) from the union (6) in the forward (condenser side) port of the receiver/dryer.

g. Remove the nut (21), washer (20), clamp (19) and spacer (18) securing the receiver/dryer to the mounting stud (17) on the interior surface of the aft fuselage.

h. Remove nut (4) and washer (5) securing union (6) to the mounting bracket (2), and remove the receiver/dryer (1) from the mounting bracket (2).

i. Remove the unions (6 and 9) from the receiver/dryer (1).

j. Remove and discard O-rings (7 and 8) from the unions (6 and 9).

AIR CONDITIONER RECEIVER/DRYER INSTALLATION (Effectivity: All) (Figure 5)

CAUTION

The air conditioner receiver/dryer must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Install new O-rings (7 and 8) on the unions (6 and 9).

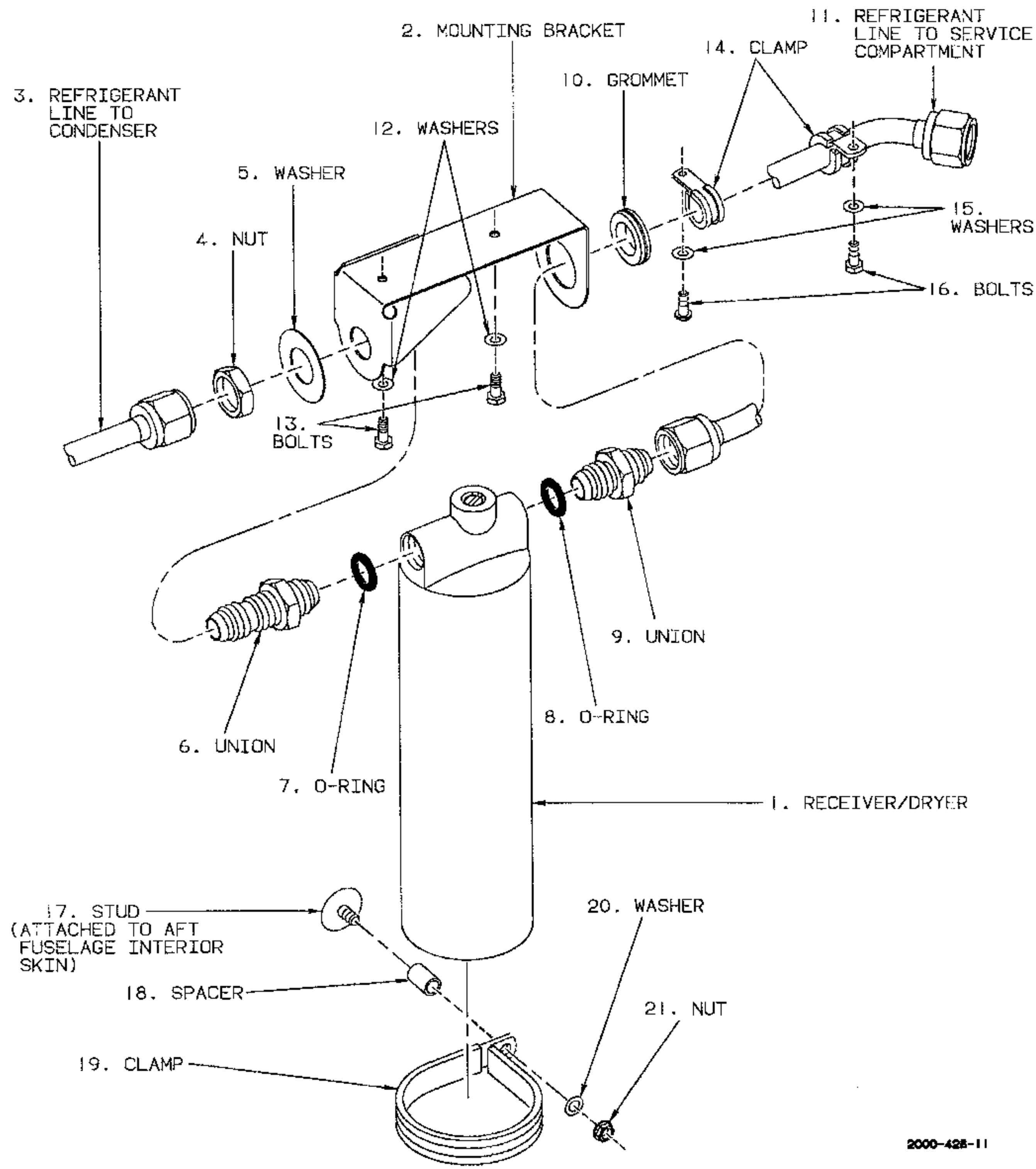
b. Install the unions (6 and 9) in the receiver/dryer (1).

NOTE

Thread the union (6) into the forward (to condenser) port of the receiver/dryer.

c. Align the receiver/dryer (1) with the mounting bracket (2) by inserting the union (6) into the forward hole of the mounting bracket (2). Secure with washer (5) and nut (4).

d. Secure the receiver/dryer (1) to the mounting stud (17) attached to the interior of the aft fuselage wall with spacer (18), clamp (19), washer (20) and nut (21).



Air Conditioner Receiver/Dryer Installation (Effectivity: All)
Figure 5

e. Connect the refrigerant lines (3 and 11) to their respective receiver/dryer unions (6 and 9).

f. Install the axial vane blower as outlined under AXIAL VANE BLOWER INSTALLATION in this chapter.

g. Restore electrical power to the airplane.

h. Check the installation for leaks and charge the system as outlined under AIR CONDITIONING SYSTEM CHARGING in this chapter.

i. Install the air conditioning service compartment access panel and secure with captive fasteners.

AIR CONDITIONER COMPRESSOR LOW PRESSURE SWITCH REMOVAL (Effectivity: All) (Figure 6)

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the main wing RH trailing edge cove.

c. Loosen the captive fasteners and remove the air conditioning service compartment access panel.

d. Connect recovery/recycle servicing unit (4, Chart 1, 21-00-00) to the service valves in the air conditioning service compartment, and slowly bleed the refrigerant from the air conditioning system.

e. Remove and discard insulation from the refrigerant lines connected to the air conditioner low pressure switch.

f. Remove safety wire from the low pressure switch.

g. Tag and disconnect wiring from the air conditioner compressor low pressure switch.

h. After all the refrigerant has been completely bled from the system, remove the air conditioner compressor low pressure switch from the reducer.

CAUTION

Cap all open refrigerant tubes, lines, ports and connectors to prevent contamination of the air conditioner system.

i. Remove and discard the O-ring from the air conditioner compressor low pressure switch.

AIR CONDITIONER COMPRESSOR LOW PRESSURE SWITCH INSTALLATION (Effectivity: All) (Figure 6)

CAUTION

The air conditioner compressor low pressure switch must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Install a new O-ring on the air conditioner compressor low pressure switch.

b. Install the air conditioner compressor low pressure switch in the reducer and safety wire.

c. Reconnect wiring to the air conditioner compressor low pressure switch according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

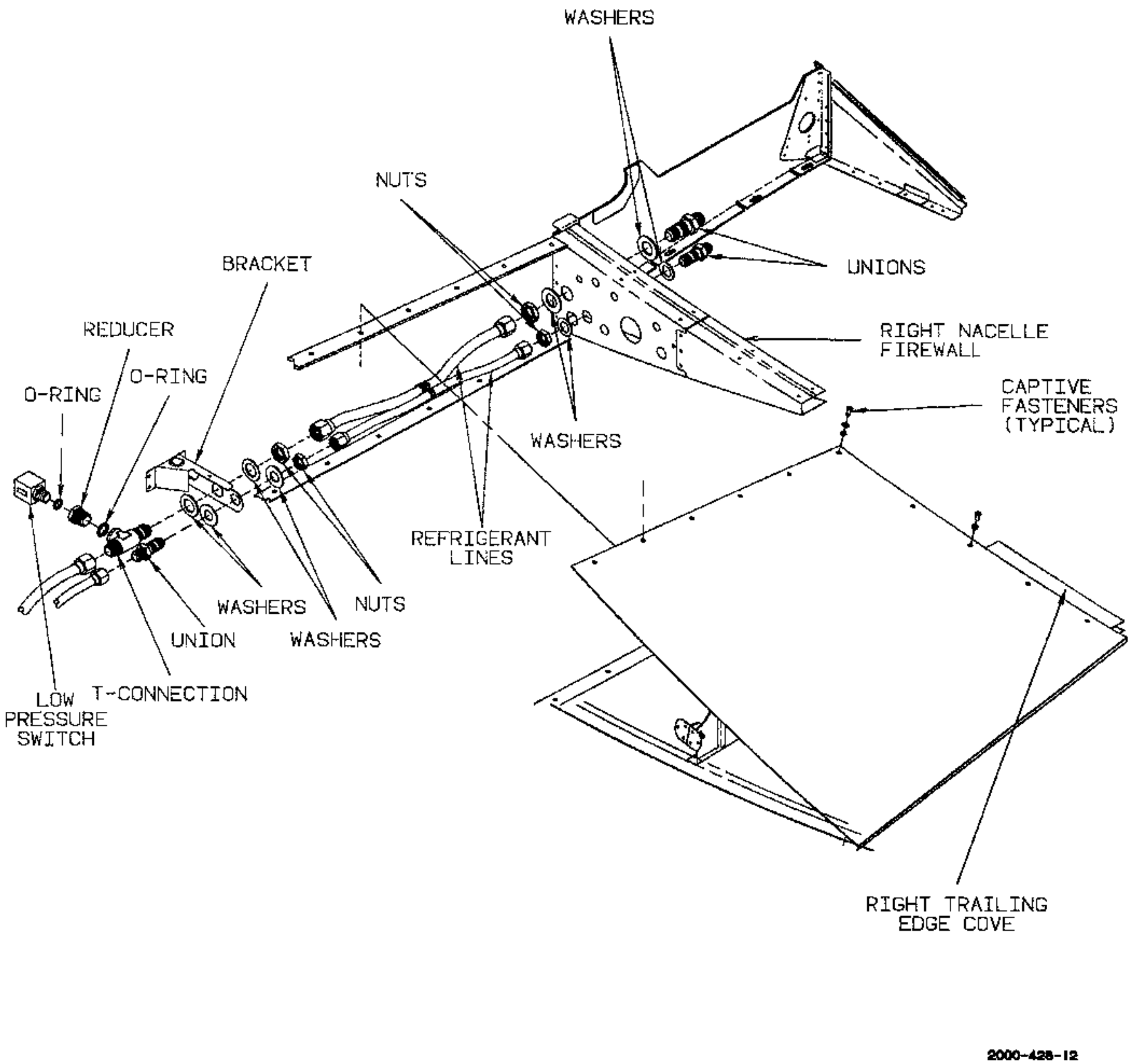
d. Check the installation for leaks and charge the system as outlined under AIR CONDITIONING CHARGING in this chapter.

e. Insulate the refrigerant lines connected to the air conditioner compressor low temperature switch with one wrap of insulation (19, Chart 2, 21-00-00) and a full wrap of tape (16, Chart 2, 21-00-00).

f. Restore electrical power to the airplane.

g. Install the main wing RH trailing edge cove and secure with captive fasteners.

h. Install the air conditioning service compartment access panel and secure with captive fasteners.



Air Conditioner Compressor Low Pressure Switch Installation (Effectivity: All)
Figure 6

CONDENSER HIGH PRESSURE SWITCH REMOVAL (Effectivity: All) (Figure 7)

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the aft lower fuselage ambient air inlet door.

c. Loosen the captive fasteners and remove the air conditioning service compartment access panel.

d. Connect recovery/recycle servicing unit (4, Chart 1, 21-00-00) to the service valves in the air conditioning service compartment, and slowly bleed the refrigerant from the air conditioning system.

e. Remove safety wire from the condenser high pressure switch.

f. Tag and disconnect wiring from the condenser high pressure switch.

g. After the refrigerant has been completely bled from the system, remove the switch from the reducer.

CAUTION

Cap all open refrigerant tubes, lines, ports and connectors to prevent contamination of the air conditioning system.

h. Remove and discard the O-ring from the condenser high pressure switch.

CONDENSER HIGH PRESSURE SWITCH INSTALLATION (Effectivity: All) (Figure 7)

CAUTION

The condenser high pressure switch must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Install a new O-ring on the condenser high pressure switch.

b. Install the condenser high pressure switch in the reducer and safety wire.

c. Reconnect wiring to the condenser high pressure switch according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

d. Restore electrical power to the airplane.

e. Check the installation for leaks and charge the system as outlined under AIR CONDITIONING SYSTEM CHARGING in this chapter.

f. Install the aft lower fuselage ambient air inlet door and secure with captive fasteners.

g. Install the air conditioning service compartment access panel and secure with captive fasteners.

VANE AXIAL BLOWER REMOVAL (Effectivity: All) (Figure 8)

WARNING

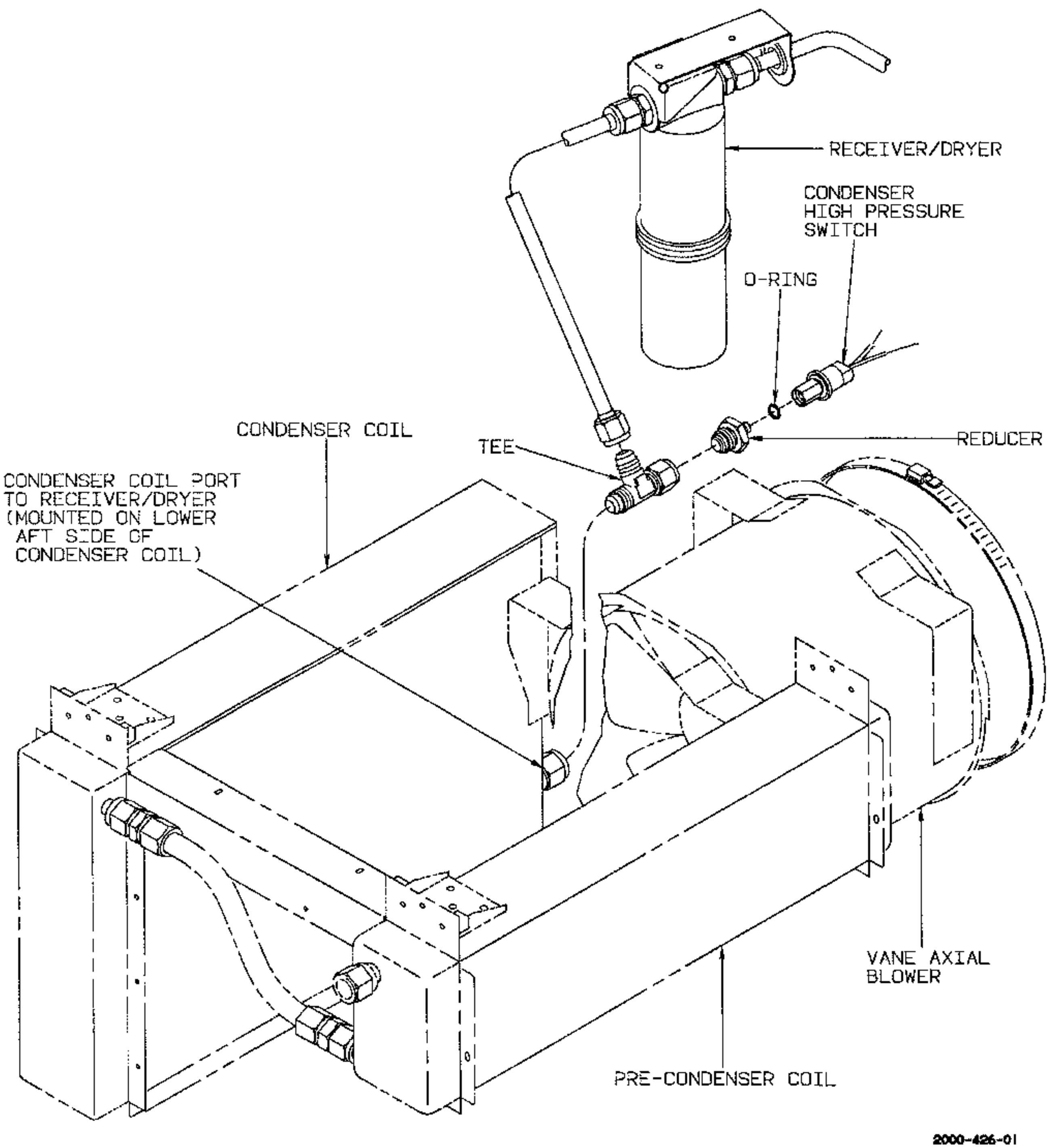
Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the aft fuselage ambient air inlet door.



Condenser High Pressure Switch Installation (Effectivity: All)
Figure 7

c. Loosen the clamp attaching the vane axial blower to the aft turning duct.

d. Remove duct tape from the aft turning and bypass duct joints.

e. Loosen the captive fasteners and remove the upper aft fuselage access panel.

f. Support the aft turning duct before removing the mounting hardware. Reach into the upper aft fuselage compartment and remove the four bolts and washers which secure the aft turning duct to the lower side of the aft fuselage equipment shelf.

g. Remove the aft turning duct from the airplane.

h. Remove the screws and washers attaching the lower closeout to the condenser plenum assembly and remove the lower closeout.

i. Remove the screws and washers attaching the closure plate to the aft closeout and bypass duct. Remove the closure plate.

j. Tag and disconnect all wiring from the vane axial blower.

k. Remove the four mounting screws and eight washers securing the vane axial blower to the shock mounts.

l. Carefully lower the vane axial blower until it can be removed from the airplane.

VANE AXIAL BLOWER INSTALLATION (Effectivity: All) (Figure 8)

CAUTION

The vane axial blower must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the vane axial blower mounting brackets with the four shock mounts attached to the lower side of the aft fuselage equipment shelf.

b. Secure the vane axial blower to the shock mounts by installing the four mounting screws with two washers per screw.

c. Reconnect all wiring to the vane axial blower according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

d. Ensure that the bonding jumper is reinstalled on the vane axial blower.

e. Align the closure plate with the aft closeout and secure with mounting screws and washers. Ensure that a good seal is obtained between the vane axial blower and closure plate blower seal.

NOTE

If a new seal is to be installed, or if the old one needs rebonding, apply adhesive (5, Chart 2, 21-00-00) to the portion of the seal that is to be bonded, and allow to set before installing the closure plate.

f. Attach the bypass duct to the closure plate with a screw and washer.

g. Align the lower closeout with the condenser plenum assembly and secure with screws and washers.

h. Align the aft turning duct with the vane axial blower and the mounting holes on the aft fuselage equipment shelf. Ensure that the clamp is loosely installed where the turning duct seal and vane axial blower attach.

i. Reach into the upper aft fuselage compartment and install the four bolts and washers that secure the aft turning duct to the lower side of the aft fuselage equipment shelf.

j. Tighten the clamp and ensure that the seal is flush with the vane axial blower to provide a good seal.

k. Seal the aft turning and bypass duct joints with tape (16, Chart 2, 21-00-00).

l. Install the upper aft fuselage access panel and secure with captive fasteners.

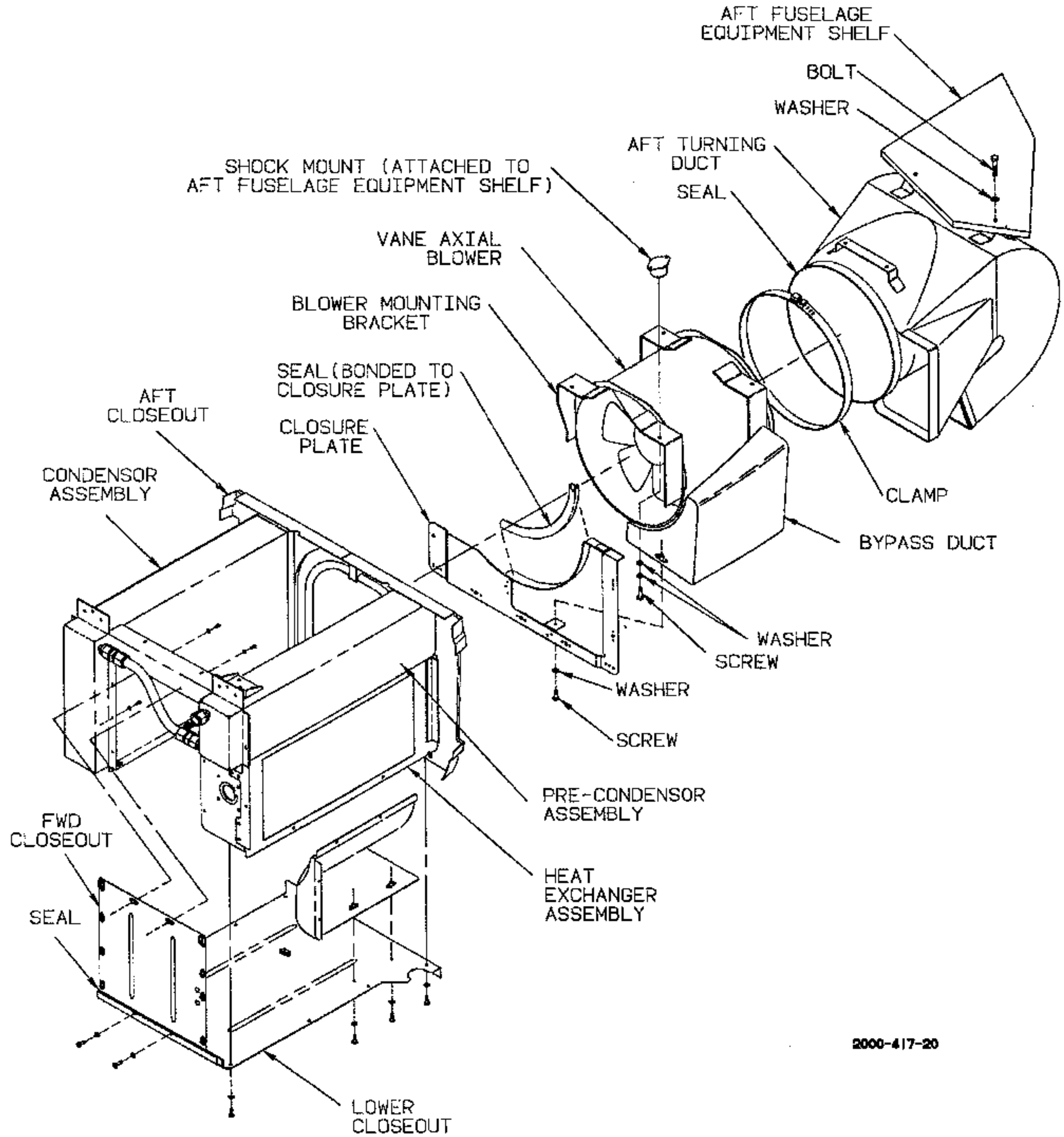
m. Install the lower aft fuselage ambient air inlet door and secure with captive fasteners.

n. Restore electrical power to the airplane.

AIR CONDITIONER SERVICE VALVE UNION AND SERVICE VALVE REMOVAL (Effectivity: All) (Figure 9)

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.



Vane Axial Blower Installation (Effectivity: All)
Figure 8

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the aft lower fuselage ambient air inlet door.

c. Loosen the captive fasteners and remove the aft upper fuselage access panel.

d. Loosen the captive fasteners and remove the air conditioning service compartment access panel.

e. Loosen the clamp securing the aft turning duct to the vane axial blower.

f. Remove tape from the aft turning and bypass ducts.

g. Support the aft turning duct before removing the mounting hardware. Reach into the aft upper fuselage compartment, remove the bolts and washers that secure the aft turning duct to the aft fuselage divider shelf, and remove the aft turning duct from the aft lower fuselage compartment.

h. Connect recovery/recycle servicing unit (4, Chart 1, 21-00-00) to the service valves in the air conditioning service compartment, and slowly bleed the refrigerant from the air conditioning system.

i. Remove the insulation from the suction line up to the service valve.

j. After the refrigerant has been completely bled from the system, tag and disconnect the refrigerant lines from the service valve unions.

CAUTION

Cap all open refrigerant tubes, lines, ports and connectors to prevent contamination of the air conditioning system.

k. Remove the nuts and washers securing the service valve unions to the air conditioning service compartment and remove the service valve unions from the air conditioning service compartment.

l. Remove the service valves from the service valve unions.

AIR CONDITIONER SERVICE VALVE UNION AND SERVICE VALVE INSTALLATION (Effectivity: All) (Figure 9)

CAUTION

The air conditioner service valves and service valve unions must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Install the air conditioner service valves in their respective unions.

b. Align the service valve unions with the cutouts in the air conditioning service compartment and secure with washers and nuts.

c. Reconnect the refrigerant lines to the service valve unions according to tags.

d. Insulate the suction line up to the service valve with one layer of insulation (19, Chart 2, 21-00-00) and a full wrap of tape (16, Chart 2, 21-00-00).

e. Align the aft turning duct with the vane axial blower and the mounting holes in the aft fuselage equipment shelf. Ensure that the seal between the vane axial blower and aft turning duct is properly aligned to provide a good seal.

f. Reach into the aft upper fuselage compartment and secure the aft turning duct to the aft fuselage equipment shelf with bolts and washers.

g. Tighten the clamp attaching the aft turning duct to the vane axial blower.

h. Seal the aft turning duct and bypass duct joints with tape (16, Chart 2, 21-00-00).

i. Restore electrical power to the airplane.

j. Check the installation for leaks and charge the system as outlined under AIR CONDITIONING SYSTEM CHARGING in this chapter.

k. Install the aft upper fuselage access panel and secure with captive fasteners.

l. Install the aft lower fuselage ambient air inlet door and secure with captive fasteners.

m. Install the air conditioning service compartment access panel and secure with captive fasteners.

AIR CONDITIONER SIGHT GLASS REMOVAL (Effectivity: All) (Figure 9)

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the the aft lower fuselage ambient air inlet door.

c. Loosen the captive fasteners and remove the air conditioning service compartment access panel.

d. Connect recovery/recycle servicing unit (4, Chart 1, 21-00-00) to the service valves in the air conditioning service compartment, and slowly bleed the refrigerant from the air conditioning system.

e. After the refrigerant has been completely bled from the system, disconnect the refrigerant lines from the sight glass and remove the sight glass from the air conditioning service compartment.

CAUTION

Cap all open refrigerant tubes, lines, ports and connectors to prevent contamination of the air conditioning system.

AIR CONDITIONER SIGHT GLASS INSTALLATION (Effectivity: All) (Figure 9)

CAUTION

The air conditioner sight glass must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Replace the grommets in the air conditioning service compartment sight glass refrigerant line openings if they show signs of deterioration or age.

b. Align the sight glass in the air conditioning service compartment and connect the refrigerant lines.

c. Restore electrical power to the airplane.

d. Check the installation for leaks and charge the system as outlined under AIR CONDITIONING SYSTEM CHARGING in this chapter.

e. Install the aft lower fuselage ambient air inlet door and secure with captive fasteners.

f. Install the air conditioning service compartment access panel and secure with captive fasteners.

AIR CONDITIONER UNDER PRESSURE LOCKOUT SWITCH REMOVAL (Effectivity: All) (Figure 10)

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the aft lower fuselage ambient air inlet door.

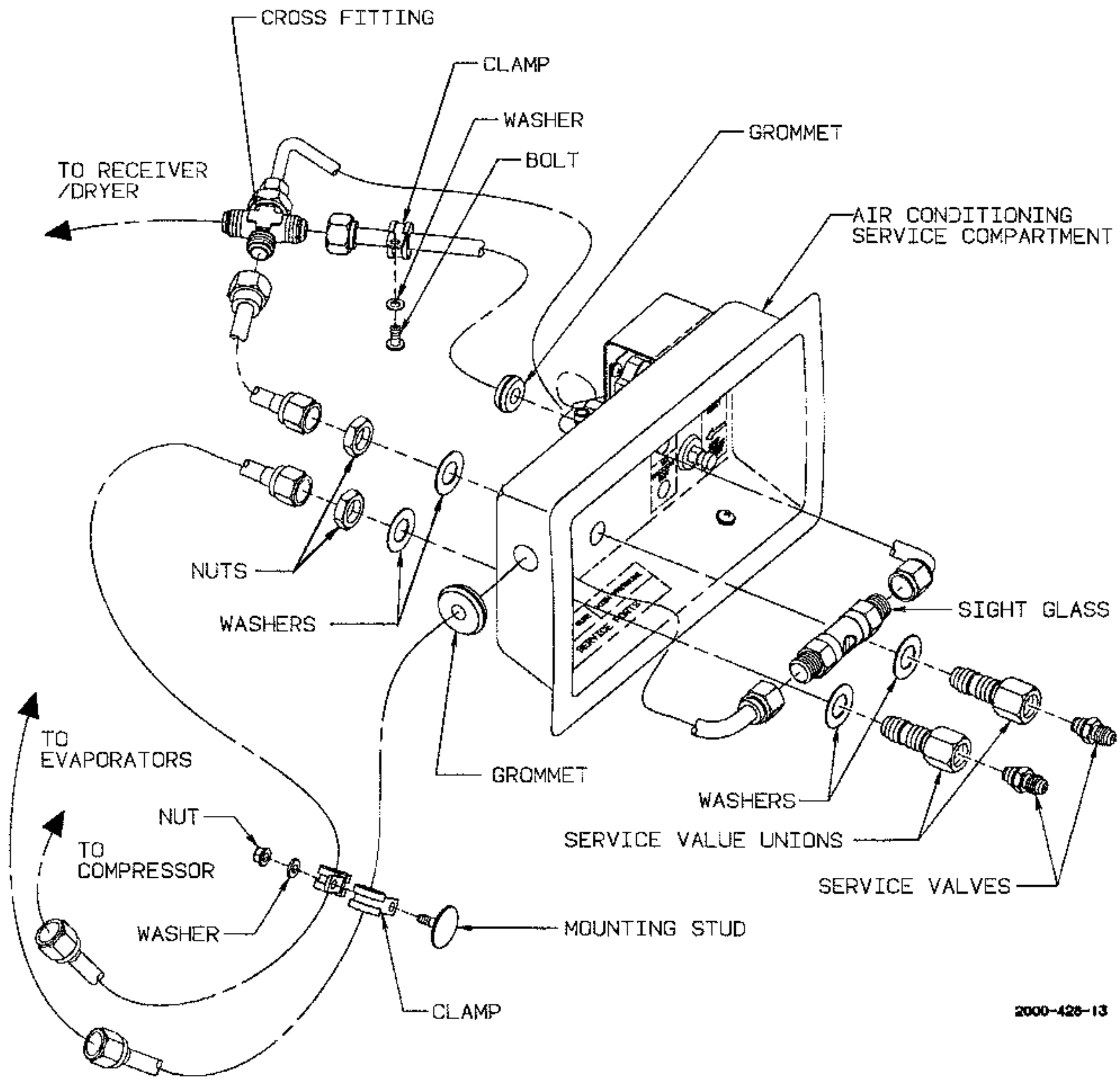
c. Loosen the captive fasteners and remove the aft upper fuselage access panel.

d. Loosen the captive fasteners and remove the air conditioning service compartment access panel.

e. Remove the clamp securing the aft turning duct to the vane axial blower.

f. Remove tape from the aft turning and bypass duct joints.

g. Support the aft turning duct before removing the mounting hardware. Reach into the aft upper fuselage



Air Conditioner Service Valve Union, Service Valve and Sight Glass Installation (Effectivity: All)
Figure 9

compartment and remove the bolts and washers securing the aft turning duct to the aft fuselage equipment shelf and remove it from the airplane.

h. Tag and disconnect wiring from the under pressure lockout switch.

i. Loosen the clamp securing the over pressure lockout switch refrigerant line to its mounting bracket.

j. Remove screws and washers that secure the mounting bracket to the air conditioning service compartment and pull the mounting bracket away from the compartment.

k. Remove the screws and washers securing the under pressure lockout switch to the mounting bracket and remove the underpressure lockout switch from the airplane.

AIR CONDITIONER UNDER PRESSURE LOCKOUT SWITCH INSTALLATION (Effectivity: All) (Figure 10)

CAUTION

The air conditioner under pressure lockout switch must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the under pressure lockout switch with the mounting bracket and secure with screws and washers.

b. Replace the grommets in the air conditioning service compartment under pressure lockout switch opening if they shows signs of deterioration or age.

c. Align the mounting bracket with the air conditioner service compartment and secure with the screws and washers.

d. Tighten the clamp that secures the over pressure lockout switch refrigerant line to the mounting bracket.

e. Reconnect wiring to the under pressure lockout switch according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

f. Align the aft turning duct with the vane axial blower, bypass duct and the mounting holes in the aft fuselage equipment shelf.

g. Reach into the upper aft fuselage compartment and secure the aft turning duct to the aft fuselage equipment shelf with bolts and washers. Ensure that the seal on the aft turning duct is properly aligned with the vane axial blower to provide a tight seal.

h. Tighten the clamp securing the vane axial blower to the aft turning duct.

i. Seal the aft turning and bypass duct joints with tape (16, Chart 2, 21-00-00)

j. Install the aft upper fuselage access panel and secure with captive fasteners.

k. Install the aft lower fuselage ambient air inlet door and secure with captive fasteners.

l. Install the air conditioning service compartment access panel and secure with captive fasteners.

m. Restore electrical power to the airplane.

AIR CONDITIONER OVER PRESSURE LOCKOUT SWITCH REMOVAL (Effectivity: All) (Figure 10)

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the aft lower fuselage ambient air inlet door.

c. Loosen the captive fasteners and remove the aft upper fuselage access panel.

d. Loosen the captive fasteners and remove the air conditioning service compartment access panel.

e. Remove tape from the aft turning and bypass ducts.

f. Loosen the clamp securing the aft turning duct to the vane axial blower.

g. Support the aft turning duct before removing the mounting hardware. Reach into the aft upper fuselage compartment and remove the bolts and washers securing the aft turning duct to the aft fuselage equipment shelf, then remove the aft turning duct from the airplane.

h. Connect recovery/recycle servicing unit (4, Chart 1, 21-00-00) to the service valves in the air conditioning service compartment, and slowly bleed the refrigerant from the air conditioning system.

i. Tag and disconnect wiring from the over pressure lockout switch.

j. Remove the bolt, washer and clamp securing the over pressure lockout switch refrigerant line to the mounting bracket.

k. Remove the screws and washers securing the mounting bracket to the air conditioning service compartment, and pull the bracket away from the service compartment.

l. After the refrigerant has been completely bled from the system, disconnect the refrigerant line from the over pressure lockout switch and remove the over pressure switch from the airplane.

CAUTION

Cap all open refrigerant tubes, lines, ports and connectors to prevent contamination of the air conditioning system.

AIR CONDITIONER OVER PRESSURE LOCKOUT SWITCH INSTALLATION (Effectivity: All) (Figure 10)

CAUTION

The air conditioner over pressure lockout switch must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Replace the grommet in the air conditioning service compartment over pressure lockout switch opening if it shows signs of deterioration or age.

b. Reconnect the air conditioner refrigerant line to the over pressure lockout switch.

c. Align the mounting bracket with the air conditioning service compartment and secure with the screws and washers.

d. Secure the overpressure switch refrigerant line to the mounting bracket with clamp, washer and screw.

e. Reconnect wiring to the over pressure lockout switch according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

f. Align the aft turning duct with the vane axial blower bypass duct and the mounting holes on the aft fuselage equipment shelf.

g. Reach into the upper aft fuselage compartment and install bolts and washers to secure the aft turning duct to the equipment shelf.

h. Tighten the clamp securing the aft turning duct to the vane axial blower.

i. Seal the aft turning duct and bypass duct joints with tape (16, Chart 2, 21-00-00).

j. Restore electrical power to the airplane.

k. Check the installation for leaks and charge the system as outlined under AIR CONDITIONING SYSTEM CHARGING in this chapter.

l. Install the aft upper fuselage access panel and secure with captive fasteners.

m. Install the aft lower fuselage ambient air inlet door and secure with captive fasteners.

n. Install the air conditioning service compartment access door and secure with captive fasteners.

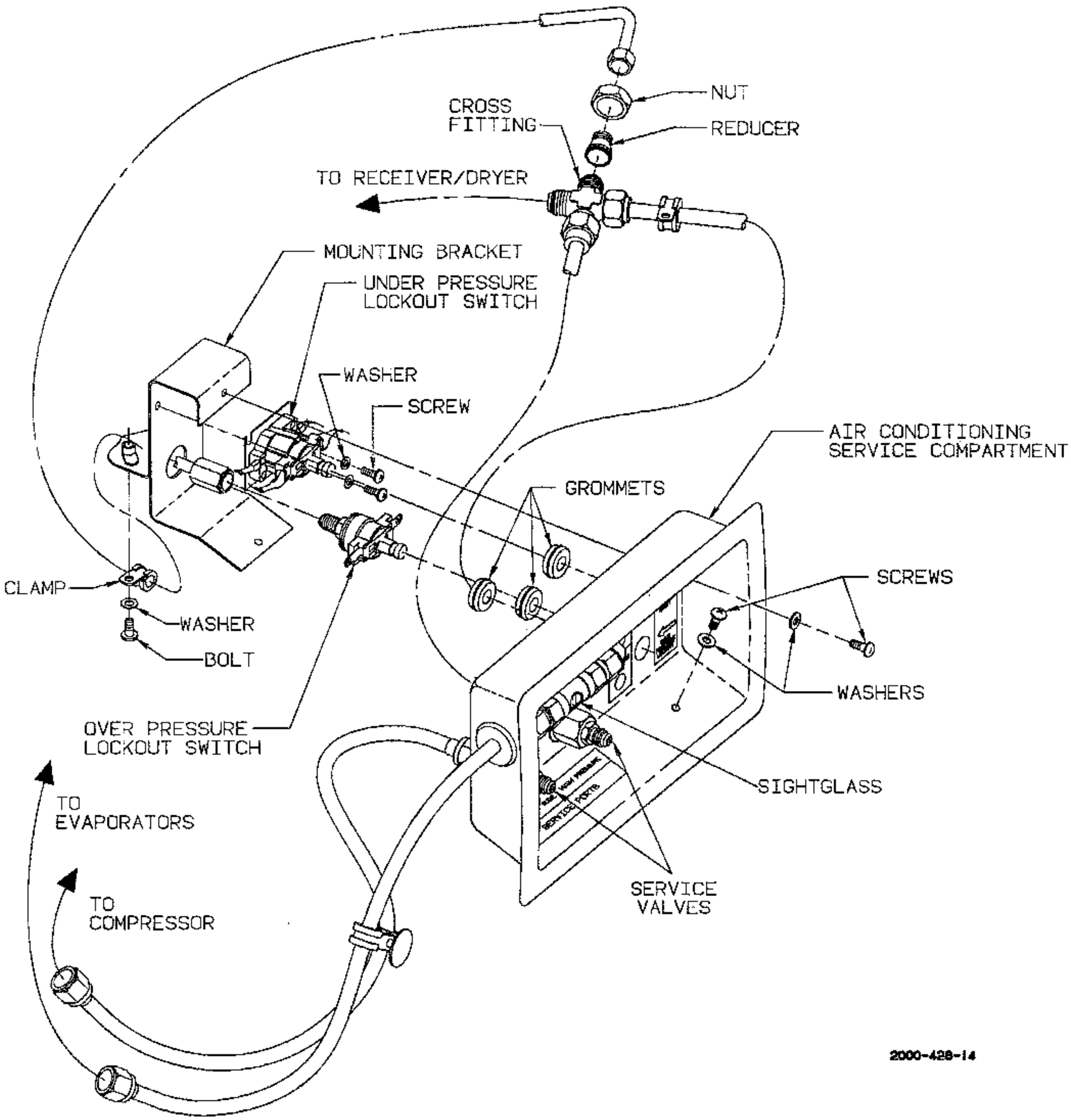
FORWARD EVAPORATOR REMOVAL (Effectivity: All) (Figure 11)

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.



Air Conditioner Under Pressure and Over Pressure Lockout Switches Installation (Effectivity: All)
Figure 10

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the air conditioning service compartment access panel.

c. Connect recovery/recycle servicing unit (4, Chart 1, 21-00-00) to the service valves in the air conditioning service compartment, and slowly bleed the refrigerant from the air conditioning system.

d. Loosen the captive fasteners and remove the outflow valve exit ramp.

e. Loosen the captive fasteners on the outflow valve access door and pull the door out far enough to access the pneumatic lines.

CAUTION

Do not remove the outflow valve access door until the pneumatic lines are disconnected from the outflow valves.

f. Tag and disconnect the pneumatic lines from the outflow valves.

g. Carefully remove and discard the tape and insulation wrapped around the low temperature switch and the expansion valve thermal bulb.

h. Remove the thermal bulb and low temperature switch from the evaporator suction line by removing the screw, washer and clamp that secures them.

i. After the refrigerant has been completely bled from the system, tag and disconnect the air conditioning refrigerant lines from the forward evaporator connectors.

CAUTION

Cap all open refrigeration tubes, lines, ports and connectors to prevent contamination of the air conditioning system.

j. Remove the filter from the forward evaporator (attached with Velcro fasteners).

k. Remove the mounting screws that secure the forward evaporator to its support and remove the forward evaporator from the airplane.

FORWARD EVAPORATOR INSTALLATION (Effectivity: All) (Figure 11)

CAUTION

The forward evaporator must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the forward evaporator with its support and secure with mounting screws and washers.

b. Install the filter on the forward evaporator (secured with Velcro fasteners).

NOTE

If a new forward evaporator is being installed, new filter fasteners must be installed before the filter can be installed.

c. Connect the refrigerant lines to the forward evaporator connectors.

d. Coat the evaporator suction line with lubricant (17, Chart 2, 21-00-00) in the area where the low temperature switch and expansion valve thermal bulb are to be installed.

e. Install the thermal bulb and low temperature switch on the evaporator suction line, and secure with clamp, screw and washer. Ensure that uniform contact between the low temperature switch, thermal bulb and suction line is achieved.

NOTE

The thermal bulb must have 100 percent contact with the suction line along one side to ensure that the expansion valve functions properly.

f. Restore electrical power to the airplane.

g. Check the installation for leaks and charge the system as outlined under AIR CONDITIONING SYSTEM CHARGING in this chapter.

h. Insulate the thermal bulb and low temperature switch with two layers of insulation (18, Chart 2, 21-00-00), vapor barrier facing out, and secure with a full wrap of tape (16, Chart 2, 21-00-00).

i. Reconnect the pneumatic lines to the outflow valves according to tags.

CAUTION

Ensure that the pneumatic lines are connected to the proper fittings and ports on the outflow valves or the system will not operate properly.

j. Install the outflow valve access door and secure with captive fasteners.

k. Install the outflow valve exit ramp and secure with captive fasteners.

l. Install the air conditioning service compartment access panel and secure with captive fasteners.

FORWARD EXPANSION VALVE REMOVAL (Effectivity: All) (Figure 11)

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the air conditioning service compartment access panel.

c. Connect recovery/recycle servicing unit (4, Chart 1, 21-00-00) to the service valves in the air conditioning service compartment, and slowly bleed the refrigerant from the air conditioning system.

d. Loosen the captive fasteners and remove the outflow valve exit ramp.

e. Loosen the captive fasteners on the outflow valve access door and pull the door out far enough to access the pneumatic lines.

CAUTION

Do not remove the outflow valve access door until the pneumatic lines are disconnected from the outflow valves.

f. Tag and disconnect the pneumatic lines from the outflow valves.

g. Carefully remove and discard the tape and insulation wrapped around the low temperature switch and expansion valve thermal bulb.

h. Remove the screw, washer and clamp that secures the thermal bulb and low temperature switch to the evaporator suction line, and remove the thermal bulb and low temperature switch.

i. After the refrigerant has been completely bled from the system, disconnect the refrigerant lines from the forward expansion valve and remove the valve.

CAUTION

Cap all open refrigerant tubes, lines, ports and connectors to prevent contamination of the air conditioning system.

FORWARD EXPANSION VALVE INSTALLATION (Effectivity: All) (Figure 11)

CAUTION

The forward expansion valve must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Reconnect the refrigerant lines to the forward expansion valve.

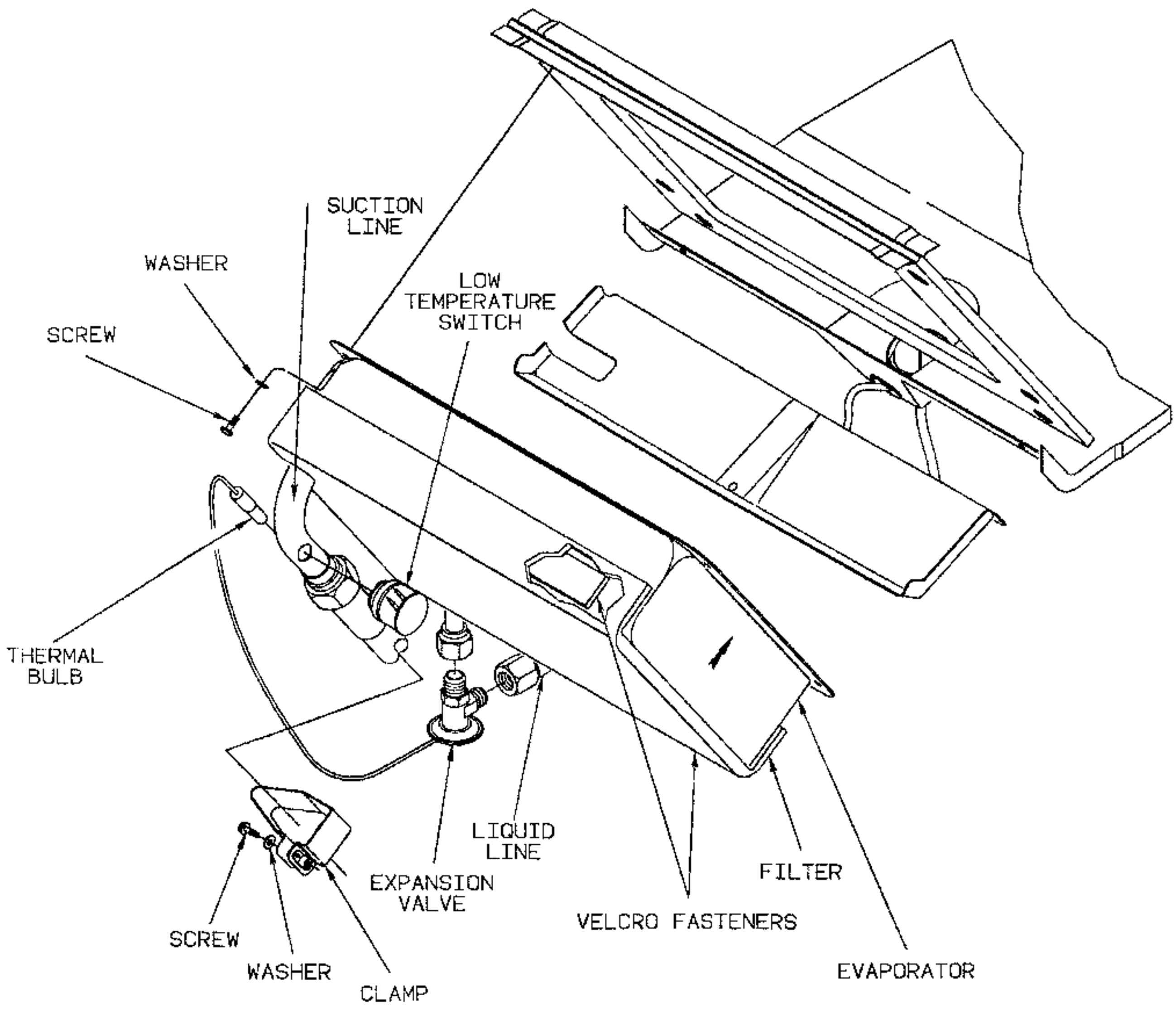
b. Coat the evaporator suction line with lubricant (17, Chart 2, 21-00-00) in the area where the low temperature switch and expansion valve thermal bulb are to be installed.

c. Install the thermal bulb and the evaporator low temperature switch on the evaporator suction line and secure with the clamp, screw and washer. Ensure that uniform contact between the low temperature switch, thermal bulb and suction line is achieved.

NOTE

The thermal bulb must have 100 percent contact with the suction line along one side to ensure that the expansion valve functions properly.

d. Restore electrical power to the airplane.



Forward Evaporator, Filter, Expansion Valve and Low Temperature Switch Installation (Effectivity: All)
Figure 11

e. Check the installation for leaks and charge the system as outlined under AIR CONDITIONING SYSTEM CHARGING in this chapter.

f. Insulate the thermal bulb and temperature switch with two layers of insulation (18, Chart 2, 21-00-00), vapor barrier facing out, and secure with a full wrap of tape (16, Chart 2, 21-00-00).

g. Reconnect the pneumatic tubes to the outflow valves according to tags.

CAUTION

Ensure that the pneumatic lines are connected to the proper fittings and ports on the outflow valves or the system will not operate properly.

h. Install the outflow valve access door and secure with captive fasteners.

i. Install the outflow valve exit ramp and secure with captive fasteners.

j. Install the air conditioning service compartment access panel and secure with captive fasteners.

FORWARD LOW TEMPERATURE SWITCH REMOVAL (Effectivity: All) (Figure 11)

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the outflow valve exit ramp.

c. Loosen the captive fasteners on the outflow valve access door and pull the door out far enough to access the pneumatic lines.

CAUTION

Do not remove the outflow valve access door until the pneumatic lines are disconnected from the outflow valves.

d. Tag and disconnect the pneumatic lines from the outflow valves.

e. Carefully remove and discard tape and insulation wrapped around the expansion valve thermal bulb and forward low temperature switch.

f. Tag and disconnect wiring from the forward low temperature switch.

g. Remove the screw, washer and clamp securing the thermal bulb and forward low temperature switch to the evaporator suction line, and remove the forward low temperature switch.

FORWARD LOW TEMPERATURE SWITCH INSTALLATION (Effectivity: All) (Figure 11)

CAUTION

The air conditioner forward low temperature switch must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Coat the evaporator suction line with lubricant (17, Chart 2, 21-00-00) in the area where the forward low temperature switch and expansion valve thermal bulb are to be installed.

b. Install the thermal bulb and forward low temperature switch on the evaporator suction line and secure with the clamp, washer and screw. Ensure that uniform contact between the low temperature switch, thermal bulb and suction line is achieved.

NOTE

The thermal bulb must have 100 percent contact with the suction line along one side to ensure that the expansion valve functions properly.

c. Reconnect wiring to the forward low temperature switch according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

d. Insulate the thermal bulb and forward low temperature switch with two layers of insulation (18, Chart 2, 21-00-00), vapor barrier facing out, and secure with a full wrap of tape (16, Chart 2, 21-00-00).

e. Reconnect the pneumatic lines to the outflow valves according to tags.

CAUTION

Ensure that the pneumatic lines are connected to the proper fittings and ports on the outflow valves or the system will not operate properly.

f. Install the outflow valve access door and secure with captive fasteners.

g. Install the outflow valve exit ramp and secure with captive fasteners.

h. Restore electrical power to the airplane.

FORWARD EVAPORATOR FILTER REPLACEMENT (Effectivity: All) (Figure 11)

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the outflow valve exit ramp.

c. Loosen the captive fasteners on the outflow valve access door and pull the door out far enough to access the pneumatic lines.

CAUTION

Do not remove the outflow valve access door until the pneumatic lines are disconnected from the outflow valves.

d. Tag and disconnect the pneumatic lines from the outflow valves.

e. Remove the filter from the forward evaporator.

NOTE

The filter is secured to the top and bottom of the forward evaporator with Velcro fasteners.

f. Install a new filter on the forward evaporator

g. Reconnect the pneumatic lines to the outflow valves according to tags.

CAUTION

Ensure that the pneumatic lines are connected to the proper fittings and ports on the outflow valves or the system will not operate properly.

h. Install the outflow valve access door and secure with captive fasteners.

i. Install the outflow valve exit ramp and secure with captive fasteners.

j. Restore electrical power to the airplane.

FORWARD EVAPORATOR CONDENSATION DRAIN ASSEMBLY REMOVAL (Effectivity: All) (Figure 12)

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the cooling system.

a. Remove all electrical power from the airplane.

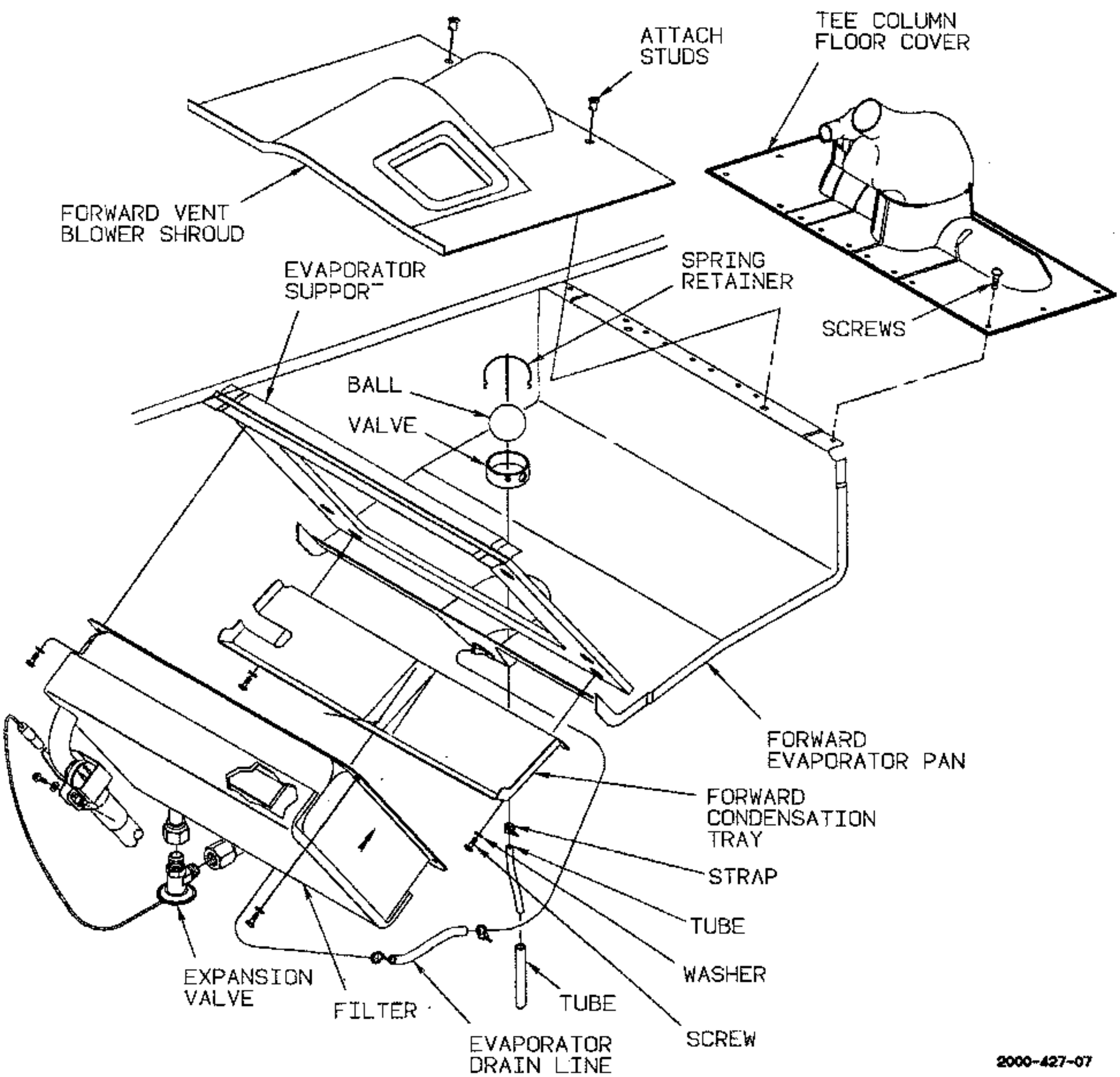
b. Loosen the captive fasteners and remove the outflow valve exit ramp.

c. Loosen the captive fasteners on the outflow valve access door and pull the door out far enough to access the pneumatic lines.

CAUTION

Do not remove the outflow valve access door until the pneumatic lines are disconnected from the outflow valves.

d. Tag and disconnect the pneumatic lines from the outflow valves.



Forward Evaporator Condensation Drain Assembly Installation (Effectivity: All)
Figure 12

e. Remove the straps and evaporator drain line connecting the condensation tray drain port to the drain cup inlet port on the forward evaporator pan.

f. Remove the strap, lower drain tube and overboard drain tube from the drain valve port (located on the underside of the forward evaporator pan).

NOTE

Perform the following steps if the drain valve must be removed.

g. Remove the pilot and copilot seats, cockpit carpet and pedestal side upholstery kick panels.

h. Remove tape and disconnect the air duct from the forward ventilation blower.

i. Loosen the attach studs and remove the forward ventilation blower shroud.

j. Tag and disconnect wiring from the forward ventilation blower.

k. Loosen the clamp attaching the flexible air duct (from the blower speed controller) to the forward ventilation blower and remove the flexible duct from the blower.

l. Remove the bolts, washers and lock washers securing the forward ventilation blower to its mount.

m. Remove the forward ventilation blower from the airplane.

n. Remove the spring retainer and ball.

o. Remove the drain valve from the drain cup.

FORWARD EVAPORATOR CONDENSATION DRAIN ASSEMBLY INSTALLATION (Effectivity: All) (Figure 12)

CAUTION

The air conditioner forward evaporator condensation drain assembly must meet electrical bonding requirements specified in Chapter 20-00-03.

NOTE

If the drain valve was not removed proceed to step "h".

a. Install the drain valve, ball and spring retainer in the drain cup and secure the valve in place with sealant (8, Chart 2, 21-00-00).

b. Align the forward ventilation blower with its mount and secure with washers, lock washers and screws.

c. Connect the flexible air duct from the blower speed controller to the forward ventilation blower and secure with clamp.

d. Reconnect wiring to the forward ventilation blower according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

e. Install the forward ventilation blower shroud and secure with attach studs.

f. Connect the air duct to the forward ventilation blower and secure with 1 1/2 wraps of tape (16, Chart 2, 21-00-00).

g. Install the pedestal side upholstery kick panels, cockpit carpet, and the pilot and copilot seats.

h. Install the overboard drain tube, lower drain tube and strap on the drain valve port and skin drain opening.

i. Seal around the overboard drain tube with sealant (8, Chart 2, 21-00-00) where it penetrates through the drain opening.

j. Install the evaporator drain line and straps on the condensation tray drain port and drain cup inlet port.

k. Reconnect the pneumatic tubes to the outflow valves according to tags.

CAUTION

Ensure that the pneumatic lines are connected to the proper fittings and ports on the outflow valves or the system will not operate properly.

l. Install the outflow valve access door and secure with captive fasteners.

m. Install the outflow valve exit ramp and secure with captive fasteners.

n. Restore electrical power to the airplane.

AIR CONDITIONER FORWARD HOT GAS BYPASS VALVE REMOVAL (Effectivity: All) (Figure 13)

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the air conditioning service compartment access panel.

c. Connect recovery/recycle servicing unit (4, Chart 1, 21-00-00) to the service valves in the air conditioning service compartment, and slowly bleed the refrigerant from the air conditioning system.

d. Remove the cockpit carpet, pilot and copilot seats and pedestal side upholstery kick panels.

e. Remove the boot assemblies from the push rod assembly and Tee column (secured with Velcro fasteners).

f. Remove the screws from the edge of the Tee column air return cover and remove the cover.

g. Reach into the opening on the RH forward side of the pedestal, and tag and disconnect wiring from the hot gas bypass valve.

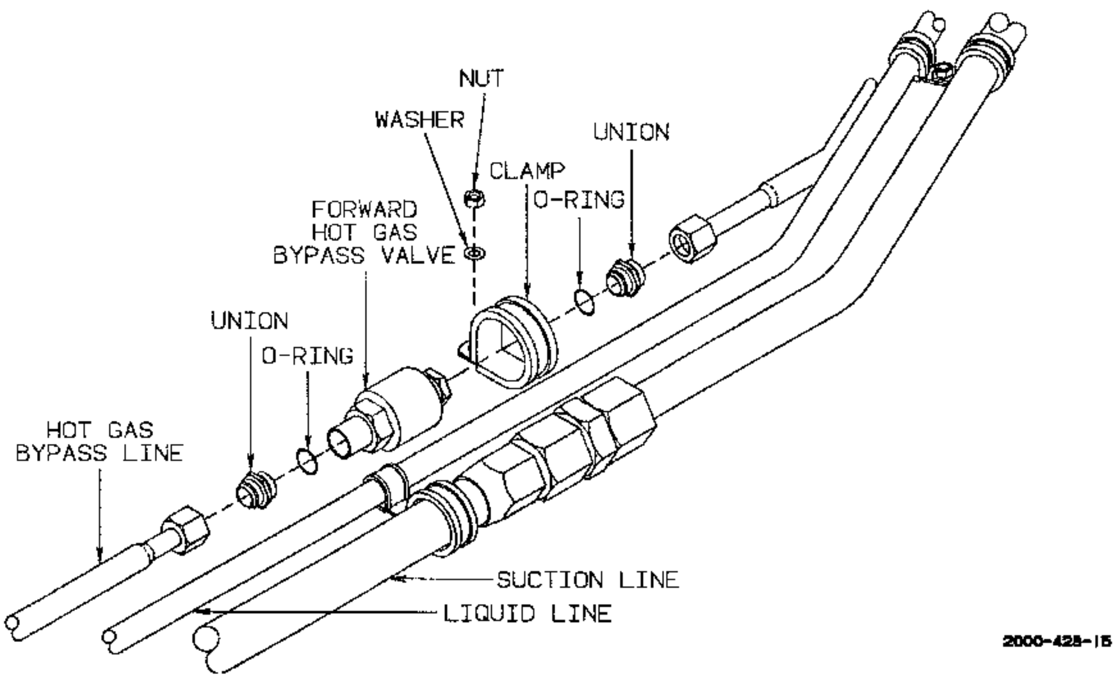
h. Remove the nut, washer and clamp from the mounting stud that secures the hot gas bypass valve to the airplane.

i. After the refrigerant has been completely bled from the system, disconnect the hot gas bypass valve refrigerant lines from the valve unions and remove the valve from the airplane.

CAUTION

Cap all open refrigerant tubes, lines, ports and connectors to prevent contamination of the air conditioning system.

j. Remove the unions from the hot gas bypass valve.



Forward Hot Gas Bypass Valve Installation (Effectivity: All)
Figure 13

k. Remove and discard the O-rings from the unions.

AIR CONDITIONER FORWARD HOT GAS BYPASS VALVE INSTALLATION (Effectivity: All) (Figure 13)

CAUTION

The air conditioner forward hot gas bypass valve must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Install new O-rings on the unions.

NOTE

If new unions are being installed, remove the teflon seal from the end of the unions.

b. Install the unions in the forward hot gas bypass valve.

c. Connect the forward hot gas bypass valve refrigerant lines to the valve unions.

d. Secure the forward hot gas bypass valve to the mounting stud with nut, washer and clamp.

e. Reconnect wiring to the forward hot gas bypass valve according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

f. Restore electrical power to the airplane.

g. Check the installation for leaks and charge the system as outlined under AIR CONDITIONING SYSTEM CHARGING in this chapter.

h. Install the Tee column air return cover and secure with screws.

i. Install the boot assemblies on the Tee column and push rod assembly (secured with Velcro fasteners).

j. Install the pedestal side upholstery kick panels, cockpit carpet and pilot and copilot seats.

k. Install the air conditioning service compartment access panel and secure with captive fasteners.

AFT EVAPORATOR REMOVAL (Effectivity: NC-4) (Figure 14)

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the air conditioning service compartment access panel.

c. Connect recovery/recycle servicing unit (4, Chart 1, 21-00-00) to the service valves in the air conditioning service compartment and slowly bleed the refrigerant from the air conditioning system.

d. Fold down the aft couch back and open the aft baggage compartment door (the door is hinged at the bottom and middle, and opens forward).

e. Remove the aft baggage compartment side and top upholstery panels (secured to brackets on the interior surface of the fuselage with Velcro fasteners).

f. Remove the screws, washers and spacers attaching the environmental dome transducer assembly to the aft false bulkhead air return cover and aft false bulkhead upholstery panel.

g. Tag and disconnect wiring from the environmental dome transducer assembly.

h. Remove the environmental dome transducer assembly from the airplane.

i. Remove remaining screws, washers and spacers, and remove the aft false bulkhead air return cover from the aft false bulkhead upholstery panel.

j. Remove the aft false bulkhead upholstery panel (secured with screws and washers around the air return opening and Velcro fasteners along the bottom edge of the panel).

k. Remove tape and disconnect the aft baggage compartment sidewall ducts from the environmental dome air ducts.

l. When all the refrigerant has been bled from the system, disconnect the refrigerant lines from the aft evaporator at the environmental dome connector.

CAUTION

Cap all open refrigerant tubes, lines, ports and connectors to prevent contamination of the air conditioner system.

m. Disconnect the upper drain tube and strap from the aft condensation tray drain port.

n. Tag and disconnect wiring from the aft low temperature switch.

o. Remove the screws and nuts that secure the aft evaporator support bracket to the mounting clips and environmental dome shelf, and remove the support bracket.

p. Carefully remove and discard all tape and insulation wrapped around the low temperature switch and expansion valve thermal bulb.

q. Remove the clip that secures the low temperature switch to the evaporator suction line and remove the switch.

r. Remove the screw, washer and clamp that secures the expansion valve thermal bulb to the evaporator suction line and remove the thermal bulb.

s. Disconnect the refrigerant lines and expansion valve from the aft evaporator refrigerant connections.

t. Remove the filter from the aft evaporator

u. Remove screws that secure the aft evaporator to its support bracket and remove the aft evaporator.

AFT EVAPORATOR INSTALLATION (Effectivity: NC-4) (Figure 14)

CAUTION

The aft evaporator must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the aft evaporator with its support bracket and secure with screws.

NOTE

If a new aft evaporator is being installed, attach new Velcro filter fasteners to it (installed on the forward side of the aft evaporator at the LH and RH edges).

b. Install the filter on the aft evaporator (secured with Velcro fasteners on the evaporator forward side).

c. Reconnect the expansion valve and refrigerant lines to the aft evaporator refrigerant connections.

d. Coat the evaporator suction line with lubricant (17, Chart 2, 21-00-00) in the area where the low temperature switch and expansion valve thermal bulb are to be installed.

e. Install the thermal bulb and low temperature switch on the aft evaporator suction line and secure with the clamp, washer and screw. Ensure that uniform contact between the low temperature switch, thermal bulb and suction line is achieved.

NOTE

The thermal bulb must have 100 percent contact with the suction line along one side to ensure that the expansion valve functions properly.

f. Align the low temperature switch with the aft evaporator suction line and secure with its clip.

g. Insulate the thermal bulb and the low temperature switch with two layers of insulation (18, Chart 2, 21-00-00), vapor barrier facing out, and secure with a full wrap of tape (16, Chart 2, 21-00-00).

h. Align the aft evaporator support bracket with its mounting clips and the mounting holes in the environmental dome shelf. Install screws and nuts to secure the support bracket.

i. Reconnect the aft evaporator refrigerant lines to the environmental dome refrigerant connections.

j. Install the upper drain tube and strap on the aft condensation tray drain port.

k. Reconnect wiring to the aft low temperature switch according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

l. Restore electrical power to the airplane.

m. Check the installation for leaks and charge the system as outlined under AIR CONDITIONING SYSTEM CHARGING in this chapter.

n. Join the baggage compartment sidewall ducts with the environmental dome air ducts and secure with 1 1/2 wraps of tape (16, Chart 2, 21-00-00).

o. Install the aft false bulkhead upholstery panel (secured with washers and screws around the air return opening and with Velcro fasteners along the bottom edge of the panel).

NOTE

The environmental dome transducer assembly wiring is routed through the aft air return opening.

p. Align the aft false bulkhead air return cover with the aft false bulkhead upholstery panel and install spacers washers and screws with the exception of those used to secure the environmental dome transducer.

q. Reconnect wiring to the environmental dome transducer according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

r. Align the environmental dome transducer assembly with the aft false bulkhead air return cover and aft false bulkhead upholstery panel and secure with remaining spacers, washers and screws.

s. Install the aft baggage compartment top and side upholstery panels (secured to brackets on the interior surface of the fuselage with Velcro fasteners).

t. Close the aft baggage compartment door (the door is hinged at the middle and bottom, and opens forward) and fold up the aft couch back.

u. Install the air conditioning service compartment access panel and secure with captive fasteners.

AFT EVAPORATOR REMOVAL (Effectivity: NC-5 and After) (Figure 14)

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the the air conditioning service compartment access panel.

c. Connect recovery/recycle servicing unit (4, Chart 1, 21-00-00) to the service valves in the air conditioning service compartment and slowly bleed the refrigerant from the air conditioning system.

d. Fold down the aft couch back and open the aft baggage compartment door (the door is hinged at the bottom and middle, and opens forward).

e. Remove the aft baggage compartment side and top upholstery panels (secured to brackets on the interior surface of the fuselage with Velcro fasteners).

f. Remove the screws, washers and spacers securing the aft false bulkhead air return cover to the aft false bulkhead upholstery panel and remove the air return cover.

g. Remove the aft false bulkhead upholstery panel (secured with screws and washers around the air return opening and Velcro fasteners along the bottom edge of the panel).

h. Remove tape and disconnect the aft baggage compartment sidewall air ducts from the environmental dome air ducts.

i. When all the refrigerant has been bled from the system, disconnect the refrigerant lines from the aft evaporator at the environmental dome connector.

CAUTION

Cap all open refrigerant tubes, lines, ports and connectors to prevent contamination of the air conditioner system.

j. Remove the upper drain tube and strap from the aft condensation tray drain port.

k. Tag and disconnect wiring from the low temperature switch.

l. Remove the screws and nuts that secure the aft evaporator support bracket to the mounting clips and shelf in the environmental dome, then remove the support bracket.

m. Carefully remove and discard the tape and insulation wrapped around the low temperature switch and expansion valve thermal bulb.

n. Remove the clip that secures the low temperature switch to the aft evaporator suction line, and remove the switch.

o. Remove the screw, washer and clamp that secures the expansion valve thermal bulb to the aft evaporator suction line and remove the thermal bulb.

p. Disconnect the refrigerant lines and expansion valve from the aft evaporator refrigerant connections.

q. Remove the filter from the aft evaporator

r. Remove the screws that secure the aft evaporator to the support bracket and remove the aft evaporator from the airplane.

AFT EVAPORATOR INSTALLATION (Effectivity: NC-5 and After) (Figure 14)

CAUTION

The air conditioner aft evaporator must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the aft evaporator with its support bracket and secure with screws.

NOTE

If a new aft evaporator is to be installed, install new Velcro filter fasteners on it (installed on the forward side of the evaporator at the LH and RH edge).

b. Install the filter on the aft evaporator (secured with Velcro fasteners on the forward side of the aft evaporator).

c. Reconnect the expansion valve and refrigerant lines to the aft evaporator refrigerant connections.

d. Coat the aft evaporator suction line with lubricant (17, Chart 2, 21-00-00) 1, 21-00-00) in the area where the low temperature switch and expansion valve thermal bulb are to be installed.

e. Install the thermal bulb on the aft evaporator suction line and secure with the clamp, washer and screw. Ensure that uniform contact between the low temperature switch, thermal bulb and suction line is achieved.

NOTE

The thermal bulb must have 100 percent contact with the suction line along one side to ensure that the expansion valve functions properly.

f. Align the low temperature switch with the aft evaporator suction line and secure to the line with its clip.

g. Insulate the thermal bulb and low temperature switch with two layers of insulation (18, Chart 2, 21-00-00), vapor barrier facing out, and secure with a full wrap of tape (16, Chart 2, 21-00-00).

h. Align the aft evaporator support bracket with it mounting clips and the mounting holes in the environmental dome shelf, then secure with screws and nuts.

i. Reconnect the aft evaporator refrigerant lines to the environmental dome refrigerant connections.

j. Install the upper drain tube and strap on the aft condensation tray drain port.

k. Reconnect wiring to the aft low temperature switch according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

l. Restore electrical power to the airplane.

m. Check the installation for leaks and charge the system as outlined under AIR CONDITIONING SYSTEM CHARGING in this chapter.

n. Join the aft baggage compartment sidewall ducts to the environmental dome air ducts and secure with 1 1/2 wraps of tape (16, Chart 2, 21-00-00).

o. Install the aft false bulkhead upholstery panel (secured with washers and screws around the air return opening and with Velcro fasteners along the bottom edge of the panel).

p. Align the aft false bulkhead air return cover with the mounting holes in aft false bulkhead upholstery panel and secure the return cover with spacers, washers and screws.

q. Install the aft baggage compartment top and side upholstery panels (secured to brackets on the interior surface of the fuselage with Velcro fasteners).

r. Close the aft baggage compartment door (the door is hinged at the middle and bottom, and opens forward) and fold up the aft couch back.

s. Install the air conditioning service compartment access panel and secure with captive fasteners.

AFT EXPANSION VALVE REMOVAL (Effectivity: NC-4) (Figure 14)

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the air conditioning service compartment access panel.

c. Connect recovery/recycle servicing unit (4, Chart 1, 21-00-00) to the service valves located in the air conditioning service compartment, and slowly bleed the refrigerant from the air conditioning system.

d. Fold down the aft couch back and open the aft baggage compartment door (the door is hinged in the middle and at the bottom, and opens forward).

e. Remove the aft baggage compartment side and top upholstery panel (secured to brackets on the interior surface of the fuselage with Velcro fasteners).

f. Remove the spacers, washers and screws securing the environmental dome transducer assembly to the aft false bulkhead air return cover and aft false bulkhead upholstery panel, then remove the transducer assembly.

g. Tag and disconnect wiring from the environmental dome transducer assembly.

h. Remove the screws, washers and spacers securing the aft false bulkhead air return cover to the aft false bulkhead upholstery panel and remove the return cover.

i. Remove the aft false bulkhead upholstery panel (secured with screws and washers around the air return opening and with Velcro fasteners along the bottom edge of the panel).

j. Remove all tape and disconnect the aft baggage compartment sidewall air ducts from the environmental dome air ducts.

k. When all the refrigerant has been bled from the system, disconnect all refrigerant lines from the aft evaporator at the environmental dome connectors.

CAUTION

Cap all open refrigerant tubes, lines, ports and connectors to prevent contamination of the air conditioning system.

l. Remove the upper drain tube and strap from the aft condensation tray drain port.

m. Tag and disconnect wiring from the aft low temperature switch.

n. Remove the screws and nuts that secure the aft evaporator support bracket to the environmental dome shelf and mounting clips. Remove the support bracket from the airplane.

o. Carefully remove and discard all tape and insulation wrapped around the low temperature switch and the expansion valve thermal bulb.

p. Remove the screw, washer and clamp that secures the expansion valve thermal bulb to the evaporator suction line, and remove the thermal bulb.

q. Disconnect the refrigerant line from the expansion valve.

r. Disconnect the expansion valve from the aft evaporator liquid line connector and remove it from the airplane.

AFT EXPANSION VALVE INSTALLATION (Effectivity: NC-4) (Figure 14)

CAUTION

The air conditioner aft expansion valve must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Install the expansion valve in the aft evaporator liquid line connector.

b. Reconnect the refrigerant line to the expansion valve.

c. Coat the aft evaporator suction line with lubricant (17, Chart 1, 21-00-00) in the area where the low temperature switch and expansion valve thermal bulb are to be installed.

d. Install the thermal bulb on the aft evaporator suction line and secure with the clamp, washer and screw. Ensure that uniform contact between the low temperature switch, thermal bulb and suction line is achieved.

NOTE

The thermal bulb must have 100 percent contact with the suction line along one side to ensure that the expansion valve functions properly.

e. Insulate the thermal bulb and the aft low temperature switch with two layers of insulation (18, Chart 2, 21-00-00), vapor barrier facing out, and secure with a full wrap of tape (16, Chart 2, 21-00-00).

f. Align the aft evaporator support bracket with the mounting clips and environmental dome shelf mounting holes, then secure with screws and nuts.

g. Reconnect the refrigerant lines to the environmental dome refrigerant connections.

h. Install the upper drain tube and strap on the aft condensation tray drain port.

i. Reconnect wiring to the aft low temperature switch according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

j. Restore electrical power to the airplane.

k. Check the installation for leaks and charge the system as outlined under AIR CONDITIONING SYSTEM CHARGING in this chapter.

l. Join the aft baggage compartment air ducts with the environmental dome ducts and secure with 1 1/2 wraps of tape (16, Chart 2, 21-00-00).

m. Install the aft false bulkhead upholstery panel (secured with washers and screws around the air return opening and with Velcro fasteners along the bottom edge of the panel).

NOTE

The environmental dome transducer assembly wiring is routed through the air return opening.

n. Align the aft false bulkhead air return cover with the aft false bulkhead upholstery panel and install spacers, washers and screws with the exception of those used to attach the transducer assembly.

o. Reconnect wiring to the environmental dome transducer assembly according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

p. Align the environmental dome transducer assembly with the aft false bulkhead air return cover and aft false bulkhead upholstery panel and secure with remaining spacers, washers and screws.

q. Install the aft baggage compartment top and side upholstery panels (secured to brackets on the interior surface of the fuselage with Velcro fasteners).

r. Close the aft baggage compartment door (the door is hinged at the middle and bottom, and opens forward) and fold up the aft couch back.

s. Install the air conditioning service compartment access panel and secure with captive fasteners.

AFT EXPANSION VALVE REMOVAL (Effectivity: NC-5 and After) (Figure 14)

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the air conditioning service compartment access panel.

c. Connect recovery/recycle servicing unit (4, Chart 1, 21-00-00) to the service valves in the air conditioning service compartment, and slowly bleed the refrigerant from the air conditioning system.

d. Fold down the aft couch back and open the aft baggage compartment door (the door is hinged at the middle and bottom, and opens forward).

e. Remove the aft baggage compartment side and top upholstery panels (secured to brackets on the interior surface of the fuselage with Velcro fasteners).

f. Remove the screws, washers and spacers securing the aft false bulkhead air return cover to the aft false bulkhead upholstery panel, and remove the air return cover.

g. Remove the aft false bulkhead upholstery panel (secured with screws and washers around the air return opening and with Velcro fasteners along the bottom edge of the panel).

h. Remove tape and disconnect the aft baggage compartment sidewall air ducts from the environmental dome ducts.

i. When all the refrigerant has been bled from the system, disconnect all refrigerant lines from the aft evaporator at the environmental dome connectors.

CAUTION

Cap all open refrigerant tubes, lines, ports and connectors to prevent contamination of the air conditioning system.

j. Remove the upper drain tube and strap from the aft condensation tray drain port.

k. Tag and disconnect wiring from the aft low temperature switch.

l. Remove the screws and nuts that secure the aft evaporator support bracket to the mounting clips and environmental dome shelf mounting holes, and remove the support bracket.

m. Carefully remove and discard the tape and insulation from the low temperature switch and expansion valve thermal bulb.

n. Remove the screw, washer and clamp that secures the expansion valve thermal bulb to the evaporator suction line and remove the thermal bulb.

o. Disconnect the refrigerant line from the expansion valve.

p. Remove the expansion valve from the aft evaporator liquid line and remove it from the airplane.

AFT EXPANSION VALVE INSTALLATION (Effectivity: NC-5 and After) (Figure 14)

CAUTION

The aft expansion valve must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Install the expansion valve in the aft evaporator liquid line.

b. Reconnect the refrigerant line to the expansion valve.

c. Coat the aft evaporator suction line with lubricant (17, Chart 2, 21-00-00) in the area where the low temperature switch and expansion valve thermal bulb are to be installed.

d. Install the thermal bulb on the aft evaporator suction line and secure with the clamp, washer and screw. Ensure that uniform contact between the low temperature switch, thermal bulb and suction line is achieved.

NOTE

The thermal bulb must have 100 percent contact with the suction line along one side to ensure that the expansion valve functions properly.

e. Insulate the thermal bulb and the low temperature switch with two layers of insulation (18, Chart 2, 21-00-00), vapor barrier facing out, and secure with a full wrap of tape (16, Chart 2, 21-00-00).

f. Align the aft evaporator support bracket with the mounting clips and environmental dome shelf mounting holes and secure with screws and nuts.

g. Reconnect the refrigerant lines to the environmental dome refrigerant connections.

h. Install the upper drain tube and strap in the aft condensation tray drain port.

i. Reconnect wiring to the aft low temperature switch according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

j. Restore electrical power to the airplane.

k. Check the installation for leaks and charge the system as outlined under AIR CONDITIONING SYSTEM CHARGING in this chapter.

l. Join the aft baggage compartment sidewall air ducts with the environmental dome air ducts and secure with 1 1/2 wraps of tape (16, Chart 2, 21-00-00).

m. Install the aft false bulkhead upholstery panel (secured with washers and screws around the air return opening and with Velcro fasteners along the bottom edge of the panel).

n. Align the aft false bulkhead air return cover with mounting holes in the aft false bulkhead upholstery panel and secure with spacers, washers and screws.

o. Install the aft baggage compartment top and side upholstery panels (secured to brackets on the interior surface of the fuselage with Velcro fasteners).

p. Close the aft baggage compartment door (the door is hinged at the middle and bottom, and opens forward) and fold up the aft couch back.

q. Install the air conditioning service compartment access panel and secure with captive fasteners.

AIR CONDITIONER AFT HOT GAS BYPASS VALVE REMOVAL (Effectivity: NC-4) (Figure 14)

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the air conditioning service compartment access panel.

c. Connect recovery/recycle servicing unit (4, Chart 1, 21-00-00) to the service valves in the air conditioning service compartment, and slowly bleed the refrigerant from the air conditioning system.

d. Fold down the aft couch back and open the aft baggage compartment door (the door is hinged at the middle and bottom, and opens forward).

e. Remove the aft baggage compartment side and top upholstery panels (secured to brackets on the interior surface of the fuselage with Velcro fasteners).

f. Remove screws, washers, and spacers securing the environmental dome transducer assembly to the aft false bulkhead air return cover and aft false bulkhead upholstery panel.

g. Tag and disconnect wiring from the environmental dome transducer assembly.

h. Remove the environmental dome transducer assembly.

i. Remove the remaining screws, washers and spacers attaching the aft false bulkhead air return cover to the aft false bulkhead upholstery panel, and remove the cover.

j. Remove the aft false bulkhead upholstery panel (secured with screws and washers around the air return opening and with Velcro fasteners along the bottom edge of the panel).

k. Tag and disconnect wiring from the aft hot gas bypass valve.

l. When all the refrigerant has been bled from the system, disconnect the refrigerant lines from the aft hot gas bypass valve and union.

m. Remove the screw, washer, nut and clamp securing the bypass valve to the aft evaporator support bracket, and remove both the bypass valve and union.

n. Remove the union from the bypass valve, remove and discard the seals.

AIR CONDITIONER HOT GAS BYPASS VALVE INSTALLATION (Effectivity: NC-4) (Figure 14)

CAUTION

The air conditioning aft hot gas bypass valve must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Install the union and new seals in the hot gas bypass valve.

b. Reconnect the refrigerant lines to the valve and union.

c. Secure the bypass valve to the aft evaporator mounting bracket with clamp, washers, screw and nut.

d. Reconnect wiring to the aft hot gas bypass valve according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

e. Restore electrical power to the airplane.

f. Check the installation for leaks and charge the system as outlined under AIR CONDITIONING SYSTEM CHARGING in this chapter.

g. Install the aft false bulkhead upholstery panel (secured with washers and screws around the air return opening and with Velcro fasteners along the bottom edge of the panel).

NOTE

The environmental dome transducer assembly wiring is routed through the aft false bulkhead upholstery panel air return opening.

h. Align the aft false bulkhead air return cover with the aft false bulkhead upholstery panel and install spacers, screws and washers with the exception of those used to secure the environmental dome transducer assembly.

i. Reconnect wiring to the environmental dome transducer assembly according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

j. Align the environmental dome transducer assembly with the aft false bulkhead air return cover and aft false bulkhead upholstery panel and secure with remaining spacers, washers and screws.

k. Install the aft baggage compartment top and side upholstery panels (secured to brackets on the interior surface of the fuselage with Velcro fasteners).

l. Close the aft baggage compartment door (the door is hinged at the middle and bottom, and opens forward) and fold up the aft couch back.

AIR CONDITIONER AFT HOT GAS BYPASS VALVE REMOVAL (Effectivity: NC-5 and After) (Figure 14)

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the air conditioning service compartment access panel.

c. Connect recovery/recycle servicing unit (4, Chart 1, 21-00-00) to the service valves in the air conditioning service compartment, and slowly bleed the refrigerant from the air conditioning system.

d. Fold down the aft couch back and open the aft baggage compartment door (the door is hinged at the middle and bottom, and opens forward).

e. Remove the aft baggage compartment side and top upholstery panels (secured to brackets on the interior surface of the fuselage with Velcro fasteners).

f. Remove the screws, washers and spacers securing the aft false bulkhead air return cover to the aft false bulkhead upholstery panel and remove the air return cover.

g. Remove the aft false bulkhead upholstery panel (secured with screws and washers around the air return opening and with Velcro fasteners along the bottom edge of the panel).

h. Tag and disconnect wiring from the aft hot gas bypass valve.

i. When all the refrigerant has been bled from the system, disconnect the refrigerant lines from the aft hot gas bypass valve and union.

j. Remove the screw, washers, nut and clamp securing the bypass valve to the aft evaporator support bracket, and remove the bypass valve and union.

k. Remove the union from the bypass valve.

l. Remove and discard the seals.

AIR CONDITIONER AFT HOT GAS BYPASS VALVE INSTALLATION (Effectivity: NC-5 and After) (Figure 14)

CAUTION

The air conditioner aft hot gas bypass valve must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Install the union and new seals in the hot gas bypass valve.

b. Reconnect the refrigerant lines to the bypass valve union.

c. Secure the bypass valve to the aft evaporator mounting bracket with the clamp, washers, screw and nut.

d. Reconnect wiring to the hot gas bypass valve according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

e. Restore electrical power to the airplane.

f. Check the installation for leaks and charge the system as outlined under AIR CONDITIONING SYSTEM CHARGING in this chapter.

g. Install the aft false bulkhead upholstery panel (secured with washers and screws around the air return opening and with Velcro fasteners along the bottom edge of the panel).

h. Align the aft false bulkhead air return cover with the aft false bulkhead upholstery panel and secure with spacers, washers and screws.

i. Install the aft baggage compartment top and side upholstery panels (secured to brackets on the interior surface of the fuselage with Velcro fasteners).

j. Close the aft baggage compartment door (the door is hinged at the middle and bottom, and opens forward) and fold up the aft couch back.

AFT LOW TEMPERATURE SWITCH REMOVAL (Effectivity: NC-4) (Figure 14)

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the air conditioning service compartment access panel.

c. Connect recovery/recycle servicing unit (4, Chart 1, 21-00-00) to the service valves in the air conditioning service compartment, and slowly bleed the refrigerant from the air conditioning system.

d. Fold down the aft couch back and open the aft baggage compartment door (the door is hinged at the middle and bottom, and opens forward).

e. Remove the aft baggage compartment side and top upholstery panels (secured to brackets on the interior surface of the fuselage with Velcro fasteners).

f. Remove screws, washers and spacers securing the environmental dome transducer assembly to the aft false bulkhead air return cover and aft false bulkhead upholstery panel.

g. Tag and disconnect wiring from the environmental dome transducer assembly.

h. Remove the environmental dome transducer assembly.

i. Remove remaining screws, washers and spacers attaching the aft false bulkhead air return cover to the aft false bulkhead upholstery panel and remove the air return cover.

j. Remove the aft false bulkhead upholstery panel (secured with screws and washers around the air return opening and with Velcro fasteners along the bottom edge of the panel).

k. Remove tape and disconnect the aft baggage compartment sidewall air ducts from the environmental dome air ducts.

l. When all the refrigerant has been bled from the system, disconnect the aft evaporator refrigerant lines from the environmental dome refrigerant connections.

CAUTION

Cap all open refrigerant tubes, lines, ports and connectors to prevent contamination of the air conditioning system.

m. Remove the upper drain tube and strap from the aft condensation tray drain port.

n. Tag and disconnect wiring from the aft low temperature switch.

o. Remove the screws and nuts securing the aft evaporator support bracket to the mounting clips and environmental dome shelf mounting holes, then remove the support bracket from the airplane.

p. Carefully remove and discard all tape and insulation from the low temperature switch and expansion valve thermal bulb.

q. Remove the screw, washer and clamp that secures the expansion valve thermal bulb to the evaporator suction line and remove the thermal bulb.

r. Remove the clip that secures the low temperature switch to the evaporator suction line and remove the switch.

AFT LOW TEMPERATURE SWITCH INSTALLATION (Effectivity: NC-4) (Figure 14)

CAUTION

The air conditioner aft low temperature switch must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Coat the aft evaporator suction line with lubricant (17, Chart 2, 21-00-00) in the area where the low temperature switch and expansion valve thermal bulb are to be installed.

b. Install the aft low temperature switch on the suction line and secure with clip.

c. Install the thermal bulb on the aft evaporator suction line and secure with the clamp, washer and screw.

NOTE

Ensure that uniform contact between the low temperature switch, thermal bulb and suction line is achieved. the thermal bulb must have 100 percent contact with the suction line along one side to ensure that the expansion valve functions properly.

d. Insulate the thermal bulb and low temperature switch with two layers of insulation (18, Chart 2, 21-00-00), vapor barrier facing out, and secure with a full wrap of tape (16, Chart 2, 21-00-00).

e. Align the aft evaporator support bracket with its mounting clips and the mounting holes in the environmental dome shelf, and secure with screws, washers and nuts.

f. Reconnect the aft evaporator refrigerant lines to the environmental dome refrigerant connections.

g. Install the upper drain tube and strap on the aft condensation tray drain port.

h. Reconnect wiring to the aft low temperature switch according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

i. Restore electrical power to the airplane.

j. Check the installation for leaks and charge the system as outlined under AIR CONDITIONING SYSTEM CHARGING in this chapter.

k. Join the aft baggage compartment sidewall air ducts with the environmental dome air ducts and secure with 1 1/2 wraps of tape (16, Chart 2, 21-00-00)

l. Install the aft false bulkhead upholstery panel (secured with washers and screws around the air return opening and with Velcro fasteners along the bottom edge of the panel).

NOTE

The environmental dome transducer assembly wiring is routed through the air return opening.

m. Align the aft false bulkhead air return cover with the aft false bulkhead upholstery panel and install spacers, washers and screws with the exception of those used to secure the environmental dome transducer assembly.

n. Reconnect wiring to the environmental dome transducer according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

o. Align the environmental dome transducer assembly with the aft false bulkhead air return cover and aft false bulkhead upholstery panel and secure with remaining spacers, washers and screws.

p. Install the aft baggage compartment top and side upholstery panels (secured to brackets on the interior surface of the fuselage with Velcro fasteners).

q. Close the aft baggage compartment door (the door is hinged at the middle and bottom, and opens forward) and fold up the aft couch back.

r. Install the air conditioning service compartment access panel and secure with captive fasteners.

AFT LOW TEMPERATURE SWITCH REMOVAL (Effectivity: NC-5 and After) (Figure 14)

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the air conditioning service compartment access panel.

c. Connect recovery/recycle servicing unit (4, Chart 1, 21-00-00) to the service valves in the air conditioning service compartment, and slowly bleed the refrigerant from the air conditioning system.

d. Fold down the aft couch back and open the aft baggage compartment door (the door is hinged at the middle and bottom, and opens forward).

e. Remove the aft baggage compartment side and top upholstery panels (secured to brackets on the interior surface of the fuselage with Velcro fasteners).

f. Remove the screws, washers and spacers attaching the aft false bulkhead air return cover to the aft false bulkhead upholstery panel and remove the air return cover.

g. Remove the aft false bulkhead upholstery panel (secured with screws and washers around the air return opening and with Velcro fasteners along the bottom edge of the panel).

h. Remove all tape and disconnect the aft baggage compartment sidewall air ducts from the environmental dome air ducts.

i. When all the refrigerant has been bled from the system, disconnect the aft evaporator refrigerant lines from the environmental dome refrigerant connections.

CAUTION

Cap all open refrigerant tubes, lines, ports and connectors to prevent contamination of the air conditioning system.

j. Remove the upper drain tube and strap from the aft condensation tray drain port.

k. Tag and disconnect wiring from the aft low temperature switch.

l. Remove the screws and nuts securing the aft evaporator support bracket to its mounting clips and mounting holes in the environmental dome shelf, and remove the support bracket from the airplane.

m. Carefully remove and discard all tape and insulation wrapped around the low temperature switch and expansion valve thermal bulb.

n. Remove the screw, washer and clamp that secures the expansion valve thermal bulb to the evaporator suction line and remove the thermal bulb.

o. Remove the clip that secures the low temperature switch to the aft evaporator suction line and remove the switch.

AFT LOW TEMPERATURE SWITCH INSTALLATION (Effectivity: NC-5 and After) (Figure 14)

CAUTION

The air conditioner aft low temperature switch must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Coat the aft evaporator suction line with lubricant (17, Chart 2, 21-00-00) in the area where the low temperature switch and expansion valve thermal bulb are to be installed.

b. Install the aft low temperature switch on the suction line and secure with clip.

c. Install the thermal bulb on the aft evaporator suction line and secure with the clamp, washer and screw.

NOTE

Ensure that uniform contact between the low temperature switch, thermal bulb and suction line is achieved. the thermal bulb must have 100 percent contact with the suction line along one side to ensure that the expansion valve functions properly.

d. Insulate the low temperature switch and the thermal bulb with two layers of insulation (18, Chart 2, 21-00-00), vapor barrier facing out, and secure with tape (16, Chart 2, 21-00-00).

e. Align the aft evaporator support bracket with its mounting clips and the mounting holes in the environmental dome shelf.

f. Reconnect the aft evaporator refrigerant lines to the environmental dome refrigerant connections.

g. Install the upper drain tube and strap on the aft condensation tray drain port.

h. Reconnect wiring to the aft low temperature switch according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

i. Restore electrical power to the airplane.

j. Check the installation for leaks and charge the system as instructed under AIR CONDITIONING SYSTEM CHARGING found in this chapter.

k. Join the aft baggage compartment sidewall air ducts with the environmental dome ducts and secure with 1 1/2 wraps of tape (16, Chart 2, 21-00-00)

l. Install the aft false bulkhead upholstery panel (secured with washers and screws around the air return opening and with Velcro fasteners along the bottom edge of the panel).

m. Install the aft false bulkhead air return cover and secure with spacers, washers and screws.

n. Install the aft baggage compartment top and side upholstery panels (secured to brackets on the interior surface of the fuselage with Velcro fasteners).

o. Close the aft baggage compartment door (the door is hinged at the middle and bottom, and opens forward) and fold up the aft couch back.

p. Install the air conditioning service compartment access panel and secure with captive fasteners.

AFT EVAPORATOR CONDENSATION DRAIN ASSEMBLY REMOVAL (Effectivity: NC-4)

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Fold down the aft couch back and open the aft baggage compartment door (the door is hinged at the bottom and middle, and opens forward).

c. Remove the aft baggage compartment side and top upholstery panels (secured to brackets on the interior surface of the fuselage with Velcro fasteners).

d. Remove the screws, washers and spacers securing the environmental dome transducer to the aft false bulkhead air return cover and aft false bulkhead upholstery panel.

e. Tag and disconnect wiring from the environmental dome transducer assembly.

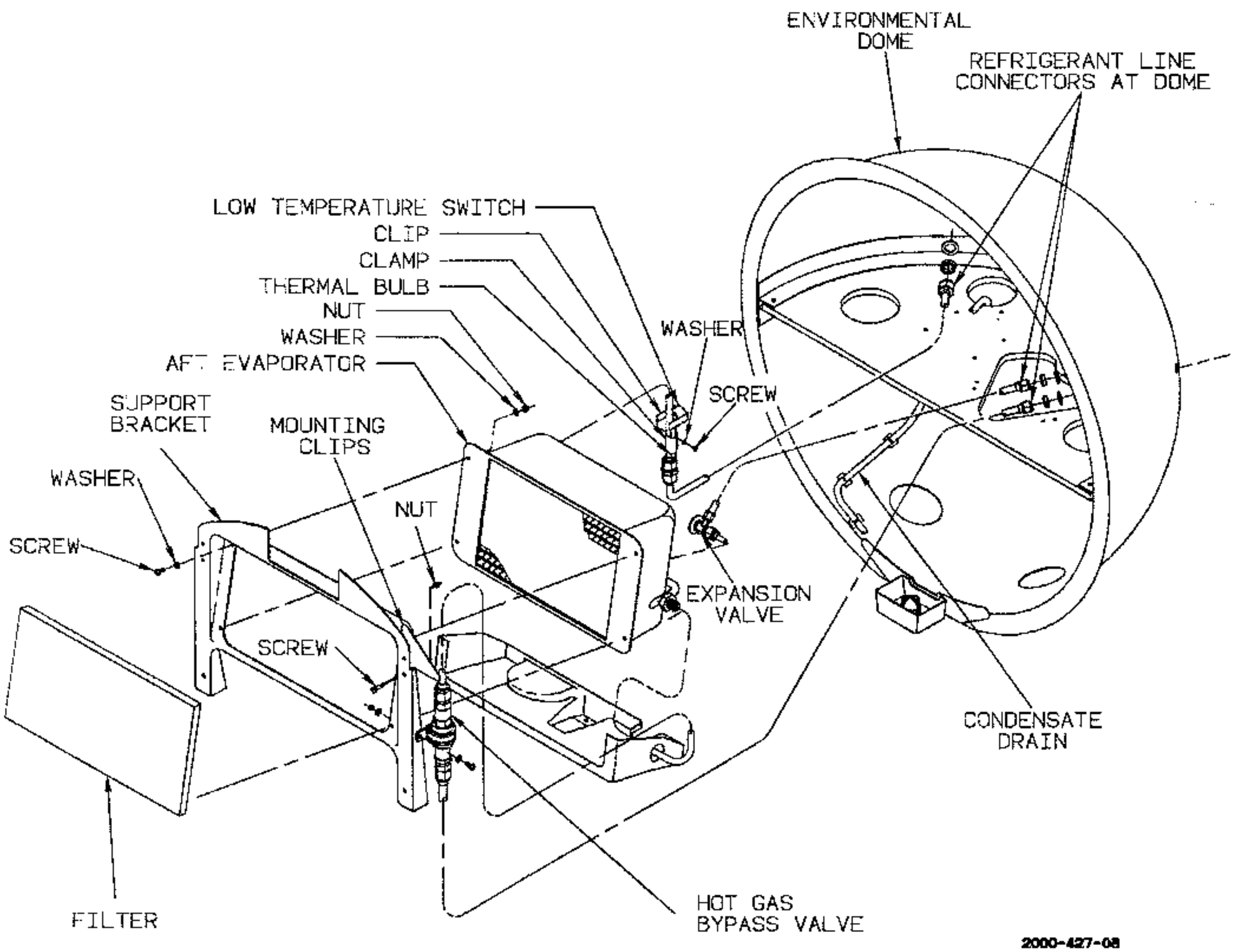
f. Remove the environmental dome transducer.

g. Remove the remaining screws, washers and spacers securing the aft false bulkhead air return cover to the aft false bulkhead upholstery panel and remove the air return cover.

h. Remove the aft false bulkhead upholstery panel (secured with screws and washers around the air return opening and Velcro fasteners along the bottom edge of the panel).

i. Disconnect and remove the lower aft baggage compartment air duct from the environmental dome duct and the cabin side wall ducts.

j. Remove the upper drain tube and strap from the aft condensation tray drain port and straps securing them to the environmental dome.



Aft Evaporator, Expansion Valve, Hot Gas Bypass Valve and Low Temperature Switch Installation (Effectivity: All)
Figure 14

k. Remove the middle drain tube and straps from the drain valve port (located in the drain cup at the lower edge of the environmental dome) and the drain tube penetrating the aft baggage compartment floor (LH side).

l. Loosen the captive fasteners and remove the upper aft main wing box fairing.

m. Loosen the captive fasteners and remove the LH upper aft main wing to fuselage seal, and the main wing LH trailing edge cove.

n. Disconnect the lower drain tube, strap and clamp from the drain tube penetrating the aft baggage compartment floor, and the bracket mounted on the main wing aft spar.

o. Remove the drain valve from the upper drain cup.

AFT EVAPORATOR CONDENSATION DRAIN ASSEMBLY INSTALLATION (Effectivity: NC-4)

CAUTION

The air conditioner aft evaporator condensation drain assembly must meet electrical bonding requirements specified in Chapter 20-00-03.

NOTE

The upper drain cup is bonded to the lower flange of the environmental dome and the lower drain cup is bonded to the interior surface of the main wing LH trailing edge cove. Use adhesive (7, Chart 2, 21-00-00) to bond both components.

a. Install the lower drain tube, strap and clamp on the drain tube that penetrates the aft baggage compartment floor and the bracket mounted to the main wing aft spar.

b. Install the main wing LH trailing edge cove and secure with captive fasteners at the mating edges.

c. Install the LH upper aft wing box fairing and secure with captive fasteners.

d. Install the LH upper aft wing to fuselage seal as outlined under FUSELAGE TO FORWARD FUEL TANK/AFT WING SEALS REPLACEMENT in Chapter 53-50-00.

e. Install the drain valve in the upper drain cup and secure with sealant (8, Chart 2, 21-00-00).

f. Install the middle drain tube and straps on the drain valve and tube that penetrates the aft baggage compartment floor (LH side).

g. Connect the upper drain tube and strap to the condensation tray drain port, and to the straps that secure the drain tube to the environmental dome.

h. Join the lower aft baggage compartment air duct to the the aft compartment side wall ducts and the environmental dome duct, then wrap each joint with 1 1/2 wraps of tape (16, Chart 2, 21-00-00) and secure to the fasteners with the Velcro straps.

i. Install the aft false bulkhead upholstery panel (secured with washers and screws around the air return opening and with Velcro fasteners along the bottom edge of the panel).

NOTE

The environmental dome transducer assembly wiring is routed through the air return opening.

j. Align the aft false bulkhead air return cover with the aft false bulkhead upholstery panel and secure with spacers, washers and screws with the exception of those used to secure the environmental dome transducer assembly.

k. Reconnect wiring to the environmental dome transducer assembly according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

l. Align the environmental dome transducer assembly with the aft false bulkhead air return cover and aft false bulkhead upholstery panel and secure with remaining spacers, washers and screws.

m. Install the aft baggage compartment top and side upholstery panels (secured to brackets on the interior surface of the fuselage with Velcro fasteners).

n. Close the aft baggage compartment door (the door is hinged at the middle and bottom, and opens forward) and fold up the aft couch back.

AFT EVAPORATOR CONDENSATION DRAIN ASSEMBLY REMOVAL (Effectivity: NC-5 and After)

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Fold down the aft couch back and open the aft baggage compartment door (the door is hinged at the bottom and middle, and opens forward).

c. Remove the aft baggage compartment side and top upholstery panels (secured to brackets on the interior surface of the fuselage with Velcro fasteners).

d. Remove screws, washers and spacers securing the aft false bulkhead air return cover to the aft false bulkhead upholstery panel and remove the air return cover.

e. Remove the aft false bulkhead upholstery panel (secured with screws and washers around the air return opening and Velcro fasteners along the bottom edge of the panel).

f. Remove tape from the duct joints.

g. Disconnect and remove the baggage compartment sidewall ducts from the environmental dome duct and cabin side wall ducts

h. Remove the upper drain tube and strap from the aft condensation tray drain port and the from straps securing it to the environmental dome.

i. Disconnect the middle drain tube and straps from the drain valve port (located in the drain cup at the lower edge of the environmental dome) and the drain tube penetrating the aft baggage compartment floor (LH side).

j. Loosen the captive fasteners and remove the LH upper aft wing box fairing.

k. Loosen the captive fasteners and remove the LH upper aft main wing to fuselage seal and main wing LH trailing edge cove.

l. Disconnect the lower drain tube, strap and clamp from the drain tube penetrating the aft baggage compartment floor and from the bracket mounted on the wing aft spar.

m. Remove the drain valve from the upper drain cup.

AFT EVAPORATOR CONDENSATION DRAIN ASSEMBLY INSTALLATION (Effectivity: NC-5 and After)

CAUTION

The air conditioner aft evaporator condensation drain assembly must meet electrical bonding requirements specified in Chapter 20-00-03.

NOTE

The upper drain cup is bonded to the lower flange of the environmental dome while lower drain cup is bonded to the interior surface of the LH wing trailing edge cove. Use adhesive (7, Chart 2, 21-00-00) to bond both components.

a. Install the lower drain tube, strap and clamp on the drain tube that penetrates the aft baggage compartment floor and the bracket mounted to the wing aft spar.

b. Install the main wing LH trailing edge cove and secure with captive fasteners at the mating edges.

c. Install the LH upper aft wing box fairing and secure with captive fasteners.

d. Install the LH upper aft wing to fuselage seal as outlined under FUSELAGE TO FORWARD FUEL TANK/AFT WING SEALS REPLACEMENT in Chapter 53-50-00.

e. Install the drain valve in the upper drain cup and secure with sealant (8, Chart 2, 21-00-00).

f. Install the middle drain tube and straps on the drain valve and tube that penetrates the aft baggage compartment floor (LH side).

g. Reconnect the upper drain tube and strap to the condensation tray drain port and secure with straps to the environmental dome.

h. Join the aft baggage compartment sidewall ducts with the the cabin sidewall and environmental dome air ducts, then wrap each joint with 1 1/2 wraps of tape (16, chart 1, 21-00-00). Secure the air ducts in place with the Velcro straps.

i. Install the aft false bulkhead upholstery panel (secured with washers and screws around the air return opening and with Velcro fasteners along the bottom edge of the panel).

j. Align the aft false bulkhead air return cover with the aft false bulkhead upholstery panel and secure with spacers, washers and screws.

k. Install the aft baggage compartment top and side upholstery panels (secured to brackets on the interior surface of the fuselage with Velcro fasteners).

l. Close the aft baggage compartment door (the door is hinged at the middle and bottom, and opens forward) and fold up the aft couch back.

AIR CONDITIONING REFRIGERATION PLUMBING

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES before attempting any service on the air conditioning system.

CAUTION

When removing plumbing, note the locations of all bonding jumpers to aid in reinstallation.

a. Access to the refrigeration plumbing in a specific area of the airplane is gained as follows:

1. RH Engine - remove the RH engine cowlings (reference ENGINE COWLING REMOVAL in Chapter 71-10-00).

2. Area between the RH Engine and the Fuselage - Loosen the captive fasteners at the mating edges and remove the main wing RH trailing edge cove.

3. Aft Fuselage (aft of the aft pressure bulkhead/ wing aft spar) - Loosen captive fasteners and remove the aft lower fuselage ambient air inlet door.

4. Fuselage/Wing Box Area (between the main wing forward spar and the main wing aft spar) - Loosen the captive fasteners and remove the aft wing box shear panel.

5. Fuselage (cabin) - Remove the RH cabin furnishings, carpet, floorboards and pedestal.

b. All pressure vessel refrigerant line penetrations (environmental dome and aft pressure bulkhead) are to be sealed with sealant (3, Chart 2, 21-00-00).

c. All refrigerant suction lines are to be insulated with one layer of insulation (19, Chart 2, 21-00-00) fully wrapped with tape (16, Chart 2, 21-00-00) unless otherwise specified.

d. Support brackets and clamps removed during removal procedures are to be reinstalled. If these brackets or clamps are damaged they must be replaced.

TEMPERATURE CONTROL - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

The temperature control system is designed to maintain cabin and cockpit temperature between 65° and 85° F. The display placarded CABIN TEMP on the copilot's inboard subpanel displays the cabin temperature as referenced by the Environmental System Controller (ESC). Temperature may be manually controlled by the pilot or automatically controlled by the ESC.

COCKPIT TEMPERATURE CONTROLS (Effectivity: All)

The rotary switch, placarded TEMP MODE, MAN-OFF-AUTO, on the copilot's inboard subpanel selects the manual or automatic temperature control mode. When the TEMP MODE switch is placed in the AUTO position, cabin temperature is automatically determined by the position of the CKPT/CABIN AUTO TEMP, INCR-DECR switch on the copilot's inboard subpanel. This switch is a dual stacked rotary switch; rotation of the small knob controls the cockpit functions and rotation of the large knob controls the cabin functions. Rotation of the CKPT/CABIN AUTO TEMP switch signals the ESC to vary the proportion of bleed air to the cockpit versus bleed air to the cabin.

Manual blower speed and temperature controls are also located on the copilot's inboard subpanel. When the TEMP MODE switch is placed in the MAN postion, cabin temperature is manually controlled with the toggle switch placarded MAN TEMP, INCR-DECR on the copilot's inboard subpanel. Cabin temperature response is proportional to the amount of time the MAN TEMP switch is held in the desired position. Approximately one minute is required to go from full increase to full decrease or vice versa. Blower speed is regulated with the switch placarded CKPT/CABIN BLOWERS, HIGH-LOW on the copilot's inboard subpanel. This switch is a dual stacked rotary switch; rotation of the small knob controls the cockpit functions and rotation of the large knob controls the cabin functions. Blower speeds are varied from 70% to 100%, depending upon the desired setting. The ESC will override manual control should an overtemperature condition require increased air flow.

ENVIRONMENTAL SYSTEM CONTROLLER (Effectivity: All)

The ESC is mounted on the aft fuselage equipment shelf and serves as a central controller for the environmental system. The ESC monitors several temperature sensors, transducers and pressure switches in the airplane to compile information used in maintaining proper temperature control in the cabin and cockpit. There are four temperature sensors and six transducers in the cabin and cockpit, and additional sensors and transducers in the aft fuselage environmental section. Temperature monitoring components located in the aft fuselage environmental section consist of a temperature sensor in the ambient air inlet duct, a temperature sensor in the exit duct, and a bleed air transducer and thermal switch in the bleed air tube between the diverter and bypass valves. Two temperature sensors are located in the cockpit crossover duct, and two are located in the aft baggage compartment sidewall ducts. Four transducers are mounted adjacent to the four temperature sensors in the respective air ducts. These four transducers are responsible for monitoring temperature inside the air ducts. Two additional transducers monitor cabin temperature from the cabin floor air return area and aft false bulkhead air return inlet.

CHART 1
TEMPERATURE CONTROL SYSTEM COMPONENT LOCATIONS
(Effectivity: NC-4)

ITEM	LOCATION	ZONE
Forward LH Temperature Sensor	Located on the aft side of the forward crossover air duct, toward the LH outboard end	221
Forward LH Transducer	Located on top of the forward crossover air duct, toward the LH outboard end	221
Forward RH Temperature Sensor	Located on top of the forward crossover air duct, toward the outboard end and outboard of the forward RH transducer	222
Forward RH Transducer	Located on top of the forward crossover air duct, toward the outboard end and inboard of the RH temperature sensor	222
Forward Ventilation Blower Pressure Switch	Located on top of the forward ventilation blower shroud, between the pedestal and the ventilation blower	221
IAPS Cooling Duct Air Flow Sensor	Located in the copilot's console, just below the avionics breaker panel	247
LH Cabin Temperature Transducer	Located below the LH cabin floor, mounted to the support rail found at the aft end of the first floorboard, aft of the cabin door	161
Aft LH Temperature Sensor	Located in the aft baggage compartment on top of the LH sidewall air duct, just forward of the aft LH transducer	291
Aft LH Transducer	Located in the aft baggage compartment on top of the LH sidewall air duct, just aft of the aft LH temperature sensor	291
Aft RH Temperature Sensor	Located in the aft baggage compartment on top of the RH sidewall air duct, just forward of the aft RH transducer	292
Aft RH Transducer	Located in the aft baggage compartment on top of the RH sidewall air duct, just aft of the aft RH temperature sensor	292
Environmental Dome Transducer	Located behind the aft false bulkhead air return cover, lower center	295
Aft Ventilation Blower Pressure Switch	Located in the environmental dome, mounted on the shelf just below the aft evaporator	295
Aft Bleed Air Transducer	Located in the aft lower fuselage compartment, installed in the bleed air line connecting the bypass valve and the diverter valve, right of the aft bleed air thermal switch	310
Aft Bleed Air Thermal Switch	Located in the aft lower fuselage compartment, installed in the bleed air line connecting the bypass valve and the diverter valve, left of the aft bleed air transducer	310

CHART 1
TEMPERATURE CONTROL SYSTEM COMPONENT LOCATIONS
(Effectivity: NC-4) *(Continued)*

ITEM	LOCATION	ZONE
Heat Exchanger Exit Duct Temperature Sensor	Located in the aft lower fuselage compartment, installed in the underside of the bleed air heat exchanger ambient air exit duct (LH side of fuselage)	310
Ambient Air Inlet Temperature Sensor	Located in the aft lower fuselage compartment, installed in the underside of the aft turning duct	310
Environmental System Controller	Located on the aft fuselage equipment shelf	320

CHART 2
TEMPERATURE CONTROL SYSTEM COMPONENT LOCATION
(Effectivity: NC-5 and after)

ITEM	LOCATION	ZONE
Forward LH Temperature Sensor	Located on the aft side of the forward crossover air duct, toward the LH outboard end	221
Forward LH Transducer	Located on top of the forward crossover air duct, toward the LH outboard end	221
Forward RH Temperature Sensor	Located on top of the forward crossover air duct, toward the outboard end and outboard of the forward RH transducer	222
Forward RH Transducer	Located on top of the forward crossover air duct, toward the outboard end and inboard of the RH temperature sensor	222
Forward Ventilation Blower Pressure Switch	Located on top of the forward ventilation blower shroud, between the pedestal and the ventilation blower	221
IAPS Cooling Duct Air Flow Sensor	Located in the copilot's console, just below the avionics circuit breaker panel	247
LH Cabin Transducer	Located below the LH cabin floor, mounted to the support rail found at the aft end of the first floorboard, aft of the cabin door	161
Aft LH Temperature Sensor	Located in the aft baggage compartment on top of the LH sidewall air duct, just forward of the aft LH transducer	291
Aft LH Transducer	Located in the aft baggage compartment on top of the LH sidewall air duct, just aft of the aft LH temperature sensor	291
Aft RH Temperature Sensor	Located in the aft baggage compartment on top of the RH sidewall air duct, just forward of the aft RH transducer	292
Aft RH Transducer	Located in the aft baggage compartment on top of the RH sidewall air duct, just aft of the aft RH temperature sensor	292

CHART 2
TEMPERATURE CONTROL SYSTEM COMPONENT LOCATION
(Effectivity: NC-5 and after) *(Continued)*

ITEM	LOCATION	ZONE
Environmental Dome Transducer	Located in the upper LH corner of the aft evaporator support frame, mounted in the environmental dome	295
Aft Ventilation Blower Pressure Switch	Located in the environmental dome, mounted on the shelf just below the aft evaporator	295
Aft Bleed Air Transducer	Located in the aft lower fuselage compartment, installed in the bleed air line connecting the bypass valve and the diverter valve, right of the aft bleed air thermal switch	310
Aft Bleed Air Thermal Switch	Located in the aft lower fuselage compartment, installed in the bleed air line connecting the bypass valve and the diverter valve, left of the aft bleed air transducer	310
Heat Exchanger Exit Duct Temperature Sensor	Located in the aft lower fuselage compartment, installed in the underside of the bleed air heat exchanger ambient air exit duct (LH side of fuselage)	310
Ambient Air Inlet Temperature Sensor	Located in the aft lower fuselage compartment, installed in the underside of the aft turning duct	310
Environmental System Controller	Located on the aft fuselage equipment shelf toward the forward end	320

The ESC will correct a duct overtemperature condition by increasing blower speed(s), repositioning the diverter valve, modulating the bypass valve toward heat exchanger, activating the air conditioning vapor cycle and commanding the vane axial blower ON to improve heat exchanger capability. The ESC also utilizes two pressure switches to monitor air flow at each ventilation blower. If insufficient air flow is detected, the ESC will assume a blower failure has occurred and make operating adjustments within the system to maintain proper temperature control. A three digit code is displayed on the CABIN TEMP display to indicate the nature of the system fault. A list of fault codes and the associated faults is provided in the troubleshooting section of this chapter.

TEMPERATURE CONTROL - TROUBLESHOOTING (Effectivity: All)

FAULT CODE ANALYSIS (Effectivity: All)

Transducers, temperature sensors and pressure switches used in the temperature control system are monitored by the ESC self-diagnostic system. When a fault occurs in a monitored component, the ESC signals the CABIN TEMP display (located on the copilot's inboard subpanel) to display a three digit fault code. Chart 3 provides a list of fault codes and the associated faults to aid in troubleshooting the temperature control system.

CHART 3
TEMPERATURE CONTROL FAULT CODES (Effectivity: All)

ITEM	LOCATION	ZONE
910	Forward Ventilation Blower Failed	1
911	Forward LH Transducer Failed	2
912	Forward RH Transducer Failed	2
913	LH Cabin Transducer Failed	3
920	Aft Ventilation Blower Failed	1
921	Aft LH Transducer Failed	2
922	Aft RH Transducer Failed	2
923	Environmental Dome Transducer Failed	3
951	Aft Bleed Air Transducer Failed	4
953	Power Source to ESC Failed	5
955	Processor Failed	6

NOTE 1: Blower status is continuously monitored by its respective pressure switch. This switch is normally open, and closes when blower outlet pressure is greater than 1.5 in. H_2O.

The ESC provides power to the switch and continuously monitors the switch return pin. An open switch indicates no flow. The ESC, upon sensing no flow for a period of ten (10) consecutive seconds, declares the respective blower failed and signals the diverter valve to fully divert all bleed air to the opposite blower.

NOTE 2: An open or shorted circuit causes the ESC to declare the transducer faulty. The ESC transmits the respective fault code to the display and continues uninterrupted operation, utilizing valid inputs from good transducers.

NOTE 3: The ESC monitors this transducer any time the bleed air or TEMP MODE selector is in a functional position. An open or shorted circuit causes the ESC to declare the transducer faulty and generate the respective fault code for display. The ESC then continues uninterrupted operation, utilizing the valid input from the other transducer.

NOTE 4: The ESC continuously monitors this transducer any time the bleed air selector is in a functional position. An open or shorted circuit causes the ESC to declare the transducer faulty. The ESC transmits the fault code to the display and continues uninterrupted normal operation.

NOTE 5: The two separate electrical power sources for the ESC are continuously monitored for loss of either. On sensing a loss of either source, the ESC generates the fault code for display and continues uninterrupted normal operation.

NOTE 6: The ESC has self-check capability to monitor for its own internal failures. On sensing the loss of a processor, the ESC generates the fault code for display and continues operation with a minimum of operational degradation. This alerts the crew of loss of backup control capability.

TEMPERATURE CONTROL - MAINTENANCE PRACTICES (Effectivity: All)

FORWARD LH TEMPERATURE SENSOR REMOVAL (Effectivity: All) (Figure 1)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Remove the pilot's seat.

c. Reach under the LH side of the instrument panel to access wiring. Tag and disconnect wiring from the forward LH temperature sensor.

d. Unlatch the retainer spring and remove the temperature sensor from the retainer.

FORWARD LH TEMPERATURE SENSOR INSTALLATION (Effectivity: All) (Figure 1)

CAUTION

The forward LH temperature sensor must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Position the forward LH temperature sensor in the retainer and secure with the retainer spring.

b. Reconnect wiring to the forward LH temperature sensor according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

c. Install the pilot's seat.

d. Restore electrical power to the airplane.

FORWARD LH TRANSDUCER REMOVAL (Effectivity: All) (Figure 1)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Remove the pilot's seat.

c. Reach under the LH side of the instrument panel to access wiring. Tag and disconnect wiring from the forward LH transducer.

d. Unlatch the retainer spring and remove the transducer.

FORWARD LH TRANSDUCER INSTALLATION (Effectivity: All) (Figure 1)

CAUTION

The forward LH transducer must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the forward LH transducer with its retainer and secure with the retainer spring.

b. Reconnect wiring to the forward LH transducer as tagged or according to the BEECHCRAFT Starship 1 Wiring Diagram Manual.

c. Install the pilot's seat.

d. Restore electrical power to the airplane.

FORWARD RH TEMPERATURE SENSOR REMOVAL (Effectivity: All) (Figure 1)

CAUTION

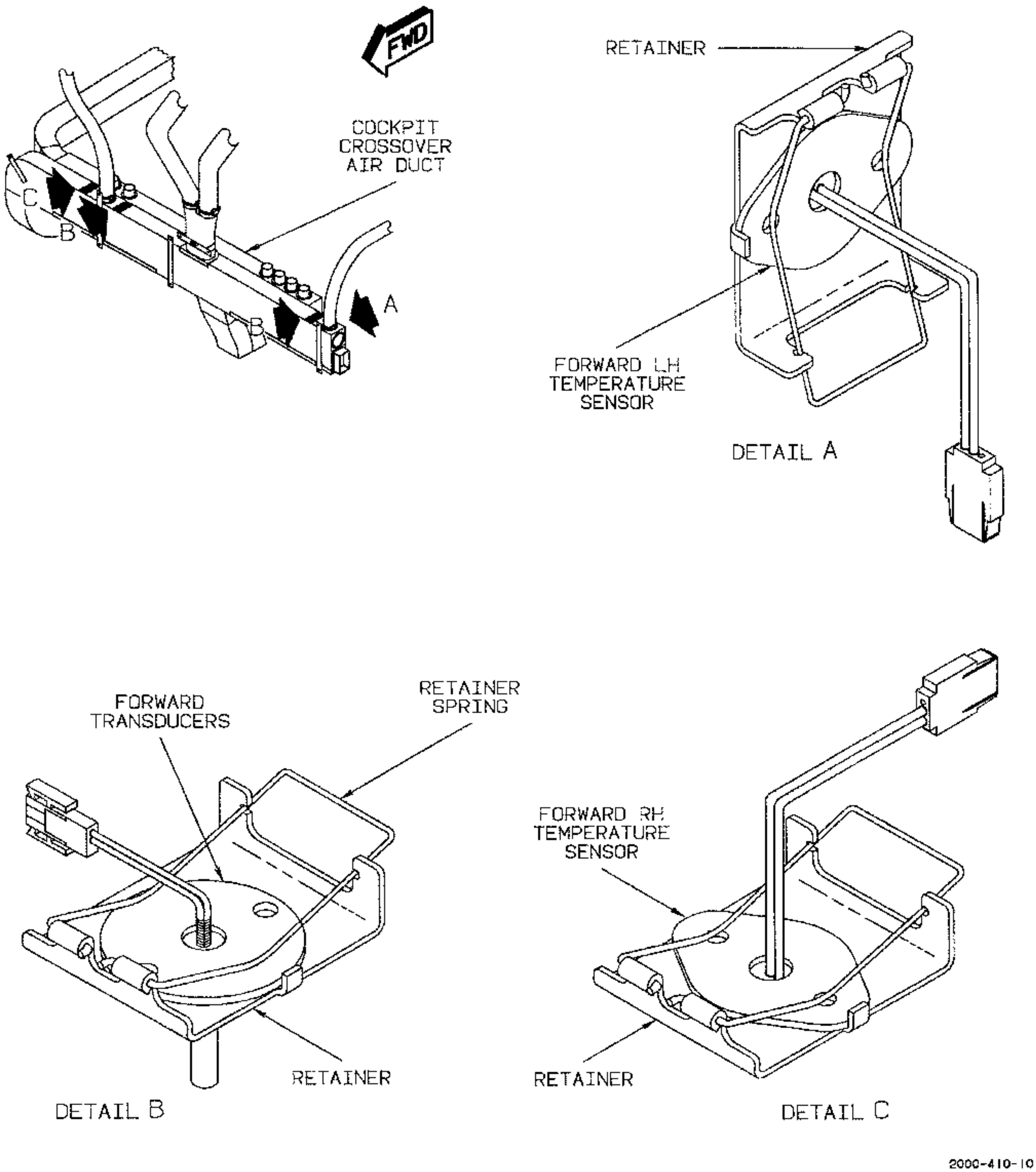
When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Remove the copilot's seat.

c. Reach under the RH side of the instrument panel to access wiring. Tag and disconnect wiring from the forward RH temperature sensor.

d. Unlatch the retainer spring and remove the temperature sensor from the retainer.



Forward LH and RH Temperature Sensors and Transducers Installation (Effectivity: All)
Figure 1

FORWARD RH TEMPERATURE SENSOR INSTALLATION (Effectivity: All) (Figure 1)

CAUTION

The forward RH temperature sensor must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the forward RH temperature sensor with its retainer and secure with the retainer spring.

b. Reconnect wiring to the forward RH temperature sensor according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

c. Install the copilot's seat.

d. Restore electrical power to the airplane.

FORWARD RH TRANSDUCER REMOVAL (Effectivity: All) (Figure 1)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Remove the copilot's seat.

c. Reach under the RH side of the instrument panel to access wiring. Tag and disconnect wiring from the forward RH transducer.

d. Unlatch the retainer spring and remove the transducer from the retainer.

FORWARD RH TRANSDUCER INSTALLATION (Effectivity: All) (Figure 1)

CAUTION

The forward RH transducer must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the forward RH transducer with its retainer and secure with the retainer spring.

b. Reconnect wiring to the forward RH transducer according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

c. Install the copilot's seat.

d. Restore electrical power to the airplane.

FORWARD VENTILATION BLOWER PRESSURE SWITCH REMOVAL (Effectivity: All) (Figure 2)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Remove both the pilot's seat and LH pedestal side upholstery kick panel.

c. Reach into the area forward of the pedestal to access wiring. Tag and disconnect wiring from the forward ventilation blower pressure switch.

d. Tag and disconnect the air tubes from the forward ventilation blower pressure switch.

e. Remove the screws and nuts attaching the forward ventilation blower pressure switch to its mounting clip and remove the switch from the blower shroud.

FORWARD VENTILATION BLOWER PRESSURE SWITCH INSTALLATION (Effectivity: All) (Figure 2)

CAUTION

The forward ventilation blower pressure switch must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the forward ventilation blower pressure switch with its mounting clip and secure with screws and nuts.

b. Reconnect the air tubes to the forward ventilation blower pressure switch according to tags.

c. Reconnect wiring to the forward ventilation blower pressure switch according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

d. Install the LH pedestal side upholstery kick panel and pilot's seat.

e. Restore electrical power to the airplane.

IAPS COOLING DUCT AIR FLOW SENSOR REMOVAL (Effectivity: All) (Figure 3)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Remove the copilot's seat and console upholstery cover.

c. Refer to Chapter 24-50-00 and remove the avionics circuit breaker panel mounting screws.

d. Lift the inboard edge of the avionics circuit breaker panel enough to remove the wire tray cover.

e. Tag and disconnect wiring from the IAPS cooling duct air flow sensor.

f. Remove the air flow sensor mounting clamp from the flexible IAPS cooling duct.

g. Remove the screws and nuts attaching the air flow sensor to the mounting clamp and remove it from the clamp.

IAPS COOLING DUCT AIR FLOW SENSOR INSTALLATION (Effectivity: All) (Figure 3)

CAUTION

The air flow sensor must meet electrical bonding requirements as specified in Chapter 20-00-03.

a. Align the IAPS cooling duct air flow sensor with the mounting clamp and install screws and nuts to secure the air flow sensor to the clamp.

b. Install the mounting clamp on the flexible IAPS cooling duct in the copilot's console.

c. Reconnect wiring to the air flow sensor according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

WARNING

The upper wire tray cover is load supporting and must be installed before flight of the airplane.

d. Lift the inboard edge of the avionics circuit breaker panel enough to align the upper wire tray cover mounting holes.

e. Refer to Chapter 24-50-00 and install the avionics circuit breaker panel.

f. Install remaining screws to secure the upper wire tray cover.

g. Install the copilot's console upholstery cover and seat.

h. Restore electrical power to the airplane.

LH CABIN TEMPERATURE TRANSDUCER REMOVAL (Effectivity: All) (Figure 4)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove the LH cabin seats and carpet between the cabin door and second cabin window.

b. Loosen the captive fasteners and remove both LH floorboards directly aft of the cabin door.

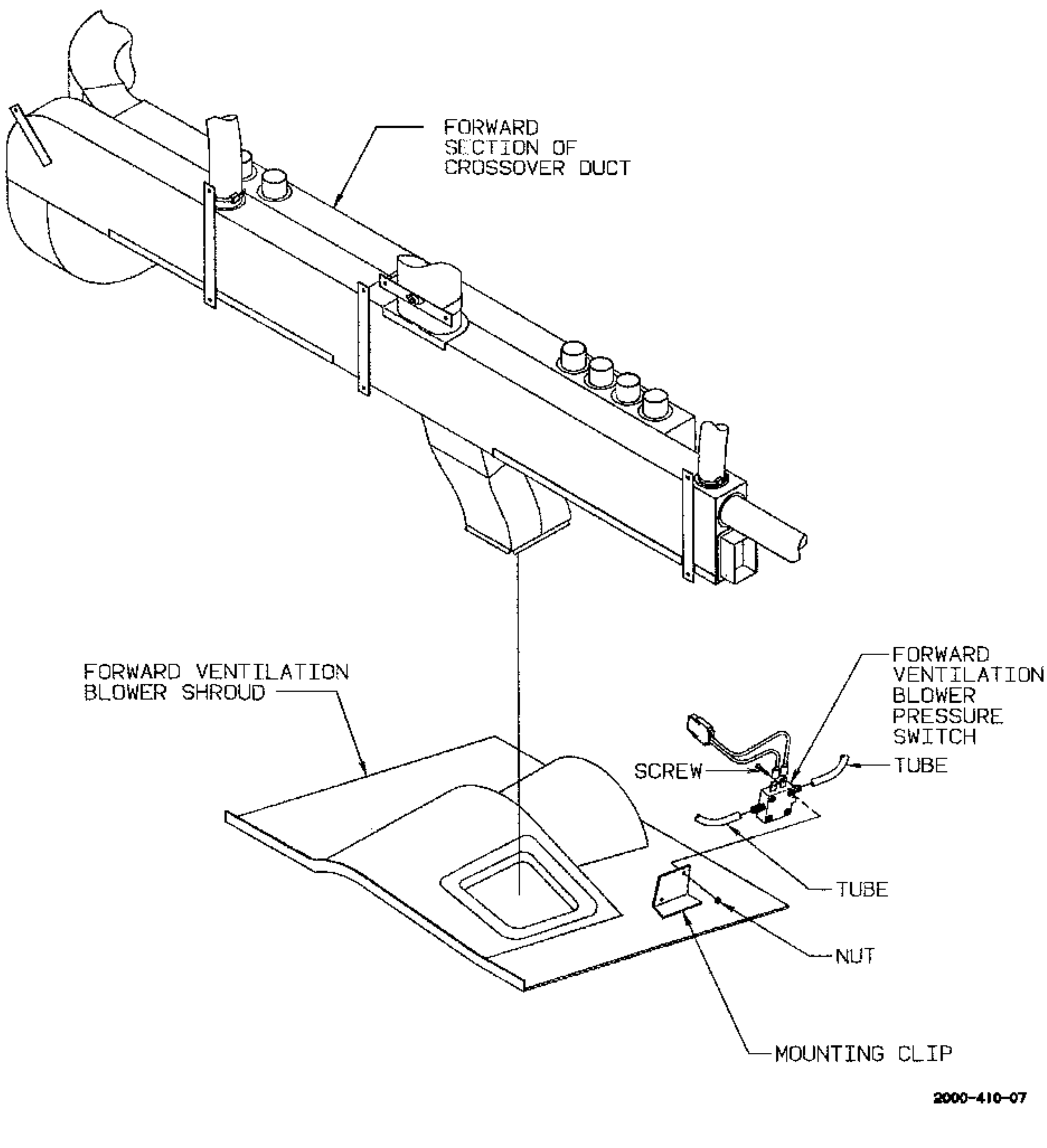
c. Tag and disconnect wiring from the LH cabin transducer.

d. Remove the LH cabin transducer from the mounting clip (secured with screws and nuts).

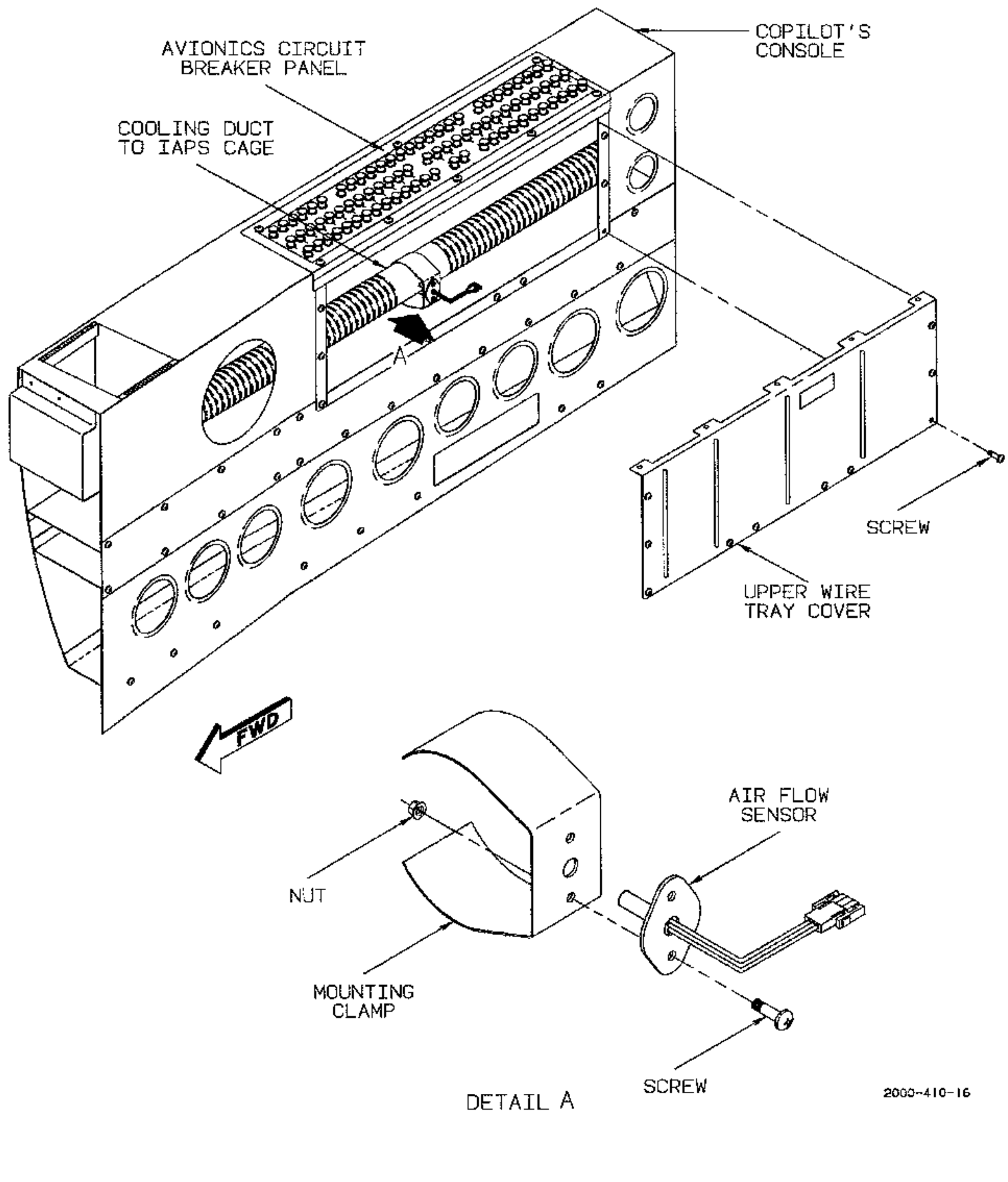
LH CABIN TEMPERATURE TRANSDUCER INSTALLATION (Effectivity: All) (Figure 4)

CAUTION

The LH cabin transducer must meet electrical bonding requirements specified in Chapter 20-00-03.



Forward Ventilation Blower Pressure Switch Installation (Effectivity: All)
Figure 2



IAPS Cooling Duct Air Flow Sensor Installation (Effectivity: All)
Figure 3

a. Align the LH cabin transducer with the mounting clip and secure with screws and nuts.

b. Reconnect wiring to the LH cabin transducer according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

c. Install the LH cabin floorboards and secure with captive fasteners.

d. Install the LH cabin carpet and seats.

e. Restore electrical power to the airplane.

AFT LH TEMPERATURE SENSOR REMOVAL (Effectivity: All) (Figure 5)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Fold down the aft couch back and open the aft baggage compartment door (the door is hinged at the bottom and middle, and opens forward).

c. Remove the aft baggage compartment LH side upholstery panel (secured to the interior surface of the fuselage with Velcro fasteners).

d. Tag and disconnect wiring from the aft LH temperature sensor.

e. Unlatch the retainer spring and remove the aft LH temperature sensor from the retainer.

AFT LH TEMPERATURE SENSOR INSTALLATION (Effectivity: All) (Figure 5)

CAUTION

The aft LH temperature sensor must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the aft LH temperature sensor with its retainer and secure with the retainer spring.

b. Reconnect wiring to the aft LH temperature sensor according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

c. Install the aft baggage compartment LH side upholstery panel (secured to the interior surface of the fuselage with Velcro fasteners).

d. Close the aft baggage compartment door (the door is hinged at the middle and bottom, and opens forward) and fold up the aft couch back.

e. Restore electrical power to the airplane.

AFT LH TRANSDUCER REMOVAL (Effectivity: All) (Figure 5)

CAUTION

When removing components, note the location of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Fold down the aft couch back and open the aft baggage compartment door (the door is hinged at the bottom and middle, and opens forward).

c. Remove the aft baggage compartment LH side upholstery panel (secured to the interior surface of the fuselage with Velcro fasteners).

d. Tag and disconnect wiring from the aft LH transducer.

e. Unlatch the retainer spring and remove the aft LH transducer from the retainer.

AFT LH TRANSDUCER INSTALLATION (Effectivity: All) (Figure 5)

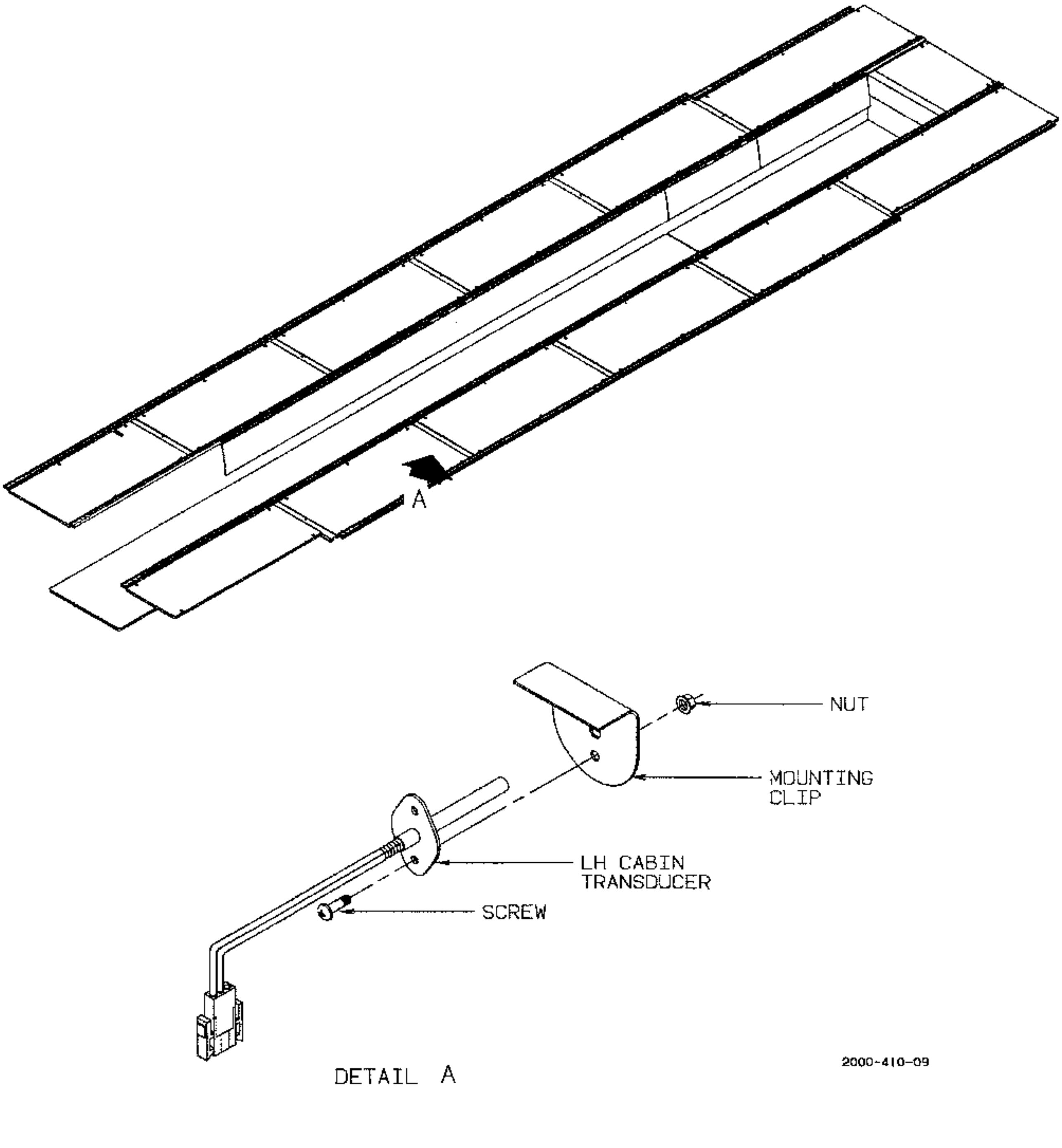
CAUTION

The aft LH transducer must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the aft LH transducer with its retainer and secure with the retainer spring.

b. Reconnect wiring to the aft LH transducer according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

c. Install the aft baggage compartment LH side upholstery panel (secured to the interior surface of the fuselage with Velcro fasteners).



LH Cabin Temperature Transducer Installation (Effectivity: All)
Figure 4

d. Close the aft baggage compartment door (the door is hinged at the middle and bottom, and opens forward) and fold up the aft couch back.

e. Restore electrical power to the airplane.

AFT RH TEMPERATURE SENSOR REMOVAL (Effectivity: All) (Figure 5)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Fold down the aft couch back and open the aft baggage compartment door (the door is hinged at the bottom and middle, and opens forward).

c. Remove the aft baggage compartment RH side upholstery panel (secured to the interior surface of the fuselage with Velcro fasteners).

d. Tag and disconnect wiring from the aft RH temperature sensor.

e. Unlatch the retainer spring and remove the aft RH temperature sensor from the retainer.

AFT RH TEMPERATURE SENSOR INSTALLATION (Effectivity: All) (Figure 5)

CAUTION

The aft RH temperature sensor must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the aft RH temperature sensor with its retainer and secure with the retainer spring.

b. Reconnect wiring to the aft RH temperature sensor according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

c. Install the aft baggage compartment RH side upholstery panel (secured to the interior surface of the fuselage with Velcro fasteners).

d. Close the aft baggage compartment door (the door is hinged at the middle and bottom, and opens forward) and fold up the aft couch back.

e. Restore electrical power to the airplane.

AFT RH TRANSDUCER REMOVAL (Effectivity: All) (Figure 5)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Fold down the aft couch back and open the aft baggage compartment door (the door is hinged at the bottom and middle, and opens forward).

c. Remove the aft baggage compartment RH side upholstery panel (secured to the interior surface of the fuselage with Velcro fasteners).

d. Tag and disconnect wiring from the aft RH transducer.

e. Unlatch the retainer spring and remove the transducer from the retainer.

AFT RH TRANSDUCER INSTALLATION (Effectivity: All) (Figure 5)

CAUTION

The aft RH transducer must meet electrical bonding requirements specified in Chapter 20-00-03.

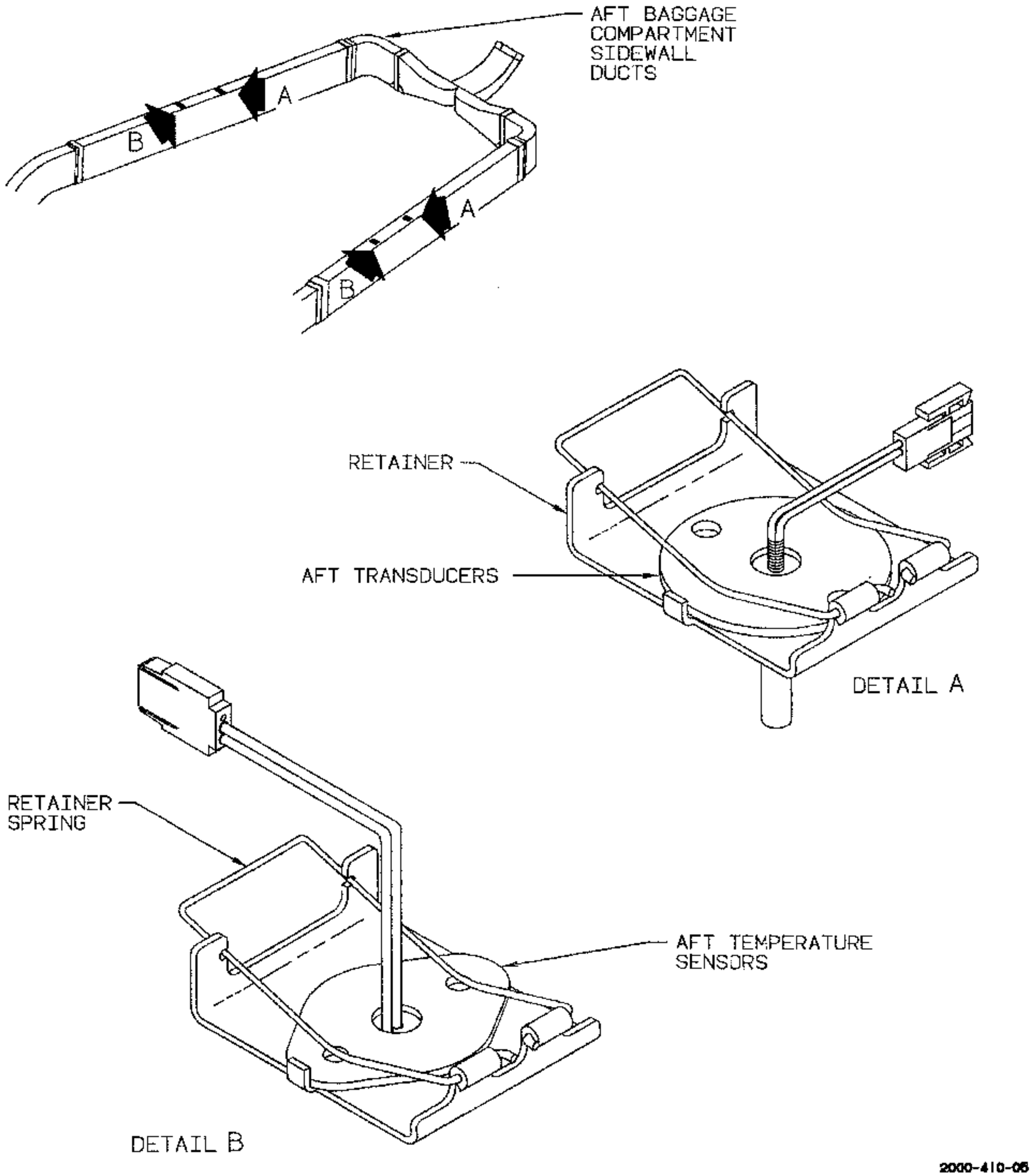
a. Align the aft RH transducer with its retainer and secure with the retainer spring.

b. Reconnect wiring to the aft RH transducer according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

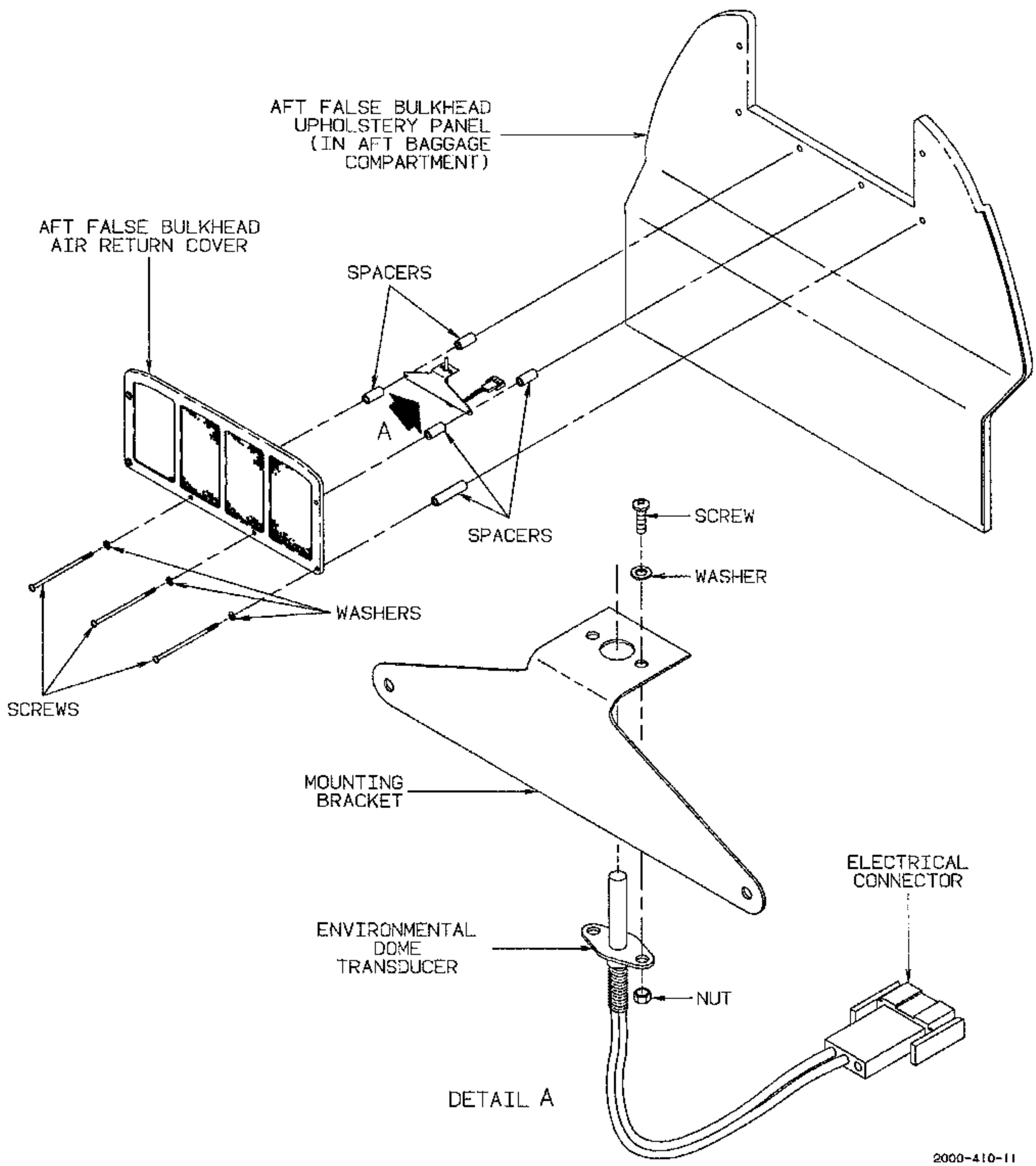
c. Install the aft baggage compartment RH side upholstery panel (secured to the interior surface of the fuselage with Velcro fasteners).

d. Close the aft baggage compartment door (the door is hinged at the middle and bottom, and opens forward) and fold up the aft couch back.

e. Restore electrical power to the airplane.



Aft LH and RH Temperature Sensors and Transducers Installation (Effectivity: All)
Figure 5



Environmental Dome Transducer Installation (Effectivity: NC-4)
Figure 6

ENVIRONMENTAL DOME TRANSDUCER REMOVAL (EFFECTIVITY: NC-4) (Figure 6)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Fold down the aft couch back and open the aft baggage compartment door (the door is hinged at the bottom and middle, and opens forward).

c. Remove the aft baggage compartment side and top upholstery panels (secured to brackets on the interior side of the fuselage with Velcro fasteners).

d. Remove the screws, washers and spacers securing the aft false bulkhead air return cover and environmental dome transducer assembly to the aft false bulkhead upholstery panel.

e. Remove the aft false bulkhead air return cover.

f. Remove the aft false bulkhead upholstery panel (secured with screws and washers around the air return opening and Velcro fasteners along the bottom edge of the panel).

g. Tag and disconnect wiring from the environmental dome transducer assembly and remove it from the airplane.

h. Remove the environmental dome transducer from its mounting bracket by removing screws, washers and nuts.

ENVIRONMENTAL DOME TRANSDUCER INSTALLATION (Effectivity: NC-4) (Figure 6)

CAUTION

The environmental dome transducer must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the environmental dome transducer with its mounting bracket and secure with screws, washers and nuts.

b. Reconnect wiring to the environmental dome transducer according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

c. Install the aft false bulkhead upholstery panel (secured with washers and screws around the air return opening and Velcro fasteners along the bottom edge of the panel).

NOTE

The environmental dome transducer wiring must be routed through the air return opening in the aft false bulkhead upholstery panel.

d. Align the aft false bulkhead air return cover and environmental dome transducer assembly with the aft false bulkhead upholstery panel, then secure with washers, spacers and screws.

e. Install the aft baggage compartment top and side upholstery panels (secured to brackets on the interior surface of the fuselage with Velcro fasteners).

f. Close the aft baggage compartment door (the door is hinged at the middle and bottom, and opens forward) and fold up the aft couch back.

g. Restore electrical power to the airplane.

ENVIRONMENTAL DOME TRANSDUCER REMOVAL (Effectivity: NC-5 and after) (Figure 7)

CAUTION

When removing components, note the location of all bonding jumpers to aid in reinstallation.

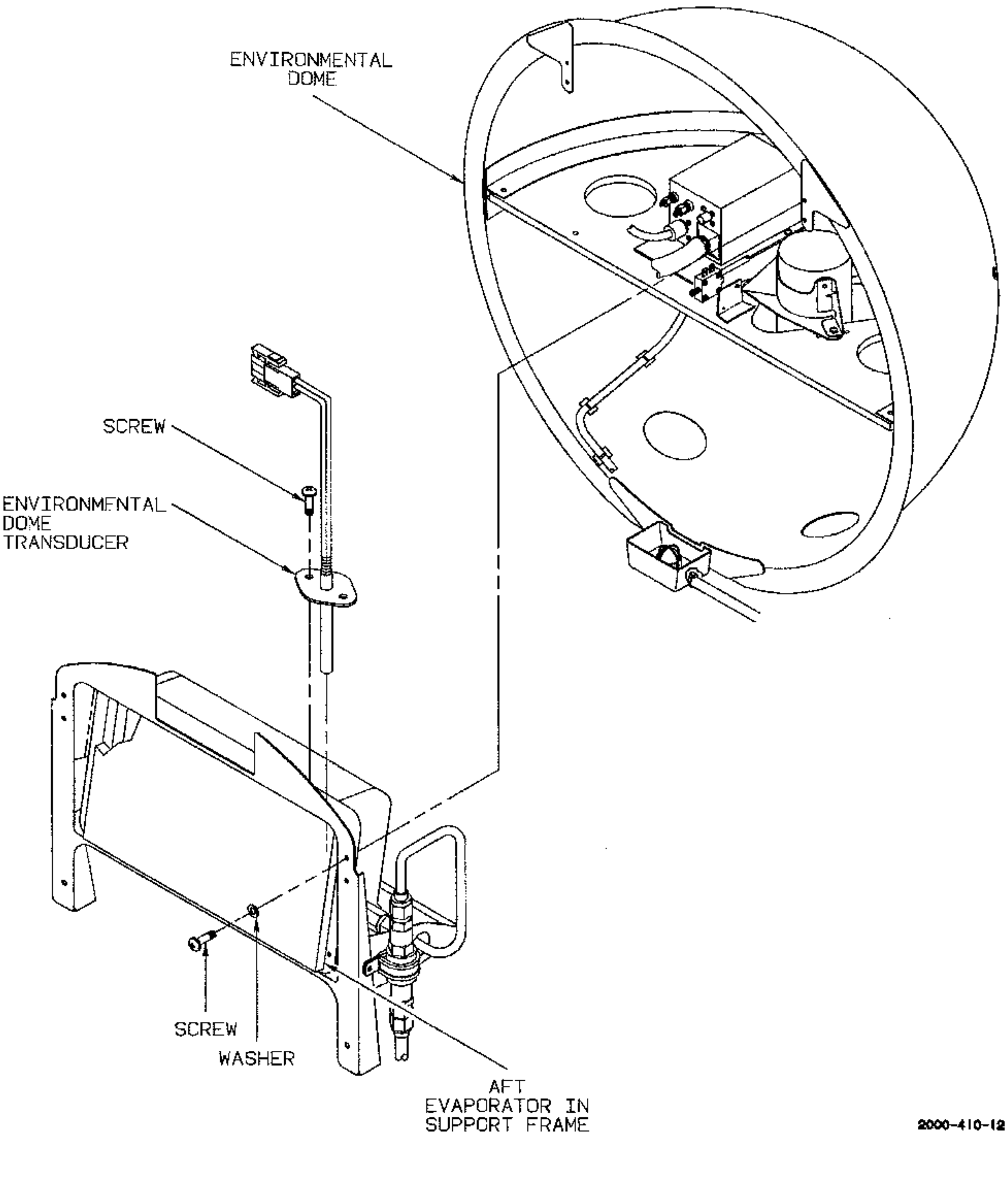
a. Remove all electrical power from the airplane.

b. Fold down the aft couch back and open the aft baggage compartment door (the door is hinged at the bottom and middle, and opens forward).

c. Loosen the captive fasteners and remove the air conditioning service compartment door.

WARNING

Refer to PRECAUTIONARY SERVICE PROCEDURES in Chapter 21-50-00 before attempting any service on the air conditioning system.



Environmental Dome Transducer Installation (Effectivity: NC-5 and After)
Figure 7

d. Connect recovery/recycle servicing unit to the service valves located in the air conditioning service compartment, and slowly bleed the refrigerant from the air conditioning system.

e. Remove the aft baggage compartment side and top upholstery panels (secured to the interior surface of the fuselage with Velcro fasteners).

f. Remove screws, washers and spacers attaching the aft false bulkhead air return cover to the aft false bulkhead upholstery panel.

g. Remove the aft false bulkhead upholstery panel (secured with screws and washers around the air return opening and Velcro fasteners along the bottom edge of the panel).

h. Remove tape from the overhead air duct and disconnect it from the environmental dome upper air duct.

i. When all the refrigerant has been bled from the air conditioning system, disconnect the refrigerant lines from the aft evaporator at the environmental dome connections.

NOTE

Cap all open refrigerant tubes, lines, ports and connectors to prevent contamination of the air conditioner system.

j. Remove the upper drain tube and strap from the aft condensate tray drain port.

k. Tag and disconnect wiring from the aft low temperature switch and the aft hot gas bypass valve.

l. Remove the screws and nuts that secure the aft evaporator support frame to the environmental dome shelf and mounting clips.

m. Carefully pull the support frame away from the environmental dome, then tag and disconnect wiring from the environmental dome transducer.

n. Remove the support frame from the environmental dome.

o. Remove the screws and washers attaching the the environmental dome transducer to the support frame.

ENVIRONMENTAL DOME TRANSDUCER INSTALLATION (Effectivity: NC-5 and after) (Figure 7)

CAUTION

The environmental dome transducer must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the environmental dome transducer with the evaporator support frame and secure with screws and washers.

b. Align the support frame with the environmental dome and connect wiring to the environmental dome transducer according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

c. Secure the support frame to the environmental dome shelf and mounting clips by installing screws and nuts.

d. Reconnect wiring to the aft hot gas bypass valve and the aft low temperature switch according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

e. Reconnect the aft evaporator refrigerant lines to the environmental dome refrigerant connectors.

f. Install the upper drain tube and strap on the aft condensate tray drain port.

g. Restore electrical power to the airplane.

h. Check the installation for leaks and charge the system as outlined under AIR CONDITIONING SYSTEM CHARGING in Chapter 21-50-00.

i. Align the overhead air duct with the environmental air duct and secure with 1 1/2 wraps of tape (16, Chart 1, 21-00-00).

j. Install the aft bulkhead upholstery panel (secured with washers and screws around the air return opening and with Velcro fasteners along the bottom edge of the panel).

k. Align the aft air return cover with the aft bulkhead and secure with spacers, washers and screws.

l. Install the aft baggage compartment top and side upholstery panels (secured to the brackets on the interior surface of the fuselage with Velcro fasteners).

m. Close the aft baggage compartment door (the door is hinged at the middle and bottom, and opens forward) and fold up the aft couch back.

n. Install the air conditioning service compartment door and secure with captive fasteners.

AFT VENTILATION BLOWER PRESSURE SWITCH REMOVAL (Effectivity: NC-4) (Figure 8)

CAUTION

When removing components, note the locations of bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Fold down the aft couch back and open the aft baggage compartment door (the door is hinged at the bottom and middle, and opens forward).

c. Remove the aft baggage compartment side and top upholstery panels (secured to bracket on the interior surface of the fuselage with Velcro fasteners).

d. Remove the two screws, washers and spacers attaching the environmental dome transducer assembly to the aft false bulkhead air return cover and the aft false bulkhead upholstery panel.

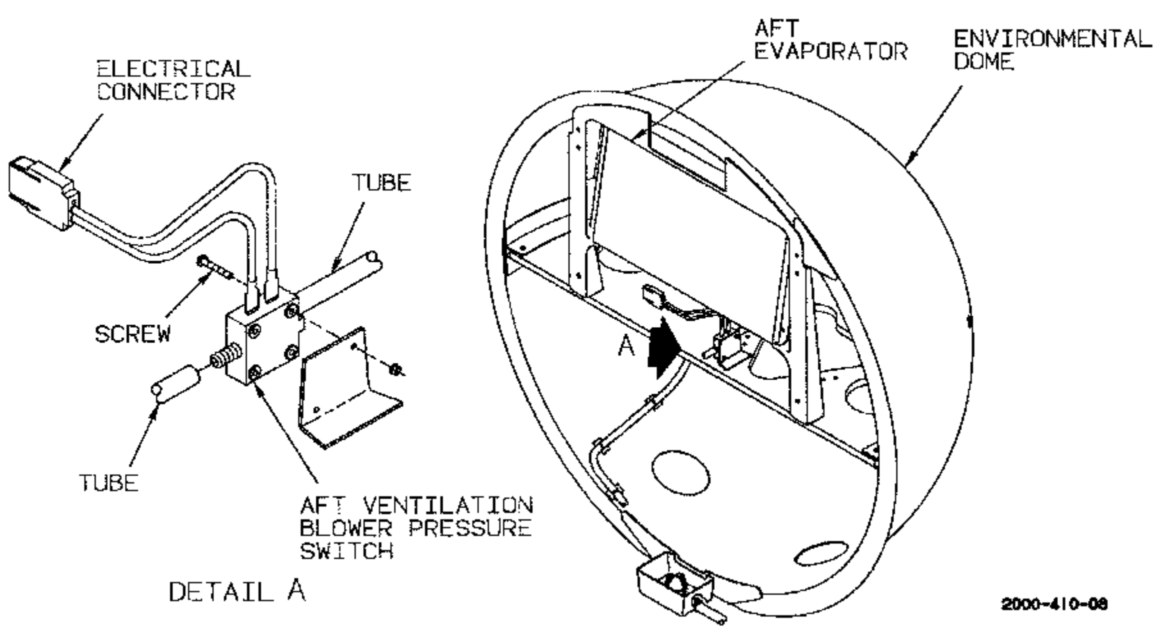
e. Remove the remaining screws, washers and spacers attaching the aft false bulkhead air return cover to the aft false bulkhead upholstery panel.

f. Remove the aft false bulkhead upholstery panel (secured with screws and washers around the air return opening and Velcro fasteners along the bottom edge of the panel).

g. Tag and disconnect wiring from the aft ventilation blower pressure switch.

h. Tag and disconnect the air tubes from the aft ventilation blower pressure switch.

i. Remove the aft ventilation blower pressure switch from the mounting clip (secured with screws and nuts).



Aft Ventilation Blower Pressure Switch Installation (Effectivity: All)
Figure 8

AFT VENTILATION BLOWER PRESSURE SWITCH INSTALLATION (Effectivity: NC-4) (Figure 8)

CAUTION

The aft ventilation blower pressure switch must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the aft ventilation blower pressure switch with the mounting clip and secure with screws and nuts.

b. Reconnect the air tubes to the aft ventilation blower pressure switch as tagged.

c. Reconnect wiring to the aft ventilation blower pressure switch according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

d. Install the aft false bulkhead upholstery panel (secured with screws and washers around the air return opening and Velcro fasteners along the bottom edge of the panel).

NOTE

The environmental dome transducer assembly wiring is routed through the aft false bulkhead air return opening.

e. Install the aft false bulkhead air return cover (secured with spacers, washers and screws).

f. Align the environmental dome transducer assembly with the aft false bulkhead air return cover and aft false bulkhead upholstery panel, then secure with two remaining spacers, washers and screws.

g. Install the aft baggage compartment side and top upholstery panels (secured to brackets on the interior surface of the fuselage with Velcro fasteners).

h. Close the aft baggage compartment door (the door is hinged at the middle and bottom, and opens forward) and fold up the aft couch back.

i. Restore electrical power to the airplane.

AFT VENTILATION BLOWER PRESSURE SWITCH REMOVAL (Effectivity: NC-5 and after) (Figure 8)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Fold down the aft couch back and open the aft baggage compartment door (the door is hinged at the bottom and middle, and opens forward).

c. Remove the aft false bulkhead air return cover (secured with screws, washers and spacers).

d. Remove the aft false bulkhead upholstery panel (secured with screws and washers around the air return opening and Velcro fasteners along the bottom edge of the panel).

e. Tag and disconnect wiring from the aft ventilation blower pressure switch.

f. Tag and disconnect the air tubes from the aft ventilation blower pressure switch.

g. Remove the aft ventilation blower pressure switch from the mounting clip (secured with screws and nuts).

AFT VENTILATION BLOWER PRESSURE SWITCH INSTALLATION (Effectivity: NC-5 and after) (Figure 8)

CAUTION

The aft ventilation blower pressure switch must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the aft ventilation blower pressure switch with the mounting clip and secure with screws and nuts.

b. Reconnect the air tubes to the aft ventilation blower pressure switch according to tags.

c. Reconnect wiring to the aft ventilation blower pressure switch according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

d. Install the aft false bulkhead upholstery panel (secured with screws and washers around the air return opening and Velcro fasteners along the bottom edge of the panel).

e. Align the aft false bulkhead air return cover with the aft false bulkhead upholstery panel and secure with spacers, washers and screws.

f. Install the aft baggage compartment top and side upholstery panels (secured to brackets on the interior surface of the fuselage with Velcro fasteners).

g. Close the aft baggage compartment door (the door is hinged at the bottom and middle, and opens forward) and fold up the aft couch back.

h. Restore electrical power to the airplane.

AFT BLEED AIR TRANSDUCER REMOVAL (Effectivity: All) (Figure 9)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the aft lower fuselage ambient air inlet door

c. Remove the condenser plenum lower and forward closeouts (secured with screws and washers).

d. Tag and disconnect wiring from the aft bleed air transducer.

e. Remove the aft bleed air transducer from the bleed air line (secured with screws and nuts).

f. Remove and discard the O-ring from the aft bleed air transducer.

AFT BLEED AIR TRANSDUCER INSTALLATION (Effectivity: All) (Figure 9)

CAUTION

The aft bleed air transducer must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Install a new O-ring on the aft bleed air transducer.

b. Align the aft bleed air transducer with the bleed air line and secure with screws and nuts.

c. Reconnect wiring to the aft bleed air transducer according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

d. Install the condenser plenum forward and lower closeouts (secured with washers and screws).

e. Install the aft lower fuselage ambient air inlet door and secure with captive fasteners.

f. Restore electrical power to the airplane.

AFT BLEED AIR THERMAL SWITCH REMOVAL (Effectivity: All) (Figure 9)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

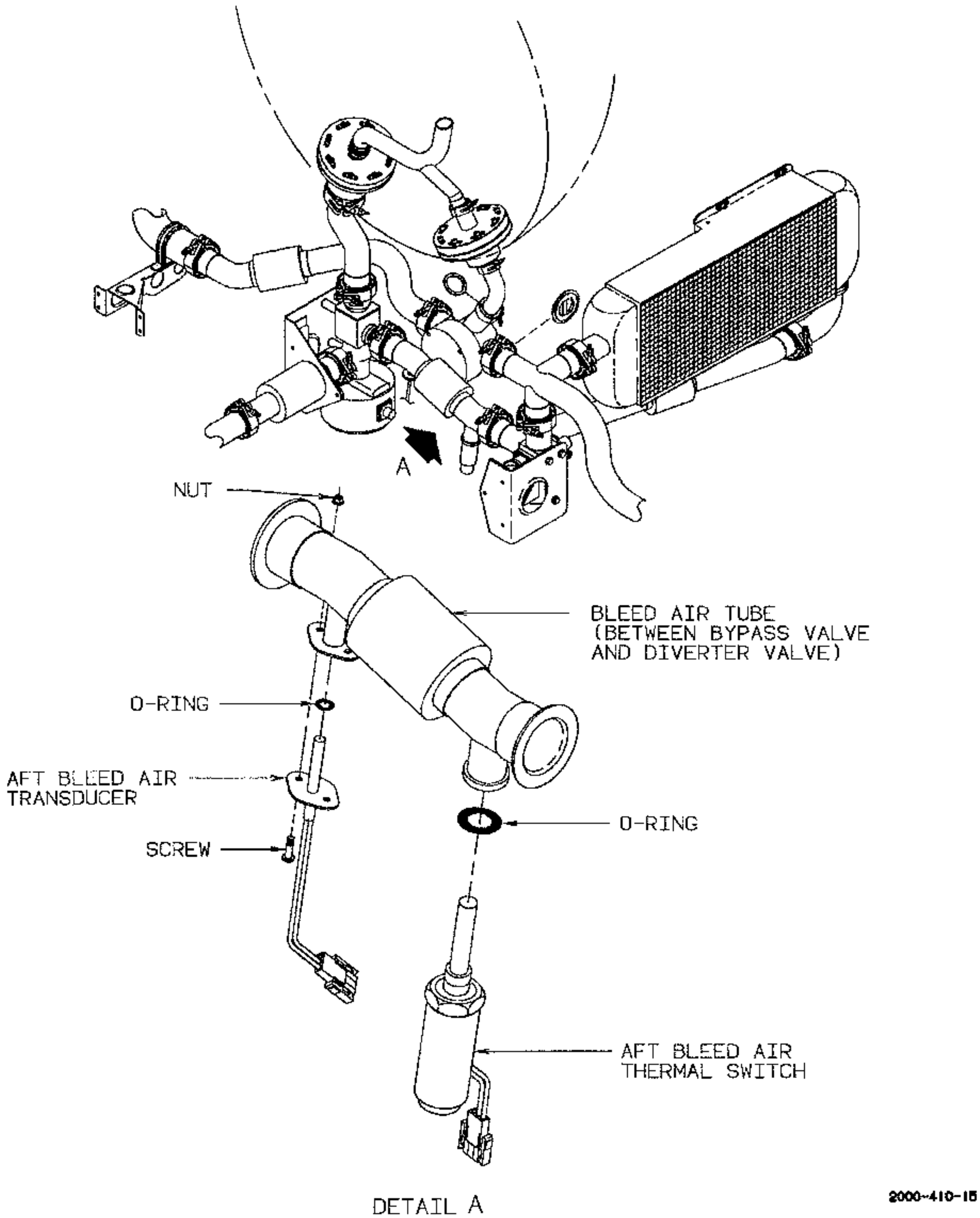
b. Loosen the captive fasteners and remove the aft lower fuselage ambient air inlet door.

c. Remove the condenser plenum lower and forward closeouts (secured with screws and washers).

d. Tag and disconnect wiring from the aft bleed air thermal switch.

e. Remove safety wire from the aft bleed air thermal switch and unscrew it from the bleed air line.

f. Remove and discard the O-ring from the aft bleed air thermal switch.



Aft Bleed Air Transducer and Thermal Switch Installation (Effectivity: All)
Figure 9

AFT BLEED AIR THERMAL SWITCH INSTALLATION (Effectivity: All) (Figure 9)

CAUTION

The aft bleed air thermal switch must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Install a new O-ring on the aft bleed air thermal switch.

b. Screw the thermal switch into the bleed air line boss and tighten until the O-ring provides a tight seal and safety wire.

c. Reconnect wiring to the aft bleed air thermal switch according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

d. Install the condenser plenum forward and lower closeouts (secured washers and screws).

e. Install the aft lower fuselage ambient air inlet door and secure with captive fasteners.

f. Restore electrical power to the airplane.

AFT FUSELAGE LH EXIT DUCT TEMPERATURE SENSOR REMOVAL (Effectivity: All) (Figure 10)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the aft lower fuselage ambient air inlet door.

c. Tag and disconnect wiring from the aft fuselage LH exit duct temperature sensor.

d. Remove the aft fuselage LH exit duct temperature sensor from the LH exit duct (secured with screws and washers).

AFT FUSELAGE LH EXIT DUCT TEMPERATURE SENSOR INSTALLATION (Effectivity: All) (Figure 10)

CAUTION

The aft fuselage LH exit duct temperature sensor must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the aft fuselage LH exit duct temperature sensor with the aft fuselage LH exit duct and secure with washers and screws.

b. Reconnect wiring to the aft fuselage LH exit duct temperature sensor according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

c. Install the aft lower fuselage ambient air inlet door and secure with captive fasteners.

d. Restore electrical power to the airplane.

AMBIENT AIR INLET TEMPERATURE SENSOR REMOVAL (Effectivity: All) (Figure 11)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the lower fuselage ambient air inlet door.

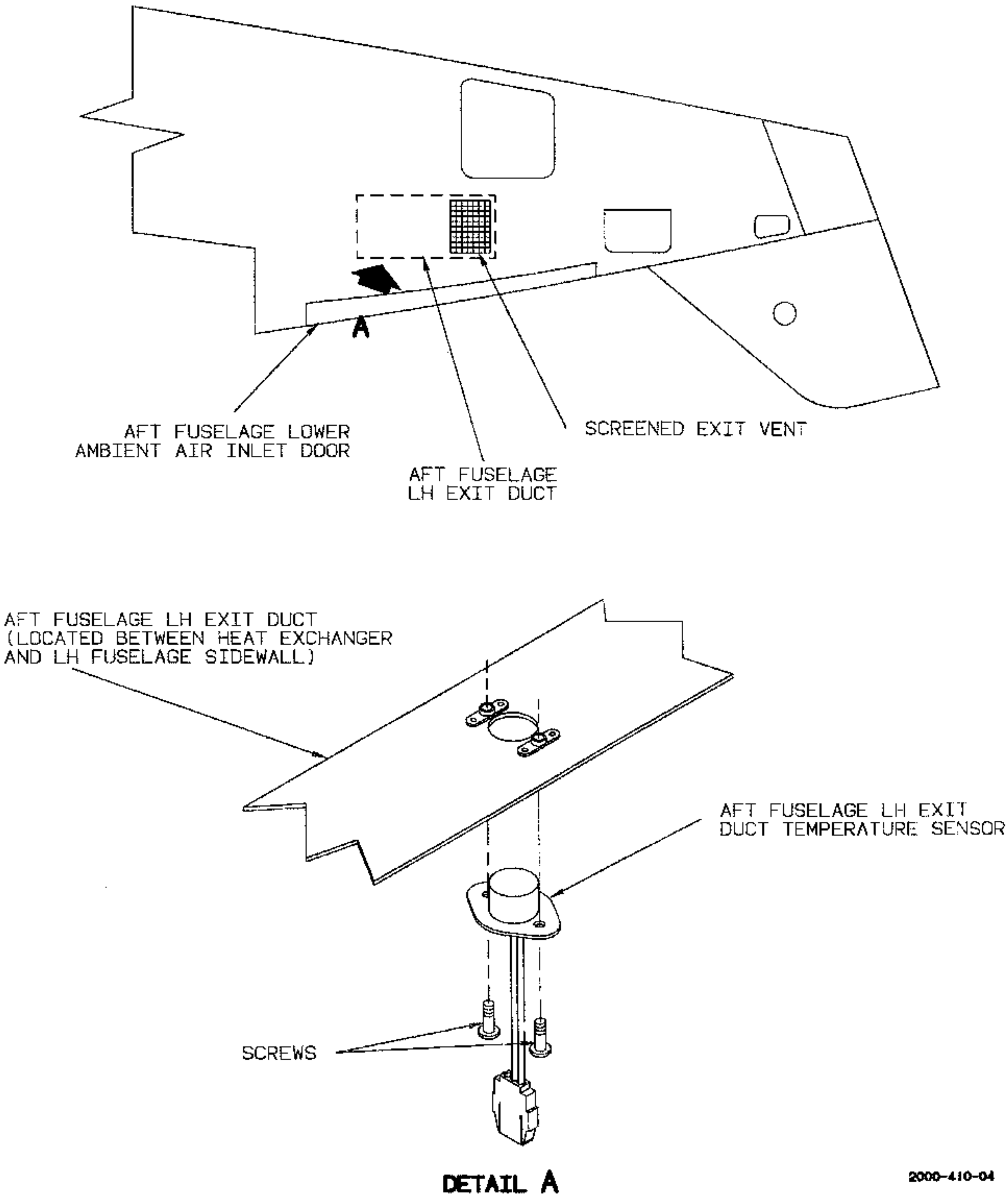
c. Tag and disconnect wiring from the ambient air inlet temperature sensor.

d. Remove the temperature sensor from the underside of the aft turning duct inlet (secured with screws).

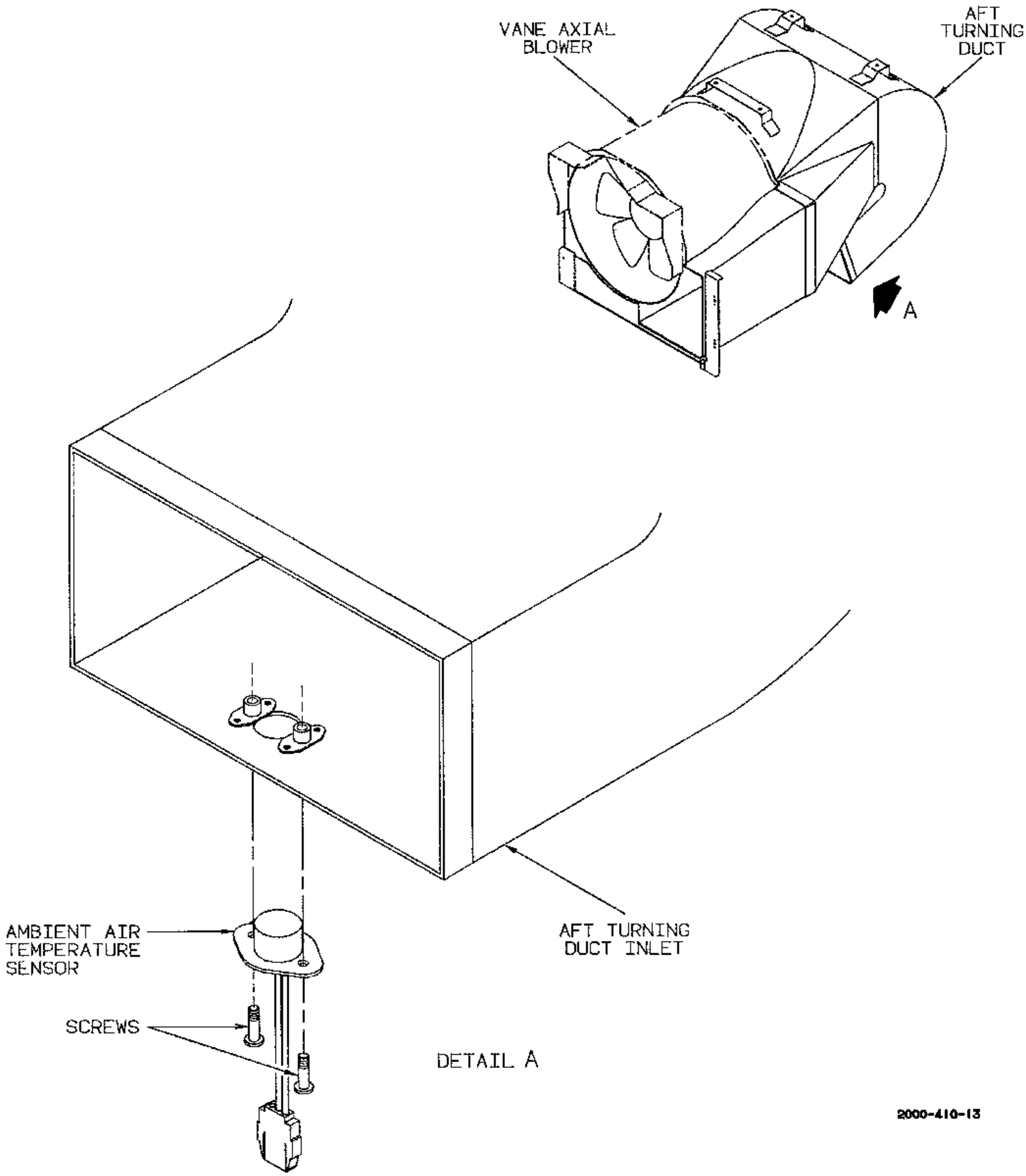
AMBIENT AIR INLET TEMPERATURE SENSOR INSTALLATION (Effectivity: All) (Figure 11)

CAUTION

The ambient air inlet temperature sensor must meet electrical bonding requirements specified in Chapter 20-00-03.



Aft Fuselage LH Exit Duct Temperature Sensor Installation (Effectivity: All)
Figure 10



Ambient Air Inlet Temperature Sensor Installation (Effectivity: All)
Figure 11

a. Install the ambient air inlet temperature sensor in the underside of the aft turning duct (secured with screws).

b. Reconnect wiring to the ambient air inlet temperature sensor according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

c. Install the aft lower fuselage ambient air inlet door and secure with captive fasteners.

d. Restore electrical power to the airplane.

ENVIRONMENTAL SYSTEM CONTROLLER REMOVAL (Effectivity: All) (Figure 12)

CAUTION

When removing components, note the locations of all bonding jumpers to aid in reinstallation.

a. Remove all electrical power from the airplane.

b. Loosen the captive fasteners and remove the aft upper fuselage access door.

c. Tag and disconnect all wiring from the Environmental System Controller (ESC).

d. Remove screws and washers attaching the ESC to the aft fuselage equipment shelf and remove the ESC from the airplane.

ENVIRONMENTAL SYSTEM CONTROLLER INSTALLATION (Effectivity: All) (Figure 12)

CAUTION

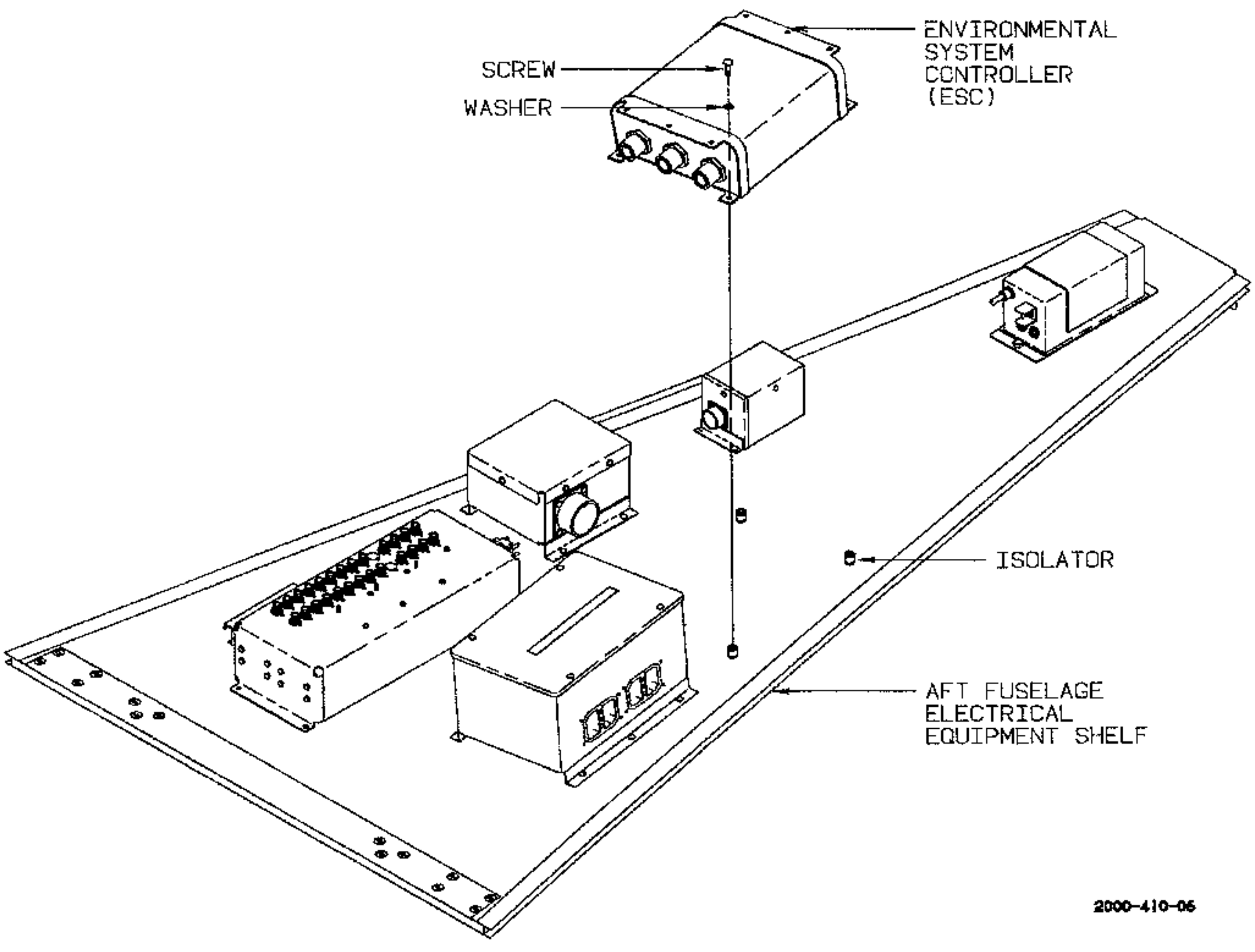
The Environmental System Controller (ESC) must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the ESC with the aft fuselage equipment shelf and secure to the isolator mounts with washers and screws.

b. Reconnect wiring to the ESC according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

c. Install the aft upper fuselage access door and secure with captive fasteners.

d. Restore electrical power to the airplane.



Environmental System Controller Installation (Effectivity: All)
Figure 12

22 - AUTO FLIGHT

LIST OF PAGE EFFECTIVITY

CHAPTER 22 - AUTO FLIGHT

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22-10-00

AUTOPILOT - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

AUTOMATIC FLIGHT CONTROL SYSTEM (Effectivity: All)

The Collins Automatic Flight Control System (AFCS) is certified for use on the Starship 1 and is an integrated flight control system consisting of a full three axis autopilot and dual flight director guidance systems. The AFCS consists of two identical computers, two identical flight guidance mode select panels, one autopilot control panel, three primary servos, and an automatic trim system.

FLIGHT CONTROL COMPUTERS FCC-850 (Effectivity: All)

The two FCC-850 Flight Control Computers are located in the Integrated Avionics Processor System (IAPS) card cage. These computers provide independent flight guidance functions, and operate together to provide the three axis autopilot function.

The FCC-850 computers also provide outputs to automatically run the trim system. The pitch trim axis is controlled through the IAPS. The roll and yaw trim axes are controlled through the ATC-81 Automatic Trim Coupler. When engaged, the FCC-850 computers apply drive signals to each servo. The servo motors then run to position the flight control surfaces in response to the autopilot command.

FLIGHT GUIDANCE MODE SELECT PANEL (Effectivity: All)

The MSP-850A Mode Select Panels are mounted near the lower-center of the instrument panel. Each MSP-850A contains two rows of pushbuttons which allow the operator to select onside flight guidance modes.

AUTOPILOT CONTROL PANEL (Effectivity: All)

The APP-85D Autopilot Panel is mounted in the center pedestal. The APP-85D provides controls to engage the autopilot/yaw damper, manually slew the pitch and roll references, and to select left or right flight guidance input to the autopilot.

AUTOMATIC TRIM COUPLER (Effectivity: All)

The roll and yaw trim axes are controlled through the ATC-81 Automatic Trim Coupler. Each of the trim axes are interfaced to the flight control surfaces as described in Chapter 27.

NOTE

A nonfunctioning system or component may be indicated by a message generated by the self-diagnostics system. A self-test of the system is performed constantly whenever the system has power applied. Refer to the latest revision of the Collins Starship 1 Avionics System Manual P/N 523-0774076-00111A for the proper procedures to be used for accessing and interpreting the diagnostic codes and messages.

ELEVON (ROLL) SERVO (Effectivity: All)

The elevon servo is mounted in the aft wing just forward of the elevon control mixer. Cables from the servo capstan are connected to cables attached to the elevon control mixer. When the autopilot is engaged, the servo rotates, causing elevon deflection dependent on the direction of servo rotation.

NOTE

Improper cable tension may cause unstable or erratic response to autopilot signals.

RUDDER (YAW) SERVO (Effectivity: All)

The rudder servo is mounted in the aft wing, aft of the elevon control mixer. Cables from the yaw servo capstan are attached to cables connected to the aft rudder quadrant. When the yaw axis is engaged, the servo rotates in response to the autopilot signals causing rudder deflection dependent upon the direction of servo rotation.

NOTE

Improper cable tension may cause unstable or erratic response to autopilot signals.

ELEVATOR (PITCH) SERVO (Effectivity: All)

The elevator servo is located in the right forward nose avionics compartment. Cables from the servo capstan are connected to a sector assembly which is connected to the mechanical elevator control linkage. When the autopilot is engaged, the servo causes an elevator deflection dependent on the direction of servo rotation.

NOTE

Improper cable tension may cause unstable or erratic response to autopilot signals.

AUTOPILOT - TROUBLESHOOTING (Effectivity: All)

The FCC-850 Flight Control Computer No. 1 and No. 2, and MSP-850A No. 1 and No. 2 report some faults to the avionics status page on the MFD. The APP-85D Autopilot panel, ATC-81 Automatic Trim Coupler, and SVO-85 Servos do not report faults to the avionics status page for level 1 troubleshooting. Most autopilot and flight directer troubleshooting should be done using the FCS diagnostics section of the Collins Starship 1 Avionics System Manual 523-0774076-00111A.

AUTOPILOT-MAINTENANCE PRACTICES (Effectivity: All)

ELEVON (ROLL) SERVO CABLE REMOVAL (Effectivity: All) (Figure 1)

a. Remove all electrical power from the airplane.

b. Remove the aft wing box shear panel below the wing. Refer to Chapter 53-50-00 for removal procedures. The elevon (roll) servo is accessed through the forward manhole.

c. Cut the safety wire on the screws and remove the cable guards (5) from the capstan (6).

d. Remove the turnbuckle lock clips (2) and disconnect the servo cable turnbuckles (3).

CAUTION

The fuselage elevon roll cables and the aft portion of the elevon servo cable are connected to the elevon control mixer as an assembly. Do not disconnect the assembly from the elevon control mixer to adjust the tension on the elevon servo cable. If it is necessary to remove the aft portion of the elevon servo cable, remove the fuselage elevon cable as described in ELEVON CONTROL CABLES REMOVAL in Chapter 27-30-00.

e. Unwrap and disconnect the cables from the capstan (6), or remove the capstan assembly (6) from the mounting bracket (1) with the cables attached.

ELEVON (ROLL) SERVO CABLE INSTALLATION (Effectivity: All) (Figure 1)

NOTE

Before the autopilot control cables can be rigged, the respective flight control primary cables must be rigged as specified in Chapter 27-30-00.

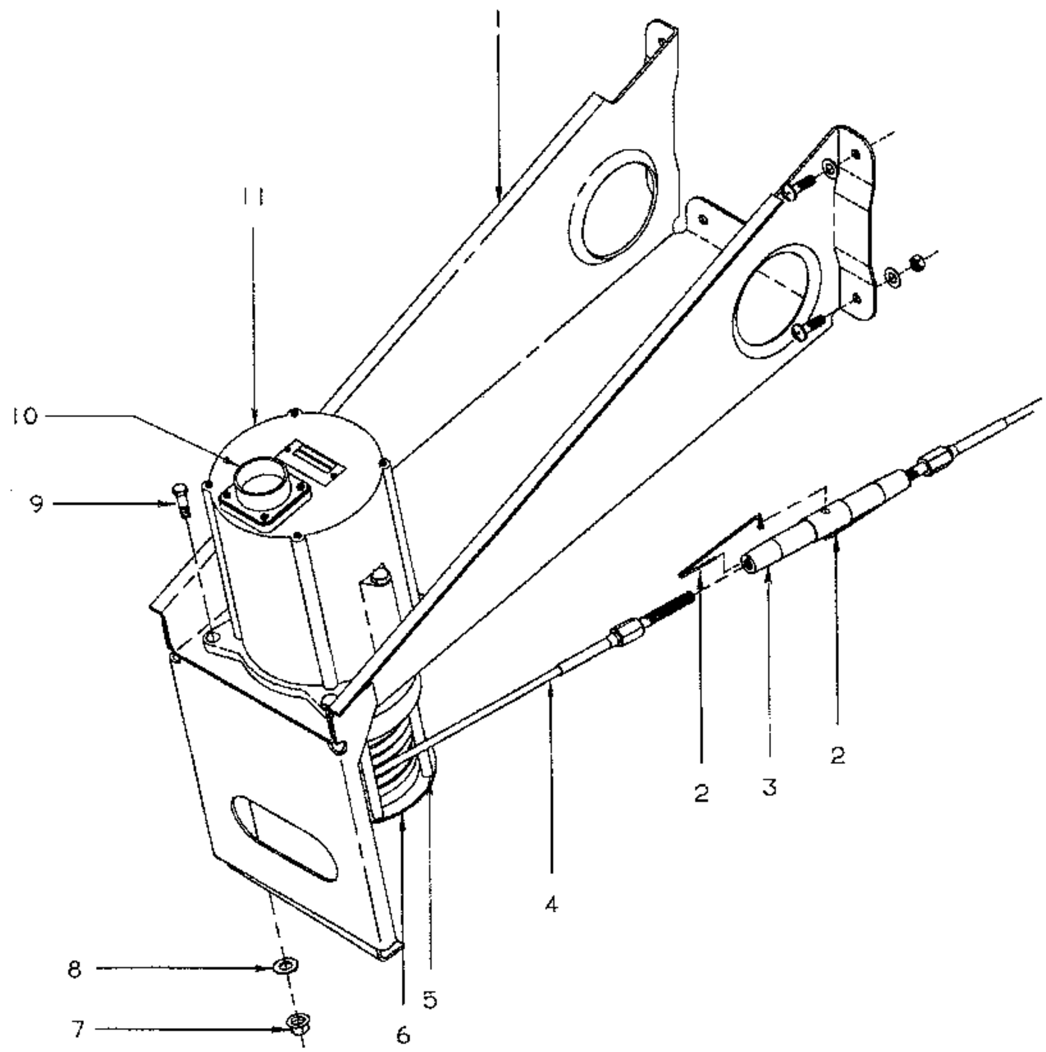
a. Place the elevon in the neutral position and install the rig pins in the elevon control mixer. Refer to Chapter 27-30-00 for pin placement procedures.

b. Attach the right hand threaded cable on the inboard side and the left hand threaded cable on the outboard side of the capstan (4).

c. Wrap the cables on the capstan as follows:

1. Wrap the inboard elevon servo cable approximately 2 turns clockwise on the capstan and attach it to the inboard turnbuckle.

2. Wrap the outboard elevon servo cable approximately 2 1/2 turns counterclockwise around the capstan while aligning the cable with the elevon control mixer. Attach the cable to the outboard turnbuckle.



1. SERVO MOUNTING BRACKET
2. TURNBUCKLE LOCK CLIP
3. TURNBUCKLE
4. OUTBOARD CABLE
5. CABLE GUARDS
6. CAPSTAN
7. NUT
8. WASHER
9. BOLT
10. CONNECTOR
11. SERVO

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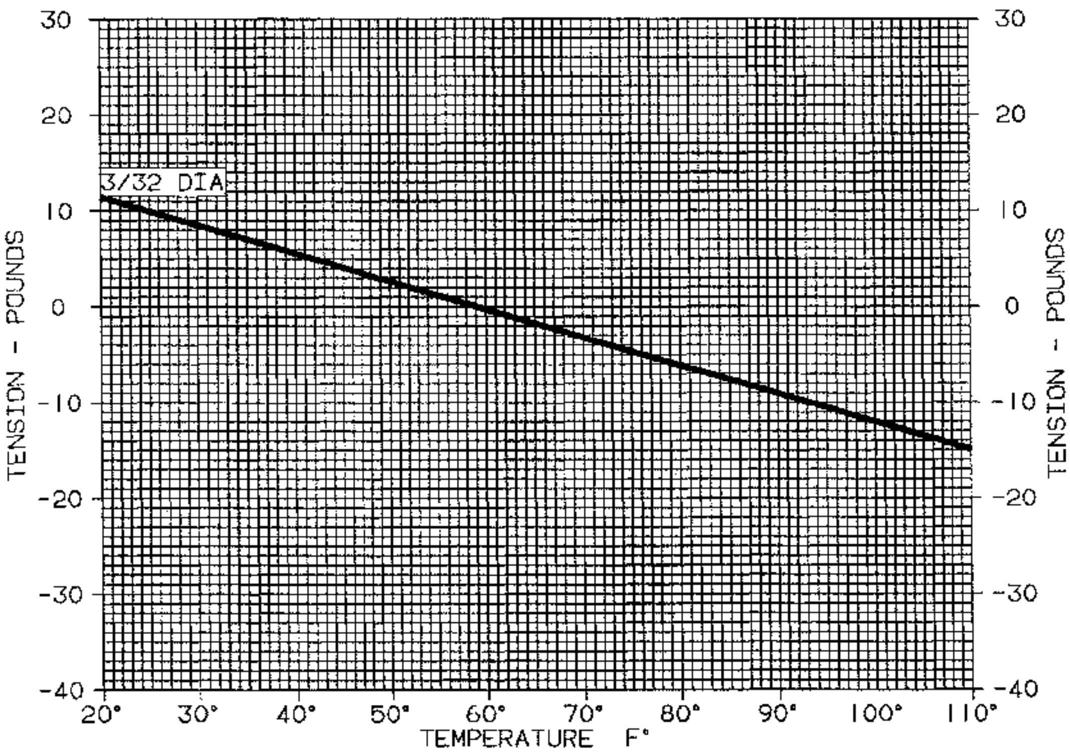
Elevon (Roll) Servo Cable Installation (Effectivity: All)
Figure 1

EXAMPLE:
TO RIG 3/32 DIA. CABLE TO
25±5 LBS AT 59°F
AT TEMPERATURE 80°F
3/32 DIA CABLE TENSION SHOULD BE:
(25-6)±5 LBS
WHERE -6 LBS IS FROM CHART



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Elevon (Roll) Servo Cable Tension Graph (Effectivity: All)
Figure 2

d. Install the cable guards (5) and safety wire the screws.

e. Using the turnbuckles (3), temporarily adjust the elevon servo cable tension to 50 pounds.

f. Remove the rig pins. Refer to Chapter 27-30-00 for procedure.

g. Move the control surface through full travel several times and verify cable/clamp clearance and that no binding exists.

h. Using the turnbuckles (3), adjust the servo cable tension to 25 ±5 pounds at 59° F (refer to Figure 2) and install the turnbuckle lock clips (2).

i. Install the wing box shear panel on the fuselage. Refer to Chapter 53-50-00 for installation procedures.

j. Restore electrical power to the airplane.

ELEVON (ROLL) SERVO/CAPSTAN REMOVAL (Effectivity: All) (Figure 1)

a. Remove the wing box shear panel and elevon servo cables as described previously in this Chapter.

b. Remove and tag the electrical cable from the servo connector (10).

c. Remove bolts (9), washers (8) and nuts (7) holding the servo/capstan (11, 6) assembly on the servo mounting bracket (1).

d. Remove the servo/capstan assembly from the mounting bracket and take to the workbench or a safe storage area.

ELEVON (ROLL) SERVO/CAPSTAN INSTALLATION (Effectivity: All) (Figure 1)

a. Insert the servo/capstan assembly in the mounting bracket and attach with bolts (9), washers (8) and nuts (7).

b. Connect the electrical cable to the servo connector (10).

c. Install the servo cables and aft wing box shear panel as described previously in this Chapter.

RUDDER (YAW) SERVO CABLE REMOVAL (Effectivity: All) (Figure 3)

a. Remove all electrical power from the airplane.

b. Remove the aft wing-box shear panel below the wing as described in Chapter 53-50-00. The rudder (yaw) servo is accessed through the aft manhole.

c. Cut the safety wire and disconnect the cable barrel-turnbuckle (9) by loosening the nuts.

d. Disconnect the forward servo cables (10) from the aft rudder quadrant (12) by cutting the safety wire and removing the screws (11) securing the retainers to the aft rudder quadrant.

e. Cut the safety wire on the screws and remove the cable guards (6).

f. Unwrap and remove the aft servo cables (8 and 13) from the capstan (7).

RUDDER (YAW) SERVO CABLE INSTALLATION (Effectivity: All) (Figure 3)

NOTE

Before the autopilot control cables can be rigged, the respective flight control primary cables must be rigged as specified in Chapter 27-20-00.

a. With the rudder in the neutral position, place one rig pin in the forward rudder sector and another in the rig pin hole in the aft rudder quadrant. Refer to Chapter 27-30-00 for details.

b. Attach the aft servo cables (8 and 13) to the capstan (7).

c. Wrap the aft servo cables on the capstan (7) as follows:

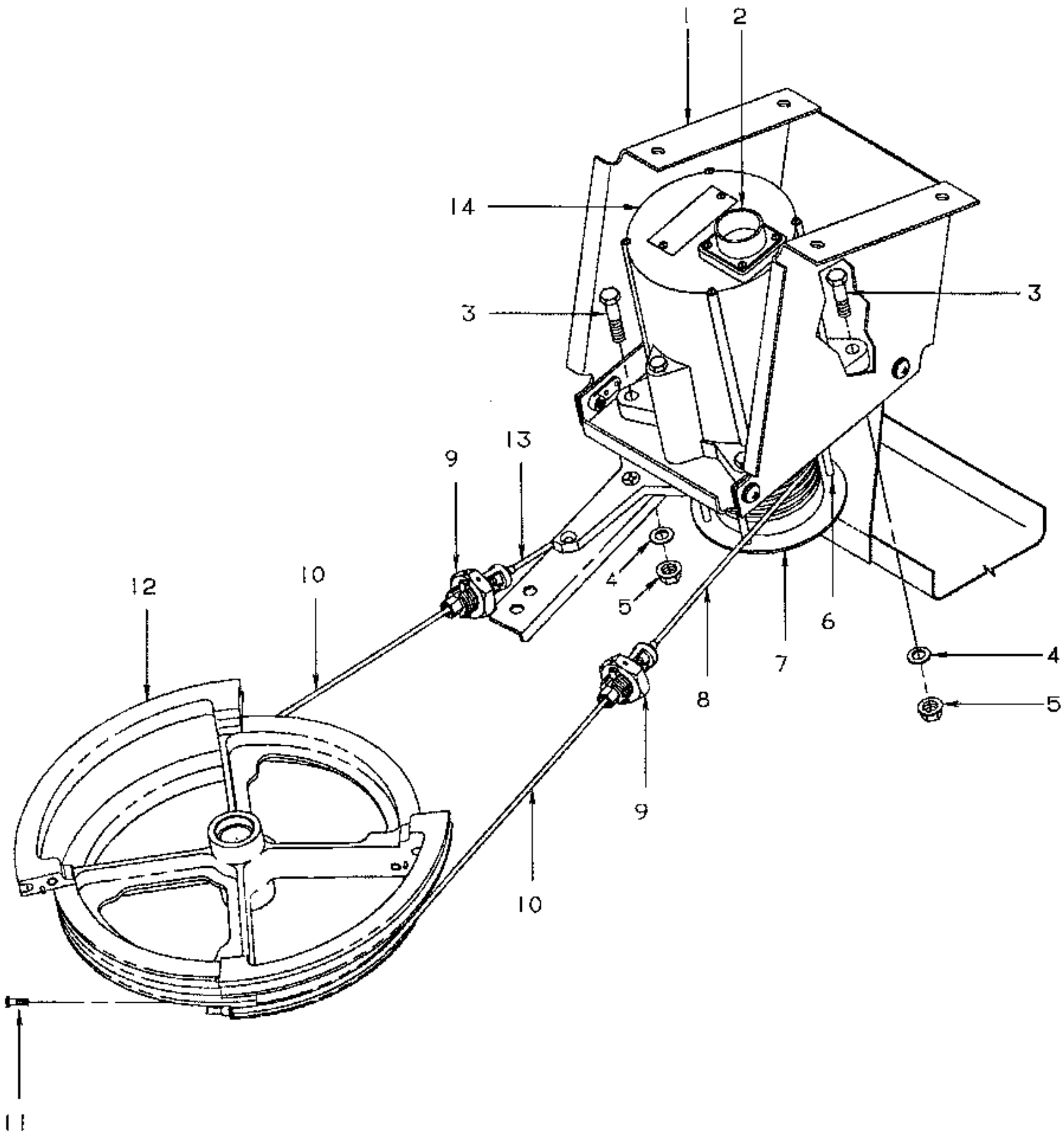
1. Wrap the LH aft servo cable (8) approximately 2 turns clockwise around the capstan (7) to align with the aft rudder quadrant (12).

2. Wrap the RH aft servo cable (13) approximately 2 1/2 turns counterclockwise around the capstan (7) to align with the aft rudder quadrant (12).

3. Attach the forward servo cables (10) to the aft rudder quadrant (12) by securing the retainers to the aft rudder quadrant with the attaching screws (11). Safety wire the screws.

4. Connect the aft servo cables to the forward servo cables by tightening the nuts on the barrel-turnbuckles (9).

d. Install the cable guards (6) and safety wire the attaching screws.



1. MOUNTING BRACKET
2. ELECTRICAL CONNECTOR
3. BOLT
4. WASHER
5. NUT
6. CABLE GUARDS
7. CAPSTAN
8. LH AFT SERVO CABLE
9. BARREL-TURNBUCKLE
10. FORWARD SERVO CABLE
11. SCREW
12. AFT RUDDER QUADRANT
13. RH AFT SERVO CABLE
14. SERVO

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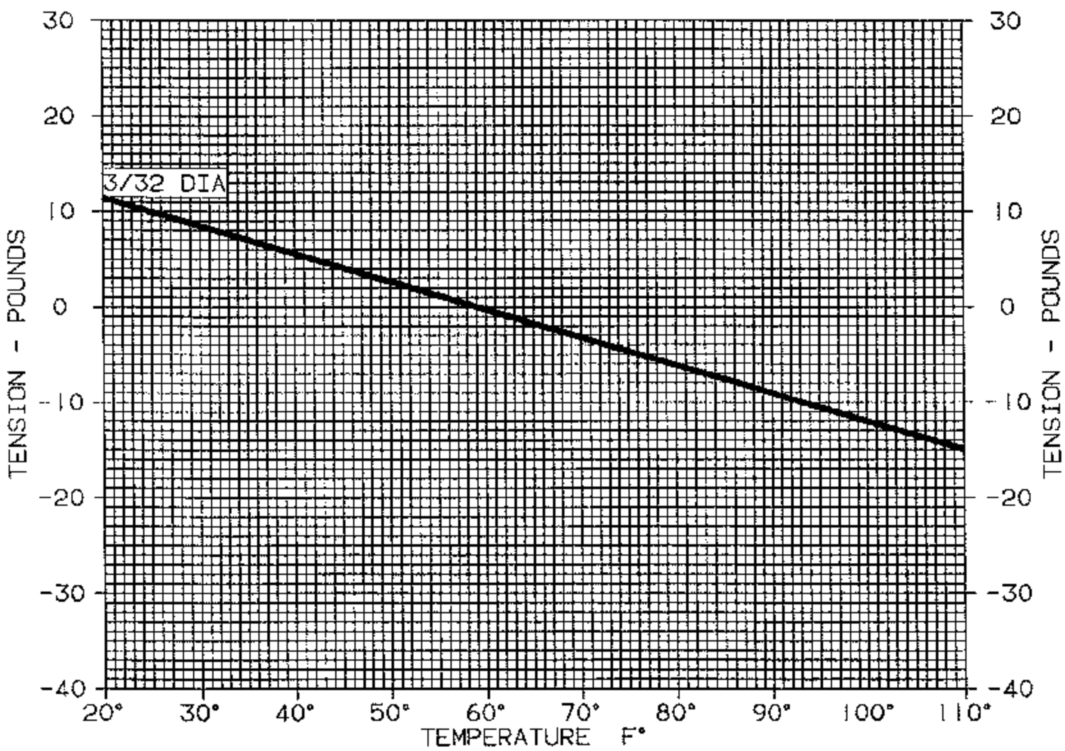
Rudder (Yaw) Servo Cable Installation (Effectivity: All)
Figure 3

EXAMPLE:
TO RIG 3/32 DIA. CABLE TO
25±5 LBS AT 59°F
AT TEMPERATURE 80°F
3/32 DIA CABLE TENSION SHOULD BE:
(25-6)±5 LBS
WHERE -6 LBS IS FROM CHART



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Rudder (Yaw) Servo Cable Tension Graph (Effectivity: All)
Figure 4

e. Using the barrel-turnbuckles (9), set the servo cable tension to approximately 50 pounds of tension.

f. Remove the rig pins.

g. Move the control surface through full travel several times to verify cable/clamp clearance and no binding.

h. Using the barrel-turnbuckles (9), adjust the servo cable to 25 ±5 pounds at 59° F (refer to Figure 4) and safety wire the nuts to the barrel-turnbuckles.

i. Install the wing-box shear panel on the fuselage. Refer to Chapter 53-50-00 for installation procedures.

j. Restore electrical power to the airplane.

RUDDER (YAW) SERVO/CAPSTAN REMOVAL (Effectivity: All) (Figure 3)

a. Remove the wing-box shear panel and rudder servo cables as described previously in this Chapter.

b. Disconnect and tag the electrical connector from the servo connector (2).

c. Remove bolts (3), washers (4) and nuts (5) holding the servo/capstan (7, 14) assembly on the servo mounting bracket (1).

d. Remove the servo/capstan assembly from the mounting bracket and take to the workbench or a safe storage area.

RUDDER (YAW) SERVO/CAPSTAN INSTALLATION (Effectivity: All) (Figure 3)

a. Insert the servo/capstan assembly in the mounting bracket and attach with bolts (3), washers (4) and nuts (5).

b. Connect the electrical connector to the servo connector (2).

c. Install the servo cables and aft wing-box shear panel as described previously in this Chapter.

ELEVATOR (PITCH) SERVO/CAPSTAN AND SERVO CABLE REMOVAL (Effectivity: All) (Figure 5)

a. Remove all electrical power from the airplane.

b. Remove the right avionics compartment door. Refer to Chapter 52-40-00 for removal procedures.

c. Disconnect servo cable (3) from the servo sector assembly (1) by cutting the safety wire and removing the screw (2). Remove servo cable (9) from the sector assembly by loosening the bolt (10) and jam nut (11) until the cable can be removed.

d. Remove bolts (14) and washers (15) holding the servo motor (16) on the bracket (17).

e. Remove the servo and capstan assembly from the bracket (17).

f. Remove the cable guards (8) from the capstan by cutting the safety wire and removing the screws securing the cable guards to the capstan (7).

g. Unwrap and remove the cables from the capstan (7).

ELEVATOR (PITCH) SERVO/CAPSTAN AND SERVO CABLE INSTALLATION (Effectivity: All) (Figure 5)

NOTE

> Before the autopilot control cables can be rigged, the respective flight control primary cables must be rigged as specified in Chapter 27-30-00.

a. Install one rig pin in the forward wing elevator inboard arm and another rig pin in each elevator bell crank. Refer to Chapter 27-30-00 for rig pin details.

b. Attach the servo cables (3 and 9) to the capstan (7).

c. Wrap the servo cables (3 and 9) on the capstan (7) as follows:

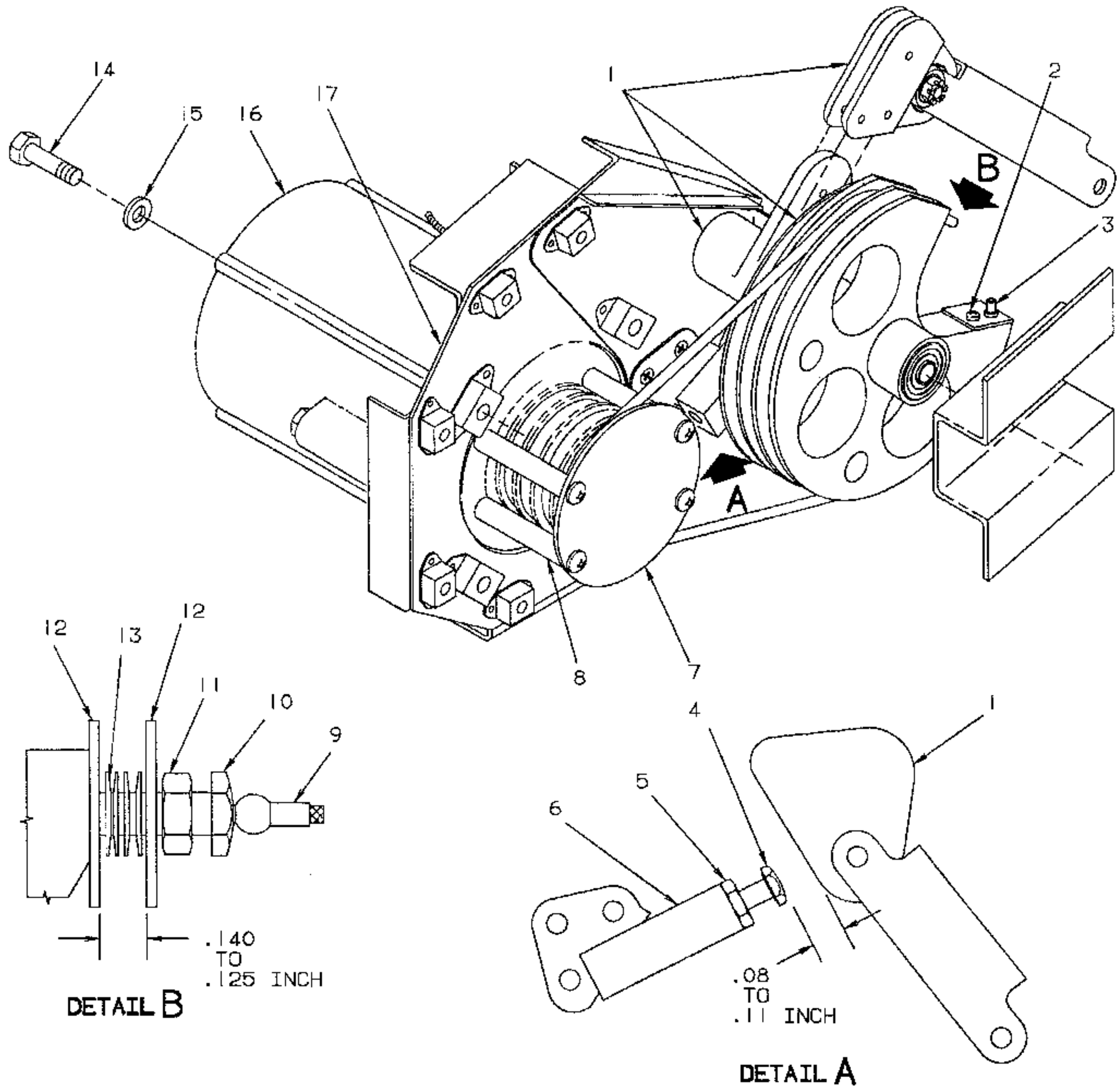
1. Wrap the bottom cable (3) approximately 2 turns clockwise around the capstan (7).
2. Wrap the top servo cable (9) approximately 2 1/2 turns counterclockwise around the capstan.

d. Install the cable guards (8) and safety wire the screws.

e. Insert the servo/capstan assembly (16/7) into the hole in the mounting bracket (17) and secure with bolts (14) and washers (15).

f. Attach servo cable (3) to the servo sector with screw (2). Safety wire the screw.

g. Attach servo cable (9) to the servo sector with washers (12), spring washers (13), jam nut (11) and bolt (10).



1. SECTOR ASSEMBLY
2. SCREW
3. BOTTOM CABLE
4. BOLT
5. JAM NUT
6. STOP FITTING
7. CAPSTAN
8. CABLE GUARDS
9. TOP CABLE
10. BOLT
11. JAM NUT
12. WASHERS
13. SPRING WASHERS
14. BOLT
15. WASHER
16. SERVO MOTOR
17. MOUNTING BRACKET

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Elevator (Pitch) Servo/Capstan and Servo Cable Removal/Installation (Effectivity: All)
Figure 5

h. Set the top servo cable tension by tightening the jam nut (11) to the dimensions given in Figure 5, Detail B. Measure the gap with a feeler gage. Safety wire the jam nut.

i. Remove the rig pins.

j. Move the control surface through full travel several times to verify cable/clamp clearance with no binding.

k. After completion of elevator system rigging, and with the elevator against the elevator trailing edge downstop, adjust the gap between the bolt (4) and the sector assembly (1) to the dimensions shown in Figure 5, Detail A, by adjusting the jam nut (5) and bolt (4).

l. Install the right avionics compartment door. Refer to Chapter 52-40-00 for installation procedures.

m. Restore electrical power to the airplane.

AUTOMATIC TRIM COUPLER REMOVAL (Effectivity: All) (Figure 6)

a. Remove all electrical power from the airplane.

b. Operate the alternate extension hand pump in the cockpit until the forward nose landing gear doors are fully open. Refer to Chapter 32-20-00 for nose gear door procedure.

c. Insert the locking pin in the nose gear door bellcrank. Refer to Chapter 32-20-00 for procedure.

d. Remove the left nose wheel avionics access panel (710AZ).

e. Disconnect the 2 electrical connectors from the automatic trim coupler (4).

f. Remove the 4 screws (1), washers (3), and lockwashers (2) securing the automatic trim coupler (4) to the avionics shelf.

g. Remove the automatic trim coupler (4) to the workbench or a safe storage area.

AUTOMATIC TRIM COUPLER INSTALLATION (Effectivity: All) (Figure 6)

a. Position the automatic trim coupler (4) on the avionics shelf and secure with the 4 screws (1), washers (3), and lockwashers (2).

b. Connect the 2 electrical connectors (5) to the automatic trim coupler (4).

c. Install the left avionics access panel (710AZ) in the nose wheel well.

d. Remove the landing gear door locking pin and push the doors closed.

e. Restore electrical power to the airplane.

SERVO/CAPSTAN DISASSEMBLY (Effectivity: All) (Figure 7)

While each servo and capstan are different for each location (rudder, elevon, and elevator) the procedures for assembly and disassembly are identical.

a. Cut safety wire on bolts (4). Remove bolts (4) and washers (3) from servo.

b. Carefully seperate the capstan mount (2) from the servo motor (1) while taking care to prevent damage to the exposed clutch plates.

SERVO/CAPSTAN ASSEMBLY (Effectivity: All) (Figure 7)

a. Carefully join the capstan mount (2) to the servo motor (1) and install bolts (4) and washers (3).

b. Perform a run-in procedure on the servo mount clutch if a new capstan is being installed on the servo mount. Refer to Collins SVO-85 Primary Servo repair Manual 523-0772563-00311A.

SERVO CLUTCH TORQUE ADJUSTMENT (Effectivity: All)

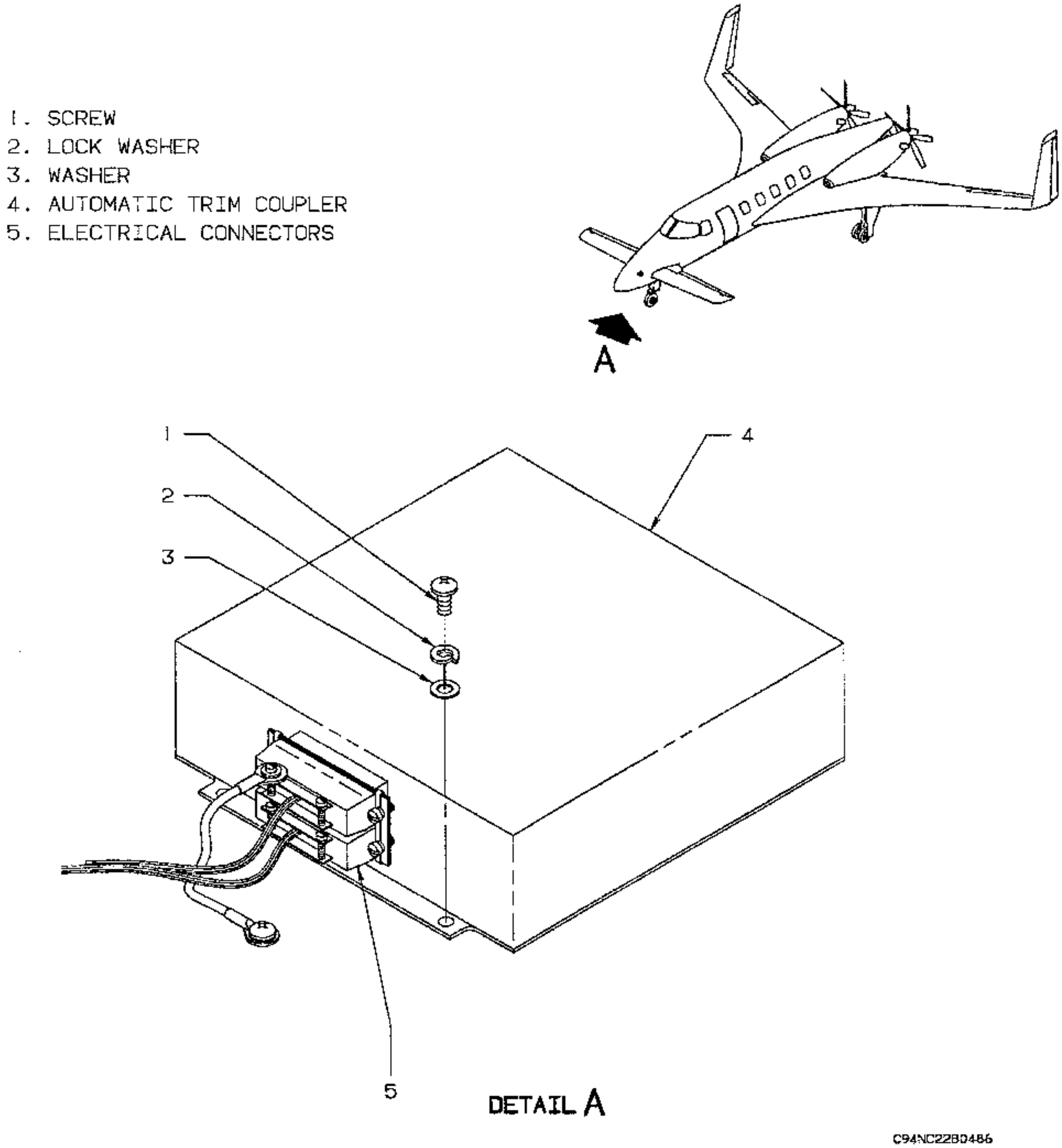
If replacement of the capstan becomes necessary, or if any of the servo clutch torque settings are to be checked, refer to the SVO-85 Collins Instruction Manual for clutch adjustment procedures.

AUTOPILOT CONTROL PANEL REMOVAL (Effectivity: All) (Figure 8)

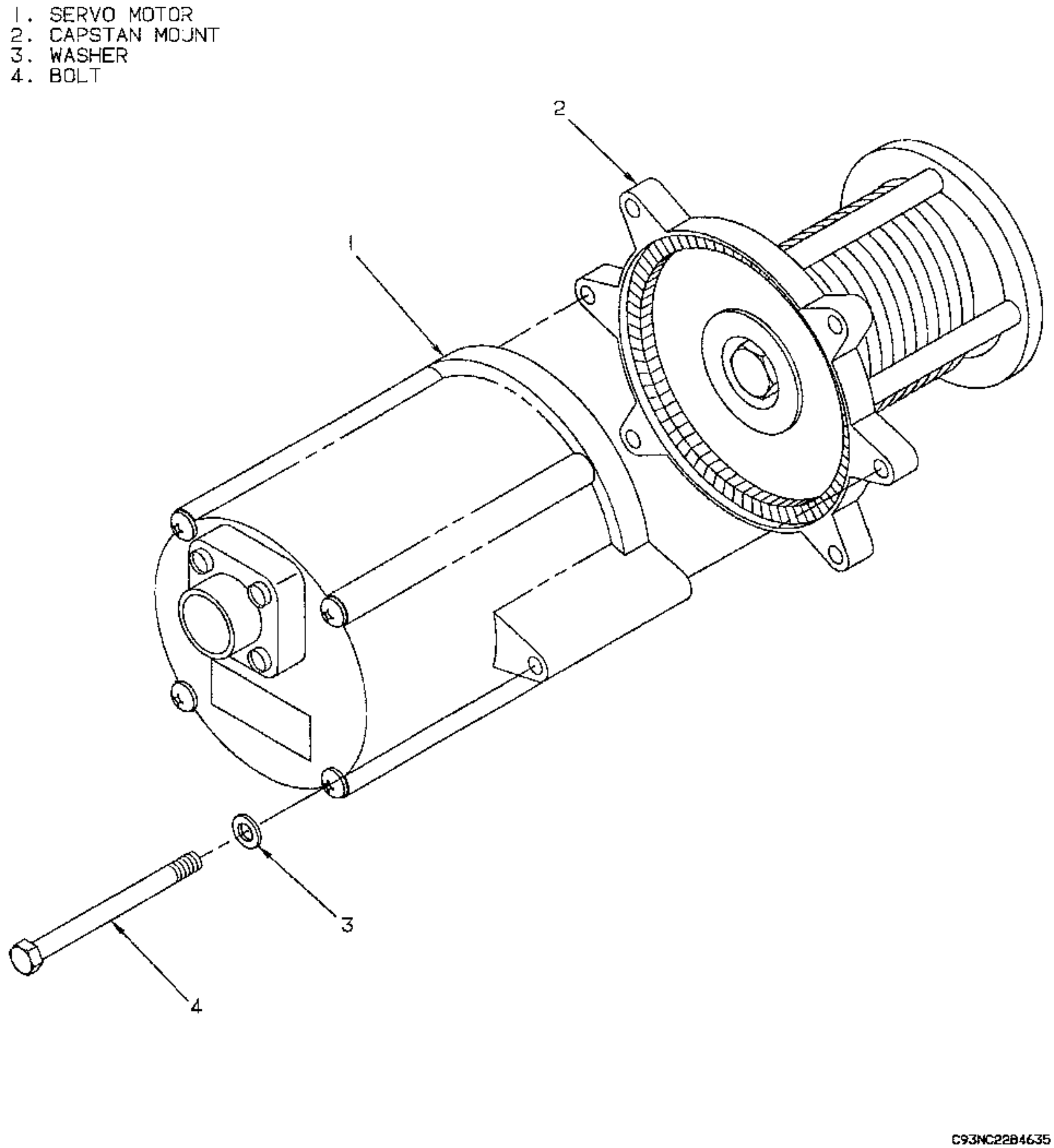
a. Remove all electrical power from the airplane.

b. Turn the two fasteners (4) 1/4-turn counterclockwise.

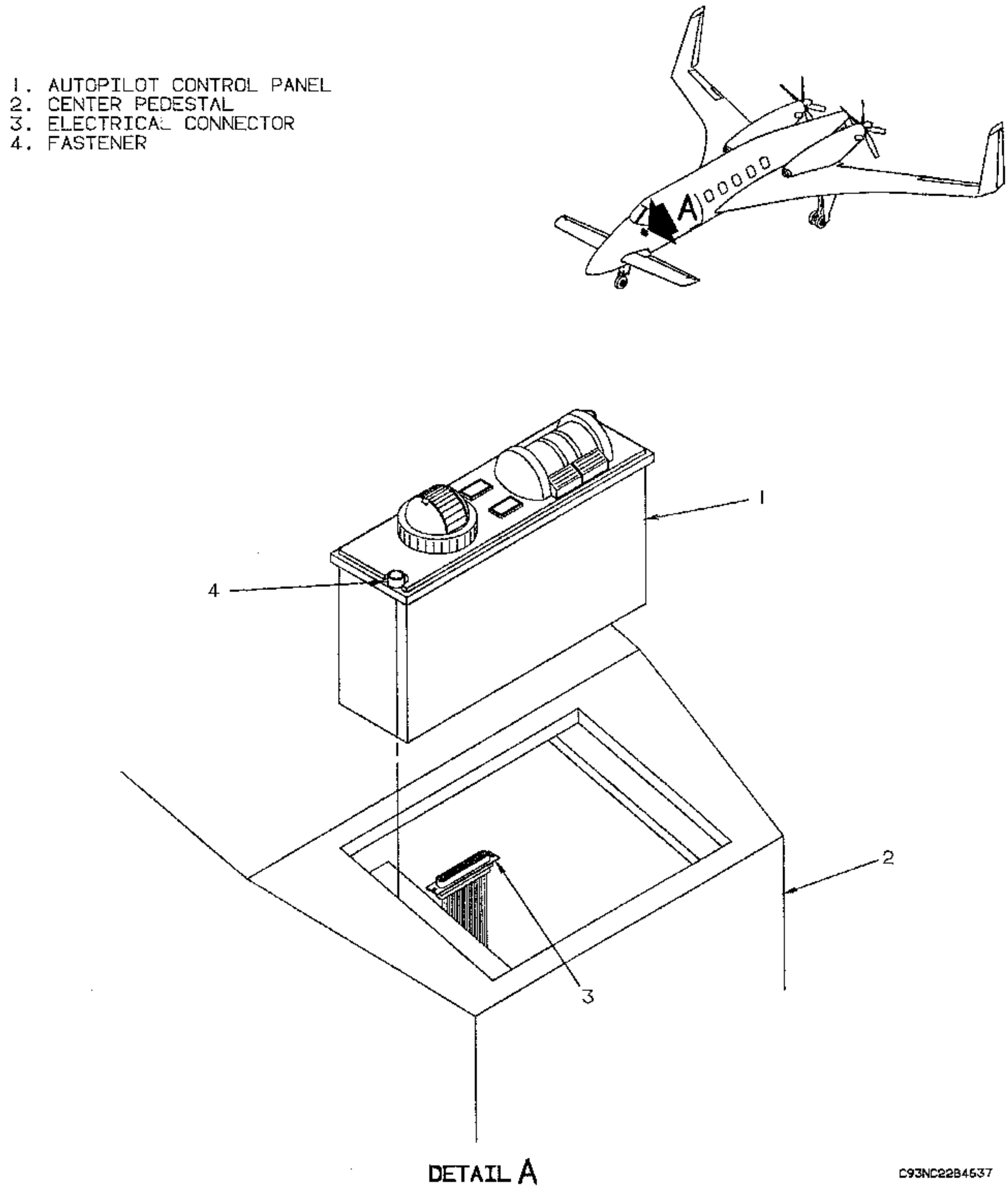
c. Pull the autopilot control panel (1) out of the center pedestal (2) and disconnect the electrical connector (3).



Automatic Trim Coupler (Effectivity: All)
Figure 6



Servo/Capstan Assembly/Disassembly (Effectivity: All)
Figure 7



Autopilot Control Panel Removal/Installation (Effectivity: All)
Figure 8

AUTOPILOT CONTROL PANEL INSTALLATION (Effectivity: All) (Figure 8)

a. Connect the electrical connector (3) and slide the autopilot control panel (1) into the center pedestal (2).

b. Turn the two fasteners (4) 1/4-turn clockwise to secure the autopilot control panel (1).

c. Restore electrical power to the airplane.

FLIGHT GUIDANCE MODE SELECT PANEL REMOVAL/INSTALLATION (Effectivity: All)

Refer to Chapter 31-10-00 for removal/installation procedures.

FLIGHT CONTROL COMPUTER REMOVAL/INSTALLATION (Effectivity: All)

Refer to Chapter 31-41-00, IAPS PRINTED CIRCUIT CARD REMOVAL/ REPLACEMENT for flight control computer removal/installation procedures.

CHAPTER 23 - COMMUNICATIONS

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GENERAL - DESCRIPTION AND OPERATION

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lockpin installation procedures.

CAUTION

When removing communication system components, note the locations of all bonding jumpers to aid in reinstallation. The communication system components must meet the electrical bonding requirements specified in Chapter 20-00-03.

Chapters 23-10-00, 23-11-00, 23-12-00 and 23-40-00 of this manual cover those units and components which furnish a means of communicating from one part of the airplane to another and between the airplane and other airplanes or ground stations. This chapter also includes description and maintenance instructions pertaining to the sound equipment used to address the passengers.

Chapter 23-50-00 of this manual covers the audio integration section and describes the systems that control the output of the communication and navigation receivers in the pilot's headphones and speakers and the output of the pilot's microphones into the communication transmitters.

Chapter 23-60-00 of this manual covers the static discharge section and describes the systems that are used to dissipate static electricity.

NOTE

A nonfunctioning system or component may be indicated by a message generated by the self-diagnostic system. A self-test of the system is performed continously when power is applied. A flashing message (MSG) annunciation on the Control Display Unit (CDU) may indicate that the diagnostics have detected a failure, it can be assumed that the system is functioning properly when the MSG annunciation is not displayed. The self-diagnostic feature of the system is a useful method of verifying proper system operation after performing maintenance on the system. Refer to the latest revision of the Collins Starship 1 Avionics System Manual, P/N 523-0774076-00111A for the proper procedures to be used for accessing and interpreting the diagnostic codes and messages.

SPECIAL TOOLS AND RECOMMENDED MATERIALS

The special tools and recommended materials listed in Charts 1 and 2 as meeting federal, military or supplier specifications are provided for reference only and are not specifically prescribed by Raytheon Aircraft Company. Any product conforming to the specification listed may be used. The products included in these charts have been tested and approved for aviation usage by Raytheon Aircraft Company, by the supplier or by compliance with the applicable specifications. Generic or locally manufactured products which conform to the requirements of the specification listed may be used even though not included in the charts. Only the basic number of each specification is listed. No attempt has been made to update the listing to the latest revision. It is the responsibility of the technician or mechanic to determine the current revision of the applicable specification prior to usage of the product listed. This can be done by contacting the supplier of the product to be used.

CHART 1
SPECIAL TOOLS AND EQUIPMENT

TOOL NAME	PART NO.	SUPPLIER	USE
1. Megohmmeter	Model 2850 or equivalent	Associated Research,Inc 3773 W. Belmont Ave Chicago, IL 60618	Measure high resistance
2. Biddle Tester	TK-2146	Raytheon Aircraft Co Wichita, KS	Perform resistance check on the ground plane

CHART 2
RECOMMENDED MATERIALS

MATERIALS	SPECIFICATION	PRODUCT	SUPPLIER
1. Cleaner		Methyl Propyl Ketone	Obtain locally
2. Sealant	MIL-S-8802, Type 11	Pro-Seal	Pro-Seal Corporation, Division of Essex Chemical Corp, Aerospace Products, Compton, CA. 90220
3. Corrosion Preventive	MIL-C-5541	Alodine 1200	Amchem Products Inc., Spring Garden Street, Ambler, PA. 19002
4. Sealant	MIL-S-8802, Type I	PR1422	Products Research and Chemical Corp. 5426 San Franando Road Glendale, CA 91203
5. Solvent	PD680 Type III	Stoddard Solvent	Obtain locally
6. Sealant	MIL-A-46146	RTV 738	P/N of Dow Corning Corporation, Midland, MI CAGE 71984

SPEECH COMMUNICATION - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

This section covers that portion of the system which utilizes voice-modulated electromagnetic waves to transmit and/or receive messages from air-to-air or air-to-ground installations.

The communication system consists of two identical systems, one for the pilot and one for the copilot. Each system contains a VHF COM transceiver and a radio tuning unit. Each system may also be tuned by the pilot's or the copilot's Control Display Unit (CDU).

The optional radiophone system consists of a handset, transceiver and antenna. A telephone call can be made directly to a ground station from the cabin or cockpit. The radiophone system is covered in Chapter 23-12-00.

VHF COMMUNICATION-DESCRIPTION AND OPERATION (Effectivity: All) (Figure 1)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear must be pinned in the down and locked position. The only exception to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operation prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors must be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for proper lock pin installation procedures.

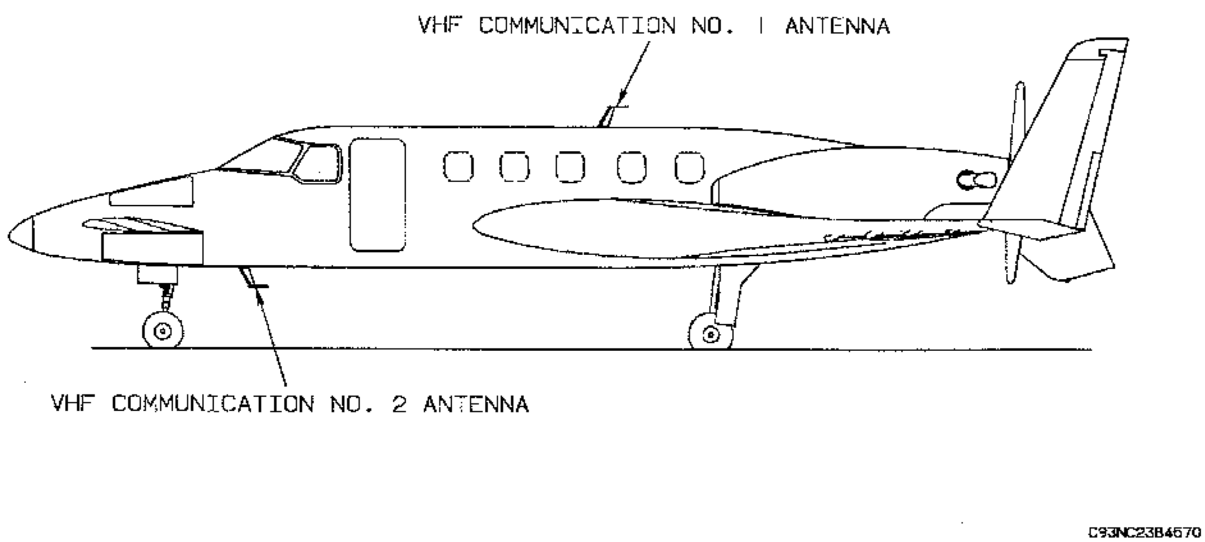
The standard configuration for VHF speech communication in the Starship is two VHF-422A transceivers mounted in the nose wheel well avionics compartment and two antennas, one mounted on the upper fuselage skin (FS291) and one on the lower fuselage skin (FS116). The Radio Tuning Units (RTU) are mounted in the instrument panel.

RADIO TUNING UNIT (RTU) (Effectivity: All) (Figure 2)

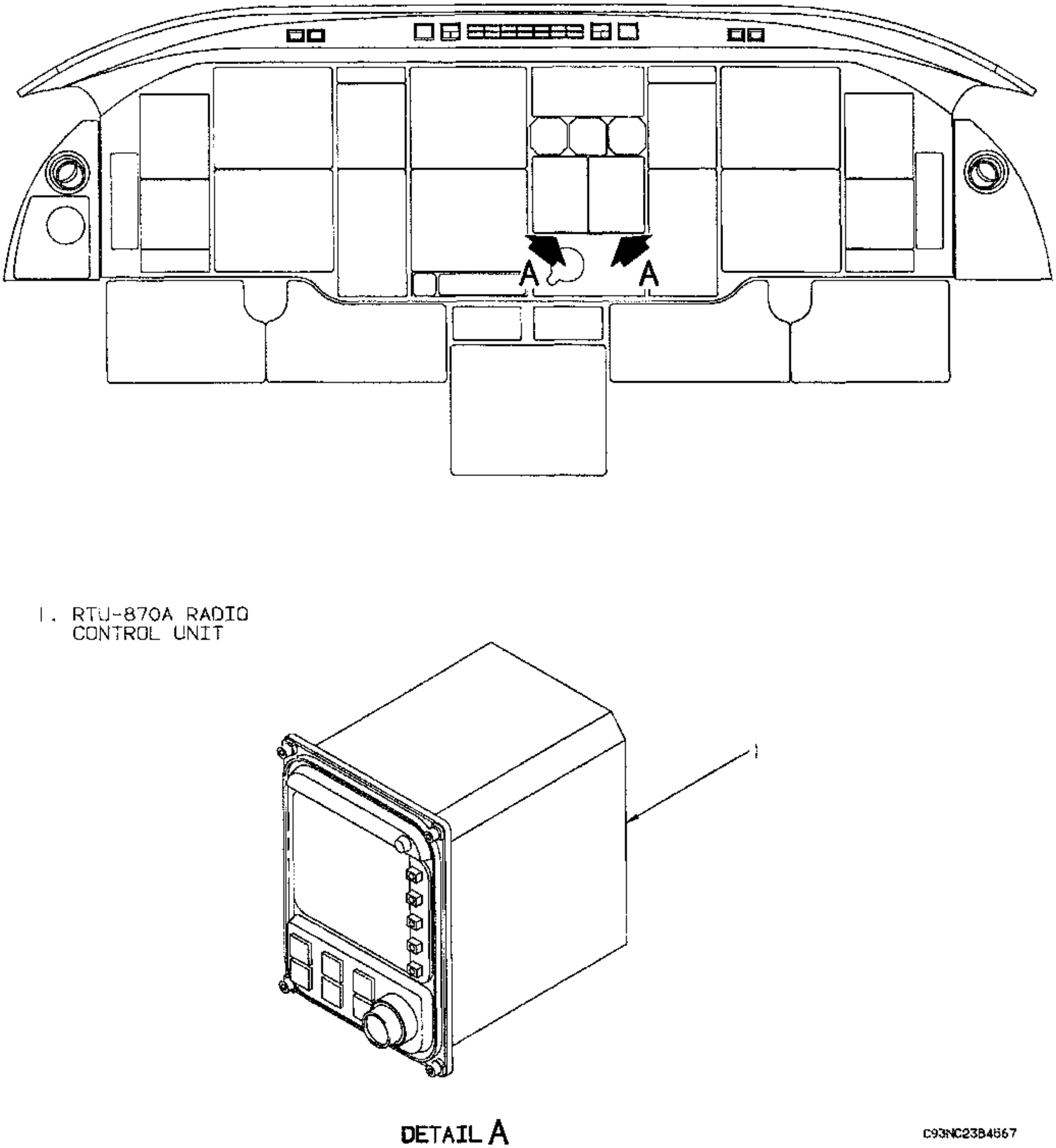
The RTU's are located in the center of the instrument panel. They are the primary controllers of the VHF communications.The No.1 RTU (left) is used to tune the left side transceiver. The No.2 RTU is used to tune the right side transceiver. Either RTU can be switched to display engine data.

VHF COMMUNICATION TRANSCEIVER (Effectivity: All) (Figure 3)

The transceivers are remotely mounted units that provide voice comunications. The transceivers are made



VHF Communication Antenna Locations (Effectivity: All)
Figure 1



Radio Tuning Unit (RTU) (Effectivity: All)
Figure 2

by Collins and are configured to operate over an ARINC-429 bus. The range of frequencies available is from 118.000 to 135.975 MHz. The transceiver frequency can be set by the Control Display Units (CDU) or RTU. Comm No. 1 is tuned by the pilot's RTU and Comm No. 2 is tuned by the copilot's RTU. If one RTU is disabled, the remaining RTU can be used to tune the frequency of both transceivers. The audio output is applied to the audio system. The RH and LH outboard instrument panel subpanels contain switches that control where the VHF audio is heard. Volume is controlled by a potentimeter on the microphone output select switch and by the individual potentimeters located on the center reversionary panel.

VHF COMMUNICATION SYSTEM - TROUBLESHOOTING (Effectivity: All)

Troubleshoot the VHF communication system as outlined in the Collins Starship 1 Avioncs System Manual, P/N 523-0774076-00111A.

VHF COMMUNICATION-MAINTENANCE PRACTICES (Effectivity: All)

VHF TRANSCEIVERS REMOVAL (Effectivity: All) (Figure 3)

a. Remove electrical power from the airplane.

b. Operate the emergency landing gear extension handle enough to open the nose landing gear doors then secure the handle. Perform the NOSE LANDING GEAR DOOR LOCK PIN INSTALLATION procedure in Chapter 32-20-00.

c. Gain access to the right or left nose wheel well avionics compartment by removing the screws securing the nose avionics compartment panel (710BZ or 710AZ). Comm No.1 is in the left and Comm No.2 is in the right nose avionics compartment.

d. Loosen the knurled knobs (3) securing the transceiver (2) in the rack (1) and carefully remove the transceiver from the rack and airplane.

VHF TRANSCEIVERS INSTALLATION (Effectivity: All) (Figure 3)

a. Carefully position the transceiver (2) in the rack (1).

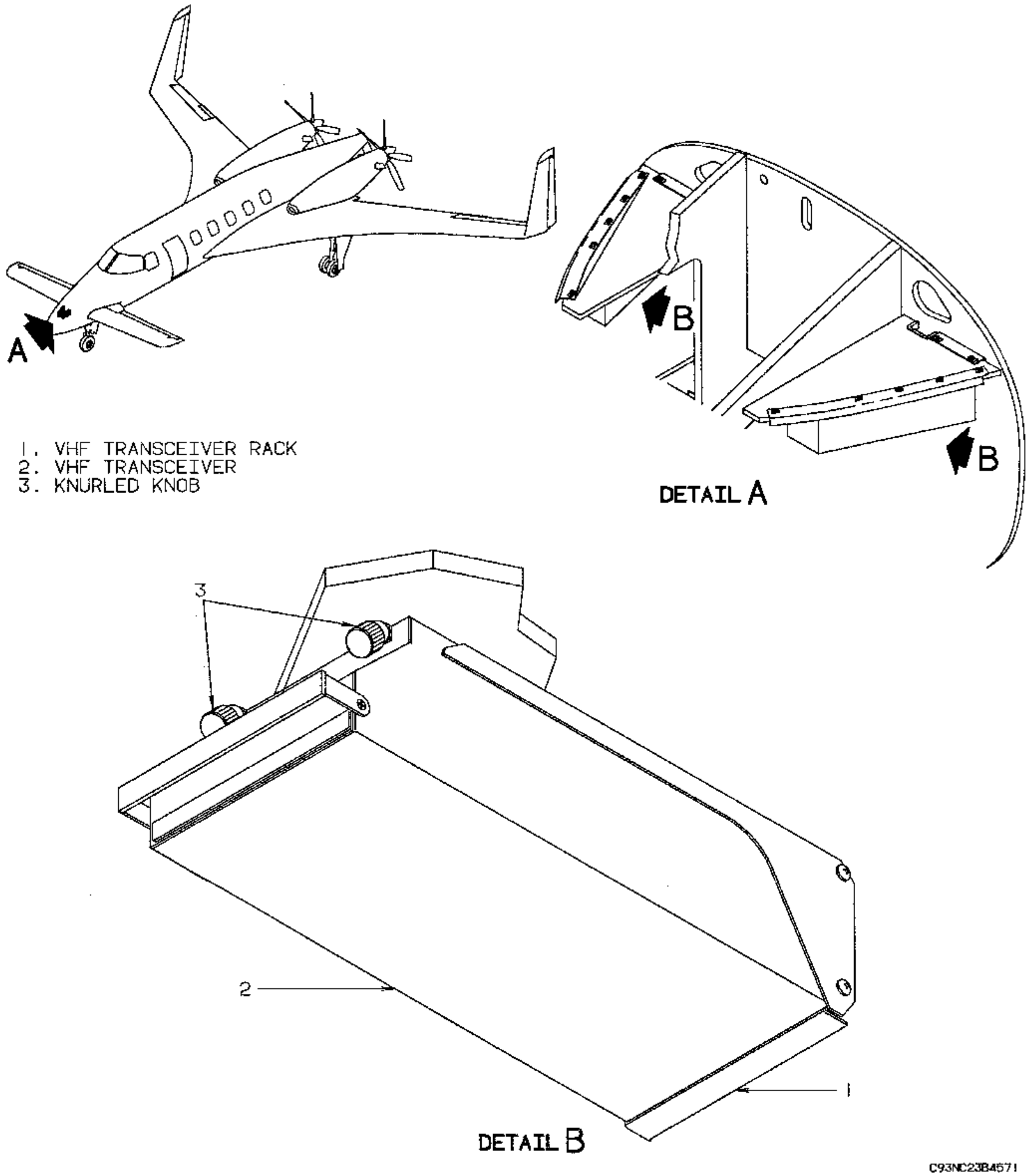
b. Tighten the knurled knobs (3) securing the transceiver (2) in the rack (1).

c. Apply electrical power to the airplane.

d. Test the VHF communication system using the Collins Starship 1 Avionic Systems Manual, P/N 523-0774076-00111A, Level 2 Troubleshooting Procedures.

e. Secure the nose avionics compartment panel (710BZ or 710AZ) covering the nose wheel well avionics compartment.

f. Remove the nose landing gear door lock pin and close the nose gear doors.



VHF Transceivers Installation (Effectivity: All)
Figure 3

UPPER VHF ANTENNA REMOVAL
(Effectivity: All)
(Figure 4 Detail A)

a. Remove electrical power from the airplane.

b. Remove the four screws (4) securing the antenna (3) to the fuselage.

c. Carefully strip the sealant (5) from the edge of the antenna (3) with a nonmetallic scraper. Avoid damage to the fuselage, paint or antenna.

NOTE

When removing or installing antennas, always secure coaxial cable to keep it from slipping inside the structure. This can be accomplished by tying a piece of string around the coaxial cable and securing the string to the structure.

d. Pull the antenna (3) far enough up to reach the antenna coaxial cable and disconnect the coaxial cable from the antenna.

e. Remove the antenna (3) and the spacer (2).

UPPER VHF ANTENNA INSTALLATION
(Effectivity: All)
(Figure 4 Detail A)

a. Remove all the old sealant (5) from around the contact area of the fuselage, antenna (3) and spacer (2).

b. Thoroughly clean the contact surface of the fuselage where the antenna (3) is to be mounted. Refer to Chapter 20-00-03, COMPOSITE SURFACE PREPARATION FOR ELECTRICAL BONDING, for cleaning and bonding procedures.

c. Thoroughly clean the antenna (3) and spacer (2) down to the base metal, then chemically treat the antenna with alodine (3, Chart 2, Chapter 23-00-00) to prevent corrosion. Refer to Chapter 20-00-03, METAL SURFACE PREPARATION AND ELECTRICAL BONDING, for bonding procedures.

d. Hold antenna (3) close to opening with the spacer (2) in place and connect the coaxial cable to the antenna.

e. Place the antenna (3) and spacer (2) on the fuselage and secure the antenna with four screws (4).

f. After the antenna (3) is installed, check the bond resistance (refer to Chapter 20-00-03, ELECTRICAL BOND RESISTANCE CHECK).

g. Apply electrical power to the airplane and perform the VHF Communication Inspection/Check per Collins Starship 1 Avionics System Manual, P/N 523-07740-00111A, Level 2 Troubleshooting Procedures.

h. Apply sealant (5) (2, Chart 1, 23-00-00) around the periphery of the antenna (2).

LOWER VHF ANTENNA REMOVAL
(Effectivity: NC-4 and after without BEECHCRAFT Kit No. 122-3014-1 or -3 installed)
(Figure 4 Details B and D)

a. Remove electrical power from the airplane.

b. Refer to Chapter 25-10-00 and remove the lower left access panel of pedestal to gain access to VHF antenna connector and reinforcement plate assembly (1).

c. Carefully strip sealant (5) from around the edge of antenna (3) with a nonmetallic scraper. Avoid damaging the fuselage, paint, or antenna.

d. Disconnect coaxial cable connector from antenna (3).

e. Remove the four screws (4) securing antenna (3) to fuselage.

f. Remove the antenna (3) and spacer (2).

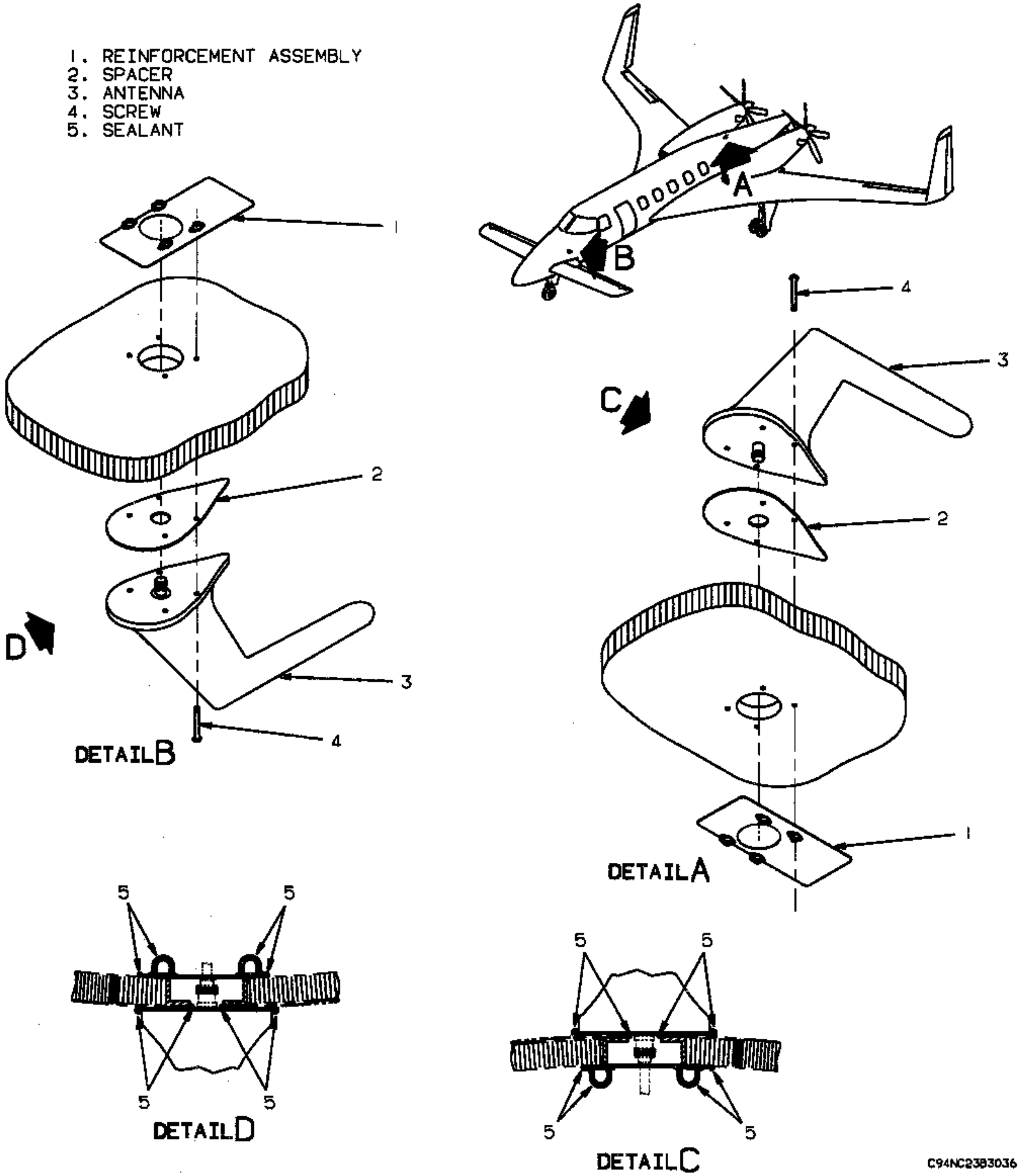
g. Remove reinforcement plate (1) from inside airplane.

LOWER VHF ANTENNA INSTALLATION
(Effectivity: NC-4 and after without BEECHCRAFT Kit No. 122-3014-1 or -3 installed)
(Figure 4 Details B and D)

a. Remove all the old sealant (5) from around contact areas of the fuselage, antenna (3) and reinforcement plate assembly (1).

b. Thoroughly clean the contact surface of fuselage where antenna (3) is to be installed. Refer to Chapter 20-00-03, COMPOSITE SURFACE PREPARATION FOR ELECTRICAL BONDING, for cleaning and bonding procedures.

c. Thoroughly clean antenna (3), spacer (2), and reinforcement plate assembly (1) down to base metal; then chemically treat the antenna with alodine (3, Chart 2, Chapter 23-00-00) to prevent corrosion.



VHF Communication Antenna Installation (Effectivity: NC-4 and after without BEECHCRAFT Kit No. 122-3014-1 or -3 installed)
Figure 4

Refer to Chapter 20-00-03, METAL SURFACE PREPARATION AND ELECTRICAL BONDING, for bonding procedures.

d. With help from an assistant inside the airplane, properly position antenna (3), spacer (2), and reinforcement plate assembly (1) for installation.

e. Secure these parts in place with the four screws (4).

f. Connect coaxial connector to antenna.

g. After the antenna (3) is installed, refer to Chapter 20-00-03, ELECTRICAL BOND RESISTANCE CHECK, and check the bond resistance.

h. Apply electrical power to the airplane and perform the VHF Communication Inspection/Check per the latest revision of the Collins Starship 1, Avionics System Manual, P/N 523-07740-00111A, Level 2 Troubleshooting Procedures.

i. From inside the cabin, apply sealant (5) (2, Chart 2, 23-00-00) around the inside of antenna fuselage opening where antenna (3) joins the fuselage skin. Apply sealant (5) (2, Chart 2, 23-00-00) around periphery of reinforcement plate assembly (1) and completely cover each nut plate on reinforcement plate assembly (1) with sealant (5) (6, Chart 2, 23-00-00).

j. From exterior of airplane, apply sealant (5) (2, Chart 2, 23-00-00) around periphery of antenna (3).

k. Refer to Chapter 25-10-00 and reinstall the pedestal upholstery panel.

LOWER VHF ANTENNA REMOVAL (Effectivity: NC-4 and after with BEECHCRAFT Kit No. 122-3014-1 or -3 installed) (Figure 5 Details B and D)

a. Remove electrical power from the airplane.

b. Refer to Chapter 25-10-00 and remove the lower left access panel of pedestal to gain access to the VHF antenna connector and reinforcement plate assembly (2).

c. Carefully strip the sealant (6) from around the edge of antenna (4) with a nonmetallic scraper. Avoid damaging the fuselage, paint, and antenna.

d. Remove the four screws (5) securing antenna (4) to fuselage.

e. Pull antenna (4) down and disconnect the coaxial cable connector. Remove antenna (4) and spacer (3).

f. Remove reinforcement plate assembly (2) from inside the airplane. Use a nonmetallic scraper to remove boot (1) from reinforcement plate assembly (2).

NOTE

If the boot is not damaged it may be reused. However, it must be removed to facilitate the application of sealant upon reinstallation of antenna.

LOWER VHF ANTENNA INSTALLATION (Effectivity: NC-4 and after with BEECHCRAFT Kit No. 122-3014-1 or -3 installed) (Figure 5 Details B and D)

a. Remove all the old sealant (6) from around the contact areas of the fuselage, antenna (4), and reinforcement plate assembly (2).

b. Thoroughly clean the contact surface of the fuselage where antenna (4) is to be mounted. Refer to Chapter 20-00-03, COMPOSITE SURFACE PREPARATION FOR ELECTRICAL BONDING, for cleaning and bonding procedures.

c. Thoroughly clean antenna (4), spacer (3), and reinforcement plate assembly (2) down to base metal; then chemically treat the antenna (4) with alodine (3, Chart 2, Chapter 23-00-00) to prevent corrosion. Refer to Chapter 20-00-03, METAL SURFACE PREPARATION AND ELECTRICAL BONDING, for bonding procedures.

d. With help from an assistant inside the airplane, properly position antenna (4), spacer (3), and reinforcement plate assembly (2) for installation. Secure these parts in place with the four screws (5).

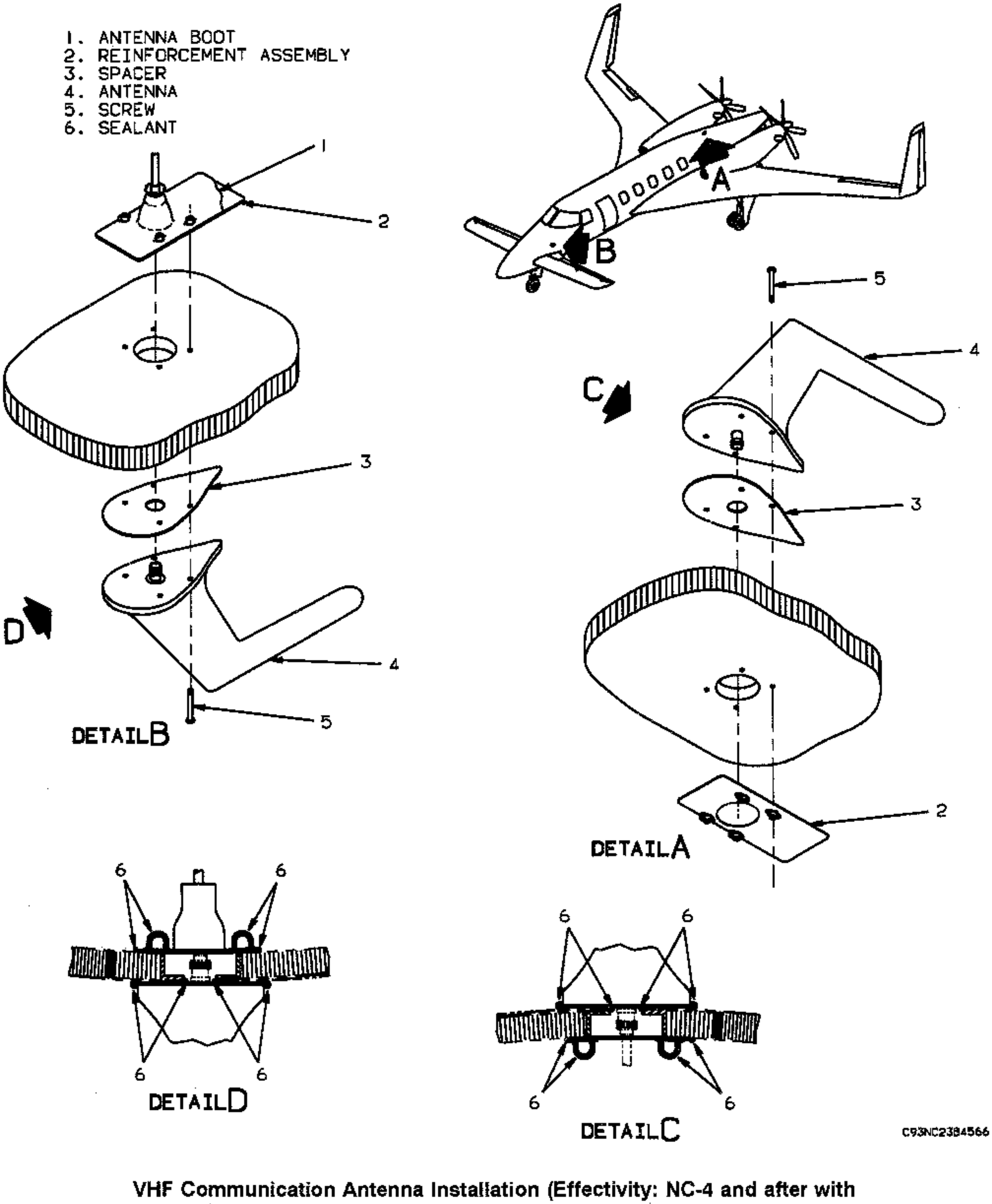
e. After the antenna (4) is installed, refer to Chapter 20-00-03, ELECTRICAL BOND RESISTANCE CHECK, and check the bond resistance.

f. If antenna boot (1) is being replaced, locate and cut holes to accomodate nut plates on reinforcement plate assembly (2).

g. From inside the cabin install boot (1) onto coaxial cable.

h. Connect coaxial connector to antenna (4).

i. Apply electrical power to the airplane and perform VHF Communication Inspection/Check per the latest revision of the Collins Starship 1, Avionics System Manual, P/N 523-07740-00111A, Level 2 Troubleshooting Procedures.



VHF Communication Antenna Installation (Effectivity: NC-4 and after with BEECHCRAFT Kit No. 122-3014-1 or -3 installed)
Figure 5

j. Apply sealant (6) (2, Chart 2, 23-00-00) around inside of antenna fuselage opening where antenna (4) joins the fuselage skin.

k. Bond antenna boot (1) to reinforcement plate assembly (2) with sealant (6) (6, Chart 2, 23-00-00).

l. Apply sealant (6) (6, Chart 2, 23-00-00) to periphery of reinforcement plate assembly (2) and antenna boot (1) as necessary to provide a good moisture barrier.

m. Completely cover each nut plate on reinforcement plate assembly (2) with sealant (6) (6, Chart 2, 23-00-00).

n. From exterior of airplane, apply sealant (6) (2, Chart 2, 23-00-00) around periphery of antenna (4).

o. Refer to Chapter 25-10-00 and reinstall the pedestal upholstery panel.

RADIOPHONE SYSTEM-DESCRIPTION AND OPERATION (Effectivity: NC-4 thru NC-13; Optional NC-14 and after)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lockpin installation procedures.

A radiophone handset can be installed in the cabin and/or the cockpit. With either installation, a telephone call may be made directly to a ground station. The system consists of a transceiver, an antenna and the radiophone handset. The transceiver and handset(s) receive 28 vdc from the FLIGHT PHONE circuit breaker. The volume control on the handset is used to set the loudness of the communication in the headset.

RADIOPHONE SYSTEM - TROUBLESHOOTING (Effectivity: NC-4 thru NC-13; Optional NC-14 and after)

Troubleshooting of the radiophone system should be accomplished using the BEECHCRAFT avionics wiring diagrams and the latest revision of the Global/ Wulfsberg installation/maintenance manual for the Flitefone 6.

RADIOPHONE SYSTEM-MAINTENANCE PRACTICES (Effectivity: NC-4 thru NC-13; Optional NC-14 and after)

RADIOPHONE TRANSCEIVER REMOVAL (Effectivity: NC-4 thru NC-13; Optional NC-14 and after) (Figure 1)

a. Remove power from the airplane.

b. Gain access to the transceiver (3) located in the forward manhole by removing the aft wing shear panel (528AB).

c. Disconnect the electrical connectors from the transceiver (3).

d. Loosen the knurled knob (1) securing the transceiver (3) to the tray (2) and carefully pull the transceiver out.

RADIOPHONE TRANSCEIVER INSTALLATION (Effectivity: NC-4 thru NC-13; Optional NC-14 and after) (Figure 1)

a. Carefully position the transceiver (3) in the tray (2).

b. Tighten the knurled knob (1) securing the transceiver (3) to the tray (2). Safety wire knurled knob (1) to transceiver handle.

c. Connect electrical connectors to the transceiver (3).

d. Install the aft wing shear panel (528AB). Insure that the bond strap and all other cables are reconnected.

RADIOPHONE ANTENNA REMOVAL (Effectivity: NC-4 thru NC-13 without BEECHCRAFT Kit No. 122-3014-3 installed; Optional NC-14 and after without BEECHCRAFT kit No. 122-3014-1 installed) (Figure 2)

a. Remove power from airplane.

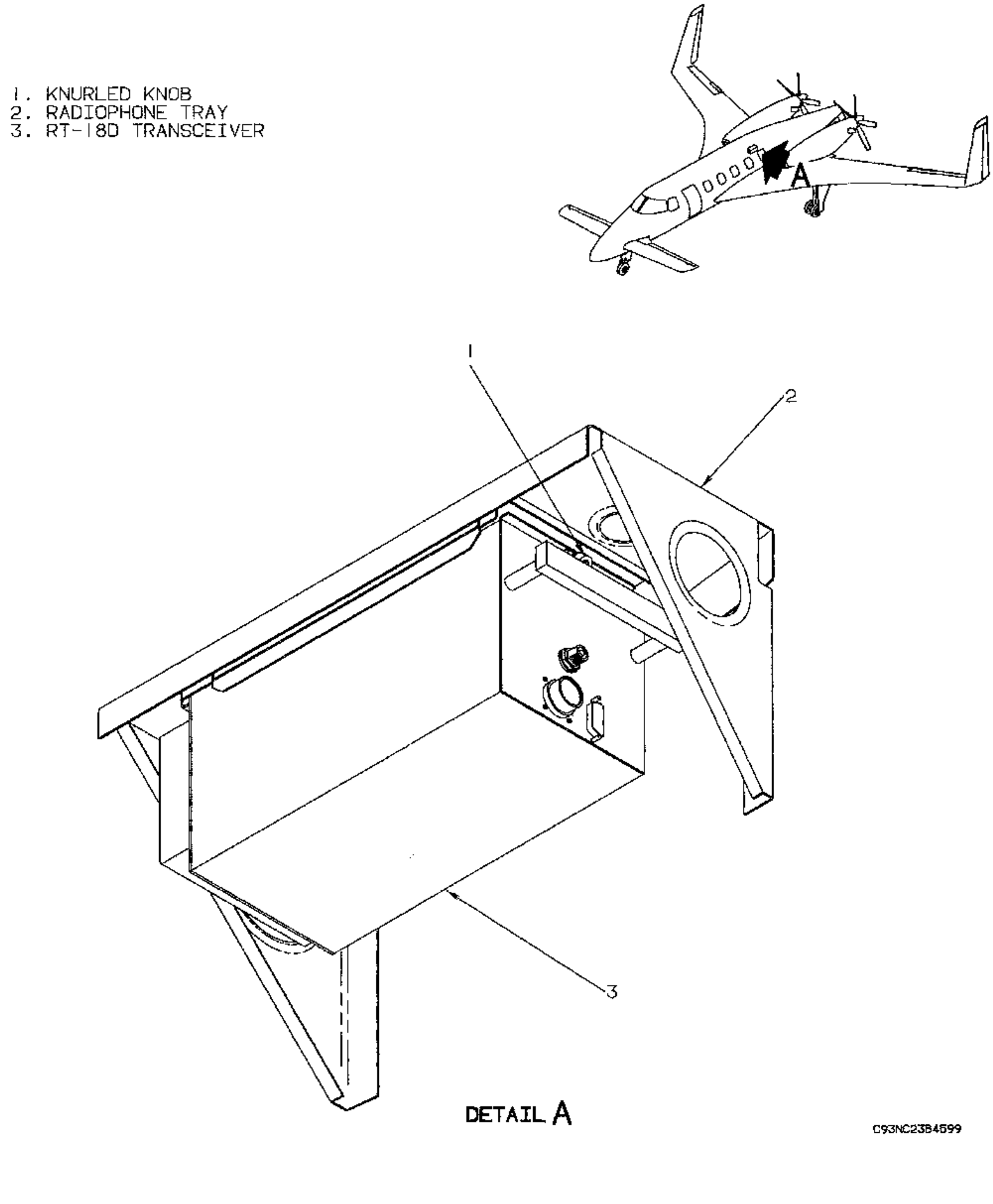
b. Remove floorboard (163ATC) and gain access to the antenna (2) at FS 199.

c. Disconnect coaxial cable connector (4) from antenna (2).

d. Use a nonmetallic scraper and remove sealant (5) from around the base of the antenna (2), using caution to avoid damaging the antenna or airplane surface.

e. Remove the four screws (3) securing antenna (2) to the lower fuselage and remove antenna (2).

f. Remove reinforcement plate assembly (1) from inside the airplane.



Radiophone Transceiver Installation (Effectivity: NC-4 thru NC-13; Optional NC-14 and after)
Figure 1

RADIOPHONE ANTENNA INSTALLATION (Effectivity: NC-4 thru NC-13 without BEECHCRAFT Kit No. 122-3014-3 installed; Optional NC-14 and after without BEECHCRAFT Kit No. 122-3014-1 installed) (Figure 2)

a. Remove all the old sealant (5) from around the fuselage, antenna (2) and the reinforcement plate assembly (1) contact areas.

b. Thoroughly clean the contact surface of fuselage where antenna (2) is to be installed. Refer to Chapter 20-00-03, COMPOSITE SURFACE PREPARATION FOR ELECTRICAL BONDING, for cleaning and bonding procedures.

c. Thoroughly clean antenna (2) and reinforcement plate assembly (1) down to base metal; then chemically treat the antenna with alodine (3, Chart 2, Chapter 23-00-00) to prevent corrosion. Refer to Chapter 20-00-03, METAL SURFACE PREPARATION AND ELECTRICAL BONDING, for bonding procedures.

d. With help from an assistant inside the airplane, properly position antenna (2) and reinforcement plate assembly (1) for installation. Secure in place with the four screws (3).

e. After antenna (2) is installed, refer to Chapter 20-00-03, ELECTRICAL BOND RESISTANCE CHECK, and check bond resistance.

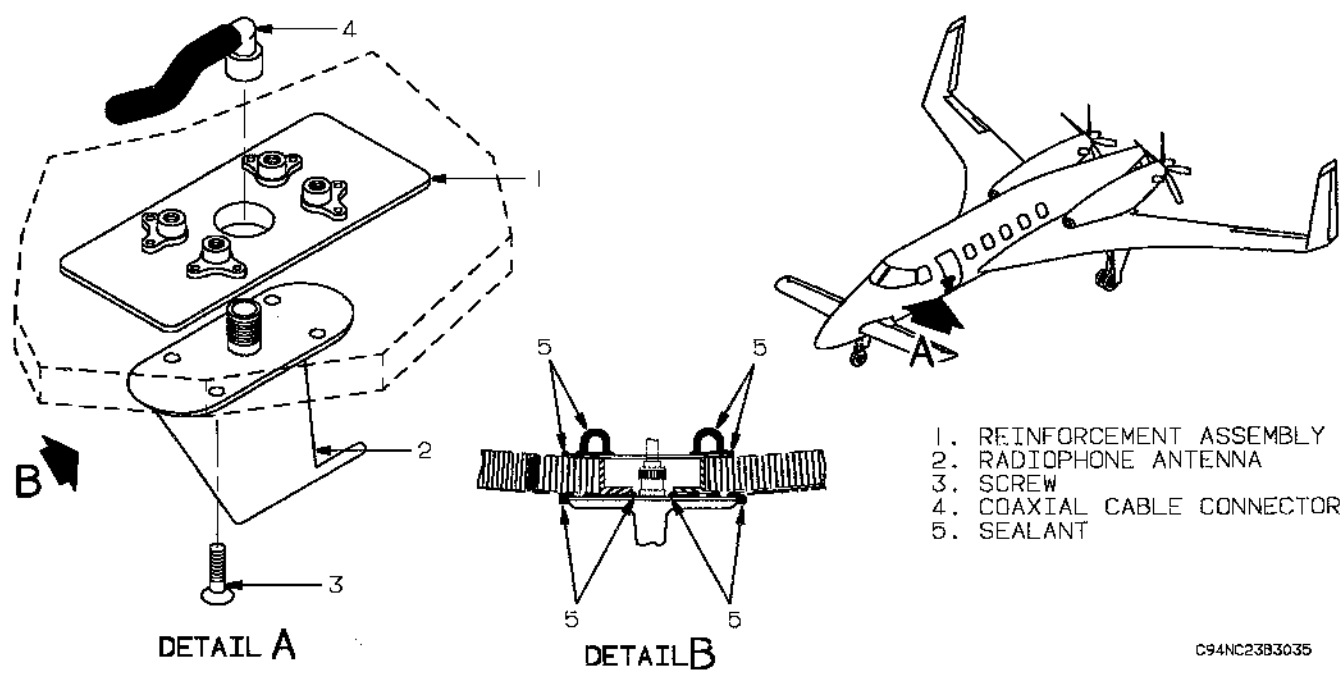
f. From inside the cabin, apply sealant (5) (2, Chart 2, 23-00-00) around the inside of antenna fuselage opening where antenna (2) joins the fuselage skin. Also apply sealant (5) (2, Chart 2, 23-00-00) around periphery of reinforcement plate assembly (1).

g. Completely cover each nut plate on reinforcement plate assembly (1) with sealant (5) (6, Chart 2, 23-00-00).

h. Connect coaxial cable connector (4) to antenna (2).

i. Replace floorboard (163ATC).

j. From exterior of airplane, apply sealant (5) (2, Chart 2, 23-00-00) around periphery of antenna (2).



Radiophone Antenna Installation (Effectivity: NC-4 thru NC-13 without BEECHCRAFT Kit No. 122-3014-3 installed; Optional NC-14 and after without BEECHCRAFT Kit No. 122-3014-1 installed)
Figure 2

RADIOPHONE ANTENNA REMOVAL (Effectivity: NC-4 thru NC-13 with BEECHCRAFT Kit No. 122-3014-3 installed; optional NC-14 and after with BEECHCRAFT Kit No. 122-3014-1 installed) (Figure 3)

a. Remove power from airplane.

b. Remove floorboard (163ATC) and gain access to antenna (4) at FS 199.

CAUTION

Avoid damage to coaxial cable and connector, antenna, and surrounding airplane surface.

c. Cut and remove tie-wrap (7).

d. Slice open antenna boot (2) to gain access to coaxial connector.

e. Disconnect coaxial cable connector (1) from antenna (4).

f. Use a nonmetallic scraper to remove old sealant (6) from around base of antenna (4).

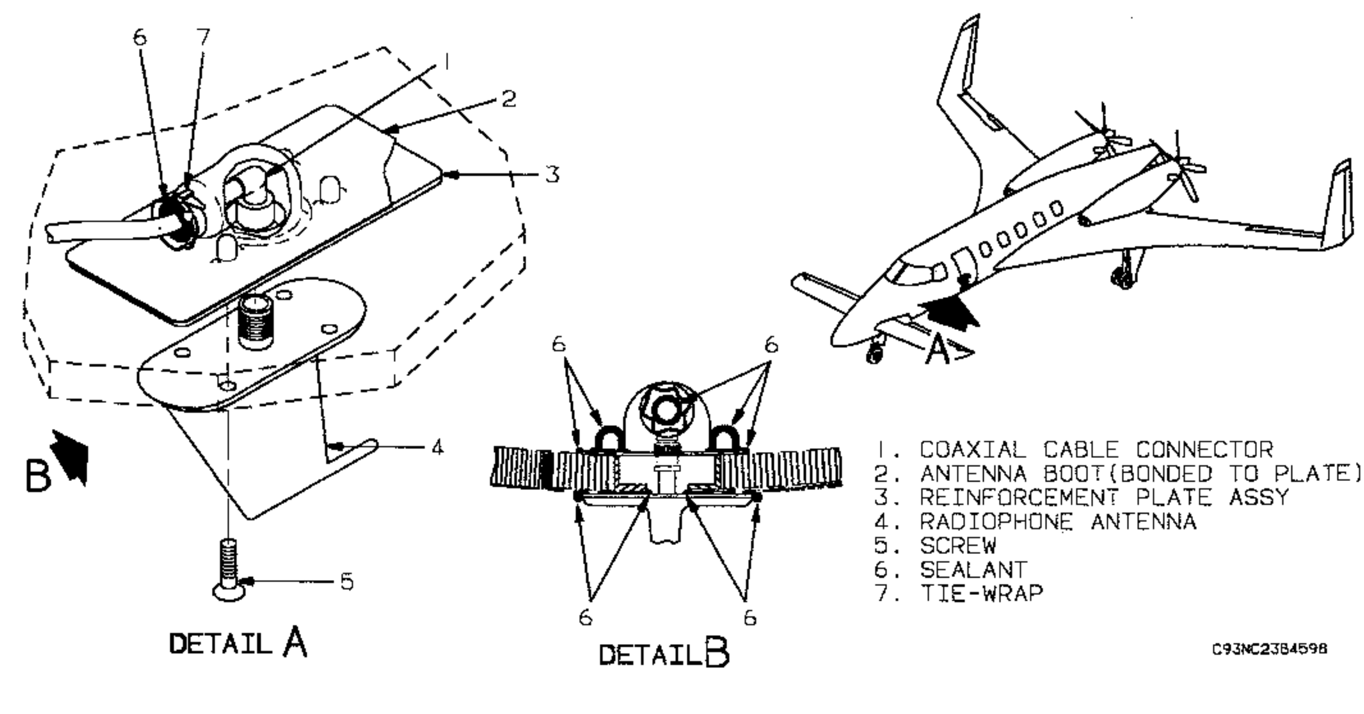
g. Remove the four screws (5) securing antenna (4) to the lower fuselage and remove antenna (4) from airplane.

h. Remove reinforcement plate assembly (3) from inside the airplane.

RADIOPHONE ANTENNA INSTALLATION (Effectivity: NC-4 thru NC-13 with BEECHCRAFT Kit No. 122-3014-3 installed; Optional NC-14 and after with BEECHCRAFT Kit No. 122-3014-1 installed) (Figure 3)

a. Remove all the old sealant from around antenna (4), reinforcement plate assembly (3), and fuselage contact areas.

b. Thoroughly clean the contact surface of fuselage where antenna (4) is to be installed. Refer to Chapter 20-00-03, COMPOSITE SURFACE PREPARATION FOR ELECTRICAL BONDING, for cleaning and bonding procedures.



Radiophone Antenna Installation (Effectivity: NC-4 thru NC-13 with BEECHCRAFT Kit No. 122-3014-3 installed; Optional NC-14 and after with BEECHCRAFT Kit No. 122-3014-1 installed)
Figure 3

c. Thoroughly clean antenna (4) and reinforcement plate assembly (3) down to base metal, then chemically treat the antenna with alodine (3, Chart 2, Chapter 23-00-00) to prevent corrosion. Refer to Chapter 20-00-03, METAL SURFACE PREPARATION AND ELECTRICAL BONDING, for bonding procedures.

d. Use a nonmetallic scraper to remove remainder of boot (2) from surface of reinforcement plate assembly (3).

e. Locate and cut holes in the new antenna boot (2) to accomodate the nut plates on reinforcement plate assembly (3).

f. With help from an assistant inside the airplane, properly position antenna (4) and reinforcement plate assembly (3) for installation. Secure in place with the four screws (5).

g. After the antenna (4) is installed, refer to Chapter 20-00-03, ELECTRICAL BOND RESISTANCE CHECK, and check the bond resistance.

h. From inside the cabin, apply sealant (6) (2, Chart 2, 23-00-00) around the inside of antenna fuselage opening where the antenna (4) joins the fuselage skin.

i. Install antenna boot (2) onto coaxial assembly, carefully pushing it over the connector (1).

j. Connect the coaxial cable connector (1) to antenna (4).

k. Bond antenna boot (2) to reinforcement plate (3) with sealant (6) (6, Chart 2, 23-00-00).

l. Apply sealant (6) (6, Chart 2, 23-00-00) to periphery of of reinforcment plate assembly (3) and antenna boot (2) to provide a good moisture barrier from this assembly to the airplane skin.

m. Completely cover nut plates on reinforcment plate assembly (3) with sealant (6) (6, Chart 2, 23-00-00).

n. Apply sealant (6) (6, Chart 2, 23-00-00) approximately 1/2 inch into the end of antenna boot (2) and close the end of the boot with tie-wrap (7).

o. Replace floorboard (163ATC).

p. From exterior of airplane, apply sealant (6) (2, Chart 2, 23-00-00) around periphery of antenna (4).

GROUND INTERPHONE SYSTEM - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear must be pinned in the down and locked position. The only exception to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operation prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors must be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for proper lock pin installation procedures.

The interphone system is that portion of the system which is used by flight and ground personnel to communicate between areas on the airplane. It does not include the interphone system within the flight compartment which is part of the audio integrating system discussed in Chapter 23-50-00.

There is a MIC and PHONE jack and a speaker in the nose wheel well. When a boom microphone is inserted into the nose wheel MIC jack, the crew in the cockpit can communicate with the ground crew through the wheel well speaker. With the headphone inserted in the nose wheel phone jack, the wheel well speaker is disabled. The cockpit crew can communicate through the wheel well speaker even if a boom microphone is not inserted into the MIC jack. The wheel well spkr/phone volume is adjusted in the DB-218 paging amplifier. The wheel well microphone audio is adjusted in the DB-204 interphone amplifier. Both are located in the right nose avionics compartment.

GROUND INTERPHONE SYSTEM - TROUBLESHOOTING (Effectivity: All)

Troubleshooting of the ground interphone system should be accomplished using BEECHCRAFT avionics wiring diagrams supplied with the airplane for interconnecting information.

GROUND INTERPHONE SYSTEM - MAINTENANCE PRACTICES (Effectivity: All)

NOTE

The airplane battery must be installed for this procedure. The battery switch and external power do not need to be on.

GROUND INTERPHONE SYSTEM CHECKOUT (Effectivity: All)

a. Place the MIC OUTPUT SELECT switch to the WHEEL WELL position.

b. Place the AUDIO SPKR switch to ON.

c. Turn the MIC SELECT switch to the position required for the microphone being used.

d. Plug a headset/boom microphone into the nosewheel MIC and PHONE jacks. Ground interphone is now active between the nosewheel and the cockpit.

e. Disconnect the nose headphone.

f. When the headphone is pulled from the nose jack, the cockpit can be heard through the wheel well speaker.

g. Disconnect the boom microphone/headset from the nose wheel well jacks to prevent battery from being discharged.

NOSE WHEEL WELL SPEAKER REMOVAL (Effectivity: All) (Figure 1)

a. Pump the alternate extension hand pump in the cockpit until the forward nose landing gear doors are open.

b. Refer to Chapter 32-20-00 and install the lockpin into the nose gear door bellcrank.

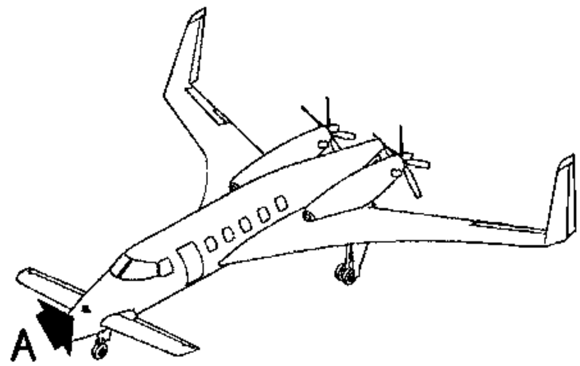
c. Disconnect electrical connector (5) from the speaker (4).

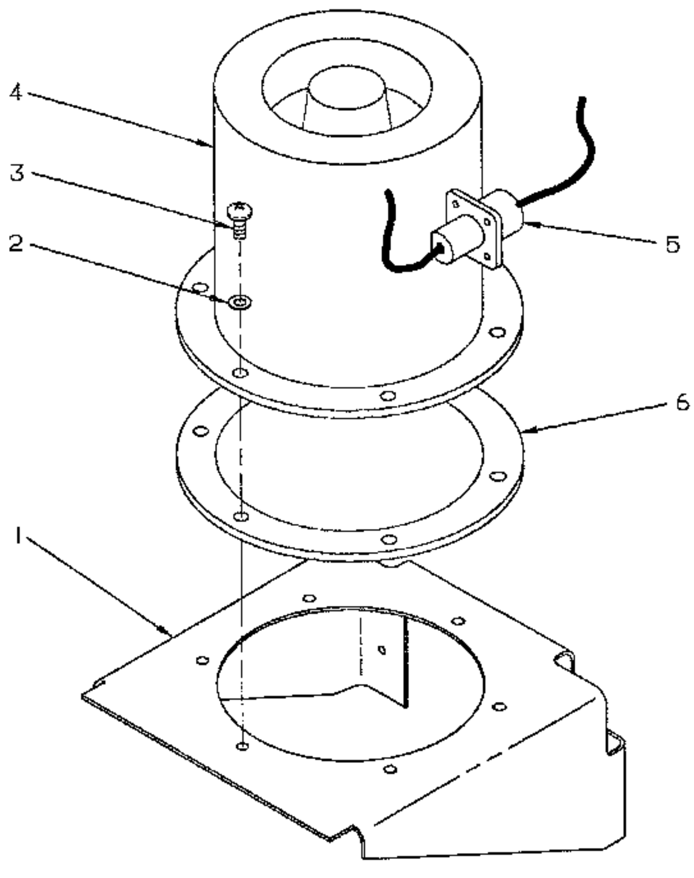
d. Remove six screws (3) and washers (2) securing speaker (4) to the speaker bracket (1). Save the gasket (6) between the speaker (4) and the speaker bracket (1).

NOSE WHEEL WELL SPEAKER INSTALLATION (Effectivity: All) (Figure 1)

a. Position gasket (6) between the speaker (4) and the speaker bracket (1).

1. SPEAKER BRACKET
2. WASHER
3. SCREW
4. NOSE WHEEL WELL SPEAKER
5. CONNECTOR
6. GASKET





DETAIL A

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Nose Wheel Well Speaker Installation (Effectivity: All)
Figure 1

b. Secure the speaker (4) to the speaker bracket (1) with six screws (3) and washers (2).

c. Connect electrical connector (5) to the speaker (4).

d. Remove the lock pin and close the forward nose landing gear doors.

NOSE WHEEL WELL MIC/PHONE JACK REMOVAL (Effectivity: All) (Figure 2)

a. Remove all electrical power from the airplane.

b. Remove two screws (8) securing cover (3) to phone connector box (1).

c. Pull the cover (3) out of box (1) far enough to reach wires soldered to MIC/PHONE jacks (9 and 10).

d. Tag and identify wires to be removed. Unsolder wires from jack (9 or 10).

e. Remove connector cover (7), nuts (6), washers (4 and 5).

f. Remove the MIC/PHONE jack (9 or 10) and the washer (2) from the cover (3).

NOSE WHEEL WELL MIC/PHONE JACK INSTALLATION (Effectivity: All) (Figure 2)

a. Position the washer (2) on the MIC/PHONE jack (9 or 10) and the MIC/PHONE jack in the cover (3).

b. Install washers (4 and 5), nut (6) and connector cover (7).

c. Position cover (3) close enough to box to solder the wires to MIC/PHONE jack (9 or 10).

d. Secure the cover (3) to the box (1) with two screws (8).

e. Restore electrical power to the airplane.

INTERPHONE AMPLIFIER REMOVAL (Effectivity: All) (Figure 3)

a. Remove all electrical power from airplane.

b. Remove panel (214AR) from the right-hand nose avionics compartment and locate applicable interphone amplifier (1).

c. Remove electrical connector (2) from interphone amplifier (1).

d. Remove four screws (3), washers (5 and 6) and lock washers (4) securing the interphone amplifier (1) to the avionics shelf, then remove the amplifier from the airplane.

INTERPHONE AMPLIFIER INSTALLATION (Effectivity: All) (Figure 3)

a. Position interphone amplifier (1) on avionics shelf and secure with four screws (3), washers (5 and 6) and lock washers (4).

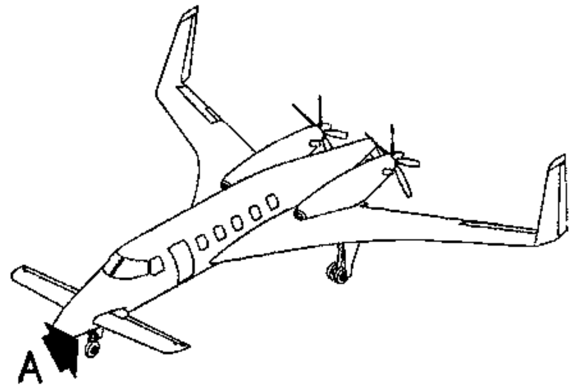
b. Connect electrical connector (2) to interphone amplifier (1).

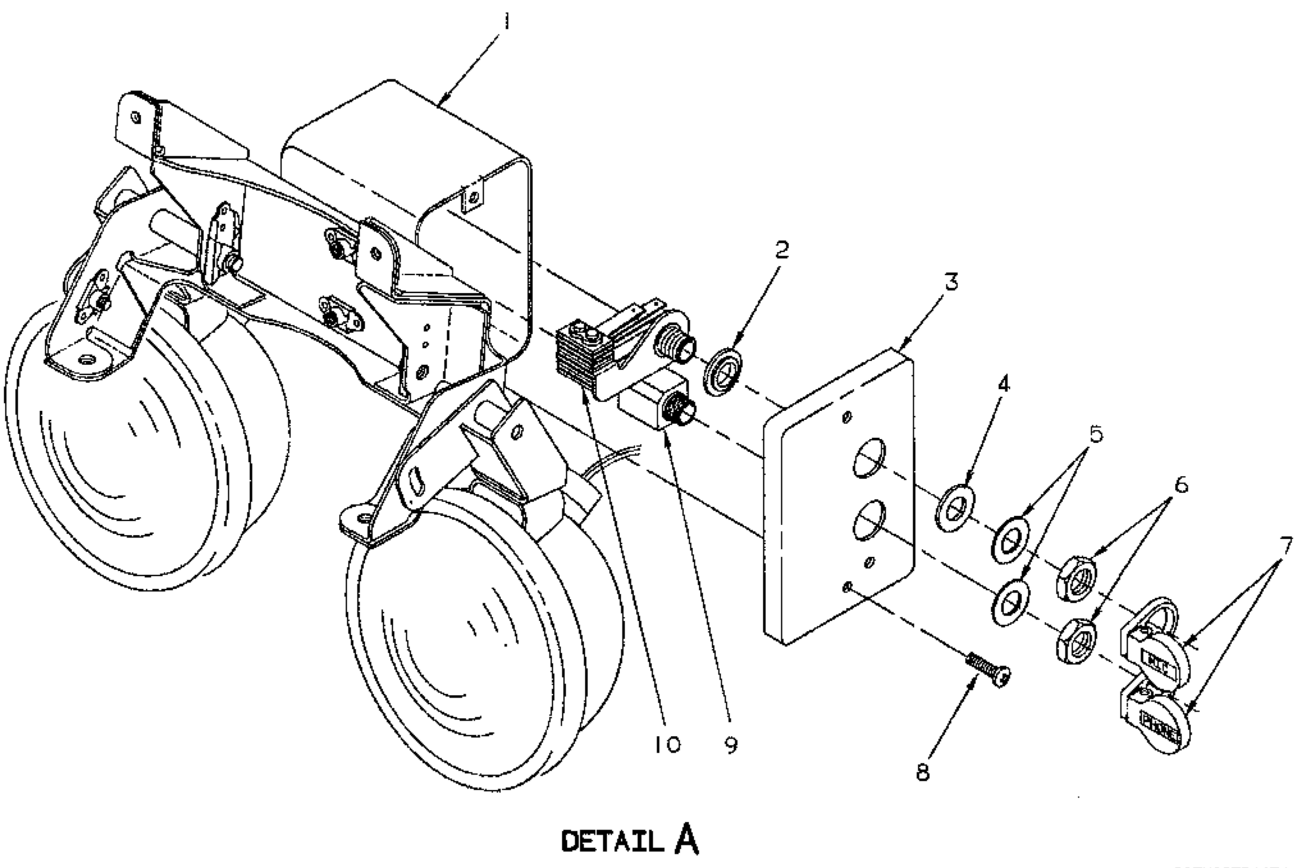
c. Restore electrical power to the airplane.

d. Perform the GROUND INTERPHONE SYSTEM CHECKOUT in this chapter.

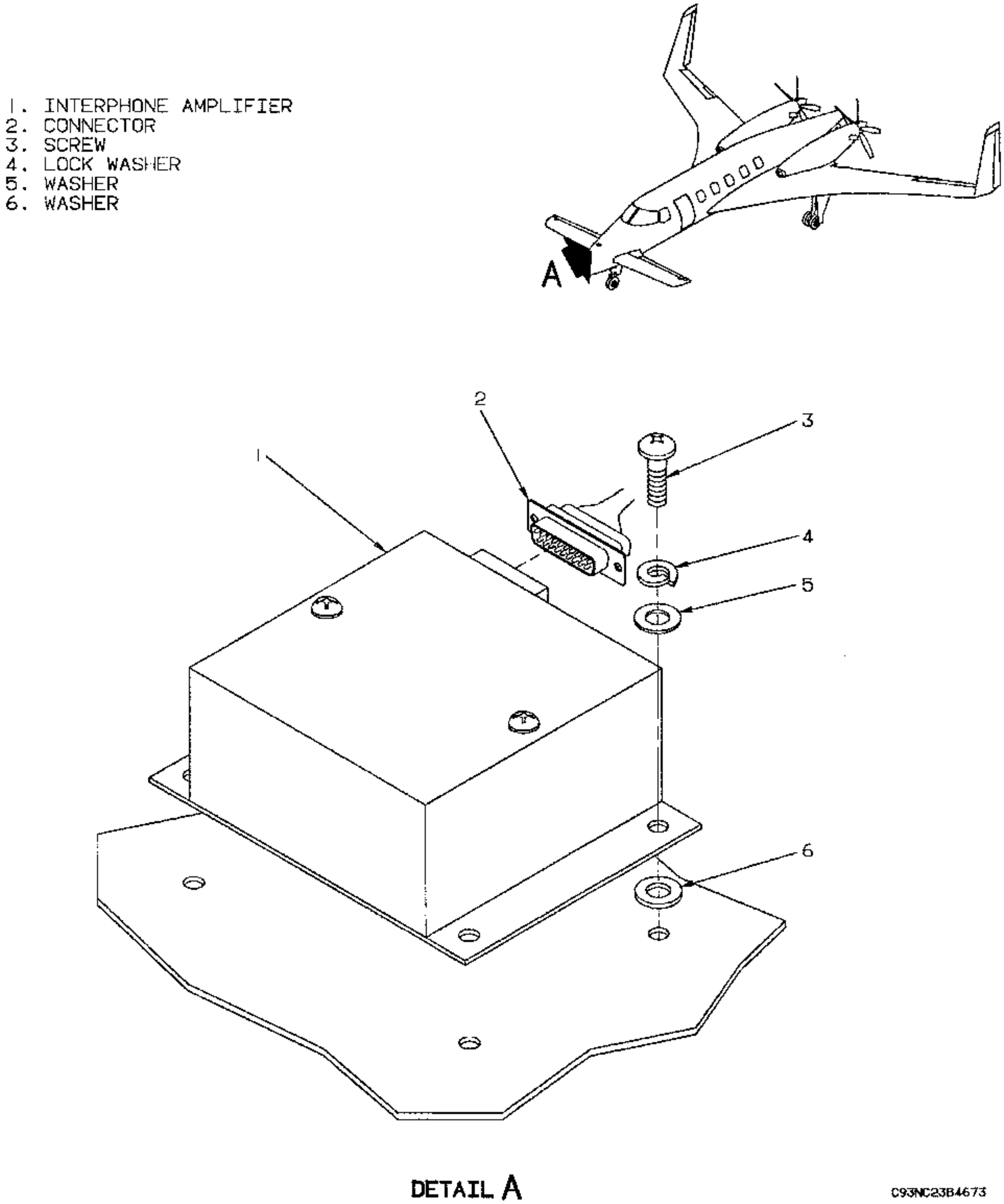
e. Install right hand nose avionics compartment panel (214AR).

1. PHONE CONNECTOR BOX
2. WASHER
3. COVER
4. WASHER
5. WASHERS
6. NUTS
7. CONNECTOR COVERS
8. SCREW
9. PHONE JACK
10. MIC JACK





Nose Wheel Well Mic/Phone Jack Installation (Effectivity: All)
Figure 2



Interphone Amplifier Installation (Effectivity: All)
Figure 3

AUDIO INTEGRATING-DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear must be pinned in the down and locked position. The only exception to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operation prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors must be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for proper lock pin installation procedures.

This section covers that portion of the system which controls the output audio of the communications and navigation receivers into the flight crew headphones and speakers, and the output of the flight crew microphones into the communications transmitters. This includes items such as microphones, headphones, cockpit loudspeakers and MIC/PHONE jacks on both sides of the cockpit. There are two audio amplifiers installed in the RH nose avionics compartment. Audio amplifier No.1 is for the pilot's side, while audio amplifier No.2 is for the copilot's side. The amplifiers provide the gain, isolation and switching for the received audio.

There are three microphones available for audio communication. The first is the hand-held microphone installed on either side of the cockpit in a microphone and reel configuration. The second available microphone is the boom microphone. This microphone/headphone combination can be plugged into the MIC/PHONE jacks on either side of the cockpit and can both send and receive audio. The third available microphone is the oxygen mask microphone. When the oxygen masks are in use, audio can be sent from the oxygen mask. The cockpit speakers must be used when the oxygen mask microphone is used. Refer to Chapter 35 for more information on the oxygen mask.

There is a cockpit speaker installed on either side of the cockpit light in the center of the headliner. Use of these speakers is dependent on the position of the AUDIO SPKR-OFF switch on either the pilot's or copilot's outboard subpanels.

When it is desired to use the VHF communication radio without turning on other equipment, the GND COMM switch on the center subpanel may be pushed. This will turn on the No. 1 COMM, the No. 1 RTU, and both pilot's and copilot's audio.

AUDIO INTEGRATING SWITCHES (Effectivity: All)

Audio integrating switches on the pilot's and copilot's subpanels and their functions are as follows:

a. The MIC SELECT switch controls whether the boom microphone, the oxygen mask microphone or the hand-held microphone is the audio source for communication from the cockpit.

b. The AUDIO SPKR-OFF switch routes audio to the cockpit speakers when in the up position.

c. The VOICE-BOTH-IDENT switch controls the ADF and NAV audio filters.

d. The holes next to the microphone audio output select switch are access holes for potentiometer adjustments for cockpit interphone squelch (S), interphone volume (V) and sidetone (T).

e. The MIC audio output select switch controls the destination of the microphone audio.

f. There are ten two-position switches which control audio to or from the avionics. They function as follows:

1. The AUTO COMM switch automatically selects the received audio of the transceiver selected by the MIC audio output selector.

2. The COMM 1 switch selects audio from the COMM 1 transceiver.

3. The COMM 2 switch selects audio from the COMM 2 transceiver.

4. The NAV 1 switch selects audio from the NAV 1 receiver.

5. The NAV 2 switch selects audio from the NAV 2 receiver.

6. The MKR BCN 1 switch selects marker audio from marker beacon receiver No. 1.

7. The MKR BCN 2 switch selects marker audio from marker beacon receiver No. 2.

8. The DME 1 switch selects audio identification signals from DME receiver No. 1.

9. The DME 2 switch selects audio identification signals from DME receiver No. 2.

10. The ADF switch selects the audio signal from the ADF receiver.

g. On the pilot's outboard subpanel only, there is an AUDIO ALTN-NORM switch. In NORM, the audio will be controlled by audio amplifiers. If the audio amplifiers fail, this switch may be set to AUDIO ALTN to bypass the audio amplifiers. In this position, the VOL controls on the pilot's and copilot's subpanels no longer control the audio. Volume levels are set with the individual receiver volume knobs on the center reversionary panel. Headphones must be used in this mode.

h. The INTPH-OFF switch (on the pilot's panel only) activates cockpit interphone between pilot and copilot.

AUDIO INTEGRATION SYSTEM - TROUBLESHOOTING (Effectivity: All)

Troubleshooting of the audio control system should be accomplished using BEECHCRAFT avionics wiring diagrams supplied with the airplane for interconnecting information.

AUDIO INTEGRATION - MAINTENANCE PRACTICES (Effectivity: All)

AUDIO CONTROL AMPLIFIER REMOVAL (Effectivity: All) (Figure 1)

a. Remove electrical power from the airplane.

b. Remove the right hand nose avionics compartment panel (214AR).

c. Locate the applicable audio control amplifier (1) (pilot's amplifier is the aft one and copilot's amplifier is the forward one) and disconnect the electrical connectors (2) from the amplifier (1).

d. Loosen the knurled knob (3) and remove the audio control amplifier (1) from the rack (4).

AUDIO CONTROL AMPLIFIER INSTALLATION (Effectivity: All) (Figure 1)

a. Position the audio control amplifier (1) on the audio control rack (4) and secure with the knurled knob (3).

b. Connect the electrical connectors (2) to the audio control amplifier (1).

c. Install the right hand nose avionics compartment panel (214AR).

d. Restore electrical power to the airplane.

MICROPHONE AND REEL REMOVAL (Effectivity: All) (Figure 2)

a. Disconnect the hand microphone (1) from microphone connector (2).

b. Remove forward upholstery panel per Chapter 25-10-00 and gain access to microphone reel (4).

c. Disconnect the reel assembly electrical connector (5).

d. Remove three screws (3) securing the assembly in the sidepanel and remove the microphone reel assembly (4) from the airplane.

MICROPHONE AND REEL INSTALLATION (Effectivity: All) (Figure 2)

a. Position the microphone reel assembly (4) in the sidepanel.

b. Secure the microphone reel assembly (4) in the sidepanel with three screws (3).

c. Connect the electrical connector (5) to the microphone reel assembly (4).

d. Replace the forward upholstery panel on the sidepanel per Chapter 25-10-00.

e. Connect the hand microphone (1) to the microphone connector (2).

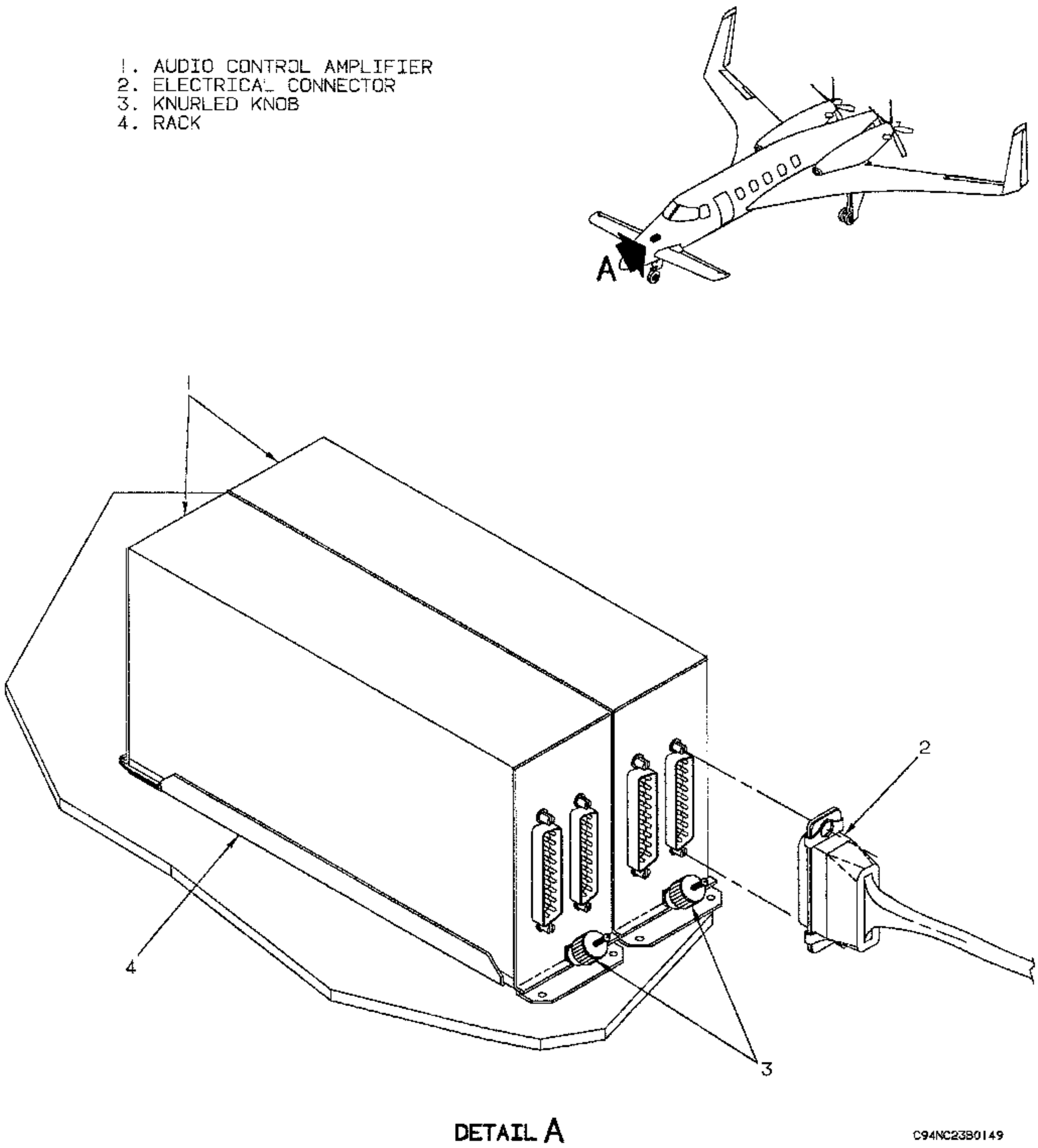
MIC/PHONE JACK ENCLOSURE REMOVAL (Effectivity: All) (Figure 3)

a. Remove three retaining screws (2) from the MIC/PHONE jack enclosure (1).

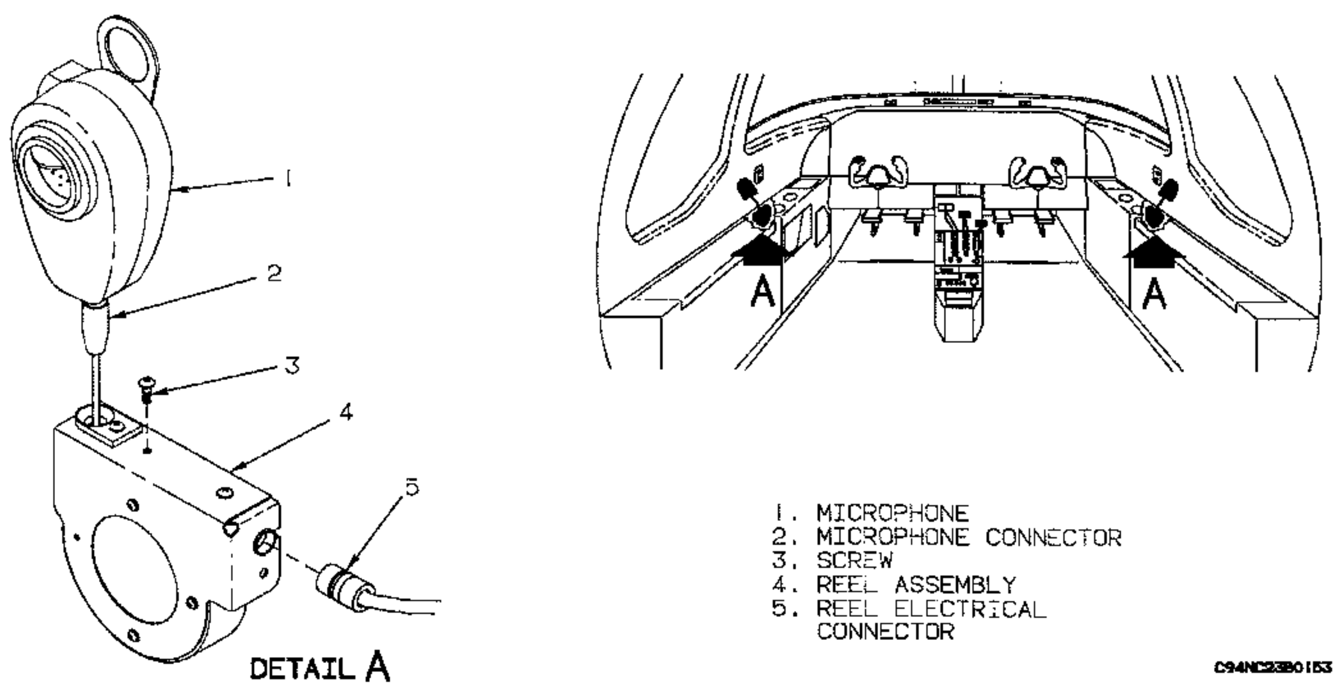
b. Move the enclosure from the panel and disconnect the audio connector (3).

NOTE

It may be necessary to loosen the panel (4) and reach behind the jack enclosure to gain access to the audio connector (3).



Audio Control Amplifier Installation (Effectivity: All)
Figure 1



Microphone and Reel Installation (Effectivity: All)
Figure 2

c. Remove the MIC/PHONE jack enclosure (1).

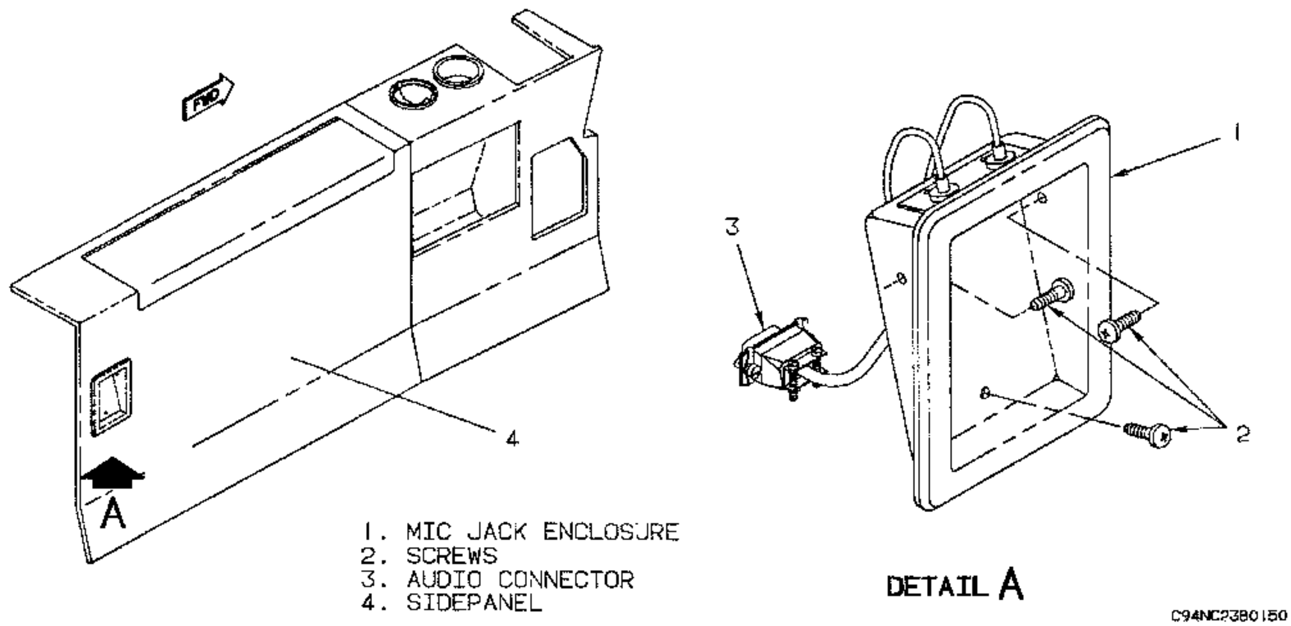
MIC/PHONE JACK ENCLOSURE INSTALLATION (Effectivity: All) (Figure 3)

a. Place the MIC/PHONE jack enclosure (1) near the opening and connect the audio connector (3).

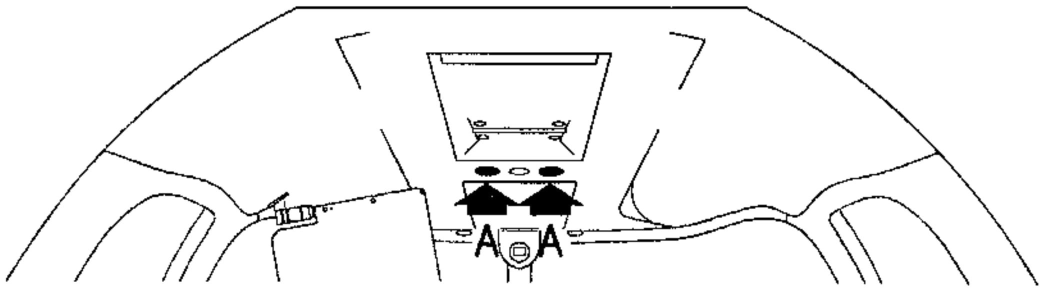
NOTE

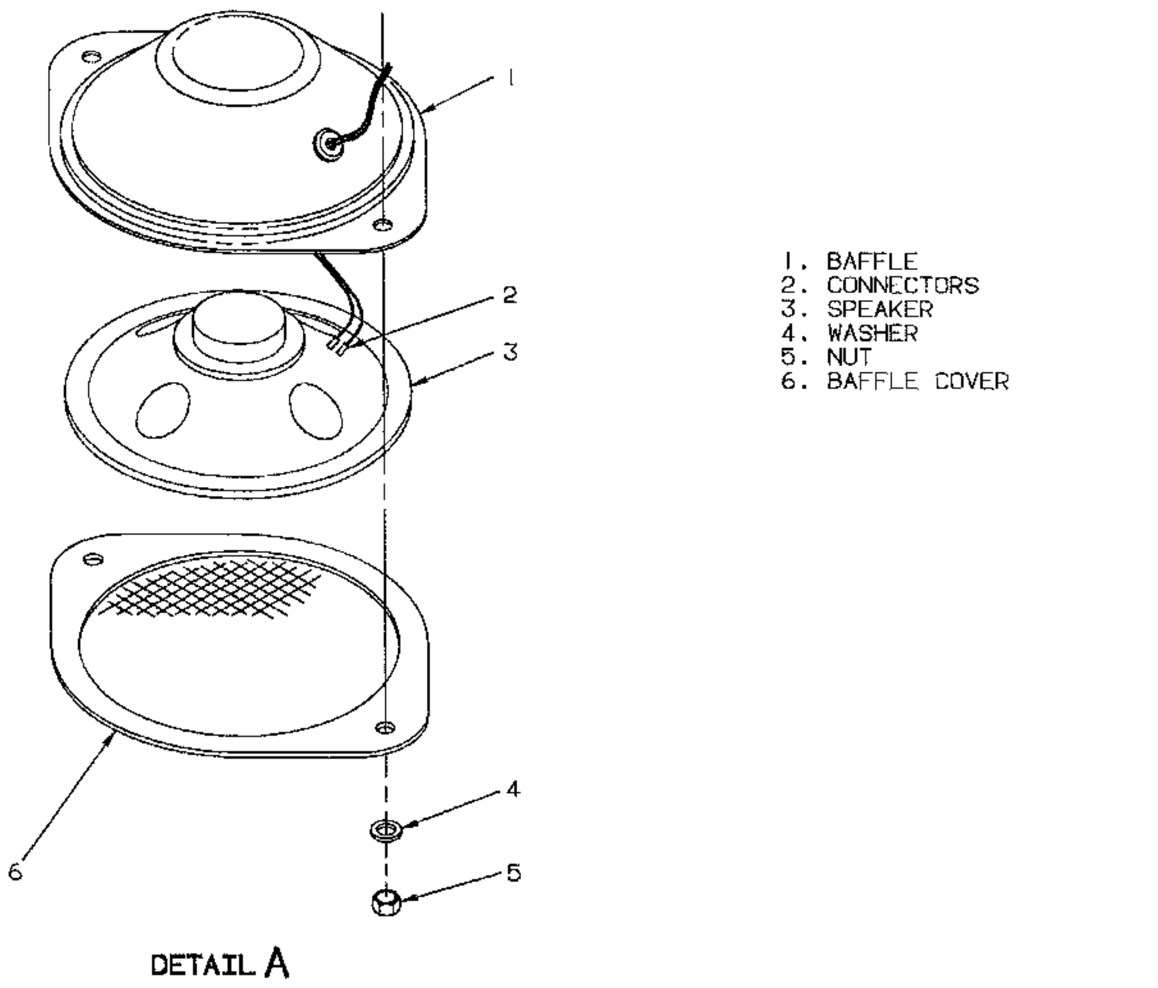
It may be necessary to loosen the panel (4) and reach behind the jack enclosure to gain access to the audio connector (3).

b. Hold the MIC/PHONE jack enclosure (1) in the opening and secure with three screws (2).



MIC/PHONE Jack Enclosure Installation (Effectivity: All)
Figure 3





Cockpit Speakers Installation (Effectivity: All)
Figure 4

COCKPIT SPEAKERS REMOVAL
(Effectivity: All)
(Figure 4)

a. Refer to Chapter 25-00-00 and remove the cockpit headliner.

b. Remove two mounting nuts (5) and washers (4) from the speaker (3) and baffle (1).

c. Remove the baffle cover (6).

d. Hold the speaker (3) and baffle (1) while lowering and remove the audio connectors (2)

COCKPIT SPEAKERS INSTALLATION
(Effectivity: All)
(Figure 4)

a. Hold the speaker (3) and baffle (1) up to opening and clip the audio connectors (2) to the speaker (3).

b. Secure the speaker (3), baffle cover (6) and baffle (1) to the mounting bracket with two washers (4) and nuts (5).

c. Refer to Chapter 25-10-00 and install the headliner.

STATIC DISCHARGING - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear must be pinned in the down and locked position. The only exception to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operation prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors must be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for proper lock pin installation procedures.

STATIC DISCHARGE WICKS (Effectivity: All) (Figure 1)

During flight, a static charge may build up on the exterior surface of the airplane. This electrical charge, if retained, may interfere with radio and avionic equipment operation. Static charge is also dangerous to passengers, crew and maintenance personel subject to contact with the outside surface of the airplane. To alleviate this potential danger, static discharge wicks are installed on the trailing edge of selected flight control surfaces to aid in the dissipation of any static build-up. There are two static wicks installed on each elevator of the forward wing, four on each elevon of the aft wing and three on each rudder of the tipsails. An additional static wick is installed on each main landing gear between the wheels.

STATIC DISCHARGING - TROUBLESHOOTING (Effectivity: All)

NOTE

Use a megohmmeter (1, Chart 1, 23-00-00) with a minimum test voltage of 500 volts to measure resistance of the static discharge wicks. Test voltages less than 500 volts will not generate sufficient leakage rates to provide an accurate reading.

The following resistance measurements should be made when there is a noticable static build-up from precipitation, or anytime a lighting strike has occurred.

To ensure maximum discharge capability of each static discharge wick, use a Biddle Tester (2, Chart 1, 23-00-00) and refer to chapter 20-00-03. Verify that the resistance between the central ground point and the mounting base of the static discharge wick is no more than 20 ohms. If resistance is in excess of 20 ohms, remove the mounting base and rebond it to the control surface as outlined by procedures in this chapter.

Using a megohmmeter (1, Chart 1, 23-00-00) check the resistance from the tip of each static discharge wick to its mounting base. The resistance should be in the range of 1-100 megohms. If not, remove and replace the static discharge wick. To ensure accurate measurements, attach an alligator clip from the applicable meter lead to the bristles of the static discharge wick.

STATIC DISCHARGING - MAINTENANCE PRACTICES (Effectivity: All)

CONTROL SURFACE STATIC DISCHARGE WICK REMOVAL (Effectivity: All) (Figure 1)

a. Grasp the static discharge wick (10) near the mounting base (8) and rotate it counterclockwise until it and the lock washer (9) are removed from the mounting base.

CONTROL SURFACE STATIC DISCHARGE WICK INSTALLATION (Effectivity: All) (Figure 1)

a. Install the lock washer (9) on the static discharge wick (10).

b. Position the static discharge wick (10) with the mounting base (8) and thread it clockwise into the base until it is secure.

CONTROL SURFACE STATIC DISCHARGE WICK MOUNTING BASE REMOVAL (Effectivity: All) (Figure 1)

a. Perform the CONTROL SURFACE STATIC WICK REMOVAL procedure found in this subchapter.

b. Use a No. 30 drill bit to remove the two attaching rivets, then remove the mounting base (8) from the control surface.

CONTROL SURFACE STATIC DISCHARGE WICK MOUNTING BASE INSTALLATION (Effectivity: All) (Figure 1)

a. Refer to Chapter 20-00-03 to prepare the composite surface for installation of the mounting base.

b. Verify that both the mounting base and control surface bonding areas are free from all grease, oil, dirt and paint before mounting base installation. If necessary, use solvent (5, Chart 2, 23-00-00) to wipe the bonding surfaces clean.

c. Align the mounting base (8) with the holes in the control surface and secure with two No. 4 rivets.

d. Verify an adequate electrical bond by performing the necessary resistance checks outlined in the troubleshooting section of this chapter.

e. Restore the original finish as specified in Chapter 20-00-08.

f. Perform the CONTROL SURFACE STATIC DISCHARGE WICK INSTALLATION procedure found in this subchapter.

LANDING GEAR STATIC DISCHARGE WICK REMOVAL (Effectivity: All) (Figure 1)

a. Remove the nut (1) from the static discharge wick (5).

b. Remove the static discharge wick (5) from the bracket (4).

LANDING GEAR STATIC DISCHARGE WICK INSTALLATION (Effectivity: All) (Figure 1)

a. Position the static discharge wick (5) in the bracket (4).

b. Install the nut (1) to secure the static discharge wick (5) to the bracket (4).

LANDING GEAR STATIC DISCHARGE WICK MOUNTING BASE REMOVAL (Effectivity: All) (Figure 1)

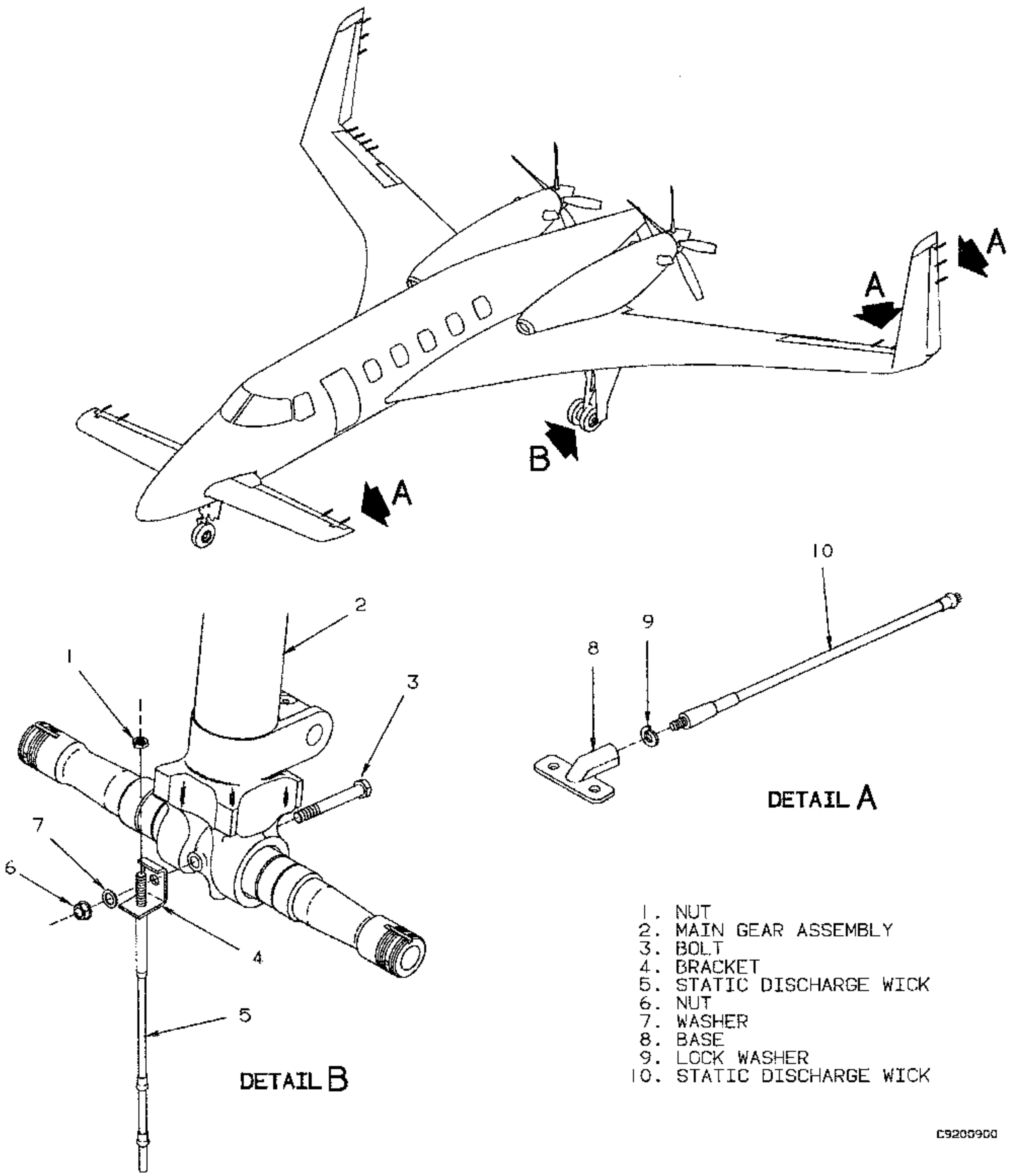
a. Perform the LANDING GEAR STATIC DISCHARGE WICK REMOVAL procedure found in this subchapter.

b. Remove the nut (6), washer (7), bolt (3) and bracket (4) from the main gear assembly (2).

LANDING GEAR STATIC DISCHARGE WICK MOUNTING BASE INSTALLATION (Effectivity: All) (Figure 1)

a. Position the bracket (4) with the main gear assembly (2) and install the bolt (3), washer (7), and nut (6).

b. Perform the LANDING GEAR STATIC DISCHARGE WICK INSTALLATION procedure found in this subchapter.



Static Discharge Wick Installation (Effectivity: All)
Figure 1

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GENERAL - DESCRIPTION AND OPERATION (Effectivity: All) (Figure 1)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

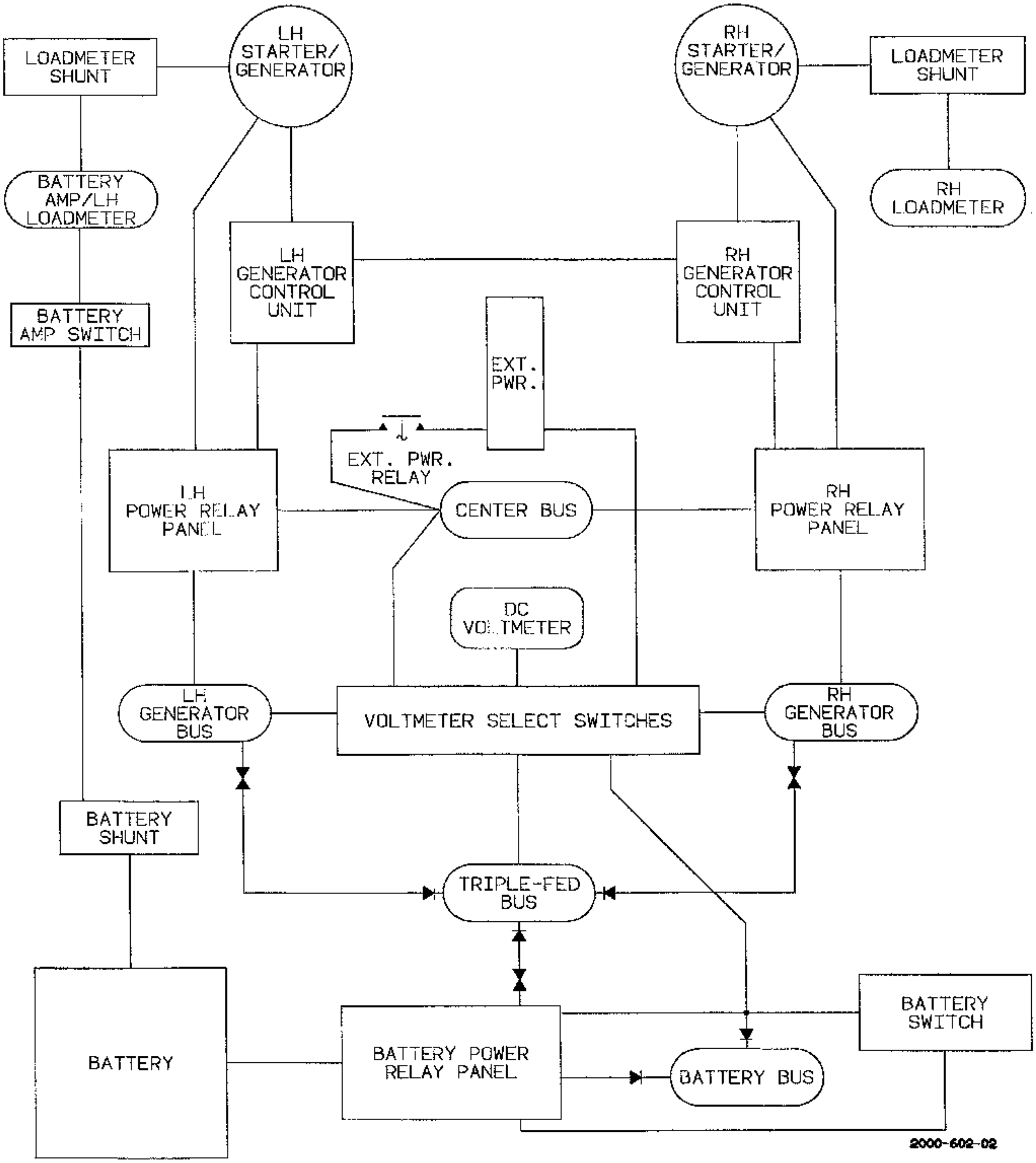
The Starship 1 electrical system is a 28-volt dc, single loop, "triple-fed" bus system with a negative ground. During normal operation, two 28-volt, 300-ampere dc starter/generators and a 24-volt nickel-cadmium battery supply all of the airplane electrical needs. These power sources are brought on-line by the pilot with three switches under the master switch gang bar placarded MASTER SWITCH, BATT, ON-OFF, L GEN, R GEN, RESET-ON-OFF on the center subpanel. An auxiliary power unit (APU) may be connected to the airplane external power receptacle when an external power source is required.

The battery is installed in the RH nacelle just forward of the firewall, where it connects to the "hot" battery bus through the battery power relay panel. All equipment directly connected to the "hot" battery bus may be operated without placing the battery switch in the ON position. Refer to Chapter 24-31-00 for detailed information on the battery. Control of the starter/generators is accomplished with the Generator Control Units (GCU), power distribution PCB, and generator power relay panels. The GCUs provide line contactor relay control, voltage regulation, generator paralleling, differential voltage sensing and control, reverse current sensing and control, overvoltage and overexcitation protection, and cross-start current limiting. The power relay panels contain the hardware essential to connect or isolate the starter/generators from the circuit. For more information on the starter/generators and power relay panels refer to Chapter 24-30-00.

Five primary buses distribute power to all of the subbuses from the three main power sources. The primary buses consist of a "hot" battery bus, center bus, triple-fed bus, and the left and right generator buses. The bus system is known as a "triple-fed" system, with each bus receiving power from all three power sources. This design minimizes the risk of a complete power loss should a power source become isolated. The primary buses are individually protected through the use of current sensors, current limiters, diodes, and relays. The triple-fed bus receives power from both generator buses and the battery. A diode and 60-ampere current limiter are wired between the triple-fed bus and each of its feeder buses to provide overcurrent protection and prevent any current flow away from the triple-fed bus. The loads for each bus may be shed by isolating the faulty bus from the other buses, preventing a failure of the entire electrical system. For more detailed information and a schematic of the buses and their protective devices, refer to Chapter 24-50-00.

The avionics equipment receives power from the primary buses through eight separate avionics bus feeders. Four of the avionics bus feeders have an avionics power relay between them and the avionics bus. The avionics power relays are controlled by the pilot's and copilot's avionics master switches placarded INTEGRATED AVIONICS, PILOT-COPILOT, OFF on the center subpanel. Refer to Chapter 24-50-00 for detailed information on avionics power distribution.

There are two auxiliary power supplies installed in the nose avionics compartment. Both are lead-acid batteries with a trickle charger and test circuit included. During engine starts, the Engine Instrument Crew Alerting System (EICAS) auxiliary battery provides power for temporary operation of the EICAS display, for reversionary EICAS on the Multifunction Display (MFD), and for alignment of the Attitude Heading Reference System computers (AHRS). This auxiliary battery is installed for use as a momentary backup power supply, and is not intended for extended operation. When all power is lost from the primary buses, the attitude gyro auxiliary battery supplies standby power to illuminate the three standby instruments and magnetic compass. It also supplies standby power for operation



Electrical System Block Diagram (Effectivity: All)
Figure 1

of the standby gyro and standby altimeter vibrator. Both auxiliary batteries charge from the avionics center bus. Refer to Chapter 24-32-00 for detailed information on auxiliary power.

The electrical system uses three main printed circuit boards to analyze, direct, and control certain functions of the electrical system. They are the power distribution PCB, battery monitor PCB, and the external power and windshield de-ice PCB. The power distribution PCB monitors inputs from all three power relay panels, both generator control units (GCU), and other related components. Depending on the status of signals received, it will open or close the bus tie relays to exercise control over power distribution. For more information on this PCB and its built-in test features refer to Chapter 24-30-00. The battery monitor PCB receives its power from the triple-fed bus and provides an indication of abnormal battery charge rate to the pilot. This is accomplished by analyzing the rate of charge and comparing it to acceptable limits for the system. A self-test has been incorporated in this PCB. For more information on this PCB refer to Chapter 24-31-00. The external power and windshield deice PCB protects the airplane electrical system from APU reverse polarity and excessive voltage. It receives power from the external power control circuit breaker which is fed by the APU. For more information on this PCB refer to Chapter 24-40-00.

The BATT CHG RATE warning annunciator provides the only warning for the electrical system. The remaining electrical system messages are displayed on the Engine Instrument Crew Alerting System (EICAS) display as caution, advisory, or status messages. The EICAS messages for the electrical system are: L GEN INOP, R GEN INOP, L GEN TIE OPEN, R GEN TIE OPEN, BATTERY TIE OPEN, MAN TIES CLOSED, EXT POWER CONN, STBY ATT BAT OK, ATT GYRO BATT LO, STBY ATT BAT TST, and BATT TEST-WAIT. For more information on these messages refer to the applicable section in this chapter.

Two LCD loadmeters and a voltmeter are located in the cockpit on the center subpanel. Starter/generator loads are displayed in percent on the loadmeters for each side of the system. The left loadmeter functions as an ammeter for the battery whenever the switch placarded BATT AMP on the center subpanel is pressed. The voltmeter displays voltage readings for each of the five primary buses or external power, depending upon the voltmeter select switch being pressed. For detailed information on DC voltage and load indication refer to Chapter 24-30-00.

There are seven main circuit breaker panels in the airplane. The left circuit breaker panel is mounted on the pilot's console and the avionics circuit breaker panel is mounted on the copilot's console. The LH nacelle contains the left generator circuit breaker panel, and the RH nacelle contains both the right generator circuit breaker panel and the battery bus circuit breaker panel. The aft circuit breaker panel is mounted on the aft fuselage electrical equipment shelf and the auxiliary circuit breaker panel is mounted in the pilot's console just forward of the printed circuit card rack. There are two limiter panels mounted in each nacelle and four limiter holders located in the wing center section. For more information on these components refer to Chapter 24-50-00.

SPECIAL TOOLS AND RECOMMENDED MATERIALS (Effectivity: All)

The special tools and recommended materials listed in Charts 1 and 2 as meeting federal, military or vendor specifications are provided for reference only and are not specifically prescribed by Beech Aircraft Corporation. Any product conforming to the specification listed may be used. The products included in these charts have been tested and approved for aviation usage by Beech Aircraft Corporation, by the vendor, or by compliance with the applicable specifications. Generic or locally manufactured products which which conform to the requirements of the specification listed may be used even though not included in the charts. Only the basic number of each specification is listed. No attempt has been made to update the listing to the latest revision. It is the responsibility of the technician or mechanic to determine the current revision of the applicable specification prior to usage of the product listed. This can be done by contacting the vendor of the product to be used.

CHART 1
SPECIAL TOOLS AND EQUIPMENT (Effectivity: All)

TOOL NAME	PART NO.	VENDOR	USE
1. Generator Control Unit Test Unit	TK1999/935 or fabricate per instr. in this chapter	Beech Aircraft Corp. Wichita, Kansas	For gaining access to the GCU pins.
2. Digital Multimeter (4 1/2 digit, accurate within 1%)	8060A or equivalent	John Fluke Manufacturing, Everrett, Wash.	Measure voltage and resistance.
3. Multimeter	N/A	Obtain locally.	Perform voltage and resistance checks.
4. Battery Charger	BC-815A	Jet Electronics Grand Rapids, Michigan	Auxiliary battery charging.

CHART 2
RECOMMENDED MATERIALS (Effectivity: All)

MATERIAL	SPECIFICATION	PRODUCT	VENDOR
1. Solvent, Dry Cleaner or White Spirit	PD680 or British Specification 245	Stoddard Solvent (Mineral Spirits)	Obtain Locally
2. Cleaner	TT-M-261	MEK	Obtain Locally
3. Adhesive		Dapcotac #3300	D Aircraft Products Co., 1191 Hawk Circle Anaheim, CA 92708
4. Sealer, Tamper Proof		EC1252	Minnesota Mining and Manufacturing Co., Bush Ave. St. Paul, MN 55144
5. Thermal Joint Compound		Thermal Joint Compound 120	R S C Electronics Dist., 131 Laura Wichita, KS 67201

GENERAL - MAINTENANCE PRACTICES (Effectivity: All)

Due to the nature of composite materials extensively used in the construction of Starship 1, specific electrical configurations have been incorporated into the design. The ground plane is located throughout the airplane, and instead of grounding to the airplane structure, ground studs are used extensively to connect panels and wiring to the ground plane. Many of the electrical panels are protected by devices designed to dissipate unwanted current such as that incurred during a lightning strike. Maintenance on these components and the proper bonding procedures and checks are provided in Chapter 20-00-03. Many of the electrical components covered in this chapter require some type of electrical bonding. While performing installation procedures, special attention must be given to these requirements, as they are an important criteria in protection of the entire electrical system.

When making electrical repairs on the Starship 1, methods used must be in accordance with the Federal Aviation Administration's "Aircraft Inspection and Repair" manual AC43.13-1A and with the "Aircraft Alterations" manual AC43.13-2. Any components replaced, and any wire, cable or terminals used in the maintenance of the electrical system must be of airplane quality. Any solder connections must be made in an approved manner. Any solderless terminals or splices used must be applied with tooling specified by the vendor. Always remove power from the system being repaired and pay specific attention to all electrical bonding requirements. Detailed schematics of connectors and wiring may be found in the BEECHCRAFT Starship 1 Wiring Diagram Manual.

DC GENERATION AND CONTROL - DESCRIPTION AND OPERATION (Effectivity: All) (Figure 1)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

The dc generation and control system consists of two dc starter/generators, two generator-power relay panels, a battery, one battery-power relay panel, two generator control units, two field and sense relays, two dc loadmeters, one dc voltmeter, a power-distribution printed circuit board (PCB) and the associated control switches, circuit breakers, and Engine Instrument Crew Alerting System (EICAS) messages.

DC STARTER/GENERATORS (Effectivity: All) (Figures 1 and 2)

The starter/generators are dual purpose, 28-volt, 300-ampere units which produce torque for engine starts or generate electrical current to meet the airplane electrical loads. A series starter winding is used for starter operation, and a shunt field winding is used during generator operation. Refer to Chapter 80-00-00 for detailed information on starter operation. The starter/generator interpole and compensating windings are in series with the armature and provide a voltage proportional to starter/generator output current. Voltage developed across the interpole and compensating windings is output at terminal D of the starter/generator. The generator control unit (GCU) senses this voltage at pin D to provide equalization during dual generator operation. Each GCU will also provide a field excitation voltage from pin M to terminal A on the starter/generator. By monitoring input at pin B to control the field excitation voltage, starter/generator output at terminal B is regulated to 28.25 ± .25 vdc by the GCU.

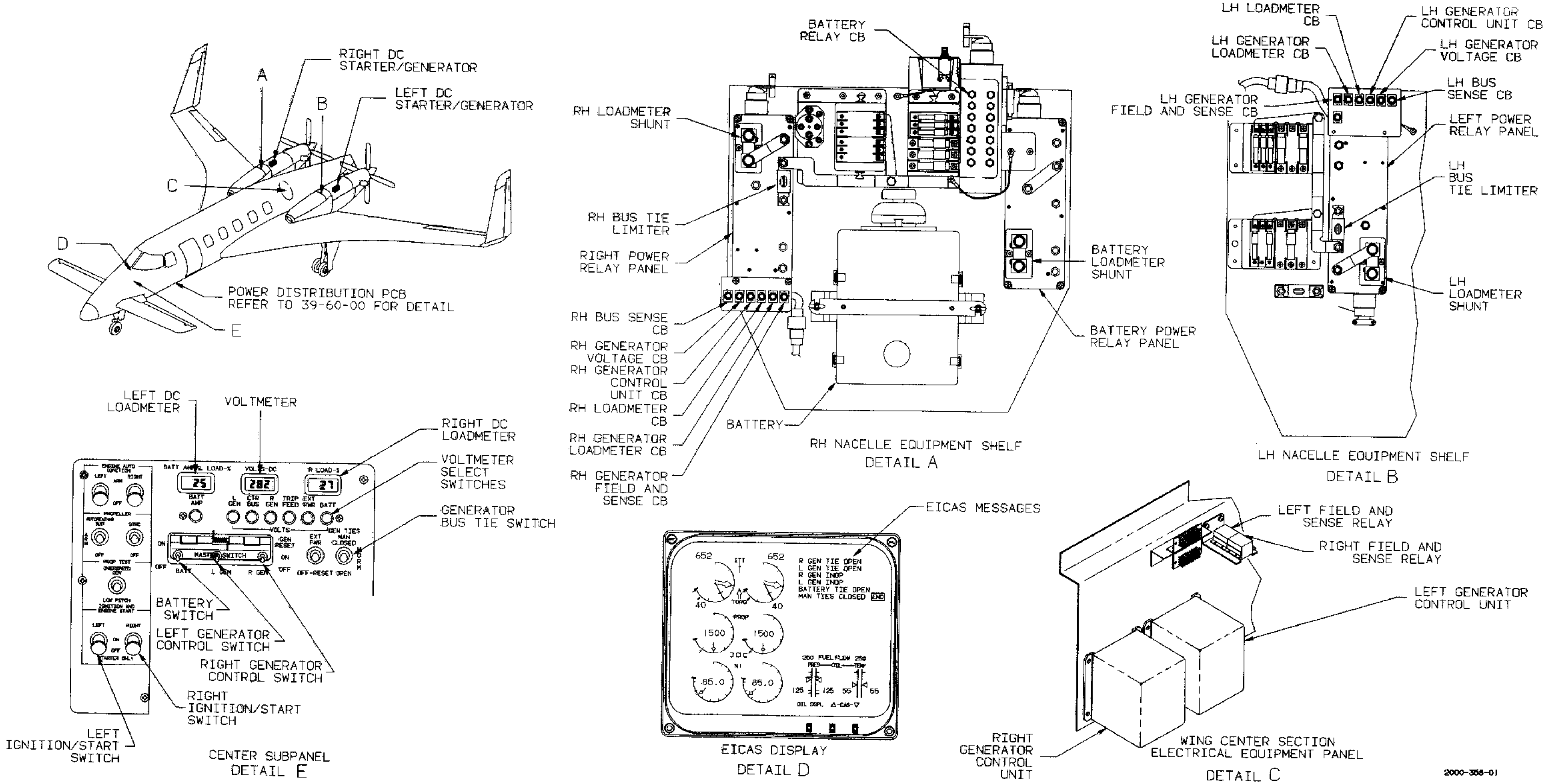
A quick-disconnect mounting adapter is bolted to a mounting pad on the engine accessory gearbox, providing the starter/generator with a pin-aligned mount. The unit mates with the engine gearbox by means of a splined drive shaft, providing a direct torque transfer for both starting and generator functions. If a condition occurs causing the starter/generator splined drive shaft torque to exceed 1600 inch-pounds, the shaft will shear, minimizing damage to the starter/generator and engine components.

An internal shaft-driven fan draws outside air through the starter/generator to provide ground cooling. Refer to Chapter 75-20-00 for detailed information on starter/generator cooling.

POWER RELAY PANELS (Effectivity: All) (Figures 1 and 2)

A generator-power relay panel is mounted on each nacelle equipment shelf. The generator-power relay panels are identical and contain a bidirectional current sensor, bus-tie relay, line-contactor relay and an engine-start relay. Each generator-power relay panel also has a 400-ampere current limiter and loadmeter shunt mounted on the outside of the case. Refer to DC VOLTAGE AND LOAD INDICATION in this chapter for more information on the loadmeter shunt. The current limiter, between terminals 3 and 4 of the generator-power relay panel, will open any time current in excess of 400 amperes is applied to it for 30 to 40 seconds.

The power-distribution PCB monitors the current sensor signals and other inputs to provide control of the bus-tie relays. When the current sensors are not sensing an overcurrent and at least one line contactor relay is closed, the power-distribution PCB will close the generator bus-tie relays, powering the center, battery and opposite side generator bus with generator power. Whenever an overcurrent of 325 amperes or greater is flowing in either direction through either of the current sensors on the generator-power relay panel, the affected current sensor will signal the power-distribution PCB to open the applicable generator bus-tie relay, isolating the overcurrent. Refer to



DC Generation and Control System
(Effectivity: All)
Figure 1

Chapter 24-50-00 for power-distribution schematics and to POWER-DISTRIBUTION PCB in this chapter for information on the generator bus-tie switch.

Each bus-tie relay has two sets of auxiliary contacts. The first set will allow the generator control unit (GCU) to sense center-bus voltage when the bus-tie relay is open and to sense generator bus voltage when closed. The second set sends 28 vdc to the Engine Data Concentrator (EDC) to prevent the Engine Instrument Crew Alerting System (EICAS) from displaying the yellow L GEN TIE OPEN and R GEN TIE OPEN caution messages while the bus-tie relay is closed. The line-contactor relay has one set of auxiliary contacts that sends 28 vdc to the EDC to prevent the EICAS from displaying the yellow L GEN INOP or R GEN INOP caution messages after the line-contactor relay connects the starter/generator to the generator bus. Refer to LINE-CONTACTOR RELAY CONTROL in this chapter for detailed information on the line-contactor relay and to Chapter 80-00-00 for detailed information on the engine start relay.

The battery-power relay panel is mounted on the RH nacelle equipment shelf adjacent to the battery and contains a bidirectional current sensor, battery relay and bus-tie relay. The current sensor monitors current flow to and from the battery and, if current exceeds 325 amperes, will signal the power-distribution PCB to open the battery bus-tie relay. After the battery switch is placed in the ON position to close the battery relay and power the triple-fed bus, the power-distribution PCB will close the battery bus-tie relay if no overcurrent is present. Whenever the battery bus-tie relay is closed, the battery bus-tie relay will apply 28 vdc through its auxiliary contacts to the EDC, preventing the EICAS from displaying the yellow BATTERY TIE OPEN caution message. For detailed information on battery power refer to Chapter 24-31-00.

GENERATOR CONTROL UNITS (Effectivity: All)

The generator control units (GCU) are self-contained units mounted on the wing center section electrical equipment panel. Each starter/generator has its own GCU to provide line-contactor relay control, voltage regulation, generator paralleling, differential voltage sensing and control, reverse current sensing and control, overvoltage and overexcitation protection and cross-start current limiting. There are two voltage measurement jacks and a voltage adjustment access on the front of each GCU to allow for adjustment of starter/generator output through the GCU regulator circuit. Refer to GENERATOR CONTROL UNIT VOLTAGE ADJUSTMENT in this chapter for voltage adjustment procedures.

LINE-CONTACTOR RELAY CONTROL (Effectivity: All)

When the generator control switch, placarded L GEN or R GEN, GEN RESET-ON-OFF on the center subpanel is in the ON position, voltage from the starter/generator is applied to pin C of the generator control unit (GCU). Bus voltage is sensed at pin A of the GCU and is compared to starter/generator output voltage at pin B of the GCU. When these voltages are nearly equal, an output from pin H of the GCU will close the line-contactor relay. The GCU monitors a number of inhibiting signals and will open the line-contactor relay if a fault should occur requiring isolation of the starter/generator from the generator bus.

FIELD-FLASH CIRCUIT AND VOLTAGE REGULATION (Effectivity: All)

The generator control unit (GCU) monitors starter/generator output voltage and controls the shunt field excitation to maintain a constant voltage under varying operating conditions such as speed, load and temperature. Before the GCU can regulate starter/generator output, it must use residual voltage to build starter/generator output to a level the regulation circuit can control. Residual voltage, normally 0.3 to 2.0 vdc, is present at terminal B of the starter/generator as long as the unit is spinning and the GCU is not supplying a regulator voltage to the shunt field at terminal A of the starter/generator. When either generator control switch, placarded L GEN or R GEN, GEN RESET-ON-OFF, on the center subpanel is placed in the GEN RESET position, a low-resistance path is established from terminal B of the starter/generator to pin K on the GCU, through an internal relay, then out pin M and back to the starter/generator at terminal A. Upon reaching terminal A of the starter/generator, residual voltage will excite the shunt field and increase output at terminal B of the starter/generator until the GCU internal relay energizes, breaking the field-flash path. At this point, starter/generator output voltage should be sufficient to allow the regulator circuit to take over and continue increasing starter/generator output until 28.25 ±.25 vdc is reached. The GCU will continue to regulate the starter/generator by adjusting output at pin M to maintain starter/generator output at 28.25 ±.25 vdc. Anytime the generator control switch is placed in the OFF position, the switch must be placed in the GEN RESET position to bring the starter/generator back up to operating voltage and back on-line.

STARTER/GENERATOR PARALLELING (Effectivity: All)

The generator control units (GCU) incorporate circuitry to maintain the starter/generator electrical loads within 10 percent of each other for their entire operating range. An equalizer relay in each GCU is used to connect both starter/generator equalizer channels when the line contactor relay is closed, enabling the GCU equalizer circuit only when load sharing is possible. The power-distribution PCB also incorporates an internal relay to provide an interconnect between pin E of each GCU. The power-distribution PCB internal circuitry will not close the internal relay until it receives signals indicating that the line-contactor and bus-tie relays are closed in both generator-power relay panels. Once these conditions for load sharing are met, each GCU will compare the interpole winding voltages from terminal D of both starter/generators to determine the relative amount of load current being supplied by each starter/generator. The GCU's accomplish this by sensing interpole voltage of the starter/generator they are regulating at pin D and the opposite side starter/generator interpole voltage at pin E. The GCU's then bias their voltage regulation circuits accordingly, adjusting voltage output at pin M to accomplish equal load sharing. Precise load distribution from the GCU's is provided without the need for adjustment while the units are in service.

OVEREXCITATION PROTECTION (Effectivity: All)

When a failure occurs causing excessive field excitation, the affected starter/generator will attempt to carry all of the airplane's electrical load. During parallel operation, this is sensed at the GCU by comparing interpole voltages of the starter/generators. The starter/generator will be de-energized if generator bus voltage is greater than 28.5 vdc and the output current differential between starter/generators is greater than 15 percent for 5 seconds. This circuit functions during parallel operation only and does not require an overvoltage to function.

REVERSE CURRENT AND POLARITY PROTECTION (Effectivity: All)

When the generator field becomes underexcited for any reason, or when the starter/generator slows down to a point where it can no longer maintain a positive load, it will begin to draw current from the center bus. The reverse-current-protection function senses starter/generator interpole voltage at pin D of the GCU to determine if the starter/generator has become a load rather than a power source. If reverse current is present, indicated by positive voltage at pin D, the GCU will open the line-contactor relay and remove the starter/generator from the bus. During engine shutdown, the unit will have a tendency to wait longer to open the line-contactor relay. This will eliminate unnecessary cycling of the line-contactor relay during a normal condition.

NOTE

The starter/generator does not require a reset when the GCU reverse current protection circuit has been tripped. The GCU will automatically reset its internal circuitry.

In the case of starter/generator reverse-polarity buildup, the GCU protects the electrical system from damage by tripping an internal-field relay to de-energize the starter/generator.

OVERVOLTAGE PROTECTION (Effectivity: All)

If a fault occurs where starter/generator output or bus voltage is supplied to the generator field at terminal A of the starter/generator, or should the voltage regulation circuit fail, the affected starter/generator will attempt to assume the full load as its input voltage increases. If bus voltage increases above 28.25 ±.25 vdc, reverse current will begin to flow to the regulated starter/generator and the line-contactor relay will be opened, isolating the regulated starter/generator from the buses. If the affected starter/generator output voltage rises above 32.5 vdc, it will be removed from the bus and the unaffected starter/generator will automatically be reconnected. The resultant voltage depends upon starter/generator speed, electrical load and the nature of the fault.

The generator control units (GCU) monitor starter/generator output voltage at pin J for excessive voltage that could potentially damage the airplane electrical system. If starter/generator output exceeds 32.5 vdc, an inverse time delay will trip an internal field relay to de-energize the starter/generator and open the line-contactor relay. Slight voltage surges will normally be associated with a longer time delay to prevent nuisance trips of the internal-field relay, whereas a severe increase will cause an immediate trip. This overvoltage protection circuit requires a manual reset of the starter/generator to bring the starter/generator back on-line.

A completely separate circuit is used to open the line-contactor relay if voltage exceeds 40 vdc. This provides extra protection of the electrical system and allows a faster response to a fault because it does not work on a time delay. Manual reset of this individual circuit is not required because there is no time-delay mechanism.

An overvoltage condition arising from a resistive connection in the signal ground wire to the GCU can be detected by the GCU with an alternate ground return path. This ground allows the GCU to sense an otherwise undetectable overvoltage condition and provide an automatic trip of the internal field relay.

Provisions are made within the GCU to exercise the overvoltage-protection circuit. When the generator control switch is moved from ON to OFF, voltage is removed from pin C of the GCU (line contactor in) opening the line-contactor relay. Once in the OFF position, the generator control switch applies starter/generator output to pin P (overvoltage test) of the GCU, tripping the GCU overvoltage circuit and shutting down the starter/generator. This circuit allows the GCU to shut down its starter/generator without creating an actual overvoltage condition. Refer to GENERATOR CONTROL UNIT OVERVOLTAGE CIRCUIT CHECK procedures in this chapter to verify proper operation of the overvoltage circuit.

CROSS-START OVERLOAD CURRENT LIMITING (Effectivity: All)

The generator control units (GCU) have a feature that limits the on-line starter/generator output current during engine cross-starts. This circuit prevents the on-line starter/generator from providing excess current to the starter/generator being used as a starter. When either ignition/start switch on the center subpanel, placarded IGNITION AND ENGINE START, LEFT, RIGHT, ON-OFF-STARTER ONLY, is placed in either the ON or STARTER ONLY position, a signal is applied to pin R of the opposite GCU, enabling its current limiting circuit. The GCU will then limit starter/generator output until the signal is removed from pin R.

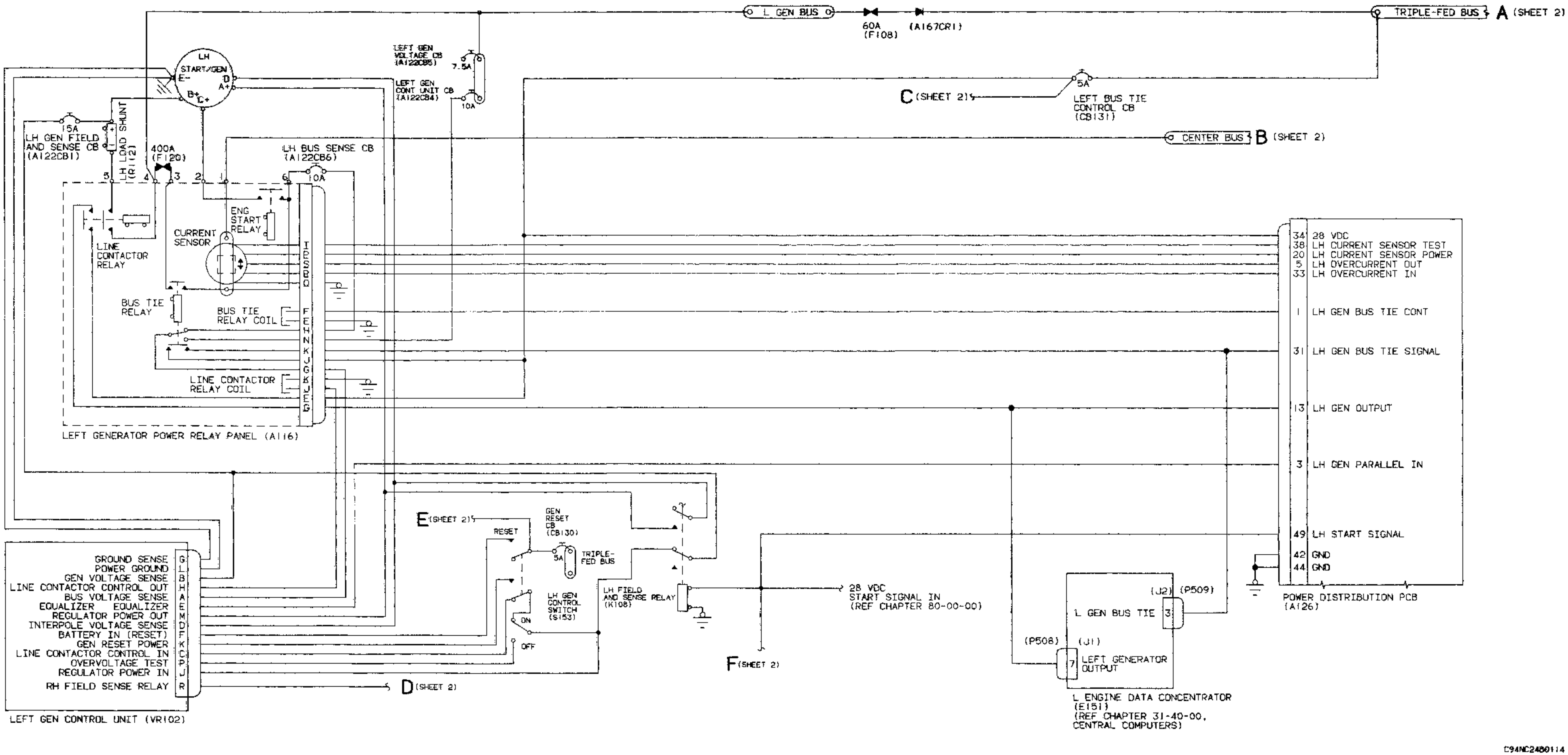
FIELD AND SENSE RELAY (Effectivity: All)

The field and sense relays are individually mounted on a bracket attached to the wing center section electrical equipment panel. Each has three sets of contacts and is energized when the applicable ignition/start switch is placed in the ON or STARTER ONLY position. One set of contacts supplies starter/generator output voltage to pin J of the GCU, allowing the GCU to sense any overvoltage that may be present when the relay is de-energized. When the field and sense relay is energized, this same set of contacts will open, removing power from pin J of the GCU. This prevents generator output during starter operation. The two remaining sets are closed only when the relay is energized. One set provides 28 vdc to energize the engine start relay and the other set shorts the shunt field of the starter/generator during engine starts, preventing transients from entering the GCU. Refer to Chapter 80-00-00 for a schematic of the starting system.

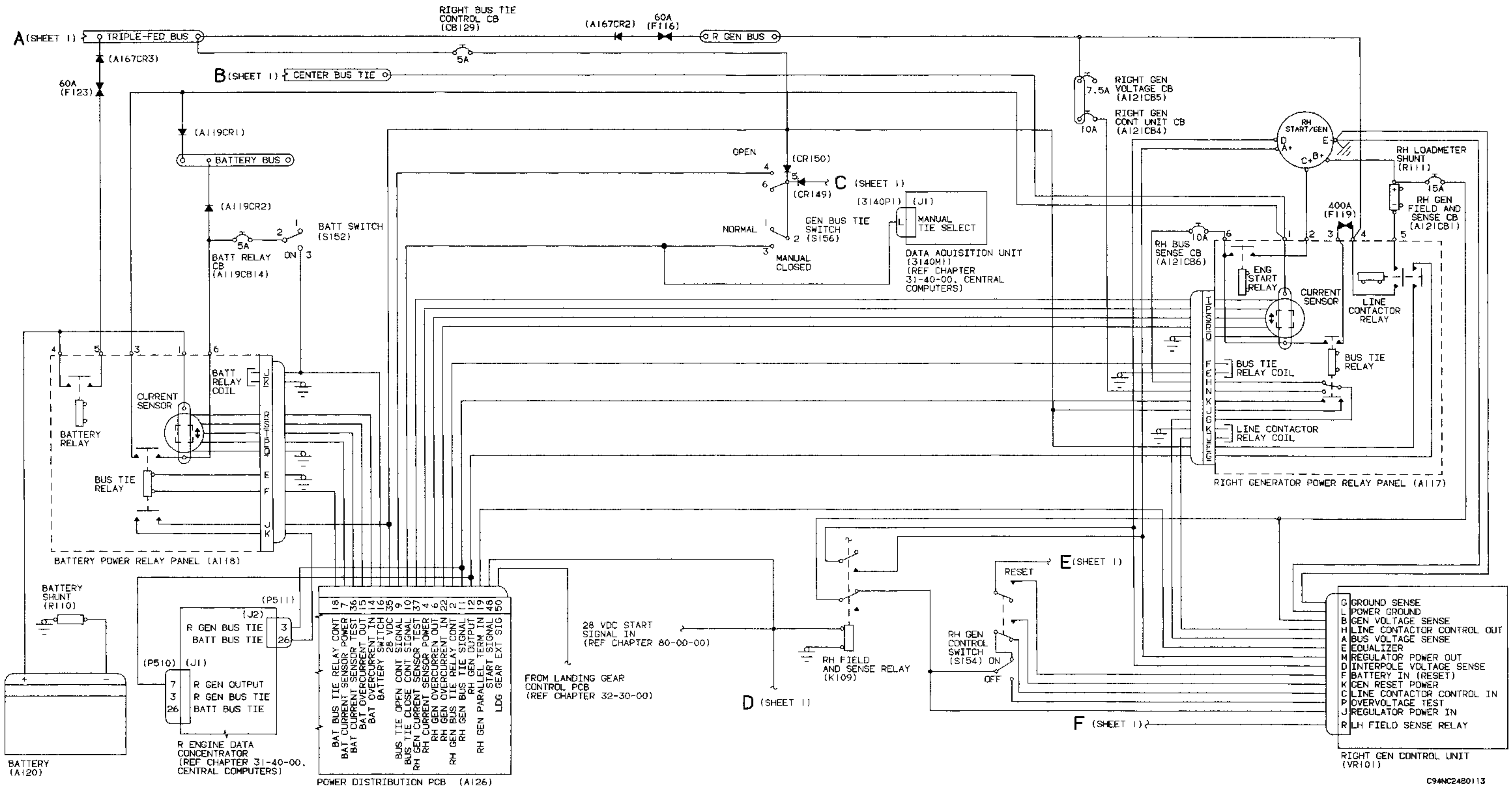
POWER DISTRIBUTION PCB (Effectivity: All)

The power-distribution PCB is mounted in the pilot's console on the printed circuit card rack and receives 28 vdc operating voltage from the triple-fed bus through the left and right bus-tie-control circuit breakers placarded ELECTRICAL, BUS TIE CONTROL, LEFT-RIGHT, on the left circuit breaker panel. All three power-relay-panel current sensors and bus-tie relays are monitored and controlled by the power-distribution PCB. When one or more current sensors signal an overcurrent in the amount of 325 amperes or greater on the buses, the power-distribution PCB will open the applicable bus-tie relays (all three if needed) to isolate the overcurrent on the affected bus. Due to the high amount of current required to perform landing gear and engine starting operations, signals are sent to the power-distribution PCB, allowing it to disregard overcurrent signals from the current sensors and keep the bus-tie relays closed.

The bus-tie relays can be manually opened or closed through the power-distribution PCB with the generator bus-tie switch placarded GEN TIES, MAN CLOSED-NORM-OPEN on the center subpanel. When the switch is placed in the MAN CLOSED position, voltage is applied to the power-distribution PCB bus-tie-close control input, closing both generator bus-tie relays. The same voltage will signal the Engine Data Concentrator (EDC) causing the Engine Instrument Crew Alerting System (EICAS) green MAN TIES CLOSED advisory message to be displayed. When the generator bus-tie switch is placed in the OPEN position, voltage is applied to the power-distribution PCB bus-tie-open control input, opening both generator bus-tie



DC Generation and Control System Functional Schematic (Effectivity: All)
(Sheet 1 of 2)
Figure 2



DC Generation and Control System Functional Schematic (Effectivity: All)
(Sheet 2 of 2)
Figure 2

relays. The power-distribution PCB will close the battery bus-tie relay if the battery switch is in the ON position and no overcurrent is on the center bus. It will also automatically close both generator bus-tie relays if at least one starter/generator is operating with the line-contactor relay closed and the generator bus-tie switch in the NORM position.

NOTE

A self-test of the power-distribution PCB can be initiated by the generator bus-tie switch. Refer to POWER DISTRIBUTION PCB SELF-TEST in this chapter for details about the self-test.

The power-distribution PCB will also provide an interconnect for the generator control units (GCU) during starter/generator parallel operation. It consists of a connection from each GCU pin E to the power-distribution PCB at pins 19 and 3. The power-distribution PCB uses an internal relay to connect the two GCU paralleling channels when the line contactor and bus-tie relays are closed in both generator-power relay panels. This feature ensures that load sharing is possible only when both generators are on-line with their bus-tie relays closed.

DC VOLTAGE AND LOAD INDICATION (Effectivity: All)

The voltage and load indication system allows the pilot to monitor the electrical status of the generation and control system. It consists of circuit breakers, voltmeter select switches, one dc voltmeter, a battery shunt, battery current switch and both a left and right loadmeter with the left also functioning as a battery ammeter. The voltmeter select switches are of the push-button type and are located in a cluster on the center subpanel. When the desired voltmeter select switch, placarded L GEN, CTR BUS, R GEN, TRIP FED, EXT PWR, or BATT, is pushed, voltage on the applicable bus will be displayed on the voltmeter located directly above the switches on the center subpanel. On either side of the voltmeter are two LCD loadmeters. These two loadmeters indicate the starter/generator electrical loads in percent and receive their signals from the left and right starter/generator loadmeter shunts. When the BATT AMP switch is pressed, the left loadmeter contacts will remove the starter/generator signal and close the battery-amperage contacts, indicating current flow to and from the battery. The battery shunt provides the signal to read battery current via a series circuit through the battery monitor PCB. The signal is then routed from the battery monitor PCB to the BATT AMP/L LOAD % meter where the current reading will be displayed.

All three meters are identical except for display parameters. They are capable of averaging the inputs every 10 seconds and updating the display at least every minute. Voltage inputs can be read from 0.0 to 32.0 vdc with an accuracy rate of ±0.5 vdc. Load indications are displayed in percent ranging from -99 to 199 with any reading above or below these parameters displayed as -99 or 199. Accuracy of the loadmeters depends upon the bus offset voltage on which it is operating. Since the starter/generator loadmeter shunts are wired in the positive side of the circuit, they operate on the actual bus voltage with an accuracy of ±1 ampere. The battery shunt is wired into the negative lead of the battery; therefore, it will normally operate on a bus offset voltage of 0 vdc with an accuracy of ±5 amperes.

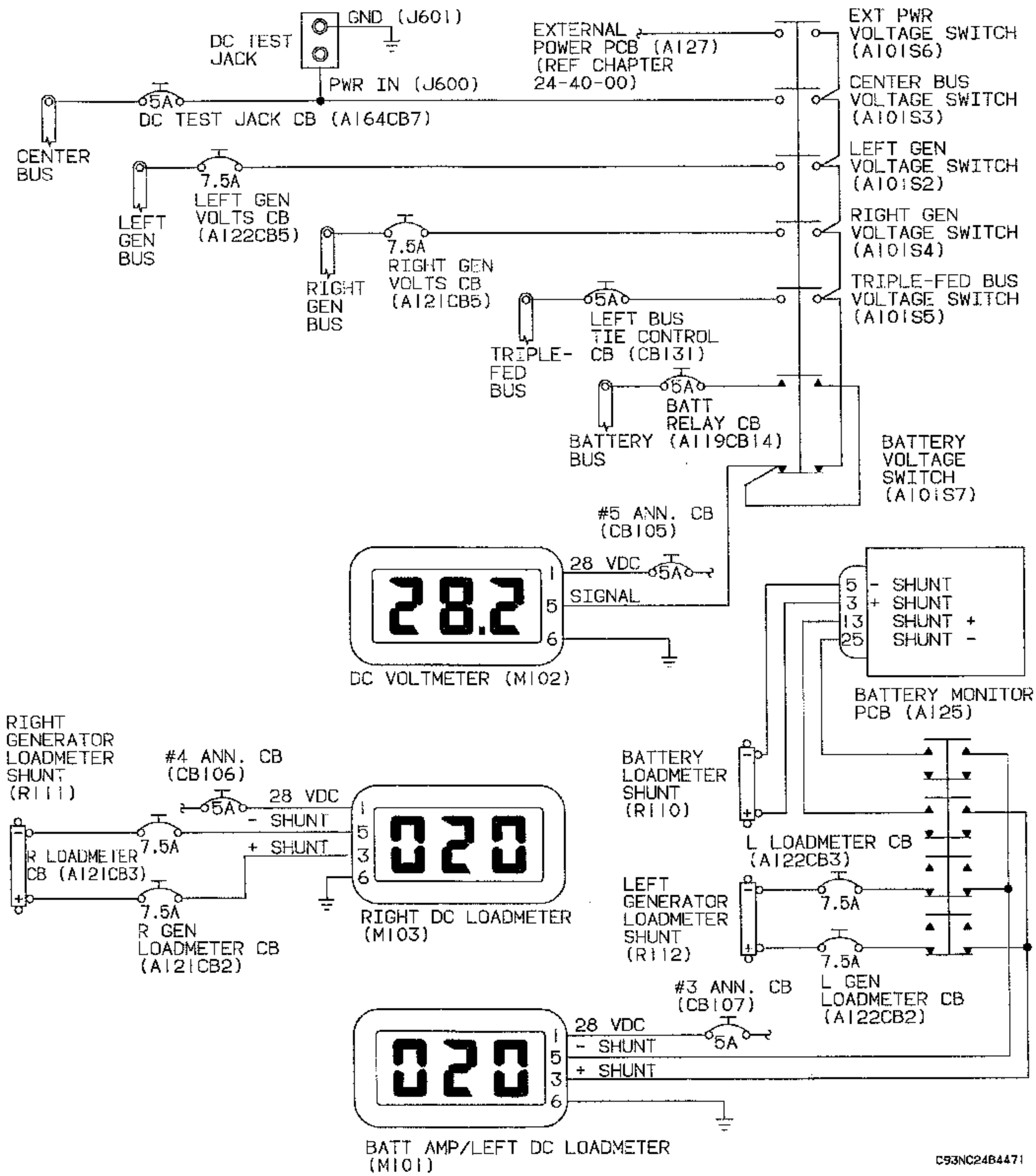
A dc test jack is located on the pilot's inboard subpanel adjacent to the pedestal. It may be used to check center bus voltage as long as the dc test jack circuit breaker on the the aft circuit breaker panel is closed.

DC GENERATION AND CONTROL - TROUBLESHOOTING (Effectivity: All)

All dc generation troubleshooting is best accomplished by monitoring each of the generator control unit (GCU) pins for the resistance and voltage values shown in Charts 1, 2 and 3. All three charts clarify the operating mode and electrical check to be performed with chart headings and notes. By using the TK1999/935 generator control unit test unit (1, Chart 1, 24-00-00), readings can be obtained during the different operating modes and compared to those of a normal system. Refer to GENERATOR CONTROL UNIT TEST UNIT (TK1999/935) in this chapter for detailed information on building and operating the GCU test unit when troubleshooting the DC generation system.

NOTE

The resistance values shown in Chart 1 are approximate values. It is not expected that identical values will be obtained during checkout, but even slight deviations may indicate a system fault.



DC Voltage and Load Indication Schematic (Effectivity: All)
Figure 3

Usually it should not be necessary to check each of the inputs given in Charts 1, 2 and 3 to isolate a defective component. Many times the description of the system malfunction is sufficient to indicate which circuits to check. Checking the ground wires and one or two specific circuits will normally isolate a fault. The BEECHCRAFT Starship 1 Wiring Diagram Manual should be used to trace specific wire routes and locate pin and plug numbers. Many times a loose or faulty pin connection will cause a fault. Ensure that there are no loose, damaged or corroded pins in any system connectors. If a fault cannot be isolated with these general troubleshooting guidelines or checks, refer to the applicable chart in this chapter to isolate the fault. The steps in each chart should be followed sequentially unless otherwise specified. An example would be to proceed to the next step when there are no directions immediately following a NO condition.

CAUTION

Never apply voltage to pin H of the GCU. Never apply a ground to pins H or M. Always ensure that pins G and L are well grounded.

GENERATOR CONTROL UNIT TEST UNIT (TK1999/935) (Effectivity: All) (Figure 4)

A generator control unit test unit (1, Chart 1, 24-00-00) should be used to gain access to the individual pins on the generator control units (GCU) when troubleshooting the dc generation system. Refer to Figure 4 for component part numbers and a schematic for use when building the GCU test unit. Since maximum starter/generator output is 300 amperes, the 50 percent load specified in Chart 3 should be established by turning on enough electrical equipment to establish approximately 150 amperes of load on the electrical system. Refer to Chapter 24-50-00 for loads utilized by the various electrical systems and components.

Set up the GCU test unit for troubleshooting as follows:

CAUTION

Never connect or disconnect the GCU wiring harness plug when the engine is running as this may damage the GCU.

a. Disconnect the airplane wiring harness electrical connector from the GCU and connect it to the receptacle of the GCU test unit.

b. Connect the plug from the GCU test unit to the GCU receptacle to perform voltage checks.

NOTE

Do not connect the GCU to the GCU test unit when checking resistance and continuity values.

CAUTION

Never apply voltage to pin H of the GCU. Never apply a ground to pins H or M. Always ensure that pins G and L are well grounded.

c. A multimeter or volt/ohmmeter (2, Chart 1, 24-00-00) accurate within 1 percent should be used for electrical measurements. A digital readout is preferred. Connect the meter to the jacks on the face of the GCU, ensuring proper polarity of the connections.

d. Attach the GCU test unit alligator clip from pin G to the wing center section electrical equipment panel. This provides a nonresistive path to ground for accurate electrical checks.

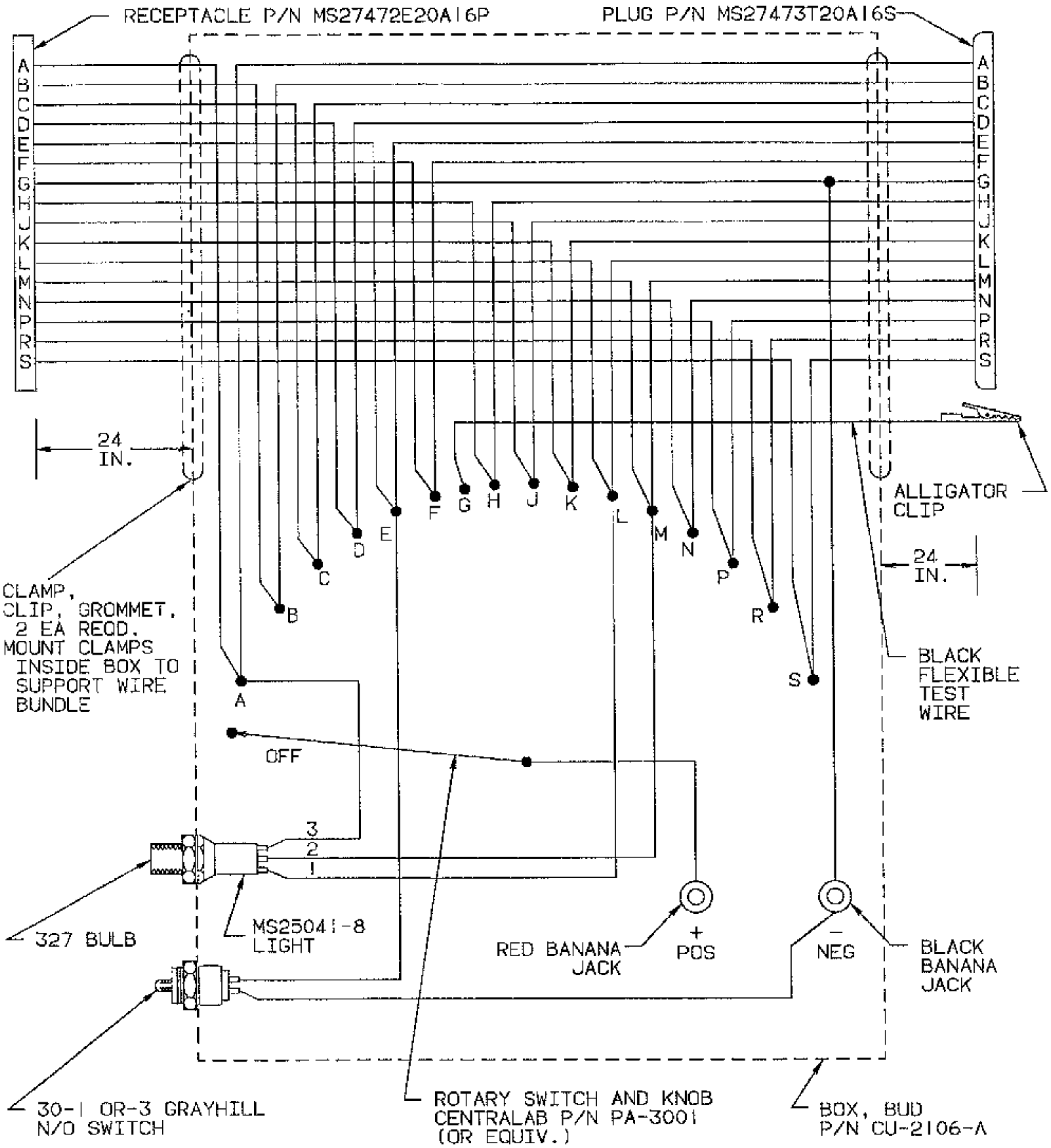
e. Rotate the knob on the face of the GCU test unit to the pin being checked, then compare the meter reading with the normal value shown in the chart being used.

f. If a check of the equalizer circuit is required, use the press-to-test switch to apply a ground to pin E of the GCU. A 2 to 3 vdc drop at pin B is an indication of a good equalizer circuit. Refer to STARTER/GENERATOR PARALLELING EQUALIZER CIRCUIT and Chart 7 for further troubleshooting information regarding potential equalizer circuit faults.

CAUTION

Never replace a damaged GCU until proper operation of the field and sense relay being checked is confirmed.

g. If a check of the field and sense relay on the side being tested is required, rotate the knob on the face of the GCU test unit to the OFF position and perform the check as instructed under FIELD AND SENSE RELAY CHECK in this chapter.



NOTE:
ALL WIRE, EXCEPT BLACK GROUND WIRE, TO BE 18 GAGE MIL-W-5086

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Generator Control Unit Test Unit (TK1999/935) (Effectivity: All)
Figure 4

CAUTION

Never connect or disconnect the GCU wiring harness plug when the engine is running as this may damage the GCU.

h. Disconnect the GCU test unit when all electrical checks have been performed.

i. Perform any required maintenance before reconnecting the GCU.

STARTER/GENERATOR PARALLELING EQUALIZER CIRCUIT (Effectivity: All)

One of the more common problems encountered with the equalizer circuit during starter/generator paralleling is a resistive connection between the starter/generator and GCU. To assist in troubleshooting the equalizer circuit with Chart 7, the following information is provided to explain the effect of resistive connections on the equalizer circuit.

With both starter/generators on-line and operating in parallel, proper operation of the equalizer circuit is dependent upon a nonresistive connection between each starter/generator and its GCU. Voltage at pin B of the GCU must be the same as the output voltage at terminal B of the starter/generator. Voltage at pin D of the GCU must also be the same as voltage at terminal D of the starter/generator. If either of these connections on either side of the system causes a voltage drop between the GCU and starter/generator, an adjustment of field voltage by the GCU will cause an out-of-parallel condition. For example, if the output at terminal B of the starter/generator was subject to a 2-vdc drop before reaching pin B of its GCU, the GCU would compensate and raise the starter/generator output 2 vdc. This rise in starter/generator output will cause the affected starter/generator to carry more of the electrical load. An out-of-parallel condition would exist, with the GCU unable to compensate because it had adjusted to an erroneous input.

NOTE

The GCU regulator circuit will not adjust starter/generator output more than 2.0 vdc in either direction; consequently, the GCU will not parallel the starter/generators if the voltage difference is too great.

Many times a resistive connection to ground will also cause an equalization fault. Use Chart 7 to isolate any potential ground faults in the equalizer circuit.

GENERATOR CONTROL UNIT OVERVOLTAGE CIRCUIT CHECK (Effectivity: All)

NOTE

A multimeter or volt/ohmmeter (2, Chart 1, 24-00-00). accurate within 1 percent should be used for electrical measurements. A digital readout is preferred.

The overvoltage circuit of the generator control unit (GCU) can be tested during the performance of a normal maintenance inspection without disturbing the voltage adjustment and without subjecting the electrical system to excessive voltage. Refer to Chapter 5 for the specified inspection interval. Connect the meter to pin J of the GCU. With the generator to be tested operating, set the respective generator control switch to OFF and observe the meter. The voltage on the meter should change from 28.25 ±.25 vdc to residual voltage (approximately 0.3 to 2.0 vdc). Failure of pin J to drop to residual voltage indicates a faulty overvoltage circuit in the GCU.

GENERATOR CONTROL UNIT REVERSE CURRENT CIRCUIT CHECK (Effectivity: All)

a. Refer to the BEECHCRAFT Starship 1 Airplane Flight Manual and start the LH engine.

b. Bring the LH starter/generator on-line by placing the LH generator control switch in the RESET position, then release to ON.

c. Refer to the BEECHCRAFT Starship 1 Airplane Flight Manual and start the RH engine.

d. Bring the RH starter/generator on-line by placing the RH generator control switch in the RESET position, then release to ON.

e. Place the fuel shutoff valve for the right engine in the OFF position to shut down the RH engine.

f. Monitor the RH loadmeter. It should gradually decrease the reading until a spike or zero is indicated, signaling that the GCU has sensed reverse current and has shut down the the starter/generator. If the engine is motored by the starter/generator after engine shutdown, a faulty reverse current protection circuit is indicated.

g. Refer to Section IV of the BEECHCRAFT Starship 1 Airplane Flight Manual and start the RH engine.

h. Bring the RH starter/generator on line.

i. Repeat steps e and f for the opposite side of the system.

POWER DISTRIBUTION PCB SELF-TEST (Effectivity: All)

A self-test of the system has been incorporated to exercise the power-distribution circuit components and their current paths. The battery switch should be ON and both starter/generators on-line, with the generator bus-tie switch in the NORM position. No Engine Instrument Crew Alerting System (EICAS) messages should be displayed for the system at this time. When the generator bus-tie switch is placed in the OPEN position, the EICAS should display the yellow L GEN TIE OPEN and R GEN TIE OPEN caution messages. When the switch is placed in the NORM position, no message should be displayed for 2 seconds. After 2 seconds, all three bus-tie relays will open and the yellow L GEN TIE OPEN, R GEN TIE OPEN and BATTERY TIE OPEN caution messages should be displayed for 2 seconds.

NOTE

These two time periods may not be exactly 2 seconds but must be identical.

After 5 seconds no bus-tie messages should be displayed on the EICAS. If the circuit performs as described, it has passed the self-test. If the bus-tie relays did not open, refer to Chart 8 to help isolate the faulty component. If the length of time that the EICAS messages are displayed is not the same as the time period that they are not displayed, or the times are not approximately 2 seconds, suspect an internal fault of the power-distribution PCB.

CHART 1

TROUBLESHOOTING - DC GENERATION AND CONTROL (Effectivity: All)

CONTINUITY VALUES AT CONTROL UNIT CONNECTOR (1)

PIN	FUNCTION	GEN SWITCH POSITION		
		OFF	ON	RESET
A	Bus Voltage Signal Input	138 (2) ∞ (3)	138 (2) ∞ (3)	138 (2) ∞ (3)
B	Gen Voltage Signal In	.3 (4) ∞ (5)	.4 (4) ∞ (5)	.4 (4) ∞ (5)
C	Line Contactor Power Control In	∞	.7 (4) ∞ (5)	∞ (4) ∞ (5)
D	Interpole Voltage Signal In	0 to .4	0 to .4	0 to .4
E	Equalizer	∞	∞	∞
F	Battery In (Reset)	∞	∞	18 (6) ∞ (7)
G	Signal Ground	0	0	0
H	Line Contactor Control Out	38k	38k	38k
J	Regulator Power In	.4 (4) ∞ (5)	.4 (4) ∞ (5)	.4 (4) ∞ (5)
K	Gen Start-Up Power in (Reset)	∞	∞	.8 (4) ∞ (5)
L	Power Ground	0 to .3	0 to .3	0 to .3
M	Regulator Power Out	2.6	2.6	2.6
P	Overvoltage Test	.5	∞	∞
R	Cross-start Current Limiting	386	386	386

NOTES

1. Chart 1 resistance and continuity checks should be made with the battery OFF, external power OFF, engines OFF and the GCU disconnected.
2. Bus sense circuit breaker closed. Resistance may vary due to bus loads.
3. Bus sense circuit breaker open.
4. Generator field and sense circuit breaker closed. Reading may vary due to wiring and circuit breaker resistance.
5. Generator field and sense circuit breaker open.
6. Generator reset circuit breaker closed. Resistance may vary due to bus loads.
7. Generator reset circuit breaker open.

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CHART 2
TROUBLESHOOTING - DC GENERATION AND CONTROL (Effectivity: All)

VOLTAGE VALUES AT CONTROL UNIT CONNECTOR (1)

PIN	FUNCTION	GEN SWITCH POSITION			ENGINE CRANKING (4)
		OFF	ON	RESET	
A	Bus Voltage Signal Input	24 (2) 0 (3)	24 (2) 0 (3)	24 (2) 0 (3)	15/20
B	Gen Voltage Signal In	0	0	0	12/18
C	Line Contactor Power Control In	0	0	0	0/0
D	Interpole Voltage Signal In	0	0	0	6/2
E	Equalizer	0	0	0	6/2
F	Battery In (Reset)	0	0	24	0/0
G	Signal Ground	0	0	0	0/0
H	Line Contactor Control Out	0	0	0	0/0
J	Regulator Power In	0	0	0	0/0
K	Gen Start-Up Power in (Reset)	0	0	0	0/0
L	Power Ground	0	0	0	0/0
M	Regulator Power Out	0	0	0	6/2
P	Overvoltage Test	0	0	0	0/0
R	Cross-start Current Limiting	0	0	0	15/20

NOTES

1. Chart 2 voltage checks should be made with the battery ON, external power OFF, engines OFF and the GCU connected, with the exception of engine cranking (see note 4).
2. Bus sense circuit breaker closed. Voltage may vary with battery charge and loads.
3. Bus sense circuit breaker open.
4. With the generator control switch in the OFF position, crank the engine on the side being checked. The first value is obtained initially, while the second value occurs just before cranking is discontinued.

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CHART 3
TROUBLESHOOTING - DC GENERATION AND CONTROL (Effectivity: All)
VOLTAGE VALUES AT CONTROL UNIT CONNECTOR (1)

PIN	FUNCTION	ENGINE @ 70% N_1 LOAD @ 50% GEN SWITCH POSITION			ENGINE SHUTDOWN GEN SWITCH POSITION	
		OFF	RESET	ON	ON (2)	OFF (3)
A	Bus Voltage Signal Input	26	26	28.3	28/28	28/28
B	Gen Voltage Signal In	1 (4)	28 (5)	28.3	28/25	1/0 (4)
C	Line Contactor Power Cont In	0	0	28.2	28/25	0/0
D	Interpole Voltage Signal In	0	0	-1 (6)	0/0.5	0/0
E	Equalizer	0	0	-1 (6)	0/0.5	0/0
F	Battery IN (Reset)	0	26	0 to .2	0/0	0/0
G	Signal Ground	0	0	0 to .2	0/0	0/0
H	Line Contactor Control Out	0	0	26.5	26/0	0/0
J	Regulator Power In	1 (4)	28 (5)	28.3	28/25	1/0 (4)
K	Gen Start-up Power In (Reset)	0	28 (5)	0 to .1	0/0	0/0
L	Power Ground	0	0	0 to -.2	0/0	0/0
M	Regulator Power Out	0	4 (7)	8 (7)	4/22	0/0
P	Overvoltage Test	1 (4)	.2 (8)	.2 (8)	.2/0 (8)	1/0 (4)
R	Cross-Start Current Limiting	0	.035 (8)	.035 (8)	.035 (8)	0/0

NOTES

1. All voltage measurements are made with one engine running and the generator control switch in the specified position unless otherwise indicated.
2. All voltage measurements for this switch position should be made with both generators on-line and operating in parallel. Shut down the engine on the side of the starter/generator under test. The first value given is at engine shutdown. The second value is just before the line contactor relay opens.
3. After the line contactor relay opens, place the generator control switch in the OFF position and take the first reading. The second value is when the engine stops rotating.
4. Approximation of residual voltage. May vary from 0.3-2.0 vdc.
5. Starter/generator output voltage should build from residual voltage and stabilize at 28.25 ± .25.
6. For starter/generator current, interpole voltage is negative with respect to ground. The voltage will vary depending upon starter/generator current. A negative 2 volts is proportional to 300 amperes of output current.
7. Variable output. The average voltage value will vary with starter/generator speed and load.
8. GCU internal voltage.

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CHART 4
TROUBLESHOOTING - DC GENERATION AND CONTROL (Effectivity: All)

STARTER/GENERATOR DOES NOT RESET

STEP 1	Is 0.3-2.0 vdc at pin B of the GCU? (See Note 1.)	**YES**	Proceed to Step 7.
	NO		
STEP 2	Is the generator field and sense circuit breaker closed?	**YES**	Proceed to Step 4.
	NO		
STEP 3	Are pins B, J or K shorted to ground? (See Note 2.)	**YES**	Close circuit breaker after locating and correcting short.
	NO		
	Close circuit breaker.		
STEP 4	Is a negative voltage at pin B of the GCU? (See Note 7.)	**YES**	Shut down both the starter/generator and engine, then operate the unit as a starter to eliminate reverse polarity build-up.
	NO		
STEP 5	Is there 0.3-2.0 vdc at terminal B of the starter/generator? (See Note 1.)	**YES**	Proceed to Step 6.
	NO		
	Faulty starter/generator.		
STEP 6	Does the generator field and sense circuit breaker check for continuity?	**YES**	Locate fault in wiring between terminal B on the starter/generator and pin B on the GCU.
	NO		
	Replace faulty circuit breaker.		
STEP 7	Is there 0.3-2.0 vdc at pin J of the GCU? (See Note 1.)	**YES**	Proceed to Step 11.
	NO		
STEP 8	Is there 0.3-2.0 vdc at terminal 2A of the field and sense relay? (See Note 1.)	**YES**	Proceed to Step 9.
	NO		
	Find break in wiring between the starter/generator terminal B and the field and sense relay.		
STEP 9	Is there 0.3-2.0 vdc at terminal 3A of the field and sense relay?	**YES**	Locate and correct wiring fault between pin 3A on the relay and pin J on the GCU.
	NO		
STEP 10	Is voltage being applied to the field and sense relay coil at any time other than engine start?	**YES**	Locate the source of power and correct the circuit so relay energizes during engine start only.

CHART 4
TROUBLESHOOTING - DC GENERATION AND CONTROL (Effectivity: All) *(Continued)*

STARTER/GENERATOR DOES NOT RESET

	NO Replace faulty relay.		
STEP 11	Is there 0.3-2.0 vdc at pin K during reset? (See Note 3.)	**YES**	Proceed to Step 12.
	NO Faulty generator control switch or wiring fault between switch and GCU pin K. Locate and correct the wiring fault or replace the switch. (See Note 2.)		
STEP 12	Is there 0.3-2.0 vdc at pin M during reset?	**YES**	Proceed to Step 14.
	NO		
STEP 13	Is there field voltage at pin M of the GCU during reset? (See Note 6.)	**YES**	System is functional.
	NO Proceed to Step 15.		
STEP 14	Is there continuity between terminal A of the starter/generator and pin M of the GCU? (See Note 2.)	**YES**	If it is determined that residual voltage is at terminal A of the starter/generator, and the unit is not building to 28.25 ±.25 vdc, suspect an internal fault of the starter/generator.
	NO Correct wiring fault between terminal A on the starter/generator and GCU pin M.		
STEP 15	Is pin G properly grounded? (See Note 2.)	**YES**	Proceed to Step 16.
	NO Restore full continuity to ground. (See Note 5.)		
STEP 16	Is pin L properly grounded? (See Note 2.)	**YES**	Suspect a fault of the GCU. (See Note 4.) If the fault is still not identified, perform the steps in Chart 4 again to recheck the system. Charts 1 and 2 may provide enough information to isolate the fault if still unidentified.
	NO Restore full continuity to ground. (See Note 5.)		

1. This check is for residual voltage and should be made with one engine running and the generator control switch in the OFF position.

CHART 4
TROUBLESHOOTING - DC GENERATION AND CONTROL (Effectivity: All) *(Continued)*

STARTER/GENERATOR DOES NOT RESET

2. An ohmmeter (3, Chart 1, 24-00-00) is sufficient for these resistance and continuity checks. The engines should be off, both the battery and external power switched off, and the GCU disconnected.

3. The generator control switch must be placed in the RESET position for this reading.

4. Failure of the field and sense relay to short the shunt field of the starter/generator can produce transient voltage spikes at pin M of the GCU during engine start. These spikes may be of sufficient magnitude to damage the GCU internal circuitry. Before replacing the GCU, perform an operational check of the field and sense relay as outlined under FIELD AND SENSE RELAY CHECK in this chapter.

5. System operation without a proper ground at pin G or L of the GCU may cause permanent damage to the GCU internal circuitry. If the system still does not function properly after restoring full continuity, suspect GCU internal damage due to an inadequate ground.

6. Field voltage is variable depending upon engine RPM and electrical system load. An indication of approximately 5-10 vdc is normal.

7. Voltage at pin B of the GCU must be positive for generator reset. A negative voltage is an indication of starter/generator reverse polarity, and will prevent the starter/generator from resetting.

CHART 5
TROUBLESHOOTING - DC GENERATION AND CONTROL (Effectivity: All)

STARTER/GENERATOR DOES NOT COME ON LINE

STEP 1	Does starter/generator output voltage at pin B of the GCU build to 28.25 ±.25 vdc when the starter/generator is reset? (See Note 4.)	**YES**	Proceed to Step 3 when bringing the first starter/generator on-line and to Step 4 when bringing a second on-line.
	NO		
STEP 2	Is a condition in the wiring between terminal B of the starter/generator and pin B of the GCU causing a differential of output voltage between the two pins when sensed by the GCU? (See Note 6.)	**YES**	Zero volts at pin B of the GCU indicates a tripped field and sense circuit breaker, complete wiring break, or a trip of the GCU overvoltage circuit. A voltage differential indicates excess resistance in the circuit. (See Note 6.) Locate and correct the fault.
	NO		
	Starter/generator is not building output to 28.25 ±.25 vdc during reset. Use Chart 4 to isolate the fault.		
STEP 3	Is starter/generator voltage at pin B at least 0.5 vdc greater than center bus voltage as sensed at pin A of the GCU? (See Note 2.)	**YES**	Proceed to Step 11.
	NO		
	The GCU is sensing a higher voltage at pin A than pin B. Ensure that external power is off. If it is locate the source of voltage and correct the problem.		

CHART 5
TROUBLESHOOTING - DC GENERATION AND CONTROL (Effectivity: All) *(Continued)*

STARTER/GENERATOR DOES NOT COME ON LINE

STEP 4 Is starter/generator voltage at pin B greater than 0.5 vdc of the opposite unit's voltage when sensed at pin A of the GCU? (See Note 3.)
YES Proceed to Step 11.

NO

STEP 5 Are the voltage readings at the center bus and pin A of the GCU equivalent? (See Note 5.)
YES Possible equalization fault. Use Chart 7 to isolate the fault.

NO

STEP 6 Is there center bus voltage at terminal 1 of the generator-power relay panel?
YES Proceed to Step 7.

NO

Locate and correct wiring fault between the center bus and terminal 1.

STEP 7 Is there center bus voltage at terminal 6 of the generator-power relay panel?
YES Proceed to Step 8.

NO

Check the generator-power relay panel current sensor for continuity. (Check between terminals 1 and 6 on the generator-power relay panel.)

STEP 8 Is there center bus voltage at both terminals of the bus-sense circuit breaker?
YES Proceed to Step 9.

NO

Reset circuit breaker. Replace if continuity is not restored.

STEP 9 Is there center bus voltage at pin H of the generator-power relay panel?
YES Proceed to Step 10.

NO

Locate and correct wiring fault between terminal 6 and pin H on the generator-power relay panel.

STEP 10 Is there center bus voltage at pin G of the generator-power relay panel?
YES Locate and correct wiring fault between pin G on the generator-power relay panel and pin A on the GCU.

NO

Faulty bus-tie-relay auxiliary contacts.

STEP 11 Is there 28 vdc at pin C of the GCU?
YES Proceed to Step 13.

NO

CHART 5
TROUBLESHOOTING - DC GENERATION AND CONTROL (Effectivity: All) *(Continued)*

STARTER/GENERATOR DOES NOT COME ON LINE

STEP 12 Does the generator control switch check for continuity across the contacts when in the ON position? (See Note 1.)

YES Locate and correct wiring fault between generator control switch and pin C on the GCU.

NO

Replace faulty switch.

STEP 13 Is there 28 vdc at pin H of the GCU? (See Note 7.)

YES Proceed to Step 14.

NO

Faulty GCU. (See Note 8.)

STEP 14 Is there 28 vdc at pin j of the generator-power relay panel?

YES Proceed to Step 15.

NO

Locate and correct break in wiring between the generator-power relay panel pin j and pin H on the GCU.

STEP 15 Does pin k of the generator-power relay panel have continuity to ground?

YES Proceed to Step 16.

NO

Restore full continuity to ground.

STEP 16 Is there starter/generator voltage at terminal 4 of the generator-power relay panel?

YES If an EICAS yellow L GEN INOP or R GEN INOP caution message is displayed, troubleshoot the EICAS message circuit for a faulty message signal.

NO

Faulty line-contactor relay.

1. Resistance and continuity checks should be made with the engines off, both the battery and external power switches off and the GCU disconnected.

2. The bus-sense circuit breaker must be closed to receive this reading.

3. The opposite starter/generator must be on-line with the bus-tie relay and GCU circuit breakers closed.

4. The generator field and sense circuit breaker must be closed to receive this reading.

5. Voltage check should be made on the side that is being brought on-line. The bus-tie relay should be open. This note applies to Steps 5 through 10.

6. A false starter/generator output reading at pin B of the GCU will cause the equalization circuit to increase the field voltage; consequently, the affected side will try to carry more of a load with both starter/generators on-line or go into overvoltage with only one on-line.

7. Any time pin H is subjected to a voltage input, damage to the GCU internal circuitry could result.

8. If the GCU senses differential voltage, reverse current or an overvoltage condition, a control voltage will not be supplied to the line-contactor relay coil. Ensure that these faults do not exist before replacing a GCU.

CHART 6
TROUBLESHOOTING - DC GENERATION AND CONTROL (Effectivity: All)

BUS-TIES NOT CLOSING WHEN STARTER/GENERATOR IS ON LINE

STEP 1 Are either of the generator bus-tie-control circuit breakers open? **YES** Close circuit breaker.

NO

STEP 2 Is there starter/generator voltage at pin f of the generator-power relay panel? (See Note 3.) **YES** Proceed to Step 3.

NO

Locate and correct wiring fault between bus-tie-control circuit breaker and pin f.

STEP 3 Is there starter/generator voltage at pin g of the generator-power relay panel? (See Note 3.) **YES** Proceed to Step 4.

NO

Faulty line-contactor relay auxiliary contacts.

STEP 4 Is there starter/generator voltage at pin 13 (LH) or pin 12 (RH) of the power-distribution PCB? (See Note 3.) **YES** Proceed to Step 5.

NO

Locate and correct fault between pins 13 (LH) or pin 12 (RH) of the power-distribution PCB and the generator-power relay panel.

STEP 5 Is there 28 vdc at pins 34 (LH) and 35 (RH) of the power-distribution PCB? (See Note 3.) **YES** Proceed to Step 6.

NO

Locate and correct wiring fault between bus-tie control circuit breaker and pin 34 (LH) or 35 (RH) of the power-distribution PCB.

STEP 6 Is there 28 vdc at pin 1 (LH) or pin 2 (RH) of the power-distribution PCB? (See Note 3.) **YES** Proceed to Step 8.

NO

CHART 6
TROUBLESHOOTING - DC GENERATION AND CONTROL (Effectivity: All) *(Continued)*

BUS-TIES NOT CLOSING WHEN STARTER/GENERATOR IS ON LINE

STEP 7 Is the power-distribution PCB receiving an overcurrent signal from the current sensors?

YES Check the buses for an 325 ampere or greater overcurrent. If none exists, check for an output at pins r and s, or an input at pin t on the generator-power relay panel. The outputs indicate a faulty current sensor, while the input at pin t indicates a short to power or a faulty power-distribution PCB.

NO

Fault is in the power-distribution PCB.

STEP 8 Is there 28 vdc at pin F of the generator-power relay panel? (See Note 3.)

YES Proceed to Step 9.

NO

Locate and correct wiring fault between pin F on the generator-power relay panel and pin 1 (LH) or pin 2 (RH) on the power-distribution PCB.

STEP 9 Does pin E on the generator-power relay panel have continuity to ground?

YES Faulty bus-tie relay.

NO

Restore continuity to ground.

1. The generator bus-tie switch should be in the normal position with both generators on-line for all generator voltage checks.

2. Manually closing the bus-tie relays when an overcurrent is present may cause damage to the airplane electrical system.

3. Many times a voltage will be present at the connector, but a loose connection at the pin itself will not allow circuit continuity.

CHART 7
TROUBLESHOOTING - DC GENERATION AND CONTROL (Effectivity: All)

STARTER/GENERATORS DO NOT SHARE LOADS

STEP 1 Are the loadmeters indicating the actual load of each starter/generator? (See Note 1.)

YES Proceed to Step 2.

NO

Check the loadmeter shunt and associated wiring for faults. If none are found, replace the faulty loadmeter.

CHART 7
TROUBLESHOOTING - DC GENERATION AND CONTROL (Effectivity: All) *(Continued)*

STARTER/GENERATORS DO NOT SHARE LOADS

STEP 2 Use the GCU test unit (1 Chart 1, 24-00-00) to apply a ground to pin E of the GCU. Is there approximately a 2.0 vdc suppression of generator output voltage indicated? (See Note 2.)

YES Proceed to Step 3.

NO

Faulty GCU.

STEP 3 Connect the GCU test unit to the opposite side GCU. Is approximately a 2.0 vdc suppression of starter/generator output voltage indicated when a ground is applied to pin E by the GCU test unit? (See Note 2.)

YES The GCU equalization circuit is functioning properly for both sides during this test. Proceed to Step 4.

NO

Faulty GCU.

STEP 4 Is the voltage from pin E of the applicable GCU present at pin 3 (LH) or pin 19 (RH) of the power-distribution PCB?

YES Proceed to Step 5.

NO

Locate and correct wiring fault between the power-distribution PCB pin 3 (LH) or pin 19 (RH) and pin E on the applicable GCU.

STEP 5 Read voltage at terminal D of the starter/generator and pin D of the GCU. Are the voltages approximately equivalent between the starter/generator and GCU? (See Notes 2 and 3.) (Perform check on both sides of the system.)

YES If the voltage reading was approximately -1.0 vdc, proceed to Step 6. If a reading of 0.0 vdc was obtained, check the starter/generator for a fault. If the unit is good, locate and correct short to ground. A field and sense relay check should be performed if a short is not evident.

NO

Locate the source of resistance between starter/generator terminal D and pin D of the GCU. Restore full continuity so there is no loss of voltage to the GCU.

STEP 6 Does a condition exist in the wiring between terminal B of the starter/generator and pin B of the GCU, that causes output voltage to differ before it is sensed at the GCU? (See Note 4.)

YES Zero vdc at pin B of the GCU indicates a tripped generator field and sense circuit breaker, complete wiring break or a starter/generator with no output. A slight drop in voltage indicates a loose or faulty wire. Correct indicated fault.

NO

CHART 7
TROUBLESHOOTING - DC GENERATION AND CONTROL (Effectivity: All) *(Continued)*

STARTER/GENERATORS DO NOT SHARE LOADS

STEP 7 Does terminal E of the starter/generator have the same ground potential as the opposite starter/generator terminal E? (See Note 5.)

YES Proceed to Step 8.

NO

Check all ground connections to the affected starter/generator. Restore full continuity to any inferior grounds.

STEP 8 Are pins G and L of the GCU well grounded? (See Note 6.)

YES The system should be functional now. If not, repeat the steps in this chart to find a fault that may not have been evident the first time. If the problem is still apparent, suspect a fault of the power distribution PCB to connect the equalizer channels. A check of voltage and continuity values in Charts 1 and 2 may isolate a fault that has not been detected.

NO

Restore full continuity to ground by checking all ground connections.

1. Bring one starter/generator on-line and establish a constant 50% load on the loadmeter. Disconnect the starter/generator from the line and connect the opposite side. Record the reading on the opposite loadmeter. The indication should be the same if the loadmeters are indicating accurately, and circuit resistance is the same for both sides.

2. Use the GCU test unit (1, Chart 1, 24-00-00) shown in Figure 4 to perform this test. It should be conducted with one starter/generator on-line and a constant 50% load.

3. Voltage is negative with respect to ground and will change with respect to starter/generator output current. A reading of approximately -1.0 vdc is normal for a 50% load. A small variation in circuit resistance will cause the equalizer circuit to adjust to an out-of-parallel condition when none exists.

4. A false starter/generator output reading at pin B on the GCU will cause the equalization circuit to increase the field voltage, and consequently the affected side will carry more of a load.

5. Many times an ohmmeter will not be sufficient to measure a small deviation from ground. Make the check with a voltmeter, one engine running, and a 50% load. A voltage reading of 1.0-3.0 vdc or greater indicates an inferior ground.

6. An ohmmeter is insufficient for this check. Make the check with a voltmeter, one engine running, and a 50% load. Voltage readings of approximately 0.0 for pin G and -0.1 for pin L are acceptable.

CHART 8
TROUBLESHOOTING - DC GENERATION AND CONTROL (Effectivity: All)

BUS-TIES NOT OPENING DURING SELF-TEST

STEP 1	Are either of the generator bus-tie-control circuit breakers open?	**YES**	Close circuit breakers and perform self-test again.
	NO		
STEP 2	Is there slightly less than 28.25 ±.25 vdc on the triple-fed bus?	**YES**	Proceed to Step 3.
	NO		
	Troubleshoot for incorrect voltage on the triple-fed bus.		
STEP 3	Is there triple-fed bus voltage at pin 5 of the generator bus-tie switch?	**YES**	Proceed to Step 4.
	NO		
	Locate and correct wiring fault between the triple-fed bus and generator bus-tie switch.		
STEP 4	Is there triple-fed bus voltage at pin 4 of the generator bus-tie switch? (See Note 1.)	**YES**	Proceed to Step 5.
	NO		
	Faulty switch contacts.		
STEP 5	Is there triple-fed bus voltage at pin 9 of the power-distribution PCB? (See Note 2.)	**YES**	Proceed to Step 6.
	NO		
	Locate and correct wiring fault between the generator bus-tie switch and the power-distribution PCB.		
STEP 6	Is there 28 vdc at pin 1 (LH) or pin 2 (RH) of the power-distribution PCB? (See Note 2.)	**YES**	Faulty power-distribution PCB.
	NO		
STEP 7	Is there 28.25 ±.25 vdc at terminal 6 of the generator-power relay panel? (See Note 2.)	**YES**	Proceed to Step 8.
	NO		
	Generator bus-tie relay is open.		
STEP 8	Is there 28 vdc at pin F of the generator-power relay panel? (See Note 2.)	**YES**	Locate and correct pin F short to power.
	NO		
	Faulty relay.		

1. The generator bus-tie switch should be in the OPEN position when making this voltage check. Refer to POWER DISTRIBUTION PCB SELF-TEST for self-test procedures.

CHART 8
TROUBLESHOOTING - DC GENERATION AND CONTROL (Effectivity: All) *(Continued)*

BUS-TIES NOT OPENING DURING SELF-TEST

2. Many times a voltage will be present at the connector, but a loose connection at the pin will not allow a continuous circuit.

DC GENERATION AND CONTROL - MAINTENANCE PRACTICES (Effectivity: All)

STARTER/GENERATOR REMOVAL (Effectivity: All) (Figure 5)

a. Refer to Chapter 71-10-00 and remove the engine cowling.

b. Remove all electrical power from the airplane.

c. Remove the two cover screws and terminal block cover.

d. Remove the screw and washers attaching wire shielding termination to the terminal block.

e. Tag and remove all wiring.

f. Loosen the adapter clamp at the forward end of the starter/generator and remove the cooling cap adapter from the unit.

g. Pull the cooling adapter down from the unit enough to prevent interference while removing the starter/generator.

CAUTION

It is mandatory that the starter/generator be fully supported from the time the quick-disconnect clamp is loosened until the unit is removed from the engine. The starter/generator must never be allowed to support its own weight through the splined-shaft engagement, or damage to the shaft shear section will result.

h. Loosen the T-bolt on the quick-disconnect clamp which holds the starter/generator on the quick-disconnect mounting adapter.

i. Open the clamp and remove the starter/generator from the quick-disconnect mounting adapter.

j. Remove and discard the O-ring from the splined drive shaft.

STARTER/GENERATOR INSTALLATION (Effectivity: All) (Figure 5)

a. Install a new O-ring on the starter/generator splined drive shaft.

CAUTION

It is mandatory that the starter/generator be fully supported from the time the unit is placed in position until the clamp is installed and properly torqued. The starter/generator must never be allowed to support its own weight through the splined-shaft engagement, or damage to the shaft shear section will result.

b. Align the four mating pins on the starter/generator with the quick-disconnect mounting adapter, and secure it in place with the quick-disconnect clamp. Using an inspection mirror, ensure that the clamp groove fully captures both mating flanges.

NOTE

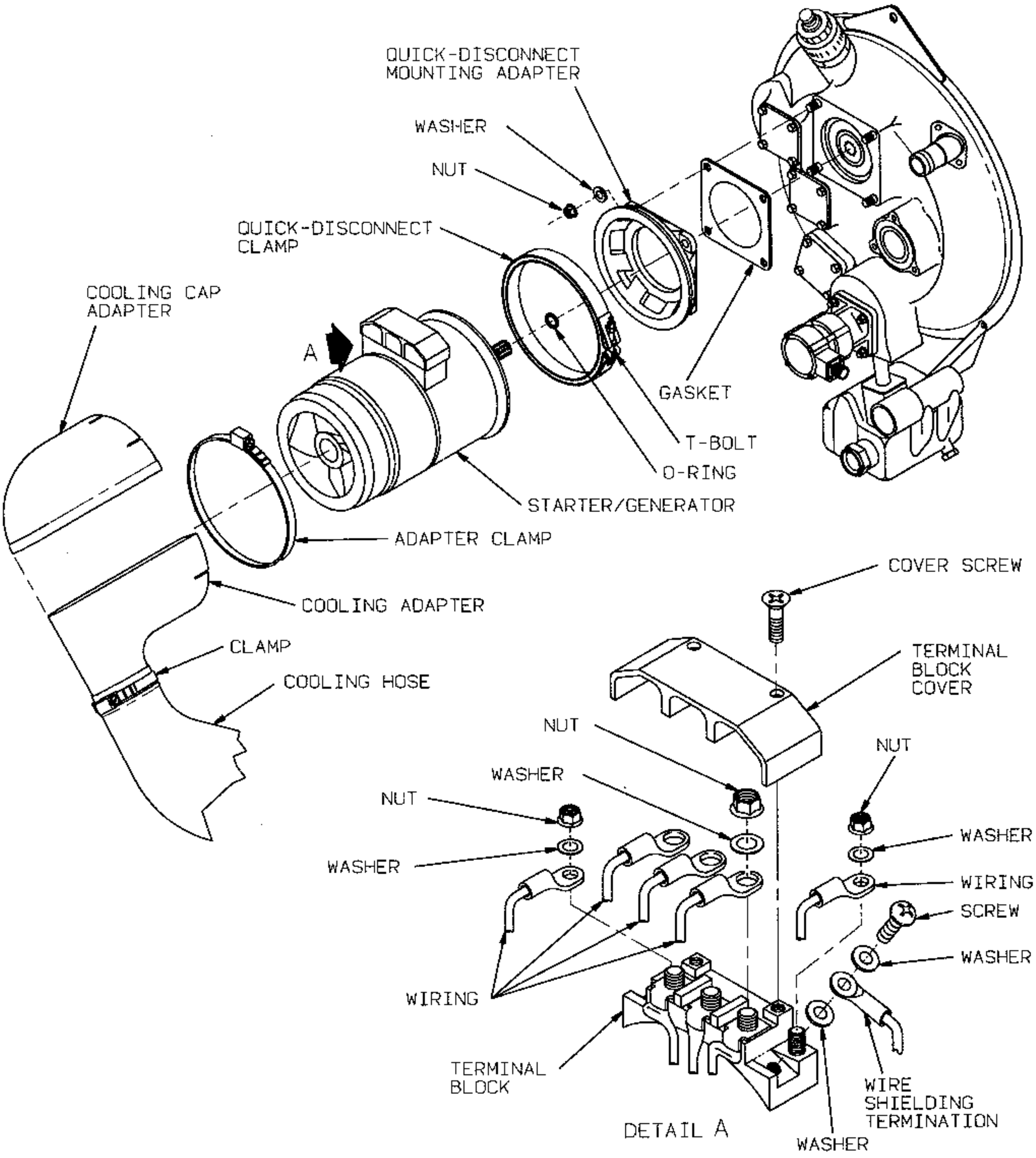
The engine uses wet splines; therefore, lubrication of the splines is unnecessary.

c. When the unit is correctly positioned, torque the T-bolt retaining nut to 50 inch-pounds.

d. Slide the adapter clamp onto the starter/generator and position the cooling adapter on the lower end of the starter/generator.

e. Place the cooling cap adapter over the starter/generator and cooling adapter.

f. Adjust the cooling cap adapter until the alignment provides a good seal; then position and tighten the adapter clamp until the cooling ductwork is secure.



Starter/Generator Installation (Effectivity: All)
Figure 5

CAUTION

The self-locking nuts securing the airplane wiring to the starter/generator must be tightened to the proper torque or damage to the starter/generator or attaching hardware may result.

g. Connect all electrical wiring according to tags, or the BEECHCRAFT Starship 1 Wiring Diagram Manual. Torque the 3/8-inch terminal nuts to 220-235 inch-pounds. Torque the 5/16-inch terminal nuts to 125-135 inch-pounds. Torque any #10-32 terminals to 20-25 inch-pounds.

h. Attach wire shielding termination to the terminal block with screw and washers.

i. Secure the terminal block cover to the starter/generator with screws and washers.

j. Restore electrical power to the airplane.

k. Start the engine using procedures outlined in Section IV of the BEECHCRAFT Starship 1 Airplane Flight Manual. Advance the condition lever to RUN and the power lever to 80% N1 speed.

l. Run the engine for at least two minutes. Shut the engine down using procedures outlined in Section IV of the BEECHCRAFT Starship 1 Airplane Flight Manual, and retorque the clamp retaining nut to 50 inch-pounds.

NOTE

If torque has fallen below 25 inch-pounds, loosen the quick-disconnect clamp, check the starter/generator for proper alignment, and follow steps b, c, k and l again to ensure proper installation of the unit.

m. Safety wire the T-bolt after the torque has been verified.

n. Refer to Chapter 71-10-00 and install the engine cowling.

GENERATOR CONTROL UNIT REMOVAL (Effectivity: All) (Figure 6)

a. Refer to Chapter 53-30-00 and remove the aft wing-box shear panel.

b. Remove all electrical power from the airplane.

c. Loosen the electrical connector at the bottom of GCU and pull connector down and clear of the GCU.

d. Remove the four mounting screws and washers from outer flange of GCU.

e. Remove the GCU from the airplane.

GENERATOR CONTROL UNIT INSTALLATION (Effectivity: All) (Figure 6)

CAUTION

The GCU's must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align holes on flange of GCU with nutplates on panel.

b. Secure the GCU to the panel with four mounting screws and washers.

c. Align electrical connector so that the slot is facing out.

d. Mate connector to GCU and tighten the sleeve until the connector is snug and keeper is engaged.

e. Restore electrical power to the airplane.

f. Refer to Chapter 53-30-00 and install the aft wing-box shear panel.

FIELD AND SENSE RELAY REMOVAL (Effectivity: All) (Figure 7)

a. Refer to Chapter 53-30-00 and remove the aft wing-box shear panel.

b. Remove all electrical power from the airplane.

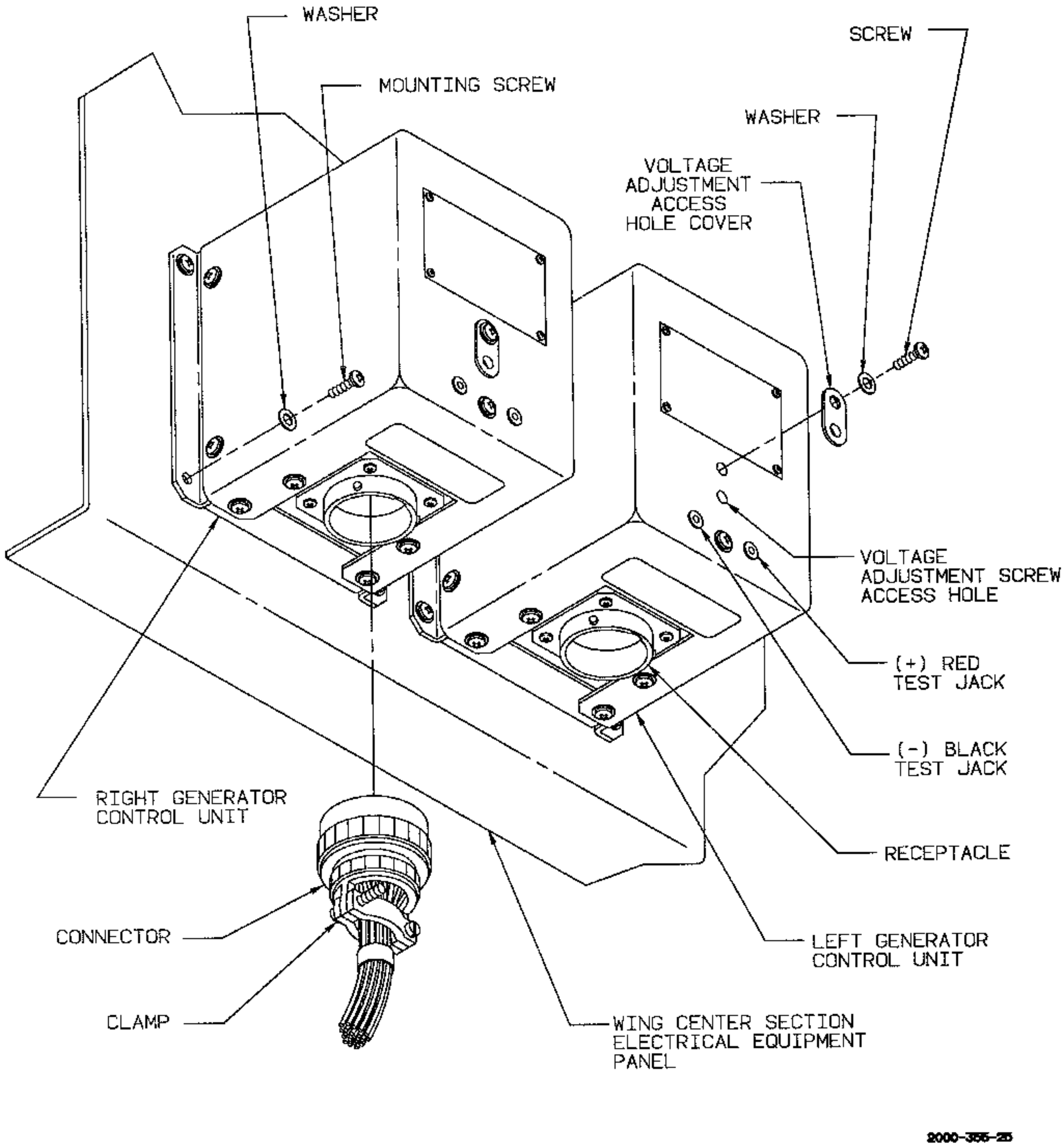
c. Remove the three nuts (1) and washers (2) from studs (9) on the relay socket (7).

d. Lift the field and sense relay (3) from the socket (7).

e. Remove the silicone gasket (14).

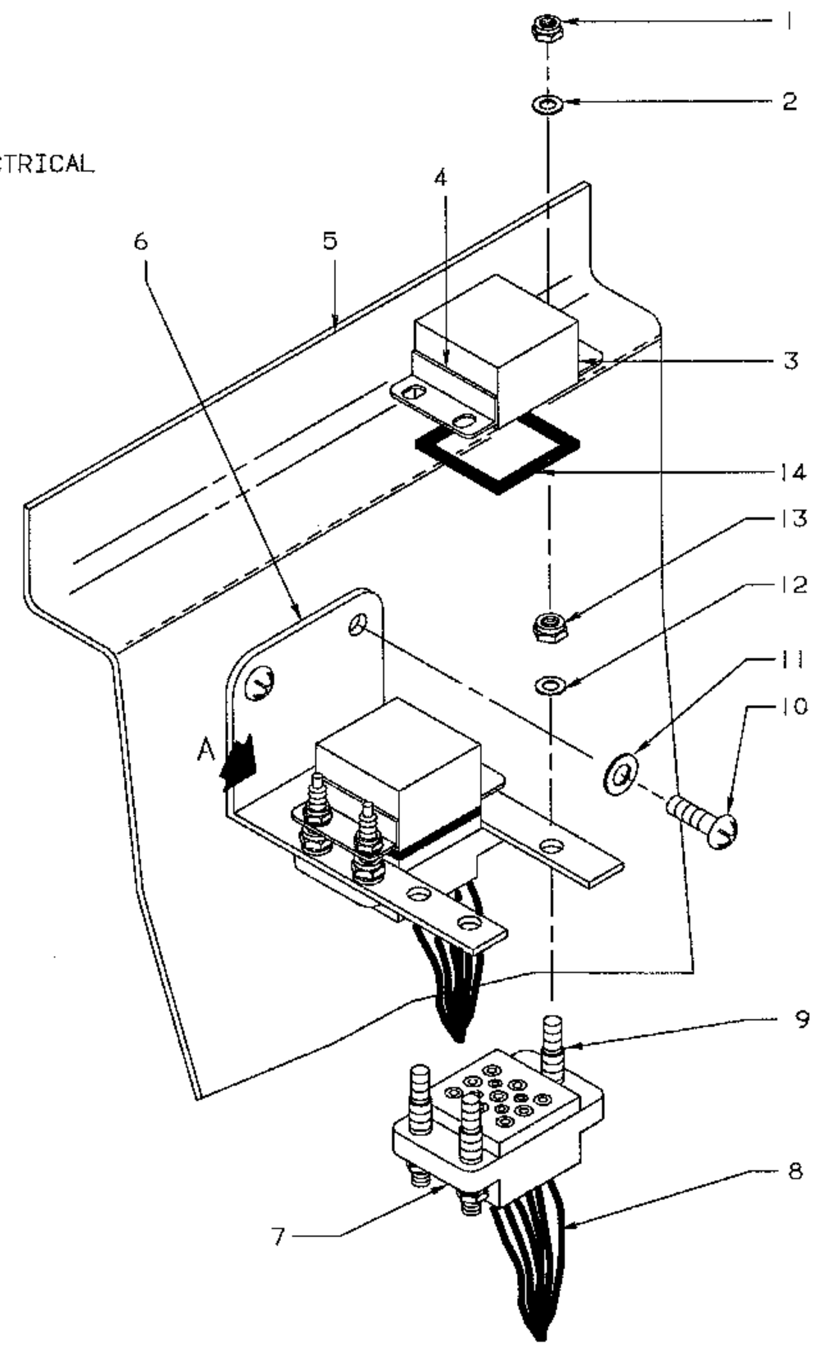
NOTE

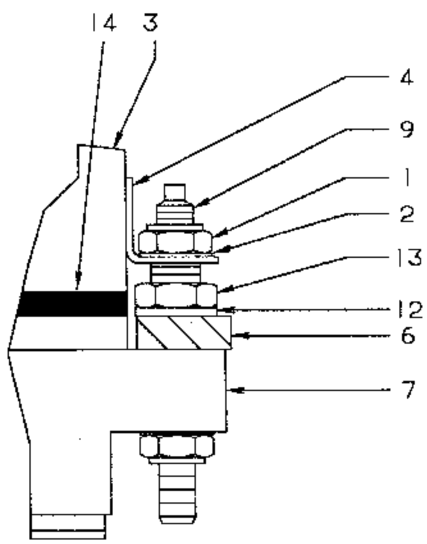
To remove the relay socket (7), remove the nuts (13) and washers (12); then remove the relay socket (7) from the panel mounting bracket (6). Refer to the BEECHCRAFT Starship 1 Wiring Diagram Manual for the connector schematic if needed.



Generator Control Unit Installation (Effectivity: All)
Figure 6

1. NUT
2. WASHER
3. FIELD AND SENSE RELAY
4. RELAY MOUNTING BRACKET
5. WING CENTER SECTION ELECTRICAL EQUIPMENT PANEL
6. PANEL MOUNTING BRACKET
7. RELAY SOCKET
8. WIRE HARNESS
9. STUD
10. MOUNTING SCREW
11. WASHER
12. WASHER
13. NUT
14. SILICONE GASKET





DETAIL A

2000-355-31

Field and Sense Relay Installation (Effectivity: All)
Figure 7

FIELD AND SENSE RELAY INSTALLATION (Effectivity: All) (Figure 7)

NOTE

If the relay socket (7) requires installation refer to the BEECHCRAFT Starship 1 Wiring Diagram Manual for the connector schematic. Align the studs (9) with the panel mounting bracket (6) and attach with three washers (12) and nuts (13).

a. Install the silicone gasket (14) on the relay socket (7).

b. Align the relay mounting bracket (4) with the studs (9) and press down until pins are firmly seated in the relay socket (7).

c. Install the three nuts (1) and washers (2) on the studs (9).

d. Tighten the nuts (1) until the field and sense relay (3) is secure.

e. Restore electrical power to the airplane.

f. Refer to Chapter 53-30-00 and install the aft wing-box shear panel.

NOTE

After any maintenance, perform a check of the field and sense relay as outlined in this chapter under FIELD AND SENSE RELAY CHECK.

RIGHT GENERATOR CIRCUIT BREAKER PANEL REMOVAL (Effectivity: All) (Figure 8)

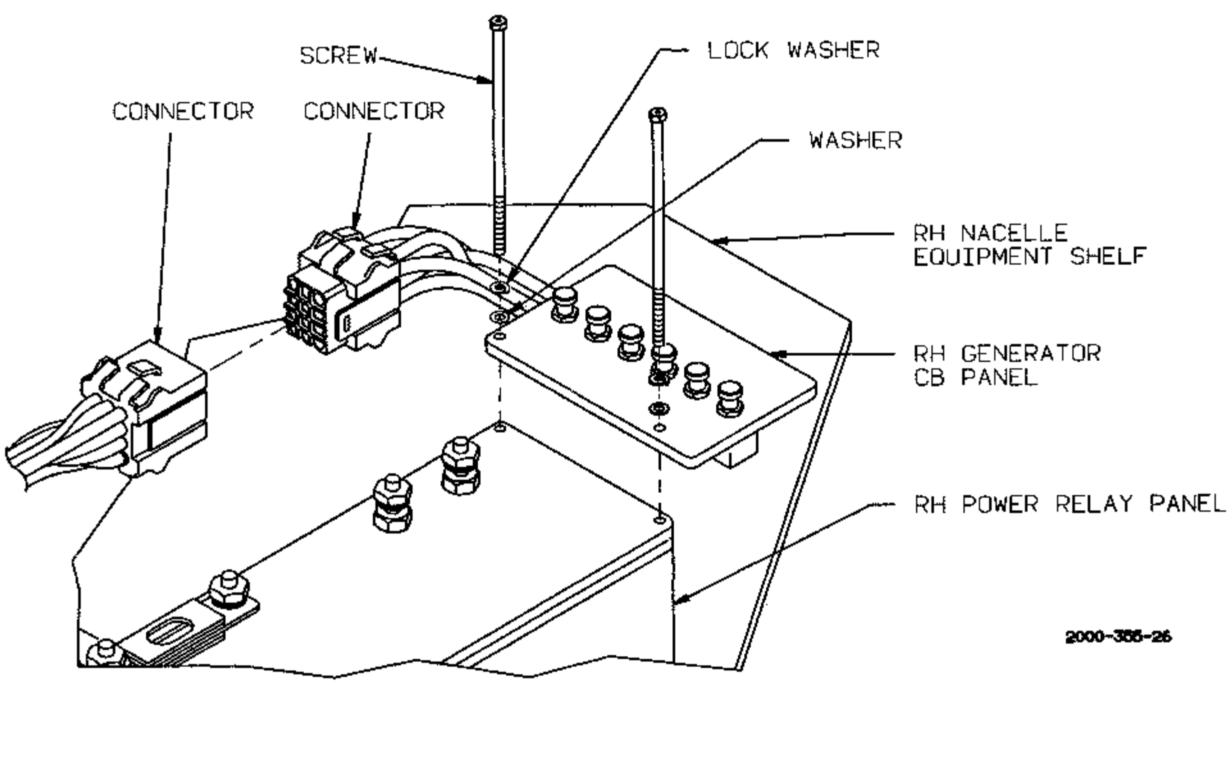
a. Refer to Chapter 54-30-00 and remove the RH nacelle upper aft access panel (683).

b. Remove all electrical power from the airplane.

c. Disconnect the electrical connector.

d. Remove the two screws, lock washers and washers attaching the circuit breaker panel to the generator-power relay panel.

e. Remove the circuit breaker panel from the generator-power relay panel.



Right Generator Circuit Breaker Panel Installation (Effectivity: All)
Figure 8

RIGHT GENERATOR CIRCUIT BREAKER PANEL INSTALLATION (Effectivity: All) (Figure 8)

CAUTION

The generator circuit breaker panel must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the two circuit breaker mounting holes with those on the generator-power relay panel.

b. Install the two screws, lock washers and washers.

c. Reconnect the electrical connector.

d. Restore electrical power to the airplane.

e. Refer to Chapter 54-30-00 and install the RH nacelle upper aft access panel (683).

LEFT GENERATOR CIRCUIT BREAKER PANEL REMOVAL (Effectivity: All) (Figure 9)

a. Refer to Chapter 54-30-00 and remove the LH nacelle upper aft access panel (583).

b. Remove all electrical power from the airplane.

c. Disconnect the electrical connectors.

d. Remove nut, washer and lock washer securing jumper to ground stud.

e. Loosen and remove the two mounting screws, lock washers and washers.

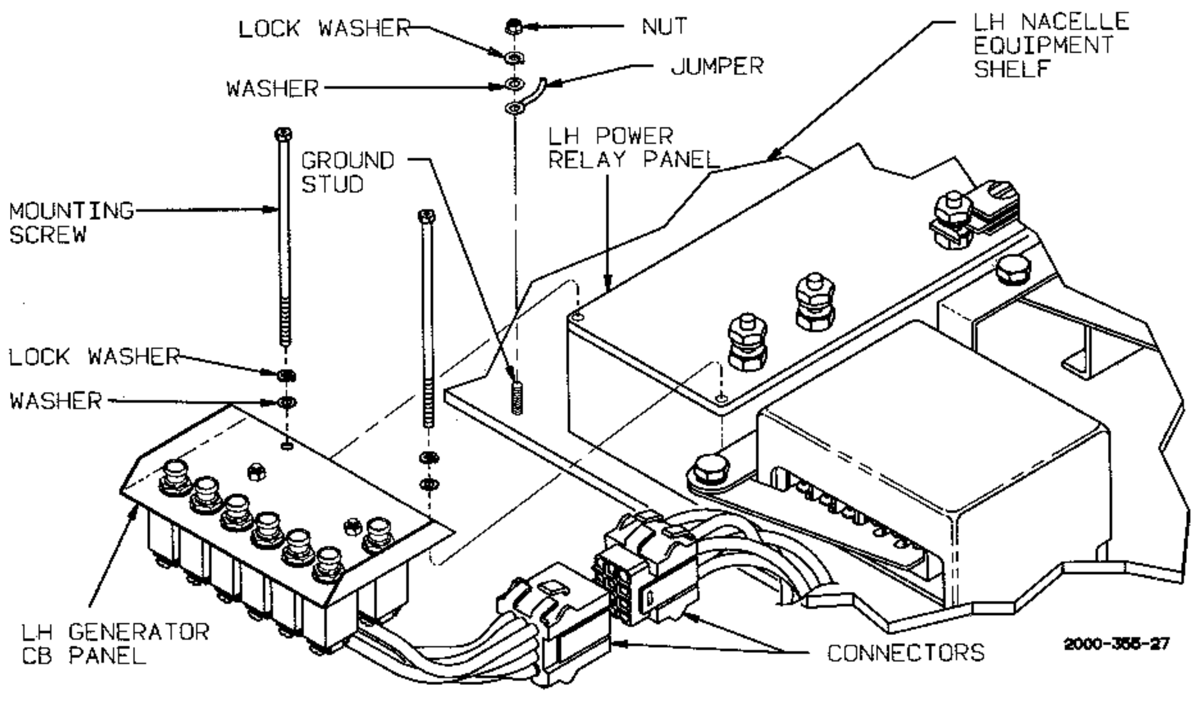
f. Remove the circuit breaker panel from the generator-power relay panel.

LEFT GENERATOR CIRCUIT BREAKER PANEL INSTALLATION (Effectivity: All) (Figure 9)

CAUTION

The generator circuit breaker panel must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the circuit breaker panel mounting holes with those on the generator-power relay panel.



Left Generator Circuit Breaker Panel Installation (Effectivity: All)
Figure 9

b. Install and tighten the mounting screws, lock washers and washers.

c. Secure jumper to ground stud with washer, lock washer and nut.

d. Reconnect the electrical connector.

e. Restore electrical power to the airplane.

f. Refer to Chapter 54-30-00 and install the LH nacelle upper aft access panel (583).

GENERATOR-POWER RELAY PANEL REMOVAL (Effectivity: All) (Figure 10)

a. Refer to Chapter 54-30-00 and remove the respective nacelle upper aft access panel (LH 583 or RH 683).

b. Remove all electrical power from the airplane.

c. Remove screws attaching the clear protective cover, and remove the cover from the generator-power relay panel.

d. Disconnect the electrical connector from the generator-power relay panel.

e. Tag all wiring and bus bars attached to the generator-power relay panel.

f. Remove the nuts, lock washers and washers attaching the bus bars and wiring to the generator-power relay panel.

g. Remove all wiring, bus bars and remaining washers.

h. Remove the generator circuit breaker panel from the power relay panel with procedures outlined in this chapter.

i. Remove the remaining power relay panel mounting screw, lock washer and washer; then remove the generator-power relay panel from the nacelle equipment shelf.

GENERATOR-POWER RELAY PANEL INSTALLATION (Effectivity: All) (Figure 10)

a. Reconnect the electrical connector to the generator-power relay panel.

b. Install all wiring and bus bars according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual, and secure with nuts, lock washers and washers.

CAUTION

Ensure that all nipples are pulled over the wire terminals to avoid accidental shorting.

c. Align the generator-power relay panel with the four inserts in the nacelle equipment shelf.

d. Install one mounting screw, washer and lock washer on the generator-power relay panel opposite the side where the generator circuit breaker panel is to be installed.

e. Install the generator circuit breaker panel on the generator-power relay panel according to procedures outlined in this chapter.

f. Install the clear protective cover on the generator-power relay panel.

g. Restore electrical power to the airplane.

h. Refer to Chapter 54-30-00 and install the nacelle upper aft access panel (LH 583 or RH 683).

STARTER/GENERATOR BRUSH REPLACEMENT (Effectivity: All) (Figure 11)

a. Refer to Chapter 71-10-00 and remove the engine cowling.

CAUTION

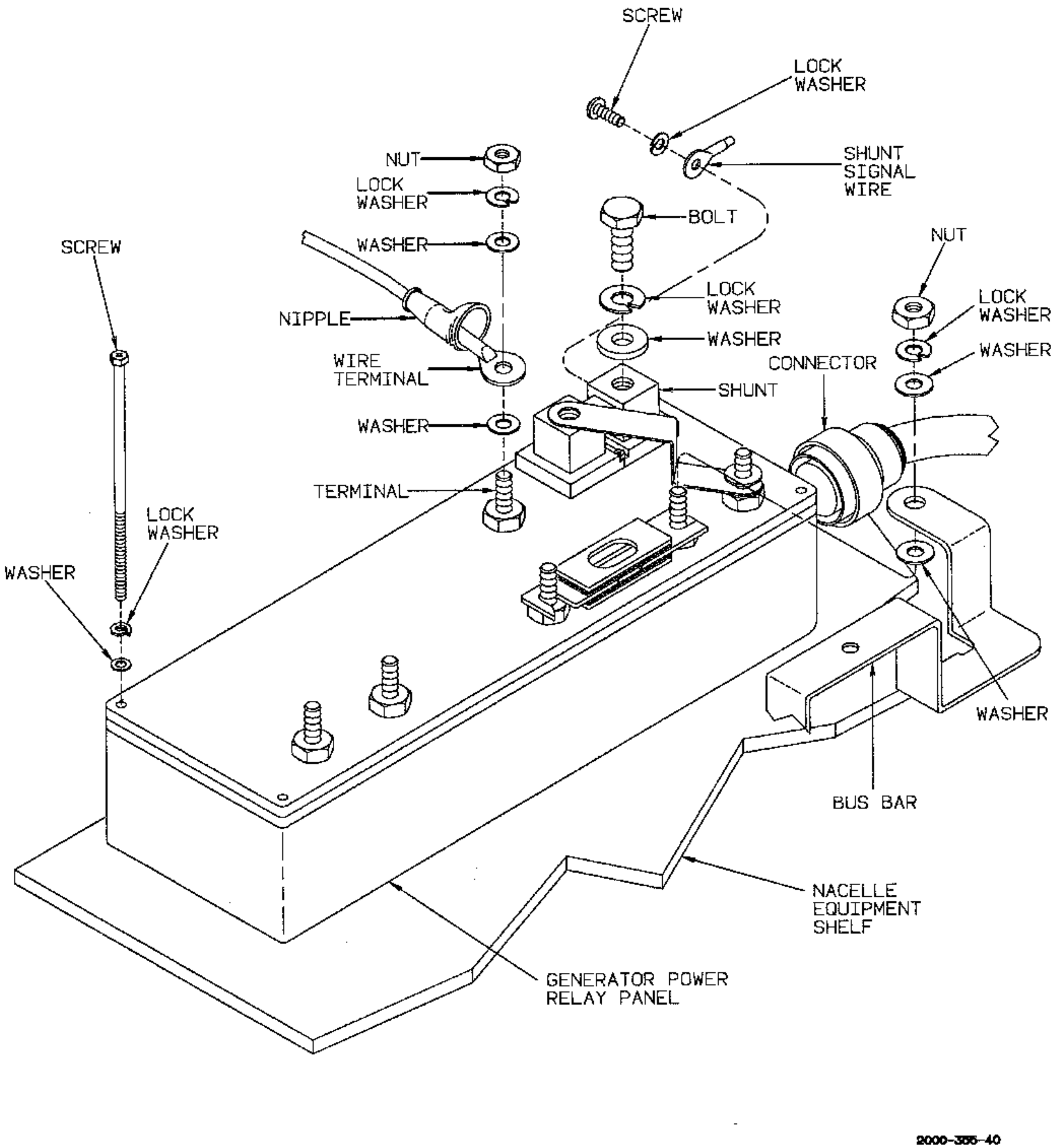
Always replace the starter/generator brushes as a set. Even when only one brush does not meet inspection criteria or will exceed the wear limit before the next inspection, replace the entire set.

b. Refer to STARTER/GENERATOR REMOVAL in this chapter and remove the starter/generator from the engine.

c. Use a clean rag moistened with solvent (1, Chart 2, 24-00-00) to remove any foreign matter on the exterior of the starter/generator.

d. Loosen the brush-cover retaining screw and spread the brush cover open. Remove the brush cover if necessary.

e. Using a low-pressure air supply, blow as much carbon and copper dust as possible out of the armature, stator windings, brush holder and commutator area. Use care not to blow particles into the bearings.



Generator-Power Relay Panel Installation (Effectivity: All)
Figure 10

f. Use a clean rag moistened with solvent (1, Chart 2, 24-00-00) to remove any foreign matter in the starter/generator.

g. Using a low-pressure air supply, dry the areas cleaned with solvent.

h. Remove the screws securing the brush leads to the brush holders.

i. Remove the brush spring clips.

j. Pull the brushes out of the holder.

k. Make a visual check of commutator before installing new brushes. It should have a burnished appearance with only light filming.

NOTE

> The starter/generator uses cored brushes. This type of brush may cause the commutator to become grooved during normal operation. If any of the grooves are .020-inch deep or deeper, the unit should be overhauled.

l. Perform brush run-in procedures as outlined in the BEECHCRAFT Starship 1 Component Maintenance Manual.

m. Install the new brushes, ensuring that the top bevel is oriented to the commutator's rotation as shown in Figure 11.

n. Install the brush spring clips.

o. Secure the brush leads with screws and ensure that the brush leads are laid over the brush spring clips.

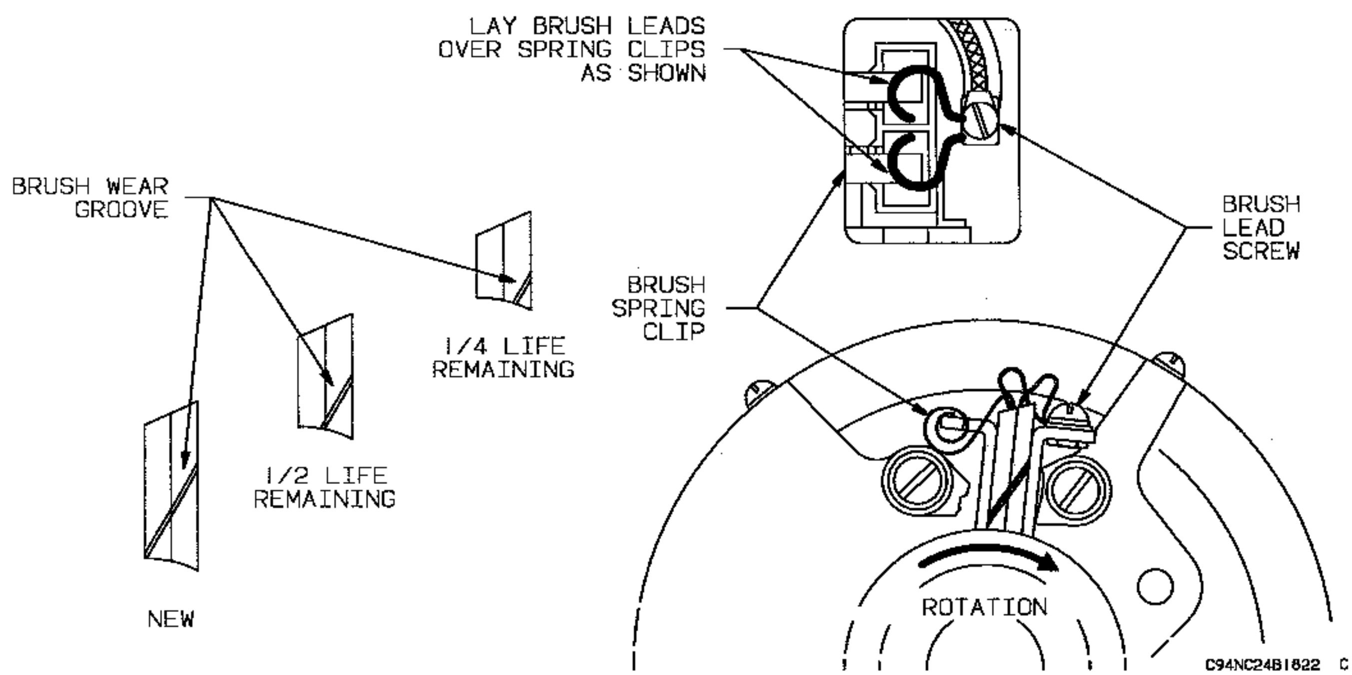
p. Install the brush cover, ensuring a proper seat in the housing recess.

q. Install the starter/generator as outlined under STARTER/GENERATOR INSTALLATION in this chapter.

r. Refer to Chapter 71-10-00 and install the engine cowling.

GENERATOR CONTROL UNIT VOLTAGE ADJUSTMENT (Effectivity: All) (Figure 6)

Any time a voltage adjustment is required on one generator control unit, both units must be adjusted to ensure proper parallel operation.



Starter/Generator Brush Installation and Wear Limits (Effectivity: All)
Figure 11

a. Refer to Chapter 53-30-00 and remove the aft wing-box shear panel.

b. Remove the screw, washer and voltage adjustment access hole cover on both GCU's to expose each voltage adjustment screw.

c. Connect a voltmeter to the voltmeter jacks located on the front of the RH GCU.

d. A multimeter or volt/ohmmeter (2, Chart 1, 24-00-00) accurate within 1% should be used for electrical measurements. A digital readout is preferred.

e. Start the engines with procedures outlined in Section IV of the BEECHCRAFT Starship 1 Airplane Flight Manual. Bring the RH starter/generator on-line by placing the RH generator control switch in the RESET position; then release to ON.

f. Place the generator bus-tie switch in the OPEN position to open the generator bus-tie relays.

g. Insert a small screwdriver into the voltage adjustment screw access hole of the RH GCU.

h. Adjust the screw clockwise to increase, or counterclockwise to decrease output until a reading of 28.25 ±.25 vdc is obtained.

i. Place the RH starter/generator control switch in the OFF position.

j. Bring the LH starter/generator on-line.

k. Repeat the adjustment procedure for the LH GCU.

l. Shut down the engines with procedures outlined in Section IV of the BEECHCRAFT Starship 1 Airplane Flight Manual.

m. Disconnect the voltmeter.

n. Replace both voltage adjustment access hole covers and secure to the GCU's with the cover screws and washers.

o. Refer to Chapter 53-30-00 and install the aft wing-box shear panel.

FIELD AND SENSE RELAY CHECK (Effectivity: All) (Figure 4)

a. Refer to Chapter 53-30-00 and remove the aft wing-box shear panel.

b. Refer to GENERATOR CONTROL UNIT TEST UNIT in this chapter and connect the GCU test unit (1, Chart 1, 24-00-00) to the appropriate GCU.

c. While monitoring the test lamp on the GCU test unit, place the battery switch in the ON position and the appropriate ignition/start switch in the STARTER ONLY position.

d. A normal indication is for the GCU test unit test lamp to glow continuously for the duration of the engine start. A bright flash when the ignition/start switch is released to OFF is normal. If the test lamp flashes brightly at the instant the ignition/start switch is activated, the field and sense relay is not operating properly. Replace a faulty field and sense relay.

CAUTION

Never connect or disconnect the GCU wiring harness plug when the engine is running as this may damage the GCU.

e. Disconnect the GCU test unit from the GCU.

f. Reconnect the electrical connector to the GCU.

g. Refer to Chapter 53-30-00 and install the aft wing-box shear panel.

STARTER/GENERATOR BRUSH INSPECTION (Effectivity: All) (Figure 11)

Inspect the brushes according to the interval specified in Chapter 5. Replace the brushes if the wear limit will be reached prior to the next inspection. When performing a thorough inspection of the brushes and commutator, remove the starter/generator from the engine using STARTER/GENERATOR REMOVAL procedures outlined in this chapter.

NOTE

Brush life varies with different operating conditions; consequently, inspection intervals should be adjusted accordingly.

Inspect the brushes for damage such as cracks, chips, frayed leads, loose rivets and loose shunt connections. Compare the brushes with the examples in Figure 11 to determine their remaining life. The brushes are provided with a diagonal groove from one side of the brush at the contact surface to a point on the opposite side of the brush corresponding to the maximum permissible wear point. Brush wear can be estimated by the position of the groove on the contact surface.

CAUTION

Always replace the starter/generator brushes as a set. Even when only one brush does not meet the inspection criteria or will exceed the wear limit before the next inspection, replace the entire set.

BATTERY POWER - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

BATTERY POWER SYSTEM (Effectivity: All) (Figure 1)

The Starship 1 is equipped with a 24-volt, 20-cell, nickel-cadmium battery rated at 36-ampere hours (one-hour rate). The battery is mounted on the RH nacelle equipment shelf, along with a battery shunt, battery bus circuit breaker panel, and battery-power relay panel. The battery system also includes a "hot" battery bus inside the battery bus circuit breaker panel, and a ventilation system installed in the RH nacelle to vent dangerous gases and heat. A battery switch placarded MASTER SWITCH, BATT, ON-OFF is located under the master switch gangbar on the center subpanel and allows the pilot to apply battery power to the rest of the buses.

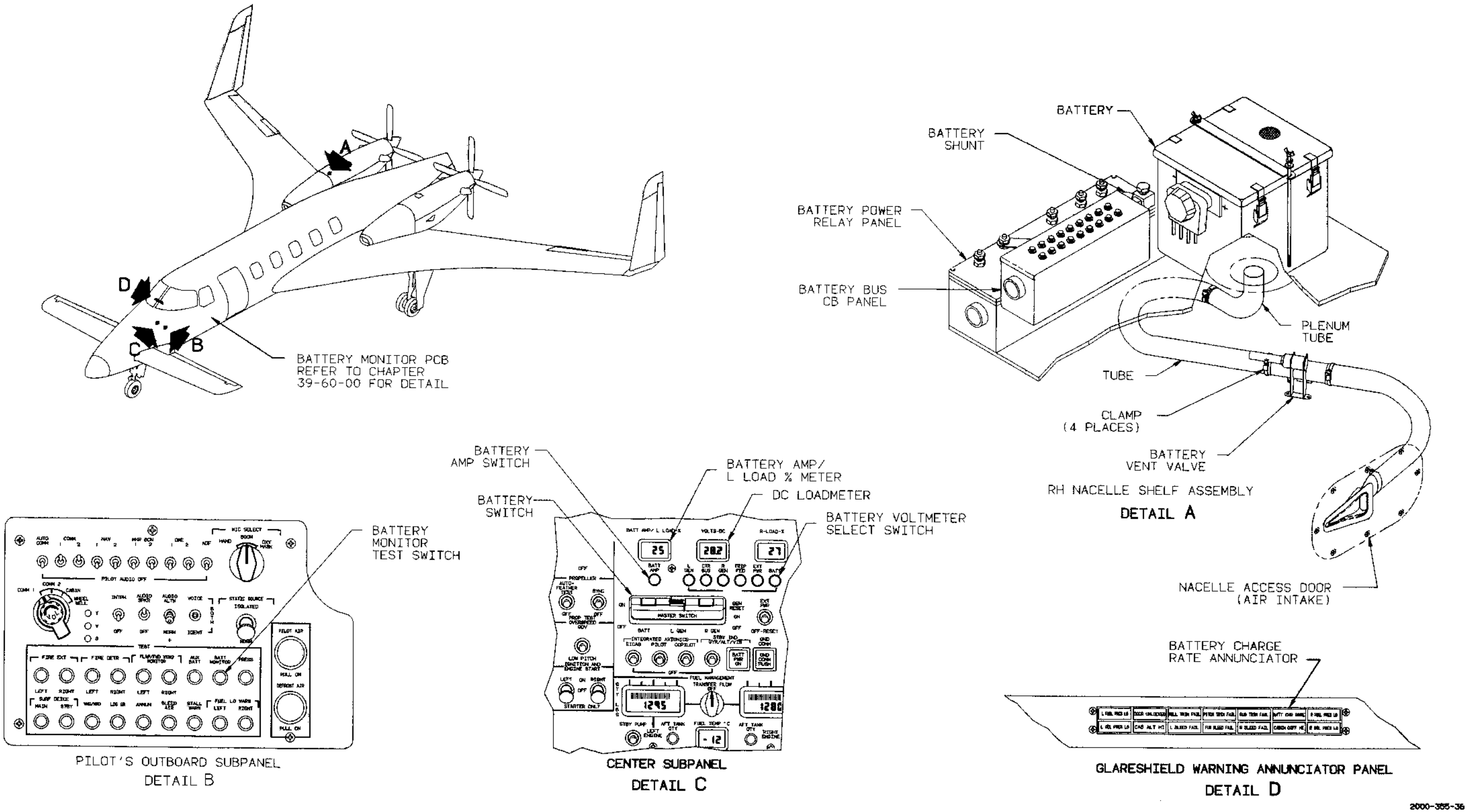
The battery consists of a steel case containing 20 identical individual cells connected in series by link bars and fitted side-by-side in the battery case. This design of nickel-cadmium batteries allows for replacement of the individual cells if one becomes damaged. Each cell has two threaded terminals with nuts and washers for mounting the link bars. The end cells are connected by a solid link to a terminal on the face of the battery case. An O-ring prevents electrolyte leakage around each terminal and each cell has a removable filler cap which serves as a vent in case of overcharge. Ventilation holes in the cover and in the bottom of the battery case permit cooling during operation and allow escape of the gases produced during overcharge.

Outside air, used to vent dangerous gases and cool the battery, is inducted by a vent in the ice vane actuator access door on the inboard side of the RH nacelle. The air is directed through tubing from the vent to a battery vent valve mounted on the engine air inlet duct beneath the RH nacelle equipment shelf. A temperature-sensitive spring inside the valve opens and closes a butterfly valve to control air flow to the battery. The butterfly valve should be completely open at 80° F and fully closed at 30° F. When the butterfly valve is fully closed, a small amount of air will still flow to the battery. Air passing through the valve is directed through tubing to a gasket-sealed plenum mounted directly beneath the battery. The air then passes from the plenum through ventilation holes in the bottom of the battery case, around the individual cells, and out the ventilation hole in the battery cover. Louvers in the upper aft access panel provide the air with an exit from the nacelle.

Service facilities for nickel-cadmium batteries must be separate from lead-acid battery service facilities. The electrolyte contained in nickel-cadmium batteries is a highly alkaline solution of potassium hydroxide and water. This solution is a chemical "opposite" to the sulfuric acid contained in lead-acid batteries. Anything associated with lead-acid batteries, including acid fumes, should never come in contact with a nickel-cadmium battery or its electrolyte. If traces of sulfuric acid enter a nickel-cadmium battery, it can become damaged permanently.

If the electrolyte becomes contaminated with tap water, acids or other incompatible substances, poor performance or complete failure of the battery will result. If a battery operates with damaged, missing or loose vent caps, the result will be low battery capacity caused by the loss of electrolyte. The state of charge for a nickel-cadmium battery cannot be determined like that of the lead-acid type. The battery must be discharged at a known current rate to calculate this figure.

All equipment fed by the "hot" battery bus receives battery power when the battery switch is in the OFF position. When the battery switch is placed in the ON position, the battery relay is energized to connect the battery to the triple-fed bus. The power distribution

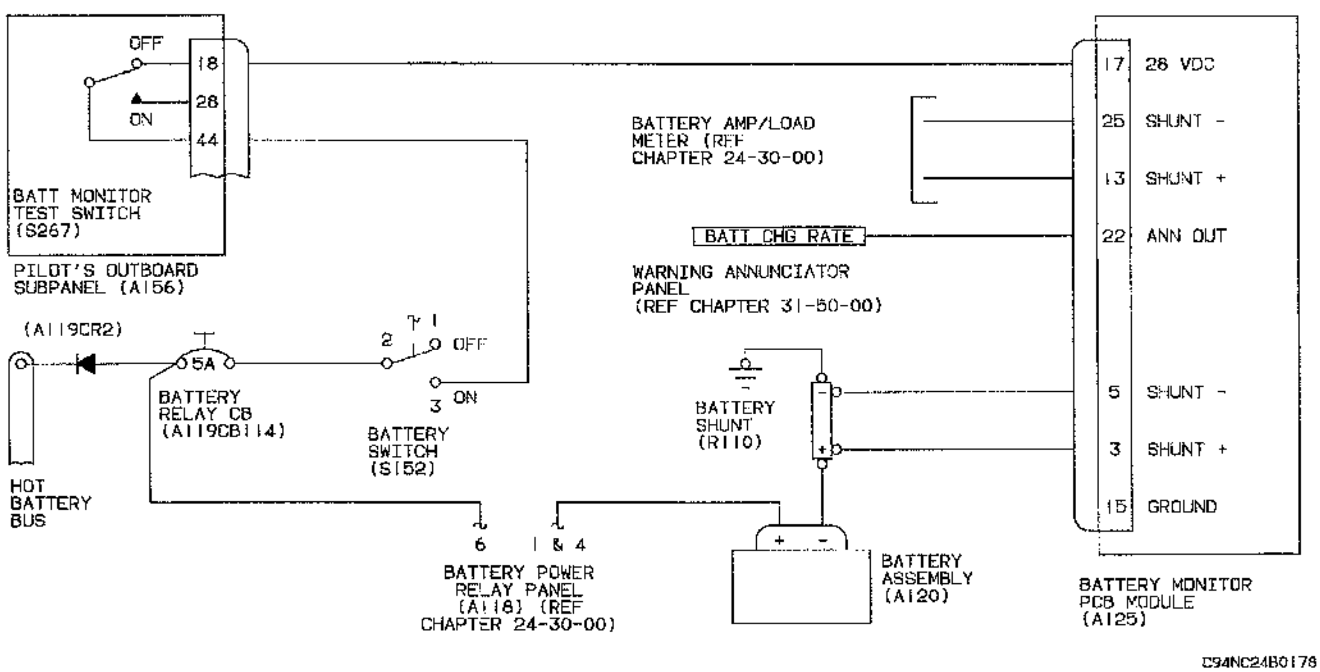


Battery Power System (Effectivity: All)
Figure 1

PCB will check for an overcurrent through the current sensor of the battery-power relay panel. If no overcurrent is present, and the generator bus-tie switch (placarded GEN TIES, MAN CLOSED-NORM-OPEN on the center subpanel) is in the NORM position, the power distribution PCB will automatically close the battery bus-tie relay, connecting the battery to the center bus. If an electrical fault prevents closing of the battery bus-tie relay, the Engine Instrument Crew Alerting System (EICAS) yellow BATTERY TIE OPEN caution message will display. The generator bus-tie switch must be placed in the MAN CLOSED position to power the LH and RH generator buses with battery power only. Battery voltage for the battery voltmeter select switch, placarded BATT on the center subpanel, is pulled from a connection between the battery switch and battery-relay circuit breaker; therefore, if the battery relay circuit breaker is open, a reading of zero volts will be obtained on the voltmeter when BATT is pressed. Refer to Chapter 24-50-00 for electrical load distribution schematics showing battery power on the buses.

BATTERY MONITOR SYSTEM (Effectivity: All) (Figure 2)

The battery monitor system is designed to inform the pilot of an abnormal charge current by illuminating the red BATT CHG RATE warning annunciator in the glareshield warning annunciator panel. A high charge current usually results from high battery temperature, high charging voltage, or gas barrier damage. Normally, heating will occur with a high charge rate that is gradually increasing or when the battery is subject to a high discharge current. During normal operation, the idle current of the battery is less than 3 amps, but increases significantly above the normal level when the battery is charged at an elevated temperature or at a high voltage. Gas barrier damage and increased water consumption may occur due to a high idle current or to battery overcharge at a high temperature. Once the battery has sustained gas barrier damage, it is subject to thermal runaway when charged on a constant voltage charging system over an extended period of time. A thermal runaway condition will cause



Battery Monitor System Schematic (Effectivity: All)
Figure 2

the battery idle current and temperature to increase without control as long as the battery is receiving a constant charge.

The system includes a 250-ampere shunt in the negative lead of the battery and a battery monitor PCB mounted on the printed circuit card rack in the pilot's console. The charge rate is monitored directly from the shunt by the battery monitor PCB. If the charge is in excess of 12 amps over a period of 15 minutes, or increases at a rate of more than 1/2 an amp over a period of 30 minutes, the red "BATT CHG RATE" warning annunciator will illuminate. If an abnormal charge rate is indicated, the battery should be disconnected from the circuit by placing the battery switch in the OFF position.

NOTE

Current readings from the battery shunt are routed directly through the battery monitor PCB and displayed in amperes on the BATT AMP/L LOAD % meter. A failure of the monitor circuitry will result in a reading of zero on the ammeter when the switch, placarded BATT AMP on the center subpanel, is pressed. Refer to Chapter 24-30-00 for detailed information on the loadmeters.

When the battery switch is placed in the ON position, the battery monitor PCB will perform a self-test of the battery monitor circuitry. A two-second time delay begins when the battery switch is placed in the ON position. After the two-second delay, the red BATT CHG RATE warning annunciator will illuminate for two seconds, then extinguish if the system is functioning properly.

NOTE

The delay and illumination times should be equivalent; if not, it is an indication of a fault in the battery monitor system.

After the red BATT CHG RATE warning annunciator extinguishes, it should remain off unless the battery charge is excessive or the idle current has increased in response to an increase in electrical system voltage. Such a voltage increase normally results from poor starter/generator paralleling or load switching.

With the battery switch in the ON position, a self-test of the battery monitor system is performed by pressing the BATT MONITOR switch located on the pilot's outboard subpanel. When momentarily pressed, the test switch removes, then applies 28 vdc to the battery monitor PCB, thereby initiating the self-test cycle again.

BATTERY POWER - TROUBLESHOOTING (Effectivity: All)

When troubleshooting battery power to the airplane, always check for any loose or damaged connections. Checking the battery for low electrolyte or erratic readings from individual cells can locate some electrical problems and eliminate the need for extensive electrical system checks. The battery monitor PCB is designed to recognize an overcharge condition and often will indicate when a fault is present.

The BEECHCRAFT Starship 1 Wiring Diagram Manual should be used to trace out specific wire routes and locate pin and plug numbers. Many times a loose or faulty pin connection will cause a fault. Ensure that there are no loose, damaged, or corroded pins on any connectors in the system. Continuity checks should be made with power removed from the specific terminal or connector. Use a calibrated voltmeter for all voltage checks, and ensure that the battery switch is ON for these checks unless otherwise indicated. The steps in each of the following troubleshooting charts should be performed sequentially unless otherwise specified. An example would be to proceed to the next step when there are no directions immediately following a NO condition.

WARNING

Remove all watches, rings and metal jewelry prior to electrical troubleshooting. If metal articles come in contact with battery-powered leads of opposite polarity, the objects will fuse themselves at the point of contact, resulting in severe burns to the wearer.

CHART 1
TROUBLESHOOTING - BATTERY POWER (Effectivity: All)

Zero Battery Voltage At Battery-Power Relay Panel

Step 1	Is battery voltage at terminal "4" of the battery-power relay panel?	**YES**	Battery is holding a charge. If the charge is low, or a low voltage condition is suspected, complete the steps in Chart 1 to eliminate faults not covered in Chart 5. Proceed to Chart 5. if necessary.
	NO		
Step 2	Is the battery connector free of corrosion and tightly secured to the battery terminal?	**YES**	Proceed to Step 3.
	NO		
	Remove corrosion and ensure a good connection. Perform Step 1 again.		
Step 3	Check for voltage across the battery terminals with a voltmeter. Is battery voltage indicated?	**YES**	Proceed to Step 4.
	NO		
	Proceed to Step 7.		
Step 4	Are there any signs of damage such as burns, cracks, cuts, or chaffing on the battery connector or cables?	**YES**	Replace the connector and any damaged cables.
	NO		
Step 5	Is the battery connected to the ground stud on the firewall with a tight, corrosion-free connection?	**YES**	Proceed to Step 6.
	NO		
	Restore continuity to ground.		
Step 6	Is the battery shunt shorted open, preventing a system ground?	**YES**	Replace battery shunt.
	NO		
Step 7	Do any of the link bars appear to be loose, corroded, or damaged in any way?	**YES**	Replace, clean, or tighten any affected link bars.
	NO		
Step 8	Perform a visual inspection of the individual cells. Do any of the cells appear to be corroded, cracked, burned, or deformed in any manner.	**YES**	Replace the faulty cell or cells. Cell case deformation is usually caused by excessive heat or pressure. Refer to Chart 4 to troubleshoot the cause.
	NO		
Step 9	Do any of the cells have erratic or abnormal voltage readings when checked across the terminals with a voltmeter?	**YES**	Replace any faulty cells. Perform applicable charging procedures and capacity test the battery.

CHART 1
TROUBLESHOOTING - BATTERY POWER (Effectivity: All) *(Continued)*

Zero Battery Voltage At Battery-Power Relay Panel

NO

The battery is in a discharged state. Perform applicable charging procedures and capacity test the battery. If the battery will not hold a charge under normal operating conditions make a thorough check of the airplane charging system.

CHART 2
TROUBLESHOOTING - BATTERY POWER (Effectivity: All)

Battery Requires Frequent Addition of Electrolyte

Step 1 Are there any signs of electrolyte leakage around the exterior of the battery case? **YES** Proceed to Step 6.

NO

Step 2 Are the individual cells equally charged? **YES** Proceed to Step 3.

NO

Perform applicable battery charging procedures and adjust the electrolyte level when all cells are evenly charged. If the individual cell voltages still vary after charging, replace the cell or cells that are erratic.

Step 3 Has the battery been overcharged for an extended time or at an elevated temperature with an external battery charger? **YES** Replenish electrolyte and perform electrical checks. Erratic cell voltage may indicate damage to the cell from excessive current or heat. Replace any defective cells.

NO

Step 4 Is the battery receiving an overcharge from the airplane electrical system? **YES** Suspect a possible fault with the regulator circuit in the generator control units. Refer to Chapter 24-30-00 for system information on DC generation and control.

NO

Step 5 Is the battery being vented properly under normal operation? **YES** Proceed to Step 6.

NO

Battery may have sustained thermal damage due to heat buildup. Perform electrical checks and a visual inspection of the individual cells.

CHART 2
TROUBLESHOOTING - BATTERY POWER (Effectivity: All) *(Continued)*

Battery Requires Frequent Addition of Electrolyte

Step 6 Do any of the individual cells have cracks or faulty relief valves where electrolyte can escape? (Valves should open at 10 psi and close at 2 psi. Refer to the BEECHCRAFT Starship 1 Component Maintenance Manual for detailed information on the relief valves.)

NO

If there is no evidence of electrolyte leakage, and no other faults are found, suspect an airplane charging system fault. Add electrolyte as required and troubleshoot charging system.

CHART 3
TROUBLESHOOTING - BATTERY POWER (Effectivity: All)

Excessive Electrolyte Spewage

Step 1 Is the electrolyte level too high or the electrolyte concentration too low?

YES Adjust electrolyte level, clean the battery and perform electrical testing on the battery as required in the BEECHCRAFT Starship 1 Component Maintenance Manual. Monitor battery for spewage after adjusting electrolyte level.

NO

Step 2 Do any of the cells have loose or damaged relief valves? (Valves should open at 10 psi and close at 2 psi. Refer to the BEECHCRAFT Starship 1 Component Maintenance Manual for detailed information on the relief valves.)

YES Tighten or replace relief valves as required.

NO

Step 3 Has the battery been exposed to an excessive charge rate?

YES Adjust charging rate and restore electrolyte to proper level.

NO

Step 4 Has the battery experienced an abnormally high discharge rate?

YES Suspect a reverse polarity condition on one of the cells. Determine affected cells operational capability with electrical checks and replace if necessary. After the battery has been charged, a complete check of the airplane charging system should be made.

NO

CHART 3
TROUBLESHOOTING - BATTERY POWER (Effectivity: All) *(Continued)*

Excessive Electrolyte Spewage

Step 5	Are any of the cells contaminated with oil or grease?	**YES**	Replace any contaminated cells and perform applicable charging procedures.
	NO		
	If no electrical faults are detected, the electrolyte level may have been excessive. Adjust electrolyte level when the battery is at full capacity.		

1. Nickel-Cadmium batteries will experience different electrolyte levels according to the level of charge. Overfilling a battery with low voltage may cause spewage when the battery is charged to full capacity.

2.Any time electrolyte has overflowed into the battery case, the battery assembly should be thoroughly cleaned.

CHART 4
TROUBLESHOOTING - BATTERY POWER (Effectivity: All)

Distorted Battery or Cell Cases

Step 1	Has the battery been exposed to a high charge rate?	**YES**	Perform electrical checks on the individual cell as outlined in the BEECHCRAFT Starship 1 Component Maintenance Manual to determine if any of the cells have been damaged. Replace any defective cells, perform applicable charging procedures on the battery, and follow up with a check of the airplane charging system.
	NO		
Step 2	Are any of the link bars loose or damaged?	**YES**	Replace any unserviceable links and torque connections as needed.
	NO		
Step 3	Is the battery receiving adequate ventilation?	**YES**	Proceed to Step 4
	NO		
	Battery has been exposed to excessive heat. Perform electrical checks as outlined in the BEECHCRAFT Starship 1 Component Maintenance Manual and replace any faulty cells before charging. Locate and correct fault in the battery ventilation system.		

CHART 4
TROUBLESHOOTING - BATTERY POWER (Effectivity: All) *(Continued)*

Distorted Battery or Cell Cases

Step 4 Are any of the battery cell vent valves obstructed, causing an overpressure inside the cell? (Valves should open at 10 psi. Refer to the BEECHCRAFT Starship 1 Component Maintenance Manual for detailed information on the relief valves.)
YES Replace any affected cells.

NO

Step 5 Perform electrical checks on the individual cells as outlined in the BEECHCRAFT Starship 1 Component Maintenance Manual to locate any electrical faults in the cells. Are there any signs of internal shorting or excessive cell voltages?
YES Replace affected cells and perform applicable charging procedures.

NO

If the cause of cell deformation is still undetermined, replace defective cells after a through inspection and capacity test the battery with procedures outlined in the BEECHCRAFT Starship 1 Component Maintenance Manual.

CHART 5
TROUBLESHOOTING - BATTERY POWER (Effectivity: All)

Low Battery Voltage

Step 1 Has the battery switch been left on for an extended period of time? (See Note 1.)
YES Charge and capacity test the battery.

NO

Step 2 Is the battery receiving charging voltage from the starter/generators during normal operation of the airplane?
YES Proceed to Step 3.

NO

Refer to Chapter 24-30-00 to troubleshoot the charging system and correct any electrical faults.

Step 3 Are the generator control units regulating starter/generator output to 28.50 $\pm$.25 vdc?
YES Proceed to Step 4

NO

Suspect a fault with the voltage regulation circuit. Refer to Chapter 24-30-00 for more information on the generator control units.

CHART 5
TROUBLESHOOTING - BATTERY POWER (Effectivity: All) *(Continued)*

Low Battery Voltage

Step 4	Is there any indication of cell-to-case current leakage when a current check is made?	**YES**	Replace the affected cell or cells and perform applicable charging procedures.
	NO		
Step 5	Do any of the cells show signs of internal shorting or reverse polarity when individually checked with a voltmeter?	**YES**	Replace the defective cell or cells and perform applicable charging procedures.
	NO		
	The battery should maintain a charge if all the checks were good. If the problem still persists after rechecking all connections suspect a fault in the airplane electrical system.		

1. After checking the battery switch in step 1 isolate any connection related faults with Chart 1.

BATTERY POWER - MAINTENANCE PRACTICES (Effectivity: All)

BATTERY SERVICING (Effectivity: All)

Maintenance of the battery should be performed at regular intervals to obtain maximum service from the battery. The battery should be removed from the airplane to perform service. Inspections and servicing should be accomplished every 100 hours or thirty days, whichever comes first. However, if temperature conditions above 90° F (32° C) or extreme discharge loads have occurred, the service interval should be reduced.

For best operation and maximum life, nickel-cadmium batteries should be completely disassembled and all components thoroughly inspected and cleaned at least once a year as outlined in the BEECHCRAFT Starship 1 Component Maintenance Manual. For most applications, this maintenance can be scheduled to coincide with a major inspection of the airplane itself. Since complete battery servicing requires two days, an additional battery may be required to allow use of the airplane.

CAUTION

Service facilities for nickel-cadmium batteries must be entirely separate from those for lead-acid batteries. Fumes from lead-acid batteries or small traces of sulfuric acid entering a nickel-cadmium battery can damage it permanently.

Use not only separate filler equipment, but separate supplies of distilled water to avoid contamination of the nickel-cadmium cells. Brushes, scrapers, *cloths, tools or other implements used to maintain lead-acid batteries should never be used on nickel-cadmium batteries.*

WARNING

The electrolyte is caustic and can cause serious burns if it comes in contact with the skin. If electrolyte does contact the skin, the area should be flushed immediately with large amounts of water, and neutralized with a 3% solution of acetic acid, vinegar, lemon juice or a 10% solution of boric acid. For treatment of electrolyte in the eyes, flush with large amounts of water and contact a physician immediately.

WARNING

Remove all watches, rings and metal jewelry before attempting maintenance on the battery. If metal articles contact intercell connectors of opposite polarity, the objects will fuse themselves to the connectors and result in severe burning to the wearer.

BATTERY CHARGING (Effectivity: All)

All charging maintenance should be performed using procedures outlined in the BEECHCRAFT Starship 1 Component Maintenance Manual.

MAINTENANCE LOG (Effectivity: All)

Because of the importance of keeping track of the liquid level as well as the general state of charge and condition of the battery, it is strongly advised that a maintenance log be kept of all service and maintenance. Not only are careful records helpful in correcting battery malfunctions in normal servicing, they are vital to the substantiation of battery warranty claims. A service record form can be found in the battery manufacturer's operating and maintenance manual.

CLEANING (Effectivity: All)

a. Remove the battery as instructed under BATTERY REMOVAL in this chapter.

CAUTION

Do not use petroleum spirits, trichloroethylene or other solvents to clean the battery.

b. Wipe the battery case and its cover with a clean cloth.

c. Remove the battery cover.

d. Clean the top of the battery using dry, filtered compressed air with a nonmetallic nozzle. Blow around the tops of the cells to eject any dust and salt crystals that may have been deposited in the battery case.

NOTE

To avoid forcing dust and deposits down between the cells, do not use a brush to clean the top of the battery.

e. Loosen stubborn deposits with a plastic scraper and then blow away the particles.

f. Install the battery as instructed under BATTERY INSTALLATION in this chapter.

BATTERY REMOVAL (Effectivity: All) (Figure 3)

WARNING

Remove all watches, rings and metal jewelry before attempting maintenance on the battery. If metal articles contact intercell connectors of opposite polarity, the objects will fuse themselves to the connectors and result in severe burning to the wearer.

a. Refer to Chapter 54-30-00 and remove the RH nacelle upper aft access panel (683).

b. Disconnect the battery connector assembly from the battery.

c. Cut safety wire securing the bolt assemblies together.

d. Remove the bolt assemblies on either side of the battery strap.

e. Lift the battery from the nacelle equipment shelf.

BATTERY INSTALLATION (Effectivity: All) (Figure 3)

a. Inspect the battery plenum gasket for cuts, cracks and proper adhesion. If necessary, replace the gasket as instructed under BATTERY PLENUM GASKET REPLACEMENT in this chapter.

b. Ensure that the battery support brackets are positioned under the plenum assembly and aligned with the inserts in the nacelle equipment shelf.

c. Align the battery with the plenum and lower into place so the plenum gasket provides a seal around the bottom of the battery case. The weight of the battery will hold the plenum in place against the RH nacelle equipment shelf.

d. Place the bolt assemblies through the battery strap slots and battery support brackets, then thread them into the nacelle equipment shelf inserts until they are tight enough to hold the battery in place.

e. Safety wire the bolt assembly wing nuts together.

f. Reconnect the battery connector assembly to the battery and ensure a tight, corrosion free connection.

g. Refer to Chapter 54-30-00 and install the RH nacelle upper aft access panel (683).

BATTERY PLENUM GASKET REPLACEMENT (Effectivity: All) (Figure 3)

a. Remove the battery as instructed under BATTERY REMOVAL in this chapter.

b. Remove the gasket from the plenum with a plastic scraper.

c. Clean the plenum surface with cleaner (2, Chart 2, 24-00-00) and a plastic scraper.

d. Apply an even coat of adhesive (3, Chart 2, 24-00-00) to the plenum surface.

e. Fit the new gasket over adhesive and ensure proper alignment.

f. Wipe off any excess adhesive and allow the gasket to adhere.

g. Install the battery as instructed under BATTERY INSTALLATION in this chapter.

BATTERY VENT VALVE REMOVAL (Effectivity: All) (Figure 4)

a. Remove the battery as instructed under BATTERY REMOVAL in this chapter.

b. Lift the plenum assembly from the equipment shelf.

c. Loosen the clamp attaching vent tube to plenum tube and remove entire plenum assembly.

d. Loosen clamps attaching vent tubing to vent valve and slide tubing off of valve.

e. Remove the three screws attaching vent valve to mounting bracket.

f. Remove vent valve from airplane.

BATTERY VENT VALVE INSTALLATION (Effectivity: All) (Figure 4)

a. Align vent valve with mounting bracket and attach with three screws.

b. Slide vent tubing over ends of vent valve and secure with clamps.

c. Slide vent tubing over plenum tube and secure with clamp.

d. Position the plenum assembly.

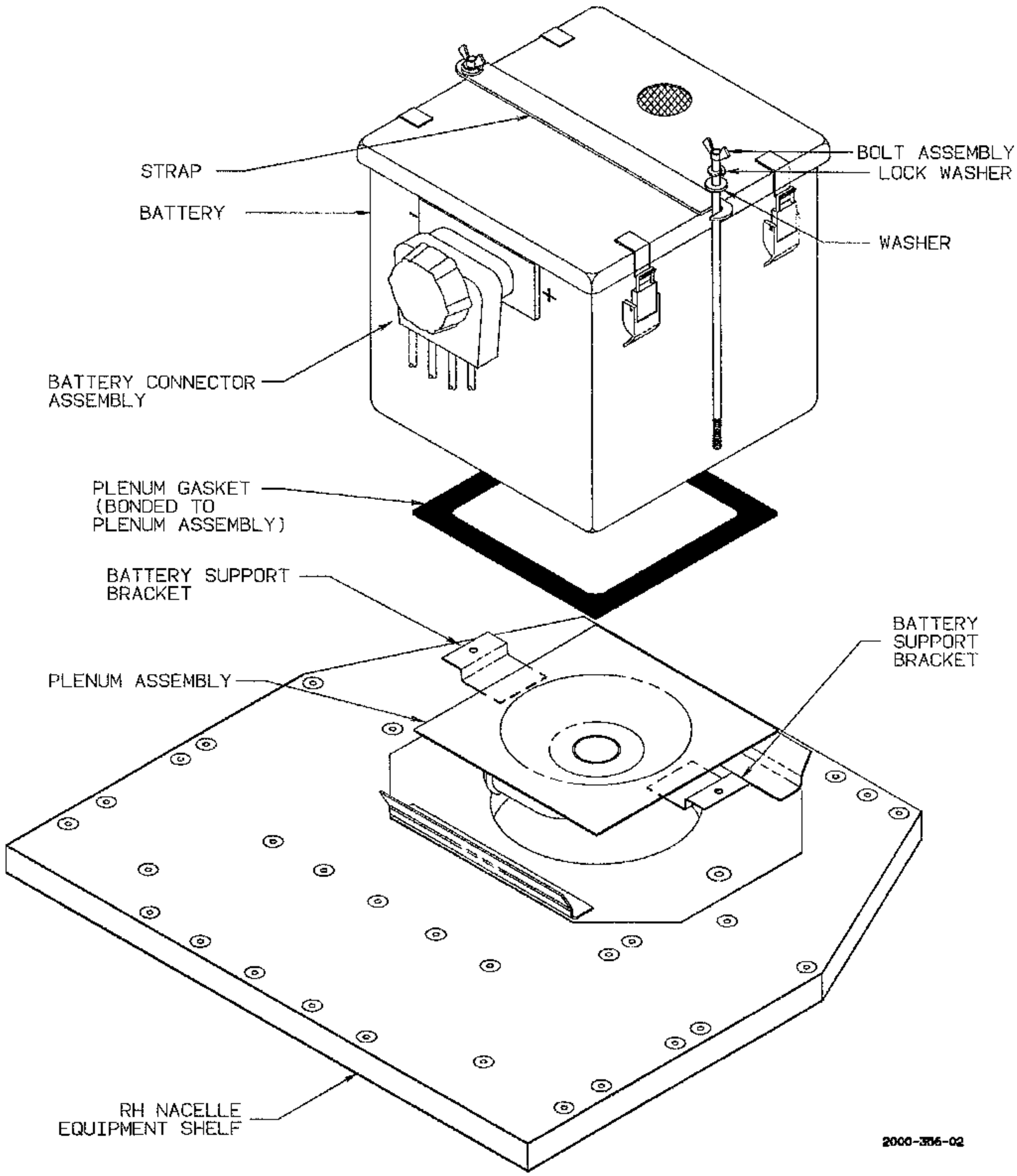
e. Install the battery as instructed under BATTERY INSTALLATION in this chapter.

BATTERY SHUNT REMOVAL (Effectivity: All) (Figure 5)

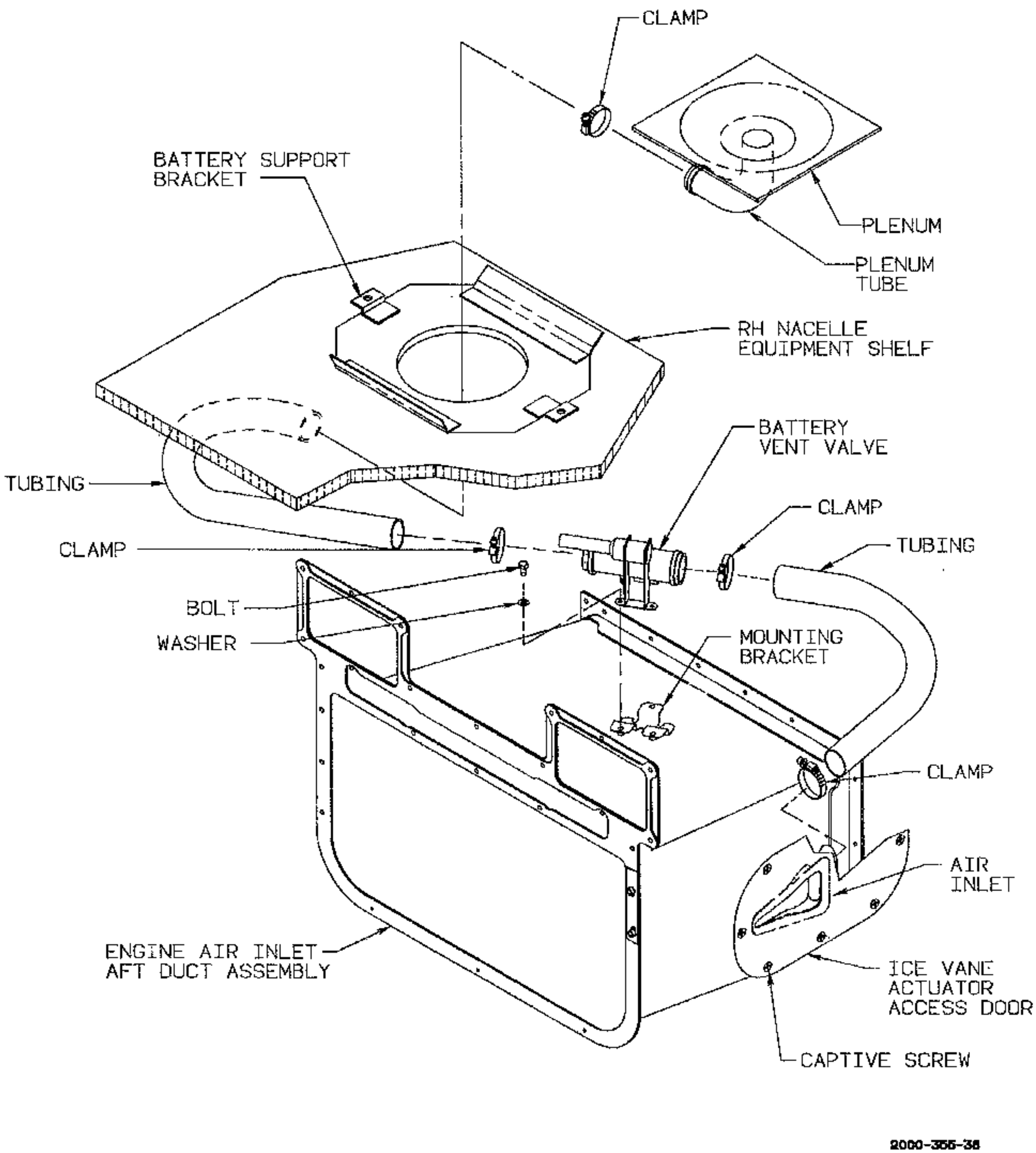
a. Refer to Chapter 54-30-00 and remove the RH nacelle upper aft access panel (683).

WARNING

Remove all watches, rings and metal jewelry before disconnecting the battery. If metal articles contact intercell connectors of opposite polarity, the objects will fuse themselves to the connectors and result in severe burning to the wearer.



Battery Installation (Effectivity: All)
Figure 3



Battery Vent Valve Installation (Effectivity: All)
Figure 4

b. Disconnect the battery connector assembly from the battery.

c. Remove the clear protective cover from the battery-power relay panel by removing two mounting screws, lock washers and washers.

d. Tag wiring to the battery shunt and remove bolts, lock washers and wiring.

e. Remove the two signal wire attaching screws and lock washers from the side of the battery shunt, and remove the signal wires.

f. Remove the two battery shunt mounting screws, lock washers and washers, and remove the battery shunt.

BATTERY SHUNT INSTALLATION (Effectivity: All) (Figure 5)

a. Align the battery shunt with mounting holes on battery power relay panel.

b. Install two mounting screws, lock washers, and washers.

c. Attach signal wires according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual, and secure with two screws and lock washers.

d. Install remaining wiring to the battery shunt according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual. A washer should be installed under the wire terminal lug. Secure with lock washer and bolt.

e. Secure the clear protective cover to the battery-power relay panel with two mounting screws lock washers and washers.

WARNING

Remove all watches, rings and metal jewelry before reconnecting the battery. If metal articles contact intercell connectors of opposite polarity, the objects will fuse themselves to the connectors and result in severe burning to the wearer.

f. Reconnect the battery connector assembly to the battery.

g. Refer to Chapter 54-30-00 and install the RH nacelle upper aft access panel (683).

BATTERY POWER RELAY PANEL REMOVAL (Effectivity: All) (Figure 5)

a. Refer to Chapter 54-30-00 and remove the RH nacelle upper aft access panel (683).

b. Remove all electrical power from the airplane.

c. Remove the clear protective cover from the battery-power relay panel by removing two mounting screws, lock washers and washers.

d. Disconnect the electrical connector from the battery-power relay panel.

e. Tag all wiring and bus bars attached to the battery-power relay panel.

f. Remove the nuts, lock washers, and washers attaching the bus bars and wiring to the battery-power relay panel.

g. Remove all wiring, bus bars and remaining washers.

h. Remove the two remaining battery-power relay panel mounting screws, lock washers, and washers.

i. Remove the battery-power relay panel from the RH nacelle equipment shelf.

BATTERY POWER RELAY PANEL INSTALLATION (Effectivity: All) (Figure 5)

a. Align the battery-power relay panel with the RH nacelle equipment shelf inserts.

b. Install the two battery-power relay panel mounting screws, lock washers and washers that do not attach the clear protective cover.

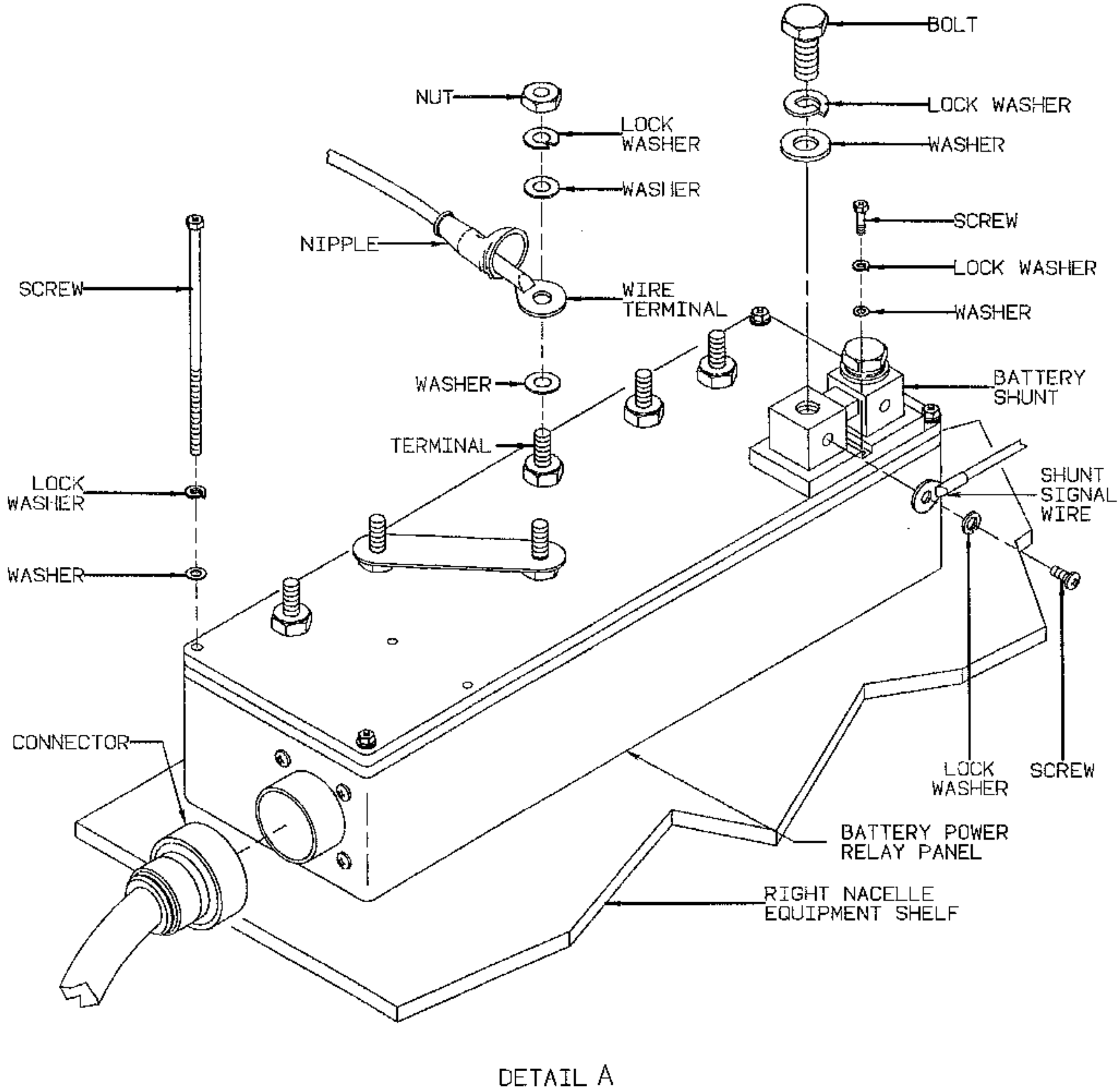
c. Reconnect the electrical connector to the battery-power relay panel.

d. Install all wiring and bus bars according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual, and secure with nuts, lock washers and washers.

CAUTION

Ensure that the nipples are installed over the terminals to prevent accidental shorting.

e. Secure the clear protective cover on the battery-power relay panel with two mounting screws, washers and lock washers.



Battery Power Relay Panel Installation (Effectivity: All)
Figure 5

f. Restore electrical power to the airplane.

g. Refer to Chapter 54-30-00 and install the RH nacelle upper aft access panel (683).

AUXILIARY BATTERY POWER - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

GENERAL (Effectivity: All) (Figure 1)

There are two identical auxiliary batteries installed in the nose avionics compartment. Each auxiliary battery is wired in a different configuration to meet the individual needs of the components to which it supplies standby power. Each auxiliary battery contains twelve sealed, lead-acid cells for a combined rating of 5.0 ampere-hours at the 10-hour rate. Charging voltage is provided to each auxiliary battery from the avionics center bus. Refer to Chapter 24-50-00 for detailed information on bus electrical load distribution.

An etched-foil heating resistor is installed on each auxiliary battery to provide a varied amount of heat to the individual cells. When airplane primary bus voltage is applied to the auxiliary battery input, battery surface temperature is monitored. If battery surface temperature is below 63° F, current is applied to the heating resistor, raising battery cell temperatures to an acceptable operating range for increased battery efficiency. An LED placarded HEATER ON on the battery face illuminates to indicate heater operation. Current flow is restricted to the heater as cell temperatures approach 132° F. Should battery surface temperature reach 132° F (55° C), the heater is disabled and the LED placarded OVER 55° C on the battery face is illuminated.

The heater also functions as a test load. When the battery-voltage-level test switch placarded TEST on the battery face is pressed (hold for 5 seconds to establish a load on the battery), the heater-disable system is bypassed, and an approximate 3-ampere load is applied to the battery with the heating resistor. A yellow battery-voltage-level LED on the battery face is illuminated adjacent to the the applicable voltage level. Illumination of the green LED indicates battery charging in progress. There are twelve red cell-monitor LEDs adjacent to twelve cell-test switches, placarded CELL TEST, ON-OFF, on the battery face. When one of the CELL TEST switches is pressed, the corresponding cell-monitor LED illuminates to indicate a normal cell condition. If the cell-monitor LED does not illuminate, an abnormal cell condition is indicated.

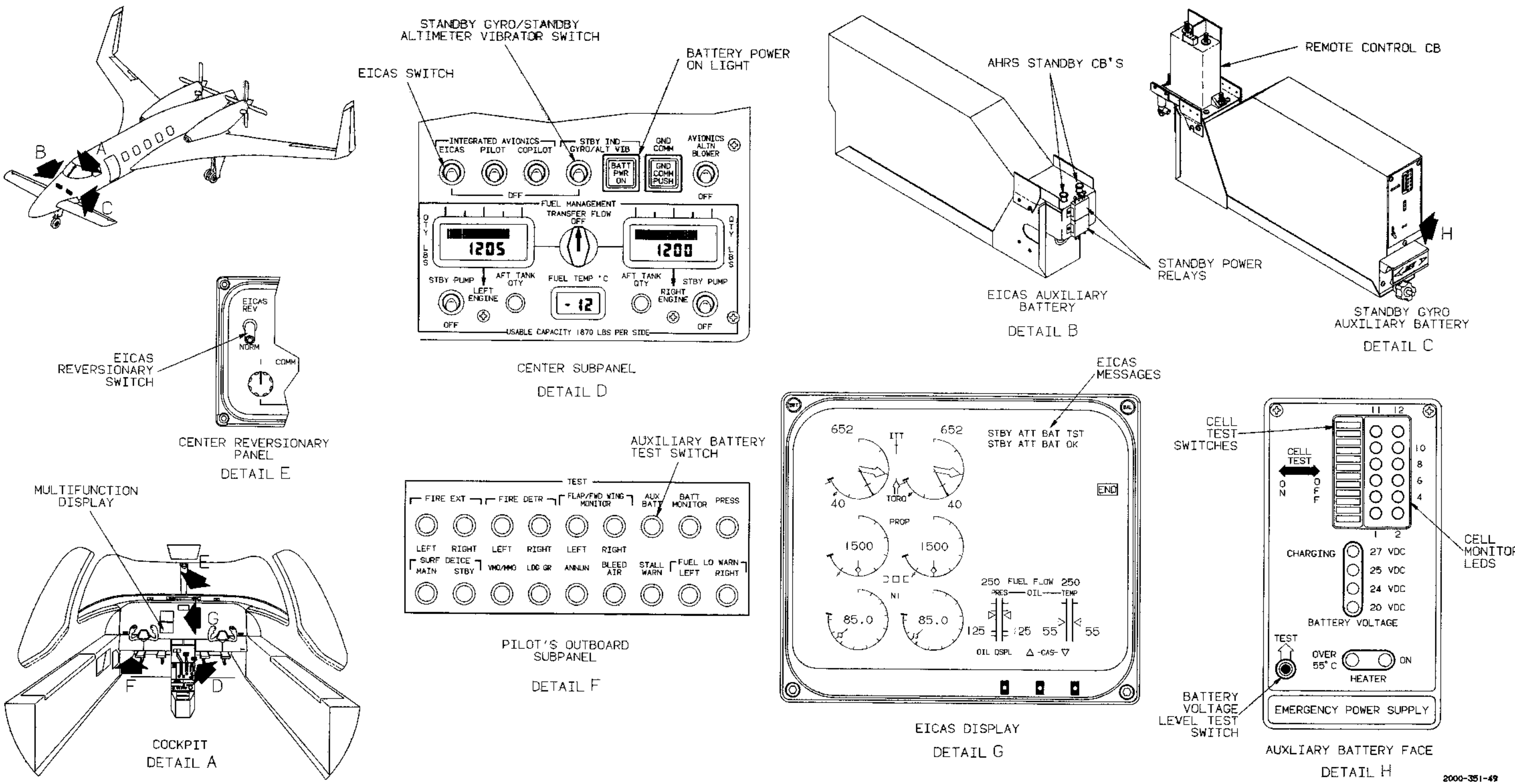
NOTE

Brightness of the cell-monitor LED's may vary and does not indicate an abnormal cell condition.

EICAS AUXILIARY BATTERY (Effectivity: All) (Figure 2)

The Engine Instrument Crew Alerting System (EICAS) auxiliary battery is mounted with two Attitude Heading Reference System (AHRS) circuit breakers and two standby power relays on a rack attached to the RH avionics equipment shelf. The EICAS auxiliary battery is not intended for extended operation, but rather as a temporary standby power supply for the AHRS computers, EICAS display, reversionary EICAS display on the Multifunction Display (MFD), and all display dimming inputs from the center dim bus. Refer to Chapter 33-10-00 for detailed information on the center dim bus.

When the triple-fed bus is powered, voltage through the avionics master circuit breaker energizes the AHRS standby power relay. EICAS auxiliary battery voltage is then applied through the AHRS standby power relay to each AHRS computer standby power input. EICAS auxiliary battery voltage initially powers the AHRS computers for about 70 seconds for AHRS alignment. The white-boxed AHRS ALIGNING DO NOT TAXI message is displayed on the EICAS display and both Primary Flight Displays. When the AHRS computers have completed alignment, they



Auxiliary Power System (Effectivity: All)
Figure 1

revert from standby to primary bus voltage inputs, and the white-boxed AHRS ALIGNING DO NOT TAXI message is no longer displayed. In the event voltage is lost from the triple-fed bus, the AHRS standby power relay is de-energized, removing EICAS auxiliary battery voltage from the AHRS computer standby power inputs.

For the duration of the bus voltage drop incurred during engine starts, the EICAS auxiliary battery provides standby power to maintain constant operation of the EICAS display in the normal or reversionary mode. When either ignition/start switch is moved to the ON or STARTER ONLY position, a start signal closes the EICAS standby power relay. EICAS auxiliary battery voltage is then applied to the coils of relays 3931K8 and 3931K9. The EICAS reversionary switch controls a ground to these relays so that only one may be energized at any given time. With the EICAS reversionary switch in the NORM position, and the EICAS display switch ON, relay 3931K8 is energized, powering the EICAS display with EICAS auxiliary battery voltage. If the EICAS reversionary switch is placed in the REV position, relay 3931K9 is energized, and the reversionary EICAS display on the MFD is powered with EICAS auxiliary battery voltage. The EICAS normal and reversionary displays cannot be powered on standby power at the same time. When EICAS auxiliary battery power is on-line, the avionics blower is enabled with a signal from the auxiliary battery instead of the pilot's and copilot's master avionics switches.

The displays on the center dim bus decrease in brightness as the voltage level to the dimming inputs is lowered. Once voltage to the dimming inputs falls below a certain threshold, the displays revert back to full bright. When the EICAS standby power relay is energized during engine start, EICAS auxiliary battery voltage is applied to the center dim bus. This maintains a constant voltage level on the center dim bus, preventing a sudden fluctuation in brightness of the center dim bus displays.

ATTITUDE GYRO AUXILIARY BATTERY (Effectivity: All) (Figure 3)

The attitude gyro auxiliary battery is mounted with a remote control circuit breaker on a rack attached to the LH avionics shelf. The remote control circuit breaker allows the pilot to select attitude gyro auxiliary battery power from the cockpit with the switch placarded STBY IND-GYRO/ALT VIB, OFF on the center subpanel. The remote control circuit breaker applies auxiliary battery voltage to the standby attitude gyro and standby altimeter vibrator power inputs. With electrical power on the primary buses, and the switch in the OFF position, the Engine Instrument Crew Alerting System (EICAS) yellow STANDBY ATT GYRO OFF caution message is displayed on the EICAS display. When the switch is placed in the ON position, the Data Acquisition Unit (DAU) receives a signal indicating that the standby gyro has been selected and the EICAS yellow STANDBY ATT GYRO OFF caution message is no longer displayed. Refer to Chapter 31-40-00 for detailed information on the EICAS system.

The attitude gyro auxiliary battery also provides standby power for standby instrument and magnetic compass lighting. When primary bus voltage is lost, the instrument light power relay is de-energized. Auxiliary battery voltage is applied through the relay contacts to the lighting inputs on the three standby instruments, magnetic compass and BATT PWR ON light. Refer to Chapter 33-10-00 for detailed information on standby instrument and magnetic compass lighting.

ATTITUDE GYRO AUXILIARY BATTERY TEST CIRCUIT (Effectivity: All) (Figure 3)

The attitude gyro auxiliary battery can be tested from the cockpit by pressing the switch placarded AUX BATT on the pilot's outboard subpanel. The switch removes a ground from the STBY IND-GYRO/ALT VIB switch and applies it to relay 3931K5. Removing the ground disables operation of the remote control circuit breaker, thereby isolating the auxiliary battery from any standby electrical loads during test. Relay 3931K5 is energized, and applies center bus voltage to both the battery test enable on the auxiliary battery, and the auxiliary battery test input on the Data Acquisition Unit (DAU). The Engine Instrument Crew Alerting System (EICAS) white STBY ATT BAT TST status message is then displayed on the EICAS display. With the battery test circuit enabled, the auxiliary battery applies voltage from its test indicator output, to the DAU standby gyro battery level input. The DAU reads the auxiliary battery charge level and initiates one of two EICAS messages. The EICAS white STBY ATT BAT OK status message or yellow STBY ATT BATT LO caution message is displayed on the EICAS display, indicating the attitude gyro auxiliary battery state of charge. When the AUX BATT test switch is released, relay 3931K5 is de-energized, and the EICAS test and charge level messages are no longer displayed.

AUXILIARY BATTERY POWER - MAINTENANCE PRACTICES (Effectivity: All)

AUXILIARY BATTERY REMOVAL (Effectivity: All) (Figure 1)

a. Remove all electrical power from the airplane.

b. Refer to Chapter 53-30-00 and remove the applicable nose avionics compartment door.

c. Disconnect the electrical connector from the top of the auxiliary battery.

d. Remove the safety wire securing knurled knob to rack.

e. Loosen the knurled knob.

f. Remove the auxiliary battery from the rack.

NOTE

The connector at the back of the auxiliary battery will disconnect as the battery is pulled from the rack.

AUXILIARY BATTERY INSTALLATION (Effectivity: All) (Figure 1)

a. Align the index hole in the auxiliary battery bracket with the guide pin above the plug on the rack. The guide pin should provide sufficient alignment to connect the electrical connector.

b. Position the auxiliary battery in the rack.

c. Reconnect the electrical connector at the top of the auxiliary battery.

d. Tighten the knurled knob until the auxiliary battery is secure.

e. Safety wire the knob to the rack so it will not turn.

f. Refer to Chapter 53-30-00 and install the nose avionics compartment door.

g. Restore electrical power to the airplane.

AUXILIARY BATTERY OPERATIONAL CHECK (Effectivity: All)

NOTE

Perform the AUXILIARY BATTERY OPERATIONAL CHECK in accordance with the current inspection interval specified in Chapter 5.

a. Place all twelve of the CELL TEST switches on the auxiliary battery face in the ON position. Verify that all twelve of the cell-monitor LED's are illuminated.

NOTE

The cell-monitor LED's function as GO/NO GO indicators. Brightness of the cell-monitor LEDs may vary, and does not indicate an abnormal cell condition.

b. Press the battery voltage level TEST switch on the battery face, and hold for ten seconds. A yellow LED should illuminate adjacent to the appropriate battery voltage level. If battery surface temperature is below 132° F (55° C), verify that the HEATER ON LED is illuminated.

c. Place the twelve CELL TEST switches in the OFF position.

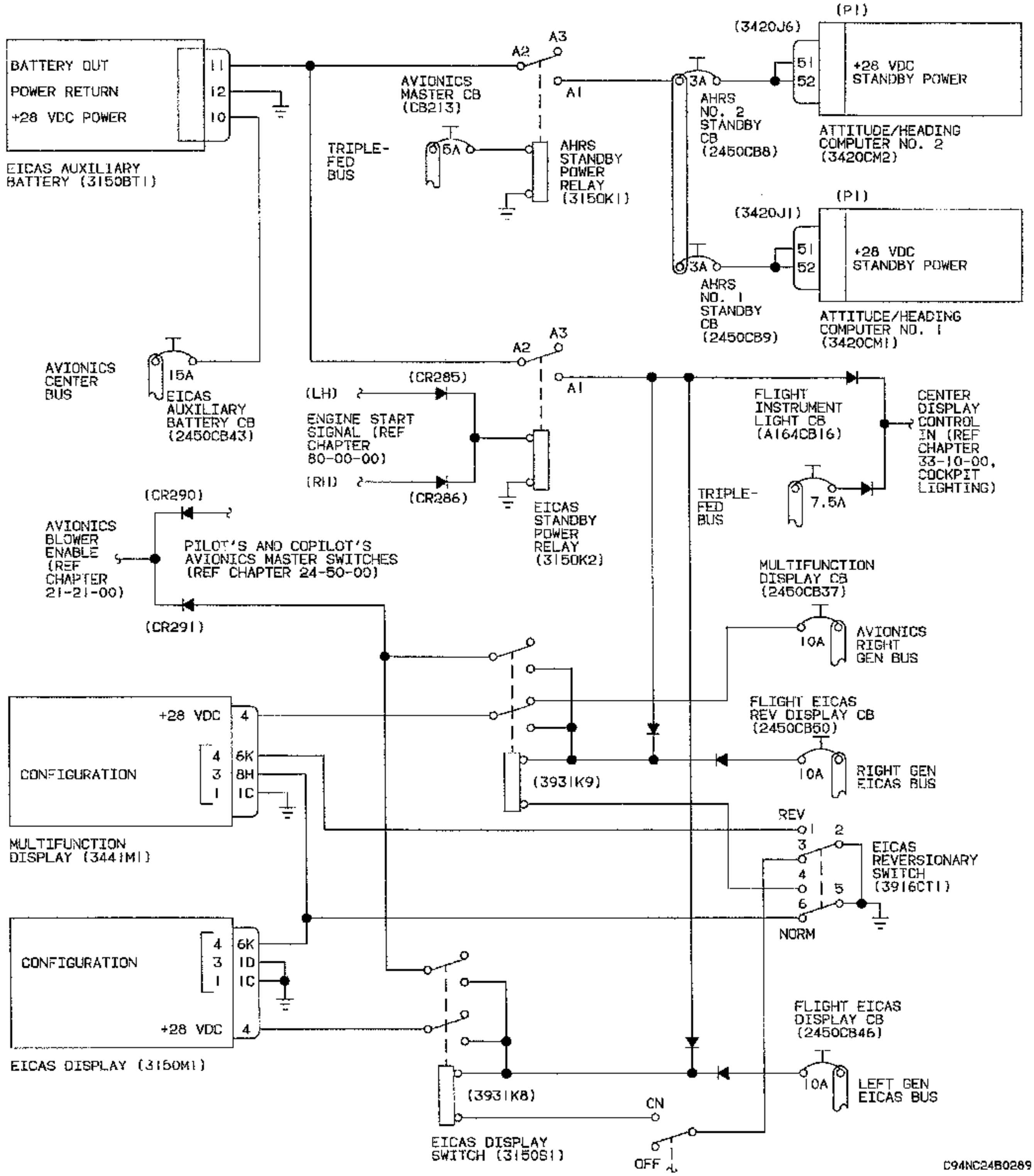
d. If auxiliary battery voltage indicated in step b was below 24 vdc, charge the battery using AUXILIARY BATTERY CHARGING PROCEDURES in this chapter.

NOTE

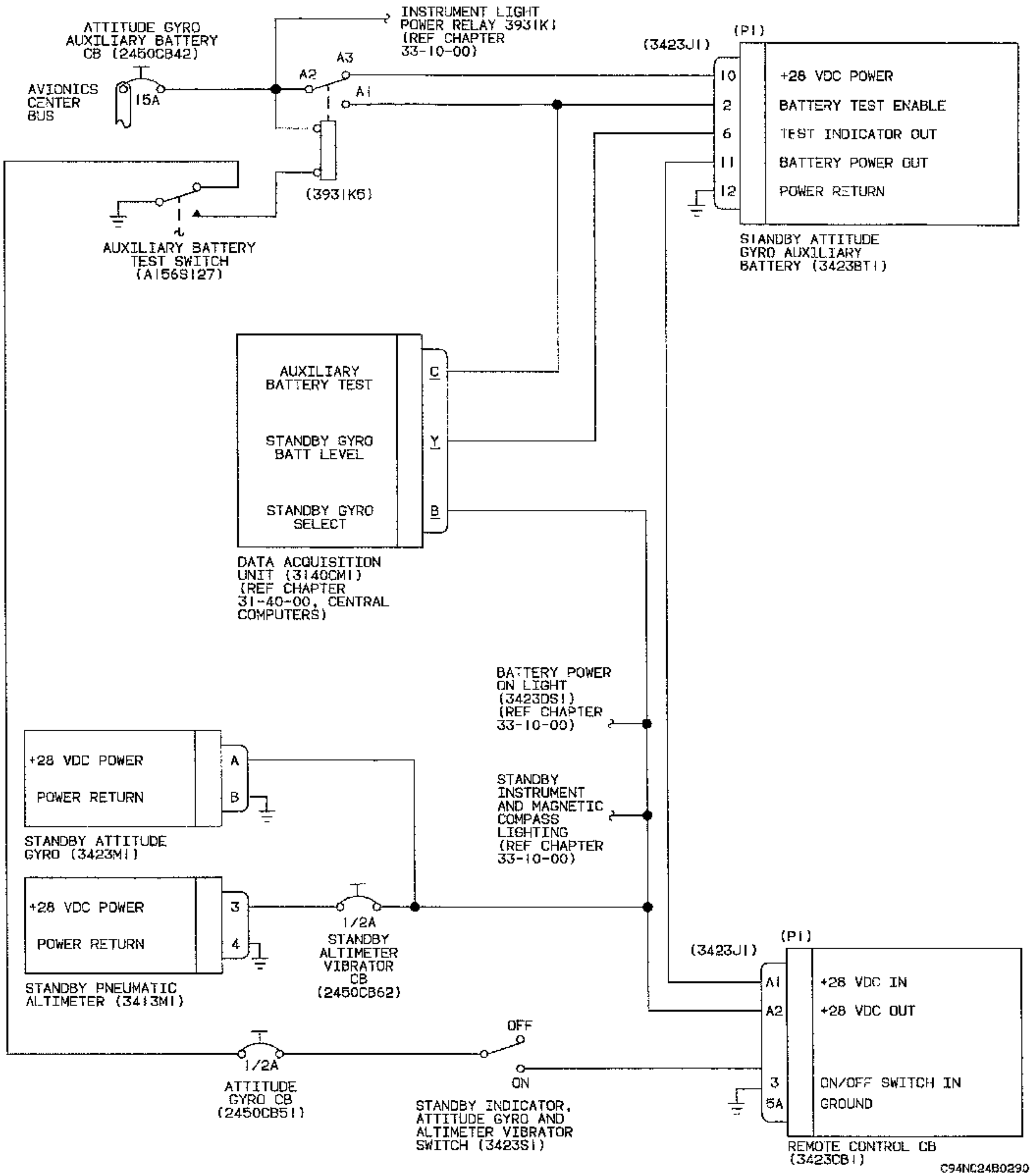
If auxiliary battery temperature is above 132° F (55° C), the battery's heating resistor will not turn on to provide a test load for the battery. This is not an ideal condition for auxiliary battery voltage level tests, but results should be considered valid.

CAUTION

The auxiliary batteries should never be left in a continual state of discharge as this may prevent the battery from accepting a charge later. If a battery has been discharged under a load for more than 48 hours, refer to the BEECHCRAFT Starship 1 Component Maintenance Manual to determine if the battery is still serviceable.



EICAS Auxiliary Battery Power Schematic (Effectivity: All)
Figure 2



Attitude Gyro Auxiliary Battery Power Schematic (Effectivity: All)
Figure 3

AUXILIARY BATTERY CHARGING PROCEDURES (Effectivity: All)

CAUTION

Never expose an auxiliary battery to an overcharge condition as permanent damage could result. If the odor of rotten eggs becomes apparent, it is advisable to pull the applicable auxiliary battery circuit breaker and/or disconnect the battery from the charging source. The rotten egg odor is evident when lead-acid cells vent due to prolonged high-rate overcharging. High-rate overcharging is brought about by charging at excessive charging voltage or charging a battery with shorted dead cells at normal charging voltage.

a. Refer to AUXILIARY BATTERY REMOVAL procedures in this chapter and remove the auxiliary battery to be charged.

b. Remove the cover from the auxiliary battery.

NOTE

When a battery cell is repeatedly charged and discharged, a white powdery deposit may appear around the inner perimeter of the battery cap seal area. This is a carbonate formation and is harmless to the battery or other components. Venting is a normal process in which the battery cell releases excessive internal pressure which can result from overcharging or overheating. Excessive venting is indicated by a visible rupture near the top center of the battery cell or by the appearance of corrosion from spewage in the same area.

c. Inspect the individual cells for obvious signs of excessive venting or corrosion. Replace any defective cells before charging. Refer to the BEECHCRAFT Starship 1 Component Maintenance Manual to replace any damaged cells or other internal components.

NOTE

The auxiliary batteries may be charged by two different means. They are listed in order of preference.

USE OF BC-815A BATTERY CHARGER (Effectivity: All)

CAUTION

Do not touch, or allow any foreign objects to contact, the auxiliary battery connector pins.

a. Position the BC-815 battery charger next to the auxiliary battery, and connect it to the charger electrical connector.

b. Connect the battery charger adapter to a 110/120 vac 50/400 hz power source.

c. Place the charge level selector switch in the 5.0A HR position.

d. Place the ON/OFF switch in the ON position. The amber charge LED should illuminate to indicate the battery is charging. When the cells are within 90% of full charge, the green "float" LED should illuminate, indicating the charger is in the trickle charge mode.

NOTE

Charging time depends upon the battery's state of charge. Twenty-three hours or more may be required for fully discharged cells. The charger may be operated in the trickle charge mode for an indefinite time without damage to the charger or battery.

e. Place the charger ON/OFF switch in the OFF position.

CAUTION

Do not touch, or allow any foreign objects to contact, the auxiliary battery connector pins.

f. Unplug the battery charger from the AC power source, and disconnect the electrical connector from the auxiliary battery.

g. Refer to AUXILIARY BATTERY OPERATIONAL CHECK in this chapter and perform an operational check of the auxiliary battery.

h. Refer to AUXILIARY BATTERY INSTALLATION procedures in this chapter and install the auxiliary battery.

USE OF CONSTANT CURRENT (REGULATED) BATTERY CHARGER (Effectivity: All)

CAUTION

Do not touch, or allow any foreign objects to contact, the auxiliary battery connector pins.

a. Connect the constant current, regulated battery charger to the indicated pins on the connector at the rear of the auxiliary battery. Use pin 10 for the positive lead and pin 7 for the negative lead.

NOTE

Monitor the entire charging sequence. Charge at, but do not exceed, 30 vdc (5-10 ampere capacity), and charge no longer than 16 hours. The auxiliary battery should reach 80% capacity within 1 hour and be fully charged after 16 hours.

CAUTION

Do not touch, or allow any foreign objects to contact, the auxiliary battery connector pins.

b. Disconnect the battery charger and allow sufficient time for battery temperature stabilization before performing an operational check.

c. Refer to AUXILIARY BATTERY OPERATIONAL CHECK in this chapter and perform an operational check of the auxiliary battery.

d. Refer to AUXILIARY BATTERY INSTALLATION in this chapter and install the auxiliary battery.

EXTERNAL POWER - DESCRIPTION AND OPERATION (Effectivity: All) (Figures 1 and 2)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

Airplanes NC-4 thru NC-29, without BEECHCRAFT Kit No. 122-3002 installed, have the external power receptacle mounted on the lower wing skin at F.S. 400 (Figure 1). Airplanes NC-4 thru NC-29 with BEECHCRAFT Kit No. 122-3002 installed, and NC-30 and after, have the receptacle mounted on the underside of the aft main wing, just outboard of the LH main landing gear wheel well (Figure 2). Both receptacle installations are accessible through an access door and are compatible with a ground auxiliary power unit (APU) equipped with a standard AN plug.

The external power relay is mounted on a bracket attached to the lower wing skin at F.S. 400 on airplanes NC-4 thru NC-29 (Figure 2). The external power relay is mounted on the LH nacelle equipment shelf on airplanes NC-30 and after (Figure 2).

Relay K141 and both the external power sense and external power control circuit breakers are mounted on brackets adjacent to the receptacle. The external power and windshield deice printed circuit board (PCB) is mounted in the printed circuit card rack in the pilot's console. The external power switch is placarded EXT PWR, OFF-RESET on the center subpanel in the cockpit.

EXTERNAL POWER CIRCUIT (Effectivity: All) (Figures 3 and 4)

CAUTION

The generator bus tie switch should be placed in the OPEN position, and the battery switch to ON, before external power is connected. This will energize the avionics master relays and prevent any potential external power overcurrent on the buses. After external power is connected, the generator bus tie switch should be placed in the NORM position, allowing the power distribution PCB to automatically close the bus tie relays.

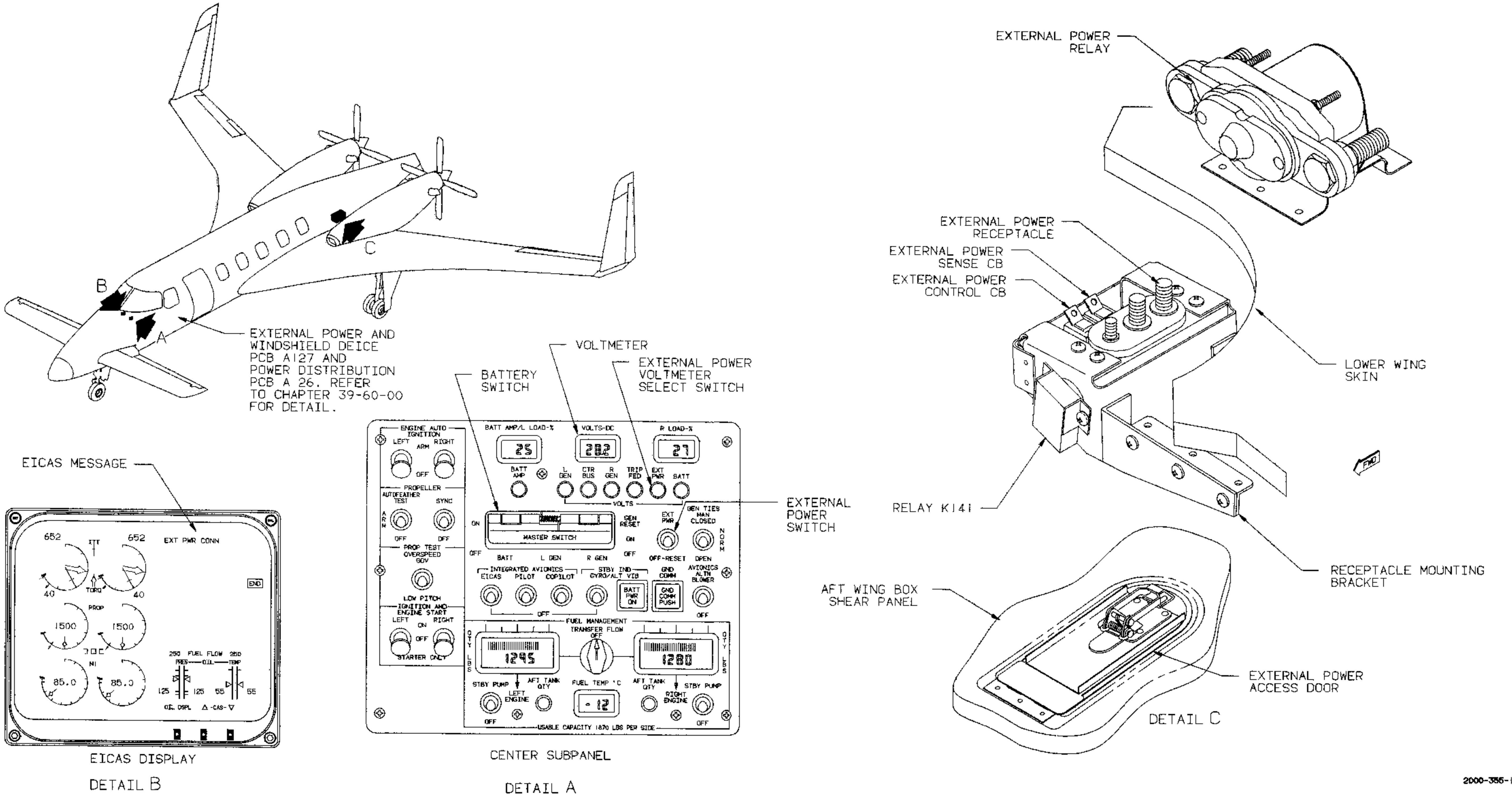
When the APU plug is inserted and the unit turned ON, voltage from the small positive pin of the external power receptacle energizes relay K141. When energized, relay K141 connects voltage from the the receptacle's small pin to the external power switch and the small pin input on the external power and windshield deice PCB. The external power and windshield deice PCB sends a signal to the Data Aquisition Unit (DAU), causing the Engine Instrument Crew Alerting System (EICAS) white EXT PWR CONN status message to be displayed on the EICAS.

NOTE

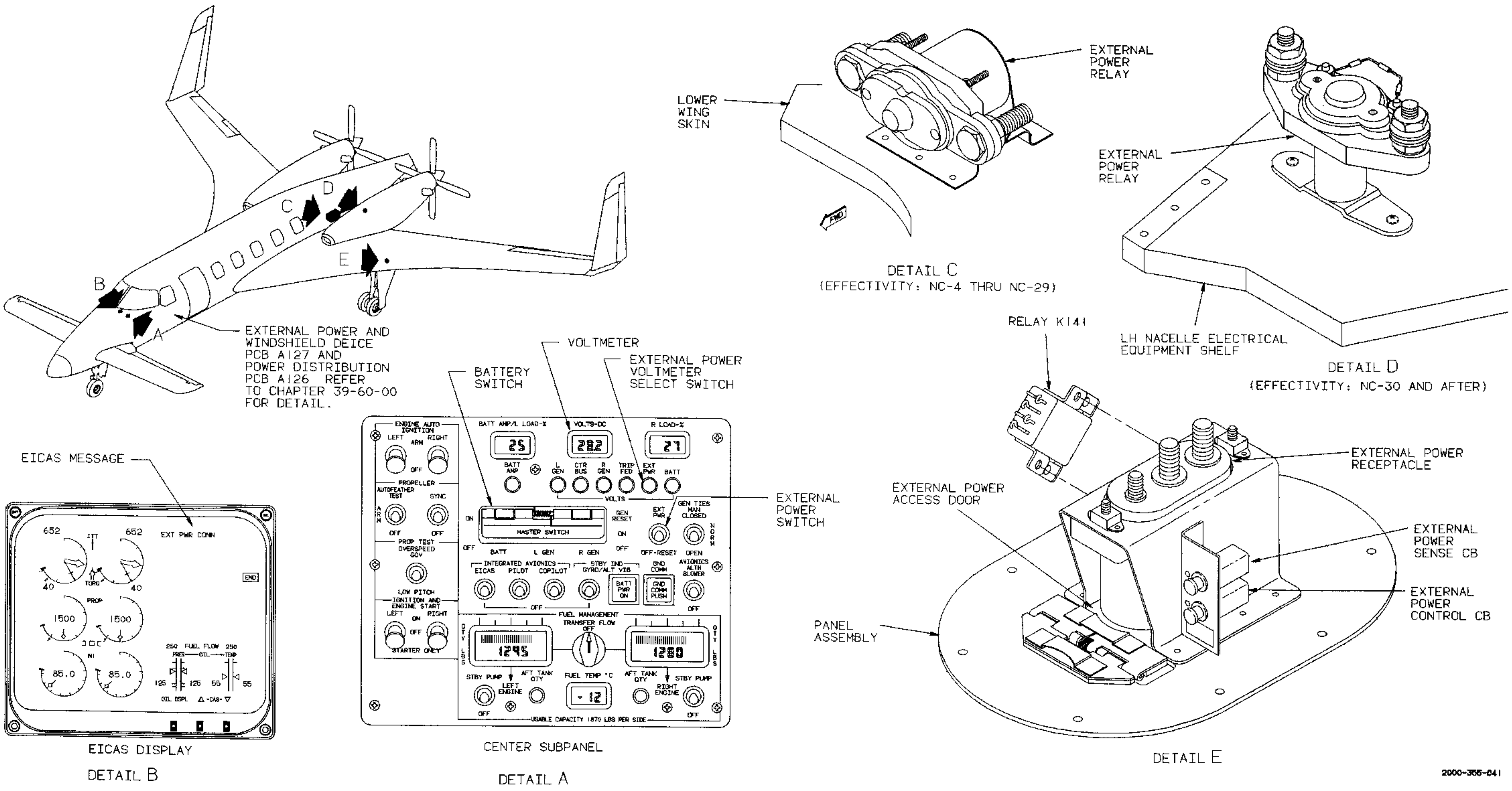
Relay K141, installed on airplanes NC-4 thru NC-29 without BEECHCRAFT Kit No. 122-3002 installed, prevents engine starts with external power.

When the external power switch is placed in the EXT PWR position, the external power and windshield deice PCB monitors ground APU output and battery voltage before closing the external power relay. If ground APU polarity is not reversed, if output voltage is between 25 and 32 vdc, and if battery voltage is above 20 vdc, the external power and windshield deice PCB will close the external power relay, powering the center bus via the center bus terminal board.

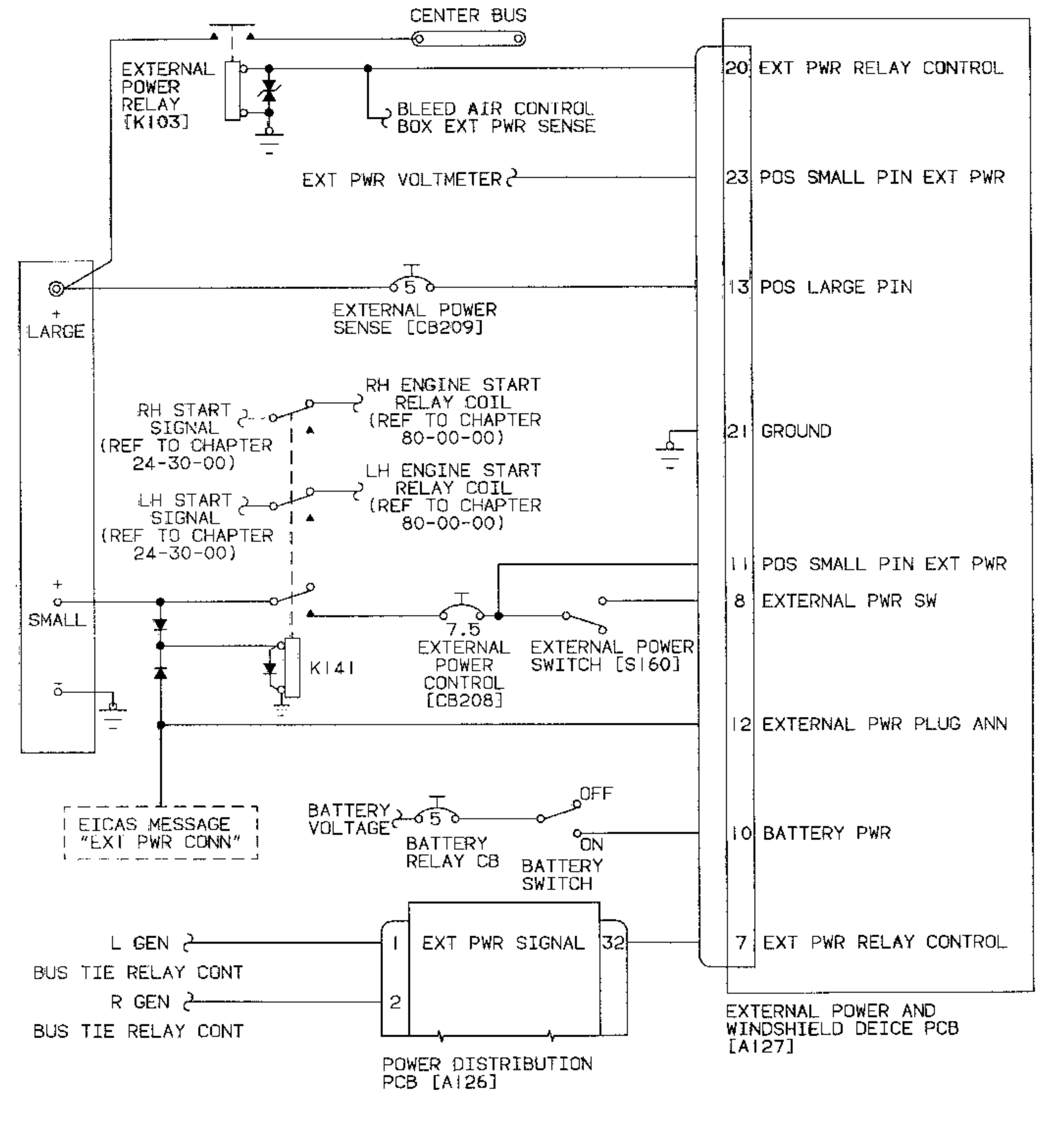
The power distribution PCB will then analyze bus voltage, and, if no overcurrent is present, will close the generator bus tie relays, powering both generator buses and the triple-fed bus with external power. External power may be monitored on the center subpanel voltmeter by pressing the EXT PWR voltmeter



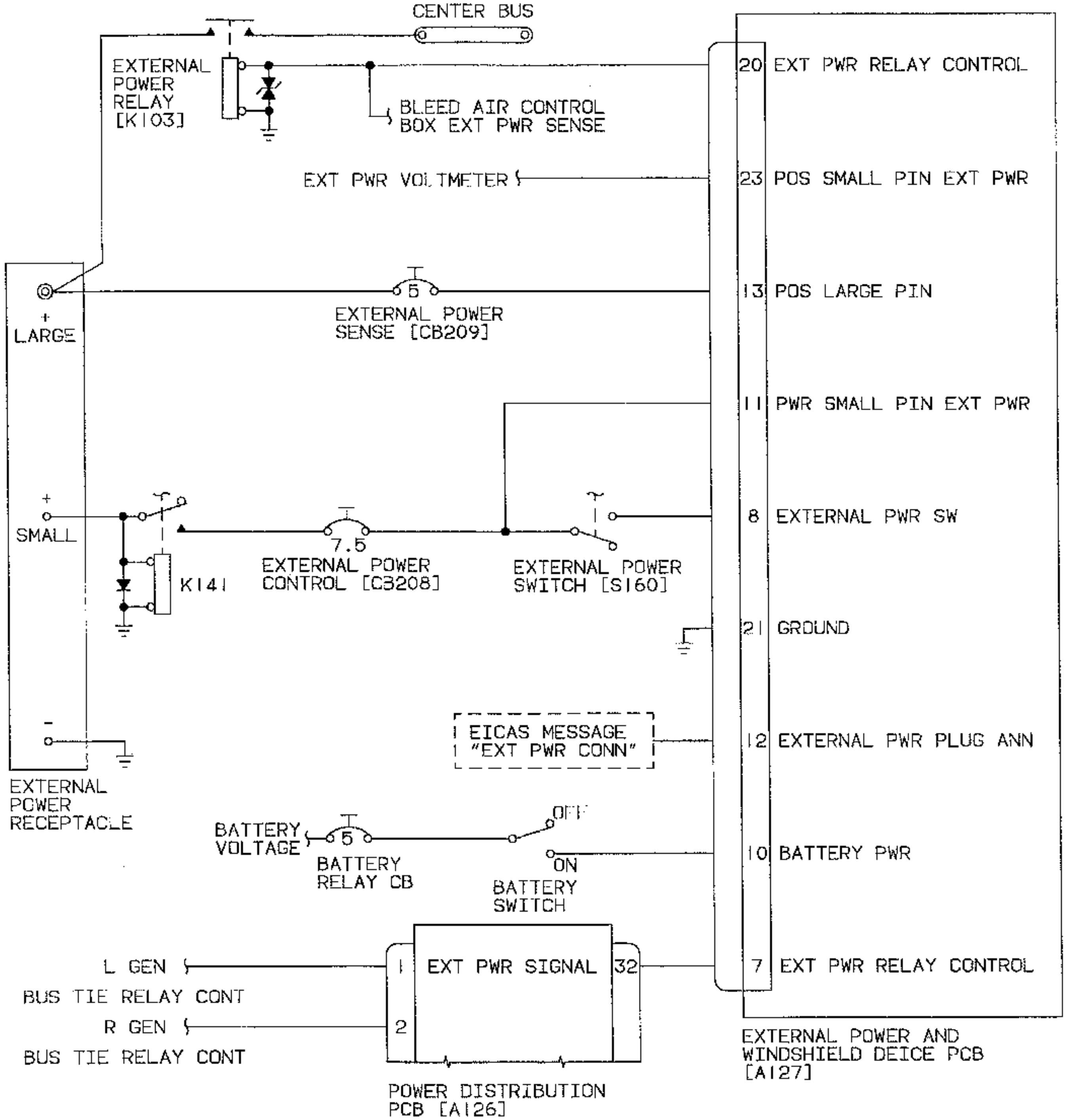
External Power System (Effectivity: NC-4 thru NC-29 without BEECHCRAFT Kit No. 122-3002 Installed)
Figure 1



External Power System (Effectivity: NC-4 thru NC-29 with BEECHCRAFT Kit No. 122-3002 Installed, and NC-30 and after)
Figure 2



External Power System Schematic (Effectivity: NC-4 thru NC-29 without BEECHCRAFT Kit No. 122-3002 Installed)
Figure 3



External Power System Schematic (Effectivity: NC-4 thru NC-29 with BEECHCRAFT Kit No. 122-3002 Installed, and NC-30 and after)
Figure 4

select switch. This circuit allows monitoring of ground APU output before it is applied to the airplane buses. Refer to Chapter 24-50-00 for an external power distribution schematic.

EXTERNAL POWER - TROUBLESHOOTING (Effectivity: All)

The BEECHCRAFT Starship 1 Wiring Diagram Manual should be used to trace specific wire routes and to locate pin and plug numbers. Many times a loose or damaged connection will cause a fault. Ensure there are no loose, damaged, or corroded pins on any connectors in the system. Continuity checks should be made with power removed from the specific terminal or connector. Use a calibrated voltmeter for all voltage checks and ensure the battery switch is ON during these checks unless otherwise indicated. The steps in Chart 1 should be followed sequentially unless otherwise specified. An example would be to proceed to the next step when there are no directions immediately following a NO condition.

CHART 1
TROUBLESHOOTING - EXTERNAL POWER AND CONTROL (Effectivity: All)

NO VOLTAGE ON BUSES WHEN EXTERNAL POWER IS APPLIED

STEP 1 Does the center subpanel voltmeter indicate a charge of 20 vdc or better when BATT is pressed?

YES Proceed to Step 2.

NO

Charge battery to 20 vdc or greater.

STEP 2 Does the center subpanel voltmeter indicate external power voltage when EXT PWR is pressed?

YES Proceed to Step 8.

NO

STEP 3 Is the ground APU plug secure?

YES Remove plug and check for corrosion or dirt on the receptacle and pins. Clean as required and proceed to Step 4 if necessary.

NO

Secure plug.

STEP 4 Is relay K141 energized to connect external power to the external power switch?

YES Proceed to Step 5.

NO

Locate and correct a possible wiring fault between the coil of relay K141 and the external power receptacle. If wiring is good, suspect a faulty relay.

STEP 5 Is external power at the contacts of relay K141?

YES Correct possible wiring fault between external power switch and relay K141. Proceed to Step 6 if wiring is good.

NO

Faulty wiring between relay K141 and receptacle or a faulty relay. Make repairs as required

CHART 1
TROUBLESHOOTING - EXTERNAL POWER AND CONTROL (Effectivity: All) *(Continued)*

NO VOLTAGE ON BUSES WHEN EXTERNAL POWER IS APPLIED

STEP 6 Is the EXT PWR CONT or EXT PWR SENSE circuit breaker open? **YES** Close circuit breaker. Proceed to Step 7.

NO

Proceed to Step 9.

STEP 7 Do circuit breakers remain closed when reset? **YES** Buses should now be powered.

NO

STEP 8 Is ground APU voltage too high or polarity reversed? **YES** Adjust voltage or reverse the polarity.

NO

Replace the defective circuit breaker.

STEP 9 Does the center subpanel voltmeter indicate 25 to 30 vdc when CTR BUS is pressed? **YES** Center bus is correctly powered. Proceed to Step 16.

NO

STEP 10 Is the DC test jack circuit breaker open? **YES** Close circuit breaker.

NO

STEP 11 Is there voltage at the coil of the external power relay? **YES** Proceed to Step 14.

NO

STEP 12 Is there voltage at the external power and windshield deice PCB external power relay control output? **YES** Proceed to Step 13.

NO

Suspect a fault in the external power and windshield deice PCB.

STEP 13 Is there continuity between the external power and windshield deice PCB and the external power relay coil? **YES** Proceed to Step 14.

NO

Locate and correct break in circuit.

STEP 14 Is there continuity to ground from the external power relay coil? **YES** Refer to Step 15.

NO

Restore continuity to the external power relay coil ground.

STEP 15 Is resistance correct at coil of external power relay so that relay can energize? **YES** Proceed to Step 16.

CHART 1
TROUBLESHOOTING - EXTERNAL POWER AND CONTROL (Effectivity: All) *(Continued)*

NO VOLTAGE ON BUSES WHEN EXTERNAL POWER IS APPLIED

	NO		
	Replace faulty external power relay.		
STEP 16	Is there continuity between the external power relay and the center bus terminal board?	**YES**	Proceed to Step 17.
	NO		
	Locate and correct break in circuit.		
STEP 17	Is there continuity between the center bus and center bus terminal board?	**YES**	Proceed to Step 18.
	NO		
	Locate and correct break in circuit.		
STEP 18	Are the left and right generator buses powered?	**YES**	System is functional.
	NO		
STEP 19	Are the left and right generator bus tie relays energized?	**YES**	The buses should be correctly powered. If not, refer to Chapter 24-50-00 to check for a fault in the bus system.
	NO		
STEP 20	Is there continuity between the power distribution PCB and the power relay panels?	**YES**	Proceed to Step 21.
	NO		
	Refer to Chapter 24-30-00 to locate and correct the faulty circuit.		
STEP 21	Is the external power and windshield deice PCB providing a control voltage to the power distribution PCB external power signal input?	**YES**	Buses should be powered. If not, suspect a fault in the power distribution PCB internal circuitry.
	NO		
	Suspect a fault in the external power and windshield deice PCB internal circuitry.		

1. The battery and external power switches should both be ON when making voltage checks.

2. If the system does not function properly and all checks have been good, suspect a fault of either the power distribution PCB or the external power and windshield deice PCB. Some electrical faults on the buses will cause the PCB's to react and prevent normal system operation.

EXTERNAL POWER - MAINTENANCE PRACTICES (Effectivity: All)

The ground auxiliary power unit (APU) must be capable of supplying load requirements without an excessive voltage drop. The unit must be capable of delivering up to 750 amperes for 1 second and deliver up to 600 amperes continuously at 24 to 30 volts. Use of an inadequate ground APU may cause voltage to fall below the dropout threshold of the external power relay and starter relay. This can result in relay chatter and/or welded contacts.

CAUTION

The output setting must not exceed 750 amperes on external power sources with a higher current-carrying capability. Any current in excess of 750 amperes may overtorque the drive shaft of the starter/ generator or produce heat sufficient to shorten the life of the unit.

Observe the following precautions and procedures when using an external power source:

a. Use only an external power source that is negatively grounded. If the polarity of the power source is unknown, determine the polarity with a voltmeter before connecting external power to the airplane.

b. Ensure that the external power switch on the center subpanel is set to OFF-RESET.

c. Ensure that the GEN TIES switch is in the NORM position. The power distribution PCB should automatically close the generator bus tie relays after external power has been applied to the electrical system.

CAUTION

Voltage is required to energize the avionics master power relays to remove power from the avionics equipment; therefore, never apply external power to the airplane without first applying battery voltage. Refer to Chapter 24-50-00 for an avionics power distribution schematic. If the battery is removed from the airplane or the battery switch is to be placed in the OFF position, connect an external battery in parallel with the ground APU prior to applying external power to the airplane electrical system.

d. Place the battery switch in the ON position.

e. Open the spring-loaded access door and mate the ground APU plug with the external power receptacle.

f. Turn the ground APU on and regulate output voltage to 28.25 ±.25 vdc.

g. Monitor ground APU voltage from the cockpit by pressing the external power voltmeter select switch on the center subpanel.

CAUTION

The battery may be damaged if exposed to voltages higher than 30 vdc for an extended period of time.

h. Place the external power switch in the EXT PWR position.

i. Turn the EICAS display on. The white EXT POWER CONN status message should be displayed.

EXTERNAL POWER RELAY REMOVAL (Effectivity: NC-4 thru NC-29) (Figure 5)

a. Refer to Chapter 53-30-00 and remove the aft wing box shear panel.

b. Remove all electrical power from the airplane.

c. Remove nut (13), lock washer (12) and washer (10) from relay (9).

d. Tag and remove the wiring, then remove remaining washer (10).

e. Remove nut (1), lock washer (2) and washer (3), then tag the diode and coil wiring (4).

f. Remove the spacing nut (5) and remaining washer (3) and remove the wiring.

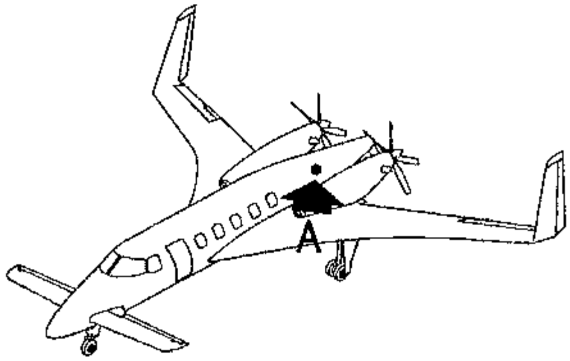
g. Remove two screws (6) and washers (7) securing the relay (9) to mounting bracket, then remove the relay from the airplane.

EXTERNAL POWER RELAY INSTALLATION (Effectivity: NC-4 thru NC-29) (Figure 5)

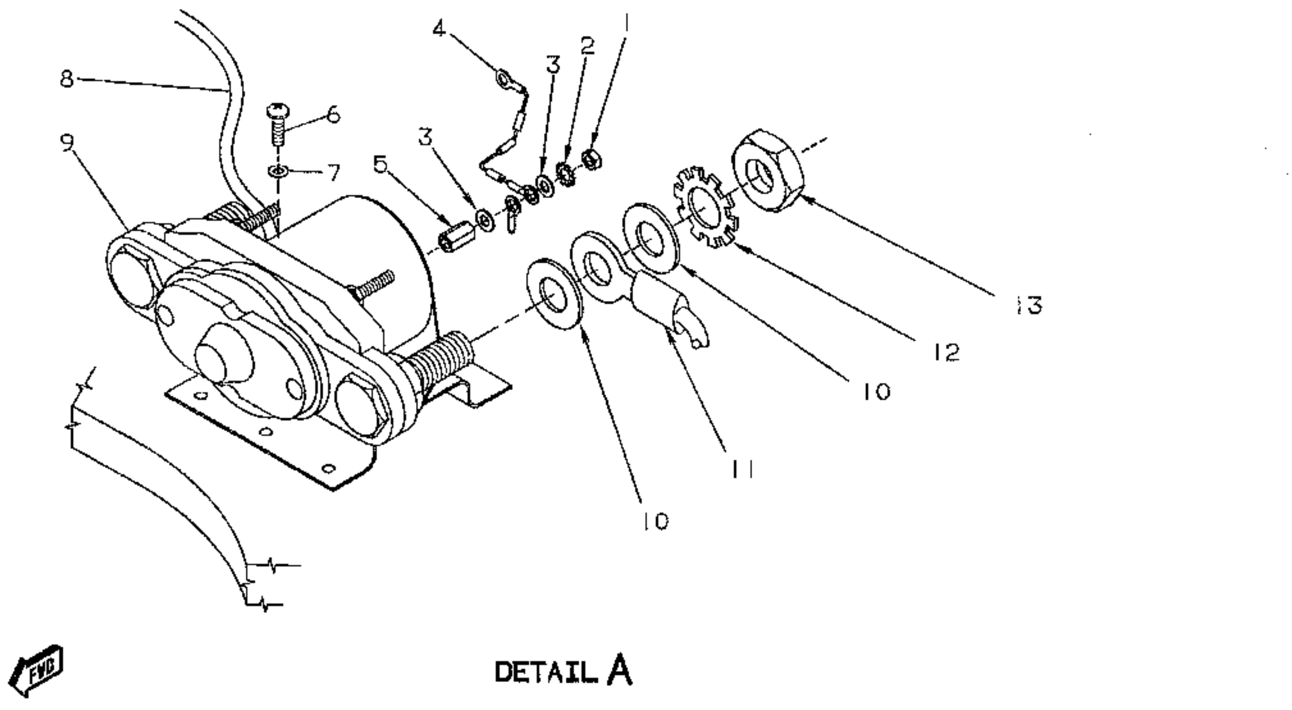
CAUTION

The external power relay must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Attach relay (9) to the mounting bracket with two screws (6) and washers (7).



1. NUT
2. LOCK WASHER
3. WASHER
4. DIODE WIRE TERMINAL
5. SPACING NUT
6. SCREW
7. WASHER
8. BONDING JUMPER
9. EXTERNAL POWER RELAY
10. WASHER
11. WIRE TERMINAL
12. LOCK WASHER
13. NUT



2000-350-008

External Power Relay Installation
(Effectivity: NC-4 thru NC-29)
Figure 5

b. Install spacing nut (5), washer (3), coil wiring, diode wiring (4), washer (3), lock washer (2) and nut (1).

c. Install remaining wiring on the relay terminals according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual with the washers (10) installed on each side of the wire terminal (11).

d. Secure wiring to the relay (9) with lock washer (12) and nut (13).

e. Restore electrical power to the airplane.

f. Refer to Chapter 53-30-00 and install the aft wing box shear panel.

EXTERNAL POWER RELAY REMOVAL (Effectivity: NC-30 and after) (Figure 6)

a. Remove all electrical power from the airplane.

b. Refer to Chapter 54-30-00 and remove the LH nacelle upper aft access panel.

c. Remove nut (8), lock washer (7) and washer (6) from relay (1).

d. Tag and remove the wiring (5), then remove remaining washer (4).

e. Tag and disconnect diode wiring from relay (1).

f. Remove two screws (3) and washers (2) securing the relay (1) to nacelle shelf, then remove the relay from the airplane.

EXTERNAL POWER RELAY INSTALLATION (Effectivity: NC-30 and after) (Figure 6)

CAUTION

The external power relay must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Secure relay (1) to nacelle shelf with two screws (3) and washers (2).

b. Reconnect diode wiring to the external power relay (1) according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

c. Install remaining wiring according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual with washers (4 and 6) on either side of each wire terminal (5).

d. Secure each wire terminal (5) with lock washer (7) and nut (8).

e. Restore electrical power to the airplane.

f. Refer to Chapter 54-30-00 and install LH nacelle upper aft access panel.

EXTERNAL POWER RECEPTACLE REMOVAL (Effectivity: NC-4 thru NC-29 without BEECHCRAFT Kit No. 122-3002 Installed) (Figure 7)

a. Remove all electrical power from the airplane.

b. Refer to Chapter 53-30-00 and remove the aft wing box shear panel.

c. Tag all wiring to the external power receptacle.

d. Remove nuts (4), lock washers (3), washers (2) and wiring from the receptacle terminals.

e. Tag and remove wiring from the circuit breakers (11).

f. Remove six screws (18), washers (16) and nuts (15) attaching support bracket (17) to the bracket assembly (9).

g. Remove the receptacle (1) and bracket assembly (9) from the wing center section.

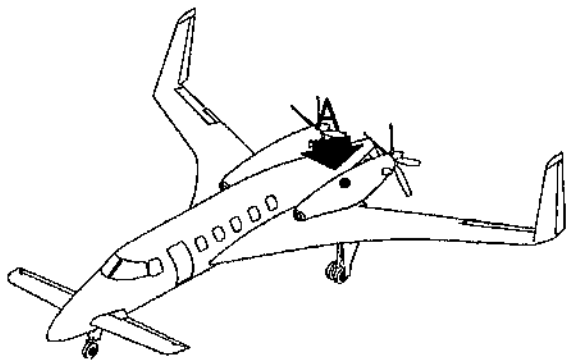
h. Remove four screws (12), washers (13) and nuts (14) securing the receptacle (1) to the bracket assembly (9), then pull the receptacle from the bracket assembly.

EXTERNAL POWER RECEPTACLE INSTALLATION (Effectivity: NC-4 thru NC-29 without BEECHCRAFT Kit No. 122-3002 Installed) (Figure 7)

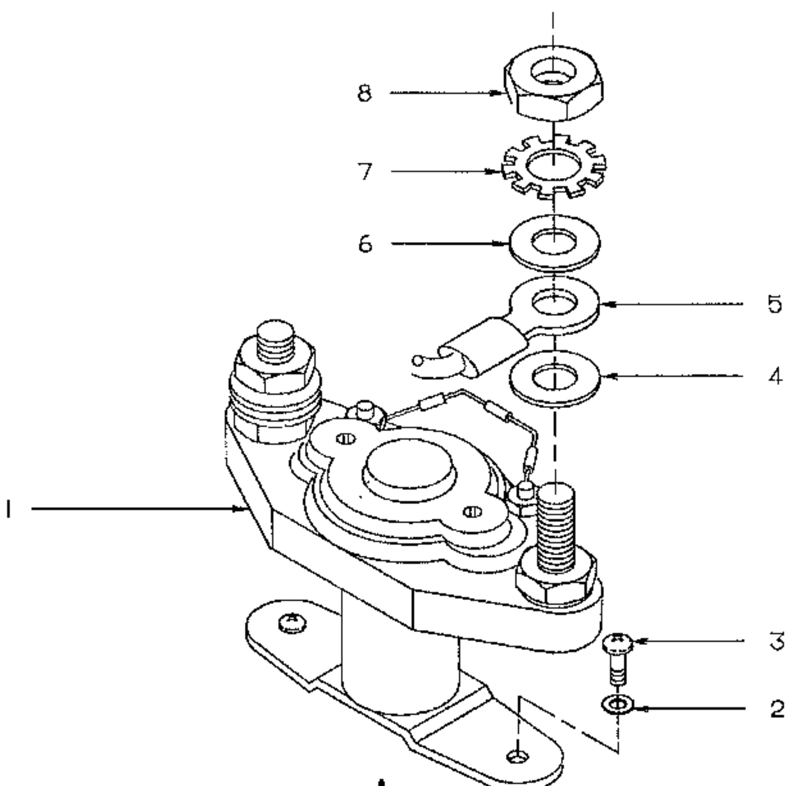
CAUTION

The external power receptacle must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the mounting holes on the external power receptacle (1) with the mounting holes on the bracket assembly (9).



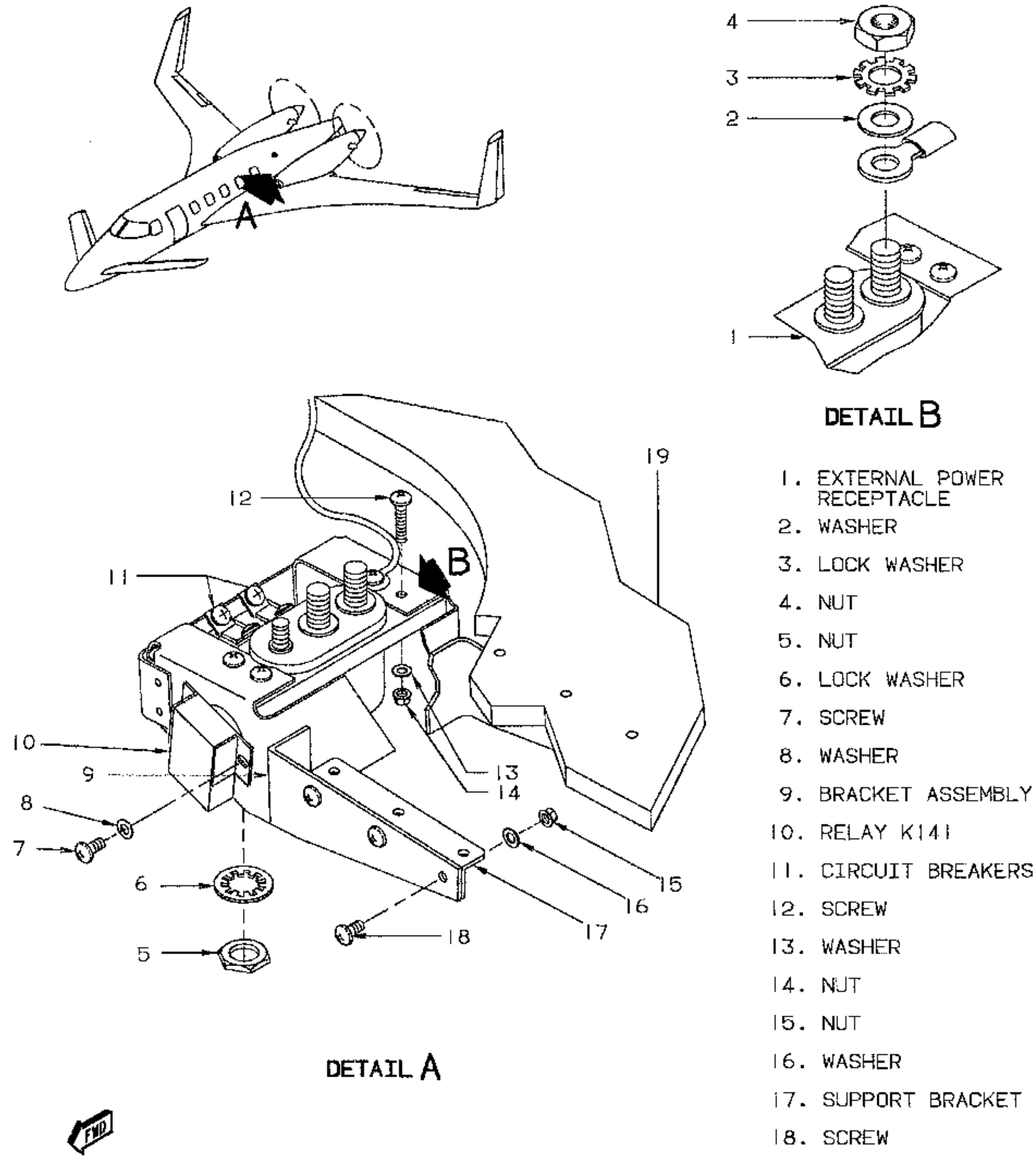
1. EXTERNAL POWER RELAY
2. WASHER
3. SCREW
4. WASHER
5. WIRE TERMINAL
6. WASHER
7. LOCK WASHER
8. NUT



DETAIL A

2000-350-009

External Power Relay Installation
(Effectivity: NC-30 and after)
Figure 6



1. EXTERNAL POWER RECEPTACLE
2. WASHER
3. LOCK WASHER
4. NUT
5. NUT
6. LOCK WASHER
7. SCREW
8. WASHER
9. BRACKET ASSEMBLY
10. RELAY K141
11. CIRCUIT BREAKERS
12. SCREW
13. WASHER
14. NUT
15. NUT
16. WASHER
17. SUPPORT BRACKET
18. SCREW
19. LOWER WING SKIN

2000-350-010

External Power Receptacle and Relay K141 Installation (Effectivity: NC-4 thru NC-29 without BEECHCRAFT Kit No. 122-3002 Installed)
Figure 7

b. Install four screws (12), washers (13) and nuts (14) securing the receptacle (1) to the bracket assembly (9).

c. Position the receptacle (1) and bracket assembly (9) adjacent to the support bracket (17) on the lower wing skin (19) so that all six mounting holes are aligned.

d. Install six screws (18), washers (16) and nuts (15) to secure mounting bracket (9) to support brackets (17).

CAUTION

When connecting wiring to the receptacle (1), ensure that the wiring is positioned in a way to prevent accidental contact between the terminals.

e. Install the receptacle wiring according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual, then secure with washers (2), lock washers (3) and nuts (4).

f. Install wiring on circuit breakers (11) according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

g. Restore electrical power to the airplane.

h. Refer to Chapter 53-30-00 and install the aft wing box shear panel.

RELAY K141 REMOVAL (Effectivity: NC-4 thru NC-29 without BEECHCRAFT Kit No. 122-3002 Installed) (Figure 7)

a. Remove all electrical power from the airplane.

b. Refer to Chapter 53-30-00 and remove the aft wing box shear panel.

c. Tag and remove all wiring from relay K141 (10).

d. Remove screws (7) and washers (8) securing relay K141 (10) to the bracket assembly (9).

e. Remove relay K141 (10) from the airplane.

RELAY K141 INSTALLATION (Effectivity: NC-4 thru NC-29 without BEECHCRAFT Kit No. 122-3002 Installed) (Figure 7)

a. Align relay K141 (10) with the bracket assembly (9) and secure with screws (7) and washers (8).

b. Install wiring on relay K141 according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

c. Restore electrical power to the airplane.

d. Refer to Chapter 53-30-00 and install the aft wing box shear panel.

EXTERNAL POWER RECEPTACLE REMOVAL (Effectivity: NC-4 thru NC-29 with BEECHCRAFT Kit No. 122-3002 Installed, and NC-30 and after) (Figure 8)

a. Remove all electrical power from the airplane.

b. Remove the screws securing the panel assembly (5) to the LH outboard wing, then lower the panel assembly enough to access the receptacle wiring.

c. Tag all wiring to the external power receptacle (11).

d. Remove nut (6), lock washer (7), washer (8) and wire terminal (9) from each receptacle terminal (10).

e. Remove the two screws (12) that secure the receptacle (11) to the channel assembly (16).

f. Remove the receptacle (11) from the channel assembly (16).

EXTERNAL POWER RECEPTACLE INSTALLATION (Effectivity: NC-4 thru NC-29 with BEECHCRAFT Kit No. 122-3002 Installed, and NC-30 and after) (Figure 8)

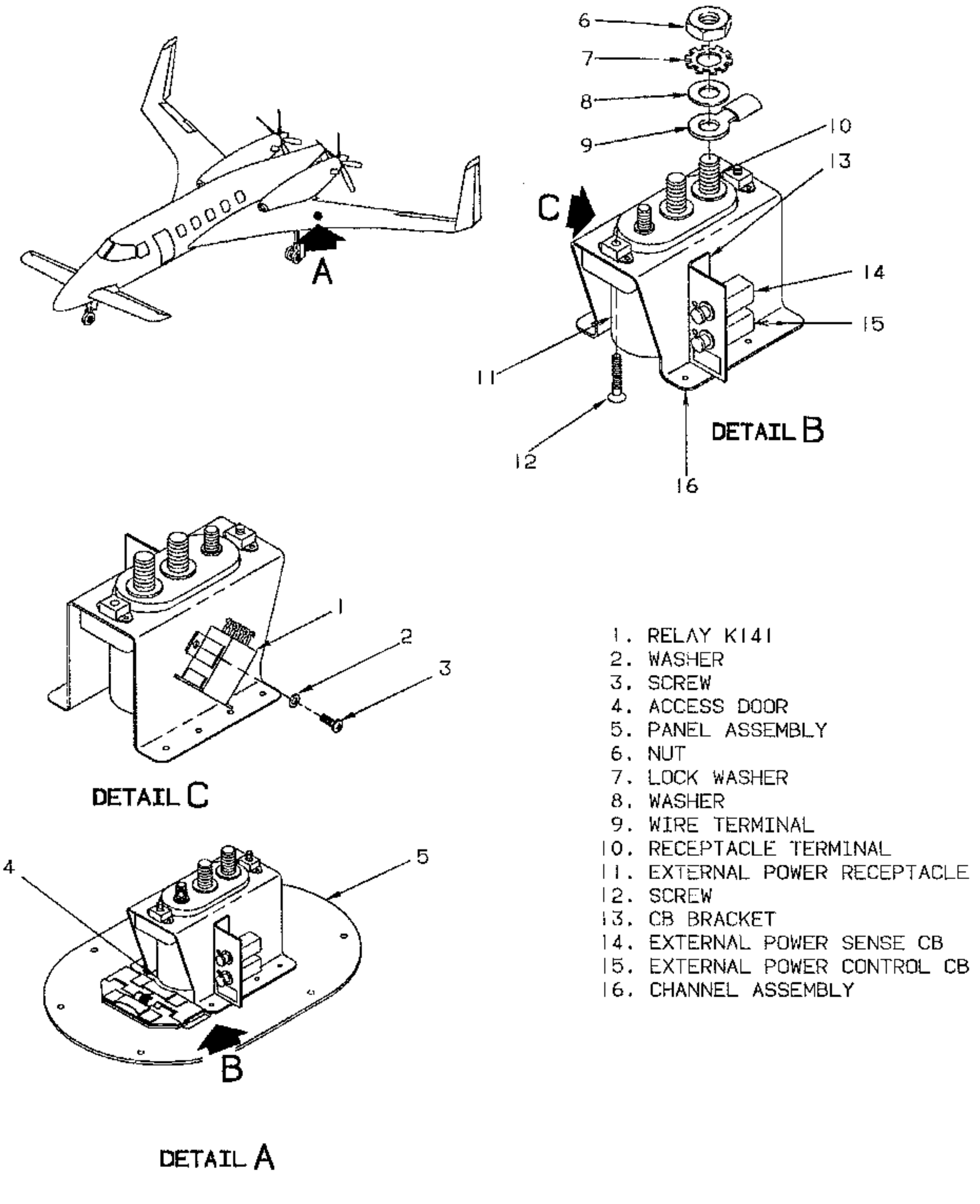
CAUTION

The external power receptacle must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the external power receptacle (11) with the mounting holes in the channel assembly (16) and secure with two screws (12).

CAUTION

When connecting wiring (9) to the receptacle terminals (10), ensure that the wiring is positioned in a way to prevent accidental contact between the terminals.



External Power Receptacle and Relay K141 Installation (Effectivity: NC-4 thru NC-29 with BEECHCRAFT Kit No. 122-3002 Installed, and NC-30 and after)
Figure 8

b. Install receptacle wiring according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual, then secure each wire terminal (9) with washer (8), lock washer (7) and nut (6).

c. Align the panel assembly (5) with the LH outboard wing and secure with screws.

d. Restore electrical power to the airplane.

RELAY K141 REMOVAL (Effectivity: NC-4 thru NC-29 with BEECHCRAFT Kit No. 122-3002 Installed, and NC-30 and after) (Figure 8)

a. Remove all electrical power from the airplane.

b. Refer to Chapter 53-30-00 and remove the LH nacelle upper aft access panel.

c. Tag and remove all wiring from relay K141 (1).

d. Remove screws (3) and washers (2) securing relay K141 (1) to the channel assembly (16).

e. Remove relay K141 (1) from the airplane.

RELAY K141 INSTALLATION (Effectivity: NC-4 thru NC-29 with BEECHCRAFT Kit No. 122-3002 Installed, and NC-30 and after) (Figure 8)

a. Align relay K141 (1) with the channel assembly (16) and secure with screws (3) and washers (2).

b. Install wiring on relay K141 according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

c. Restore electrical power to the airplane.

d. Refer to Chapter 53-30-00 and install the LH nacelle upper aft access panel.

ELECTRICAL LOAD DISTRIBUTION - DESCRIPTION AND OPERATION (Effectivity: All) (Figures 1 thru 17)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

There are five primary buses which distribute electrical power through the system; the "hot" battery bus, center bus, triple-fed bus, and the left and right generator buses. The triple-fed and center buses are mounted on limiter holders in the wing center section. The battery bus is mounted in the battery bus circuit breaker panel in the RH nacelle. The LH and RH generator buses are connected to their respective generator-power relay panels in the LH and RH nacelles. The power relay panels house the current sensors, bus tie relays, line contactor relays and battery relay. Refer to Chapter 24-30-00 for detailed information on the power relay panels, and to POWER DISTRIBUTION ON THE BUSES in this chapter for further information on bus electrical load distribution.

NOTE

All power to the center bus is first routed to the center bus terminal board. This terminal board is located in the wing center section adjacent to the forward face of the aft wing center spar. Each bus is divided into several sub-buses to feed power to the using systems through current limiters, circuit breakers and switches. In most instances the sub-buses are located on or in the limiter or circuit breaker panels.

Three power sources are used to power the five primary buses during normal operation. They consist of two 28-volt, 300-ampere DC starter/generators and a 24-volt nickel-cadmium battery. Refer to Chapter 24-30-00 for detailed information on the starter/generators and to Chapter 24-31-00 for detailed information on the battery. A ground auxiliary power unit may be connected to the airplane to supply external power to all five primary buses during ground operations (Figure 9). Refer to Chapter 24-40-00 for detailed information on external power. The airplane electrical load distribution system is termed a "triple-fed" system since most of the buses receive power from the starter/generators and battery simultaneously. Under normal conditions the buses are automatically tied together into a single loop system. This configuration provides a back-up source of power to the bus if the main power source is isolated or inoperative due to an electrical fault.

There are seven main circuit breaker panels in the airplane. The left circuit breaker panel is located in the pilot's console and the avionics circuit breaker panel is located in the copilot's console. The left generator circuit breaker panel is located in the left nacelle. The right generator circuit breaker panel and the battery bus circuit breaker panel are both located in the right nacelle. The aft circuit breaker panel is mounted on the the aft fuselage equipment shelf. The auxiliary circuit breaker panel is mounted in the pilot's console forward of the printed circuit card rack. There are four limiter panels; two in each nacelle for each generator bus with two limiter holders per panel. There are four additional limiter holders mounted on the wing center section electrical equipment panel; two for the triple-fed bus and two for the center bus. Figures 14 through 17 show circuit breakers and limiters along with the buses they receive power from. To locate a specific limiter or circuit breaker on its respective panel refer to Chapter 39-20-00.

Five switches that control power distribution components are located on the center subpanel. Four are used to bring a power source on-line while the fifth is used to control the generator bus tie relays. The three switches under the master switch gang bar placarded

BATT, ON-OFF, L GEN, R GEN, GEN RESET-ON-OFF bring both starter/generators and the battery on-line. The switch placarded EXT PWR located immediately to the right of the master switch gang bar applies external power to all five primary buses by signaling the external power and windshield de-ice PCB to close the external power relay. The generator bus tie switch placarded GEN TIES, MAN CLOSED-NORM-OPEN is located immediately to the right of the EXT PWR switch and has four functions implemented through three switch positions. MAN CLOSED will manually close the generator bus tie relays (Figure 4). OPEN will manually open the generator bus tie relays (Figure 8). The NORM position allows the power distribution PCB to analyze bus voltages and automatically close the generator bus tie relays when no fault exists. A power distribution PCB self-test is initiated any time the generator bus tie switch is moved from the OPEN position to the NORM position.

A self-test of the power distribution PCB has been incorporated to exercise every component and signal path in the system. The battery switch should be ON and both starter/generators on-line with the generator bus tie switch in the NORM position. No Engine Instrument, Crew Alerting System (EICAS) messages should be displayed for the system at this time. When the generator bus tie switch is placed in the OPEN position the yellow L GEN TIE OPEN and R GEN TIE OPEN caution messages should be displayed. When the switch is placed back to the NORM position, no messages should be displayed for 2 seconds. After 2 seconds the yellow L GEN TIE OPEN, R GEN TIE OPEN, and BATTERY TIE OPEN caution messages should be displayed for 2 seconds.

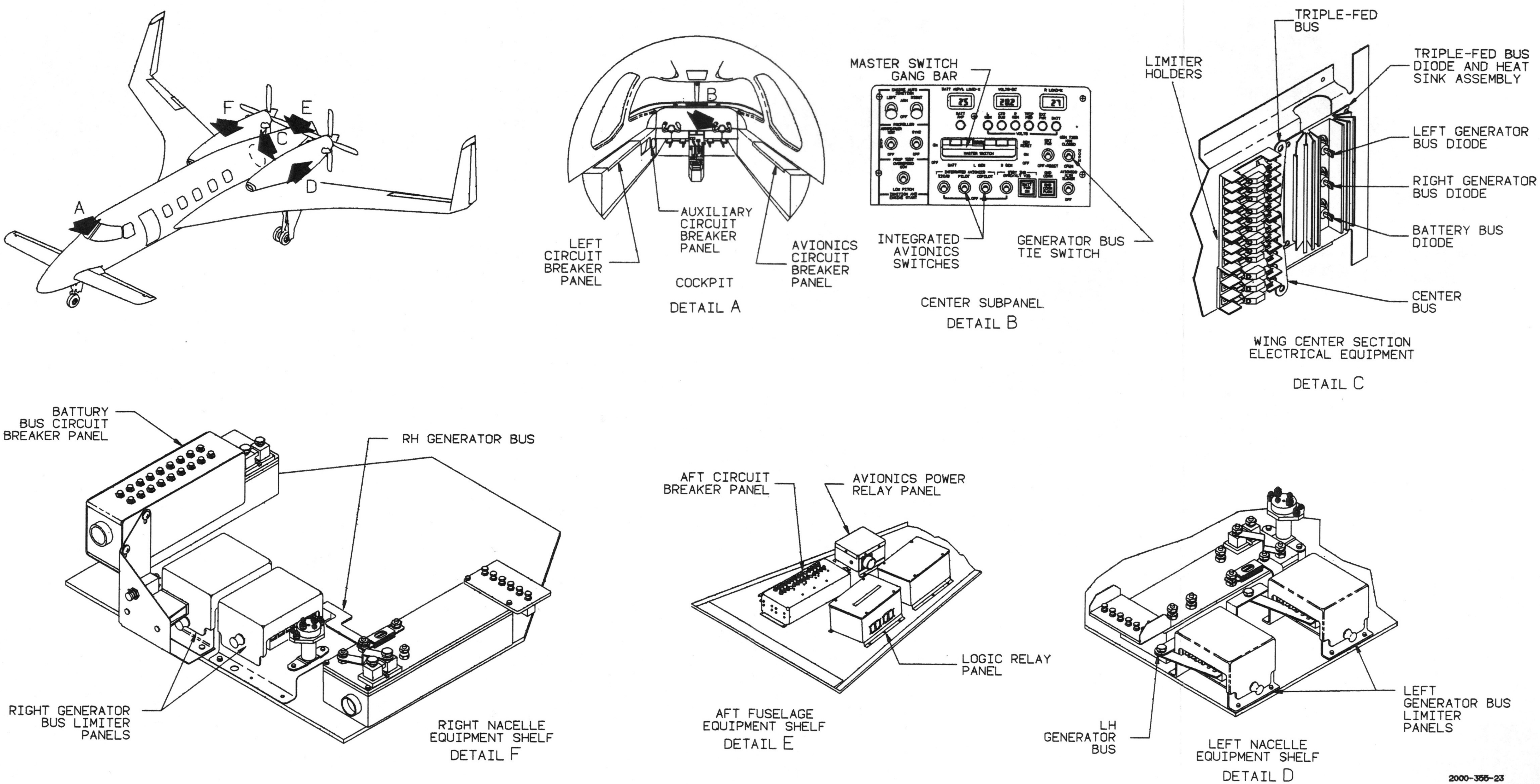
NOTE

These two time periods may not be exactly 2 seconds, but must be equivalent. After 5 seconds no related messages should be displayed on the EICAS display. If the circuit performs as described it has passed the self-test. If the bus tie relays did not open during the self-test refer to Chapter 24-30-00 to troubleshoot the fault. If the time periods are not equivalent suspect an internal fault of the power distribution PCB.

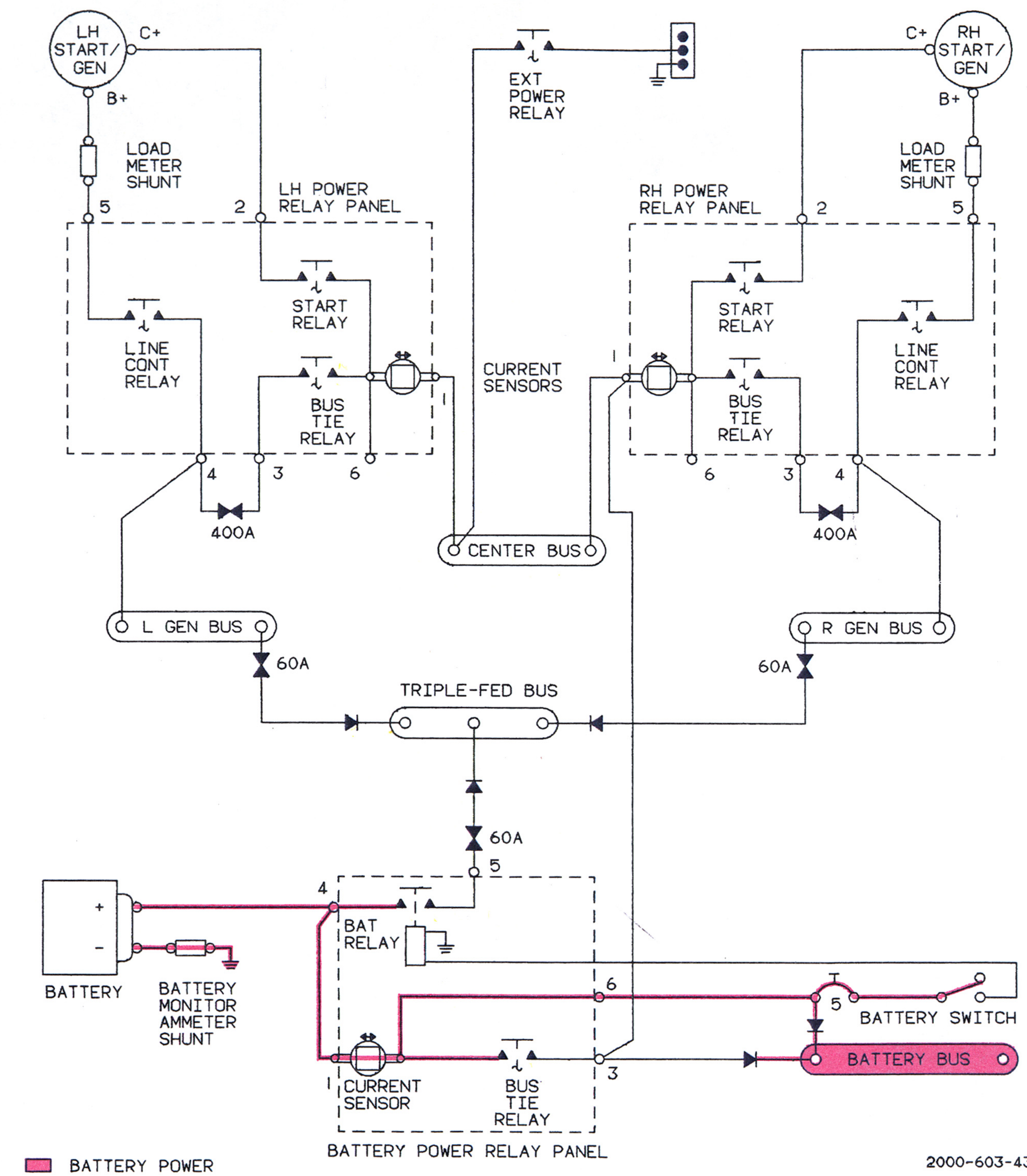
POWER DISTRIBUTION ON THE BUSES (Effectivity: All)

With no power sources on-line and the battery switch in the OFF position, the "hot" battery bus is battery powered through the battery power relay panel (Figure 2). When the battery switch is placed in the ON position, the battery relay will close, applying battery power to the triple-fed bus through a diode and 60-ampere current limiter (Figure 3). The power distribution PCB will analyze the bus voltages and if no overcurrent exists will automatically close the battery bus tie relay. This will power the center bus, allowing engine starts with battery power (Figure 5). The generator bus tie relays can be manually closed by placing the generator bus tie switch in the MAN CLOSED position (Figure 4). This allows the pilot or technician to check systems powered by the generator buses with battery power instead of bringing a starter/generator on-line.

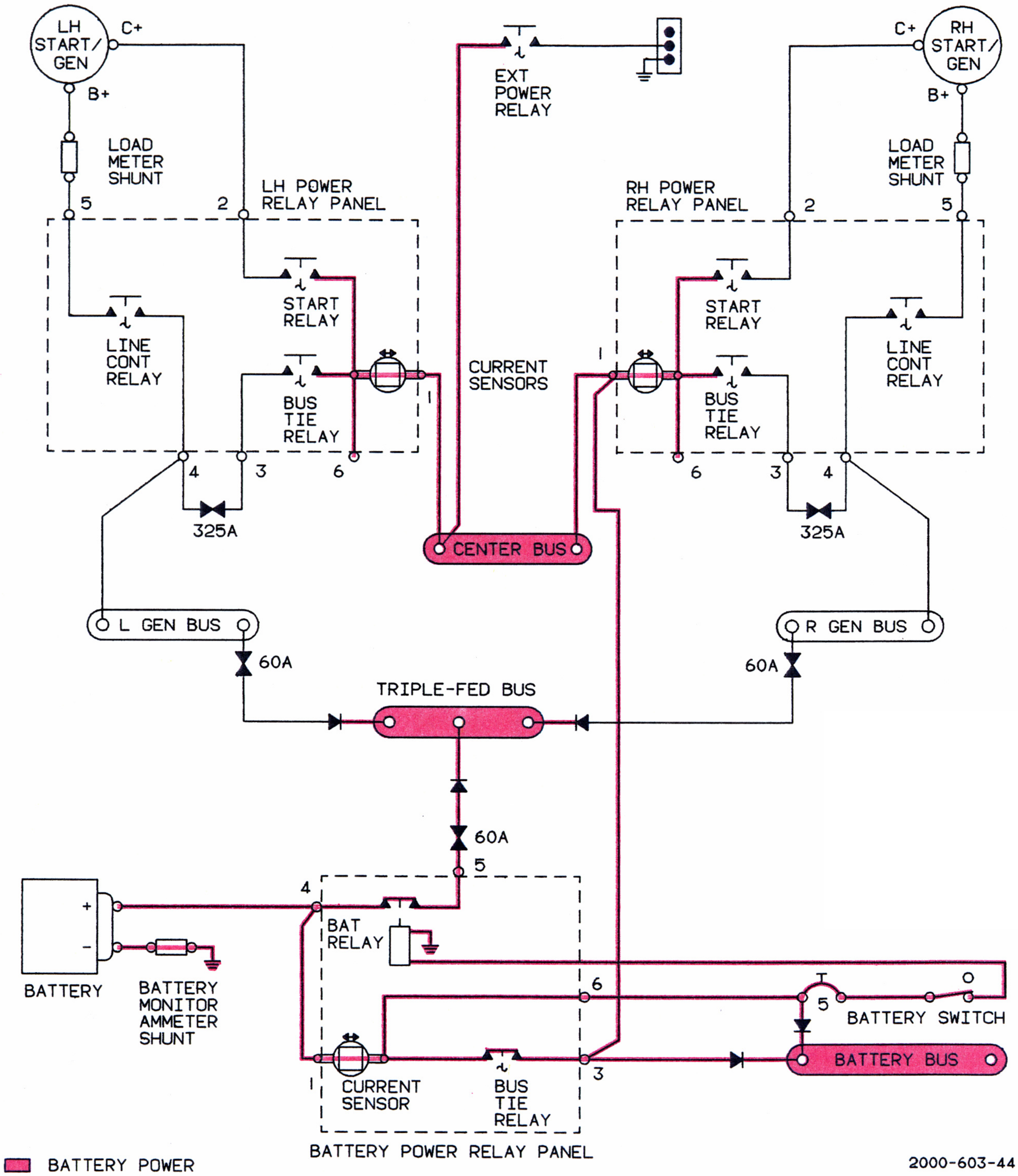
During starter/generator reset, the line contactor relay for the starter/generator being brought on-line, and both generator bus tie relays are closed to power the five primary buses (Figure 6). Charging of the battery with generator power will occur if the battery switch is left in the ON position. When a cross-start is performed a signal is sent to the power distribution PCB to disable the current sensors, allowing the bus tie relays to remain closed. Refer to Chapter 80-00-00 for detailed information on the starting circuit. When the second starter/generator is brought on-line, the starter/generators will parallel and share bus loads (Figure 7). If one of the starter/generators begins to go into an overvoltage condition or fails to share its required load, the GCU will sense reverse current and open the line contactor relay that connects the affected starter/generator to its generator bus. After the starter/generator has been isolated from the generator bus, the bus tie relay on the affected side of the system will be closed as the power distribution PCB no longer senses the fault. The buses will then be powered by the opposite starter/generator (Figure 10).



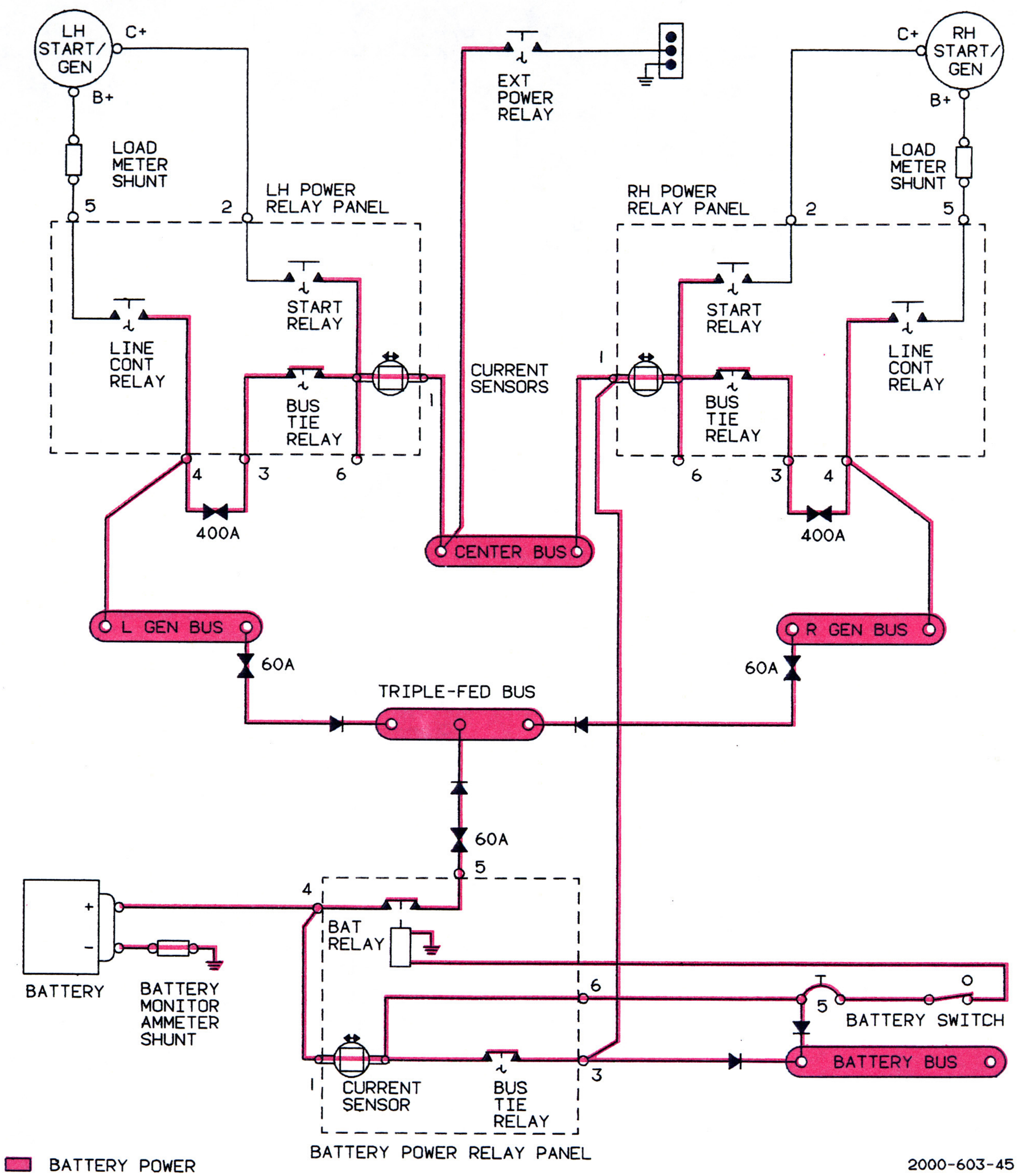
Electrical Load Distribution System (Effectivity: All)
Figure 1



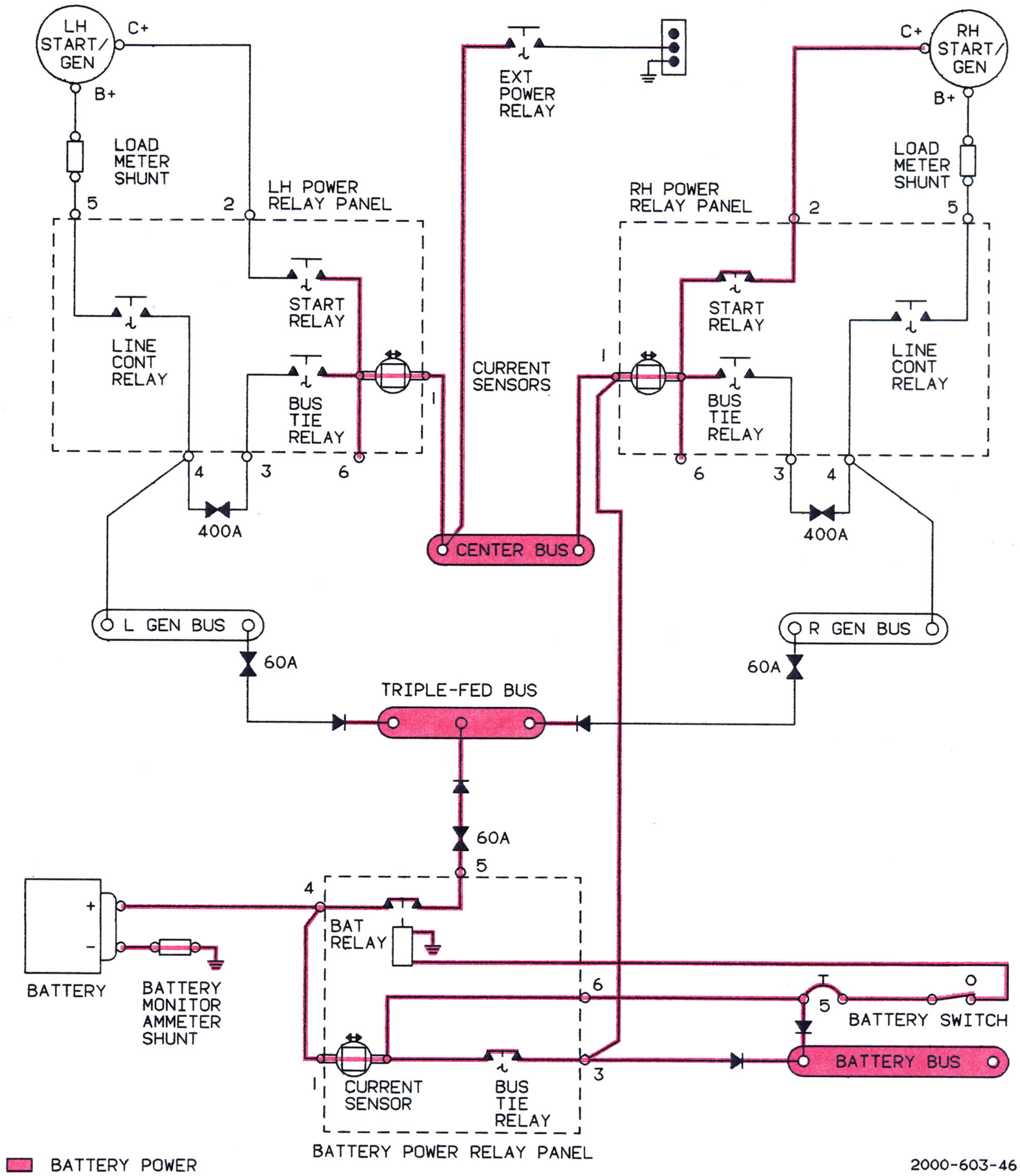
Power Distribution Schematic (Battery Switch OFF) (Effectivity: All)
Figure 2



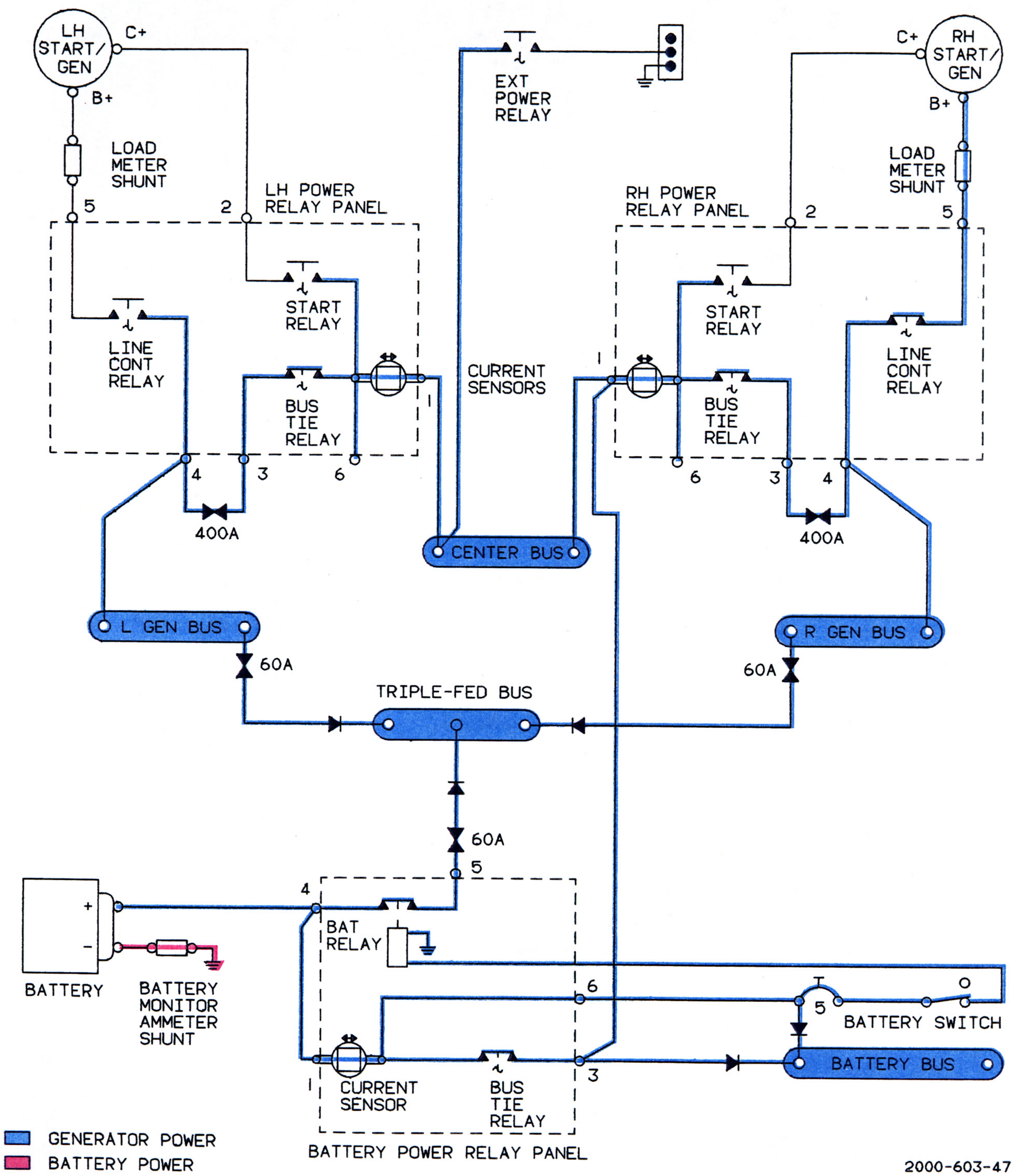
Power Distribution Schematic (Battery Switch ON) (Effectivity: All)
Figure 3



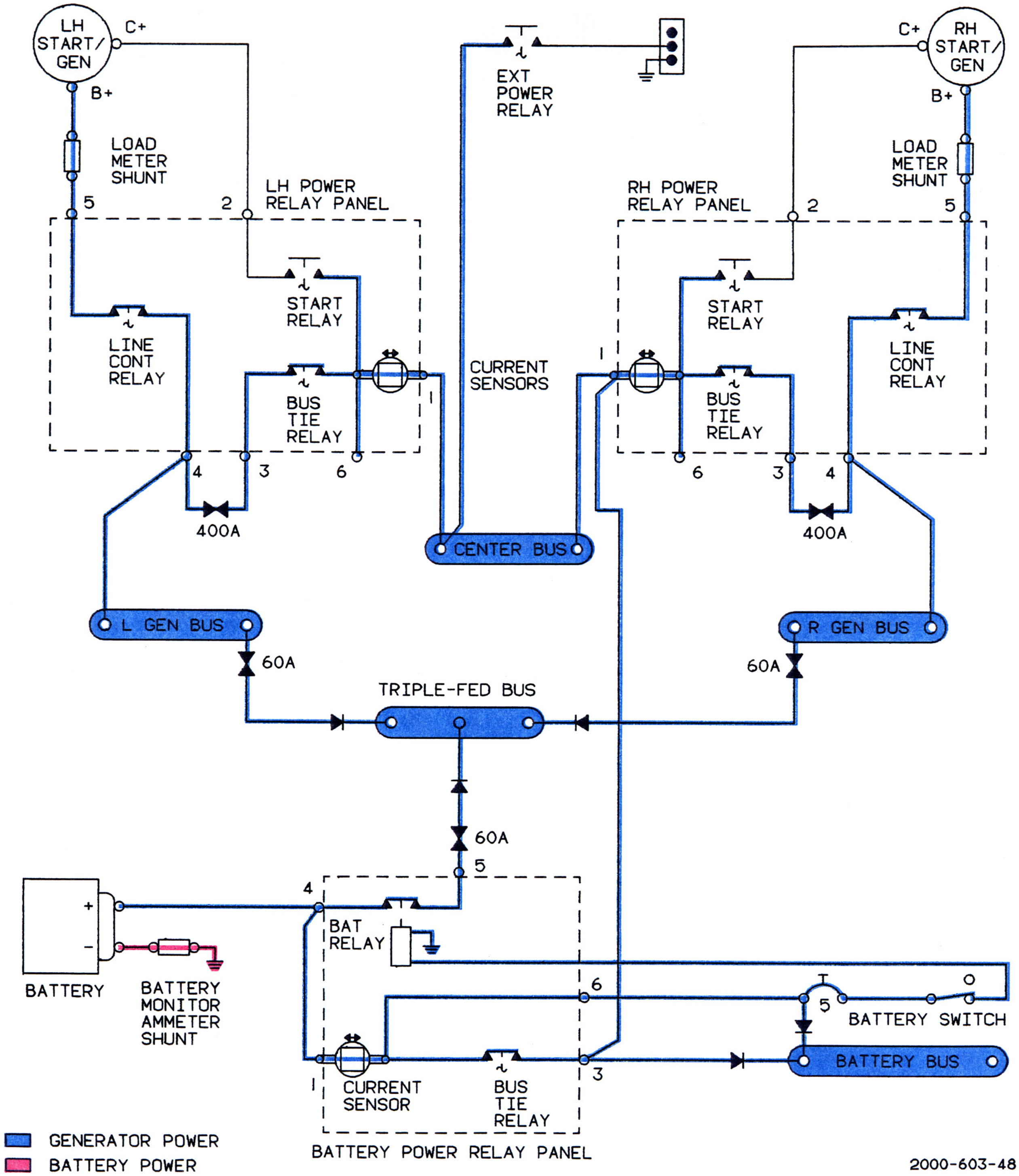
Power Distribution Schematic (Bus Ties Manually Closed) (Effectivity: All)
Figure 4



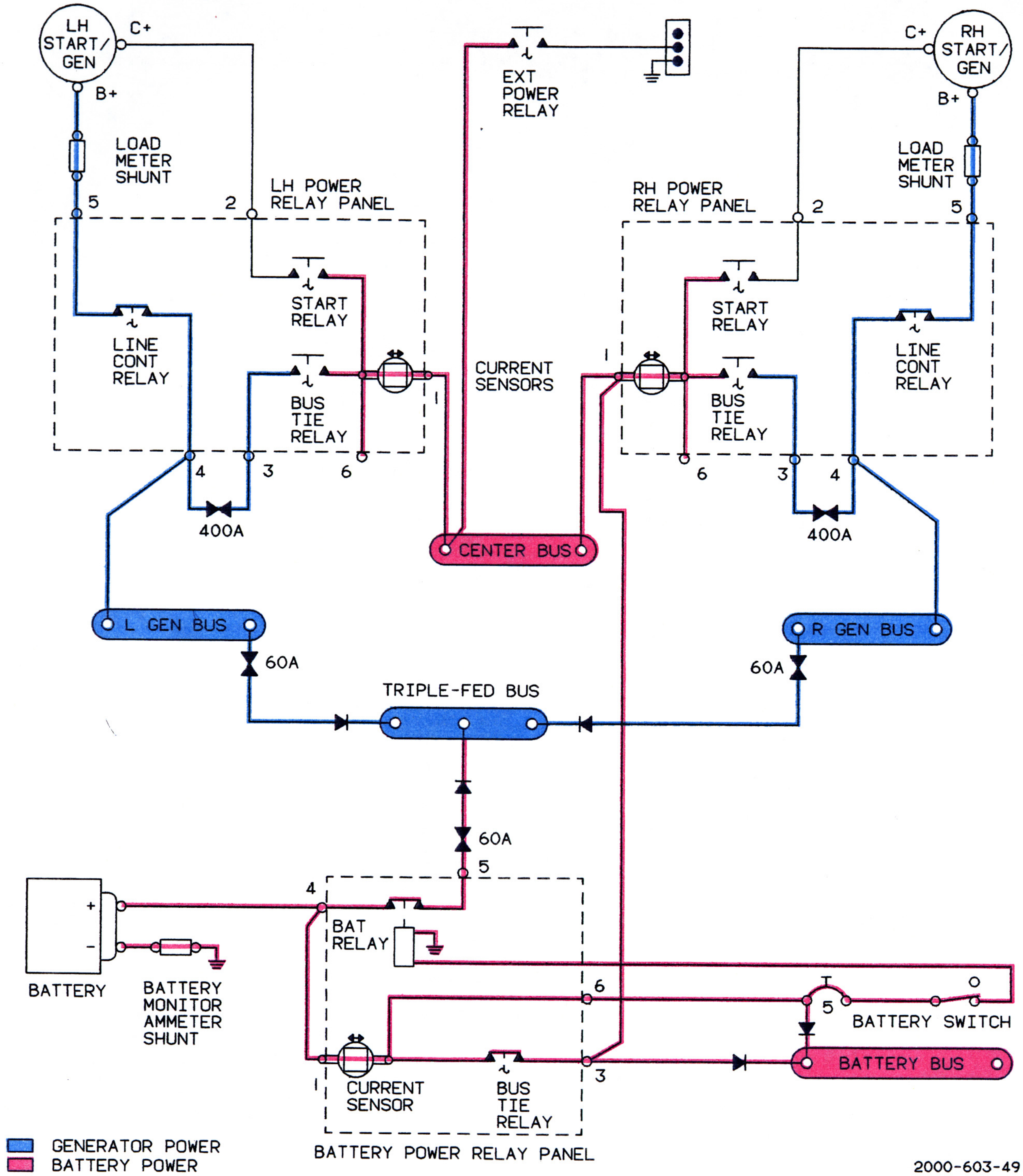
Power Distribution Schematic (RH Engine Start) (Effectivity: All)
Figure 5



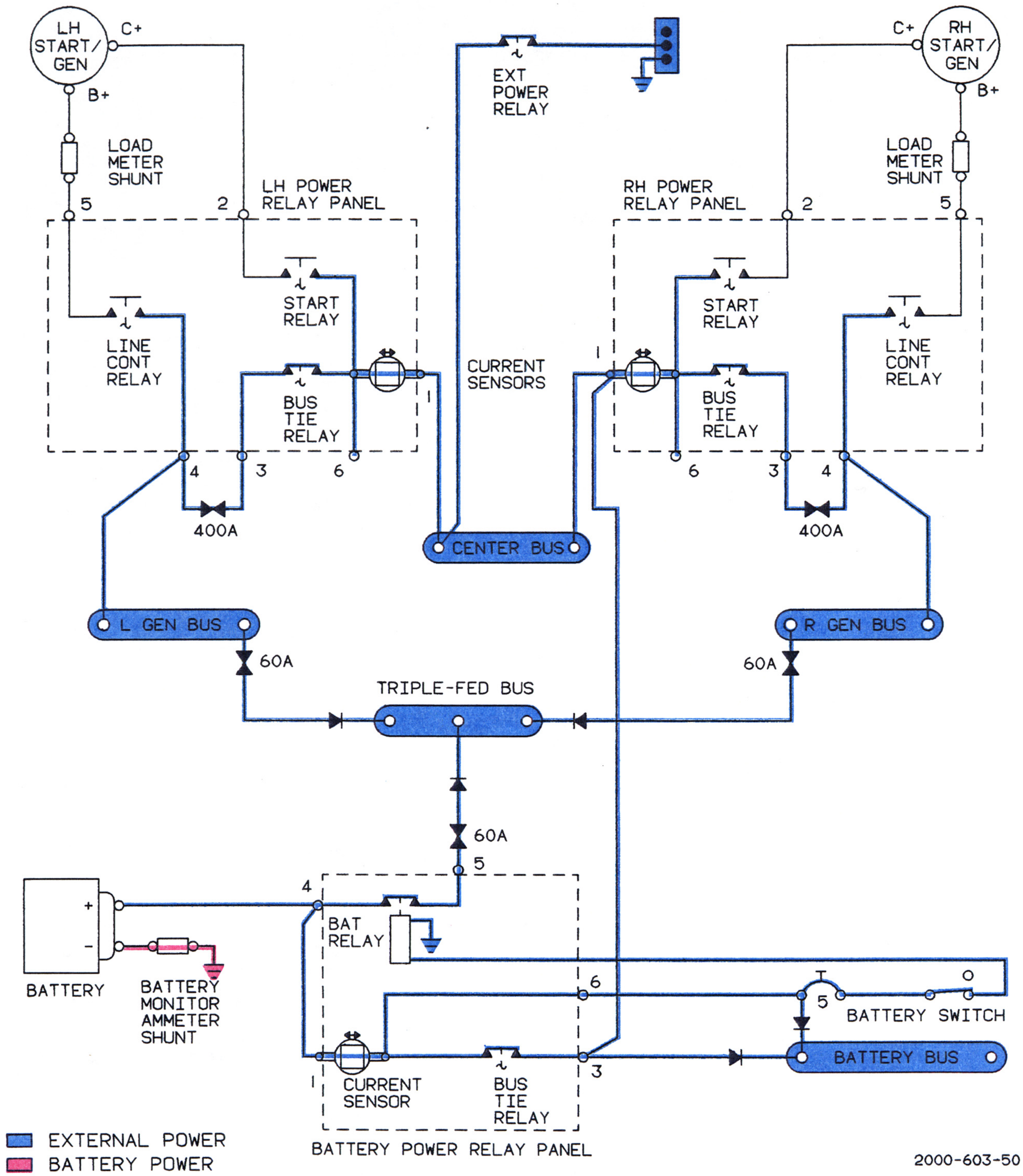
Power Distribution Schematic (RH Generator On-Line) (Effectivity: All)
Figure 6



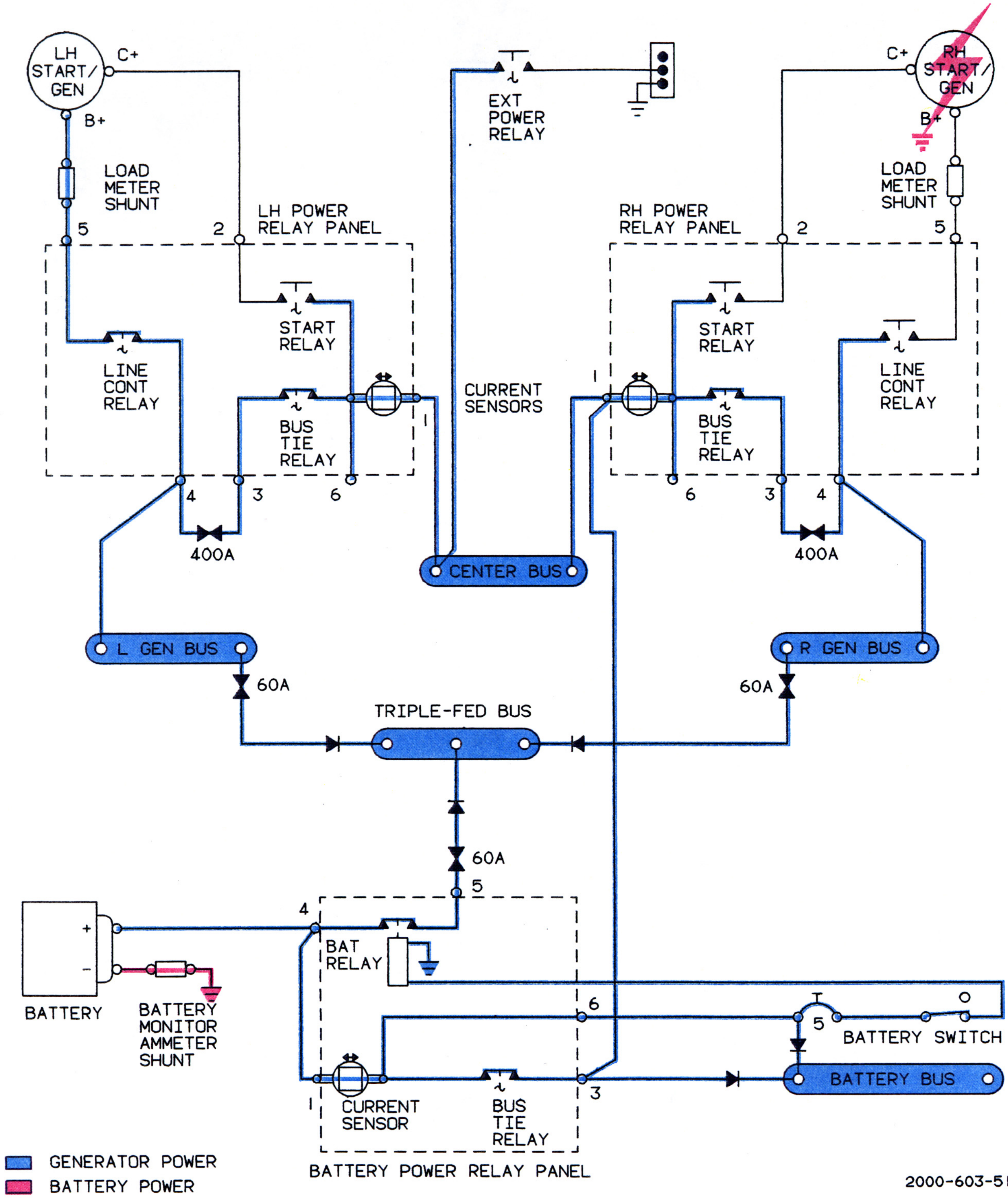
Power Distribution Schematic (Both Generators On-Line) (Effectivity: All)
Figure 7



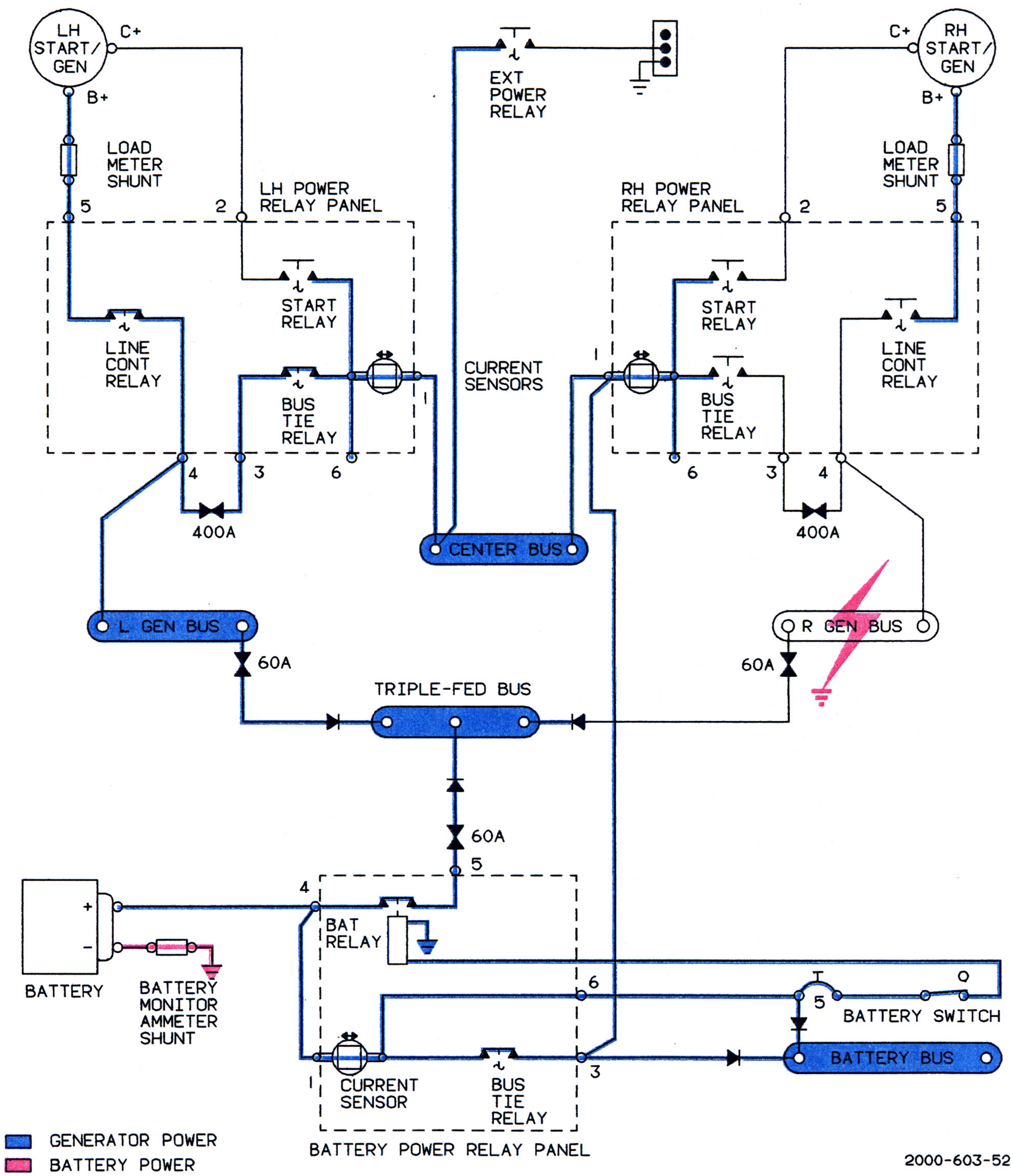
Power Distribution Schematic (Generator Bus Ties Manually Open) (Effectivity: All)
Figure 8



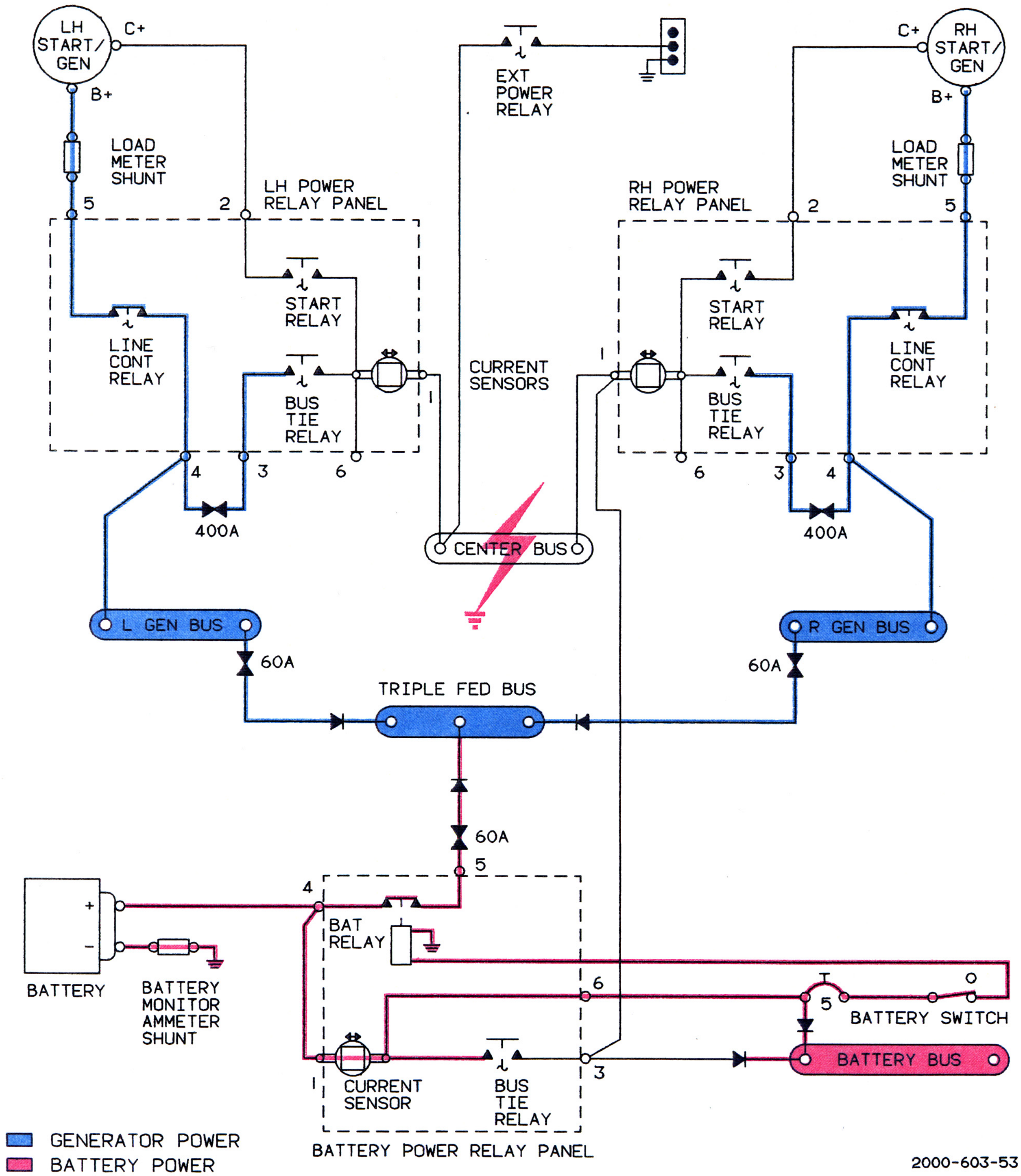
Power Distribution Schematic (External Power ON) (Effectivity: All)
Figure 9



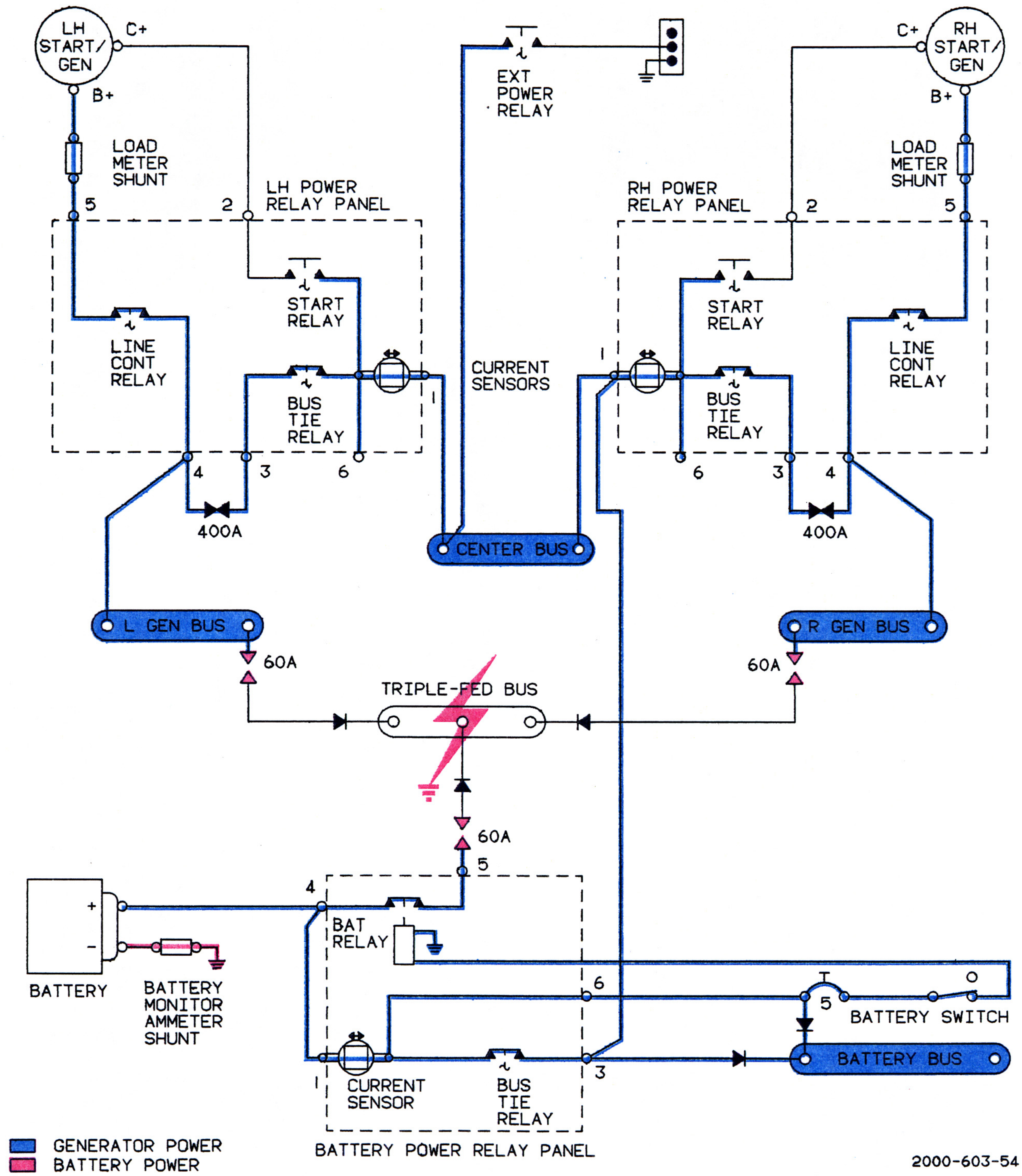
Power Distribution Schematic (RH Generator Failure) (Effectivity: All)
Figure 10



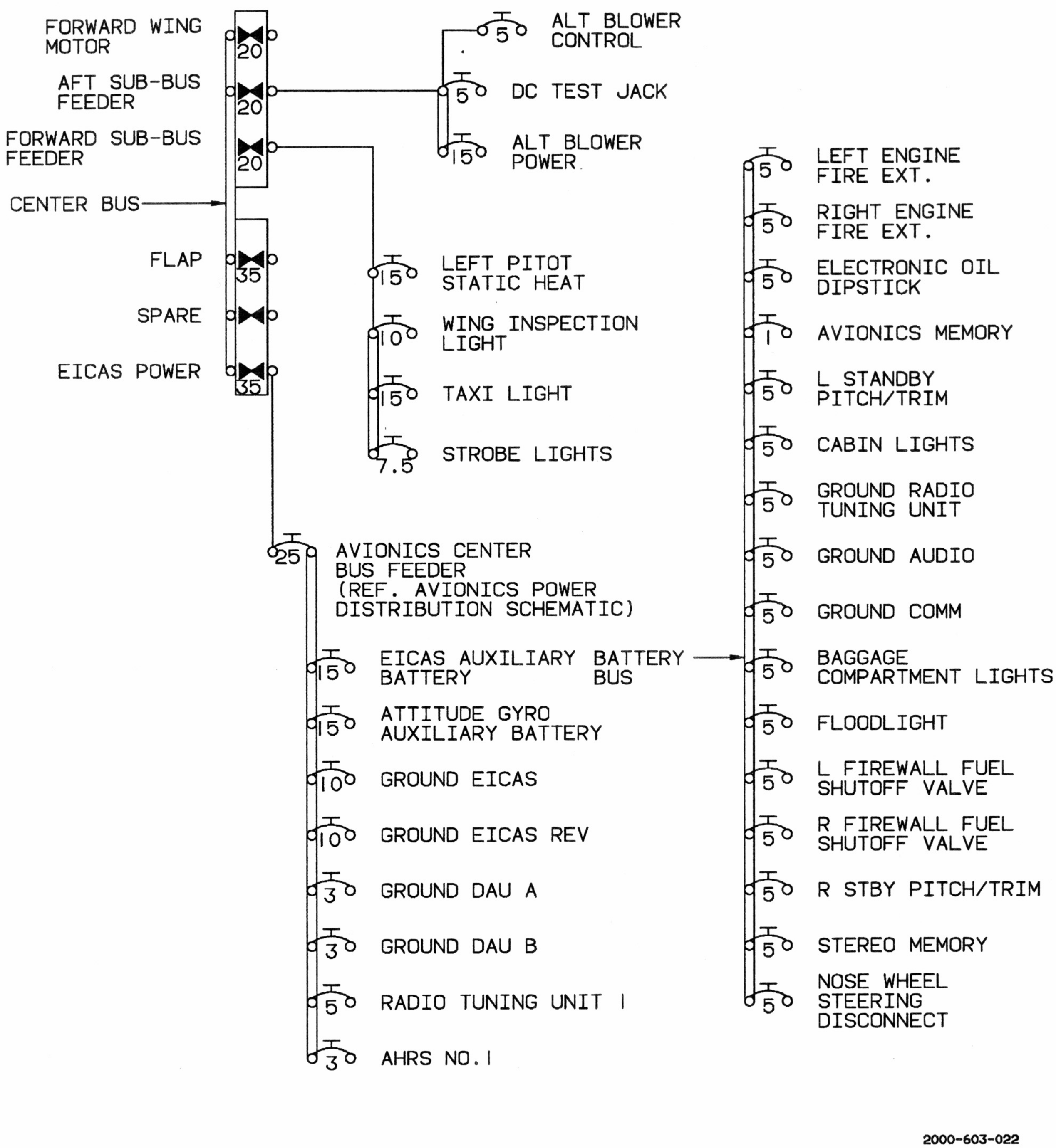
Power Distribution Schematic (RH Generator Bus Short) (Effectivity: All)
Figure 11



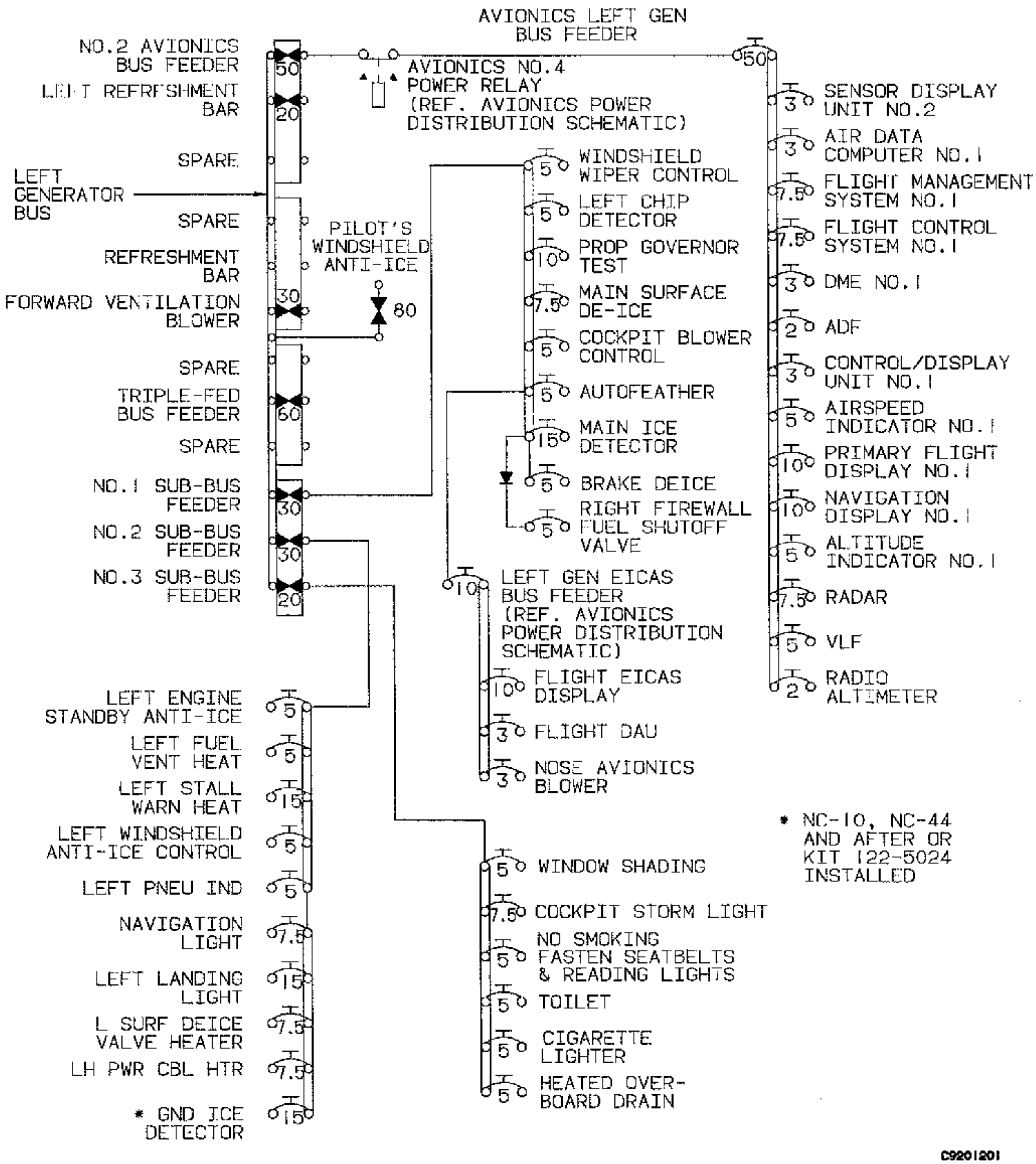
Power Distribution Schematic (Center Bus Short) (Effectivity: All)
Figure 12



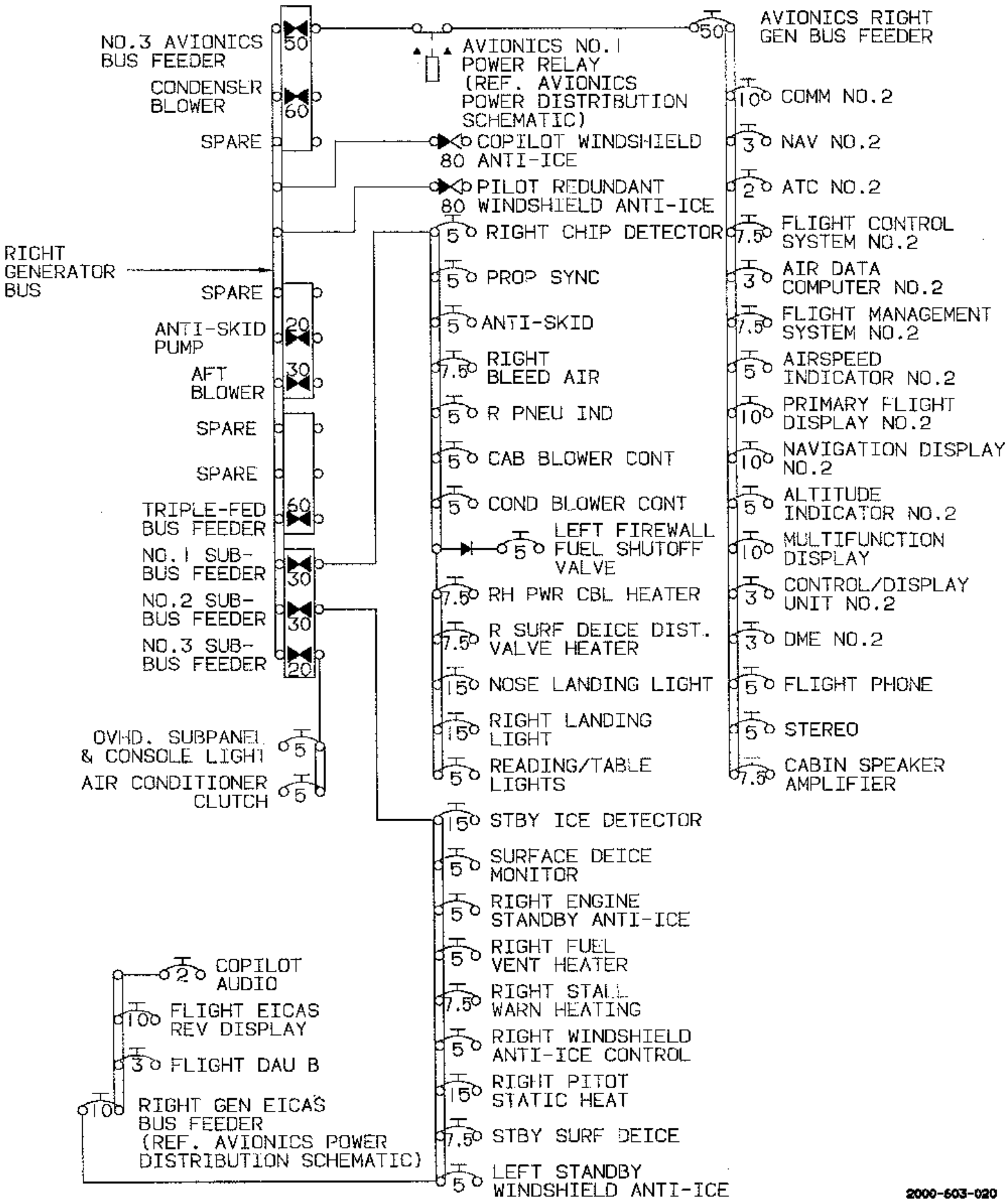
Power Distribution Schematic (Triple-fed Bus Isolation) (Effectivity: All)
Figure 13



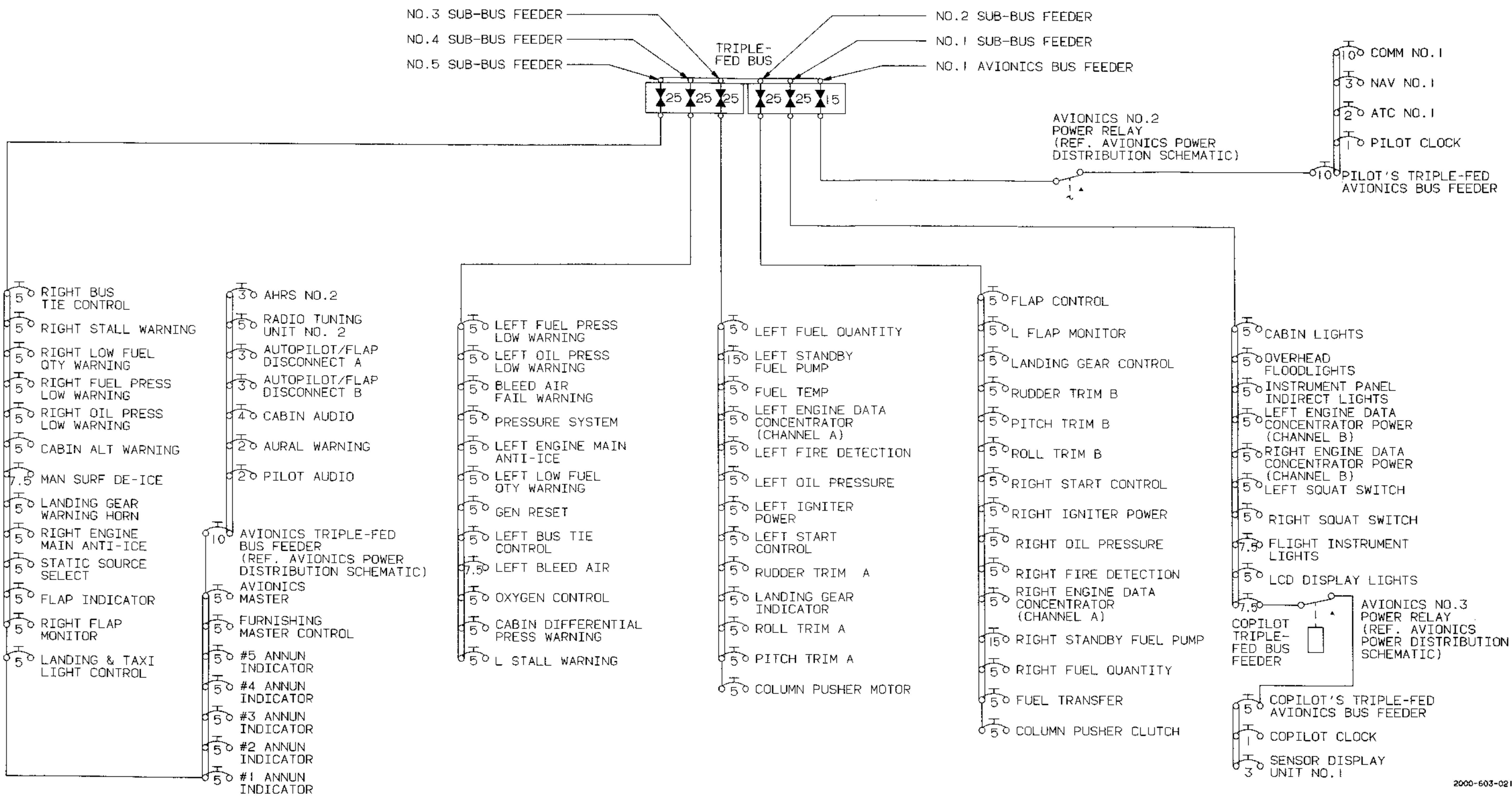
Center and Battery Bus Power Distribution (Effectivity: All)
Figure 14



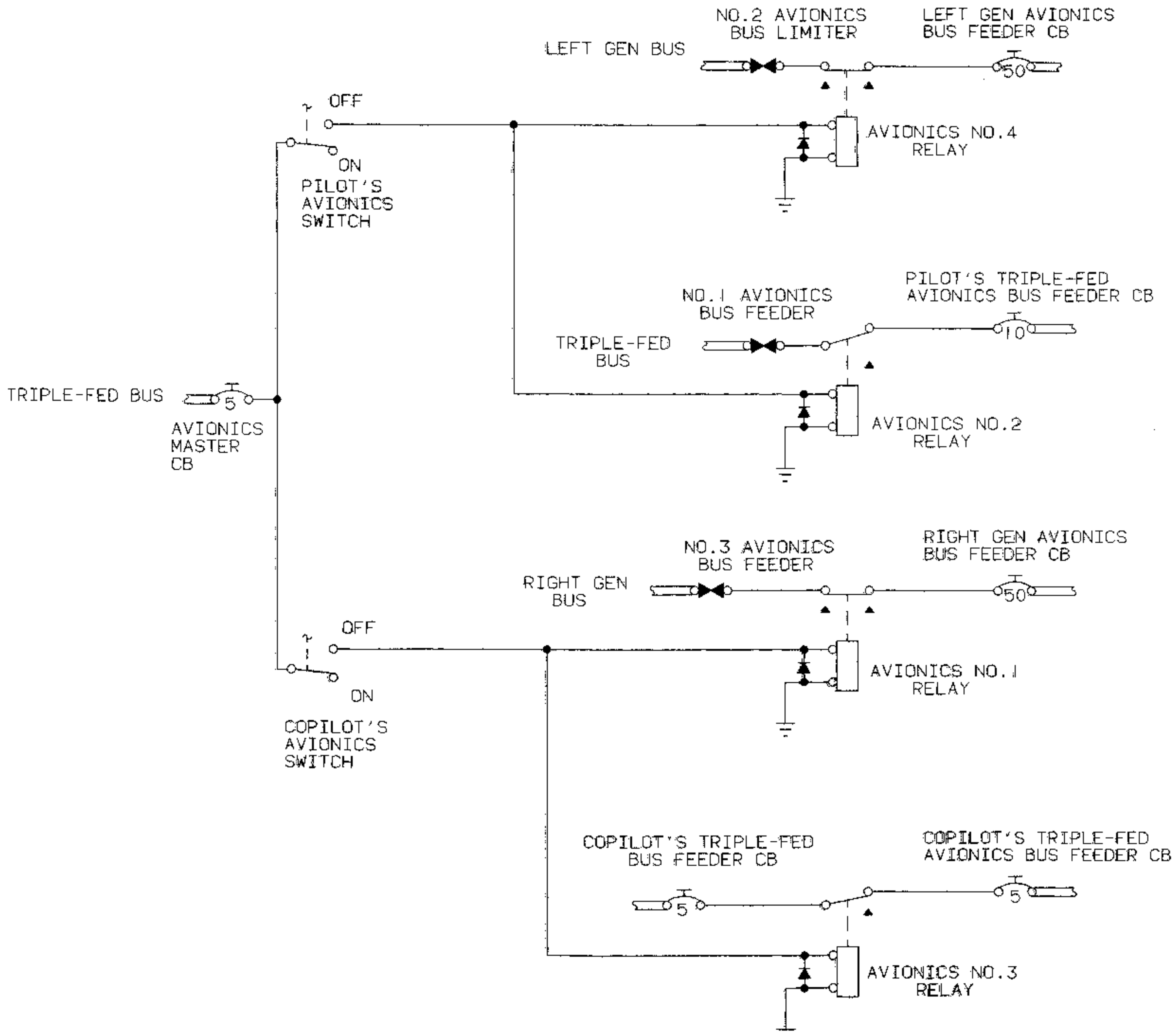
LH Generator Bus Power Distribution (Effectivity: All)
Figure 15

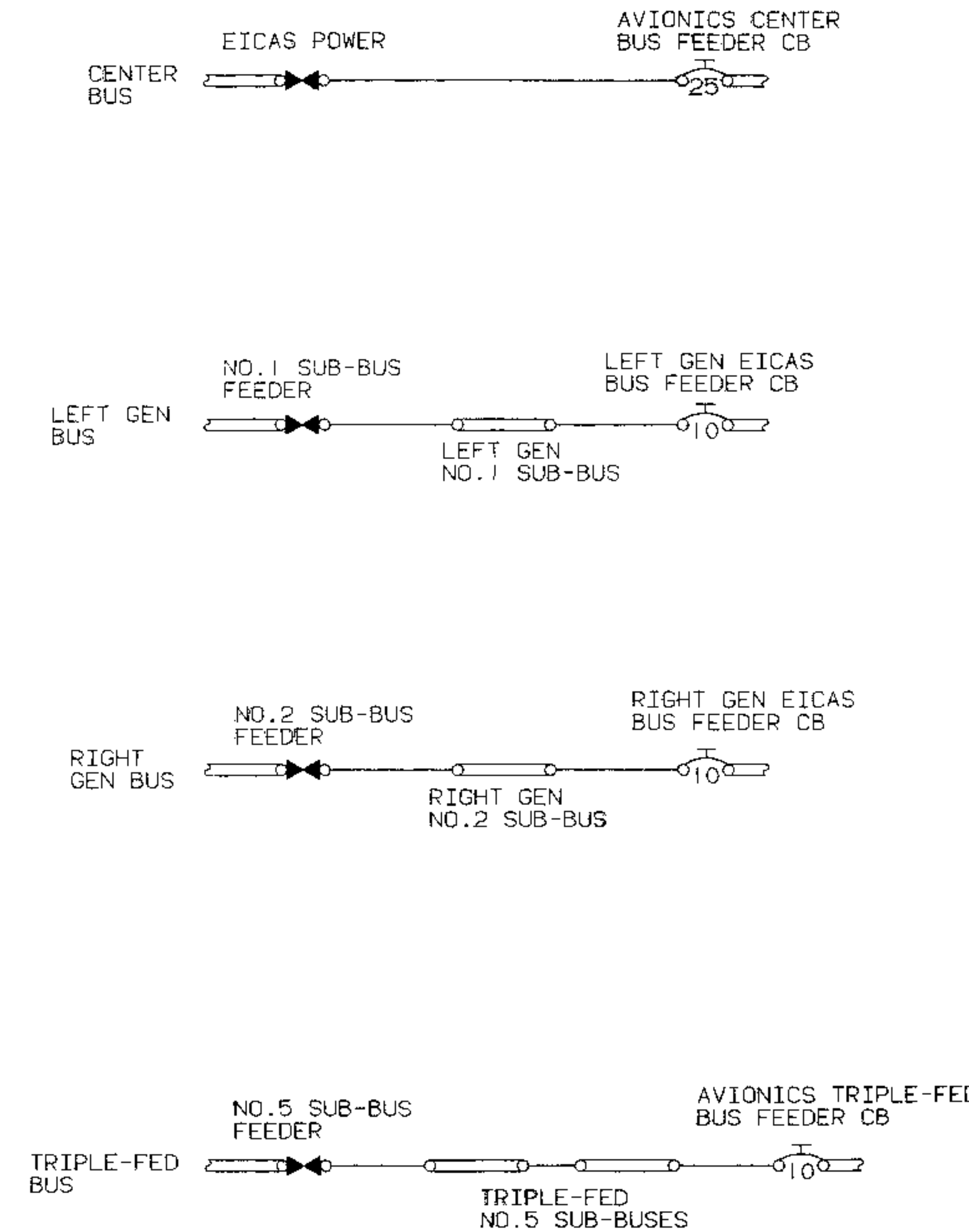


RH Generator Bus Power Distribution (Effectivity: All)
Figure 16



Triple-Fed Bus Power Distribution (Effectivity: All)
Figure 17





2000-603-030

Avionics Power Distribution Schematic (Effectivity: All)
Figure 18

BUS ISOLATION (Effectivity: All)

When a fault occurs that causes an unusually high current draw, the affected bus will be isolated by limiters or relays. Each generator bus current limiter is mounted on top of its generator-power relay panel between terminals 3 and 4. If starter/generator output exceeds 325 amps, the power distribution PCB will open the applicable bus tie relay, and the applicable GCU will open its line contactor relay to isolate the affected starter/generator before the current limiter has time to open. If for some reason the relays are unable to isolate the fault, the current limiters will open in 30 to 40 seconds. A fault on one of the generator buses is isolated by the bus tie relay and line contactor relay on the affected side of the system (Figure 11). A fault on the center bus is isolated when the power distribution PCB opens all three bus tie relays after receiving overcurrent signals from the power relay panel current sensors (Figure 12). The triple-fed bus receives protection from both a diode and 60-ampere current limiter in the wiring between itself and all three triple-fed bus feeders, consisting of the battery and both generator buses. The diodes prevent current flow away from the triple-fed bus while the limiters will isolate the triple-fed bus from the three feeder buses if there is a short on the triple-fed bus causing excess current draw (Figure 13). The battery bus 60-ampere triple-fed bus feeder limiter is mounted on the side of the battery bus circuit breaker panel. Both generator bus 60-ampere triple-fed bus feeder limiters are mounted in a limiter holder on their respective generator limiter panel. All three triple-fed bus diodes are mounted on a heat sink directly to the right of the triple-fed bus.

LOAD SHEDDING (Effectivity: All)

Another beneficial feature of the triple-fed bus system is load shedding. Excess loads will be removed from the buses in the case of dual starter/generator failure. The generator bus tie relays will open, leaving the battery, center, and triple-fed buses to be powered by the battery. The generator bus loads are shed, conserving battery power unless the generator bus tie relays are manually closed.

AVIONICS POWER DISTRIBUTION (Effectivity: All) (Figure 18)

Electrical power is distributed to the avionics equipment from four primary buses through eight avionics feeder circuit breakers to eight individual avionics buses. Four of the avionics buses have an avionics power relay between them and the primary bus. These avionics power relays are mounted in the avionics power relay panel on the aft fuselage equipment shelf. They are energized with triple-fed bus voltage through the avionics master circuit breaker and avionics master switches. The avionics master switches are placarded INTEGRATED AVIONICS, PILOT-COPILOT, OFF on the center subpanel, with each switch controlling two avionics power relays. The circuit is such that a control voltage will open the avionics power relays when the applicable avionics switch is placed in the OFF position. This configuration allows power to be supplied to the relay controlled avionics buses in the event a switch or relay malfunctions. All of the avionics circuit breakers are located on the avionics circuit breaker panel mounted in the copilot's console. Memory power for the avionics equipment is provided by the "hot" battery bus.

ELECTRICAL LOAD DISTRIBUTION CHART (Effectivity: All)

The following chart lists the electrical load requirements for each item of electrical equipment on the airplane. All resistance loads are calculated at 80 percent of normal bus voltage, and lamp loads are calculated at 87 percent of full load current. To determine the total electrical load of the airplane, determine the electrical load of all optional equipment installed in the airplane and add that number to the total electrical load of the standard equipment. The total load shall not exceed 90 percent (540 amperes) of the total generating capacity of the two 28-volt, 300-ampere starter/generators. When an item of equipment functions in more than one system, the load value per unit listed in Chart 1 represents the highest value required to operate that item. Each starter/generator supplies half of the load of the triple-fed bus when both starter/generators are operating in parallel with the bus tie relays closed.

CHART 1
ELECTRICAL LOAD DISTRIBUTION (Effectivity: All)

Equipment	Units	Load Ea. Unit (Amps DC)	Cruise Load (Amps DC)	Notes
Hot Battery Bus				
LH Fire Extinguisher Bottle	1	3.00	3.00	
RH Fire Extinguisher Bottle	1	3.00	3.00	
LH Oil Indicator Light	1	0.04		3
RH Oil Indicator Light	1	0.04		3
Battery Relay	1	0.54	0.43	14
LH Fuel Firewall Shutoff Valve	1	2.00		14
RH Fuel Firewall Shutoff Valve	1	2.00		14
LH Subpanel Area Light	1	0.34		3,14
RH Subpanel Area Light	1	0.34		3,14
LH Cockpit Floodlight	1	0.56		3,14
RH Cockpit Floodlight	1	0.56		3,14
Aft Baggage Compartment Light	1	0.67		3,14
Fwd Baggage Compartment Light	1	0.67		3,14
LH Aisle Light El Power Supply	1	0.49		3,14
RH Aisle Light El Power Supply	1	0.49		3,14
Cabin Door El Power Supply	1	0.49		3,14
Cabin Entry Light Power Supply	1	0.70		3,14
Cabin Main Entry Light	1	0.67		3,14
LH Standby Pitch Trim PCB	1	0.04		15
RH Standby Pitch Trim PCB	1	0.04		15
Steering Disconnect Actuator	1	2.50		6
LH Standby Pitch Trim Actuator	1	1.00		15
RH Standby Pitch Trim Actuator	1	1.00		15
Ground RTU	1	0.40		3,22
Ground Audio	1	1.60		3,22
Ground Comm	1	5.00 (Xmit) 0.70 (Rec.)		3,4 3,22
HOT BATTERY BUS TOTAL			6.43 9.68	 17
Center Bus				
Forward Wing Actuator EICAS Power (Center Bus Feeder) (See Center Avionics Bus)	1	20.00		6
Aft Sub-Bus Feeder				
DC Test Jack	1			21
Alt Blower Control Relay	1	0.12		1
Alternate Blower	1	7.00		1
Forward Sub-Bus Feeder				
Wing Inspection Light	1	1.42		
Taxi Light	1	3.60	3.60	3,13
LH Strobe Light Power Supply	1	1.70	1.70	
RH Strobe Light Power Supply	1	1.70	1.70	
LH Pitot Static Heat	1	6.25	6.34	
Flap motor	1	20.00		

CHART 1
ELECTRICAL LOAD DISTRIBUTION (Effectivity: All) *(Continued)*

Equipment	Units	Load Ea. Unit (Amps DC)	Cruise Load (Amps DC)	Notes
Forward Sub-Bus Feeder *(Continued)*				
Landing Gear Motor	1	180.0		6
LH Pitot Static Heat Relay	1	0.09	0.09	17
Taxi Light Power Relay	1	0.10	1.00	3,13
CENTER BUS TOTAL			14.43	
Center Avionics Bus				
RTU No. 1	1	0.40	0.40	
Attitude Gyro Auxiliary Battery	1	8.00	8.00	19
EICAS Auxiliary Battery	1	8.00	8.00	19
AHRS No. 1	1	1.40	1.40	
Ground EICAS	1	5.00		3
Ground EICAS Reversionary	1	5.00		3
Ground DAU A	1	0.54		3
Ground DAU B	1	0.54		3
CENTER AVIONICS BUS TOTAL			17.8	
LH Generator Bus				
Forward Ventilation Blower	1	28.00	28.00	
Refreshment Bar		TBD	TBD	
No. 2 Avionics Feeder (See LH Gen Avionics Bus)				
Pilot's Windshield Heat Lo	1	59.50	59.50	
Pilot's Windshield Heat Hi	1	85.30		
Pilot's Side Window Anti-Ice	1	9.40	9.40	
Triple-Fed Bus Feeder **No. 1 Sub-Bus Feeder**				
LH Chip Detector	1	0.002		5
LH Prop Speed Reset Solenoid	1	0.84		3
RH Prop Speed Reset Solenoid	1	0.84		3
Gnd Idle Solenoid Voltage Drop Relay	1	0.08	0.08	3
LH Ground Idle Stop Solenoid	1	2.69		3
RH Ground Idle Stop Solenoid	1	2.69		3
Ground Idle Stop Control Relay	1	0.08		3
Ground Idle Stop Time Delay PCB	1	0.04		3
Autofeather Test Relay	2	0.08		3
Autofeather Solenoid Relay	2	0.08		3
LH & RH Autofeather Solenoid	2	1.20		3
Windshield Wiper Control	1	0.08	0.08	
LH & RH Brake Deice Valve	2	1.00	2.00	
Ice Detector	1	0.53	12.50	16
RH Firewall Fuel Shutoff Valve	1	2.00		
Heated Deice Distributor Valve	2	1.78	3.57	
Main Surface Deice Test Relay	1	0.09		
Deice Valve	6	1.75	3.50	23

CHART 1
ELECTRICAL LOAD DISTRIBUTION (Effectivity: All) *(Continued)*

Equipment	Units	Load Ea. Unit (Amps DC)	Cruise Load (Amps DC)	Notes
No. 2 Sub-Bus Feeder				
LH & RH Light Assembly - Wing Tip	2	1.82	3.64	
Light Assembly - Tail Navigation	1	.89	.89	
LH Landing Light	1	9.00	9.00	13
LH Standby Engine Anti-Ice	1	3.00		
LH Fuel Vent Heater	1	1.92	1.92	
LH Windshield Heat Control PCB	1	0.06	0.06	
LH Landing Light Relay	1	0.10	0.10	13
LH AOA Transmitter Case Heater	1	1.78	1.78	
AOA Transmitter	1	5.60	5.60	
LH Power Cable Heater	1	6.35	6.35	
GND Ice Detector	1	0.35	12.50	16
No. 3 Sub-Bus Feeder				
LH Windshield Wiper	1	3.00		6
Storm Light	2	1.79		
No smoke Light	10	0.024	0.24	13
Fasten Seat Belt Light	10	0.024	0.24	
Toilet	1	2.70	2.70	
Cigarette Lighter	1	6.20	6.20	
Heated Overboard Drain	1	0.67	0.67	
Forward Vent Blower Control Relay	1	0.35	0.35	
Fluorescent Light Power Supply	12	0.27	3.24	
LH GENERATOR BUS TOTAL			174.11	
LH Generator Avionics Bus No. 2 Avionics Feeder				
Flight EICAS Display	1	5.00	5.00	
Flight DAU A	1	0.54	0.54	
Nose Avionics Blower	1	0.80	0.80	
SDU No. 2	1	1.18	1.18	
ADC No. 1	1	1.10	1.10	
FMS No. 1	1	5.00	5.00	
FCS No. 1	1	5.00	5.00	
DME No. 1	1	0.73	0.73	
ADF	1	0.60	0.60	
CDU No. 1	1	1.60	1.60	
ASI No. 1	1	1.03	1.03	
PFD No. 1	1	4.70	4.70	
ND No. 1	1	4.70	4.70	
ALT No. 1	1	1.03	1.03	
Radar	1	3.00	3.00	
RAD ALT	1	1.30	1.30	
LH GEN BUS AVIONICS TOTAL			37.31	
RH Generator Bus				
Aft Ventilation Blower	1	28.0	28.0	
No. 3 Avionics Bus Feeder (See RH Gen Avionics Bus)				

CHART 1
ELECTRICAL LOAD DISTRIBUTION (Effectivity: All) *(Continued)*

Equipment	Units	Load Ea. Unit (Amps DC)	Cruise Load (Amps DC)	Notes
RH Generator Bus *(Continued)*				
Copilot's Windshield Heat	1	59.50	59.50	
Copilot's Side Window Heat Lo	1	9.40	9.40	
Copilot's Windshield Heat Hi	1	85.30		3,20
Condenser Blower	1	58.00		3,20
Pilot's Redundant Windshield Heat	1	22.90		15
No. 1 Sub-Bus Feeder				
RH Chip Detector	1	0.002		
Synchrophaser	1	0.205	0.205	
Emergency Bleed Air Valve	1	1.00		18
RH Bleed Air Shutoff Valve	1	1.00		18
Nose Landing Light	1	8.93	8.93	3,13
RH Landing Light	1	9.00	9.00	3,13
LH Fuel Firewall Shutoff Valve	1	2.00		
RH & Nose Landing Light Relay	2	0.10	0.20	3,13
Heated Deice Distributor Valve	2	1.78	3.57	
RH Power Cable Heater	1	5.29	5.29	
No. 2 Sub-Bus Feeder				
RH Standby Engine Anti-Ice Vane	1	3.00		15
RH Fuel Vent Heater	1	1.92	1.92	
Windshield Heat Control PCB	1	0.06	0.06	
Copilot's Windshield High Heat Relay	1	0.45		
Copilot's Windshield Low Heat Relay	1	.040	.040	
RH Pitot Static Heat	1	6.25	6.25	
RH Pitot Static Heat Relay	1	0.09	0.09	
Pilot's Redundant Windshield Relay	1	0.45	0.45	15
RH AOA Transmitter	1	5.60	5.60	
AOA Transmitter Case Heater	1	0.06	1.78	
RH Standby Ice Detector	1	0.53	12.50	16
Surface Deice PCB Assembly	1	0.20	0.20	
Standby Surface Deice Test Relay	1			21
No. 3 Sub-Bus Feeder				
LH Subpanel and Circuit Breaker Panel EI Power Supply	1	1.15	1.15	
RH Subpanel and Circuit Breaker Panel EI Power Supply	1	0.38	0.38	
RH Subpanel and Circuit Breaker Panel EI Power Supply	1	0.38	0.38	
Autopilot Mode Control Panel Lights	3	0.04	0.12	
N1 Speed Control PCB	1	0.04	0.04	
Air Conditioner Compressor Clutch	1	1.70	1.70	
Aft Vent Blower Control Relay	1	0.35	0.35	
Condenser Blower Control Relay	1	0.08	0.08	
RH GENERATOR BUS TOTAL			156.36	

CHART 1
ELECTRICAL LOAD DISTRIBUTION (Effectivity: All) *(Continued)*

Equipment	Units	Load Ea. Unit (Amps DC)	Cruise Load (Amps DC)	Notes
RH Generator Avionics Bus				
Copilot Audio	1	1.60	1.60	
Flight DAU B	1	0.54	0.54	
Flight EICAS Rev Display	1	5.00	5.00	
Comm No. 2	1	5.00(Xmit)	5.00	
		0.70 (Rec.)	0.70	
NAV No. 2	1	0.80	0.80	
ATC No. 2	1	1.65	1.65	
FCS No. 2	1	5.00	5.00	
DME No. 2	1	0.73	0.73	
ADC No. 2	1	1.10	1.10	
FMS No. 2	1	5.00	5.00	
CDU No. 2	1	1.60	1.60	
ASI No. 2	1	1.03	1.03	
PFD No. 2	1	4.70	4.70	
ND No. 2	1	4.70	4.70	
ALT No. 2	1	1.03	1.03	
MFD	1	5.00	5.00	
RH GENERATOR AVIONICS BUS TOTAL			45.18	
Triple-Fed Bus **No. 1 Sub-Bus Feeder**				
LH Aisle Light		0.63	0.63	
RH Aisle Light		0.63	0.63	
Cockpit Floodlight	2	0.34		
Subpanel Area Light	2	0.56	1.12	
Instrument Indirect El Power	1	0.08	0.08	
LH EDC Channel B	1	0.80		15
RH EDC Channel B	1	0.80		15
Logic Relay	2	0.08		3
LCD Lighting Power Supply 0-5V	1	2.03	2.03	
Fluorescent Light Relay	1	0.08	0.08	
No. 2 Sub-Bus Feeder				
RH Fuel System Concentrator	1	0.161	0.161	
RH Fuel Quantity Indicator	1	0.304	0.304	
RH Standby Fuel Pump	1	8.50		10
RH Standby Fuel Pump Relay	1	0.12		10
Fuel Cross-Feed Valve	1	1.42		10
RH EDC Channel A	1	0.80	0.80	
RH Engine Fire Annunciator Light	1	0.04		9
RH Engine Oil Pressure Transducer	1	0.05	0.05	
RH Ignition Exciter	1	3.50		2
RH Engine Field and Sense Relay	1	0.08		2,12
RH Engine Start Relay	1	0.43		2,12
RH Fuel Purge Valve	1	0.10		2,12
Landing Gear Power Relay	1	0.60		6

CHART 1
ELECTRICAL LOAD DISTRIBUTION (Effectivity: All) *(Continued)*

Equipment	Units	Load Ea. Unit (Amps DC)	Cruise Load (Amps DC)	Notes
No. 2 Sub-Bus Feeder *(Continued)*				
Nose Gear Door Select Solenoid	1	1.00		6
Landing Gear Direction Solenoid	1	1.00		6
Landing Gear Control PCB	1	0.15	0.15	
Flap/Fwd Wing Control PCB	1	0.04	0.04	
Flap Controller - Logic Power	1	0.10	0.08	
Forward Wing Lock Solenoid	1	1.00		6
Forward Wing Power Relay	1	0.35		6
LH Flap/Fwd Wing Monitor PCB	1	0.02	0.02	
LH Flap Monitor Relay	1	0.54		7
Flap/Fwd Wing Sense Switch Driver	2	0.065	0.13	
Rudder Trim Actuator B	2	5.00		15
Pitch Trim B	2	1.00		15
Roll Trim B	2	5.00		15
Yaw Trim Control PCB	1	0.04	0.04	
RH Bus Tie Control Relay	1	0.04		
Avionics Power Relay	2	0.33		11
Avionics Power Relay	2	0.09		11
Column Pusher Clutch	1	0.75		
Pitch Trim Control PCB	1	0.04		
Roll Trim Control PCB	1	0.04		
No. 3 Sub-Bus Feeder				
LH Fuel System Concentrator	1	0.161	0.161	
LH Fuel Quantity Indicator	1	0.304	0.304	
Fuel Temperature Indicator	1	0.80	0.80	
LH EDC Channel A	1	0.80	0.80	
LH Fire Detection Annunciator Lights	2	0.06		9
LH Engine Oil Pressure Transducer	1	0.05	0.05	
LH Ignition Exciter	1	3.50		2
LH Field and Sense Relay	1	0.05		2,12
LH Engine Start Relay	1	0.43		2,12
LH Fuel Purge Valve	1	0.10		2,12
Rudder Trim Actuator A	2	5.00		15
Roll Trim Actuator A	2	5.00		15
Pitch Trim Actuator A	2	1.00		15
Pitch Trim Control PCB	1	0.04	0.04	
Roll Trim Control PCB	1	0.04	0.04	
Landing Gear Hydraulic Fluid Level Low Light	1	0.12	0.12	
Landing Gear Indicator PCB	1	0.04	0.04	
Landing Gear Handle Solenoid	1	0.25	0.25	
Landing Gear Position Indicator	6	0.06	0.36	13
Landing Gear Handle Lights	2	0.04	0.08	
LH Standby Fuel Pump	1	8.50		10
Column Pusher Motor	1	1.80		

CHART 1
ELECTRICAL LOAD DISTRIBUTION (Effectivity: All) *(Continued)*

Equipment	Units	Load Ea. Unit (Amps DC)	Cruise Load (Amps DC)	Notes
No. 4 Sub-Bus Feeder				
LH Fuel Pressure Low Light	2	0.04		5
LH Oil Pressure Low Light	2	0.04		5
Bleed Air Leak Detector	1	0.20		
LH Engine Anti-Ice Actuator	1	3.00		
LH & RH Starter/Generator Reset	2	0.09		8
DC Voltmeter	1	0.08	0.08	
Power Distribution PCB	1	0.04	0.04	
Bleed Air Controller Channel A	1	5.00	5.00	
LH Bleed Air Shutoff Valve	1	1.00		
Oxygen Control Solenoid	1	0.50		18
Cabin Pressurization Controller	1	0.60		3
LH Fuel Low Warning Transmitter	1	0.13	0.025	
Cabin Pressurization Preset Solenoid B	1	0.26		3
Cabin Pressurization Preset Solenoid C	1	0.26		3
LH Stall Warn Computer	1	0.26		
No. 5 Sub-Bus Feeder				
RH Fuel Low Warning Transmitter	1	0.13	0.025	
RH Fuel Pressure Low Annunciator Light	2	0.04		5
RH Oil Pressure Low Annunciator Light	2	0.04		5
Cabin Altitude Warning Annunciator Light	2	0.04		5
Landing Gear Warning Horn Relay	1	0.08		
RH Engine Ice Vane Actuator	3	3.00		
Static Port Solenoid Valve	2	8.30		17
Flap/Fwd Wing Indication PCB	1	0.04	0.04	
Flap/Fwd Wing Position Indicator	2	0.06	0.12	13
RH Flap Monitor PCB	1	0.04	0.04	
RH Flap Monitor Relay	1	0.54		7
RH Flap/Fwd Wing Sense Switch Driver	2	0.065	0.13	10
Deice Valve (Manual Mode Only)	6	1.75	0.605	23
RH Standby Fuel Pump	1	8.50		10
Deice Valve (Manual Mode Only)	6	1.75	0.605	23
LH Bleed Air Duct Overtemp Sensor	1	0.003		5
RH Bleed Air Test	1	0.004		5
Annunciator Control PCB	1	0.040		5
Master Warning Annunciator Lights	2	0.030		5,9
Master Warning and Caution Reset	1	0.003		9
LH Bleed Air Fail Annunciator	1	0.030		5
RH Stall Warning Computer	1	0.25	0.25	
RH Bleed Air Fail Annunciator	1	0.030		5
LH & RH Fuel Low Warning Annunciators	2	0.030		5
Flap/Fwd Wing Transient and Extend Lights	4	0.030		5
Landing Gear Handle Lights	2	0.030		
Landing Gear Position Lights	2	0.030		

CHART 1
ELECTRICAL LOAD DISTRIBUTION (Effectivity: All) *(Continued)*

Equipment	Units	Load Ea. Unit (Amps DC)	Cruise Load (Amps DC)	Notes
No. 5 Sub-Bus Feeder *(Continued)*				
LH & RH Fire Extinguisher Disc/OK	4	0.030		5
LH & RH Fire Lights	4	0.030		5
LH & RH Firewall Fuel Valve Closed Lights	4	0.030		5
Oxygen Control Lights	1	0.003		5
LH Bleed Air Annunciator (Off)	1	0.003		5
Prop Autofeather Switch	1	0.003		
LH Firewall Valve Closed	1	0.003		5
RH Pitot Heat	1	0.003		5
LH & RH Engine Cutoff Switch	1	0.003		5
Propeller Sync	1	0.003		5
LH Pitot Heat On	1	0.003		5
LH Ice Vane Fail	1	0.003		5
RH Loadmeter	1	0.080	0.80	
Landing Gear Down Select	1	0.003		5
Oxygen Press Not Armed	1	0.003		5
LH Duct Overtemp	1	0.003		5
RH Firewall Valve Closed and Firewall Valve Fail	1	0.003		5
RH Ice Vane Fail	1	0.003		5
Alternate Bleed Air Valve On	1	0.003		5
Battery Monitor Power	1	0.080	0.080	
DC Voltmeter	1	0.080	0.080	
TRIPLE-FED BUS TOTAL			14.87	
Triple-Fed Bus Avionics Feeder No. 1				
Copilot's Clock	1	0.125	0.125	
SDU No. 1	1	1.18	1.18	
Pilot's Clock	1	0.125	0.125	
ATC No. 1	1	1.65	1.65	
NAV No. 1	1	0.80	0.80	
Comm No. 1	1	5.00 (Xmit)		4
		0.70 (Rec.)	0.70	
Pilot Audio	1	1.60	1.60	
Aural Warning	1	0.60	0.60	
Cabin Audio	1	2.80	2.80	
Turn and Slip	1	0.50	0.50	
AP/Flap Disconnect B	2	0.056	0.112	
AHRS No. 2	2	1.40	1.40	
RTU No. 2	1	0.40	0.40	
TRIPLE-FED BUS AVIONICS TOTAL			11.99	

CHART 1
ELECTRICAL LOAD DISTRIBUTION (Effectivity: All) *(Continued)*

Equipment	Units	Load Ea. Unit (Amps DC)	Cruise Load (Amps DC)	Notes

NOTES:

1. Used for back-up of the forward ventilation blower.
2. Starting loads are not tabulated in the cruise load.
3. Used only on the ground.
4. Limit transmissions to three minutes total when operating on battery power only.
5. Annunciator lights.
6. Used during take-off and landing only.
7. Operates only if the flap/forward wing is out of synchronization.
8. Spring-loaded release type switch for the RESET position. Momentary load only.
9. Controlled by a momentary pushbutton switch.
10. Used only when engine-driven boost pump fails.
11. Relays energized when the avionics master switch is in the OFF position.
12. Used only during engine starting.
13. Used five minutes before landing.
14. Power is supplied by the airplane's battery or bus.
15. Only one unit operates at a time.
16. Deice Mode.
17. Emergency only.
18. Used only during a loss of cabin pressure.
19. Batteries charged; fifteen minutes.
20. Operates if duct temperature is over limit in air.
21. Test only.
22. Fed by battery bus when the battery switch is OFF.
23. Only two valves operate at a time.

BT00913

ELECTRICAL LOAD DISTRIBUTION - MAINTENANCE PRACTICES (Effectivity: All)

CIRCUIT BREAKER REMOVAL (EFFECTIVITY: ALL) (Figure 19)

Removal and installation procedures for all circuit breakers are the same unless otherwise specified.

NOTE

If access to the circuit breaker terminals is impossible while the panel is installed, remove the panel with procedures outlined in this chapter.

a. Remove all electrical power from the airplane.

b. Determine if the circuit breaker panel needs to be removed.

c. Remove terminal screws and lock washers from any circuit breaker bus bar connections.

d. Tag and remove all bus bars and wiring that would obstruct removal of the circuit breaker.

e. Remove circuit breaker mounting nut and lock washer from face of panel.

f. Remove the circuit breaker from back side of panel.

CIRCUIT BREAKER INSTALLATION (Effectivity: All) (Figure 19)

CAUTION

All circuit breakers must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align tang and circuit breaker button with circuit breaker panel mounting holes.

b. Install nut and washer on circuit breaker and secure to panel.

c. Attach bus bar or wiring to circuit breaker terminals with terminal screws and lock washers according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

d. If removed, install the circuit breaker panel.

e. Restore electrical power to the airplane.

LEFT CIRCUIT BREAKER PANEL REMOVAL (Effectivity: All) (Figure 20)

a. Remove all electrical power from the airplane.

b. Refer to Chapter 25-10-00 and remove the pilot's seat and console upholstery panel.

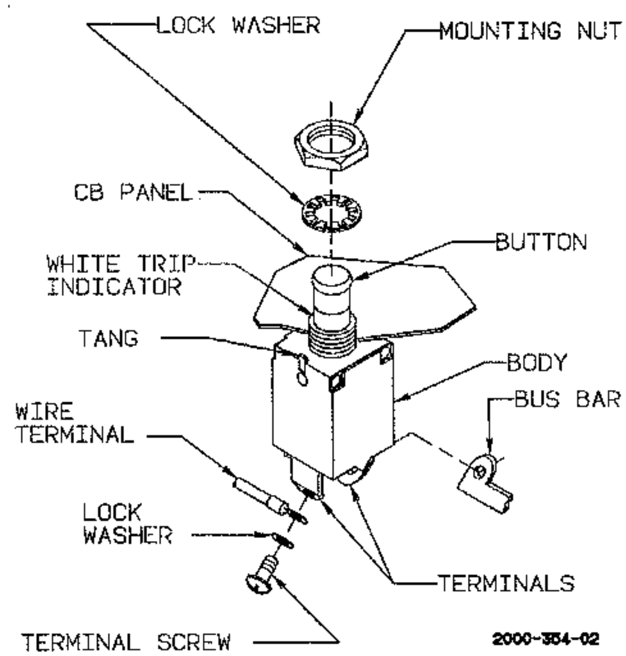
c. Remove screws attaching upper wire tray cover to the console structure and remove the cover.

d. Tag and disconnect all wiring.

e. Remove the eight mounting screws securing the electroluminescent panel and circuit breaker panel to the console structure.

CAUTION

When performing maintenance around electroluminescent panels take precautions not to damage the panels as they cannot be repaired.



Circuit Breaker Installation (Effectivity: All)
Figure 19

f. Lift the electroluminescent panel from the circuit breaker panel.

g. Tag and disconnect the circuit breaker panel bonding jumper.

h. Lift the circuit breaker panel from the console.

LEFT CIRCUIT BREAKER PANEL INSTALLATION (Effectivity: All) (Figure 20)

CAUTION

The left circuit breaker panel must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the circuit breaker panel screw holes with the nutplates in console.

b. Secure bonding jumper to connection as tagged.

CAUTION

When performing maintenance around electroluminescent panels take precautions not to damage the panels as they cannot be repaired.

c. Align the electroluminescent panel with the circuit breaker panel mounting holes.

d. Install the eight mounting screws.

e. Connect all wiring according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

WARNING

The upper wire tray cover is load supporting and must be installed before flight of the airplane.

f. Install the upper wire tray cover and secure to the console structure with screws.

g. Refer to Chapter 25-10-00 and install the pilot's console upholstery panel and seat.

h. Restore electrical power to the airplane.

AUXILIARY CIRCUIT BREAKER PANEL REMOVAL (Effectivity: All) (Figure 21)

a. Remove all electrical power from the airplane.

b. Remove the two screws securing the electroluminescent panel to the auxiliary circuit breaker panel and remove from the console.

CAUTION

When performing maintenance around electroluminescent panels take precautions not to damage the panels as they cannot be repaired.

c. Remove four screws attaching the auxiliary circuit breaker panel to the console structure.

d. Pull the circuit breaker panel out enough to access wiring.

e. Tag and remove all wiring.

f. Remove the circuit breaker panel from the console.

AUXILIARY CIRCUIT BREAKER PANEL INSTALLATION (Effectivity: All) (Figure 21)

CAUTION

The auxiliary circuit breaker panel must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Connect all wiring according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

b. Align the circuit breaker panel with nutplates in the console structure.

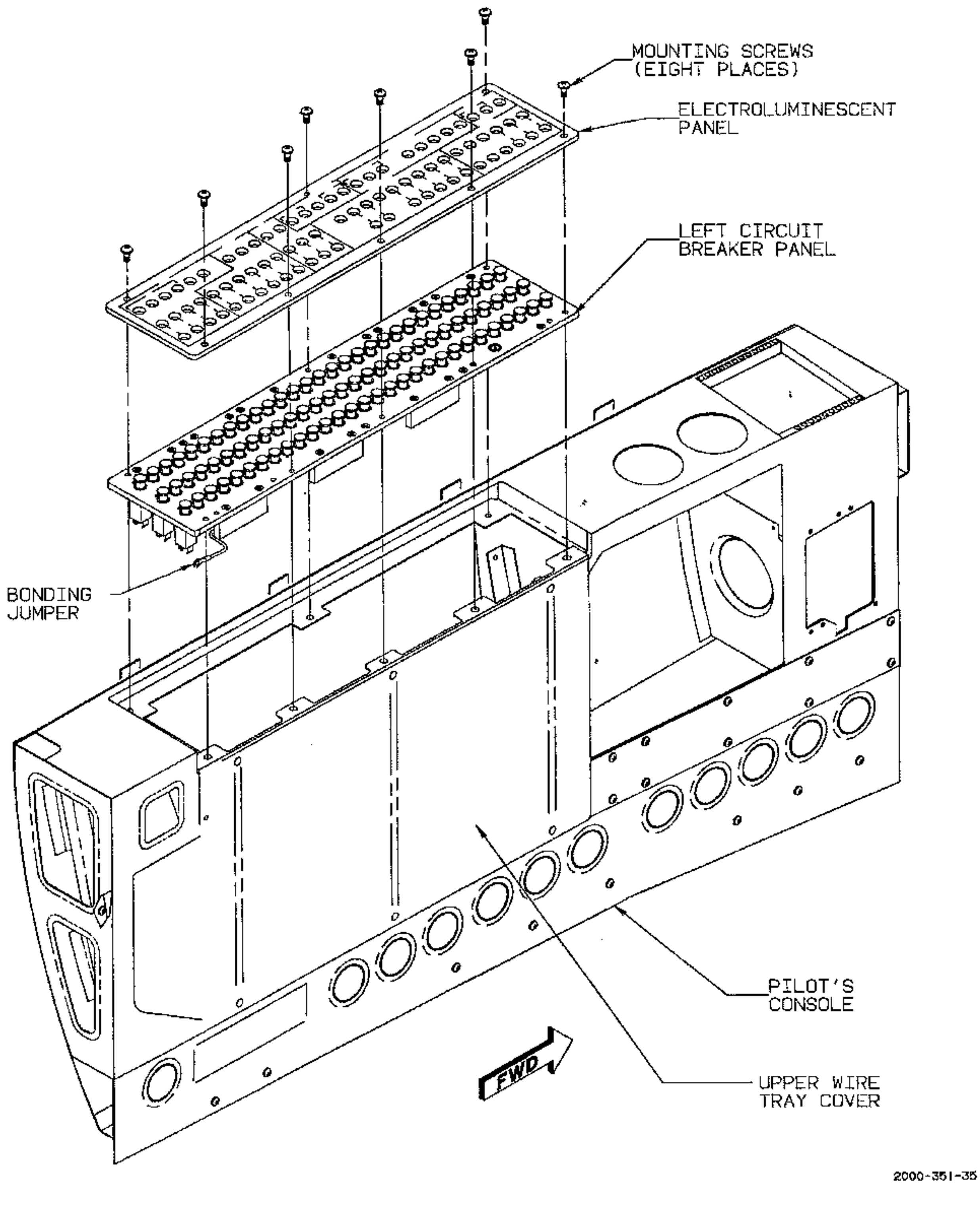
c. Secure the auxiliary circuit breaker panel to the console structure with four screws.

d. Secure the electroluminescent panel to the circuit breaker panel with two screws.

e. Restore electrical power to the airplane.

AVIONICS CIRCUIT BREAKER PANEL REMOVAL (Effectivity: All) (Figure 22)

a. Remove all electrical power from the airplane.



Left Circuit Breaker Panel Installation (Effectivity: All)
Figure 20

b. Refer to Chapter 25-10-00 and remove the copilot's seat and console upholstery panel.

c. Remove the screws attaching the upper wire tray cover to the console structure and remove the cover.

d. Remove safety wire and disconnect two electrical connectors directly below the avionics circuit breaker panel.

e. Tag and disconnect remaining wiring from the avionics circuit breaker panel.

f. Tag and remove the circuit breaker panel bonding jumper.

g. Remove the eight mounting screws securing the electroluminescent panel and circuit breaker panel to the console structure.

CAUTION

When performing maintenance around electroluminescent panels take precautions not to damage the panels as they cannot be repaired.

h. Lift the electroluminescent panel from the console.

i. Lift the circuit breaker panel from the console.

AVIONICS CIRCUIT BREAKER PANEL INSTALLATION (Effectivity: All) (Figure 22)

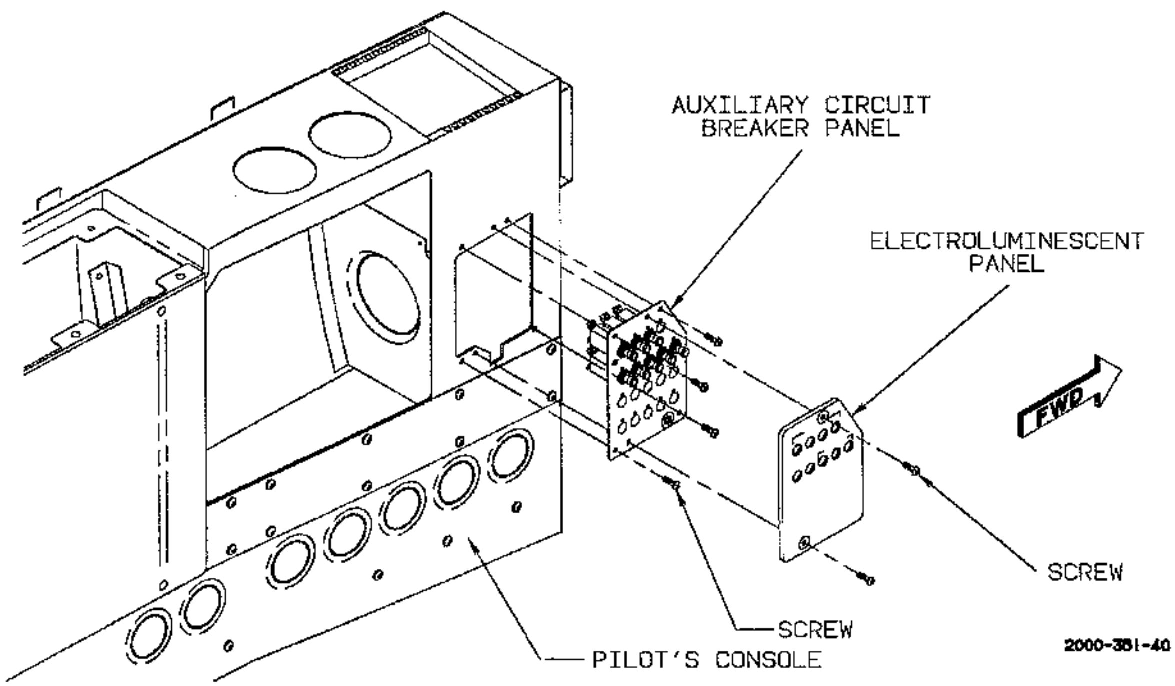
CAUTION

The avionics circuit breaker panel must meet electrical bonding requirements specified in Chapter 20-00-03.

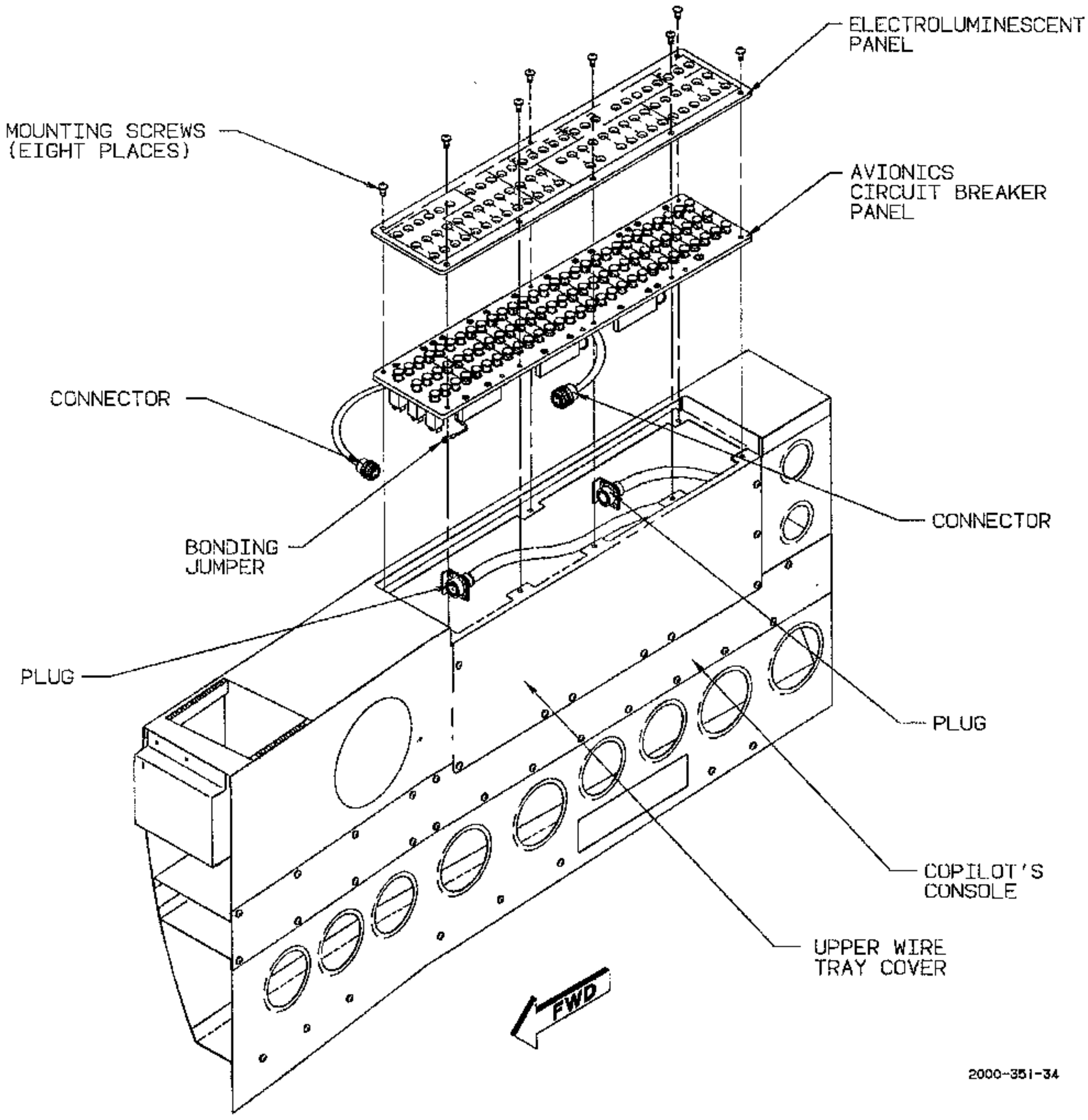
a. Align circuit breaker panel screw holes with nutplates in the console structure.

CAUTION

When performing maintenance around electroluminescent panels take precautions not to damage the panels as they cannot be repaired.



Auxiliary Circuit Breaker Panel Installation (Effectivity: All)
Figure 21



Avionics Circuit Breaker Panel Installation (Effectivity: All)
Figure 22

b. Align the electroluminescent panel with the circuit breaker panel.

c. Install the eight mounting screws and tighten until snug.

d. Reconnect the two electrical connectors under panel and safety wire.

e. Secure bonding jumper to connection as tagged.

f. Connect remaining wiring according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

WARNING

The upper wire tray cover is load supporting and must be installed before flight of the airplane.

g. Install the upper wire tray cover and secure to the console structure with screws.

h. Refer to Chapter 25-10-00 and install the copilot's seat and console upholstery cover.

i. Restore electrical power to the airplane.

BATTERY BUS CIRCUIT BREAKER PANEL REMOVAL (Effectivity: All) (Figure 23)

a. Refer to Chapter 54-30-00 and remove the RH nacelle upper aft access panel.

b. Remove all electrical power from the airplane.

c. Tag and disconnect the wiring to the battery bus triple-fed bus feeder limiter base (6).

d. Remove safety wire and disconnect the electrical connector (15) from the panel receptacle (18).

e. Remove two screws (3) and lock washers (2) securing the panel cover (4) to the battery power relay panel (17).

f. Remove two screws (13) and washers (14) attaching the metal oxide varistor (MOV) bracket (16) to the battery bus circuit breaker panel assembly.

g. Move bonding jumper (12) to the side and remove the battery bus circuit breaker panel assembly from the nacelle.

h. Remove screws (11) and washers (10) attaching panel cover (4) to the circuit breaker panel (7).

BATTERY BUS CIRCUIT BREAKER PANEL INSTALLATION (Effectivity: All) (Figure 23)

CAUTION

The battery bus circuit breaker panel must meet electrical bonding requirements specified in Chapter 20-00-00.

a. Align the battery bus circuit breaker panel (7) mounting holes with panel cover (4) mounting holes and install screws (11) and washers (10).

b. Lower the assembled circuit breaker panel (7 and 4) onto the nacelle electrical equipment shelf and align the holes on the side of the panel with those on the metal oxide varistor (MOV) bracket (16).

c. Install a screw (13) and washer (14) through the MOV bracket (16) to position the circuit breaker panel.

d. Align the attaching plate (1) on the panel cover (4) with the power relay panel (17).

e. Install two screws (3) and washers (2), and secure the bonding jumper (12) to the attaching plate.

f. Install other screw (13) and washer (14) attaching MOV bracket (16) to circuit breaker panel assembly (7 and 4).

g. Connect limiter leads to limiter base according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

h. Reconnect electrical connector (15) to the circuit breaker panel receptacle (18) and safety wire.

i. Refer to Chapter 54-30-00 and install the RH nacelle upper aft access panel.

j. Restore electrical power to the airplane.

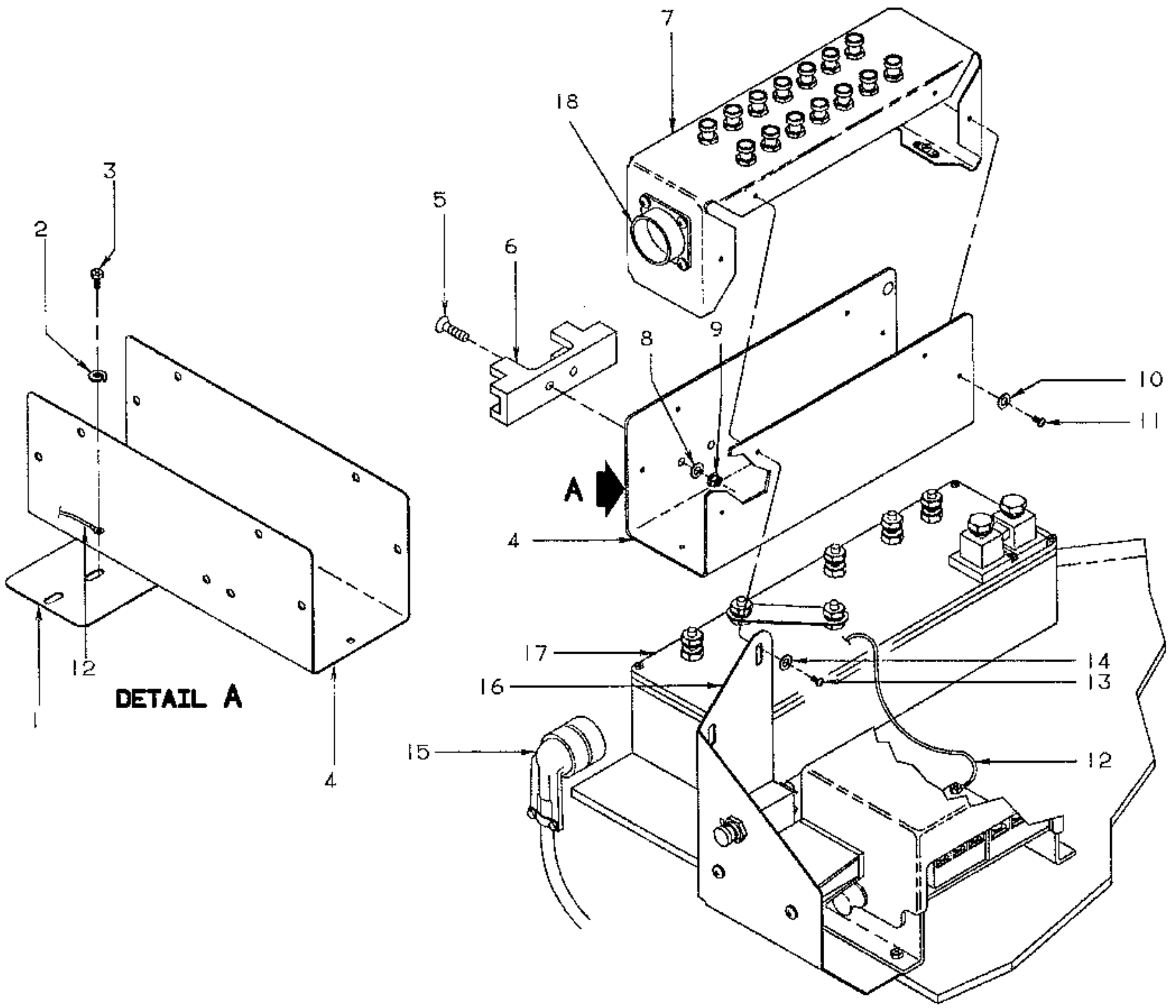
AFT CIRCUIT BREAKER PANEL REMOVAL (Effectivity: All) (Figure 24)

a. Remove all electrical power from the airplane.

b. Refer to Chapter 53-30-00 and remove the left aft fuselage equipment shelf access panel.

c. Tag and remove wiring to the terminal block located on the aft side of the aft circuit breaker panel.

d. Remove safety wire from electrical connector and disconnect the connector.



1.	ATTACHING PLATE	7.	BATTERY BUS CB PANEL	13.	SCREW
2.	LOCK WASHER	8.	WASHER	14.	WASHER
3.	SCREW	9.	NUT	15.	CONNECTOR
4.	PANEL COVER	10.	WASHER	16.	MOV BRACKET
5.	SCREW	11.	SCREW	17.	BATTERY POWER RELAY PANEL
6.	LIMITER BASE	12.	BONDING JUMPER	18.	RECEPTACLE

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Battery Bus Circuit Breaker Panel Installation (Effectivity: All)
Figure 23

e. Remove six screws and washers securing panel to the aft fuselage equipment shelf.

f. Move the bonding jumper to the side and remove the panel from the airplane.

AFT CIRCUIT BREAKER PANEL INSTALLATION (Effectivity: All) (Figure 24)

CAUTION

The aft circuit breaker panel must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align circuit breaker panel mounting holes with inserts in the aft fuselage equipment shelf.

b. Align the bonding jumper with its mounting hole on the panel.

c. Install six screws and washers securing panel to equipment shelf.

d. Reconnect the electrical connector to the panel receptacle and safety wire.

e. Connect terminal board wiring according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

f. Restore electrical power to the airplane.

g. Refer to Chapter 53-30-00 and install the left aft fuselage equipment shelf access panel.

AVIONICS POWER RELAY PANEL REMOVAL (Effectivity: All) (Figure 25)

a. Remove all electrical power from the airplane.

b. Refer to Chapter 53-30-00 and remove the left aft fuselage equipment shelf access panel.

c. Remove safety wire and disconnect both of the electrical connectors (18 and 19) from their respective receptacles (17 and 20).

d. Remove the four screws (5) and washers (4) attaching the relay panel (3) to the aft fuselage equipment shelf.

e. Slide bonding jumper (15) to the side and remove the relay panel (3) from the airplane.

AVIONICS POWER RELAY PANEL INSTALLATION (Effectivity: All) (Figure 25)

CAUTION

The avionics power relay panel must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align the relay panel (3) with inserts on the aft fuselage equipment shelf.

b. Align the bonding jumper (15) with the relay panel (3).

c. Secure the bonding jumper (15) and relay panel (3) to the equipment shelf with four screws (5) and washers (4).

d. Reconnect both electrical connectors (18 and 19) to their respective receptacles (17 and 20) and safety wire 17 to 18.

e. Restore electrical power to the airplane.

f. Refer to Chapter 53-30-00 and install the left aft fuselage equipment shelf access panel.

AVIONICS POWER RELAY REMOVAL (Effectivity: All) (Figure 25)

a. Remove all electrical power from the airplane.

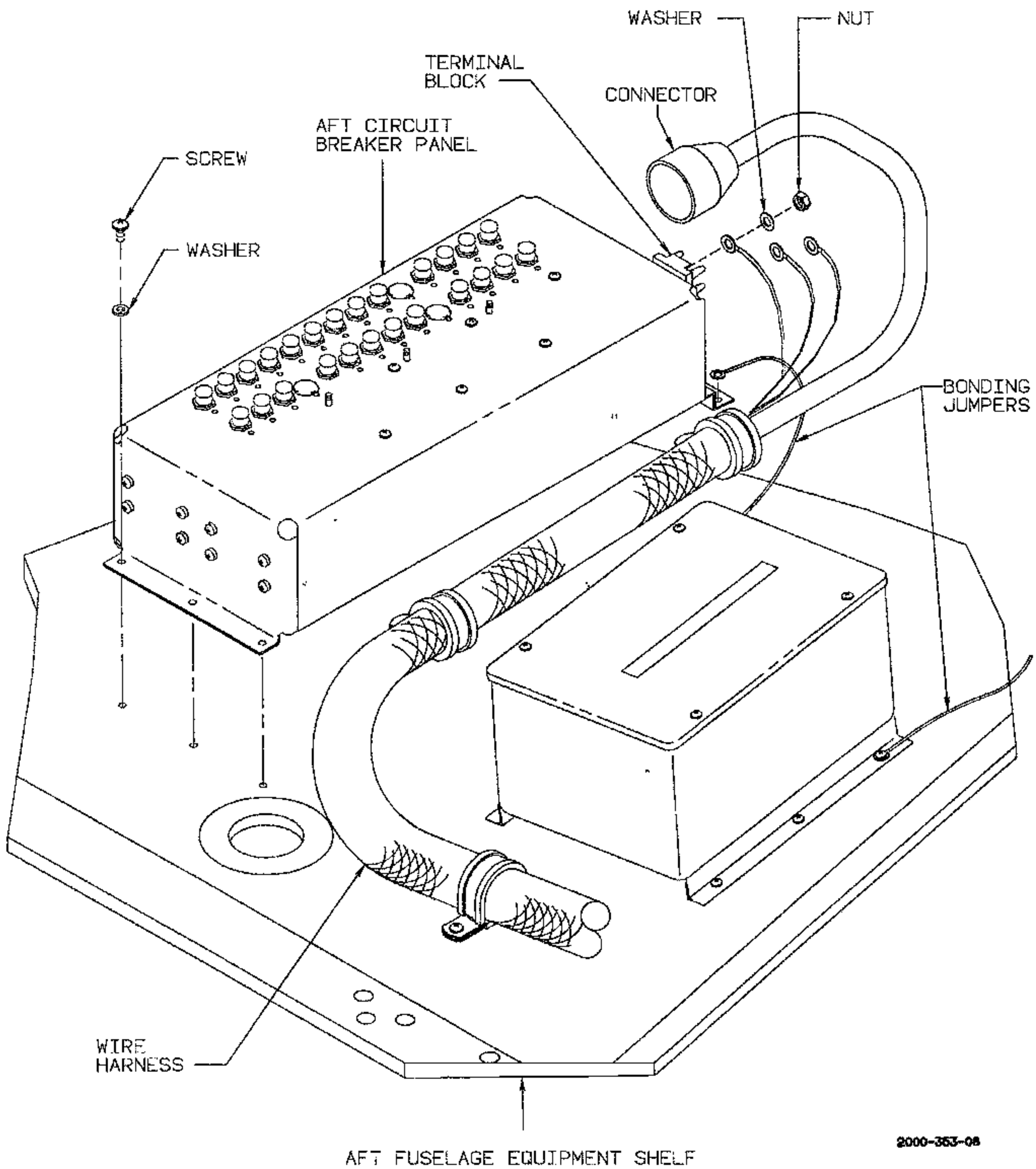
b. Refer to Chapter 53-30-00 and remove the left aft fuselage equipment shelf access panel.

c. Remove the six screws (10) and washers (9) attaching panel cover (8) to relay panel (3) and remove the cover.

d. Tag and disconnect wiring on the relay to be removed.

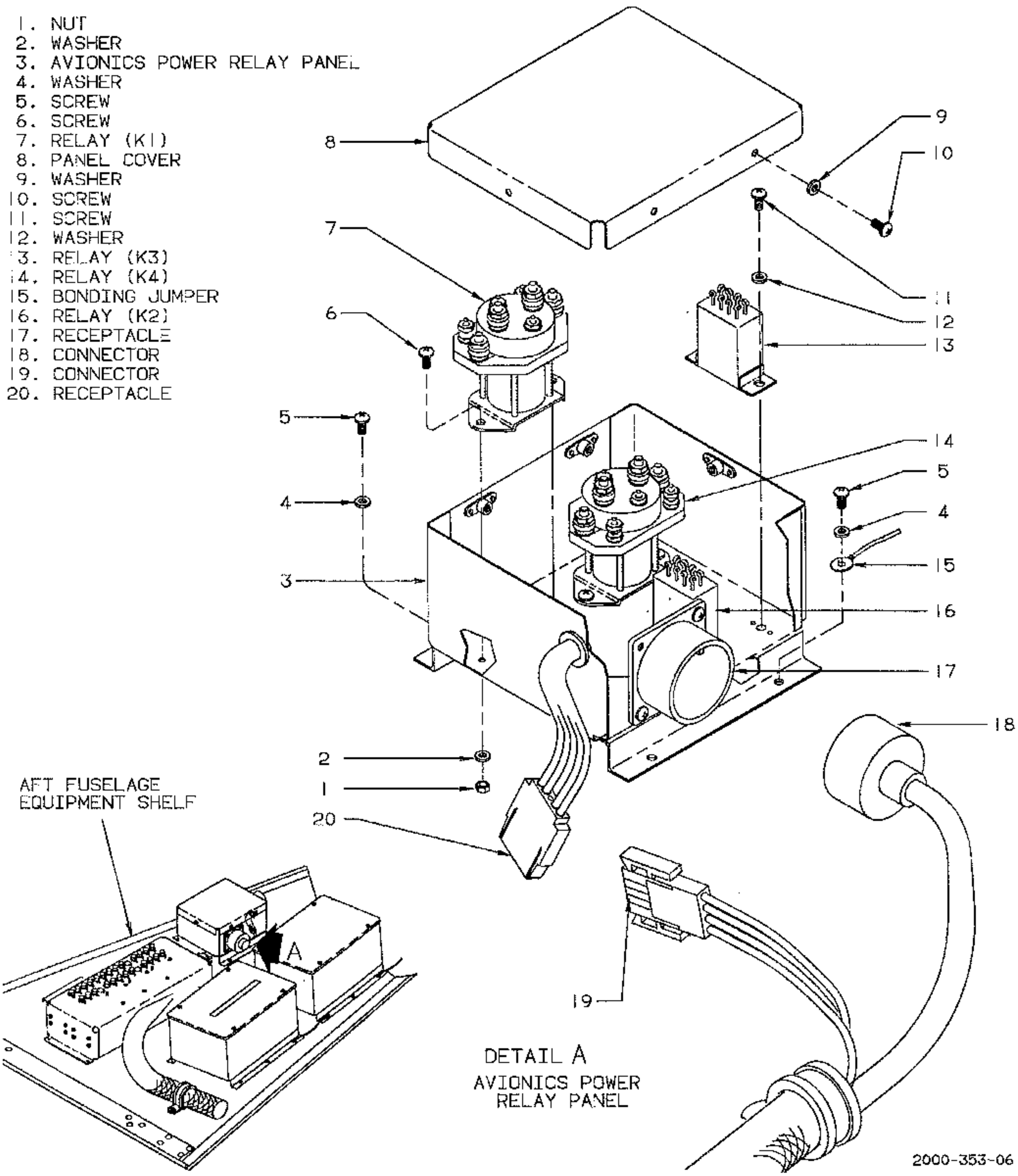
e. Remove two screws (11) and washers (12) attaching relay K2 (16) or K3 (13) to the relay panel and remove the applicable relay.

f. Remove two screws (6), washers (2) and nuts (1) attaching relay K1 (7) or K4 (14) to the relay panel and remove the applicable relay.



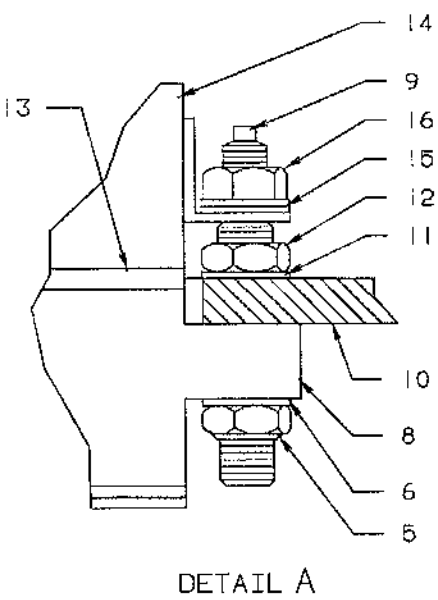
Aft Circuit Breaker Panel Installation (Effectivity: All)
Figure 24

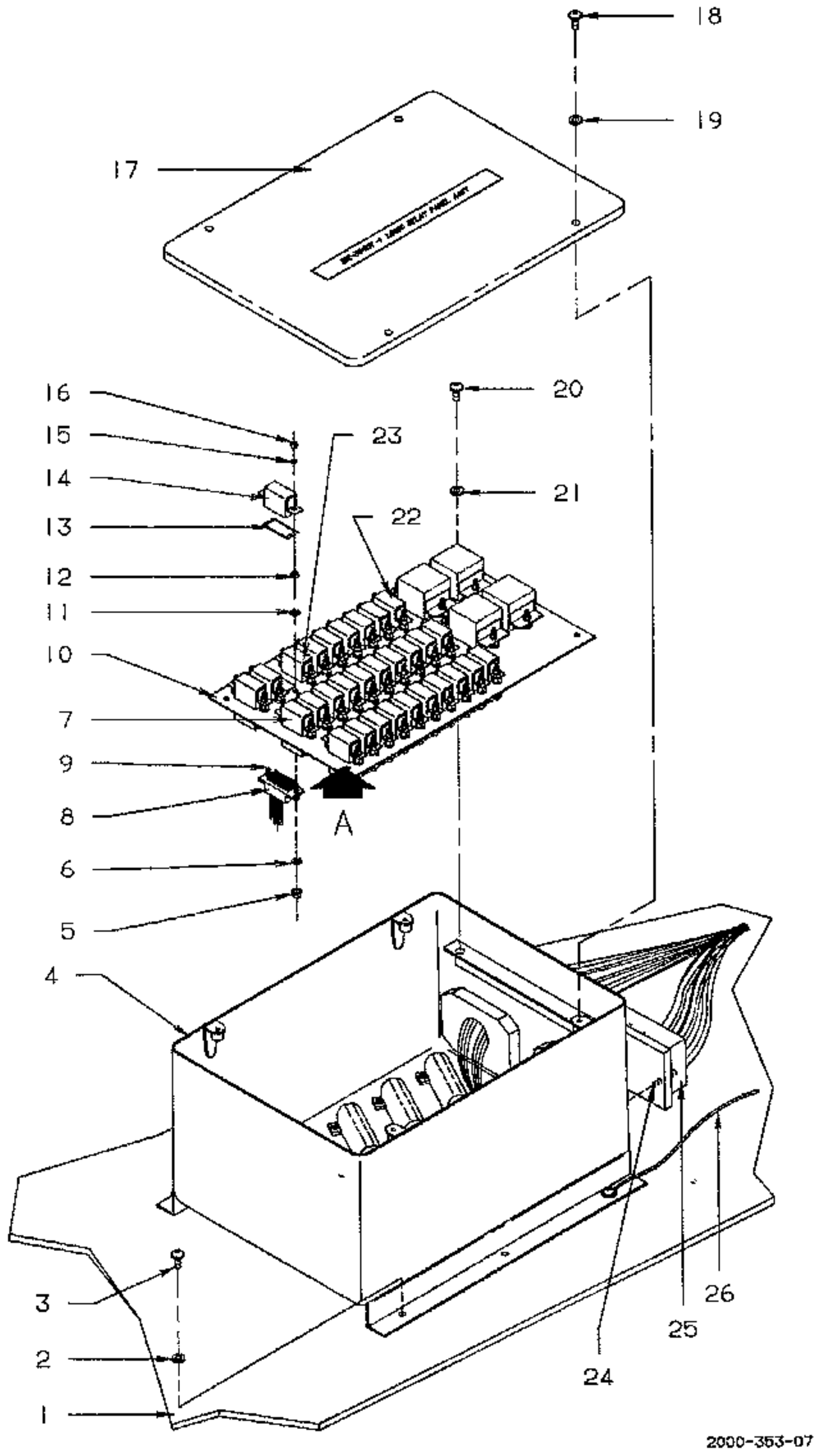
1. NUT
2. WASHER
3. AVIONICS POWER RELAY PANEL
4. WASHER
5. SCREW
6. SCREW
7. RELAY (K1)
8. PANEL COVER
9. WASHER
10. SCREW
11. SCREW
12. WASHER
13. RELAY (K3)
14. RELAY (K4)
15. BONDING JUMPER
16. RELAY (K2)
17. RECEPTACLE
18. CONNECTOR
19. CONNECTOR
20. RECEPTACLE



Avionics Power Relay and Panel Installation (Effectivity: All)
Figure 25

1. AFT FUSELAGE EQUIPMENT SHELF
2. WASHER
3. SCREW
4. LOGIC RELAY PANEL
5. NUT
6. WASHER
7. RELAY (K13)
8. RELAY SOCKET
9. STUD
10. SHELF ASSEMBLY
11. WASHER
12. NUT
13. SILICONE GASKET
14. RELAY (K3)
15. WASHER
16. NUT
17. COVER ASSEMBLY
18. SCREW
19. WASHER
20. SCREW
21. WASHER
22. RELAY (K12)
23. RELAY (K4)
24. JACKSCREW
25. CONNECTOR
26. BONDING JUMPER





Logic Relay and Panel Installation (Effectivity: All)
Figure 26

AVIONICS POWER RELAY INSTALLATION
(Effectivity: All)
(Figure 25)

CAUTION

The avionics power relays must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align relay K2 (16) or K3 (13) with nutplates on relay panel (3).

b. Secure the relay to the panel with two screws (11) and washers (12).

c. Align relay K1 (7) or K4 (14) with mounting holes on relay panel (3).

d. Secure the relay with two screws (6), washers (2), and nuts (1).

e. Attach wiring to relays according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

f. Align panel cover (8) with relay panel (3) and secure with six screws (10) and washers (9).

g. Restore electrical power to the airplane.

h. Refer to Chapter 53-30-00 and install the left aft fuselage equipment shelf access panel.

LOGIC RELAY PANEL REMOVAL
(Effectivity: All)
(Figure 26)

a. Remove all electrical power from the airplane.

b. Refer to Chapter 53-30-00 and remove the left aft fuselage equipment shelf access panel.

c. Disconnect the electrical connectors (25) on the side of the panel by loosening the jackscrews (24) and pulling the connector out.

d. Remove the six mounting screws (3) and washers (2).

e. Slide the bonding jumper (26) to the side and remove the logic relay panel (4) from the aft fuselage equipment shelf.

LOGIC RELAY PANEL INSTALLATION
(Effectivity: All)
(Figure 26)

CAUTION

The logic relay panel must meet electrical bonding requirements specified in Chapter 20-00-00.

a. Align the logic relay panel (4) with mounting holes on the aft fuselage equipment shelf.

b. Align the bonding jumper (26) with mounting hole on logic relay panel (4).

c. Install six washers (2) and screws (3) securing the logic relay panel to the aft fuselage equipment shelf.

d. Mate connectors (25) with panel receptacle and secure with jackscrews (24).

e. Restore electrical power to the airplane.

f. Refer to Chapter 53-30-00 and install the left aft fuselage equipment shelf access panel.

LOGIC RELAY AND SOCKET REMOVAL
(Effectivity: All)
(Figure 26)

a. Remove all electrical power from the airplane.

b. Refer to Chapter 53-30-00 and remove the left aft fuselage equipment shelf access panel.

c. Remove the four screws (18) and washers (19) from relay panel cover assembly (17).

d. Remove nuts (16) and washers (15) securing relay to shelf assembly (10).

e. Lift relay from socket (8).

f. Remove silicone gasket (13).

g. Remove the four screws (20) and washers (21) attaching shelf assembly (10) to logic relay panel (4) and remove the shelf assembly.

h. Remove the nuts (12) and washers (11) from relay socket stud (9).

i. Tag and disconnect wiring.

j. Remove relay socket (8) from shelf assembly (10).

LOGIC RELAY AND SOCKET INSTALLATION (Effectivity: All) (Figure 26)

CAUTION

The logic relays must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align relay socket studs (9) with shelf assembly holes and secure with two washers (11) and nuts (12).

b. Attach wiring to relay socket (8) according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

c. Align the shelf assembly (10) with the logic relay panel (4) and secure with four washers (21) and screws (20).

d. Place silicone gasket (13) on relay socket (8).

e. Align relay with relay socket (8) and press until pins are firmly seated.

f. Install two washers (15) and nuts (16) on relay socket studs (9) and tighten until relay is firmly in place.

g. Align holes in cover assembly (17) with holes in relay panel (4) and install four washers (19) and screws (18).

h. Restore electrical power to the airplane.

i. Refer to Chapter 53-30-00 and install the left aft fuselage equipment shelf access panel.

RIGHT GENERATOR LIMITER PANEL REMOVAL (OUTBOARD) (Effectivity: All) (Figure 27)

a. Refer to Chapter 54-30-00 and remove the RH nacelle upper aft access panel.

b. Remove all electrical power from the airplane.

c. Pull the locking pins out and remove the limiter panel cover.

d. Remove terminal screws (16) and lock washers (17), then tag all wiring as it is removed from the limiter panel.

e. Remove nut (13) and washers (14) attaching the RH generator bus (12) to terminal 4 on the RH generator-power relay panel.

f. Remove bolts (11), nuts (15) and washers (10) connecting buses (12 and 5).

g. Lift the RH generator bus (12) from the equipment shelf.

h. Remove terminal screws (7 and 9) and lock washers (6 and 8) from limiter holders and remove bus bar (5).

i. Remove four mounting screws (3), lock washers (2) and washers (1) securing limiter panel base to equipment shelf.

j. Slide bonding jumper (23) to the side.

k. Lift the limiter panel from the nacelle.

RIGHT GENERATOR LIMITER PANEL INSTALLATION (OUTBOARD) (Effectivity: All) (Figure 27)

CAUTION

The right generator limiter panel must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align mounting holes with inserts on the RH nacelle equipment shelf.

b. Align bonding jumper (23) and attach with mounting screw (3), lock washer (2) and washer (1).

c. Install remaining screws (3), lock washers (2) and washers (1).

d. Place bus bar (5) on limiter panel and secure with terminal screws (7 and 9) and lock washers (6 and 8).

e. Match limiter panel wiring according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual, then secure with terminal screws (16) and lock washers (17).

f. Align the RH generator bus (12) with both limiter bus bars (5) and terminal 4 on the RH generator-power relay panel.

g. Secure RH generator bus (12) to the RH generator-power relay panel with nuts (13) and washers (14).

h. Attach buses (5 and 12), with bolts (11), nuts (15) and washers (10).

i. Install limiter panel cover with locking pins indented.

j. Restore electrical power to the airplane.

k. Refer to Chapter 54-30-00 and install the RH nacelle upper aft access panel.

RIGHT GENERATOR LIMITER PANEL REMOVAL (INBOARD) (Effectivity: All) (Figure 27)

a. Remove all electrical power from the airplane.

b. Refer to Chapter 54-30-00 and remove the RH nacelle upper aft access panel.

c. The aft vent fan relay is mounted adjacent to the limiter holders on the limiter panel. Tag and remove all wiring to this relay.

d. Remove nut (13) and washers (14) securing the RH generator bus (12) to terminal "4" on the RH generator-power relay panel.

e. Remove nuts (15), bolts (11) and washers (10) attaching buses (5 and 12).

f. Remove RH generator bus (12) from the RH nacelle equipment shelf.

g. Pull the locking pins out and remove the limiter panel cover.

h. Remove terminal screws (7 and 9) and lock washers (6 and 8) attaching bus bar (5) to limiter holder.

i. Remove bus bar (5).

j. Remove terminal screws (16) and lock washers (17), then tag all wiring as it is removed.

k. Remove six mounting screws (3), lock washers (2) and washers (1).

l. Remove limiter panel from the RH nacelle equipment shelf.

RIGHT GENERATOR LIMITER PANEL INSTALLATION (INBOARD) (Effectivity: All) (Figure 27)

CAUTION

The right generator limiter panel must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Align limiter panel mounting holes with inserts on the RH nacelle equipment shelf.

b. Install six mounting screws (3), lock washers (2) and washers (1).

c. Place bus bar (5) on inboard side of limiter panel and secure with terminal screws (7 and 9) and lock washers (6 and 8).

d. Attach wiring on opposite side of limiter panel with six terminal screws (16) and lock washers (17) according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

e. Align the RH generator bus (12) with terminal 4 on the RH generator-power relay panel and bus bars (5). A washer (14) should be installed between the RH generator bus (12) and terminal 4.

f. Connect buses (5 and 12) with nuts (15), bolts (11) and washers (10).

g. Install nut (13) and other washer (14) on terminal 4 of the RH generator-power relay panel.

h. Install wiring on the aft vent fan relay according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

i. Install limiter panel cover with locking pins indented in panel.

j. Refer to Chapter 54-30-00 and install the RH nacelle upper aft access panel.

k. Restore electrical power to the airplane.

LEFT GENERATOR LIMITER PANEL REMOVAL (Effectivity: All) (Figure 28)

NOTE

Procedures for removing both limiter panels on the LH nacelle equipment shelf are the same.

a. Remove all electrical power from the airplane.

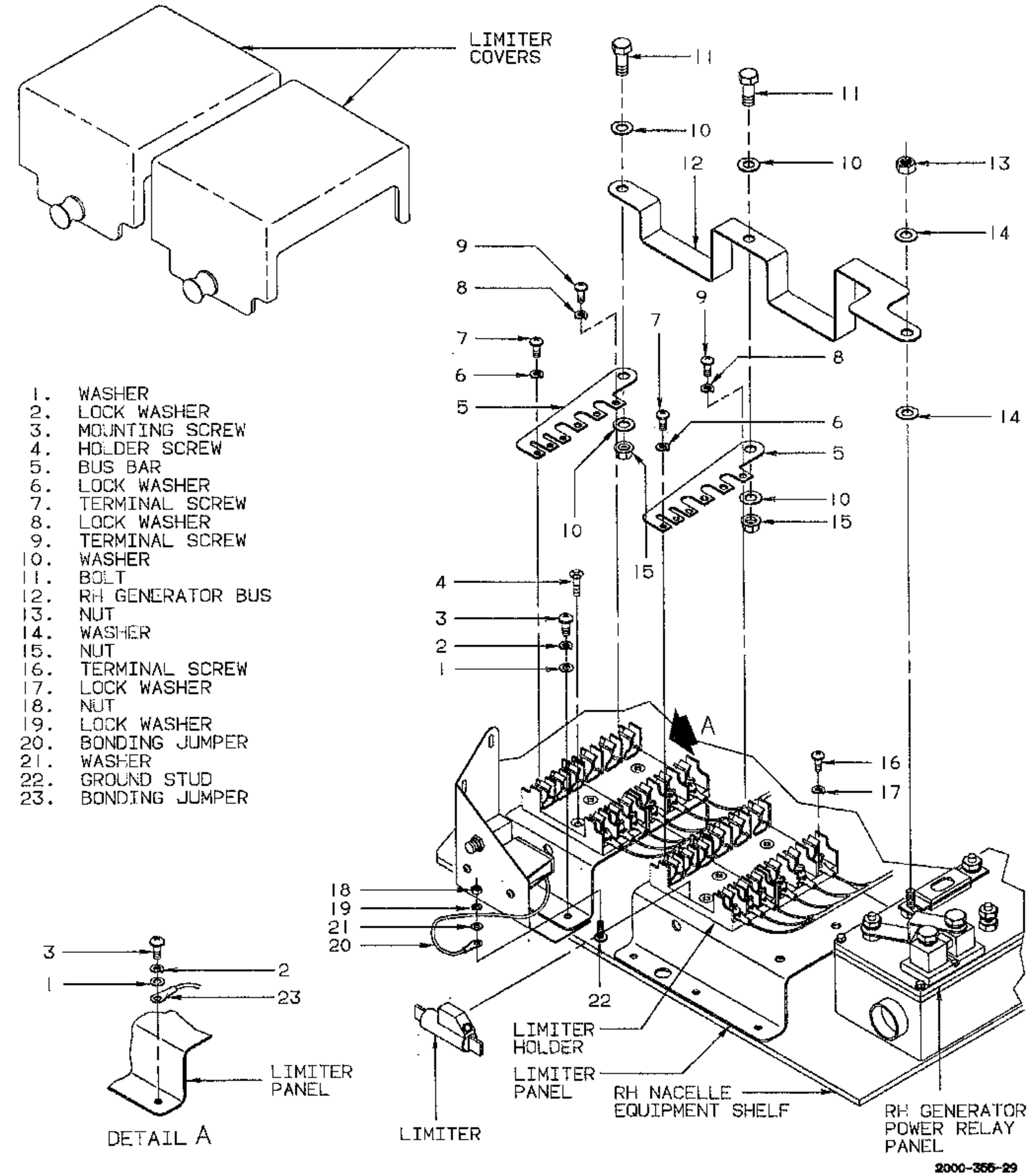
b. Refer to Chapter 54-30-00 and remove the LH nacelle upper aft access panel.

c. Remove nut (10) and washers (11) that attach the LH generator bus (9) to terminal 4 on the LH generator-power relay panel.

d. Remove bolts (8), nuts (5) and washers (6) attaching the LH generator bus (9) to the remaining bus bars (7).

e. Remove the LH generator bus (9) from nacelle shelf.

f. Pull out the locking pins and remove limiter panel cover.



1. WASHER
2. LOCK WASHER
3. MOUNTING SCREW
4. HOLDER SCREW
5. BUS BAR
6. LOCK WASHER
7. TERMINAL SCREW
8. LOCK WASHER
9. TERMINAL SCREW
10. WASHER
11. BOLT
12. RH GENERATOR BUS
13. NUT
14. WASHER
15. NUT
16. TERMINAL SCREW
17. LOCK WASHER
18. NUT
19. LOCK WASHER
20. BONDING JUMPER
21. WASHER
22. GROUND STUD
23. BONDING JUMPER

Right Generator Limiter Panel Installation (Effectivity: All)
Figure 27

g. Remove four mounting screws (15), lock washers (16) and washers (17) securing limiter panel to shelf.

h. Remove screws (13) and lock washers (14) attaching wiring to limiter holders, then tag wiring as it is removed.

NOTE

Due to the nacelle plumbing it may be necessary to slide the panel sideways to gain access to the terminal screws.

i. Remove screws (2 and 4) and lock washers (1 and 3) attaching bus bar (7) to limiter holder.

j. Slide limiter panel out from under plumbing and remove from the nacelle.

LEFT GENERATOR LIMITER PANEL INSTALLATION (Effectivity: All) (Figure 28)

NOTE

Procedures for installing both limiter panels in the LH nacelle are the same.

CAUTION

The left generator limiter panel must meet electrical bonding requirements specified in Chapter 20-00-03.

a. Slide limiter panel under plumbing onto the LH nacelle equipment shelf.

b. Attach bus bar (7) to limiter holder with screws (2 and 4) and lock washers (1 and 3).

c. Connect wiring to the limiter holder with screws (13) and lock washers (14), according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

d. Align the limiter panel mounting holes with the LH nacelle equipment shelf inserts.

e. Secure the panel to the shelf with four screws (15), lock washers (16) and washers (17).

f. Install limiter panel cover with locking pins indented in the panel.

g. Align LH generator bus (9) with limiter panel bus bars (7) and the LH generator-power relay panel terminal 4.

h. Attach LH generator bus (9) to LH generator-power relay panel terminal 4 with nut (10) and washers (11).

i. Connect the buses (7 and 9) with bolts (8), nuts (5), and washers.

j. Restore electrical power to the airplane.

k. Refer to Chapter 54-30-00 and install the LH nacelle upper aft access panel.

WING CENTER SECTION LIMITER HOLDER REMOVAL (Effectivity: All) (Figure 29)

a. Remove all electrical power from the airplane.

b. Refer to Chapter 53-30-00 and remove the aft wing-box shear panel.

c. Remove the applicable limiters (27 or 28) from the limiter holder (2 or 30).

d. Remove bolt (3), washer (6), lock washer (7) and nut (21) attaching electrical wiring to bus bar (4 or 26), and remove the wiring.

e. Remove limiter holder terminal screws (22 and 24) and lock washers (23 and 25), then remove the applicable bus bar (4 or 26).

f. Tag and remove all wiring on the limiter holder to be removed.

g. Remove the two mounting screws (29) from the center of the limiter holder (2 or 30) and remove it from the wing center section electrical equipment panel (1).

WING CENTER SECTION LIMITER HOLDER INSTALLATION (Effectivity: All) (Figure 29)

a. Align limiter holder mounting holes with the wing center section electrical equipment panel mounting holes.

b. Secure the limiter holder (2 or 30) to the electrical equipment panel with two mounting screws (29).

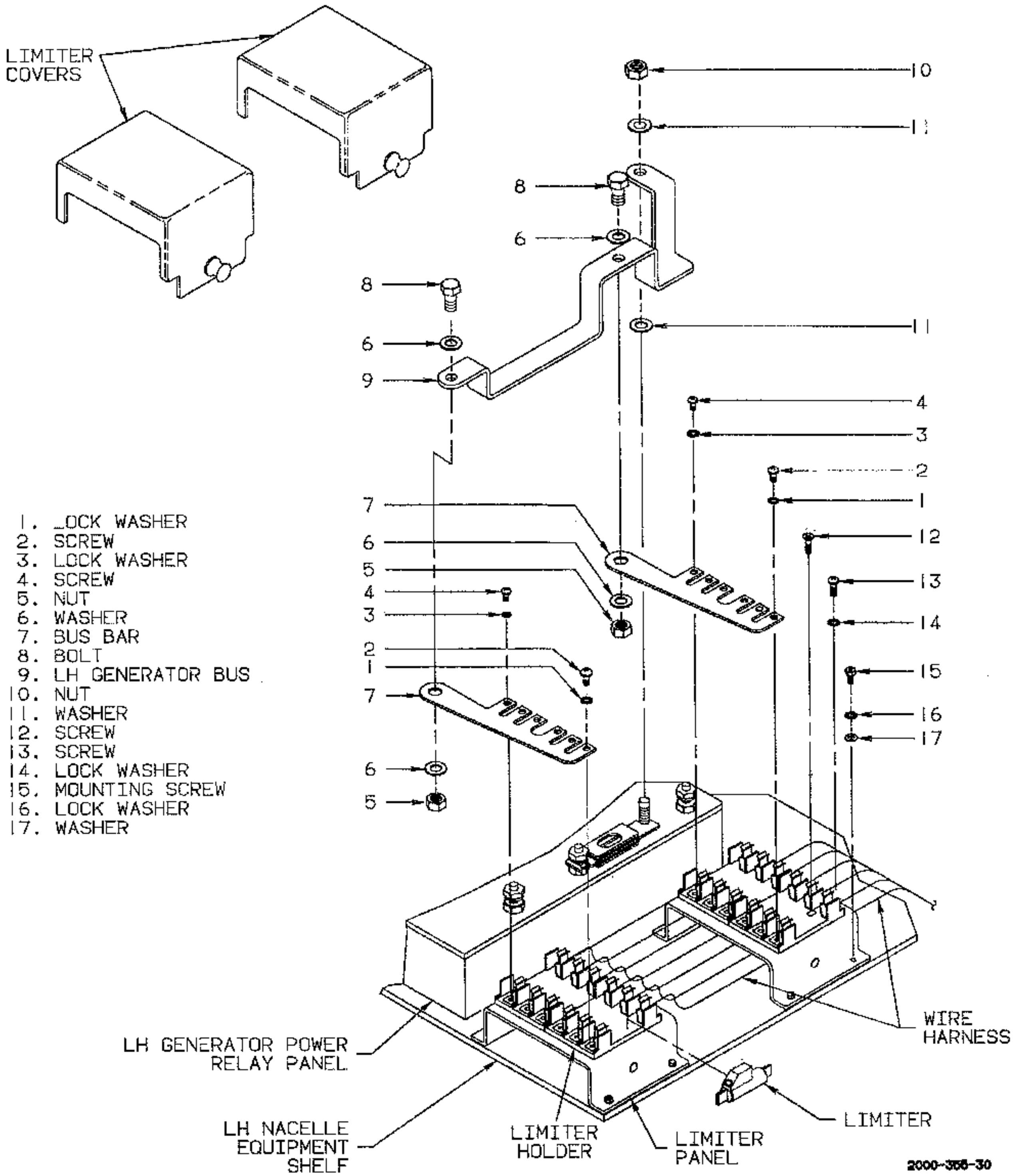
c. Align the applicable bus bar (4 or 26) with the limiter holder (2 or 30) and secure with terminal screws (22 or 24) and lock washers (23 or 25).

d. Attach wiring to the remaining limiter panel terminals according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

e. Install limiters (27 or 28).

f. Attach wiring to the bus bar (4 or 26) with bolt (3), washer (6), lock washer (7) and nut (21).

g. Restore electrical power to the airplane.



Left Generator Limiter Panel Installation (Effectivity: All)
Figure 28

h. Refer to Chapter 53-30-00 and install the aft wing-box shear panel.

TRIPLE-FED BUS DIODE AND HEAT SINK REMOVAL (Effectivity: All) (Figure 29)

a. Refer to Chapter 53-30-00 and remove the aft wing-box shear panel.

b. Remove all electrical power from the airplane.

c. Locate the heat sink (20) adjacent to the limiter holders (2 and 30).

d. Remove nut (17), washer (18) and screw (19) attaching wiring to diode (15).

e. Tag and remove wiring (5).

f. Remove the four screws (16) and washers (14) attaching heat sink (20) to the wing center section electrical equipment panel (1) and pull the heat sink away from the panel to access diode wiring on the opposite side.

g. Remove the nut (8), lock washer (9), wiring (5), washers (10) and insulators (11 and 12) from diode (15).

h. Remove the diode (15) and remaining insulator (11) from the heat sink (20).

TRIPLE-FED BUS DIODE AND HEAT SINK INSTALLATION (Effectivity: All) (Figure 29)

a. Clean all insulator (11 and 12), heatsink (20) and diode (15) contacting surfaces so they are dry and free of oil and grease to provide maximum heat dissipation.

b. Apply thermo joint compound (5, Chart 2, 24-00-00) to the contacting surfaces of the diode (15), heat sink (20) and insulators (11 and 12).

c. Position washer (10) and insulators (11 and 12) on the diode (15), then position the diode (15) and remaining insulator (11) on the heat sink (20).

d. Install washers (10), wiring (5), lock washer (9) and nut (8) on diode.

e. Torque the diode nuts (8) to 25 ±5 inch-pounds and apply a tamper proof sealant (4, CHART 2, 24-00-00) to the diode assembly.

f. Inspect the insulators (13) on the heat sink mounting flange to ensure they are neither loose nor damaged. Replace as necessary.

g. Align insulators (13) with holes in wing center section electrical equipment panel and install four screws (16) and washers (14) securing the heat sink to panel.

h. Attach wiring to diode (15) according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual and secure with screw (19), washer (18) and nut (17).

i. Refer to Chapter 53-30-00 and install the aft wing-box shear panel.

j. Restore electrical power to the airplane.

BUS CONFORMITY CHECK (Effectivity: All)

During normal operation, detection of faulty limiters and diodes in the airplane electrical system is difficult. However, by utilizing the voltmeter and the voltmeter select switches on the center subpanel, an operational check of the airplane bus system may be accomplished. These procedures should be followed after maintenance has been performed on the electrical system.

a. The battery switch should be OFF and the generator bus tie switch in the NORM position. A reading of battery voltage should be obtained when BATT is pressed. A reading of zero volts should be obtained when each of the remaining voltmeter select switches are pressed.

b. Place the battery switch in the ON position.

c. Individually press the TRIP FED and CTR BUS voltmeter select switches. A minimum of 22 volts should be on the triple-fed bus, and a minimum of 23 volts should be on the center bus.

d. Individually press the L GEN and R GEN voltmeter select switches. A reading of zero volts should be displayed for each bus.

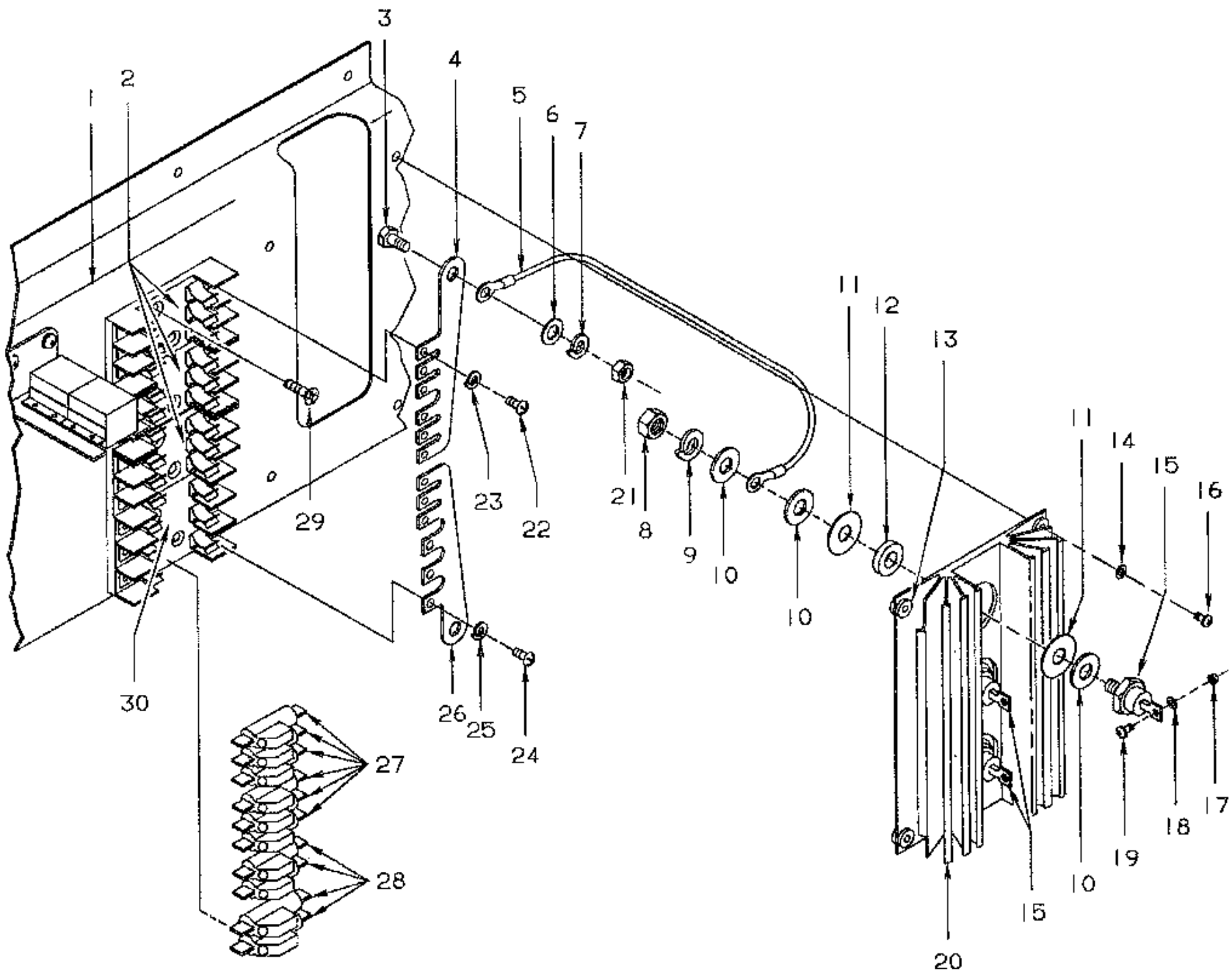
e. Start the RH engine with procedures outlined in the Starship 1 Airplane Flight Manual. Advance the condition lever to RUN and the power lever to 80% N1 speed.

f. Place the RH generator control switch in the RESET position, then release to ON.

g. Start the LH engine with procedures outlined in the Starship 1 Airplane Flight Manual. Advance the condition lever to RUN and the power lever to 80% N1 speed.

h. Individually press the L GEN and R GEN voltmeter select switches. A reading of 27.5 to 29.0 volts should be obtained for both generator buses.

i. Place the generator bus tie switch in the OPEN position. The EICAS yellow L GEN TIE OPEN and R GEN TIE OPEN caution messages should be displayed.



1. WING CENTER SECTION ELECTRICAL EQUIPMENT PANEL
2. LIMITER HOLDERS
3. BOLT
4. TRIPLE-FED BUS
5. TRIPLE-FED BUS WIRING
6. WASHER
7. LOCK WASHER
8. NUT
9. LOCK WASHER
10. WASHER
11. INSULATOR
12. INSULATOR
13. INSULATOR
14. WASHER
15. DIODE
16. MOUNTING SCREW
17. NUT
18. WASHER
19. SCREW
20. HEAT SINK
21. NUT
22. TERMINAL SCREW
23. LOCK WASHER
24. TERMINAL SCREW
25. LOCK WASHER
26. CENTER BUS
27. TRIPLE-FED BUS LIMITERS
28. CENTER BUS LIMITERS
29. SCREW
30. LIMITER HOLDER

2000-355-24

Wing Center Section Electrical Equipment Installation (Effectivity: All)
Figure 29

j. Press the TRIP FED voltmeter select switch. A reading of 26.5 to 28.0 volts should be displayed.

k. Place the LH generator control switch in the RESET position, then release to ON.

l. Place the RH generator control switch in the OFF position. A reading of 26.5 to 28.0 volts should be obtained when the TRIP FED voltmeter select switch is pressed.

m. Place the generator bus tie switch in the NORM position. The EICAS yellow L GEN TIE OPEN and R GEN TIE OPEN caution messages should not be displayed for approximately 2 seconds. After 2 seconds the EICAS yellow L GEN TIE OPEN, R GEN TIE OPEN and BATTERY TIE OPEN caution messages will be displayed for 2 seconds. After 5 seconds no bus tie messages should be displayed.

NOTE

This built-in self-test feature will run through its test any time the battery switch is ON and the generator bus tie switch is moved to NORM from OPEN. It is designed to exercise every component and signal path in the system. Refer to Chapter 24-30-00 if the generator bus ties do not open during the self-test. Suspect a fault of the power distribution PCB if the times are erratic.

n. Place the RH generator control switch in the RESET position, then release to ON.

o. Press the BATT voltmeter select switch. A reading of generator voltage should be displayed.

p. Observe the loads for each starter/generator. Loadmeter indications should be within 10% of each other.

q. Shut down the engines using procedures outlined in the Starship 1 Airplane Flight Manual.

r. Place both generator control switches in the OFF position.

s. If all indications were typical of a normal system as specified in the previous steps, the system has passed the bus conformity check. Any abnormal readings indicate a system fault. Replace any faulty components.

TRIPLE-FED BUS DIODES OPERATIONAL CHECK (Effectivity: All)

Power is fed to the triple-fed bus from both generator buses and the battery bus through three diodes mounted on a heat sink in the wing center section. It is important to verify that continuity, in one direction only, exists through each diode to ensure that the triple-fed bus can be fed by each power source individually, if necessary. The following operational check should coincide with periodic detailed inspections of the airplane.

a. Place the battery switch in the ON position and the generator bus tie switch in the OPEN position. Press the TRIP FED voltmeter select switch. A reading slightly less than battery voltage should be displayed for the triple-fed bus (minimum of 22 volts).

b. Start the RH engine with procedures outlined in the Starship 1 Airplane Flight Manual. Advance the condition lever to RUN and the power lever to 80% N1 speed.

c. Place the RH generator control switch in the RESET position, then release to ON.

d. The battery switch should be in the ON position and the generator bus tie switch should be in the OPEN position. Press the TRIP FED voltmeter select switch. A reading slightly less than generator voltage should be displayed.

e. Press the L GEN voltmeter select switch. A reading of zero should be displayed. If not, suspect a faulty diode between the left generator and triple-fed buses.

f. Press the BATT voltmeter select switch. A reading of battery voltage should be displayed. If generator voltage is displayed when BATT is pressed, suspect a faulty diode between the triple-fed bus and battery power relay panel.

g. Start the LH engine with procedures outlined in the Starship 1 Airplane Flight Manual. Advance the condition lever to RUN and the power lever to 80% N1 speed.

h. Place the LH generator control switch in the RESET position, then release to ON. Place the RH generator control switch in the OFF position.

i. Press the TRIP FED voltmeter select switch. A reading slightly less than generator voltage should be displayed on the voltmeter. When the R GEN voltmeter select switch is pressed a reading of zero should be displayed.

j. Shut the engines down with procedures outlined in the Starship 1 Airplane Flight Manual.

k. Place the LH generator control switch in the OFF position.

l. If all checks had normal indications the triple-fed bus diodes are functioning correctly. If any abnormal readings were present replace the affected diode as outlined under TRIPLE-FED BUS DIODE AND HEAT SINK REMOVAL in this chapter.

CHAPTER 25 - EQUIPMENT/FURNISHINGS

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CHAPTER 25 - EQUIPMENT/FURNISHINGS

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CHAPTER 25 - FURNISHINGS

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CHAPTER 25 - FURNISHINGS

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GENERAL - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

The equipment/furnishings consist of upholstery paneling, carpeting, crew and passenger seating, refreshment cabinets, baggage compartments, and lavatory facilities.

Chapter 25-10-00 describes the flight compartment headliner, upholstery panels, sunvisors, map case, carpet, and trim installation and removal. Crew seat operation, removal and installation is also provided here.

Chapter 25-20-00 describes the cabin compartment upholstery panels, headliners, forward baggage compartment, refreshment cabinets, tables, and entrance and emergency exit installation and removal. Passenger seat and lavatory facilities removal and installation are also provided here.

Chapter 25-50-00 describes the aft baggage compartment upholstery, headliner, partition, webbing, and aft toilet cabinet removal and installation.

Chapter 25-60-00 describes the emergency locator transmitter (ELT) used to locate the airplane in the event of a crash or emergency landing. Maintenance procedures for the ELT include battery removal and replacement, ELT testing procedures, and the removal and installation of the ELT in the airplane.

RECOMMENDED MATERIALS (Effectivity: All)

The recommended materials listed in Chart 1 as meeting federal, military or vendor specifications are provided for reference only and are not specifically prescribed by Beech Aircraft Corporation. Any product conforming to the specification listed may be used. The products included in these charts have been tested and approved for aviation usage by Beech Aircraft Corporation, by the vendor, or by compliance with the applicable specifications. Generic or locally manufactured products which conform to the requirements of the specification listed may be used even though not included in the charts. Only the basic number of each specification is listed. No attempt has been made to update the listing to the latest revision. It is the responsibility of the technician or mechanic to determine the current revision of the applicable specification prior to usage of the product listed. This can be done by contacting the vendor of the product to be used.

CHART 1
RECOMMENDED MATERIALS (Effectivity: All)

MATERIAL	SPECIFICATION	PRODUCT	VENDOR
1. Cleaning Solvent	TT-N-95	Naptha	Locally available
2. Adhesive		EC1368	Minnesota Mining & Manufacturing Co., 900 Bush Ave. St. Paul, MN 55144
3. Adhesive Double Tack Back Tape		445	Minnesota Mining & Manufacturing Co., 900 Bush Ave. St. Paul, MN 55144

COCKPIT - DESCRIPTION AND OPERATION

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

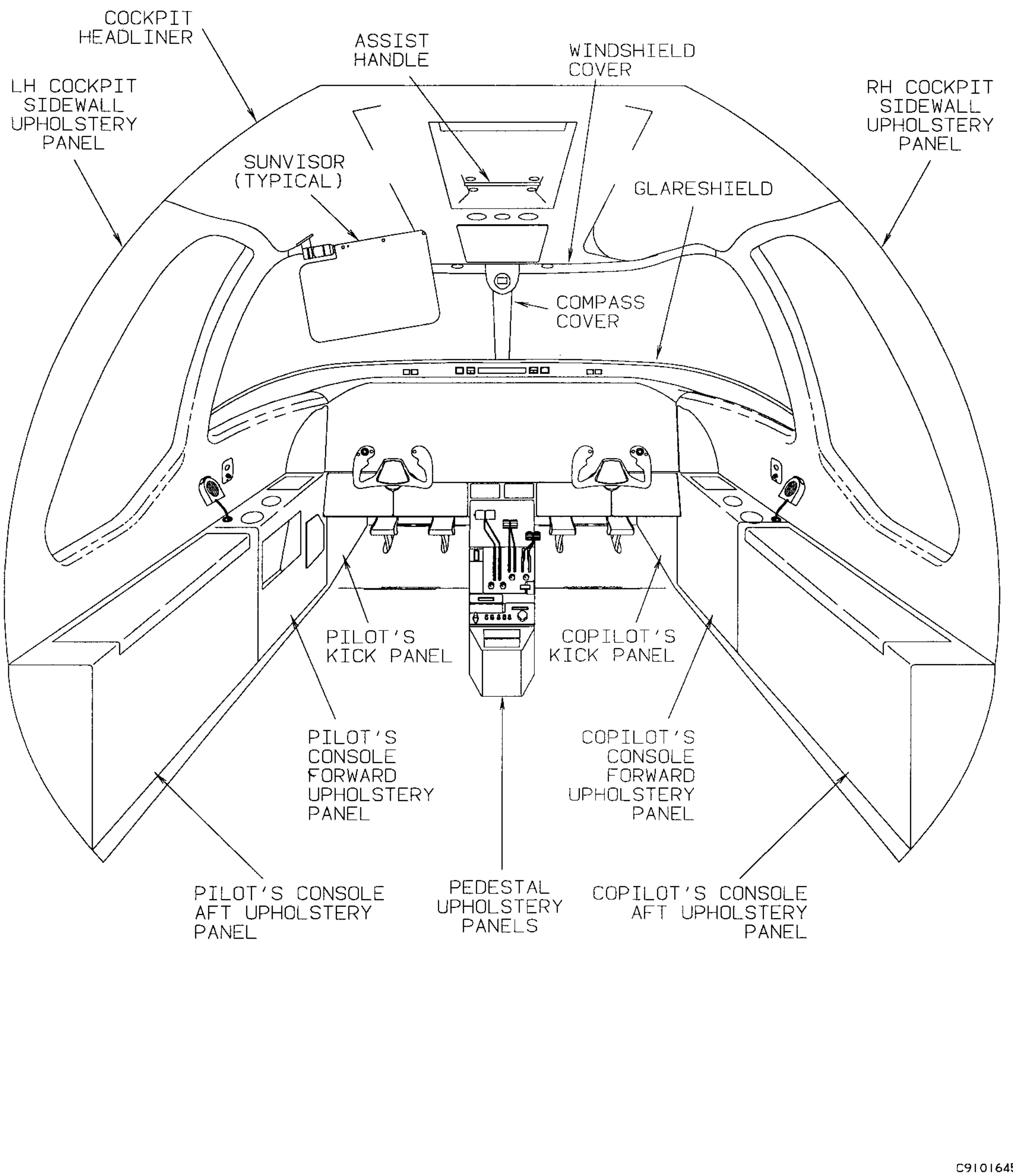
The cockpit upholstery is comprised of the consoles forward and aft upholstery panels, the LH and RH upper sidewall upholstery panels, the headliner, glareshield, compass cover, windshield frame cover, sunvisors, map case, kick panels, pedestal upholstery panels, rudder pedal brushes, crew seats and carpet.

The pilot and copilot seats are mounted on seat tracks to allow for horizontal adjustment. The seat tracks incorporate holes for the locking pins to lock into and hold the crew seat in the desired position. A handle grip mounted under the seat pan disengages the seat track locking pins to allow horizontal adjustment. Seat stops are bolted to the ends of the four seat tracks to ensure that any horizontal seat movement is limited to a specific area. The crew seat assemblies also incorporate a vertical adjustment which is controlled by a handle grip adjacent to the seat locking-pin handle grip under the seat pan. An adjustment knob lever on the end of each armrest facilitates vertical adjustment of the armrests.

Eight upholstery sidepanels are installed on the pedestal assembly. They are installed four per side from the forward end aft in the following order: the pedestal upholstered kick panel, upper pedestal upholstery panel, lower pedestal upholstered sidepanel and the pedestal upholstered sidepanel. A pedestal extension upholstery panel closes out the aft end of the pedestal, and two covers are installed on the pedestal trim control panels.

The cockpit headliner covers the cockpit ceiling from the windshield frame cover aft, where it meets the vestibule. The windshield frame cover trims out the upper windshield frame and forward edge of the headliner. A sunvisor assembly is installed on each outboard end of the windshield cover. The sunvisors incorporate a swivel fitting and slide rail for easy adjustment and stowage. The compass cover trims the compass directly below the windshield cover, then extends downward the length of the windshield center post and behind the glareshield assembly. A glareshield assembly and two deck extensions are installed over the instrument panel to prevent sunlight from directly striking the annunciators and display units. The glareshield assembly and deck extensions overlap the cockpit sidewall upholstery panels at the aft outboard edges.

The cockpit upper sidewall upholstery panels overlap the outboard edges of the cockpit headliner, trim out the cockpit window side posts, and slide behind the console forward and aft upholstery panels. The console aft upholstery panels extend past the lower end of the console structure and attach with dual lock fasteners. A hinged door on the console aft upholstery panel provides access to the desired circuit breaker panel without removal of the upholstery panel. The console forward upholstery panels extend upward from the cockpit carpet and overlap the cockpit sidewall upholstery panels. The forward end of each console forward upholstery panel is flush with the outboard kick panel and the aft end is overlapped by the console aft upholstery panel. The cockpit oxygen compartment lid and oxygen mask assemblies, ashtrays, cupholders and microphones are installed on the console forward upholstery panels. The pilot's console forward upholstery panel also includes a map case and trims out the auxiliary circuit breaker panel. Like the console aft upholstery panels, the forward panels are attached by dual lock fasteners.



Cockpit upholstery
Figure 1

COCKPIT - MAINTENANCE PRACTICES

CREW SEAT REMOVAL

a. Lower the crewseat to its lowest position and place the armrest in the up position. Refer to Figure 2.

b. Refer to SEAT STOP REMOVAL and remove the forward seat stops from the seat tracks.

c. Squeeze the handle grip mounted under the seat pan to release the seat adjustment lock pins from the seat track locking holes.

NOTE

It may be necessary to move the armrest up and turn the seat on its side to provide adequate clearance to maneuver the seat from the cockpit and out the cabin door.

d. Slide the crew seat assembly forward until it clears the seat tracks, then remove it from the airplane.

CREW SEAT INSTALLATION

NOTE

It may be necessary to move the armrest up and turn the seat on its side to provide adequate clearance to maneuver the seat through the cabin door and into the cockpit.

a. Position the seat in the cockpit just forward of the seat tracks and align the seat guides with the seat tracks. Refer to Figure 2.

b. Squeeze the handle grip mounted under the seat pan to retract the seat track lock pins, then slide the seat aft until it reaches the desired position. Release the handle to engage the lock pins and verify that the seat locks into place.

c. Refer to SEAT STOP INSTALLATION and install the seat stops.

SEAT TRACK-POSITION LOCK PIN REMOVAL

a. Refer to CREW SEAT REMOVAL procedures and remove the desired seat from the airplane.

NOTE

The seat position lock pin (7) is under spring pressure. Provide a means of retaining the hardware during disassembly.

b. Remove the cotter pin (3) and washer (4). Refer to Figure 2.

c. Pull the pin (1) to disconnect the seat position lock pin (7) from the cable assembly (2).

d. Remove the seat-position lock pin (7) and spring (6) from the lower seat frame (5).

SEAT TRACK-POSITION LOCK PIN INSTALLATION

a. Position the spring (6) on the seat position lock pin (7) and insert the assembly into the lower seat frame (5) until it protrudes through the opposite end and is aligned with the cable assembly (2). Refer to Figure 2.

b. Install the pin (1) and washer (4), then secure with cotter pin (3).

c. Refer to CREW SEAT INSTALLATION procedures and reinstall the crew seat assembly.

SEAT VERTICAL-POSITION LOCK PIN REMOVAL

a. Refer to CREW SEAT REMOVAL and remove the desired crew seat assembly.

NOTE

The vertical seat position lock pin (12) is under spring pressure. Provide a means of retaining the hardware during disassembly.

b. Remove the cotter pin (9) and washer (10). Refer to Figure 2.

c. Remove the pin (8) and cable end from the seat-position lock pin (12).

d. Remove the screws (30) and washers (29) attaching the retainer block (27) to the slide (28).

e. Remove the vertical seat- position lock pin (12) and spring (11) from the retainer block (27).

SEAT VERTICAL-POSITION LOCK PIN INSTALLATION

a. Install the spring (11) on the vertical seat position lock pin (12), then insert the pin and spring assembly into the retainer block (27). Refer to Figure 2.

b. Align the retainer block (27) with the slide (28) and secure with washers (29) and screws (30).

c. Align the cable end with the lock pin (12) and install the retainer pin (8) and washer (10), then secure with cotter pin (9).

d. Refer to CREW SEAT INSTALLATION and reinstall the crew seat in the airplane.

HANDLE GRIP ASSEMBLY REMOVAL AND CABLE DISCONNECTION

a. Refer to CREW SEAT REMOVAL and remove the desired seat from the airplane.

b. Remove the bolts (18), washers (15) and nuts (16) attaching the frame halves (13 and 14), and separate them to facilitate access to the cable attachment hardware. Refer to Figure 2.

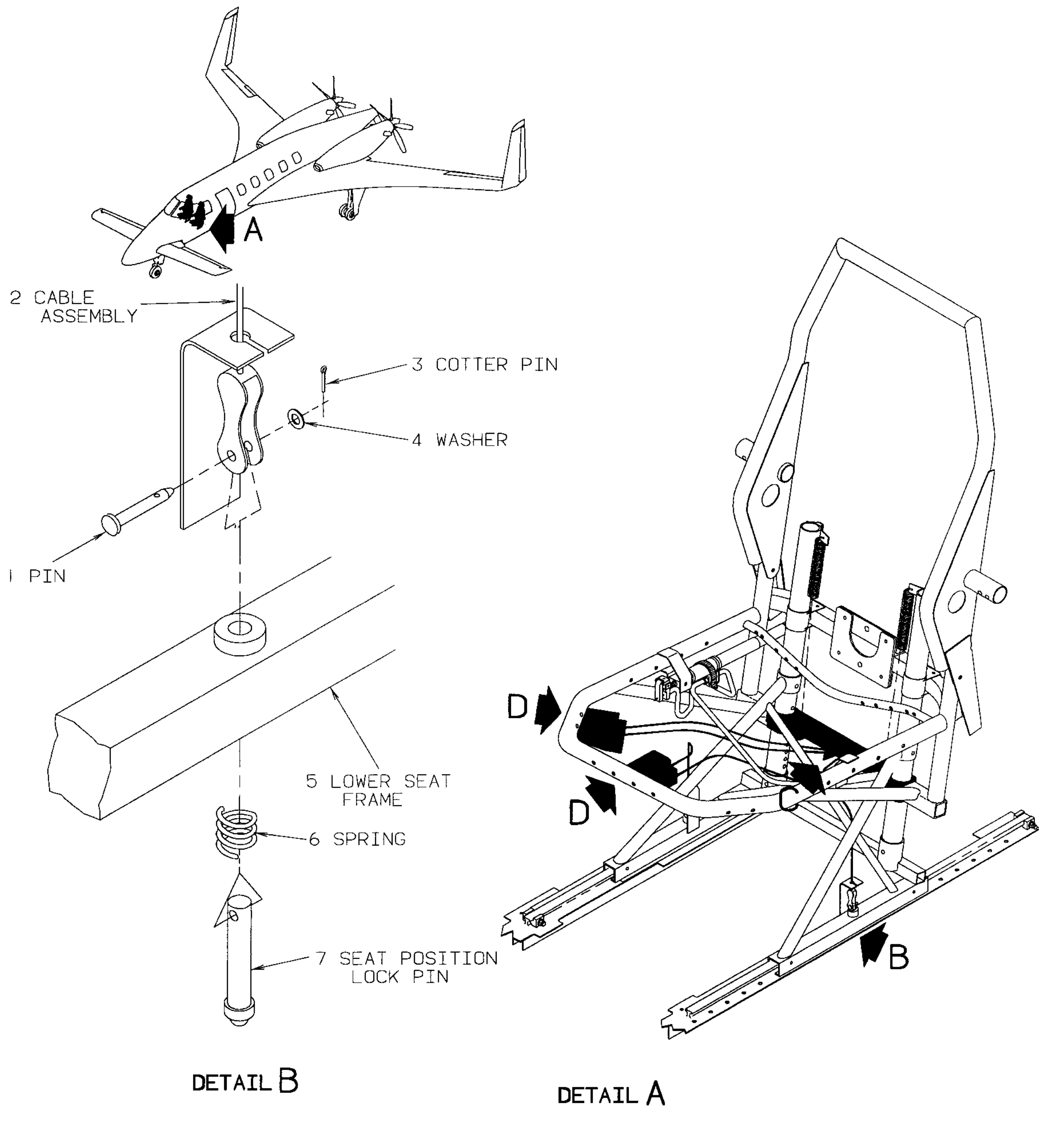
c. Remove the nuts (25), washers (23 and 24) and nuts (22) from the cable assembly (17).

d. Remove the jam nut (21) and washer (20) from the cable assembly (17), then remove it from the doubler (19).

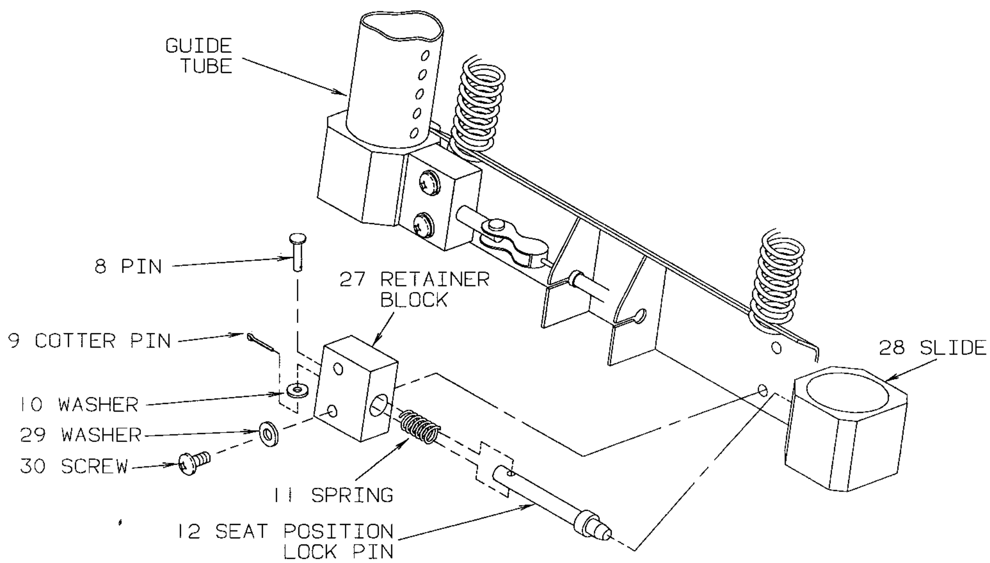
HANDLE GRIP ASSEMBLY INSTALLATION AND CABLE CONNECTION

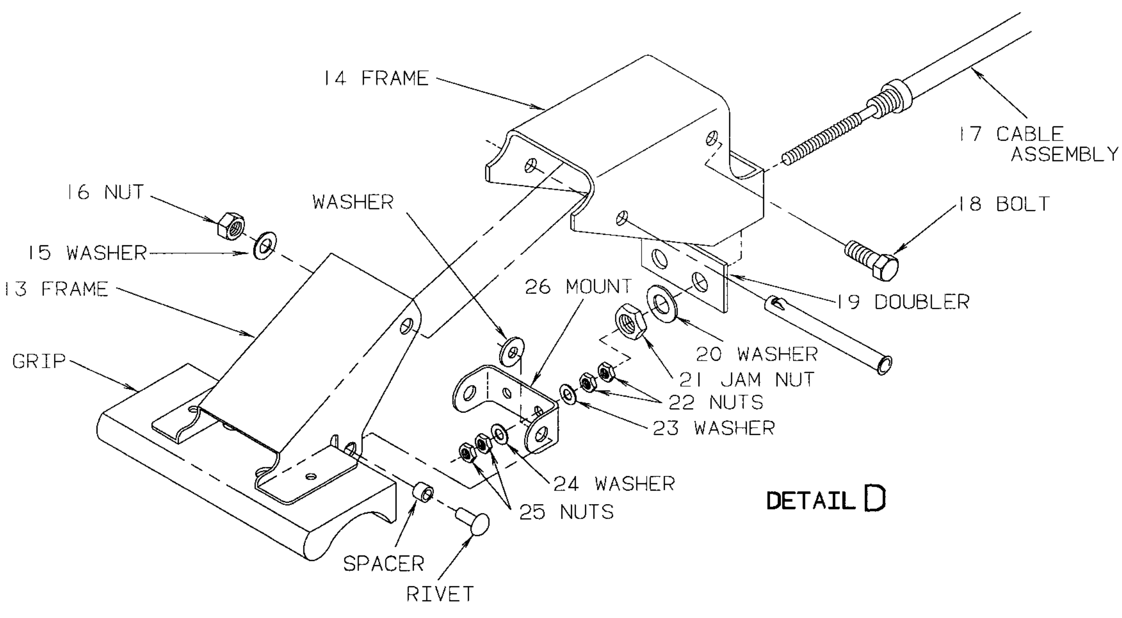
a. Align the cable assembly (17) with the doubler (19) and secure with washer (20) and jam nut (21). Refer to Figure 2Figure 3.

b. Install the nuts (22), washers (23 and 24) and nuts (25) to attach the cable assembly (17) to the mount (26).



Crew Seat Assembly Installation (Sheet 1 of 2)
Figure 2





Crew Seat Assembly Installation (Sheet 2 of 2)
Figure 2

c. Align the frame halves (13 and 14) and install the bolts (18), washers (15) and nuts (16).

NOTE

When the seat-track lock pin-cable is adjusted to its proper length, the locking pins (seat track), should be flush with, or no more than .050 inch above, the lower surface of the chair frame when the handle grip is held against the handle stop. If not, adjust the cable length to attain the proper clearance

d. Refer to CREW SEAT INSTALLATION and install the crew seat.

SEAT STOP REMOVAL

a. Remove the nut from the screw attaching the seat stop to the seat track. Refer to Figure 3.

b. Remove the screw and remove the two seat stop halves.

c. Repeat steps a and b for the remaining seat stops

SEAT STOP INSTALLATION

NOTE

The aft seat stops are installed in the aft of the two aft seat stop mounting holes as shown by Detail B of Figure 3.

a. Align the seat stop halves with the seat track. Refer to Figure 3.

b. Install the screw, washer and nut to secure the stop to the seat track.

WARNING

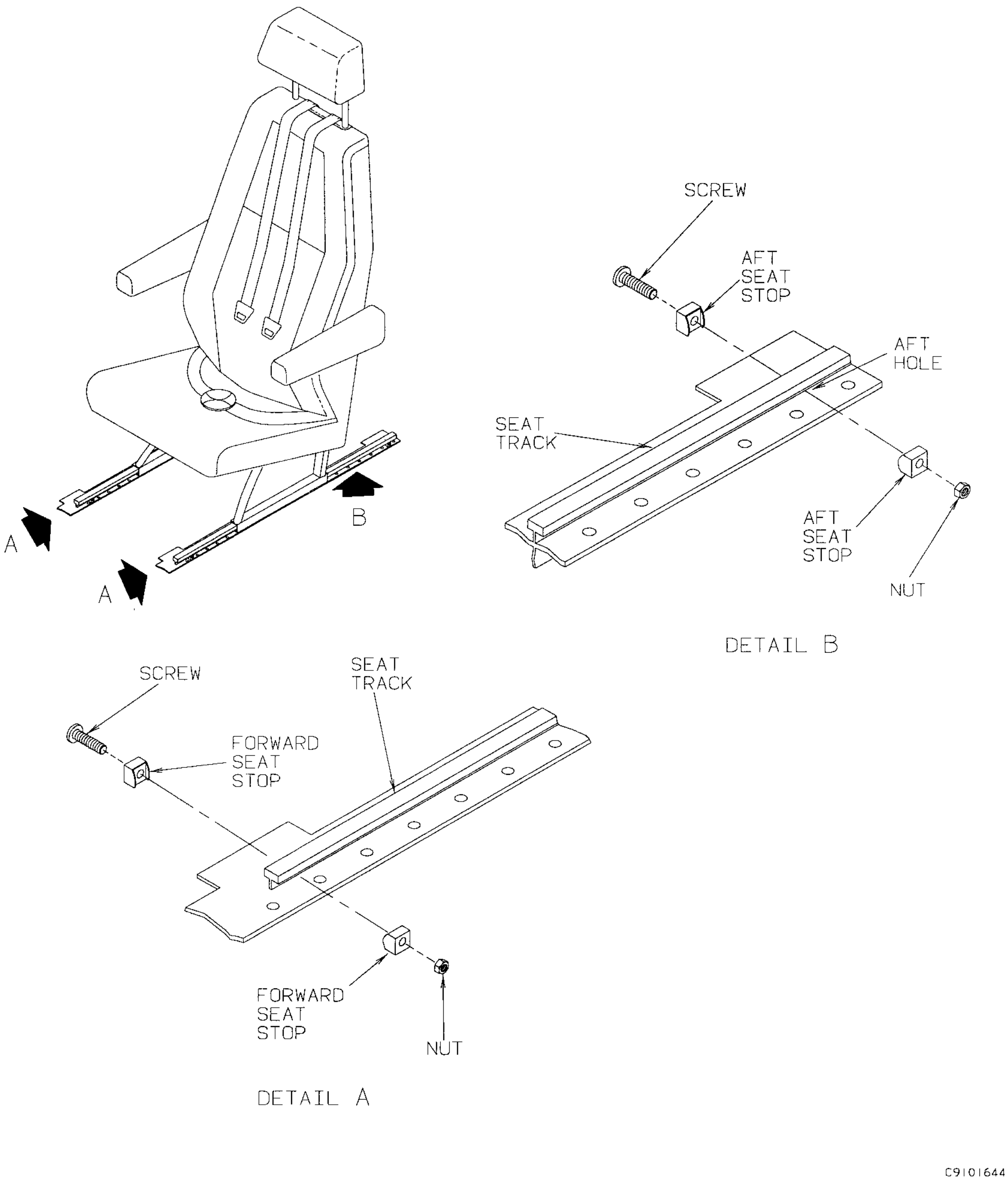
Verify that the seat stops are properly secured to the seat tracks.

CREW SEAT COMPONENT WEAR LIMITS

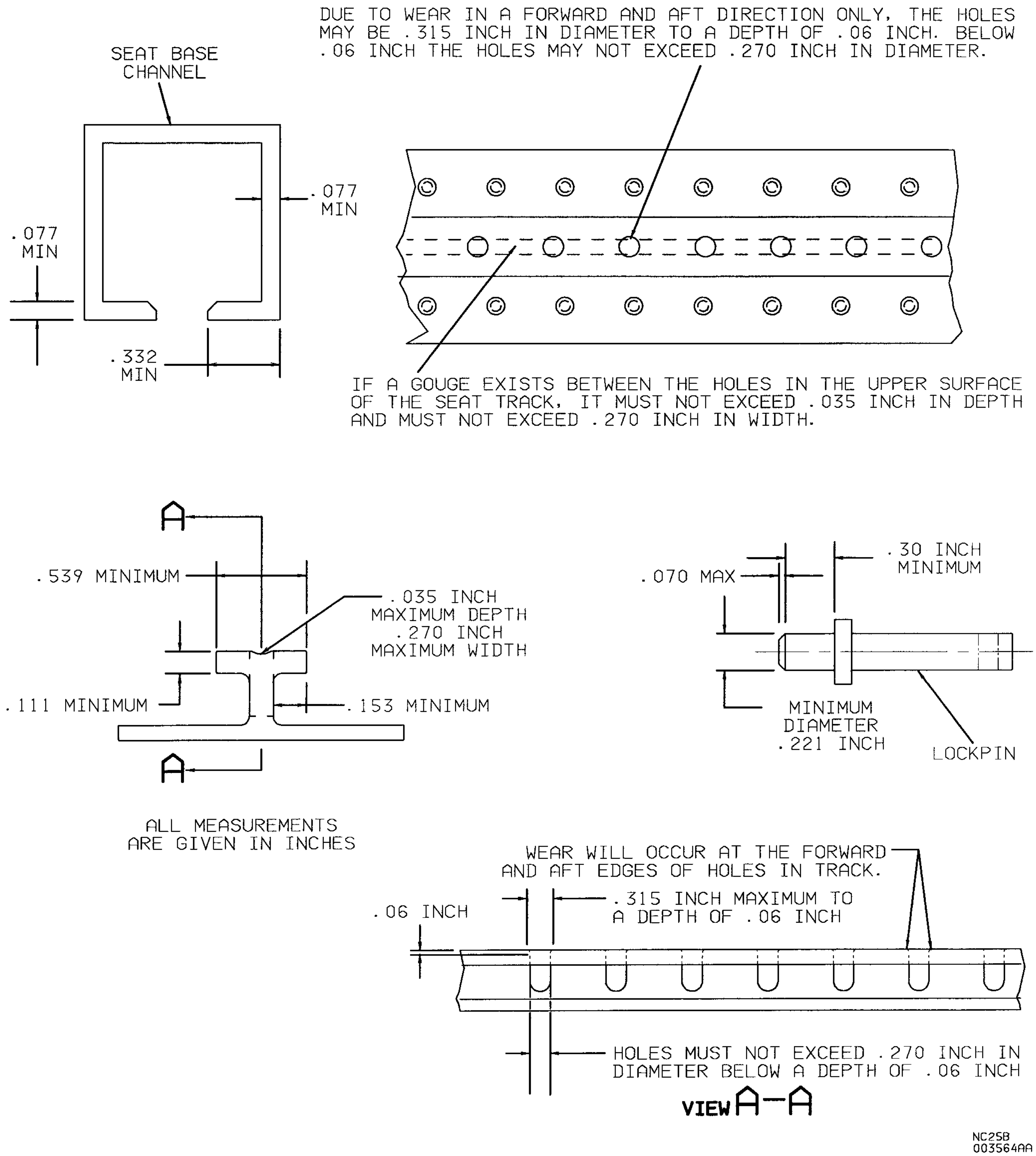
Excessive wear of certain seat attach components may cause the crew seat to become unstable. Therefore, wear limits have been established for these components. The components affected include the seat base channel, seat lock pins and the seat tracks. If any one part exceeds any one of the limits set for that part it must be replaced. The maximum wear limits are illustrated in Figure 4

SEAT BELT INSPECTION

Contact manufacturer of the seat belts and shoulder harnesses installed in aircraft for inspection information.



Seat Stop Installation
Figure 3



Crew Seat Wear Limits
Figure 4

COCKPIT CARPET REMOVAL

a. Refer to CREW SEAT REMOVAL and remove crew seats as necessary.

b. Pull upward on the edge of the carpet to release the double-backed tape securing the carpet to the floor panel of the cockpit. Refer to Figure 5.

c. Remove the carpet from the airplane.

COCKPIT CARPET INSTALLATION

NOTE

All cockpit carpeting is installed using strips of double-backed tape (3, Chart 1, 25-00-00) positioned on the back of the carpet in the areas outlined in Figure 5. If new tape is to be installed the tape contacting surfaces must be cleaned with cleaning solvent (1, Chart 1, 25-00-00) to remove dust, oil, fingerprints or other contaminants.

a. Position the carpet over the cockpit floor panel.

b. Press firmly on the carpet areas where the tape is positioned to adhere the tape to the cockpit floor panel.

c. Refer to CREW SEAT INSTALLATION and install the seats as necessary.

COCKPIT HEADLINER REMOVAL

a. Remove all electrical power from the airplane

b. Refer to Chapter 33-10-00 and remove the electroluminescent panel.

c. Remove the screw caps and screws attaching the upper portion of the compass cover, then lower it enough to remove the windshield cover and headliner (1). Refer to Figure 6.

d. Refer to WINDSHIELD COVER REMOVAL and remove the windshield cover.

e. Remove the four screws (5) and washers (6) attaching the assist handle (4) to the fuselage.

f. Remove the screw caps (3) from the remaining headliner attaching screws (2).

g. Remove the remaining screws (2) and slowly lower the headliner assembly (1) to allow disconnection of the air distribution ducts (7) from the eyeball outlets.

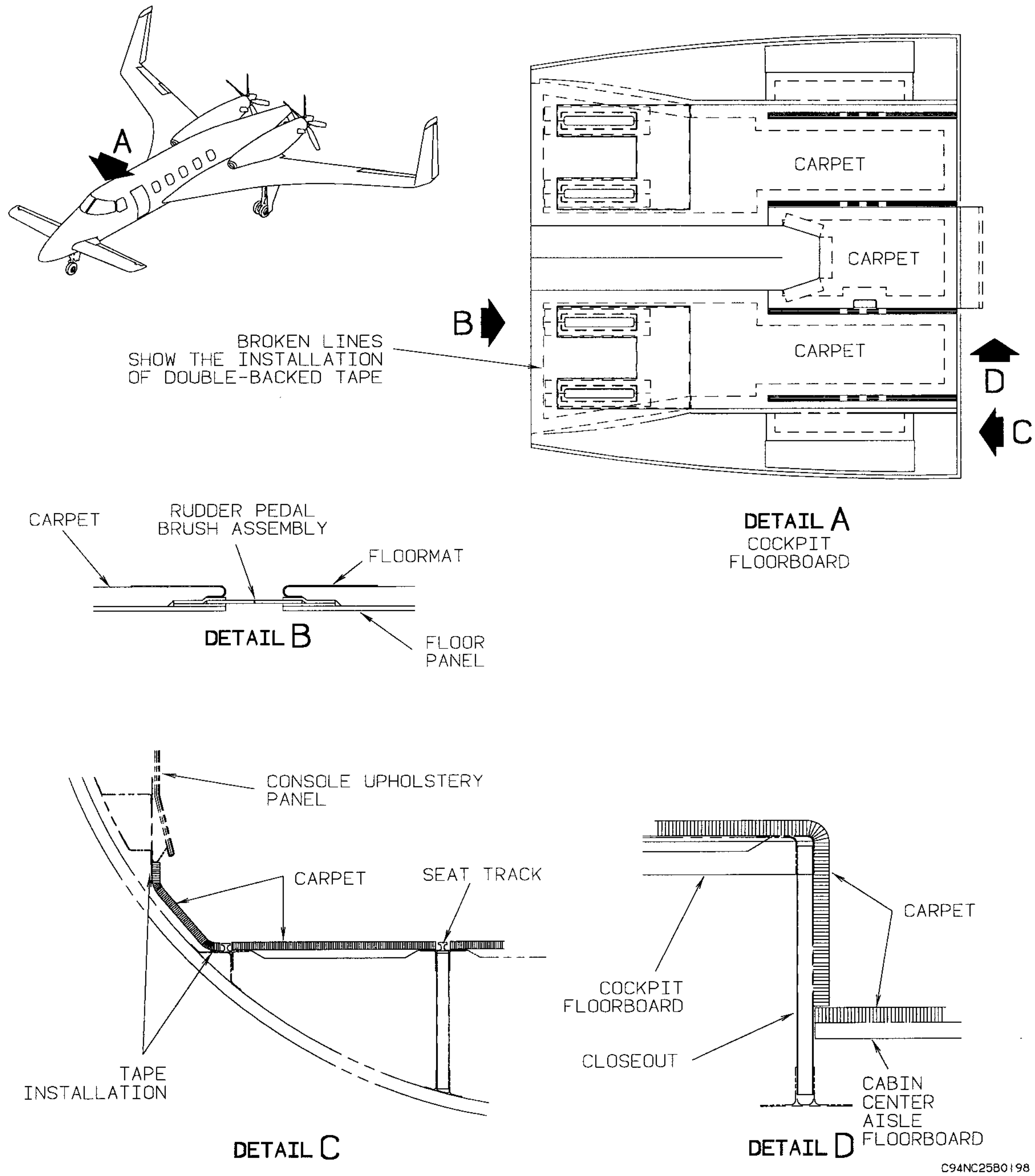
h. Disconnect the air distribution (7) ducts from the eyeball outlets.

i. Tag and disconnect all electrical wiring from the speakers, storm light and floodlight.

j. Lower the headliner assembly (1) until it clears the overhead panel assembly, then remove the headliner (1) from the airplane.

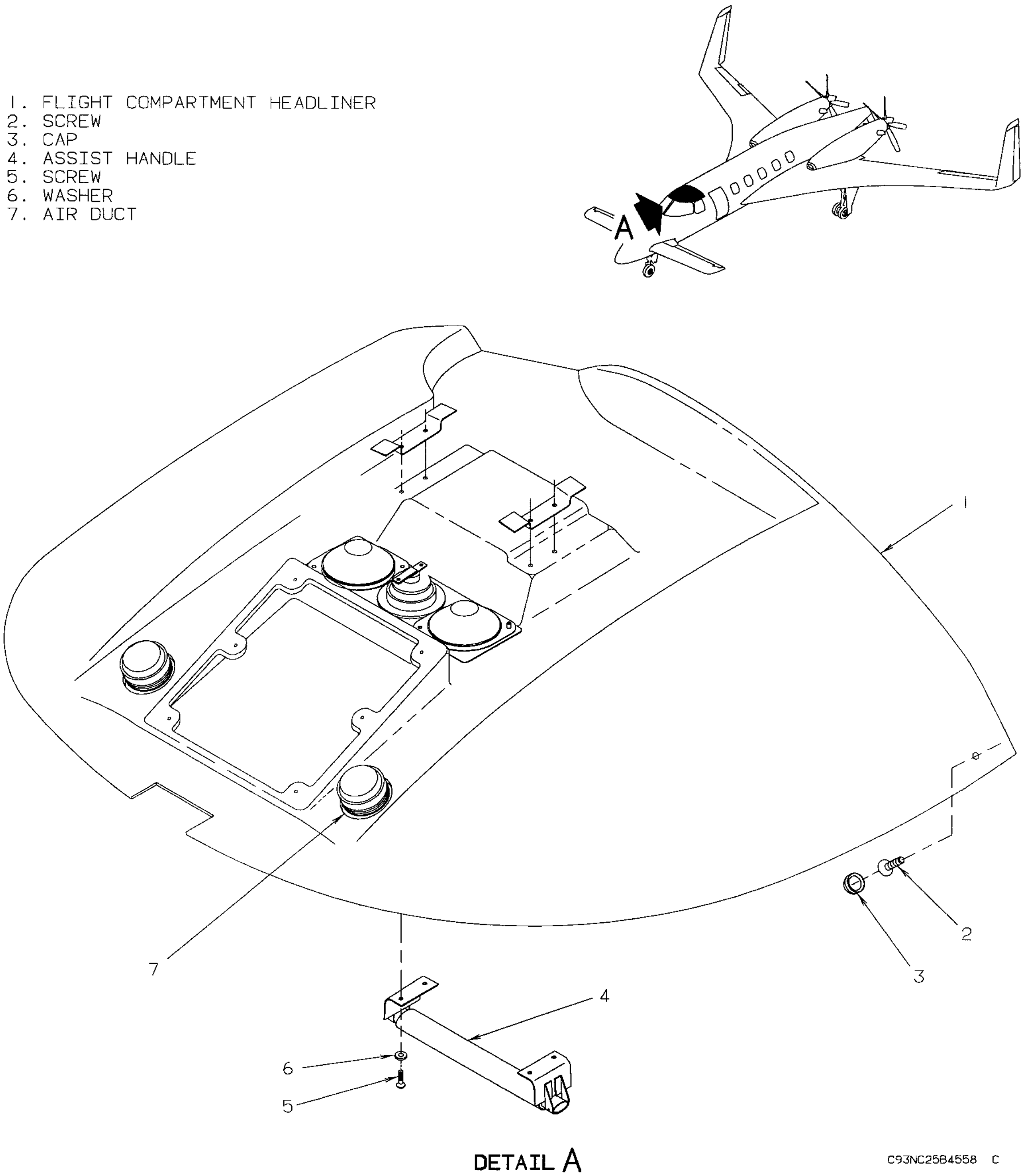
COCKPIT HEADLINER INSTALLATION

a. Position the headliner (1) around the overhead panel assembly and connect the electrical wiring to the storm light, floodlight and speakers according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual. Refer to Figure 6.



Cockpit Carpet Installation
Figure 5

1. FLIGHT COMPARTMENT HEADLINER
2. SCREW
3. CAP
4. ASSIST HANDLE
5. SCREW
6. WASHER
7. AIR DUCT



Cockpit Headliner Installation
Figure 205

b. Connect the air distribution ducts (7) to their respective eyeball outlets.

NOTE

The cockpit headliner edges are overlapped by the upper sidewall upholstery panels, windshield cover and compass cover. The aft RH corner of the headliner fits between the map case and upper fuselage when properly installed.

c. Install the screws (2) and caps (3) at the headliner (1) aft edges.

d. Install the assist handle (4) attaching screws (5) and washers (6).

e. Refer to WINDSHIELD COVER INSTALLATION and install the windshield cover.

f. Position the compass cover over the headliner and windshield cover, then secure with screws and install the screw caps (3).

g. Refer to Chapter 33-10-00 and install the electroluminescent panel

h. Restore electrical power to the airplane.

CONSOLE AFT UPHOLSTERY PANEL REMOVAL

NOTE

Removal of the pilot's and copilot's console aft upholstery panels is typical.

a. Remove all electrical power from the airplane.

b. Refer to CREW SEAT REMOVAL and remove the seat(s).

c. Carefully pull on the lower edge of the console to release the lower dual lock (velcro-type) fasteners securing the lower portion of the console aft upholstery panel to the console structure. Refer to Figure 7.

d. Carefully pull upward on the console aft upholstery panel to release the remaining upper dual lock fasteners.

e. Tag and disconnect electrical wiring from the microphone jack assembly.

f. Remove the console aft upholstery panel from the airplane.

CONSOLE AFT UPHOLSTERY PANEL INSTALLATION

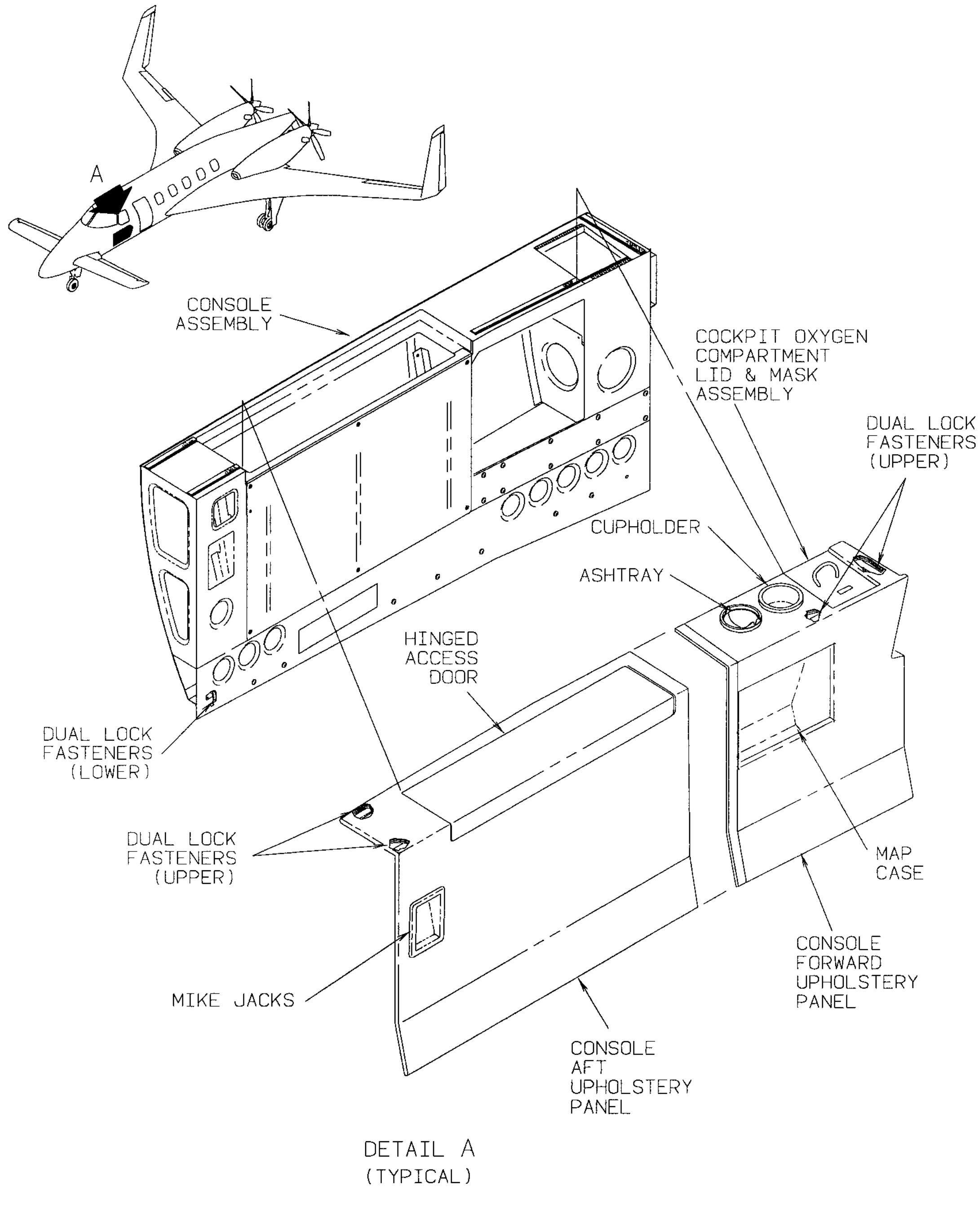
NOTE

Installation of the pilot's and copilot's console aft upholstery panels is typical.

a. Align the console aft upholstery panel with the console structure and reconnect electrical wiring to the microphone jack assembly as tagged. Refer to Figure 7.

b. Firmly press the upholstery panel in place after ensuring that the upper dual lock (velcro-type) fasteners are properly aligned.

c. Firmly press on the lower side of the upholstery panel to mate the lower dual lock fasteners.



Console Forward and Aft Upholstery Panels Installation
Figure 7

d. Refer to CREW SEAT INSTALLATION and install the seat(s).

e. Restore electrical power to the airplane.

CONSOLE FORWARD UPHOLSTERY PANEL REMOVAL

NOTE

Removal of the console forward upholstery panels is typical.

a. Refer to CREW SEAT REMOVAL and remove the seat(s).

b. Refer to CONSOLE AFT UPHOLSTERY PANEL REMOVAL and remove the console aft upholstery panel.

c. Refer to Chapter 35-10-00 and remove the cockpit oxygen compartment lid assembly.

d. Disconnect the microphone cable at the microphone.

e. Remove the cupholder and ashtray and remove the screw under the cupholder and ashtray area.

f. Carefully pull on the lower edge of the console forward upholstery panel to release the lower dual lock (velcro-type) fasteners that secure the lower portion of the console upholstery panel to the console structure. Refer to Figure 7.

g. Carefully pull up on the upholstery panel until the upper dual lock fasteners release.

h. Carefully pull up on the upholstery panel until the upper dual lock fasteners release.

CONSOLE FORWARD UPHOLSTERY PANEL INSTALLATION

NOTE

Installation of the console forward upholstery panels is typical.

a. Position the console forward upholstery panel above the console assembly. Refer to Figure 7.

b. Align the console forward upholstery panel assembly with the dual lock fasteners, then firmly press down on the exterior to ensure that the fasteners are properly mated.

c. Press firmly on the lower portion of the upholstery panel to lock the lower set of dual lock fasteners.

d. Install the screw under the cupholder and ashtray area and then install the cupholder and ashtray.

e. Connect the microphone cable to the microphone.

f. Refer to Chapter 35-10-00 and install the cockpit oxygen compartment lid assembly.

g. Refer to CONSOLE AFT UPHOLSTERY PANEL INSTALLATION and install the console aft upholstery panel.

h. Refer to CREW SEAT INSTALLATION and install the seat(s).

COCKPIT SIDEWALL UPHOLSTERY PANEL REMOVAL (NC-4 THRU NC-14 AND NC-18 AND AFTER)

NOTE

Removal of the LH and RH cockpit sidewall upholstery panels is typical.

NOTE

Refer to Figure 8 to locate the upholstery attaching screws on airplanes NC-4 thru NC-14 and to Figure 9 to locate the upholstery attaching screws on NC-18 and After.

a. Remove the microphone from the hook.

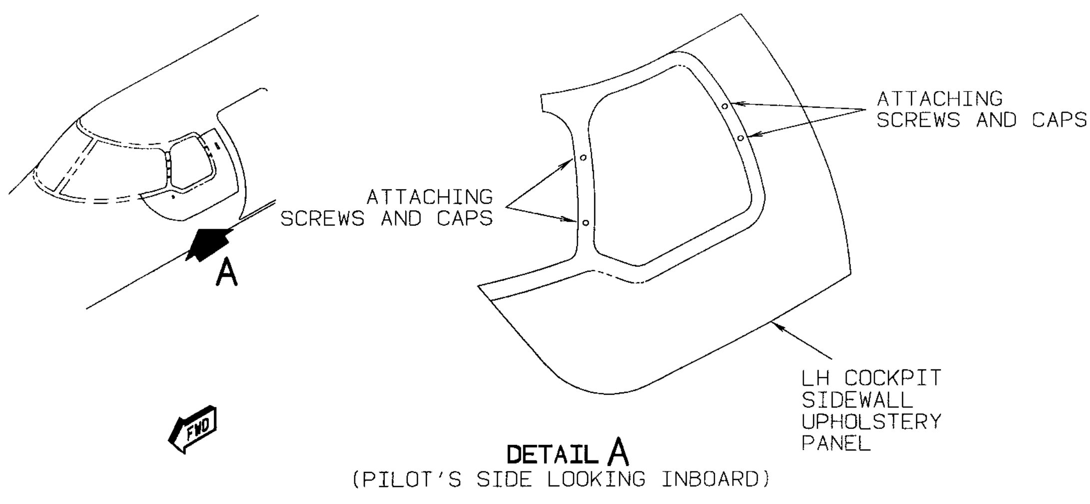
b. Refer to Chapter 33-10-00 and remove the map light assembly from the upholstery panel.

c. Remove the caps from the two screws that attach the headliner outboard edges directly above the sidewall upholstery panels, then remove the two screws.

d. Remove the screw caps from the remaining attaching screws.

e. Remove the four remaining attaching screws from the sidewall upholstery panel.

f. Remove the cockpit sidewall upholstery panel from the airplane by pulling upward and aft to clear the glareshield deck extension and the console upholstery panels.



Cockpit Sidewall Upholstery Panel Installation (NC-4 thru NC-14)
Figure 8

COCKPIT SIDEWALL UPHOLSTERY PANEL INSTALLATION (NC-4 THRU NC-14 AND NC-18 AND AFTER)

NOTE

Installation of the LH and RH cockpit sidewall upholstery panels is typical.

NOTE

Refer to Figure 8 to locate the upholstery attaching screws on airplanes NC-4 thru NC-14 and to Figure 9 to locate the upholstery attaching screws on NC-18 and After

a. Position the cockpit sidewall upholstery panel so that it extends behind the glareshield, headliner and both console upholstery panels.

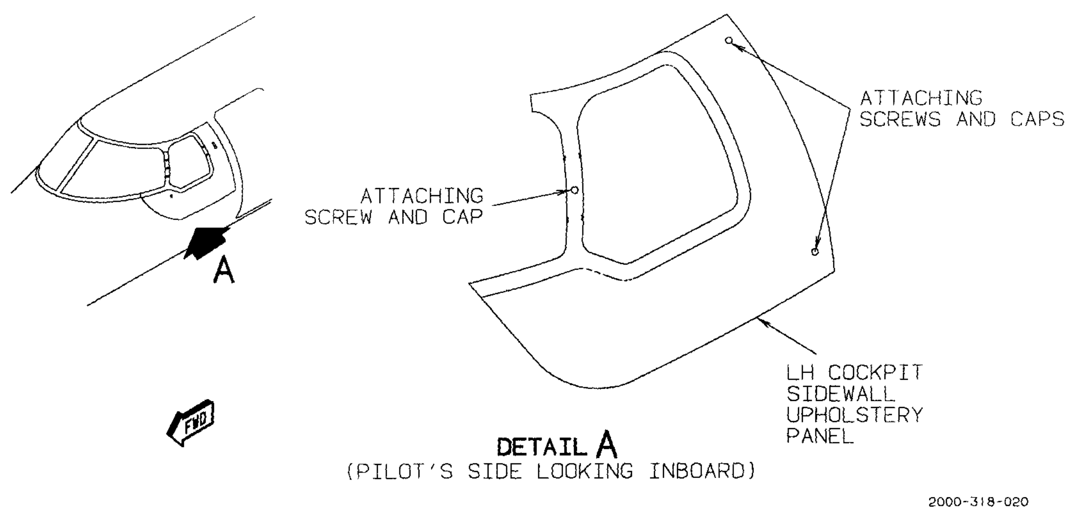
b. When properly positioned, secure the upholstery panel to the cockpit sidewall by installing the attaching screws.

c. Install the caps on the attaching screws.

d. Install the two screws and screw caps that secure the outboard edges of the headliner directly above the sidewall upholstery panels.

e. Place the mike back on its hook.

f. Refer to Chapter 33-10-00 and reinstall the map light assembly.



Cockpit Sidewall Upholstery Panel Installation (NC-18 and After)
Figure 9

COCKPIT SIDEWALL UPHOLSTERY PANEL REMOVAL (NC-15, NC-16 AND NC-17)

NOTE

The RH cockpit sidewall upholstery panels are a split-panel design which requires removal of the RH sidewall upholstery panel closeout before the RH forward sidewall upholstery panel can be removed.

a. Refer to CREW SEAT REMOVAL and remove the seat(s).

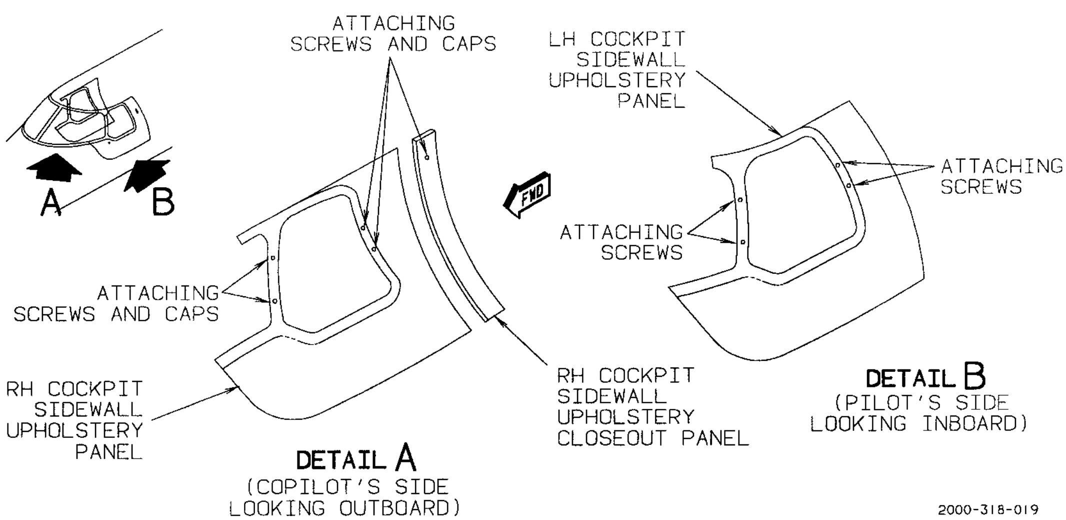
b. Remove the microphone from the hook.

c. Refer to Chapter 33-10-00 and remove the map light assembly from the upholstery panel.

d. Refer to Chapter 33-10-00 and remove the map light assembly from the upholstery panel.

e. To remove the LH cockpit sidewall upholstery panel, remove the screw caps and screws, then remove the upholstery panel from the airplane by pulling upward and aft to clear the glareshield deck extension and console upholstery panels. Refer to Figure 10.

f. To remove the RH cockpit sidewall upholstery panel, remove the remaining screw caps and screws from both panels and remove the RH sidewall upholstery panel closeout first. After removal of the upholstery panel closeout, there should be adequate clearance to slide the RH forward sidewall upholstery panel aft far enough to clear the glareshield deck extension and console upholstery panels. Remove the RH forward sidewall upholstery panel.



Cockpit Sidewall Upholstery Panel Installation (NC-15, NC-16 and NC-17)
Figure 10

COCKPIT SIDEWALL UPHOLSTERY PANEL INSTALLATION (NC-15, NC-16 AND NC-17)

NOTE

The RH cockpit sidewall upholstery panels are a split-panel design which provides the additional clearance necessary for installation of the forward upholstery panel without excessive flexing of the panel.

a. Position the LH cockpit sidewall upholstery panel over the cockpit sidewall and ensure that it extends behind the glareshield deck extension, headliner and both console upholstery panels. Refer to Figure 10.

b. Secure the LH cockpit sidewall upholstery panel against the cockpit sidewall and secure with four attaching screws.

c. Install the caps on the attaching screws.

d. Position the RH cockpit sidewall upholstery panel over the cockpit sidewall and ensure that it extends behind the glareshield deck extension, headliner and console upholstery panels.

e. Position the RH cockpit sidewall upholstery panel closeout behind the map case and slide the forward edge behind the forward sidewall upholstery panel.

f. Secure the RH cockpit sidewall upholstery panel to the cockpit sidewall by installing the four attaching screws.

g. Install caps on the attaching screws.

h. Verify that the closeout is properly positioned between the foam block (bonded to the fuselage structure) and the map case before installing the attaching screw.

i. Secure the closeout with the attaching screw and cap.

j. Install the two screws and screw caps securing the outboard edges of the headliner directly above the cockpit sidewall upholstery panels.

k. Place the mike back on the sidewall hook.

l. Refer to Chapter 33-10-00 and reinstall the map light assembly.

m. Refer to CREW SEAT INSTALLATION and install the seat(s).

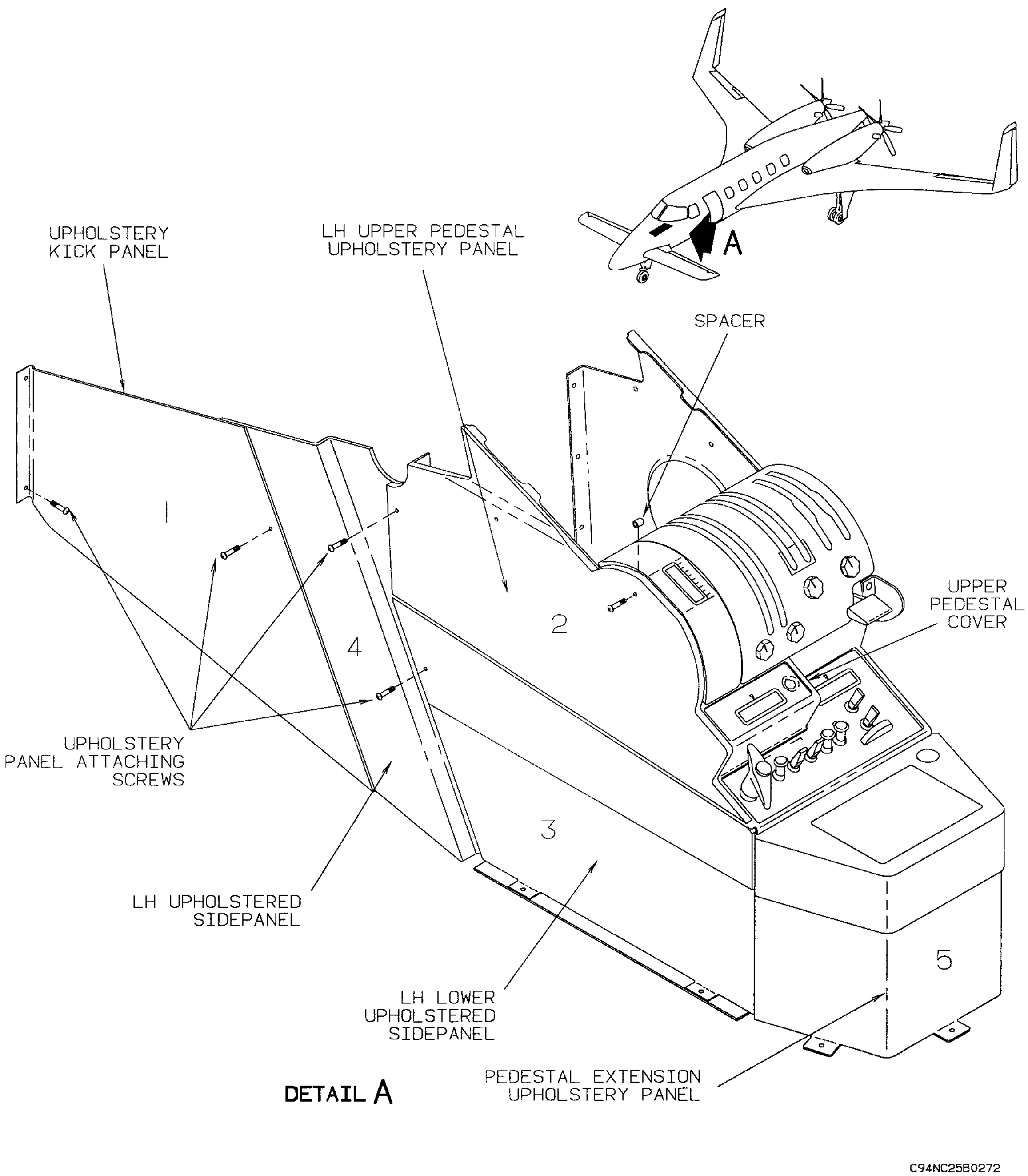
PEDESTAL UPHOLSTERY PANELS REMOVAL

NOTE

The pedestal upholstery panels are installed in such a way that removal of them must be accomplished in sequence. The numbers assigned to the upholstery panels in Figure 11 represent the proper order of removal.

a. Refer to CREW SEAT REMOVAL and remove the seat(s).

b. Remove the screws attaching the LH upholstered kick panel (1) to the pedestal, then remove the upholstery panel from the airplane. Refer to Figure 11.



Pedestal Upholstery Panels Installation
Figure 11

c. Remove the screws and spacers attaching the LH upper pedestal upholstery panel (2) to the pedestal and remove the upholstery panel from the airplane.

d. Remove the screws attaching the LH lower upholstered side panel (3) to the pedestal.

e. Pull the carpet back from the bottom flange of the lower side panel (3), remove the two mounting screws, and remove the side panel from the airplane.

f. Remove the screws from the LH side upholstered panel (4) and remove the panel from the airplane.

g. Remove the RH pedestal upholstery panels by following steps a thru f.

h. Pull the carpet away from the pedestal extension upholstery panel and remove the attaching screws.

i. Disconnect the cigarette lighter receptacle electrical connector.

j. Remove the pedestal extension upholstery panel (5) from the airplane.

UPPER PEDESTAL COVER REMOVAL

NOTE

The LH lower upholstered sidepanel, LH upper pedestal upholstery panel and pedestal extension panel must be loosened or removed before removal of the upper pedestal cover.

a. Pull the flight instrument light circuit breaker located on the aft circuit breaker panel.

b. Remove the parking brake knob.

c. Refer to Chapter 33-10-00 and remove the autopilot panel electroluminescent panel from the pedestal.

d. Remove the roll trim cover.

e. Loosen the pitch trim panel by removing the lower two screws.

f. Remove the two screws attaching the FLAP/FWD WING lever guard and remove the guard from the pedestal.

g. Loosen the curved power quadrant panel at the bottom, carefully pull outward, and remove the upper pedestal cover.

PEDESTAL UPHOLSTERY PANELS INSTALLATION

UPPER PEDESTAL COVER INSTALLATION

a. With the curved power quadrant panel loosened at the bottom, carefully pull outward to allow positioning of the upper pedestal cover. Refer to Figure 11.

b. Align the FLAP/FWD WING lever guard with the upper pedestal cover and the screw holes in the pedestal. Secure with two screws.

c. Install the pitch trim panel.

d. Install the roll trim cover.

e. Refer to Chapter 33-10-00 and install the autopilot panel electroluminescent panel on the pedestal.

f. Install the parking brake knob.

g. Close the flight instrument light circuit breaker.

h. Tighten the curved power quadrant panel.

NOTE

Tighten the LH upper pedestal upholstery panel, LH lower upholstered side-panel and pedestal extension upholstery panel, or install them as outlined by the following:

The pedestal upholstery panels must be installed in sequence. Figure 11 numbers the panels to indicate which is removed first. To install the panels, begin with the panel that was removed last. For example, the pedestal extension panel (5) is installed first.

i. Position the pedestal extension upholstery panel (5) over the pedestal extension and install the lower attaching screws at the bottom of the panel.

j. Align the LH upholstered sidepanel (4) with the pedestal structure and secure with attaching screws.

k. Align the LH lower upholstered sidepanel (3) with the pedestal structure and install the attaching screws.

l. Position the carpet around the pedestal upholstery panels in accordance with COCKPIT CARPET INSTALLATION instructions.

m. Align the LH upper pedestal upholstery panel (2) with the pedestal structure so that it overlaps the other upholstery panels.

n. Position the spacers between the panel (2) and pedestal structure, then secure the panel in place with the attaching screws.

o. Align the LH upholstered kick panel (1) with the pedestal structure and secure with attaching screws.

p. Repeat steps j thru o for the RH side.

q. Refer to CREW SEAT INSTALLATION and install the crew seat(s).

GLARESHIELD REMOVAL

a. Remove all electrical power from the airplane.

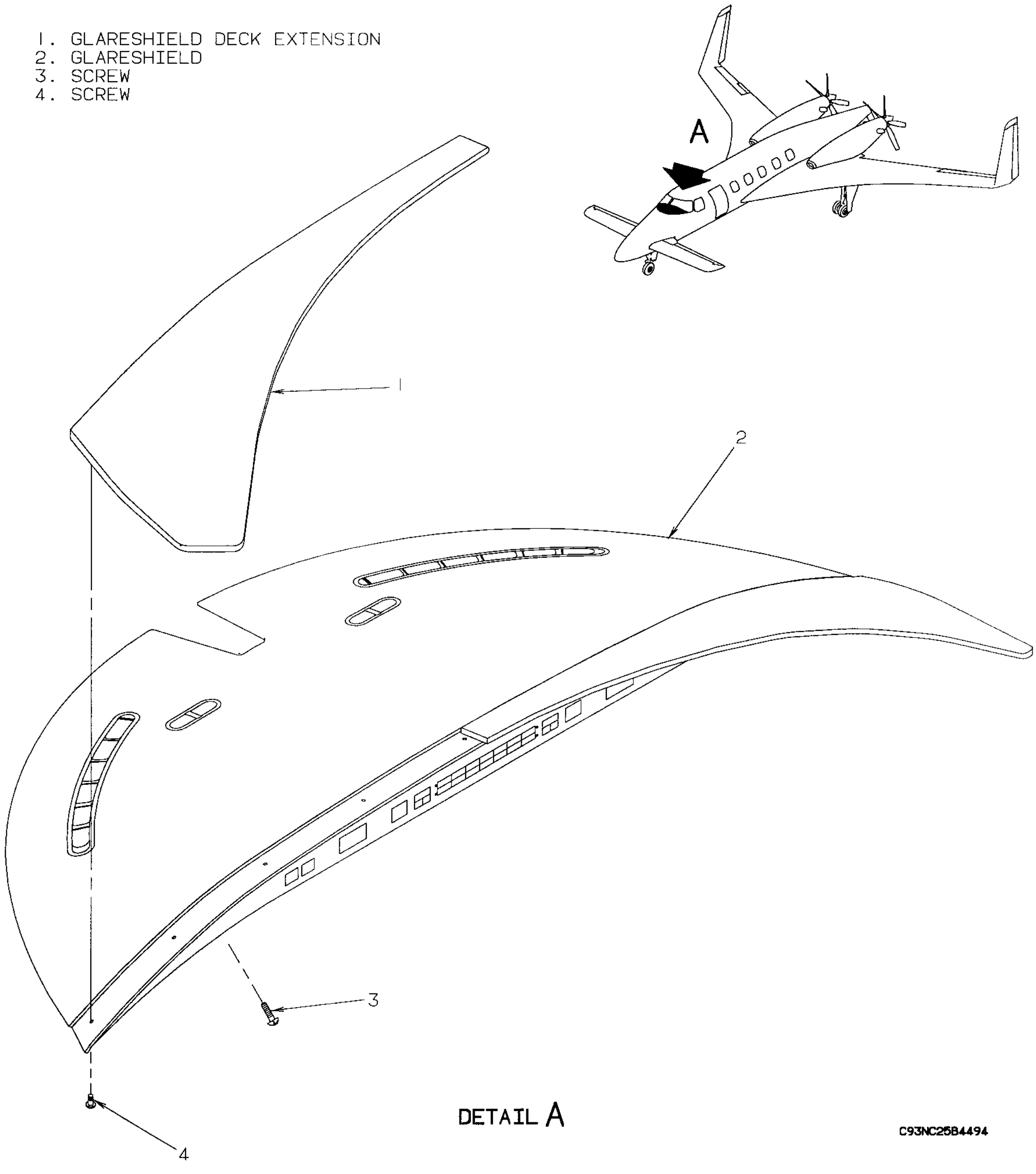
b. Remove the five mounting screws (4) that attach each glareshield deck extension (1) to the glareshield (2). Remove the deck extensions from the airplane. Refer to Figure 12.

c. Tag and remove all electrical connectors from the glareshield (2).

d. Remove the three mounting screws (3) that attach the glareshield assembly (2) to the mounting brackets.

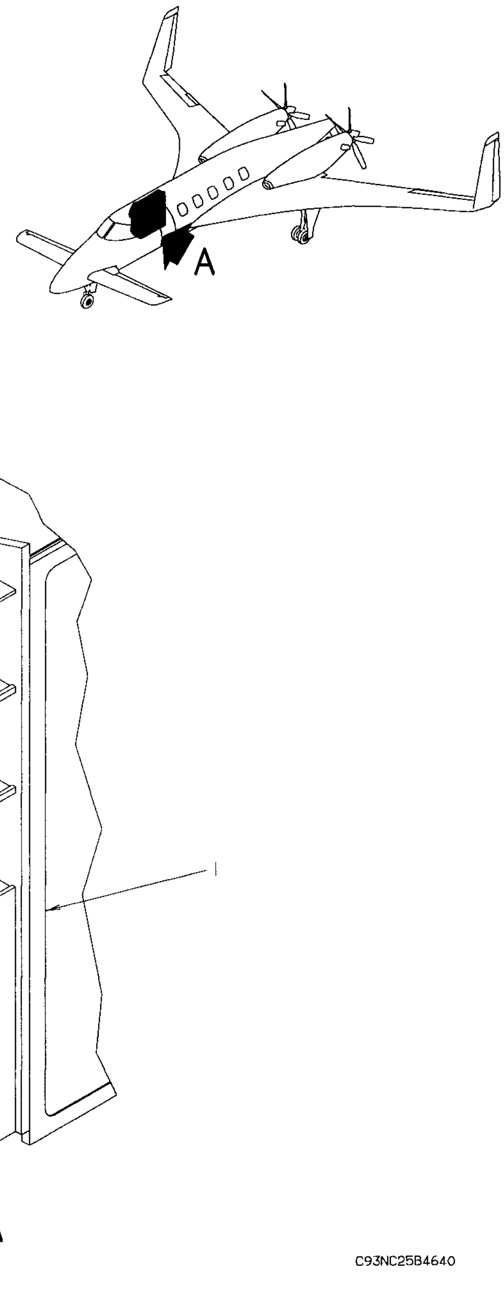
e. Tag and disconnect the air distribution ducts from the glareshield air ducts.

f. Carefully remove the glareshield (2) from the airplane.



Glairshield Installation
Figure 12

1. FORWARD BAGGAGE COMPARTMENT
2. MAP CASE
3. SCREW



Map Case Installation
Figure 13

GLARESHIELD INSTALLATION

a. Position the glareshield (2) in the cockpit to allow installation of components that were removed. Refer to Figure 12.

b. Connect the electrical connectors to the glareshield connector assembly according to tags or the BEECH-CRAFT Starship 1 Wiring Diagram Manual.

c. Connect the air distribution ducts to the glareshield air ducts as tagged.

d. Position the glareshield assembly (2) over the instrument panel and ensure that the glareshield perimeter is adjacent to the glareshield perimeter at the windshield.

e. Secure the glareshield (2) to the mounting brackets by installing the three attaching screws (3).

f. Align the glareshield deck extensions (1) with their respective glareshield edges and secure each with the five mounting screws (4).

g. Restore electrical power to the airplane.

MAP CASE REMOVAL

a. Refer to CREW SEAT REMOVAL and remove the copilot's seat.

b. Remove the four attaching screws (2) from the map case (3). Refer to Figure 13.

c. Remove the map case (3) from the airplane.

MAP CASE INSTALLATION

a. Align the map case (3) with the RH forward baggage compartment (1). Refer to Figure 13.

b. Install the four mounting screws (2).

c. Refer to CREW SEAT INSTALLATION and install the copilot's seat.

COMPASS COVER REMOVAL

a. Refer to GLARESHIELD REMOVAL and remove the glareshield to access the attachment screws on the lower end of the compass cover.

b. Remove the lower attaching screws (4). Refer to Figure 14.

c. Remove the caps (1) from the upper attaching screws (2).

d. Remove the upper attaching screws (2), then remove the compass cover (3) from the airplane.

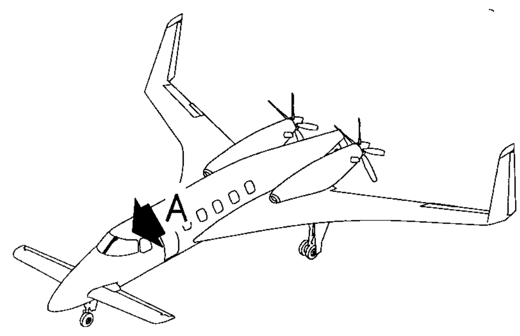
COMPASS COVER INSTALLATION

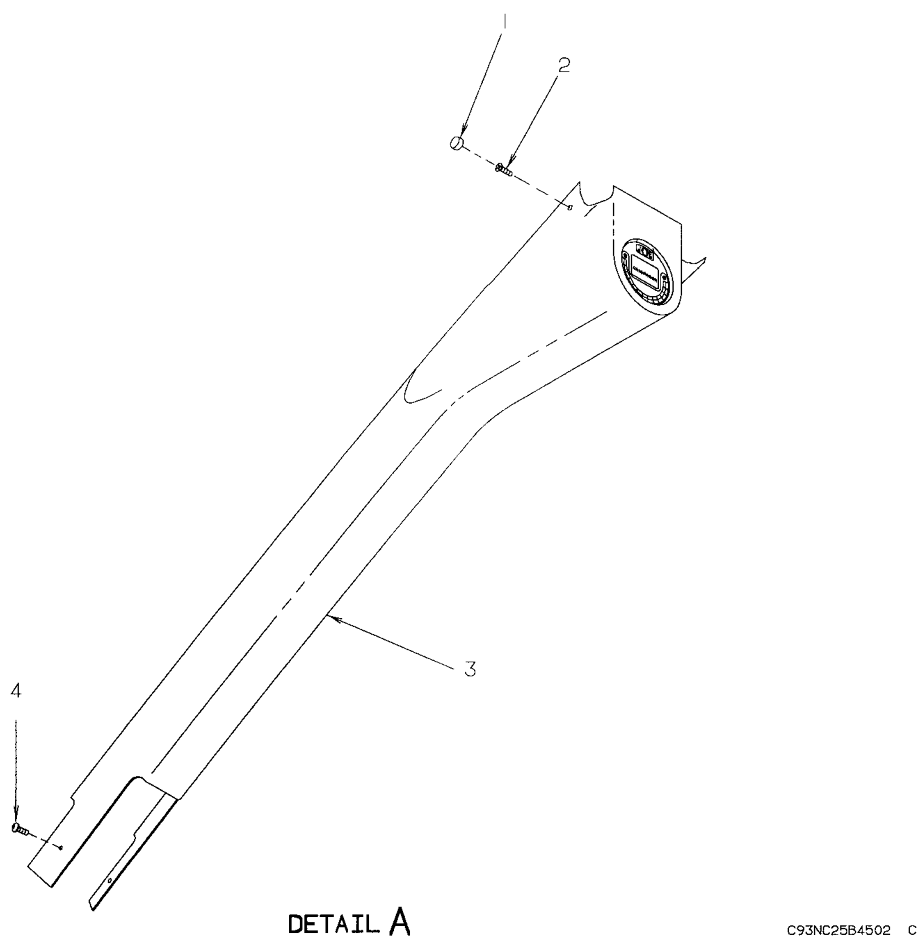
a. Align the compass cover (3) with the compass and windshield center post. Refer to Figure 14.

b. Install the cover (3) lower attaching screws (4).

c. Install the cover (3) upper attaching screws (2) and caps (1).

1. CAP
2. SCREW
3. COMPASS COVER
4. SCREW





Compass Cover Installation
Figure 14

d. Refer to GLARESHIELD INSTALLATION and reinstall the glareshield.

WINDSHIELD COVER REMOVAL

a. Remove the caps and screws attaching the upper edge of the compass cover. Refer to Figure 15.

b. Refer to SUNVISOR REMOVAL and remove both sunvisors.

c. Remove the five caps (2) from the windshield cover attaching screws (3), then remove the screws (3).

d. Remove the windshield cover (1) from the airplane.

WINDSHIELD COVER INSTALLATION

a. Align the windshield cover (1) with the upper windshield frame and secure with the attaching screws (3). Refer to Figure 15.

b. Install caps on the attaching screws (2).

c. Refer to SUNVISOR INSTALLATION and install both sunvisors.

d. Install the screws and caps that attach the upper edge of the compass cover to the overhead brackets.

SUNVISOR REMOVAL

a. Remove the screws (2) and washers (1) attaching the sunvisor (3) to the windshield cover. Refer to Figure 16.

b. Remove the sunvisor (3) from the airplane.

SUNVISOR INSTALLATION

a. Align the sunvisor (3) with the windshield cover. Refer to Figure 16.

b. Install the mounting screws (2) and washers (1).

KICK PANEL REMOVAL

a. Remove the three screws (2) and spacers (1) from the kick panel (3). Refer to Figure 17.

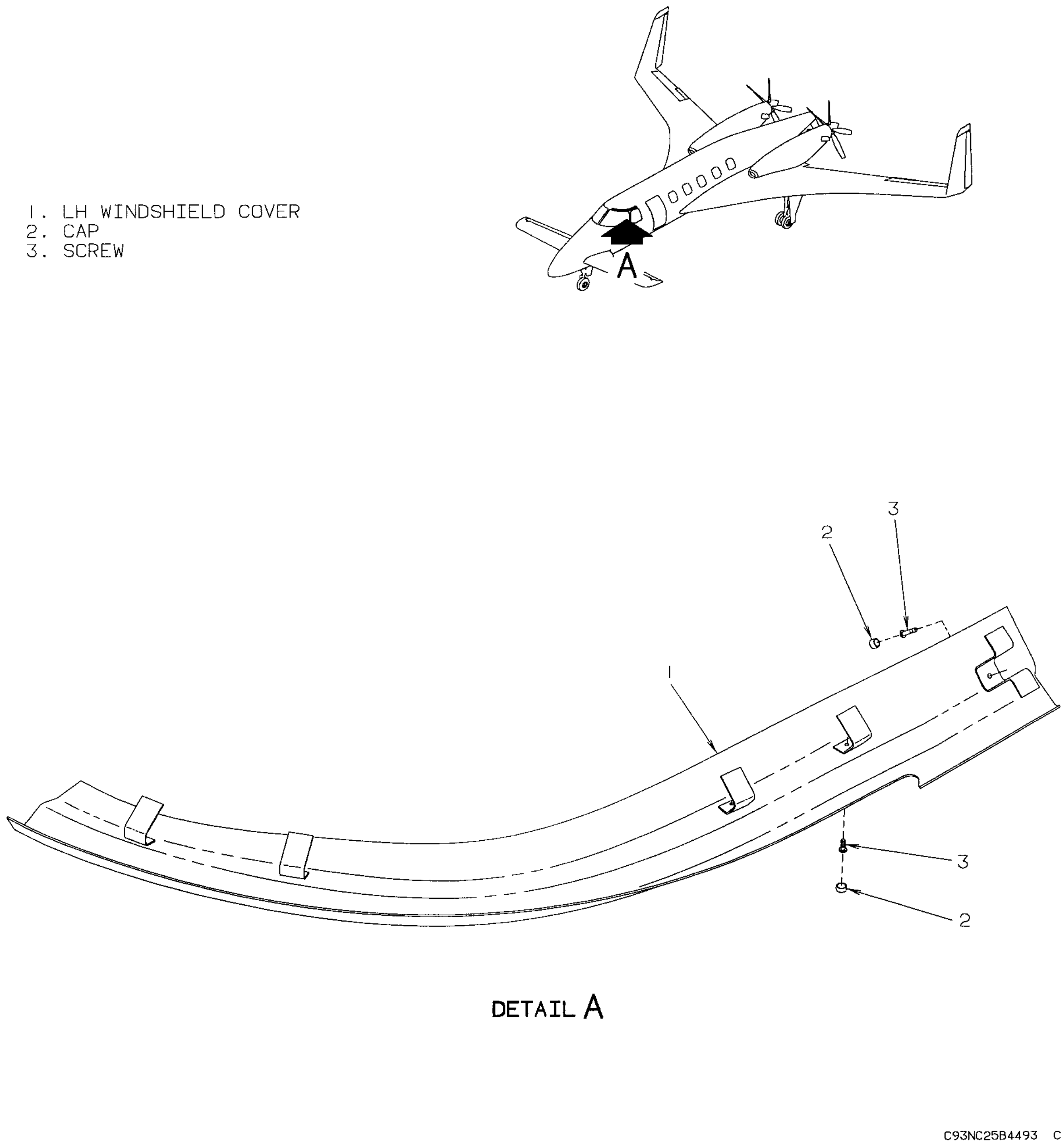
b. Remove the kick panel from the airplane.

KICK PANEL INSTALLATION

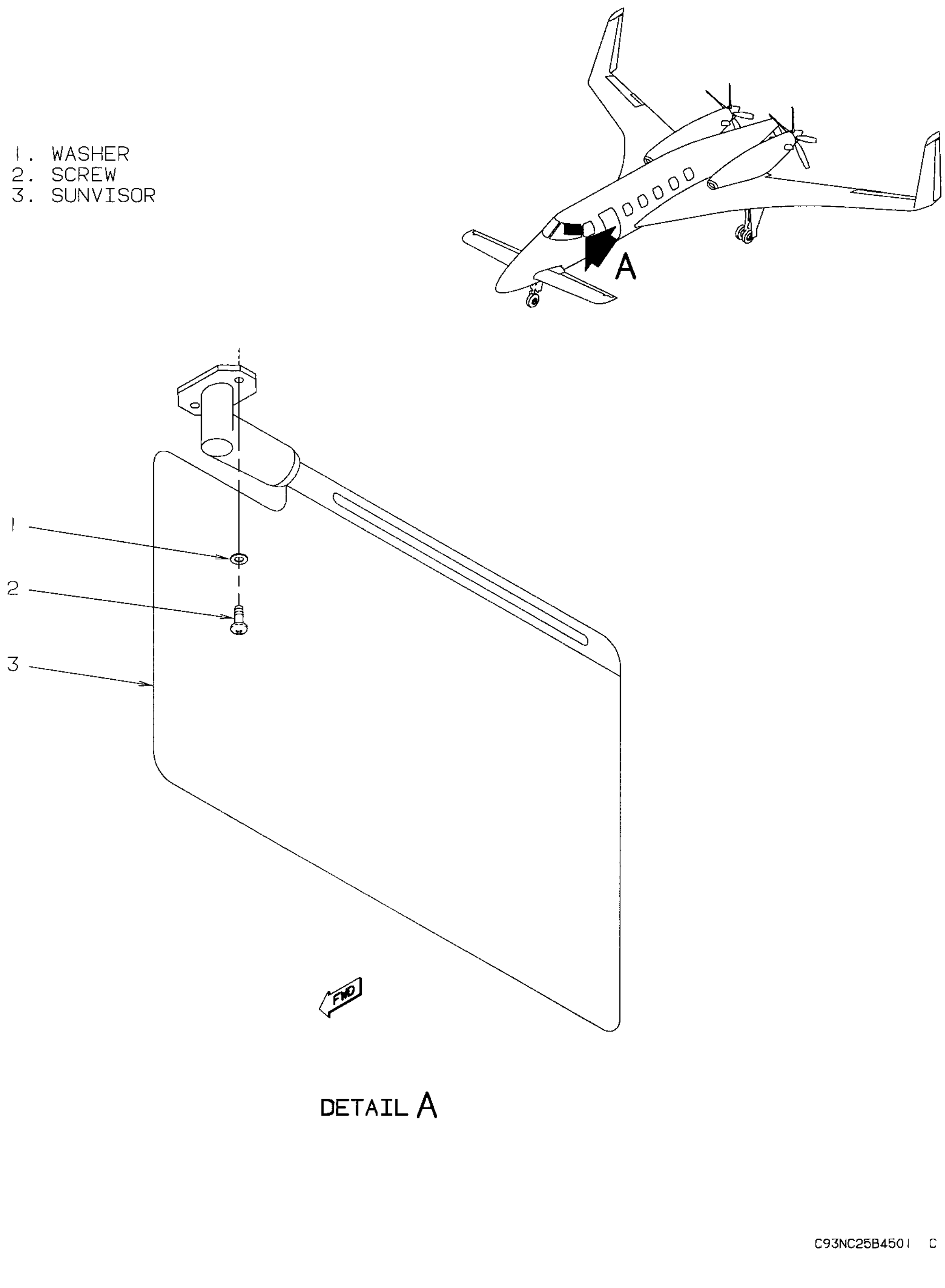
a. Align the kick panel (3) with the cockpit lower sidewall and ensure that the spacers (1) are properly installed between the sidewall and kick panel (3). Refer to Figure 17.

b. Install the screws (2) that attach the kick panel (3) to the cockpit sidewall.

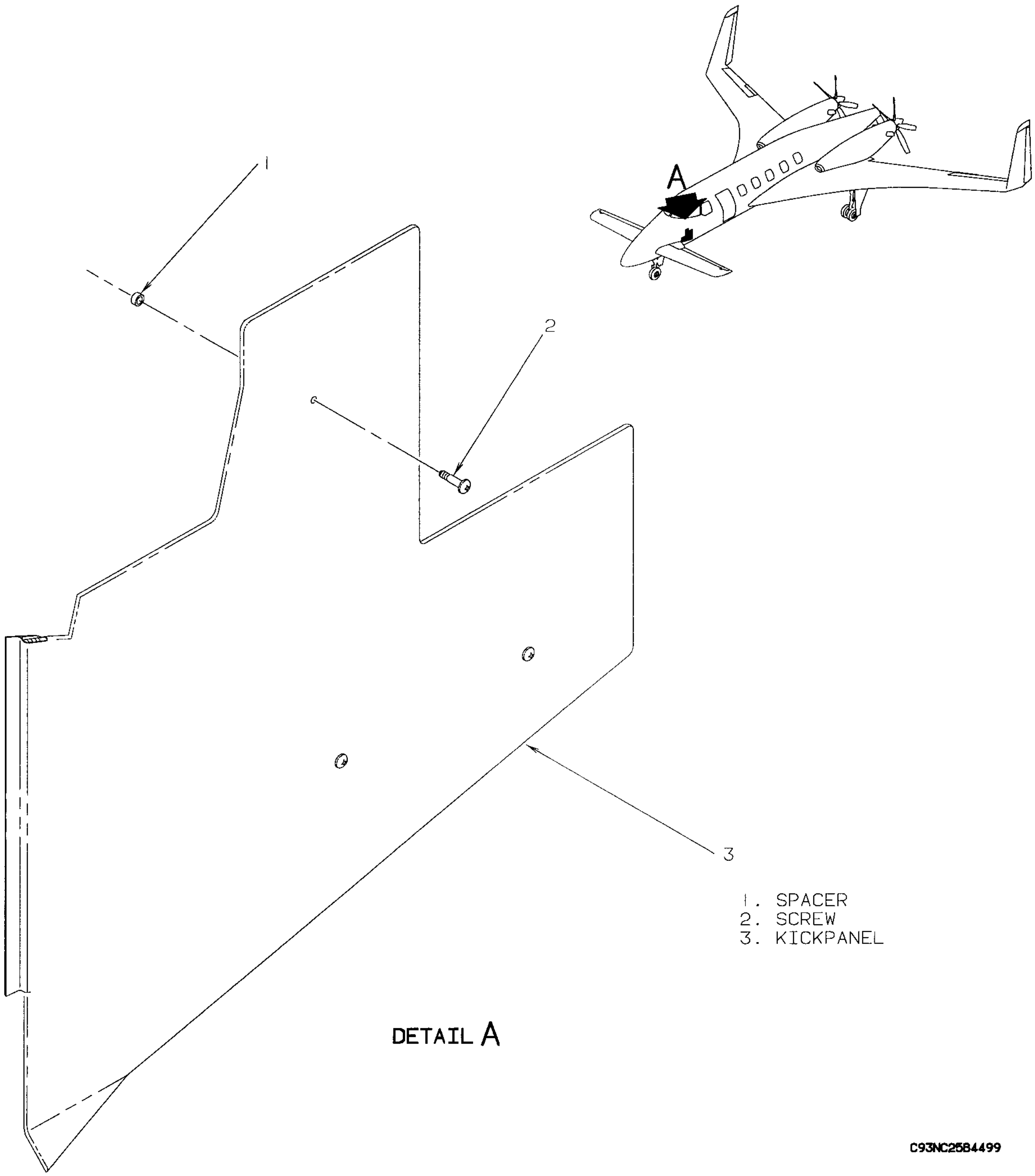
1. LH WINDSHIELD COVER
2. CAP
3. SCREW



Windshield Cover Installation
Figure 15



Sunvisor Installation
Figure 16



Kick Panel Installation
Figure 17

RUDDER PEDAL BRUSH ASSEMBLY REMOVAL

NOTE

Screw (4) and washer (5) are only used to install the left outboard rudder pedal brush assembly as shown in Detail B of Figure 18.

a. Refer to CREW SEAT REMOVAL and remove the crew seats.

b. Pull the floormat and carpet assembly (1) back far enough to access the rudder pedal brush assembly (6) attaching screws.

c. Remove the applicable screws and washers attaching the brush assembly (6) to the cockpit floor panel.

d. Remove the brush assembly from the airplane.

RUDDER PEDAL BRUSH ASSEMBLY INSTALLATION

NOTE

Screw (4) and washer (5) are only used to install the left outboard rudder pedal brush assembly as shown in Detail B of Figure 18.

a. Align the rudder pedal brush assembly (6) with the cockpit floor panel and install the applicable screws and washers.

b. Reposition the floor mat and carpet assembly around the rudder pedal brush assembly.

c. Refer to CREW SEAT INSTALLATION and install the crew seats.

PASSENGER COMPARTMENT - DESCRIPTION AND OPERATION

Anytime the airplane is on the ground (whether on jacks or on wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal and installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST must be pinned in the open position. Refer to Chapter 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

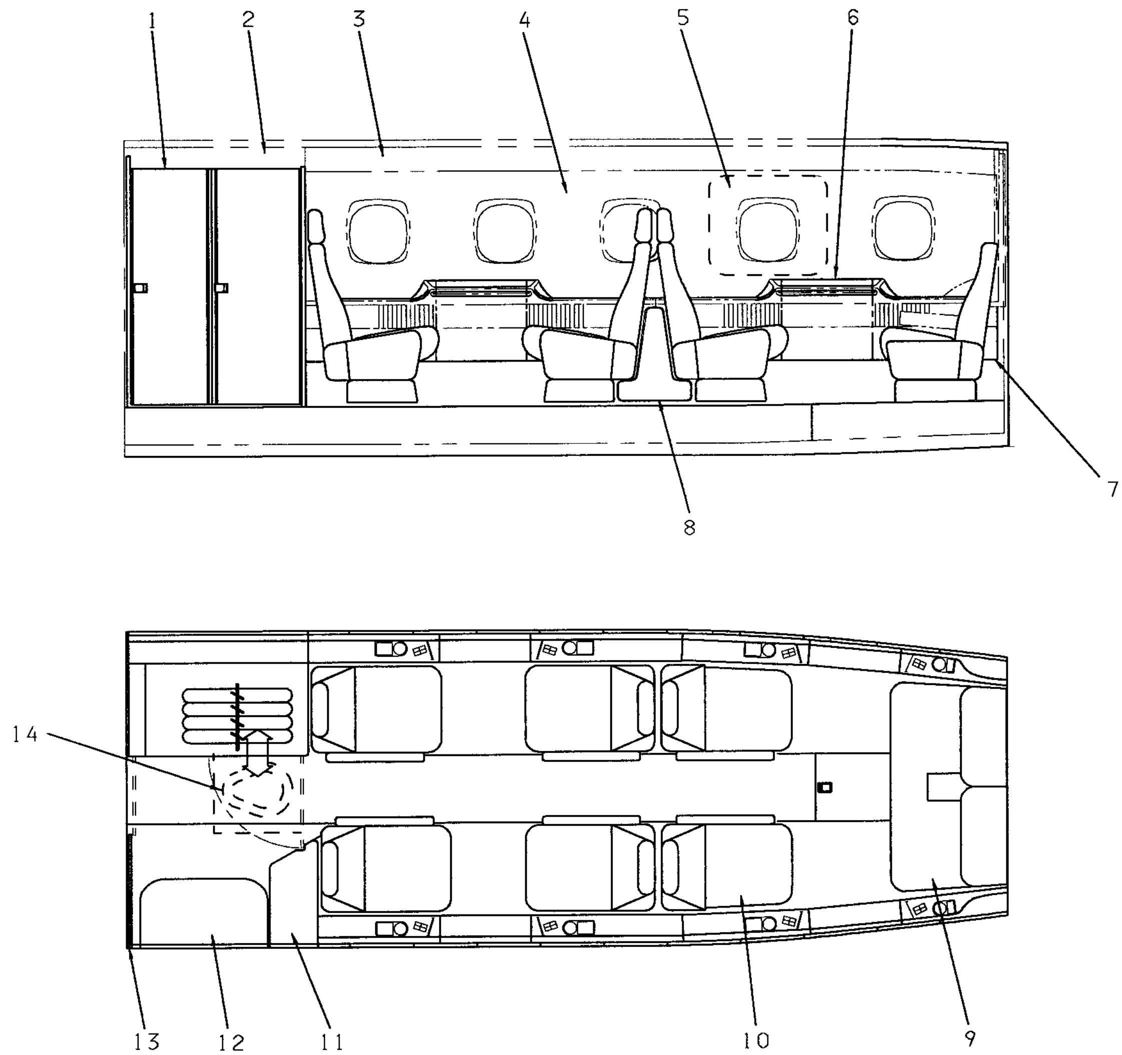
The cabin upholstery is comprised of the entry and cabin headliners, LH forward partition, forward baggage compartment, airstair door upholstery panels, forward and aft doorpost trim panels, LH forward refreshment cabinet, window panels, sidewall upholstery, tables, emergency exit door upholstery, passenger seats and carpet.

The entry headliner covers the entry ceiling from the aft edge of the cockpit headliner to the forward edge of the cabin headliner. A single lighting strip is installed in the headliner. The cabin headliner covers the cabin ceiling from the aft edge of the entry headliner to the edge of the aft baggage compartment bulkhead. Two lighting strips are installed in the cabin headliner. Oxygen masks are stowed behind four panels in the headliner, two forward and two aft of the cabin. The cabin airstair door is trimmed by two upholstery panels, one installed on either side of the steps, a cover below the lower step, and step covers installed on each of the four steps. The door handle is installed in a cavity under the third step. The cavity is lined with an upholstery panel, an upholstery cover, and the opening is trimmed with an upholstery cover assembly.

The LH forward partition is located directly behind the pilot's seat, left of the cabin entrance. The entry light switch panel is located on the panel for access when entering or exiting the airplane. The certificate holder is located above the light switch panel. The forward baggage compartment is located directly behind the copilot's seat. A map case is mounted on the forward sidewall of the compartment directly behind the copilot's seat.

The LH forward refreshment cabinet located aft of the cabin entrance is mounted on the seat tracks, and attached to the cabin overhead.

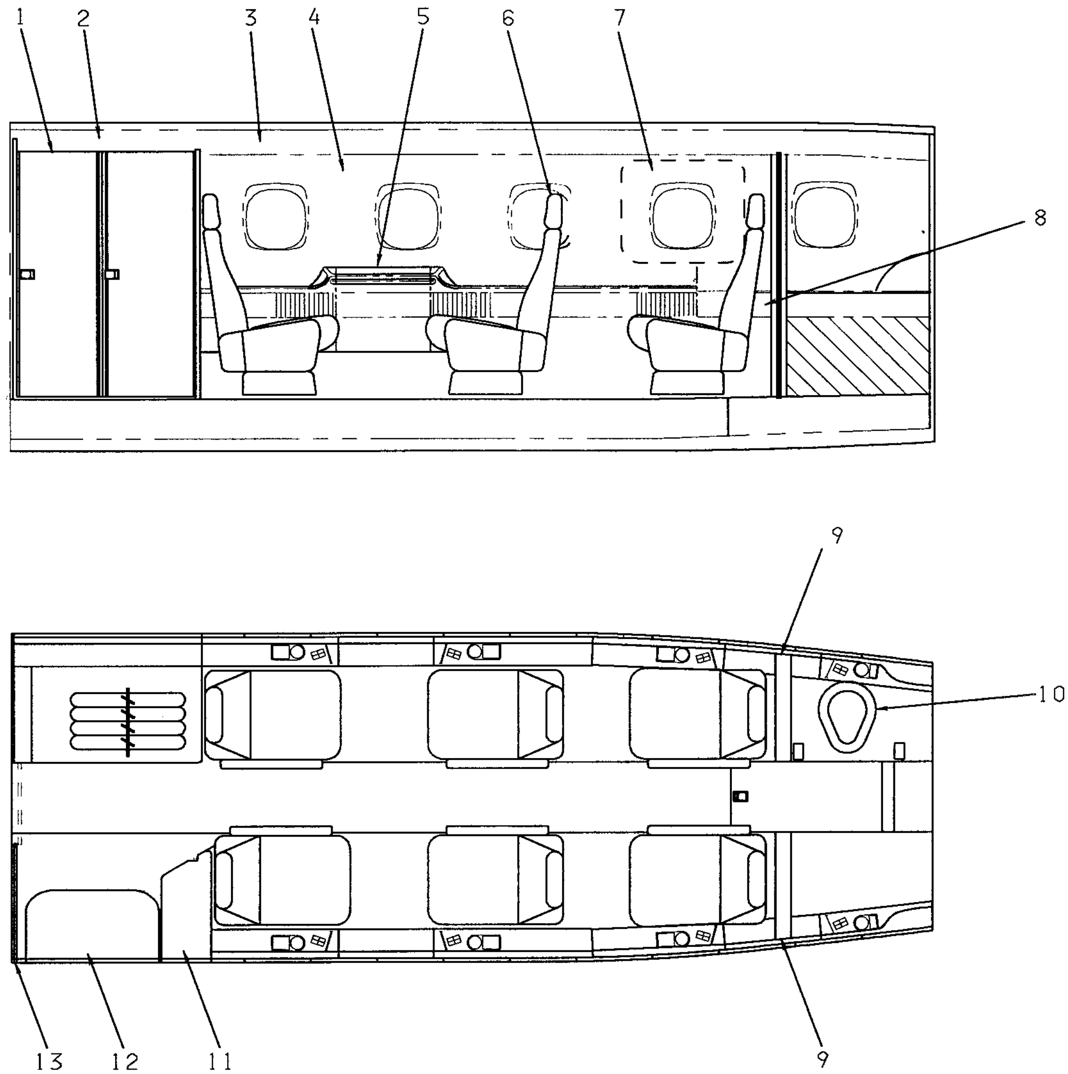
There are three cabin-window upholstery panels located on each side of the cabin. The two forward panels extend from the forward luggage compartment and LH forward refreshment cabinet to the aft edge of the third window on each side. The two remaining windows on each side of the cabin are covered by individual panels. The upper edge of the panels are attached to the overhead behind the lighting strips. The lower edge of the panels extend behind the upper edge of the lower sidewall upholstery panels. The window upholstery panel on the emergency exit door at the aft right side of the cabin is attached directly to the emergency door.



1. RH BAGGAGE CABINET
2. ENTRY HEADLINER
3. CABIN HEADLINER
4. CABIN WINDOW PANEL
5. EMERGENCY EXIT DOOR UPHOLSTERY
6. CABIN TABLE
7. CABIN LOWER SIDEWALL UPHOLSTERY
8. PYRAMID CABINET
9. AFT TWO PLACE COUCH
10. PASSENGER SEAT
11. LH FORWARD REFRESHMENT CENTER
12. CABIN AIRSTAIR DOOR ASSEMBLY
13. LH FORWARD PARTITION
14. TOILET

C94NC25B0005

Cabin Upholstery (NC-4 thru NC-20)
Figure 1



1. RH BAGGAGE CABINET
2. ENTRY HEADLINER
3. CABIN HEADLINER
4. CABIN WINDOW PANEL
5. CABIN TABLE
6. PASSENGER SEAT
7. EMERGENCY EXIT DOOR UPHOLSTERY
8. CABIN LOWER SIDEWALL UPHOLSTERY
9. AFT CABIN PARTITION
10. AFT TOILET CABINET
11. LH FORWARD REFRESHMENT CENTER
12. CABIN AIRSTAIR DOOR ASSEMBLY
13. LH FORWARD PARTITION

C94NC25B0008

Cabin Upholstery (NC-21 and After)
Figure 2

PASSENGER COMPARTMENT - MAINTENANCE PRACTICES

LH FORWARD PARTITION REMOVAL

a. Remove all electrical power from the airplane.

b. Adjust the pilot's seat to the full forward position.

c. Remove the screws (2) and washers (3) attaching the LH forward partition (4) to the four mounting brackets (1). Refer to Figure 3.

d. Carefully move the partition (4) away from bulkhead and disconnect the entry light panel electrical connector.

e. Remove the partition (4) from airplane.

LH FORWARD PARTITION INSTALLATION

a. Ensure the pilot's seat is adjusted to the fully forward position.

b. Align the LH forward partition (4) with the four mounting brackets (1), then connect the entry light panel electrical connector. Refer to Figure 3.

c. Install the screws (2) and washers (3) that attach the partition (4) to the four mounting brackets (1).

d. Restore electrical power to the airplane.

ENTRY HEADLINER REMOVAL

a. Refer to Chapter 33-20-00 and remove the overhead lighting.

b. Refer to DOORPOST TRIM REMOVAL and loosen the upper part of the forward and aft trim panels.

c. Remove the screws (3) and washers (4) attaching the lower edge of the entry headliner (5) to the forward and aft doorposts. Refer to Figure 4.

d. Remove the screws (2) and washers (1) attaching the headliner (4) to the overhead supports, then remove the headliner (5) from the airplane.

ENTRY HEADLINER INSTALLATION

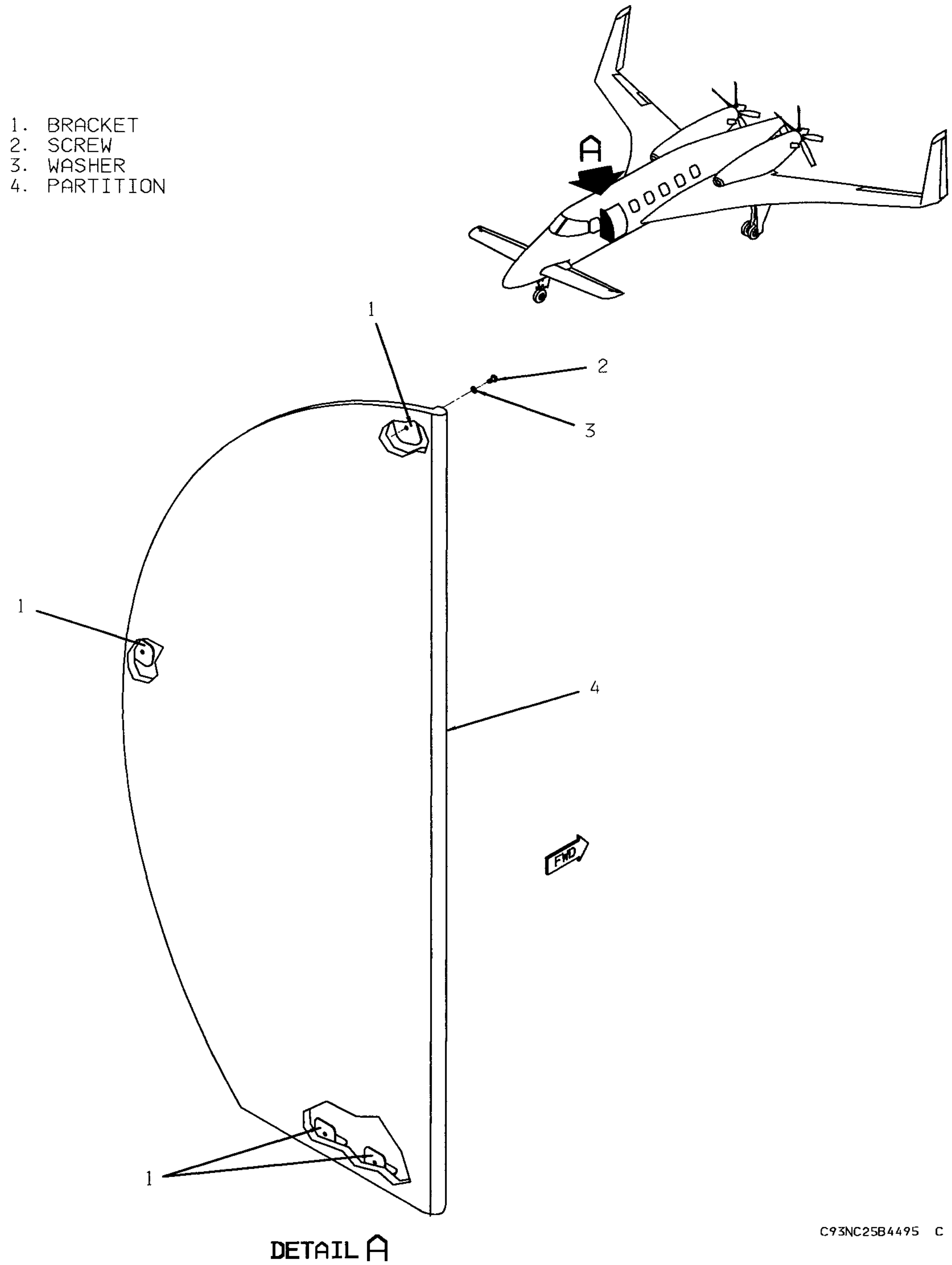
a. Position the entry headliner (5) so that the lower edge extends behind the forward and aft doorpost trim panels. Refer to Figure 4.

b. Install the screws (2) and washers (1) that attach the headliner (5) to the overhead supports.

c. Install the screws (3) and washers (4) that attach the headliner (5) to the forward and aft doorposts.

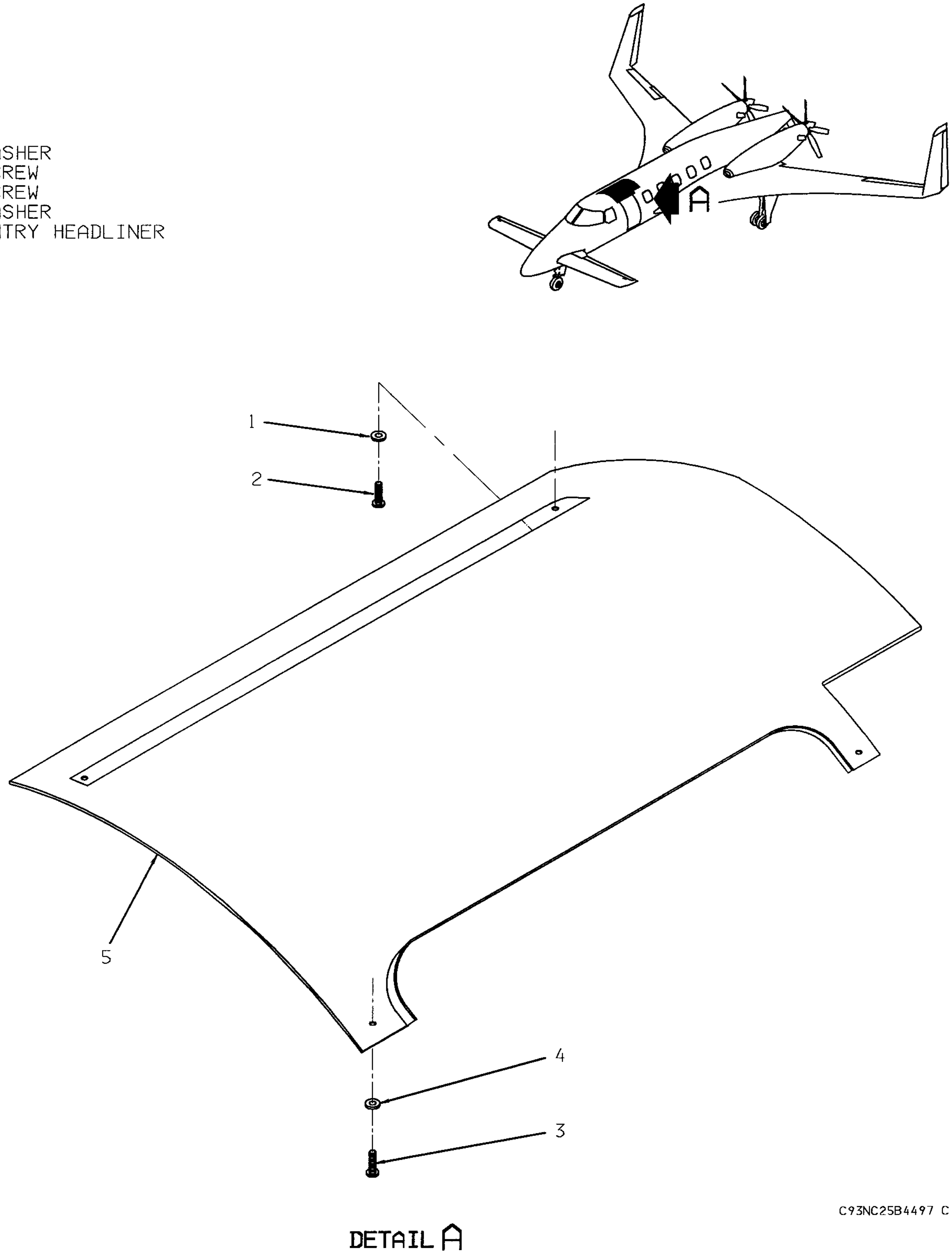
d. Refer to DOORPOST TRIM INSTALLATION and install the upper part of the forward and aft doorpost trim panels.

e. Refer to Chapter 33-20-00 and install the overhead entry lighting.

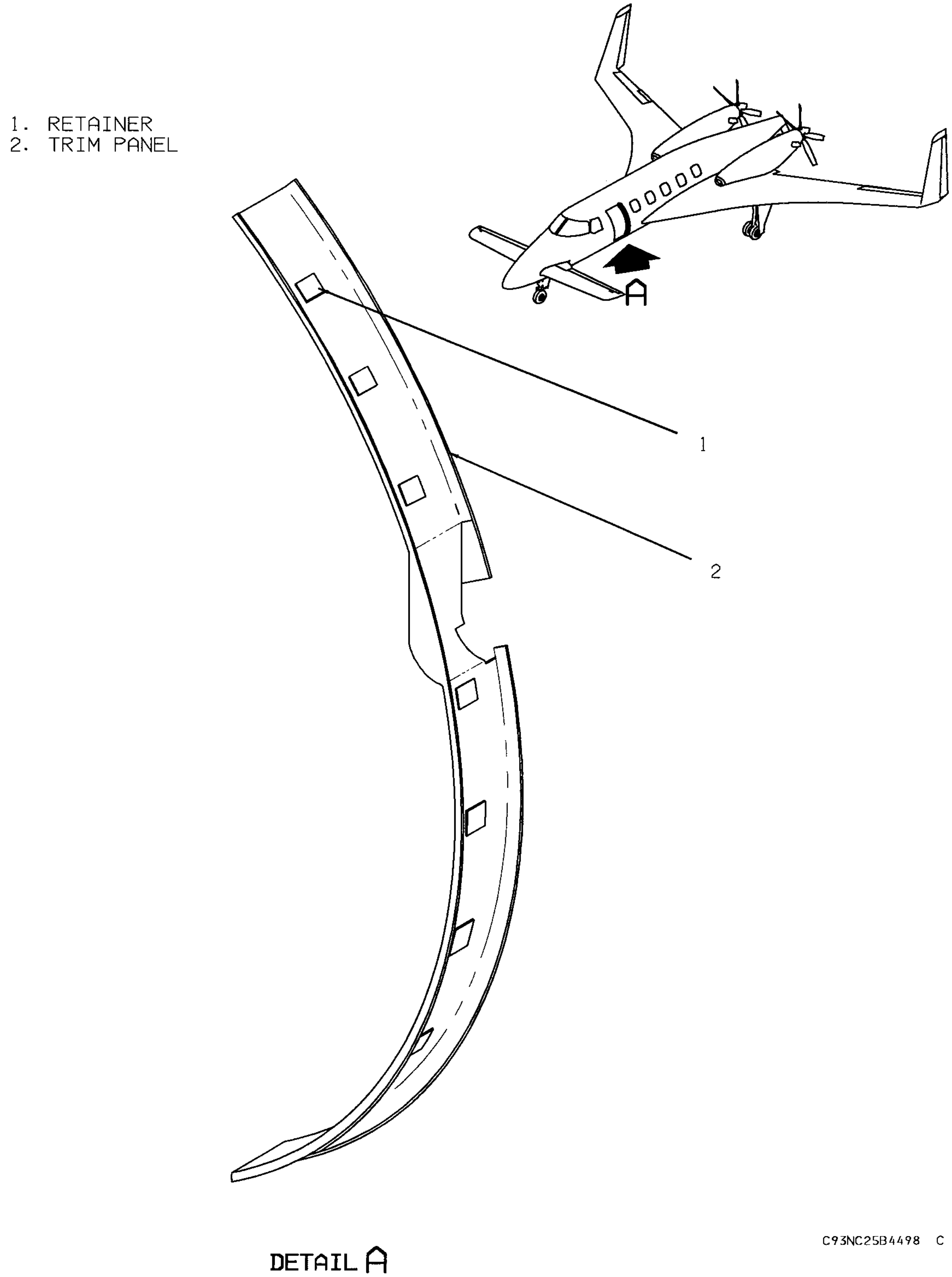


LH Forward Partition Installation
Figure 3

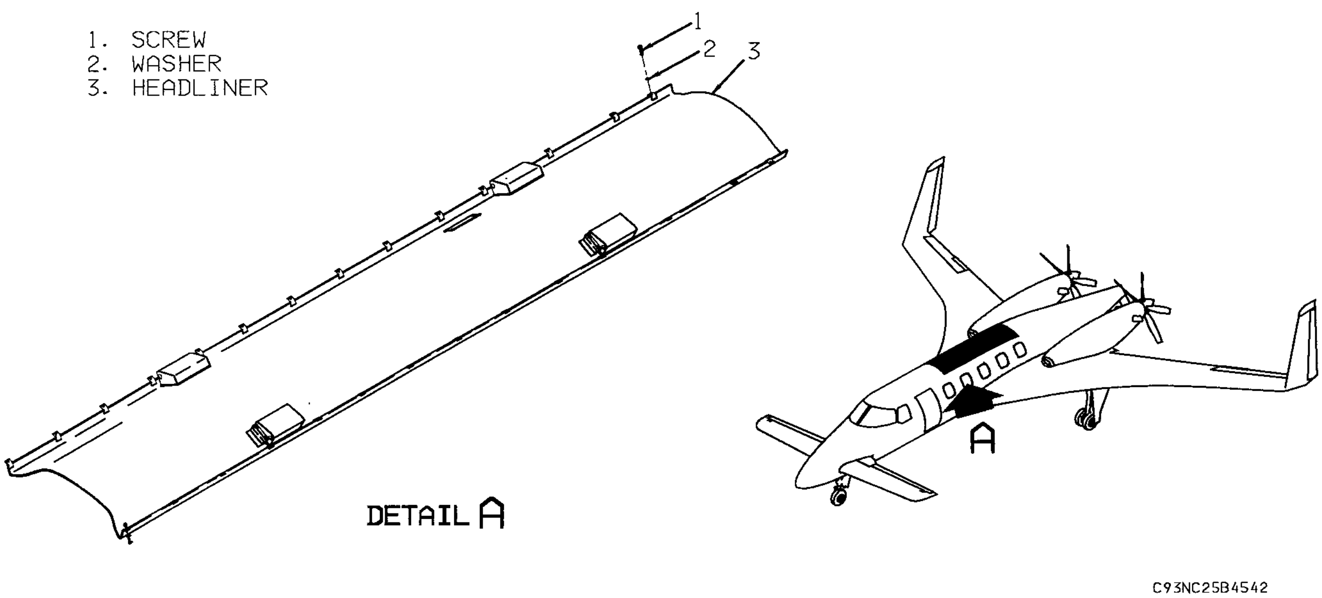
1. WASHER
2. SCREW
3. SCREW
4. WASHER
5. ENTRY HEADLINER



Entry Headliner Installation
Figure 4



Entry Doorpost Installation
Figure 5



Cabin Headliner Installation
Figure 6

ENTRY DOORPOST TRIM REMOVAL

a. Carefully pull on the top edge of the entry doorpost trim (2) and continue downward to release the dual lock (velcro-type) retainers (1) attaching the doorpost trim (2) to the doorpost. Refer to Figure 5.

b. Remove the doorpost trim (2) from the airplane.

ENTRY DOORPOST TRIM INSTALLATION

a. Align the entry doorpost trim (2) with the doorpost. Refer to Figure 5.

b. Firmly press the doorpost trim (2) in place to mate the dual lock retainers (1)

CABIN HEADLINER REMOVAL

a. Refer to Chapter 35-00-00 and turn off the oxygen to the airplane, then disconnect the oxygen supply hoses from the oxygen compartments in the cabin headliner (3). Refer to Figure 5.

b. Refer to Chapter 33-20-00 and remove the lighting trays from the cabin overhead.

c. Remove the screws (1) and washers (2) attaching the headliner (3) to the overhead supports.

d. Remove the headliner from the airplane.

CABIN HEADLINER INSTALLATION

a. Align the cabin headliner (3) with the overhead supports, then install the screws (1) and washers (2) that attach the headliner (3) to the overhead supports. Refer to Figure 6.

b. Refer to Chapter 33-20-00 and install the lighting trays in the cabin overhead.

c. Refer to Chapter 35-00-00 and connect the oxygen supply hoses to the oxygen compartments in the cabin headliner (3).

CABIN WINDOW PANEL REMOVAL

NOTE

Removal of all cabin window panels is typical except for the emergency exit door window panel. For instructions on its removal see EMERGENCY EXIT DOOR UPHOLSTERY REMOVAL.

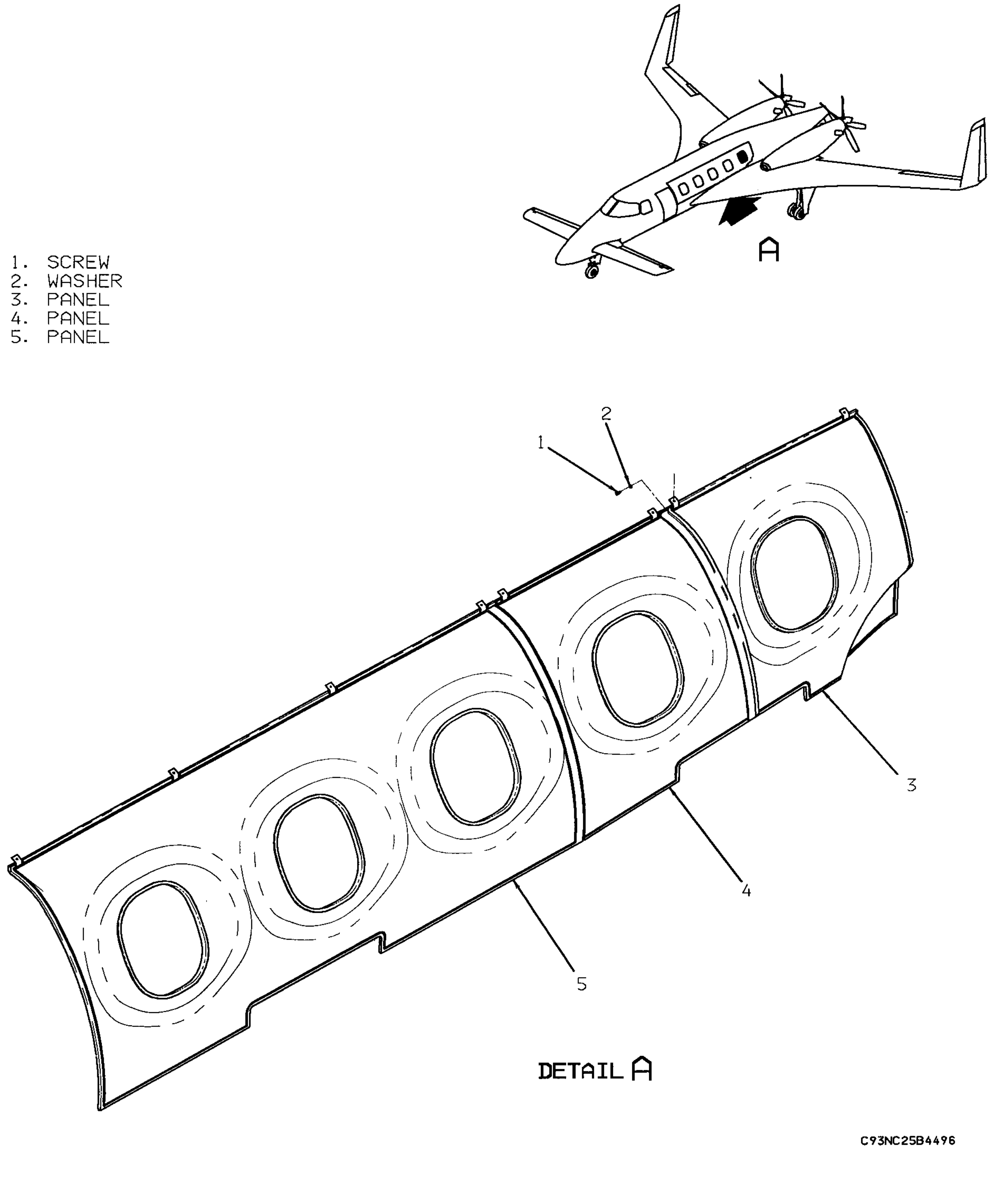
a. Refer to Chapter 33-20-00 and remove the lighting reflector and tray from the overhead.

b. Remove the screws (1) and washers (2) attaching the cabin window panel (3, 4 or 5) to the overhead supports. Refer to Figure 7.

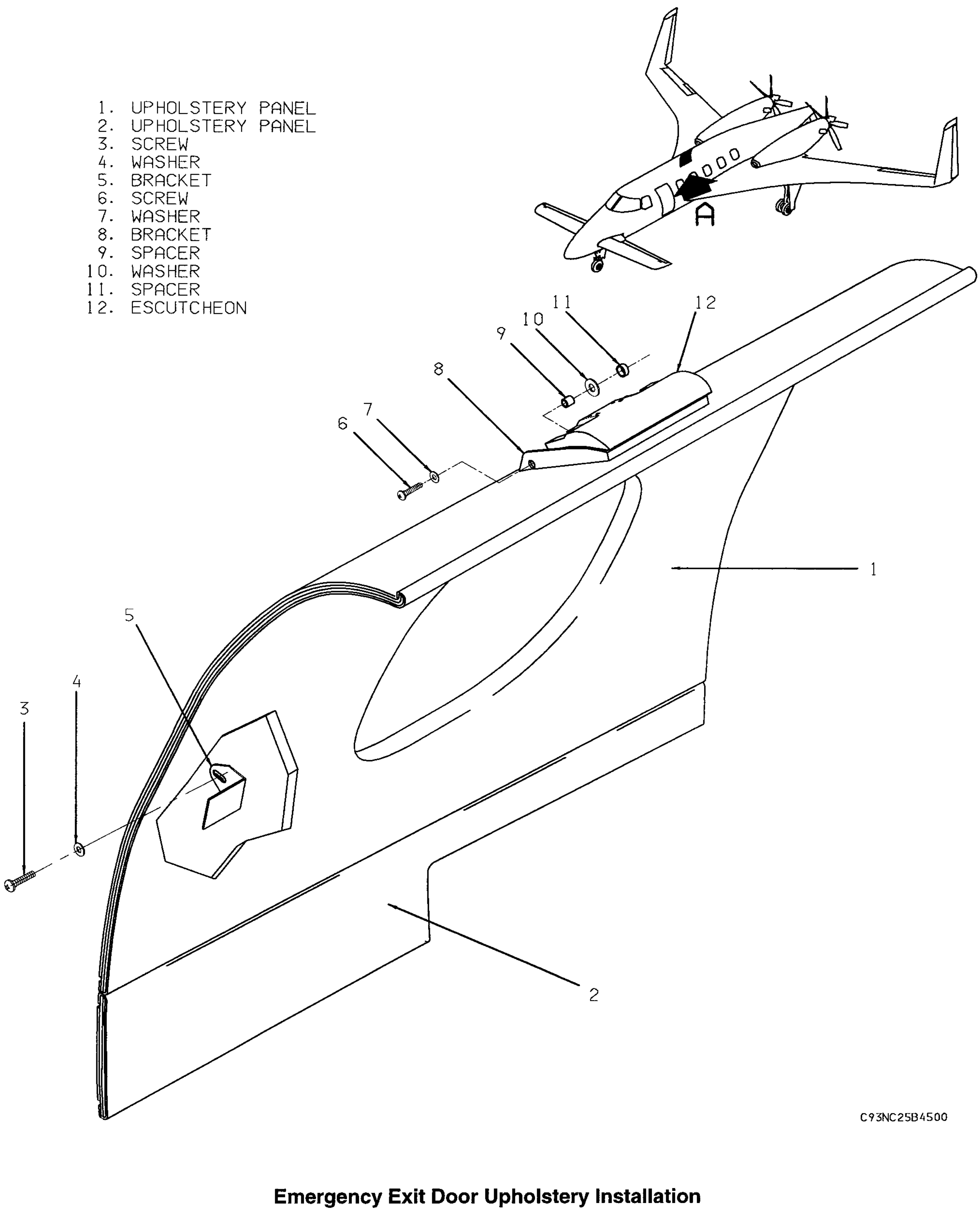
c. Lift the panel (3, 4 or 5) upward and away from the bulkhead to clear the upper edge of the lower sidewall upholstery panel.

d. Remove the window panel from the airplane.

1. SCREW
2. WASHER
3. PANEL
4. PANEL
5. PANEL



Cabin Window Panel Installation
Figure 7



Emergency Exit Door Upholstery Installation
Figure 8

CABIN WINDOW PANEL INSTALLATION

NOTE

Installation of all cabin window panels is typical except for the emergency exit door window panel. For instructions on its installation see EMERGENCY EXIT DOOR UPHOLSTERY INSTALLATION.

a. Position the cabin window panel (3,4 or 5) so that the lower edge is extended behind the upper edge of the lower sidewall upholstery panel. Refer to Figure 7.

b. Install the screws (1) and washers (2) that attach the window panel (3, 4,or 5) to the cabin lighting support.

c. Refer to Chapter 33-20-00 and install the cabin lighting tray and reflector.

EMERGENCY EXIT DOOR UPHOLSTERY REMOVAL

a. Refer to Chapter 52-20-00 and remove the emergency exit door from the airplane.

b. Remove the screws (3) and washers (4) from the brackets (5) attaching the upholstery panels (1 and 2) to the emergency door structure, then remove the upholstery panels (1 and 2) from the door. Refer to Figure 8.

NOTE

Tag the spacers (9 and 11) to ensure correct reinstallation.

c. Remove the screws (6), washers (7 and 10) and spacers (9 and 11) attaching the escutcheon (12) to the bracket (8), then remove the escutcheon (12) from the bracket (8).

EMERGENCY EXIT DOOR UPHOLSTERY INSTALLATION

a. Align the escutcheon (12) with the bracket (8). Refer to Figure 8.

NOTE

Ensure that the spacers (9 and 11) are in the correct position before installing the escutcheon.

b. Install the screws (6), washers (7 and 10) and spacers (9 and 11) that attach the escutcheon (12) to the bracket (8).

c. Install the four screws (3) and washers (4) through the brackets (5) to attach the door upholstery panels (1 and 2) to the door.

d. Refer to Chapter 52-20-00 and install the emergency door on the airplane.

CABIN AIRSTAIR DOOR FORWARD UPHOLSTERY PANEL REMOVAL

NOTE

Removal of the cabin airstair door forward and aft upholstery panels is typical.

a. Refer to Chapter 52-10-00 and disconnect the hand cable from the hand cable connector (10) and disconnect the damper position rod from the damper position rod connector (1). Refer to Figure 9.

b. Remove the caps (13) from the screws (13) attaching the forward upholstery panel (12) to the side of the door steps, then remove the screws (13).

c. Remove the caps (11) from the screws (11) attaching the forward upholstery panel (12) to the cabin door (14), then remove the screws (11).

d. Remove the upholstery panel (12) from the door (14).

CABIN AIRSTAIR DOOR FORWARD UPHOLSTERY INSTALLATION

NOTE

Installation of the cabin airstair door forward and aft upholstery panels is typical.

a. Position the cabin door forward upholstery panel (12) on the cabin door (14) and install the screws (11) that attach the upholstery panel (12 to the door (14), then install the caps (11). Refer to Figure 9.

b. Install the screws (13) that attach the upholstery panel (12) to the side of the door steps, then install the caps (13).

c. Refer to Chapter 52-10-00 and connect the damper position rod to the damper position rod connector (1) and connect the hand cable to the hand cable connector (10).

CABIN AIRSTAIR DOOR LOWER COVER REMOVAL

a. Remove the screws (8) attaching the carpet and light retainer (7) to the lower step. Refer to Figure 9.

b. Remove the door lower cover (9) from the cabin door (14).

CABIN AIRSTAIR DOOR LOWER COVER INSTALLATION

a. Align the door lower cover (9) with the bottom of the cabin door (14). Refer to Figure 9.

b. Position the carpet and light retainer (7) over the door lower cover (9) and install the screws (8) that attach the retainer (7) to the lower step.

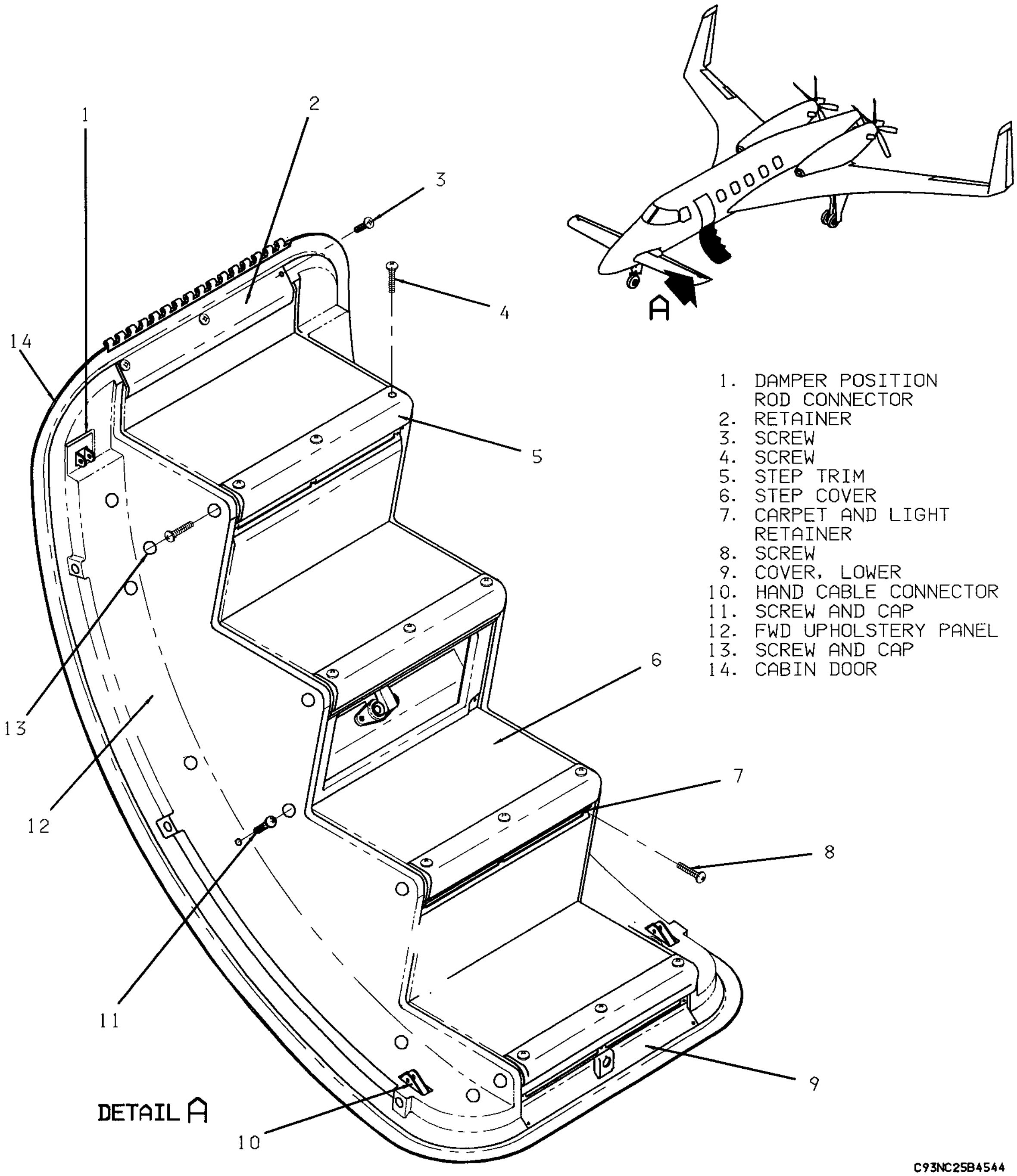
CABIN AIRSTAIR DOOR STEP COVER REMOVAL

NOTE

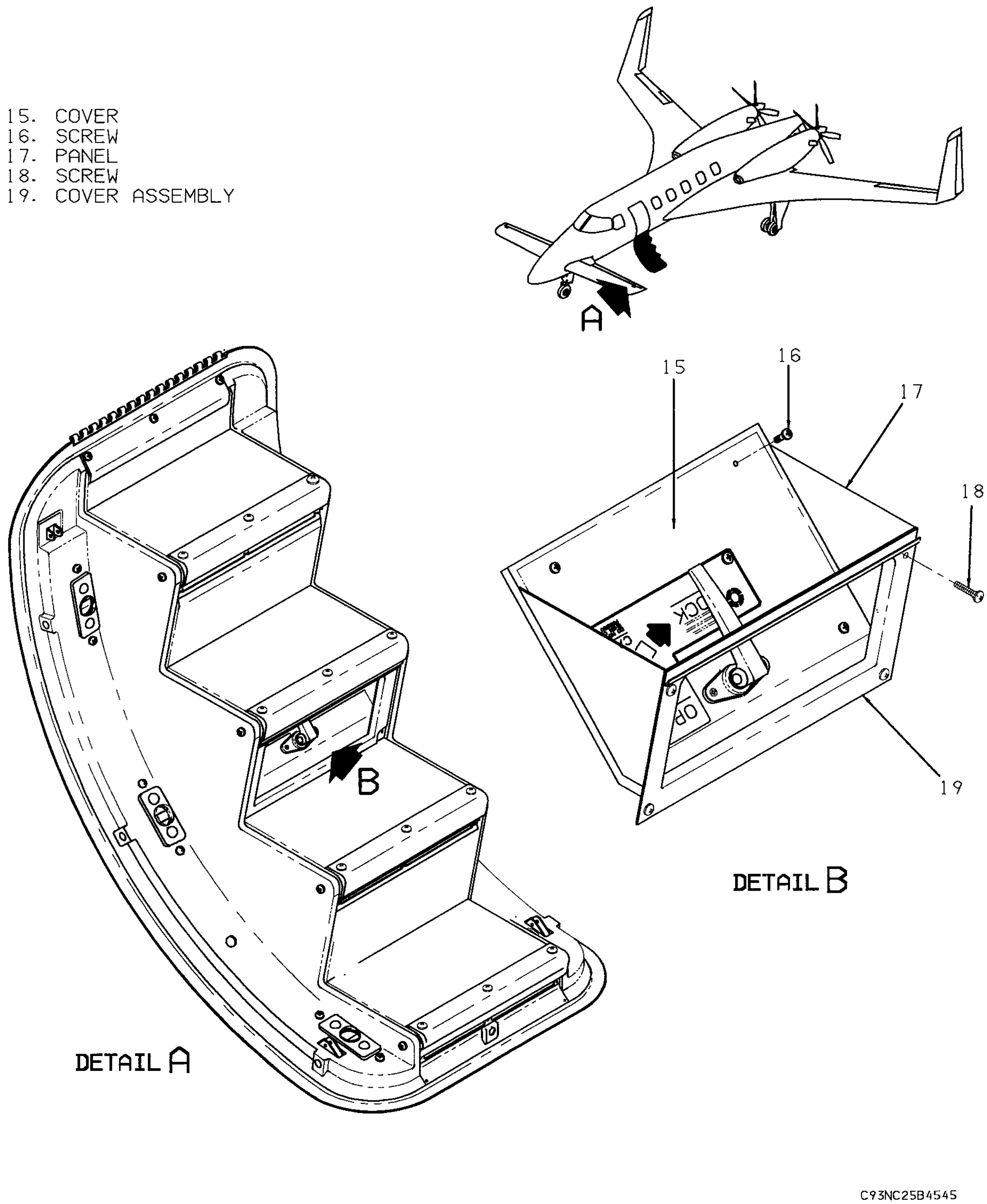
Refer to steps a thru c to remove the lower step cover. Refer to steps d thru f to remove the second step cover. Refer to steps g thru i to remove the third step cover. Refer to steps j thru m to remove the fourth step cover.

a. Remove the screws (4) attaching the step trim (5) to the lower step trim (5), then remove the step trim (5). Refer to Figure 9.

b. Remove the screws (8) attaching the carpet and light retainer (7) to the lower and second steps, then remove the retainers (7).



Cabin Airstair Door Upholstery Installation (Sheet 1 of 2)
Figure 9



Cabin Airstair Door Upholstery Installation (Sheet 2 of 2)
Figure 9

c. Remove the step cover (6) from the lower step.

d. Remove the screws (4) attaching the step trim (5) to the second step, then remove the step trim (5).

e. Remove the screws (8) attaching the carpet and light retainer (7) to the second step, then remove the retainer (7).

f. Remove the edge of the step cover (6) from the retainer at the bottom of the cover assembly (19), then remove the step cover (6).

g. Remove the screws (4) attaching the step trim (5) to the third step, then remove the step trim (5).

h. Remove the screws (8) attaching the carpet and light retainer (7) to the fourth step, then remove the retainer (7).

i. Remove the edge of the step cover (6) from the retainer at the top of the cover assembly (19), then remove the step cover (6).

j. Remove the screws (3) attaching the retainer (2) to the back of the fourth step, then remove the retainer (2).

k. Remove the screws (4) attaching the step trim (5) to the fourth step, then remove the step trim (5).

l. Remove the screws (8) attaching the carpet and light retainer (7) to the fourth step, then remove the retainer (7).

m. Remove the step cover (6) from the fourth step.

CABIN AIRSTAIR DOOR STEP INSTALLATION

NOTE

Refer to steps a thru c to install the lower step cover. Refer to steps d thru g to install the second step cover. Refer to steps h thru k to install the third step cover. Refer to steps l thru o to install the fourth step cover.

Install step covers on steps using adhesive (2, Chart 1, 25-00-00). Do not bond the step cover to the forward or aft door upholstery panel.

a. Apply adhesive to the step cover (6), then position the cover (6) on the lower step. Refer to Figure 9.

b. Align the carpet and light retainers (7) with the lower and second steps, then install the attaching screws (8).

c. Position the step trim (5) on the lower and second steps, then install the attaching screws (4).

d. Apply adhesive to the step cover (6), then position the cover (6) on the second step.

e. Attach the edge of the step cover (6) to the retainer at the bottom of the cover assembly (19) located below step three.

f. Align the carpet and light retainer (7) with the second step, then install the attaching screws (8).

g. Position the step trim (5) on the second step, then install the attaching screws (4).

h. Apply adhesive to the step cover (6), then position the cover (6) on the third step.

i. Attach the edge of the step cover (6) to the retainer at the top of the cover assembly (19) located below step three.

j. Align the carpet and light retainer (7) with the third step, then install the attaching screws (8).

k. Position the step trim (5) on the third step, then install the attaching screws (4).

l. Apply adhesive to the step cover (6), then position the cover (6) on the fourth step.

m. Align the retainer (2) with the back of the fourth step, then install the attaching screws (3).

n. Align the carpet and light retainer (7) with the fourth step, then install the attaching screws (8).

o. Position the step trim (5) on the fourth step, then install the attaching screws (4).

CABIN LOWER SIDEWALL UPHOLSTERY REMOVAL

NOTE

Removal of the left and right cabin lower sidewall upholstery is typical.

a. Refer to PASSENGER SEAT REMOVAL and remove the seat(s) to gain access to the lower sidewall upholstery (6). Refer to Figure 10.

b. Lift the carpet away from the bottom of the cabin consoles (3) and the cabin table.

c. Remove the screws (5) and washers (4) attaching the bottom of the consoles (3), table and lower sidewall upholstery (6) to the bulkhead.

d. Lift the lower edge of the consoles (3) and table and remove the upholstery panel (6) from the airplane.

CABIN LOWER SIDEWALL UPHOLSTERY INSTALLATION

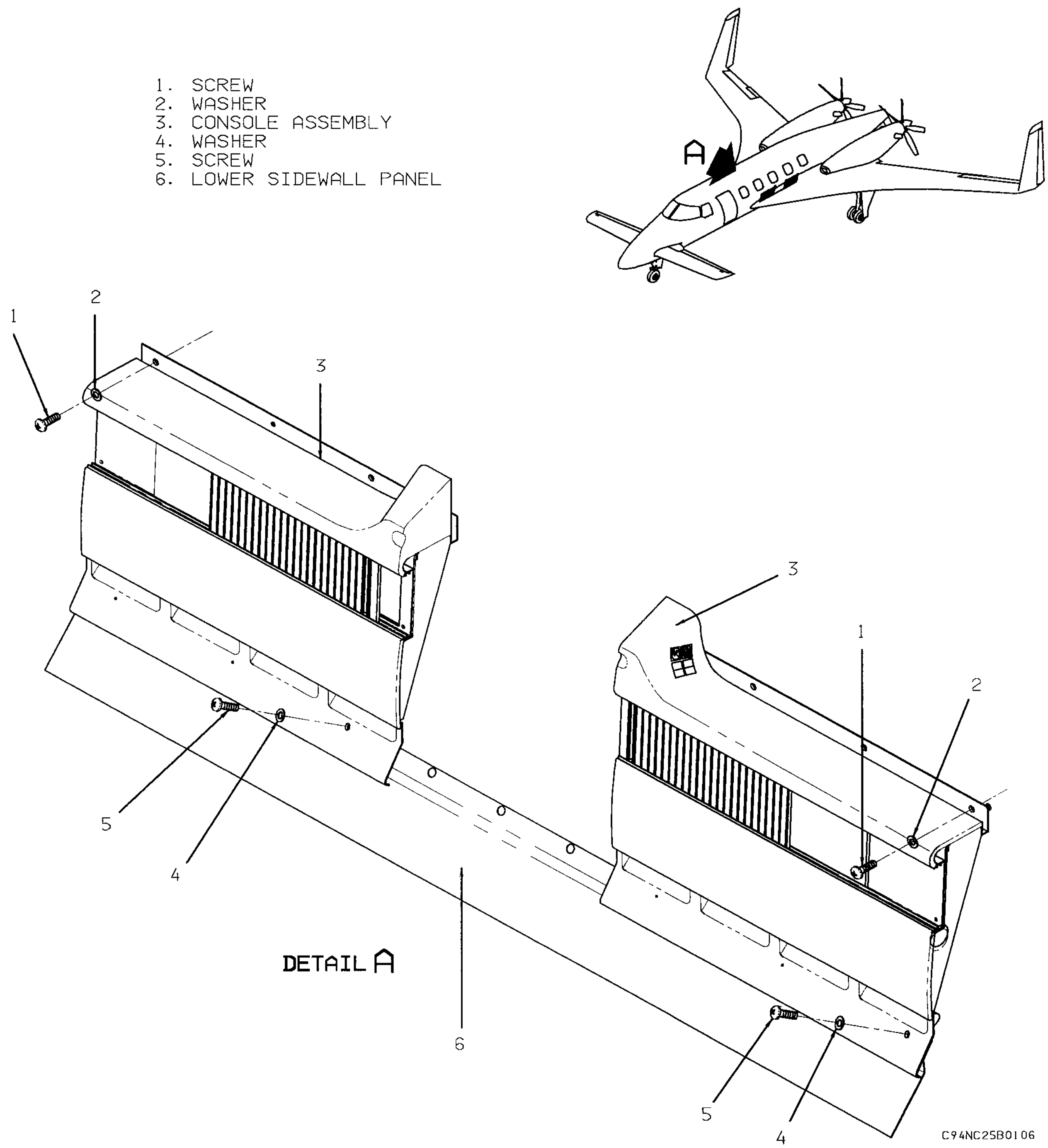
NOTE

Installation of the left and right cabin lower sidewall upholstery is typical.

a. Lift the lower edge of the consoles (3) and cabin table and extend the lower sidewall upholstery panel (6) into position. Refer to Figure 10.

b. Lower the consoles (3) and table over the upholstery panel (6) and install the attaching screws (5) and washers (4).

c. Refer to PASSENGER SEAT INSTALLATION and install the seat(s).



Cabin Lower Sidewall Upholstery and Console Installation
Figure 10

CABIN CONSOLE REMOVAL

NOTE

Removal of all cabin consoles is typical.

a. Remove all electrical power from the airplane.

b. Refer to PASSENGER SEAT REMOVAL and remove the seat(s) to gain access to the console (3). Refer to Figure 10.

c. Refer to CABIN WINDOW PANEL REMOVAL and remove the window panels.

d. Lift the carpet and remove the screws (5) and washers (4) attaching the lower edge of the console (3) to the bulkhead.

e. Remove the screws (1) and washers (2) attaching the top of the console (3) to the sidewall.

f. Move the console (3) away from the bulkhead and disconnect the electrical connector, then remove the console (3) from the airplane.

CABIN CONSOLE INSTALLATION

NOTE

Installation of all cabin consoles is typical.

a. Position the cabin console (3) near the sidewall and connect the electrical connector. Refer to Figure 10.

b. Install the screws (1) and washers (2) attaching the top of the console (3) to the sidewall.

c. Install the screws (5) and washers (4) attaching the bottom of the console (3) to the sidewall and replace the carpet.

d. Refer to CABIN WINDOW PANEL INSTALLATION and install the window panel.

e. Refer to PASSENGER SEAT INSTALLATION and install the seat(s).

f. Restore electrical power to the airplane.

CABIN TABLE REMOVAL

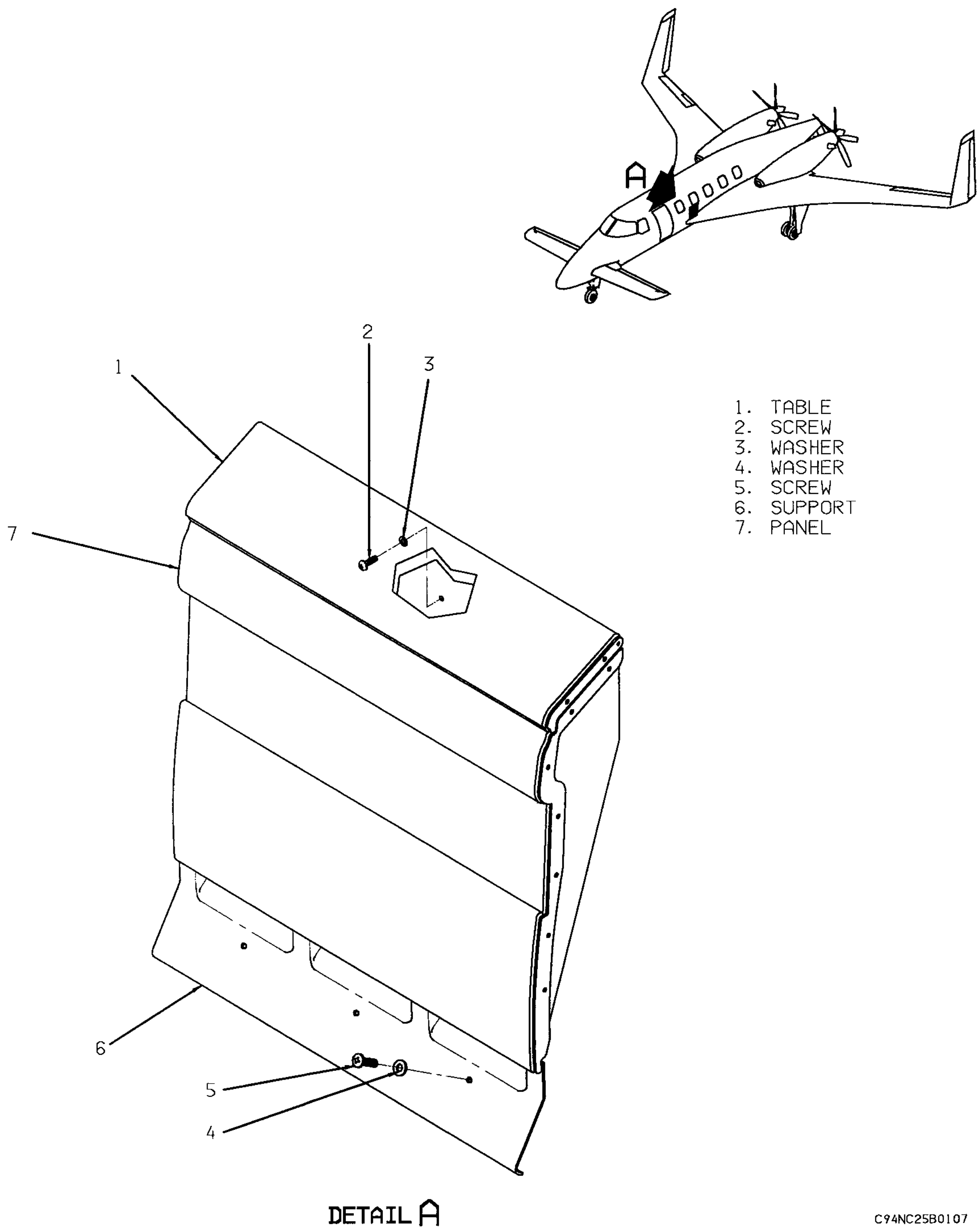
a. Remove the screws (5) and washers (4) attaching the lower edge of the table assembly (1) to the sidewall. Refer to Figure 11.

b. Lift the panel (7) approximately 1/4 inch and remove from the table assembly.

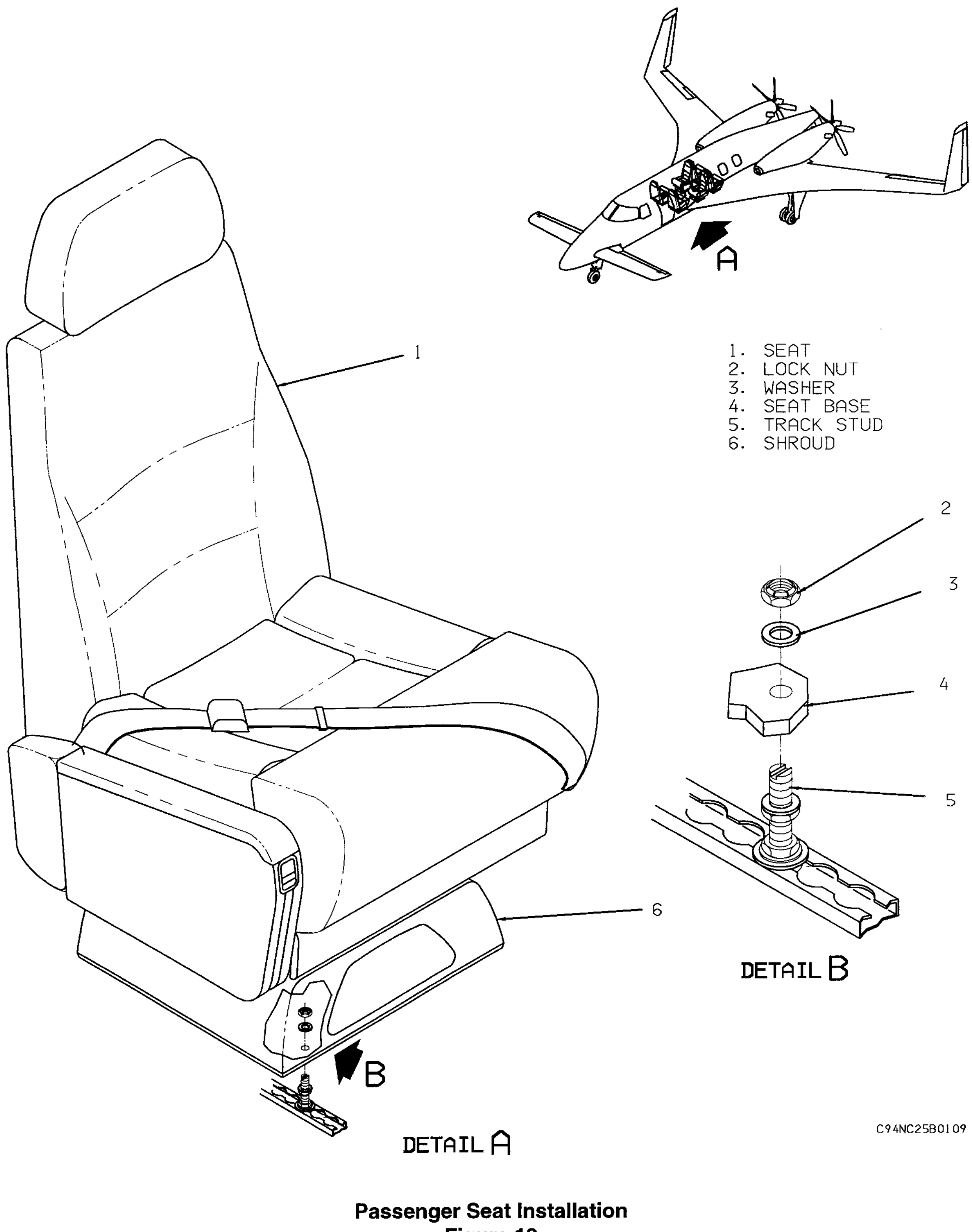
c. Open the table access door and set the table to the upright position.

d. Remove the screws (2) and washers (3) attaching the upper edge of the table assembly (1) to the sidewall.

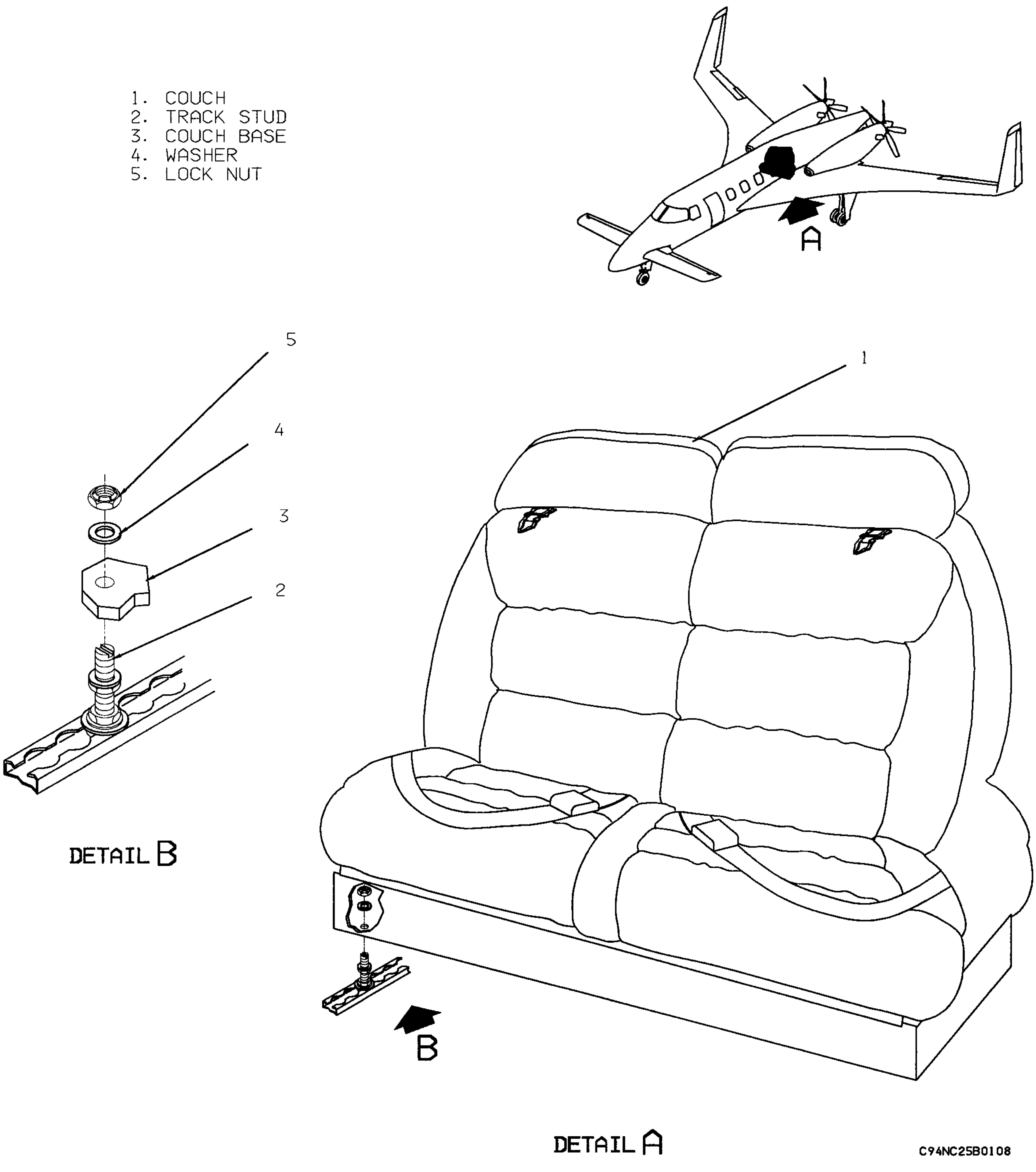
e. Remove the table assembly (1) from the airplane.



Cabin Table Installation
Figure 11



Passenger Seat Installation
Figure 12



Aft Two Place Couch Installation (NC-4 thru NC-20)
Figure 13

CABIN TABLE INSTALLATION

a. Align the cabin table assembly (1) with the sidewall. Refer to Figure 11.

b. Open the table access door and set the table to the upright position.

c. Install the screws (2) and washers (3) that attach the upper edge of the table assembly (1) to the sidewall.

d. Install the panel (7) in the table assembly.

e. Stow the table and install the screws (5) and washers (4) that attach the lower edge of the table assembly (1) to the sidewall.

PASSENGER SEAT REMOVAL

a. Remove the shroud (6) from the seat (1). Refer to Figure 12.

b. Remove the locknuts (2) and washers (3) from the four track studs (5).

c. Remove the seat (1) from the airplane.

PASSENGER SEAT INSTALLATION

a. Position the passenger seat (1) on the track studs (5). Refer to Figure 12.

b. Secure the seat base (4) to the track studs (5) with the washers (3) and locknuts (2).

c. Install the shroud (6) on the base of the seat (1).

SEAT BELT INSPECTION

Contact manufacturer of the seat belts and shoulder harnesses installed in aircraft for inspection information.

AFT TWO PLACE COUCH REMOVAL (NC-4 THRU NC-20)

a. Remove the eight locknuts (5) and washers (4) attaching the couch (1) to the track studs (2). Refer to Figure 13.

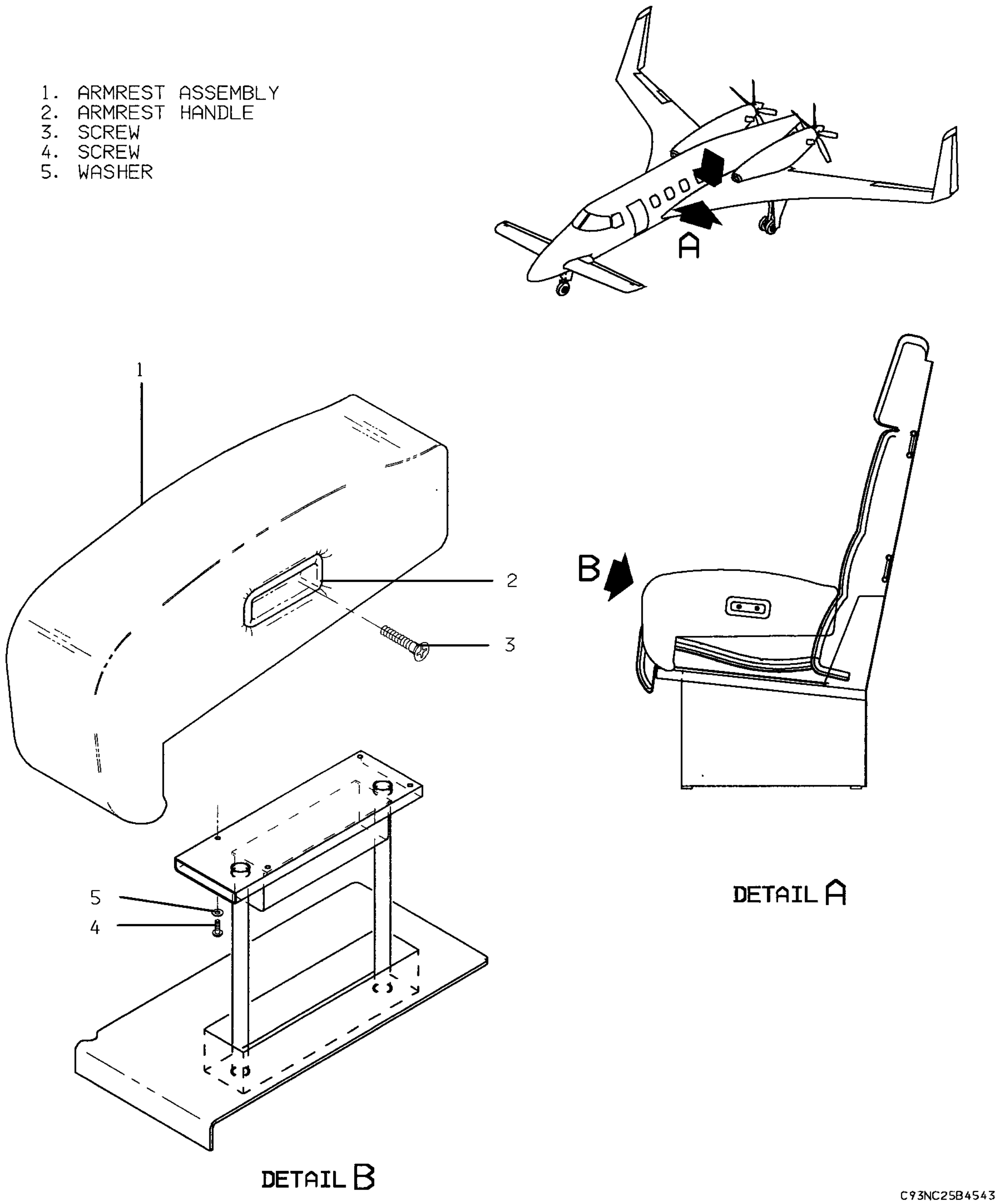
b. If necessary fold the back of the couch (1) forward, then remove the couch (1) from the airplane.

AFT TWO PLACE COUCH INSTALLATION (NC-4 THRU NC-20)

a. Position the couch (1) on the track studs (2). Refer to Figure 13.

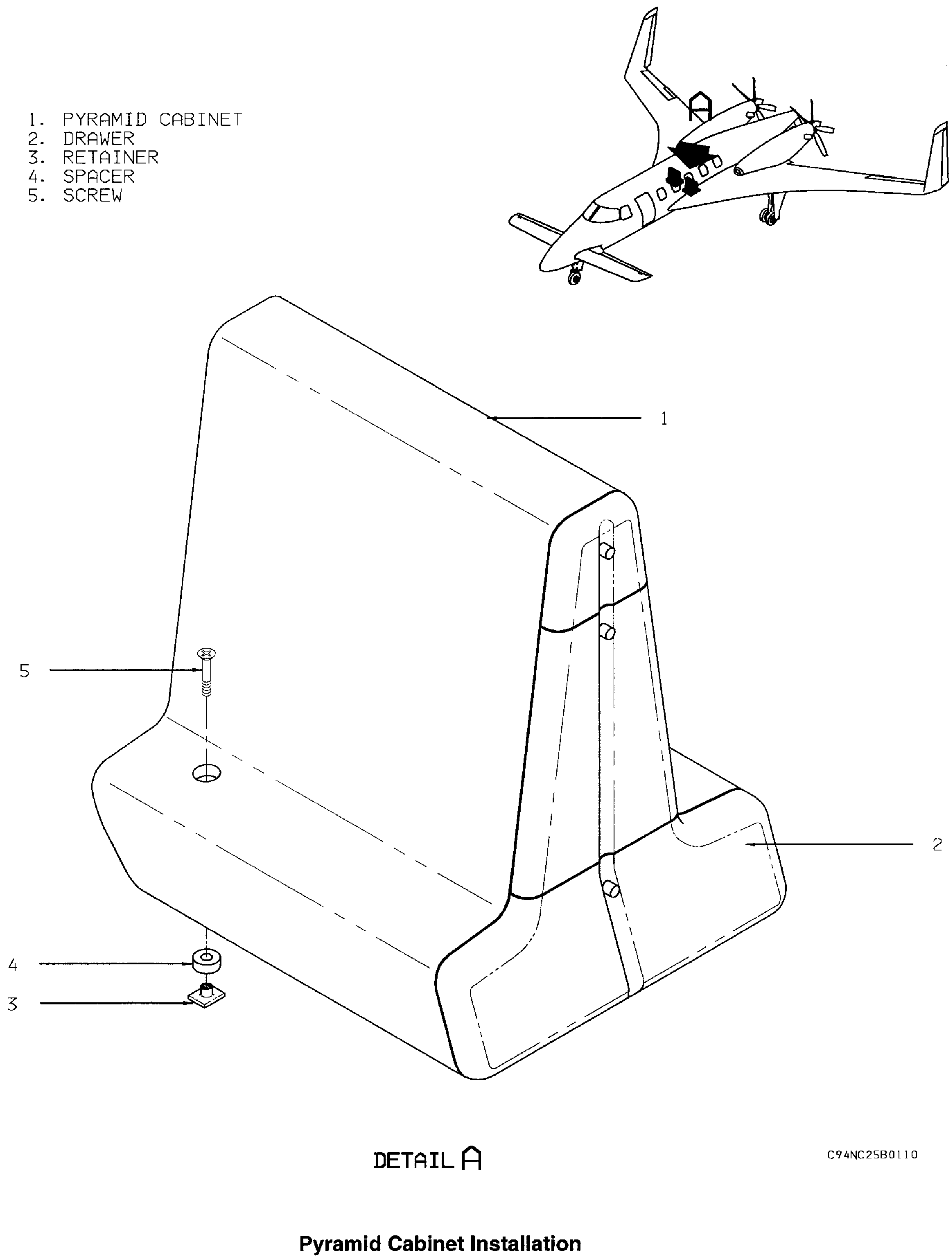
b. Secure the couch base (3) to the track studs (2) with the washers (4) and locknuts (5).

1. ARMREST ASSEMBLY
2. ARMREST HANDLE
3. SCREW
4. SCREW
5. WASHER



Aft Two Place Couch Armrest Installation (NC-4 thru NC-20)
Figure 14

1. PYRAMID CABINET
2. DRAWER
3. RETAINER
4. SPACER
5. SCREW



Pyramid Cabinet Installation
Figure 15

AFT TWO PLACE COUCH ARMREST REMOVAL (NC-4 THRU NC-20)

a. Place the aft couch armrest (1) in the fully extended position. Refer to Figure 14.

b. Remove the screws (4) and washers (5) attaching the armrest (1) to the frame, then remove the armrest (1) from the airplane.

c. Remove the screws (3) attaching the handle (2) to the armrest (1), then remove the handle (2) from the armrest (1).

AFT TWO PLACE COUCH ARMREST INSTALLATION (NC-4 THRU NC-20)

a. Install the aft two place couch armrest handle (2) in the recess of the armrest (1) and install the screws (3) that attach the handle to the armrest (1). Refer to Figure 14.

b. Ensure the frame is fully extended, then install the screws (4) that attach the armrest (1) to the frame.

PYRAMID CABINET REMOVAL

NOTE

Removal of pyramid cabinets is typical in each airplane equipped with the cabinets.

a. Remove all electrical power from the airplane.

b. Refer to PASSENGER SEAT REMOVAL and remove the seat(s) adjacent to the pyramid cabinet (1). Refer to Figure 15.

c. Remove the lower drawer (2), then remove the screws (5) attaching the cabinet (1) to the retainers (3) in the seat tracks.

d. Carefully move the cabinet (1) away from the sidewall and disconnect the telephone connection or electrical connection, as applicable, then remove the cabinet (1) from the airplane.

PYRAMID CABINET INSTALLATION

NOTE

Installation of pyramid cabinets is typical in each airplane equipped with the cabinets.

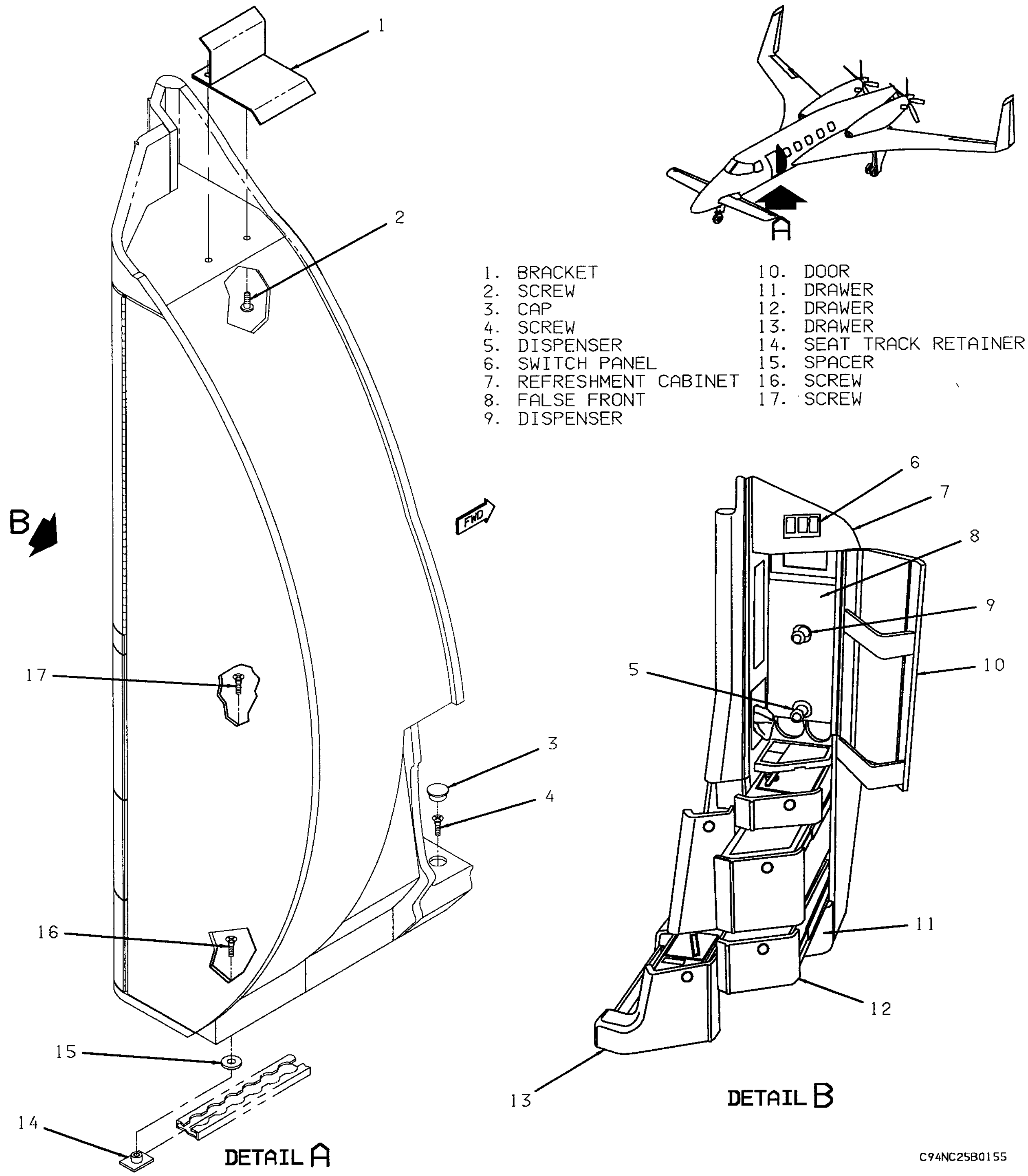
a. Position the pyramid cabinet (1) in the cabin and connect the telephone connector or electrical connector, as applicable. Refer to Figure 15.

b. Align the cabinet (1) and spacers (4) with the retainers (3), then install the screws (5) that attach the cabinet (1) to the seat tracks.

c. Install the drawer (2) in the cabinet (1).

d. Refer to PASSENGER SEAT INSTALLATION and install the seat(s) adjacent to the cabinet (1).

e. Restore electrical power to the airplane.



LH Forward Refreshment Cabinet Installation
Figure 16

LH FORWARD REFRESHMENT CABINET REMOVAL

a. Remove electrical power from the airplane.

b. Open the door (10) of the refreshment cabinet (7). Press in and release the false front (8) to disconnect it from its latch, then remove the false front that is covering the dispensers (5 and 9). Refer to Figure 17.

c. Remove the upper dispenser (9).

d. Disconnect the electrical connector located behind the switch panel (6).

e. Remove the two screws (2) securing the cabinet (7) to the bracket (1).

f. Remove the drawers (11, 12, and 13) from the cabinet (7).

g. Remove the cap (3) from the cabinet (7).

h. Using the opening that was covered by the cap (3) for access, remove the two screws (4 and 17), inside the drawer (13) compartment, from the seat track retainers (14).

i. Remove the screw (16), inside the drawer (12) compartment, from the seat track retainers (14).

j. Disconnect the drain line located in the drawer (12) compartment, then remove the cabinet (7) from the airplane.

LH FORWARD REFRESHMENT CABINET INSTALLATION

a. Position the refreshment cabinet (7) in the cabin. Refer to Figure 17.

b. Align the cabinet (7) and spacers (15) with the seat track retainers (14), then install the attaching screws (4, 16 and 17). Install the cap (3) in the cabinet (7).

c. Install the two screws (2) into the bracket (1).

d. Connect the electrical connector located behind the switch panel (6).

e. Install the top dispenser (9) into the cabinet (7).

f. Install the bottom edge of the false front (8) into the clip at the base of the lower dispenser (5). Push the front over the dispensers (5 and 9) until the catch engages.

g. Connect the drain tubing located in the drawer (12) compartment.

h. Install the drawers (11, 12 and 13) in the cabinet (7).

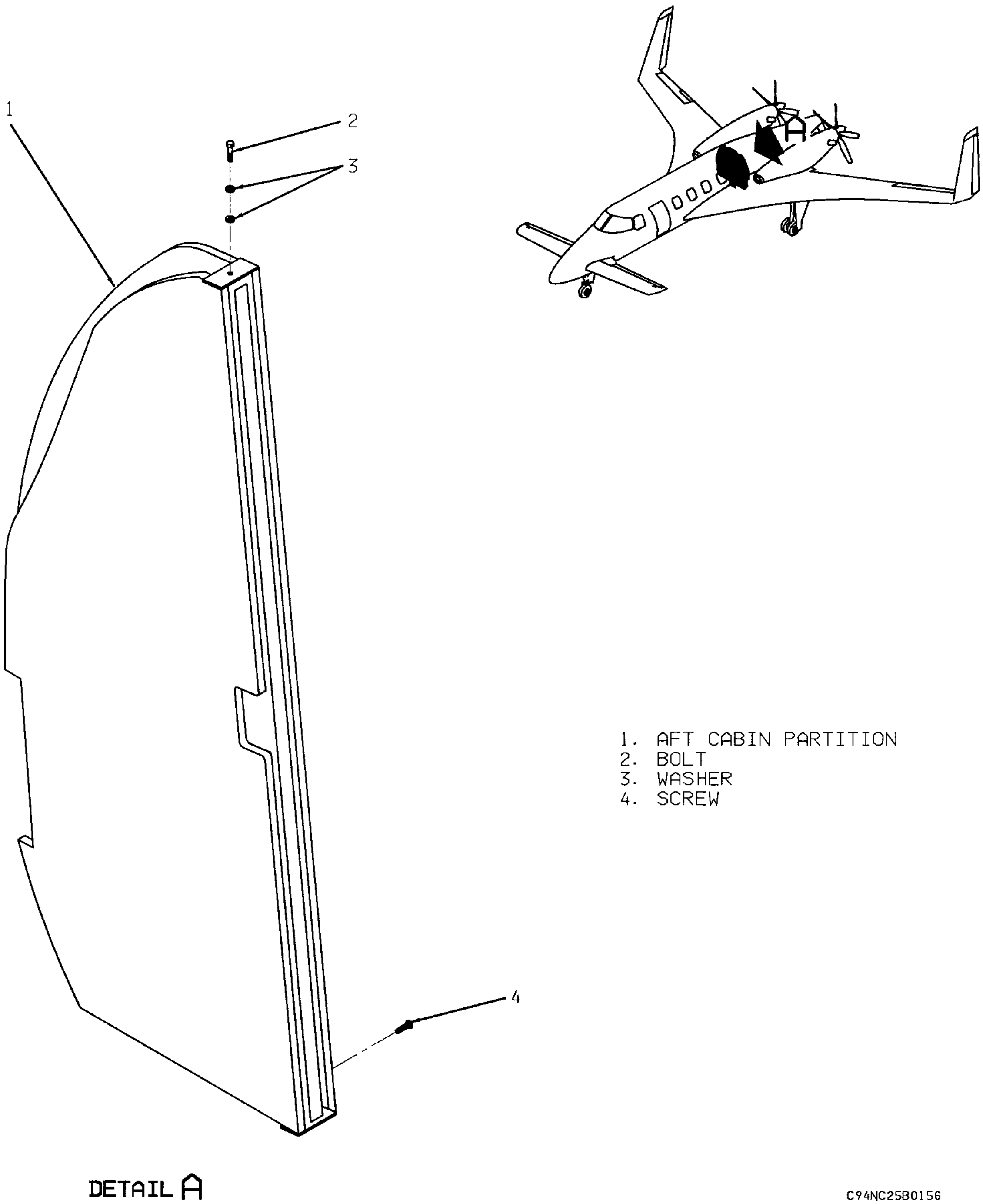
i. Restore electrical power to the airplane.

AFT CABIN PARTITION REMOVAL (NC-21 AND AFTER)

a. Refer to AFT TOILET HEADLINER REMOVAL and remove the aft headliner.

NOTE

Observe the position of the washers (3) during removal.



1. AFT CABIN PARTITION
2. BOLT
3. WASHER
4. SCREW

Aft Cabin Partition Installation (NC-21 and After)
Figure 17

b. Remove the bolt (2) and washers (3) attaching the aft cabin partition to the overhead.Refer to Figure 18.

c. Remove the two screws (4) attaching the cabin partition (1) to the floor bracket.

d. Remove the cabin partition (1) from the airplane.

AFT CABIN PARTITION INSTALLATION (NC-21 AND AFTER)

a. Align the aft cabin partition (1) with the upper and lower mounting brackets. Refer to Figure 18.

NOTE

Install a washer (3) above and below the upper bracket.

b. Install the bolt (2) and washers (3) that attach the cabin partition (1) to the overhead bracket.

c. Install the two screws (4) that attach the cabin partition (1) to the floor bracket.

d. Refer to AFT TOILET HEADLINER INSTALLATION and install the toilet headliner.

BAGGAGE CABINET REMOVAL, RH FORWARD (NC-4 THRU NC-20)

a. Remove the right forward aft facing seat. Refer to CABIN SEAT REMOVAL.

b. Remove the forward right sidewall console. Refer to CABIN SIDEWALL CONSOLE REMOVAL.

c. Partially open the aft door and lift the door straight up to disengage the hinge pins. Remove the door.

d. Partially open the forward door and remove the two hinge pins securing the articulating door to the cabinet frame. Remove the door and articulating door.

e. Remove the webbing from the baggage compartment.

f. Remove the access panel over the electrical components within the forward bulkhead by pulling straight away to disengage the friction fasteners.

g. Remove the screw (6) located on the aft side of the aft bulkhead. Refer to Figure 18.

h. Remove the two screws (2) in the inside upper right corner that fasten the upper header to the aft bulkhead.

i. Open the toilet drawer and lift the toilet out of the drawer to expose the drain tube and the electrical wiring. Disengage the toilet drain tube and the toilet electrical wiring.

j. Disengage the drawer glides and remove the drawer and toilet.

k. Remove the 3 screws (7) inside the toilet drawer space that secures the lower drawer unit to the aft bulkhead. Remove the aft bulkhead.

l. Disengage the oxygen supply. Refer to chapter 35, FORWARD BAGGAGE CABIN OXYGEN COMPARTMENT REMOVAL.

m. The false back rests in a groove in each header and the back of the lower base unit. Remove the false back by carefully sliding aft.

n. Remove the four screws (11) that attach the top header to the forward cabinet bulkhead.

NOTE

The paging amplifier (if installed) must be removed from the forward bulkhead to gain access to the four screws attaching the header to the forward cabinet bulkhead.

o. While supporting the header:

1. Remove the three screws (1) in the top of the header.

2. Slide the header aft (approximately 2 inches). Pull the header outward and down far enough to expose the electrical wiring.

3. Disengage the electrical wiring for the lights and switch.

p. Remove the header.

q. Open the supply drawer. Disengage the drawer glides and remove the drawer.

r. Remove the tissue dispenser.

s. Disengage the relief tube drain located on the upper inside of the supply drawer space.

t. Remove the screw (9) on the front edge of the supply drawer opening.

u. Remove the three screws (8) inside the supply drawer opening.

v. Remove the screw (10) on the front edge of the tissue dispenser opening.

w. Remove two screws in each of the five footman loops securing the chrome carpet flashing. Remove the flashing and the footman loops.

x. Remove the four fasteners securing the cabinet to the seat tracks.

y. Remove the drawer supply cabinet unit.

z. Remove the four screws (3) in the bottom of the forward cabinet bulkhead.

aa. Support the forward bulkhead while performing the following steps:

1. Remove the two metal plates (4 and 5) attaching the back of the lower cabinet console to the forward cabinet bulkhead.

2. Disconnect and tag all component electrical connectors.

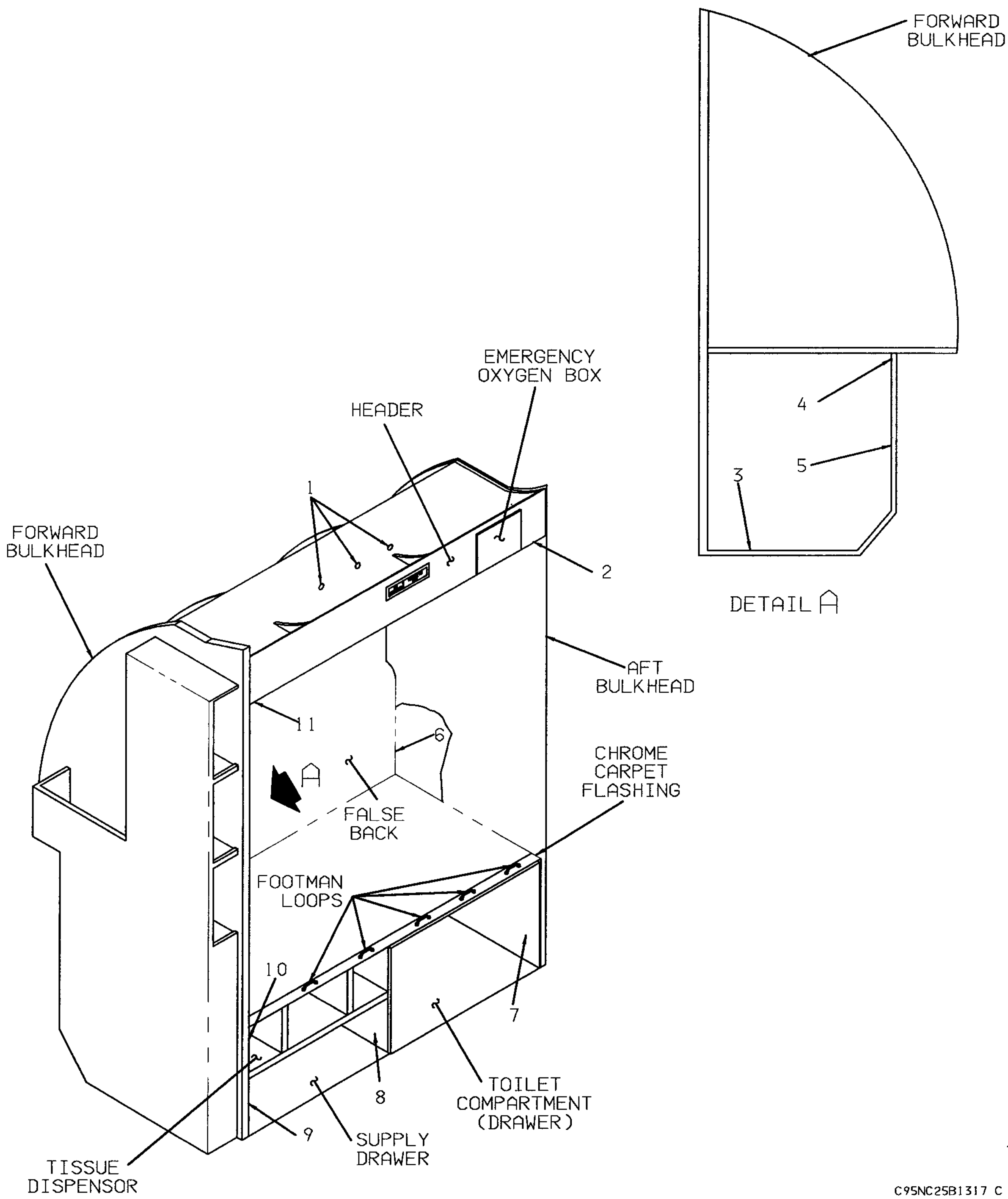
3. Disconnect and tag the grounding bond straps.

ab. Remove the forward bulkhead.

BAGGAGE CABINET INSTALLATION, RH FORWARD (NC-4 THRU NC-20)

a. Place the forward cabinet bulkhead in place and secure until step j. is completed.

b. Feed the electrical harnesses through the opening in the forward bulkhead.



RH Forward Baggage Compartment (NC-4 thru NC-20)
Figure 18

c. Place the toilet drawer console in place.

d. Install the four screws (3) in the bottom of the forward cabinet bulkhead. Refer to Figure 18.

e. Install the two metal plates (4 and 5) to attach the back of the lower cabinet console to the forward cabinet bulkhead.

f. Place the supply drawer console in place.

g. Install the screw (10) into the front edge of the tissue dispenser opening.

h. Install the screw (9) into the front edge of the supply drawer opening.

i. Install the three screws (8) inside the supply drawer opening.

j. Install the four fasteners securing the cabinet to the seat tracks.

k. Install the electrical connectors to their respective components.

l. Install the grounding bond straps.

m. Install the chrome carpet flashing and the five footman loops.

n. Connect the relief tube drain located on the upper inside of the supply drawer space.

o. Install the supply drawer by engaging the drawer glides.

p. Install the tissue dispenser.

q. Install the header by the following steps:

1. Raise and hold the header in a position that will allow the electrical connections for the switch and lights to be connected.

2. Connect the electrical connectors.

3. Connect the oxygen supply line to the emergency oxygen box. Refer to Chapter 35, FORWARD BAGGAGE CABIN OXYGEN COMPARTMENT INSTALLATION.

4. Place the header in a position that will allow it to mate with the slot in the forward bulkhead.

5. Slide the header forward to engage the header with the forward bulkhead. The header must be supported until the header is secured with screws.

6. Install the three screws (1) and the four screws (11) to secure the header.

r. Insert the false back into the groove in the header and the groove in the bottom console. Slide the false back forward until it contacts the forward bulkhead.

s. Place the aft bulkhead in position and secure with screw (6).

t. Secure the upper header and lower drawer unit to the aft bulkhead with screws (2 and 7).

u. Install the toilet drawer by engaging the drawer glides.

v. Lift the toilet out of the drawer to expose the drain tube and the electrical wiring, then perform the following steps:

1. Connect the drain tube.

2. Connect the electrical wiring.
3. Replace toilet to proper position.

w. Install the left cabinet door.

x. Install the right door.

y. Install the forward right sidewall console. Refer to CABIN SIDEWALL CONSOLE INSTALLATION.

z. Install the right forward aft facing seat. Refer to CABIN SEAT INSTALLATION.

EMERGENCY - DESCRIPTION AND OPERATION

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

The Starship airplane is equipped with a self-contained, battery-powered emergency locator transmitter (ELT) to assist in tracking and recovery of the airplane, crew and passengers in the event of a crash or emergency landing.

The emergency locator transmitter (ELT) system consists of an ELT mounted on the equipment shelf in the aft fuselage, an antenna mounted in the tail cone and a remote switch accessible through a spring-loaded access door in the LH side of the fuselage adjacent to the ELT. The ELT transmits simultaneously on the emergency frequencies of 121.5 and 243.0 MHz. Range is approximately line of sight.

DORNE AND MARGOLIN ELT (NC-4 THRU NC-13)

An AUTO-OFF-ON switch located on the ELT controls the operation of the unit. When the switch is in the ON position, the ELT will transmit for testing or manual operation. The AUTO position arms an inertia switch which will activate the ELT automatically upon impact. The OFF position prevents operation of the ELT. The remote TEST-AUTO-XMIT switch is used for testing and manual activation of the ELT. The TEST position is a momentary switch which will cause the ELT to transmit while held. The XMIT position turns the unit on for manual operation and the AUTO position arms the unit to operate when the inertia switch is triggered.

ARTEX ELT (NC-14 AND AFTER)

An ON-OFF switch located on the ELT controls the operation of the unit. When the switch is in the ON position, the ELT will transmit for testing or manual operation; place the switch in the OFF position to discontinue the transmission. An internal g-switch will activate the ELT on impact. The remote ARMED/RESET-ON switch is used to arm the ELT or to manually activate the ELT. When placed in the ON position, the switch signals the ELT to transmit. The ARMED/RESET position arms the unit to operate when the g-switch is triggered. To reset the ELT, cycle the switch on the ELT to the ON, then OFF position, and the remote switch to the ON, then ARMED/RESET position.

UNDERWATER LOCATOR DEVICE (ULD)

The underwater locator device (also called a underwater acoustic beacon) is installed on the forward side of the Cockpit Voice Recorder. There are two suppliers of the ULDs. One supplier is the Dukane Corporation which supplies the DK100 underwater acoustic beacon. The battery in the DK100 beacon is replacable only by the supplier. The other is Benthos Inc., which supplies the ELP-362D underwater acoustic beacon. The battery in the ELP-362D may or may not be replaceble. If the serial number on the beacon begins with the letter "S" the battery is not replaceable, otherwise it is replaceable. The major items of the ULD are the beacon, the battery and the water switch. Refer to Chapter 25-60-10 for more information and procedures on the ULD.

EMERGENCY - MAINTENANCE PRACTICES

EMERGENCY LOCATOR TRANSMITTER MAINTENANCE

Maintenance of the ELT is normally limited to replacement of the battery. If maintenance other than battery replacement becomes necessary, the unit should be removed from the airplane and sent to the manufacturer for repair. The following is a list of conditions which warrant battery replacement:

a. Visual inspection shows signs of leakage, corrosion or insecure leads.

b. Elapsed replacement date is noted on the battery case. This date represents 50% of the useful life of the battery. The information on battery life and replacement is included in the data furnished with each ELT, and is usually placarded on the battery.

NOTE

The useful life of the battery is the length of time which the battery may be stored without losing its ability to continuously operate the ELT for 48 hours.

c. After any emergency use.

d. After one cumulative hour of use.

e. After operation of unknown duration.

f. If the transmitter is stored in an area where the temperature is normally above 100° F (38°C), the battery should be replaced every 12 months.

CAUTION

Avoid storing the batteries at temperatures in excess of 55° C (130° F).

EMERGENCY LOCATOR TRANSMITTER BATTERY PACK REPLACEMENT (NC-4 THRU NC-13)

a. Remove the aft fuselage equipment shelf access panel as detailed in Chapter 53-30-00.

b. Place the switch on the ELT in the OFF position. Refer to Figure 1.

c. Disconnect the antenna from the ELT.

d. Disconnect the remote switch leads from the ELT.

e. Remove the two bolts and washers securing the ELT and jumper cable.

f. Remove the ELT from the airplane.

g. Replace the battery pack by following the instructions included with the Dorne and Margolin replacement battery pack.

WARNING

Do not discard battery pack in fire.

NOTE

Replacement battery packs should be obtained only from ELT and airplane manufacturers or from other acceptable suppliers, since the condition and useful life of over-the-counter batteries, such as those sold for flashlights, portable radios, etc., are usually unknown.

h. A new battery pack replacement date must be marked on the outside of the transmitter. The date is 50% of the useful life of the battery pack as defined by the battery pack manufacturer.

i. Secure the ELT to the aft fuselage equipment shelf with the two bolts and washers; install the jumper cable under the forward bolt. Position the ELT so that the arrow on the top of the ELT is pointed in the direction of flight.

j. Connect the remote switch leads to the ELT.

k. Connect the antenna to the ELT.

l. Install the aft fuselage equipment shelf access panel as detailed in Chapter 53-30-00.

m. Test the ELT as outlined in this chapter.

EMERGENCY LOCATOR TRANSMITTER BATTERY PACK REPLACEMENT (NC-14 AND AFTER)

a. Remove the aft fuselage equipment shelf access panel as detailed in Chapter 53-30-00.

b. Place the switch on the ELT in the OFF position. Refer to Figure 2.

c. Loosen the two thumbscrews (1) securing the mounting frame cap (2) to the mounting frame base (5).

d. Disconnect the antenna cable (4) from the ELT.

e. Disconnect the remote switch harness (3) from the ELT (11).

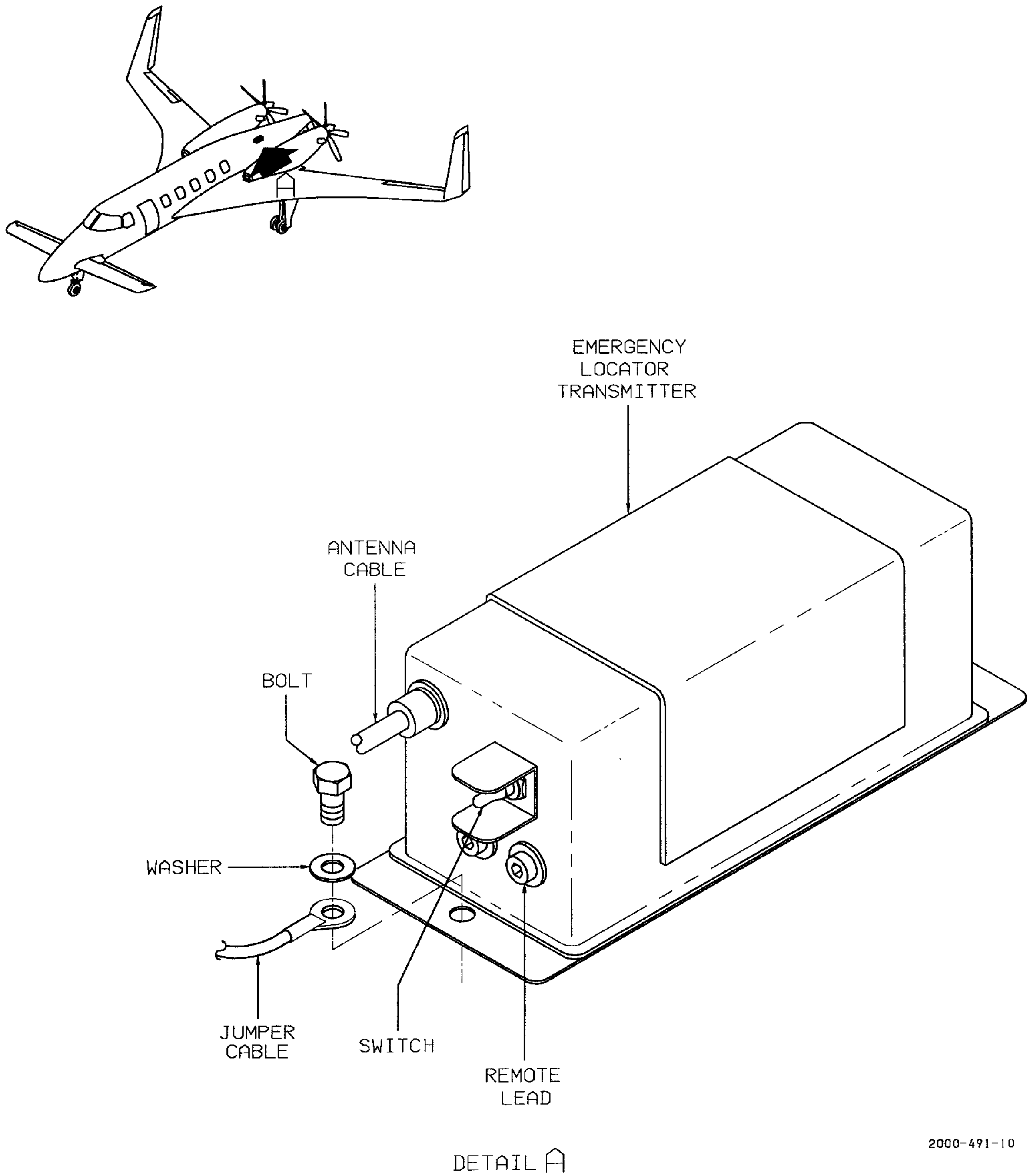
f. Remove the ELT (11) from the mounting frame base (5).

g. Disconnect the battery pack connector (10) from the ELT.

h. Remove the screws (8) securing the battery pack to the ELT (11).

WARNING

Do not discard battery pack in fire.



Emergency Locator Transmitter Installation (NC-4 thru NC-13)
Figure 1

NOTE

Replacement battery packs should be obtained only from ELT and airplane manufacturers or from other acceptable suppliers, since the condition and useful life of over-the-counter batteries, such as those sold for flashlights, portable radios, etc., are usually unknown.

i. A new battery pack replacement date must be marked on the outside of the transmitter. The date is 50% of the useful life of the battery pack as defined by the battery pack manufacturer.

j. Connect the battery pack electrical connector (10).

k. Secure the battery pack to the ELT with the screws (8). Make certain that all gaskets are properly aligned and in good condition.

l. Feed the antenna cable (4) through the mounting frame cap (2) and connect to the ELT (11).

m. Feed the remote switch harness (3) through the mounting frame cap (2) and connect to the ELT (11).

n. Install the ELT (11) in the mounting frame base (5). Position the ELT in the mounting frame base so that the arrow on the top of the ELT is pointed in the direction of flight.

o. Install the mounting frame cap (2) onto the mounting frame base (5) and secure with the thumbscrews (1).

p. Place the switch on the ELT in the OFF position.

q. Install the aft fuselage equipment shelf access panel as detailed in Chapter 53-30-00.

r. Test the ELT as outlined in this chapter.

EMERGENCY LOCATOR TRANSMITTER REMOVAL (NC-4 THRU NC-13)

a. Remove the aft fuselage equipment shelf access panel as detailed in Chapter 53-30-00.

b. Place the switch on the ELT in the OFF position. Refer to Figure 1.

c. Disconnect the antenna from the ELT.

d. Disconnect the remote switch leads from the ELT.

e. Remove the two bolts and washers securing the ELT and jumper cable.

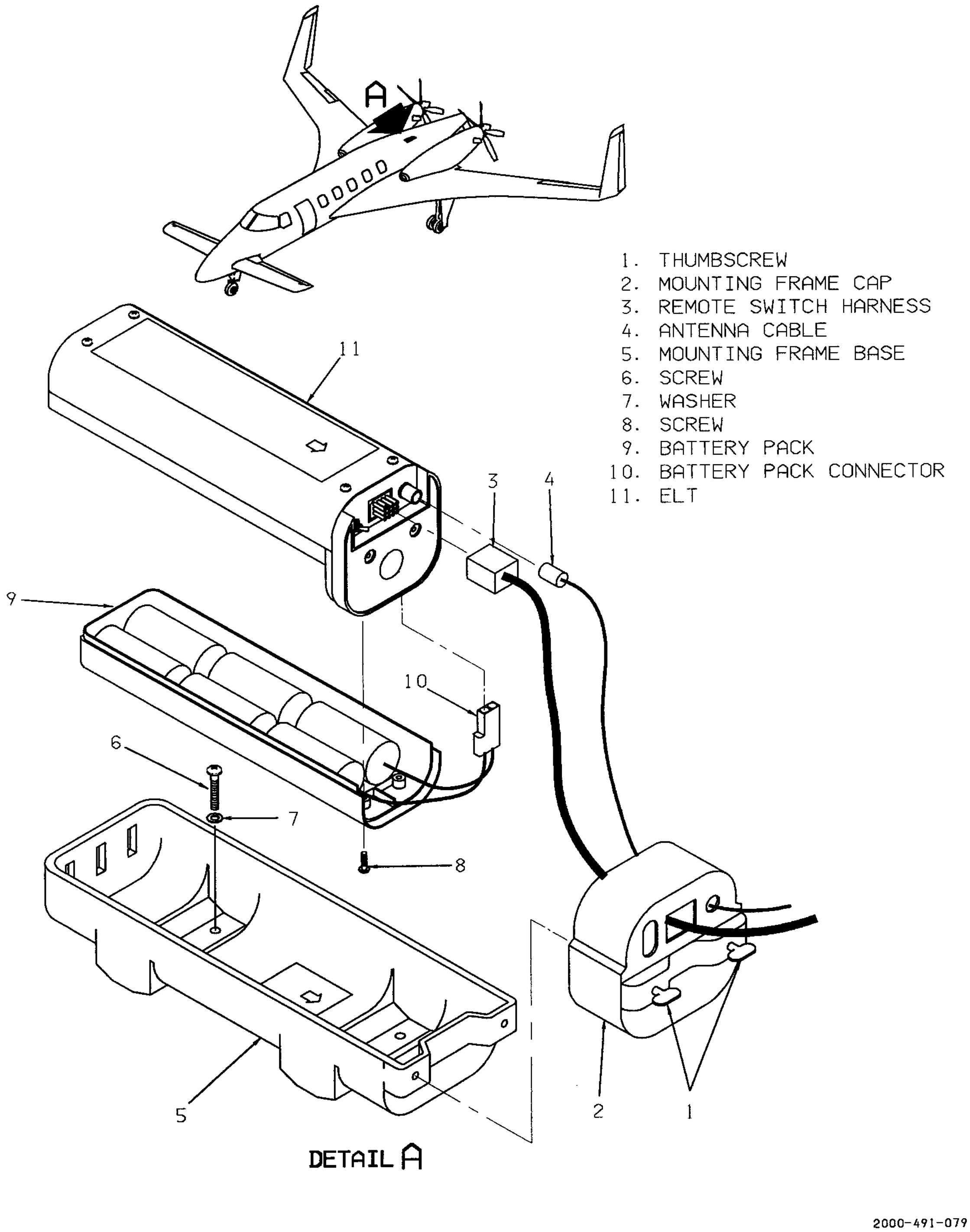
f. Remove the ELT from the airplane.

EMERGENCY LOCATOR TRANSMITTER INSTALLATION (NC-4 THRU NC-13)

a. Secure the ELT to the aft fuselage equipment shelf with the two bolts and washers; install the jumper cable under the forward bolt. Position the ELT so that the arrow on the top of the ELT is pointed in the direction of flight. Refer to Figure 1.

b. Connect the remote switch leads to the ELT.

c. Connect the antenna to the ELT.



Emergency Locator Transmitter (NC-14 and After)
Figure 2

d. Install the aft fuselage equipment shelf access panel as detailed in Chapter 53-30-00.

e. Test the ELT as outlined in this chapter.

EMERGENCY LOCATOR TRANSMITTER REMOVAL (NC-14 AND AFTER)

a. Remove the aft fuselage equipment shelf access panel as detailed in Chapter 53-30-00.

b. Place the switch on the ELT in the OFF position. Refer to Figure 2.

c. Loosen the two thumbscrews (1) securing the mounting frame cap (2) to the mounting frame base (5).

d. Disconnect the antenna cable (4) from the ELT (11).

e. Disconnect the remote switch harness (3) from the ELT (11).

f. Remove the ELT (11) from the mounting frame base (5).

g. Remove screws (6) and washers (7) to remove the mounting frame base (5) from the equipment shelf.

EMERGENCY LOCATOR TRANSMITTER INSTALLATION (NC-14 AND AFTER)

a. Secure the mounting frame base (5) to the aft fuselage equipment shelf with the screws (6) and washers (7). Position the base so that the arrow is pointed in the direction of flight. Refer to Figure 2.

b. Feed the antenna cable through the mounting frame cap (2) and connect to the ELT (11).

c. Feed the remote switch harness (3) though the mounting frame cap (2) and connect to the ELT (11).

d. Install the ELT (11) in the mounting frame base (5). Position the ELT in the mounting frame base so that the arrow on the top of the ELT is pointed in the direction of flight.

e. Install the mounting frame cap (2) onto the mounting frame base (5) and secure with the thumbscrews (1).

f. Place the switch on the ELT in the OFF position.

g. Install the aft fuselage equipment shelf access panel as detailed in Chapter 53-30-00.

h. Test the ELT as outlined in this chapter.

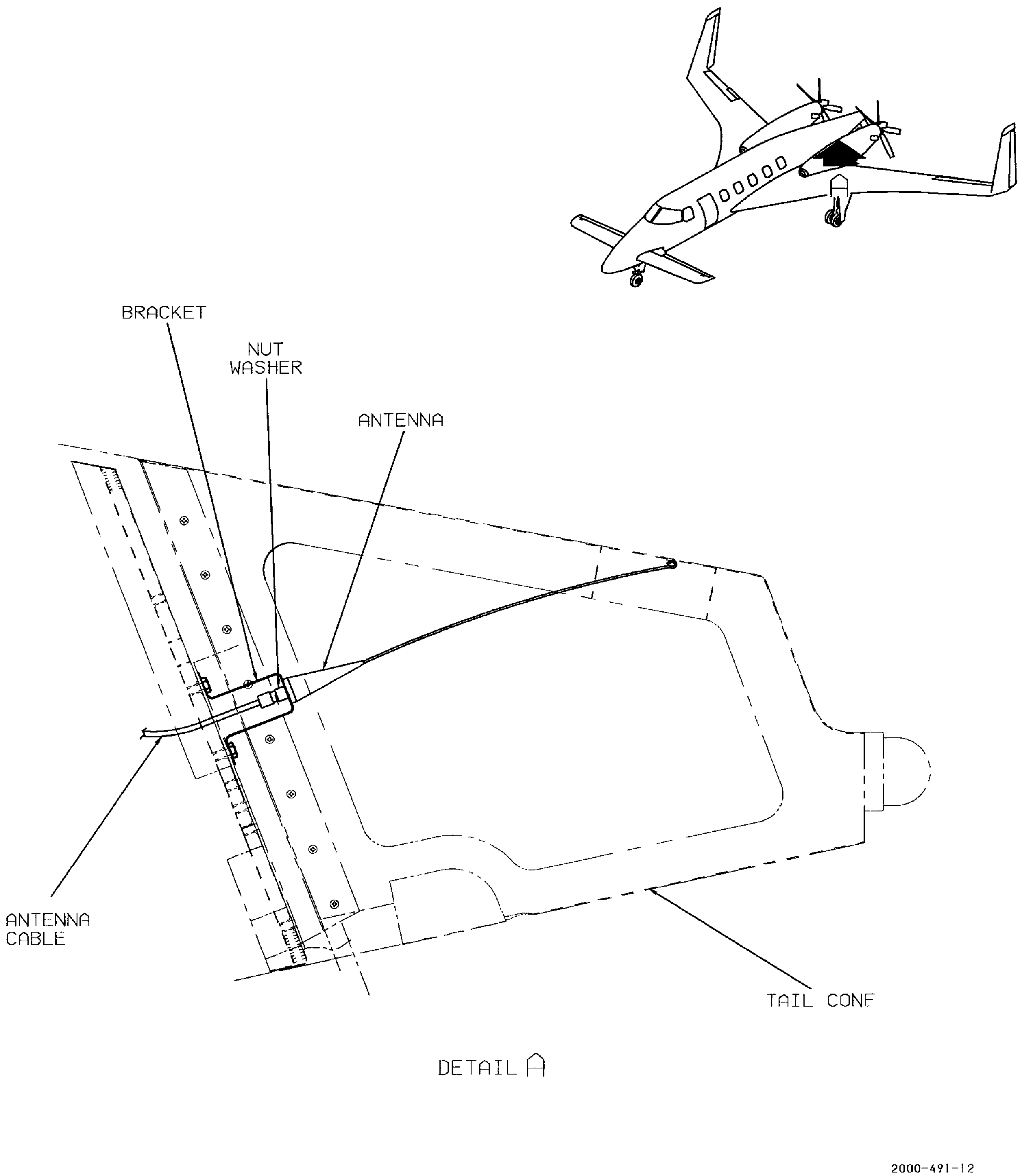
EMERGENCY LOCATOR TRANSMITTER ANTENNA REMOVAL

a. Remove the tail cone as described in Chapter 53-50-00.

b. Reach into the antenna bracket and disconnect the coaxial cable. Refer to Figure 3.

c. Remove the retaining nut and lockwasher from the antenna assembly.

d. Pull the ELT antenna assembly from the bracket.



Emergency Locator Transmitter Antenna Installation
Figure 3

EMERGENCY LOCATOR TRANSMITTER ANTENNA INSTALLATION

a. Place the antenna assembly on the tail cone bracket. Refer to Figure 3.

b. Install the lockwasher and retaining nut.

c. Tighten the retaining nut.

d. Attach the coaxial cable to the connector on the antenna.

e. Install the tail cone as described in Chapter 53-50-00.

EMERGENCY LOCATOR TRANSMITTER TESTING PROCEDURE

Any time maintenance is performed on the ELT, the following operational test must be performed. The FAA/DOT allows free space transmission tests from the airplane anytime within five minutes after each hour. The test time is generally three sweeps of the warble tone, or approximately a one-second test. The control tower should be notified that a test is about to be performed.

Improper testing of the ELT could trigger false alerts and create frequency jamming of real emergency transmissions. Be certain that all procedures are closely followed and that monitoring of frequencies occurs to ensure the ELT switches are placed in the proper positions after testing is complete. If the test is performed with the ELT removed from the airplane, Federal Communications Commission regulations require the testing be done in a screened or shielded test room, or in a test enclosure that will hold the self-contained ELT and an antenna.

CAUTION

The ELT switch should not be placed in the ON position unless the ELT is connected to its associated antenna or to a 50-ohm dummy load.

Operational testing of installed ELT's may be accomplished as follows:

NOTE

Tests should not be longer than three audio sweeps. One audio sweep may be defined as amplitude modulating the carrier with an audio frequency sweeping downward over a range of not less than 700 Hz, within the range of 1600 to 300 Hz and a sweep repetition rate between two and four Hz. Tests should be conducted only in the first five minutes of any hour. If the tests must be made at a time not included within the first five minutes after the hour, the tests should be coordinated with the nearest FAA tower or flight service station.

Operational testing of installed ELT's may be accomplished as follows:

DORNE AND MARGOLIN ELT TESTING (NC-4 THRU NC-13)

a. Turn on COMM 1 and tune to 121.5 MHz.

b. Monitor COMM 1 through the cockpit speakers.

NOTE

Monitor a frequency on COMM 1 to be certain the radio is operating.

c. Place the remote TEST-AUTO-XMIT switch in the TEST position and hold the switch for approximately one second.

NOTE

A distinctive downward sweeping tone should have been heard from the monitoring receiver during the test. If the tone was heard, the ELT is functioning properly. If there was no audible tone (assuming that the VHF transceiver is operating properly), the battery is probably disconnected, outdated or discharged.

d. After the test, place the remote TEST-AUTO-XMIT switch in the AUTO position.

e. Monitor the emergency channel to ensure the ELT has discontinued operation.

f. If the ELT continues to operate, be certain the remote switch is in the AUTO position. Check the switch on the ELT unit and make certain it is in the AUTO position also.

g. If the ELT still continues to send a signal, cycle the switch on the ELT to the ON position and then to the AUTO position to reset the ELT inertia switch.

ARTEX ELT TESTING (NC-14 AND AFTER)

a. Turn on COMM 1 and tune to 121.5 MHz.

b. Monitor COMM 1 through the cockpit speakers.

NOTE

Monitor a frequency on COMM 1 to be certain the radio is operating.

c. Place the remote ARMED/RESET-ON switch in the ON position for approximately one second.

NOTE

A distinctive downward sweeping tone should have been heard from the monitoring receiver during the test. If the tone was heard, the ELT is functioning properly. If there was no audible tone (assuming that the VHF transceiver is operating properly), the battery is probably disconnected, outdated or discharged.

d. After the test, place the remote ARMED/RESET-ON switch in the ARMED/RESEST position.

e. Monitor the emergency channel to ensure the ELT has discontinued operation.

f. If the ELT continues to operate, be certain the remote switch is in the ARMED/RESEST position. Check the switch on the ELT and make certain it is in the OFF position also.

g. If the ELT still continues to send a signal, cycle the switch on the ELT to the ON and then OFF position and the remote switch to the ON and then ARMED/RESEST position to reset the ELT inertia switch.

EMERGENCY - MAINTENANCE PRACTICES

UNDERWATER LOCATOR DEVICE (ULD) - COCKPIT VOICE RECORDER MAINTENANCE

Maintenance on the underwater locator device (underwater acoustic beacon) is limited to:

- Cleaning the water switch.
- Replacing the battery.
- Checking the beacon for operation
- Replacing the beacon.

WATER SWITCH CLEANING

Clean the water switch at intervals specified in Chapter 5-10-00. Refer to Chapter 25-60-00 and the following manufacturers manuals for information on the water switch: Dukane Technical manual - Underwater Acoustic Beacon Models DK100/DK120/DK130/DK140 Document 03-TM-0037 or the Benthos ELP-362D Emergency Locator Beacon User's manual.

BATTERY REPLACEMENT

NOTE

The battery in the DK100 beacon is not field replaceable. The battery in the ELP-362D is replaceable only if the beacon serial number does not start with an "S".

Replace the battery at intervals specified in Chapter 5-10-00. Refer to Chapter 25-60-00 and the following manufacturers manuals for information on battery replacement: Dukane Technical manual - Underwater Acoustic Beacon Models DK100/DK120/DK130/DK140 Document 03-TM-0037 or the Benthos ELP-362D Emergency Locator Beacon User's manual.

OPERATIONAL TEST

Test the operation of the ULD at intervals specified 05-10-00. Refer to Chapter 25-60-00 and the following manufacturers manuals for information on the operational test: Dukane Technical manual - Underwater Acoustic Beacon Models DK100/DK120/DK130/DK140 Document 03-TM-0037 or the Benthos ELP-362D Emergency Locator Beacon User's manual.

REPLACEMENT

Replace the ULD at intervals specified in Chapter 5-11-00. Refer to Chapter 25-60-00 and the following manufacturers manuals for information on battery replacement: Dukane Technical manual - Underwater Acoustic Beacon Models DK100/DK120/DK130/DK140 Document 03-TM-0037 or the Benthos ELP-362D Emergency Locator Beacon User's manual.

CHAPTER 26 - FIRE PROTECTION

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	10	Jun 30/95
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CHAPTER 26 - FIRE PROTECTION

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CHAPTER 26 - FIRE PROTECTION

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GENERAL - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

This chapter is concerned with the detection and the extinguishing of engine fires and cabin fires onboard the airplane. Also described is the detection of hot engine bleed air tubing leaks throughout the engine nacelles and fuselage.

ENGINE FIRE DETECTION (Effectivity: All)

The fire detection system provides a warning when an overtemp condition exists in either the left or the right engine compartment. The fire detection system consists of a responder-sensor cable assembly, left and right ENG FIRE F/W VALVE PUSH CLOSED light/switches, test switches and a printed circuit board. The lights in the ENG FIRE F/W VALVE PUSH CLOSED light/switches illuminate as an annunciator. Actuation of the switches controls the fuel firewall shutoff valves and arms the fire extinguishing system. The test switches provide for fire detection system testing.

ENGINE BLEED AIR WARNING (Effectivity: All)

The engine bleed air warning system provides a means for detecting a hot bleed air leak along the bleed air system tubing. The warning system consists of a control unit, sensing elements routed in three different areas of the airplane, three annunciator lights, a test switch and a printed circuit board. The warning system will detect heat from leaking bleed air tube(s) or connectors and illuminate the annunciator light(s), L BLEED FAIL, R BLEED FAIL, and/or FUS BLEED FAIL. Bleed air must be shut off for the area indicating an overheat condition. The press-to-test switch provides for testing the integrity of the bleed air leak detection circuitry.

ENGINE FIRE EXTINGUISHING (Effectivity: All)

The engine fire extinguishing systems provides a means to deploy extinguishing agent throughout the left and right engine compartments. The left and right engine fire extinguishing systems are identical. Each system consists of a fire extinguisher bottle and necessary deployment tubes with nozzles, left and right EXTINGUISHER PUSH light/switches, test switches and printed circuit boards. The light/switches are armed by the fire detection system and, when actuated, fire an explosive cartridge on the fire extinguisher bottle to release extinguishing agent in the engine compartment. The test switches provide a means of confirming that the systems are operational.

PORTABLE FIRE EXTINGUISHERS (Effectivity: All)

Portable fire extinguishers are mounted in the cockpit and the cabin areas. On airplanes NC-4 thru NC-7, the cockpit fire extinguisher is located behind the copilot's seat on the map case. On airplanes NC-8 and after, the cockpit extinguisher is located behind pilot's seat on the floorboard (141CT). The cabin fire extinguisher is located aft of the right storage cabinet on the floorboard (162AT). The fire extinguishers are held and operated by hand at the discretion of the user in case of fire. Each fire extinguisher has a pressure gage and an indicating disc to confirm serviceability. Serviceable fire extinguishers are required to be on board before flight.

SPECIAL TOOLS AND EQUIPMENT (Effectivity: All)

Each tool listed in Chart 1 is provided as an example of the equipment designed to perform a specific function. Generic or locally manufactured tools that are the equivalent with respect to accuracy, function and craftsmanship may be used in lieu of those listed.

CHART 1
SPECIAL TOOLS AND EQUIPMENTT
(Effectivity: All)

TOOL NAME	PART NO.	MANUFACTURER	USE
1. Jet-Cal Analyzer with Element Heater		Howel Instrument Co. 3479 w. Vickery Fort Worth, Texas 76107	Apply heat to sensing element to test bleed air warning system.

ENGINE FIRE DETECTION SYSTEM - DESCRIPTION AND OPERATION (Effectivity: All) (Figures 1 and 2)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

The fire detection system provides immediate warning in the event of a fire or overheat condition in the engine compartment(s). The system consists of a responder and sensor assembly mounted on each engine, circuit breakers identified as LEFT and RIGHT FIRE DETR on the left circuit breaker panel in the cockpit, and left and right ENG FIRE F/W VALVE PUSH CLOSED light/switches located on the glareshield. Associated directly with the fire detection system is the EXTINGUISHER PUSH light/switch on the glareshield, and the annunciator fault-detection printed circuit board (A137) located in the pilot's side console. LEFT and RIGHT FIRE DETR test switches are mounted on a test switch module assembly located on the pilot's outboard subpanel. The module is of printed circuit board construction.

Electrical ground for illumination of the ENG FIRE F/W VALVE PUSH CLOSED light/switch is provided through the annunciator control module printed circuit board (A135); the intensity of the lights is also controlled with the ambient lighting sensor and printed circuit board circuitry, refer to Chapter 31.

The responder and sensor cable assembly is hermetically sealed. The responder incorporates an integrity switch, alarm switch and an electrical connector which connects to the airplane wiring. The sensor cable is a stainless steel tube containing a hydrogen-charged core and helium gas under pressure. The precharged gas pressure within the sensor cable maintains the integrity switch in the closed position. The alarm switch is normally open and is electrically connected through the annunciator fault-detection printed circuit board, to the applicable ENG FIRE F/W VALVE PUSH CLOSED light/switch.

The responder-sensor will sense and signal two types of temperature hazards; a high intensity fire occurring around a short section of the sensor tube or an average overheat condition occurring along the full length of the sensor tube. In case of an overtemp or fire in an engine compartment, the fire detection sensor cable senses the heat and the precharged gas expands. Expansion of the gas closes the alarm switch and signals the annunciator fault-detection printed circuit board, which in turn, illuminates the appropriate left or right ENG FIRE light on the ENG FIRE F/W VALVE PUSH CLOSED light/switch.

NOTE

The ENG FIRE F/W VALVE PUSH CLOSED light/switch is designed with the legend F/W VALVE PUSH constantly visible with white lettering. The legend ENG FIRE has black lettering with a red background and is not visible until illuminated by the fire detection system or during tests. The legend CLOSED has red lettering and is not visible until illuminated by the closing of the fuel firewall shutoff valve.

Control of the left and right fuel firewall shutoff valve is accomplished with the left and right ENG FIRE F/W VALVE PUSH CLOSED light/switches. Actuating an F/W VALVE PUSH light/switch closes the respective fuel firewall shutoff valve. Electrical power for the operation of the fuel firewall shutoff valves is supplied by the LEFT and RIGHT FUEL F/W VALVE circuit breakers on the left circuit breaker panel in the cockpit. When a fuel firewall shutoff valve is closed, electrical power from ANNUNCIATOR #2 (left) or ANNUNCIATOR #5 (right) circuit breakers on the right circuit breaker panel in the cockpit is supplied through the left or right fuel firewall shutoff valve to illuminate the CLOSED light (red) on the applicable light/switch. Actuation of the ENG FIRE F/W VALVE PUSH CLOSED light/switch also illuminates and arms the EXTINGUISHER PUSH light/switch with 28 vdc for firing the respective fire extinguisher bottle cartridge (squib) at the discretion the flight crew. For maintenance of the fuel firewall shutoff valves, refer to Chapter 28-20-00.

The fire detection systems can be tested to confirm that they are operational. Left and right FIRE DETR push-to-test switches, when actuated, check the electrical circuitry through the respective responder integrity switch, annunciator fault detection printed circuit board, and the ENG FIRE F/W VALVE PUSH CLOSED light/switch. In the event that the precharged gas pressure is lost or decreased in the responder-sensor assembly, the integrity switch will open, and a fault will be indicated when the respective left or right FIRE DETR test switch is actuated and the ENG FIRE light fails to illuminate on the ENG FIRE F/W VALVE PUSH CLOSED light/switch.

ENGINE FIRE DETECTION SYSTEM - TROUBLESHOOTING (Effectivity: All)

The left and right fire detection systems are identical and independent of each other, except they both utilize printed circuit board (A137). Performing a fire detection system test should confirm the integrity of the detector sensor cable, as well as test the electrical circuitry and components. Refer to ENGINE FIRE DETECTION SYSTEM OPERATIONAL TEST and Troubleshooting Chart 1, this Chapter.

NOTE

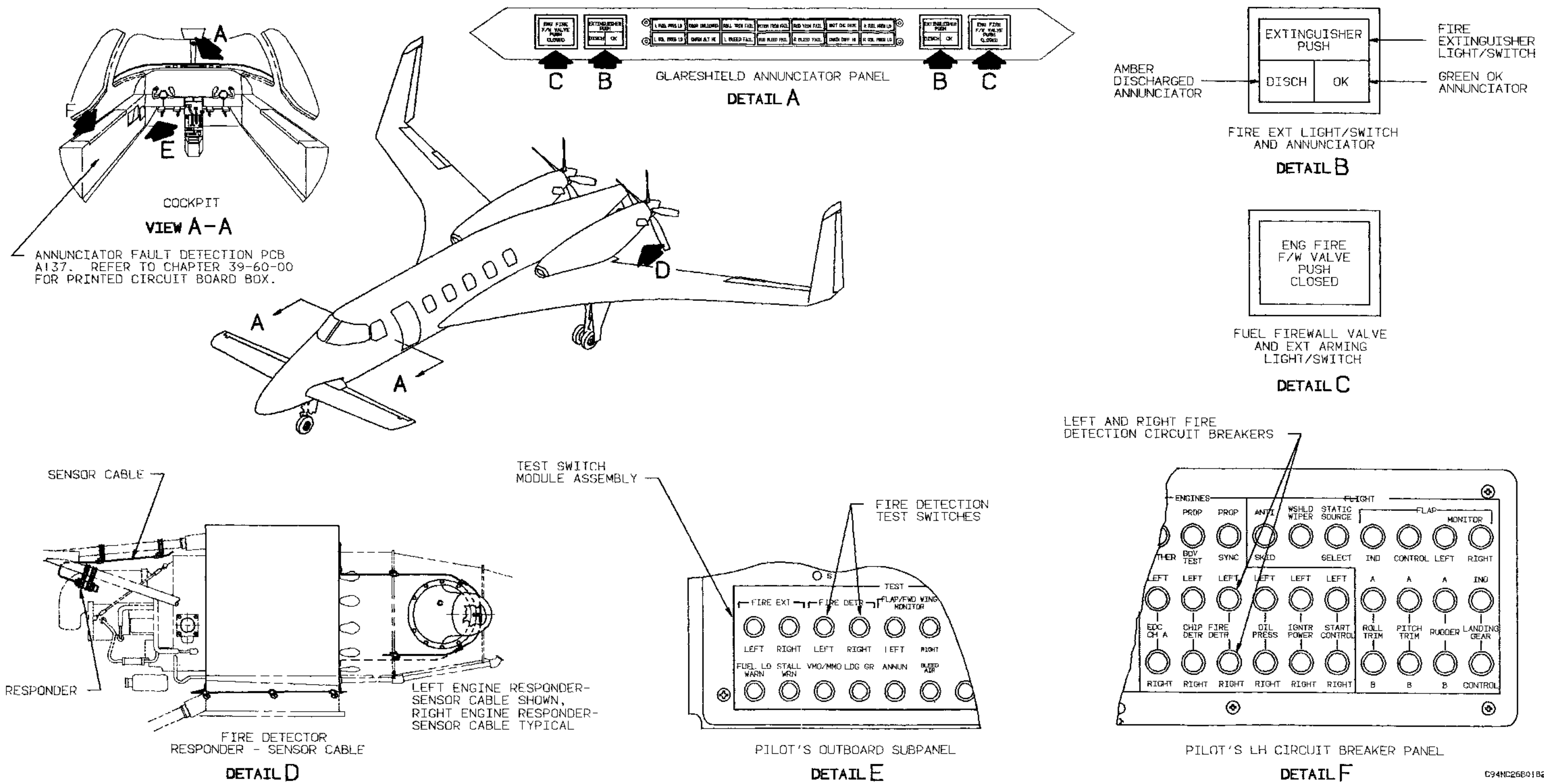
For troubleshooting the firewall fuel shutoff valve control system, refer to Chapter 28-20-00.

TROUBLESHOOTING RESPONDER-SENSOR CABLE ASSEMBLY (Effectivity: All)

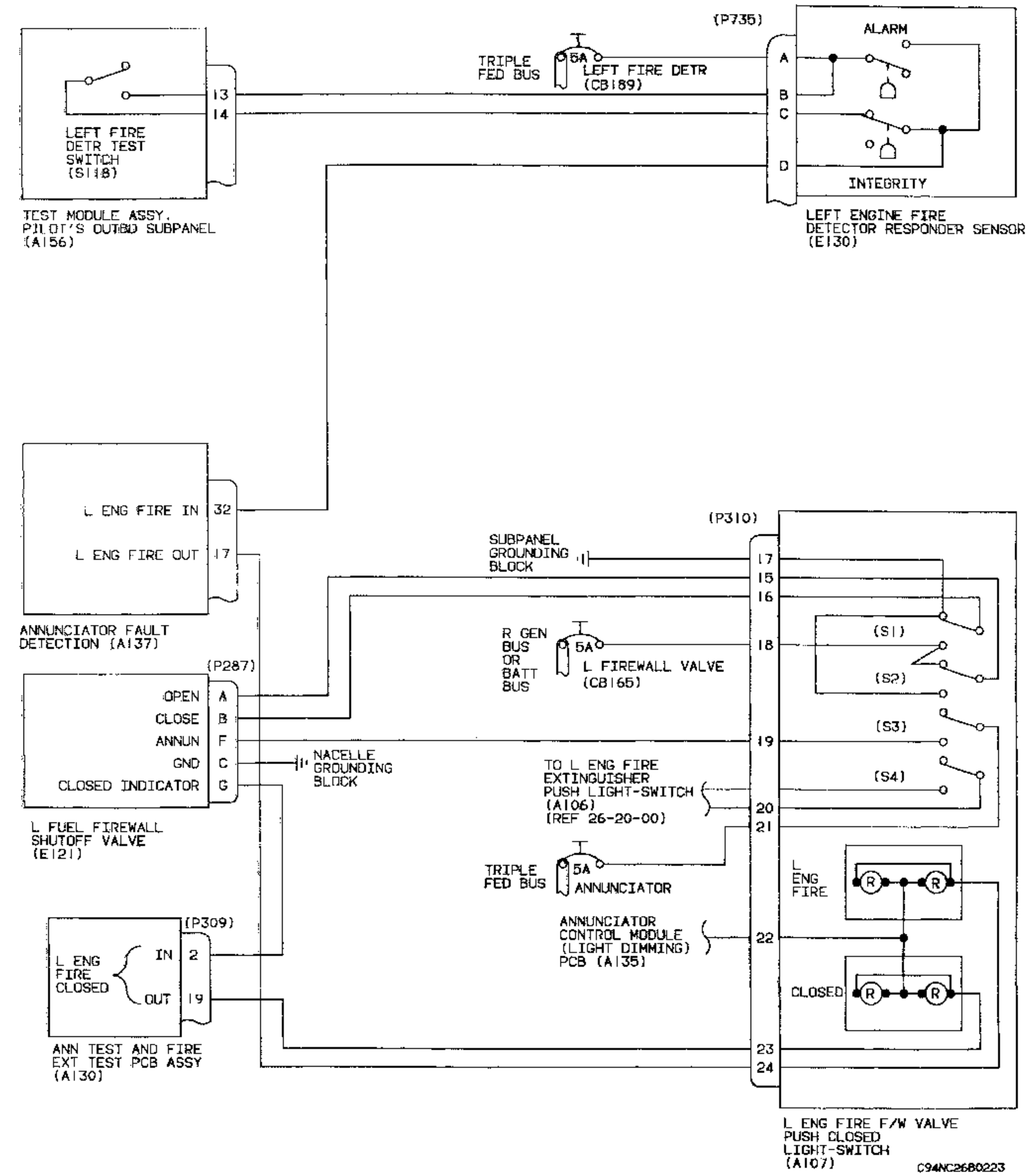
Loss of inert gas from the sensor cable is revealed during a system test when the "ENG FIRE" light on the ENG FIRE F/W VALVE PUSH CLOSED light/switch fails to illuminate. To check the integrity of the sensor cable, disconnect the electrical connector from the responder and perform a continuity test, refer to RESPONDER CONTINUITY TEST, this Chapter. No continuity between pins C and D is an indication that the inert gas is lost or the integrity switch is defective.

To check the fire detection electrical wiring for an open circuit or short to ground, perform continuity checks utilizing Figure 2 or the BEECHCRAFT Starship 1 Wiring Diagram Manual.

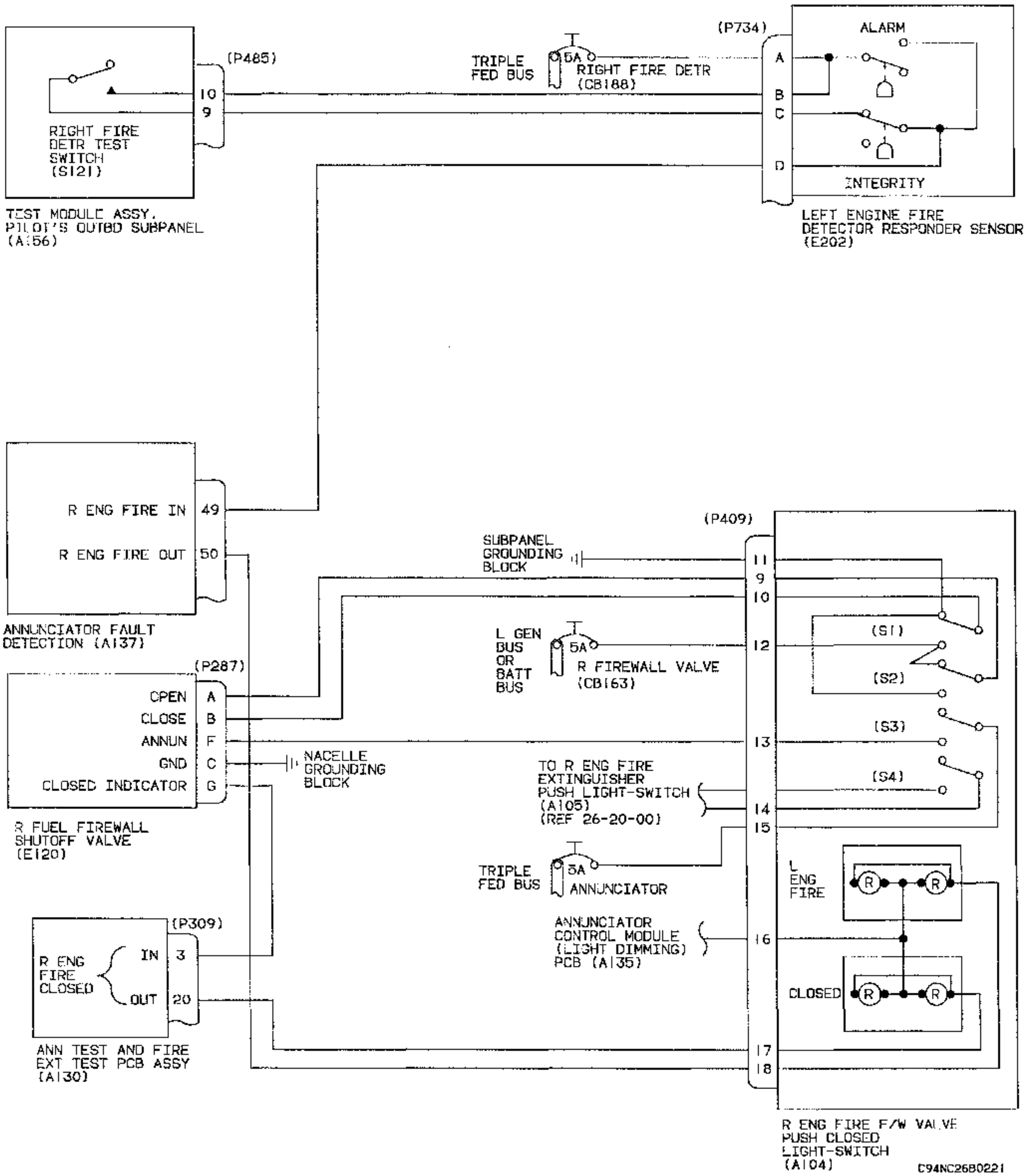
The steps in these troubleshooting charts are to be followed sequentially unless otherwise specified.



Engine Fire Detection System (Effectivity: All)
Figure 1



Left Engine Fire Detection System Electrical Schematic
(Effectivity: All)
Figure 2



Right Engine Fire Detection System Electrical Schematic
(Effectivity: All)
Figure 3

CHART 1
TROUBLESHOOTING - FIRE DETECTION SYSTEM (Effectivity: All)

Failure of Fire Detectors to Test

Step 1 Is the Left/Right FIRE DETR circuit breaker engaged? **YES** Proceed to Step 2.

NO

Engage Left/Right FIRE DETR circuit breaker.

Step 2 Do the lamps in the ENG F/W VALVE PUSH CLOSED light/switch illuminate? **YES** Proceed to Step 3.

NO

Press-to-test ANNUN test switch. Replace lamps not illuminating.

Step 3 Is there electrical power (28 vdc) at pin A of the engine fire detector responder-sensor electrical connector? **YES** If 28 vdc is indicated at pin A, remove electrical power from the airplane and proceed to Step 4.

NO

Repair electrical wiring between LEFT/RIGHT FIRE DETR circuit breaker and the responder-sensor.

Step 4 Is there continuity between pins B, C of the left/right responder-sensor(s) and pins 13, 14 left/10, 9 right respectively of the test module assembly on the pilot's outboard subpanel? **YES** Proceed to Step 5.

NO

Repair electrical wiring between the responder-sensor and the test switch module assembly.

Step 5 Is there continuity between pin D of the responder-sensor and pin 32 left/49 right of the annunciator fault detection PCB (A137)? **YES** Proceed to Step 6.

NO

Repair electrical wiring between responder-sensor and PCB (A137).

Step 6 Is there continuity between pins 17 left, 50 right of PCB (A137) and the respective left/right ENG FIRE lamps on the ENG FIRE F/W VALVE PUSH CLOSED light/switch(es)? **YES** Proceed to Step 7.

NO

CHART 1
TROUBLESHOOTING - FIRE DETECTION SYSTEM (Effectivity: All) *(Continued)*

Failure of Fire Detectors to Test

Repair electrical wiring between PCB (A137) and the ENG FIRE F/W VALVE PUSH CLOSED light/switch(es).

Step 7 Does the Annunciator Fault Detection PCB (A137) check without defects? Refer to Chapter 39-60-00.

YES Proceed to Step 8.

NO

Replace the Annunciator Fault Detection PCB (A137).

Step 8 Is continuity indicated through the responder-sensor integrity switch? Check continuity between pins C and D on the responder.

YES Perform the fire detection system test. Refer to ENGINE FIRE DETECTION SYSTEM OPERATIONAL TEST.

NO

Replace the responder-sensor cable assembly.

CHART 2
TROUBLESHOOTING - FIRE DETECTION SYSTEM (Effectivity: All)

ENG FIRE Light On The Light/Switch Remains Illuminated

Step 1 Is there continuity between pins B and D on the responder-sensor electrical connector?

YES Proceed to Step 2.

NO

Replace the responder-sensor cable assembly.

Step 2 Is there continuity between pins 13 and 14 (left system), or continuity between pins 9 and 10 (right system) on the test switch module assembly of the pilot's outboard subpanel?

YES Proceed to Step 3.

NO

Replace the FIRE DETR test switch on the test switch module of the pilot's outboard subpanel.

Step 3 Is there continuity between pin 22 of the glareshield connector A107P310 and pin 23 of the PCB A135? Refer to BEECHCRAFT Starship 1 Wiring Diagram Manual.

YES Perform the fire detection system test. Refer to ENGINE FIRE DETECTION SYSTEM OPERATIONAL TEST.

NO

CHART 2
TROUBLESHOOTING - FIRE DETECTION SYSTEM (Effectivity: All) *(Continued)*

ENG FIRE Light On The Light/Switch Remains Illuminated

Repair electrical wiring between the glareshield electrical connector and PCB (A135).

ENGINE FIRE DETECTION SYSTEM - MAINTENANCE PRACTICES (Effectivity: All)

Maintenance practices of the engine fire detection system consist mainly of removal and/or installation of components. For maintenance of associated components, such as the fuel firewall shutoff valve (Chapter 28), printed circuit boards (Chapter 39), switches and panels (Chapter 31), refer to the Table of Contents of the applicable chapter.

FIRE DETECTION RESPONDER-SENSOR CABLE ASSEMBLY REMOVAL (Effectivity: All) (Figure 4)

WARNING

Remove all electrical power from the airplane by disconnecting the battery. Tag the external power receptacle; DO NOT APPLY ELECTRICAL POWER TO THE AIRPLANE - FIRE DETECTION MAINTENANCE IN PROGRESS.

Removal of the left and right engine fire detection responder-sensor cable is typical.

a. Remove the engine cowling. Refer to Chapter 71-10-00.

b. Remove the nuts, bolts, screws, and clamp/liners throughout the length of sensor cable.

c. Cut safety wire and disconnect the electrical connector from the fire detector responder unit mounted on the engine mount.

d. Remove the clamps securing the responder unit to the engine mount.

e. Remove the responder-sensor cable assembly from the engine.

FIRE DETECTION RESPONDER-SENSOR CABLE ASSEMBLY INSTALLATION (Effectivity: All) (Figure 4)

NOTE

Installation of the left and right engine fire detection responder-sensor cable is typical.

a. Install the fire detector sensor cable on the engine using the nuts, bolts, screws and clamp/liners to properly secure the sensor cable in place.

b. The end of the sensor cable should extend 1.00-inch beyond the last liner/clamp.

NOTE

Use care when installing the fire detector sensor cable. The minimum bend radius allowable for the sensor cable is 0.375 inch.

c. Attach the responder unit with two clamps around the responder and two clamps on the engine mount, secure the clamps together with bolts, washers and nuts.

d. Perform a continuity test of the responder to verify the installation. Refer to RESPONDER CONTINUITY TEST, this Chapter.

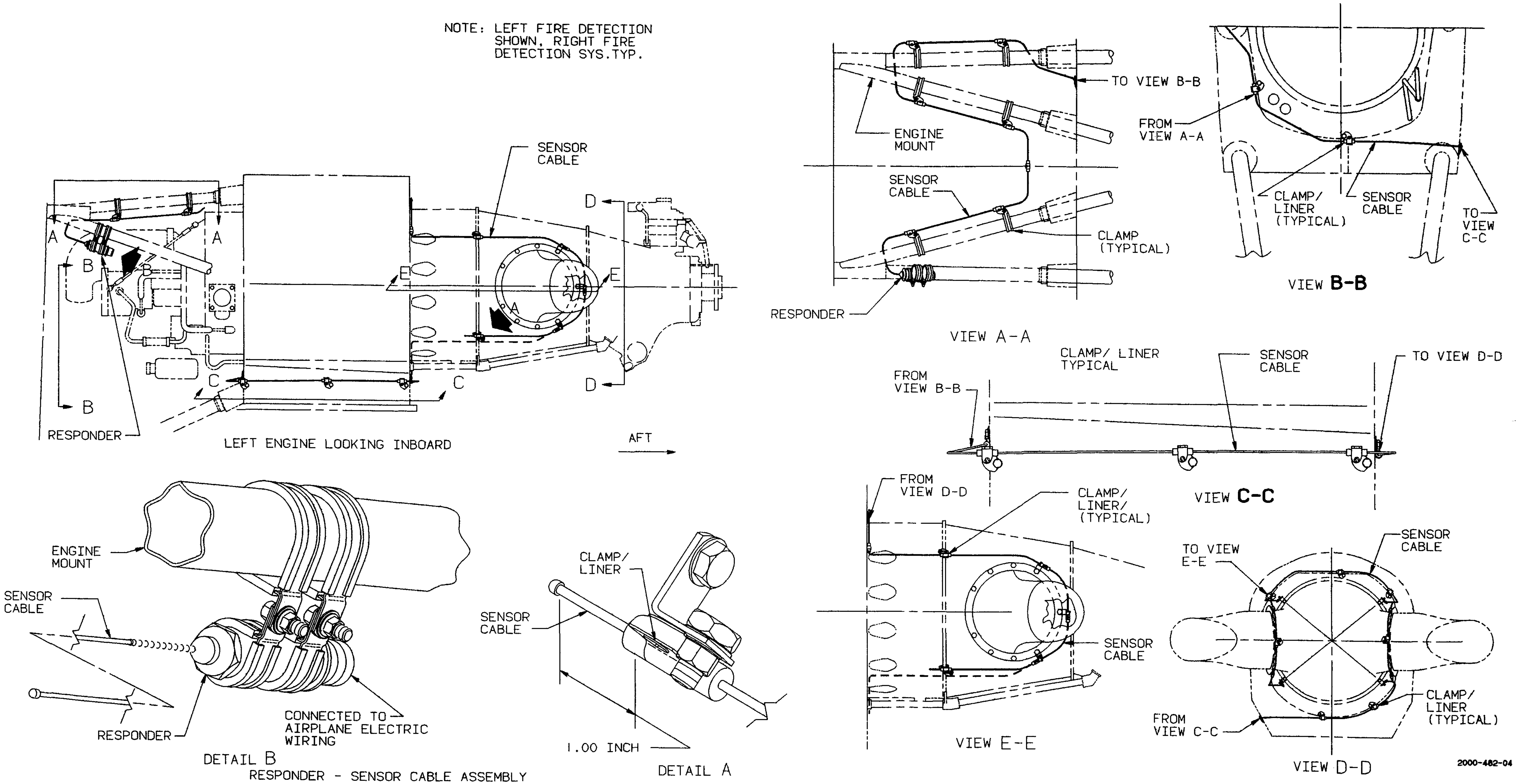
e. Connect the electrical connector to the responder unit and safety wire the electrical connector.

f. Connect the battery and apply electrical power to the airplane.

g. Perform operational test of the system. Refer to ENGINE FIRE DETECTION SYSTEM OPERATIONAL TEST, this Chapter.

RESPONDER CONTINUITY TEST (Effectivity: All)

The following continuity test is used to verify the responder installation. If the results of the continuity test are not satisfactory, the responder-sensor must



Engine Fire Detection System Installation
(Effectivity: All)
Figure 4

be rejected. The continuity test is accomplished by measuring between pins in the responder connector with a ohmmeter (1-percent precision or better).

The ohmmeter indications must be:

a. Pin A to Pin B - Less than 1 ohm

b. Pin A to Pin C - More than 100 megohms (open circuit)

c. Pin A to Pin D - More than 100 megohms (open circuit)

d. Pin B to Pin C - More than 100 megohms (open circuit)

e. Pin C to Pin D - Less than 1 ohm

f. Insulation resistance test - Measure between one pin in the responder connector and the case. The ohmmeter indication must be more than 100-megohms (open circuit).

ENGINE FIRE DETECTION SYSTEM OPERATIONAL TEST (Effectivity: All)

The responder and sensor cable assembly is hermetically sealed and is not adjustable. The integrity test of the assembly can be accomplished by actuating the Left or Right FIRE DETR test switch. If the ENG FIRE light on the ENG FIRE F/W VALVE PUSH CLOSED light/switch does not illuminate, the responder-sensor cable has a leak, or there is an open electrical circuit between the responder and the light/switch. To check the integrity of the responder-sensor, refer to TROUBLESHOOTING RESPONDER-SENSOR CABLE ASSEMBLY in this Chapter. If a leak in the responder or sensor cable is indicated, the responder-sensor cable assembly must be replaced.

If an electrical circuit is found at fault during the continuity checks, repair the faulty circuit. Refer to Troubleshooting Chart 1, Figures 2 and 3, or the BEECHCRAFT Starship 1 Wiring Diagram Manual to troubleshoot or trace the electrical circuits.

a. Apply electrical power to the airplane and check that the Left and Right FIRE DETR circuit breakers on the left circuit breaker panel in the cockpit are engaged.

b. Actuate the Left FIRE DETR test switch. The ENG FIRE light on the left ENG FIRE F/W VALVE PUSH CLOSED light/switch should illuminate.

NOTE

Illumination of the ENG FIRE light on the light/switch confirms that the responder-sensor cable assembly and the left fire detection system is operational.

c. Release the Left FIRE DETR test switch.

d. Actuate the Right FIRE DETR test switch. The ENG FIRE light on the right ENG FIRE F/W VALVE PUSH CLOSED light/switch should illuminate.

NOTE

Illumination of the ENG FIRE light on the light/switch confirms that the responder-sensor cable assembly and the right fire detection system is operational.

e. Release the Right FIRE DETR test switch.

f. Remove electrical power from the airplane.

ENGINE BLEED AIR WARNING SYSTEM - DESCRIPTION AND OPERATION (Effectivity: All) (Figures 1 and 2)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

The bleed air warning system provides a visual indication of excessive heat caused by a leak or rupture in the bleed air lines. Components in the system consist of a bleed air leak detection control unit mounted on the aft fuselage electrical shelf; bleed air sensing elements routed along the bleed air lines in three areas (left engine nacelle Zone 580, right engine nacelle Zone 680, and fuselage Zones 142, 152, 162, 172 and 528); an annunciator fault-detection printed circuit board in the pilot's side console; and three annunciator lights (L BLEED FAIL, FUS BLEED FAIL and R BLEED FAIL) on the glareshield warning annunciator panel. Electrical power (28 vdc) for the bleed air warning system is supplied by a 5-ampere, BLEED AIR FAIL circuit breaker, located on the left circuit breaker panel in the cockpit.

The sensing elements in each area are connected together in series. The first and last element are connected electrically, forming a loop, back to the control unit. Each sensing element consists of a 0.085-inch diameter, heavy-wall tubular sheath of inconel. Within the sheath is a ceramic-like thermistor core separated into short beads in which two electrical conductors are embedded. One of the conductors is welded to the connector shell at each end of the tube. The other conductor is welded to the center contact of the end connector. The thermistor core is impregnated and coated with a eutectic salt. The element ends terminate in hermetically sealed pin-plug connectors. The electrical contacts of the pin-plug connectors are shrouded by ceramic insulators. Eutectic salt has the capability of changing from nonconductive to conductive as it melts at a temperature of 215 +15, -25 degrees Fahrenheit. Each series of sensing elements is mounted along the bleed air line using tie-wraps, spacers, and washers which serve as standoff brackets.

A BLEED AIR push-to-test switch is mounted on the test module assembly of the pilot's outboard subpanel. The module assembly is of a printed circuit board construction. The switch provides a means for testing and confirming that the bleed air fail warning system is operational. Electrical power (28 vdc) is supplied to the BLEED AIR test switch from ANNUNCIATOR 1 circuit breaker on the right circuit breaker panel. With the BLEED AIR test switch actuated, power is supplied to the test function of the bleed air leak detection control unit. Refer to BLEED AIR WARNING SYSTEM OPERATIONAL TEST, this Chapter, for function and testing procedures.

The control unit monitors the electrical resistance between the eutectic salt and the conductors of the sensing element. At normal ambient temperatures, the resistance is high and as the element is heated the resistance drops rapidly. When the resistance drops below a preset level, it triggers an alarm in the control unit; this completes the electrical circuit through the warning annunciator fault-detection printed circuit board to the respective L BLEED FAIL, R BLEED FAIL, FUS BLEED FAIL light on the warning annunciator panel. The alarm occurs whenever any part of the sensing element is heated to 215 +15, -25 degrees Fahrenheit or higher. Should a break occur in the sensing element loop, the control unit continues to monitor the series of elements from each end to each side of the break. Should a second break occur, the element or loop wiring that is isolated by the two breaks becomes inactive.

The control unit incorporates a short discriminator circuit which enables it to discriminate between the resistance lowered at a finite time rate due to heating and an instant resistance lowered due to a direct short. A direct short renders that series of elements inoperative and will be revealed during an integrity test of the system. The system resets immediately when the short has been corrected.

The bleed air system is controlled with the BLEED AIR VALVE selector switch, located on the copilot's inboard subpanel. In the event that a bleed air leak is indicated by illumination of the L BLEED FAIL annunciator light, position the BLEED AIR VALVE selector to R ENG. If the R BLEED FAIL annunciator light illuminates, position the selector to L ENG. If the FUS BLEED FAIL annunciator light illuminates, position the selector to EMER. When the bleed air is shut off in response to the overheat warning, the system resets as the sensing element(s) cool.

ENGINE BLEED AIR WARNING SYSTEM - TROUBLESHOOTING (Effectivity: All)

Troubleshooting the engine bleed air warning system consists mainly of utilizing the BLEED AIR test switch, located on the pilot's outboard subpanel. When the bleed air system is operational and the BLEED AIR test switch is actuated, the annunciator lights L BLEED FAIL, FUS BLEED FAIL and R BLEED FAIL should illuminate. An inoperative system may result from open electrical circuit(s) that include the power circuit, indicating circuits, ground circuit and/or the test circuit. Refer to BLEED AIR WARNING SYSTEM OPERATIONAL TEST and Troubleshooting Chart 1 in this Chapter for testing and troubleshooting the system.

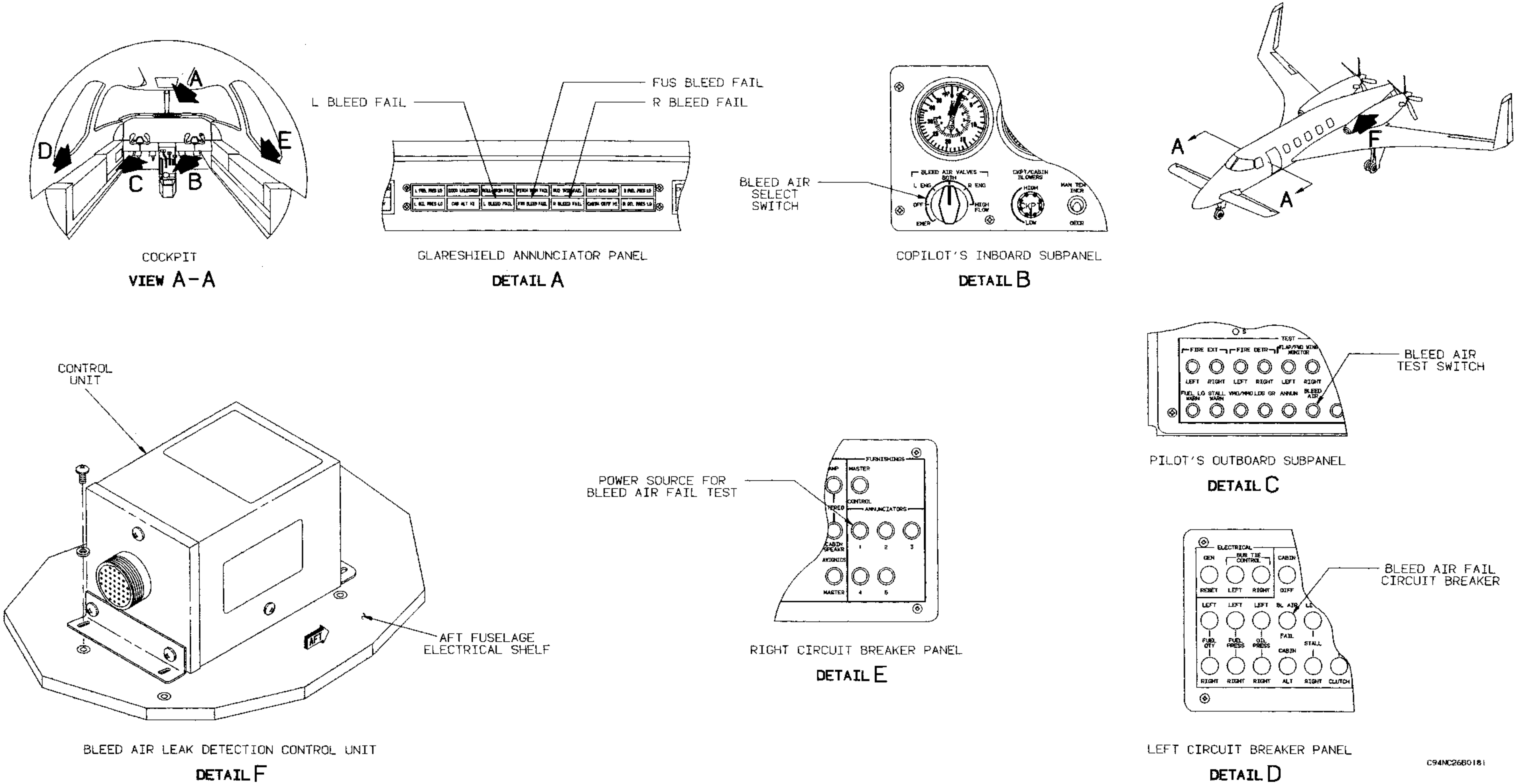
NOTE

Broken or disconnected sensing elements may not indicate a fault until the BLEED AIR test switch is actuated.

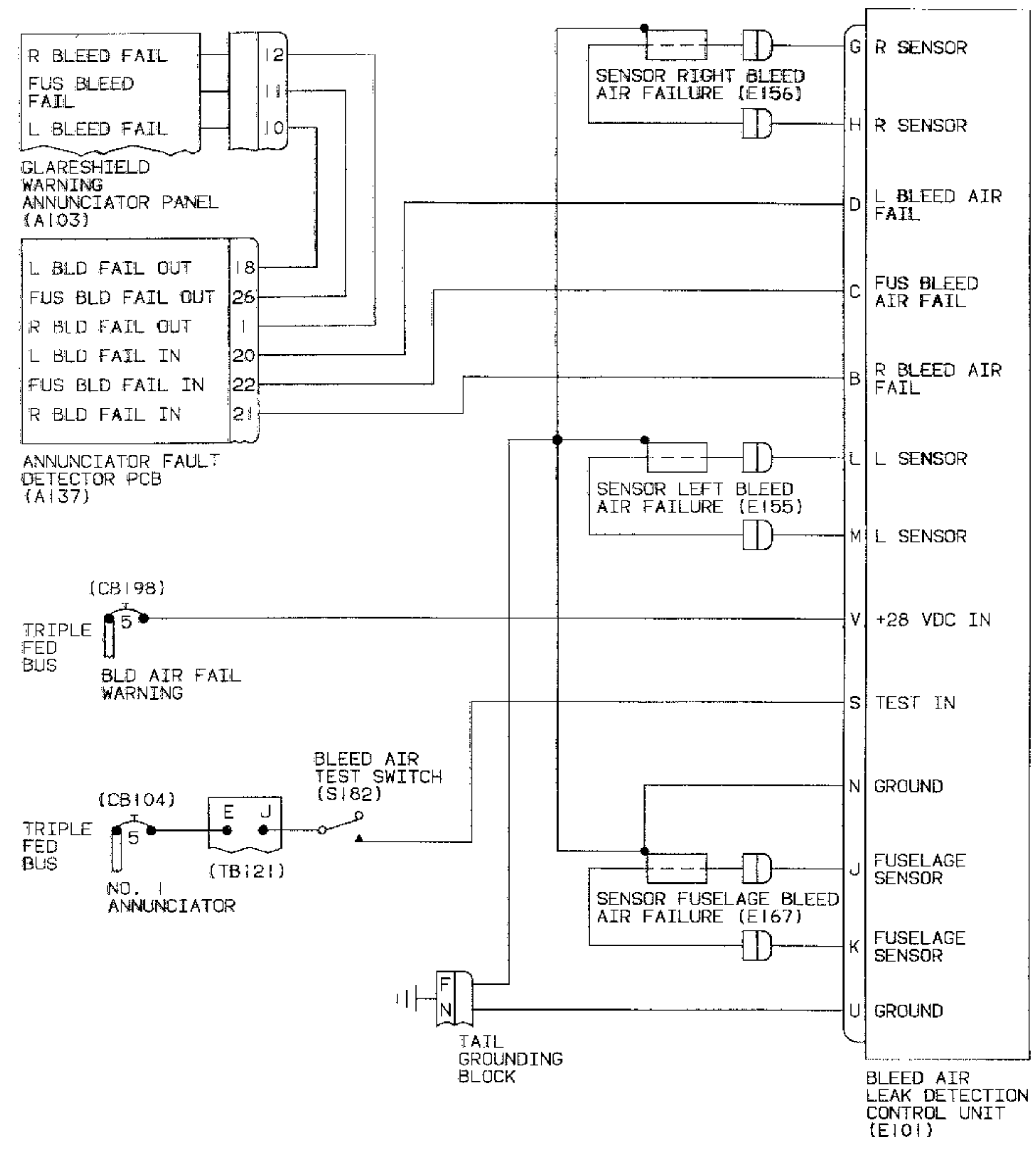
Malfunction of the bleed air leakage warning control unit can affect operation of one or all of the bleed air warning areas. To determine if the control unit is faulty, gain access to printed circuit board, annunciator fault detector (A137) in the pilot's side console and disconnect the electrical connector. Apply electrical power to the airplane. Actuate the BLEED AIR press-to-test switch and check for 28 vdc on pins 20, 21 and 22 of the disconnected electrical connector. Any one of the three pins not indicating 28 vdc requires replacement of the control unit.

The annunciator fault detection printed circuit board (A137) relays bleed-air-fail signals from the bleed air leak-detection control unit to the annunciator lights on the glareshield annunciator panel. Printed circuit board (A137) is located in the pilot's side console. To check the circuitry through the printed circuit board, remove the printed circuit board as outlined in Chapter 39-60-00. On the disconnected electrical connector, check continuity between pins 18 and 20 (L Bleed Fail), between pins 22 and 26 (Fus Bleed Fail), and between pins 1 and 21 (R Bleed Fail). Any checks not indicating continuity between the pins is cause for replacement of the printed circuit board.

The steps in this troubleshooting chart are to be followed sequentially unless otherwise specified.



Engine Bleed Air Warning System (Effectivity: All)
Figure 1



Engine Bleed Air Warning Electrical Schematic
(Effectivity: All)
Figure 2

CHART 1
TROUBLESHOOTING - BLEED AIR WARNING SYSTEM (Effectivity: All)

Failure of BLEED FAIL Annunciator(s) to Illuminate During Test

Step 1	Is ANNUNCIATOR 1 circuit breaker engaged?	**YES**	Proceed to Step 2.
	NO		
	Engage ANNUNCIATOR 1 circuit breaker.		
Step 2	Press-to-test ANNUN test switch. Are the annunciator lamps operable?	**YES**	Proceed to Step 3.
	NO		
	Replace lamps not illuminating.		
Step 3	Remove electrical power from the airplane. Is there continuity in wiring between PCB A137 and the glareshield warning annunciator panel?	**YES**	Refer to Figure 2 and BEECHCRAFT Starship 1 Wiring Diagram Manual to identify and trace wiring. Proceed to Step 4.
	NO		
	Repair electrical wiring as necessary.		
Step 4	Is ground circuit between the leak detection control unit and the tail grounding block continuous? Check continuity.	**YES**	Proceed to Step 5.
	NO		
	Repair ground circuit as necessary.		
Step 5	Is sensing element loop(s) continuous and all pin-plug(s) connected? Check continuity.	**YES**	Proceed to Step 6.
	NO		
	Replace defective sensing element section or loop wiring, and/or connect pin-plug(s).		
Step 6	Are the sensing element loop circuits shorted to ground?	**YES**	Repair short to ground as necessary.
	NO		
	Proceed to Step 7.		
Step 7	Has the printed circuit board (A137) been checked for malfunction?	**YES**	Proceed to Step 8.
	NO		
	Check for PCB (A137) malfunction. Refer to Chapter 39-60-00. Replace defective PCB (A137).		
Step 8	Does the test circuit perform satisfactory?	**YES**	Proceed to Step 9.
	NO		
	Check continuity of the test circuit wiring. Repair test circuitry as necessary.		

CHART 1
TROUBLESHOOTING - BLEED AIR WARNING SYSTEM (Effectivity: All) *(Continued)*

Failure of BLEED FAIL Annunciator(s) to Illuminate During Test

Step 9 Does the leak detection control unit operate satisfactorily?

YES Perform an operational test. Refer to BLEED AIR WARNING SYSTEM OPERATIONAL TEST.

NO

Replace the leak detection control unit.

ENGINE BLEED AIR WARNING SYSTEM - MAINTENANCE PRACTICES (Effectivity: All)

Maintenance practices for the bleed air warning system consist mainly of removal, installation, and operational testing the components or system. For maintenance of associated components, such as the bleed air valve selector (Chapter 36), printed circuit boards (Chapter 39), annunciator lights and switch panels (Chapter 31), refer to the Table of Contents of the applicable Chapter.

BLEED AIR WARNING CONTROL UNIT REMOVAL (Effectivity: All) (Figure 3)

a. Disengage BLEED AIR FAIL circuit breaker on the left circuit breaker panel in the cockpit.

b. Gain access to the control unit (located on the aft fuselage electrical shelf) by removing the electrical shelf access door (320AL); refer to Chapter 53-30-00.

c. Cut safety wire and disconnect the electrical connector from the control unit.

d. Remove the four screws and washers securing the control unit and the two ground jumper cables.

e. Remove the control unit from the airplane.

BLEED AIR WARNING CONTROL UNIT INSTALLATION (Effectivity: All) (Figure 3)

a. Place the control unit on the aft fuselage electrical shelf aligning the mounting holes to the shelf inserts with the electrical connector facing forward.

b. Secure the control unit with four screws and washers. Secure one ground jumper cable to the forward outboard mounting screw and one ground cable to the aft inboard mounting screw. Refer to Chapter 40-00-00 for effective indirect electrical bonding procedures using bonding jumpers.

c. Connect the electrical connector to the control unit. Safety wire the electrical connector.

d. Engage BLEED AIR FAIL circuit breaker and perform operational test of the system. Refer to BLEED AIR WARNING SYSTEM OPERATIONAL TEST, this Chapter.

e. Install the electrical shelf access door (320AL); refer to Chapter 53-30-00.

BLEED AIR WARNING SENSING ELEMENT REMOVAL (Effectivity: All) (Figure 4)

NOTE

The sensing elements are connected in sections with pin-plug connections. The end of the last section is connected to a loop wire to complete the electrical loop circuit to the bleed air warning control unit.

a. Refer to Chapter 53-20-00 and remove the lower aft fuselage panel (310AB) to gain access to the aft fuselage sensing elements.

b. Refer to Chapter 53-20-00 and remove the right cabin floorboards (152AT, 162AT, 162BT, 162CT, 172AT, 172BT) to gain access to the cabin sensing elements.

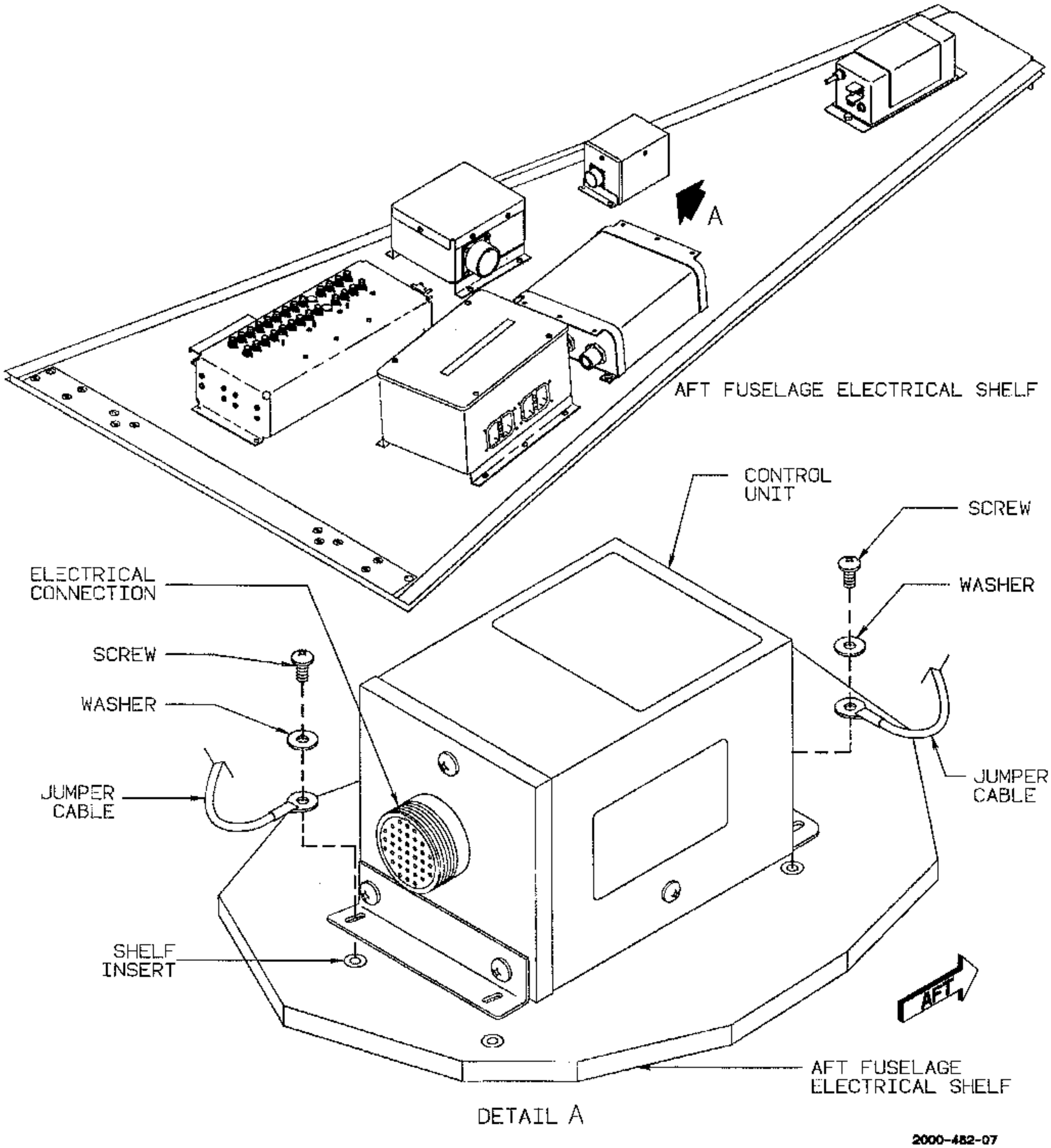
c. Refer to Chapter 53-20-00 and remove the cockpit floorboards (142CT, 143BTC, 143ATC) to gain access to the cockpit sensing elements.

d. Disengage BLEED AIR FAIL circuit breaker located on the left circuit breaker panel.

e. Cut the safety wire securing the sensing element pin-plug at each end of the element to be removed.

f. If the pin-plug has a grounding strap, disconnect the grounding strap and disconnect the pin-plug.

g. When removing the last sensing element in an area, disconnect the loop wire from the end pin-plug connection.



Bleed Air Warning Control Unit Installation
(Effectivity: All)
Figure 3

h. Remove the clamps or tie-wraps securing the element to be removed.

i. Carefully unwrap the element at any bleed air tube couplings, and thread the element through bulkhead wire bundles as applicable.

j. Remove the sensing element from the airplane.

BLEED AIR WARNING SENSING ELEMENT INSTALLATION (Effectivity: All) (Figure 4)

CAUTION

Do not kink or form bends or loops in the sensing elements smaller than 1.5 inch radius or damage to the element will result.

NOTE

The sensing elements must be located below the centerline of the bleed air tubing and within 0.25 inch of the insulation. The sensing element should be between the bleed air tubing and the closest composite structure.

a. Route the sensing element section(s) along the bleed air tubing, looping it around any bleed air couplings and through necessary bulkheads with wire bundles as applicable.

b. Connect each end of the element pin-plugs with the existing element pin-plugs. Torque the pin-plug nuts to 50 - 70 inch pounds.

c. When installing the last sensing element in an area, connect the loop wire to the end pin-plug connection and safety.

d. Secure the sensing element(s) with clamps or tie-wraps as applicable.

e. Safety wire the element pin-plugs, and connect necessary grounding straps.

f. Engage BLEED AIR FAIL circuit breaker.

g. Perform test of the bleed air warning system. Refer to BLEED AIR WARNING SYSTEM OPERATIONAL TEST and/or BLEED AIR WARNING SYSTEM FUNCTIONAL TEST, this Chapter.

BLEED AIR WARNING SYSTEM OPERATIONAL TEST (Effectivity: All)

The bleed air warning system is tested with electrical power on the airplane, ANNUNCIATOR 1 circuit breaker engaged and actuation of the BLEED AIR test switch on the pilot's outboard subpanel.

Actuation of the BLEED AIR test switch activates the test function of the bleed air leak-detection sensing-element loops (left engine nacelle, right engine nacelle and fuselage areas), and signals the annunciator fault detection printed circuit board. The fault detection printed circuit board illuminates the glareshield annunciator warning legends L BLEED FAIL, R BLEED FAIL and FUS BLEED FAIL. A legend not illuminating indicates that the sensing element loop is discontinuous, shorted, or the circuits (including the test circuit) are inoperative. A discontinuous element loop will not disable the system; however, the operational test will show a system failure and maintenance action is necessary.

NOTE

If one or more of the annunciator warning legends does not illuminate, the sensing-element loop(s) or system components require checking to determine malfunction. Refer to Troubleshooting Chart 1, Figure 2, and/or the BEECHCRAFT Starship 1 Wiring Diagram Manual to trace the electrical circuits.

a. Apply electrical power to the airplane and check that the ANNUNCIATOR 1 circuit breaker is engaged. The ANNUNCIATOR 1 circuit breaker is located on the right circuit breaker panel in the cockpit.

b. Actuate and hold the BLEED AIR test switch.

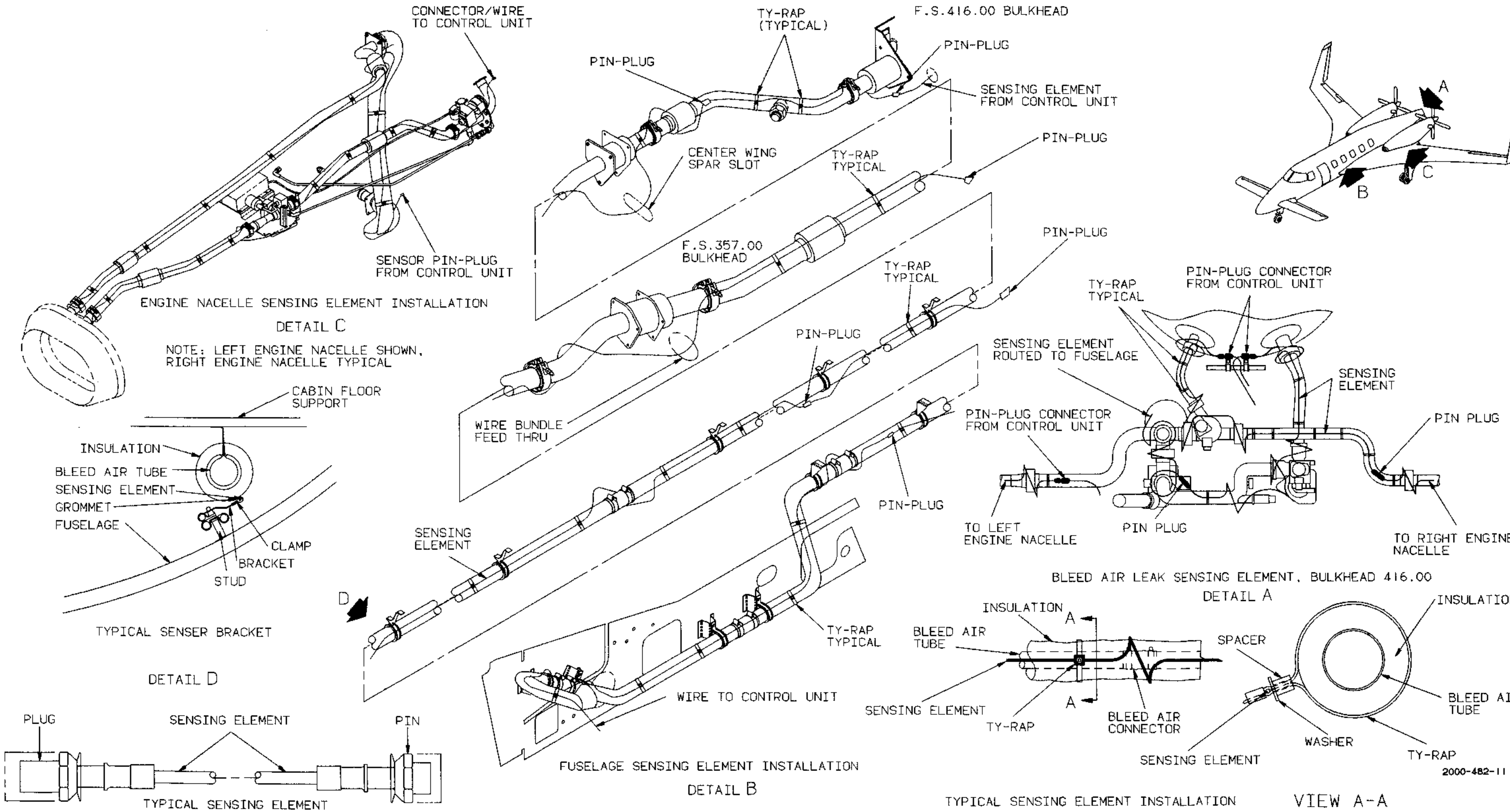
c. Check that the L BLEED FAIL, R BLEED FAIL and FUS BLEED FAIL annunciator legends illuminate.

d. Release the BLEED AIR test switch and remove electrical power from the airplane.

BLEED AIR WARNING SYSTEM FUNCTIONAL TEST (Effectivity: All)

The purpose of the functional test is to verify the integrity of the bleed air warning system and components. Functional testing the bleed air warning system consist of applying heat to the sensing element(s) and observing the illumination of the warning annunciator lights (MASTER WARNING, L BLEED FAIL, FUS BLEED FAIL and/or R BLEED FAIL).

a. An analyzer with an element heater (1, Chart 1, 26-00-00) is required to perform the BLEED AIR WARNING SYSTEM FUNCTIONAL TEST.



Bleed Air Leak Sensing Element Installation
(Effectivity: All)
Figure 4

b. Engage the ANNUNCIATOR 1 and BLEED AIR FAIL circuit breakers.

c. Connect 28 vdc external power to the airplane.

d. Refer to BLEED AIR WARNING OPERATIONAL TEST and perform an operational test.

e. Preheat the element heater (1, Chart 1, 26-00-00) to 188 - 190 degrees Fahrenheit.

f. Locate a straight section of the LEFT sensing element and clamp the element heater (1, Chart 1, 26-00-00) to the sensing element. Wait at least five minutes and confirm that the L BLEED FAIL annunciator and MASTER WARNING lights DO NOT illuminate.

g. Locate a straight section of the FUSELAGE sensing element and clamp the element heater to the sensing element. Wait at least five minutes and confirm that the FUS BLEED FAIL annunciator and MASTER WARNING lights DO NOT illuminate.

h. Locate a straight section of the RIGHT sensing element and clamp the element heater to the sensing element. Wait at least five minutes and confirm that the R BLEED FAIL annunciator and MASTER WARNING lights DO NOT illuminate.

i. Increase the temperature of the element heater to 230 - 232 degrees Fahrenheit and allow five minutes for the temperature to stabilize.

j. Clamp the element heater to the LEFT sensing element.

1. Confirm that the MASTER WARNING and L BLEED FAIL annunciator lights illuminate within three minutes.

2. Remove the element heater from the left sensing element and reset the MASTER WARNING light.

k. Clamp the element heater to the FUSELAGE sensing element.

1. Confirm that the MASTER WARNING and FUS BLEED FAIL annunciator lights illuminate within three minutes.

2. Remove the element heater from the fuselage sensing element and reset the MASTER WARNING light.

l. Clamp the element heater to the RIGHT sensing element.

1. Confirm that the MASTER WARNING and R BLEED FAIL annunciator lights illuminate within three minutes.

2. Remove the element heater from the right sensing element and reset the MASTER WARNING light.

m. Remove 28 vdc external power from the airplane and secure the element heater.

ENGINE FIRE EXTINGUISHING - DESCRIPTION AND OPERATION (Effectivity: All) (Figures 1, 2 and 3)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

The purpose of the left and right engine fire extinguishing systems is to provide a means of extinguishing an engine fire in the forward and aft engine compartments. The systems are identical, independent of each other, and are controlled separately.

Each system consists of a fire extinguisher bottle with deployment tubes and nozzles strategically located in the engine compartment area to disperse extinguishing agent into the engine compartment in the event of a fire. The systems are controlled by their respective ENG FIRE F/W VALVE PUSH CLOSED light/switch and EXTINGUISHER PUSH light/switch located on the glareshield in the cockpit.

Two fire extinguisher bottles are mounted forward of the respective engine firewall (Zone 581 left and 681 right). Each fire extinguisher bottle is charged with bromotrifluoromethane (CBrF3) which can be discharged into the engine compartment. The extinguishing agent has no damaging effects on the engine compartment or components, which means no engine components require replacement as a result of extinguishing agent entering the nacelle.

The fire extinguisher controls that are used to arm and actuate the engine extinguisher systems are the ENG FIRE F/W VALVE PUSH CLOSED light/switches and the EXTINGUISHER PUSH light/switches. The electrical power for the light/switches originates from 5-ampere circuit breakers identified as CB1 (left) and CB2 (right), located on the right engine nacelle battery bus circuit breaker panel (A119). Each ENG FIRE F/W VALVE PUSH CLOSED light/switch functions as an annunciator light and a switch. The annunciator "ENG FIRE" on the ENG FIRE F/W VALVE PUSH CLOSED light/switch is illuminated by the fire detection system in the event of an engine fire or during a fire detection system operational test. Actuating the switch provides electrical power to close the fuel firewall shutoff valve, and to arm the EXTINGUISHER PUSH light/switch with 28 vdc. The EXTINGUISHER PUSH light/switches are protected by a guard cover safety-wired to prevent the accidental discharge of the fire extinguisher(s).

When the fuel firewall shutoff valve closes, the annunciator "CLOSED" illuminates red on the ENG FIRE F/W VALVE PUSH CLOSED light/switch. Each EXTINGUISHER PUSH light/switch functions as an arming annunciator and a switch. The annunciator "EXTINGUISHER PUSH" is illuminated by actuation of the ENG FIRE F/W VALVE PUSH CLOSED light/switch. At the same time, the EXTINGUISHER PUSH switch is armed with 28 vdc, and if actuated, will detonate the explosive cartridge.

Each EXTINGUISHER PUSH light/switch incorporates two additional indicator lights, "DISCH" and "OK". The lower left indicator light illuminates "DISCH" (amber) when the fire extinguisher bottle has been discharged. This indicator light will remain illuminated until a full (precharged) bottle has been installed, replacing the discharged bottle. The lower right indicator light is used for testing the circuitry of the system and will illuminate "OK" (green) if the system is functional. For operation of the fire extinguishing test systems, refer to FIRE EXTINGUISHING SYSTEM OPERATIONAL TEST, this Chapter. The "EXTINGUISHER PUSH" annunciator lights and the "OK" indicator light intensity are controlled with the ambient lighting sensor and printed circuit board circuitry (day and night lighting), refer to Chapter 31.

FIRE EXTINGUISHER BOTTLES (Effectivity: All) (Figure 1)

WARNING

THE FIRE EXTINGUISHER BOTTLES ARE PRESSURIZED CONTAINERS AND UTILIZE AN EXPLOSIVE CARTRIDGE. Extreme care must be taken when handling the fire extinguisher bottle and cartridge assemblies to prevent accidental firing of the cartridge. Injury to personnel and/or damage to equipment can result.

NOTE

The fire extinguisher bottles must be replaced at the interval specified in Chapter 4.

The fire extinguisher bottles are mounted forward of the respective engine firewall (Zone 581 left and 681 right). Each 90 cubic-inch fire extinguisher bottle is charged with 3.00, +.25, -0 pounds of Bromotrifluoromethane (CBrF3) superpressurized with 600, +.25, -0 psig of Nitrogen (N2) at 70 degrees Fahrenheit. The fire extinguisher bottle is fired by detonation of an explosive cartridge on the fire extinguisher bottle head. Once a fire extinguisher bottle cartridge is detonated, the entire supply of extinguishing agent is discharged from the fire extinguisher bottle. A fill and safety relief valve is located on the fire extinguisher bottle. The safety relief valve releases pressure from 1520 to 1700 psi at 200 degrees Fahrenheit. For components of the fire extinguishing test system, refer to FIRE EXTINGUISHING SYSTEM OPERATIONAL TEST.

FIRE EXTINGUISHER ACTUATOR CARTRIDGE/SQUIB (Effectivity: All) (Figure 1)

WARNING

The cartridge/squib is a pyrotechnic device. Inadvertant detonation of the cartridge can cause personnel injury. For safe handling, the electrical connector must be disconnected and a plastic protection cap installed on the cartridge/squib electrical connector.

NOTE

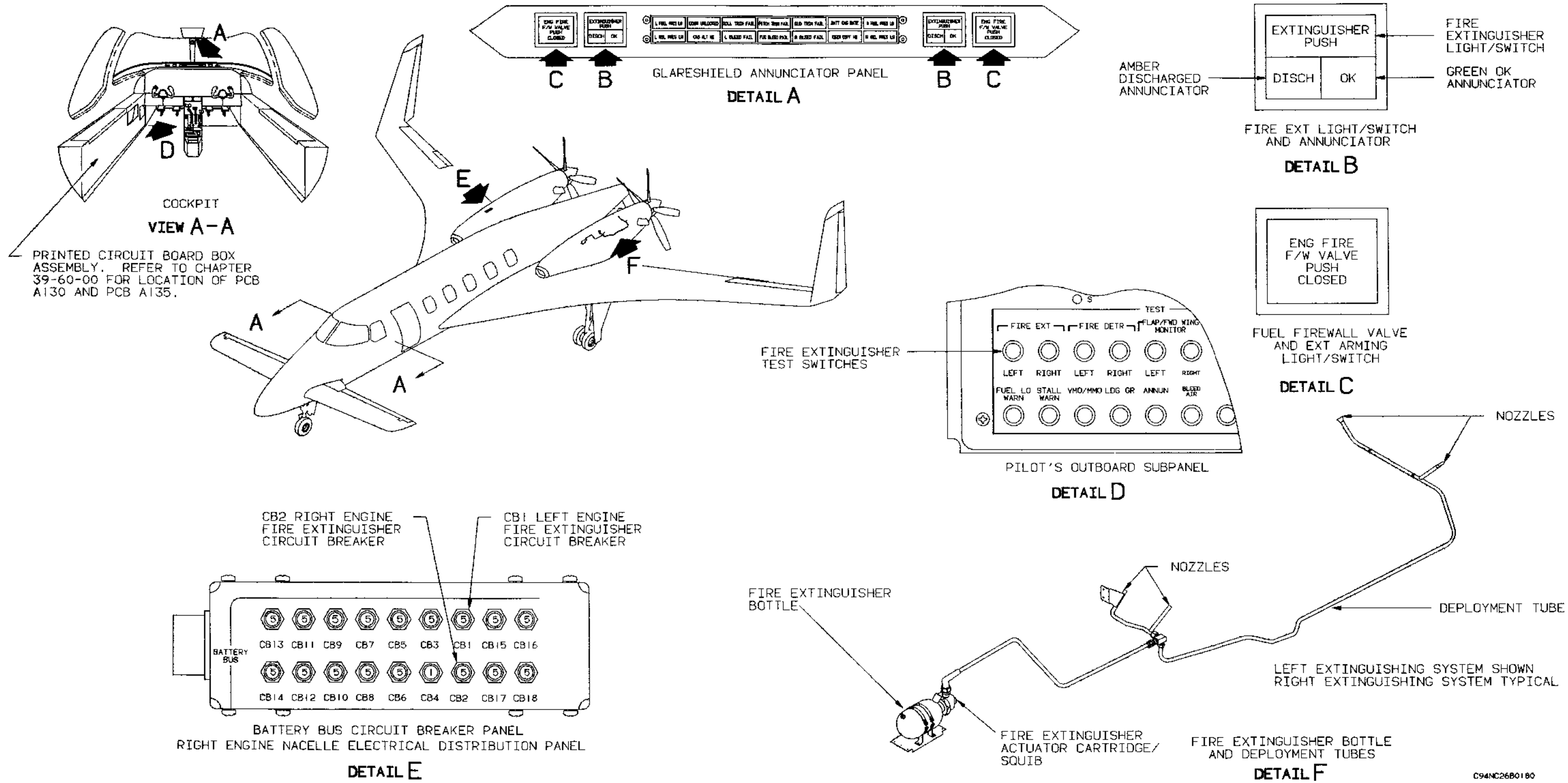
The cartridge/squib must be replaced at the interval specified in Chapter 4.

The fire extinguisher actuator cartridge is electrically fired providing a method of controlling the release of the fire extinguishing agent. When actuated, the cartridge produces high energy pressure to rupture the housing assembly, removing the restraining force from the discharge valve plug. The pressurized extinguishing agent unseats the plug, releasing extinguishing agent through the deployment tubes to the nacelle discharge ducts.

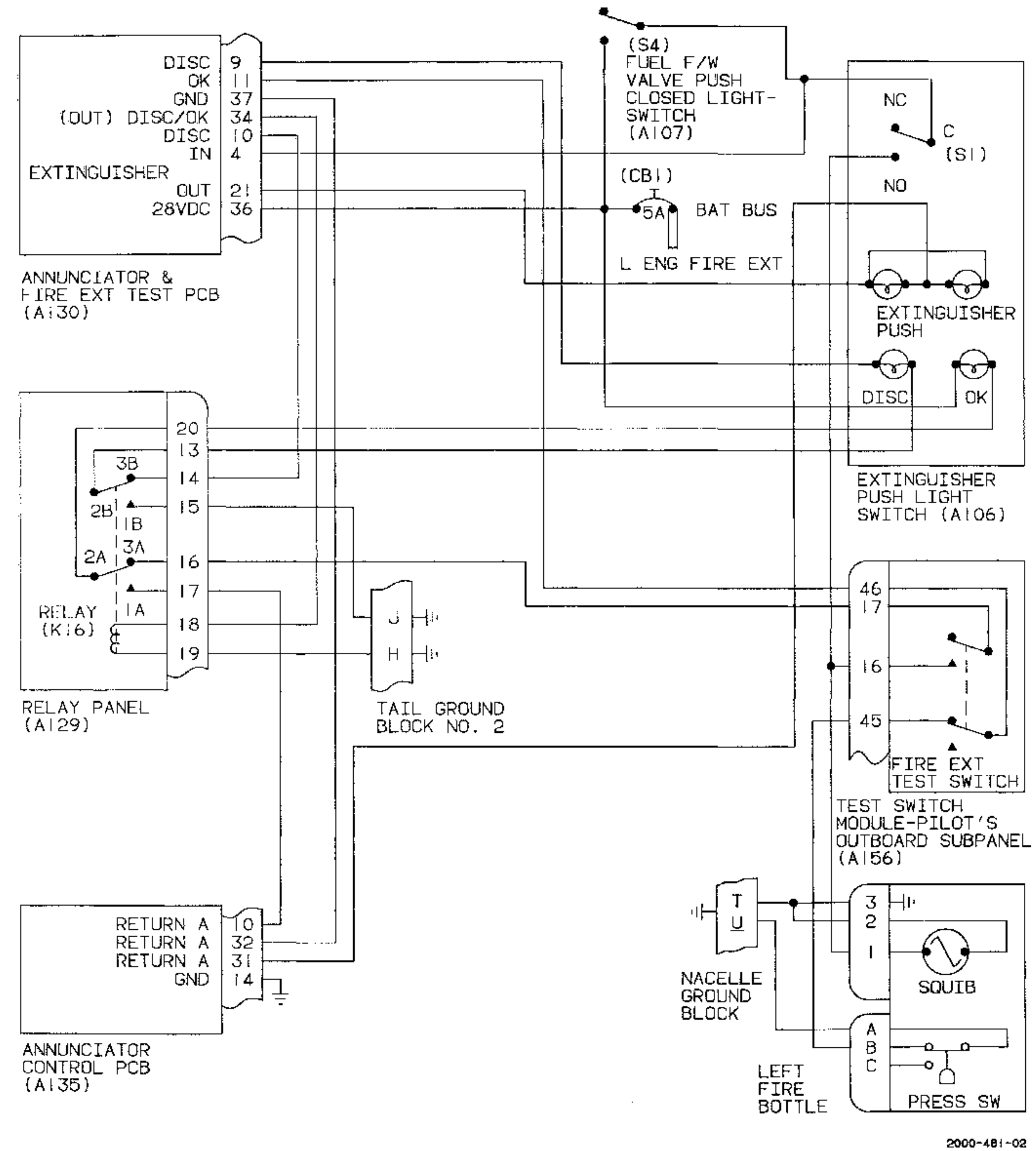
ENGINE FIRE EXTINGUISHING - TROUBLESHOOTING (Effectivity: All)

WARNING

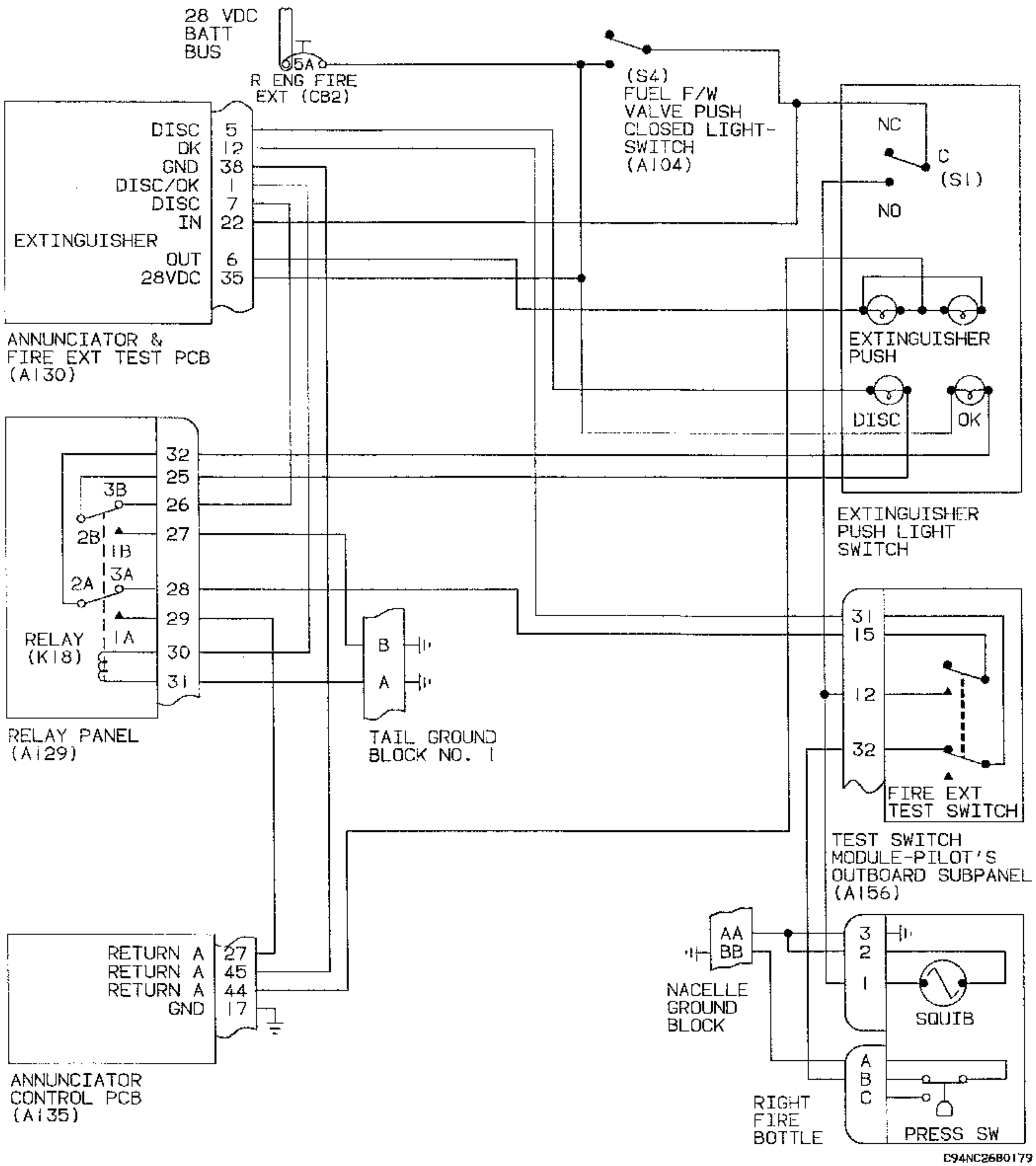
The extinguishing agent, bromotrifluoromethane, is nonpoisonous and is classed semitoxic. Contact with the agent or breathing of the agent vapors should be avoided. If working in a closed area, ventilate thoroughly before entering.



Engine Fire Extinguishing System
(Effectivity: All)
Figure 1



Left Engine Fire Extinguishing System Electrical Schematic
(Effectivity: All)
Figure 2



Right Engine Fire Extinguishing System Electrical Schematic
(Effectivity: All)
Figure 3

Troubleshooting the left and right fire extinguishing systems is the same. Checking that the systems are operational is accomplished by using the FIRE EXT test switches located on the pilot's outboard subpanel. Refer to FIRE EXTINGUISHING SYSTEM OPERATIONAL TEST in this chapter for testing the systems. Open electrical circuits in the power circuit, ground circuit and/or test circuit will result in an inoperative extinguishing system or test system.

FIRE EXTINGUISHER ACTUATION SYSTEM TROUBLESHOOTING (Effectivity: All)

CAUTION

To prevent accidental detonation of the fire extinguisher bottle explosive cartridge (squib), ensure that a plastic protection cap is installed on the cartridge electrical connector when the connector is disconnected.

To troubleshoot the fire extinguisher actuation system, disconnect the electrical connector from the fire extinguisher bottle cartridge (squib). Install a plastic protection cap on the cartridge electrical connector to prevent accidental detonation of the cartridge. Apply electrical power to the airplane and check that the CB1 or CB2 circuit breaker is engaged. Actuate the ENG FIRE F/W VALVE PUSH CLOSED light/switch and the EXTINGUISHER PUSH light/switch. Check for 28 vdc at pin 1 of the disconnected cartridge electrical connector. If 28 vdc is present, check for ground at pin 2. If 28 vdc is not present at pin 1, remove electrical power from the airplane and check for an open circuit between pin 1 and the glareshield electrical connector (P310) pin 8. If pin 2 does not check to ground, repair ground circuit. At completion of troubleshooting and/or repair, remove the plastic protection cap from the cartridge electrical connector and connect the airplane electrical connector and safety wire.

To check the EXTINGUISHER PUSH light/switch, disengage CB1 and CB2 circuit breakers. Disconnect the glareshield electrical connector (P310); actuate the light/switch and check continuity between pins 8 and 31 of connector (J310). No continuity is cause for replacement of the light/switch.

To isolate a defective ENG FIRE F/W VALVE PUSH CLOSED light/switch disconnect the fire extinguisher bottle cartridge electrical connector, install a protection cap on the cartridge electrical connector. Apply electrical power to the airplane and check that CB1 or CB2 circuit breaker is engaged. Actuate the ENG FIRE F/W VALVE PUSH CLOSED light/switch. The EXTINGUISHER PUSH light/switch should illuminate and the respective fuel firewall shutoff valve should CLOSE. If the EXTINGUISHER PUSH light/switch does not illuminate and/or the fuel firewall shutoff valve does not close, a defective ENG FIRE F/W VALVE PUSH CLOSED light/switch is indicated. When the fuel firewall valve closes, the ENG FIRE F/W VALVE PUSH CLOSED light/switch should illuminate CLOSED.

FIRE EXTINGUISHING TEST SYSTEM TROUBLESHOOTING (Effectivity: All)

Troubleshooting the left and right test systems is typical. Components of the fire extinguisher test system are: The Left and Right FIRE EXT test switches located on the pilot's outboard subpanel, relay K16 (left system) and K18 (right system) located on the relay panel (A129) in the aft fuselage, and printed circuit board (A130) located in the pilots side console. To troubleshoot the test system, perform a test of the system as outlined in FIRE EXTINGUISHING SYSTEM OPERATIONAL TEST, and refer to Troubleshooting Charts for steps that may be followed sequentially to determine the cause and the corrective action to take.

CHART 1
TROUBLESHOOTING - FIRE EXTINGUISHING SYSTEM (Effectivity: All)

OK Light Does Not Illuminate During Operational Test

Step 1	Is CB1 (left) or CB2 (right) circuit breaker(s) engaged?	**YES**	Proceed to Step 2.
	NO		

CHART 1
TROUBLESHOOTING - FIRE EXTINGUISHING SYSTEM (Effectivity: All) *(Continued)*

OK Light Does Not Illuminate During Operational Test

	Engage CB1/CB2 circuit breaker.		
Step 2	Is the OK lamp operable?	**YES**	Proceed to Step 3.
	NO		
	Replace the OK lamp.		
Step 3	Remove electrical power from the airplane. Is there continuity between CB1/CB2 circuit breaker(s) and the OK light?	**YES**	Refer to Figure 1 or 2, and BEECHCRAFT Starship 1 Wiring Diagram Manual. Proceed to Step 4.
	NO		
	Repair electrical wiring as necessary.		
Step 4	Is there continuity between the OK light and relay K16 (left) or K18 (right)?	**YES**	Proceed to Step 5.
	NO		
	Repair electrical wiring as necessary.		
Step 5	Is there continuity between relay K16 (left) or K18 (right) and the respective FIRE EXT test switch?	**YES**	Proceed to Step 6.
	NO		
	Repair electrical wiring as necessary.		
Step 6	Is there continuity between the left/right FIRE EXT test switch and the fire extinguisher bottle?	**YES**	Proceed to Step 7.
	NO		
	Repair electrical wiring as necessary.		
Step 7	Is there continuity between the fire extinguisher bottle and the nacelle grounding block?	**YES**	Perform system operational test. Refer to FIRE EXTINGUISHING SYSTEM OPERATIONAL TEST.
	NO		
	Repair grounding circuit as necessary.		

CHART 2
TROUBLESHOOTING - FIRE EXTINGUISHING SYSTEM (Effectivity: All)

DISCH Light Does Not Illuminate During Operational Test

Step 1	Is DISCH lamp operable?	**YES**	Proceed to Step 2.
	NO		
	Replace the DISCH lamp.		

CHART 2
TROUBLESHOOTING - FIRE EXTINGUISHING SYSTEM (Effectivity: All) *(Continued)*

DISCH Light Does Not Illuminate During Operational Test

Step 2 Remove electrical power from the airplane. Is there continuity between printed circuit board (A130) and the DISCH light?

YES Refer to Figure 2 or 3, and BEECHCRAFT Starship 1 Wiring Diagram Manual. Proceed to Step 3.

NO

Repair electrical wiring as necessary.

Step 3 Is there continuity between the DISCH light and relay K16 (left)/K18 (right)?

YES Proceed to Step 4.

NO

Repair electrical wiring as necessary.

Step 4 Is there continuity between relay K16 (left)/K18 (right) and printed circuit board (A130)?

YES Proceed to Step 5.

NO

Repair electrical wiring as necessary.

Step 5 Is there continuity between relay K16 (left)/K18 (right) and the tail ground block?

YES Perform system operational test. Refer to FIRE EXTINGUISHING SYSTEM OPERATIONAL TEST.

NO

Repair electrical wiring as necessary.

CHART 3
TROUBLESHOOTING - FIRE EXTINGUISHING SYSTEM (Effectivity: All)

DISCH Light Remains Illuminated

Step 1 Is the DISCH light electrical circuit through relay K16/K18 free of shorts to ground?

Refer to BEECHCRAFT Starship 1 Wiring Diagram Manual to trace the electrical circuit.

YES Proceed to Step 2.

NO

Locate and repair short to ground. Refer to BEECHCRAFT Starship 1 Wiring Diagram Manual to trace the electrical circuit.

Step 2 Does a check through the fire extinguisher bottle pressure switch (Pins A and B) indicate continuity?

YES Perform system operational test. Refer to FIRE EXTINGUISHING SYSTEM OPERATIONAL TEST.

NO

If there is no continuity through the pressure switch, a defective pressure switch is probable, or the pressure has been lost or discharged from the bottle.

CHART 3
TROUBLESHOOTING - FIRE EXTINGUISHING SYSTEM (Effectivity: All) *(Continued)*

DISCH Light Remains Illuminated

Replace the fire extinguisher bottle.

ENGINE FIRE EXTINGUISHING - MAINTENANCE PRACTICES (Effectivity: All)

Maintenance practices for the fire extinguishing system consist mainly of removal, installation, and operational testing the systems. For maintenance of associated components, such as the printed circuit boards (Chapter 39) and annunciator lights and switches (Chapter 31), refer to the applicable Chapter.

WARNING

THE FIRE EXTINGUISHER BOTTLES ARE PRESSURIZED CONTAINERS AND UTILIZE AN EXPLOSIVE CARTRIDGE. Extreme care must be taken when handling the fire extinguisher bottle and cartridge assemblies to prevent accidental firing of the cartridge. Injury to personnel and/or damage to equipment can result.

CAUTION

To prevent accidental detonation of the fire extinguisher bottle explosive cartridge (squib), install a plastic protection cap on the cartridge when the electrical connector is disconnected.

FIRE EXTINGUISHER BOTTLE REMOVAL (Effectivity: All) (Figure 4)

WARNING

The extinguishing agent, bromotrifluoromethane, is nonpoisonous and is classed semitoxic. Contact with the agent or breathing of the agent vapors should be avoided. If working in a closed area, ventilate thoroughly before entering.

a. Remove all electrical power from the airplane.

b. Gain access to the fire extinguisher bottle by removing the nacelle upper access panel (581AT left, 681AT right). Refer to Chapter 54-00-00.

c. Cut safety wire and disconnect the electrical connector from the fire extinguisher bottle cartridge (squib).

d. Install a plastic protection cap on the electrical connector of the cartridge to prevent accidental firing of the explosive cartridge.

e. Cut safety wire and disconnect the electrical connector from the fire extinguisher bottle pressure switch.

f. Disconnect the deployment tube from the fire bottle head. Cover openings to prevent entry of foreign matter.

g. Loosen the two clamps securing the fire extinguisher bottle to its mounting brackets. Remove the fire extinguisher bottle from the airplane.

FIRE EXTINGUISHER BOTTLE INSTALLATION (Effectivity: All) (Figure 4)

WARNING

The extinguishing agent, bromotriflouromethane, is nonpoisonous and is classed semitoxic. Contact with the agent or breathing of the agent vapors should be avoided. If working in a closed area, ventilate thoroughly before entering.

New fire extinguisher bottles are received disassembled and a protective cap is installed on the neck of the fire extinguisher bottle. During assembly, the discharge head is secured with the swivel nut which is torqued to 48-52 foot-pounds. The cartridge is torqued to 80-100 inch-pounds.

a. Check that the protection cap is installed on the cartridge electrical connector to prevent accidental firing of the explosive cartridge.

b. Position the fire extinguisher bottle to the mounting brackets with the placard "THIS LINE UP" on the top of the bottle and the outlet port fitting on the discharge head upward. Secure the fire extinguisher bottle with the two mounting clamps. Torque the clamps to 30-40 inch-pounds.

c. Connect the deployment tube to the outlet port fitting on the discharge head of the fire extinguisher bottle.

d. Remove the plastic protection cap from the cartridge electrical connector. Check that no electrical power is present and connect the electrical connector to the fire extinguisher bottle cartridge (squib). Safety wire the electrical connector.

e. Connect the electrical connector to the pressure switch. Safety wire the electrical connector.

f. Install the upper nacelle access panel (581AT left, 681AT right) assembly. Refer to Chapter 54.

FIRE EXTINGUISHER BOTTLE INSPECTION (Effectivity: All)

NOTE

The fire extinguisher bottles must be replaced at the interval specified in Chapter 4.

a. Inspect the bottles for proper operating pressure. Discharged bottles or bottles with gauge pressure below the minimum operating pressure must be replaced.

b. Inspect the bottle for visible damage, such as dents deeper than 1/16 inch and scratches deeper than .004 inch.

c. Inspect the electrical connections and relief valves.

d. Inspect the condition and security of the identification plate.

e. Inspect the mounting lugs for cracks and the mount bolts for proper security.

f. Verify the replacement schedule of the bottle from Chapter 4.

FIRE EXTINGUISHER ACTUATOR CARTRIDGE/SQUIB INSPECTION (Effectivity: All)

The life of the actuator cartridge/squib is determined from the date (month/year) stamped on the cartridge/squib body or marked on the plastic bag containing the cartridge/squib. Replace the cartridge at the interval specified in Chapter 4 or sooner if not in compliance with the following conditions:

- The storage temperature must be maintained at temperatures below 100°F, preferably below 70° F.

- The service temperature (installed) must be in a range of -100° F to +320° F.

WARNING

Do not use a voltmeter, flashlight battery, continuity light or any similar device in an attempt to test the cartridge/squib. Using these devices may affect the useful life and reliability, and cause accidental detonation.

DEPLOYMENT TUBES REMOVAL (Effectivity: All) (Figure 4)

NOTE

The removal of the deployment tubing for fire extinguishing fluid is typical for both engines. The deployment tubing is routed from the fire extinguisher bottle through a special bulkhead fitting to the upper flange of the oil cooler. Extinguishing agent outlets (nozzles) are located in the forward and aft engine areas.

a. Remove electrical power from the airplane.

b. Gain access to the deployment tubes by removing the aft engine nacelle access panel assembly and cowling. Refer to Chapters 54 and 71 respectively.

c. Disconnect and remove the forward deployment tube between the outlet port fitting on the fire extinguishing bottle and the special bulkhead fitting on the forward side of the engine firewall.

d. Disconnect the forward nozzles and bracket assembly from the special bulkhead fitting located on the aft side of the firewall. Remove the two bolts, and washers securing the forward nozzles and bracket assembly to the firewall. Remove the forward nozzles and bracket assembly.

e. At the engine oil cooler upper flange, remove the two nuts, washers and bolts securing the aft deployment tube clamps to the oil cooler upper flange.

f. Remove the support clamp securing the aft deployment tube to the engine mount clamp.

g. Disconnect the aft deployment tube from the special bulkhead fitting on the aft side of the firewall.

h. Remove the aft deployment tube and cover the openings of the tubes and fittings to prevent entry of foreign matter.

DEPLOYMENT TUBES INSTALLATION (Effectivity: All) (Figure 4)

NOTE

The installation of the left and right engine fire extinguishing deployment tubes is typical.

a. Position and connect the forward deployment tube between the fire extinguisher bottle discharge head outlet port fitting and the special bulkhead fitting.

b. On the aft side of the engine firewall, connect the forward nozzles and tube bracket assembly to the special bulkhead fitting. Secure the forward nozzles and tube bracket assembly to the firewall with two bolts and washers.

c. Position the aft deployment tube in its route from the aft side of the firewall to the engine oil cooler upper flange.

NOTE

Check that the two aft nozzles and the 0.125-diameter hole located in the tube between the nozzles are not clogged or obstructed to ensure proper distribution of the extinguishing agent in the aft engine area.

d. Secure the aft deployment tube to the engine oil cooler upper flange with two clamps and the flange bolts, washers and nuts.

e. Connect the aft deployment tube to the special bulkhead fitting at the firewall.

f. Secure the aft deployment tube support clamp to the engine mount clamp.

g. Refer to Chapters 54-00-00 and 71-00-00 and install the nacelle access panel assembly and cowling, respectively.

FIRE EXTINGUISHING SYSTEM OPERATIONAL TEST (Effectivity: All)

The purpose of the fire extinguishing test system is to check the electrical circuits without actually firing the fire extinguisher bottles. Electrical power (28 vdc) for testing originates from CB1 (left) and CB2 (right) circuit breakers located on the right engine nacelle battery bus circuit breaker panel (A119). Electrical power is available to the positive side of the "OK" light located on the glareshield EXTINGUISHER PUSH light/switch and the annunciator printed circuit board (A130). Electrical power for the "DISCH" (discharged) light, located next to the "OK" light, is from printed circuit board A-130. Refer to Figures 2 or 3, and/or the BEECHCRAFT Starship 1 Wiring Diagram Manual to trace the electrical circuits.

The Left and Right FIRE EXT test switches, located on the pilot's outboard subpanel, perform two functions; when actuated, the test switch closes the electrical test circuit for the "OK" light, and opens the test circuit for the "DISCH" light to simulate loss of pressure in the fire extinguisher bottle.

a. With electrical power on the airplane and the Left or Right FIRE EXT test switch actuated, the negative circuit is completed from ground through the fire extinguisher bottle cartridge, through the deenergized relay (K16 left or K18 right), and to the negative side of the "OK" light. The "OK" light provides resistor-type low voltage which is insufficient to fire the cartridge.

b. With electrical power on the airplane and the Left or Right FIRE EXT test switch actuated, the ground circuit of the fire extinguisher bottle pressure switch to the annunciator printed circuit board A130 is interrupted. Identifying the interruption, the printed circuit board provides electrical power to the "DISCH" light and a ground is completed through the deenergized relay (K16 left or K18 right) to the negative side of the light.

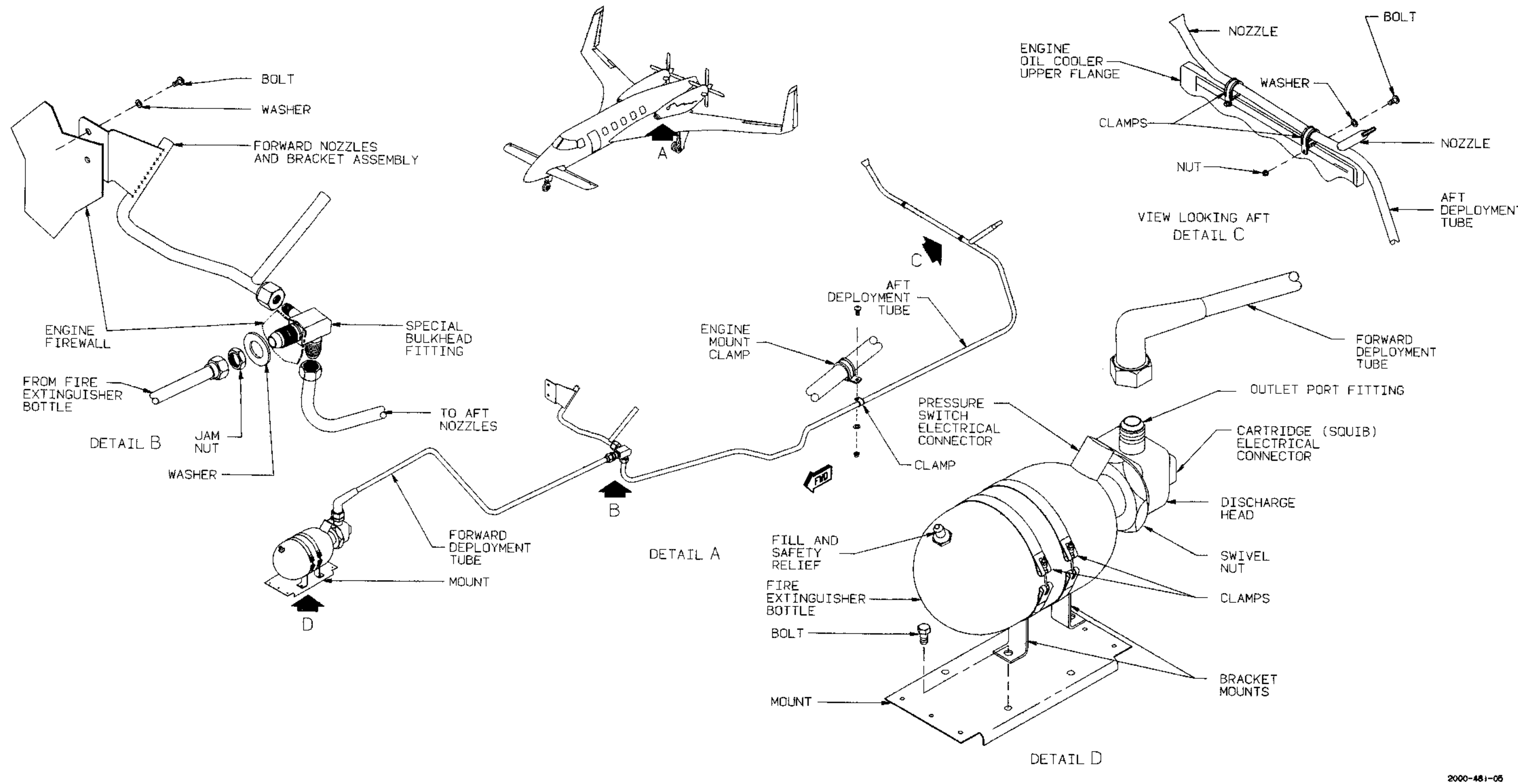
OPERATIONAL TEST (Effectivity: All)

a. Apply electrical power to the airplane.

b. Check that the LEFT and RIGHT ENG FIRE EXT circuit breakers are engaged.

c. On the pilot's outboard subpanel, actuate the Left FIRE EXT test switch. The corresponding green "OK" light and the yellow "DISCH" light should illuminate.

d. Release the Left FIRE EXT test switch.



Engine Fire Extinguishing System Installation
(Effectivity: All)
Figure 4

e. Actuate the Right FIRE EXT test switch. The corresponding green "OK" light and the yellow "DISCH" light should illuminate.

f. Release the Right FIRE EXT test switch.

g. Remove electrical power from the airplane.

PORTABLE FIRE EXTINGUISHING - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

PORTABLE FIRE EXTINGUISHING (Effectivity: NC-4 thru NC-7)

Provisions are made for installation of two portable (hand-held) fire extinguishers. In the cockpit, an extinguisher is mounted behind the copilot's seat on top of the map case. In the cabin, an extinguisher is mounted on the cabin floor just aft of the right side storage cabinet.

The portable fire extinguisher (Model 2-10) is a pressurized container (bottle) containing two pounds of extinguishing agent (Halon 1211-BCF) and 100 psig dry nitrogen. The nitrogen is for pressurizing the bottle. The extinguishing agent is recommended for small combustible fires (Class A), flammable liquid fires (Class B), and electrical fires (Class C). The agent is colorless, noncorrosive liquefied gas which rapidly evaporates leaving no residue. It will not harm fabrics or metals.

The extinguisher consists of two major parts, the head and the bottle. The head is comprised of a discharge nozzle, lever, safety catch and a red discharge disc. A pressure gauge is mounted on the fire extinguisher for confirming that the bottle contains the specified dry nitrogen supercharge. The gauge needle should register in the "green sector".

When the fire extinguisher has been used or the pressure is indicating below the operating range of the gage, the bottle must be charged by an authorized facility or replaced with a serviceable fire extinguisher before the next flight. Refer to Chapter 5-10-00 for periodic hydrostatic test intervals.

The portable fire extinguishers incorporate a bottle bracket with a strap and quick-release latch. The fire extinguisher mounted on the cabin floor has the bottle bracket secured to inserts in the floorboard. The fire extinguisher mounted in the cockpit has the bottle bracket secured to inserts in the map case top behind the copilot's seat. The operating temperature of the portable fire extinguisher ranges from -40 degrees Fahrenheit through +120 degrees Fahrenheit. To operate the fire extinguisher, remove the fire extinguisher from its bracket, hold it upright, slide the red safety catch down with the thumb, direct the nozzle toward the base of the fire source and squeeze the lever with the palm of the hand.

NOTE

When the lever is first squeezed, a red indicator disc is ejected from the rear of the operating head. A missing indicator disc is an indication of a partial or completely discharged fire extinguisher.

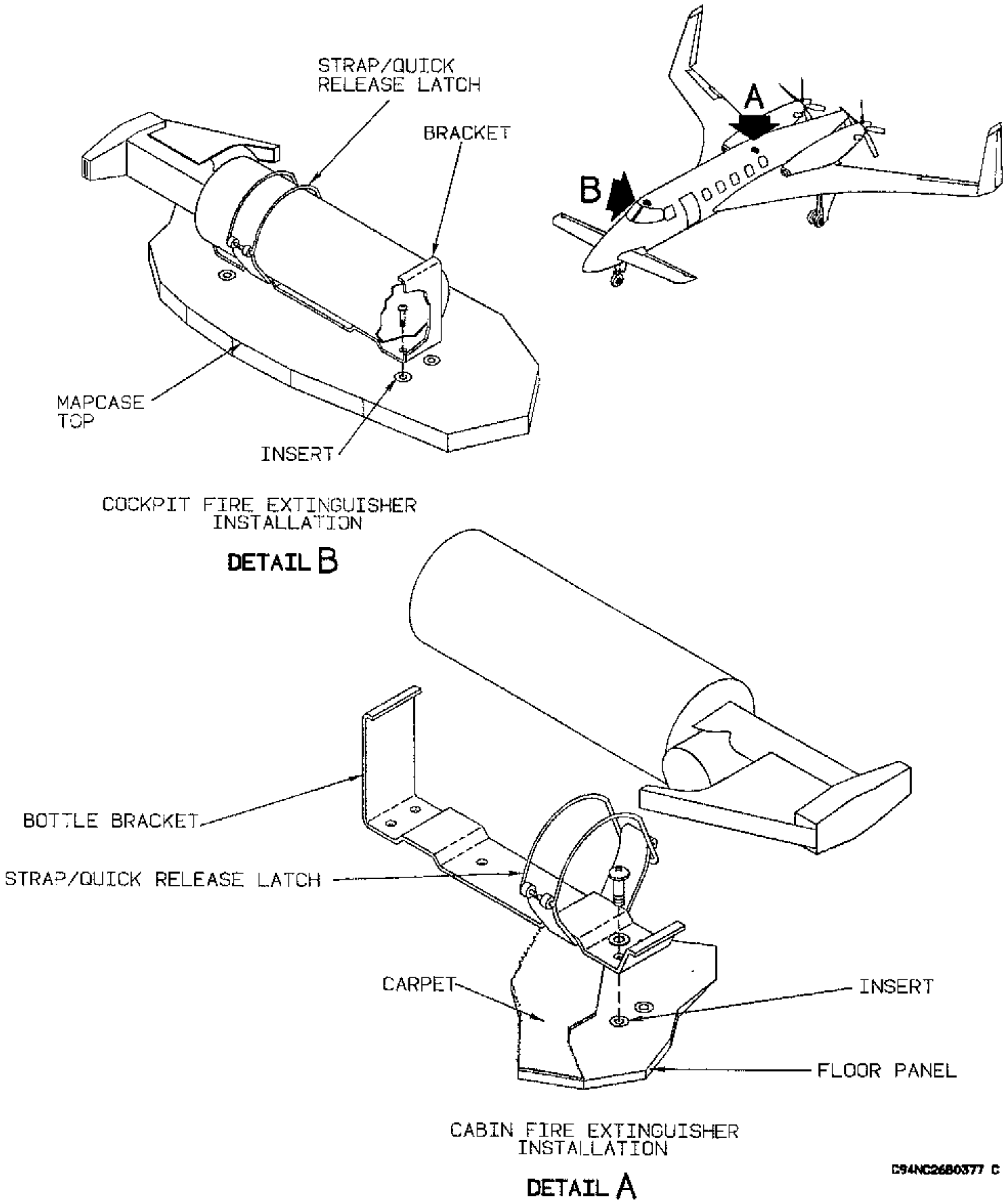
When the lever is squeezed, a piston valve in the operating head fractures the plug seal on top of the bottle to release the extinguishing agent through the discharge nozzle. The time for total discharge of the container is ten seconds. The discharge nozzle is designed to give a wide, flat pattern.

Releasing the lever closes a secondary seal and stops the flow of extinguishing agent. The remaining agent can be used in case of a flashback fire.

PORTABLE FIRE EXTINGUISHING (Effectivity: NC-8 and after)

Provisions are made for the installation of two portable fire extinguishers. One extinguisher is mounted in the cockpit on the floorboard (141CT) behind the pilot's seat. A second extinguisher is mounted on the floorboard (162AT) aft of the right side baggage compartment. Both extinguishers are mounted in red quick-release brackets.

The portable extinguisher containers are pressure tested to 480 psi and contain 2 1/2 lbs. ±2 oz. of RM53029 Halon Type 1211 extinguishing agent and



Portable Fire Extinguisher Installation
(Effectivity: NC-4 thru NC-7)
Figure 1

125 psi of nitrogen for pressurization. Halon 1211 is a chemical agent effective against combustible fires (Class A), flammable liquid fires (Class B), and electrical fires (Class C); however, the smaller size extinguishers do not contain enough agent to qualify for a Class A rating. The extinguishers are suitable for use at temperatures from -65° F to 120° F.

Halon 1211 or bromochlorodifluoromethane is in a liquid gas state while contained under pressure in the fire extinguisher. Upon release, the liquid quickly turns to a vapor that dissipates into the air and leaves no residue to cleanup. As it changes from liquid to vapor, a rapid temperature drop to below freezing occurs. The discharge should not be directed at exposed skin or eyes. When used on fires of intense heat, decomposition of the Halon 1211 vapor may be accompanied by a sharp acrid odor. This odor will serve to warn the operator to take evasive action against excessive exposure to the products of combustion.

WARNING

Liquefied Halon 1211 can cause frostbite. Avoid contact with exposed skin or eyes. High concentrations of Halon can produce toxic byproducts when applied to fire. Avoid inhalation of the byproducts by evacuating and ventilating the area. Do not use in confined spaces with less than 312 cubic feet per extinguisher.

PORTABLE FIRE EXTINGUISHING - MAINTENANCE PRACTICES (Effectivity: All)

PORTABLE FIRE EXTINGUISHER SERVICING (Effectivity: All)

CAUTION

Do not recharge with any materials except Halon 1211 and Nitrogen. Press lever only in case of fire. Partial discharge will cause pressure loss. Do not recharge extinguisher if damaged or corroded.

a. After use, discharge the extinguisher completely to relieve pressure and replace the ring pin.

b. Return the extinguisher to an authorized service agency or dealer for recharging immediately after use. Extinguisher charge is 2 1/2 lbs of Halon 1211 pressurized to 125 psi with Nitrogen.

c. Record recharge date on attached tag.

PORTABLE FIRE EXTINGUISHER AND BRACKET REMOVAL (Effectivity: NC-4 thru NC-7) (Figure 1)

Removal of the portable fire extinguishers and/or bottle brackets in the cabin and cockpit locations is typical.

a. To remove the cockpit or cabin fire extinguisher from the bottle bracket, release the strap overcenter-type latch and remove the fire extinguisher.

b. To remove the bracket from the map case, remove the six screws and washers securing the bracket to inserts in the map case. Remove the bottle bracket from the map case.

c. To remove the floor-mounted bottle bracket, remove the six screws and washers securing the bracket to inserts in the floor panel. Remove the bottle bracket.

PORTABLE FIRE EXTINGUISHER AND BRACKET INSTALLATION (Effectivity: NC-4 thru NC-7) (Figure 1)

a. To install the bracket on the map case, align the bracket to the map case and secure with six screws and washers into inserts in the top of the map case.

b. To install the bottle bracket, position the bracket on the top surface of the floor panel (carpet) and secure with six screws and washers into inserts in the floor panel.

c. To stow the fire extinguisher in the bottle bracket, position the extinguisher in the bottle bracket and secure with the quick release over-center type latch.

PORTABLE FIRE EXTINGUISHER AND BRACKET REMOVAL (Effectivity: NC-8 and after) (Figure 2)

a. Open and unhook the two latches (6).

b. Remove the fire extinguisher (1) from the bracket (4).

c. Remove four screws (2) and washers (3) from the bracket (4) and remove the bracket (4) from the floorboard (141CT, or 162AT).

PORTABLE FIRE EXTINGUISHER AND BRACKET INSTALLATION (Effectivity: NC-8 and after) (Figure 2)

a. Position the bracket (4) on the floorboard (141CT, or 162AT) and install the four screws (2) and washers (3).

b. Position the fire extinguisher (1) in the bracket (4).

c. Close the two clamps (5) and lock the two latches (6).

PORTABLE FIRE EXTINGUISHER INSPECTION (Effectivity: All)

NOTE

The portable fire extinguishers must be inspected at the interval specified in Chapter 5.

The portable extinguisher inspection consists of checking the gauge to verify that normal pressure is maintained and recharging the extinguisher after use or at the required date. During the routine inspections, the following inspection procedures must be performed.

a. Check the gauge for cracks, chips, and cleanliness. The pointer on the face of the pressure gauge must be in the "green" operating range between the recharge and overcharge marks.

b. Check the lockpin and make sure the wire seal is in place. If the seal is broken or missing, the extinguisher may have been discharged or partially discharged. A partially discharged extinguisher will leak, lose pressure and become inoperable. The extinguisher must be recharged in accordance with the recharge instructions on the label.

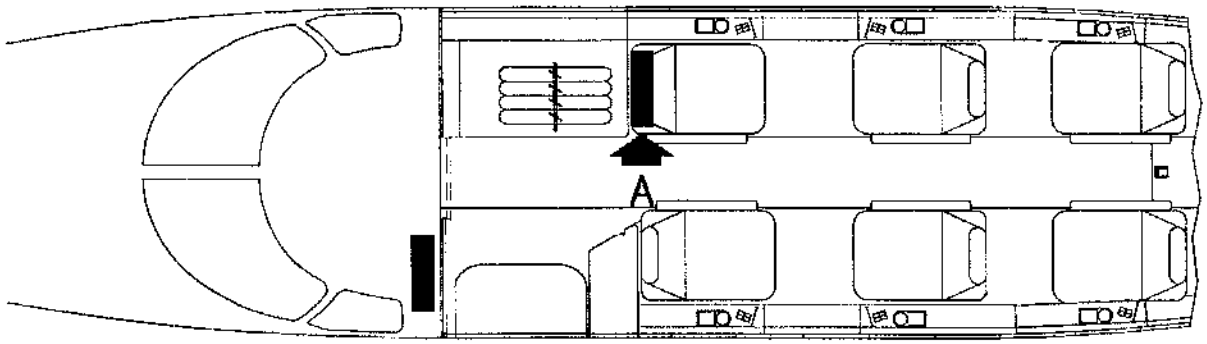
c. Ensure that the mounting brackets are secure and the quick-release clamps operate properly.

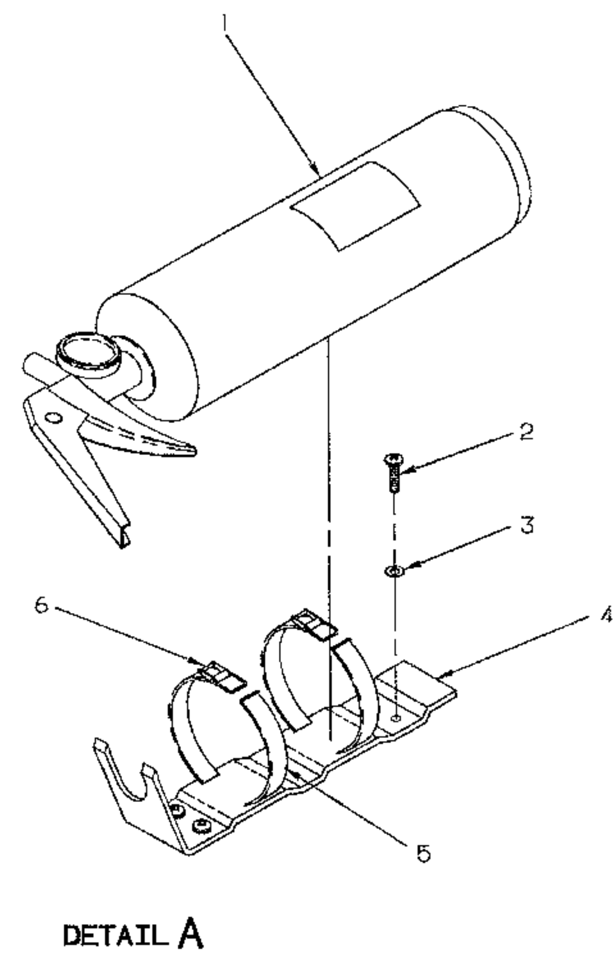
d. Ensure that the discharge nozzle is unobstructed.

e. Make sure the operating instructions and replacement schedule tags are in good condition, legible, and securely attached to the extinguisher.

f. Weigh the extinguisher and record the results on the attached replacement schedule tag. The maximum gross weight is 5 lbs. 2 oz. and the minimum gross weight is 4 lbs. 10 oz. Recharge the extinguisher if the gross weight is less than 4 lbs. 10 oz. Recharge the extinguisher if the gross weight decreases more than 2 ounces from the initial weight.

g. Record the inspection date on the attached replacement schedule tag.





1. FIRE EXTINGUISHER
2. SCREW
3. WASHER
4. BRACKET
5. CLAMP
6. LATCH

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Portable Fire Extinguisher and Bracket Installation
(Effectivity: NC-8 and after)
Figure 2

CHAPTER 27 - FLIGHT CONTROLS

LIST OF PAGE EFFECTIVITY

CHAPTER 27 - FLIGHT CONTROLS

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GENERAL - DESCRIPTION AND OPERATION
(EFFECTIVITY: ALL)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

The primary flight controls, consisting of the elevons on the aft wing, the elevators on the forward wings, and the rudders installed on each tipsail, are cable-bell crank and push-pull rod operated control surfaces which require no power assistance for normal control by the pilot or copilot. The flaps, the forward wings, the elevator trim tabs, the elevon trim tabs, and the rudder trim tabs are electrically powered. A yaw damper system works through the auto-pilot rudder servo described in Chapter 22 when the yaw damper is engaged.

Dual control wheels are provided for operation by either the pilot or the copilot. Elevons and elevators are operated by conventional push-pull control wheels, interconnected by a "T" shaped control column. A down-spring and bob weight are incorporated into the control column for improved stability in the elevator control system.

Chapter 27-20-00 describes that portion of the system which controls the position and movement of the rudder and rudder tabs. The yaw axis of the airplane is controlled by the rudder and rudder tabs. The rudders are mounted in the tipsails at the outboard ends of the aft wing. The rudder pedals are interconnected by a linkage below the cockpit floor. Rudder bell cranks are adjustable to three positions which move the pedals approximately one inch forward or aft. The rudder trim tabs are electrically controlled. A rudder trim tab indicator is provided on the pedestal to show the state of the trim tabs.

Chapter 27-30-00 describes that portion of the system which controls the position and movement of the elevators, elevons, elevator trim tabs and elevon trim tabs. The elevators are located in the trailing edge of the forward wings. The elevator control linkage is a mechanical series of push-pull rods. The elevons are located in the trailing edge of the aft wing. Elevon control is by means of a cable-bell crank system. Differential movement of the elevons controls the roll axis of the airplane. The elevators and elevons work together to control the pitch axis of the airplane. The elevator and elevon trim tabs are electrically controlled. Elevator and elevon trim tab indicators are provided on the pedestal to show the position of the trim tabs.

Chapter 27-31-00 describes a stall warning system which incorporates a stall warning shaker, a column pusher, warning horns, and a visual display to warn the crew of impending or actual stall conditions. If a stall occurs and no action is taken by the crew, the column pusher will cause the autopilot pitch servo to push the nose of the airplane down.

Chapter 27-50-00 describes the portion of the system which controls the position and movement of the flaps and the forward wings. Two flaps installed on each side of the aft wing are operated by an electric motor-driven gearbox mounted in the aft manhole under the aft wing box shear panel. The gearbox drives flexible drive shafts connected to a ball screw type jackscrew at each flap. The flaps and forward wings move at the same time and are controlled by a FLAP/FWD WING switch mounted in the pedestal. The flaps and forward wings have only two positions, fully extended or fully retracted.

Chapter 27-70-00 describes the gust control lock which is installed in the cockpit to secure the elevators, elevons, and the engine control levers when the airplane is on the ground and out of service.

SPECIAL TOOLS AND RECOMMENDED MATERIALS (EFFECTIVITY: ALL)

The special tools and recommended materials listed in Charts 1 and 2 as meeting federal, military or supplier specifications are provided for reference only and are not specifically prescribed by Raytheon Aircraft Company. Any product conforming to the specification listed may be used. The products included in these charts have been tested and approved for aviation usage by Raytheon Aircraft Company, by the supplier, or by compliance with the applicable specifications. Generic or locally manufactured products which conform to the requirements of specification may be used even though not included in the charts. Only the basic number of each specification is listed. No attempt has been made to update the listing to the latest revision. It is the responsibility of the technician or mechanic to determine the current revision of the applicable specification prior to usage of the product listed. This can be done by contacting the supplier of the product to be used.

CHART 1
SPECIAL TOOLS (EFFECTIVITY: ALL)

TOOL NAME	PART NO.	SUPPLIER	USE
1. RH Rudder Travel Board	122-630000-3, D810-2	Raytheon Aircraft Company, Wichita, Ks.	Set RH rudder travel.
2. LH Rudder Travel Board	122-630000-4, D810-2	Raytheon Aircraft Company, Wichita, Ks.	Set LH rudder travel.
3. RH Rudder Trim Tab Travel Board	122-630000-3, D810	Raytheon Aircraft Company, Wichita, Ks.	Set RH rudder trim tab travel.
4. LH Rudder Trim Tab Travel Board	122-630000-4, D810	Raytheon Aircraft Company, Wichita, Ks.	Set LH rudder trim tab travel.
5. Trim Tab Free-Play Measurement Tool	45-135030-9/810	Raytheon Aircraft Company, Wichita, Ks. (or fabricate as shown in this chapter)	Measure trim tab free-play.
6. Multipurpose Rigging Pin	None	Fabricate as shown in this chapter	Hold a variety of components during rigging.
7. LH Elevator Trim Tab Travel Board	122-610000-5/ D810-1	Raytheon Aircraft Company, Wichita, Ks.	Set LH elevator trim tab travel.
8. RH Elevator Trim Tab Travel Board	122-613000-6/ D810-1	Raytheon Aircraft Company, Wichita, Ks.	Set RH elevator trim tab travel.

CHART 1
SPECIAL TOOLS (EFFECTIVITY: ALL) (CONTINUED)

TOOL NAME	PART NO.	SUPPLIER	USE
9. LH Elevon Travel Board	122-130000-3/ D810-3 (or TE-100TB Universal Travel Board)	Raytheon Aircraft Company, Wichita, Ks.	Set LH elevon travel.
10. LH Elevon Trim Tab Travel Board	122-130000-3/ D810-4	Raytheon Aircraft Company, Wichita, Ks.	Set LH elevon trim tab travel.
11. RH Elevon Travel Board	122-130000-4/ D810-3 (or TE-100TB Universal Travel Board)	Raytheon Aircraft Company, Wichita, Ks.	Set RH elevon travel.
12. RH Elevon Trim Tab Travel Board	122-130000-4/ D810-4	Raytheon Aircraft Company, Wichita, Ks.	Set RH elevon trim tab travel.
13. Elevon Control Mixer Rigging Pin	None	Fabricate as shown in this chapter.	Pin elevon control during rigging mixer.
14. Outboard Wing Sector Rigging Pin	None	Fabricate as shown in this chapter.	Pin outboard wing sector during rigging.
15. RH Elevator Travel Board	122-610000-5, D810 (or TE-100TB Universal Travel Board)	Raytheon Aircraft Company, Wichita, Ks.	Set RH elevator travel.
16. LH Elevator Travel Board	122-610000-5, D810 (or TE-100TB Universal Travel Board)	Raytheon Aircraft Company, Wichita, Ks.	Set LH elevator travel.
17. Stall Warning Breakout Box	122-040149/935	Raytheon Aircraft Company, Wichita, Ks.	Calibrate stall warning system.
18. Forward Wing Rig Pin	122-410700-25	Raytheon Aircraft Company, Wichita, Ks.	Pin forward wings while rigging.
19. Control Lock	122-590011-17	Raytheon Aircraft Company, Wichita, Ks.	Lock control surfaces and engine control levers.

CHART 2
RECOMMENDED MATERIALS (EFFECTIVITY: ALL)

MATERIAL	SPECIFICATION	PRODUCT	SUPPLIER
1. Sealant	MIL-S-8802, Type II	Pro Seal 890	Pro-Seal Corp., Div. of Essex Chemical Corp., Aerospace Products Compton, CA 90220
2. Solvent	PD680, Type III		
3. Corrosion Preventive Compound	MIL-C-16173, Grade 2		
4. Hydraulic Fluid	MIL-H-5606	2126 Hydraulic Oil	Exxon Company U.S.A., P.O. Box 2108 Houston, TX 77001
5. Grease, Aircraft and Instrument, Gear and Actuator Screw	MIL-G-23827	Super Mil Grease No. A72832	American Oil Co., 165 N. Canal Chicago, IL 60606

RUDDERS AND TABS - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

The tipsails mounted at each end of the aft wing incorporate a rudder on their trailing edge. The rudders are connected to the rudder pedals by a system of pushrod and bell crank assemblies linked by control cables.

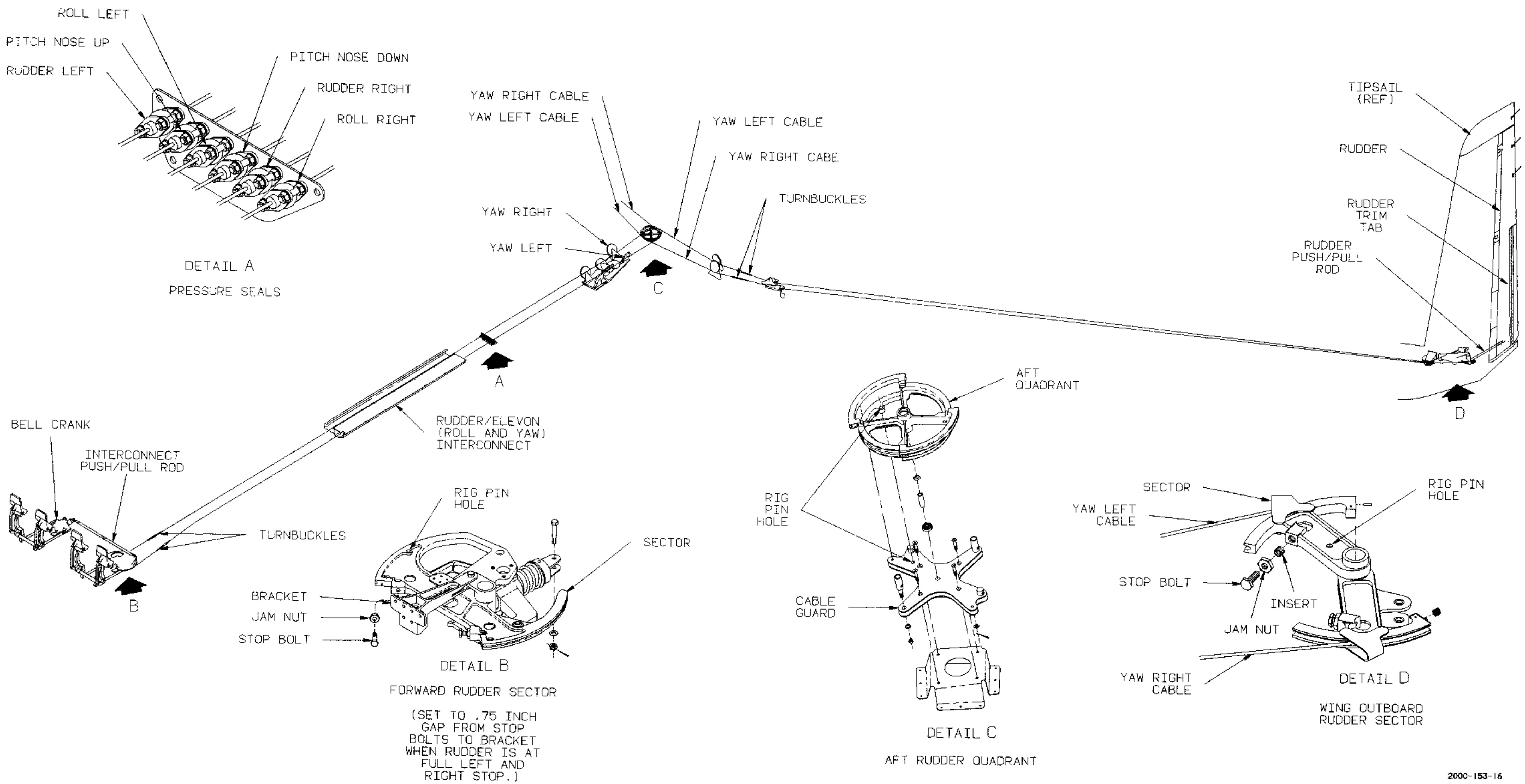
Each rudder incorporates a rudder trim tab on its trailing edge. The rudder trim tabs are electrically driven by rudder trim tab actuators, located in the lower trailing edge of the rudders, controlled either by the autopilot or manually by the pilot/copilot through the RUDDER TRIM switch and the RUDDER TRIM control knob on the pedestal. A rudder trim indicator, placarded RUDDER TRIM-NOSE LEFT-NOSE RIGHT, is installed in the pedestal to indicate the position of the rudder trim tabs.

Power is supplied to the RUDDER TRIM switch, the rudder trim indicator, and the electric trim control box from the RUDDER TRIM A and B circuit breakers located on the LH circuit breaker panel. The electric trim control box monitors the synchronization between the trim actuators. Refer to Chapter 27-30-00 for further information about the electric trim control box. When the RUDDER TRIM switch is in the NORMAL position, power is supplied to the RUDDER TRIM control knob to manually control the rudder trim. When the RUDDER TRIM switch is in the OFF position, a yellow "PITCH TRIM OFF" message is displayed on the Engine Instruments, Crew Alerting System (EICAS) display. If a fault in synchronization is detected, a yellow "PITCH TRIM SYNC" message is displayed on the EICAS display.

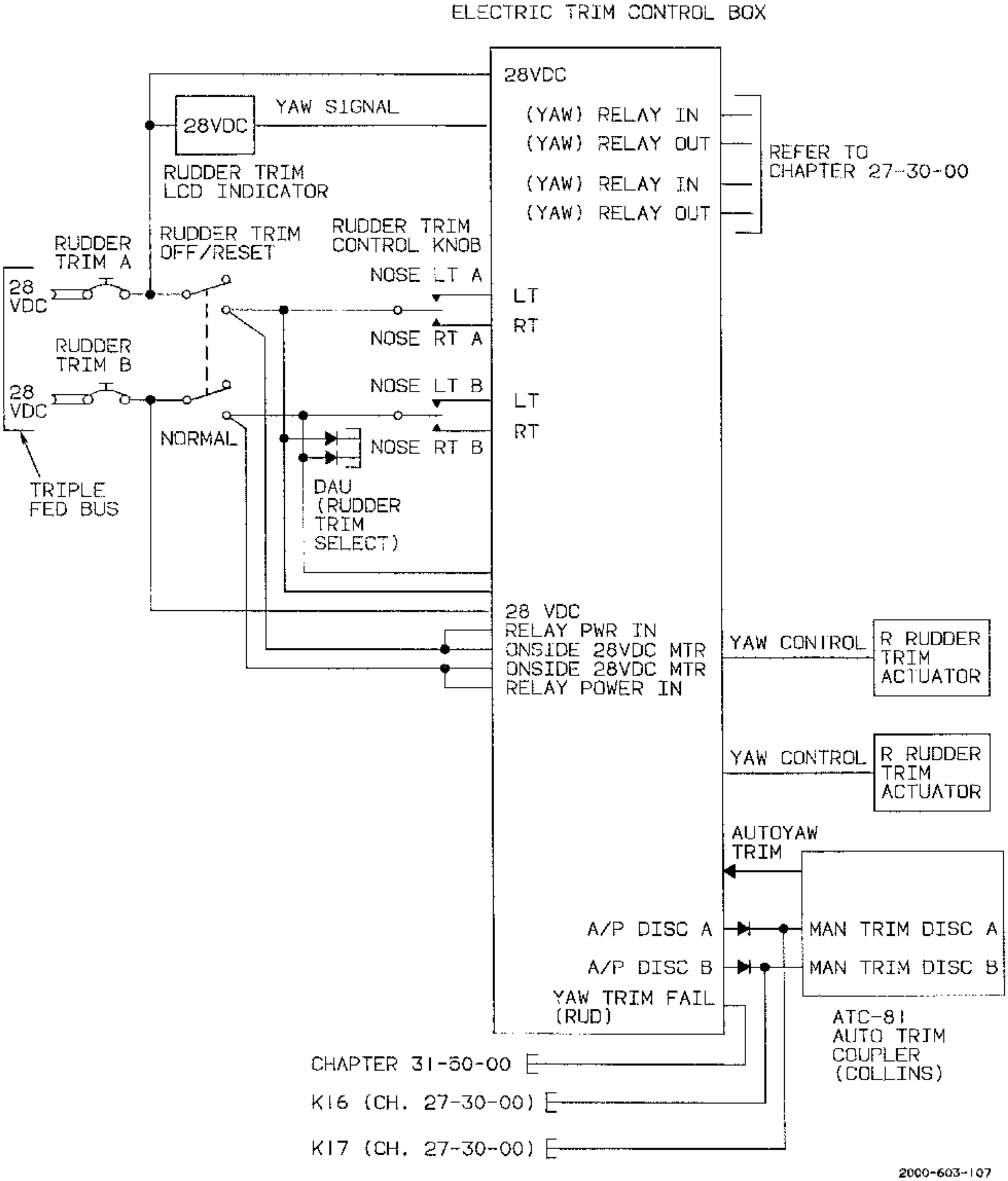
Relays K14 and K15 (refer to Figure 1, Chapter 27-30-00) in the radio junction box provide a means of disconnecting rudder trim power. When the FLAP/TRIM PUSHER INTER- AP/YD DISC button on either control wheel is depressed, rudder trim will be interrupted as long as the button is held.

Rudder (yaw) trim is controlled by the autopilot when the yaw damper is engaged on the autopilot control panel on the pedestal.

Any time a fault is sensed in the rudder trim system, the electric trim control box outputs a signal to the warning annunciator system described in Chapter 31-50-00. A red "RUD TRIM FAIL" message will then be displayed on the warning annunciator panel located in the glareshield.



Rudder System (Effectivity: All)
Figure 1



Rudder Trim System Schematic (Effectivity: All)
Figure 2

RUDDERS AND TABS - MAINTENANCE PRACTICES (Effectivity: All)

RUDDER REMOVAL (Effectivity: All) (Figure 3)

a. Remove electrical power from the airplane and disconnect the battery.

b. Remove the screws (13) securing the covers (12) on the leading edge of the rudder (1) around the three hinge points and over the rudder trim tab actuator.

c. Disconnect the electrical connector from the rudder trim tab actuator.

d. Remove the bolt (8), washer (9), nut (10) and cotter pin (11) securing the rudder push-pull rod (7) to the clevis on the rudder hinge bracket (6).

e. Disconnect the bonding jumper (14) from between the tipsail and the rudder (1) at the center hinge point.

f. Support the rudder (1) and remove the nuts (4), washers (3), bolts (2), and cotter pins (5) securing the rudder (1) to the tipsail at the three hinge points.

RUDDER INSTALLATION (Effectivity: All) (Figure 3)

NOTE

Any repair, modification, painting or replacement of the rudder, the rudder tab or rudder tab actuator requires that the rudder be rebalanced. Refer to Chapter 55-40-00 for the rudder balancing procedure.

a. Guide the rudder into position on the airplane, taking care not to damage the rudder (1) or the rudder trim tab push-pull rod (7).

b. Connect the rubber (1) to the tipsail at the three hinge points with the attaching bolts (2), washers (3), nuts (4), and cotter pins (5). Torque to 57 to 60 inch-pounds.

c. Connect the rudder push-pull rod (7) to the clevis on the inboard edge of the rudder hinge bracket (6).

d. Connect the electrical connector to the rudder trim tab actuator.

e. Connect the bonding jumper (14) between the rudder (1) and the tipsail at the center hinge point. The bonding jumper must meet electrical bonding requirements specified in Chapter 20-00-00.

f. Install the screws (13) securing the covers (12) to the leading edge of the rudder (1) around the three hinge points and around the rudder trim tab actuator.

CAUTION

Do not check tensions or perform roll and rudder system friction checks with rudder/elevon interconnect springs connected.

g. Connect the battery and restore power to the airplane.

h. Rig the rudder system as described in RUDDER CONTROL SYSTEM RIGGING in this chapter.

RUDDER TRIM TAB REMOVAL (Effectivity: All) (Figure 4)

a. Remove the rudder from the airplane as described in RUDDER REMOVAL in this chapter.

b. Remove the bolts (9), washers (11), nuts (12), and cotter pins (13) securing the actuator push-pull rods (10) to the rudder trim tab (1).

c. Remove the screw (3), washer (6), lock washer (7), and nut (8) at the lower edge of the hinge half (2) which secures the hinge pin (4) and the bonding jumper (5).

d. Remove the bonding jumper (5) from between the rudder and the rudder trim tab (1).

e. While supporting the rudder trim tab (1), pull the hinge pin (4) out of the hinge halves.

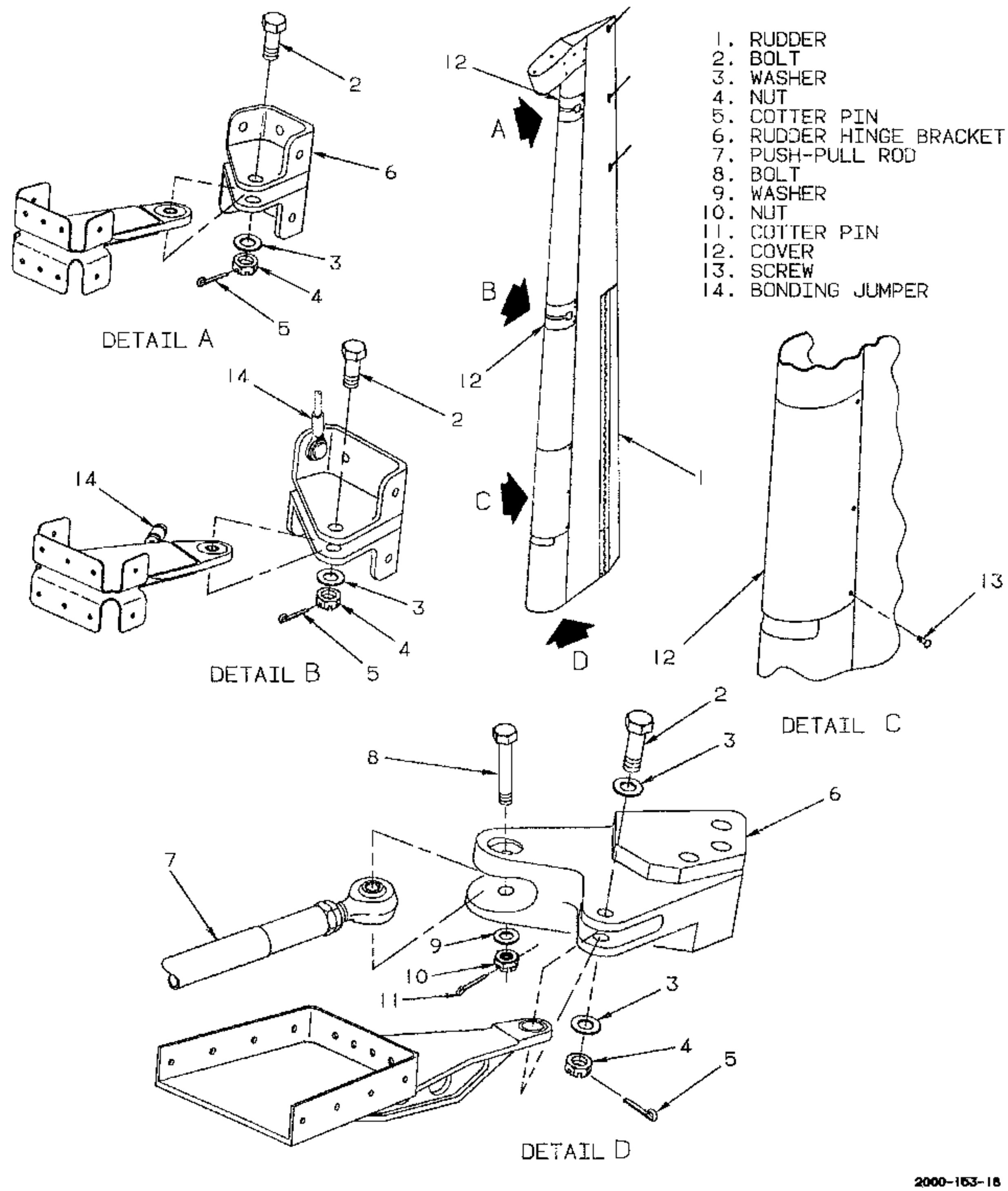
f. Remove the rudder trim tab (1) from the rudder.

RUDDER TRIM TAB INSTALLATION (Effectivity: All) (Figure 4)

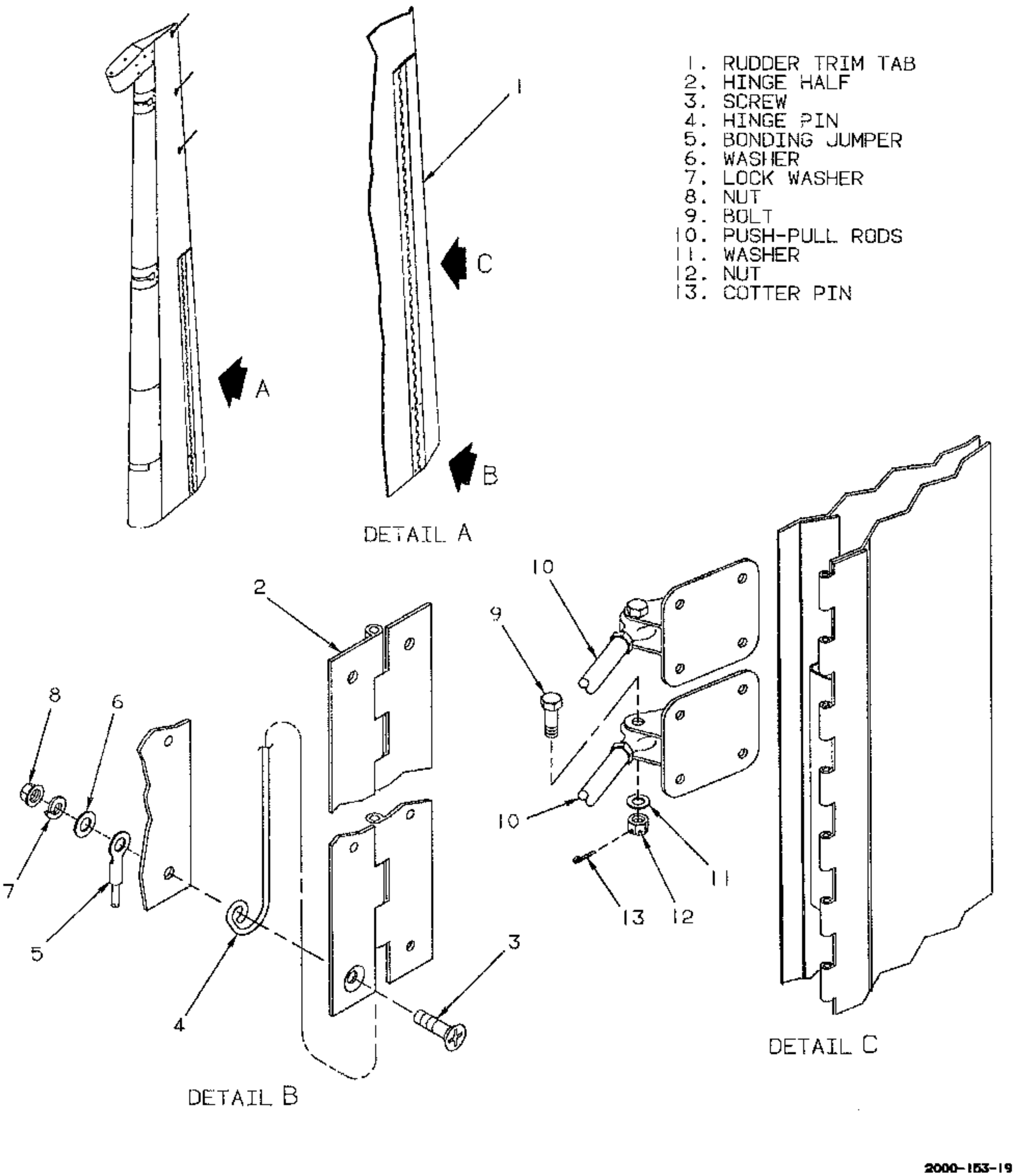
NOTE

Any repair, modification, painting or replacement of the rudder, the rudder tab or rudder tab actuator requires that the rudder be rebalanced. Refer to Chapter 55-40-00 for the rudder balancing procedure.

a. Position the trim tab hinge half to align with the hinge half on the rudder.



Rudder Installation (Effectivity: All)
Figure 3



Rudder Trim Tab Installation (Effectivity: All)
Figure 4

b. Insert the hinge pin (4) to secure the rudder trim tab (1) to the rudder.

c. Secure the hinge pin (4) to the rudder with the attaching screw (3), lock washer (7), washer (6), bonding jumper (5), and nut (8). The bonding jumper must meet electrical bonding requirements specified in Chapter 20-00-00.

d. Secure the actuator push-pull rods (10) to the rudder trim tab (1) with the attaching bolts (9), washers (11), nuts (12), and cotter pins (13).

CAUTION

Do not check cable tensions or perform roll and rudder system friction checks with rudder/elevon interconnect springs connected.

e. Install the rudder on the airplane as described in RUDDER INSTALLATION in this chapter.

f. Rig the trim tab as described in RUDDER TRIM TAB RIGGING in this chapter.

RUDDER TRIM TAB ACTUATOR REMOVAL (Effectivity: All) (Figure 5)

a. Remove the rudder from the airplane as described in RUDDER REMOVAL in this chapter.

b. Cut safety wire and remove the bolts (1) and washers (2) securing the actuator push-pull rods (6) to the actuator (5).

c. Remove the four screws (4) and washers (3) securing the actuator (5) to the rudder.

d. Remove the actuator (5) from the rudder.

RUDDER TRIM TAB ACTUATOR INSTALLATION (Effectivity: All) (Figure 5)

CAUTION

Do not intermix rudder trim tab actuators from different vendors. Always replace actuators removed with actuators having the same part number. All rudder trim tab actuators and elevon trim tab actuators installed in the airplane must have the same part numbers.

NOTE

Any repair, modification, painting or replacement of the rudder, the rudder tab or rudder tab actuator requires that the rudder be rebalanced. Refer to Chapter 55-40-00 for the rudder balancing procedure.

a. Position the actuator (5) in the rudder.

b. Install the four screws (4) and washers (3) securing the actuator (5) to the rudder.

c. Install the bolts (1) and washers (2) securing the actuator push-pull rods (6) to the actuator (5) and safety wire.

CAUTION

Do not check cable tensions or perform roll and rudder system friction checks with rudder/elevon interconnect springs connected.

d. Install the rudder on the airplane as described in RUDDER INSTALLATION in this chapter.

e. Rig the trim tab as described in RUDDER TRIM TAB RIGGING in this chapter.

RUDDER/ELEVON INTERCONNECT REMOVAL (Effectivity: All) (Figure 6)

CAUTION

Do not check cable tensions or perform roll and rudder system friction checks with rudder/elevon interconnect springs connected.

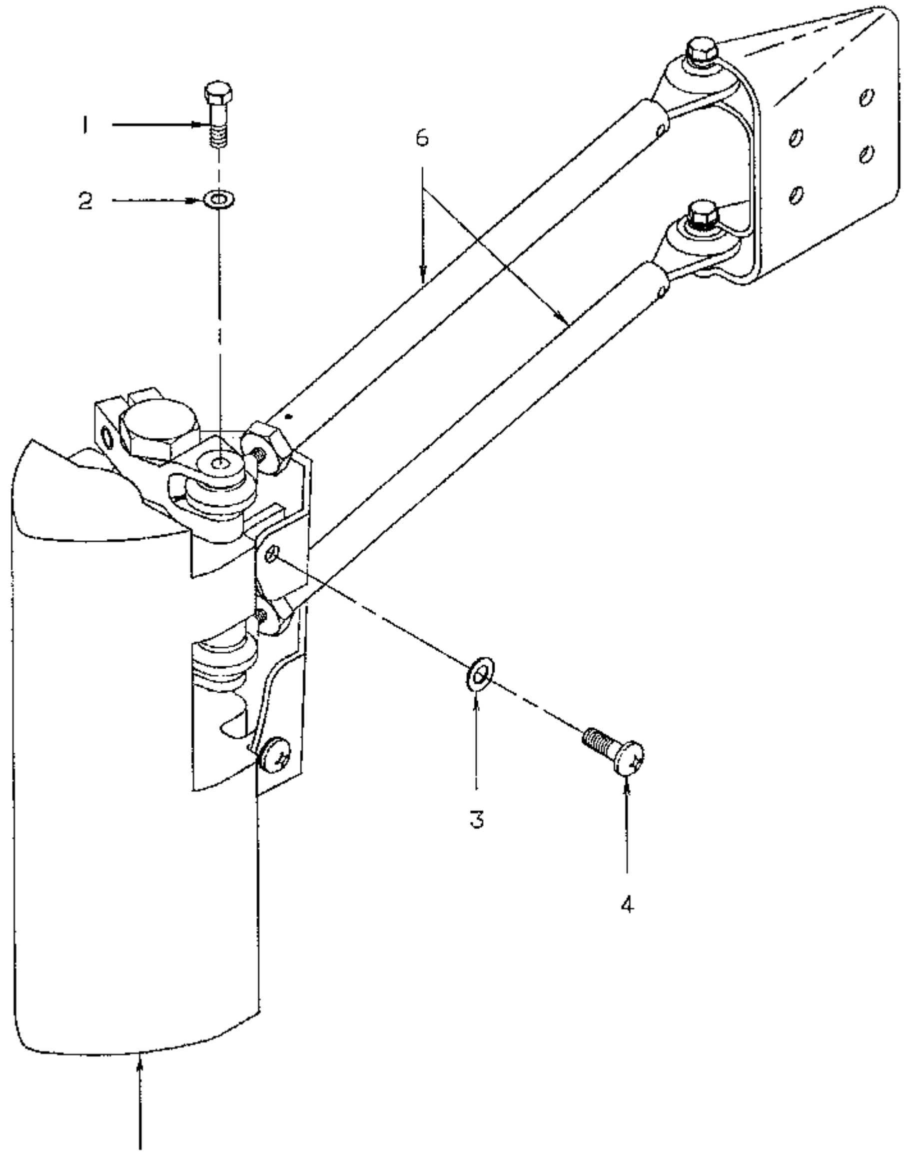
a. Install rig pins in the forward rudder sector and in the roll sector on the control column.

b. Remove LH cabin seats and the floorboard panels below them between F.S. 258 and approximately F.S. 320 as described in Chapter 25-20-00.

c. Remove the screws and washers securing the cover (1) to the tray installation.

d. Loosen nuts (5) securing interconnect installation on the rudder right and roll right cables to relieve the spring tension.

e. Remove springs (3) from interconnect installation.



1. BOLT
2. WASHER
3. WASHER
4. SCREW
5. ACTUATOR
6. PUSH-PULL RODS

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Rudder Trim Tab Actuator Installation (Effectivity: All)
Figure 5

f. Remove the nuts (5), screws (8), and washers (7) securing the blocks (4) and plates (6) on the rudder and roll cables and remove the blocks (4) and plates (6) from the airplane.

RUDDER/ELEVON INTERCONNECT INSTALLATION (Effectivity: All) (Figure 6)

a. Install rig pins in the forward rudder sector and in the roll sector on the control column.

b. Clamp the center block and plate on the rudder right cable per the dimensions shown in Figure 6 and secure with attaching screws (8), washers (7), and nuts (5).

c. Clamp the other two blocks and plates to the roll right cable per the dimensions shown in Figure 6 and secure with attaching screws (8), washers (7), and nuts (5).

d. Install the springs (3) between the clamps and recheck the dimensions shown in Figure 6.

e. Remove all rig pins.

NOTE

If the conditions listed in the following steps f through k are not met, perform RUDDER CONTROL SYSTEM RIGGING as specified in this chapter.

f. Rotate the control wheel for roll left and verify that the rudder trailing edge moves left.

g. Apply right rudder and verify that the control wheel rotates for right roll.

h. Apply full left rudder and simultaneously apply full right with the control wheel. Verify that the stop bolt on the wing outboard rudder sector contacts the stop when the rudder reaches maximum full left travel. Also verify that the stop bolt on the elevon mixer roll input sector at the elevon control mixer contacts the stops as described in ELEVON (ROLL) RIGGING in Chapter 27-30-00 when the elevons reach maximum roll travel.

i. Rotate the control wheel for roll right and verify that the rudder trailing edge moves right.

j. Apply left rudder and verify that the control wheel rotates for left roll.

k. Apply full right rudder and simultaneously apply full left roll with the control wheel. Verify that the stop bolt on the wing outboard rudder sector contracts the stop when the rudder reaches maximum full right travel. Also verify that the stop bolt on the elevon mixer roll input sector at the elevon control mixer contacts the stops as described in ELEVON (ROLL) RIGGING in Chapter 27-30-00 when the elevons reach maximum roll travel.

l. Install the screws and washers securing the cover (1) to the tray installation.

m. Install LH cabin seats and the floorboard panels below them between F.S. 258 and approximately F.S. 320 as described in Chapter 25-20-00.

RUDDER CABLE REMOVAL (Effectivity: All) (Figure 1)

a. Remove the pilot's seat as described in Chapter 25-10-00.

b. Remove the couch and LH cabin seats as described in Chapter 25-20-00.

c. Remove the floorboard panels on the LH side of the cockpit and the cabin.

d. Refer to Chapter 53-50-00 and remove the aft wing box shear panel (528AB).

e. Remove aft row of access doors on the lower surface of the aft wing (remove doors 551AB, 551BB, 552AB, 552BB, 553AB, 553BB, 554AB, 554BB, 555AB and 555BB from the left wing or doors 651AB, 651BB, 652AB, 652BB, 653AB, 653BB, 654AB, 654BB, 655AB and 655BB from the left wing).

f. Remove the screws attaching the tipsail fairing to the tipsail, then lower the tipsail fairing and disconnect the electrical connector at the tipsail fairing wire harness break.

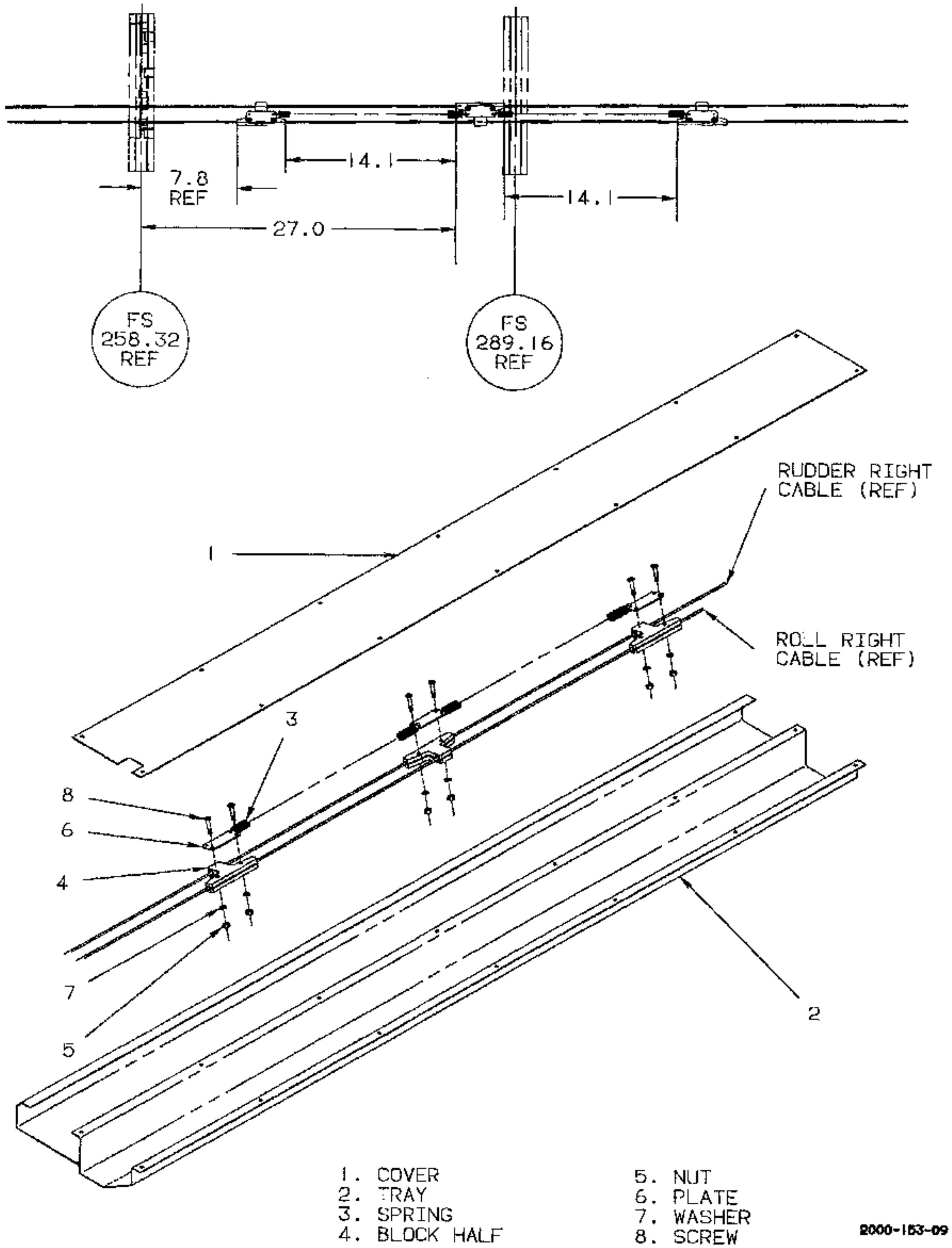
g. Remove the rudder/elevon interconnect as described in RUDDER/ELVEON INTERCONNECT REMOVAL in this chapter.

h. Remove the rudder servo cables from the aft rudder quadrant. Refer to RUDDER (YAW) SERVO CABLE REMOVAL in Chapter 22-10-00 for the proper procedures.

i. Cut the safety wire and remove the fuselage rudder cables from the aft rudder quadrant.

NOTE

The lead lines used in this procedure can be made locally from stout cord. They are used to facilitate installation of the cables.



Rudder/Elevon Interconnect Installation (Effectivity: All)
Figure 6

j. Disconnect the fuselage rudder cables at the turnbuckles just aft of the forward rudder sector. For ease of installation, connect lead lines to the forward ends of the fuselage rudder cables. Tag and identify the lead lines.

k. Remove the rudder cable pressure seals from the aft pressure bulkhead and remove the cable retaining pins from the rudder pulley brackets.

NOTE

It may be necessary to remove the rudder pulleys if cable passage is restricted.

l. Pull the fuselage rudder cables out of the fuselage through the aft wing.

m. Disconnect the lead lines from the fuselage rudder cables, leaving the lead lines in the fuselage.

n. Lubricate the fuselage rudder cables with corrosion preventive compound (3, Chart 2, 27-00-00) and store them in a plastic bag.

o. Disconnect the aft wing rudder cables from the turnbuckles in the wing. Connect lead lines to the inboard end of the wing rudder cables.

p. Remove the cable retaining pins from the pulley brackets.

NOTE

It may be necessary to remove the pulleys if cable passage is restricted.

q. Disconnect the wing rudder cables at the outboard wing rudder sector.

r. Pull the wing rudder cables out of the wing from the wing outboard rudder sectors.

s. Disconnect the lead lines from the wing rudder cables, leaving the lead lines in the wing.

t. Lubricate the wing rudder cables with corrosion preventive compound (3, Chart 2, 27-00-00) and store them in a plastic bag.

RUDDER CABLE INSTALLATION (Effectivity: All) (Figure 1)

a. Identify the fuselage rudder cables, attach them to the lead lines at the aft rudder quadrant, and pull them into position from the cockpit.

b. Disconnect the lead lines from the fuselage rudder cables.

c. Attach the fuselage rudder cables to the forward rudder sector at the turnbuckles.

d. Attach the wing lead lines to the wing rudder cables at the outboard wing sectors and pull the cables into the wing using the lead lines.

e. Disconnect the lead lines from the wing rudder cables.

f. Attach the wing rudder cables to the aft rudder quadrant at the turnbuckles.

g. Install the wing rudder cables on the wing outboard rudder sector and safety wire.

h. Install the cable retaining pins in the pulley brackets. Reinstall any pulleys that had been taken out to facilitate removal of the cables.

i. The interior of all turnbuckles should be coated or filled with grease (5, Chart 2, 27-00-00) for corrosion protection.

j. Using solvent (2, Chart 2, 27-00-00), clean the fuselage rudder cables for the length of travel through the pressure seals. Lubricate to one inch beyond the cleaned area with grease (5, Chart 2, 27-00-00).

k. Fill the pressure seals with grease (5, Chart 2, 27-00-00), and install.

CAUTION

Do not check cable tensions or perform roll and rudder system friction checks with rudder/elevon interconnect springs connected.

l. Rig the rudder control system as outlined in the RUDDER CONTROL SYSTEM RIGGING procedures in this chapter, then secure the turnbuckles with safety clips.

m. Connect the rudder servo cable to the aft rudder quadrant in accordance with the procedures for RUDDER (YAW) SERVO CABLE INSTALLATION in Chapter 22-10-00.

n. Install the rudder/elevon interconnect as described in RUDDER/ELEVON INTERCONNECT INSTALLATION in this chapter.

o. Install the floorboard panels on the LH side of the cockpit and cabin.

p. Install the pilot's seat as described in Chapter 25-10-00.

q. Install the couch and the LH seats as described in Chapter 25-20-00.

r. Install the aft wing box shear panel and the aft access panels on the bottom of the aft wing.

s. Reconnect the tipsail fairing wire harness break electrical connector, align the tipsail fairing mounting holes with the tipsail nutplates, and install the tipsail fairing mounting screws.

RUDDER PEDAL AND BELL CRANK REMOVAL (Effectivity: All) (Figure 7)

a. Remove the pilot's and copilot's seats as described in Chapter 25-10-00.

b. Remove the floorboards forward of the pilot's and copilot's seats.

c. Release tension on the rudder cables and disconnect the rudder cables at the turnbuckles (3) aft of the forward rudder sector (42).

d. Remove the nonadjustable push-pull rods (1) connecting the brake torque tube (4) to the bell cranks (41 and 44) by removing the bolts (11), washers (12), nuts (13), and cotter pins (14).

e. Disconnect the nose steering push-pull rod (2) from the nose steering crank (15).

f. Disconnect the brake master cylinders (16) from the brake idler arms (43) and the inboard arms on the brake torque tube (4) by removing the bolts (17), washers (18), nuts (19), and cotter pins (20). Retain the bushings (21) as the master cylinders are removed.

g. Remove the bolts (22), washers (23), nuts (24), and cotter pins (25) securing the brake torque tube (4) to the rudder pedal support tube (5).

h. Lift the rudder pedals up and out of the airplane.

NOTE

> Note the proper position of the brake idler arms, pedals and brake torque tube before removing the rudder pedals. These positions must be maintained to assure proper operation when the pedals are installed.

i. Disconnect the adjustable push-pull rod (6) connecting the two bell cranks (41 and 44) by removing the bolts (26), washers (27), nuts (28), and cotter pins (29).

j. Remove the bolts (7), washers (8), nuts (9), and cotter pins (10) attaching the bell cranks (41 and 44) to the brackets and remove the bell crank assemblies from the airplane.

k. On the LH bell crank (41), disconnect the nose gear actuator (30) from the bell crank assembly by removing the bolts (31), washers (32), nuts (33), and cotter pins (34).

l. On the LH bell crank (41), disconnect the nose steering crank (15) from the bell crank assembly by removing the bolt (37), washer (38), nut (39), cotter pin (40), spacer (35), and bearing (36).

RUDDER PEDAL AND BELL CRANK INSTALLATION (Effectivity: All) (Figure 7)

a. On the LH bell crank (41), connect the nose gear actuator (30) to the bell crank assembly by attaching with the bolts (31), washers (32), nuts (33), and cotter pins (34).

b. On the LH bell crank (41), connect the nose steering crank (15) to the bell crank assembly by attaching with the bolt (37), washer (38), nut (39), cotter pin (40), spacer (35), and bearing (36).

c. Place the bell cranks (41 and 44) in their respective positions and secure to the brackets with the attaching bolts (7), washers (8), nuts (9), and cotter pins (10).

d. Connect the adjustable push-pull rod (6) connecting the two bell cranks and secure with the attaching bolts (26), washers (27), nuts (28), and cotter pins (29).

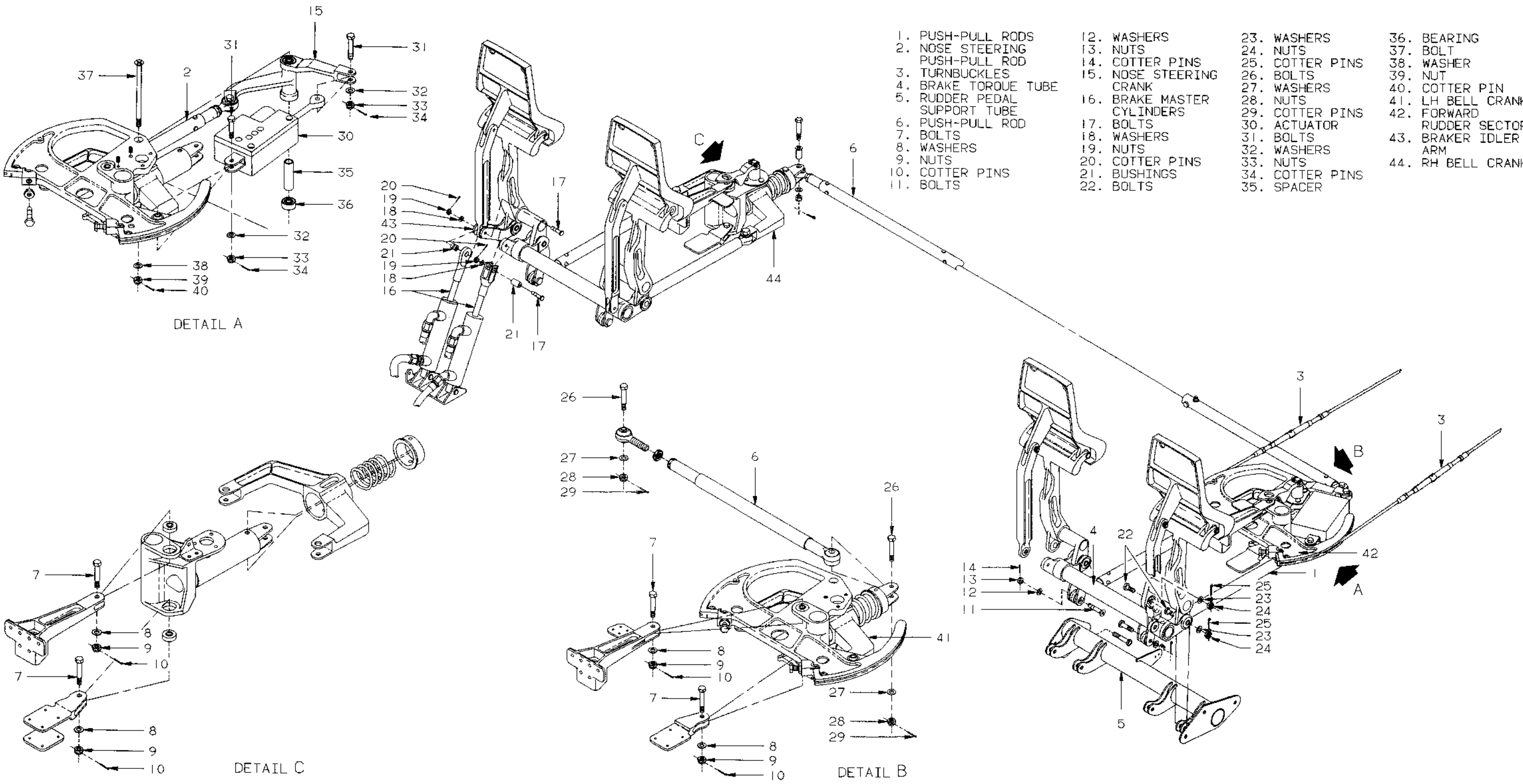
e. Place the pilot's and copilot's rudder pedals in position on the rudder pedal support tube (5) and secure with attaching bolts (22), washers (23), nuts (24), and cotter pins (25).

f. Connect the brake master cylinders (16) to the brake idler arms (43) and the inboard arms on the brake torque tube (4) with the attaching bolts (17), washers (18), nuts (19), cotter pins (20), and bushings (21).

g. Install the non-adjustable push-pull rods (1) between the brake torque tube (4) and the bell cranks and secure with the attaching bolts (11), washers (12), nuts (13), and cotter pins (14).

h. Connect the nose steering push-pull rod (2) to the nose steering crank (15).

1. PUSH-PULL RODS
2. NOSE STEERING PUSH-PULL ROD
3. TURNBUCKLES
4. BRAKE TORQUE TUBE
5. RUDDER PEDAL SUPPORT TUBE
6. PUSH-PULL ROD
7. BOLTS
8. WASHERS
9. NUTS
10. COTTER PINS
11. BOLTS
12. WASHERS
13. NUTS
14. COTTER PINS
15. NOSE STEERING CRANK
16. BRAKE MASTER CYLINDERS
17. BOLTS
18. WASHERS
19. NUTS
20. COTTER PINS
21. BUSHINGS
22. BOLTS
23. WASHERS
24. NUTS
25. COTTER PINS
26. BOLTS
27. WASHERS
28. NUTS
29. COTTER PINS
30. ACTUATOR
31. BOLTS
32. WASHERS
33. NUTS
34. COTTER PINS
35. SPACER
36. BEARING
37. BOLT
38. WASHER
39. NUT
40. COTTER PIN
41. LH BELL CRANK
42. FORWARD RUDDER SECTOR
43. BRAKER IDLER ARM
44. RH BELL CRANK



Rudder Pedals and Bell Cranks Installation
(Effectivity: All)
Figure 7

i. Connect the rudder cables to the LH bell crank (41) and secure the rudder cables at the turnbuckles (3).

CAUTION

Do not check cable tensions or perform roll and rudder system friction checks with rudder/elevon interconnect springs connected.

j. Rig the rudder control system as indicated in the RUDDER CONTROL SYSTEM RIGGING procedures in this chapter.

k. Depress the adjustment lever on each bell crank (41 and 44) and push or pull the pedals to the desired position. There are three possible positions.

l. Release the pedal and adjustment lever, then check that the spherical end of the adjustment pin enters the index hole in the bell crank.

m. Install the floorboards forward of the pilot's and copilot's seats.

n. Install the pilot's and copilot's seats as described in Chapter 25-10-00.

RUDDER CONTROL SYSTEM RIGGING (Effectivity: All) (Figures 1, 8, 9 and 10)

CAUTION

Do not check cable tensions or perform roll and rudder system friction checks with rudder/elevon interconnect springs connected. Refer to RUDDER/ELEVON INTERCONNECT REMOVAL in this chapter.

Rig the rudder control system as follows:

a. With rudder push-pull rod disconnected and hinge bolts properly torqued, check that rudders move freely through left and right range without binding.

b. Remove two screws securing fairings to tipsails as shown in Figure 8. Attach rudder travel boards (1 and 2, Chart 1, 27-00-00).

c. Install rig pin (refer to Figure 10) at wing outboard rudder sector. Set rudder to neutral position of 9 ± 1/2°, reading from rudder travel board.

d. Remove rig pin from wing outboard rudder sector. Set stop bolts in wing outboard rudder sector for 34 + 0°, -1° reading from travel board in both directions of rudder travel.

e. Set forward rudder sector stop bolts for .75 inch clearance from bracket in Figure 1, Detail B when stop bolts at wing outboard rudder sector are at full stop and full right stop.

f. Install the rig pin in the forward rudder sector. Adjust the interconnect push-pull rod to align copilot pedals with the pilot pedals. Remove the rig pin from the forward rudder sector.

g. Install the rig pin in the aft rudder quadrant. Rig wing rudder cables to 90 ± 8 pounds tensiometer reading at 59°F (refer to Figure 9). Rig fuselage rudder cables to 50 ± 5 pounds at 59°F (refer to Figure 9). Remove the rig pin from the aft rudder quadrant.

h. Place the airplane on jacks as outlined in Chapter 7-10-00.

i. To reach full left and full right rudder deflection, a maximum of 7 pounds pedal force (rudder system friction) is allowed. Rudder pedal force must be measured at pedal pivot in rudder pedal arm (8.0 inch radius arm). Rudder pedal force must increase and decrease steadily with rudder deflection. The force versus rudder deflection curve, if plotted, should be a smooth curve with no sudden changes in force.

j. Remove the airplane from the jacks.

k. Repeat step g, except reduce wing rudder cables rig load to 40 ± 5 pounds at 59° F (refer to Figure 9).

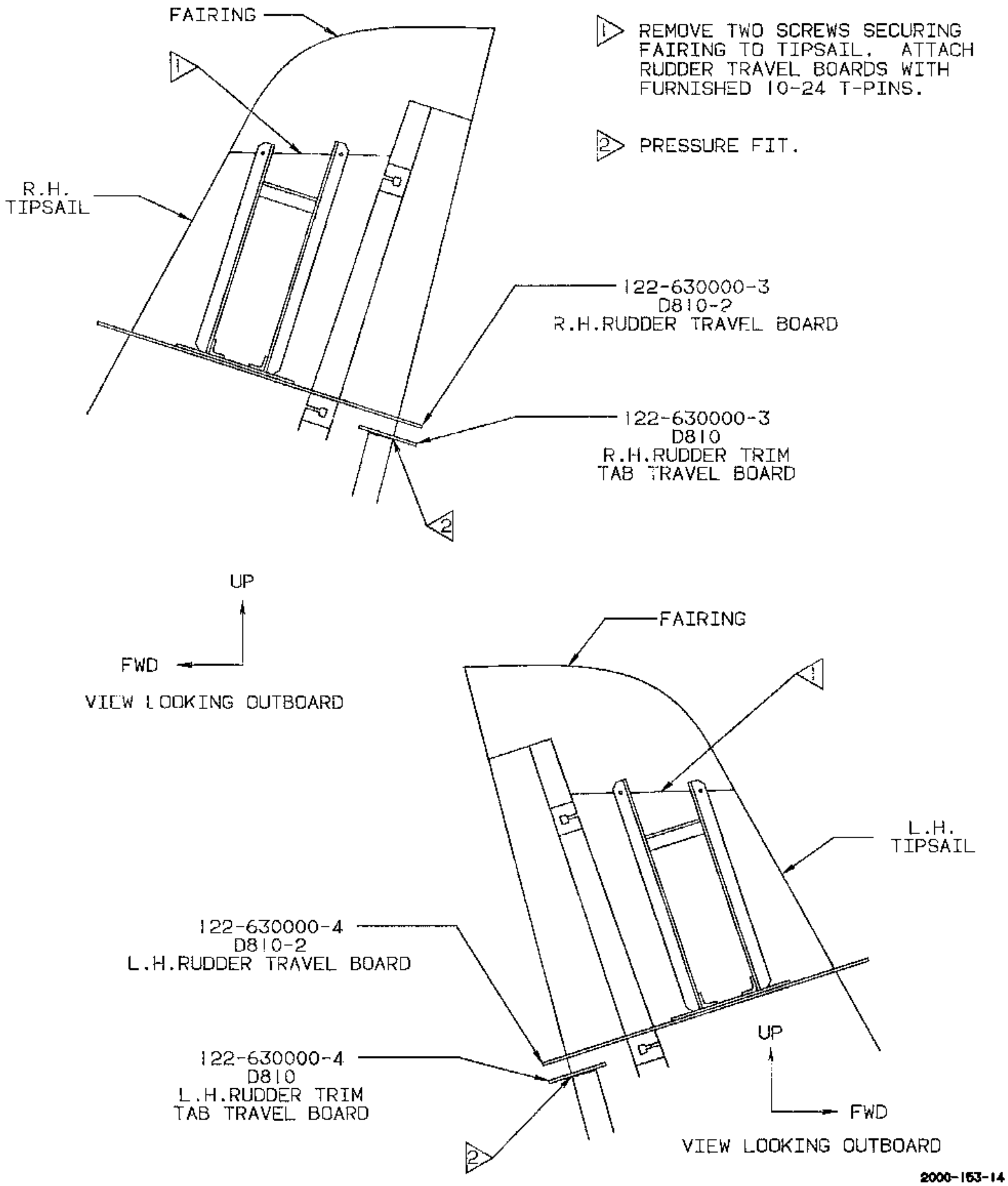
l. Remove rudder travel boards from the tipsails. Install the screws securing fairings to tipsails.

m. Install rudder/elevon interconnect as described in RUDDER/ELEVON INTERCONNECT in this chapter.

RUDDER TRIM TAB RIGGING (Effectivity: All) (Figure 8)

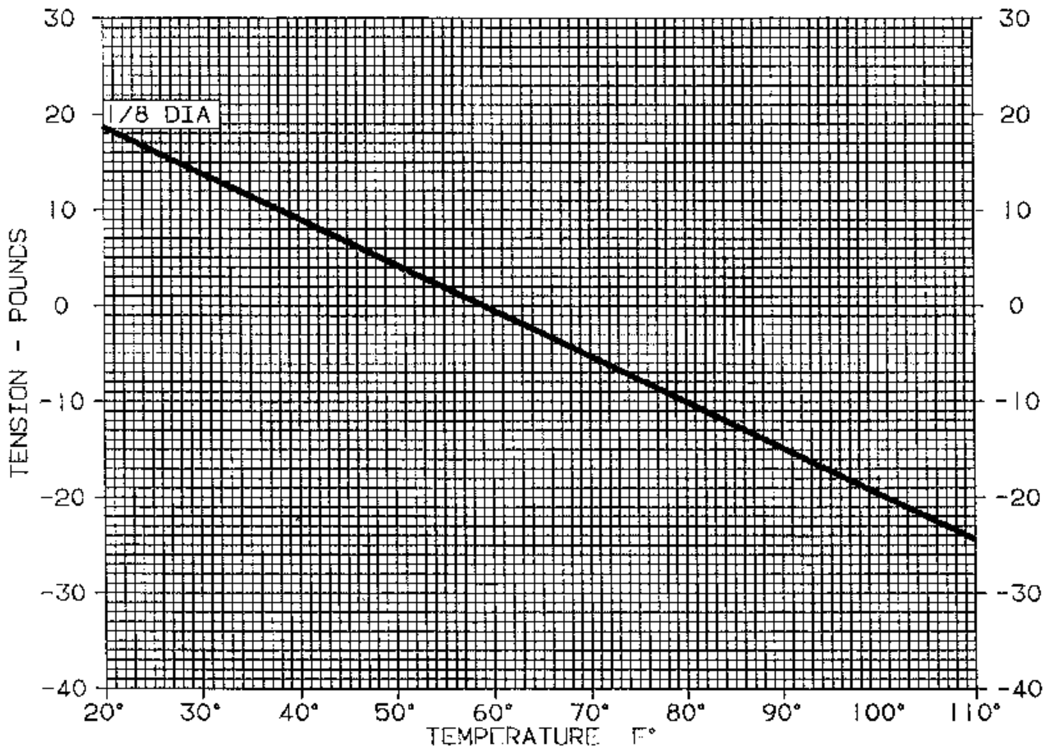
a. Position rudder trim tab travel board (3 and 4, Chart 2, 27-00-00) just above the top of the rudder trim tab as shown in Figure 8. The rudder trim tab travel board is supported in place by friction fit.

b. Operate rudder trim tab actuator to full airplane nose left position. Adjust rudder trim tab push-pull rod to provide 18 ± 1/2° trailing edge right, reading from



Rudder Travel Boards (Effectivity: All)
Figure 8

EXAMPLE:
TO RIG 1/8 DIA. CABLE TO
50±5 LBS AT 59°F
AT TEMPERATURE 80°F
1/8 DIA. CABLE TENSION SHOULD BE:
(50-10)±5 LBS
WHERE -10 LBS IS FROM CHART



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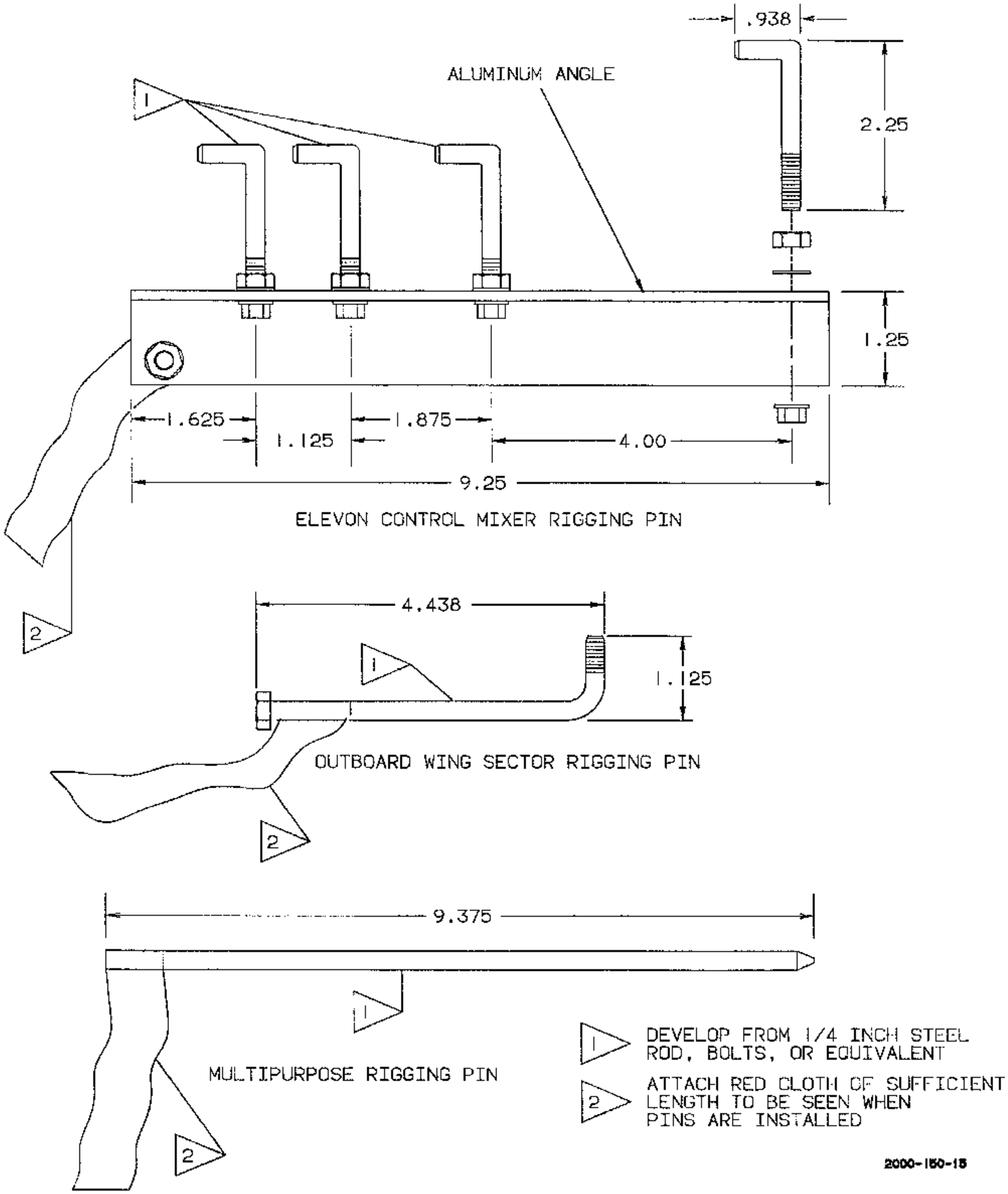
Cable Tension Graph (Effectivity: All)
Figure 9



Flight Control System Rig Pins (Effectivity: All)
Figure 10

travel board. Operate rudder trim tab actuator to full airplane nose right position. Rudder trim tab should be 18 ± 1° trailing edge left, reading from travel board.

c. Operate rudder trim tab actuator to position rudder trim tab to neutral position of 0° ± 1/2°, reading from travel board. Verify that rudder trim indicator on pedestal agrees.

d. The left and right rudder trim tabs shall agree within 1/2° at neutral, and 1° at all other positions.

e. Inspect rudder trim tab for free play of each surface as specified in RUDDER TRIM TAB FREE PLAY CHECK in this chapter.

f. Remove rudder trim tab travel board from airplane.

RUDDER TRIM TAB FREE PLAY CHECK (Effectivity: All) (Figures 4 and 11)

a. Visually inspect the rudder tab for any damage, for security of hinge attach point and for tightness of the actuating system. Inconsistencies should be remedied prior to checking the free play of the tab.

b. A check fixture (P/N 45-135030-9/810) (5, Chart 1, 27-00-00) or the equivalent as shown in Figure 11, a dial indicator, and a push-pull scale for applying accurate loading to the tabs are required for making the inspection for free play of the tabs.

c. Install rig pins to prevent movement of the rudders. Set the rudder trim tabs in the neutral position.

d. Disconnect one rudder trim tab actuator push-pull rod (refer to Figure 4) from the rudder trim tab being checked.

e. Affix the dial indicator check fixture so that the dial indicator point is 2 inches aft of the rudder trim tab hinge line and on the outboard side of the rudder trim tab.

f. Apply a small piece of masking tape (for paint protection) 2 inches aft of the rudder trim tab hinge line and along the centerline of the rudder trim tab actuator. This will be the point of pressure by the push-pull scale against the rudder trim tab.

g. Apply another piece of masking tape in the corresponding position on the inboard edge of the rudder trim tab for the same purpose.

h. Zero the dial indicator at no load initially. Do no reset during the checking procedure.

i. With the push-pull scale at the point of masking tape, apply a full 10-pound outward load. Record the dial reading as "A".

j. Release half the load until a 5-pound outward load is obtained. Record the dial reading as "B".

k. Apply a full 10-pound inward load at the masking tape on the inboard surface. Record the dial reading as "C".

l. Release half the load until a 5-pound inward load is obtained. Record the dial reading as "D".

m. Enter the recorded values on a copy of Chart 2 and proceed as follows:

1. Multiply "B" by 2 and record as "2B".
2. Subtract "A" from "2B" and record as "X".
3. Multiply "D" by 2 and record as "2D".
4. Subtract "C" from "2D" and record as "Y".

NOTE

The results of "X" and "Y" can be negative numbers.

5. Add "X" and "Y" and record as "E".

n. If deflection of the rudder trim tab is within the allowable limits, the tab and its linkage are in good condition.

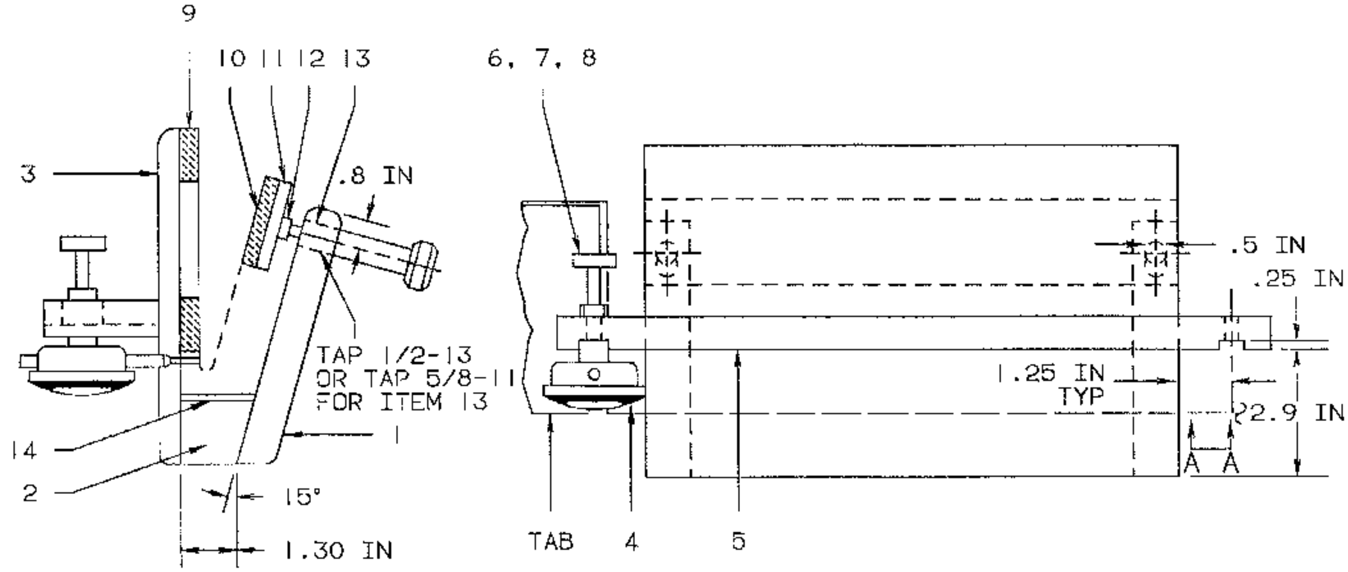
o. If the free play is excessive, disconnect the rudder trim tab actuator rod and visually inspect the bolts and bushing for indications of excessive wear. Replace excessively worn parts.

p. Disconnect the first push-pull rod on which free play has just been checked. Connect the second push-pull rod on the same rudder trim tab and repeat the procedure.

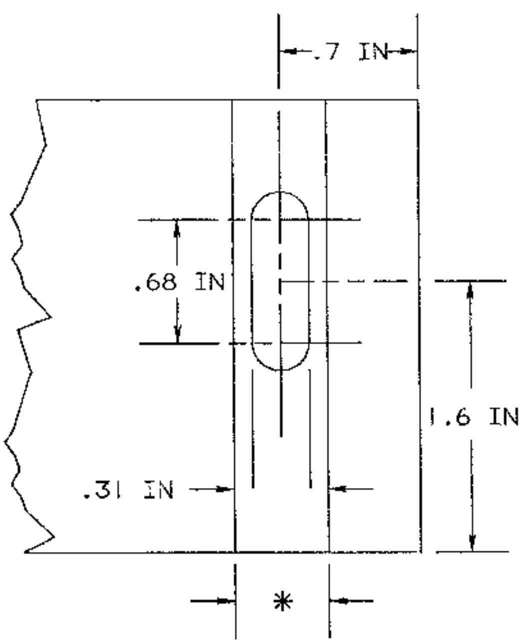
q. Connect the first push-pull rod to the rudder trim tab.

r. With both push-pull rods connected repeat steps g through o.

s. Remove the check fixture and the masking tape from the airplane.



P/N 45-135030-9/810		
ITEM	QUAN	DESCRIPTION
1	2	3/4 X 1 X 6 ALUM. OR EQV.
2	2	1 X 1 3/8 X 1 3/4 ALUM. OR EQV.
3	1	1/2 X 7 1/2 X 10 ALUM. OR EQV.
4	1	C81Q INDICATOR**
5	1	3/4 X 2 1/2 X 14 ALUM OR EQV.
6	1	1/4 DIA. X 2 CRES. STL.
7	1	1/4 DIA. X 1 CRES. STL.
8	1	1/4-28 NUT
9	1	3/8 X 5 X 10 RUBBER
10	1	3/8 X 2 X 10 RUBBER
11	1	1/4 X 2 X 10 RUBBER
12	2	1/2 - 13 X 3 VLIER TORQ. SCRW.
13	2	KN813 KEENSERT
14	2	1/8 X 1 3/4 RUBBER
**P/N OF FEDERAL PROD. CORP., PROV. R.I.		



SECTION A A

*THIS GROOVE TO BE A SNUG FIT TO THE SCREW BRACKET ON THE DIAL INDICATOR.

2000-153-15

Trim Tab Free-Play Measurement Tool (Effectivity: All)
Figure 11

CHART 1
RUDDER TRIM TAB FREE PLAY LIMITS
(Effectivity: All)

5-Pound Reading	10-Pound Reading	
B ________		
2B ________	-A ________	=X ________
D ________		
2D ________	-C ________	=Y ________

CHART 1
RUDDER TRIM TAB FREE PLAY LIMITS
(Effectivity: All) *(Continued)*

5-Pound Reading	10-Pound Reading	
X ________	+Y ________	=E ________

(E = .04 inch maximum, single pushrod connected)

(E = .03 inch maximum, both pushrods connected)

ELEVATORS, ELEVONS AND TABS - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

The airplane is equipped with nose mounted forward wings that incorporate an elevator on the trailing edge. Each elevator incorporates an elevator trim tab driven by an electrical actuator.

The aft wing incorporates an elevon on each outboard trailing edge. Each of the elevons incorporates an elevon trim tab driven by an electrical actuator.

The forward wing elevators and the aft wing elevons are operated by conventional dual control wheels interconnected by a T-bar. The elevators in the forward wing are connected to the T-bar by push-pull rod linkage. The elevons on the aft wing are connected to the control wheels by a cable bell crank system.

Pitch control is provided by the simultaneous operation of the elevators and the elevons. Roll control is provided by differential movement of the elevons. An elevon control mixer in the aft wing mixes the pitch and roll inputs to the elevons.

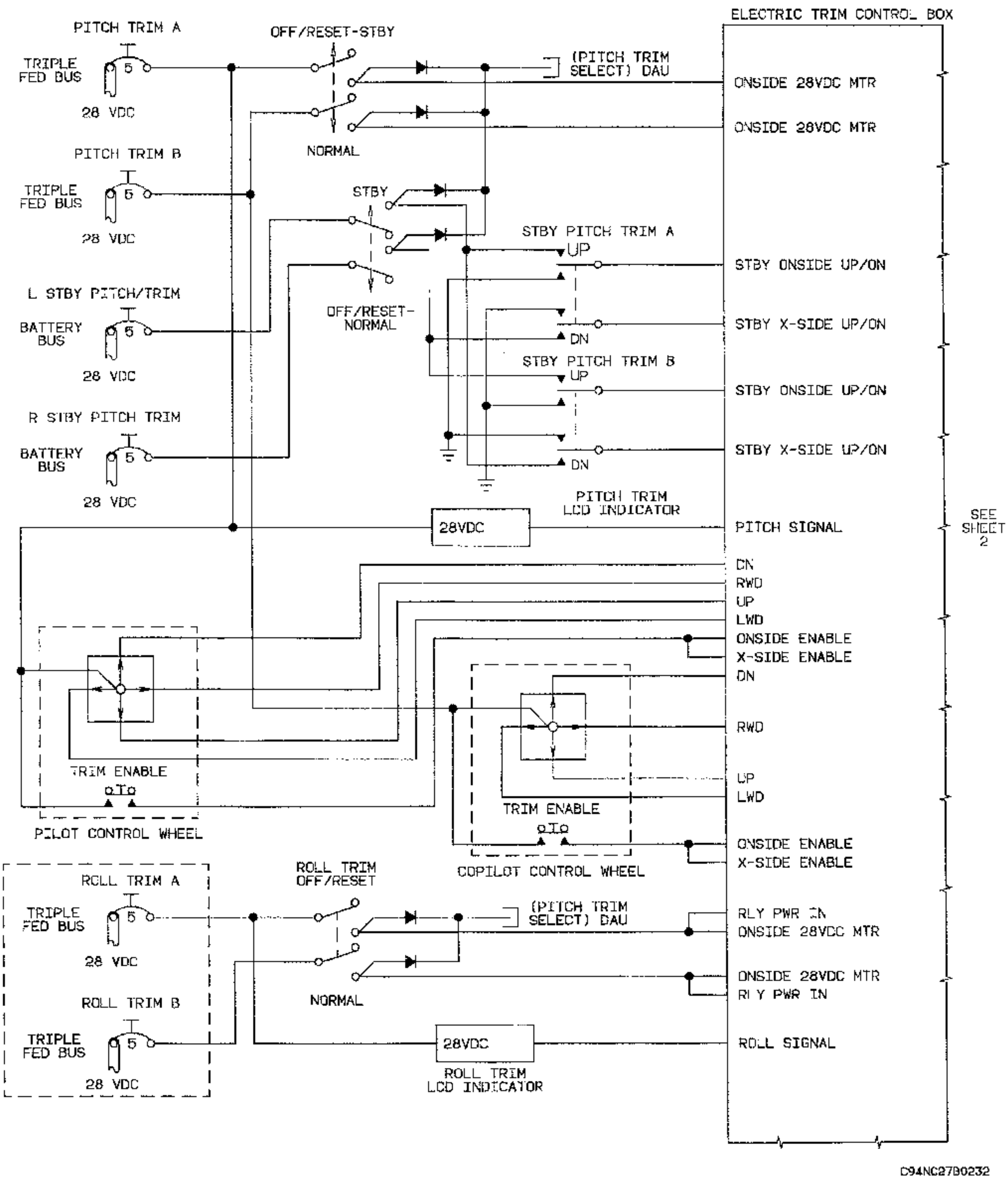
The pitch/roll trim switch, placarded NOSE DOWN-NOSE UP-LWD-RWD, located on the outboard horn of each control wheel is the normal manual elevator (pitch) trim tab and elevon (pitch and roll) trim tab control. The pitch/roll trim switch is powered from the triple-fed bus. The pitch trim NORM-OFF/RESET-STBY switch on the pedestal, when set to the NORM position, provides power to the electric trim control box. The pitch trim NORM-OFF/RESET-STBY switch, when set to the STBY position, provides battery bus power for standby manual pitch trim by operation of the two adjacent STBY NOSE DN-STBY NOSE UP switches and also provides battery bus power to the electric trim control box. Pitch trim speed is inversely proportional to airspeed in the normal mode and one speed in the standby mode. If manual pitch or roll trim is used, the autopilot, if engaged, will be disengaged.

Pitch and roll trim are controlled by the autopilot when the autopilot is engaged. The trim is monitored before and after autopilot engagement. Failure of the trim system prior to engagement prevents autopilot engagement. Failure of the trim system after engagement prevents automatic trim, but does not disengage the autopilot. Autopilot pitch trim is controlled through the Collins Integrated Avionics Processor System (IAPS). Autopilot roll trim is controlled through the Collins ATC-81 Auto Trim Computer Box. Refer to Chapter 22-10-00 for more information on the autopilot system.

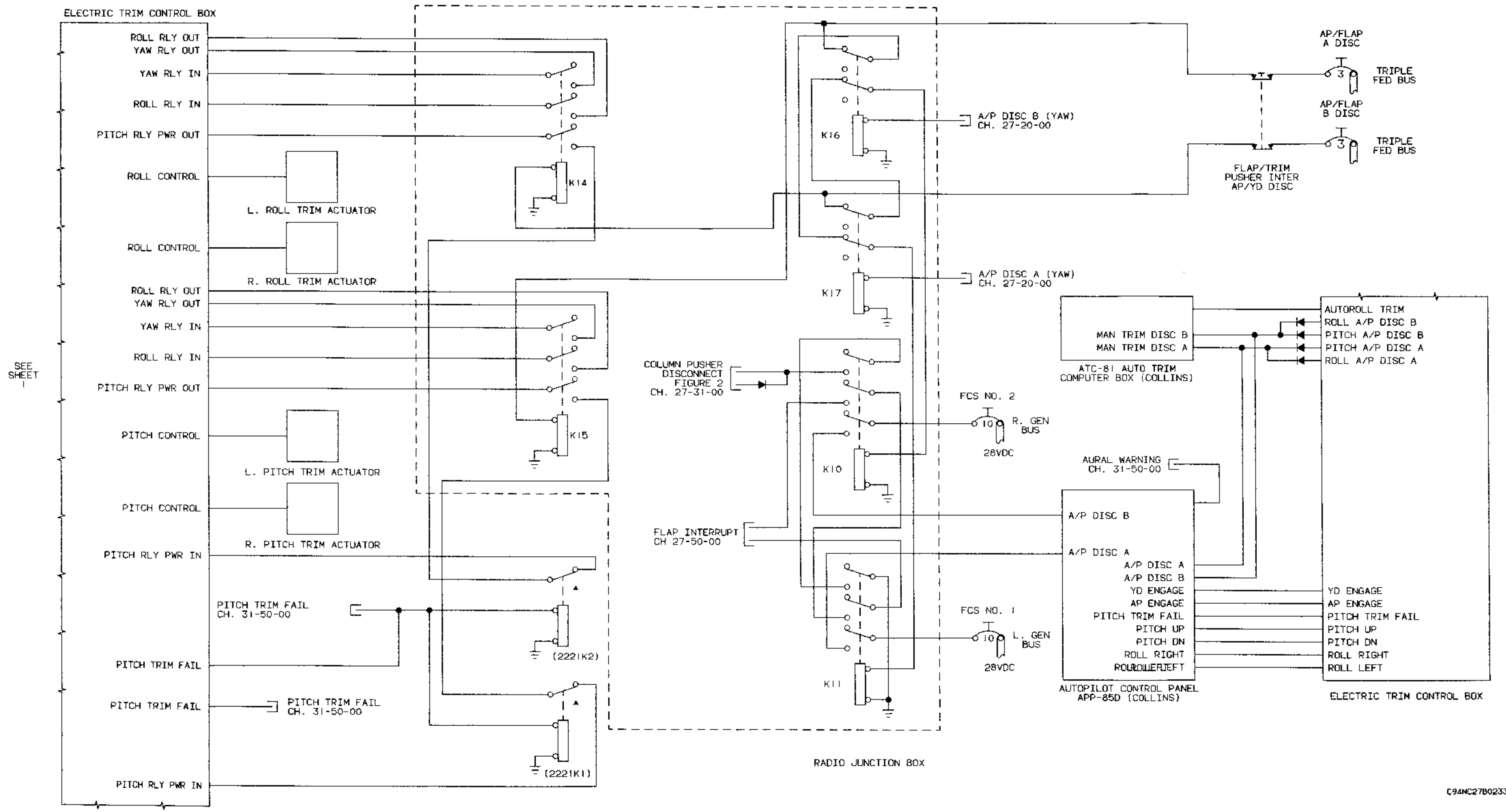
A roll trim indicator, placarded ROLL TRIM-LWD-RWD, and a pitch trim indicator, placarded PITCH TRIM-NOSE DOWN-NOSE UP, are installed in the pedestal to indicate the position of the elevator and elevon (pitch) and elevon (roll) trim tabs.

When the pitch trim NORM-OFF/RESET-STBY switch is set to the OFF/RESET position, a yellow "PITCH TRIM OFF" message is displayed on the Engine Instruments, Crew Alerting System (EICAS) display. When the electric trim control box senses a fault in pitch trim synchronization, a yellow "PITCH TRIM SYNC" message is displayed on the EICAS display. If a failure occurs in pitch trim, the electric trim control box outputs a failure signal to the warning annunciator system to illuminate the "PITCH TRIM FAIL" warning annunciator on the glareshield. Refer to Chapter 31-50-00 for more information on the warning annunciator system.

When the roll trim NORM-OFF/RESET switch is set to the OFF/RESET position, a yellow "ROLL TRIM OFF" message is displayed on the EICAS display. When the electric trim control box senses a fault in roll trim synchronization, a yellow "ROLL TRIM SYNC" message is displayed on the EICAS display. If a failure occurs in roll trim, the electric trim control box outputs a failure signal to the warning annunciator system to illuminate the "ROLL TRIM FAIL" warning annunciator on the glareshield. Refer to Chapter 31-50-00 for more information on the warning annunciator system.



Elevator and Elevon System Schematic (Effectivity: All)
(Sheet 1 of 2)
Figure 1



Elevator and Elevon System Schematic
(Effectivity: All) (Sheet 2 of 2)
Figure 1

ELEVATORS, ELEVONS AND TABS - MAINTENANCE PRACTICES (Effectivity: All)

ELEVATOR REMOVAL (Effectivity: All) (Figure 2)

a. Remove all electrical power from the airplane.

b. Disengage the captive screws (12) securing the covers (1) on the leading edge of the elevator around the three hinge points and the cover (2) over the trim tab actuator.

c. Disconnect the electrical connector from the trim tab actuator.

d. Remove the bolt (6), washers (5), nut (4), and cotter pin (3) securing the elevator push-pull rod to the clevis on the elevator.

e. Disconnect the bonding jumper (15) between the elevator and the forward wing.

f. Support the elevator and remove the nuts (8), washers (9), bolts (11), spacers (10), and cotter pins (7) securing the elevator to the forward wing at the hinge points.

g. Carefully remove the elevator from the airplane to avoid damage to the elevator or to the elevator trim tab push-pull rod.

ELEVATOR INSTALLATION (Effectivity: All) (Figure 2)

NOTE

Any repair, modification, painting or replacement of the elevator or tab will require rebalancing of the elevator. Refer to Chapter 55-20-00 for balancing procedures.

a. Guide the elevator into position on the airplane, taking care not to damage the elevator or the elevator trim tab push-pull rod.

b. Connect the elevator to the forward wing at the three hinge points with the attaching bolts (11), washers (9), nuts (8), and cotter pins (7). Torque to 57 to 60 inch-pounds.

c. Connect the elevator push-pull rod to the clevis on the inboard edge of the elevator with the attaching bolt (6), washers (5), nut (4), and cotter pin (3).

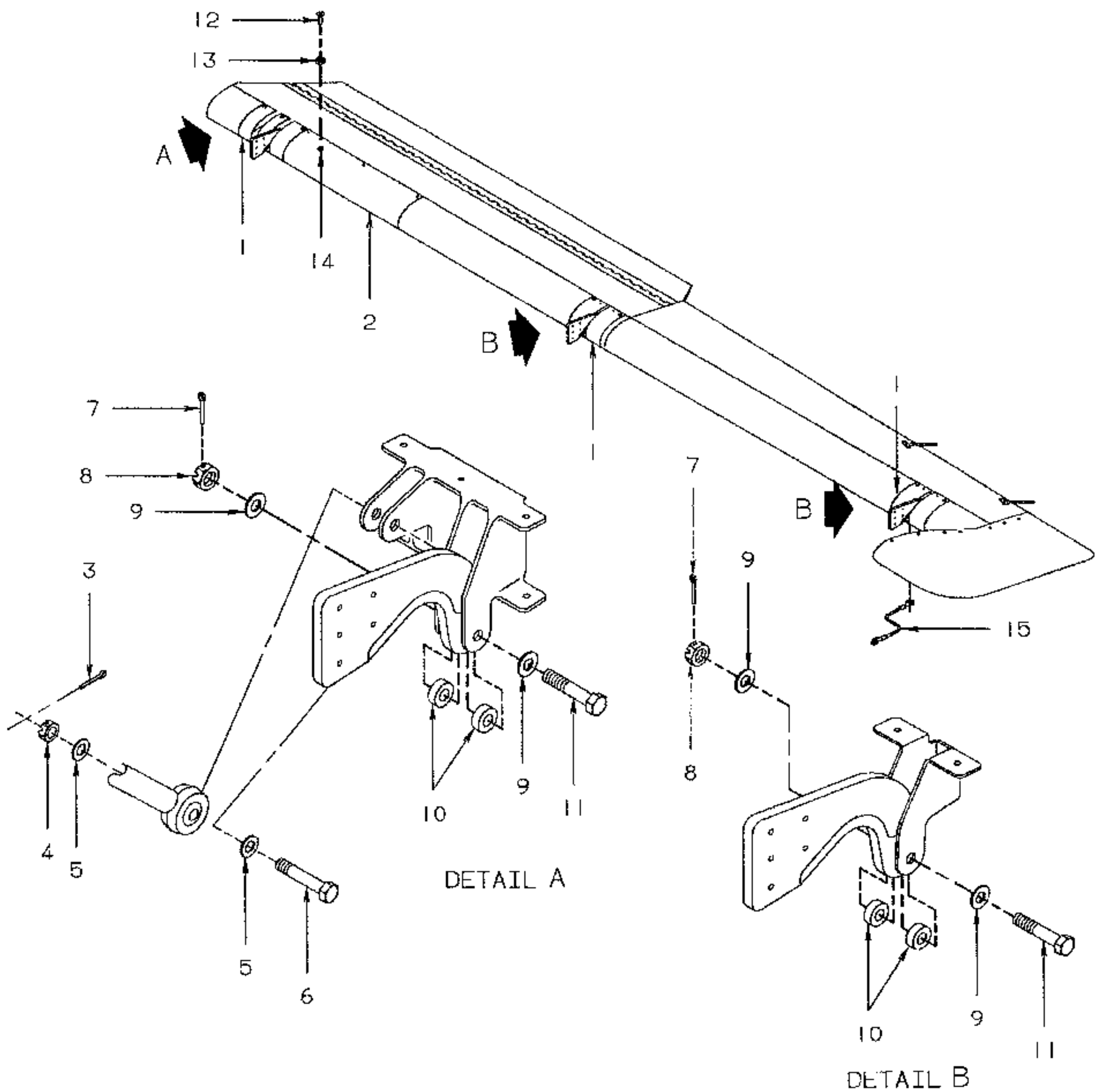
d. Connect the electrical connector to the trim tab actuator.

e. Connect the bonding jumper between the elevator and the forward wing at the outboard hinge point. Refer to Chapter 20-00-03 for the bonding requirements.

f. Install the captive screws (12) securing the three covers (1) around the hinge points and the cover (2) over the actuator to the leading edge of the elevator.

g. Restore electrical power to the airplane.

h. Rig the elevator control system as instructed under ELEVATOR (Pitch) RIGGING and ELEVON (PITCH) RIGGING in this chapter.



1. COVERS
2. COVER
3. COTTER PIN
4. NUT
5. WASHER
6. BOLT
7. COTTER PIN
8. NUT
9. WASHER
10. SPACER
11. BOLT
12. SCREW
13. WASHER
14. RETAINER
15. BONDING JUMPER

2000-133-06

Elevator Installation (Effectivity: All)
Figure 2

ELEVON CONTROL CABLES REMOVAL (Effectivity: All) (Figure 3)

a. Remove the pilot's seat.

b. Remove the couch and LH cabin seats.

c. Remove the floorboard panels on the LH side of the cockpit and the cabin.

d. Remove the aft wing box shear panel on the bottom of the aft wing and the aft access panels on the bottom of the aft wing. The aft access panels are identified in Chapter 6-50-00 as 551AB (651AB) through 555AB (655AB).

e. Remove the rudder/elevon interconnect as described in RUDDER/ELEVON INTERCONNECT REMOVAL in Chapter 27-20-00.

f. Remove the elevon (roll) servo cables from the elevon control mixer. Refer to ELEVON (ROLL) SERVO CABLE REMOVAL in Chapter 22-10-00 for the proper procedures.

NOTE

The lead lines used in this procedure can be made locally from stout cord. They are used to facilitate installation of the cables.

g. Disconnect the fuselage elevon roll cables at the turnbuckles on the control column. Disconnect the fuselage elevon pitch cables at the turnbuckles just aft of the forward pitch sector. For ease of installation, connect lead lines to the forward ends of the fuselage elevon cables. Tag and identify the lead lines.

h. Remove the elevon pressure seals from the aft pressure bulkhead and the cable retaining pins from the elevon pulley brackets.

NOTE

It may be necessary to remove the pulleys if cable passage is restricted.

i. Cut the safety wire and disconnect the fuselage elevon cables from the elevon control mixer.

j. Pull the fuselage elevon cables out through the aft wing, leaving the lead lines in the fuselage.

k. Disconnect the lead lines from the fuselage elevon cables.

l. Lubricate the fuselage elevon cables with corrosion preventive compound (3, Chart 2, 27-00-00) and store them in a plastic bag.

m. Cut the safety wire and remove the wing elevon cables from the elevon control mixer.

n. Disconnect the wing elevon cables from the inboard ends of the turnbuckles.

o. Connect lead lines to the wing elevon cables at the ends removed from the elevon control mixer. Tag and identify the lead lines.

p. Remove the cable retaining pins from the pulley brackets in the wing.

q. Remove one of the fairleads for each wing elevon cable at the pulleys and fairleads installation in the aft wing.

r. Pull the wing elevon cables out of the wing from the elevon control mixer while guiding the cables around the pulleys and fairleads. Leave the lead lines in the wing.

NOTE

It may be necessary to remove the pulleys if cable passage is restricted.

s. Disconnect the lead lines from the wing elevon cables.

t. Lubricate the wing elevon cables with corrosion preventive compound (3, Chart 2, 27-00-00) and store them in a plastic bag.

ELEVON CONTROL CABLES INSTALLATION (Effectivity: All) (Figure 3)

a. Identify the fuselage elevon cables, attach them to the lead lines and pull them into position from the cockpit.

b. Disconnect the lead lines.

c. Install the fuselage elevon cables on the elevon control mixer and safety wire.

d. Attach the fuselage elevon pitch cables to the forward pitch sector at the turnbuckles. Attach the fuselage elevon roll cables to the turnbuckles on the control column. The interior of all turnbuckles should be coated or filled with grease (5, Chart 2, 27-00-00) for corrosion protection.

e. Install any removed cable retaining pins in the pulley brackets. Install any pulleys that had been taken out to facilitate removal of the cables.

f. Using solvent (2, Chart 2, 27-00-00), clean the control cables for the length of travel through the pressure seals. Lubricate to one inch beyond the cleaned area with grease (5, Chart 2, 27-00-00).

g. Fill the pressure seals with grease (5, Chart 2, 27-00-00) and install.

h. Attach the wing lead lines to the wing elevon cables at the elevon control mixer and pull the cables into the wing from the location of the turnbuckles.

i. Disconnect the lead lines.

j. Install the wing elevon cables on the elevon control mixer and safety wire.

k. Attach the wing elevon cables to the turnbuckles. The interior of all turnbuckles should be coated or filled with grease (5, Chart 2, 27-00-00) for corrosion protection.

l. Install fairleads for each wing elevon cable in the aft wing.

m. Install any removed cable retaining pins in the pulley brackets. Install any pulleys that had been taken out to facilitate removal of the cables.

CAUTION

Do not check cable tensions or perform roll and rudder system friction checks with rudder/elevon interconnect springs connected.

n. Rig the elevon control system as outlined under the ELEVON (PITCH) RIGGING, ELEVON (ROLL) RIGGING, and ELEVATOR (PITCH) RIGGING in this chapter, then secure the turnbuckles with safety clips.

o. Connect the elevon (roll) servo cable to the elevon control mixer as instructed under ELEVON (ROLL) SERVO CABLE INSTALLATION in Chapter 22-10-00.

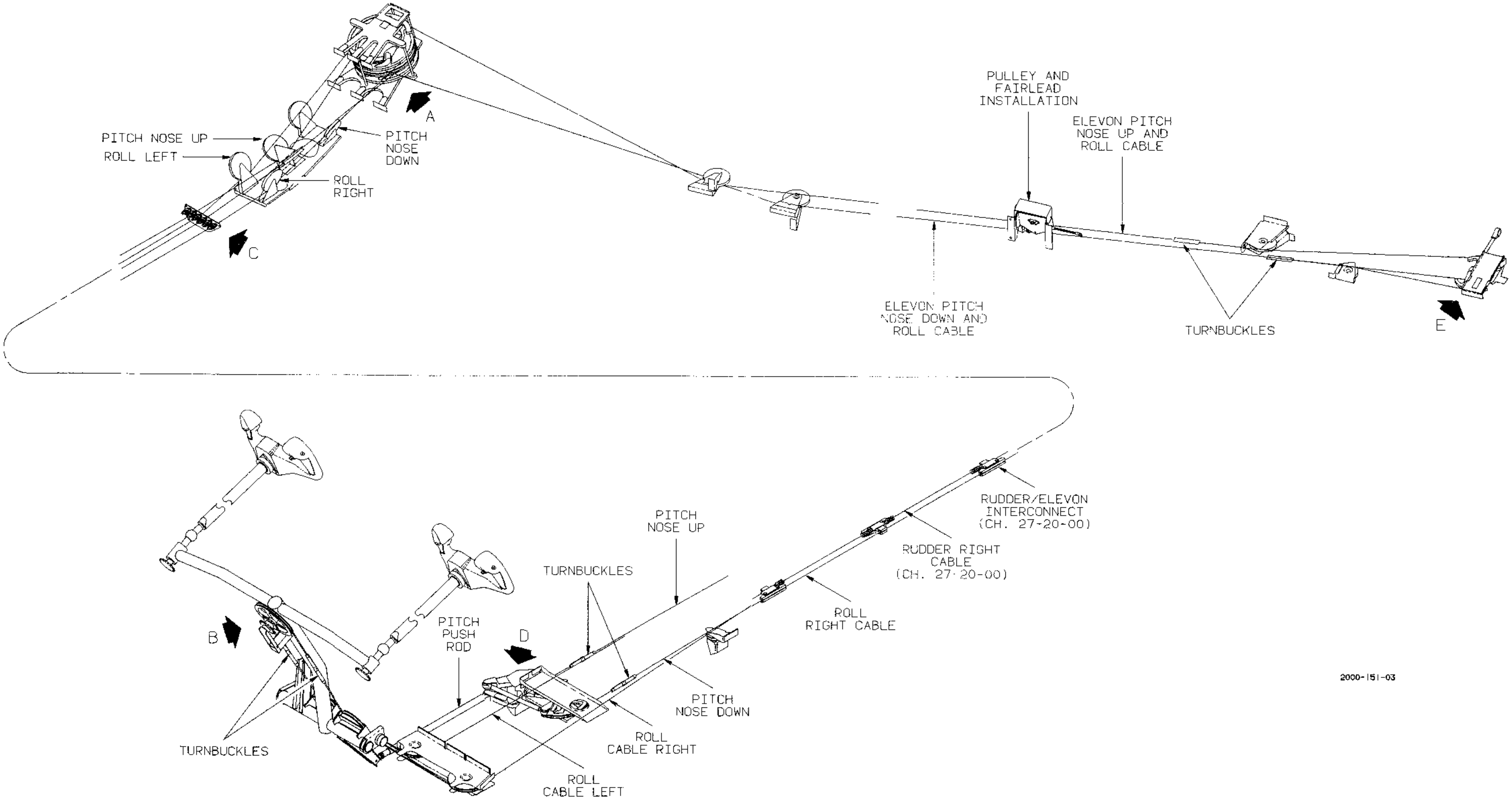
p. Install the rudder/elevon interconnect as described under RUDDER/ELEVON INTERCONNECT INSTALLATION in Chapter 27-20-00.

q. Install the floorboard panels on the LH side of the cockpit and cabin.

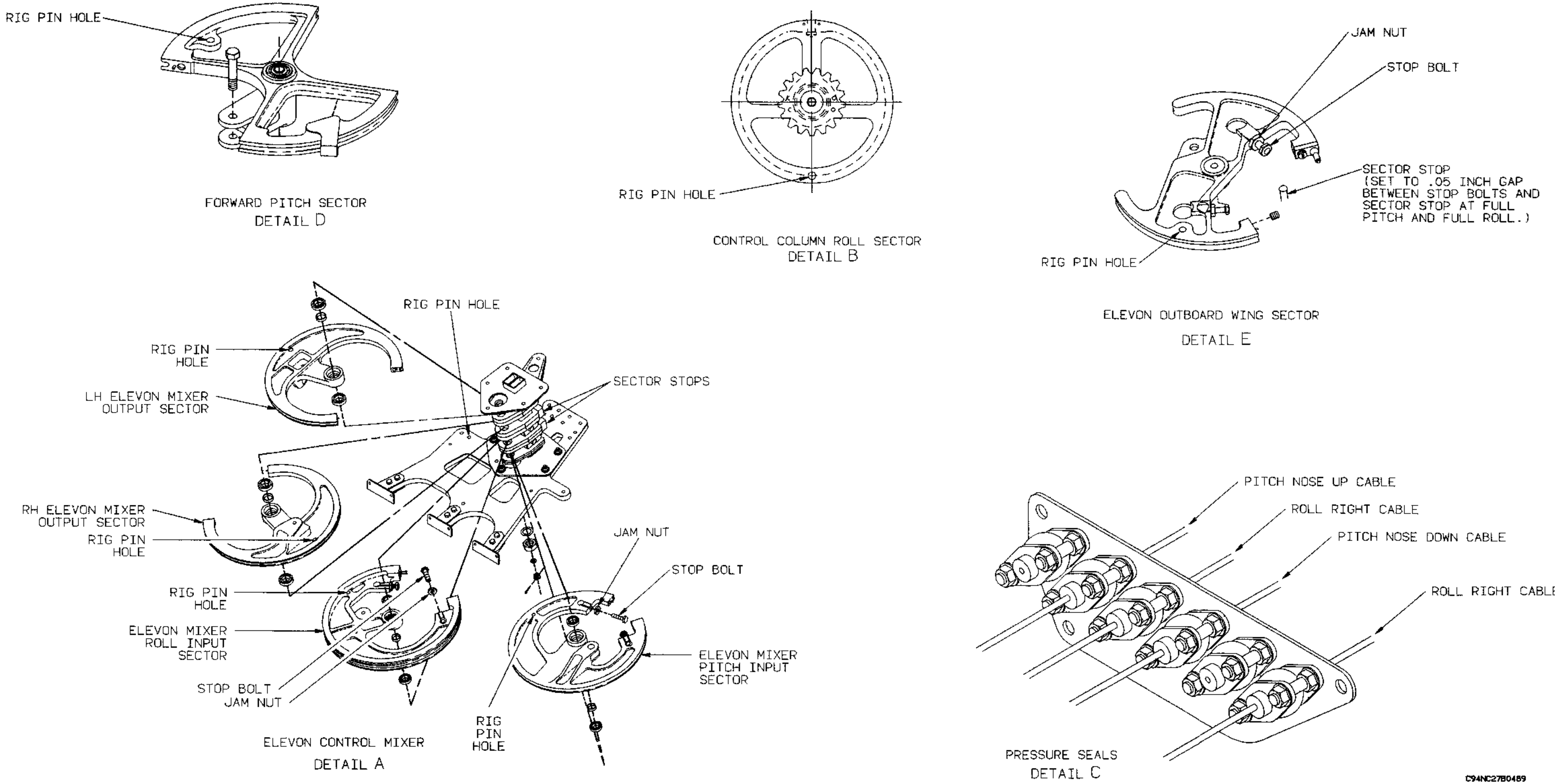
r. Install the pilot's seat.

s. Install the couch and the LH seats.

t. Install the aft wing box shear panel and the aft access panels on the bottom of the aft wing.



Elevon (Pitch and Roll) Control Linkage
(Effectivity: All) (Sheet 1 of 2)
Figure 3



Elevon (Pitch and Roll) Control Linkage
(Effectivity: All) (Sheet 2 of 2)
Figure 3

ELEVON REMOVAL (Effectivity: All) (Figure 4)

a. Remove all electrical power from the airplane.

b. Remove the screws (1 and 9) securing the small cover (8) on the leading edge of the elevon at the outboard hinge point and the large cover (7) on the leading edge of the elevon at the inboard hinge point.

c. Disconnect the electrical connector from the elevon trim tab actuator.

d. Remove the bolt (12), washer (16), cotter pin (18), and nut (17) securing the elevon push-pull rod (14) to the center hinge bracket (11) on the elevon.

e. Disconnect the bonding jumper (19) between the elevon and the aft wing at the inboard hinge point.

f. Support the elevon and remove the bolts (5 and 6), washers (4), nuts (3), and cotter pins (2) securing the elevon to the three aft wing hinge brackets.

g. Carefully remove the elevon from the airplane to avoid damage to the elevon or to the elevon push-pull rod (14).

ELEVON INSTALLATION (Effectivity: All) (Figure 4)

NOTE

Any repair, modification, painting, or replacement of the elevon or elevon tab will require rebalancing of the elevon. Refer to Chapter 57-50-00 for balancing procedures.

a. Guide the elevon into position on the airplane, taking care not to damage the elevon or the elevon push-pull rod (14).

b. Install the bolts (5 and 6), washers (4), nuts (3), and cotter pins (2) securing the elevon to the three aft wing hinge brackets. Torque the bolts to 57 to 60 inch-pounds.

c. Install the bonding jumper (19) between the elevon and the aft wing at the inboard hinge point. Refer to Chapter 20-00-03 for the bonding requirements.

d. Connect the elevon push-pull rod (14) to the center hinge bracket (11) on the elevon.

e. Connect the electrical connector to the elevon trim tab actuator.

f. Install the screws (1 and 9) securing the two covers (7 and 8) on the leading edge of elevon at the inboard and outboard hinge points.

g. Restore electrical power to the airplane.

h. Rig elevons as described under ELEVATOR (PITCH) RIGGING, ELEVON (ROLL) RIGGING and ELEVON (PITCH) RIGGING in this chapter.

CONTROL COLUMN CABLE AND CHAIN REMOVAL (Effectivity: All) (Figure 5)

a. Disconnect the elevon (roll) cables (8) from the control column cable (4) at the turnbuckles (2).

b. Paint one tooth on each control column sprocket (7) and its corresponding chain link to ensure proper alignment of the control wheels when the chains (6) are installed.

c. Loosen the cable turnbuckles (5) in the center of the control column horizontal cross member, unsafety the chain from the sprockets (7) and remove the chain assemblies (6).

d. Remove the cable retaining pins (3) and remove the control column cable (4).

e. After removing the chain assembly, clean the chain with a cloth slightly dampened with solvent (2, Chart 2, 27-00-00). Apply SAE 30W oil to the chain on the upper edge of the linkplates. Wipe off excess oil and store the chain in a plastic bag.

CONTROL COLUMN CABLE AND CHAIN INSTALLATION (Effectivity: All) (Figure 5)

a. Place the chain assemblies (6) on the sprockets (7) with the painted links of the chains engaging the corresponding painted sprocket teeth.

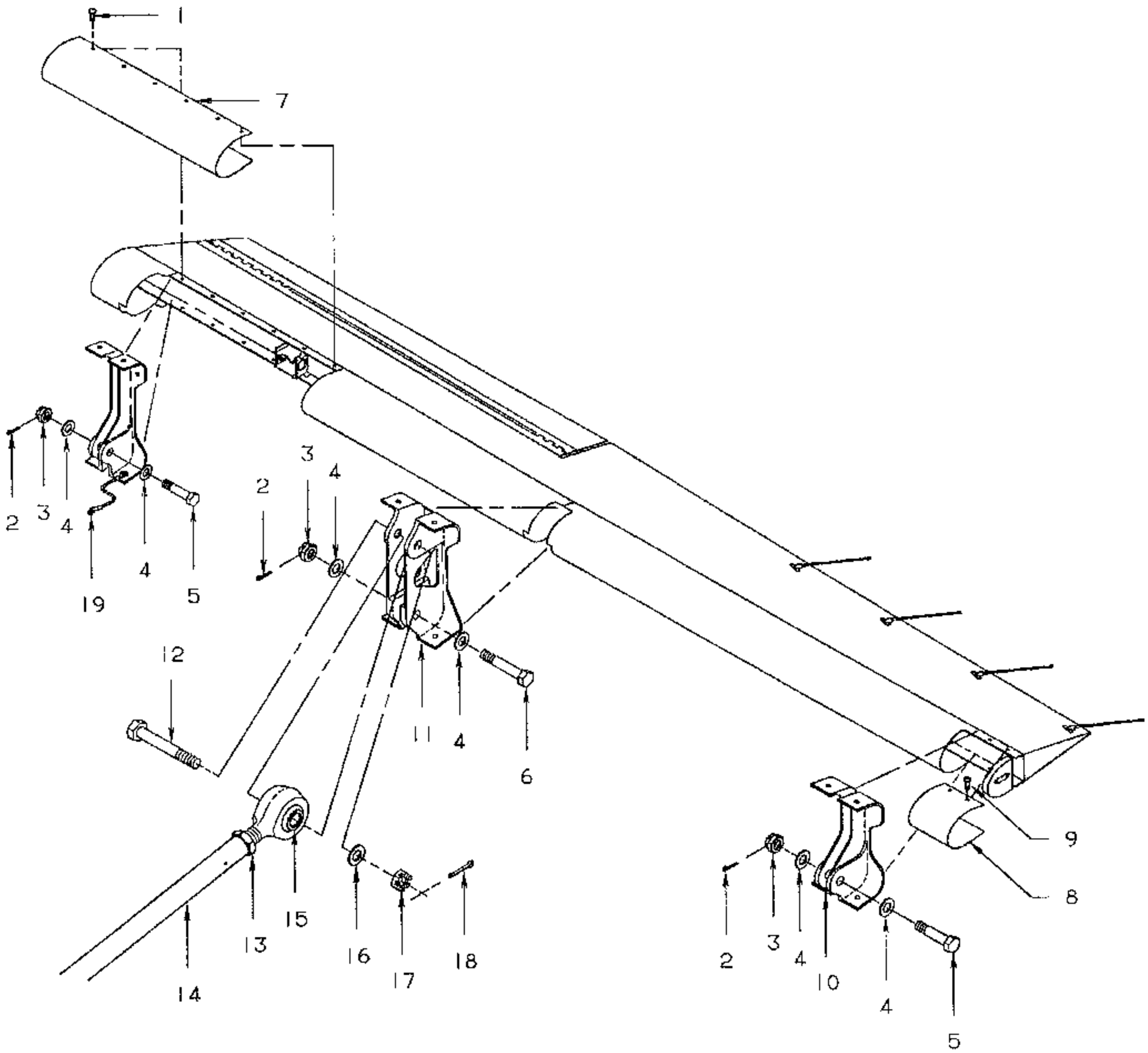
b. Connect the chain assemblies (6) at the turnbuckles (5). Adjust the chain tension to take up any slack in the chain. Safety wire the chain to the sprockets (7), install safety wire at four places and wrap two turns at each place.

c. Place the control column cable (4) on the control column and install the cable retaining pins (3).

d. Connect the elevon (roll) cables (8) at the turnbuckles (2) on the control column cable (4).

NOTE

The interior of all turnbuckles should be coated or filled with grease (5, Chart 2, 27-00-00) for corrosion protection.



1. SCREW
2. COTTER PIN
3. NUT
4. WASHER
5. BOLT
6. BOLT
7. COVER
8. COVER
9. SCREW
10. OUTBOARD HINGE BRACKET
11. CENTER HINGE BRACKET
12. BOLT
13. JAM NUT
14. PUSH-PULL ROD
15. BUSHING
16. WASHER
17. NUT
18. COTTER PIN
19. BONDING JUMPER

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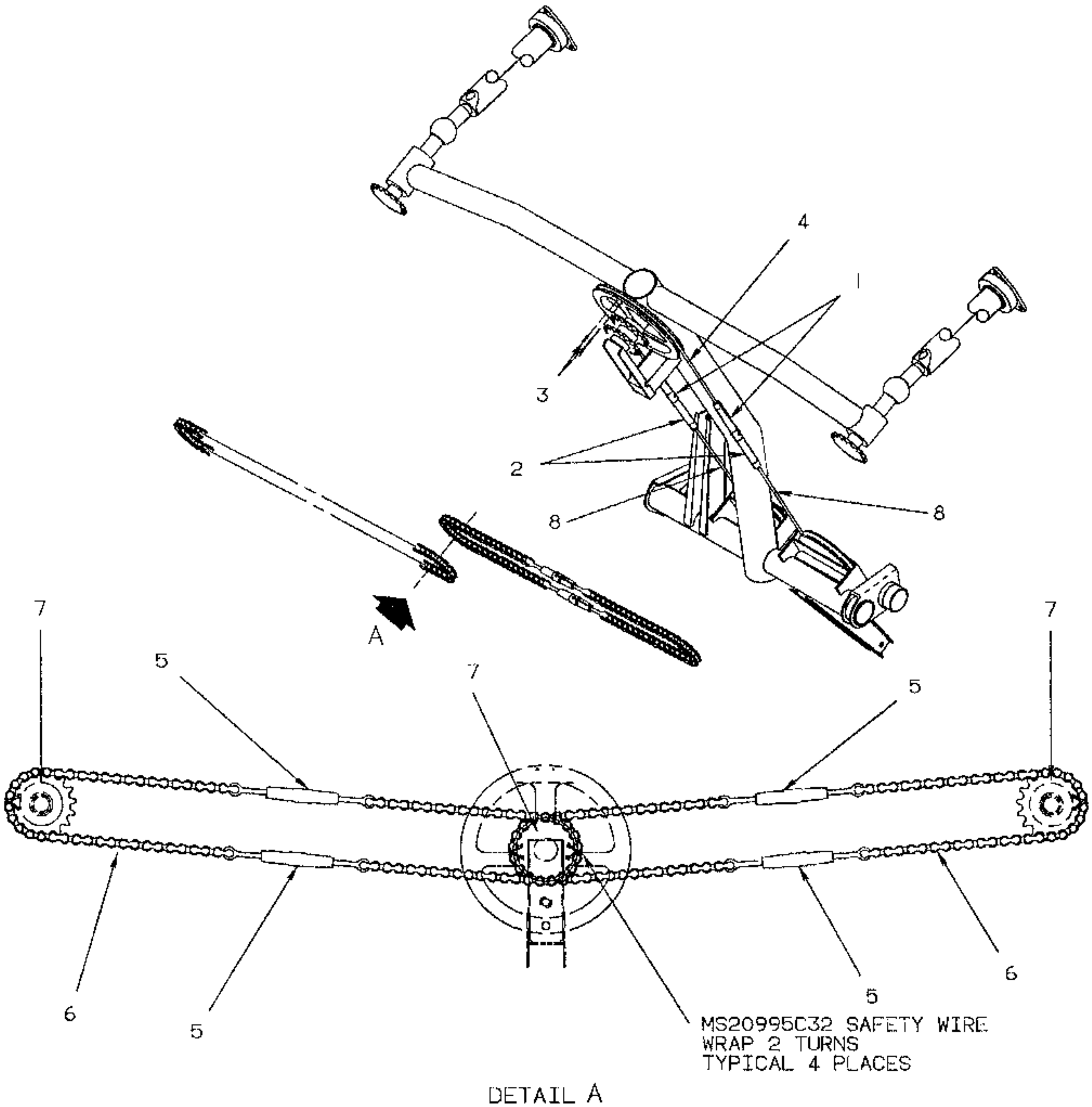
Elevon Installation (Effectivity: All)
Figure 4



1. CLIPS
2. TURNBUCKLES
3. CABLE RETAINING PINS
4. CONTROL COLUMN CABLE
5. TURNBUCKLES
6. CHAIN
7. SPROCKET
8. ELEVON (ROLL) CONTROL CABLE

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Control Column Cable Installation (Effectivity: All)
Figure 5

e. Rig the cables as outlined under ELEVON (ROLL) RIGGING in this chapter.

CONTROL WHEEL REMOVAL (Effectivity: All) (Figure 6)

a. Remove electrical power from the airplane and disconnect the battery.

b. Open the approach plate holder on the face of the control wheel.

c. Remove the three bolts (1), nuts (3), and washers (2) securing control wheel (6) to control column.

d. Pull control wheel (6) straight back to disconnect electrical connector (4) from control column receptacle connector (5).

e. Remove control wheel (6) from airplane.

CONTROL WHEEL INSTALLATION (Effectivity: All) (Figure 6)

a. Position control wheel (6) on control column, being careful to align electrical connectors (4 and 5), and push the control wheel forward to mate the electrical connectors together.

b. Secure control wheel (6) to control column with 3 bolts (1), nuts (3), and washers (2).

c. Connect the battery and restore electrical power to the airplane.

ELEVATOR TRIM TAB REMOVAL (Effectivity: All) (Figure 7)

a. Remove the elevator from the airplane as described in ELEVATOR REMOVAL in this chapter.

b. Remove the bolts (9), washers (10 and 14), nuts (12), and cotter pins (11) securing the actuator push-pull rods (13) to the trim tab (1).

c. Remove the counter-sunk screw (2), washer (4), lock washer (5), and nut (6) at the inboard edge of the elevator which secure the trim tab hinge pin (8) and the bonding jumper (3).

d. While supporting the trim tab, pull the trim tab hinge pin (8) out of the hinge halves (7) from the inboard end.

e. Remove the trim tab from the elevator.

ELEVATOR TRIM TAB INSTALLATION (Effectivity: All) (Figure 7)

NOTE

Any repair, modification, painting or replacement of the elevator or tab will require rebalancing of elevator. Refer to Chapter 55-20-00 for balancing procedures.

a. Position the trim tab hinge half (7) to align with the hinge half (7) on the elevator.

b. Insert the trim tab hinge pin (8) to secure the trim tab to the elevator.

c. Secure the hinge tab pin (8) and bonding jumper (3) to the elevator with the attaching screw (2), washer (4), lock washer (5) and nut (12). Refer to Chapter 20-00-03 for bonding requirements.

d. Secure the actuator push-pull rods (13) to the trim tabs with the attaching bolts (9), washers (10 and 14), nuts (12), and cotter pins (11).

e. Install the elevator on the airplane as described under ELEVATOR INSTALLATION in this chapter.

ELEVATOR TRIM TAB ACTUATOR REMOVAL (Effectivity: All) (Figure 8)

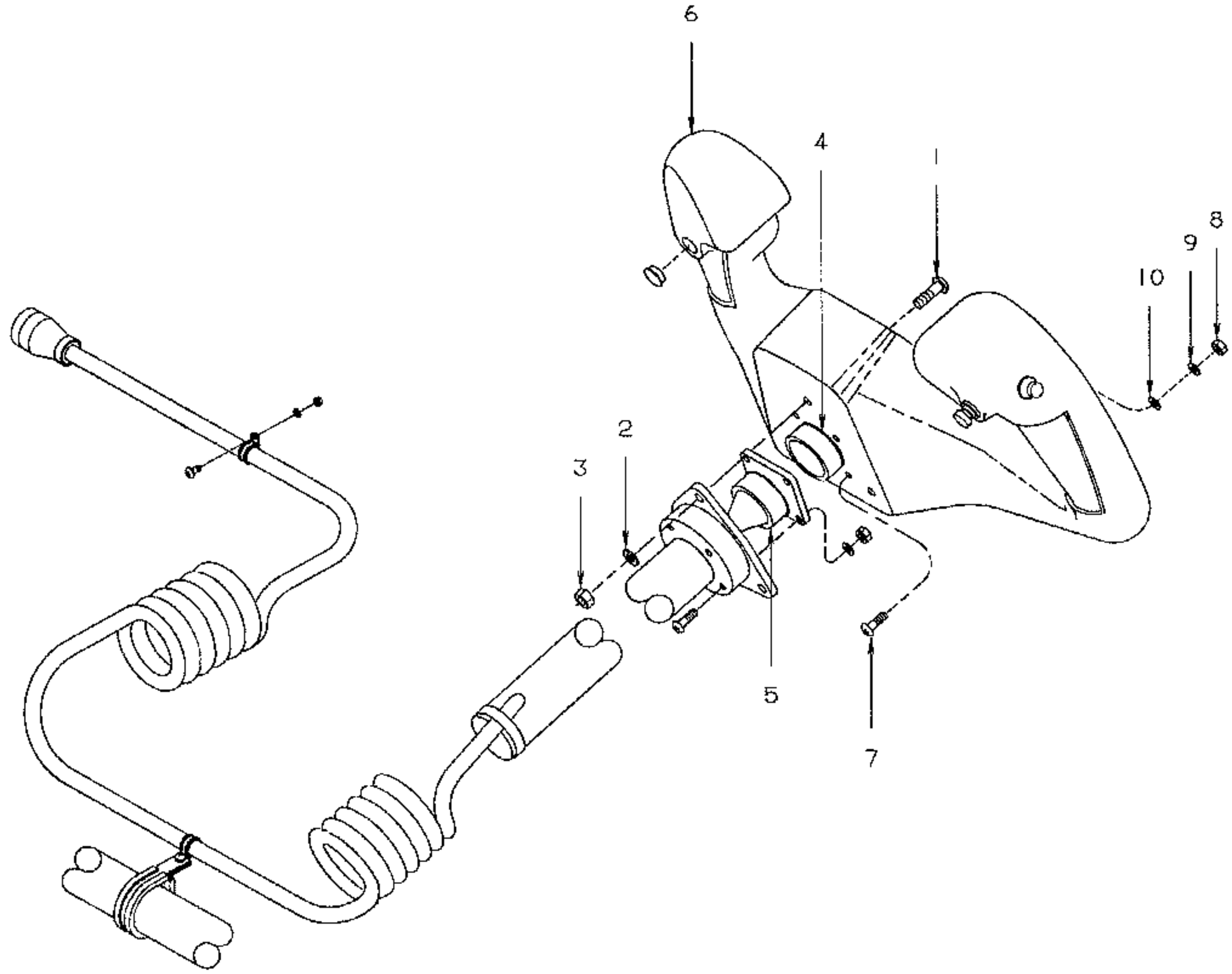
a. Remove the elevator from the airplane as described in ELEVATOR REMOVAL in this chapter.

b. Remove the trim tab push rod fairing and the access panel from the leading edge of the elevator to gain access to the actuator.

c. Remove the bolts (6), washers (4 and 5), nuts (3), and cotter pins (2) securing the actuator push-pull rods to the trim tab.

d. Remove the bolts (7) securing the actuator to the elevator.

e. Remove the actuator from the elevator.



1. BOLT
2. WASHER
3. NUT
4. CONNECTOR
5. RECEPTACLE CONNECTOR
6. CONTROL WHEEL
7. BOLT
8. NUT
9. LOCK WASHER
10. WASHER

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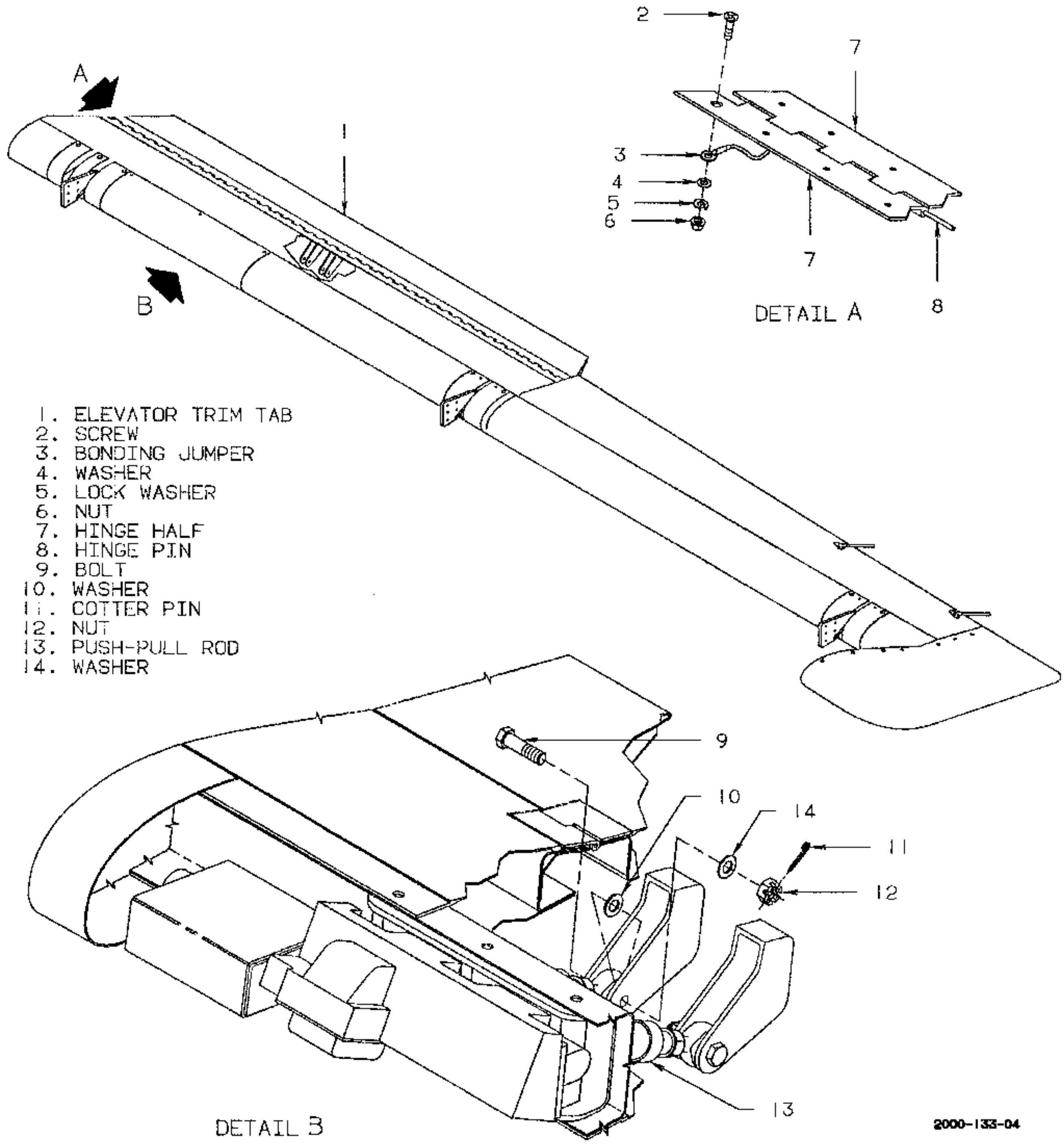
Control Wheel Installation (Effectivity: All)
Figure 6



Elevator Trim Tab Installation (Effectivity: All)
Figure 7

ELEVATOR TRIM TAB ACTUATOR INSTALLATION (Effectivity: All) (Figure 8)

NOTE

If the actuator to be installed is not the one that was removed the elevator will require rebalancing. Refer to Chapter 55-20-00 for the balancing procedure.

a. Position the actuator in the elevator.

b. Connect the actuator to the elevator with the attaching bolts (7). Install with sealant (1, Chart 2, 27-00-00) around bolt heads.

c. Install the bolts (6), nuts (3), washers (4 and 5) and cotter pins (2) securing the actuator push-pull rods to the trim tab.

d. Install the access panel and trim tab push rod fairing on the leading edge of the elevator.

e. Install the elevator in the airplane as described under ELEVATOR INSTALLATION in this chapter.

f. Rig elevator trim tab as described under ELEVATOR TRIM TAB RIGGING in this chapter.

ELEVON TRIM TAB REMOVAL (Effectivity: All) (Figure 9)

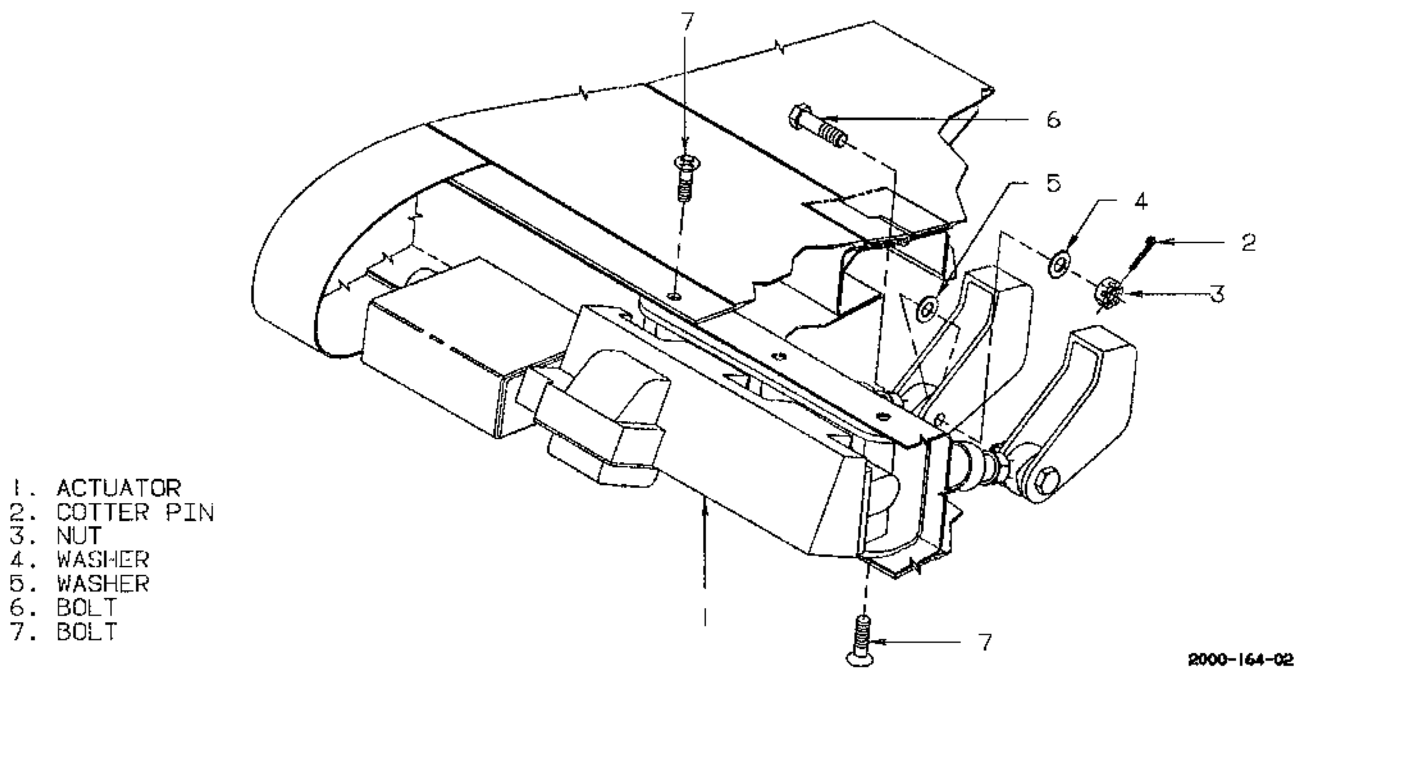
a. Remove the elevon from the airplane as described under ELEVON REMOVAL in this chapter.

b. Remove the bolts (9), washers (10), nuts (11) and cotter pins (12) securing the actuator push-pull rods (8) to the trim tab (1).

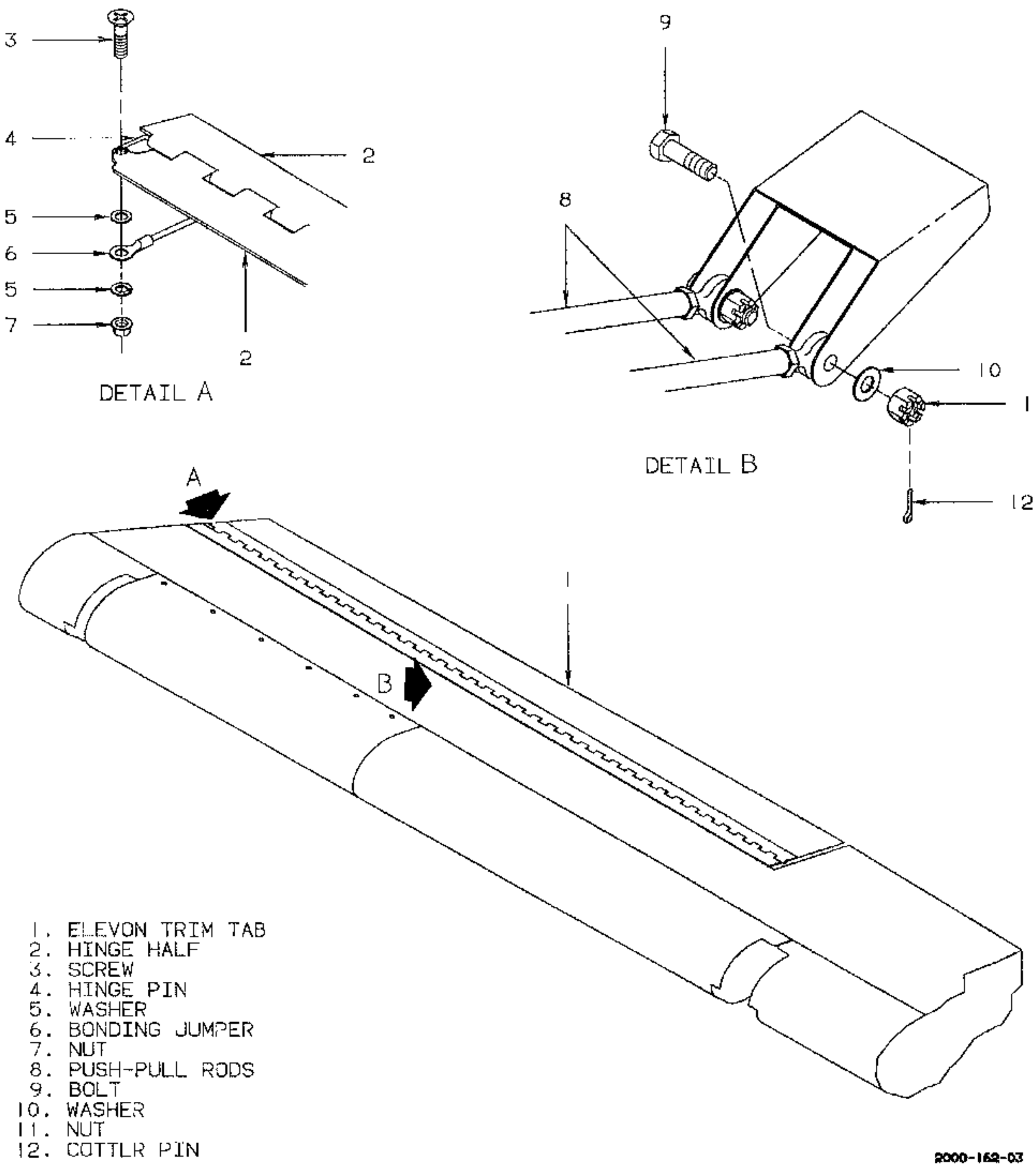
c. Remove the counter-sunk screw (3), washers (5), and nut (7) at the inboard edge of the elevon which secure the trim tab hinge pin (4) and the bonding jumper (6).

d. While supporting the trim tab (1), pull the trim tab hinge pin (4) out of the hinge halves (2) from the inboard end.

e. Remove the trim tab (1) from the elevon.



Elevator Trim Tab Actuator Installation (Effectivity: All)
Figure 8



Elevon Trim Tab Installation (Effectivity: All)
Figure 9

ELEVON TRIM TAB INSTALLATION (Effectivity: All) (Figure 9)

NOTE

Any repair, modification, painting or replacement of the elevon or elevon trim tab will require rebalancing of the elevon. Refer to Chapter 55-20-00 for balancing procedures.

a. Position the trim tab hinge half (2) to align with the hinge half (2) on the elevon.

b. Insert the trim tab hinge pin (4) to secure the trim tab (1) to the elevon.

c. Secure the hinge tab pin (4) and bonding jumper (6) to the elevon with the attaching screw (3), washers (5), nut (7).

d. Secure the actuator push-pull rods (8) to the trim tab (1) with the attaching bolts (9), washers (10), nuts (11), and cotter pins (12).

e. Install the elevon in the airplane as described under ELEVON INSTALLATION in this chapter.

f. Rig the elevon as described under ELEVON (PITCH) RIGGING and ELEVON (ROLL) RIGGING in this chapter.

g. Rig the elevon trim tab as described under ELEVON TRIM TAB RIGGING in this chapter.

ELEVON TRIM TAB ACTUATOR REMOVAL (Effectivity: All) (Figure 10)

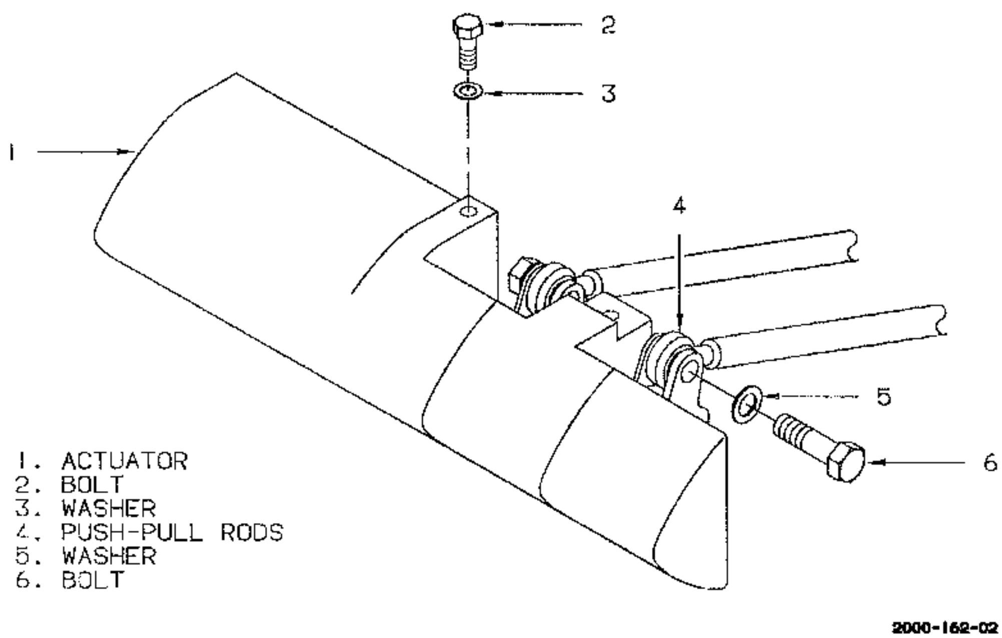
a. Remove the elevon from the airplane as described under ELEVON REMOVAL in this chapter.

b. Remove the access panel from the leading edge of the elevon to gain access to the trim tab actuator.

c. Cut safety wire and remove the two bolts (6) and washers (5) securing the actuator push-pull rods (4) to the actuator (1).

d. Cut the safety wire and remove the four bolts (2) and washers (3) securing the actuator (1) to the elevon.

e. Remove the actuator (1) from the elevon.



Elevon Trim Tab Actuator Installation (Effectivity: All)
Figure 10

ELEVON TRIM TAB ACTUATOR INSTALLATION (Effectivity: All) (Figure 10)

NOTE

If the actuator to be installed is not the one that was removed the elevon will require rebalancing. Refer to Chapter 55-20-00 for the balancing procedure.

CAUTION

Do not intermix elevon trim tab actuators from different vendors. Always replace actuators removed with actuators having the same part number. All elevon trim tab actuators installed in the airplane must have the same part numbers.

a. Position the actuator (1) in the elevon.

b. Connect the actuator (1) to the elevon with the attaching bolts (2) and washers (3) and safety wire.

c. Install the two bolts (6) and washers (5) securing the actuator push-pull rods (4) to the actuator (1) and safety wire.

d. Install the access panel on the leading edge of the elevon.

e. Install the elevon in the airplane as described under ELEVON INSTALLATION in this chapter.

ELECTRIC TRIM CONTROL BOX REMOVAL (Effectivity: All) (Figure 11)

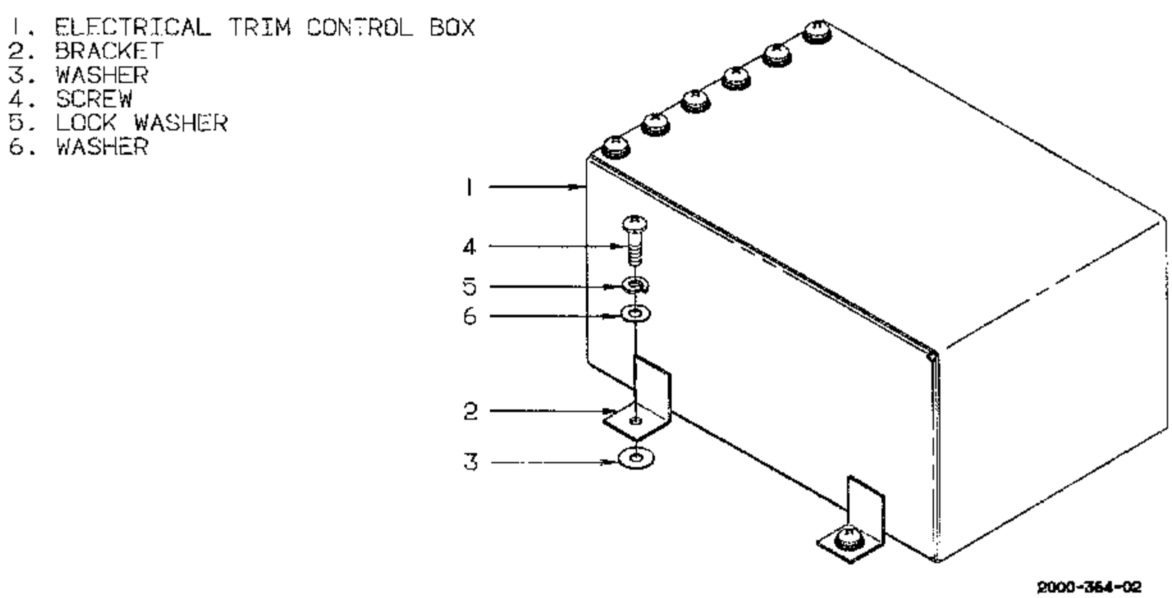
a. Remove electrical power from the airplane and disconnect the battery.

b. Loosen the screws and remove the LH nose upper avionics compartment door.

c. Disconnect the seven electrical connectors from the electric trim control box (1) and tag.

d. Remove the four screws (4), washers (3 and 6), and lock washers (5) securing the brackets (2) to the avionics shelf.

e. Remove the electric trim control box (1) from the airplane.



Electric Trim Control Box Installation (Effectivity: All)
Figure 11

ELECTRIC TRIM CONTROL BOX INSTALLATION (Effectivity: All) (Figure 11)

a. Position the electric trim control box (1) in the airplane and secure the brackets (2) to the avionics shelf with the four screws (4), washers (3 and 6), and lock washers (5).

b. Connect the electrical connectors to the electric trim control box (1).

c. Install the LH nose upper avionics compartment door.

d. Connect the battery and restore electrical power to the airplane.

ELEVON (PITCH) RIGGING (Effectivity: All) (Figures 3, 12, 13, 14 and 15)

CAUTION

Do not check cable tensions or perform roll and rudder system friction checks with rudder/elevon interconnect springs connected. Refer to RUDDER/ELEVON INTERCONNECT REMOVAL in Chapter 27-20-00. Rig elevon (pitch) system as follows:

a. With elevon push rod disconnected from elevon and hinge bolts properly torqued, the elevon must move freely through the up and down range without binding.

b. Install elevon travel boards (9 and 11, Chart 1, 27-00-00) as shown in Figure 12.

c. With rig pins installed in the outboard wing sectors, rig LH elevon neutral position to 2 +1/2°,-0° trailing edge up and RH elevon neutral position to 2 +1/2°,-0° trailing edge down on travel board. Remove rig pins.

d. With rig pins installed in the elevon control mixer and in the forward pitch sector, rig elevon wing cables to 130 ±8 pounds tensiometer reading at 59° F and elevon fuselage pitch cables to 130 ± 8 pounds at 59° F (Refer to Figure 14). Adjust push-pull rods to set control column to neutral per dimension shown in Detail A of Figure 12. Remove all rig pins.

e. With rig pin installed in the control column roll cable sector, set the stop bolts on the elevon mixer pitch input sector at the elevon control mixer such that the LH elevon travels are 13 ±1° trailing edge up and 1 ±1/2° trailing edge down and the RH elevon travels are 9 ±1° trailing edge up and 5 ±1/2° trailing edge down. The stop bolts at the elevon mixer pitch input sector must make contact at the same time or before the surface stops on the forward wing elevator bell crank (Refer to Figure 15). Remove rig pin.

f. System friction measured at neutral shall be 4 pounds maximum when the system is fully installed including autopilot. The method for taking friction measurements is as follows: Take a force reading at neutral as the control column (in full forward position) is pulled aft with a steady motion through neutral. Take another reading at neutral as the control column (in full aft position) is pushed forward with a steady motion through neutral. For example: Hand force gage reading as control column moves aft through neutral is XX pounds. Hand force gage reading as control column returns forward through neutral is YY pounds. System friction = (XX-YY)÷2.

g. Repeat step d but rig elevon wing cables to a load of 85 ± 8 pounds at 59° F and rig elevon fuselage pitch cables to a load of 85 ± 8 pounds at 59° F (Refer to Figure 14).

h. With pitch at maximum travel in both directions, the stop bolts on the elevon mixer roll input sector should hit both stops at the elevon control mixer.

i. Check the stall warning and elevator position potentiometers and reset as necesssary, refer to Chapter 27-31-00.

ELEVON (ROLL) RIGGING (Effectivity: All) (Figures 3, 12, 13 and 14)

CAUTION

Do not check cable tensions or perform roll and rudder system friction checks with rudder/elevon interconnect springs connected. Refer to RUDDER/ELEVON INTERCONNECT REMOVAL in Chapter 27-20-00.

NOTE

Rig the elevon (pitch) system as described in ELEVON (PITCH) RIGGING in this chapter before performing elevon (roll) rigging. Rig elevon (roll) system as follows:

a. With the elevon push rod disconnected from the elevon and hinge bolts properly torqued, the elevon must move freely through up and down range without binding.

b. Install elevon travel boards (9 and 11, Chart 1, 27-00-00) as shown in Figure 12.

c. With rig pins installed in the outboard wing sectors, rig LH elevon neutral position to 2 +1/2°,-0° trailing edge up and RH elevon neutral position to 2 +1/2°,-0° trailing edge down on travel board. Remove rig pins.

d. With rig pins installed in the elevon control mixer and in the forward pitch cable sector, rig elevon wing cables to 130 ± 8 pounds tensiometer reading at 59° F and elevon at neutral position. Rig elevon fuselage roll cables from control column to elevon control mixer to a tension of 130 ± 8 pounds at 59° F with control wheels aligned within ±1/2° of each other. Refer to Figure 3 and to Figure 14.

e. Set stop bolts on elevon mixer pitch input sector at elevon control mixer such that the LH elevon travels are 23 +2°,-1° trailing edge up and 12 +1°,-1/2° trailing edge down and the RH elevon travels are 19 +2°,-1° trailing edge up and 16 +1°,-1/2° trailing edge down. These readings are from the 0° marks on the travel boards.

f. Rig the control wheel interconnect chain assemblies by tightening the turnbuckles and releasing tension slowly until control wheels rotate smoothly and are aligned within ±1/2° of each other.

g. With system completely installed and cables rigged to proper tension, the force required to move the control wheel 10° to the left or right of neutral shall not exceed 17 inch-pounds.

h. Repeat step d, but rigging elevon wing cables and elevon fuselage roll cables to 85 ±8 pounds at 59° F (Refer to Figure 14).

i. With roll at maximum travel in both directions, the stop bolts on the elevon mixer pitch input sector should hit both stops at the elevon control mixer.

ELEVATOR (PITCH) RIGGING
(Effectivity: All)
(Figures 12 and 15)

NOTE

Rig the elevons as described under ELEVON (PITCH) RIGGING and ELEVON (ROLL) RIGGING in this chapter before rigging the elevators. Rig elevator mechanical linkage (pitch) system as follows:

a. With the push-pull rods disconnected from the elevators and the elevator hinge bolts properly torqued as described under ELEVATOR INSTALLATION in this chapter, the elevators must move freely through the up and down range without binding.

b. Install elevator travel boards (15 and 16, Chart 1, 27-00-00) as shown in Figure 12.

c. With rig pin installed in the forward wing elevator bell crank, adjust push-pull rod for elevator neutral position of 0° (+1/2° , -0°) on travel board.

d. Install all rig pins in the elevator control linkage and adjust the adjustable rods to set control column to neutral per the dimension shown in Detail A of Figure 12. Remove all rig pins.

e. Adjust elevator control linkage to set surface stops on forward wing elevator bell cranks for 13 ±1° trailing edge up and 28 ±1° trailing edge down.

NOTE

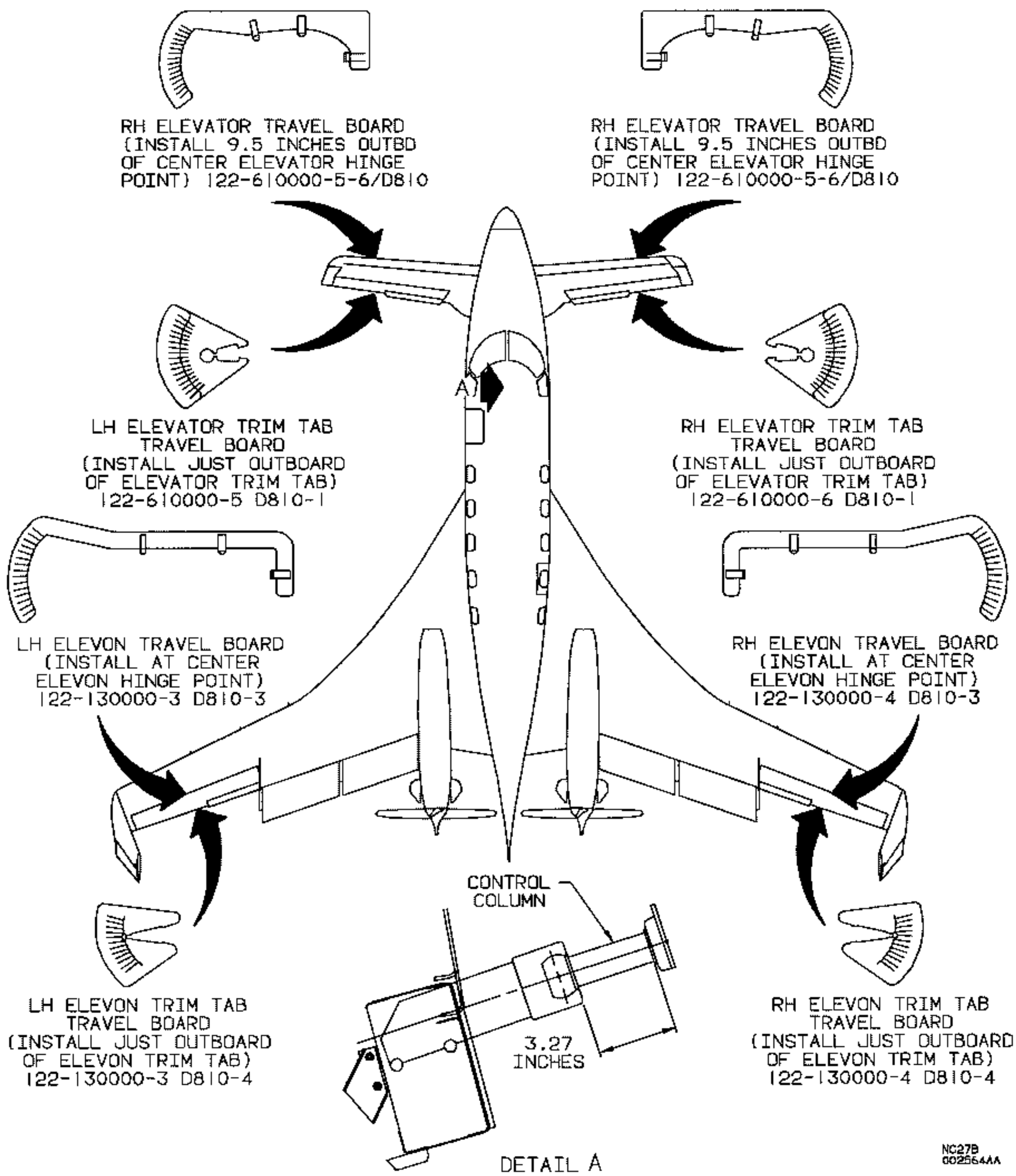
Check the system and ensure that the LH surface stops make contact before the RH surface stops. Adjust elevator control linkage if required.

ELEVATOR TRIM TAB RIGGING
(Effectivity: All)
(Figure 12)

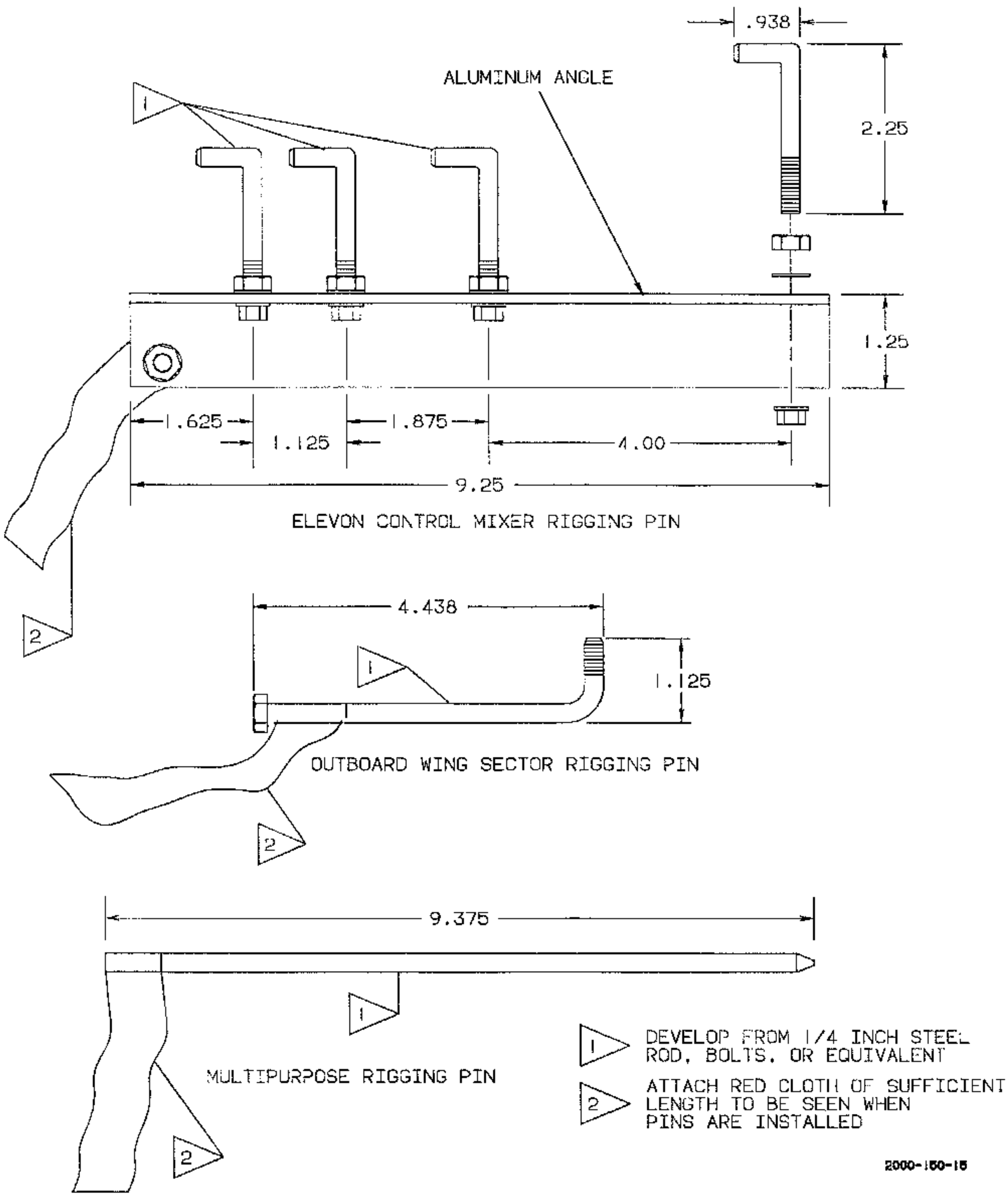
Rig elevator trim tab system as follows:

NOTE

If it is necessary to adjust the length of any push-pull rods, cut safety wire and then reinstall safety wire after the adjustment is made.

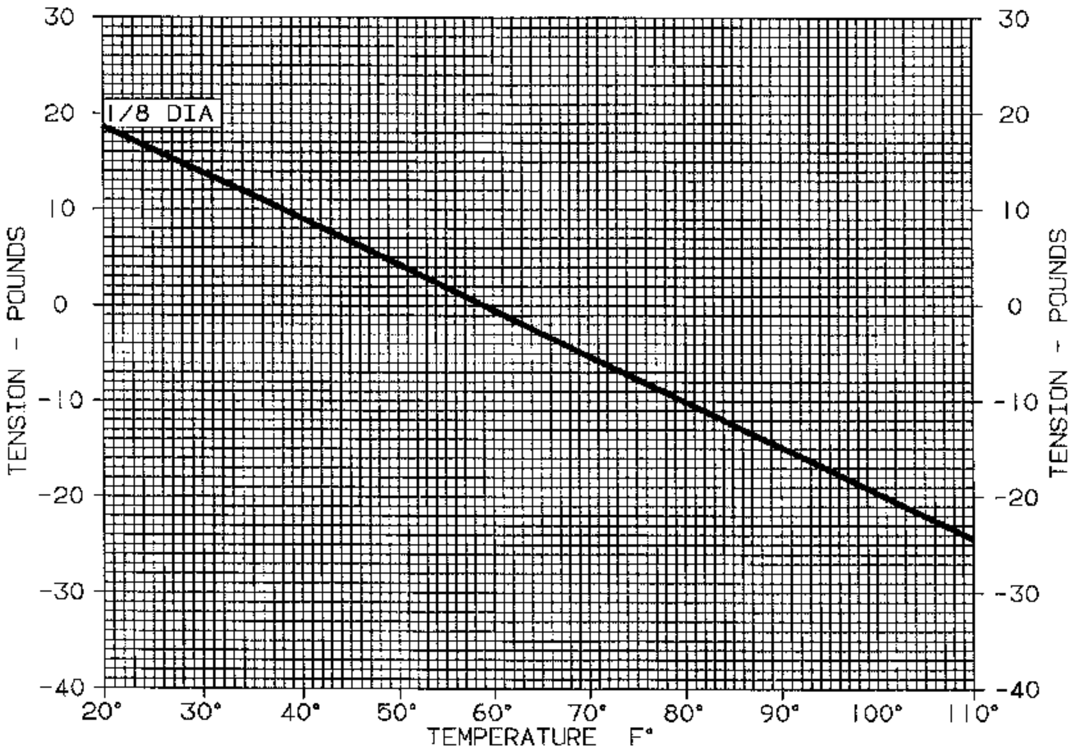


Elevon and Elevator Travel Boards (Effectivity: All)
Figure 12



Flight Control Rigging Tools (Effectivity: All)
Figure 13

EXAMPLE:
TO RIG 1/8 DIA. CABLE TO
50±5 LBS AT 59°F
AT TEMPERATURE 80°F
1/8 DIA. CABLE TENSION SHOULD BE:
(50-10)±5 LBS
WHERE -10 LBS IS FROM CHART



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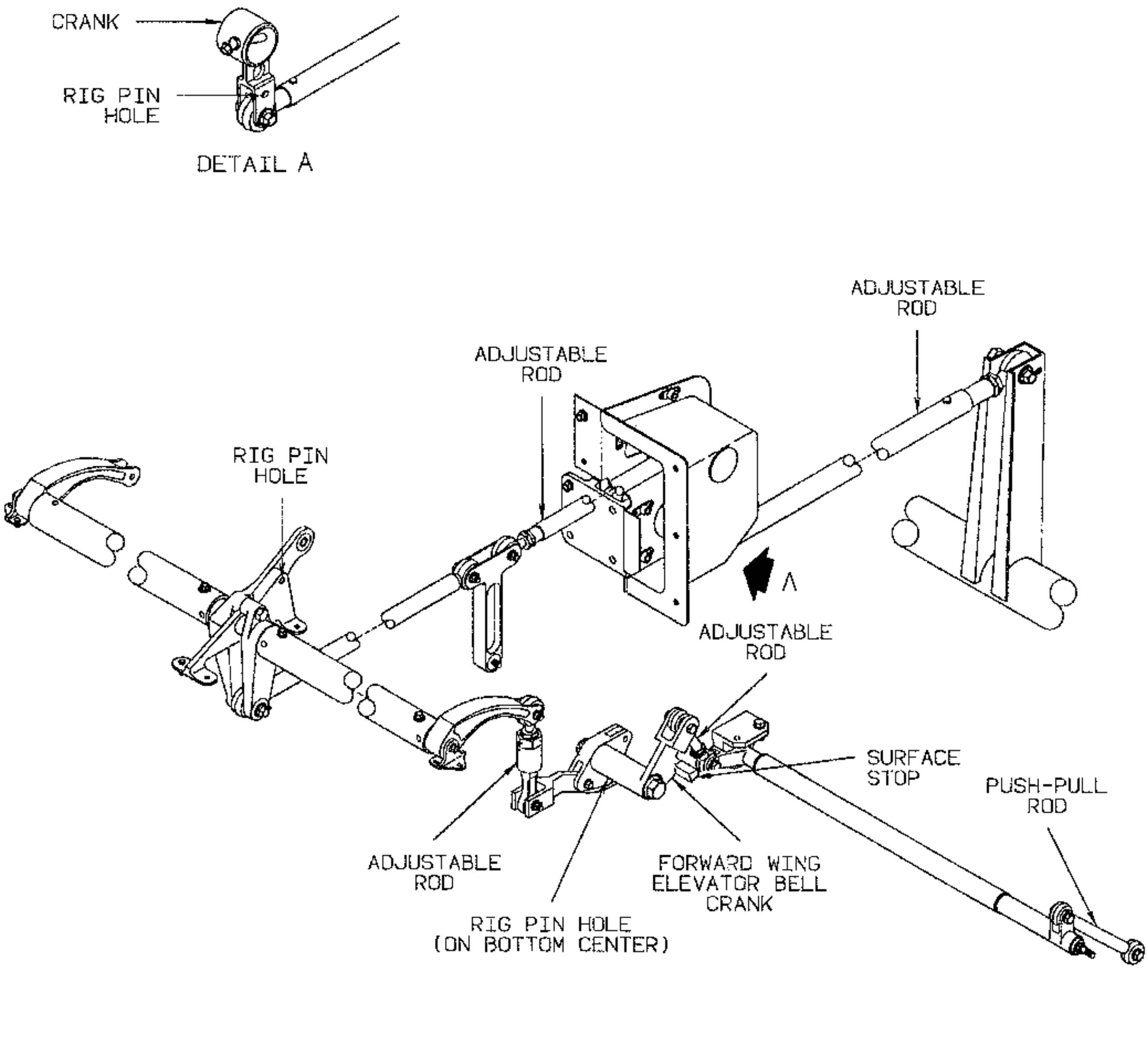
Cable Tension Graph (Effectivity: All)
Figure 14



Elevator Control Linkage (Effectivity: All)
Figure 15

a. Install elevator trim tab travel boards (7 and 8, Chart 1, 27-00-00) just outboard of the elevator trim tabs as shown in Figure 12.

b. Operate the trim tab actuator to position the elevator tab in the full trailing edge down position, then make the following push-pull rod adjustment as applicable:

1. Two degrees plus or minus one-half of a degree trailing edge down, as read from the travel board, for airplanes NC-4 thru NC-28 without BEECHCRAFT Kit No. 122-9002-1 installed.

2. Zero degrees plus or minus one-half of a degree trailing edge down, as read from the travel board, for airplanes NC-29 and after and NC-4 thru NC-28 with BEECHCRAFT Kit No. 122-9002-1 installed.

c. Operate the trim tab actuator to position the elevator tab in the full trailing edge up position, then make the following push-pull rod adjustment as applicable:

1. Eighteen degrees plus or minus one degree trailing edge up, as read from the travel board, for airplanes NC-4 thru NC-28 without BEECHCRAFT Kit No. 122-9002-1 installed.

2. Twenty degrees plus one degree or minus 0 degrees trailing edge up, as read from the travel board, for airplanes NC-29 and after and NC-4 thru NC-28 with BEECHCRAFT Kit No. 122-9002-1 installed.

d. Operate the trim tab actuator to position the elevator tab to neutral position of 0° ±1/2°, reading from travel board. Verify that the elevator trim tab indicator on the pedestal is at the zero position.

e. The left and right trim tabs shall agree within 1/2° at neutral and 1° at all other positions.

f. Inspect elevator trim tab as specified under ELEVATOR AND ELEVON TRIM TAB FREE PLAY CHECK in this chapter.

g. Load the airplane to 13,900 to 14,100 pounds with a CG of 314 to 315.

h. Fly the airplane at 12,000 to 13,000 feet and trim for level flight at 260 to 270 KIAS and record the elevator trim setting. The method used to record the elevator trim setting must allow the trim setting to be duplicated when the airplane is on the ground.

i. With the airplane on the ground, set the elevator trim to the setting recorded in step h.

j. Install elevator trim tab travel boards (7 and 8, Chart 1, 27-00 -00) just outboard of the elevator trim tabs as shown in Figure 12.

k. Reading from the travel boards, record the settings for both the LH and RH elevator trim tabs and average the readings.

l. Disconnect the push-pull rods from the trim tabs. Run the trim tab actuators to the full nose down position.

m. Adjust the push-pull rods to position the trim tabs to the average reading obtained in step k plus 3° ±.5° in the nose down direction; this new setting should not exceed -2°. Reconnect the push-pull rods to the trim tabs. Record the trim tab settings in the Airplane Log Book.

n. Run the trim tab actuators to full nose up and, reading from the travel boards, record the trim tab setting in the Airplane Log Book.

o. With the airplane loaded the same as in step g and with the landing gear down, flaps up, power at idle and full nose up trim, check that the airplane trim speed is less than 113 KIAS.

ELEVON TRIM TAB RIGGING (Effectivity: All) (Figure 12)

Rig elevon trim tab system as follows:

NOTE

If it is necessary to adjust the length of any push-pull rods, cut safety wire and then reinstall safety wire after the adjustment is made.

a. Install elevon trim tab travel boards (10 and 12, Chart 1, 27-00 -00) just outboard of the elevon trim tabs as shown in Figure 12.

b. Operate the elevon trim tab actuator to the full roll right position. Adjust the LH tab push-pull rod to provide 10 ±1/2° trailing edge up, reading from travel board. Operate the elevon trim tab actuator to the full roll left position. The LH tab should be 6° ±1° trailing edge down.

c. Operate the elevon trim tab actuator to the full roll left position. Adjust the RH tab push-pull rod to provide 10 ±1/2° trailing edge up reading from travel board. Operate the elevon trim tab actuator to the full roll right position. The RH tab should be 6 ±1° trailing edge down.

d. Operate the elevon trim tab actuator to position the elevon trim tab to neutral position of 2 ±1/2° reading from travel board. Verify that the elevon trim tab indicator on the pedestal is at the zero position.

e. The left and right trim tabs shall agree within 1/2° at neutral and ±1/2° at full deflection in both directions.

f. Inspect elevon trim tab as specified under ELEVATOR AND ELEVON TRIM TAB FREE PLAY CHECK in this chapter.

ELEVATOR AND ELEVON TRIM TAB FREE PLAY CHECK (Effectivity: All) (Figures 7, 9 and 16)

a. Visually inspect the trim tab for any damage, for security of hinge attach point and for tightness of the actuating system. Inconsistencies should be remedied prior to checking the free play of the tab.

b. A check fixture (5, Chart 1, 27-00-00) or the equivalent as shown in Figure 16, a dial indicator, and a push-pull scale for applying accurate loading to the tabs are required for making the inspection for free play of the tabs.

CHART 1
ELEVATOR AND ELEVON TRIM TAB FREE PLAY LIMITS (Effectivity: All)

5-Pound Reading	10-Pound Reading	
B ________		
2B ________	-A ________	=X ________
D ________		
2D ________	-C ________	=Y ________
X ________	+Y ________	=E ________

(Elevator: E = .055 inch maximum)

(Elevon: E = .08 inch maximum)

c. Install rig pins to prevent movement of the elevators or elevons. Set the trim tabs in the neutral position.

d. Disconnect one push-pull rod from the trim tab (Refer to Figure 7 or 9). Leave the second push-pull rod connected.

e. Affix the dial indicator check fixture so that the dial indicator point is 4.0 inches aft of the tab hinge line and on the outboard edge of the trim tab.

f. Apply a small piece of masking tape (for paint protection) 4.0 inches aft of the tab hinge line and along the centerline of the tab actuator. This will be the point of pressure against the tab by the push-pull scale.

g. Apply another piece of masking tape in the corresponding position on the bottom surface of the tab for the same purpose.

h. Zero the dial indicator at no load initially. Do not reset during the checking procedure.

i. With the push-pull scale at the point of masking tape, apply a full 10-pound downward load. Record the dial reading as "A".

j. Release half the load until a 5.0-pound downward load is obtained. Record the dial reading as "B".

k. Apply a full 10-pound upward load at the masking tape on the bottom surface. Record the dial reading as "C".

l. Release half the load until a 5.0-pound upward load is obtained. Record the dial reading as "D".

m. Enter the recorded values on a copy of Chart 2 and proceed as follows:

1. Multiply "B" by 2 and record as "2B".
2. Subtract "A" from "2B" and record as "X".
3. Multiply "D" by 2 and record as "2D".
4. Subtract "C" from "2D" and record as "Y".

NOTE

The results of "X" and "Y" can be a negative number.

5. Add "X" and "Y" and record as "E".

n. If deflection of the tab is within the allowable limits, the tab and its linkage are in good condition.

o. If the free play is excessive, disconnect the trim tab actuator rod and visually inspect the bolts and bushing for indications of excessive wear. Replace excessively worn parts.

p. Connect the first push-pull rod and repeat the procedure for the other push-pull rod.

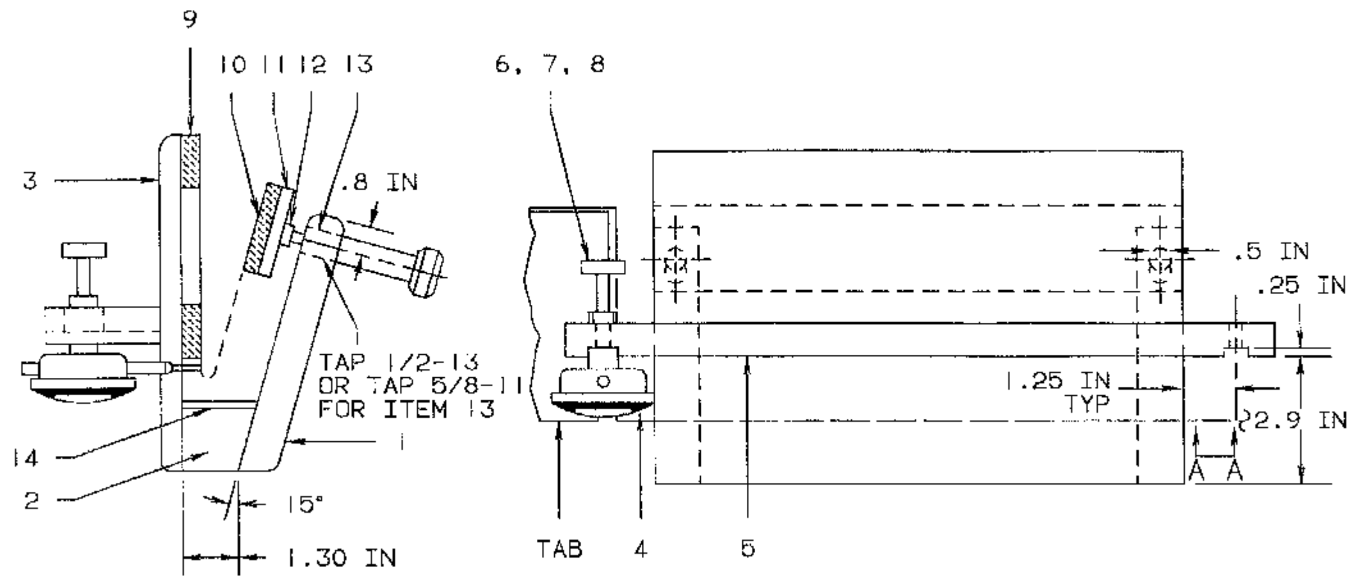
q. Connect the second push-pull rod (Refer to Figure 7 or 9).

SECURING THE CONTROL WHEEL ELECTRICAL CABLE (Effectivity: All) (Figure 17)

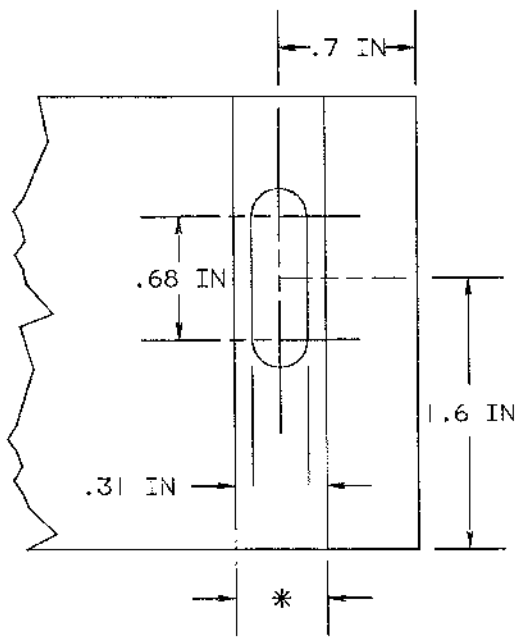
a. Disconnect electrical connector (15) from electrical connector (16).

b. Loosen clamps (4 and 14) enough to allow the cable to slide freely through the clamps.

c. Install clamp (5) on the control column (8), install clamp (9) on the cable (13) and secure them together with screw (7), washer (10), and nut (11).



P/N 45-135030-9/810		
ITEM	QUAN	DESCRIPTION
1	2	3/4 X 1 X 6 ALUM. OR EQV.
2	2	1 X 1 3/8 X 1 3/4 ALUM. OR EQV.
3	1	1/2 X 7 1/2 X 10 ALUM. OR EQV.
4	1	C81Q INDICATOR**
5	1	3/4 X 2 1/2 X 14 ALUM OR EQV.
6	1	1/4 DIA. X 2 CRES. STL.
7	1	1/4 DIA. X 1 CRES. STL.
8	1	1/4-28 NUT
9	1	3/8 X 5 X 10 RUBBER
10	1	3/8 X 2 X 10 RUBBER
11	1	1/4 X 2 X 10 RUBBER
12	2	1/2 - 13 X 3 VLIER TORQ. SCRW.
13	2	KN813 KEENSERT
14	2	1/8 X 1 3/4 RUBBER
**P/N OF FEDERAL PROD. CORP., PROV. R.I.		



SECTION A A

*THIS GROOVE TO BE A SNUG FIT TO THE SCREW BRACKET ON THE DIAL INDICATOR.

2000-153-16

Trim Tab Free-Play Measurement Tool (Effectivity: All)
Figure 16

d. Unwrap the cable coil (13) and position it around the control column (8) as shown.

CAUTION

Make sure the taper pin (12), nut, and cotter pin have no sharp edges that could chafe the cable coil (13) if they come in contact.

e. Pull any excess cable through the clamp (14) and tighten the clamp.

f. Fully rotate the control wheel (6) in both directions to ensure that the cable coil (13) does not wrap too tightly around the control column (8) or come in contact with the taper pin (12), nut, or cotter pin.

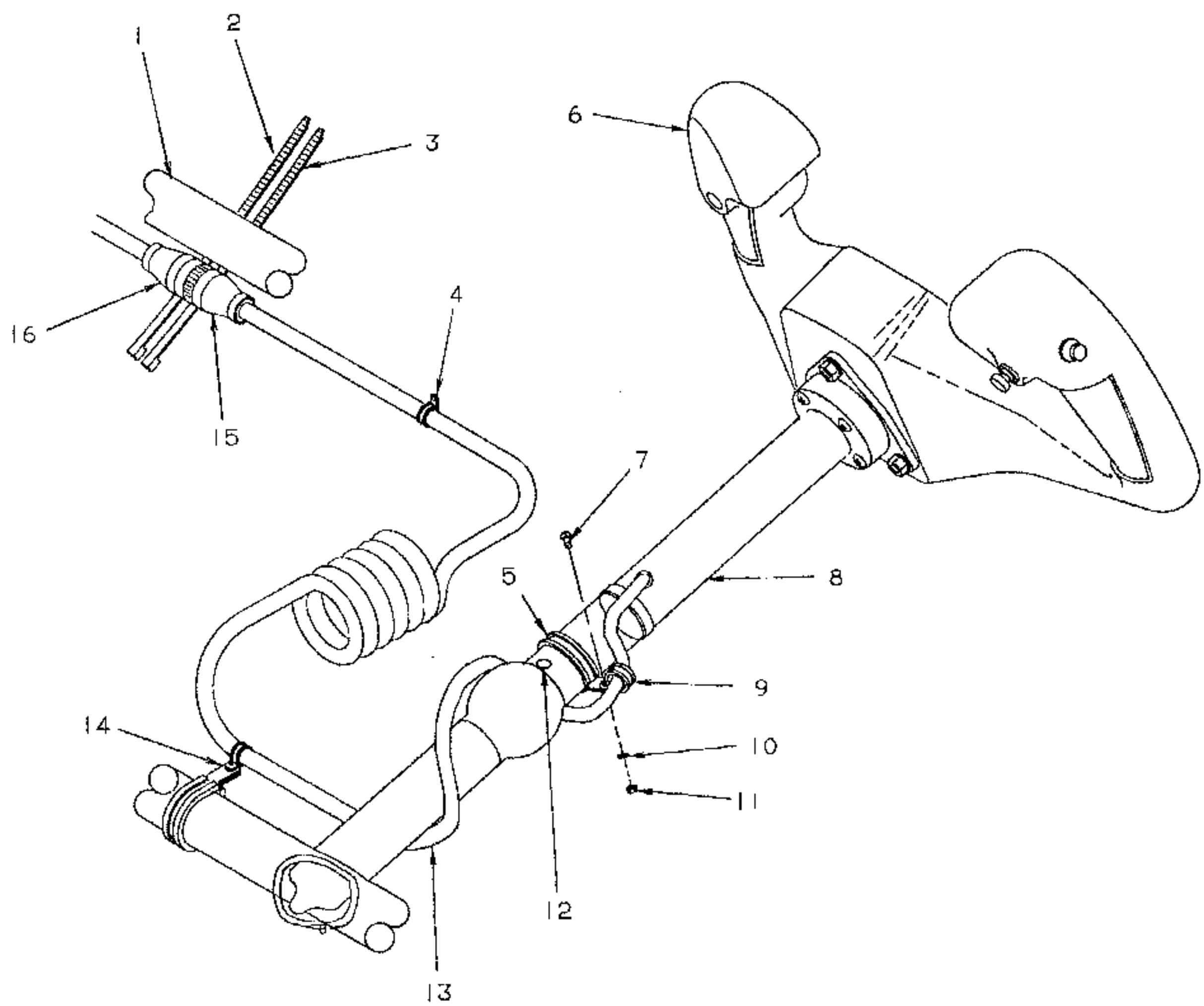
g. Pull any excess cable through the clamp (4) and tighten the clamp.

h. Connect electrical connectors (15 and 16) to each other.

i. Install the tie wrap (3) around the collar of electrical connector (15) and wire bundle (1) so that the collar of electrical connector cannot loosen.

j. Install tie wrap (2) around electrical connector (16) and wire bundle (1).

k. Pull the control wheel (6) fully aft and make sure the relaxed cable does not come in contact with any surrounding equipment.



1. WIRE BUNDLE	9. CLAMP
2. TIE WRAP	10. WASHER
3. TIE WRAP	11. NUT
4. CLAMP	12. TAPER PIN, NUT, COTTER PIN
5. CLAMP	13. CABLE COIL
6. CONTROL WHEEL	14. CLAMP
7. SCREW	15. ELECTRICAL CONNECTOR
8. CONTROL COLUMN	16. ELECTRICAL CONNECTOR

C94NC27B0389 C

Securing The Control Wheel Electrical Cable (Effectivity: All)
Figure 17

STALL WARNING SYSTEM - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

GENERAL (Effectivity: All) (Figure 1)

The stall warning system provides stall warning, stall barrier and a visual indication of angle of attack (AOA) based on the precise measurement of airstream direction relative to the airplane's fuselage reference line. Stall warning and stall barrier outputs are compensated to provide an accurate correlation with AOA as influenced by wing and elevator configurations.

The stall warning system is separated into left and right subsystems. Each subsystem incorporates its own AOA transmitter and stall warning computer. The AOA transmitters are individually mounted inside their respective wheel well cheek. The stall warning computers are mounted on the aft side of the forward pressure bulkhead on the copilot's side behind the instrument panel. A lighted AOA indicator is located on the LH upper console panel to accept reference and validation outputs from the selected stall warning computer. If 28 vdc power, or the validation signal to the AOA indicator, is interrupted, a FAIL flag is shown. The AOA LEFT-RIGHT switch is located just outboard of the AOA indicator to select the desired computer for monitoring.

The stall warning computers analyze elevator position signals from the dual elevator position potentiometers (located in the upper LH nose avionics compartment), which are mechanically connected to the elevator control linkage. Calibration of the elevator position potentiometers is accomplished through dual elevator position trim potentiometers located on the forward side of the copilot's outboard subpanel. A G-switch is installed below the center floor panel in the cockpit and prevents the generation of stall barrier outputs when normal airplane acceleration falls below 0.5 ±0.05 G. The stall warning computers share the signals from the G-switch. The stall barrier function is the only function which requires an output from both stall warning computers. Two throttle switches, installed in the pedestal adjacent to the power levers, provide a ground signal to the stall warning computers when N1 speed drops below 83 to 85%.

The stall warning shaker is mounted on the pilot's control column and is wired to operate on a 28 vdc output from either one of the stall warning computers. Dual warning horns and the A219 column pusher time delay PCB are mounted under the lip of the glareshield. The K508 column pusher disconnect relay, located adjacent to the stall warning computers, disconnects the autopilot from servo pitch control and transfers control to the column pusher to allow pusher operation. Metal oxide varistors (MOV) are installed to protect the system from lightning transients. Refer to Figure 2 for their locations.

SYSTEM OPERATION (Effectivity: All) (Figures 1 and 2)

Each subsystem operates independant of the other to provide separate stall warning computer outputs. The system outputs consist of stall warning (shaker), stall barrier (column pusher), failure annunciation and AOA indication. Each computer output is applied completely independant of its like output from the opposite computer. The only exception is the stall barrier function, which requires a simultaneous output from each computer.

The LH computer supplies the column pusher motor signals and the RH computer supplies the column pusher clutch signals through the K508 column pusher disconnect relay. The column pusher motor and clutch signals are also sent to the Data Aquisition Unit (DAU) for display of the EICAS yellow "PUSHER MOTOR ON" and "PUSHER CLUTCH ON" caution messages. A two-second time delay in the DAU circuitry prevents momentary display of these messages. If the column pusher motor signal is received by the EICAS without the column pusher clutch signal, the EICAS yellow "PUSHER MOTOR ON" caution message will be displayed. Should the column pusher clutch signal be received by the EICAS without the column pusher motor signal, the yellow EICAS "PUSHER CLUTCH ON" caution message will be displayed. The stall warning horn output is sent from either computer only if the angle of attack (AOA), as determined by the respective computer, remains at or above the stall threshold for approximately more than 1.5 seconds, or if AOA is equal to or exceeds the stall threshold.

Should stall warning shaker action be commanded, each computer will send an autopilot disconnect command to the autopilot control panel. The column pusher motor signal (from the LH computer) and the column pusher clutch signal (from the RH computer) are routed through the K508 column pusher disconnect relay and the 2213K1 relay to operate the autopilot pitch servo. The K508 disconnect relay energizes to inhibit column pusher operation when any one of the following three signals is present:

a. A signal from the FLAP/FWD WING switch when it is moved to the EXTEND position, indicating that flaps are down and that the forward wing is extended.

b. A signal from the A219 column pusher time delay PCB or a signal from the G-switch indicating that acceleration is less than 0.5 ±0.05 G.

c. If either computer senses an internal fault or a fault in the AOA transmitter, a fail signal is sent through relays in the A211 relay PCB to the Engine Instrument, Crew Alerting System (EICAS) to display the EICAS yellow "L STALL WARN FAIL" or "R STALL WARN FAIL" caution message.

With the initiation of column pusher operation, the autopilot pitch servo will cause the nose to pitch over immediately. If the stall condition is not corrected within 1.5 seconds, the stall warning horn(s) will sound to audibly warn the crew that the control wheel should be pushed forward.

During normal operation, a ground is supplied to the A219 column pusher time delay PCB and to relay 2213K1 through relays K10 and K11 in the radio junction box. If the pilot wishes to turn off the column pusher, he can momentarily depress the FLAP/TRIM PUSHER INTER switch located on the outboard horn of either control wheel. This action will cause the output latch from the A219 column pusher time delay PCB to go high and energize the column pusher disconnect relay, thereby de-energizing the 2213K1 relay to inhibit the pusher signals. Pusher action does not resume when the switch is released, providing the fault that initiated pusher action is no longer present. However, if column pusher is still commanded, the FLAP/TRIM PUSHER INTER switch can be depressed and held for 4 to 7 seconds and the output latch to the K508 column pusher disconnect relay is latched high to inhibit the column pusher signals. The EICAS yellow "PUSHER INOP" caution message will then be displayed on the EICAS display. Column pusher operation is prevented until the system is reset, which occurs when the push and/or clutch signals are no longer output by the stall warning computers.

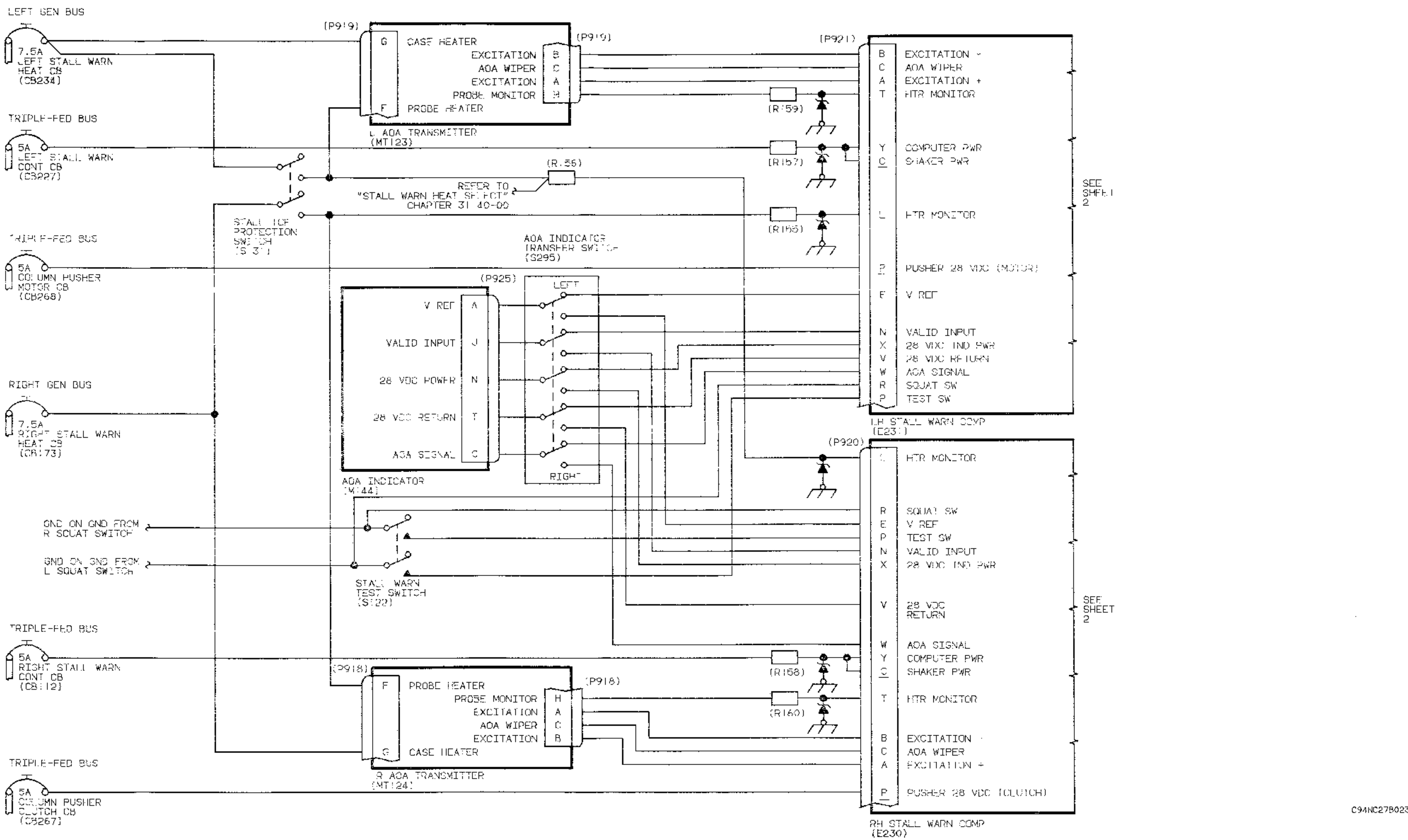
ANGLE-OF-ATTACK TRANSMITTER (Effectivity: All)

The angle-of-attack (AOA) transmitters are powered through the LEFT and RIGHT STALL WARNING circuit breakers located in the WARNING group on the LH circuit breaker panel. The AOA transmitters sense airstream direction through a paddle vane connected to a potentiometer inside the airstream sensing probe. Pressure differential relative to the center of the airstream moves the paddle vane across the potentiometer where a comparative signal is output to the respective stall warning computer.

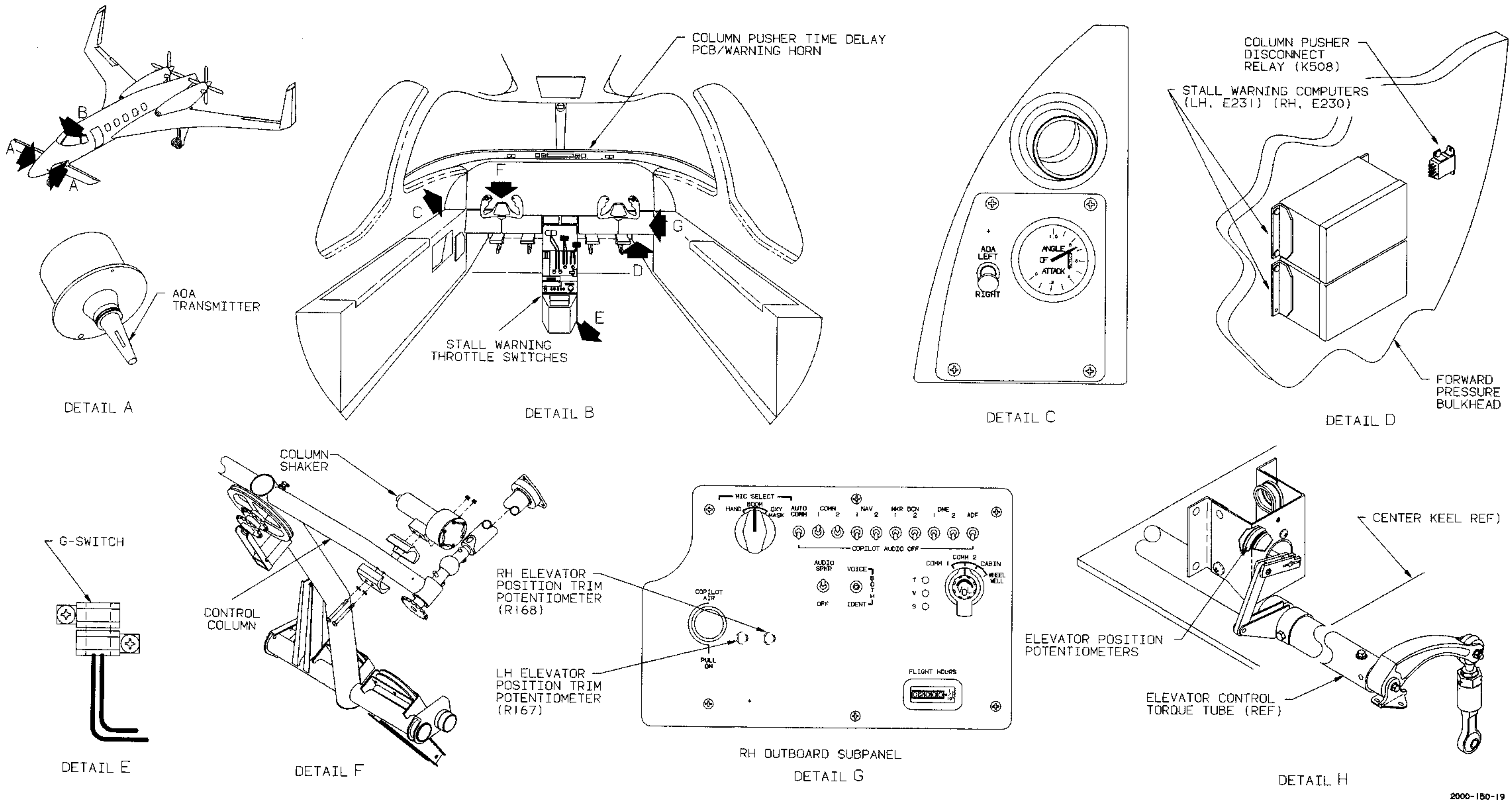
NOTE

> The AOA transmitters are mounted on an adjustable mounting plate. When the mounting plate has been adjusted and secured after in-flight calibration, no other system adjustments are required.

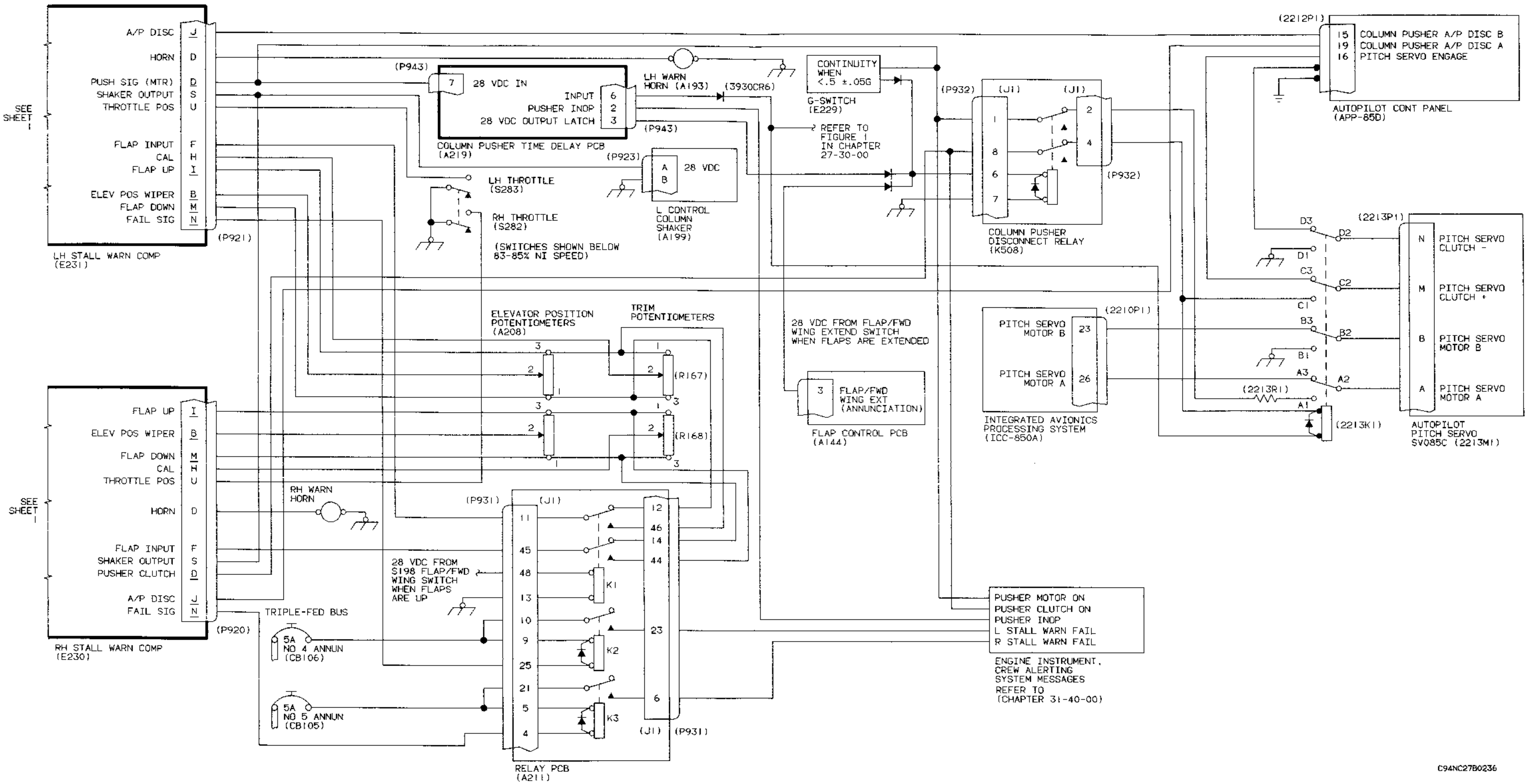
Each AOA transmitter contains two internal heating elements to prevent ice buildup on the airstream sensing probe. The case heater is a 50-watt unit used to supply additional heat for the unit as needed. The case heater is controlled by a thermostat which closes when internal temperature drops below 90° F. and opens when internal temperature rises above 125° F. The probe heater is a 157-watt unit controlled by internal circuitry which monitors an internal current sensor and limits current flow to prevent heater burnout in still air, yet still provide adequate on-ground ice protection. Both heaters are powered by the same source through the respective LEFT or RIGHT STALL



Stall Warning Schematic Diagram (Effectivity: All)
(Sheet 1 of 2)
Figure 2



Stall Warning System (Effectivity: All)
Figure 1



Stall Warning Schematic Diagram (Effectivity: All)
(Sheet 2 of 2)
Figure 2

WARNING circuit breaker located under ICE PROTECTION on the LH circuit breaker panel. A STALL WARN ice protection switch, located on the pilot's inboard subpanel, must be turned on to supply power to the probe heaters while the case heaters recieve power directly from the circuit breakers. Voltage downstream of the STALL WARN ice protection switch is input to each stall warning computer for monitoring, and to the STALL WARN HEAT SELECT input on the Engine Data Concentrator (EDC). When a fault occurs in the transmitter, or if heater power is absent, the 10-vdc signal is removed from the heater monitor input of the respective computer. The respective computer then provides a ground to the applicable relay (K2 or K3) on the A211 relay PCB to signal the Data Aquisition Unit (DAU) to initiate display of either the EICAS yellow "L STALL WARN FAIL" or "R STALL WARN FAIL" caution message. When the system is first powered-up, the "L STALL WARN FAIL" and "R STALL WARN FAIL" messages are also displayed for the duration of the system self-test.

STALL WARNING COMPUTERS (Effectivity: All)

Each stall warning computer is a solid-state, electronic microprocessor, utilizing software to incorporate power distribution, computation, monitoring, test and warning functions. The computers monitor signals from the AOA transmitters, elevator position potentiometers, elevator position trim potentiometers, the G-switch, throttle switches and the STALL WARN test switch. Each stall warning computer also supplies a 28-vdc signal to operate its respective warning horn when the speed ratio decreases below the value indicated for stall threshold. The horn signal is only sent when the stall threshold is exceeded for 1.5 seconds.

Either computer can supply an activation signal to the stall warning shaker installed on the LH control column. The activation signal is sent when either stall warning subsystem senses, depending on actual CG of the airplane, the threshold value of AOA from its transmitter probe or the threshold value of the elevator angle, as received from the elevator position potentiometer.

Simultaneous outputs by both computers are required to initiate column pusher action. The RH computer supplies power to the column pusher clutch and the LH computer supplies power to the column pusher motor. An autopilot disconnect signal is also output from both computers. If any of these signals are absent, column pusher action cannot occur. The column pusher motor and column pusher clutch signals can be interrupted by series-connected FLAP/TRIM PUSHER INTER switches located on the outboard horn of each control wheel.

STALL WARNING SYSTEM - MAINTENANCE PRACTICES (Effectivity: All)

AOA INDICATOR REMOVAL (Effectivity: All) (Figure 3)

a. Remove all electrical power from the airplane.

CAUTION

When performing maintenance around electroluminescent panels, take precautions not to damage the panels as they cannot be repaired.

b. Remove the four screws (1) securing the electroluminescent panel (2) to the panel assembly (4).

c. Remove the two screws (3) securing the panel assembly (4) to the LH upper console panel.

d. Pull the panel assembly (4) away from the LH upper panel far enough to reach the electrical connector (7) on the back of the AOA indicator (8), then disconnect the electrical connector.

e. Remove the screws (5) and nuts (6) securing the AOA indicator to the panel assembly (4).

f. Remove the AOA indicator from the airplane.

AOA INDICATOR INSTALLATION (Effectivity: All) (Figure 3)

a. Align the AOA indicator (8) with the panel assembly (4) cutout and secure with screws (5) and nuts (6).

b. Reconnect the electrical connector (7) to the AOA indicator (8).

c. Secure the panel assembly (4) to the upper LH console panel with two screws (3).

CAUTION

When performing maintenance around electroluminescent panels, take precautions not to damage the panels as they cannot be repaired.

d. Secure the electroluminescent panel (2) to the panel assembly (4) with four screws (1).

e. Restore electrical power to the airplane.

STALL WARNING COMPUTER REMOVAL (Effectivity: All) (Figure 4)

a. Remove all electrical power from the airplane.

b. Tag and disconnect the electrical connector from the computer being removed.

c. Remove the four screws and lock washers securing the computer to the forward pressure bulkhead, then remove the computer from the airplane.

STALL WARNING COMPUTER INSTALLATION (Effectivity: All) (Figure 4)

a. Align the computer with the inserts on the forward pressure bulkhead, then secure with four screws and lock washers.

b. Reconnect the electrical connector to the computer as tagged.

c. Restore electrical power to the airplane.

AOA TRANSMITTER REMOVAL (Effectivity: All) (Figure 5)

a. Remove all electrical power from the airplane.

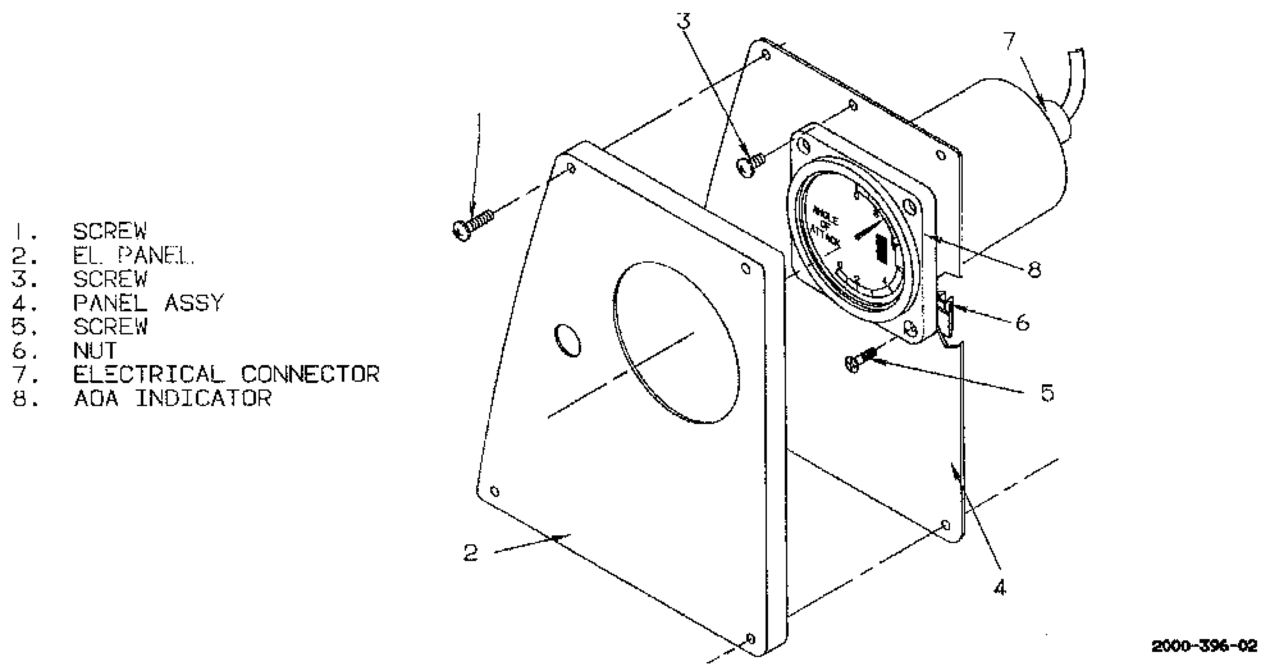
b. Pump the nose gear doors open using the landing gear alternate extension handle in the cockpit.

c. Install the lockpin in the nose gear doors as instructed in Chapter 32-20-00.

d. Remove the RH or LH access panel in nose wheel well, as applicable.

e. Remove the No. 1 NAV receiver to access the LH transmitter, or remove the ADF receiver to access the RH transmitter.

f. Tag and disconnect the electrical connector from the AOA transmitter (9).



AOA Indicator Installation (Effectivity: All)
Figure 3

NOTE

Note the AOA transmitter probe setting before removal to allow reinstallation of the assembly without recalibration.

g. Remove the self-locking nuts (1) and step-washer clamps (2).

h. Remove the AOA transmitter (9) and indexing ring (3) from airplane.

AOA TRANSMITTER INSTALLATION (Effectivity: All) (Figure 5)

NOTE

Reset the AOA transmitter probe to its original setting noted during removal.

a. Install the AOA transmitter (9) and indexing ring (3), then secure with self-locking nuts (1) and step-washer clamps (2).

b. Reconnect the electrical connector to the AOA transmitter (9) as tagged.

c. Reinstall the No. 1 NAV receiver after installation of the LH transmitter or reinstall the ADF receiver after installation of the RH transmitter

d. Restore electrical power to the airplane.

e. Remove the lockpin from the nose gear doors and push the nose gear doors to the closed position.

f. Perform a system calibration as described under STALL WARNING SYSTEM CALIBRATION if the original probe setting was changed.

G-SWITCH REMOVAL (Effectivity: All) (Figure 6)

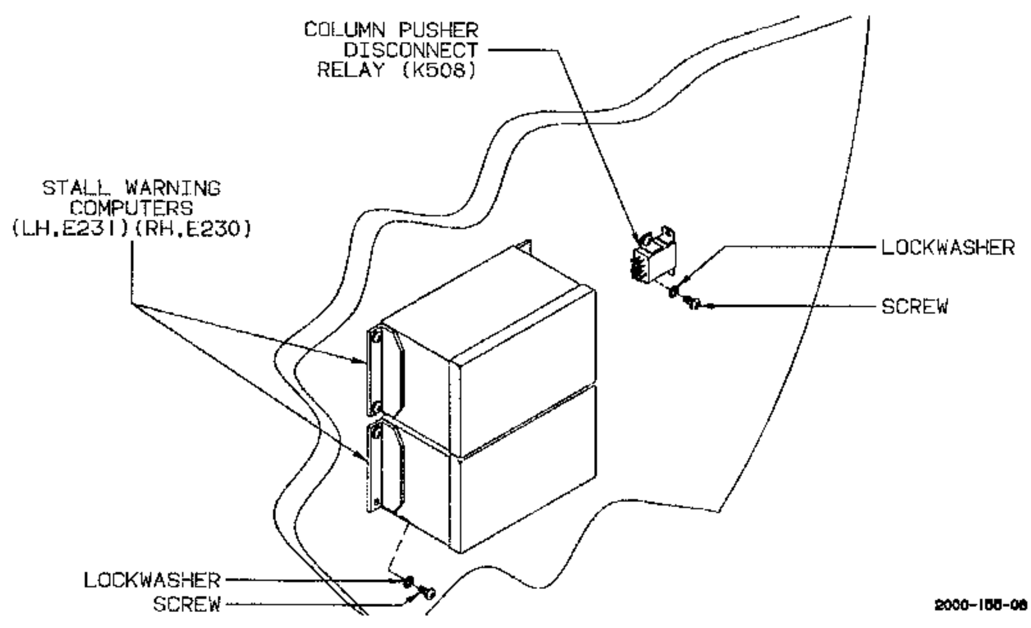
a. Remove all electrical power from the airplane.

b. Remove the center cockpit floor panel.

c. Disconnect the electrical wiring (4) from the G-switch (1).

d. Remove the two screws (2), washers (3) and clamps (5) securing the G-switch (1) to the closeout at F.S. 163.00.

e. Remove the G-switch (1) from the airplane.



Stall Warning Computer Installation (Effectivity: All)
Figure 4

G-SWITCH INSTALLATION (Effectivity: All) (Figure 6)

NOTE

The G-switch (1) must be positioned vertically ±0.5° with the airplane level. Refer to Chapter 8-00-00 for proper leveling procedures.

a. Position the G-switch (1) in the airplane and secure with the two attaching screws (2), washers (3) and clamps (5). Ensure that all electrical wiring (4) is installed pointing downward.

b. Reconnect the electrical wiring (4) to the G-switch (1).

c. Restore electrical power to the airplane.

d. Test the G-switch as instructed under G-SWITCH OPERATIONAL TEST.

e. Install the center cockpit floor panel.

STALL WARNING SHAKER REMOVAL (Effectivity: All) (Figure 7)

a. Remove all electrical power from the airplane.

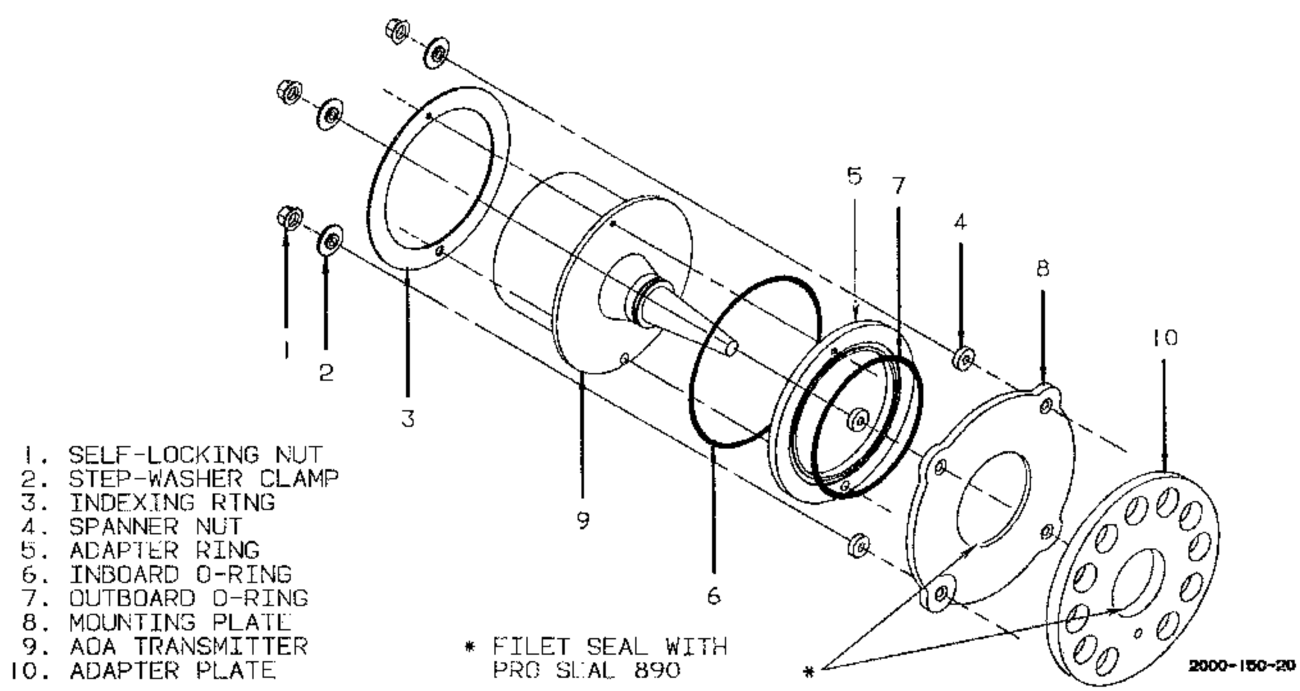
b. Disconnect the electrical connector (6) from the stall warning shaker (3) located on the LH control column.

c. Remove two screws (5), washers (4), and nuts (2) securing the stall warning shaker (3) and blocks (1) to the control column.

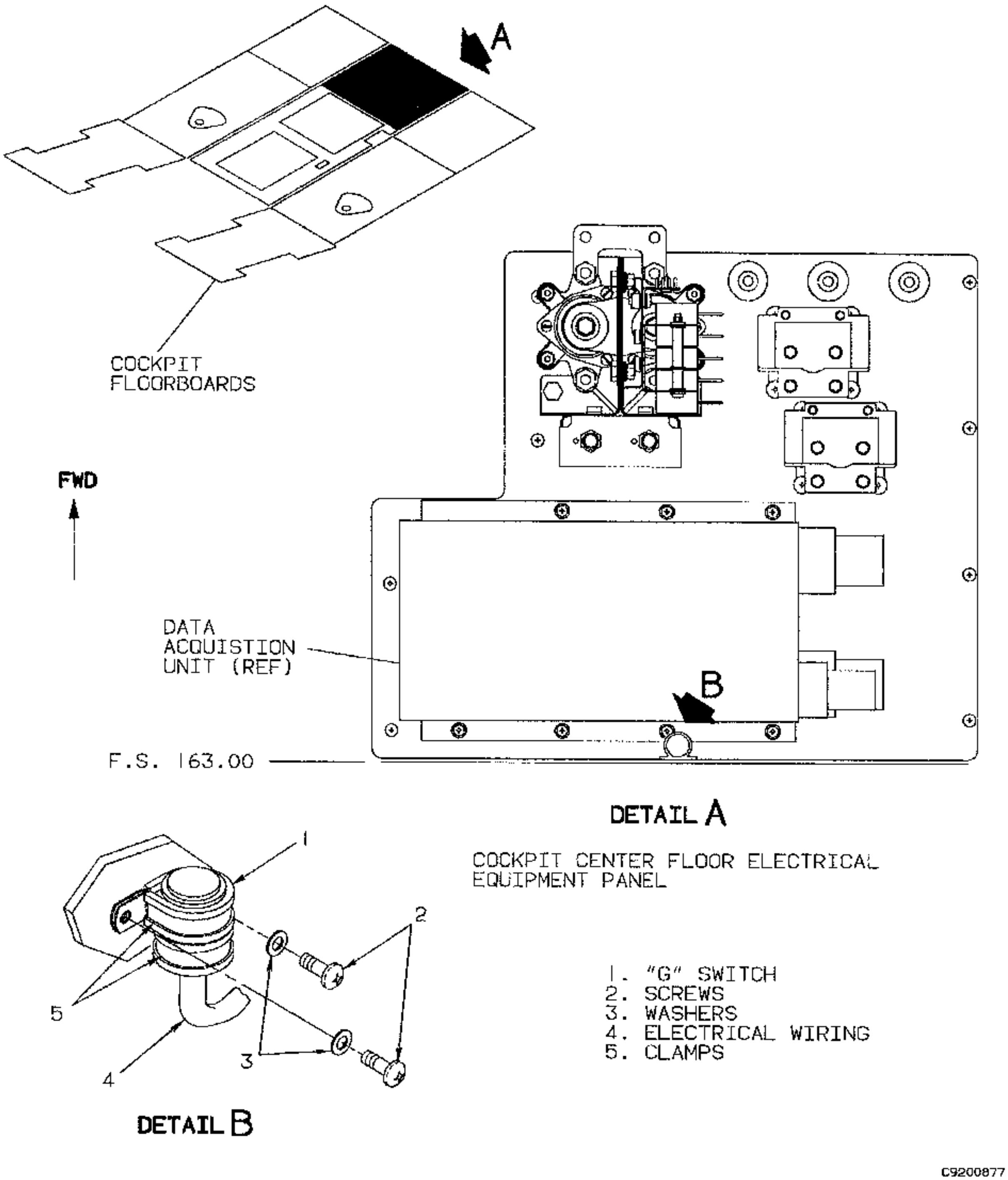
d. Remove the stall warning shaker (3) from the airplane.

STALL WARNING SHAKER INSTALLATION (Effectivity: All) (Figure 7)

a. Position the stall warning shaker (3) on the control column and secure with blocks (1), screws (5), washers (4) and nuts (2).



AOA Transmitter Installation (Effectivity: All)
Figure 5



G-Switch Installation (Effectivity: All)
Figure 6

b. Reconnect the electrical connector (6) to the stall warning shaker (3).

c. Restore electrical power to the airplane.

ELEVATOR POSITION POTENTIOMETERS REMOVAL (Effectivity: All) (Figure 8)

a. Remove all electrical power from the airplane.

b. Open the upper LH avionics compartment door.

c. Remove the screw (5), washer (6) and nut (7) securing the potentiometer arm (2) to the upper end of the link (1).

d. Disconnect the electrical connector at the airplane wire harness.

e. Remove the four screws (3) and washers (4) securing the bracket assembly together, then remove it from the airplane.

f. Loosen the screw (14) and washer (15) securing the potentiometer arm (2) to the potentiometers (10).

g. Remove the two screws (8), washers (9), and clamps (12) securing the potentiometers to the bracket (11), then remove the potentiometers.

ELEVATOR POSITION POTENTIOMETERS INSTALLATION (Effectivity: All) (Figure 8)

a. Position the potentiometers (10) in the bracket (11) and secure with two screws (8), washers (9) and clamps (12).

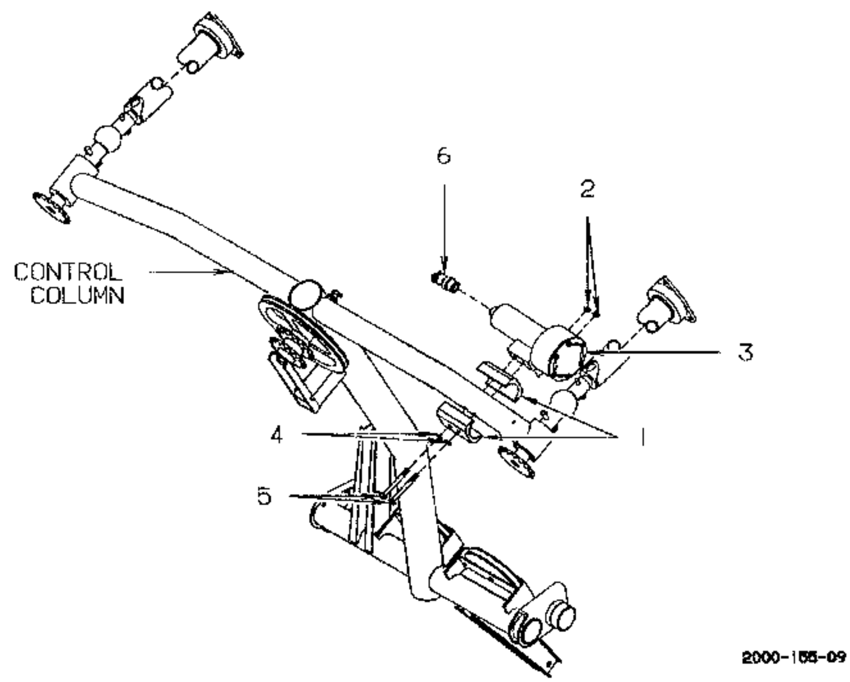
b. Loosely attach the potentiometer arm (2) to the potentiometers (10), then position the assembly in the airplane.

c. Install the four screws (3) and washers (4) securing the two halves of the bracket assembly together.

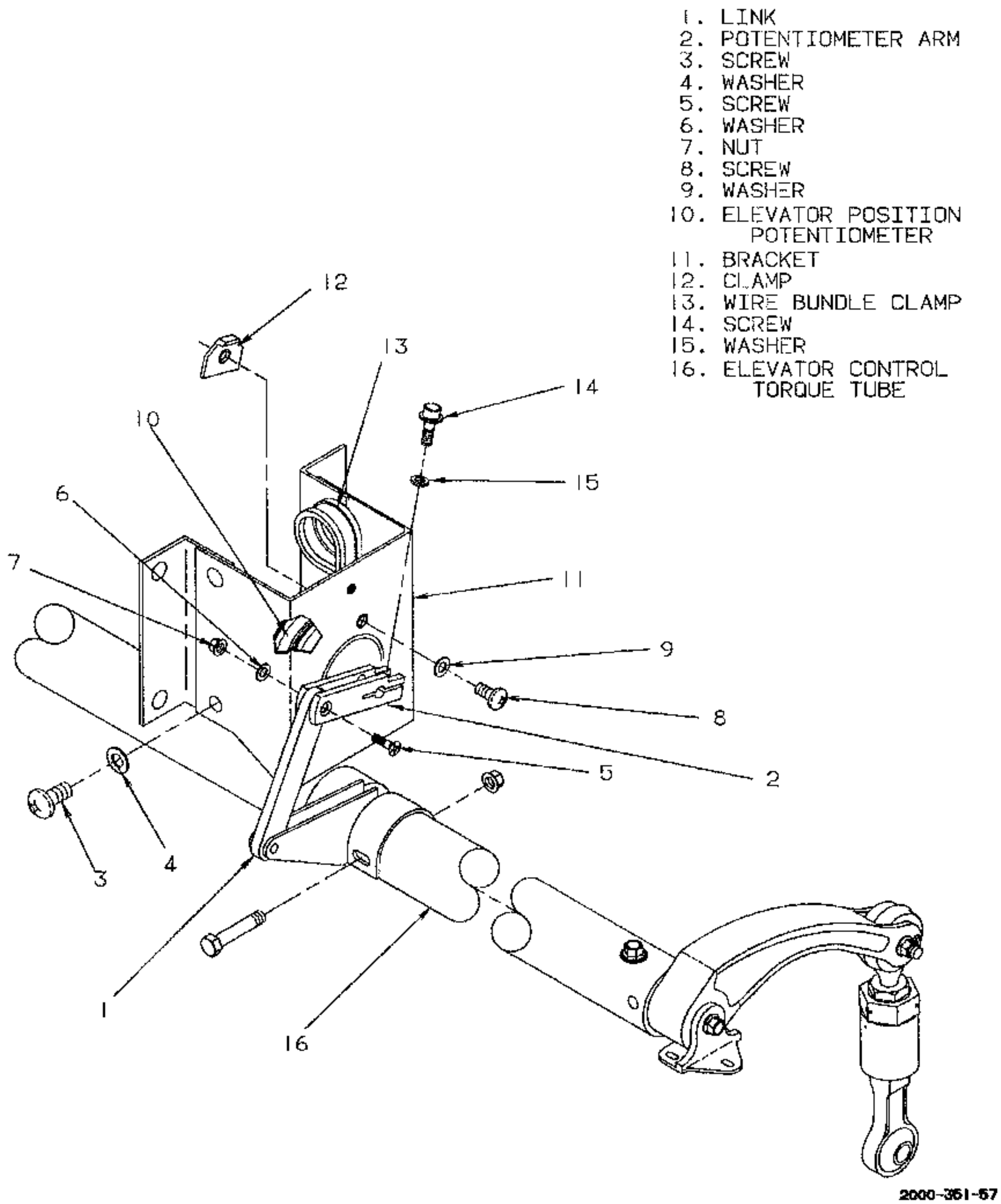
d. Reconnect the electrical connector to the airplane wire harness.

e. Install the screw (5), washer (6) and nut (7) securing the potentiometer arm (2) to the upper end of the link (1).

1. BLOCK
2. NUT
3. STALL WARNING SHAKER
4. WASHER
5. SCREW
6. ELECTRICAL CONNECTOR



Stall Warning Shaker Installation (Effectivity: All)
Figure 7



Elevator Position Potentiometers Installation (Effectivity: All)
Figure 8

f. Restore electrical power to the airplane.

g. Perform STALL WARNING CALIBRATION as outlined in this chapter.

h. Tighten the screw (14) and washer (15) securing the potentiometer arm (2) to the potentiometer shaft.

i. Reinstall the upper LH avionics compartment door.

COLUMN PUSHER TIME DELAY PCB AND WARNING HORN REMOVAL.
(Effectivity: All)
(Figure 9)

a. Remove all electrical power from the airplane.

b. Refer to Chapter 25-10-00 and remove the glareshield.

c. Remove the screws (6) and washers (7) securing the bracket (8) to the underside of the glareshield (1).

d. Tag and disconnect the electrical connector(s) from the warning horn(s) to be removed, or from the column pusher time delay PCB (12) as required.

e. Remove the screws (4) and washers (5) securing the warning horn(s) (2 or 3) to the bracket (8).

f. Remove the screws (9), nylon washers (10) and spacers (11) securing the column pusher time delay PCB (12) to the bracket (8).

COLUMN PUSHER TIME DELAY PCB AND WARNING HORN INSTALLATION
(Effectivity: All)
(Figure 9)

a. Secure the column pusher time delay PCB (12) to the bracket (8) with the attaching screws (9), nylon washers (10) and spacers (11).

b. Secure the warning horn(s) (2 or 3) to the bracket (8) with the attaching screws (4) and washers (5).

c. Reconnect the electrical connector(s) to the applicable warning horn(s) (2 or 3) and/or column pusher time delay PCB (12) as outlined by the BEECHCRAFT Starship 1 Wiring Diagram Manual.

d. Secure the assembled bracket assembly to the glareshield (1) with the attaching screws (6) and washers (7).

e. Refer to Chapter 25-10-00 and reinstall the glareshield.

f. Restore electrical power to the airplane.

THROTTLE SWITCHES ADJUSTMENT
(Effectivity: All)
(Figure 10)

A cam-operated switch is provided for each power lever linkage in the pedestal. The switches are wired so that a ground signal is supplied to each stall warning computer when the respective power lever is set above 83 to 85% N1 speed (gas generator speed). The airplane must be in flight to determine the actual power lever position corresponding to 83 to 85% N1 speed. This compensates for the ram air effect which alters the 83 to 85% N1 position indicated during ground operation.

a. With the airplane in flight, advance the power levers until 83 to 85% N1 speed is attained for each engine.

b. Mark the position of the power levers on the pedestal with a piece of tape before landing the airplane.

c. Remove all electrical power from the airplane.

d. Remove the panel from the LH side of pedestal.

e. Align the power levers with the tape on the pedestal to match the 83 to 85% N1 speed setting approximated during flight.

f. Loosen the screws (1) securing the throttle switches in their slotted mounting hangers (4), then adjust them to provide continuity between pins "3" and "5" and pins "4" and "5" of the throttle switch connector (J239), located below and just forward of the throttle switches. Use a multimeter to perform the continuity check.

g. Secure the throttle switches in their slotted mounting hangers (4) by tightening the screws (1).

h. Move the power levers aft of the tape and listen for an audible "click". Using a multimeter, verify an open circuit between pins "3" and "5" and pins "4" and "5" of the throttle switch connector (J239).

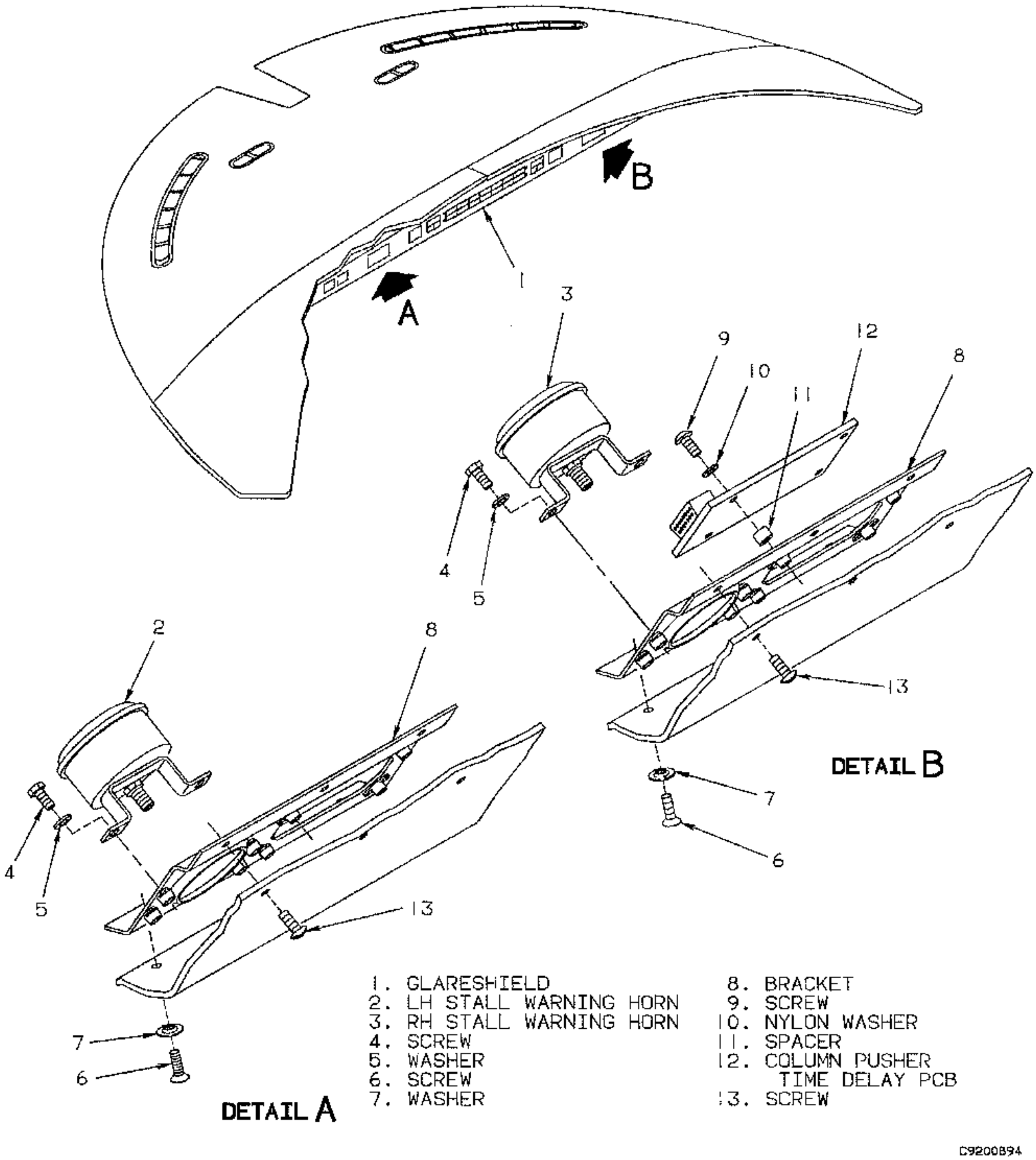
i. Advance the power levers through the tape marks and verify continuity between pins "3" and "5" and pins "4" and "5".

j. Remove the tape and install the panel on the LH side of the pedestal.

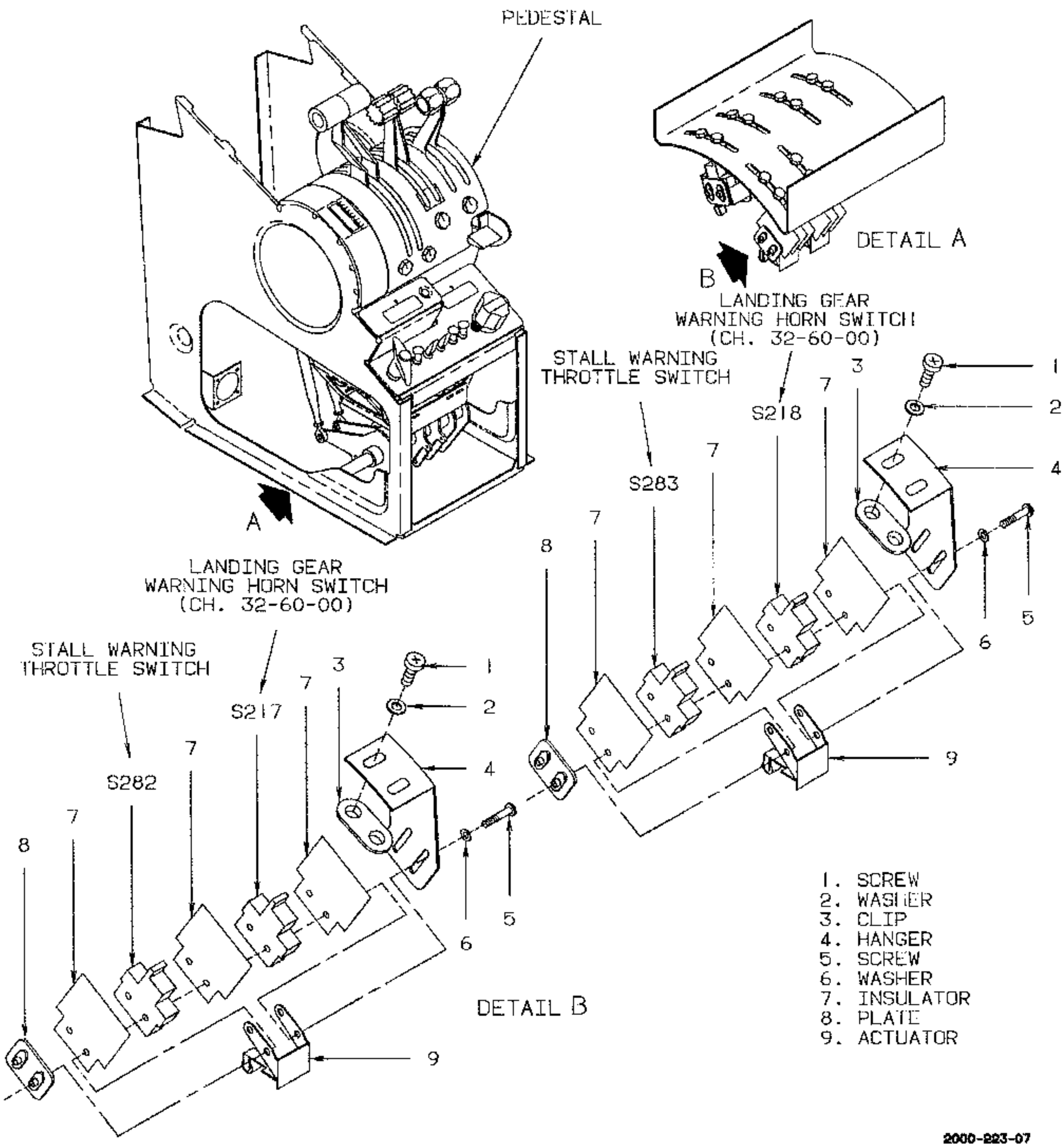
k. Restore electrical power to the airplane.

G-SWITCH OPERATIONAL TEST
(Effectivity: All)
(Figure 10)

a. Loosen the screw securing the bracket holding the G-switch to the closeout at F.S. 163.00, as shown by Figure 6.



Column Pusher Time Delay PCB and Warning Horn Installation (Effectivity: All)
Figure 9



Throttle Switches Installation (Effectivity: All)
Figure 10

b. Rotate the G-switch 90° from its normal mounting position.

c. Press the STALL WARN test switch and verify that the column pusher does not activate. The stall warning horn should sound for approximately 0.2 seconds.

d. Rotate the G-switch to its normal mounting position of ±0.5° vertical, then tighten the screw securing the bracket to the closeout.

e. Press the STALL WARN test switch and verify that the column pusher activates for approximately 1.5 seconds; after which time the stall warning horn should sound for approximately 0.2 seconds.

STALL WARNING SYSTEM OPERATIONAL TEST (Effectivity: All)

a. Turn the battery and avionics master switches ON, then place the FLAP/FWD WING switch in the RETRACT position.

b. Verify that the power levers are set at or below idle and that the elevators are set to the neutral position.

c. Press the STALL WARN test switch on the pilot's outboard subpanel.

d. Verify that the AOA indicator FAIL flag is displayed in the indicator window.

e. Observe that the AOA indicator pointer sweeps to the low end of the scale.

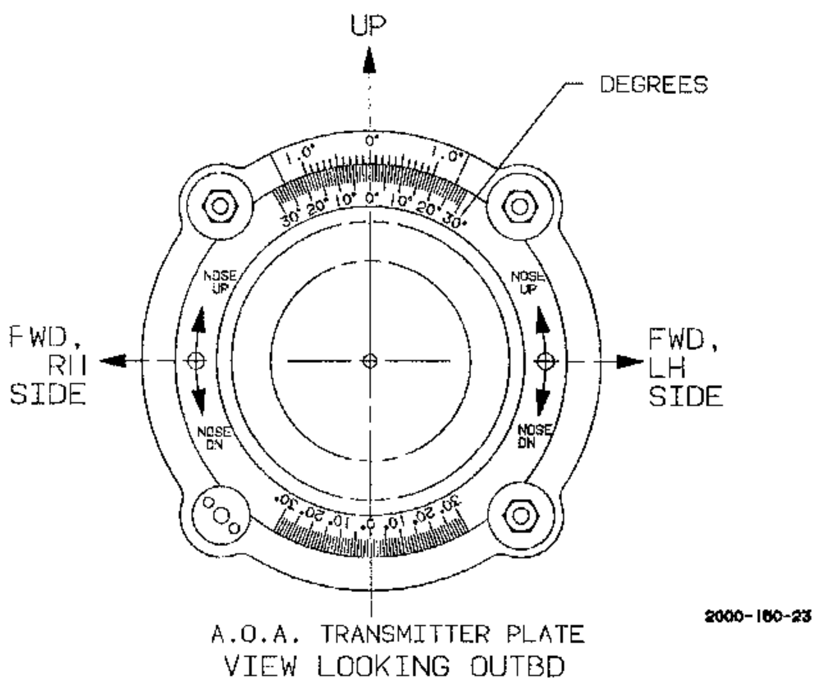
f. After approximately four seconds, verify that the AOA indicator sweeps toward 1.0 on the scale.

g. Verify that the stall warning shaker, the column pusher and the stall warning horns are activated consecutively.

h. Set the elevator position to greater than 20° trailing edge down.

i. Press the STALL WARN test switch again and verify that the stall warning shaker is instantly activated.

j. Place the FLAP/FWD WING switch in the EXTEND position and press the STALL WARN test switch. Verify that the pusher does not operate and that the warning horns sound.



AOA Transmitter Plate (Effectivity: All)
Figure 11

STALL WARNING SYSTEM CALIBRATION (Effectivity: All) (Figures 8, 12 and 13)

Calibration of the stall warning system shall be accomplished by sequentially performing the following three phases listed below.

PHASE I: AOA AND ELEVATOR POSITION POTENTIOMETER(S) SETUP (EFFECTIVITY:ALL)

a. AOA Transmitter(s)

1. Set both the LH and RH AOA transmitter probes to 1.0° nose-up, then secure. (Nose-up is: CCW looking outboard for LH; CW looking outboard for RH)

2. Connect the breakout box (17, Chart 1, 27-00-00). Refer to figures 12 and 13 for an illustration and schematic diagram of the breakout box.

3. On the breakout box, set the AOA and ELEVATOR switches to NORMAL, then set the SQUAT switch to OPEN.

4. Pull the RIGHT STALL WARNING circuit breaker.

5. Starting with the LH AOA probe in the full nose-up position, slowly rotate the probe to the nose-down position and verify that stall warning shaker onset occurs at the values listed below for each configuration. Observe the AOA indicator in the cockpit and ensure that the adjacent AOA switch is set to the side being checked.

a) Flaps down/power levers in idle position: AOA indication .80 ±.02.

b) Flaps down/power levers in 85% N1 speed position: AOA indication .50 ±.02.

c) Flaps up/power levers in idle position: AOA indication .62 ±.02.

d) Flaps up/power levers in 85% N1 speed position: AOA indication .52 ±.02.

6. Close the RIGHT STALL WARNING circuit breaker and pull the LEFT STALL WARNING circuit breaker.

7. Repeat step "5" for the RH side.

8. If the proper values for step "5" are not obtained, check the throttle switch settings as described under THROTTLE SWITCHES ADJUSTMENT, then check the flap position relay (shown in Figure 2) for proper operation.

9. Temporarily tape both of the AOA probes in the full nose-up position.

10. Set the SQUAT switch to NORMAL on the breakout box.

11. Close the LEFT and RIGHT STALL WARNING circuit breakers.

12. Configure the airplane with the flaps down and the power levers in the idle position.

b. Elevator Potentiometer(s)

1. Adjust both LH and RH elevator position trim potentiometers for a reading of 4.5 vdc from test jack "a" to test jack "H" on the breakout box. Record the voltages for both sides.

2. Pull the RIGHT STALL WARNING circuit breaker.

3. Using the pilot's control wheel, move elevators to the full trailing edge down position and hold. Loosen the clamp on the elevator position potentiometer and rotate the shaft to obtain a reading of 9.0 ±.5 vdc from test jacks "a" to "b" on the breakout box. Record the voltage for the LH side.

4. Slowly move the elevators to the full trailing edge up position, and verify that voltage measured from test jack "a" to "b" steadily decreases to approximately 1.0 vdc. If this does not occur, rotate the elevator position potentiometer shaft 180° and repeat step "2".

5. Utilizing the elevator travel board (Refer to Figure 12 in Chapter 27-30-00), set the elevators to 20° trailing edge down with the elevators loaded to the trailing edge up condition (10 lbs./side) and locked in place. Use the pilot's control wheel to move the elevators.

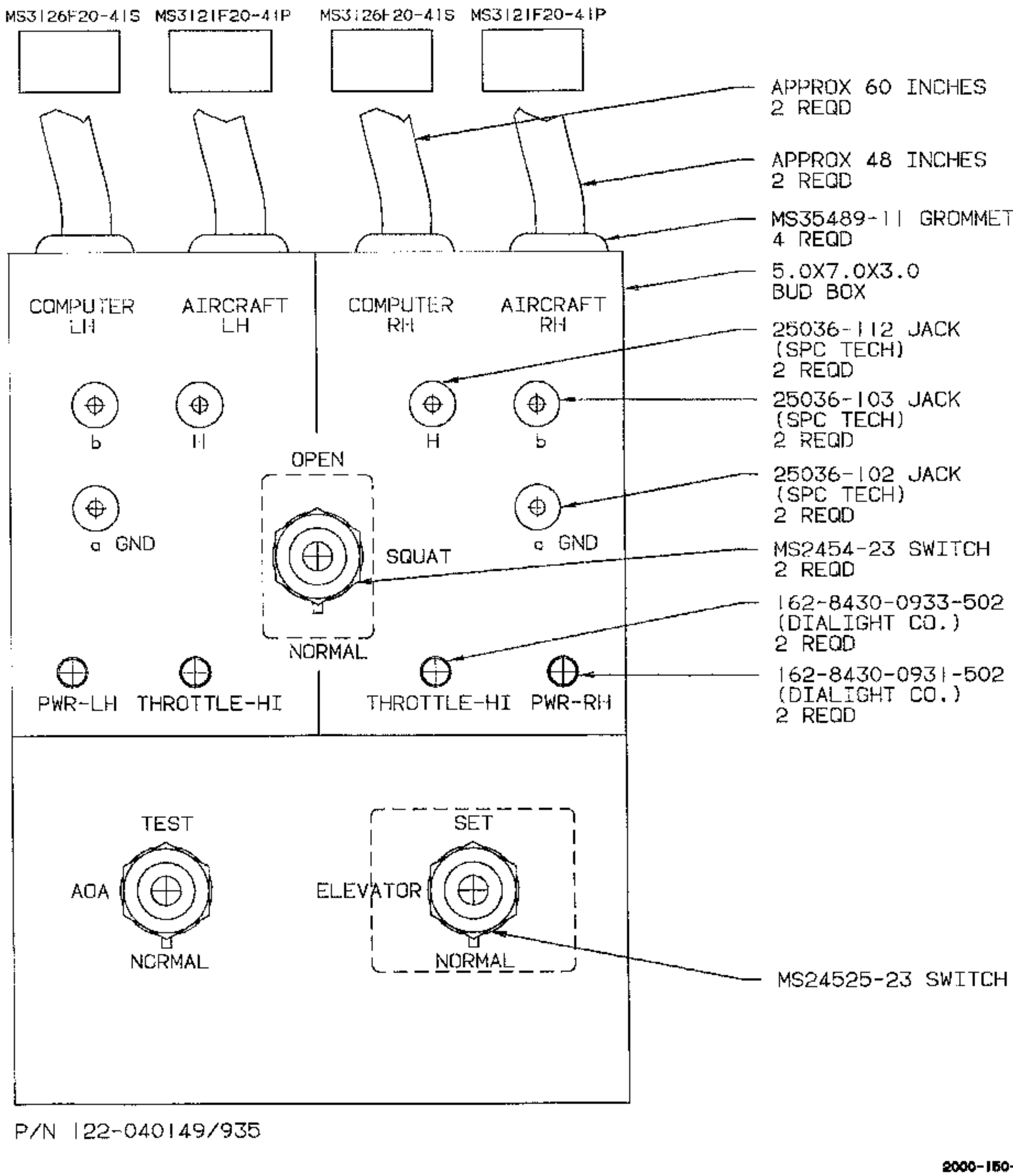
6. Set the SQUAT switch to OPEN on the breakout box.

7. Using a multimeter, read elevator DC voltage for the LH side and rotate the potentiometer shaft on the elevator position potentiometers (Refer to Figure 8) until the stall warning shaker activates at 20.0 ±1° elevator TED). Record elevator DC voltage from test jack "a" to test jack "b" on the breakout box.

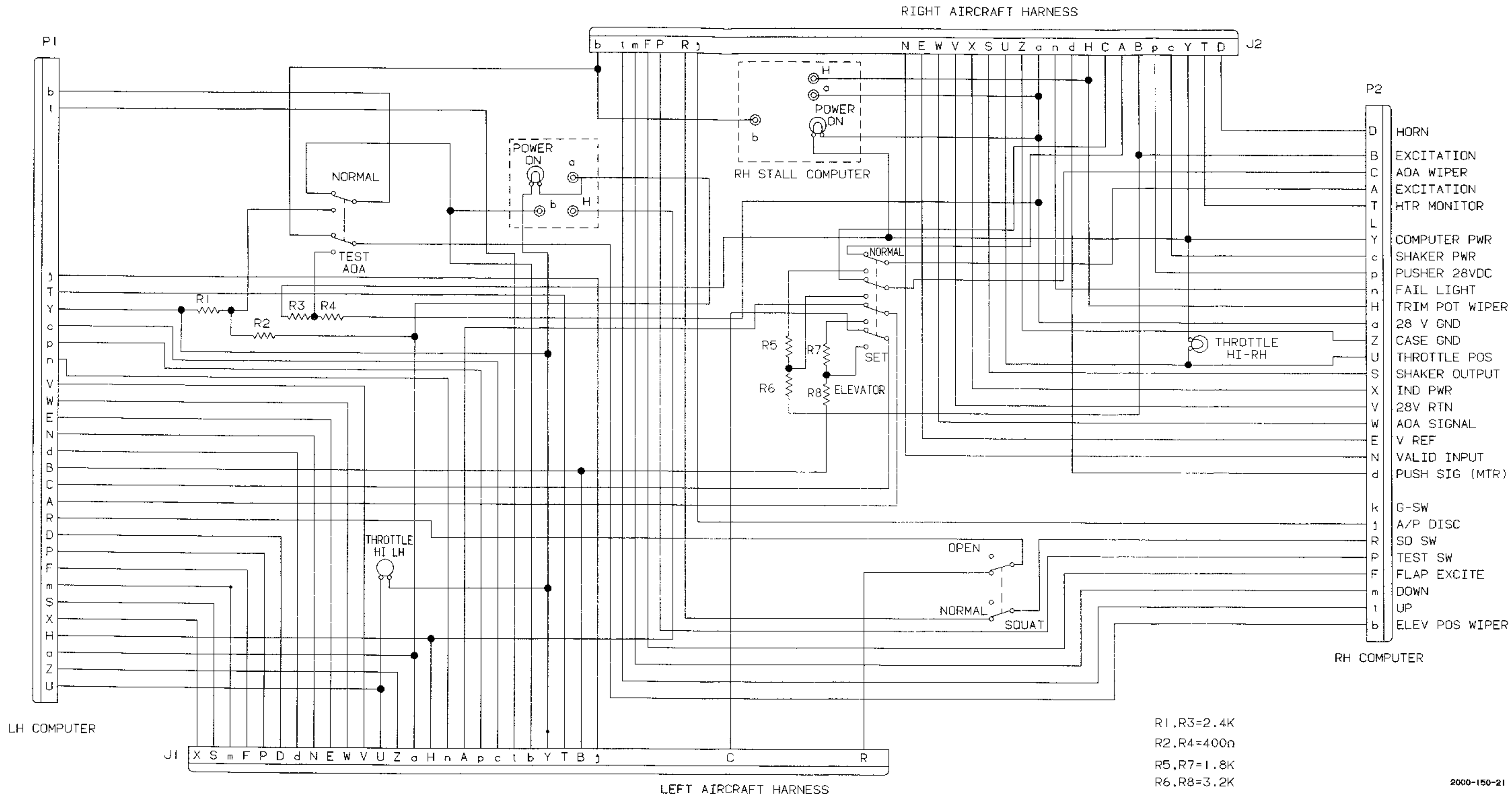
8. Unlock the pilot's control wheel and, by moving it, verify that shaker onset occurs at 20.0 ±1.0° TED.

9. Secure the elevator position potentiometer with the clamp.

10. Close the RIGHT STALL WARNING circuit breaker and open the LEFT STALL WARNING circuit



Stall Warning System Breakout Box (Effectivity: All)
Figure 12



Stall Warning System Breakout Box Schematic
(Effectivity: All)
Figure 13

breaker, then move the control wheel to verify that shaker onset occurs at 20.0° ±1° TED.

11. Adjust the RH elevator trim potentiometer as necessary to obtain 20.0° TED. Record DC voltage from test jack "a" to "b" at the breakout box.

12. Close the LEFT STALL WARNING circuit breaker.

13. Move the control wheel to verify that shaker onset occurs at 20.0° TED.

14. Disconnect the breakout box and reconnect the stall warning computers.

15. Remove the tape from the AOA probes.

PHASE II: IN-FLIGHT CALIBRATION
(Effectivity: All)

a. Prepare the airplane for Phase II calibration as follows:

1. Ballast to 14,000 - 14,300 lbs. at F.S. 314 - 315 CG.

2. Establish level cruise flight with gear and flaps up at 25% to 30% torque and 1700 RPM.

NOTE

Ensure that the POWER ON lights on the breakout box are illuminated.

b. Pull the RIGHT STALL WARNING circuit breaker.

c. Move the AOA switch on the LH upper console to the LEFT position.

d. Gradually slow the airplane down until the column shaker activates, then record the airspeed. The AOA indicator should read .52 ±.02.

NOTE

Repeat step "d" until a constant airspeed is obtained.

e. Reset the RIGHT STALL WARNING circuit breaker and pull the LEFT STALL WARNING circuit breaker.

f. Move the AOA switch on the LH upper console to the RIGHT position.

g. Repeat step "d" for the RH side until a constant airspeed is obtained.

NOTE

The airspeeds recorded in the previous steps shall agree within one knot. If not, adjust one computer as outlined in Phase III of this calibration procedure.

h. Reset the LEFT and RIGHT STALL WARNING circuit breakers.

i. Establish level cruise flight with the landing gear and flaps up at 25% to 30% torque and 1700 RPM.

j. Reduce power to idle and gradually reduce airspeed by approximately one knot per second until the column pusher activates. Record the airspeed at column pusher onset.

k. Verify that the column pusher activates in the range of 94 to 96 KIAS.

l. If the pusher does not activate in the range of 94 to 96 KIAS, adjust both AOA transmitters accordingly as outlined in Phase III for column pusher onset.

PHASE III: ADJUSTMENT OF AOA TRANSMITTER MOUNTING PLATE FOR PROPER STALL WARNING SHAKER/PUSHER ONSET
(Effectivity: All)

NOTE

The AOA indicator has the following sensitivity: 0.0 on the indicator dial is 8° on the AOA transmitter; 1.0 on the indicator dial is 28° on the AOA transmitter; 0.05 on the indicator is equal to 1° on the transmitter; 1° on the transmitter is equal to 2 KIAS.

a. Note the difference between recorded stall warning shaker onset (from Phase II) and desired stall warning shaker onset airspeed for the LH and/or RH side.

b. Move the AOA transmitter mounting plates 0.5° for each knot of desired change in airspeed (LH or RH).

c. Move the transmitter nose-down to decrease airspeed and nose-up to increase airspeed.

1. Shaker Example: If the stall warning shaker onset is 91 KIAS (LH stall warning) and the RH stall warning onset was 93 KIAS, then the RH stall warning onset was 93-91 = 2 knots too high; therefore move the RH transmitter plate .5° X 2 = 1° nose-down.

2. Pusher Example: Column pusher onset should be in the range of 94 to 96 KIAS. If the pusher fired at 98 KIAS, the pusher occured at 98-95 = 3 knots too high; therefore both transmitters should be moved .5 X 3 = 1.5° nose-down.

FLAPS/FORWARD WING - DESCRIPTION AND OPERATION (EFFECTIVITY: ALL)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

The aft wing flaps and the forward wings move together. They are controlled by a two position FLAP/FWD WING - RETRACT - EXTEND switch on the pedestal just below the condition levers. With the switch in the RETRACT position, the forward wings are swept back approximately 30 degrees. When the switch is in the EXTEND position, the forward wings are swept forward to approximately -4 degrees. The FLAP/FWD WING indicator light, located on the pilot's inboard subpanel, illuminates TRANS while the flaps and forward wings are in transit. When the flaps and forward wings are fully extended, TRANS will extinguish and EXTEND will illuminate.

A forward wing position sensor is installed for each forward wing and a flap position sensor is installed for each inboard flap. The position sensors are inductive proximity type switches. These position sensors are monitored by the flap/forward wing monitor box installed under the aft step in the cabin. The monitor box amplifies the position sensor signals and sends them to the flap/forward wing monitor and monitor test pcb's, located in the pcb panel in the pilot's console in the cockpit. If the logic on either pcb senses a fault in the system, the pcb will shut down the system by deenergizing the respective flap monitor relay, located in the aft wing center section electrical equipment panel. If the FLAP/TRIM PUSHER INTER switch on either control wheel outboard horn is depressed, the system will also be shut down by the LH flap monitor relay. Refer to Chapter 27-31-00 for more information on the FLAP/TRIM PUSHER INTER switch. When either flap monitor relay is deenergized, the flaps and forward wings will remain in their same position and the autopilot, if engaged, will be interrupted.

Power is supplied from the FLAP CONTROL circuit breaker to the flap motor controller, located adjacent to the flap motor in the aft man hole under the aft wing box shear panel, from the center bus through a 35-ampere current limiter when the flap monitor relays are energized. FLAP CONTROL circuit breaker power is also supplied to the flap/fwd wing controller and annunciation pcb through the FLAP/FWD WING switch to indicate whether the switch is in the RETRACT or EXTEND position.

The forward wing actuator controller is supplied power through a 20-ampere current limiter from the center bus through the forward wing power relay, located in the aft wing center section electrical equipment panel. The flap/fwd wing controller and annunciation pcb will deenergize the forward wing power relay when limit switches in the forward wing actuator controller indicate that the forward wings are extended or retracted.

A forward wing hydraulic lock assembly is installed on the forward wing actuator fittings to provide a back up to the forward wing actuator. The flap/fwd wing controller and annunciation pcb sends a control signal to the lock solenoid valve to open or close the valve. Hydraulic pressure will hold the pushrods on the hydraulic lock assembly in place when the valve is closed.

Test switches for the system, placarded RIGHT and LEFT FLAP/FWD WING MONITOR, are installed on the pilot's outboard subpanel. When they are pressed, the circuitry of the flap/forward wing monitor and monitor test pcb's is tested. "R FLAP MON FAIL" and "L FLAP MON FAIL" yellow caution messages will be displayed on the Engine Instrument, Crew Alerting System (EICAS) display if the pcb test fails.

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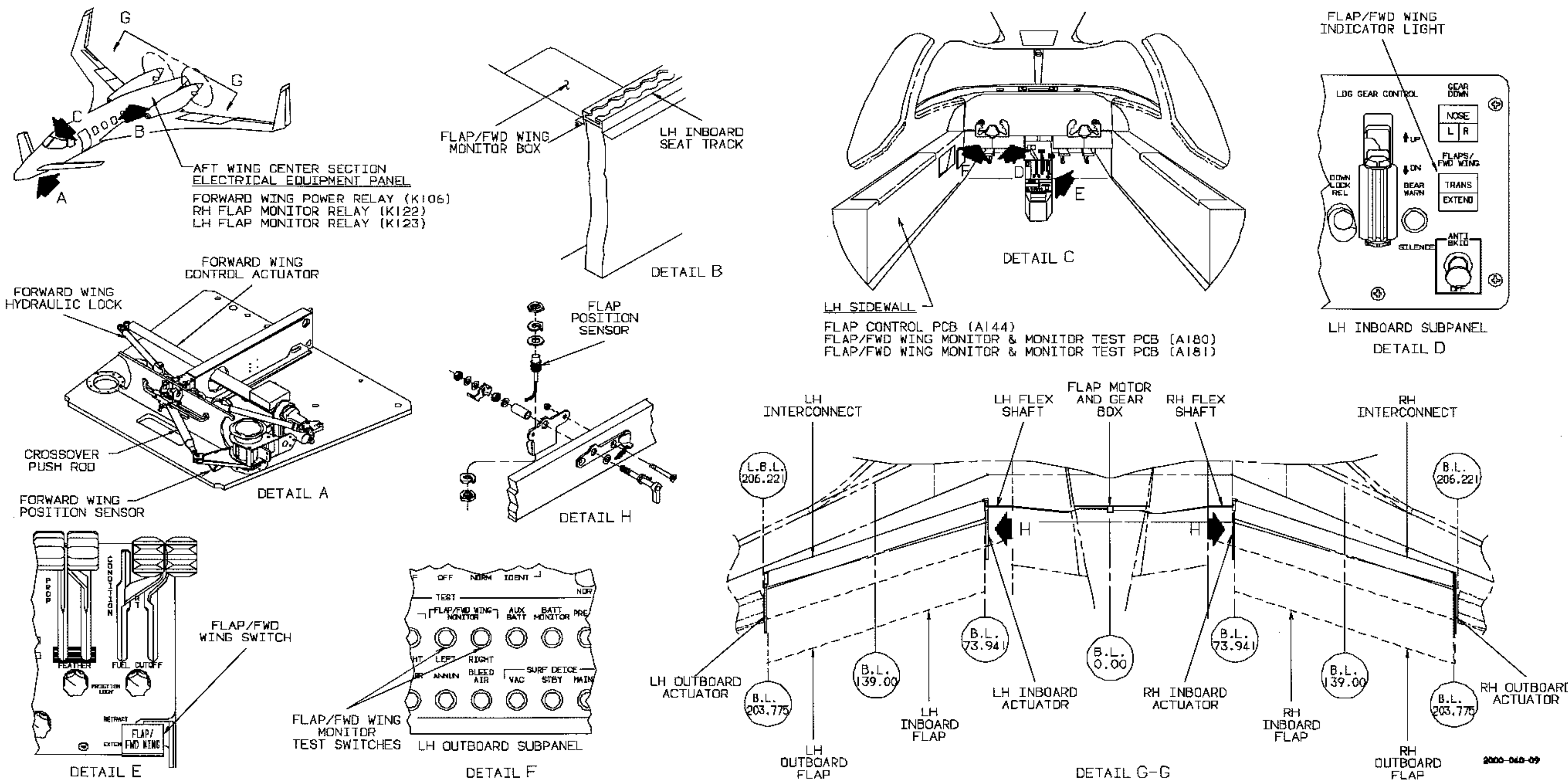

Flaps/Forward Wing System
(Effectivity: All)
Figure 1

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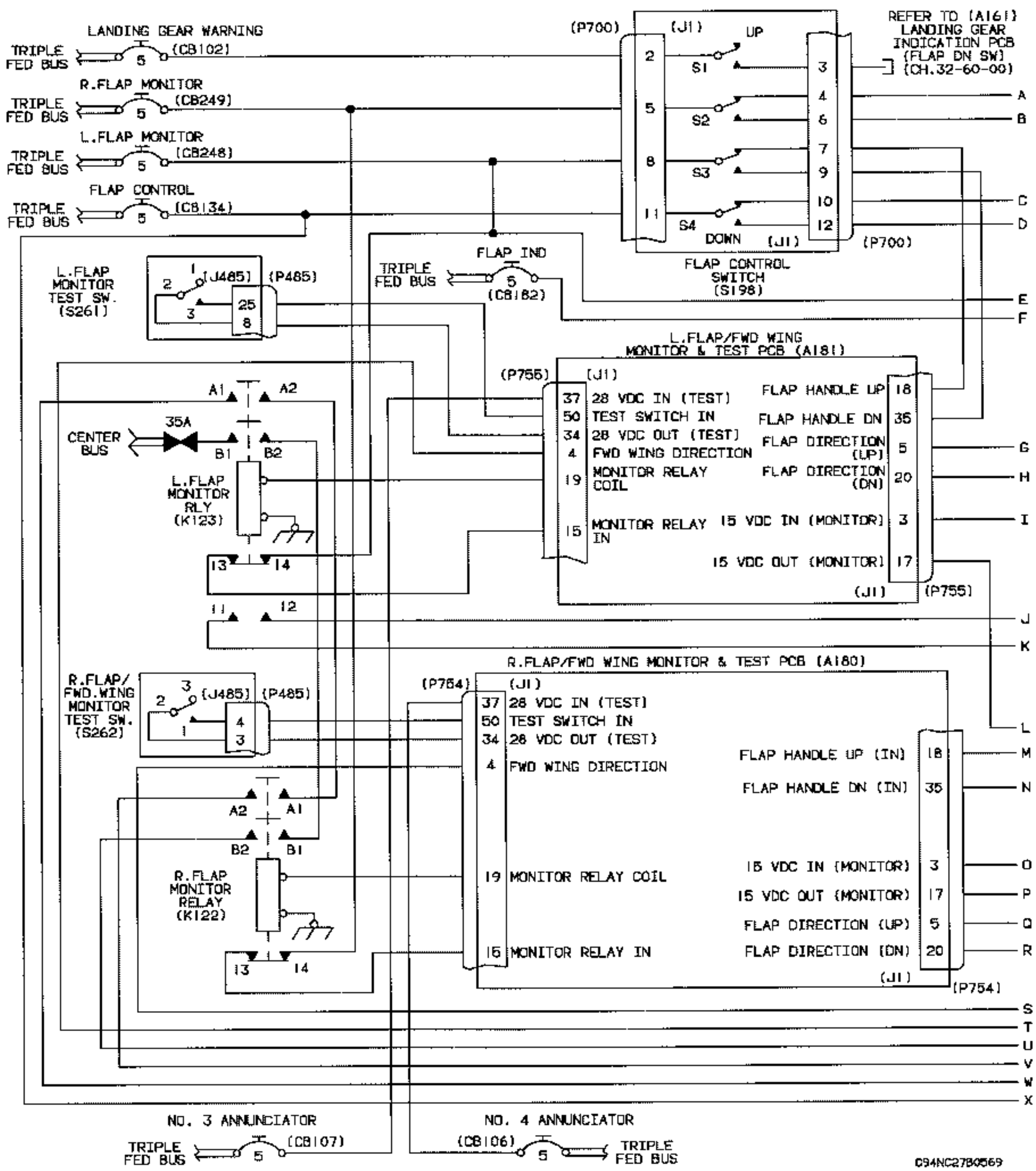

Flaps/Forward Wing Schematic Diagram
(Effectivity: All) (Sheet 1 of 2)
Figure 2

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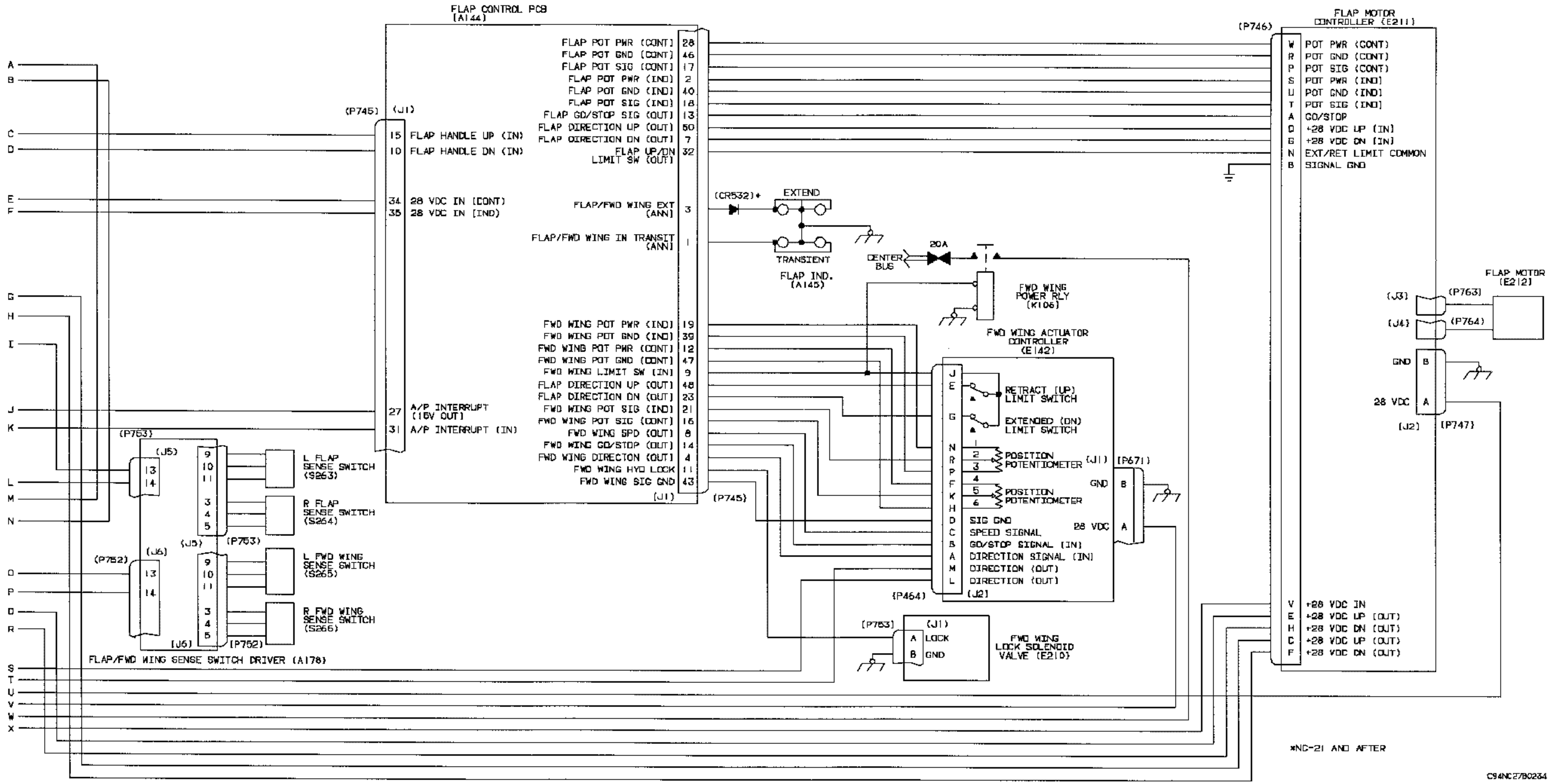

Flaps/Forward Wing Schematic Diagram
(Effectivity: All) (Sheet 2 of 2)
Figure 2

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FLAPS/FORWARD WING - MAINTENANCE PRACTICES (EFFECTIVITY: ALL)

FLAP REMOVAL (EFFECTIVITY: ALL) (FIGURE 3)

a. Place the FLAP/FWD WING switch in the EXTEND position. When the flaps are fully extended, pull the FLAP CONTROL circuit breaker located in the LH circuit breaker panel in the pilot's console.

b. Remove the cotter pin (1), bolt (2), washer (3), and nut (5) securing the flap actuator rod (5) to the flap drive bracket (6) on the bottom leading edge of the flap. Slide the flap actuator rod free of the flap drive bracket and remove the bushing from the end of the flap actuator rod.

NOTE

Measure the extension of the flap actuator rod so it can be reattached in its original position.

c. Remove the screws (20) and washers (21) securing the fairing (22) to the bottom of the inboard and outboard flaps and remove the fairing.

d. Remove the bolts (7), spacers (8), and nuts (9) connecting the inboard and outboard flaps together at the interconnect plate (10) and interconnect rod (11).

e. While providing support for the flap, remove the screws (12), washers (13), and nuts (14) securing the stops (15) on the aft end of the flap tracks (16) and then remove the flap from the wing by sliding the flap aft and out of the flap tracks.

CAUTION

Never operate the flaps with the inboard flaps removed as the flap position sensors will be inoperative. Serious damage to the flaps, wings, and actuating system can result.

FLAP INSTALLATION (EFFECTIVITY: ALL) (FIGURE 3)

a. Position the rollers (17) and fittings (18) in the flap tracks (16) and push the flap forward until the roller support fittings (19) are forward of the aft edges of the flap tracks.

b. While providing support for the flap, secure the stops (15) on the aft ends of the flap tracks with screws (12), washers (13), and nuts (14).

c. While providing support for the flap, secure the inboard and outboard flaps together at the interconnecting plate (10) and interconnecting rod (11) with the attaching bolts (7), spacers (8), and nuts (9).

d. Ascertain that the flap actuator rod (5) is extended to the same dimension as was marked upon removal, then reinstall the bushing in the end of the flap actuator rod.

e. Align the end of the flap actuator rod (5) with the flap drive bracket (6) on the flap and install the bolt (2), washer (3), nut (4), and cotter pin (1) securing the end of the flap actuator rod in place.

f. Install the fairing (22) to the inboard and outboard flaps and secure with the screws (20) and washers (21).

g. Engage the FLAP CONTROL circuit breaker on the LH circuit breaker panel.

h. Check the flap system for proper rigging as described in FLAPS/FORWARD WING RIGGING in this chapter.

FLAP MOTOR AND GEARBOX/CONTROLLER REMOVAL (EFFECTIVITY: ALL) (FIGURE 4)

a. Remove electrical power from the airplane and disconnect the battery.

b. Remove the aft wing box shear panel located on the bottom of the aft wing at the airplane center line. The flap motor and gearbox/flap controller installation is located in the aft manhole under the aft wing box shear panel.

c. Disconnect the four electrical connectors from the flap controller (5) and identify with tags to facilitate correct reinstallation.

d. Remove the safety wire from the retaining nuts securing the flex shafts (1 and 4) to the gearbox, then remove the retaining nuts.

e. Remove the three bolts (2) securing the flap motor and gearbox (3 and 8) and remove the flap motor and gearbox from the airplane.

f. Remove the two screws securing the flap motor (8) to the gearbox (3).

g. Remove the four screws (6) securing the flap controller (5) to the bracket (7) and remove the flap controller from the airplane.

FLAP MOTOR AND GEARBOX/CONTROLLER INSTALLATION (EFFECTIVITY: ALL) (FIGURE 4)

a. Secure the flap motor (8) to the gearbox (3) with the two retaining screws.

b. Position the flap motor (8) and gearbox (3) in the airplane and install the three bolts (2) to secure the flap motor and gearbox to the mounting bracket (7).

c. Position the flap controller (5) in the airplane and secure the flap controller to the bracket (7) with the four screws (6).

d. Connect the four electrical connectors to the flap controller (5) and remove the identification tags from the wiring.

e. Connect the flex shafts (1 and 4) to both sides of the gearbox (3) with the retaining nuts, then safety wire the nuts.

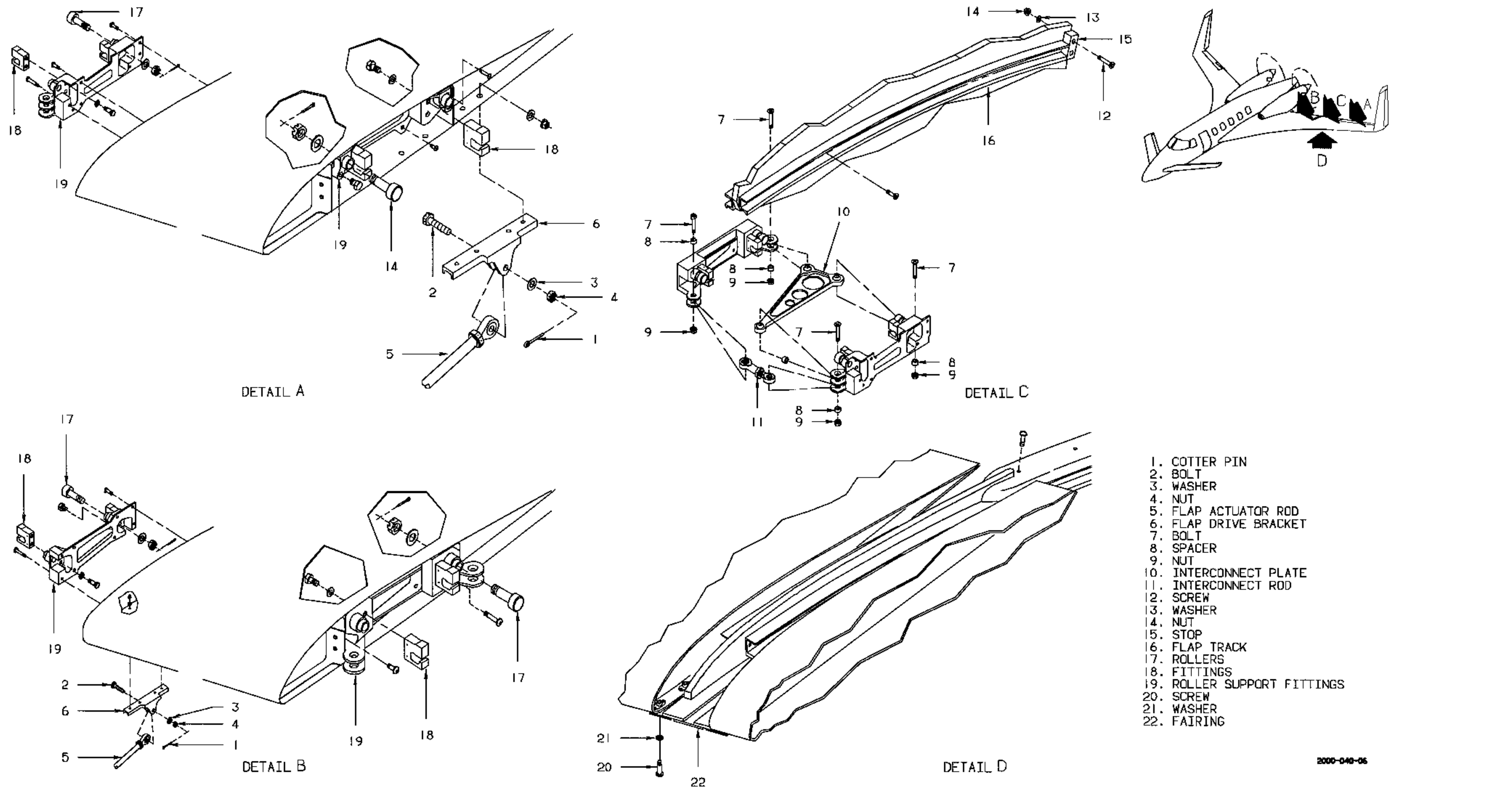
f. Connect the battery and restore power to the airplane.

NOTE

The flap motor is an intermittent-use type of motor. Do not run the motor more than two consecutive cycles without a five minute cooling period prior to additional cycles.

g. Cycle the flap system to check the rigging. Ensure that no rollers bottom out at either end of travel and that the flaps are synchronized.

h. Reinstall the aft wing box shear panel on the bottom of the aft wing.



Flap Installation (Effectivity: All)
Figure 3

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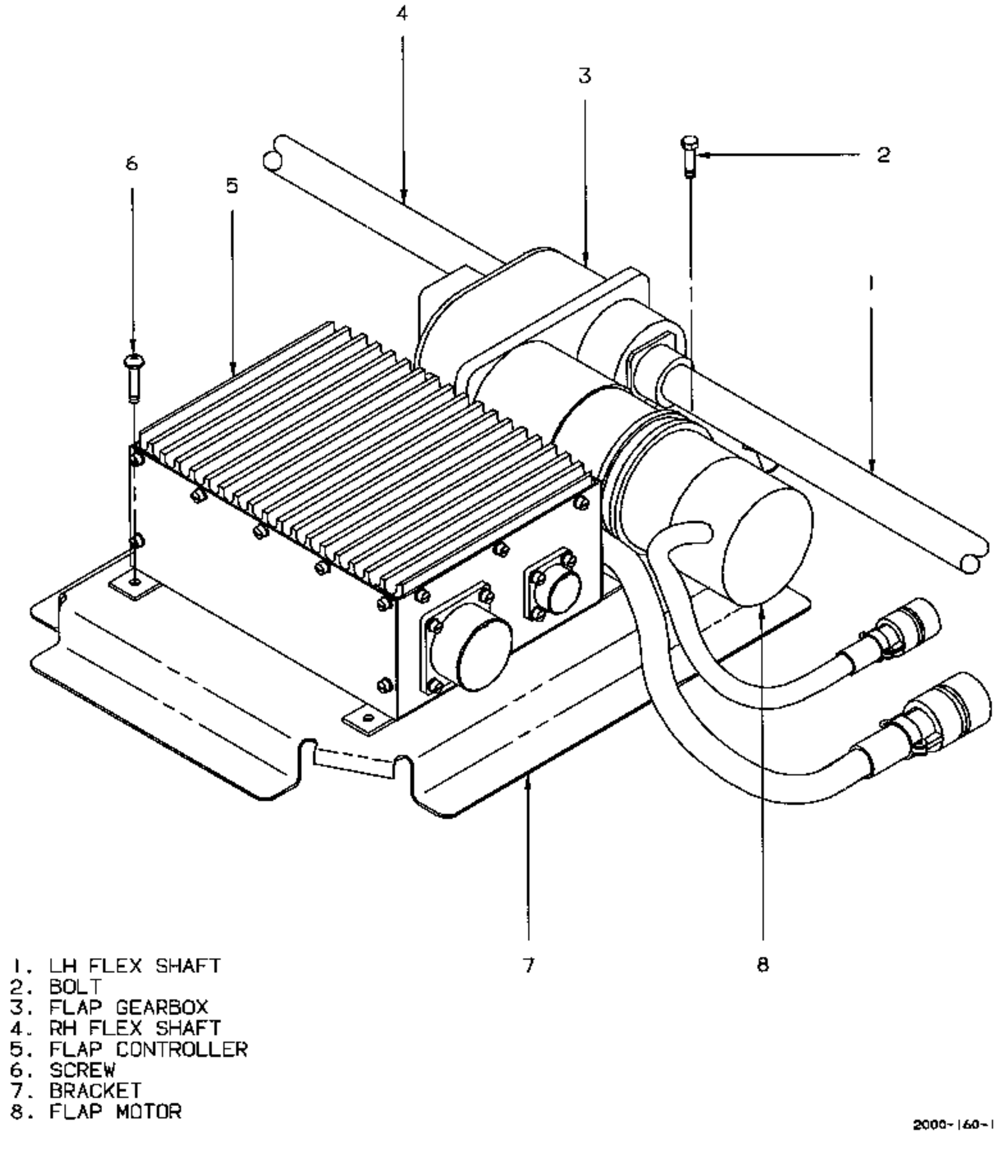


Flap Motor and Gearbox/Flap Controller Installation (Effectivity: All)
Figure 4

FLAP ACTUATOR REMOVAL (EFFECTIVITY: ALL) (FIGURE 5)

a. Fully extend the flaps by placing the FLAP/FWD WING switch in the EXTEND position.

b. Remove electrical power from the airplane and disconnect the battery.

c. Disconnect the actuator (10) from the flap by removing the washer (1), nut (2), and cotter pin (3) securing the flap actuator rod (4) to the actuator (10).

d. Remove the access panel from the lower surface of the wing and uncouple the interconnect (9) from the actuator.

NOTE

The inboard flaps will require disconnecting a flex shaft (8) on the inboard side of the actuator (10) and an interconnect (9) on the outboard side of the flap actuator (10).

e. Remove the screws (5), washers (6), and nuts (7) securing the actuator (10). Note the sizes and locations of the screws removed.

FLAP ACTUATOR INSTALLATION (EFFECTIVITY: ALL) (FIGURE 5)

a. If a new or overhauled actuator is being installed, ensure that the tape placed over the vent hole for shipping has been removed.

b. Position the actuator with its vent hole up and install the mounting screws (5), washers (6), and nuts (7) as noted during removal.

c. Connect the interconnect (9) and (for the inboard flap) flex shaft (8) to the actuator (10) and replace the access panel.

d. Extend the actuator rod (4) until the flap synchronizes with the adjacent flap, then connect the actuator rod to the flap actuator (10) with the washer (1), nut (2), and cotter pin (3).

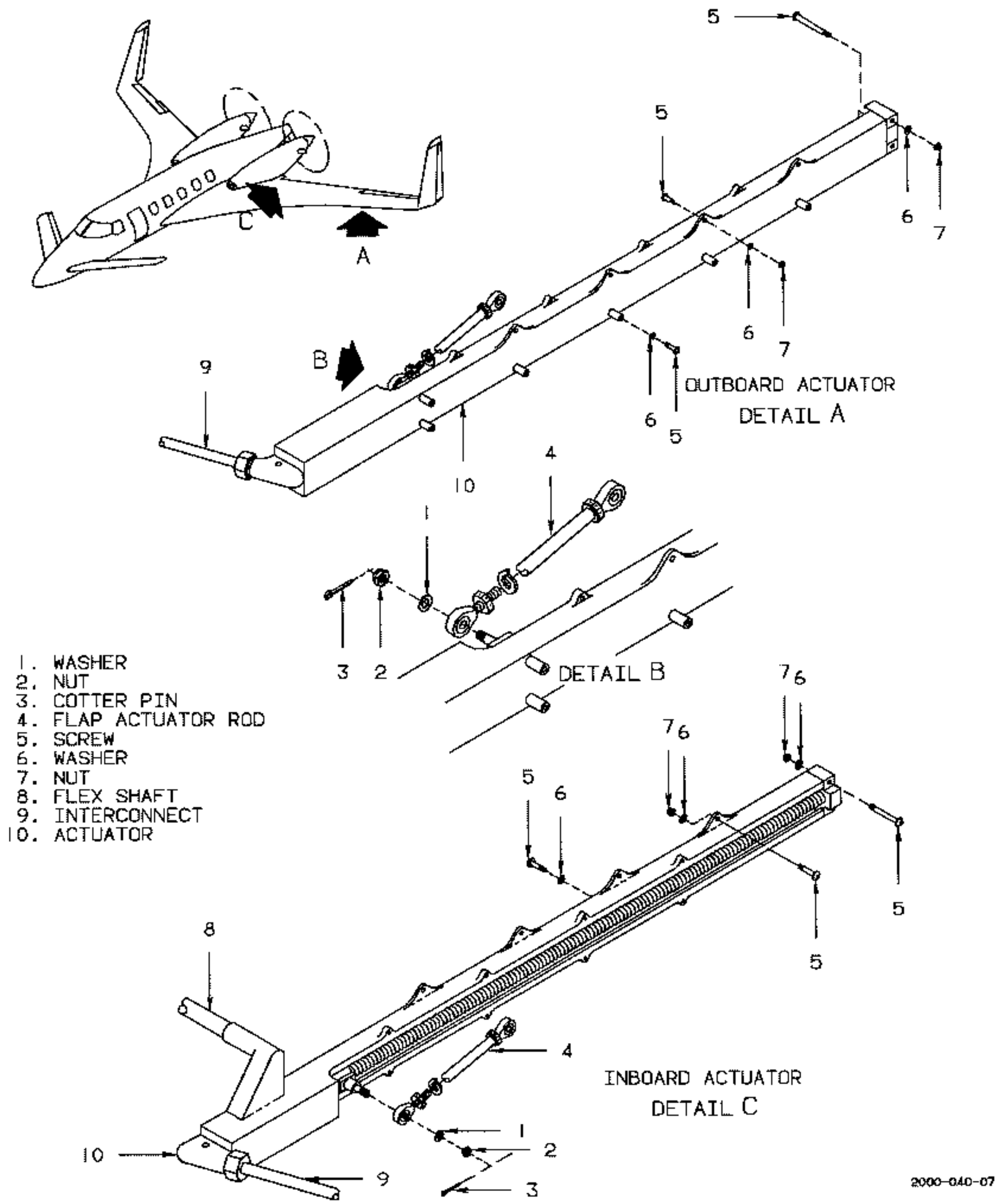
e. Connect the battery and restore electrical power to the airplane.

f. Check the flap rigging as described in FLAPS/FORWARD WING RIGGING in this chapter.

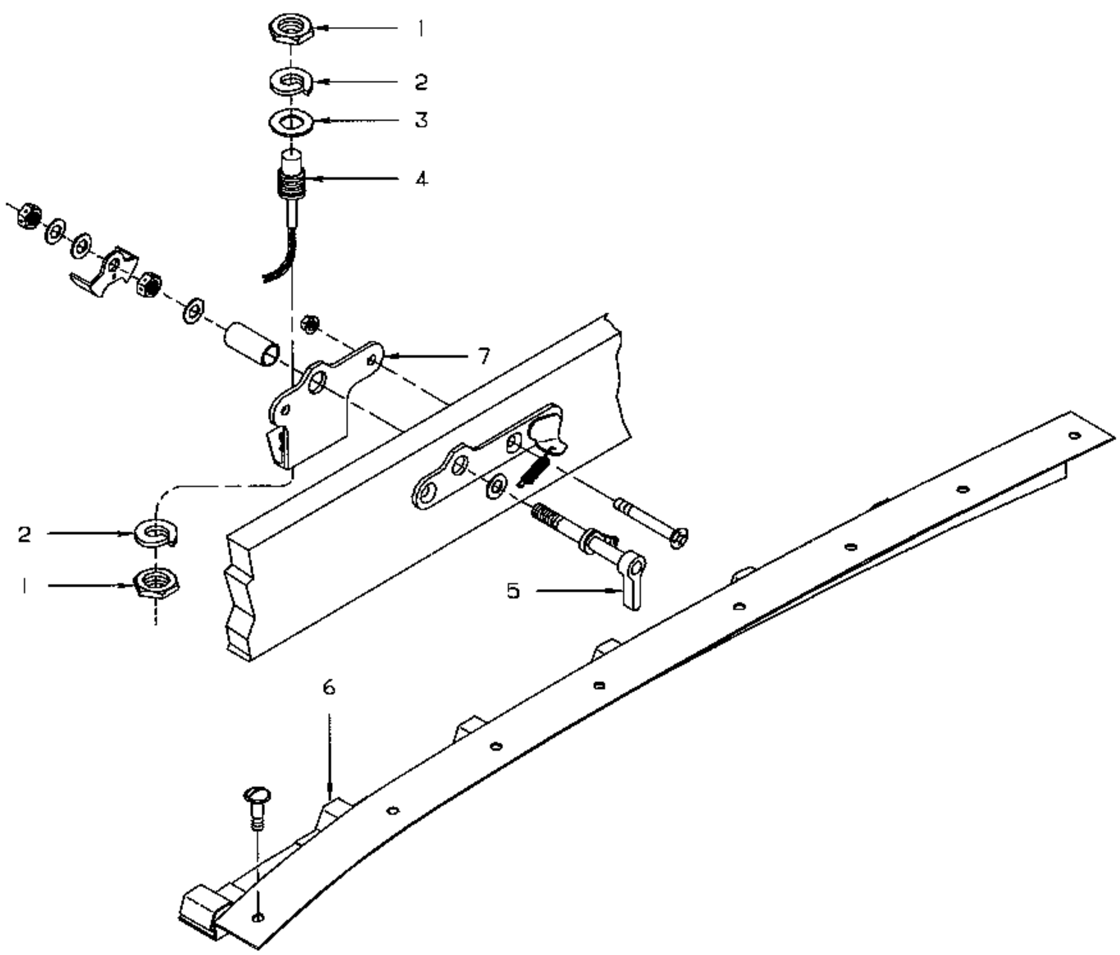
NOTE

The flap motor is an intermittent-use type of motor. Do not run the motor more than two consecutive cycles without a five minute cooling period prior to additional cycles.

g. If a new or overhauled actuator is installed, lift lightly on the trailing edge of the flap while running the flaps through a complete extension-retraction cycle. There should be no roughness or indication of binding in the actuator.



Flap Actuator Installation (Effectivity: All)
Figure 5



1. NUT
2. LOCK WASHER
3. WASHER
4. POSITION SENSOR
5. POSITION SENSOR ARM
6. SECOND DETENT
7. BRACKET

2000-160-12

Flap Position Sensor Installation (Effectivity: All)
Figure 6

FLAP POSITION SENSOR REMOVAL (EFFECTIVITY: ALL) (FIGURE 6)

a. Remove electrical power from the airplane and disconnect the battery.

b. Remove the cover from the LH or RH sensor, as applicable.

c. Remove safety wire, nuts (1), and washers (2 and 3) securing position sensor (4) to bracket (7).

d. Disconnect electrical connector and remove position sensor (4) from airplane.

FLAP POSITION SENSOR INSTALLATION (EFFECTIVITY: ALL) (FIGURE 6)

a. Connect electrical connector to position sensor (4).

b. Install position sensor (4) on bracket (7) and secure with attaching nuts (1) and washers (2 and 3). Install ground lug from wiring harness between the lower set of washers.

c. Rig the position sensor (4) as described in FLAPS/FORWARD RIGGING in this chapter.

d. Install the cover over the RH or LH sensor, as applicable.

e. Connect the battery and restore electrical power to the airplane.

FORWARD WING CONTROL ACTUATOR REMOVAL (EFFECTIVITY: ALL) (FIGURE 7)

a. Move FLAP/FWD WING switch to EXTEND. After the forward wings are in the full forward position, remove electrical power from the airplane and disconnect the battery.

b. Remove RH and LH forward wing upper and lower fairings.

c. Disconnect electrical connectors from control actuator (18).

d. Locate the forward wire harness break connector in the forward RH area of the cockpit and disconnect P679 from J679.

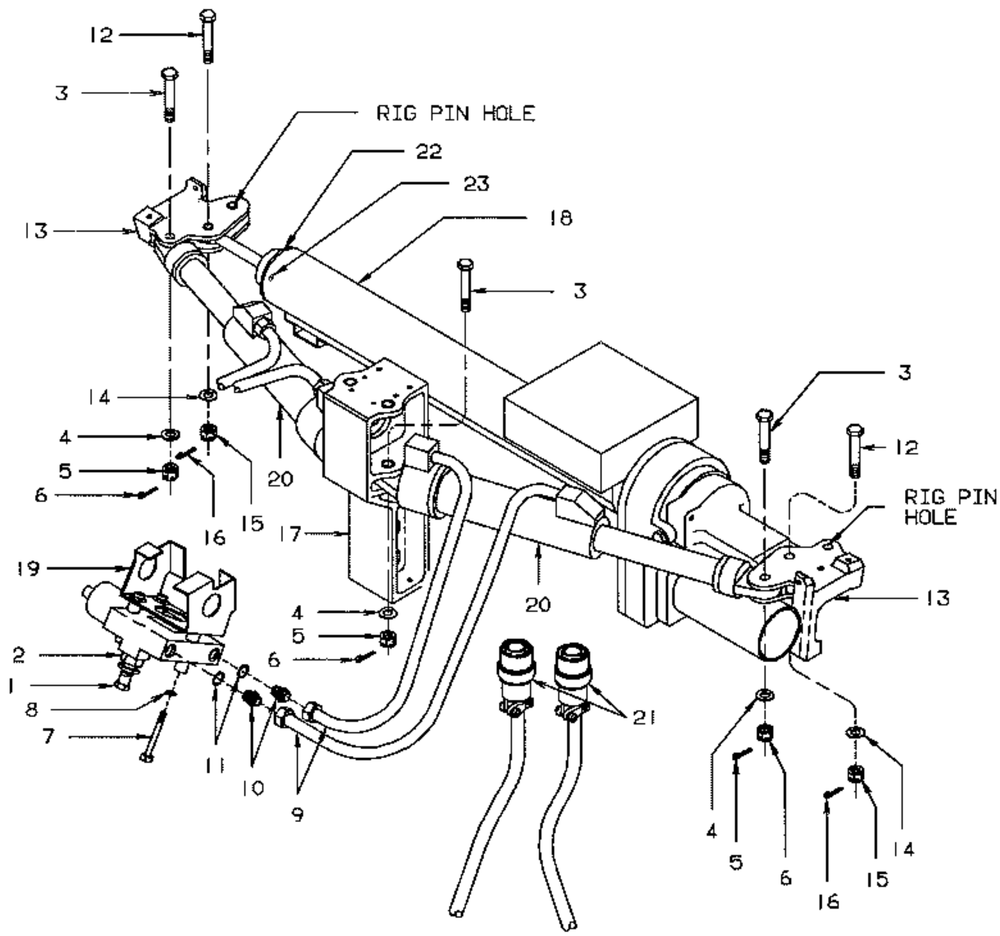
e. To open the solenoid valve, connect an external 28 vdc power supply to pin 29 (28vdc) and pin 30 (ground) of J679.

f. Manually move forward wings to the full forward position.

g. Install forward wing rig pins (18, Chart 1, 27-00-00) in both actuator fittings (13).

h. Remove bolt (12), washer (14), nut (15), and cotter pin (16) securing control actuator (18) to LH and RH actuator fittings (13).

i. Remove control actuator (18) from the LH side of airplane.



1. BLEED VALVE
2. SOLENOID VALVE
3. BOLT
4. WASHER
5. NUT
6. COTTER PIN
7. BOLT
8. WASHER
9. HOSE
10. UNION
11. O-RINGS
12. BOLT
13. ACTUATOR FITTING
14. WASHER
15. NUT
16. COTTER PIN
17. SUPPORT FITTING
18. CONTROL ACTUATOR
19. BRACKET
20. HYDRAULIC LOCK ARMS
21. ELECTRICAL CONNECTORS
22. BUSHING
23. SCREW

NC27B
002565AA

Forward Wing Control Actuator/Hydraulic Lock Installation (Effectivity: All)
Figure 7

FORWARD WING CONTROL ACTUATOR INSTALLATION (EFFECTIVITY: ALL) (FIGURE 7)

a. Disconnect flex shafts from the flap gearbox (Figure 4). Ensure that electrical connections are made between flap controller, flap gearbox, and aircraft wiring.

b. Connect the battery and restore electrical power to the airplane.

c. Support forward wing control actuator next to LH side of airplane and connect to airplane wiring.

d. Move FLAP/FWD WING switch to RETRACT. After the flap gearbox and forward wing control actuator stop retracting, disconnect forward wing control actuator electrically from airplane wiring. Install forward wing control actuator through LH side of airplane.

e. Reconnect the forward wing control actuator to airplane wiring. While supporting forward wing control actuator to prevent hanging up on structure, move FLAP/FWD WING switch to EXTEND. When the forward wing control actuator stops extending, adjust control actuator RH rod end to match distance from mounting hole to mounting hole in actuator fittings (13). Remove forward wing rig pins.

f. Remove electrical power from the airplane and disconnect the battery.

g. Install bolt (12), washer (14), nut (15), and cotter pin (16) securing control actuator (18) to LH and RH actuator fittings (13).

h. Connect electrical connectors (21) to control actuator (18).

i. Remove the 28 vdc external power supply from pins 29 and 30 on J679. Connect P679 to J679.

j. Connect flex shafts to flap gearbox (Figure 4).

k. Connect the battery and restore electrical power to the airplane.

l. Install RH and LH forward wing upper and lower fairings.

FORWARD WING CONTROL ACTUATOR BUSHING REMOVAL (EFFECTIVITY: ALL) (FIGURE 7)

a. Perform the FORWARD WING CONTROL ACTUATOR REMOVAL procedure.

b. Remove the three screws attaching the bushing to the actuator.

c. Remove the bushing from the actuator.

CAUTION

Ensure that the teflon ring from the old bushing is not still in the actuator.

FORWARD WING CONTROL ACTUATOR BUSHING INSTALLATION (EFFECTIVITY: ALL) (FIGURE 7)

a. Insert the new bushing into the actuator.

b. Install the three screws which attach the bushing to the actuator.

c. Perform the FORWARD WING CONTROL ACTUATOR INSTALLATION procedure.

FORWARD WING HYDRAULIC LOCK REMOVAL (EFFECTIVITY: ALL) (FIGURE 7)

a. Move FLAP/FWD WING switch to EXTEND. After the forward wings are in the full forward position, remove electrical power from the airplane and disconnect the battery.

b. Remove RH and LH forward wing upper and lower fairings.

c. Locate the forward wire harness break connector in the forward RH area of the cockpit and disconnect P679 from J679.

d. To open the solenoid valve, connect an external 28 vdc power supply to pin 29 (28vdc) and pin 30 (ground) of J679.

e. Disconnect the hydraulic lock hoses (9) from the solenoid valve (2).

f. Remove bolts (3), washers (4), nuts (5), and cotter pins (6) securing the hydraulic lock arms (20) to the actuator fittings (13) and support fitting (17).

g. Remove three bolts (7) and washers (8) securing hydraulic lock solenoid valve (2) to bracket (19).

h. Remove hydraulic lock assembly from airplane.

i. Remove unions (10) from hydraulic lock solenoid valve (2). Discard old O-rings (11).

FORWARD WING HYDRAULIC LOCK INSTALLATION (EFFECTIVITY: ALL) (FIGURE 7)

a. Install unions (10) on hydraulic lock solenoid valve (2), using new O-rings (11).

b. Bleed hydraulic lock solenoid valve and hoses on bench by cycling hydraulic lock arms to expel all air prior to installation.

c. Position solenoid valve (2) in airplane and secure with attaching bolts (7) and washers (8).

d. Position hydraulic lock arms (20) in airplane and secure to actuator fittings (13) and support fitting (17) with bolts (3), washers (4), nuts (5), and cotter pins (6).

e. Connect hydraulic hoses (9) to unions (10) on solenoid valve (2).

f. With forward wings in the full forward position, slowly open bleed valve (1) at hydraulic lock solenoid valve (2) to release any internal pressure.

g. Connect a clear hose to the bleed valve and place the other end in a can of hydraulic fluid (4, Chart 2, 27-00-00). With the bleed valve open, hydraulic lock solenoid valve energized, and the forward wing control actuator disconnected, cycle the forward wings forward and aft manually until all air has been expelled.

NOTE

Moving wings electrically with control actuator will not fully bleed system.

h. Manually run the forward wings to the full aft position and close bleed valve (1). Remove clear hose from bleed valve.

i. With forward wings in the full aft position, connect a hand pump (with pressure gage) to bleed valve. Open bleed valve and pump in hydraulic fluid (4, Chart 1, 27-00-00) until pressure exceeds 90 psig but less than 250 psig. Close bleed valve and remove hand pump. Do not move wings.

NOTE

Ensure that the hand pump and any lines are purged of air prior to usage so that air is not reintroduced into hydraulic lock assembly and valve.

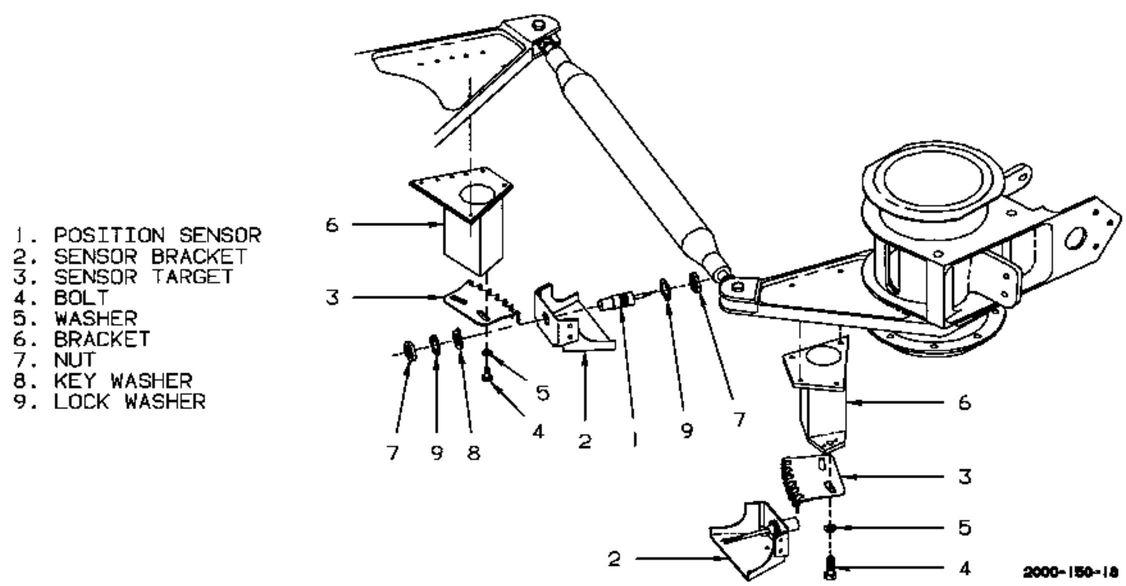
j. Using a graduated cylinder, open bleed valve slowly and drain off 12 cc's of hydraulic fluid. Close bleed valve and safety wire.

k. Install bolt (12), washer (14), nut (15), and cotter pin (16) securing control actuator (18) to LH and RH actuator fittings (13).

l. Remove the 28 vdc external power supply from pins 29 and 30 on J679. Connect P679 to J679.

m. Install RH and LH forward wing upper and lower fairings.

n. Connect the battery and restore electrical power to the airplane.



Forward Wing Position Sensor Installation (Effectivity: All)
Figure 8

FORWARD WING POSITION SENSOR REMOVAL (EFFECTIVITY: ALL) (FIGURE 8)

This procedure is typical for either the RH or LH forward wing position sensor.

a. Remove electrical power from the airplane and disconnect the battery.

b. Remove LH or RH forward wing lower fairing, as applicable.

c. Remove safety wire, nuts (7), and washers (8 and 9) securing position sensor (1) to sensor bracket (2).

d. Disconnect electrical connector and remove position sensor (1) from airplane.

FORWARD WING POSITION SENSOR INSTALLATION (EFFECTIVITY: ALL) (FIGURE 8)

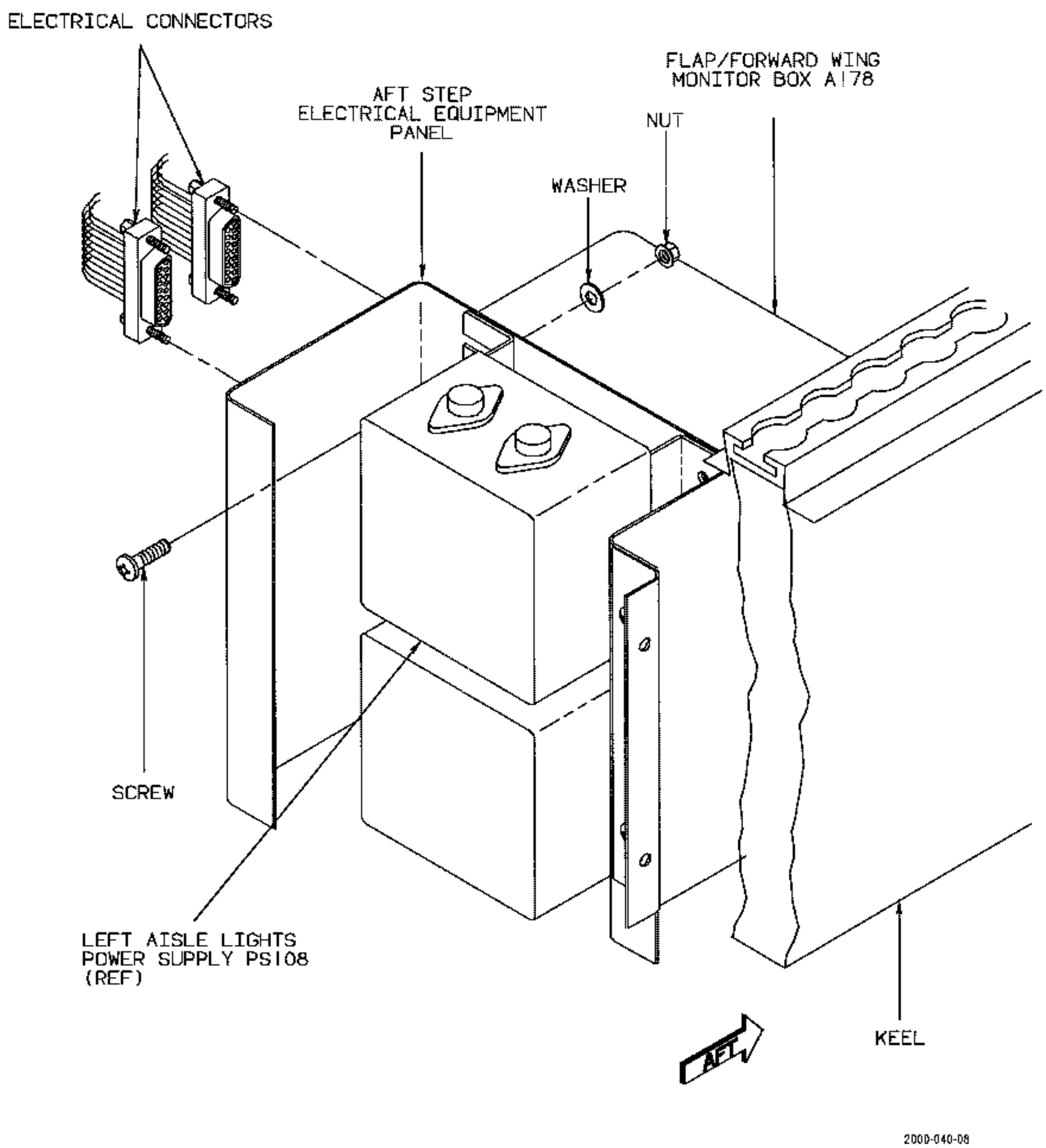
a. Install position sensor (1) on sensor bracket (2) with attaching nuts (7) and washers (8 and 9).

b. Connect electrical connector to position sensor (1).

c. Rig the position sensor (1) as described in FLAPS/FORWARD WING RIGGING.

d. Install LH or RH forward wing lower fairing, as applicable.

e. Connect the battery and restore electrical power to the airplane.



Flap/Forward Wing Monitor Box Installation (Effectivity: All)
Figure 9

FLAP/FORWARD WING MONITOR BOX REMOVAL (EFFECTIVITY: ALL) (FIGURE 9)

a. Remove electrical power from the airplane and disconnect the battery.

b. Remove the couch over the aft step.

c. Remove the six attaching screws securing the aft step to the keel and power supply panel.

d. Disconnect the electrical connectors from the monitor box.

e. Remove the four nuts and washers securing the monitor box to the aft side of the power supply panel. Leave the four screws in the power supply panel to hold the left aisle lights power supply in place.

f. Remove the monitor box from the airplane.

FLAP/FORWARD WING MONITOR BOX INSTALLATION (EFFECTIVITY: ALL) (FIGURE 9)

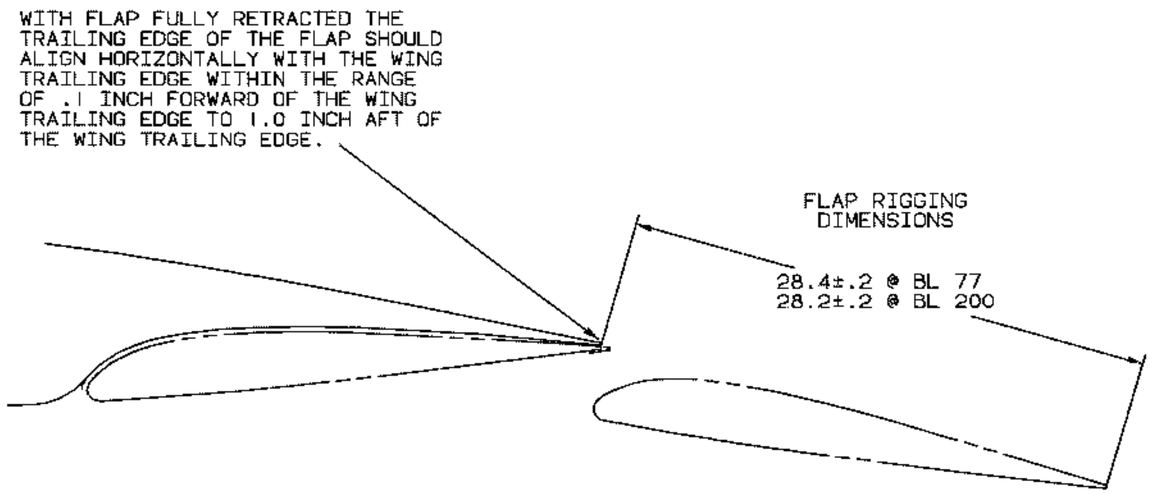
a. Position the monitor box on the aft side of the power supply panel and secure it with the four attaching screws, washers and nuts.

b. Connect the electrical connectors to the monitor box.

c. Align the aft step with the power supply panel and keel, and install the six attaching screws.

d. Install the couch over the aft step.

e. Connect the battery and restore electrical power to the airplane.



Flap Rigging (Effectivity: All)
Figure 10

FLAPS/FORWARD WING RIGGING (EFFECTIVITY: ALL) (FIGURE 6, 8 AND 10)

CAUTION

The flap motor is an intermittent-use type of motor. Do not run the motor more than two consecutive cycles without a five minute cooling period prior to additional cycles.

a. Disable the forward wing position sensors by one of the following methods:

1. Disconnect from ship's wiring.

2. Adjust gap with targets to greater than .25 inch.

3. Remove targets from bracket.

b. Rig flaps as follows:

1. Disconnect the inboard flex shafts from the flap actuators and flap gearbox.

2. Manually retract all flap actuators to the mechanical stops on the actuators. A small screwdriver may be used to turn the input shaft where the flex shaft connects to the actuator.

3. Back the traveling nut off the stop by 3/4 turn of the actuator screw itself.

4. Ensure that the flap motor and gearbox assembly is at the retract limit switch by moving the FLAP/FWD WING switch in the cockpit to the RETRACT position.

5. Connect the inboard flex shafts to the flap actuators and flap gearbox.

NOTE

The inboard flex shaft should have the end with a flange on the core connected to the flap gearbox.

6. Place flaps in the fully retracted position per Detail C of Figure 10. Adjust and connect flap actuator rods for clearance between flap and aft wing as shown in Detail C of Figure 10.

c. Rig position sensor targets as follows:

1. Disable RH flap position sensor.

2. With both forward wing position sensors still disabled, and RH flap position sensor disabled, move the FLAP/FWD WING switch to EXTEND. The LH flap system will stop when the flap position sensor arm reaches the second detent (Figure 6). Install the LH forward wing position sensor and target, and align the target with the LH forward wing position sensor as shown in Figure 8. Adjust LH forward wing position sensor to a .010 to .030 inch gap between the tip of the position sensor and each surface of target while allowing full rotation through the target's range. Ensure that the LH forward wing position sensor is aligned with the second prong of the target, counting from the outboard side of the target. Safety wire LH forward wing position sensor and target.

3. Reset the system by disengaging and then reengaging the L and R FLAP MONITOR circuit breakers. Move the FLAP/FWD WING switch to RETRACT.

4. Move the FLAP/FWD WING switch to EXTEND. Repeat Step 2 for the RH flap position sensor and the RH forward wing position sensor, but with the LH flap position sensor and the LH forward wing position sensor installed and functioning.

d. Reset the system by disengaging and then reengaging the L and R FLAP MONITOR circuit breakers. Move the FLAP/FWD WING switch to RETRACT.

e. Check the travel of the forward wing.

NOTE

Contact the Raytheon Aircraft Company Customer Support Department for the proper procedure to be used to check the forward wing travel.

f. Move the FLAP/FWD WING switch to RETRACT. The flaps should retract within limits shown in Figure 10.

NOTE

With flaps fully retracted, the trailing edge of the flaps should align horizontally with the wing trailing edge within the range of 0.1 inch forward of the wing trailing edge to 1.0 inch aft of the wing trailing edge.

g. Move the FLAP/FWD WING switch to EXTEND. The flaps should extend within the limits shown in Figure 10.

h. Check the travel of the forward wing.

NOTE

Contact the Raytheon Aircraft Company Customer Support Department for the proper procedure to be used to check the forward wing travel.

FLAP/FORWARD WING OPERATIONAL TEST (EFFECTIVITY: ALL)

a. Pull the L FLAP MONITOR circuit breaker. Move the FLAP/FWD WING switch to RETRACT and EXTEND and verify that the flaps and forward wings will not move. Reset the L FLAP MONITOR circuit breaker.

b. Pull the R FLAP MONITOR circuit breaker. Move the FLAP/FWD WING switch to RETRACT and then to EXTEND and verify that the flaps and forward wings will not move. Reset the R FLAP MONITOR circuit breaker.

c. Activate the position sensor arm for the LH flaps twice (Refer to Figure 6). Move the FLAP/FWD WING switch to RETRACT and then to EXTEND and verify that the flaps and forward wings will not move. Pull and reset the L FLAP MONITOR circuit breaker to reset the system.

d. Activate the position sensor arm for the RH flaps twice (Refer to Figure 6). Move the FLAP/FWD WING switch to RETRACT and then to EXTEND and verify that the flaps and forward wings will not move. Pull and reset the R FLAP MONITOR circuit breaker to reset the system.

e. Using a metal object (feeler gage, etc.), activate the LH forward wing position sensor twice (Refer to Figure 8). Move the FLAP/FWD WING switch to RETRACT and then to EXTEND and verify that the flaps and forward wings will not move. Pull and reset the L FLAP MONITOR circuit breaker to reset the system.

f. Using a metal object (feeler gage, etc.), activate the RH forward wing position sensor twice (Refer to Figure 8). Move the FLAP/FWD WING switch to RETRACT and then to EXTEND and verify that the flaps and forward wings will not move. Pull and reset the R FLAP MONITOR circuit breaker to reset the system.

g. Move the FLAP/FWD WING switch to RETRACT or EXTEND and verify that the flaps and forward wings start moving. Before the flaps and forward wing reach their full travel, momentarily depress the pilot's FLAP/TRIM PUSHER INTER switch and verify that the flaps and forward wings stop moving.

h. Release the pilot's FLAP/TRIM PUSHER INTER switch and verify that the flaps and forward wing continue their movement.

i. Move the FLAP/FWD WING switch to RETRACT or EXTEND and verify that the flaps and forward wings start moving. Before the flaps and forward wing reach their full travel, momentarily depress the copilot's FLAP/TRIM PUSHER INTER switch and verify that the flaps and forward wings stop moving.

j. Release the copilot's FLAP/TRIM PUSHER INTER switch and verify that the flaps and forward wing continue their movement.

k. Move the FLAP/FWD WING switch to RETRACT or EXTEND and verify that the flaps and forward wings start moving. Before the flaps and forward wings reach their full travel, pull the R FLAP MONITOR circuit breaker and verify that the flaps and forward wings stop moving.

l. Reset the R FLAP MONITOR circuit breaker.

FORWARD WING HYDRAULIC SOLENOID LOCK VALVE AND ACTUATOR INSPECTION (EFFECTIVITY: ALL) (FIGURE 7)

Inspect the forward wing actuator and the hydraulic lock solenoid valve as follows:

a. Place the FLAP/FWD WING switch in the EXTEND position. Verify that the forward wings are in the unswept (fully forward) position.

b. Remove electrical power from the airplane.

c. Locate the forward wire harness break connector in the forward RH area of the cockpit and disconnect P679 from J679.

d. To open the solenoid valve, connect an external 28 vdc power supply to pin 29 (28vdc) and pin 30 (ground) of J679.

e. Apply a force of 50 lbs. in the aft direction to the tip of the forward wing. The wing should not move, ensuring the integrity of the actuator.

f. Remove the 50 lb. force from the forward wing tip.

g. Remove the 28 vdc external power supply from pins 29 and 30 on J679.

h. Connect P679 to J679.

NOTE

When performing the following step, do not disturb the flap/forward wing rigging.

i. Disconnect the forward wing actuator at the left hand wing attach point by removing the bolt from the rod end. Refer to Figure 7.

j. Restore electrical power to the airplane.

NOTE

The FLAP/FWD WING switch is located below the condition levers. The FLAP CONTROL circuit breaker is located on the left circuit breaker panel.

k. Place the FLAP/FWD WING switch in the RETRACT position. This will cause the actuator to retract. Retract the actuator just enough to clear the attach point. It may be necessary to reset the FLAP CONTROL circuit breaker several times to accomplish this.

l. Remove electrical power to the airplane.

m. Apply a force of 50 lbs. in the aft direction to the tip of the forward wing. Verify that aft movement of the wing is stopped by the hydraulic lock. The forward wing may move slightly aft before hitting the hydraulic lock.

n. Restore electrical power to the airplane.

o. Place the FLAP/FWD WING switch in the EXTEND position.

p. Reconnect the forward wing actuator to the forward wing.

q. Operate the flap/forward wing through at least 2 cycles. Verify proper operation and rigging.

CONTROL LOCK - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

The control lock consists of a single piece welded assembly, with a horizontal pin on the left side that inserts into the control column to lock the elevons and the elevators in place. The right side slips over the engine control levers to immobilize them. There is no provision to pin the rudder pedals.

CONTROL LOCK - MAINTENANCE PRACTICES (Effectivity: All)

CONTROL LOCK INSTALLATION (Effectivity: All) (Figure 1)

Install the control lock as follows:

a. Align the engine control levers. Position the U-shaped end of the control lock around the engine control levers and the other end at the hole in the control column.

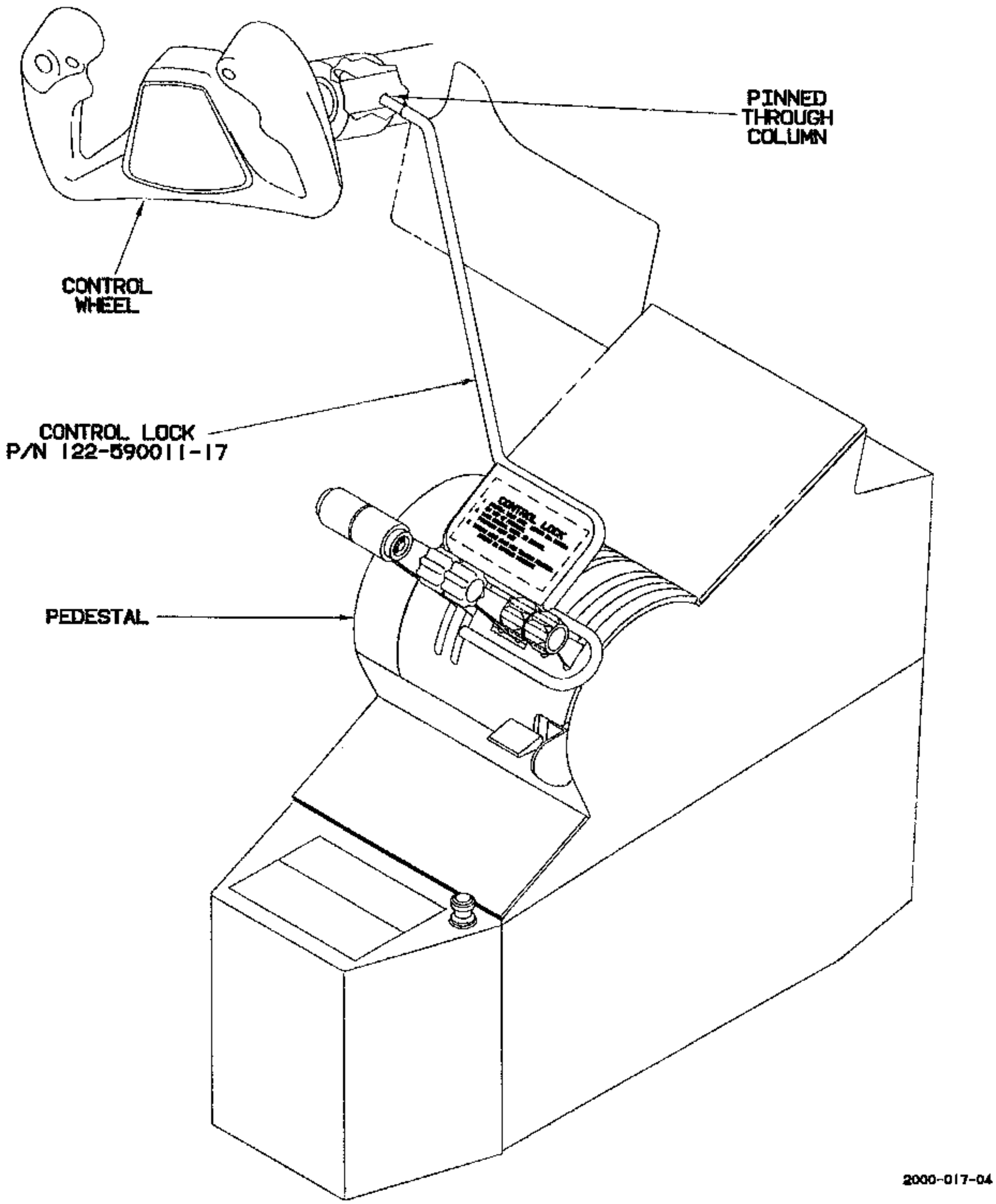
b. With the control column full forward, turn the control wheel approximately 15° to the left to align the holes in the control column.

c. Insert the control lock into the aligned holes in the control column. This will pull the U-shaped end of the control lock over the engine control levers.

d. When the control lock is fully inserted into the control column, the flight and engine controls will be immobilized. The rudders are not locked, placing no restrictions on towing with the control lock installed.

WARNING

Before starting the engines remove the control lock.



Control Lock Installation (Effectivity: All)
Figure 1

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GENERAL - DESCRIPTION AND OPERATION (Effectivity: All)

SPECIAL TOOLS AND EQUIPMENT AND RECOMMENDED MATERIALS (Effectivity: All)

The special tools and equipment listed in Chart 1 and recommended materials listed in Chart 2 as meeting federal, military and/or vendor specifications are provided for reference only and are not specifically required by Beech Aircraft Corporation. Any product conforming to the specification listed may be used, subject to availability. The products included in these charts have been tested and approved for aviation usage by Beech Aircraft Corporation, by the vendor, or by compliance with the applicable specifications. Generic or locally manufactured products which conform to the requirements of specification may be used even though not included in the chart. Only the basic number of each specification is listed. No attempt has been made to update the listing to the latest revision. It is the responsibility of the technician or mechanic to determine the current revision of the applicable specification prior to usage of the product listed. This can be done by contacting the vendor of the product to be used.

CHART 1
SPECIAL TOOLS AND EQUIPMENT (Effectivity: All)

TOOL NAME	PART NUMBER	VENDOR	USE
1. Sump Drain Wrench	122-5900015-1	Beech Aircraft Corporation 9709 E. Central Wichita, KS 67201	Opening drain valves

CHART 2
RECOMMENDED MATERIALS (Effectivity: All)

MATERIAL	SPECIFICATION	PRODUCT	VENDOR
1. Lubricant, Petrolatum	VV-P-236	Vaseline or Petroleum Jelly	Obtain locally
2. Adhesive		EA9309NA	Hysol Div., The Dexter Corp., 211 Franklin Street,
3. Retaining Compound		Retaining Compound 609	Loctite Corp., 705 N. Mountain Rd., Newington, CT 06111
4. Sealant	MIL-S-8802, Type II	Pro-Seal 890	Pro-Seal Corp., Div of Essex, Chemical Corp., Aerospace Products, Compton, CA 90220
5. Cleaner	TT-M-261	MEK	Obtain locally
6. Cleaner	TT-N-95	Naphtha (Alphatic Compound)	Obtain locally
7. Adhesive		Uralane 8089	Shell Chemical Corp., 2001 Kirby Ave., Houston, TX 77019
8. Adhesive	MMM-A-132	R-380-6	Ciba-Ceigy Composites, Material Dept., 10910 Talbert
9. Olive Drab Tape	PP-KT-60 Type IV, Class 1		Obtain locally

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

FUEL SYSTEM (Effectivity: All)

This chapter covers the left and right fuel and vent systems from the fuel storage tanks to the respective engine inboard forward firewalls. This chapter is divided into the following sections.

a. The section on Fuel Storage includes the forward fuel tank, aft fuel tank (cell), fuel filler system, fuel drains, fuel tank ventilation systems, and associated components.

b. The section on Fuel Distribution includes those components that move and control the fuel within, between, to, and from the fuel tanks; such as the standby fuel boost pumps, primary jet fuel pumps, transfer jet fuel pumps, manifold check valves, fuel shutoff valves, and associated fuel lines.

c. The section on Fuel Indicating includes the fuel quantity indicating systems, fuel temperature indicating systems, fuel low level indicating systems, and the low fuel pressure warning systems.

NOTE

For continuation of the engine fuel supply, motive fuel flow and the engine fuel pump purge systems at the engine inboard forward firewall connections, refer to Chapter 73.

FUEL SYSTEM PRECAUTIONS (Effectivity: All)

Personnel working on or around the fuel system should always be alert and aware of the dangers to persons and equipment created by the presence of fuel, fuel vapors, sparks and ignition sources. Prior to working on the fuel system, personnel must be familiar with all fire and safety precautions.

CAUTION

When performing fuel system maintenance, review all locally published fire and safety regulations.

a. For a fuel fire or explosion to develop, there must be a combination of three ingredients: Flammable Liquid or Vapors, Ignition or Flame, and Oxygen. During fuel maintenance, flammable liquids or vapors and oxygen are almost always present. It is essential that the third ingredient, ignition or flame, is never present or created. Sources of ignition or flame are: static electricity, the airplane electrical system, powered support equipment, electric extension cords, smoking, and sparks from tools.

b. The dangers of ignition, sparks, and flame can be minimized or eliminated during maintenance activities by properly grounding the airplane, the use of bonding straps, the use of explosion proof support equipment and lights, and posting NO SMOKING signs.

c. The control of static electricity is essential because it cannot be seen, and can be created by the contact and separation of two dissimilar substances or motion of material and persons. An effective way of controlling the collection and buildup of static electricity is by bonding and grounding. Bonding equalizes the charge between objects and materials and connecting a ground will drain off a potentially dangerous charge.

d. The internal and external fuel and vent lines must be protected against an accumulation of static charges which can become an energy source for causing an explosive hazard. Static charges are controlled with line clamps and bonding jumpers from line to line, and lines to structure brackets. The airplane has low impedance current paths (ground plane) for static charge dissipation and lightning strike purposes.

CAUTION

When checking the bonding of fuel system components, a volt-ohmmeter should always be used to minimize the chances of igniting any fuel vapor. If a higher current method of measuring is required (for resistance levels below 5 ohms), ensure that there is no combustible mixture present during the test.

e. When fuel and vent lines (tubing) are replaced or installed, it is essential that the tubing be static bonded the same way as the tubing that was removed. In addition, static charge testing must be accomplished anytime the fuel and vent lines or the bonding clamp or jumpers are installed or disturbed. Point to point measurements for resistance is taken with a Fluke Multimeter 8020B, or equivalent. All fuel and vent line resistance measurements must have a value of 5 ohms or less between the tube and the connection to the adjacent (conductive) structure.

f. The airplane must be grounded to an approved ground at all times with a proper and serviceable grounding cable(s). Ground cables should always be connected to a potentially charged object first, then to ground. This action will move the potential arcing away from the airplane. Work stands must be bonded to the airplane. Test stands which connect to the airplane systems must be bonded to the airplane prior to making any test connections.

g. It is essential that both the airplane and any ground servicing equipment such as electrical ground supply trucks or refueling vehicles be properly connected to a true earth grounding point before any connection is made. This is necessary to avoid the risk of shock to personnel, fault conditions which might arise on the airplane or ground equipment during servicing, and to avoid any risk of sparks during refueling.

h. Plastic or rubber containers must not be used to catch flammable fluids. Running or dripping fluid generate static charges. Use only metal containers to catch fluids, and ensure they are grounded at all times.

FIRE PRECAUTIONS AND SAFETY PRACTICES (Effectivity: All)

Fuel maintenance should only be performed in an area which will allow free movement of fire fighting equipment and emergency equipment. The area selected must not be upwind of any structure that can entrap and accumulate fuel vapors, or which houses any open flame or spark producing equipment.

a. High frequency radio transmitters are not to be operated within 200 feet of the airplane, and no radar equipment is to be operated within 400 feet of the airplane during fuel servicing or open fuel tank maintenance.

b. Prior to any fuel system maintenance, always connect grounding cables to the airplane, then to an approved ground. Move all spark producing equipment away from the airplane, such as electrically powered tools and electronic test equipment. Disconnect the airplane battery and tag: FUEL SYSTEM MAINTENANCE IN PROGRESS, DO NOT CONNECT BATTERY.

In preparation for, and during open fuel tank maintenance, observe the above Fire Precautions and Safety Practices and ensure the following is adhered to where applicable.

c. An air mover utilized to ventilate an open fuel tank must be grounded to the airplane, and to the same ground as the airplane.

d. Direct the air mover exhaust away from any objects to prevent static electricity charge buildup.

e. Do not start or stop an air mover while the air duct is inserted in a fuel tank.

f. Air ventilate the fuel tank with a clean, dust free air mover and ducting until the vapor concentration is determined to be below the explosive limit. Use a fuel vapor measuring device before beginning fuel tank maintenance. Verification of a safe level should be accomplished and approved by qualified personnel.

WARNING

Fuel vapors may be too rich to burn when a tank is first opened, however, the vapor concentration will dilute to an explosive mixture level during tank ventilation. Also, tank vapors permitted to accumulate in an unventilated area can form a potentially explosive mixture.

g. An attendant or observer should be positioned at the fuel tank to observe personnel working in a tank for any signs of distress.

h. Personnel must wear clean, lint free clothing with nonmetallic zippers or buttons when working in a fuel tank. Clothing that may generate static electricity, such as nylon and other synthetic materials must not be worn.

i. Equipment, tools and materials used inside a fuel tank must be nonsparking and free of dirt or other contaminants. Use only explosive proof lights and air driven power tools.

j. Close all tank openings when work is not in progress to prevent entry of dirt, dust, and foreign matter. Fuel tanks requiring extensive work should be vacuum cleaned with an air driven type vacuum upon completion of the work and before closing of the tank.

k. Disconnected fuel lines, fuel components and/or tanks should have all openings protected to prevent entry of foreign matter. Protective caps, plugs or covers may be used for this purpose. NEVER USE ANY TYPE OF TAPE to cover openings in a fuel system.

FUEL CONTAMINATION (Effectivity: All)

The following information includes the definition of contamination and action to correct existing fuel contamination. Fuel is contaminated when it contains foreign substances not included in a fuel specification. Foreign substances normally involve water, rust, dirt, sand, biological growth and unapproved or improperly mixed additives.

All fuels absorb moisture. Fuel may contain water in the form of suspended particles and/or liquid. Water contamination is normally held in check by the daily draining of water from the fuel tank poppet type drain valves.

Contamination from sand, dirt and/or rust can be the result of contaminated bulk fuel storage tanks, dirty transport vehicles or refueling equipment. Maintaining refueling equipment with clean filters is essential.

Fuel additives that are unapproved, or anti-icing additive blended with fuel at an improper ratio can be considered contamination. If the fuel to additive ratio cannot be corrected by the addition of unblended fuel or anti-ice additive, the contaminated fuel must be off loaded and properly disposed of.

WATER CONTAMINATION REMOVAL (Effectivity: All)

Water accumulation in a fuel tank from condensation cannot be prevented. The amount of water accumulation from condensation depends on the temperature of the fuel and ambient temperature. A daily sampling of the fuel should be taken from each drain valve. Drain valves are installed at a fuel tank's lowest point. Water discovered should be removed immediately. High concentration of water in fuel will cause the fuel to appear cloudy or hazy. Suspended droplets of water in fuel reflect light.

a. Position an approved, clean container under the drain valve.

b. Open the drain valve.

c. Permit the fuel to drain until no water is observed coming from the tank.

NOTE

When catching fuel for sampling purpose, catch the fuel in a clean, sealable container after initially draining a small amount of fluid from the drain valve.

d. Close the drain valve.

e. Repeat procedure for the remaining drain valves.

SAND, DIRT AND/OR RUST CONTAMINATION REMOVAL (Effectivity: All)

Sand, dirt and/or rust particle contamination is normally discovered when taking samples from fuel drain valves, or when the particles are found in the fuel filters. When contamination is discovered, it must be removed.

a. Completely defuel the airplane, refer to Chapter 12-10-00.

CAUTION

When performing open fuel tank maintenance, refer to General Precautions, Fire Precautions and Safety Practices, this section.

NOTE

Fuel that is known to contain dirt, sand and/or rust contamination must be discarded as waste fuel.

b. Remove the left and the right forward fuel tanks, refer to 28-10-00.

NOTE

The aft fuel tanks can be cleaned of contamination while installed in the airplane.

c. Remove all access doors from the fuel tanks. Refer to Chapter 28-10-00.

d. Air ventilate the fuel tank to reduce the fuel vapors to a safe level.

e. Remove all necessary fuel components from the fuel tanks and clear them of any contaminates.

f. With tack rags, wipe the interior of the fuel tanks and fuel components that were not removed from the tanks. Frequently change tack rags to prevent scattering the contamination in the tank. Use a mirror and an approved light to search out and eliminate all contamination. Immediately after decontaminating a tank, cover all access openings to prevent entry of foreign matter.

g. Clean or replace all fuel filters and filter elements.

h. Install all necessary fuel components in the fuel tanks.

i. Install the forward fuel tanks in the airplane, refer to 28-10-00.

j. Refuel the airplane with clean approved fuel, refer to Chapter 12-10-00.

BIOLOGICAL CONTAMINATION (Effectivity: All)

Bacteria, fungus and yeast spores are present in the air almost everywhere and find their way into pipelines, storage tanks and the airplane fuel system. This biological contamination in fuel is drawn to water which has condensed in the fuel tank. It multiplies rapidly while feeding on the fuel and forms heavy sludge and slime. It is this growth that can find its' way to, and clog fuel filters, stopping the flow of fuel. To combat biological contamination, jet fuel anti-icing additive is an excellent microbiological sludge and slime deterrent. When refueling with preblended fuel and additive, the additive should not be less than 0.06 percent by volume or more than 0.15 percent by volume. Preblended fuel and additive should be used, or the additive should be added during all fuel servicing at the proper fuel to additive ratio. Refer to Chapter 12-10-00.

FUEL LEAK CLASSIFICATION (Effectivity: All) (Figure 1)

The classification of fuel leaks is determined by the measurement of the wet area around a leak. A method of obtaining a measurement is by wiping the wet area clean and applying talcum power to the area of the leak. After 30 minutes, check (measure) the area of wetness. Wetness measuring 3/4-inch diameter is classified as a STAIN, 1 1/2-inch diameter a SEEP, 3 1/2 to 4-inches diameter a HEAVY SEEP, 4 to 5-inches diameter or an area where fuel appears to flow, run or drip is classified as a RUNNING LEAK. Fuel leaks are also classified as to immediate repair required and leaks not considered a potential flight hazard. Fuel leaks that are classified as a stain, seep or heavy seep in an open area require repair when the airplane is down for other maintenance. Running leaks and/or any fuel leakage in an enclosed area require immediate repair.

CAUTION

Any fuel leakage in an enclosed area, such as the wheel well or in an area of the fuselage, requires immediate repair.

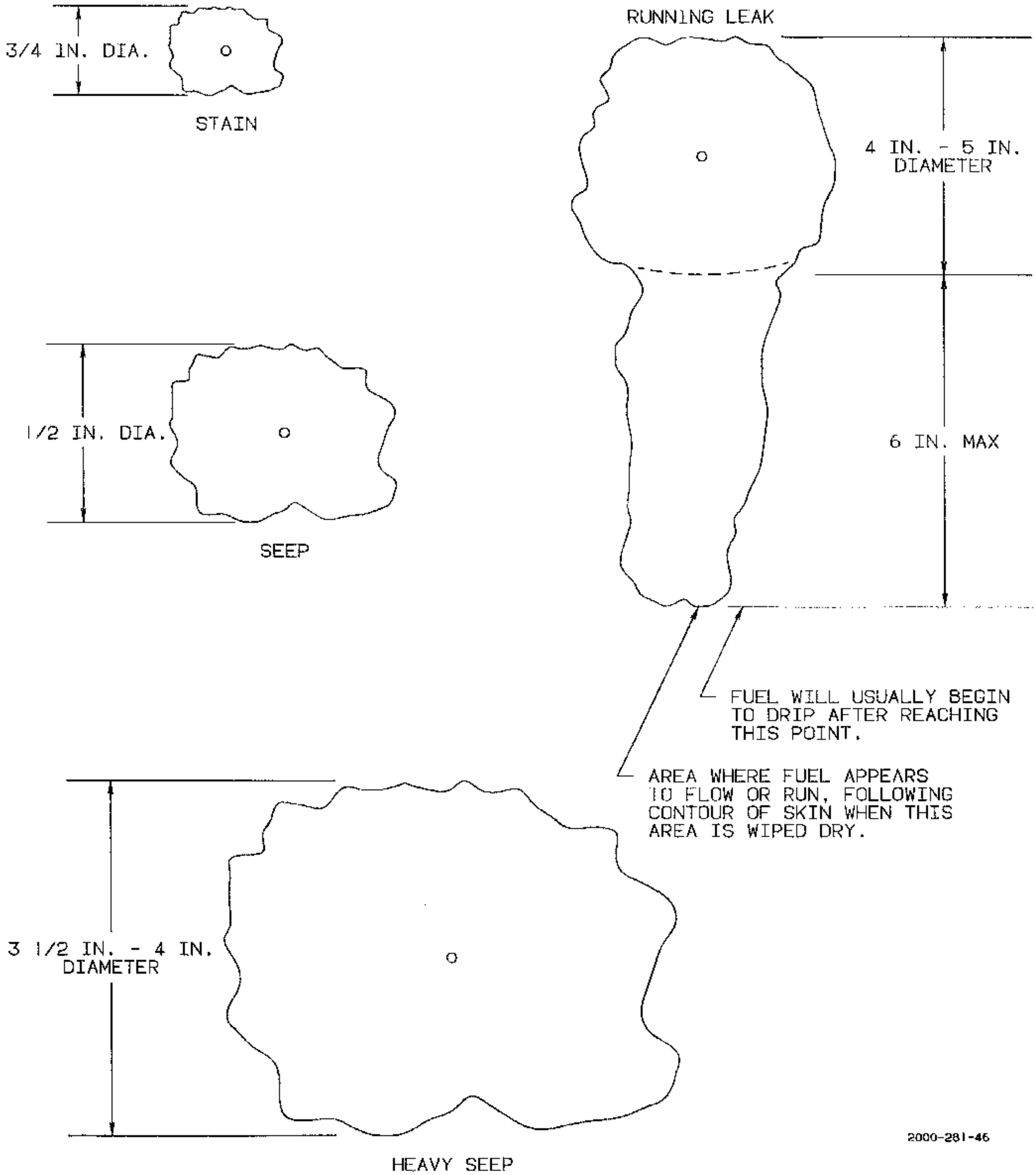
SEALING FIBER COMPOSITE FUEL TANKS (Effectivity: All)

Sealing Requirements: Surfaces must be thoroughly clean and dry before application of any sealant. Sealing must be continuous, either within itself or by overlapping the adjoining sealant. All leak paths (except at removable doors and fittings that are provided with gaskets, seals or O-rings) must be sealed. All fasteners and nutplates on the interior of the tank and the tank structure that form joints which may provide a possible leak path to the fuel tank exterior must be sealed.

Fuel leaks to be repaired inside the fiber composite fuel tanks require draining all fuel from the affected tank as outlined in Chapter 12-10-00. Remove all damaged sealant from the vicinity of the origin of the leak path area with a nonsparking scraper.

Preliminary Cleaning: Loose shavings, dust and other contaminates are removed using a vacuum cleaner, clean bristle brushes and cheese cloths.

Cleaning: After excess debris is removed, clean the general area with a cheese cloth dampened with solvent (5 or 6, Chart 2, 28-00-00). WEAR GLOVES AND APRON FOR PROTECTION. Dry the area with additional clean cloths before the solvent evaporates. If grease or oil like films are present, reclean until contaminating films are removed.



Fuel Leak Classification (Effectivity: All)
Figure 1

CAUTION

Under no circumstances are red shop rags to be used for cleaning. Cleaning solvents must never be poured or sprayed on the interior or exterior structure and surface of the tank.

Final Cleaning: Immediately prior to sealant application, a final cleaning of the area must be accomplished. Clean gloves must be worn during final cleaning and when touching a cleaned area. The area must be thoroughly dry, and if there is any delay in the application of the sealant, it must be protected from dust.

Fold clean cheese cloth to eliminate raw edges and reduce the possibility of lint, and dampen with solvent from a safety container. To prevent cross contamination, the solvent in the container must be used for final cleaning only. Thoroughly scrub an area by wiping in one direction with a dampened cloth in one hand, followed with a dry cloth in the other hand to absorb solvent before it evaporates. A new cheese cloth must be used when discoloration of the cloth is evident. A small paint brush may be used for cleaning corners and gaps, then the surface wiped dry before evaporation of the sealant. DO NOT USE NYLON BRISTLE BRUSHES.

Application of Sealant: Application time of the sealant must be observed. Do not use sealant after the end of its application time limit.

NOTE

Work life and application time should be considered as one and the same when using sealants. Sealing must be completed within the work life/application time of the sealant.

NOTE

Marking on sealing surface is permitted only with felt tip ink markers or stamps with ink. No grease pencils or any other contaminating markers may be used for marking.

Fillet type sealant is applied into and over a joint, seam, or mismatch of surfaces. Apply the sealant with a sealing gun and nozzle by forcing the sealant into the seam of the mismatched area, keeping the nozzle tip pointed into the seam and almost perpendicular to the line of travel. The sealant must be faired into the joint or seam using fairing tools. Press the tool against the sealant and move parallel to the joint or seam. Ensure that air is not entrapped within the sealant. Any evident of air bubbles must be worked out, removed or repaired. A method of degassing sealant after mixing is placing it under vacuum for five minutes.

NOTE

Care must be taken when applying sealant in the tank. Do not obstruct the openings in the tank baffles which would prevent the flow of fuel or passage of air, such as the spaces in the upper and lower corners of the baffles.

Sealant may be utilized as a separable seal for some panels and/or access doors. The procedure allows removal of the panel or doors without the sealant adhering to the panel/door or damage to the seal.

Sealant Curing: Refer to Chart 3 for cure time of sealant used in composite fuel tanks. The tank must be open during air drying.

CHART 3
SEALANT CURING TIME (Effectivity: All)

Sealant	Application Time (Hour)	Tack Free Time (Hour)	Cure Time (Hour)
PR1750A-1/2	0.5	10	30
PR899A-1/2	0.5	10	30
PR1750A	2.0	24	48
PR899A-2	20.	24	48
PR1750B-1/2	0.5	10	30
PR899B-1/2	0.5	10	30
PR1750B-2	2.0	24	48

CHART 3
SEALANT CURING TIME (Effectivity: All) *(Continued)*

Sealant	Application Time (Hour)	Tack Free Time (Hour)	Cure Time (Hour)
PR899B-2	2.0	24	72

BLADDER FUEL CELL LEAKAGE TEST (Effectivity: All) (Figure 2)

Bladder type fuel cells may be bench tested for leakage by sealing off all openings and inflating the empty cell to 1/4 psi with a mixture of shop air and ammonia gas, then checking for visible indications of leakage on a cloth saturated with phenolphthalein solution. To set up and conduct the leakage test, proceed as follows:

a. The following equipment is required and should be hooked up as indicated in Figure 2:

1. Closure plates for the fuel cell openings. Such plates may be fabricated of aluminum sheet cut to a size sufficient to cover the cell openings. Drill holes in the closure plate to match the hole pattern around the opening in the fuel cell.

2. Rubber stoppers to plug the fitting openings in the fuel cell. One of the stoppers should have a hole for insertion of the plastic tubing used to connect the fuel cell into the test setup.

3. A manometer for measuring 6 inches of water differential. The manometer can be fabricated from glass or clear plastic tubing; frame and scale similar to the illustration shown.

4. A regulator that can be set to provide 1/4 psi (6 inches of water) from a supply of shop air.

5. Two flasks (or bottles) approximately one liter (or quart) in capacity. A third container may be hooked into the test setup to provide an optional overflow collector if desired. The two containers should be provided with rubber stoppers that have holes for the insertion of 1/4-inch tubes (glass or metal) as shown in Figure 2.

6. Plastic tubing of a size to provide a leak-free fit over the tubes and of a length sufficient to interconnect the test components as shown in Figure 2.

7. Make up a solution of phenolphthalein as follows: Add 1/3 ounce phenolphthalein crystals to 1/2 gallon ethyl alcohol, mix, then add 1/2 gallon water.

8. Make up an ammonia solution by adding 100cc (3 fluid ounces) of concentrated ammonium hydroxide (NH_4OH) per gallon of water.

b. Place the fuel cell and test equipment on a clean work bench.

CAUTION

Make sure the work area is clean of metal shavings or other debris that could damage the fuel cell.

c. Install the closure plates over the fuel cell openings and torque the retaining screws as specified in the installation section of the maintenance manual for the openings, then insert the rubber stoppers into the open fittings.

d. The flask (or bottle) containing the ammonium hydroxide solution should be 1/3 to 1/2 full as shown in Figure 2.

e. Connect a shop air supply to the regulator and interconnect the regulator, beakers, fuel cell, and manometer as indicated in Figure 2.

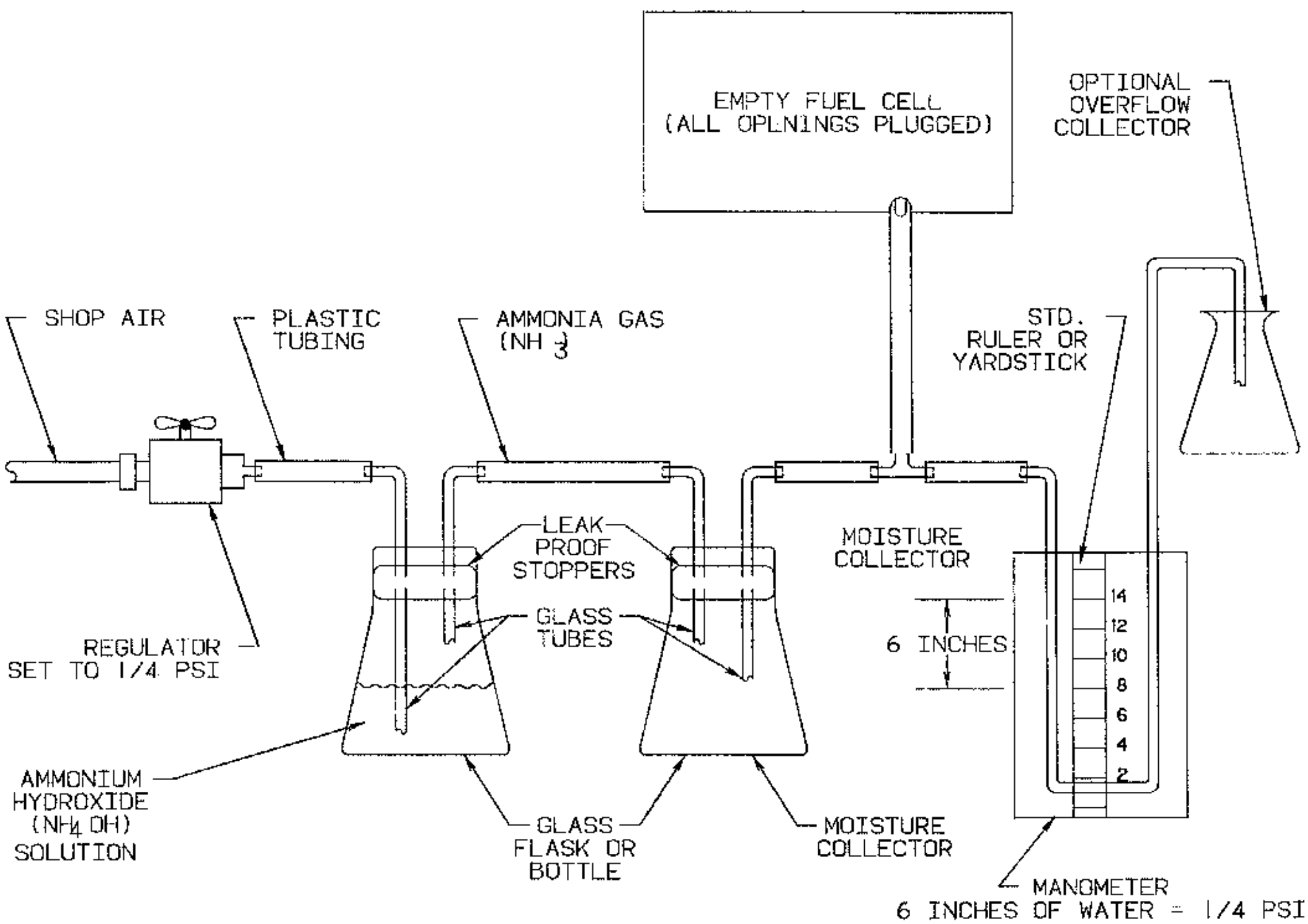
f. Inflate the fuel cell to 1/4 psi with a mixture of shop air and ammonium gas. A 6-inch difference in the two water levels of the manometer will indicate that the fuel cell is inflated to 1/4 psi. It is not necessary to restrain the cell other than to keep it from rolling off the bench. The filling of the cell will be rather slow at the 1/4 psi, but should not be rushed as overpressure of the cell could result.

g. Saturate a large, clean cloth with phenolphthalein. (Immerse it in a container and squeeze out excess liquid.)

CAUTION

Wear rubber gloves to protect against skin irritation when handling the cloth. As a further protection against possible penetration of the phenolphthalein solution through the gloves, wash your hands thoroughly after finishing the test.

h. Lay the cloth over the various portions of the fuel cell until the entire exterior of the cell has been covered. With each application of the cloth, watch for the



Bladder Fuel Cell Leakage Test (Effectivity: All)
Figure 2

formation of a reddish pink stain on the cloth to indicate the presence of a leak. Encircle the area on the fuel cell beneath such stains with a chalk mark to pinpoint the locations of leaks.

NOTE

Continued use of the testing cloth will require repeated saturations with phenolphthalein since rapid evaporation of the alcohol from the cloth progressively reduces the sensitivity of the test unless the solution in the cloth is frequently renewed.

BLADDER FUEL TANKS MAINTENANCE AND REPAIR (Effectivity: All)

The left and right aft fuel tanks are bladder type fuel cells and are of BTC-85 construction. Each cell has a repair manual number stenciled near the lower access door. For information and procedures regarding maintenance, repair and storage of the aft fuel cell, refer to the BEECHCRAFT Starship 1 Component Maintenance Manual, Chapter 28, AP368 Maintenance and Repair of Vithane Fuel Tanks.

Fuel cells to be shipped to the cell manufacturer for repair which have foreign material applied to the fittings or fuel cell walls, either inside or outside, will not be repaired and all warranty is null and void. Foreign material is defined as sealants, coatings and conditions not approved by the manufacturer for installation, operation or repair of a bladder fuel cell.

CAUTION

Never store fuel cells in the vicinity of electrical equipment, such as generators and motors. The ozone gas produced by the arcing of brushes on a commutator has highly destructive effect on fuel cells. Although it leaves no visible indication, the ozone turns the material of the cell brittle so the fuel cell may disintegrate under stress.

FUEL STORAGE - DESCRIPTION AND OPERATION (Effectivity: All) (Figures 1 and 2)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

The left and right fuel tank configurations are identical. Each side is comprised of an integral forward wet wing fuel tank and an aft bladder cell tank. The fuel tank filler systems, venting systems and drain valves are directly associated with fuel tank functions.

FORWARD FUEL TANKS (Effectivity: All)

The left and right forward fuel tanks are triangular and aerodynamically shaped. Each tank is bordered with a tank root rib, tank aft spar and a tank forward (leading edge) spar. The upper and lower tank skins are formed to match the wing surface. With a forward tank installed, the tank root rib is parallel to the fuselage. The tank aft spar is parallel to the main landing gear forward spar. The tank forward spar extends along the leading edge from the forward end of the root rib to the tank aft spar. Each forward fuel tank has a capacity of approximately 1,142 pounds (170 gallons).

The tank upper and lower skins extend over the tank aft spar and are secured along the main landing gear forward spar with screws. Shims installed between the skins and main landing gear forward spar adjust for any mismatch between the tank and wing surfaces.

Each forward fuel tank is secured to the airplane at the forward fuselage fitting (FS 237.00), the landing gear forward spar (FS 345.00), and the outboard wing leading edge structure. The forward tank fitting is in two halves: one half is bonded to the tank forward spar, and the other half is bonded to the tank root rib. The two halves are then bonded and bolted together, sandwiching the extentions of the tank forward spar and tank root rib. The ends of the fitting halves form a tang which mates with the forward fuselage clevis fitting. The tang and clevis are bolted together with shims (washers) between.

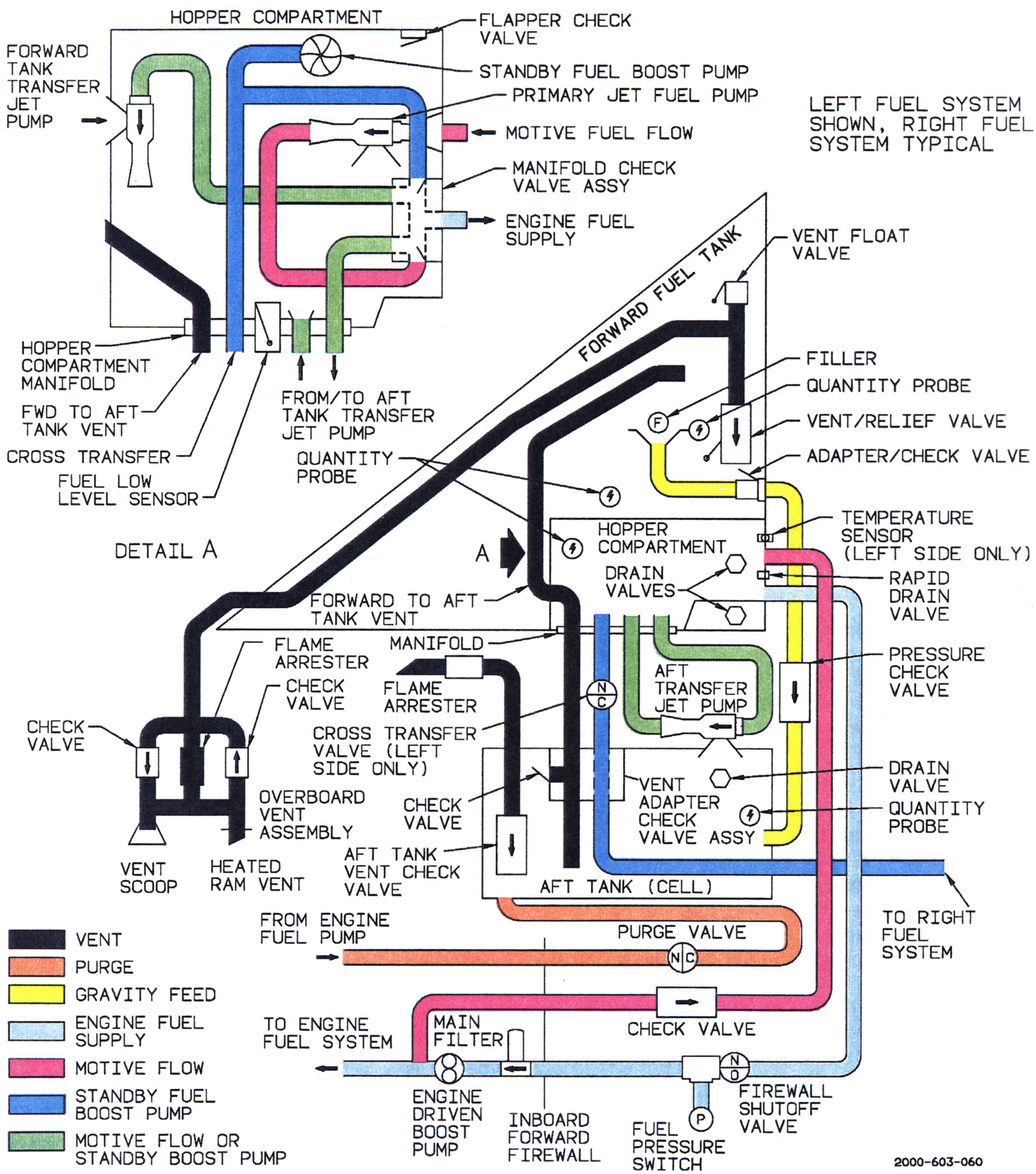
The aft tank fitting is bolted to the landing gear forward spar, which is attached to a fitting on the fuselage. The tank fitting is in two pieces: one half is bonded to the tank root rib, and the other half is bonded to the tank aft spar. The two halves are bonded and bolted together, sandwiching the extentions of the tank root rib and the tank aft spar. L-shaped ground straps are secured to the upper and lower tank fitting bolts and riveted to the upper and lower tank skins. Shims (washers of different thickness) are placed between the tank fitting and the landing gear forward spar, then secured with bolts.

The outboard tank fitting is in two pieces; one half is bonded to the tank forward spar and the other half is bonded to the tank aft spar. The halves are bonded and bolted together, sandwiching the extentions of the tank forward spar and the tank aft spar. The outboard tank fitting is bolted to the wing forward spar.

FUEL TANK ACCESS OPENINGS (Effectivity: All)

Each forward fuel tank has ten access openings covered with nine access doors and one filler cap access plate assembly. The access openings permit access into the tank for maintenance of the internal components and the tank itself. Five of the access openings are located in the tank root rib and three are in the tank aft spar. The access doors on the tank aft spar are only accessible with the forward tank removed. The access opening in the upper aft surface of the forward fuel tank permits access into the hopper compartment. A fuel filler cap is mounted on a cap-adapter access plate above the filler horizontal baffle compartment.

All of the fuel tank access doors are constructed with reinforcements and sealed locking inserts. The access doors are mounted inside the fuel tank with an O-ring on the face of the door to seal the opening. Electrical connectors are mounted through the three aft access doors on the root rib for connecting and routing the wire harness for the fuel quantity probe out of the aft



Fuel System Flow Diagram (Effectivity: All)
Figure 1

tank. Provisions are made for mounting the fuel temperature sensor to the access door on the left tank root rib. To access all baffled compartments of the forward fuel tank, it is necessary to remove the forward fuel tank from the airplane. Removal of the upper aft access door and the aft access door on the tank root rib allows access to the hopper compartment. Access to the seven forward baffled compartments is through the four access doors on the forward root rib. Access to the three aft baffled compartments is through the three access doors along the tank aft spar.

TANK BAFFLES (Effectivity: All)

The forward fuel tank is divided internally into compartments formed with vertical baffles. The tank baffles allow movement of fuel within the tank, but prevent mass movement of fuel during airplane maneuvers. The tank baffles are designed with openings to allow access from one compartment to another. The baffles throughout the forward tank have spaces in the corners to permit fuel movement. The upper corners of the baffles also incorporate spaces to prevent air entrapment during refueling. The vertical baffles forming the hopper compartment are sealed, with the exception of openings at the top which allow excess fuel flow from the hopper compartment into the forward fuel tank.

WING FUEL FILLER (Effectivity: All)

Fuel is pumped on board the airplane through an over-the-wing filler in the upper surface of each forward tank. Each fuel filler consists of a flush fuel cap, antisiphon flapper and adapter mounted on an access plate. The upper surface of the cap is painted red except for the word "FWD" and an arrow in white. The cap assembly is designed to relieve vacuum pressure (if any) when the handle is raised. The cap mates with an adapter sealed and riveted to the access plate (531AT left/631AT right). The antisiphon flapper is hinged to the bottom of the adapter and sealed with an O-ring in the closed position. The antisiphon flapper is opened by the insertion of the fuel nozzle into the filler.

Below the antisiphon access plate is the fuel filler compartment formed by vertical baffles. A horizontal baffle, shaped as a 10-inch funnel, is bonded to the vertical baffles with support clips. Access to the area below the horizontal baffle is through the access door on the center root rib. A cover secured on top of the horizontal baffle aids in the removal and installation of the fuel quantity indicating probe extending above the baffle. A 1.5-inch-diameter hole at the bottom of the horizontal baffle (funnel) is connected to the gravity feed line with a flange fitting.

REFUELING GROUNDING RECEPTACLE (Effectivity: All)

A ground receptacle is provided near each forward tank fuel filler for the purpose of grounding the fuel nozzle. The receptacle is mounted on a bracket flush with the lower tank skin at the lower tank-to-fuselage fairing just aft of the leading edge. The bracket is attached to the tank skin by rivets and electrically bonded to provide a maximum resistance of 5 ohms or less to the airplane ground plane.

HOPPER COMPARTMENT (Effectivity: All)

The inboard aft corner compartment of each forward fuel tank forms a hopper compartment. The hopper compartments are essentially sumps of the forward fuel tanks used to collect and store fuel coming from the forward and aft fuel tanks. The collected and stored fuel in each hopper compartment is made available for operation of its respective engine. Components such as the standby fuel boost pump, primary jet fuel pump, forward tank transfer jet fuel pump, manifold/check valve, a flapper check valve and the hopper compartment manifold are mounted in the hopper compartment for the purpose of moving the fuel to and from the hopper compartment. Each hopper compartment has a capacity of approximately 160 pounds (24 gallons).

The hopper compartment is enclosed by the aft end of the tank root rib, the inboard end of the tank aft spar, and the forward and outboard compartment vertical baffles. The sealed compartment is designed to contain incoming fuel while maintaining a fuel level up to the overflow openings/holes at the top of the baffles. A flapper check valve at the bottom of the forward baffle of the compartment permits fuel to enter the hopper compartment should the fuel level in the hopper compartment become lower than the fuel level in the forward tank (as during refueling operations). The outboard baffle of the hopper compartment is sealed except for a 1.25-inch-diameter hole at the top of the baffle and a 1.25-inch-diameter hole located at the lower aft end of the baffle. The top hole is used for fuel overflow and for routing the forward-to-aft tank vent line through the baffle. The lower hole in the baffle is open for forward tank fuel flow into an area of the hopper compartment partitioned off by a horizontal slanting baffle. The area below the slanted baffle contains fuel from the forward tank, and the area above contains hopper compartment fuel. Fuel below the slanted baffle is pumped into the hopper compartment by the transfer jet fuel pump mounted on the slanted baffle with its pickup tube and screen extending below the baffle. Access to the pickup tube and screen is through an access door above the hopper compartment and an access door on the slanted baffle. The slanted baffle access door is installed with a seal and secured with screws into nutplates.

HOPPER COMPARTMENT MANIFOLD (Effectivity: All)

Each hopper compartment has a manifold installed at the inboard side of the hopper compartment. The manifolds are symmetrical and provide a means of routing fuel and vent lines into and out of their respective hopper compartment. Each manifold consists of a round plate with integral ports for the jet pump return line from the aft tank, the motive fuel flow line to and from the aft tank, the forward-to-aft tank vent line, cross-transfer fuel line and the fuel low level sensor. Ferrules are bonded to each manifold port with the exception of the return line from the aft tank, which discharges directly into the hopper compartment. Each manifold is secured in place with four bolts and washers. The bolts extend from the respective main landing gear wheel well, through the landing gear forward spar, through the forward fuel tank spar, and into the inserts located on the manifold. An O-ring is installed between each manifold and the forward fuel tank spar to provide a seal.

The center hole through the manifold permits installation of the fuel low level sensor. An O-ring around the sensor and a gasket under the flange of the sensor prevent fuel leakage. The sensor is secured to the manifold with the flange gasket by two bolts threaded into self-locking inserts molded to the manifold.

GRAVITY FEED LINE (Effectivity: All)

A gravity feed line is routed from the fuel filler horizontal baffle in the forward tank to the inboard side of the aft fuel tank. Fuel flows freely through the gravity feed line. The purpose of the gravity feed line is to provide a means of filling the aft fuel tank during refueling operations and to allow gravity flow of fuel from the aft fuel tank to the forward fuel tank should the fuel level in the forward tank become lower than the fuel level in the aft tank.

The left and right gravity feed line installations are the same. The gravity feed line is connected to the center of the fuel filler horizontal baffle (funnel) with a flange and ferrule connector. The feed line is routed through a tank baffle to the adapter/check valve assembly mounted on the tank root rib. The adapter/check valve assembly is designed with ferrule connectors at each end and a flapper check valve hinged to open into the forward tank. The adapter/check valve assembly is secured to the tank root rib with a mounting plate and one ferrule connector exiting through the mounting plate, gasket and root rib. On the inboard side of the tank root rib, the gravity feed line is routed from the adapter/check valve assembly aft to a normally open inline check valve. Supporting the feed line is a support bracket and clamp. The open line check valve allows the fuel to flow freely in both directions; however, if the fuel flow toward the forward fuel tank reaches a pressure of 6.0 ±0.5 psig, the check valve closes. From the inline check valve, the gravity feed line continues aft to the aft fuel tank where it penetrates the aft fuel tank cavity (root rib) through a grommet and a fuel cell nipple fitting.

FUEL QUANTITY INDICATING PROBE SUPPORTS (Effectivity: All)

The supports for the three fuel quantity indicating probes are bonded to the internal baffles of each forward fuel tank. Upper and lower supports for each probe are located in the fuel filler compartment, hopper compartment and the compartment between the hopper compartment and filler compartment. Bracket assemblies bolted to the supports are designed with overcenter-type clamps to secure the fuel probes in place. A lightning strike shield is bonded to the forward fuel tank lower surface under the forward and aft fuel probes. Each aft fuel tank fuel quantity probe is supported by an upper and lower probe mount molded to the respective fuel cell. A cap secured to the top of each fuel probe with tie wraps shields the probe from a lightning strike.

FUEL DRAIN VALVES (Effectivity: NC-4 thru NC-25)

The fuel drain valves provide a means for taking fuel samples and draining moisture and residual fuel from the fuel tanks. The forward fuel tanks have a forward and aft drain valve located in each hopper compartment for a total of four valves.

The forward drain valves, located below and between the standby fuel boost and primary jet fuel pumps, permit the draining of fuel from the hopper compartment. The aft drain valves, located under the horizontal baffle at the inboard corner of each aft compartment, permit the draining of fuel from the area below the slanted baffle. Each drain valve is secured to the tank skin with a castellated spacer, washer and jam nut. An O-ring is installed between the valve head and fuel tank skin to seal the exterior of the valve.

The drain valves are identical in design and operation. Each valve contains an internal poppet held in the closed position by spring pressure. A crosspoint head in the poppet recess is used to open the poppet for fuel draining operations and O-ring replacement. A flange on the valve poppet allows for replacement of the primary O-ring without removal of the entire valve or loss of fuel. When the poppet is turned 55° clockwise without pushing up, spring pressure extends the poppet out of the valve body enough to expose the primary O-ring. With the poppet extended, the poppet flange mates with a seat in the valve body to form a secondary seal and prevent the loss of fuel. If replacement of the entire drain valve is necessary, two holes in the valve head allow use of a spanner wrench to hold or rotate the valve.

Individual lightning shields are bonded to the lower surface of each forward fuel tank to shield the drain valves from a lightning strike. Threaded plugs are installed in the lightning shields to allow access to the drain valves during fuel draining operations. A sump drain wrench (1, Chart 1, 28-00-00) is used to remove the plugs.

FUEL DRAIN VALVES (Effectivity: NC-26 and After)

The fuel drain valves provide a means for taking fuel samples and for draining moisture and residual fuel from the fuel tanks. The forward fuel tanks have a forward and aft drain valve located in each hopper compartment for a total of four valves.

The forward drain valves, located below and between the standby fuel boost and primary jet fuel pumps, permit the draining of fuel from the hopper compartment. The aft drain valves, located under the horizontal baffle at the inboard corner of each aft compartment, permit the draining of fuel from the area below the slanted baffle. Each drain valve is secured to the tank skin with a castellated spacer, washer and jam nut. An O-ring is installed between the valve head and fuel tank skin to seal the exterior of the valve.

The drain valves are identical in design and operation. Each valve contains an internal poppet which is held locked in t he closed position by spring pressure. A hex head in the valve poppet recess is used to open the poppet for fuel draining operations and poppet O-ring replacement. A flange on the valve poppet allows for replacement of the primary O-ring without removal of the entire valve or loss of fuel. O-ring replacement is the only time rotation of the drain valve poppet exceeds 35°. Rotation of the valve poppet 90° clockwise without pushing up will allow the poppet to extend from the valve body and expose the primary O-ring. With the poppet extended, the flange mates with a seat in the valve body to form a secondary seal and prevent the loss of fuel. If replacement of the entire drain valve is necessary, two holes in the valve allow the use of a two prong spanner wrench to hold or rotate the valve.

RAPID FUEL DRAIN VALVES (Effectivity: All)

A rapid drain valve is installed in each forward tank root rib adjacent to the hopper compartment. These drain valves initially permit the rapid draining of fuel from the forward tanks, but are incapable of draining all fuel from the tanks due to the location of each valve. The valves are held closed by spring pressure and also utilize a threaded plug to ensure that each valve remains closed.

The desired drain valve is accessed by removing the applicable wing-to-fuselage fairing (527CB left/627CB right). After the plug is removed, the valve poppet is unseated (opened) for defueling operations by screwing an MS33656E12 fitting in to the valve body. The fitting has provisions for a drain hose and is removed and replaced by the plug when draining is accomplished.

NOTE

Drain valves are also located on the left and the right main fuel filters. Refer to Chapter 73-10-00 for detailed information on operation and maintenance of the fuel filter drain valves.

AFT FUEL TANKS (Effectivity: All) (Figure 2)

The aft fuel tanks are located in the aft wing just aft of the main landing gear wheel wells. The tanks are preshaped bladder type fuel cells which conform to the shape of the wing cavities when installed. Each aft fuel cell has a capacity of approximately 585 pounds.

FUEL DRAIN VALVES (Effectivity: NC-4 thru NC-25)

The fuel drain valves provide a means for taking fuel samples and draining moisture and residual fuel from the fuel tanks. The aft fuel tanks have one drain valve installed in each tank.

Each aft tank fuel drain valve is located at the inboard forward corner of its respective fuel cell under the pickup tube for the transfer jet fuel pump of the aft tank. An O-ring is installed between the valve head and fuel tank skin to seal the exterior of the valve. The aft drain valves permit fuel draining from the aft tanks and are secured to their respective tanks by a valve plate and threaded insert.

Both drain valves are identical in design and operation. Each valve contains an internal poppet which is held in the closed position by spring pressure. A crospoint head in the poppet recess is used to open the poppet for fuel draining operations and poppet O-ring replacement. A flange on the valve poppet allows for replacement of the primary O-ring without removal of the entire valve or loss of fuel. When the poppet is turned 55° clockwise without pushing up, spring pressure extends the poppet out of the valve body enough to expose the primary O-ring. With the poppet extended, the poppet flange mates with a seat in the valve body to form a secondary seal and prevent the loss of fuel. If replacement of the entire drain valve is necessary, two holes in the valve head allow use of a spanner wrench to hold or rotate the valve.

Individual lightning shields are bonded to the lower surface of each aft fuel tank to shield the drain valves from a lightning strike. Threaded plugs are installed in the lightning shields to allow access to the drain valves during fuel draining operations. A sump drain wrench (1, Chart 1, 28-00-00) is used to remove the plugs.

FUEL DRAIN VALVES (Effectivity: NC-26 and After)

The fuel drain valves provide a means for taking fuel samples and draining moisture and residual fuel from the fuel tanks. The aft fuel tanks have one drain valve installed in each tank.

Each aft tank fuel drain valve is located at the inboard forward corner of its respective fuel cell under the pickup tube for the transfer jet fuel pump of the aft tank. An O-ring is installed between the valve head and fuel tank skin to seal the exterior of the valve. The aft drain valves permit fuel draining from the aft tanks and are secured to their respective tank by a valve plate and threaded insert.

Both drain valves are identical in design and operation. Each valve contains an internal poppet which is held locked in the closed position by spring pressure. A hex head in the valve poppet recess is used to open the poppet for fuel draining operations and poppet O-ring replacement. A flange on the valve poppet allows for replacement of the primary O-ring without removal of the entire valve or loss of fuel. O-ring replacement is the only time rotation of the drain valve poppet exceeds 35°. Rotation of the valve poppet 90° clockwise without pushing up will allow the poppet to extend from from the valve body and expose the primary O-ring. With the poppet extended, the flange mates with a seat in the valve body to form a secondary seal and prevent the loss of fuel. If replacement of the entire drain valve is necessary, two holes in the valve allow the use of a two prong spanner wrench to hold or rotate the valve.

VELCRO CELL SUPPORT (Effectivity: All)

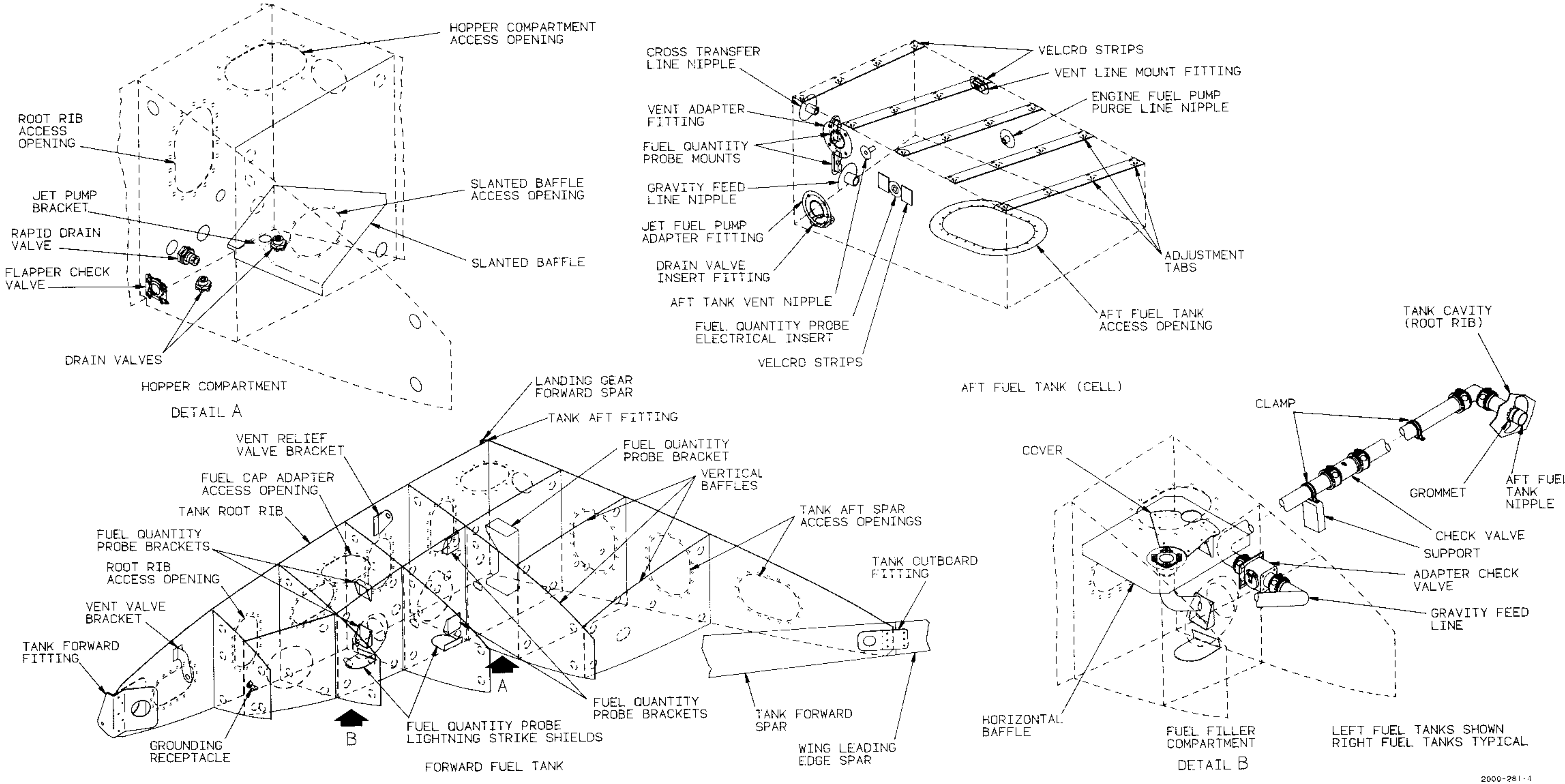
Five 2.00-inch-wide hook and loop-type velcro strips secure the top of each aft fuel cell to the cavity ceiling to prevent the fuel cell from collapsing when empty. Internal adjustment tabs on the ceiling of the fuel cell permit handling, positioning and aligning the fuel cell and the velcro strips during removal and installation. Velcro is also utilized to hold the forward sidewall of the fuel cell to the cavity at the fuel quantity probe wire bundle electrical connector.

NIPPLE FITTINGS (Effectivity: All)

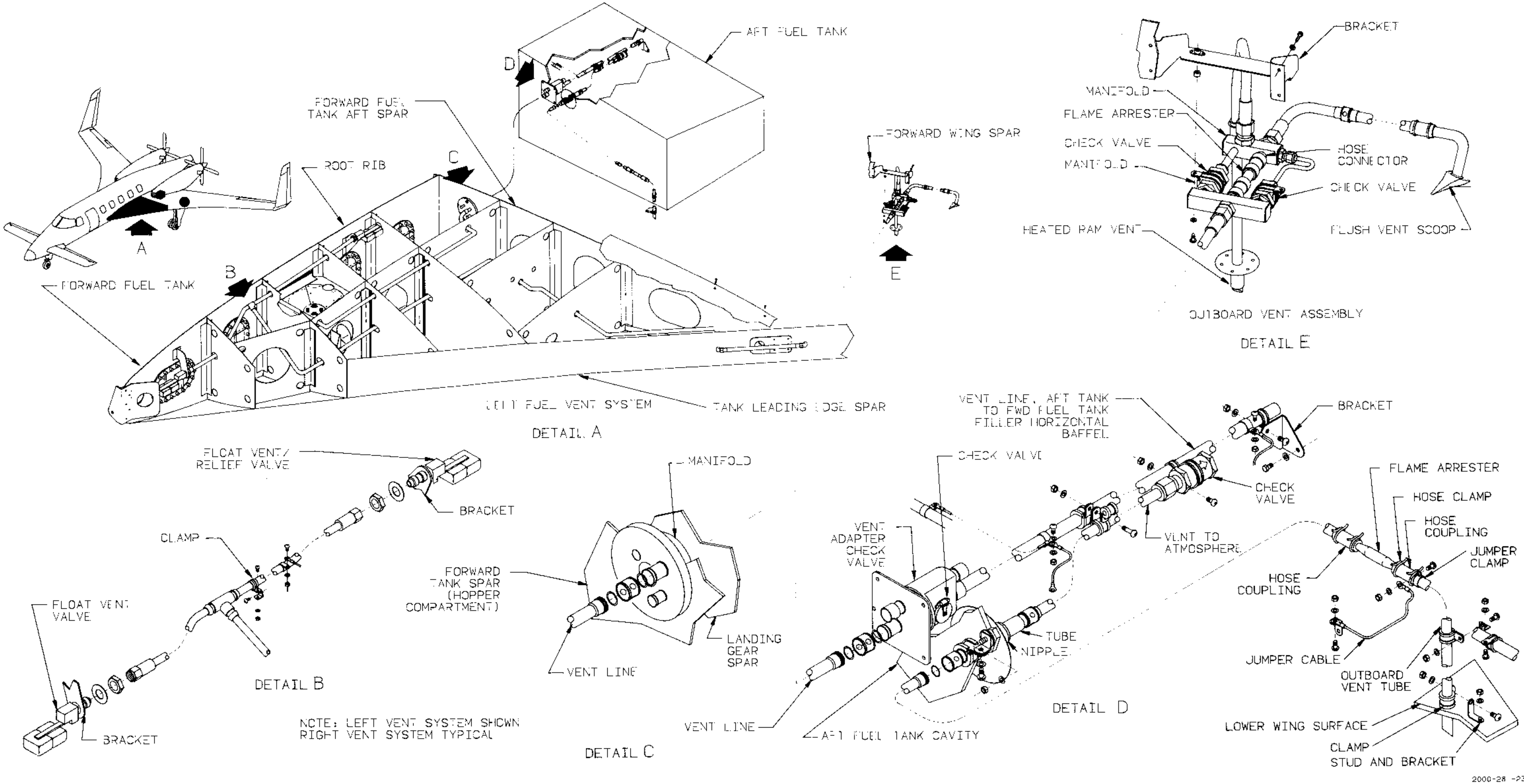
Fuel and vent lines enter or exit directly through nipple fittings molded into the aft fuel cell. The nipples are designed with protruding surfaces for clamping and sealing the nipples around tubing. The nipple clamps have "inner shoes" to protect the nipples. Correctly torquing the nipple clamps and/or fasteners of the fuel cell is essential. Over- or undertorquing can create fuel leaks.

SELF-LOCKING INSERTS (Effectivity: All)

Self-locking inserts are molded into the aft fuel cell for the purpose of securing the fuel quantity probe brackets (8 inserts), transfer jet fuel pump adapter (4 inserts), vent adapter check/valve (4 inserts), fuel drain valve plate (8 inserts), and forward-to-aft vent line bracket (3 inserts). There are 24 inserts molded



Fuel Storage Tanks and Components
(Effectivity: All)
Figure 2



Fuel Tank Vent Systems (Effectivity: All)
Figure 3

into the access door. Each self-locking insert has 0.285-inch threaded blind holes. It is essential that the correct bolt lengths be used for securing components to the fuel cell.

The internal self-locking inserts of the aft fuel cell allow attachment of the two fuel quantity probe brackets and the bracket for the forward-to-aft tank vent line. External cell self-locking inserts at the brackets support the fuel cell to the tank cavity and allow attachment of the vent adapter assembly, pump adapter and the drain valve plate.

AFT FUEL TANK ACCESS (Effectivity: All)

Access to the interior of the aft fuel tank is through an opening in the lower surface of the aft wing and an opening in the bottom of the fuel cell. The access opening in the lower wing surface is covered with an access door, and the fuel cell access opening is closed and sealed with an access door and gasket. Four L-shaped clips located 90° apart are secured to the wing access opening with screws and four fuel cell access door bolts. The purpose of the clips is to prevent shifting of the fuel cell in the tank cavity.

FUEL DISTRIBUTION (Effectivity: All)

Distribution of the fuel concerns the movement of the fuel into, within, between and out of the fuel storage tanks. During refueling operations, the left and right fuel tanks are filled through their respective filler system. Fuel entering the filler and horizontal baffle area is partially funneled through the gravity feed fuel line to the aft fuel tank and partially into the forward fuel tank from the gravity feed adapter/check valve assembly and overflow of the horizontal baffle.

Fuel is distributed throughout the forward tank through openings and spaces in the baffles. As the forward tank is filled, fuel enters the hopper compartment through a flapper check valve on the forward baffle of the hopper compartment. The forward fuel tank, aft fuel tank and hopper compartment essentially fill together.

The fuel level in the left or right tanks is decreased by the consumption of fuel by the respective engine and/or the transfer of fuel from one wing to the other. With the engine operating, fuel is pumped from the hopper compartment through the engine fuel supply line. At the same time the hopper compartment is replenished with fuel being pumped from the forward tank and aft tank at an overflow rate. The excess fuel in the hopper compartment overflows to the forward tank. Forward tank fuel is picked up by the jet fuel pump and dumped into the hopper compartment. Fuel in the aft fuel tank is delivered to the hopper compartment through plumbing and the hopper compartment manifold by the jet fuel pump of the aft tank.

Because the aft fuel tank holds less fuel, and excess fuel from the hopper compartment overflows into the forward tank, the aft fuel tank will empty first, forward fuel tank second and the hopper compartment last.

FUEL TANK VENTILATION SYSTEMS (Effectivity: All) (Figure 3)

FORWARD FUEL TANK VENT SYSTEM (Effectivity: All)

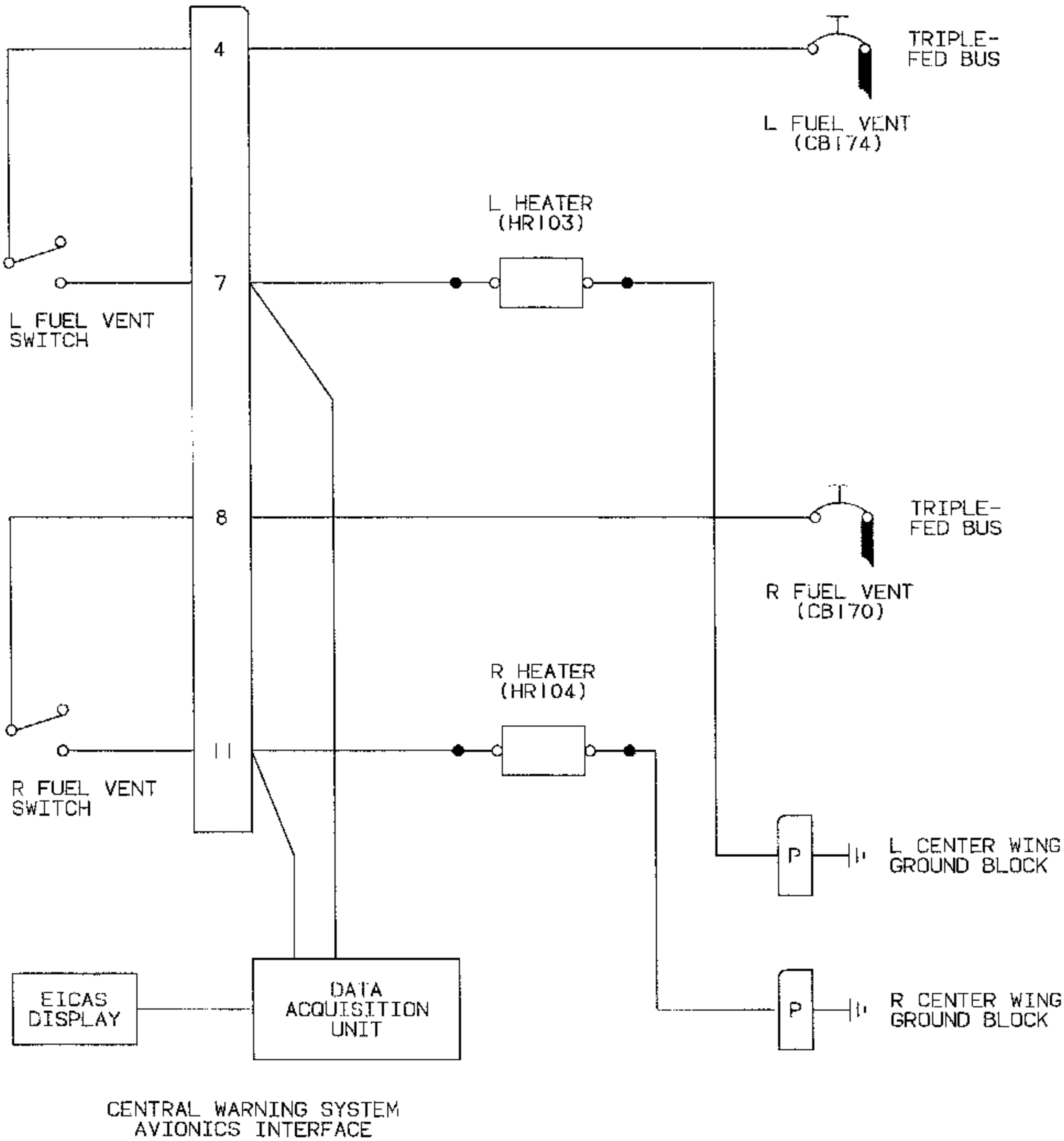
The left and right fuel tank ventilation systems are identical. Each forward fuel tank vent system consists of a float-operated vent valve and an aft float-operated vent and relief valve. Two permanent brackets are installed in each forward fuel tank to provide a means for mounting the float-operated vent valves. The float vent valve brackets are bonded internally to the tank root rib near the top of the tank. The forward and aft vent valves are connected together with tubing routed to an overboard vent assembly located in the wing. The aft vent relief valve is opened by a float and also operates on negative and positive pressures in the tank.

OVERBOARD VENT ASSEMBLY (Effectivity: All)

The overboard vent assembly consists of two manifolds, two check valves, a flame arrester, a flush vent and a heated ram vent. The heated ram vent is electrically heated to prevent icing. The flush vent serves as a backup vent in case the ram vent becomes obstructed.

During refueling operations, air in the forward tank is vented through the filler, into the float-operated vent valves, and out the overboard vent assembly. As the level of the fuel reaches the float vent valves, the floats close the valves to prevent fuel spillage out the vent system. Pressure buildup in the fuel tank, such as expansion of the fuel, is released through the overboard vent by the relief valve at a pressure of 1 psi ±10 percent. In the event a maximum negative pressure is created in the fuel tank, the relief valve will open at a maximum negative pressure of 7 inches of water.

As the fuel level decreases from consumption or defueling, the float-operated vent valves open to permit air



Ram Air Vent Heater Functional Schematic (Effectivity: All)
Figure 4

into the tanks from the ram vent tube and/or the flush vent mounted under the wing. The heated ram vent tube is scarfed forward to create ram air during flight. The ram vent tube assembly is comprised of a tube and flange plate assembly, fairing and heating element. The tube has a 45° scarf at the lower end and a bead at the upper end. The tube and flange plate are welded together. The flange plate provides for securing the vent tube to the lower wing surface with six screws. The 28-vdc left and right heating elements are controlled by the FUEL VENT, LEFT and RIGHT switches located on the pilot's inboard subpanel. Refer to the functional schematic in Figure 4 for more information on the ram air vent heater circuit.

AFT FUEL TANK VENT SYSTEM (Effectivity: All)

The aft fuel tank is vented to the atmosphere through a scarfed vent tube and an internally mounted check valve. In addition, the aft tank is vented to the horizontal baffle area of the forward tank filler through the forward-to-aft tank vent line. Refer to FORWARD-TO-AFT TANK VENT LINE for a description of the forward-to-aft tank vent line.

The vent line for the aft fuel tank is routed out of the fuel cell through a nipple fitting and nipple tube, and extends through and below the wing lower surface. The check valve, mounted on the aft end of the vent line in the tank, has two functions. It permits air into the tank as the fuel level decreases, which prevents the fuel cell from collapsing, and it prevents fuel spillage out the vent during refueling or during nose-up attitude of the airplane. The operating pressure of the check valve is 0-20 psi. A flame arrester is mounted in line with the vent line in the main landing gear wheel well. The flame arrester prevents the travel of flames through the vent line. The 45° vent line scarf faces forward to create ram air through the vent line during flight.

FORWARD-TO-AFT TANK VENT LINE (Effectivity: All)

Both left and right forward-to-aft tank vent lines consist of sections of tubing connected together with ferrule connectors. They are routed from the horizontal baffle compartment for the forward fuel tank filler, through the hopper compartment manifold, main landing gear wheel well, adapter/check valve assembly for the aft fuel tank vent, and into the aft fuel tank. The forward and aft ends of the vent line are open.

In the forward fuel tank, the vent line is routed through the tank vertical baffles. In the main landing gear wheel well, the vent line is supported with three tube support brackets between the hopper compartment manifold and the adapter/check valve assembly for the aft fuel tank vent. In the aft fuel tank, the vent line extends between the vent adapter/check valve assembly for the aft fuel tank vent, and a bracket secured to the fuel cell mount fitting.

During refueling operations, the forward-to-aft vent line allows air in the aft fuel tank to escape through the vent line and out the open forward fuel tank filler. In flight, the ram air effect created by the aft fuel tank vent system provides venting pressure in the aft tank which may escape through the forward-to-aft tank vent line and out the forward fuel tank vent system. The forward-to-aft tank vent line may carry fuel or air depending on the level of fuel in the tank and/or the attitude of the airplane (nose up/nose down). All venting out of the aft fuel tank is through the forward-to-aft vent line and the forward fuel tank vent system.

AFT FUEL TANK VENT ADAPTER/CHECK VALVE ASSEMBLY (Effectivity: All)

The vent adapter/check valve assembly provides passage in and out of the aft fuel tank for the cross-transfer fuel line and the forward-to-aft tank vent line. The vent adapter/check valve assembly is mounted on the forward side of the aft fuel tank and is secured from inside the main landing gear wheel well. Four bolts in self-locking inserts molded in the fuel cell secure the vent adapter assembly in place. The upper passage through the vent adapter/check valve assembly has a ferrule-type connector bonded at each end for routing cross-transfer fuel from one hopper compartment through the left and right aft fuel tanks to the opposite hopper compartment. The lower passage through the vent adapter/check valve assembly also has ferrule type connectors bonded at each end to connect the forward-to-aft vent line routed from the horizontal baffle of the fuel filler compartment in the forward fuel tank to the vent line bracket on the aft sidewall of the fuel cell. The forward-to-aft tank vent ensures equal pressure between the forward and aft fuel tanks.

The vent adapter/check valve assembly has a side port internally connected with the vent passage. A flapper type check valve is installed over the port. The check valve is hinged (without a spring) closed.

FUEL STORAGE - MAINTENANCE PRACTICES (Effectivity: All)

Maintenance of the fuel tanks consists mainly of removal and installation of the forward integral fuel tanks and the aft bladder type fuel tanks. Repair of the forward tanks is accomplished using composite materials, sealants and adhesives. Refer to the BEECHCRAFT Starship 1 Structural Repair Manual for procedures to repair damage to the composite tank. A damaged aft fuel cell, when repairable, is repaired using the techniques and procedures outlined by the fuel cell manufacturer.

MAINTENANCE TECHNIQUES (Effectivity: All)

Proper fuel system maintenance techniques are essential. Maintenance techniques include: personnel safety, using the correct tools and hardware for the work to be accomplished, applying the appropriate torque to fasteners and fittings, utilization of line clamps for security and to provide clearances to prevent chaffing, proper use of cleaning solvents, and correct mixing and application of sealants. It is essential that all fuel and vent lines be static bonded with clamps and jumpers to protect against the accumulation of static charges. The accumulation of static charges can be an explosive hazard.

CAUTION

When removing fuel system components, note the locations of all bonding jumpers to aid in reinstallation. All bonding jumpers must be properly reinstalled to match the original installation. Never add jumpers to, nor remove them from, the installation as this may create a hazardous condition.

When making connections of fuel and vent lines utilizing O-rings, such as on ferrule connectors, the O-rings should be lubricated with a light film of petrolatum (1, Chart 2, 28-00-00).

FERRULE CONNECTORS REMOVAL/ INSTALLATION (Effectivity: All) (Figure 5)

Hydraflow and Wiggins connectors are utilized throughout the fuel and vent system plumbing. The connectors are of different diameters to match the size of the tubing (ferrules) to be connected. Two types of tubing connections may be required. One type of connection has a female tube end and a ferrule with an O-ring seal in the ferrule groove. Another type of tubing connection has a ferrule on both mating tube ends with O-rings in both ferrule grooves and a sleeve. A connector (clamshell or retainer) secures either type of connection together.

NOTE

As a rule, a fuel or vent line connection which has only one ferrule/flange and one O-ring does not require a sleeve. A fuel or vent line connection which has two ferrule/flanges and two O-rings requires that a sleeve span both O-rings under the connector.

The connectors have bonding wires that contact both tube ends being connected to provide continuity through the connection.

FEMALE TUBE-TO-FERRULE CONNECTION REMOVAL (Effectivity: All) (Figure 5)

a. Open and remove the connector (clamshell/ retainer). The Hydraflow connector is opened by lifting the three latch pawls simultaneously. The Wiggins connector is opened by moving the safety spring, lifting the latch and unhooking the retainer.

b. Separate the ferrule and O-ring from the female tube end.

c. Remove the O-ring from the groove of the ferrule.

FEMALE TUBE-TO-FERRULE CONNECTION INSTALLATION (Effectivity: All) (Figure 5)

a. Lubricate a new O-ring and the inner surface of the female tube end with petrolatum (1, Chart 2, 28-00-00), then install the O-ring in the groove of the ferrule.

b. Align and mate the ferrule and O-ring in the female tube end.

c. Install the connector (clamshell/retainer) to secure the connection. The Hydraflow connector (clamshell) has three latch pawls that lock automatically when snapped shut. The Wiggins connector (retainer) has a latch and safety spring to hold it in the latched position.

FERRULE-TO-FERRULE CONNECTION REMOVAL (Effectivity: All) (Figure 5)

a. Open and remove the connector (clamshell/ retainer). The Hydraflow connector is opened by lifting the three latch pawls simultaneously. The Wiggins connector is opened by moving the safety spring, lifting the latch and unhooking the retainer.

b. Slide the sleeve back off of one ferrule and O-ring.

c. Separate the ferrule tube ends.

d. Slide the sleeve off of the remaining ferrule and O-ring.

e. Remove the O-rings from the grooves of both ferrules.

FERRULE-TO-FERRULE CONNECTION INSTALLATION (Effectivity: All) (Figure 5)

a. Lubricate the new O-rings and the inner surface of the sleeve with petrolatum (1, Chart 2, 28-00-00), then install them in the grooves of both ferrules.

b. Slide the sleeve over one of the ferrule ends and O-ring.

c. Align the two ferrule ends and work (slide) the sleeve to completely center and span both O-rings.

d. Install the connector (clamshell/retainer) over the sleeve. The Hydraflow connector (clamshell) has three latch pawls that lock automatically when snapped shut. The Wiggins connector (retainer) has a latch and safety spring to hold it in the latched position.

FORWARD FUEL TANK REMOVAL (Effectivity: All) (Figure 6)

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.

a. Disconnect the battery and tag the battery connections and external power receptacle: DO NOT CONNECT ELECTRICAL POWER TO THE AIRPLANE - FUEL MAINTENANCE IN PROGRESS.

b. Refer to Chapter 12-10-00 and defuel the airplane.

c. Position the airplane on a level surface.

d. Remove the upper and lower wing-to-fuselage fairings as outlined in Chapter 53-50-00.

e. Remove the wing inboard leading edge deice boot.

f. Remove the wing leading edge from the wing root outboard to the tank-to-wing vent line and outboard fuel tank attach fitting.

g. Refer to FUEL TANK-TO-WING VENT LINE REMOVAL and disconnect and remove the tank-to-wing vent line at the outboard fuel tank attach fittings.

h. Tag and disconnect electrical wiring from the forward fuel tank electrical components, including the standby fuel boost pump (28-20-00), fuel quantity probes (28-40-00), fuel temperature sensor (28-40-00), and the low fuel sensor (28-40-00). Refer to the applicable section in this chapter for more information on these components.

i. Disconnect all fuel lines from the forward fuel tank and hopper compartment at the root rib. This includes the engine fuel supply line, motive flow fuel line and gravity feed line. Disconnect the fuel and the vent lines from the hopper compartment manifold located in the main landing gear wheel well.

j. Remove the screws securing the tank upper and lower surface flanges at the tank spar along the forward landing gear spar.

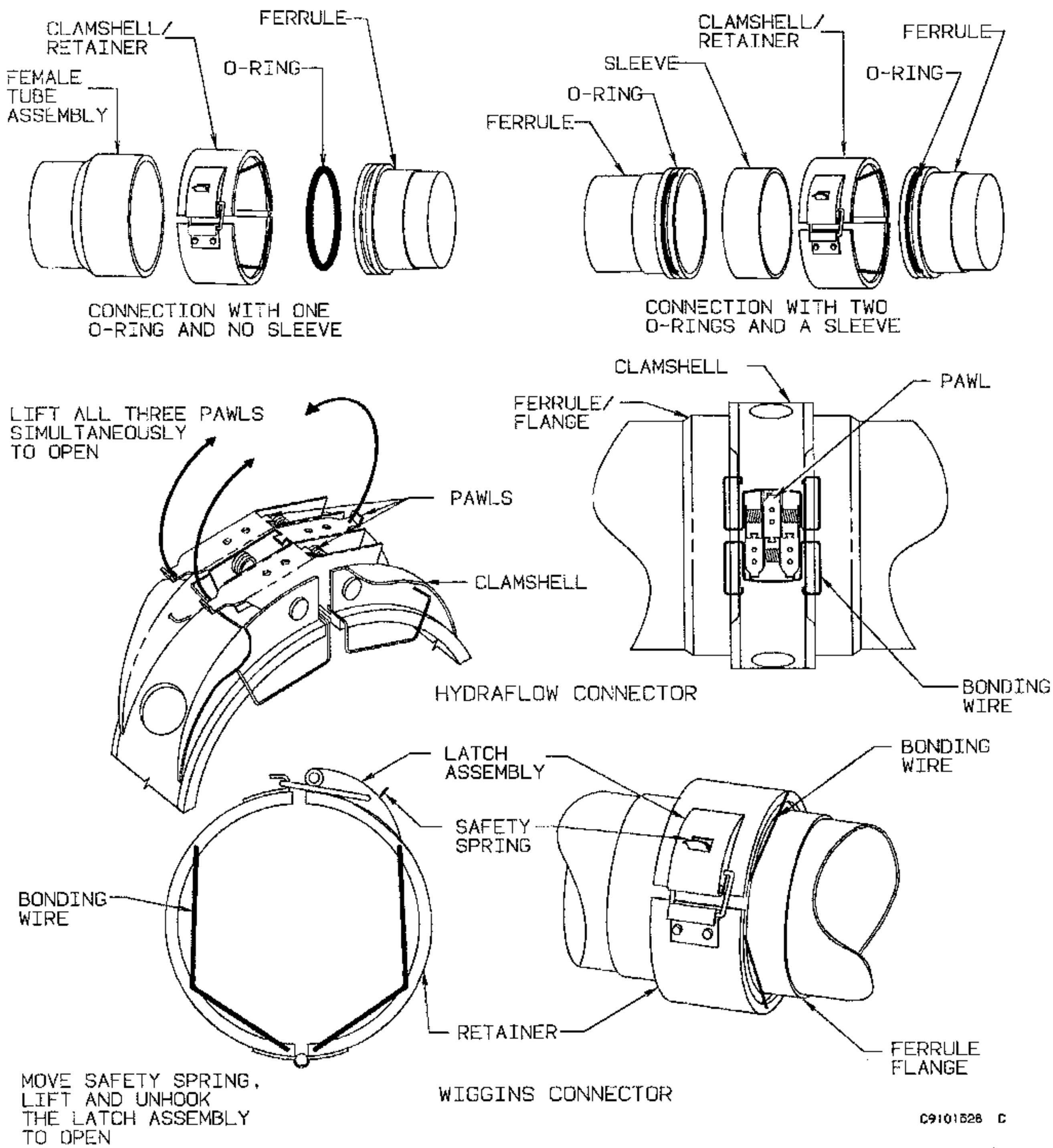
NOTE

Six or more persons are required to lift an empty forward fuel tank. Ensure that adequate personnel are available to accomplish this task.

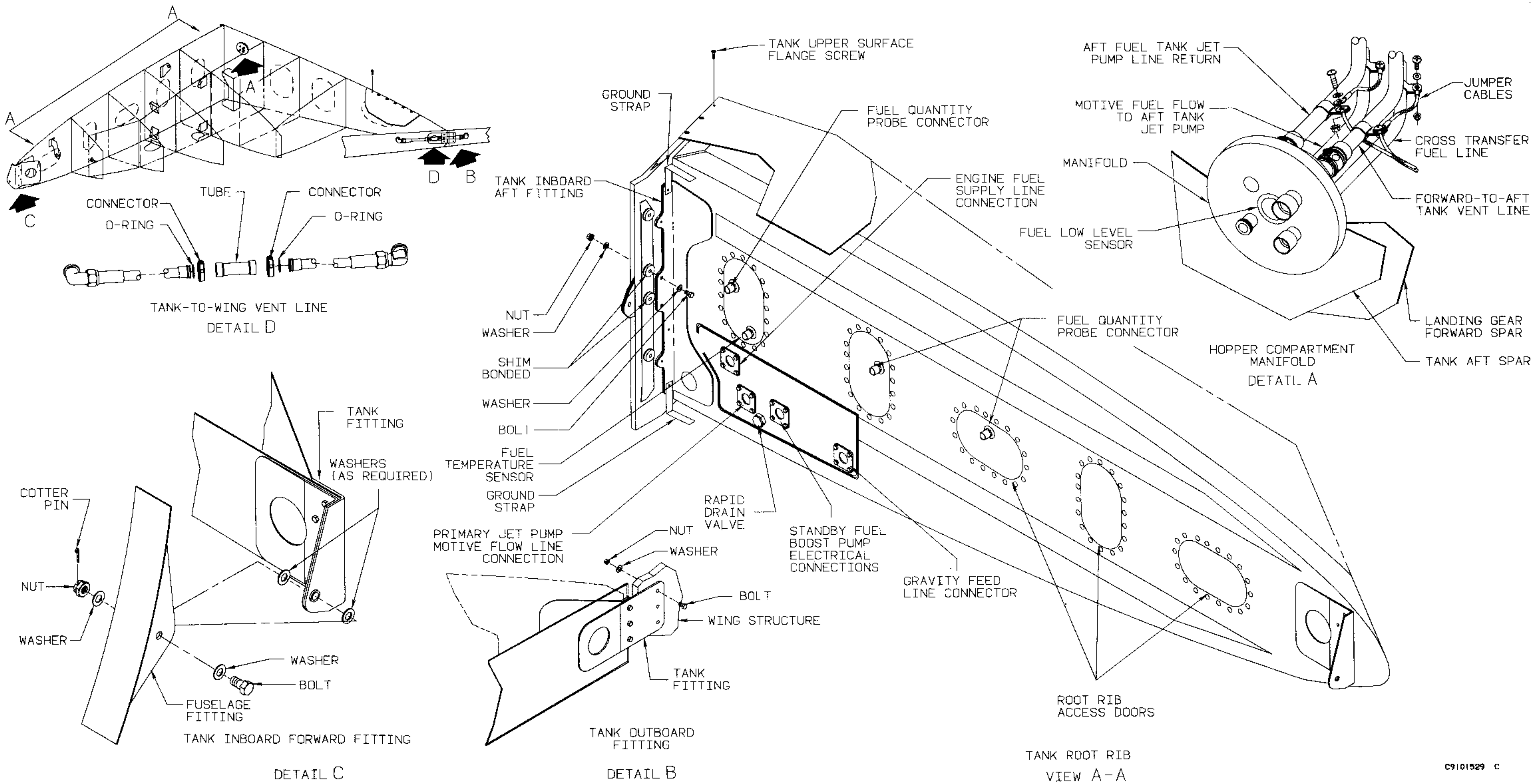
k. Take up the weight of the fuel tank at the inboard forward tank-to-fuselage fitting, then remove the cotter pin, nut, washers and bolt.

l. Take up the fuel tank weight at the outboard tank attach fitting, then remove the three nuts, washers and bolts. Gain access to the three nuts through access door (532AB left or 632AB right) on the wing lower surface and the lightening hole above the main landing gear trunnion.

m. Take up the weight of the fuel tank at the tank-to-landing gear forward spar (inboard aft attach fitting), then remove the four nuts and bolts and the eight washers. The fitting is shimmed at each bolt with a thin and a thick washer bonded to the tank fitting.



Fuel and Vent Line Ferrule Connectors Installation (Effectivity: All)
Figure 5



Forward Fuel Tank Installation (Effectivity: All)
Figure 6

n. Carefully separate the forward tank from the wing. Place the forward fuel tank on a smooth surface, and prevent tank movement with shot bags.

o. Cover, cap and/or plug all tank openings and fuel lines to prevent entry of foreign matter.

FORWARD FUEL TANK INSTALLATION (Effectivity: All) (Figure 6)

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.

a. If a new tank is to be installed, remove all serviceable components, lines and fittings from the removed fuel tank and install them on the new tank. Install replacement components for those that are not serviceable. Refer to the applicable section of this chapter for installation of individual fuel and vent components.

CAUTION

Fuel and vent lines from the forward tank must be static bonded with clamps and jumpers as they were originally installed to protect against the accumulation of static charges. The accumulation of static charges can create an explosive hazard.

b. After installation of the fuel and vent lines in the forward tank, and when all necessary static bonding clamps and jumpers have been connected, perform an internal fuel line static charge test. Refer to FORWARD FUEL TANK INTERNAL FUEL SYSTEM STATIC CHARGE TEST in this chapter.

c. Refer to FORWARD FUEL TANK ACCESS DOORS INSTALLATION and install the three access plates along the fuel tank aft spar.

d. Refer to HOPPER COMPARTMENT LEAK CHECK and perform a hopper compartment leak check after installation of the forward tank plumbing.

NOTE

Six or more persons are required to lift an empty forward fuel tank. Ensure that adequate personnel are available to accomplish this task.

e. Carefully lift the tank into position to mate with the fuselage and wing fittings.

NOTE

Shims are bonded to the wing between the tank upper and lower flanges and wing. Add or remove the shim(s) as required to prevent mismatch between the tank and wing. The maximum mismatch allowable is 0.020 inch.

f. Align the inboard aft fitting with the landing gear forward spar, and install the four bolts, eight washers (one under the head of each bolt and one under each nut), and four nuts.

NOTE

A thick (0.25-inch) shim (washer) and a thin (0.125-inch) shim (washer) are bonded to the tank aft fitting with adhesive (2, Chart 2, 28-00-00) and placed between the tank fitting and the landing gear forward spar at each bolt.

g. Align the outboard fitting with the wing and secure with three bolts, washers and nuts.

h. Align the inboard forward tank fitting with the fuselage clevis fitting and install the mounting bolt. Add washers as required between the tank tang and the fuselage clevis. Install a washer (AN960-616LL) under the nut and secure with cotter pin.

NOTE

The bushings in the tank tang are a press fit secured with retaining compound (3, Chart 2, 28-00-00).

i. Secure the tank upper and lower flanges along the forward landing gear spar (wing) by installing the correct screws into the nutplates. Cleco fasteners may be used to maintain alignment of the screw holes during installation.

j. Connect all fuel lines to the forward tank and hopper compartment, including the engine fuel supply line to the manifold/check valve at the root rib, the motive flow fuel line to the primary jet fuel pump at the root rib, and the gravity feed line forward of the hopper compartment at the root rib. Connect the fuel and vent lines to the hopper compartment manifold, which includes the fuel lines to and from the aft tank transfer jet fuel pump, forward-to-aft tank vent line and the cross-transfer fuel line.

k. Install all root rib access doors. Identify and connect all electrical wiring to the electrical components in the forward tank and hopper compartment according to tags or the BEECHCRAFT Starship 1 Wiring Diagram Manual. This includes the standby fuel boost pump (28-20-00), fuel quantity probes (28-40-00), fuel temperature sensor (28-40-00) and the low fuel quantity sensor (28-40-00). Refer to the applicable sections in this chapter.

l. Refer to FUEL TANK-TO-WING VENT LINE INSTALLATION and install the vent line at the wing leading edge.

m. Service the airplane with fuel and check for fuel leaks as outlined in Chapter 12-10-00.

n. Remove the tags from the battery and external power receptacle and connect the battery.

o. Restore electrical power to the airplane and check for proper operation of the systems on which maintenance was performed.

p. To attain aerodynamic smoothness between the newly installed fuel tank and upper and lower wing surfaces, the area must be properly prepared. Refer to the BEECHCRAFT Starship 1 Structural Repair Manual for procedures to clean the area, apply fairing compound and sand the surface for smoothness. Once the area is prepared for painting, refer to Chapter 20-00-08 for airplane finishing information. Follow the manufacturer's instructions to properly apply the fairing compound and new finish.

q. Install the wing leading edge.

r. Install the wing inboard leading edge deice boot.

s. Install the upper and lower wing-to-fuselage fairings as outlined in Chapter 53-50-00.

FORWARD FUEL TANK ACCESS DOORS REMOVAL (Effectivity: All) (Figure 7)

Removal of the access doors is typical except as noted. To remove the three access doors on the tank aft spar, the forward fuel tank must be removed from the airplane. Removal procedures for the fuel filler cap access plate assembly are outlined under FILLER CAP AND ACCESS PLATE ASSEMBLY REMOVAL in this chapter.

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.

NOTE

Access doors should be identified when removed to ensure they are reinstalled on the same opening.

a. Remove electrical power from the airplane and disconnect the battery.

b. Determine the maintenance to be performed and defuel the forward fuel tank to a level that allows removal of the desired access panels and fuel system components. Refer to Chapter 12-10-00 for defueling procedures.

c. Gain access to the root rib access doors by removing the tank-to-fuselage fairings as outlined in Chapter 53-50-00.

d. If the access door has provisions for a fuel quantity probe wire bundle, cut the safety wire and disconnect the external wire bundle at the electrical connector on the access door.

NOTE

The aft access door on the left tank root rib has a fuel temperature sensor threaded into a fitting mounted through the access door. Refer to Chapter 28-40-00 to remove the sensor.

e. If the left aft door on the tank root rib is to be removed, cut the safety wire on the temperature sensor electrical connector and disconnect the connector.

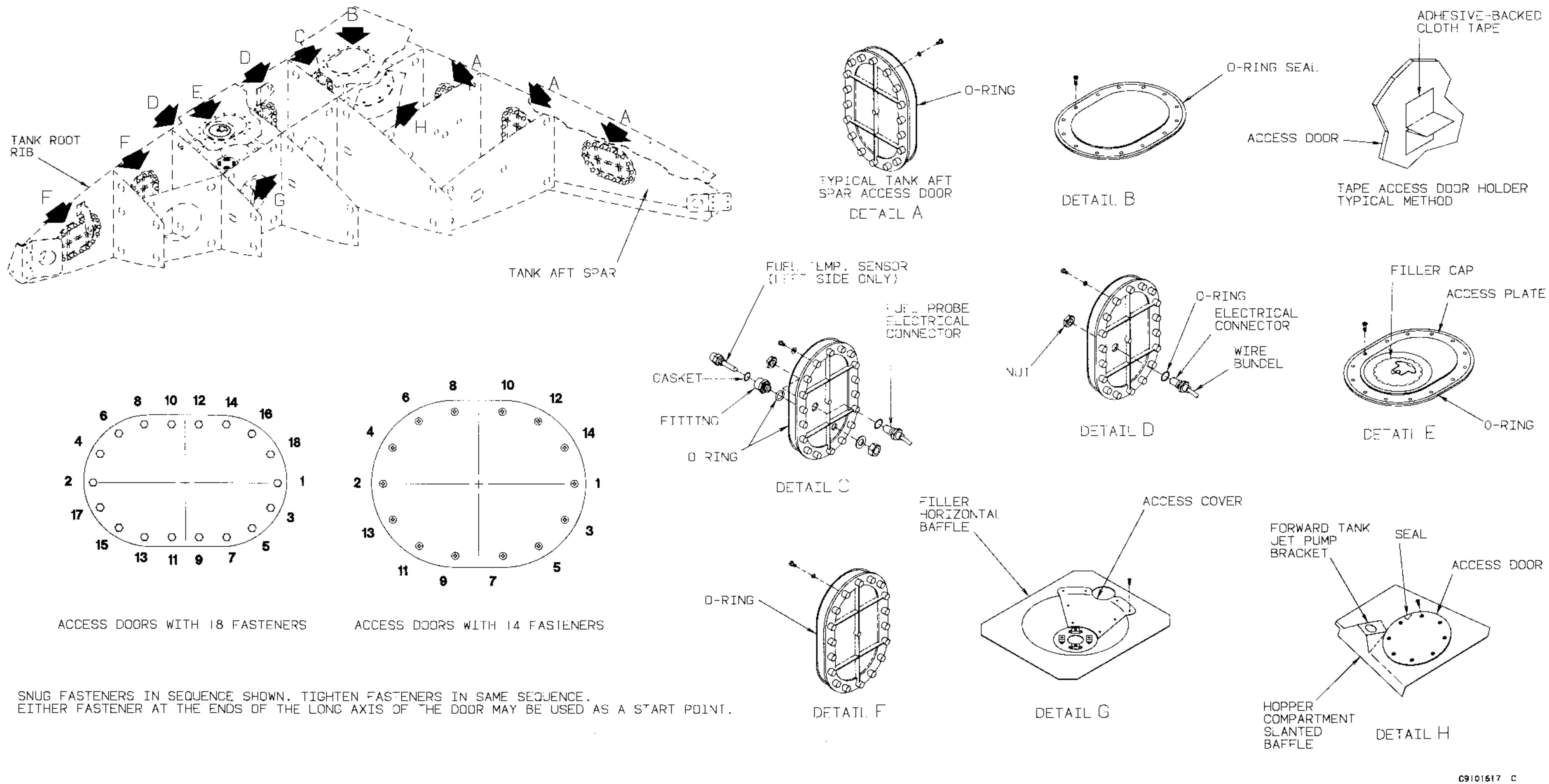
f. Remove the access door mounting bolts and washers. Press the door inward into the tank.

g. For access doors with the fuel quantity probe electrical connector, remove the internal wire bundle connector from the access door.

h. Maneuver the access door out through the tank access opening.

FORWARD FUEL TANK ACCESS DOORS INSTALLATION (Effectivity: All) (Figure 7)

Installation of the access doors is typical except as noted. The installation of the fuel filler cap access



Forward Fuel Tank Access Doors Installation
(Effectivity: All)

Figure 7

plate assembly is outlined under FILLER CAP AND ACCESS PLATE ASSEMBLY INSTALLATION in this chapter.

CAUTION

It is essential that the correct bolts be used for installing the access doors. Bolts that are too long may damage the door and/or cause fuel leakage. Bolts that are too short may not lock in the door locking inserts.

a. Verify that the access door is not warped, cracked, or damaged, and install a new O-ring in the seal groove on the face of the door.

NOTE

The aft access door on the left tank root rib requires the installation of a fuel temperature sensor and its fitting. Refer to Chapter 28-40-00 for installation of the fitting and the sensor on the access door.

b. Position the access door in the tank after placing it through the opening.

c. If the access door has an electrical connector for the fuel quantity probe wire bundle, install a new O-ring on the wire bundle connector at the access door attachment.

d. To assist in aligning and holding the access door against the access opening, use a length of adhesive-backed cloth tape with the ends applied to the face of the door and the adhesive backing folded together in the middle. Use the fold as a handle as shown by Figure 7. REMOVE THE TAPE AND ANY ADHESIVE RESIDUE FROM THE ACCESS DOOR WHEN THE INSTALLATION IS COMPLETE.

CAUTION

It is essential that the correct bolts be used for installing the access door. Bolts that are too long may damage the door/locking inserts and cause fuel leakage. Bolts that are too short may not lock in the locking inserts.

e. Align and hold the access door against the access opening while starting a couple of mounting bolts (fasteners) and washers in the locking inserts of the access door.

f. Secure the access door with the remaining bolts (fasteners) and washers. Snug fasteners in sequence, then tighten the fasteners in the same sequence as shown by Figure 7.

NOTE

If the access door has a fuel quantity probe wire bundle connector and/or the fuel temperature sensor, ensure that a drilled head mounting bolt is installed near the connector(s) for safety wiring the connector to the bolt head.

g. For access doors with fuel quantity probe wire bundle connectors and/or the fuel temperature sensor, connect the exterior wire bundle(s) and safety wire the connector to the nearby access door mounting bolt.

h. Refuel the fuel tanks as outlined in Chapter 12-10-00 and check the access doors for fuel leakage.

i. Connect the battery, apply electrical power, and verify readings on the fuel quantity indicators and the fuel temperature indicator.

HOPPER COMPARTMENT LEAK CHECK (Effectivity: All)

To confirm that there is no internal leakage from the hopper compartment into other portions of a new forward fuel tank, the following check must be accomplished prior to installing the forward fuel tank on the airplane.

a. After all plumbing and components have been installed in the forward tank, verify that the swing check valve located on the hopper compartment forward baffle is not binding and will swing freely. Verify that the vent line passing through the hopper compartment outboard baffle to the manifold is sealed between the vent line and the baffle hole. Sealant (4, Chart 2, 28-00-00) is used to seal the hole.

CAUTION

Take all precautions necessary to prevent contamination of the fuel tank during this procedure.

b. Plug the outlet of the forward tank transfer jet fuel pump.

c. Plug the aft tank transfer jet fuel pump outlet line and the standby fuel boost pump line where they exit through the hopper compartment manifold.

d. Refer to FORWARD FUEL TANK ACCESS DOORS INSTALLATION and install the hopper compartment root rib access door.

e. Through the access door above the hopper compartment, fill the hopper compartment to just below the hopper compartment overflow with a leak detection mixture (50% methanol, 50% water and add four grams minimum of Red Eosine detection dye or equivalent per gallon of mixture).

f. The maximum permissible leakage after five minutes is a 0.12 inch drop of the fluid level.

g. If the hopper compartment leakage is in excess of 0.12 inch, determine if the swing check valve and/or its gasket is leaking. Replace a leaking check valve and/or gasket. If the check valve or gasket is not leaking, determine the source of leakage by the coloration of the red dye flow.

h. Drain and dry the compartment. Make necessary sealant repairs where leaks are noted.

FUEL SYSTEM STATIC CHARGE TEST (Effectivity: All)

CAUTION

Static charge tests are essential to ensure that the fuel system components are protected against the accumulation of static charges. The accumulation of static charges can result in an explosive hazard. After any fuel system maintenance, a static charge test must be accomplished prior to refueling the fuel tanks.

After installation of a fuel or vent line, a static charge resistance test must be performed to ensure protection against the accumulation of static charges. Control of the static charge is accomplished with line clamps and jumpers installed from line to line and from line to a low impedance current path, identified as the ground plane. The ground plane provides a path for dissipating static charges and lightning strikes.

FUEL AND VENT LINE STATIC CHARGE TEST (Effectivity: All)

The static charge test consists of measuring the resistance from the fuel or vent line to the nearest wire tray or grounding bracket with a Fluke Multimeter 8020B or equivalent. The wire tray is a part of ground plane.

a. Ensure that the line(s) to be tested is static bonded with the necessary line clamps and jumpers.

b. Measure the resistance between the fuel or vent line(s) and the nearest wire tray. The multimeter must indicate 5 ohms or less of resistance.

c. For a fuel or vent line not meeting the resistance criteria of 5 ohms or less, check the line clamps and/or jumpers to ensure they have clean line contact and tight connections.

FORWARD FUEL TANK INTERNAL FUEL SYSTEM STATIC CHARGE TEST (Effectivity: All)

Testing of the forward fuel tank internal fuel system is performed prior to closing the hopper tank. All fuel and vent lines are to be installed and static bonded as necessary with line clamps and jumpers. Static charge testing is accomplished with a Fluke Multimeter 8020B or equivalent. The multimeter must indicate 5 ohms or less of resistance for a good electrical bond.

a. Measure the resistance between the standby fuel boost pump discharge fuel line and the inboard side of the fuel tank root rib structure near the boost pump mount.

b. Measure the resistance between the primary jet fuel pump discharge fuel line and the inboard side of the fuel tank root rib structure near the primary jet pump mount.

c. Measure the resistance between the aft transfer jet pump motive flow fuel line in the hopper compartment and the wing leading edge tank-to-wing vent line elbow fitting.

d. If any of the measurements exceed the 5 ohm or less resistance criteria, check the line clamps and/or jumpers to ensure they have clean line contact and tight connections. Verify that the mount bolt washers of the standby fuel boost pump, the primary jet fuel pump, and the leading edge vent line elbow washers are making full contact with the tank graphite laminate.

AFT FUEL TANK (CELL) REMOVAL (Effectivity: All) (Figure 8)

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.

a. Remove all electrical power from the airplane. Tag the battery connections and external power receptacle: DO NOT CONNECT ELECTRICAL POWER TO AIRPLANE - FUEL MAINTENANCE IN PROGRESS.

b. Refer to Chapter 12-10-00 and defuel the airplane.

c. Remove the screws securing the wing lower access door (541AB left or 641AB right) and remove the access door.

d. Remove the 24 bolts securing the fuel cell access door and the four L-shaped clips. Remove the screws securing the four clips to the opening in the wing lower surface and remove the clips.

e. Push the fuel cell access door upward and maneuver the door and its gasket out of the fuel cell.

f. Disconnect the gravity feed line from the aft tank at the ferrule connector. Inside the tank, remove clamp from the nipple and work the gravity feed line out of the nipple.

g. Inside the tank, disconnect the inboard and outboard ferrule connector on the cross-transfer line, then remove the line. Remove the clamp securing the cross-transfer tube in the nipple. Outside the tank, remove the clamp and disconnect the ferrule connector on the cross-transfer line. Work the cross-transfer tube inboard from the nipple.

h. Refer to FUEL DRAIN VALVE INSERT AND PLATE REMOVAL and remove the fuel drain plate and insert.

i. In the main landing gear wheel well, disconnect the inlet and outlet fuel lines from the transfer jet pump. Remove the two bolts securing the jet pump to its adapter. Remove the jet pump, O-ring, and the venturi screen located in the pump venturi inlet.

NOTE

The jet pump adapter assembly consists of an adapter and pickup tube bonded together. The adapter has two locking inserts to secure the jet pump and an O-ring to seal the hole in the fuel cell sidewall. The pickup tube fits into a screen at the bottom of the fuel cell. Four bolts secure the adapter to inserts molded into the fuel cell.

j. Remove the four bolts and washers securing the jet pump adapter and fuel pickup tube assembly. Remove the jet pump adapter and pickup tube assembly through the main landing gear wheel well. Remove the tube inlet screen through the aft tank access opening.

k. Refer to Chapter 28-40-00 and remove the fuel quantity probe.

l. Inside the fuel cell, remove the fuel quantity probe brackets by removing the bolts securing each bracket to the fuel cell inserts. On the inboard sidewall of the fuel tank cavity, remove the four bolts securing the fuel cell at the inserts molded to the cell.

m. Inside the tank, remove the clamp securing the vent line to its aft bracket. Remove the clamps securing the bonding jumpers, vent lines and vent check valve together. Disconnect the vent lines at the ferrule connectors and remove them from the tank.

n. In the main landing gear wheel well, disconnect the overboard vent line ferrule connector. Remove the line clamp (outside the tank) and the nipple clamp (inside the tank), then work the vent tube out of the nipple.

o. Refer to AFT TANK VENT ADAPTER/CHECK VALVE ASSEMBLY REMOVAL and remove the vent adapter/check valve assembly.

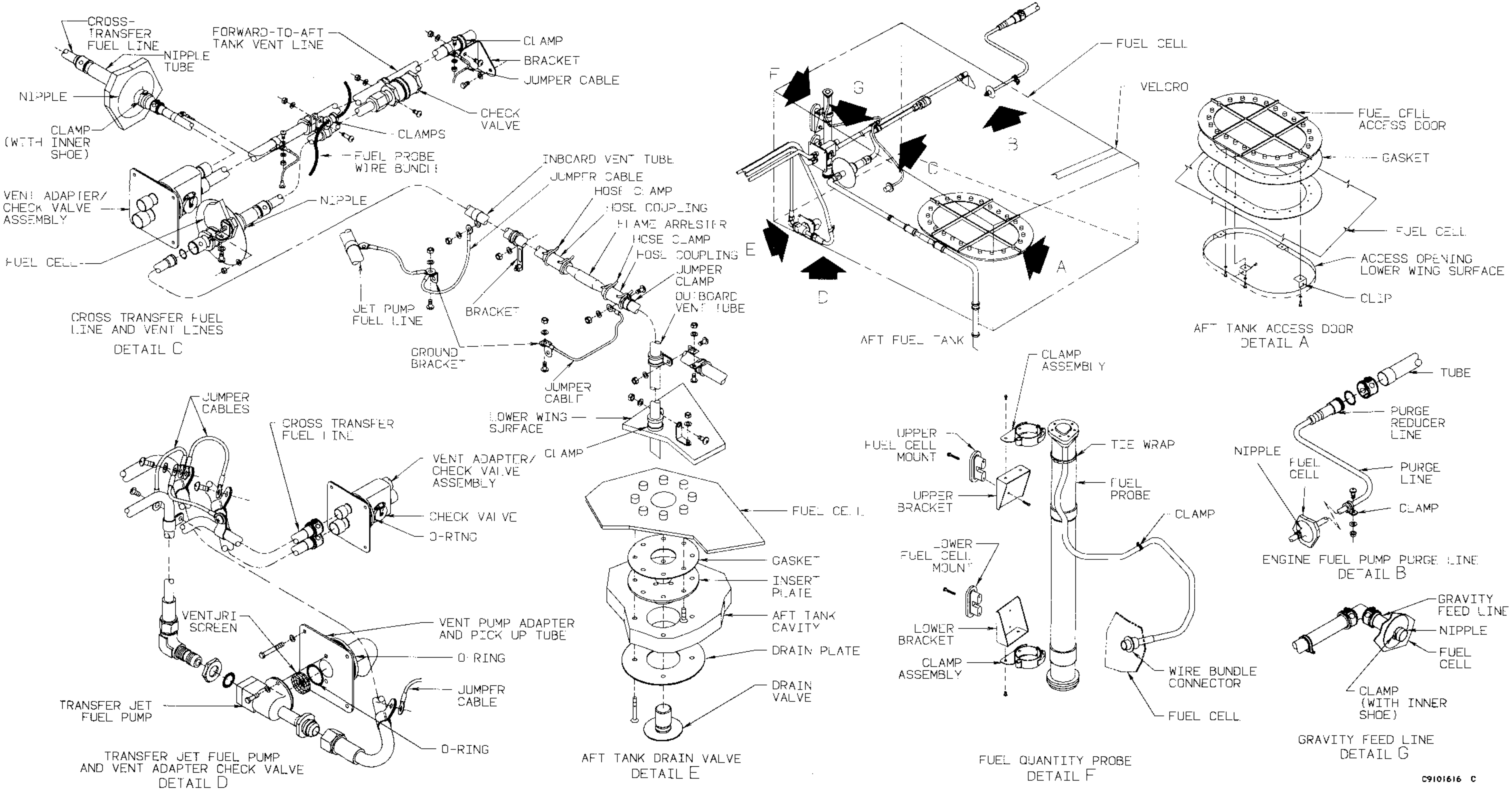
p. Gain access to the aft side of the fuel tank cavity through the access door (551BB left/651BB right) on the wing lower surface. Remove the clamp securing the purge reducer line to the tank cavity wall. Disconnect the purge reducer line at the ferrule connector. Inside the fuel cell, remove the clamp from the purge reducer line nipple and work the line out of the nipple.

q. On the aft side of the aft tank, cut the safety wire and remove the two bolts and washers securing the fuel cell at the vent line bracket mount. Remove the vent bracket from inside the cell by removing the bolt from the self-locking insert molded into the cell.

r. Remove the fuel quantity probe sidewall electrical connector by disconnecting the wire bundle in the wheel well. Hold the connector and remove the jam nut and washer.

s. Collapse the fuel cell inside the tank cavity by pulling down on the adjustment tabs and separating the velcro strips (there are five velcro strips across the top of the cell and two velcro strips at the fuel quantity wire bundle connector on the forward sidewall).

t. Fold the fuel cell small enough to allow removal through the access opening. Remove the fuel cell from the cavity.



Aft Fuel Tank (Cell) Installation (Effectivity: All)
Figure 8

u. Remove the four screws securing the drain valve insert and remove the insert and gasket.

AFT FUEL TANK (CELL) INSTALLATION (Effectivity: All) (Figure 8)

a. Verify that the fuel cell cavity is clean, clear of debris, dirt and hardware. Check the velcro strips at the top of the cavity and verify that antichaffing tape is installed in the cavity on sharp edges, overlaps and gaps. Apply tape over all rivet, screw, bolt and hylock heads that will be in contact with the installed fuel bladder. Correct as necessary. During connection of fuel line ferrule type connectors, ensure that new O-rings are installed on the ferrules and that the O-rings are lubricated with petrolatum (1, Chart 2, 28-00-00).

CAUTION

Fuel and vent lines must be static bonded with clamps and jumpers as originally installed to protect against the accumulation of static charges. The accumulation of static charges can become an explosive hazard. After the fuel and vent lines are reinstalled and all necessary static bonding clamps and jumpers are reconnected, use a multimeter to check for continuity between the fuel and/or vent lines and the nearest ground plane bracket, such as the wire bundle tray. The multimeter must indicate a resistance of 5 ohms or less for an adequate bond.

NOTE

Any antichaffing tape that is loose or will not protect the fuel cell must be replaced using tape (9, Chart 2, 28-00-00). An adhesive-backed neoprene-foam tape may also be used as protective pad material.

b. Position the fuel drain valve insert outside the fuel cell with a new gasket between the fuel cell and insert. Align the gasket, valve insert and fuel cell. Secure with four short screws and torque to 25-30 inch-pounds.

c. Fold the cell for insertion through the access opening of the tank cavity.

NOTE

To facilitate installation of the aft fuel cell, allow the fuel cell to sit at room temperature (above 60° F.) until flexible. Pay particular attention to the position of the fuel cell to ensure that it unfolds properly inside the tank cavity.

d. Place the fuel cell in the tank cavity, unfold the fuel cell and align the fuel cell openings with the openings in the tank cavity. With the adjustment tabs at the top of the fuel cell, align and press to secure the five velcro strips. Mate the velcro at the fuel quantity probe electrical wire bundle connector fitting in the forward sidewall.

e. Align the aft sidewall of the fuel cell in the tank cavity at the vent line bracket mount, and secure the fuel cell with two bolts and washers through the tank cavity into self-locking inserts molded into the fuel cell. Torque the bolts to 25-30 inch-pounds.

f. Inside the fuel cell, position and secure the vent line bracket with a bolt and washer to the self-locking insert molded into the fuel cell. Torque the bolt to 25-30 inch-pounds.

NOTE

Where tubing penetrates the tank (cell) through nipples, it is permissible to apply a light film of petrolatum (1, Chart 2, 28-00-00) on the nipples and under the clamps.

g. On the aft side of the tank, insert the purge reducer line through the nipple. Connect the purge reducer line to the purge line with a ferrule connector.

h. Inside the tank, install the clamp (with inner shoe) on the nipple to secure the purge reducer line. Torque the clamp to 12-15 inch-pounds.

i. Refer to FUEL TANK VENT ADAPTER/CHECK VALVE ASSEMBLY INSTALLATION and install the vent adapter/check valve assembly.

j. Outside the tank, insert the cross-transfer nipple tube in the cell nipple and connect the cross-transfer line. Secure the nipple tube to the tank cavity wall with a line clamp.

k. Inside the tank, secure the cross-transfer nipple tube with a nipple clamp. Torque the clamp to 15-20 inch-pounds.

l. Inside the tank, position the cross-transfer line and elbow fitting between the vent adapter/check valve assembly and the nipple tube. Connect the elbow fitting to the vent adapter/check valve assembly and the cross-transfer line to the elbow and the nipple tube with new O-rings installed on the ferrule connectors.

m. In the main landing gear wheel well, connect the vent line and cross-transfer line (from the forward fuel tank) to the vent adapter/check valve assembly with new O-rings on the ferrule connectors.

n. Insert the overboard vent tube through the tank nipple. Connect the overboard vent line to the vent tube with new O-rings on the ferrule connector. Install the line clamp (outside tank) and nipple clamp with the inner shoe (inside tank). Torque the nipple clamp to 15-20 inch-pounds.

o. Inside the tank, position and connect the vent line to the vent adapter with new O-rings on the ferrule connector, then secure the other end of the vent line to the aft bracket with a line clamp. Connect the overboard vent line and check valve assembly to the overboard vent tube with new O-rings on the ferrule connectors. Secure the check valve and vent lines together with clamps. Install the bonding jumper cables between vent lines and the cross-transfer line.

p. In the main landing gear wheel well, insert the jet pump adapter and pickup tube assembly into the fuel tank cavity and cell with a new O-ring. Install the screen in the tank at the pickup tube inlet. Secure the jet pump adapter with four bolts to the self-locking inserts molded into the cell. Torque the bolts to 25-30 inch-pounds.

q. In the main landing gear wheel well, verify that the venturi screen and a new O-ring are in the transfer jet pump venturi inlet. Align the jet pump with the jet pump adapter and pickup tube, then secure with two bolts. Torque the bolts to 15-20 inch-pounds.

r. Connect the inlet and outlet fuel lines to the transfer jet pump.

s. Refer to Chapter 28-40-00 and install the fuel quantity probe. Secure the fuel quantity probe wire bundle to the vent lines with a clamp.

t. Position the fuel quantity probe electrical connector in the tank forward sidewall with a new O-ring and secure with washer and jam nut. Connect the probe wire bundle in the wheel well to the connector.

u. Insert the gravity feed line through the tank nipple. Connect the elbow fitting to the gravity feed line with new O-rings on the ferrule connector. Inside the tank, install a nipple clamp (with inner shoe) to secure the gravity feed line. Torque the clamp to 25-30 inch-pounds.

v. Refer to FUEL DRAIN VALVE INSERT AND PLATE INSTALLATION and install the fuel drain insert and drain plate.

w. Install the aft fuel cell access door by maneuvering it inside the fuel cell and aligning the door and new gasket with the fuel cell opening. Secure the access door and the four clips with the proper bolts. Secure the clips to the opening in the lower surface with screws.

x. Service the airplane with fuel as outlined in Chapter 12-10-00 and check the aft fuel tank for fuel leaks.

y. Check all necessary aft tank components for operation.

z. Position the wing lower cover access door and secure with screws.

FILLER CAP AND ACCESS PLATE ASSEMBLY REMOVAL (Effectivity: All) (Figure 9)

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.

a. Remove electrical power from the airplane and disconnect the battery.

b. Refer to Chapter 12-10-00 and defuel the airplane to lower the fuel level in the left or right forward fuel tank well below the filler cap access plate assembly.

c. Remove the fuel cap and detach the lanyard loop from the tab in the adapter assembly.

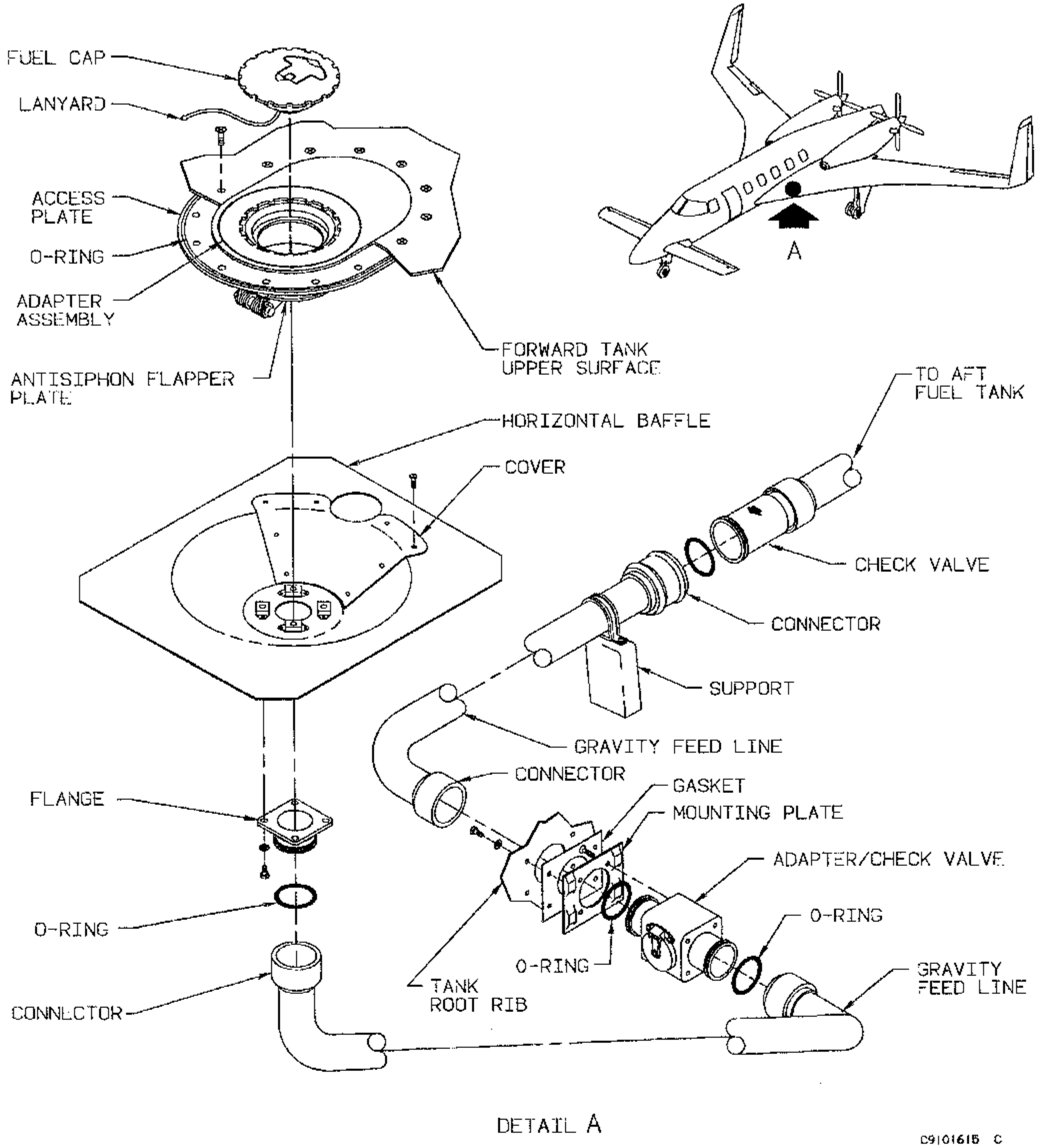
d. Remove the screws securing the access plate.

NOTE

Use care to prevent the access plate assembly from dropping into the horizontal baffle area.

e. Remove the access plate assembly by maneuvering it through the access hole.

f. If the filler cap access plate assembly is not to be installed immediately, cover the access hole to prevent entry of foreign matter.



Fuel Filler System Installation (Effectivity: All)
Figure 9

FILLER CAP AND ACCESS PLATE ASSEMBLY INSTALLATION (Effectivity: All) (Figure 9)

Prior to installing the filler cap access plate assembly, check for loose, missing and/or damaged insert fasteners in the plate. Verify that the casting is not cracked and that the plate has a new O-ring installed in the plate groove.

a. Maneuver the access plate assembly into the access opening and position the plate with the filler cap end of the plate forward.

b. Hold the access plate in position and secure with the correct screws.

c. Attach the filler cap lanyard loop to the tab in the adapter assembly. Install the filler cap.

d. Refer to Chapter 12-10-00 for instructions to service the airplane with fuel and check for fuel leakage.

e. Reconnect the battery.

FILLER CAP ACCESS PLATE ADAPTER/ ANTISIPHON FLAPPER REMOVAL (Effectivity: All)

The adapter assembly is bonded to the access plate. The antisiphon flapper is hinged on the bottom of the adapter and spring-loaded closed on an O-ring seal. Insertion of the refueling nozzle opens the antisiphon flapper.

a. Refer to FILLER CAP AND ACCESS PLATE ASSEMBLY REMOVAL and remove the filler cap and access plate assembly.

b. Remove the O-ring from the face of the access plate.

c. Separate the adapter from the access plate by carefully drilling out the six countersunk rivets (NAS1739B-4-5) and breaking the sealant bond. Remove the old sealant from the access plate with a wooden/plastic tool and solvent (5, Chart 2, 28-00-00).

d. Remove the hinged antisiphon flapper from the adapter by removing the cotter pin and washer at the end of the hinge

NOTE

Be aware of the spring action when removing the hinge pin and spring.

e. Remove the antisiphon flapper from the adapter.

FILLER CAP ACCESS PLATE ADAPTER/ ANTISIPHON FLAPPER INSTALLATION (Effectivity: All) (Figure 9)

a. Install a new O-ring around the bottom lip of the adapter. Verify that the O-ring mating surface of the antisiphon flapper is clean and smooth.

b. Align the flapper hinge half with the adapter hinge half. Assemble the spring, hinge pin (with tension on the spring to close the flapper), washer and cotter pin. Verify that the flapper closes evenly on the O-ring and does not bind.

c. Ensure the mating surfaces of the adapter and access plate are clean and dry. Assemble the adapter assembly to the access plate with sealant (4, Chart 2, 28-00-00) applied to the the mating surfaces. Align the adapter assembly with the access plate and ensure that the flapper hinge is across the FWD end of the access plate. Install the six rivets (NAS1739B-4-5) with washers (AN960C6L) on the rivet bottoms to secure the assembly.

d. Refer to FILLER CAP AND ACCESS PLATE ASSEMBLY INSTALLATION and install the access plate and filler cap assembly.

ADAPTER/CHECK VALVE ASSEMBLY REMOVAL (Effectivity: All) (Figure 9)

The adapter/check valve assembly is located in the lower portion of the forward tank root rib and has ferrule type connectors. The adapter is assembled with a mounting plate and gasket. The adapter ferrule connection extends through the mounting plate, gasket and the root rib.

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.

a. Remove electrical power from the airplane and disconnect the battery.

b. Refer to Chapter 12-10-00 and defuel the left or right fuel tanks as applicable to the adapter assembly to be removed.

c. Gain access to the adapter by removing the lower wing-to-fuselage fairing just forward of the main gear wheel well as outlined in Chapter 53-50-00. Remove the root rib access door above the gravity feed line connector.

NOTE

The fuel quantity indicating probe electrical wire bundle is routed through a connector on the access door and must be disconnected.

d. Disconnect the ferrule connectors connecting the gravity feed line to the adapter at the root rib and inside the tank. Remove sections of the feed line if necessary.

NOTE

The washers located under the adapter mounting bolt heads are in direct contact with the tank laminate and are sealed from moisture with sealant. The sealant should be cut or removed when removing the washers.

e. Cut safety wire and remove the four bolts and washers on the inboard side of the root rib that secure the adapter and mounting plate assembly.

f. Remove the adapter, mounting plate assembly and gasket from the forward fuel tank.

g. If necessary, separate the mounting plate from the adapter by removing the four screws and remove the mounting plate and gasket.

h. If required, the check valve on the adapter can be removed by cutting the safety wire and removing the two mounting screws. Remove the check valve.

i. If the adapter/check valve assembly is not to be installed immediately, cover all openings to the tank and fuel lines to prevent entry of foreign matter.

ADAPTER/CHECK VALVE ASSEMBLY INSTALLATION (Effectivity: All) (Figure 9)

Prior to installing the adapter/check valve assembly, install new O-rings on the adapter ferrules. If the flapper check valve was removed, align the check valve with the adapter and secure with two screws. Safety wire the screw heads together.

a. If the mounting plate was removed from the adapter, mate the mounting plate over the ferrule of the adapter with a new gasket in between, then secure with four screws.

b. Place the adapter with the attached mounting plate in the tank with the check valve flapper facing forward.

c. With a new gasket between the mounting plate and the root rib, insert the ferrule connection through the root rib, then align the mounting plate, gasket and bolt holes in the rib.

NOTE

The four washers on the mounting bolts must be in direct contact with the tank laminate. If necessary, lightly sand the graphite/epoxy with 400-grit aluminum oxide sandpaper to expose a conductive surface. After the mounting bolts and washers are installed, use a multimeter to verify that the resistance between the gravity feed line and adjacent tank structure (conductive surface) is 5 ohms or less.

d. Secure the mounting plate to the root rib with the correct four bolts and washers. Torque the bolts to 15-20 inch-pounds. Safety wire the four bolt heads.

e. Seal around the washers and laminate contact area with sealant (4, Chart 2, 28-00-00).

f. Connect the gravity feed line to the adapter assembly with a ferrule connector and new O-rings.

g. Refer to FORWARD FUEL TANK ACCESS DOORS INSTALLATION and install the root rib access door.

h. Service the airplane with fuel as outlined in Chapter 12-10-00, then check for fuel leakage at the gravity feed line and adapter mounting area of the root rib.

i. Install the wing-to-fuselage fairing as outlined in Chapter 53-50-00.

j. Reconnect the battery.

GRAVITY FEED LINE AND IN-LINE CHECK VALVE REMOVAL (Effectivity: All) (Figure 9)

The gravity feed line and in-line check valve are located inboard of the respective left and right root rib and routed between the forward and aft fuel tanks. Inside the forward fuel tank, the gravity feed line is connected between the fuel filler horizontal baffle and the adapter/check valve assembly.

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.

a. Remove electrical power from the airplane and disconnect the battery.

b. Refer to Chapter 12-10-00 and defuel the left or right fuel tanks as applicable to the gravity feed line to be removed.

c. Remove the wing-to-fuselage fairing forward of the gear wheel well as outlined in Chapter 53-50-00.

d. Gain access to the internal gravity feed line in the forward tank by removing the filler cap access plate, the horizontal baffle access door, and the third and fourth access doors from the forward end of the root rib. Disconnect the quantity indicating probe wiring from the electrical connector on the access door.

e. Inside the forward tank, disconnect the ferrule connectors from the flange fitting at the bottom of the horizontal baffle and at the adapter/check valve assembly. Maneuver the section of gravity feed line out of the tank.

f. Inboard of the root rib, remove the gravity feed line support and bonding strap clamps, then disconnect the ferrule connectors. Remove sections of the gravity feed line as necessary.

NOTE

To remove only the in-line check valve, disconnect the ferrule connectors at each end of the check valve.

g. To remove the gravity feed line from the aft fuel tank, the aft tank access doors must be removed to gain access to the gravity feed line nipple. Remove the clamp from the gravity feed line nipple and work the gravity feed line tube from the tank nipple.

h. If the gravity feed line is not to be installed immediately, cover all fuel tank and gravity feed line openings to prevent entry of foreign matter.

GRAVITY FEED LINE AND IN-LINE CHECK VALVE INSTALLATION (Effectivity: All) (Figure 9)

Prior to installation of the gravity feed line and/or in-line check valve, install new O-rings on all ferrule connectors. Lubricate the O-rings with petrolatum (1, Chart 2, 28-00-00).

a. Maneuver the internal gravity feed line through the access opening and the hole in the tank baffle. Align the gravity feed line with the horizontal baffle flange fitting and the adapter/check valve assembly. Connect the gravity feed line with ferrule connectors at each end.

b. Refer to FORWARD TANK ACCESS DOORS INSTALLATION to install the horizontal baffle cover door, filler cap access plate assembly and the root rib access doors.

c. Inboard of the root rib, connect the sections of the gravity feed line with ferrule connectors. Install support clamps and bonding jumpers.

NOTE

To install the in-line check valve only, position the check valve (with the flow arrow pointing forward) in the gravity feed line and install the ferrule connectors with new O-rings.

d. Work the gravity feed line tube into the tank nipple. It is permissible to apply a light film of petrolatum (1, Chart 2, 28-00-00) on the nipple and under the clamp. Secure the tube in the nipple with a clamp (with inner shoe). Torque the clamp to 25-30 inch-pounds.

e. Install the aft tank access door.

f. Refer to Chapter 12-10-00 and refuel the airplane.

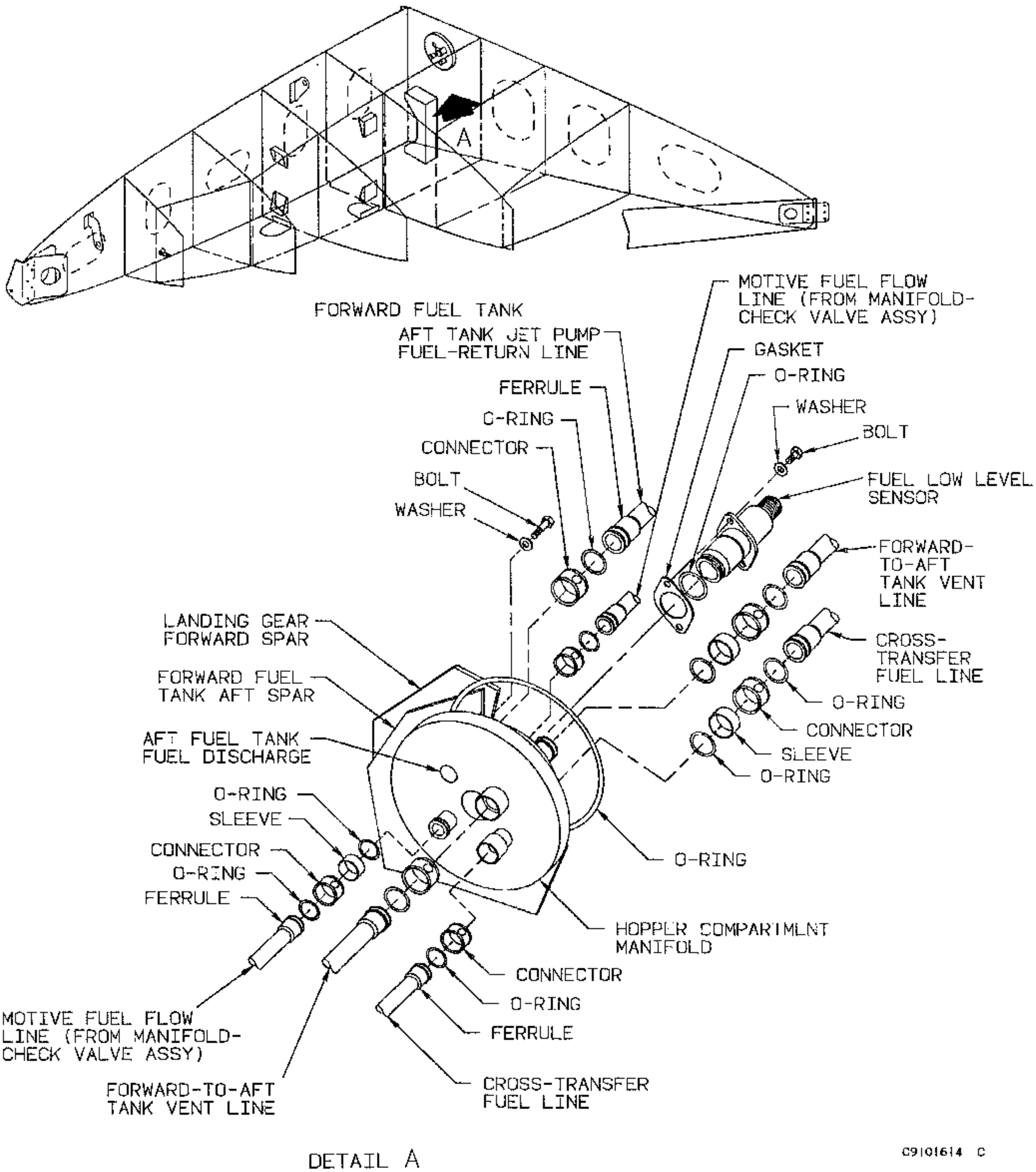
g. Check for fuel leaks along the gravity feed line at the ferrule connections and tanks.

h. Install the wing lower surface access door and the wing-to-fuselage fairings as outlined in Chapter 53-50-00.

i. Reconnect the battery.

HOPPER COMPARTMENT MANIFOLD REMOVAL (Effectivity: All) (Figure 10)

The left and right hopper compartment manifolds are mounted through the forward fuel tank aft spar into the respective hopper compartment. The low fuel level sensor is mounted in the center of the manifold.



Hopper Compartment Manifold Installation (Effectivity: All)
Figure 10

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.

a. Remove electrical power from the airplane and disconnect the battery.

b. Refer to Chapter 12-10-00 and defuel the left/right fuel tank as applicable to the one being removed.

c. Refer to FORWARD FUEL TANK ACCESS DOORS REMOVAL and gain access to the manifold in the main landing gear wheel well through the access door above the hopper compartment.

d. Inside the hopper compartment, disconnect the forward-to-aft tank vent line, cross-transfer fuel line, and the motive fuel flow line at the ferrule couplings on the hopper compartment manifold.

e. In the main landing gear wheel well, disconnect the fuel-return line of the aft jet pump, forward-to-aft tank vent line, motive fuel flow line, and the cross-transfer fuel line at the ferrule connectors on the hopper compartment manifold.

f. Refer to Chapter 28-40-00 and remove the low fuel level sensor.

g. Cut the safety wire and remove the four manifold mounting bolts and washers.

h. Separate the manifold and O-ring from the tank aft spar and remove the manifold through the hopper compartment upper access opening.

i. If the manifold is not to be installed immediately, cover the openings of the hopper compartment and the vent and fuel lines in the main landing gear wheel well.

HOPPER COMPARTMENT MANIFOLD INSTALLATION (Effectivity: All) (Figure 10)

a. Install a new O-ring in the groove on the face of the hopper compartment manifold.

b. Position the manifold in the tank aft spar from inside the hopper compartment. Ensure the manifold discharge port without a ferrule connector is located in the upper inboard position and align the self-locking inserts in the manifold with the bolt holes in the tank spar.

c. Secure the hopper compartment manifold with four bolts and washers. Torque the bolts to 25-30 inch-pounds and safety wire.

d. Refer to Chapter 28-40-00 and install the low fuel level sensor.

e. In the main landing gear wheel well, connect the cross-transfer fuel line, motive fuel flow line, forward-to-aft tank vent line, and the fuel-return line of the aft tank jet pump to the hopper compartment manifold.

NOTE

Use new O-rings on all ferrules and install sleeves on connections with two O-rings. Refer to FERRULE CONNECTORS INSTALLATION to install the ferrules

f. Inside the hopper compartment, connect the motive fuel flow line, cross-transfer fuel line, and the forward-to-aft tank vent line to the hopper compartment manifold at the ferrule connections.

g. If removed or disconnected, connect all necessary jumper cables and clamps to the fuel lines and vent lines. Attach the jumper cables to grounding brackets.

h. Install the access door above the hopper compartment.

i. Refer to Chapter 12-10-00 and refuel the fuel tanks. Check for fuel leakage at the hopper compartment manifold, fuel low level sensor and the fuel lines in the main landing gear wheel well.

j. Reconnect the battery.

FORWARD TANK FUEL DRAIN VALVES REMOVAL (Effectivity: NC-4 thru NC-25) (Figure 11)

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.

a. Remove all electrical power from the airplane and disconnect the battery.

b. Refer to Chapter 12-10-00 and defuel the left and/or right fuel tanks as necessary.

c. Refer to FORWARD FUEL TANK ACCESS DOORS REMOVAL and remove the aft access door on the root rib and the access door above the hopper compartment.

d. If the aft drain valve is to be removed, remove the access door and seal from the horizontal slanted baffle.

e. Use a sump drain wrench (1, Chart 1, 28-00-00) to remove the plug(s) from the lightning shield(s).

f. While holding the head of the drain valve stationary with a two-pin-spanner wrench, unscrew the jam nut from the drain valve.

g. Remove the castellated spacer from the valve, then remove the valve body and O-ring from the fuel tank lower skin.

NOTE

Close all fuel tank openings to prevent the entry of foreign matter if the drain valve will not be reinstalled immediately.

FORWARD TANK FUEL DRAIN VALVES INSTALLATION (Effectivity: NC-4 thru NC-25) (Figure 11)

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.

a. Install a new O-ring under the head of the drain valve.

b. Insert the drain valve body through the hole in the fuel tank lower skin.

c. Invert the castellated spacer so that the castellations are facing downward and install it over the drain valve body from inside the hopper compartment.

d. Secure the drain valve and spacer with the jam nut while holding the head of the drain valve stationary with a two-pin-spanner wrench.

e. After installation of the drain valve, reinstall the access door and seal on the horizontal slanted baffle.

f. Refer to FORWARD FUEL TANK ACCESS DOORS INSTALLATION and reinstall the access doors above the hopper compartment and on the tank root rib.

g. Refuel the airplane as outlined in Chapter 12-10-00 while observing the drain valve for fuel leakage. Stop the refueling operation if any fuel leakage is evident and properly install the affected valve to stop any leaks.

h. Use a sump drain wrench (1, Chart 1, 28-00-00) to install the lightning shield plug in the lightning shield.

i. Reconnect the battery and restore electrical power to the airplane.

AFT TANK FUEL DRAIN VALVE REMOVAL (Effectivity: NC-4 thru NC-25) (Figure 11)

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.

a. Remove all electrical power from the airplane and disconnect the battery.

b. Refer to Chapter 12-10-00 and defuel the left and/or right fuel tanks as necessary to remove the desired drain valve.

c. Use a sump drain wrench (1, Chart 1, 28-00-00) to remove the lightning shield plug.

d. Remove the drain valve with a two-pin-spanner wrench by unscrewing it counterclockwise.

e. Refer to LIGHTNING SHIELD REMOVAL to remove the respective lightning shield from the drain plate.

f. Refer to FUEL DRAIN VALVE INSERT AND PLATE REMOVAL to remove the fuel drain insert and drain plate if necessary.

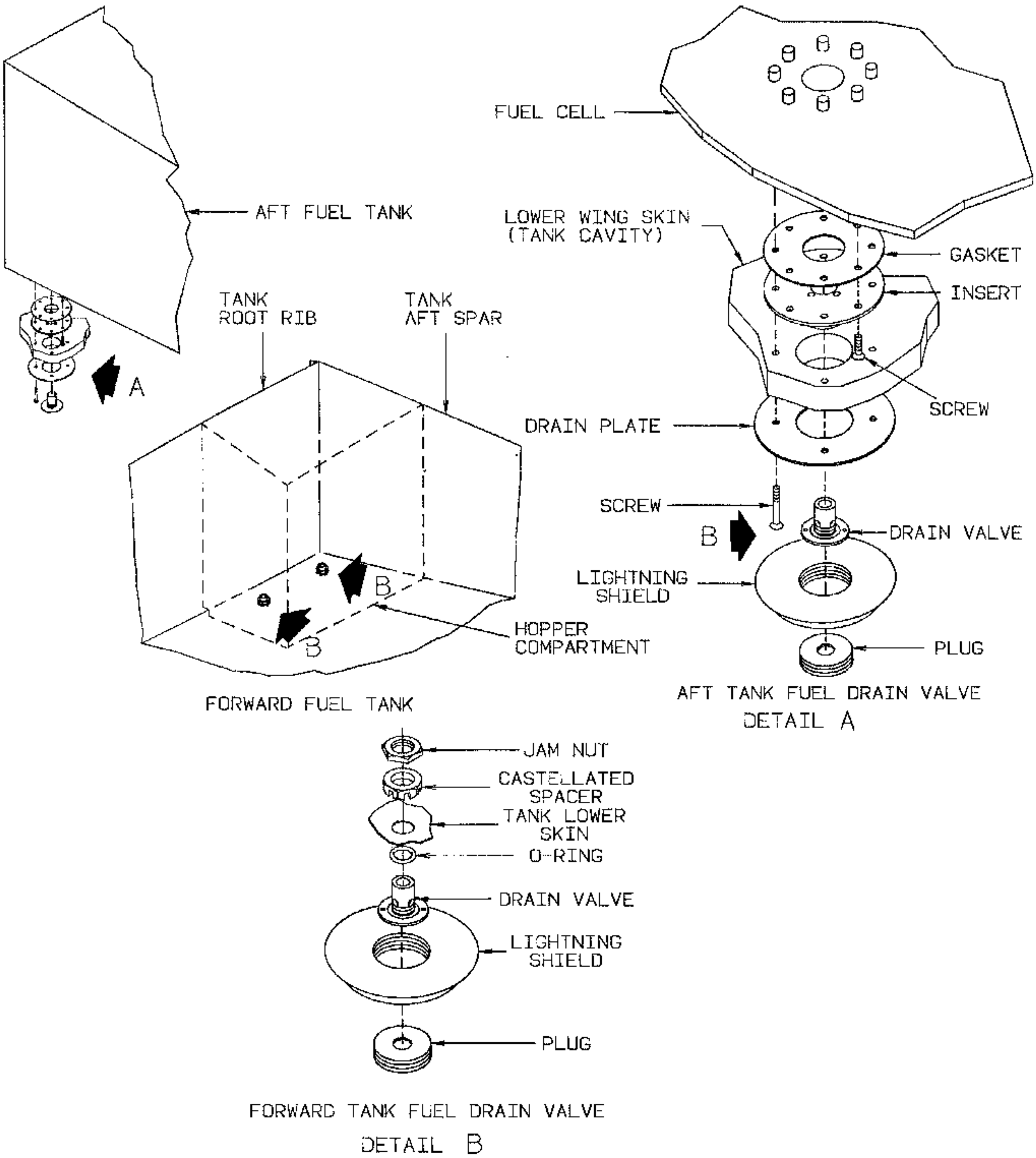
NOTE

Close all fuel tank openings to prevent the entry of foreign matter if the drain valve will not immediately be reinstalled.

AFT TANK FUEL DRAIN VALVE INSTALLATION (Effectivity: NC-4 thru NC-25) (Figure 11)

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.



Fuel Drain Valves Installation (Effectivity: NC-4 thru NC-25)
Figure 11

a. If the fuel drain insert and drain plate were removed, refer to FUEL DRAIN VALVE INSERT AND PLATE INSTALLATION for the proper reinstallation procedures.

b. Screw the valve body into the valve insert until finger tight. Using a two-pin-spanner wrench, torque the drain valve to 54-60 inch-pounds.

c. Refuel the airplane and check for fuel leaks at the drain valve as outlined in Chapter 12-10-00.

d. Use a sump drain wrench (1, Chart 1, 28-00-00) to reinstall the lightning shield plug.

e. Reconnect the battery and restore electrical power to the airplane.

LIGHTNING SHIELD REMOVAL (Effectivity: NC-4 thru NC-25) (Figure 11)

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.

a. Use a sump drain wrench (1, Chart 1, 28-00-00) to remove the lightning shield plug from the lightning shield being removed.

WARNING

When using a heat gun, hold the gun approximately twelve inches away from the lightning shield and do not allow the surface temperature to exceed 190° F.

b. Using a heat gun, apply heat (160° to 180° F. nominal) to the lightning shield to soften the adhesive. Continually monitor the surface temperature and do not allow it to exceed 190° F.

c. After the adhesive has softened, mechanically remove the lightning shield from the drain plate. Any remaining adhesive should be removed while it is still pliable.

LIGHTNING SHIELD INSTALLATION (Effectivity: NC-4 thru NC-25) (Figure 11)

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.

a. Scuff sand, with a maximum of 180-grit aluminum oxide sandpaper, an area slightly larger than the bonding surface where the lightning shield is to be installed.

b. Scuff sand the bonding surface on the lightning shield.

c. Use a clean white cloth dampened with solvent (5 or 6, Chart 2, 28-00-00) to clean the prepared surface, then immediately wipe dry with a clean, white cloth. Do not allow the solvent to evaporate on the prepared surface as this may leave an unwanted residue.

NOTE

The bonding surface must be free of all dirt and contaminants for proper adhesion of the lightning shield.

d. Mix the two-part adhesive (7, Chart 2, 28-00-00) by weight at a ratio of 100 units Part A to 35 units Part B.

e. Stir the adhesive until a uniform consistency is attained.

f. Apply the adhesive to the bonding surfaces with a spatula or brush. The mixed adhesive must be applied within 30 to 40 minutes.

g. Reinstall the lightning shield in its proper position over the drain plate and ensure that the shield is held in place for 24 hours until the adhesive is completely cured.

h. Perform a resistance check of the bond as outlined in Chapter 20-00-03. Resistance between the the lightning shield and fuel tank skin must be less than 1 ohm.

FUEL DRAIN VALVE INSERT AND PLATE REMOVAL (Effectivity: NC-4 thru NC-25) (Figure 11)

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.

a. Remove all electrical power from the airplane and disconnect the battery.

b. Use a sump drain wrench (1, Chart 1, 28-00-00) to remove the lightning shield plug from the lightning shield.

c. Refer to LIGHTNING SHIELD REMOVAL and remove the lightning shield.

d. Refer to AFT TANK FUEL DRAIN VALVE REMOVAL and remove the applicable aft drain valve from the insert.

e. Remove the four screws securing the drain plate to the lower wing skin and remove the drain plate.

f. Refer to AFT FUEL TANK REMOVAL and remove the aft fuel tank to access the drain insert.

g. Remove the drain insert and gasket by removing the four screws securing the insert to the bottom of the fuel cell.

NOTE

Close all fuel tank openings to prevent the entry of foreign matter if the drain valve will not be immediately reinstalled.

FUEL DRAIN VALVE INSERT AND PLATE INSTALLATION (Effectivity: NC-4 thru NC-25) (Figure 11)

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.

a. Position the drain valve insert at the bottom of the fuel cell with a new gasket between the drain valve insert and the fuel cell.

b. Align the mounting holes of the drain valve insert, gasket and fuel cell, then install the four short screws in every other hole of the drain valve insert. Torque the screws to 25-30 inch-pounds.

c. Refer to AFT FUEL TANK INSTALLATION and install the aft fuel tank.

d. Align the drain plate with the lower surface of the wing and the remaining holes in the drain valve insert.

e. Secure the drain plate to the lower wing skin with the four long screws. Torque the screws to 25-30 inch-pounds.

f. Refer to AFT TANK FUEL DRAIN VALVE INSTALLATION and reinstall the drain valve.

g. Refer to LIGHTNING SHIELD INSTALLATION and reinstall the lightning shield.

h. Use a sump drain wrench (1, Chart 2, 28-00-00) to install the plug in the lightning shield.

i. Reconnect the battery and restore electrical power to the airplane.

FORWARD TANK FUEL DRAIN VALVES REMOVAL (Effectivity: NC-26 and After) (Figure 12)

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.

a. Remove all electrical power from the airplane and disconnect the battery.

b. Refer to Chapter 12-10-00 and defuel the left and/or right fuel tanks as necessary.

c. Refer to FORWARD FUEL TANK ACCESS DOORS REMOVAL and remove the aft access door on the root rib and the access door above the hopper compartment.

d. If the aft drain valve is to be removed, remove the access door and seal from the horizontal slanted baffle.

e. While holding the head of the valve stationary with a two pin spanner wrench, remove the jam nut and washer from the valve.

f. Remove the castellated spacer from the valve, then remove the valve body and O-ring from the cutout in the fuel tank lower skin.

NOTE

Close all fuel tank openings to prevent the entry of foreign matter if the drain valve will not be immediately reinstalled.

FORWARD TANK FUEL DRAIN VALVES INSTALLATION (Effectivity: NC-26 and After) (Figure 12)

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.

a. Install a new O-ring under the head of the drain valve being installed.

b. Insert the valve body through the mounting hole in the fuel tank lower skin.

c. Install the castellated spacer and washer over the drain valve body from inside the hopper compartment.

d. Secure the drain valve and spacer with a jam nut while holding the drain valve head stationary with a two pin spanner wrench.

e. After installation of the drain valve, reinstall the access door and seal on the horizontal slanted baffle.

f. Refer to FORWARD FUEL TANK ACCESS DOORS INSTALLATION and reinstall the access doors above the hopper compartment and on the tank root rib.

g. Refuel the airplane as outlined in Chapter 12-10-00 while observing the drain valve for fuel leakage. Stop the refueling operation if any fuel leakage is evident and properly install the affected valve to stop any leaks.

h. Reconnect the battery and restore electrical power to the airplane.

AFT TANK FUEL DRAIN VALVE REMOVAL (Effectivity: NC-26 and After) (Figure 12)

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.

a. Remove all electrical power from the airplane and disconnect the battery.

b. Refer to Chapter 12-10-00 and defuel the left and/or right fuel tanks as applicable to the drain valve to be removed.

c. Remove the drain valve with a two pin spanner wrench by rotating it counterclockwise.

d. Refer to FUEL DRAIN VALVE INSERT AND PLATE REMOVAL to remove the drain valve insert and drain plate if necessary.

NOTE

Close all fuel tank openings to prevent the entry of foreign matter if the drain valve will not be immediately reinstalled.

AFT TANK FUEL DRAIN VALVE INSTALLATION (Effectivity: NC-26 and After) (Figure 12)

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.

a. If the fuel drain insert and drain plate were removed, refer to FUEL DRAIN VALVE INSERT AND PLATE INSTALLATION for reinstallation procedures.

b. Screw the drain valve into the drain valve insert finger tight. Using a two pin spanner wrench, torque the drain valve to 54-60 inch-pounds.

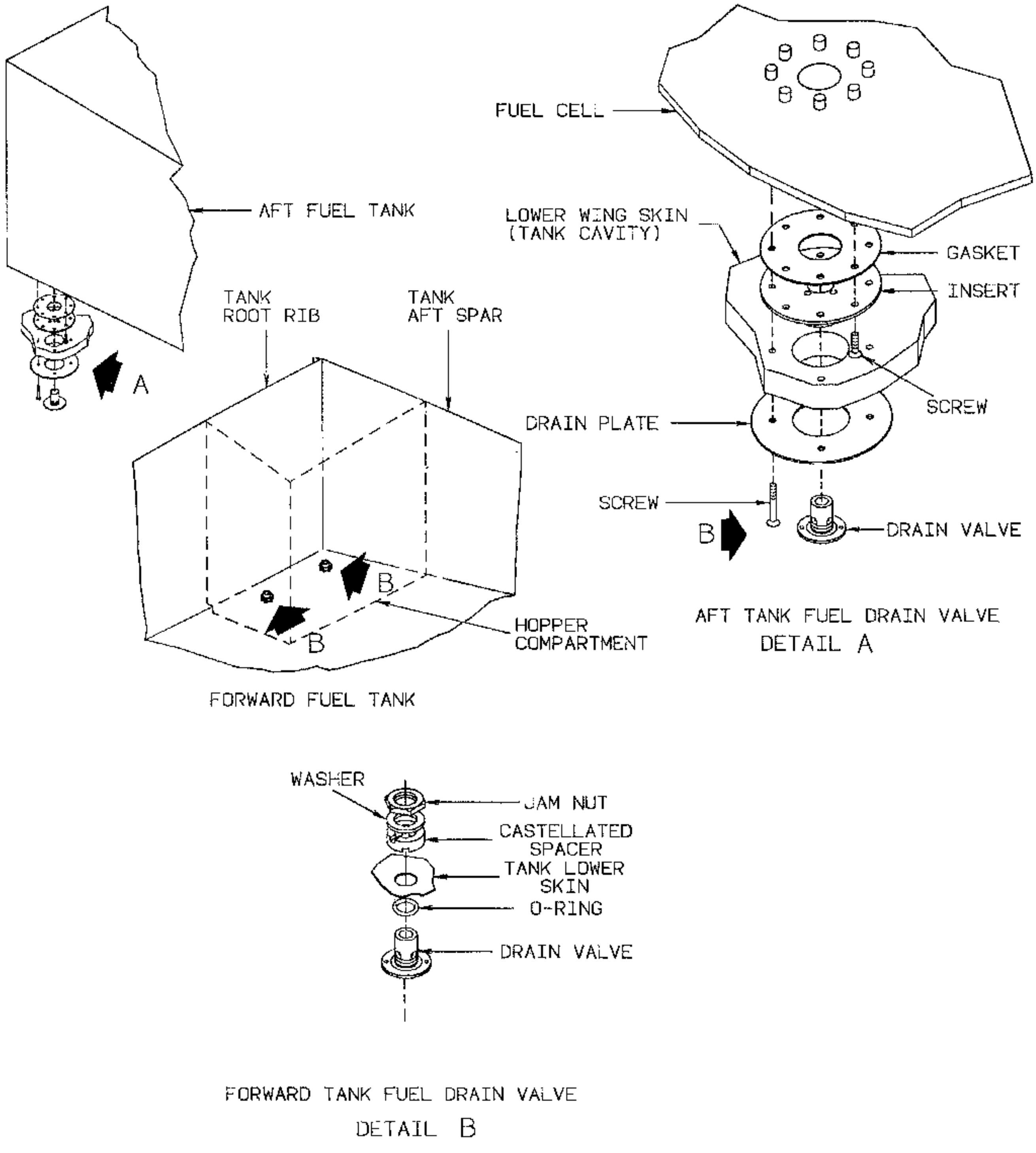
c. Refuel the airplane and check for fuel leaks at the drain valve as outlined in Chapter 12-10-00.

d. Reconnect the battery and restore electrical power to the airplane.

FUEL DRAIN VALVE INSERT AND PLATE REMOVAL (Effectivity: NC-26 and After) (Figure 12)

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.



Fuel Drain Valves Installation (Effectivity: NC-26 and After)
Figure 12

a. Remove all electrical power from the airplane and disconnect the battery.

b. Refer to AFT TANK FUEL DRAIN VALVE REMOVAL and remove the applicable aft drain valve from its insert.

c. Remove the four screws securing the drain plate to the lower wing skin and remove the drain plate.

d. Refer to AFT FUEL TANK REMOVAL and remove the aft fuel tank.

e. Remove the drain valve insert and gasket by removing the four screws securing the insert to the bottom of the fuel cell.

NOTE

Close all fuel tank openings to prevent the entry of foreign matter if the drain valve insert will not be reinstalled immediately.

FUEL DRAIN VALVE INSERT AND PLATE INSTALLATION (Effectivity: NC-26 and After) (Figure 12)

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.

a. Position the drain valve insert at the bottom of the fuel cell with a new gasket between the drain valve insert and the fuel cell.

b. Align the mounting holes of the drain valve insert, gasket and fuel cell, then install the four short screws in every other hole of the drain valve insert. Torque the screws to 25-30 inch-pounds.

c. Refer to AFT FUEL TANK INSTALLATION and install the aft fuel tank.

d. Align the drain plate with the lower surface of the wing and the remaining holes in the drain valve insert.

e. Secure the drain plate to the lower wing skin with the four long screws. Torque the screws to 25-30 inch-pounds.

f. Refer to AFT TANK FUEL DRAIN VALVE INSTALLATION and install the drain valve.

g. Restore electrical power to the airplane and reconnect the battery.

FUEL TANK DRAIN VALVE PRIMARY O-RING REPLACEMENT (Effectivity: NC-4 thru NC-25)

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.

NOTE

Design of the fuel drain valves allows for replacement of the primary O-ring without removal of the entire drain valve assembly. When the poppet is extended from the valve body, a flange on the poppet mates with a seat in the valve body to form a secondary seal and minimize the loss of fuel while the O-ring is being replaced.

a. Use a sump drain wrench (1, Chart 1, 28-00-00) to remove the lightning shield plug from the lightning shield.

b. Insert a crosspoint tool (Phillips screwdriver) into the poppet recess and rotate the poppet approximately 55° clockwise without pushing up. Spring pressure should extend the poppet out of the valve body to expose the primary O-ring.

c. Remove the primary O-ring from the poppet.

d. Lubricate the new O-ring with petrolatum (1, Chart 2, 28-00-00) and install it on the poppet groove.

e. Insert a crosspoint tool (Phillips screwdriver) into the poppet recess, depress the poppet until it is flush with the bottom of the valve head, then rotate it approximately 55° counterclockwise. The poppet should be held in the closed position by spring pressure.

f. Clean the area around the drain valve and lightning shield. Verify that the drain valve does not leak.

g. Use a sump drain wrench (1, Chart 1, 28-00-00) to reinstall the lightning shield plug.

FUEL TANK DRAIN VALVE PRIMARY O-RING REPLACEMENT (Effectivity: NC-26 and After)

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.

NOTE

Design of the fuel drain valves allows for replacement of the primary O-ring without removal of the entire drain valve assembly. When the poppet is extended from the valve body, a flange on the poppet mates with a seat in the valve body to form a secondary seal and minimize the loss of fuel while the O-ring is being replaced.

a. Insert an 1/8-inch hex point tool (allen wrench) into the poppet recess and rotate the poppet approximately 90° clockwise without pushing up. Spring pressure should extend the poppet out of the valve body to expose the primary O-ring.

b. Remove the primary O-ring from the poppet.

c. Lubricate the new O-ring with petrolatum (1, Chart 2, 28-00-00) and install it on the poppet groove.

d. Insert an 1/8-inch hex point tool (allen wrench) into the poppet recess, depress the poppet until it is flush with the bottom of the valve head, and rotate it approximately 90° counterclockwise. The poppet should lock in the closed position when released.

e. Clean the area around the drain valve to remove any residual fuel.

f. Verify that the drain valve does not leak by pressing upward on the poppet. It should remain locked in the closed position.

RAPID FUEL DRAIN VALVE REMOVAL (Effectivity: All) (Figure 13)

A rapid fuel drain valve is mounted at each hopper tank in the root rib. The drain valve is comprised of a valve body, O-ring, washer and jam nut. A plug is installed in the valve while not in use to prevent entry of foreign matter and provide a redundant seal. The valve and jam nut are safety wired. Removal and installation of the left and right drain valves is typical.

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.

a. Refer to Chapter 12-10-00 and defuel the left or right fuel tank as applicable to the drain valve to be removed.

b. Remove electrical power from the airplane and disconnect the battery.

c. Remove the lower wing-to-fuselage fairing just forward of the main gear wheel well as outlined in Chapter 53-50-00.

d. Refer to FORWARD FUEL TANK ACCESS DOORS REMOVAL to remove the aft root rib access door above the drain valve, and the access door above the hopper compartment.

e. Cut the safety wire on the drain valve and jam nut, then remove the jam nut and washer.

f. Remove the drain valve from the root rib.

g. Clean the hole in the root rib, washer and jam nut of old sealant.

h. If the drain valve is not to be installed immediately, cover all openings in the fuel tank to prevent entry of foreign matter.

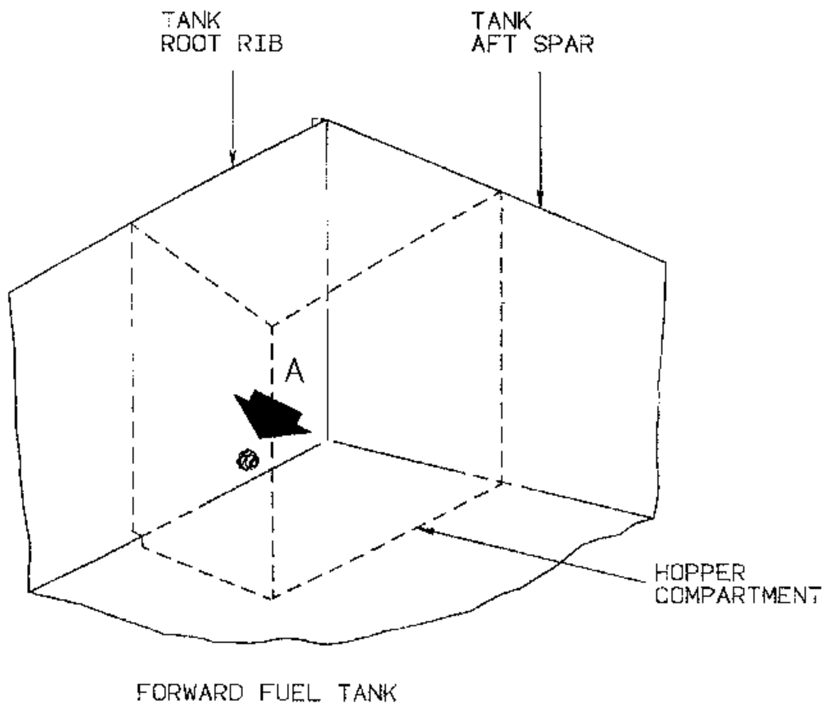
RAPID FUEL DRAIN VALVE INSTALLATION (Effectivity: All) (Figure 13)

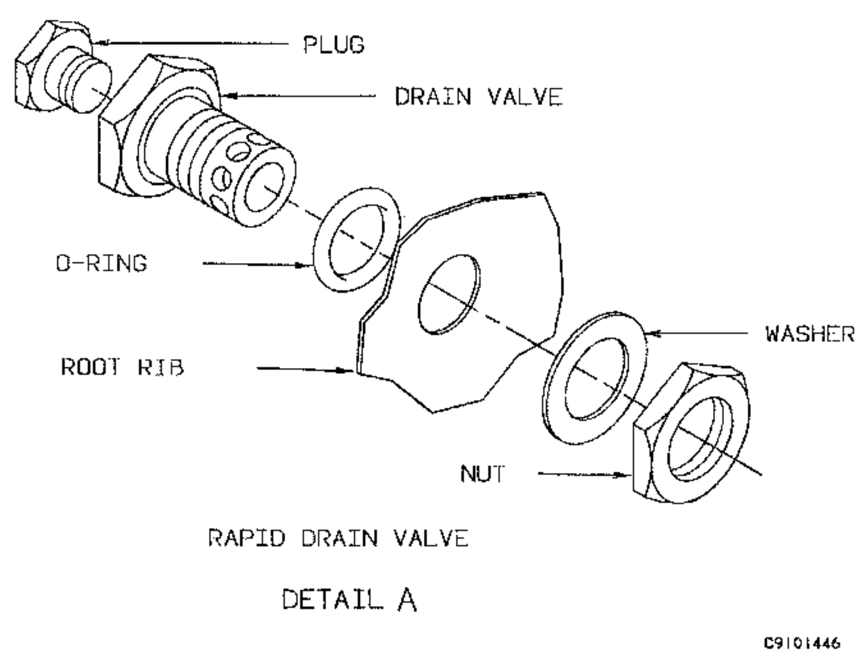
a. Insert the drain valve in the root rib with a new O-ring.

b. Prepare the washer by coating both sides with sealant (4, Chart 2, 28-00-00).

c. Install the washer with the countersink toward the root rib and secure the drain valve with the jam nut. Safety wire the jam nut to the valve body.

d. Install the plug in the valve and safety wire the plug to the valve.





Rapid Fuel Drain Valve Installation (Effectivity: All)
Figure 13

e. Install the access doors above the hopper compartment, and on the root rib. Connect the electrical connections for the fuel quantity probe and fuel temperature sensor.

f. Allow the sealant to cure and refuel the airplane as outlined in Chapter 12-10-00 while checking for fuel leakage at the drain valve.

g. Install the wing-to-fuselage fairing as outlined in Chapter 53-50-00.

h. Reconnect the battery.

FORWARD FUEL TANK FLOAT VENT VALVE REMOVAL (Effectivity: All) (Figure 14)

The float vent valve is located at the forward end of the forward fuel tank and directly behind the forward root rib access door. The vent valve is mounted on a bracket with the floats extending forward.

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.

a. Refer to Chapter 12-10-00 to defuel the left and/or right fuel tank as applicable to the vent valve to be removed.

b. Remove electrical power from the airplane and disconnect the battery.

c. Gain access to the vent valve by removing the forward wing-to-fuselage fairings as outlined in Chapter 53-50-00. Refer to FORWARD FUEL TANK ACCESS DOORS REMOVAL and remove the forward root rib access door.

d. Disconnect the vent line from the vent valve.

e. Remove the jam nut and washer securing the vent valve to the mounting bracket. Remove the vent valve from the fuel tank.

f. If the vent valve is not to be installed immediately, cover the tank opening to prevent entry of foreign matter.

FORWARD FUEL TANK FLOAT VENT VALVE INSTALLATION (Effectivity: All) (Figure 14)

a. Position the vent valve fitting in the mounting bracket with the floats forward.

b. Secure the vent valve to the bracket with washer and jam nut.

c. Connect the vent line to the vent valve.

d. Check that the float is not binding and that it operates freely.

e. Refer to FUEL TANK ACCESS DOORS INSTALLATION and install the access door on the root rib.

f. Refuel the airplane and check for fuel leakage at the access door as outlined in Chapter 12-10-00.

g. Install the wing-to-fuselage fairing as outlined in Chapter 53-50-00.

h. Reconnect the battery.

FORWARD FUEL TANK FLOAT VENT/ RELIEF VALVE REMOVAL (Effectivity: All) (Figure 14)

The float vent with relief valve is located just forward of the hopper compartment on a bracket with the float extending aft. The valve is in the highest point of the forward tank.

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.

a. Refer to Chapter 12-10-00 and defuel the left or right fuel tank as applicable to the valve to be removed.

b. Remove electrical power from the airplane and disconnect the battery.

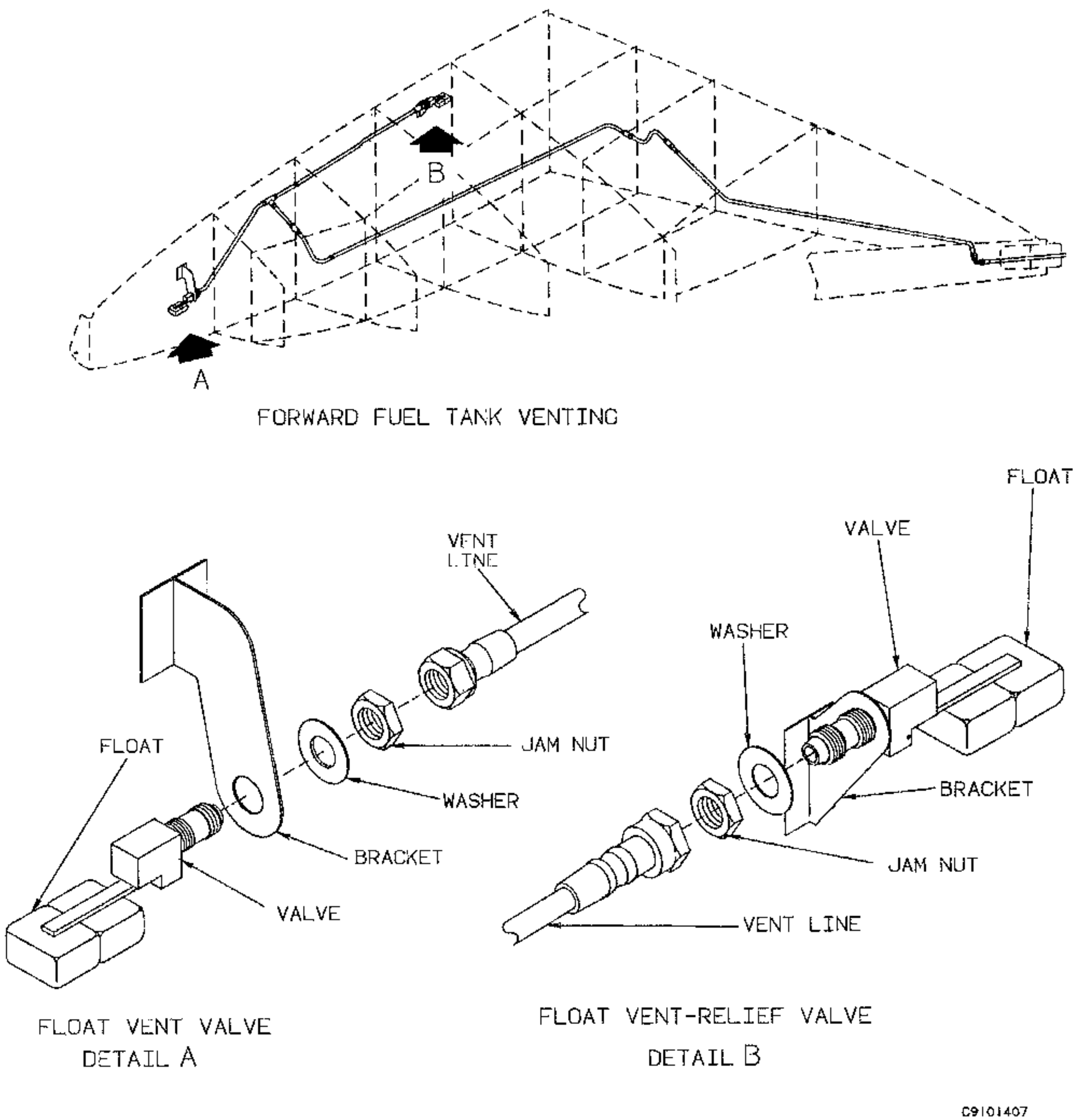
c. Gain access to the float vent/relief valve by removing the wing-to-fuselage fairing as outlined in Chapter 53-50-00.

d. Refer to FORWARD FUEL TANK ACCESS DOORS REMOVAL and remove the fourth access door from the forward end of the root rib.

e. Disconnect the vent line from the vent/relief valve.

f. Remove the jam nut and washer securing the valve to the mounting bracket. Remove the valve from the tank.

g. If the vent/relief valve is not to be installed immediately, cover the tank opening to prevent entry of foreign matter.



Forward Fuel Tank Vent Installation (Effectivity: All)
Figure 14

FORWARD FUEL TANK FLOAT VENT/ RELIEF VALVE INSTALLATION (Effectivity: All) (Figure 14)

a. Position the vent/relief valve in the mounting bracket with the float extending aft.

b. Secure the vent/relief valve to the bracket with washer and jam nut.

c. Connect the vent line to the valve.

d. Verify that the float is not binding and that it operates freely.

e. Refer to FORWARD FUEL TANK ACCESS DOORS INSTALLATION and install the access door on the root rib.

f. Refuel the airplane and check for fuel leakage at the access door as outlined in Chapter 12-10-00.

g. Install the wing-to-fuselage fairings as outlined in Chapter 53-50-00.

h. Reconnect the battery.

FUEL TANK-TO-WING VENT LINE REMOVAL (Effectivity: All) (Figure 15)

The outboard fuel tank-to-wing vent line connects the forward fuel tank vent system to the wing overboard vent assembly.

a. Gain access to the fuel tank-to-wing vent line by removing the deice boot and the section of the wing leading edge assembly (523 left/623 right) at the forward fuel tank outboard support fitting.

b. Disconnect the tank-to-wing vent line assembly from the forward and aft elbow fittings.

c. To remove the vent line elbow fitting from the fuel tank forward spar, the forward fuel tank must be removed from the airplane. Refer to FORWARD FUEL TANK REMOVAL to remove the fuel tank.

d. Gain access to the vent line elbow fitting jam nut by removing the outboard access door on the tank aft spar as outlined under FORWARD FUEL TANK ACCESS DOORS REMOVAL.

e. Inside the forward fuel tank, disconnect the internal vent line from the elbow fitting. Remove the elbow fitting, jam nut and washer.

f. Remove the elbow fitting and washer from the tank forward spar.

g. To remove the vent line elbow fitting from the wing leading edge spar, gain access to the internal vent line and elbow fitting through access door (532AB left/ 632AB right) and the lightening hole above the landing gear trunnion.

h. Inside the wing, disconnect the internal vent line from the elbow fitting. Remove the elbow fitting jam nut and washer.

i. Remove the elbow fitting and washer from the wing leading edge spar.

FUEL TANK-TO-WING VENT LINE INSTALLATION (Effectivity: All) (Figure 15)

a. If the vent line elbow fitting on the tank forward spar and/or the elbow fitting on the wing leading edge spar was removed, install the elbow fittings as follows:

NOTE

The elbow fitting in the forward fuel tank must be installed prior to installation of the fuel tank.

b. The elbow fitting washers must make direct contact with the tank forward spar and wing leading edge spar graphite laminate. Lightly sand the laminate to remove any excess resin and expose a conductive surface.

c. Use 400-grit aluminum oxide sandpaper to remove the anodizing from the elbow fittings and jam nuts, then sand the surface of the fittings where the flared ends of the tubing mate. Sand the surface of the fittings and jam nuts that will contact the washers when installed. Apply chromate chemical conversion coat to the prepared surface of the fitting and jam nut per MIL-C-5541.

d. Position the elbow fitting and washer in the fuel tank forward spar.

e. Inside the fuel tank, secure the elbow fitting with a washer and jam nut. Connect the internal vent line to the elbow fitting.

f. Position the elbow fitting and a washer in the wing leading edge spar.

g. Inside the wing, secure the elbow fitting with a washer and jam nut. Connect the internal vent line to the elbow fitting.

h. Use a multimeter to perform an electrical bond resistance check between the graphite laminate and the vent lines. The multimeter must indicate 5 ohms or less of resistance for a good bond. Reinstall the fitting(s) if resistance is above the specifed maximum, then perform another bond check.

i. Seal around all washers with sealant (4, Chart 1, 28-00-00) to prevent moisture from reaching the area where metal is in contact with the graphite laminate.

j. Refer to FORWARD FUEL TANK ACCESS DOORS INSTALLATION and install the access door on the fuel tank aft spar.

k. Refer to FORWARD FUEL TANK INSTALLATION and install the forward fuel tank.

l. Install the wing lower surface access door.

m. Assemble the tank-to-wing vent line assembly with new O-rings and ferrule connectors.

n. Connect the tank-to-wing vent line assembly to the forward and aft elbow fittings.

o. Install the wing leading edge assembly and deice boot.

OVERBOARD VENT ASSEMBLY REMOVAL (Effectivity: All) (Figure 15)

The overboard vent assembly provides an inlet and outlet for the forward tank ventilation system. The vent scoop is an integral part of an access door on the wing lower surface. The heated ram vent is scarfed forward and protrudes below the lower wing surface. The scoop and ram vents are connected to a manifold assembly. The overboard vent assembly is mounted on a bracket on the aft side of the wing front spar.

The overboard vent assembly may be removed and installed as an assembly after disconnecting the attaching vent lines, or the individual components may be replaced without removal of the assembly. Removal of the left and right outboard vent assemblies is typical. Defuel the left or right fuel tanks to lower the fuel level below the fuel vent float valves. Refer to Chapter 12-10-00 for defueling procedures.

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.

a. Disengage the LEFT/RIGHT FUEL VENT circuit breaker located on the left circuit breaker panel in the cockpit.

b. Gain access to the overboard vent assembly by removing the access door just inboard of the scoop vent. Inside, disconnect the scoop vent tube at the ferrule connector. Remove the scoop access door assembly and guide the disconnected scoop vent tube out of the wing.

c. Disconnect the heated ram vent from the aft manifold.

NOTE

Refer to HEATED RAM VENT REMOVAL and remove the heated ram vent

d. Disconnect the remaining scoop vent tube from the aft manifold.

e. Remove the two screws, clamps and spacers securing the check valve to the vent assembly bracket.

f. Maneuver the overboard vent assembly and the attaching vent tube out of the scoop access door opening.

g. If the overboard vent assembly is not to be installed immediately, close off the main vent line with a plug to prevent entry of foreign matter.

NOTE

Refer to OVERBOARD VENT ASSEMBLY DISASSEMBLY to disassemble or replace components of the overboard vent assembly.

OVERBOARD VENT ASSEMBLY INSTALLATION (Effectivity: All) (Figure 15)

a. Maneuver the overboard vent assembly, with the section of the vent tube attached, into the scoop access plate opening. Position and connect the forward manifold fitting to the main vent line.

b. Connect the heated ram vent tube to the aft manifold.

c. Connect the forward section of the scoop vent tube to the aft manifold.

d. Secure the two check valves to the vent assembly bracket with clamps, spacers and screws.

e. Position and secure the scoop access door to the wing lower surface.

f. Inside, connect the sections of scoop vent tubes with a ferrule connector.

NOTE

For control of static electricity, ensure all vent lines are properly bonded and grounded with line clamps and jumpers. Use a multimeter to verify that the bond resistance is less than 5 ohms between the bonding surfaces. Refer to FUEL AND VENT LINE STATIC CHARGE TEST for detailed information on the bond check.

g. Install the wing surface access door.

h. Engage the LEFT/RIGHT FUEL VENT circuit breaker.

OVERBOARD VENT ASSEMBLY DISASSEMBLY (Effectivity: All) (Figure 15)

Components of the overboard vent assembly are as follows: a forward manifold, two check valves, flame arrester and aft manifold. The following disassembly and assembly of the overboard vent assembly may be accomplished in part, for component replacement or as maintenance dictates. It is not necessary to remove the overboard vent assembly for replacement of a single component; however, ease of maintenance should be considered.

a. Refer to OVERBOARD VENT ASSEMBLY REMOVAL and remove the overboard vent assembly.

b. Disconnect the aft manifold assembly from the inboard check valve.

c. Disconnect the tube assembly from the manifold assembly and the outboard check valve, then remove the tube.

d. Remove the hose clamps connecting the aft manifold assembly and the flame arrester. Separate the manifold from the hose coupling and remove the aft manifold assembly.

e. Disconnect and remove the check valves and O-rings from the forward manifold fittings by rotating the check valve counterclockwise.

f. Remove the hose clamps connecting the forward manifold and flame arrester. Separate the flame arrester from the hose coupling.

ASSEMBLY OF THE OVERBOARD VENT ASSEMBLY (Effectivity: All) (Figure 15)

a. Connect the flame arrester to the forward manifold with a hose coupling and secure with hose clamps.

b. Using new O-rings, position and install check valves on the forward manifold fittings.

NOTE

The size of the manifold fitting and the check valve end fittings determine the correct position of the check valves in relation to the forward manifold.

c. Connect the aft manifold and flame arrester with a hose coupling. Before installing the hose clamps on the hose coupling, connect the manifold tube to the inboard check valve.

d. Position and connect the tube assembly to the aft manifold and the outboard check valve.

e. Refer to OVERBOARD VENT ASSEMBLY INSTALLATION and install the overboard vent assembly in the airplane.

HEATED RAM VENT REMOVAL (Effectivity: All) (Figure 15)

The heated ram vent protrudes below the surface of the wing, just inboard of the vent scoop. Removal of the left and right heated vents is typical.

a. Disengage the LEFT or RIGHT FUEL VENT circuit breaker located on the left circuit breaker panel in the cockpit.

b. Remove the access door just inboard of the ram vent tube.

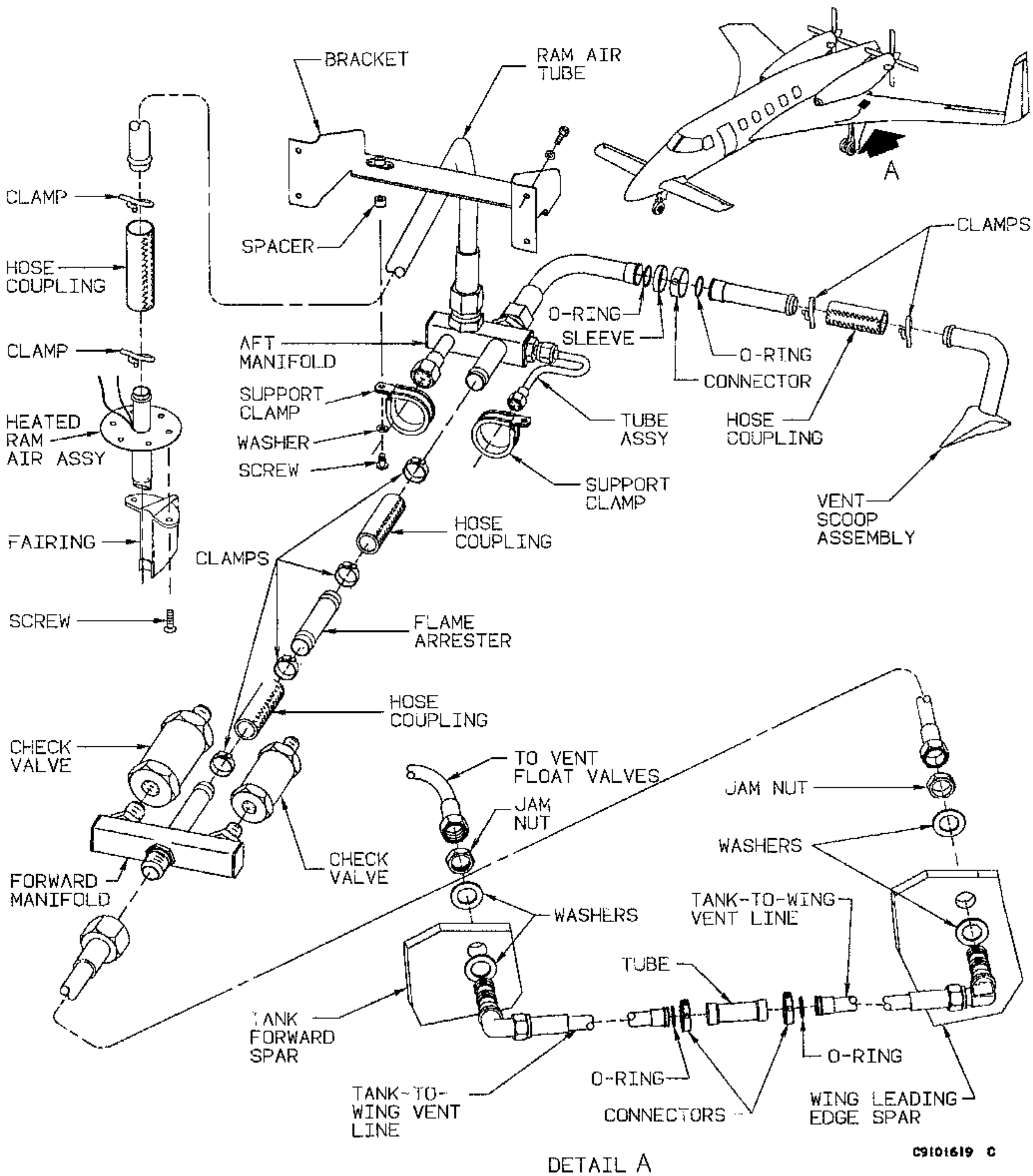
c. Disconnect the vent tube from the overboard vent assembly manifold. Remove the two clamps from the hose coupling to separate the vent tube, then remove it from the airplane.

d. Tag and disconnect electrical wiring at the heating element. Disconnect the wire shield ground plane connection from the reinforcement plate.

e. Remove the two screws and remove the fairing from the vent line. Refer to Figure 15 to locate the fairing.

f. Four screws secure the flange plate to the reinforcement plate through the lower surface of the wing. Remove the four screws to remove the flange plate.

g. Break the sealant and remove the heated ram vent assembly.



Fuel Tank-To-Wing and Overboard Vent Installation (Effectivity: All)
Figure 15

HEATED RAM VENT INSTALLATION (Effectivity: All) (Figure 15)

a. Remove old sealant from the lower wing area with a wooden/plastic scraper and solvent (5, Chart 2, 28-00-00).

NOTE

For lightning strike protection, the flange plate must be properly bonded to the wing surface graphite laminate. If the area is still covered by resin, lightly sand the area to be bonded with 400-grit aluminum oxide sandpaper to ensure that the flange will fully contact the graphite surface.

b. Apply a bead of sealant (4, Chart 2, 28-00-00) around the perimeter of the hole in the wing before the vent tube assembly is installed.

c. Align the ram vent assembly with the lower wing surface so the 45° scarf faces forward. Ensure that the vent heater electrical wiring is properly inserted into the wing.

d. Secure the flange plate to the wing surface with four screws which extend through the wing lower surface into the nutplates on the reinforcement plate. Omit the two screws on each side of the aft screw for installation of the fairing.

NOTE

The reinforcement plate has a tab for connection of the electrical wire shielding to the ground plane.

e. Use a multimeter to perform a continuity check between the lower skin graphite and the flange plate. Resistance must be 5 ohms or less. If the check does not meet the resistance criteria, the installation of the vent tube must be repeated.

f. Apply a bead of sealant (4, Chart 2, 28-00-00) around the perimeter of the flange plate.

g. Position and secure the fairing with two screws as shown by Figure 15.

h. Connect the electrical wiring to the heating element, and the electrical wire shielding to the reinforcement plate tab according to the BEECHCRAFT Starship 1 Wiring Diagram Manual.

i. Connect the vent tube with the hose coupling and secure with clamps. Connect the vent tube to the overboard vent assembly manifold.

j. Engage the LEFT or RIGHT FUEL VENT circuit breaker. Turn on the applicable LEFT or RIGHT FUEL VENT switch and carefully check that the heating element is warming. Turn the LEFT or RIGHT FUEL VENT switch OFF.

k. Install the wing access door.

FORWARD-TO-AFT TANK VENT REMOVAL (Effectivity: All) (Figure 16)

The following procedure is for removal of all or any portion of the left or right forward-to-aft vent line.

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.

a. Refer to Chapter 12-10-00 and defuel the left or right fuel tanks as applicable to the forward-to-aft vent line to be removed.

NOTE

For removal of the center section of the vent line in the forward fuel tank, the forward fuel tank must be removed. Refer to FORWARD FUEL TANK REMOVAL to remove the forward fuel tank

b. Refer to FORWARD FUEL TANK ACCESS DOORS REMOVAL and remove the access doors along the forward tank root rib, the inboard tank spar access door, the access door above the hopper compartment, and the filler cap access plate assembly.

c. In the fuel filler horizontal baffle compartment, remove the line clamp securing the end of the forward-to-aft vent line, and the line clamp with jumper cable from the vent line.

d. Through the root rib access opening (under the horizontal baffle) and the lightening hole in the internal vertical baffle, disconnect the vent line ferrule coupling. Maneuver the forward section of forward-to-aft vent line out through the filler access opening.

e. Through the root rib access opening (between the filler compartment and the hopper compartment) and the lightening hole in the internal vertical baffle, remove the line clamp securing the forward-to-aft vent line to the baffle.

f. Through the inboard tank aft spar access opening, disconnect the vent line ferrule coupling and maneuever the center section of vent line through the tank aft spar access opening.

g. Through the upper hopper compartment access opening, disconnect the clamp and jumper cable from the vent line and remove the line clamp securing the forward-to-aft vent line to the vertical baffle.

h. Disconnect the forward-to-aft vent line from the hopper compartment manifold ferrule connection. Remove the section of vent line from the hopper compartment.

i. In the main landing gear wheel well, disassemble the tube support brackets securing the vent line, fuel lines and cross-transfer valve (left landing gear wheel well only). Disconnect the forward-to-aft vent line from the aft fuel tank vent adapter/check valve assembly at the the ferrule connectors. Remove the forward-to-aft vent line.

j. Gain access inside the aft fuel tank by removing the lower wing surface access door and the fuel cell access door.

k. Inside the aft fuel cell, disconnect the vent line from the vent adapter/check valve assembly at the ferrule connection.

l. Remove the clamp with jumper cable from the vent line. Remove the line clamps securing the forward-to-aft tank vent line, aft tank vent line, and the fuel quantity probe wire bundle.

m. Remove the clamp securing the forward-to-aft vent line to the aft bracket. Remove the vent line from the aft fuel cell.

n. If the sections of vent lines are not to be installed immediately, close all openings to the fuel tanks to prevent entry of foreign matter.

FORWARD-TO-AFT TANK VENT INSTALLATION (Effectivity: All) (Figure 16)

a. In the aft fuel tank, position and secure the forward-to-aft vent line to the aft bracket with a clamp.

b. Connect the forward end of the forward-to-aft vent line to the vent adapter/check valve assembly with a new O-ring on the ferrule connection.

c. Secure the forward-to-aft vent line, aft tank vent line and the fuel quantity probe wire bundle together with line clamps (butterfly style). Install the jumper cable with line clamps.

d. Install the aft fuel cell access door and the lower wing surface access door.

e. In the main landing gear wheel well, assemble the vent line and connect it to the vent adapter/check valve with new O-rings on the ferrule connections.

NOTE

The forward-to-aft vent line will be connected during installation of the forward fuel tank.

f. In the main landing gear wheel well, attach the tube support brackets to the fuel lines, vent lines and cross-transfer valve (left wheel well only). Refer to Chapter 28-20-00 for installation of the cross-transfer valve in the left main landing gear wheel well.

g. In the hopper compartment, maneuver the section of forward-to-aft vent line through the hole in the baffle and connect it to the hopper compartment manifold with a new O-ring on the ferrule connector. Secure the vent line to the vertical baffle with a line clamp, then clamp the jumper cable to the vent line.

h. Through the tank aft spar inboard access opening, install the center section of the forward-to-aft vent line and connect it to the vent line from the hopper compartment with new O-rings on the ferrule connections.

i. Through the root rib access opening (between the filler compartment and the hopper compartment) and the lightening hole in the internal vertical baffle, secure the forward-to-aft vent line to the baffle with a line clamp.

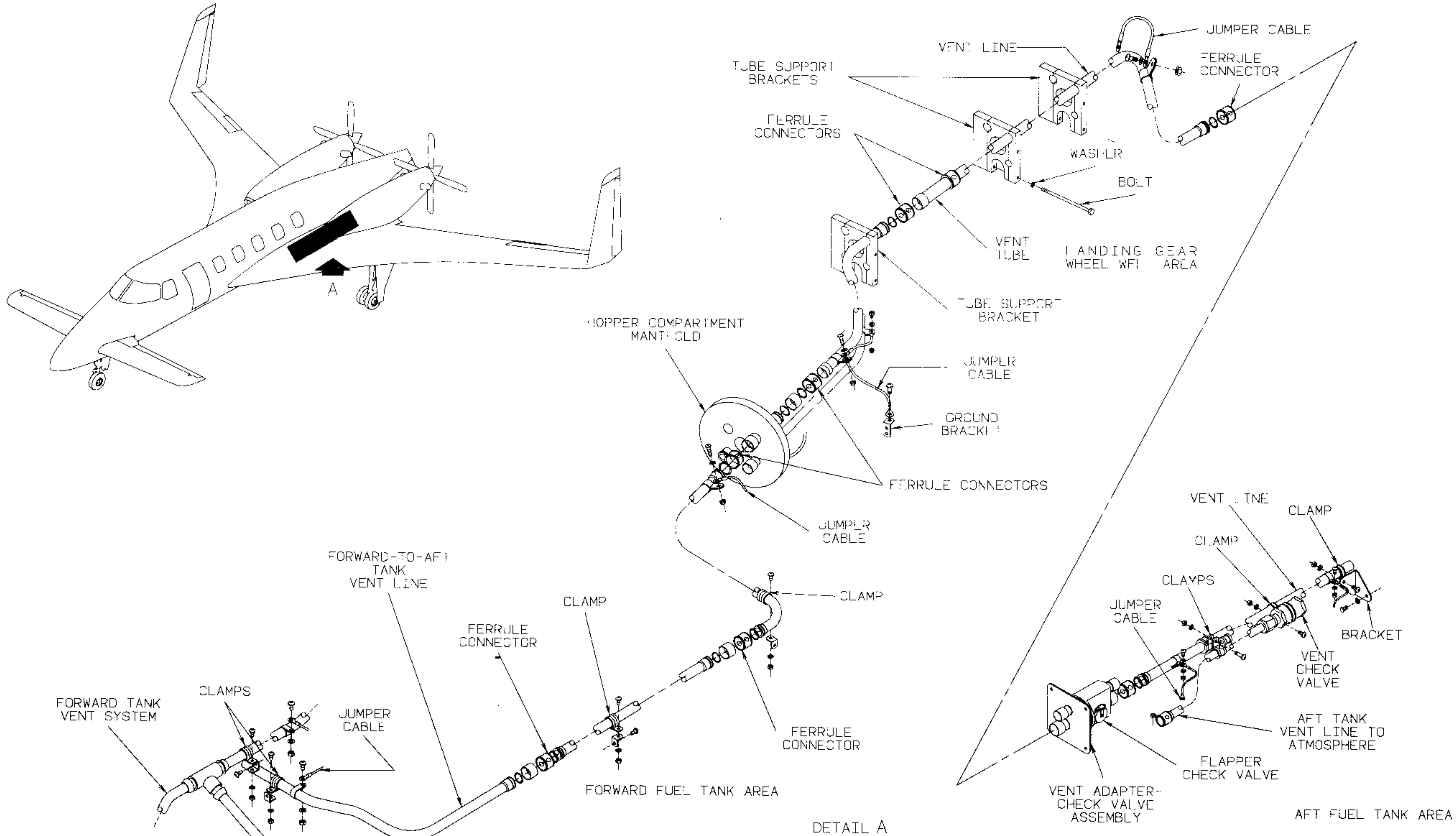
j. Maneuver the forward section of the forward-to-aft vent line in and above the filler horizontal baffle, then through the root rib access opening (under the horizontal baffle) and the lightening hole in the internal vertical baffle, then connect the vent lines with new O-rings on the ferrule connection.

k. Secure the vent line in the filler compartment with a line clamp. Clamp the jumper cable to the vent line.

l. Refer to FORWARD FUEL TANK INSTALLATION and install the forward fuel tank.

m. Install the tank root rib and tank aft spar access doors, the access door above hopper compartment and the fuel filler access plate assembly. Refer to FORWARD FUEL TANK ACCESS DOORS INSTALLATION in this Chapter.

n. Refer to Chapter 12-10-00 and service the fuel tanks.



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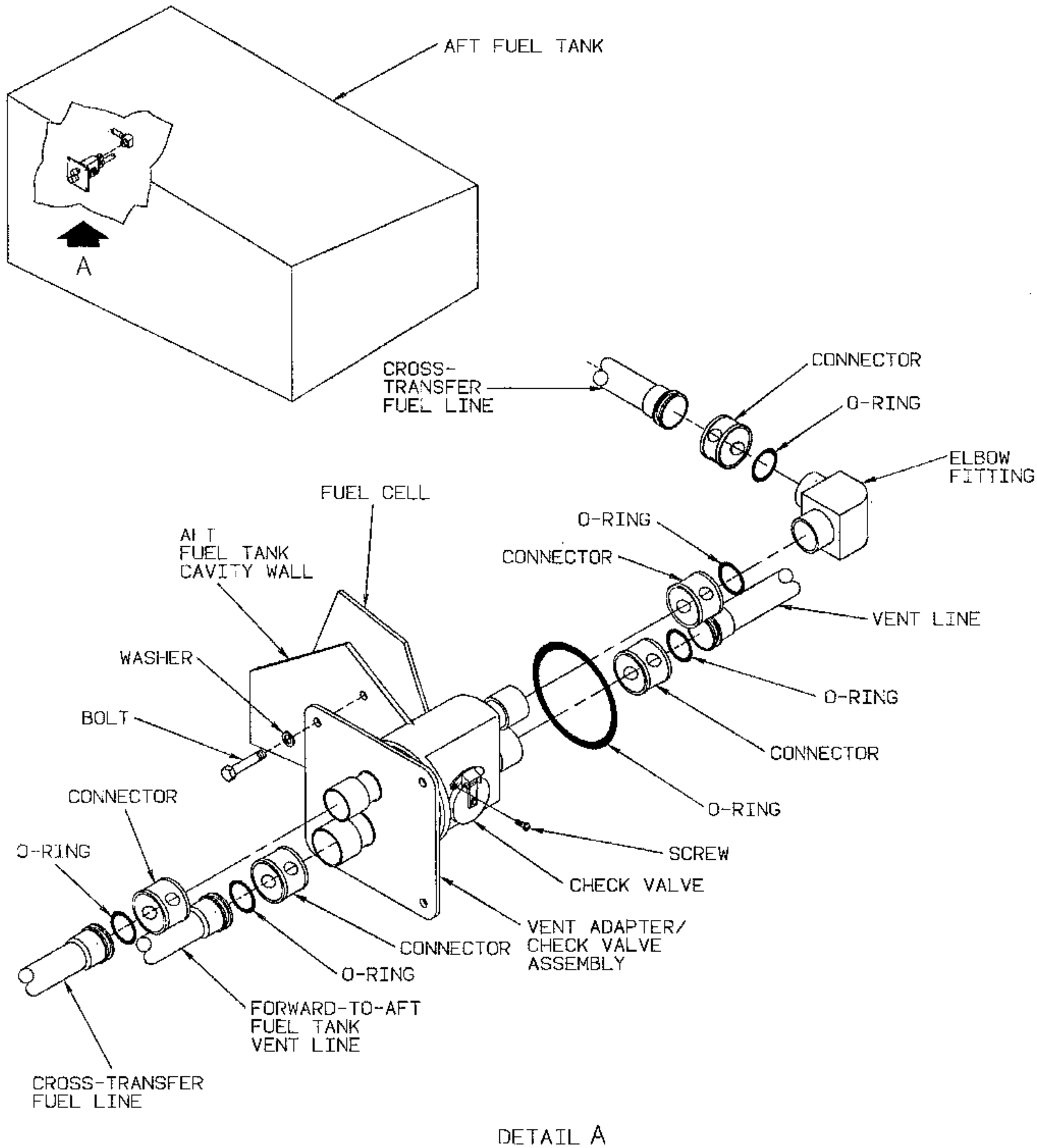
Forward-To-Aft Tank Vent Installation
(Effectivity: All)
Figure 16



Vent Adapter/Check Valve Assembly Installation (Effectivity: All)
Figure 17

AFT FUEL TANK VENT ADAPTER/CHECK VALVE ASSEMBLY REMOVAL (Effectivity: All) (Figure 17)

The aft fuel tank adapter provides for venting the forward fuel tank to the aft fuel tank vent, and the cross-transfer fuel line into the aft fuel tank. A spring-loaded closed-flapper-type check valve is mounted over a vent port of the adapter with two screws.

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.

a. Defuel the left or right fuel tanks as applicable to the vent adapter/check valve assembly to be removed. Refer to Chapter 12-10-00 for defueling procedures.

b. Gain access to the vent adapter/check valve assembly from inside the main landing gear wheel well, by removing the wing lower access door (541AB left or 641AB right), and the aft fuel tank access door and gasket.

c. In the aft fuel tank, disconnect the vent line and cross-transfer elbow fitting from the vent adapter/check valve assembly at the ferrule connectors.

d. In the main landing gear wheel well, disconnect the vent line and cross-transfer line from the vent adapter/check valve at the ferrule connectors.

e. Cut the safety wire and remove the four mounting bolts securing the vent adapter/check valve assembly.

f. Remove the vent adapter/check valve assembly and O-ring from the fuel tank through the main landing gear wheel well.

g. If the replacement vent adapter/check valve assembly is not to be installed immediately, close or cover the fuel/vent lines and fuel tank openings to prevent entry of foreign matter.

AFT FUEL TANK VENT ADAPTER/CHECK VALVE ASSEMBLY INSTALLATION (Effectivity: All) (Figure 17)

a. Verify that the flapper check valve on the vent adapter is serviceable and does not bind when opening or closing. Verify that the check valve mounting screws are tight and safety wired.

b. Place the vent adapter/check valve assembly, with a new O-ring, in the fuel tank opening and position it according to the UP and INBD arrows lettered on the base of the adapter.

c. Secure the vent adapter/check valve assembly with four bolts. Torque the bolts to 25-30 inch-pounds and safety wire.

d. In the aft fuel tank, connect the cross-transfer elbow fitting and the forward-to-aft fuel tank vent line to the vent adapter/check valve assembly with new O-rings.

e. In the main landing gear wheel well, connect the cross-transfer fuel line and the forward-to-aft fuel tank vent line to the vent adapter/check valve with new O-rings.

f. Install the aft tank access door using a new gasket.

g. Refer to Chapter 12-10-00 and refuel the airplane. Check for leaks at the vent adapter and the fuel tank access door.

h. Install the wing lower surface access door.

AFT FUEL TANK VENT REMOVAL (Effectivity: All) (Figure 18)

Removal of the left and right aft tank vents is typical.

CAUTION

When performing maintenance on the fuel system, observe all fire precautions and safety practices as outlined in Chapter 28-00-00.

a. Refer to Chapter 12-10-00 and defuel the left or right fuel tanks as applicable to the vent to be removed.

b. Remove electrical power from the airplane and disconnect the battery.

c. Gain access into the aft fuel tank by removing the access door on the bottom of the wing and the fuel cell door.

d. In the tank, remove the clamps securing the fuel quantity probe wire bundle and the vent lines together. Disconnect the clamp and jumper cable from the vent line.

e. Remove the screw, washer and nut securing the two clamps that attach the check valve to the forward-to-aft vent line.

f. Disconnect the ferrule connector at the nipple tube and remove the vent line from the tank.

g. To remove the check valve, hold the valve stationary with a wrench while disconnecting the vent line.

h. In the main landing gear wheel well, disconnect the vent line at the nipple tube. Remove the jumper clamps and the line clamps securing the vent assembly to the airframe. Remove the vent line and the flame arrester as an assembly.

i. To separate the vent line and flame arrester, remove the hose clamps. Separate the flame arrester and vent lines from the hose couplings.

j. Remove the line clamp securing the vent nipple tube. Inside the tank, remove the clamp from the nipple. Work the nipple tube from the nipple.

k. If the vent line is not to be installed immediately, cover the fuel tank openings to prevent entry of foreign matter.

AFT FUEL TANK VENT INSTALLATION (Effectivity: All) (Figure 18)

a. Insert the nipple tube through the nipple. Do not secure the nipple and tube at this time.

NOTE

It is permissible to apply a light film of petrolatum (1, Chart 2, 28-00-00) to the nipple and under the clamp.

b. Assemble the flame arrester and inboard vent tube with a hose coupling and two clamps. Connect the second hose coupling to the opposite end of the flame arrester and secure with a hose clamp.

c. To maintain the correct gap between the flame arrester and the outboard vent tube, secure the jumper cable and clamp 1.00 inch from the end of the tube. Insert the end of the vent tube into the hose coupling and butt the jumper cable clamp against the end of the hose coupling. Secure the vent tube in the hose coupling with a hose clamp.

d. Place the vent tube in the wing lower surface with the scarf end facing forward and extending 1.00 inch below the surface of the wing. Align the nipple tube and vent tube, then adjust the nipple tube in the nipple to align the vent tube assembly. Connect the ferrule connector.

e. Secure the vent tube to the airframe with a line clamp. Attach the outboard jumper cable to the grounding bracket with a screw, washer and nut.

f. Clamp the inboard jumper cable to the vent tube and to the same grounding bracket as the transfer jet pump discharge line.

g. Secure the nipple tube with a line clamp (outside of tank) to the bonded stud with a washer and nut. Secure the nipple tube with a clamp (inner shoe on the nipple) inside the tank. Torque the nipple clamp to 15-20 inch pounds.

h. Perform a static charge continuity test between the vent lines and the ground plane bracket with a Fluke Multimeter 8020B or equivalent. The multimeter must indicate 5 ohms or less of resistance between the bonded parts.

i. To install the check valve, connect the line to the check valve. Hold the valve stationary with a wrench while tightening the "B" nut. The flow arrow on the check valve should point away from the "B" nut.

j. Place the vent line and check valve in the fuel tank, then align and connect with the ferrule connector.

k. Secure the check valve to the forward-to-aft tank vent line with line clamps (butterfly clamp style).

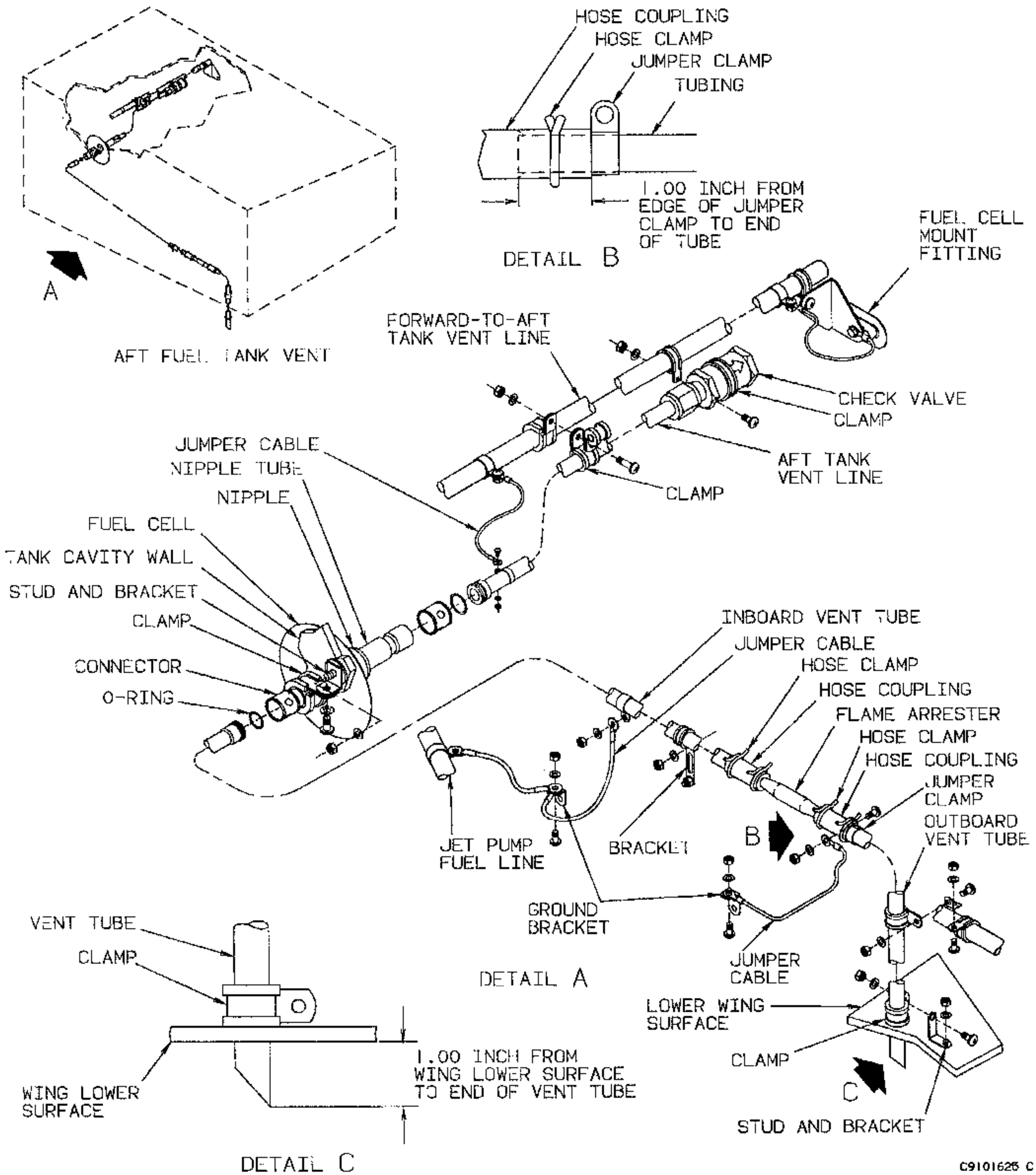
l. Secure the vent line, the fuel quantity probe wire bundle and the forward-to-aft tank vent line together with line clamps (butterfly clamp style).

m. Install the aft tank access door.

n. Refuel the airplane as outlined in Chapter 12-10-00, then check for fuel leakage at the vent nipple tube and access door.

o. Install the wing lower access door.

p. Reconnect the battery.



Aft Fuel Tank Vent Installation (Effectivity: All)
Figure 18

FUEL DISTRIBUTION - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

This section is concerned with the distribution and movement of fuel within the fuel storage tanks and to the engines. The purpose of fuel distribution is to ensure that all usable fuel on board the airplane is made available for the engines' consumption.

FUEL DISTRIBUTION COMPONENTS DESCRIPTION/OPERATION (Effectivity: All) (Figure 1)

STANDBY FUEL BOOST PUMPS (Effectivity: All) (Figure 2)

The left and right motor driven standby fuel boost pumps are 28 vdc centrifugal pumps. They are vertically mounted in the hopper compartment and secured to the root rib with four bolts into the pump self locking inserts. The pump electrical wiring is routed out of the pump mounting plate through the tank root rib. A fuel pickup tube and mesh inlet screen are secured to the bottom of each pump. The inlet screen is #12 mesh, and will allow maximum fuel flow to the pump with fifty percent of the screen obstructed. The screen surrounds the entire fuel pickup tube.

The standby fuel boost pump is controlled automatically by the engine start and ignition system during engine starts. Standby operation of the pump is controlled by the operator with the STBY PUMP switch, or the TRANSFER FLOW selector switch located on the fuel management section of the center subpanel in the cockpit.

During engine start, the IGNITION AND ENGINE START switch is positioned ON and the corresponding fuel boost pump relay is energized. Electrical power is supplied to the standby fuel boost pump through the relay by the Left/Right STBY PUMP circuit breaker on the left circuit breaker panel in the cockpit. When the engine has started and the IGNITION AND ENGINE START switch is released (positioned OFF), the standby fuel boost pump is deactivated. When the IGNITION AND ENGINE START switch is position to STARTER ONLY, the standby fuel boost pump does not operate.

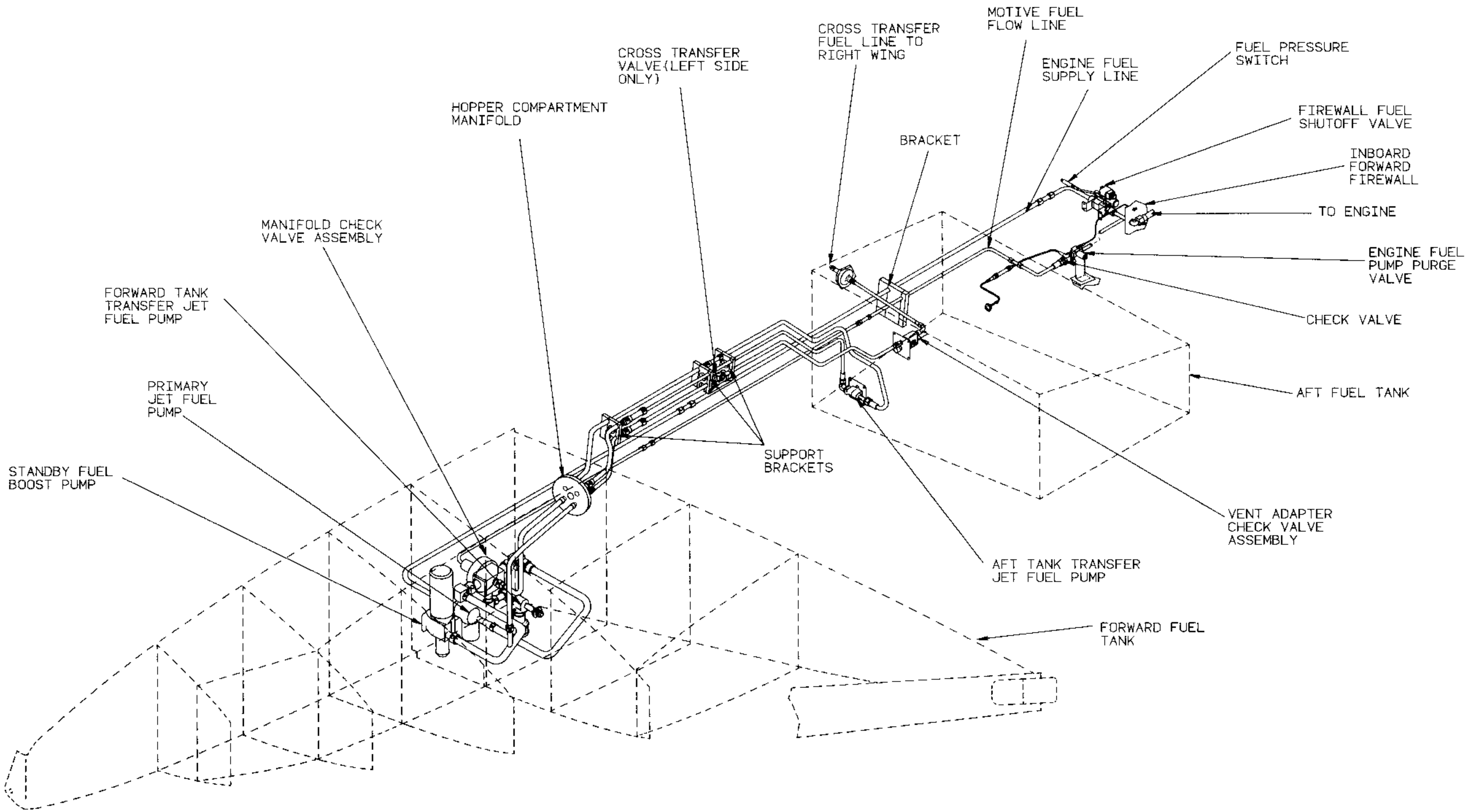
When low fuel pressure in the engine fuel supply line is indicated by illumination of the warning annunciator L or R FUEL PRESS LO, the standby fuel boost pump may be operated by positioning the STBY PUMP switch to ON. Electrical power from the Left/Right STBY PUMP circuit breaker energizes the fuel pump relay and power from the same circuit breaker activates the standby fuel boost pump.

Operation of the standby fuel boost pump during fuel cross transfer from one wing to the other is accomplished by positioning the TRANSFER FLOW selector switch toward the fuel tank (left or right) to receive the fuel. Electrical power from the TRANSFER circuit breaker on the left circuit breaker panel energizes the fuel pump relay and the cross transfer valve opens. Power from the Left/Right STBY PUMP circuit breaker, through the fuel pump relay, activates the selected standby fuel boost pump.

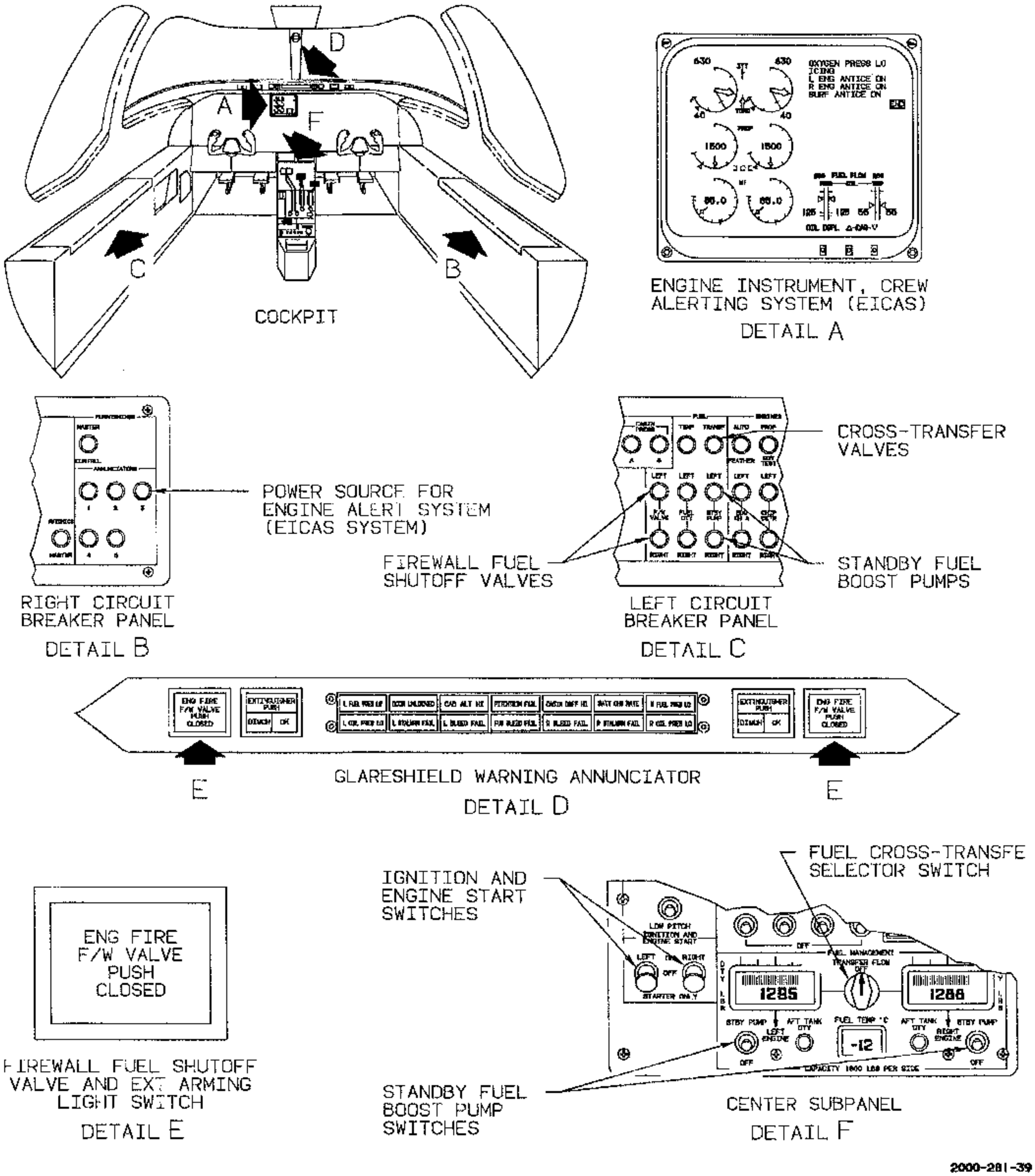
PRIMARY JET FUEL PUMPS (Effectivity: All) (Figure 1)

Primary jet fuel pumps (one for each side) are mounted in the left and right hopper compartments. The primary jet fuel pump outlet is connected by a tube to the manifold check valve assembly. The fuel pickup tube is surrounded by a framed screen bonded to the pump and located near the bottom of the hopper compartment. The primary jet fuel pump is secured to the root rib with four bolts into the pump mounting flange self locking inserts.

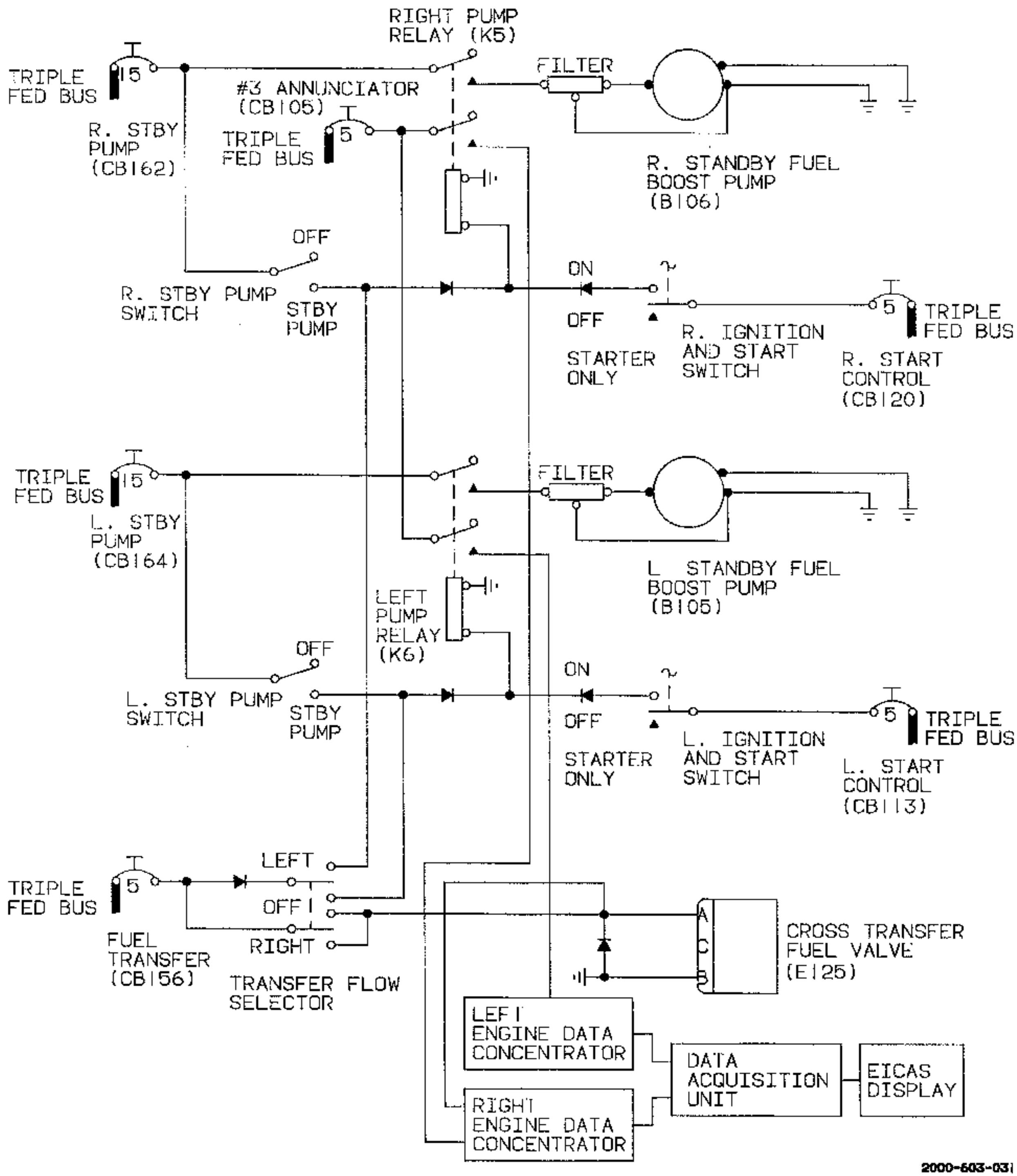
The primary jet fuel pump operates on motive fuel flow from its respective engine-driven fuel boost pump.



Fuel Distribution System (Effectivity: All)
Figure 1



Fuel System Controls (Effectivity: All)
Figure 2



Standby Fuel Boost Pump Electrical Schematic (Effectivity: All)
Figure 3

Motive fuel flow through the primary jet fuel pump creates venturi action which picks up fuel from the hopper compartment. Hopper compartment fuel enters the motive fuel flow stream and is routed into the manifold check valve assembly, which is also located in the hopper compartment. When the primary jet fuel pump is not operating and the standby fuel boost pump is in operation, a check valve in the manifold check valve assembly prevents flow through the primary jet fuel pump. During normal operation, fuel in the manifold check valve assembly from the primary jet fuel pump is directed through the engine fuel supply line, the forward tank transfer jet pump, and the aft tank transfer jet pump.

FORWARD TANK TRANSFER JET FUEL PUMP
(Effectivity: All)
(Figure 1)

A forward tank transfer jet fuel pump is mounted on a slanted horizontal baffle in the left and the right hopper compartments. The transfer jet pump operates on the same venturi principle as the primary jet pump. The forward tank transfer jet fuel pump operates on either motive fuel flow through the primary jet pump or fuel flow created by the standby fuel boost pump, depending on which pump is feeding the manifold check valve assembly.

The fuel pickup adapter and screen extend below the slanted horizontal baffle which separates the hopper compartment and the forward tank. The inlet of the transfer jet pump is connected to the manifold check valve assembly by elbow fittings. The outlet of the transfer jet pump is open to the hopper compartment.

AFT TANK TRANSFER JET FUEL PUMP
(Effectivity: All)
(Figure 1)

An aft tank transfer jet fuel pump is mounted in the left and right main gear wheel well with a fuel pick up tube extending into the aft fuel tank. The aft tank transfer jet fuel pump inlet is connected to a fuel line routed through the wheel well from the hopper compartment manifold. The outlet of the transfer pump is connected to a fuel line routed through the wheel well back through the hopper compartment manifold. The aft tank fuel is picked up by venturi action as motive fuel flows through the transfer jet fuel pump from the manifold check valve assembly. The aft tank transfer jet fuel pump operates on either primary jet fuel pump (motive) fuel flow, or standby fuel boost pump fuel flow, depending on which pump is operating and feeding the manifold check valve assembly.

MANIFOLD CHECK VALVE ASSEMBLY
(Effectivity: All)
(Figure 1)

The manifold check valve assembly is located in the hopper compartment, and mounted to the root rib with an O-ring and four mounting bolts into nonself-locking inserts. The manifold has two inlet and three outlet ports. The inlet ports have ferrule type connectors connecting tubing from the standby fuel boost pump and primary jet fuel pump. One way check valves having a cracking (opening) pressure of 8-inches water maximum are installed in the two inlet ports. The check valves may be poppet or hinged flapper type, depending on the manifold check valve assembly vendor part number. The three manifold outlet ports have ferrule type connectors for the engine fuel supply line, forward tank transfer jet fuel pump line, and aft tank transfer jet fuel pump line.

Fuel from an activated standby fuel boost pump enters the manifold check valve assembly at the forward check valve and is distributed out the three outlet ports. The aft check valve closes and prevents fuel flow to the primary jet fuel pump. When the engine driven fuel boost pump is providing motive fuel flow through the primary jet fuel pump, the fuel enters the manifold check valve assembly at the aft check valve and is distributed out the three outlet ports. The forward check valve closes and prevents fuel flow to the standby fuel boost pump.

Distribution of the fuel in the manifold check valve assembly provides the engine fuel supply line with the greater pounds-per-hour fuel flow. The remainder of the fuel flow is divided equally to, and for the operation of the forward tank transfer jet fuel pump and the aft tank transfer jet fuel pump.

FIREWALL FUEL SHUTOFF VALVES
(Effectivity: All)
(Figures 1 and 2)

Firewall fuel shutoff valves are bracket-mounted in the fuel supply line, just inboard of the left and right engine inboard forward firewalls. Each 28 vdc, normally open, motor-operated firewall fuel shutoff valve incorporates a thermal relief which, in the closed position, has a cracking (opening) pressure of 95 psi and reseats (closes) at a pressure of 65 psi. A direction of fuel flow and thermal relief arrow is marked on the valve. A visual valve position indicator (painted red), mechanically indicates when the firewall fuel shutoff valve is open or closed. The firewall fuel shutoff valves are electrically controlled by the engine fire detection system. The purpose of the firewall fuel shutoff valves is to stop the flow of fuel to the engine in the event of an engine fire. They are also utilized to prevent the gravity flow of fuel during some open fuel system maintenance. Refer to Chapter 26-10-00 for actuation and electrical control of the left and right firewall fuel shutoff valves.

NOTE

Anytime the left or right firewall fuel shutoff valve does not operate or reach its selected position within two seconds, the Engine Instrument, Crew Alerting System (EICAS) will display L or R F/W VALVE FAIL.

CROSS TRANSFER VALVE (Effectivity: All) (Figure 1)

A cross transfer valve is mounted and located in the left main landing gear wheel well. Fuel and vent line support brackets and a valve bracket secure the 28 vdc solenoid operated cross transfer valve. The purpose of the cross transfer valve is to normally prevent fuel flow between the left and right fuel tanks during normal operation. When energized open, fuel may flow in either direction, depending on the operation of the left or right standby fuel boost pump. The cross transfer valve is controlled by the Fuel Management TRANSFER FLOW selector located on the center subpanel in the cockpit. Rotation of the selector to the left or right energizes the cross transfer valve open and activates the applicable standby fuel boost pump.

NOTE

For restricted use of the cross transfer fuel system in flight, refer to the BEECHCRAFT Starship 1 Pilot's Operating Handbook.

FUEL PURGE VALVES (Effectivity: All) (Figure 1)

The fuel purge valves are located aft of the left and right aft fuel tanks. They are mounted on brackets which are bonded to the left and right lower internal wing surfaces.

The purpose of the purge valves is to allow air to be purged from the engine fuel pumps during engine starts. The left and right purge valves are connected electrically with the respective IGNITION AND ENGINE START switch. With the IGNITION AND ENGINE START switch in the ON position, electrical power from the START CONTROL circuit breaker energizes the ignition relay (K3 left or K13 right), allowing electrical power from the IGNITER POWER circuit breaker to energize the purge valve OPEN. With the IGNITION AND ENGINE START switch in the STARTER ONLY position, electrical power from the START CONTROL circuit breaker energizes the purge valve OPEN through the de-energized ignition relay.

NOTE

For an electrical schematic of the purge valve, refer to Chapter 74-30-00, ENGINE START SYSTEM.

When the ENGINE AUTO IGN CONTROL switch is positioned to ARM, electrical power from the START CONTROL circuit breaker energizes the ignition relay through the AUTO IGN HI PRESS switch, and electrical power from the IGNITER POWER circuit breaker energizes the purge valve OPEN through the energized ignition relay.

The standby fuel boost pump is activated when the IGNITION AND ENGINE START switch is positioned to ON. The standby boost pump fuel flows through the engine fuel pump, purging it of air. The purged fuel/air is then routed through the energized purge valve to the aft fuel tank. At completion of the engine start cycle, electrical power is removed from the purge valve and standby fuel boost pump.

FUEL DISTRIBUTION SYSTEM OPERATION (Effectivity: All) (Figure 1)

Fuel distribution flow begins when the IGNITION AND ENGINE START switch is positioned to ON. The standby fuel boost pump for that engine is activated. Fuel is picked up from the hopper compartment and routed through the manifold check valve assembly and the engine fuel supply line. The fuel passes through the normally open firewall shutoff valve, main fuel filter, and through the engine driven fuel boost pump to the engine fuel pump. Fuel is allowed to purge the air from the engine fuel pump through an energized open purge valve to the aft fuel tank. As the engine starts, the engine driven fuel boost pump continues the fuel flow to the engine fuel pump and provides motive fuel flow/pressure to the primary jet fuel pump in the hopper compartment.

NOTE

After the engine has started and the IGNITION AND ENGINE START switch is released (positioned OFF), the ignition discontinues, the purge valve closes, and the standby fuel boost pump is deactivated.

Fuel through the primary jet fuel pump creates venturi action to pick up hopper compartment fuel, which is routed to the manifold check valve assembly. Fuel in the manifold check valve flows in three directions; to the engine through the engine fuel supply line, to and through the forward tank transfer jet pump, and to and through the aft tank transfer jet pump. The forward tank transfer jet pump picks up forward tank fuel and dumps it into the hopper compartment. The aft tank transfer jet pump picks up aft tank fuel and also delivers it to the hopper compartment.

The cross transfer fuel system is activated by a TRANSFER FLOW selector switch. When the TRANSFER FLOW selector switch is rotated to the direction of fuel flow desired, the cross transfer valve opens and the applicable standby fuel boost pump activates to transfer the fuel from one hopper compartment to the opposite hopper compartment.

Operation of the cross transfer fuel system on the ground may be accomplished for maintenance, testing the system and/or balancing the airplane fuel load. Always verify that the tank receiving the fuel has the capacity to hold the amount of fuel to be transferred.

Operation of the cross transfer fuel system in flight may be necessary in the event of an engine failure so that fuel from the inoperative engine side of the airplane may be transferred to the the operating engine. Restrictions on the use of the cross transfer system in flight is described in the BEECHCRAFT STARSHIP 1 PILOT'S OPERATING HANDBOOK.

WARNING

Cross transferring fuel from a hopper compartment that is also feeding an operating engine on the same side may lower the fuel level in the hopper compartment faster than it can be replenished. The Engine Instrument Crew Alerting System (EICAS) display should be monitored for a message L/R FUEL LEVEL LO.

The standby fuel boost pump may be used in the event the engine fuel supply pressure is low. When the engine fuel supply pressure decreases below 5 psig, the operator is alerted by illumination of the L or R FUEL PRES LO (red) annunciator light. Fuel pressure is restored to above 10 psig by positioning the LEFT or RIGHT STBY PUMP switch to STBY PUMP, activating the applicable standby fuel boost pump. Refer to Chapter 28-40-00 for additional information on the low fuel pressure switch and indicating system.

FUEL DISTRIBUTION - TROUBLESHOOTING (Effectivity: All)

STANDBY FUEL BOOST PUMP - TROUBLESHOOTING (Effectivity: All)

Troubleshooting the standby fuel boost pump may involve three operational modes of the pump: 1) operation with the STBY PUMP switch, 2) operation with the TRANSFER FLOW selector or 3) operation with the IGNITION AND ENGINE START switch. Components affecting the operation of the standby fuel boost pump are: malfunctioning standby fuel boost pump, pump relay, switches/selector and/or circuit breakers associated with any one of the three operational modes for the standby fuel boost pump. The left and right standby fuel boost pump electrical systems are identical. Both the left and right boost pumps are electrically connected to the TRANSFER FLOW selector to control either of the fuel boost pumps during fuel cross transfer operations. The components common to only the left standby fuel boost pump system, or the right standby fuel boost pump system are the respective pump relay, STBY PUMP circuit breaker, and standby fuel boost pump. Refer to Figure 4 for an electrical schematic of the standby fuel boost pump's electrical circuits.

CHART 1
TROUBLESHOOTING - STANDBY FUEL BOOST PUMP (Effectivity: All)

Standby Fuel Boost Pump Inoperative Using STBY PUMP Switch (Standby fuel boost pump operates OK using TRANSFER FLOW selector and during engine starts.)

Step 1 Is electrical wiring OK between STBY PUMP circuit breaker and STBY PUMP switch? **YES** Proceed to Step 3.

NO

Repair open electrical wiring.

Step 2 If the standby fuel pump is still inoperative, check for faulty STBY PUMP Switch and/or check for 28 vdc at pump relay K6 left/K5 right (with STBY PUMP switch ON).

CHART 2
TROUBLESHOOTING - STANDBY FUEL BOOST PUMP (Effectivity: All)

Standby Fuel Boost Pump Inoperative Using TRANSFER FLOW Selector

Step 1 Is the TRANSFER circuit breaker engaged? **YES** Proceed to Step 2.

NO

Engage TRANSFER circuit breaker.

Step 2 Is electrical wiring OK between the TRANSFER circuit breaker and the TRANSFER FLOW selector? **YES** Proceed to Step 3.

NO

Repair open electrical wiring.

Step 3 If the standby fuel boost pump is still inoperative, check for faulty TRANSFER FLOW selector and/or check for 28 vdc at pump relay K6 left/K5 right (with TRANSFER FLOW selector positioned left/right).

CHART 3
TROUBLESHOOTING - STANDBY FUEL BOOST PUMP (Effectivity: All)

Standby Fuel Boost Pump Inoperative During Engine Start (Standby fuel boost pump operates OK using the STBY PUMP switch and TRANSFER FLOW selector.)

Step 1 Is the L/R START CONTROL circuit breaker engaged? **YES** Proceed to Step 2.

NO

Engage L/R START CONTROL circuit breaker. If the engine will not rotate, refer to Chapter 80-00-00 for checking the start control circuit.

CHART 3
TROUBLESHOOTING - STANDBY FUEL BOOST PUMP (Effectivity: All) *(Continued)*

Standby Fuel Boost Pump Inoperative During Engine Start (Standby fuel boost pump operates OK using the STBY PUMP switch and TRANSFER FLOW selector.)

Step 2 Is electrical wiring OK between L/R IGNITION AND START switch and pump relay K6 left/K5 right? — **YES** Proceed to Step 3.

NO

Repair open electrical wiring.

CHART 4
TROUBLESHOOTING - STANDBY FUEL BOOST PUMP (Effectivity: All)

Standby Fuel Boost Pump Inoperative In All Modes

Step 1 Does pump relay K6 left/K5 right energize properly? — **YES** Proceed to Step 2.

NO

Replace faulty pump relay.

Step 2 Is electrical wiring OK between pump relay and the standby fuel boost pump? — **YES** Proceed to Step 3.

NO

Repair open electrical wiring.

Step 3 Is the standby fuel boost pump electrically grounded? — **YES** Proceed to Step 4.

NO

Repair open electrical ground wiring.

Step 4 Does the standby fuel boost pump check OK? — **Yes** Perform operational check, refer to STANDBY FUEL BOOST PUMP OPERATIONAL CHECK.

NO

Replace defective standby fuel boost pump.

FIREWALL FUEL SHUTOFF VALVE - TROUBLESHOOTING (Effectivity: All)

Troubleshooting the firewall fuel shutoff valve is electrical. Components involved are the left and right ENG FIRE F/W VALVE PUSH CLOSED lights/switches, F/W VALVE circuit breakers, and firewall shutoff valves. Actuation or deactuation of the ENG FIRE F/W VALVE PUSH CLOSED light/switch controls the opening and closing of the shutoff valve. Internal switch electrical contacts of the firewall fuel shutoff valve complete an electrical circuit (in the closed position) to illuminate the CLOSED annunciator light on the ENG FIRE F/W VALVE PUSH CLOSED light/switch. The firewall fuel shutoff valve is normally open.

Proper operation of the firewall fuel shutoff valves can be determined with electrical power on the airplane and actuation of the applicable left or right ENG FIRE F/W VALVE PUSH CLOSED light/switch. The firewall fuel shutoff valve should close and the red CLOSED light on the light/switch should illuminate. Deactuation of the light/switch should open the firewall fuel shutoff valve and extinguish the CLOSED light.

Failure of the firewall fuel shutoff valve to close or open may be attributed to a disengaged LEFT or RIGHT F/W VALVE circuit breaker, a defective shutoff valve, a defective light/switch, and/or an open ground or power electrical circuit. For an electrical schematic of the firewall fuel shutoff valve circuit, refer to Chapter 26-10-00, Figure 2.

CHART 5
TROUBLESHOOTING - FIREWALL FUEL SHUTOFF VALVE (Effectivity: All)

Firewall Fuel Shutoff Valve Inoperative

Step 1 Is the F/W VALVE circuit breaker engaged? **YES** Proceed to Step 2.

NO

Engage F/W VALVE circuit breaker.

Step 2 Is electrical wiring between ENG FIRE F/W VALVE PUSH CLOSED light/switch and the firewall fuel shutoff valve OK? **YES** Proceed to Step 3.

NO

Repair open electrical wiring.

Step 3 Is electrical ground circuit OK between firewall fuel shutoff and the nacelle grounding block? **YES** Proceed to Step 4.

NO

Repair open electrical ground circuit.

Step 4 Does firewall fuel shutoff valve check OK? **YES** Perform operational check, refer to FIREWALL FUEL SHUTOFF VALVE OPERATIONAL CHECK.

NO

Replace defective firewall fuel shutoff valve.

CHART 6
TROUBLESHOOTING - FIREWALL FUEL SHUTOFF VALVE (Effectivity: All)

CLOSED Light on ENG FIRE F/W VALVE PUSH CLOSED Switch Inoperative

Step 1 Is ANNUNCIATOR #5 circuit breaker engaged? **YES** Proceed to Step 2.

NO

Engage ANNUNCIATOR #5 circuit breaker.

Step 2 Is electrical wiring OK between the light/switch lamps and the firewall fuel shutoff valve? **YES** Also, check for burned out lamp in the light/switch with the ANNUN Test switch and/or proceed to Step 3.

NO

Repair open electrical wiring and/or replace the lamp in the light/switch.

CHART 6
TROUBLESHOOTING - FIREWALL FUEL SHUTOFF VALVE (Effectivity: All) *(Continued)*

CLOSED Light on ENG FIRE F/W VALVE PUSH CLOSED Switch Inoperative

Step 3	Is internal CLOSE switch in the firewall fuel shutoff valve operational?	**YES**	Check for continuity through internal CLOSE switch with firewall fuel shutoff valve in closed position. Refer to BEECHCRAFT Starship 1 Wiring Diagram Manual.
	NO		
	Replace defective firewall fuel shutoff valve.		

CROSS TRANSFER VALVE - TROUBLESHOOTING (Effectivity: All)

Troubleshooting the cross transfer valve is electrical. Components involved are the TRANSFER circuit breaker, TRANSFER FLOW selector and the cross transfer valve. For an electrical schematic, refer to Figure 4, STANDBY FUEL BOOST PUMP ELECTRICAL SCHEMATIC, this Chapter. The TRANSFER FLOW selector energizes the normally closed cross transfer valve to the open position. At the same time it energizes the fuel boost pump relay for operation of the appropriate standby fuel boost pump.

CHART 7
TROUBLESHOOTING - CROSS TRANSFER VALVE (Effectivity: All)

Cross Transfer Valve Fails to Open (Standby Fuel Boost Pump Operates OK.)

Step 1	Is the Fuel TRANSFER circuit breaker engaged?	**YES**	Proceed to Step 2.
	NO		
	Engage Fuel TRANSFER circuit breaker.		
Step 2	Is electrical wiring OK between TRANSFER FLOW selector and the cross transfer valve?	**YES**	Proceed to Step 3.
	NO		
	Repair open electrical wiring.		
Step 3	Is electrical ground circuit for the cross transfer valve OK?	**YES**	Proceed to Step 4.
	NO		
	Repair open electrical ground circuit.		
Step 4	Is the cross transfer valve solenoid operational?	**YES**	Perform operational check, refer to CROSS TRANSFER VALVE OPERATIONAL CHECK.
	NO		
	Replace defective cross transfer valve.		

MANIFOLD CHECK VALVE ASSEMBLY - TROUBLESHOOTING (Effectivity: All)

The normal symptom for a defective manifold check valve assembly is low fuel pressure. Because low fuel pressure may be attributed to other fuel system components such as the standby fuel boost pump, engine driven fuel boost pump and/or the low fuel pressure switch, consideration should also be given to malfunction of these components.

The components that may cause the low fuel pressure (such as the standby fuel boost pump and/or engine driven fuel boost pump) should be checked to determine if they are operating satisfactorily. If low fuel pressure is still indicated, the manifold check valve assembly should be checked. A check valve in the manifold which fails in the open position can allow an excessive amount of fuel out of the manifold. This will lower fuel flow/pressure through the normally open manifold ports.

A failed check valve which allows fuel to reverse flow through the primary jet fuel pump will lower the manifold output fuel flow/pressure originated by the standby fuel boost pump. Failure of the opposite check valve will allow motive fuel flow/pressure to reverse flow to and through the standby fuel boost pump.

A cracked manifold check valve assembly may go undetected unless it develops into a rupture and/or affects the operation of a check valve. A decreasing fuel flow/pressure to 5 ±1 psig in the engine fuel supply line will cause the L or R FUEL PRES LO annunciator located on the cockpit glareshield warning annunciator panel to illuminate.

NOTE

The following Troubleshooting Chart should be considered after determining that low fuel pressure is not the result of a defective standby fuel boost pump, engine driven boost pump, or low fuel pressure switch.

CHART 8
TROUBLESHOOTING - MANIFOLD CHECK VALVE ASSEMBLY (Effectivity: All)

Low Fuel Pressure Indicated With Engine Operating

Step 1 Does the forward check valve in the manifold check valve assembly prevent reverse fuel flow through the standby fuel boost pump?

(A faulty forward check valve reduces fuel pressure in the manifold check valve assembly and its other fuel outlets.)

YES Proceed to Step 2.

NO Replace manifold check valve assembly.

Step 2 Is correct motive fuel pressure being supplied by the engine driven fuel boost pump?

YES Refer to Chapter 28-40-00 for the low fuel pressure warning system.

NO Refer to Chapter 73-10-00 for maintenance of the engine driven fuel boost pump.

CHART 9
TROUBLESHOOTING - MANIFOLD CHECK VALVE ASSEMBLY (Effectivity: All)

Low Fuel Pressure With Standby Fuel Boost Pump Operating

Step 1	Does the aft check valve in the manifold check valve assembly prevent reverse fuel flow through the primary jet fuel pump? (A faulty aft check valve reduces fuel pressure in the manifold check valve assembly and its other fuel outlets.) **NO** Replace defective manifold check valve assembly.	**YES**	Proceed to Step 2.
Step 2	Is correct fuel pressure being supplied by the standby fuel boost pump? **NO** Refer to STANDBY FUEL BOOST PUMP - TROUBLESHOOTING, this Chapter.	**YES**	Refer to Chapter 28-40-00 for the low fuel pressure warning system.

CHART 10
TROUBLESHOOTING - MANIFOLD CHECK VALVE ASSEMBLY (Effectivity: All)

Low Fuel Pressure Indicated At All Times

Step 1	Do the forward and aft check valves in the manifold check valve assembly prevent reverse fuel flow through the check valves? (Defective check valves may be the result of a ruptured manifold check valve assembly body.) **NO** Replace manifold check valve assembly.	**YES**	Proceed to Step 2.
Step 2	Is correct fuel pressure being supplied by the engine driven/standby fuel boost pump(s)? **NO** Refer to STANDBY FUEL BOOST PUMP - TROUBLESHOOTING, this Chapter and/or Chapter 73-10-00 for maintenance of the engine driven fuel boost pump.	**YES**	Refer to Chapter 28-40-00 for the low fuel pressure warning system.

FUEL PURGE VALVE - TROUBLESHOOTING (Effectivity: All)

Troubleshooting the purge valve is electrical. Components involved are: the IGNITER POWER and START CONTROL circuit breakers, IGNITION AND ENGINE START switches, ignition relays and the purge valves. Malfunctions of the engine ignition control system will affect the operation of the purge valve.

CHART 11
TROUBLESHOOTING - FUEL PURGE VALVE (Effectivity: All)

Purge Valve Inoperative (Purge valve inoperative during engine starts, starter Only or the Engine Auto Ignition Modes of Operation.)

Step 1	Is electrical wiring between the purge valve and the ignition relay (K3 left/K13 right) OK?	**YES**	Proceed to Step 2.
	NO		
	Repair open electrical wiring.		
Step 2	Is electrical ground for purge valve OK?	**YES**	Proceed to Step 3.
	NO		
	Repair open electrical ground wiring.		
Step 3	Does the engine ignition control system operate satisfactorily?	**YES**	Proceed to Step 4.
	NO		
	Refer to Chapter 74-30-00 for maintenance of the engine ignition control system.		
Step 4	Does the purge valve check satisfactorily?	**YES**	Perform operational check, refer to PURGE VALVE OPERATIONAL CHECK, this Chapter.
	NO		
	Replace defective purge valve.		

FUEL DISTRIBUTION - MAINTENANCE PRACTICES (Effectivity: All)

STANDBY FUEL BOOST PUMP REMOVAL (Effectivity: All) (Figure 4)

The standby fuel boost pumps are located in the left and right hopper compartments. Access to the pumps is through the access door above the hopper compartment, the lower wing-to-fuselage fairing and the aft root rib access door as outlined in Chapter 28-10-00.

CAUTION

Observe all fire precautions and safety practices while working with the fuel system. Refer to Chapter 28-00-00.

a. Disconnect battery and remove all electrical power from the airplane.

b. Disengage the LEFT or RIGHT STBY PUMP circuit breaker located on the left circuit breaker in the cockpit.

c. Defuel the left or right fuel tanks as applicable to the standby fuel boost pump to be removed. Refer to Chapter 12-10-00.

d. Gain access to the boost pump by removing the upper access door above the hopper compartment. Remove the lower wing-to-fuselage fairing as outlined in Chapter 53-50-00.

e. Remove the aft root rib access door. Refer to Chapter 28-10-00.

f. Identify and disconnect the standby fuel boost pump electrical wiring, including the redundant ground terminal and the fuel pump filter wire located at the pump mount on the inboard side of the rib root.

g. Inside the tank, disconnect the standby fuel boost pump outlet ferrule connector.

h. On the root rib, cut and remove the safety wire from the mounting bolts and carefully cut/peel the sealant from around the mounting bolts and washers. Support the standby fuel boost pump and remove the four mounting bolts and washers.

i. Remove the standby fuel boost pump and mounting gasket from inside the hopper compartment.

j. Clean old sealant from the bolt heads, washers and the root rib with a wooden/plastic scraper. Clean the surface of the of the root rib with cleaning solvent Methyl Ethyl Ketone or Naphtha Alphatic (5 or 6, Chart 2, 28-00-00). WEAR GLOVES WHEN HANDLING CLEANING SOLVENTS.

k. If the standby fuel boost pump is not to be installed immediately, cover the tank openings to prevent entry of foreign matter.

STANDBY FUEL BOOST PUMP INSTALLATION (Effectivity: All) (Figure 4)

a. Maneuver the standby fuel boost pump into the hopper compartment and align the pump mounting base and a new gasket to the root rib.

NOTE

The four washers on the mounting bolts must be in direct contact with the tank laminate. If necessary, lightly sand the graphite/epoxy laminate to remove excess resin and expose a conductive surface. After the mounting bolts and washers are installed, check for one ohm or less electrical resistance between the laminate and the boost pump line. Seal around washers and laminate area with Pro Seal 890, Type B, (4, Chart 2, 28-00-00).

b. Secure the standby fuel boost pump with four mounting bolts and washers. Torque bolts to 15-20 inch-pounds and safety wire the bolt heads.

c. Connect the standby fuel boost pump outlet and tube with new O-rings, sleeve and ferrule connector.

d. Identify and connect the standby fuel boost pump electrical wiring, including the redundant ground terminal and fuel pump filter wire located at the pump mount on the inboard side of the root rib.

e. Install the access doors on the root rib and above the hopper compartment as outlined in Chapter 28-10-00.

f. Refuel the airplane and check for fuel leakage at access doors and standby fuel boost pump mount area.

g. Reconnect the battery and apply electrical power to the airplane as required.

h. Engage the LEFT or RIGHT STBY PUMP circuit breaker and check the boost pump for operation. Refer to STANDBY FUEL BOOST PUMP OPERATIONAL CHECK in this chapter.

NOTE

It is not necessary to prime or purge the standby fuel boost pump after installation.

i. Install the wing-to-fuselage fairing as outlined in Chapter 53-50-00.

STANDBY FUEL BOOST PUMP INLET SCREEN REMOVAL (Effectivity: All) (Figure 4)

The inlet screen is secured to the bottom of the standby fuel boost pump with a mounting flange and two screws. Removal of the inlet screen can be accomplished without removal of the standby fuel boost pump.

a. Disconnect battery and remove electrical power from the airplane. Disengage LEFT or RIGHT STBY PUMP circuit breaker on the left circuit breaker panel in the cockpit.

b. Defuel the left or right fuel tank as applicable to the standby fuel boost pump inlet screen to be removed. Refer to Chapter 12-10-00.

c. Gain access to the standby fuel boost pump in the hopper compartment by removing the lower wing-to-fuselage fairing as outlined in Chapter 53-50-00. Remove the aft root rib access door, refer to Chapter 28-10-00.

d. Locate and remove the two screws and washers securing the inlet screen mounting flange and spacer to the bottom of the standby fuel boost pump.

e. Remove the screen, mounting flange and spacer.

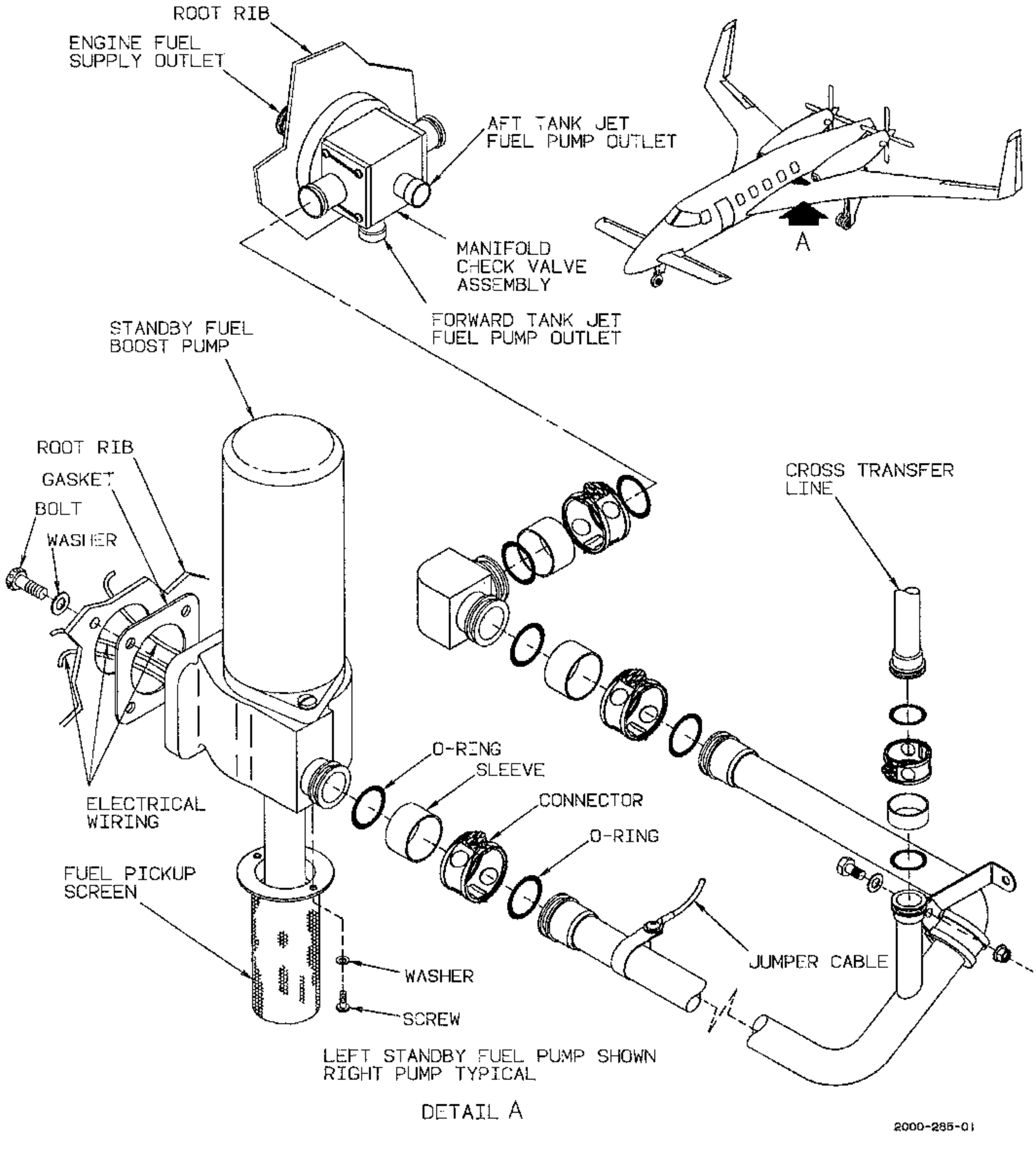
STANDBY FUEL BOOST PUMP INLET SCREEN INSTALLATION (Effectivity: All) (Figure 4)

a. Position the inlet screen mounting flange and spacer to the bottom of the standby fuel boost pump.

b. Secure the screen, mounting flange and spacer with two screws.

c. Install the aft access doors on the root rib, refer to Chapter 28-10-00.

d. Refuel airplane and check for fuel leakage at the access doors. Install wing-to-fuselage fairing as outlined in Chapter 53-50-00.



Standby Fuel Boost Pump Installation (Effectivity: All)
Figure 4

e. Reconnect battery and apply electrical power to the airplane as required. Engage LEFT or RIGHT STBY PUMP circuit breaker.

PRIMARY JET FUEL PUMP REMOVAL (Effectivity: All) (Figure 5)

The primary jet fuel pump assembly has no moving or electrical parts. The framed screen assembly is bonded to the pump with two-part epoxy adhesive Type I, Class II, (8, Chart 2, 28-00-00). The primary jet fuel pump, screen and fuel pickup tube are removed as an assembly. Removal of the left and right primary jet fuel pumps is typical.

CAUTION

Observe all fire precautions and safety practices when working on the fuel system. Refer to Chapter 28-00-00.

a. Disconnect battery and remove electric power from the airplane.

b. Defuel the left or right fuel tanks as applicable to the primary jet fuel pump to be removed. Refer to Chapter 12-10-00.

c. Gain access to the primary jet fuel pump by removing the access door above the hopper compartment. Remove the wing-to-fuselage fairing as outlined in Chapter 53-50-00.

d. Remove the aft root rib access door. Refer to Chapter 28-10-00.

e. Disconnect the primary fuel pump outlet tube at the ferrule connector.

f. On the inboard side of the root rib, disconnect the motive flow fuel line from the primary pump inlet at the threaded coupling.

g. Cut safety wire from the bolt heads and carefully cut/peel the sealant from around the mounting bolts and washers. Support the primary jet fuel pump and remove the four mounting bolts and washers.

h. Remove the primary jet fuel pump and mounting gasket from the hopper compartment.

i. Clean old sealant from the bolts, washers and root rib with a wooden/plastic scraper. Clean the surface of the root rib with cleaning solvent Methyl Ethyl Ketone or Naphtha Alphatic (5 or 6, Chart 2, 28-00-00). WEAR GLOVES WHEN HANDLING CLEANING SOLVENTS.

j. If the primary jet fuel pump is not to be installed immediately, close or cover the fuel tank openings to prevent entry of foreign matter.

PRIMARY JET FUEL PUMP INSTALLATION (Effectivity: All) (Figure 5)

a. Maneuver the primary jet fuel pump into the hopper compartment, and align the pump mounting flange and a new gasket to the root rib.

NOTE

The four washers on the mounting bolts must be in direct contact with the tank laminate. If necessary, lightly sand the graphite/epoxy laminate with #400 aluminum sandpaper to expose a conductive surface. After the mounting bolts and washers are installed, verify one ohm or less electrical resistance between the laminate and the primary pump line. Seal around washers and laminate contact area with Pro Seal 890, Type B, (4, Chart 2, 28-00-00).

b. Secure the pump with four mounting bolts and washers. Torque the bolts to 15-20 inch-pounds and safety wire the bolt heads.

c. Connect the primary jet fuel pump inlet and motive flow fuel line at the threaded coupling.

d. Connect the primary jet fuel pump outlet and tube with new O-rings, sleeve and ferrule connector.

e. Install the hopper compartment access doors. Refer to Chapter 28-10-00.

f. Refuel the airplane and check for fuel leakage at the access doors and the primary jet fuel pump mount area at the root rib.

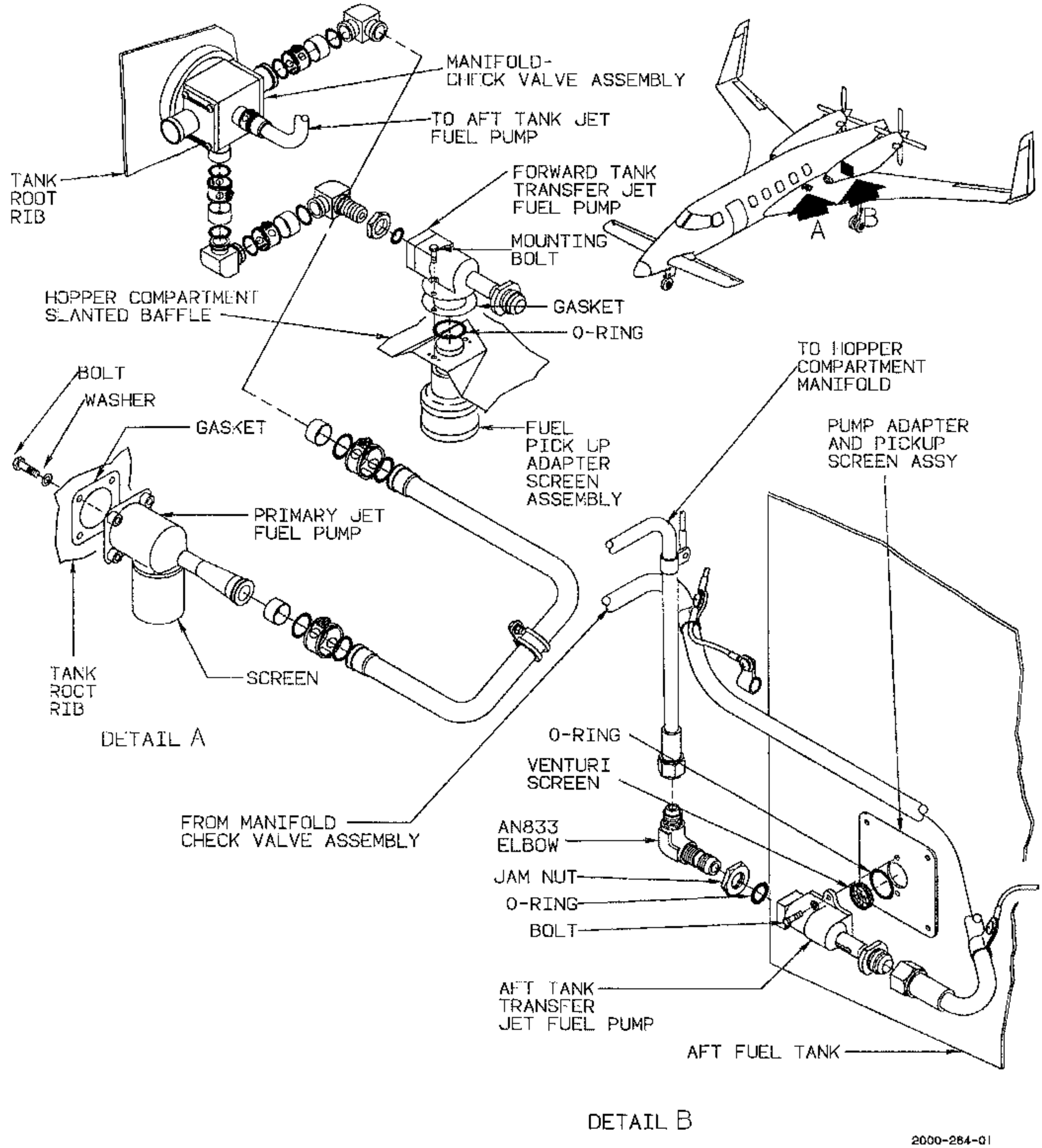
g. Reconnect battery and apply electric power to the airplane as required.

h. Install wing-to-fuselage fairing as outlined in Chapter 53-50-00.

FORWARD TANK TRANSFER JET FUEL PUMP REMOVAL (Effectivity: All) (Figure 5)

Removal of the left and right forward tank transfer jet pumps is typical.

a. Disconnect battery and remove electric power from the airplane.



Primary and Transfer Jet Fuel Pumps Installation (Effectivity: All)
Figure 5

b. Defuel the left or right fuel tanks as applicable to the transfer jet fuel pump to be removed. Refer to Chapter 12-10-00.

c. Gain access to the transfer jet fuel pump by removing the access door above the hopper compartment. Remove the wing-to-fuselage fairing as outlined in Chapter 53-50-00.

d. Remove the tank root rib aft access door. Refer to Chapter 28-10-00.

e. Disconnect the ferrule connector between the transfer jet fuel pump inlet elbow fitting and the manifold check valve elbow fitting.

f. Gain access to the fuel pickup adapter screen assembly by removing the access door and seal from the hopper compartment slanted baffle.

g. Remove the two transfer jet fuel pump mounting bolts and washers.

h. Separate the transfer jet fuel pump and fuel pickup adapter screen assembly. Remove the transfer jet fuel pump and gasket from the hopper compartment.

i. Remove the fuel pickup adapter screen assembly through the slanted baffle access opening.

j. If the transfer jet fuel pump is not to be installed immediately, cover or close the tank openings to prevent entry of foreign matter.

FORWARD TANK TRANSFER JET FUEL PUMP INSTALLATION (Effectivity: All) (Figure 5)

NOTE

If a new transfer jet fuel pump is to be installed, remove the elbow fitting from the inlet of the removed pump. With a new O-ring, position the elbow fitting on the new pump inlet port as it was installed on the removed pump. Secure the elbow fitting with a jam nut.

a. Place the fuel pickup adapter screen assembly through the hopper compartment slanted baffle access opening. Position the transfer jet fuel pump on the baffle bracket with a new gasket. Mate the fuel pickup adapter screen assembly and the pump with a new O-ring.

b. Secure the transfer jet fuel pump to the slanted baffle bracket with two mounting bolts and washers.

c. Connect the transfer jet fuel pump inlet elbow to the manifold check valve assembly elbow with new O-rings, a sleeve and ferrule connector.

d. Install the slanted baffle access door with a new seal.

e. Install the access door above the hopper compartment and the access door on the root rib, refer to Chapter 28-10-00.

f. Refuel the airplane and check for fuel leakage at the access doors.

g. Connect battery and apply electric power to the airplane as required.

h. Install wing-to-fuselage fairing as outlined in Chapter 53-50-00.

AFT TANK TRANSFER JET FUEL PUMP REMOVAL (Effectivity: All) (Figure 5)

Removal of the left and right aft tank transfer jet fuel pumps is typical.

a. Disconnect battery and remove electric power from the airplane.

b. Defuel the left or right fuel tank as applicable to the transfer jet fuel pump to be removed. Refer to Chapter 12-10-00.

c. In the main landing gear wheel well, disconnect the fuel lines to the transfer jet fuel pump inlet and outlet port fittings.

d. Disconnect the jumper cable that is clamped to the transfer jet fuel pump.

e. Remove the two bolts and washers securing the transfer jet fuel pump to the pump adapter and pickup screen assembly. Remove the transfer jet fuel pump. Remove the venturi screen and O-ring from the transfer jet fuel pump venturi inlet.

f. If the transfer jet fuel pump or fuel lines are not to be installed immediately, cover or cap the tank openings and fuel lines to prevent entry of foreign matter.

AFT TANK TRANSFER JET FUEL PUMP INSTALLATION (Effectivity: All) (Figure 5)

NOTE

If the transfer jet fuel pump to be installed is a new pump, remove the elbow fitting from the removed pump. With a new O-ring, position and install the elbow in the new pump as it was in the removed pump.

a. Position the transfer jet fuel pump on the pump adapter and pickup screen assembly with the pump venturi screen and new O-ring in place, and the outlet port pointing outboard.

b. Secure the transfer jet fuel pump with two bolts and washers.

c. Connect the fuel lines to the inlet and outlet fittings of the transfer jet fuel pump.

d. Clamp the jumper cable to the transfer jet fuel pump.

e. Refuel the airplane and check for fuel leakage at the transfer jet fuel pump and fittings disturbed.

f. Connect battery and apply electric power to the airplane as required.

MANIFOLD CHECK VALVE ASSEMBLY REMOVAL (Effectivity: All) (Figure 6)

A manifold check valve assembly is mounted in the left and right hopper compartment. Two integral check valves in each manifold are the only moving parts. Removal of the left and right manifold check valve assemblies is typical.

CAUTION

Observe all fire precautions and safety practices when working on the fuel system. Refer to Chapter 28-00-00.

a. Disconnect battery and remove electric power from the airplane.

b. Defuel the left or right fuel tank as applicable to the manifold check valve assembly to be removed. Refer to Chapter 12-10-00.

c. Gain access to the manifold check valve assembly by removing the access door above the hopper compartment. Remove the wing-to-fuselage fairing as outlined in Chapter 53-50-00.

d. Remove the aft root rib access door. Refer to Chapter 28-10-00 for removal of the access doors.

e. On the inboard side of the root rib, disconnect the engine fuel supply line from the manifold check valve assembly ferrule connector.

f. Inside the tank, disconnect the standby fuel boost pump tube, primary jet fuel pump tube, forward tank transfer jet fuel pump elbows, and the aft tank transfer jet pump tube from the manifold check valve assembly ferrule connectors.

g. Cut the safety wire and remove the four mounting bolts and washers securing the manifold check valve assembly to the root rib.

h. Remove the manifold check valve assembly and O-ring from the hopper compartment.

i. If the manifold check valve assembly is not to be installed immediately, cover or close all openings of the hopper compartment to prevent entry of foreign matter.

MANIFOLD CHECK VALVE ASSEMBLY INSTALLATION (Effectivity: All) (Figure 6)

a. With a new O-ring on the base of the manifold check valve assembly, position the manifold in the hopper compartment with the engine fuel supply outlet inserted through the root rib.

b. Secure the manifold check valve assembly to the root rib with four bolts and washers. Torque the bolts to 15-20 inch-pounds and safety wire the bolt heads.

c. Connect the engine supply line to the manifold check valve assembly with new O-rings, a sleeve and ferrule connector.

NOTE

For connecting the ferrule connectors, refer to Chapter 28-10-00, FERRULE CONNECTORS REMOVAL AND INSTALLATION.

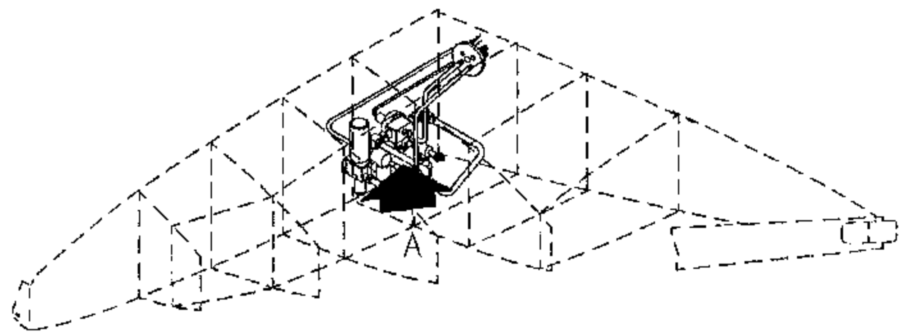
d. Install new O-rings and a sleeve for the ferrule connectors, and connect the fuel boost pump tube and the primary jet fuel pump tube to the manifold check valve assembly.

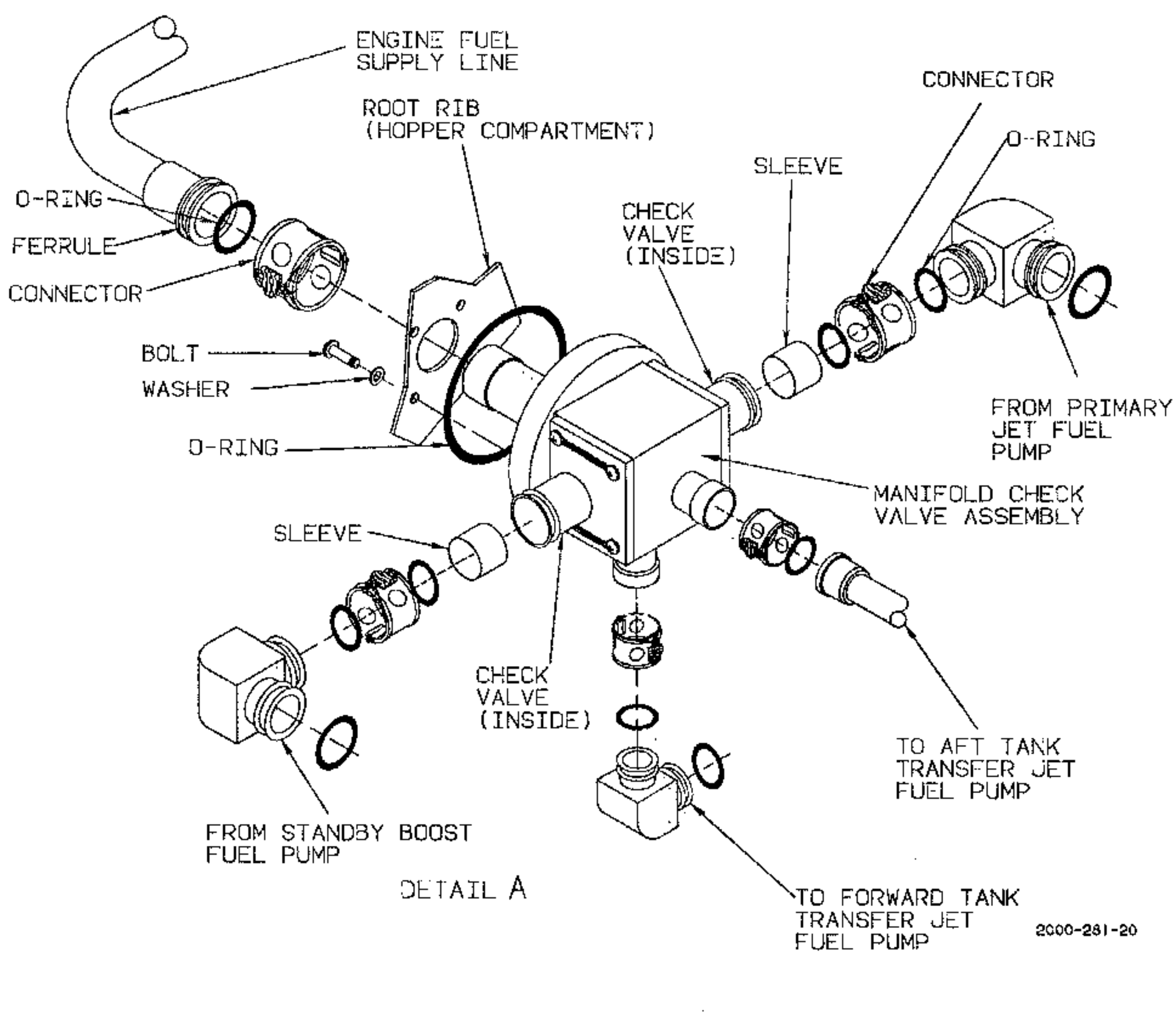
e. Install new O-rings for the ferrule connectors. Connect forward tank transfer jet fuel pump elbows and the aft tank transfer jet fuel pump tube to the manifold check valve assembly.

f. Install access doors above the hopper compartment and on the root rib. Refer to Chapter 28-10-00 for installation of the access doors.

g. Refuel the airplane as outlined in Chapter 12-10-00. Check for fuel leakage at the access doors and manifold check valve assembly on the root rib.

h. Connect battery and apply electric power to the airplane as required.





Manifold Check Valve Assembly Installation (Effectivity: All)
Figure 6

i. Install the wing-to-fuselage fairing as outlined in Chapter 53-50-00.

FIREWALL FUEL SHUTOFF VALVES REMOVAL (Effectivity: All) (Figure 7)

CAUTION

Observe all fire precautions and safety practices when working on the fuel system. Refer to Chapter 28-00-00.

NOTE

Control of the firewall fuel shutoff valves is outlined in Chapter 26-10-00.

The fuel tanks must be defueled on the side of the airplane applicable to the firewall shutoff valve to be removed. Gravity fuel flow from the forward fuel tank will occur when the fuel lines are disconnected. Removal of the left or right firewall fuel shutoff valve is typical. For connecting and disconnecting the ferrule connectors, refer to Chapter 28-10-00, FERRULE CONNECTORS REMOVAL/INSTALLATION.

a. Defuel the fuel tanks on the side of the airplane applicable to the firewall shutoff valve to be removed. Refer to Chapter 12-10-00.

b. Disconnect battery and remove electric power from the airplane.

c. Disengage the LEFT or RIGHT F/W VALVE circuit breaker as applicable to the firewall shutoff fuel valve to be removed. The circuit breaker is located on the left circuit breaker panel in the cockpit.

d. Gain access to the firewall fuel shutoff valve in the wing by removing the lower wing access door (551AB left/651AB right).

e. Cut safety wire and disconnect the electrical connector from the firewall fuel shutoff valve.

f. Disconnect the pressure switch tube assembly from the firewall fuel shutoff valve adapter elbow fitting.

g. Disconnect the engine fuel supply lines at the firewall fuel shutoff valve inlet (threaded coupling), and the adapter outlet (ferrule connector).

h. To remove the firewall fuel shutoff valve and adapter from the mounting brackets, remove the two forward bolts and washers at the end fitting and the two forward bolts at the adapter end.

i. Remove the firewall fuel shutoff valve and adapter from the mounting brackets.

j. To disassemble the firewall fuel shutoff valve, adapter and end fitting, remove the two aft bolts at the adapter and the two aft bolts at the end fitting.

k. If the firewall fuel shutoff valve is not to be installed immediately, cover the open ends of the fuel lines to prevent entry of foreign matter.

FIREWALL FUEL SHUTOFF VALVES INSTALLATION (Effectivity: All) (Figure 7)

a. Assemble the adapter to the firewall fuel shutoff valve with a new O-ring. Check to be certain the flow arrow on the the firewall fuel shutoff valve is pointing toward the adapter. Secure the firewall shutoff valve and adapter together with the two aft bolts and washers. The two forward bolts are to secure the firewall fuel shutoff valve to the mounting bracket.

b. Assemble the end fitting to the firewall fuel shutoff valve with a new O-ring. Secure the end fitting and firewall fuel shutoff valve together with two aft bolts and washers. The two forward bolts are to secure the firewall fuel shutoff valve to the mounting bracket.

c. Position the firewall fuel shutoff valve to the two mounting brackets. Secure the valve to the brackets with the four forward bolts. Safety wire the bolts together at each end of the valve.

d. Connect the engine fuel supply line to the firewall fuel shutoff valve end fitting. Install new O-rings, a sleeve and ferrule connector to connect the fuel line to the adapter.

e. Connect the pressure switch tubing to the elbow fitting of the adapter.

f. Connect the electrical connector to the firewall fuel shutoff valve. Safety wire the electrical connector.

g. Reconnect battery and apply power to the airplane as required.

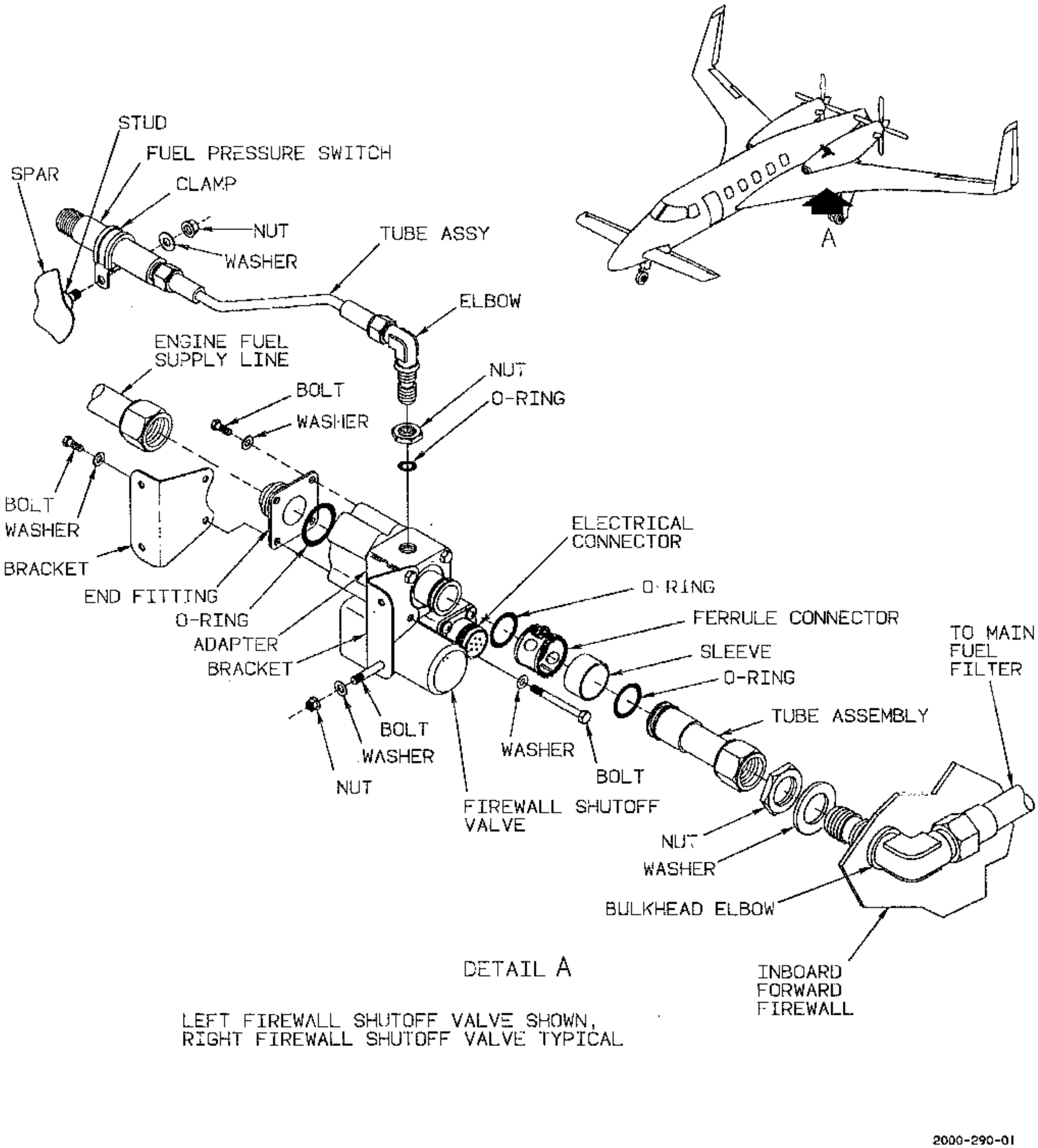
h. Refuel the airplane. Refer to Chapter 12-10-00.

i. Engage LEFT or RIGHT F/W VALVE circuit breaker as applicable.

j. Operate the left or right standby fuel boost pump and check for fuel leakage at the firewall fuel shutoff valve and adapter connections.

k. Turn the standby fuel boost pump OFF.

l. Perform operational check of the firewall fuel shutoff valve. Refer to FIREWALL FUEL SHUTOFF VALVE OPERATIONAL CHECK, this section.



Firewall Fuel Shutoff Valve Installation (Effectivity: All)
Figure 7

m. Install the lower wing access door.

CROSS TRANSFER VALVE REMOVAL (Effectivity: All) (Figure 8)

The cross transfer valve is located in the left main landing gear wheel well. The cross transfer valve is bracket mounted and supported with line-clamp-type supporting brackets.

CAUTION

Observe all fire precautions and safety practices when working on the fuel system. Refer to Chapter 28-00-00.

NOTE

For electrical schematic of the cross transfer fuel valve, refer to Figure 4, STANDBY FUEL BOOST PUMP ELECTRICAL SCHEMATIC, this Chapter.

a. Defuel the left and right fuel tanks to a fuel level below the cross transfer valve. This will prevent gravity fuel flow when the fuel lines are disconnected. Place a container under the cross transfer valve to catch residual fuel from the disconnected fuel lines. Refer to Chapter 12-10-00 for defueling procedures.

b. Disconnect battery and remove electrical power from the airplane.

c. Disengage the TRANSFER circuit breaker located on the left circuit breaker panel in the cockpit.

d. Locate the cross transfer valve in the left main gear wheel well.

e. Disconnect one end of the jumper cable that extends across the cross transfer valve.

f. Cut the safety wire and disconnect the electrical connector from the cross transfer valve.

g. Remove the two mounting bolts, washers and nuts securing the cross transfer valve to its bracket.

h. Cut the safety wire and remove the four bolts and washers securing the valve bracket and line support brackets.

i. Remove the cross transfer fuel line between the valve and the aft fuel tank vent adapter assembly by disconnecting the line from the cross transfer valve reducer fitting and the ferrule coupling at the aft fuel tank vent adapter.

j. Hold the cross transfer valve and disconnect the forward line from the valve reducer fitting.

k. Remove the cross transfer valve from the airplane.

l. If the cross transfer valve is not to be installed immediately, cover open end of the fuel lines to prevent entry of foreign matter.

CROSS TRANSFER VALVE INSTALLATION (Effectivity: All) (Figure 8)

a. If the cross transfer valve to be installed is new, remove the reducer fittings from the removed cross transfer valve. Install them on the new cross transfer valve with new O-rings. Position them as they were installed on the removed valve.

b. Position and connect the cross transfer forward line to the cross transfer valve reducer fitting.

c. Install the fuel line between the cross transfer valve reducer fitting and the aft fuel tank vent adapter with a new O-ring on the ferrule connector.

d. Install the lines, support brackets and valve bracket and secure with four bolts and washers. Safety wire the bolts.

e. Secure the cross transfer valve to the bracket with two bolts, washers and nuts.

f. Secure the jumper cable across the cross transfer valve with a line clamp, screw, washer and nut. Refer to Chapter 20 for jumper cable bonding procedures.

g. Connect the electrical connector to the cross transfer valve solenoid and safety wire the connector.

h. Reconnect battery and apply electrical power to the airplane as required.

i. Engage the TRANSFER circuit breaker on the left circuit breaker panel.

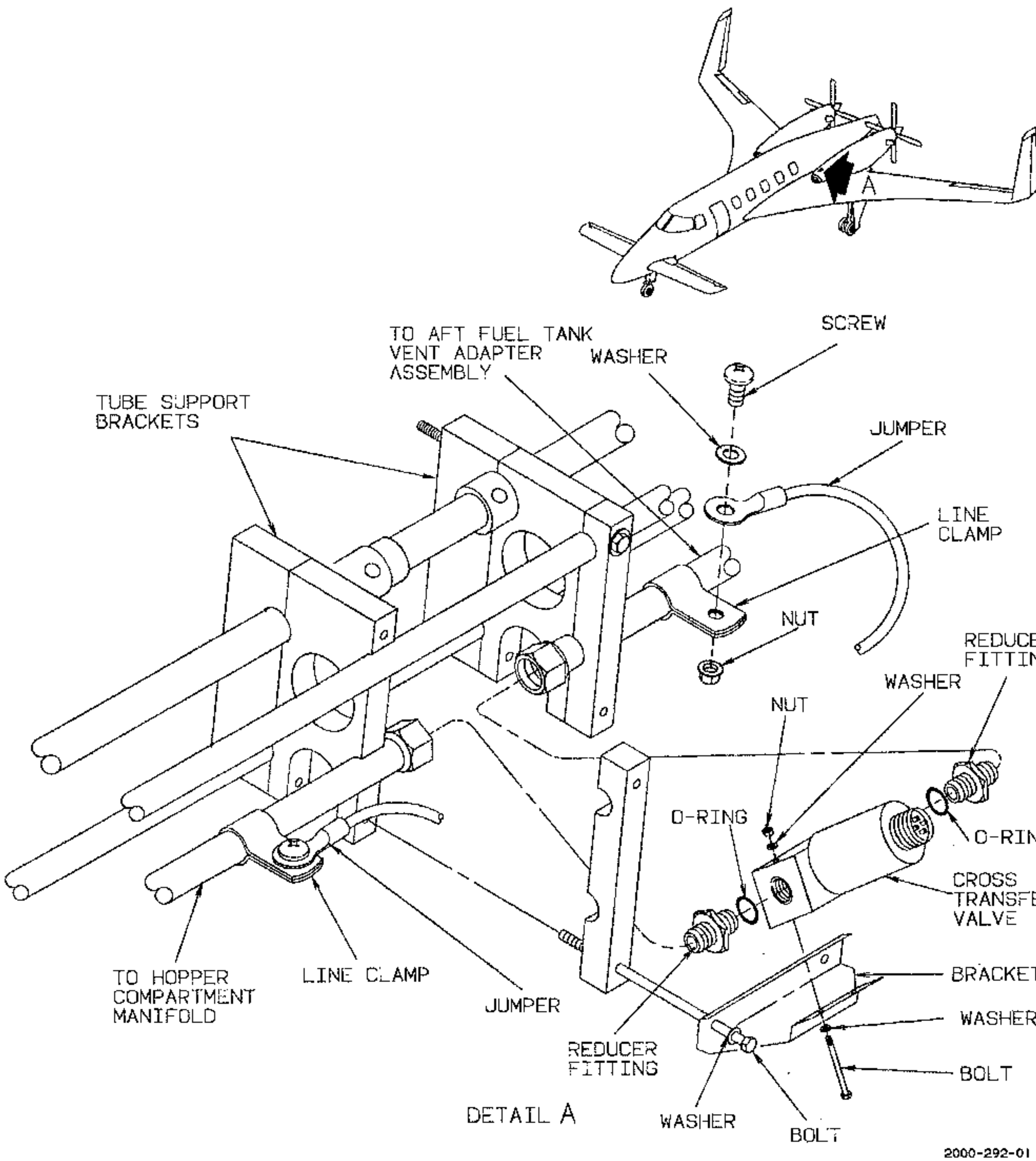
j. Refuel the airplane. Refer to Chapter 12-10-00.

k. Operational check the cross transfer valve with fuel flow and check for fuel leakage. Refer to OPERATIONAL CHECK CROSS TRANSFER VALVE in this chapter.

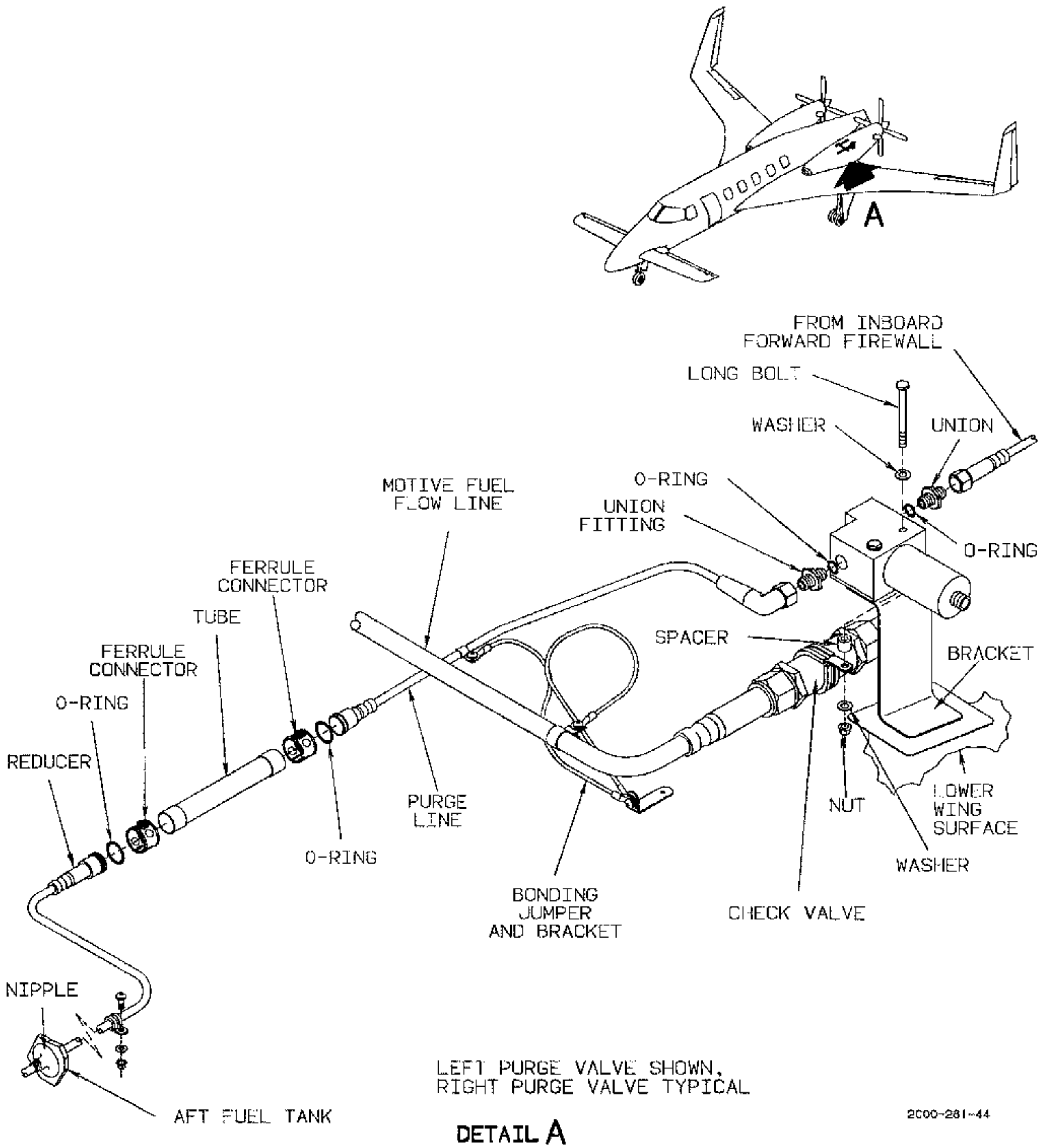
PURGE VALVE REMOVAL (Effectivity: All) (Figure 9)

CAUTION

Observe all fire precautions and safety practices when working on the fuel system. Refer to Chapter 28-00-00.



Cross Transfer Valve Installation (Effectivity: All)
Figure 8



Purge Valve Installation (Effectivity: All)
Figure 9

The purge valve is a two way valve. However, the inlet and outlet ports on the valve are identified (IN and OUT) to ensure proper installation. The engine motive flow fuel line check valve is clamp mounted to the aft mount bolt of the purge valve with a spacer. Removal of the left and right purge valves is typical.

a. Defuel the left/right fuel tanks to a fuel level below the purge valve. This will prevent gravity fuel flow when the fuel lines are disconnected.

b. Disconnect battery and remove electrical power from the airplane.

c. Disengage the LEFT or RIGHT IGNITER POWER and LEFT or RIGHT START CONTROL circuit breakers on the left circuit breaker panel in the cockpit.

d. Gain access to the purge valve through the access door (551BB left or 651BB right), aft of the aft fuel tank access door.

e. Cut the safety wire and disconnect the electrical connector from the purge valve.

f. Place a container under the purge fuel line and purge valve to catch residual fuel when the line is disconnected.

g. Disconnect the purge fuel lines from the inlet and outlet union fittings.

h. Remove the mounting nuts, washers, and bolts securing the purge valve to the bracket. The aft mount bolt also secures a spacer, clamp and the engine motive fuel flow line check valve.

i. Remove the purge valve from the airplane.

j. If the purge valve is not to be installed immediately, cover the fuel line open ends to prevent entry of foreign matter.

PURGE VALVE INSTALLATION (Effectivity: All) (Figure 9)

a. If the purge valve to be installed is a new purge valve, remove the union fittings from the inlet and outlet ports of the removed valve. With new O-rings, install the union fittings in the new purge valve ports.

b. Position the purge valve on its bracket with inlet port aft.

c. Install the mounting bolts (long bolt aft). Secure the forward bolt with washers under the bolt head and the nut. With a spacer on the aft bolt between the bracket and the clamp around the engine motive fuel flow line check valve, secure the bolt with washers under the head and the nut.

d. Connect the purge lines to the inlet and outlet union fittings.

e. Connect the electrical connector to the purge valve solenoid and safety wire the connector.

f. Connect battery and apply electrical power to the airplane as required.

g. Engage the LEFT or RIGHT IGNITER POWER and LEFT or RIGHT START CONTROL circuit breakers in the cockpit.

h. Refuel the airplane. Refer to Chapter 12-10-00.

i. Operational check the purge valve. Refer to PURGE VALVE OPERATIONAL CHECK in this chapter.

j. Check the purge valve and fuel line connections for fuel leakage.

k. Install access door on the lower wing surface.

STANDBY FUEL BOOST PUMP OPERATIONAL CHECK (Effectivity: All)

NOTE

No adjustments to the standby fuel boost pumps are required. Operational check of the left and right standby fuel boost pumps is typical.

a. Check that the LEFT or RIGHT STBY PUMP circuit breaker is engaged as applicable to the standby fuel boost pump to be checked. Apply electrical power to the airplane.

b. Check that the L or R FUEL PRES LO warning annunciator is illuminated.

c. Position the LEFT or RIGHT STBY PUMP switch to ON. The L or R FUEL PRES LO warning annunciator should extinguish.

d. Position the LEFT or RIGHT STBY PUMP switch to OFF. The L or R FUEL PRES LO warning annunciator should illuminate.

e. Position the Fuel Management TRANSFER FLOW selector to the left. The EICAS display should display FUEL TRANSFER<.

f. Position the Fuel Management TRANSFER FLOW selector to the right. The EICAS display should display FUEL TRANSFER>.

g. Position the TRANSFER FLOW selector to OFF.

Operation of the standby fuel boost pumps during engine starts is confirmed when the IGNITION AND

ENGINE START switch is positioned to ON and the respective L or R FUEL PRES LO warning annunciator extinguishes. This indicates that the boost pump is providing fuel pressure through the fuel supply line.

NOTE

Positioning the IGNITION AND ENGINE START switch to STARTER ONLY does not activate the standby fuel boost pump or the engine ignition. It will only motor the engine.

FIREWALL FUEL SHUTOFF VALVE OPERATIONAL CHECK (Effectivity: All)

CAUTION

The engine fire extinguisher system is armed when the ENG FIRE F/W VALVE PUSH CLOSED light/switch is actuated. DO NOT ACTUATE THE EXTINGUISHER PUSH LIGHT/SWITCH WITH THE SYSTEM ARMED. DEPLOYMENT OF THE FIRE EXTINGUISHING AGENT WILL RESULT.

NOTE

Anytime the left or right firewall fuel shutoff valve does not operate or reach its selected position within two seconds, the Engine Instrument, Crew Alerting System (EICAS) display will display L or R F/W VALVE FAIL.

a. With electrical power on the airplane, actuate the left ENG FIRE F/W VALVE PUSH CLOSED light/switch. Check that the light/switch illuminates CLOSED, and the EXTINGUISHER PUSH light/switch illuminates. DO NOT ACTUATE THE EXTINGUISHER PUSH LIGHT/SWITCH.

b. Confirm that the mechanical indicator (painted red) on the firewall fuel shutoff valve has moved to the CLOSED position.

c. Actuate the left ENG FIRE F/W VALVE PUSH CLOSED light/switch OFF. Check that the light/switch extinguishes, and the mechanical indicator on the shutoff valve has moved to the OPEN position.

d. Actuate the right ENG FIRE F/W VALVE PUSH CLOSED light/switch. Check that the light/switch illuminates CLOSED, and the EXTINGUISHER PUSH light/switch illuminates. DO NOT ACTUATE THE EXTINGUISHER PUSH LIGHT/SWITCH.

e. Confirm that the mechanical indicator on the shutoff valve has moved to the CLOSED position.

f. Actuate the right ENG FIRE F/W VALVE PUSH CLOSED light/switch to OFF. Check that the light/switch extinguishes, and the mechanical indicator on the shutoff valve has moved to the OPEN position.

g. Remove electrical power from the airplane.

CROSS TRANSFER VALVE OPERATIONAL CHECK (Effectivity: All)

Before performing a cross transfer valve operation, check that the fuel level in the fuel tank to receive the fuel is low enough to accept the amount of fuel to be transferred.

a. With electrical power on the airplane, position the TRANSFER FLOW selector toward the left wing. The right standby fuel boost pump should activate, and the cross transfer valve should open. The Engine Instrument, Crew Alerting System (EICAS) should display FUEL TRANSFER <.

NOTE

A person stationed in the left main landing gear wheel well at the cross transfer valve should hear the valve solenoid energize and deenergize when the TRANSFER FLOW selector is positioned left, right and off.

b. Position the TRANSFER FLOW selector to OFF, then toward the right wing. The cross transfer valve should close, then open. The right standby fuel boost pump should deactivate, and the left standby fuel boost pump should activate. The Engine Instrument, Crew Alerting System (EICAS) should display FUEL TRANSFER >.

c. Position the TRANSFER FLOW selector to OFF, and remove electrical power from the airplane.

PURGE VALVE OPERATIONAL CHECK (Effectivity: All)

Actuation of the left and/or right purge valve is checked utilizing the respective left or right IGNITION AND ENGINE START switch located on the center subpanel. The IGNITION AND ENGINE START switch has three positions: OFF, ON and STARTER ONLY. The purge valve will energize in either the ON or STARTER ONLY positions.

When placing the IGNITION AND ENGINE START switch to the ON position and accomplishing an engine start, the standby fuel boost pump is activated, engine ignition is energized and the purge valve opens with electrical power from the IGNITER POWER circuit breaker.

When placing the IGNITION AND ENGINE START switch to the STARTER ONLY position, electrical power from the START CONTROL circuit breaker opens the purge valve.

OPERATIONAL CHECK PURGE VALVE WITHOUT FUEL FLOW (Effectivity: All)

NOTE

This method to operational check the purge valve will confirm operation of the valve. The engine will motor and the purge valve will open; however, the standby fuel boost pump and the ignition power is not operational.

This check of the purge valve is accomplished to confirm actuation of the valve solenoid without engine start and run. Fuel flow is not necessary.

a. Station a person near the purge valve, or place a hand on the purge valve solenoid to hear or feel when the solenoid energizes and/or deenergizes.

b. Apply electrical power to the airplane.

c. Place the IGNITION AND ENGINE START switch to the STARTER ONLY position. The purge valve solenoid should energize immediately.

d. Place the IGNITION AND ENGINE START switch to the OFF position. The purge valve solenoid should deenergize.

e. Remove electrical power from the airplane.

OPERATIONAL CHECK PURGE VALVE WITH FUEL FLOW (Effectivity: All)

NOTE

This method to operational check the purge valve will provide purging fuel flow through the purge valve for checking for fuel leaks at the purge valve, as well as confirming its operation.

a. Station a person near the purge valve, or place a hand on the purge valve solenoid to hear or feel when the solenoid energizes and/or deenergizes.

b. Apply electrical power to the airplane.

c. Place the IGNITION AND ENGINE START switch to the ON The purge valve should energize immediately.

d. Continue the engine start. Fuel flow from the standby fuel boost pump should purge the engine fuel pump through the purge valve until the engine has started and the IGNITION AND ENGINE START switch is positioned OFF.

NOTE

The standby fuel boost pump deactivates and the purge valve de-energizes when the IGNITION AND ENGINE START switch is released (positioned OFF).

e. Check the purge valve installation for fuel leakage.

f. Shutdown the engine and remove electrical power from the airplane.

FUEL INDICATING - DESCRIPTION AND OPERATION (Effectivity: All)

WARNING

Anytime the airplane is on the ground (whether on jacks or on the wheels), the nose and main landing gear MUST be pinned in the down and locked position. The only exceptions to this would be during landing gear operational checks, during the removal or installation of the landing gear components, and during taxiing operations prior to takeoff or after landing. When any work is being performed in the nose gear wheel well, the nose gear doors MUST be pinned in the open position. Refer to Chapters 32-10-00 and 32-20-00 for the proper lock pin installation procedures.

This section is concerned with the fuel indicating systems that provide a means for the operator to monitor fuel quantity and temperature. These systems also provide an indication when the remaining fuel is low.

NOTE

The left and right fuel flow indicating systems provide information to the operator regarding the actual amount of fuel (in pounds-per-hour) being metered to each engine at any given time. The fuel flow indicating systems are discussed in detail in Chapter 73-30-00.

FUEL QUANTITY INDICATING (Effectivity: All) (Figures 1 and 2)

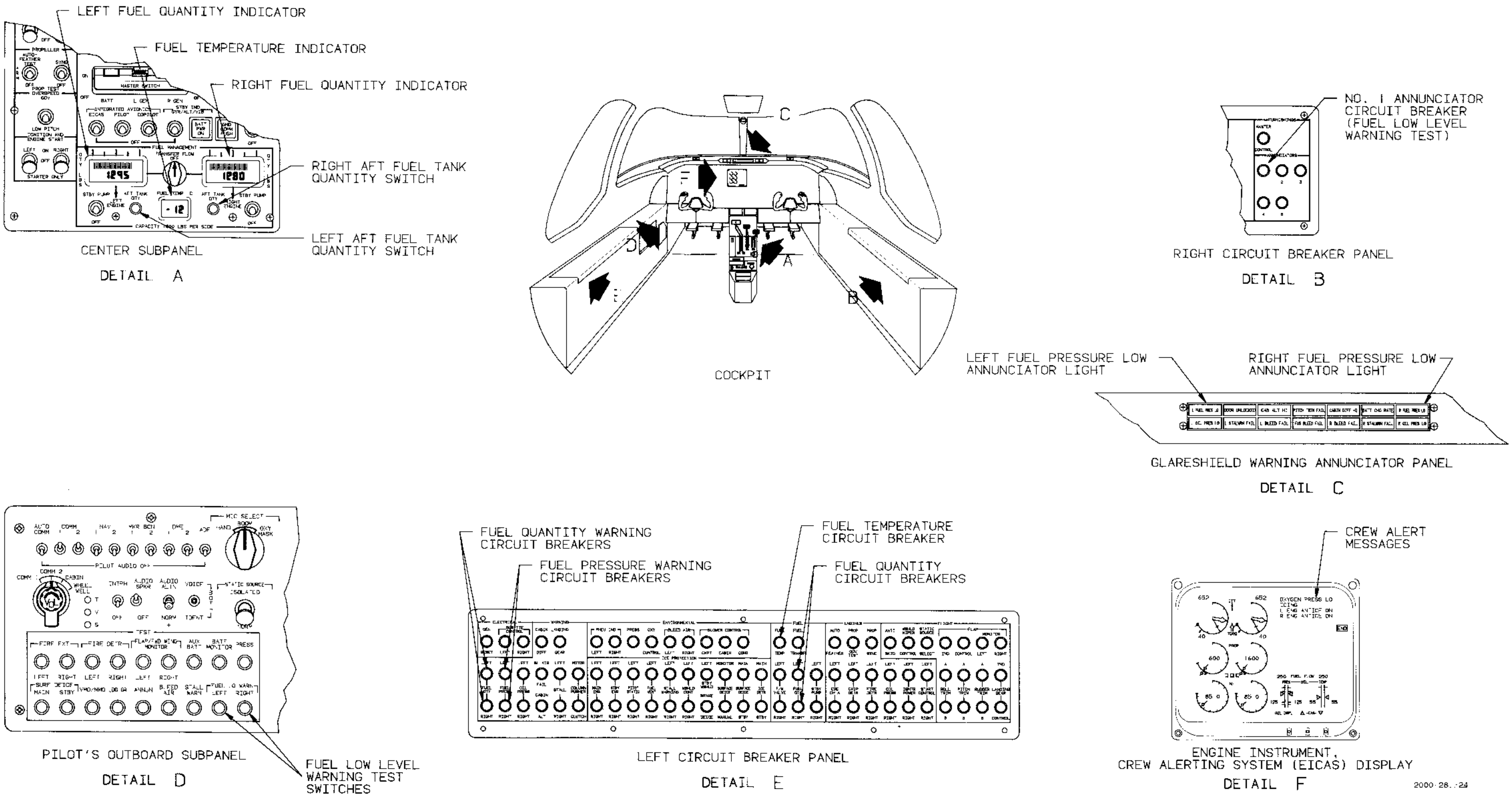
The purpose of the fuel quantity indicating systems is to permit the operator to monitor the amount of fuel (in pounds) in the left and right fuel tanks. The left and right fuel quantity indicating systems are independent of each other. Components in each system are: four fuel quantity probes (transmitters), a Fuel System Concentrator (processing unit), an LCD bargraph/ digital quantity indicator, and an AFT TANK QTY switch. The system is electrically powered with 28 vdc by the LEFT and RIGHT FUEL QTY circuit breakers located on the left circuit breaker panel in the cockpit, and 5 vdc for the incandescent LCD lighting.

The fuel quantity indicating system consists of a left and right system having identical components. Each system has three capacitance type fuel probes strategically located in the forward fuel tank and one in the aft fuel tank. The digital fuel quantity indicators are located on the Fuel Management section of the center sub panel. Left and right AFT TANK QTY switches are mounted below the quantity indicators to provide a means for checking the fuel quantity in the aft fuel tanks only. The left and right Fuel System Concentrators are mounted in the wing, aft of each aft fuel tank.

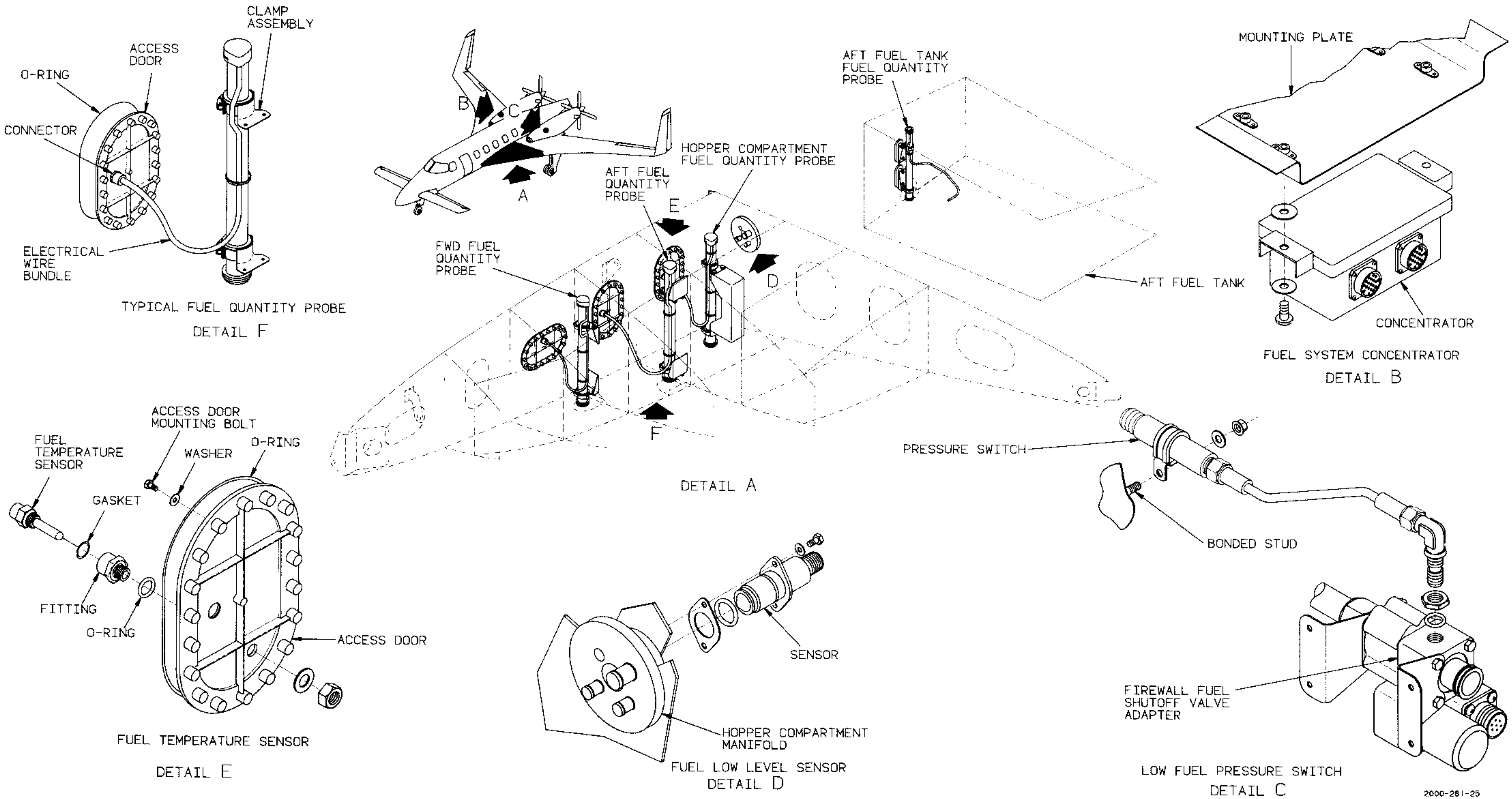
FUEL QUANTITY PROBES (Effectivity: All)

Each wing fuel system (left and right) has four fuel quantity probes. They are identified as: fwd and aft fuel probes located in the forward fuel tank, a hopper compartment fuel probe located in the hopper compartment, and an aft tank fuel probe located in the aft fuel tank. The fuel probes are secured in the upright position with brackets and overcenter clamp assemblies. The electrical wiring is enclosed in a flexible casing, which will not allow fuel to penetrate. Except for the aft tank fuel probes, a cap is installed over the top of each fuel probe for lightning protection. The wiring is routed out of the forward fuel tank with wire bundle electrical connectors, mounted through the root rib access doors. The aft fuel probe wire bundle is routed out of the tank (cell) with a wire bundle connector mounted through the forward sidewall into the wheel well. The electrical connectors on the access door and the aft fuel cell sidewall permit disconnecting the fuel probe wire bundle from outside the tanks. The connector on the fuel probe wire bundle is sealed; it is secured with an O-ring and jam nut to the access door/fuel cell sidewall.

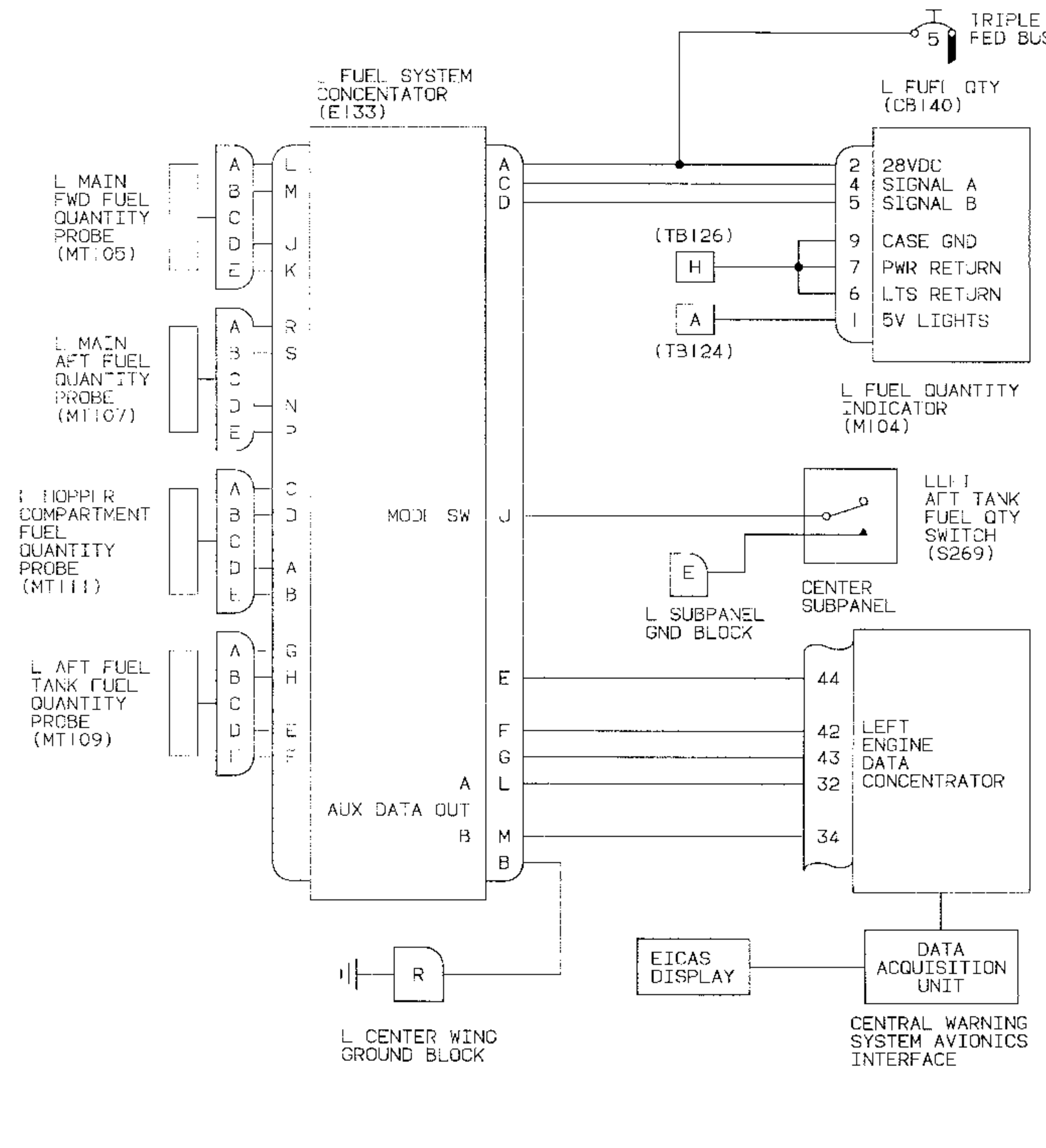
Each fuel quantity probe senses the column height of the fuel and converts that value into a digital representation. It then transmits that data to the Fuel System Concentrator. Each probe has an automatic self test for detecting internal failure when power is applied, and continuous self test during normal operation. The probes are precalibrated at the time of manufacture and sealed. Further calibration or adjustment is not required prior to, or after installation in the airplane. Lightning strike protection is incorporated in each unit.



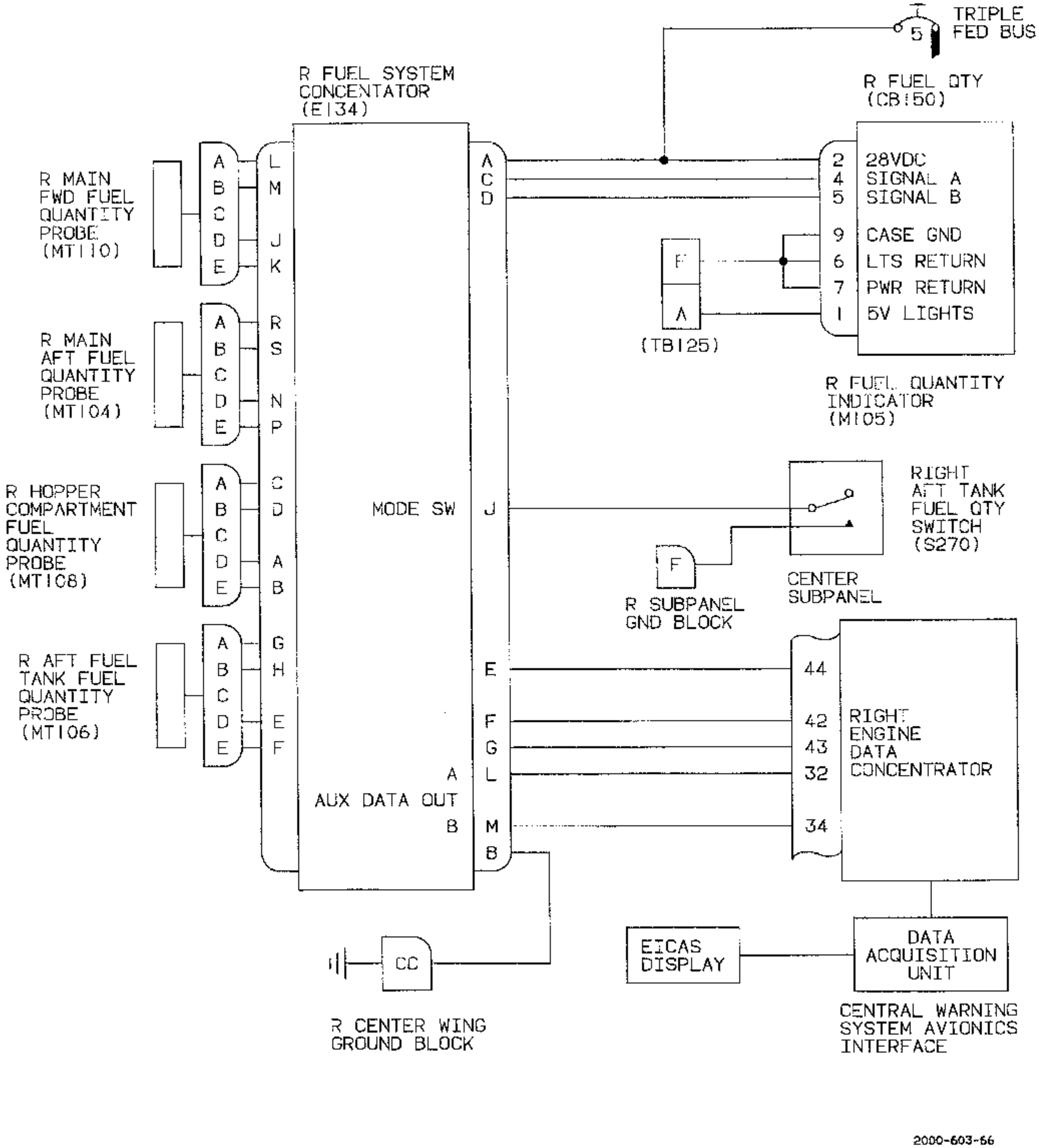
Fuel Indicating Control Systems
(Effectivity: All)
Figure 1



Fuel Indicating Components
(Effectivity: All)
Figure 2



Left Fuel Quantity Indicating Electrical Schematic (Effectivity: All)
Figure 3



Right Fuel Quantity Indicating
Electrical Schematic (Effectivity: All)
Figure 4

FUEL SYSTEM CONCENTRATOR (Effectivity: All)

Each wing fuel quantity indicating system has a Fuel System Concentrator. The Fuel System Concentrator has the capability to receive data from four fuel probes. It makes corrections for airplane pitch and roll angles, fuel temperature, fuel density, sums up total fuel quantity, revises data to indicator format, and then transmits the data at scheduled intervals.

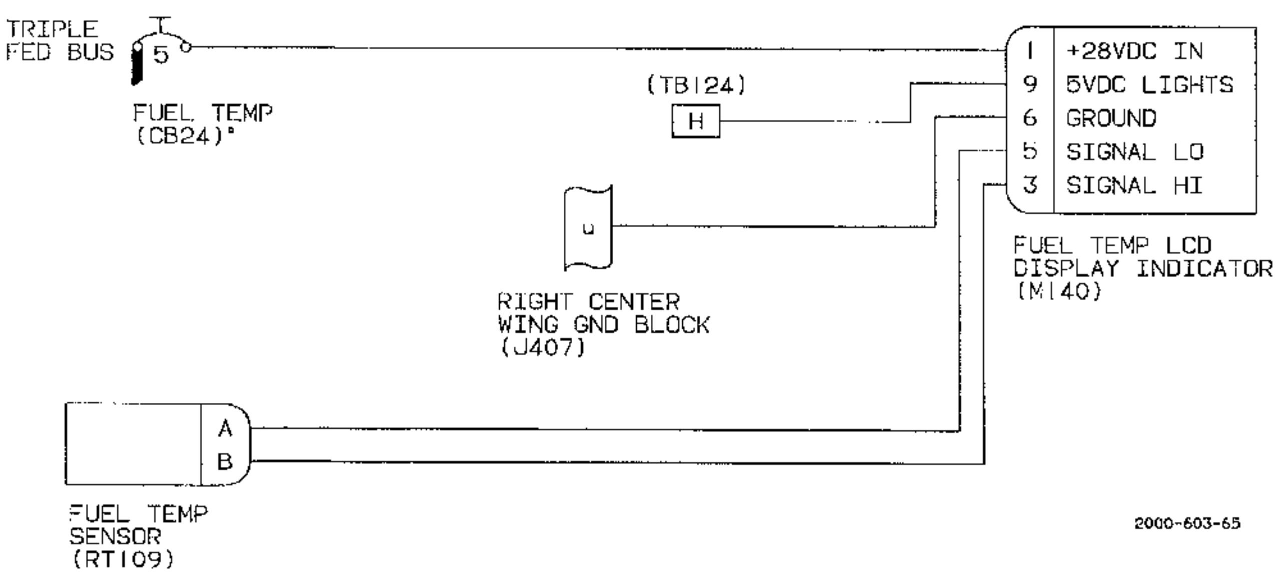
The left and right Fuel System Concentrators receive 28 vdc electrical power from the LEFT and RIGHT FUEL QTY circuit breakers located on the left circuit breaker panel in the cockpit. The left and right Fuel System Concentrators are the power supply for their respective fuel quantity probes; collectively, they receive signals and data from the probes. The total weight of fuel in the left/right fuel tanks is transmitted in 60 BIT serial format to the respective LCD quantity indicator. Lightning strike protection is incorporated in each Fuel System Concentrator.

DIGITAL FUEL QUANTITY INDICATORS (Effectivity: All)

The left and right fuel quantity indicators are located on the Fuel Management section of the center subpanel. The indicators are liquid crystal bargraph/digital display and electrically powered by 28 vdc from the LEFT and RIGHT FUEL QTY circuit breakers on the left circuit breaker panel in the cockpit. Fuel quantity is displayed in pounds. Lightning strike protection is incorporated in each indicator. For maintenance of the fuel quantity indicators, refer to Chapter 31-10-00.

AFT TANK QUANTITY SWITCHES (Effectivity: All)

The left and right AFT TANK QTY switches are momentary type push button switches mounted on the Fuel Management section of the center subpanel. The purpose of the switches is to check the quantity of fuel in the aft fuel tanks. The switches are electrically connected to the Fuel System Concentrator and, when actuated, complete a ground circuit for the aft tank quantity mode of the Fuel System Concentrator. The



Fuel Temperature Indicating Electrical Schematic (Effectivity: All)
Figure 5

quantity of fuel in the aft tanks is displayed on the applicable left and right fuel quantity bargraph/digital indicator.

FUEL TEMPERATURE INDICATING SYSTEM (Effectivity: All)

The fuel temperature indicating system provides the operator a visual display of the fuel temperature in the left hopper compartment in degrees centigrade. Components include an LCD display indicator located on the Fuel Management section of the center subpanel. The indicator is powered by 28 vdc from the fuel TEMP circuit breaker located on the left circuit breaker panel in the cockpit. A temperature sensor is located on the left hopper compartment root rib access door. The temperature sensor senses the temperature of the fuel in the left hopper compartment and provides the indicator with temperature signals. The indicator converts the signals to an LCD display.

FUEL LOW LEVEL INDICATING SYSTEMS (Effectivity: All)

The fuel low level indicating system consists of left and right fuel low level sensors, and LEFT and RIGHT FUEL LO WARN test switches. Fuel low level is displayed on the Engine Instrument, Crew Alerting System (EICAS) display.

The purpose of the fuel low level indicating system is to alert and advise the operator that the fuel remaining in the left or right hopper compartment is approximately 135 pounds. The fuel low level sensors are mounted in the center of, and protrude through the respective left and right hopper compartment manifolds. The sensors are constructed with an aluminum housing and a polished glass sensing tip. The two bolt mounting flange is an integeral part of the housing. An O-ring on the sensor and a gasket outside the fuel tank prevent fuel leakage past an installed sensor. Electrical connections to the left and right sensors are located in the main gear wheel wells. The fuel low level sensors require no adjustment.

The left and right fuel low level indicating systems are identical and independent of one another. Each system is electrically powered by the LEFT and RIGHT FUEL QTY Warning circuit breakers (28 vdc) on the left circuit breaker panel in the cockpit. The fuel low level sensors are transmitters; when sensing a low fuel level condition in one or both hopper compartments, they transmit a signal to the appropriate Engine Data Concentrator (EDC) where the 28 vdc signal is digitized. The digitized signal is then transmitted along an ARINC 429 low speed bus from the EDC through the Data Acquisition Unit (DAU) to the Engine Instrument, Crew Alerting System (EICAS) display where the yellow "L FUEL LEVEL LO" or "R FUEL LEVEL LO" caution message is displayed. For more detailed information on the operation of the Data Acquisition System and the Engine Instrument, Crew Alerting System refer to Chapter 31.

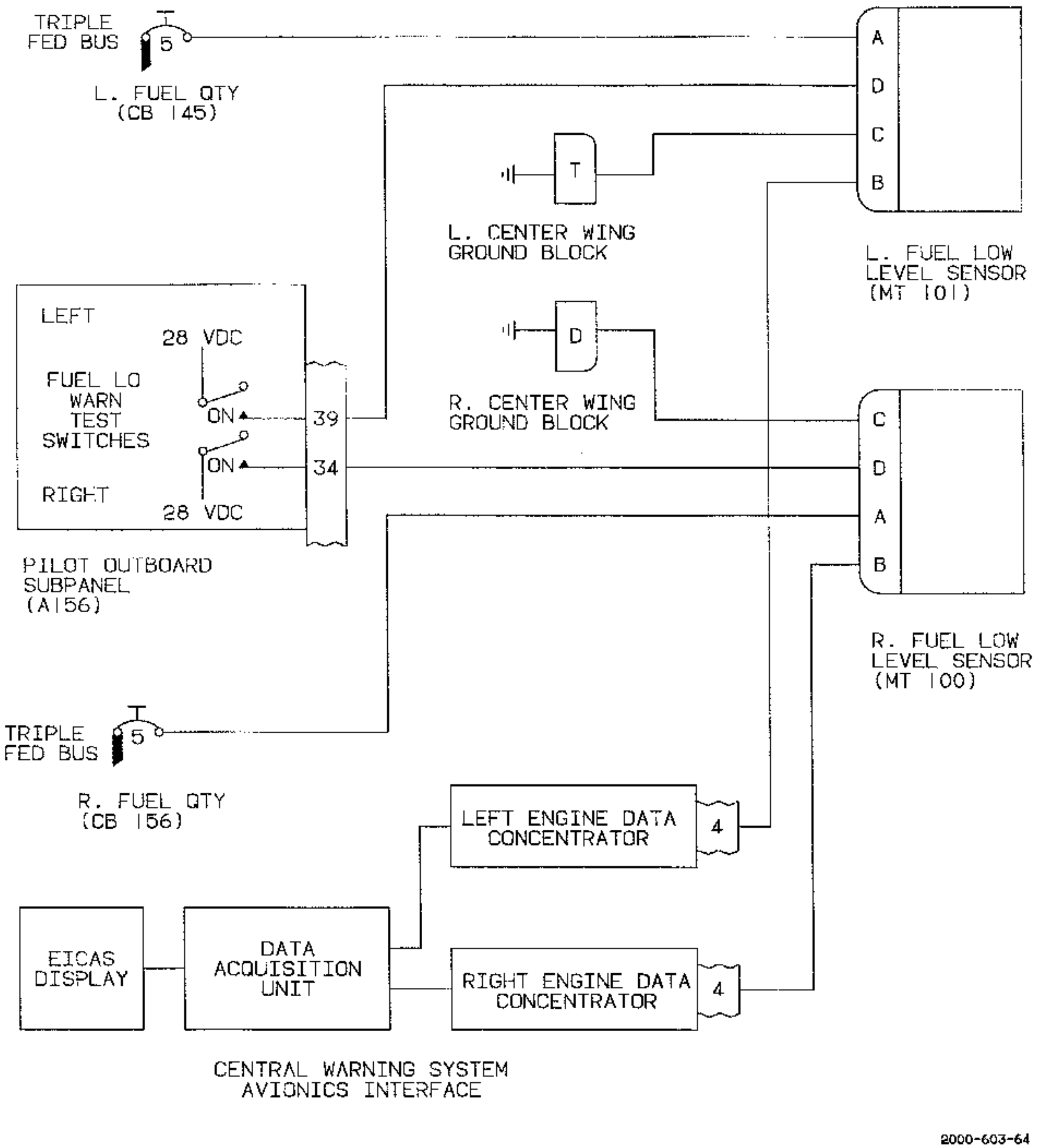
Separate LEFT and RIGHT FUEL LO WARN momentary push button test switches are located on the pilot's left outboard subpanel. The LEFT and RIGHT FUEL LO WARN test switches, when actuated, complete a 28 vdc electrical circuit from the ANNUNCIATOR No. 1 circuit breaker to the test function of the respective fuel low level sensor. The test switch circuit has a four second delay in reaction time from press-to-test actuation. This test confirms that the fuel low level indicating system is operational.

LOW FUEL PRESSURE WARNING SYSTEMS (Effectivity: All)

A low fuel pressure warning system is provided for the left and right fuel systems to alert the operator when fuel pressure in the fuel supply line to one of the engines is not sufficient for normal operation.

The low fuel pressure switches which activate the systems are clamp mounted to a stud on the aft side of the aft wing rear spar. They are accessible after removal of the left/right lower wing surface access door. Fuel pressure is sensed by the pressure switch through a tube and elbow fitting connected to the fuel firewall shutoff valve adapter which is mated to the outlet of the fuel firewall shutoff valve.

During an engine start, fuel is delivered through the engine fuel supply line under pressure by the standby fuel boost pump. This initial fuel pressure is sensed by the fuel pressure switch and actuates the contacts of the switch open with an increasing fuel pressure of 10, ±.1 PSIG. After the engine has started, motive fuel flow pressure from the engine driven fuel boost pump and the primary jet fuel pump maintains the fuel pressure and the switch contacts are held open. Anytime the fuel pressure decreases to 5, ±1 PSIG in the engine fuel supply line, the contacts in the fuel pressure switch close, completing an electrical circuit to illuminate the L or R FUEL PRES LO annunciator on the glareshield Warning Annunciator Panel. Electrical power for the low fuel pressure switches is supplied by the LEFT and RIGHT FUEL PRESS Warning circuit



Fuel Low Level Indicating Electrical Schematic (Effectivity: All)
Figure 6

breakers on the left circuit breaker panel in the cockpit. For additional information on the operation of the warning annunciator system refer to Chapter 31-50-00.

FUEL INDICATING - TROUBLESHOOTING (Effectivity: All)

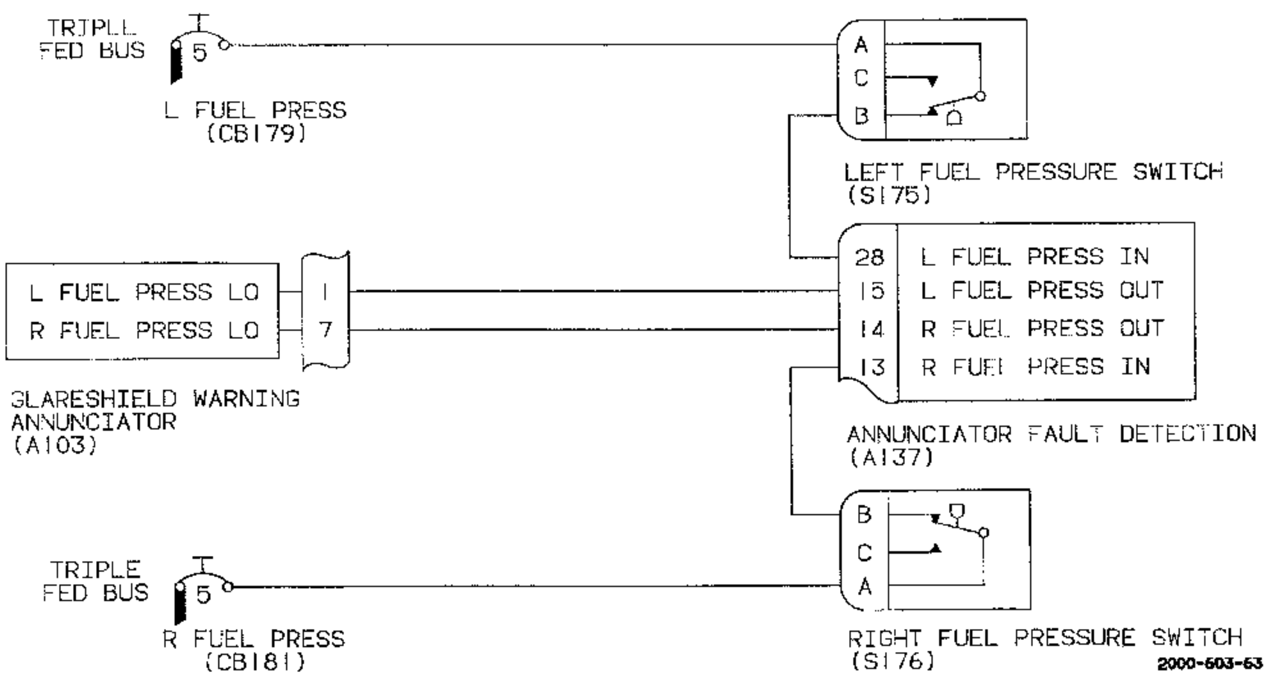
FUEL QUANTITY INDICATING SYSTEM - TROUBLESHOOTING (Effectivity: All)

Troubleshooting the fuel quantity indicating system involves the Fuel Quantity Probes, Fuel System Concentrators, Fuel Quantity Indicators, FUEL QTY circuit breakers and electrical wiring. The left and right fuel quantity indicating systems are the same.

The Fuel Quantity Probes are self tested at the initial power up and every 45 seconds thereafter. Intermittent or failed signals from a Fuel Quantity Probe are identified by the Fuel System Concentrator. The Fuel System Concentrator, sensing a malfunction, will ignore or render the signals void for that particular fuel probe. A malfunctioning fuel probe in a left or right fuel system is not individually identified by a warning.

An indication of a failed fuel quantity probe occurs when the fuel tanks are known to be full and the respective fuel quantity indicator displays less than full. A malfunctioning aft fuel tank quantity probe may be identified when the indicated total fuel is approximately 589 pounds (88 gallons) less than full; or by actuating the AFT TANK QTY momentary switch and observing the fuel quantity indicator. A malfunctioning hopper compartment probe may be evident when the indicated total fuel is approximately 161 pounds (24 gallons) less than full.

When the aft fuel tank and the hopper compartment fuel quantity probes check satisfactorily, and it is suspected that one of the two forward fuel tank quantity probes is the cause for a full fuel tank to indicate less than full, note and record the indicated quantity of fuel. On the tank root rib access doors, disconnect the fuel probe wire bundle connectors one at a time. If the indicator does not change from the recorded fuel quantity, the disconnected probe may be faulty.



Low Fuel Pressure Warning Electrical Schematic (Effectivity: All)
Figure 7

CHART 1
TROUBLESHOOTING - TROUBLESHOOTING QUANTITY INDICATING (Effectivity: All)

Left/Right Fuel Quantity Indicating System Inoperative

Step 1 Is Left/Right FUEL QTY circuit breaker engaged? **YES** Proceed to Step 2.

NO

Engage Left/Right FUEL QTY circuit breaker.

Step 2 Is the electrical wiring OK between the Left/Right FUEL QTY circuit breaker and the fuel system concentrator (FSC)? **YES** Proceed to Step 3.

NO

Repair open electrical wiring.

Step 3 Is the electrical wiring OK between the FSC and the fuel quantity indicator? **YES** Proceed to Step 4.

NO

Repair open electrical wiring.

Step 4 Is the ground wiring OK between the FSC and the center wing grounding block? **YES** Proceed to Step 5.

NO

Repair open ground wiring.

Step 5 Is the ground wiring OK to the fuel quantity indicator? **YES** Proceed to Step 6.

NO

Repair open ground wiring.

Step 6 Does the FSC check OK? **YES** Proceed to Step 7.

Swapping the left and right FSC may reveal the defective FSC unit.

NO

Replace defective FSC unit.

Step 7 Does the fuel quantity indicator check OK? **YES** System should be operational.

Swapping electrical connectors on the fuel quantity indicators may reveal the defective indicator.

NO

Replace defective fuel quantity indicator.

CHART 2
TROUBLESHOOTING - TROUBLESHOOTING FUEL QUANTITY INDICATING (Effectivity: All)

Aft Tank Fuel Quantity Mode Inoperative

Step 1 Is electrical wiring OK between fuel system concentrator (FSC) and the AFT TANK QTY switch? **YES** Proceed to Step 2.

NO

Repair open electrical wiring.

Step 2 Is electrical ground OK between the AFT TANK QTY switch and the left subpanel grounding block? **YES** Proceed to Step 3.

NO

Repair open electrical ground wiring.

Step 3 Does the AFT TANK QTY switch actuate properly? **YES** System should be operational.

NO

Replace AFT TANK QTY switch.

FUEL TEMPERATURE SYSTEM - TROUBLESHOOTING (Effectivity: All)

Troubleshooting the fuel temperature system involves the LCD display indicator, the temperature sensor, Fuel TEMP circuit breaker and the electrical wiring.

Refer to Troubleshooting Chart 3.

CHART 3
TROUBLESHOOTING - TROUBLESHOOTING FUEL TEMPERATURE SYSTEM (Effectivity: All)

Fuel Temperature System Inoperative

Step 1	Is FUEL TEMP circuit breaker engaged?	**YES**	Proceed to Step 2.
	NO		
	Engage FUEL TEMP circuit breaker.		
Step 2	Is electrical wiring OK between FUEL TEMP circuit breaker and the temperature indicator?	**YES**	Proceed to Step 3 and refer to BEECHCRAFT Starship 1 Wiring Diagram Manual.
	NO		
	Repair open electrical wiring.		
Step 3	Are signal circuits OK between the temperature sensor and the temperature indicator?	**YES**	Proceed to Step 4.
	NO		
	Repair open signal circuit(s).		
Step 4.	Is ground electrical wiring OK between the right center wing grounding block and the temperature sensor/indicator?	**YES**	Proceed to Step 5.
	NO		
	Repair open ground wiring.		
Step 5	Is ground wiring OK between the left subpanel grounding block and the temperature indicator?	**YES**	Proceed to Step 6.
	NO		
	Repair open ground wiring.		
Step 6	Is the temperature sensor OK?	**YES**	Proceed to Step 7.
	NO		
	Replace the temperature Sensor.		
Step 7	Is temperature indicator OK?	**YES**	System should be operational.
	NO		
	Replace temperature indicator.		

FUEL LOW LEVEL INDICATING - TROUBLESHOOTING (Effectivity: All)

Troubleshooting the fuel low level indicating system involves the fuel low level sensors, electrical power and test circuit(s). Performing a test with the LEFT or RIGHT FUEL LO WARN test switches should prove the respective system operational or defective. For troubleshooting a defective system, refer to Troubleshooting Chart 4.

CHART 4
TROUBLESHOOTING - TROUBLESHOOTING LOW FUEL QUANTITY INDICATING (Effectivity: All)

Fuel Low Level Indicating Fails To Test

Step 1 Is L/R FUEL QTY circuit breaker engaged? **YES** Proceed to Step 2.

NO

Engage L/R FUEL QTY circuit breaker.

Step 2 Is ANNUNCIATOR No.1 circuit breaker engaged for test? **YES** Proceed to Step 3.

NO

Engage ANNUNCIATOR No.1 circuit breaker.

Step 3 Is electrical wiring OK between the LEFT/RIGHT FUEL LO WARN test switch and the fuel low level sensor? **YES** Proceed to Step 4 and refer to BEECHCRAFT Starship 1 Wiring Diagram Manual.

NO

Repair open electrical wiring.

Step 4 Is electrical wiring OK between L/R FUEL QTY circuit breaker and the fuel low level sensor? **YES** Proceed to Step 5.

NO

Repair open electrical wiring.

Step 5 Is ground wiring OK between fuel low level sensor and the left/right center wing ground block? **YES** Proceed to Step 6.

NO

Repair open ground wiring.

Step 6 Is fuel low level sensor OK? **YES** System should be operational.

NO

Replace fuel low level sensor.

LOW FUEL PRESSURE WARNING - TROUBLESHOOTING (Effectivity: All)

Troubleshooting the low fuel pressure warning involves the left or right fuel pressure switch and the Central Warning System. The Central Warning System interfaces several unrelated systems for warning displays. To check the integrity of the Central Warning System, refer to Troubleshooting Chart 5.

CHART 5
TROUBLESHOOTING - TROUBLESHOOTING LOW FUEL PRESSURE WARNING (Effectivity: All)

Warning Annunciator L/R FUEL PRES LO Remains ON (During and After Engine Starts).

Step 1 Is the fuel pressure switch OK? — **YES** Proceed to Step 2.

Disconnect electrical connector, turn on standby fuel boost pump, check switch connector pins A to B for no continuity.

Continuity indicates faulty pressure switch.

NO

Replace fuel pressure switch.

Step 2 Is Warning Annunciator System OK? — **YES** Verify operation of other warning annunciator systems.

NO

Refer to Chapter 31-50-00 for maintenance of the warning annunciator system.

CHART 6
TROUBLESHOOTING - TROUBLESHOOTING LOW FUEL PRESSURE WARNING (Effectivity: All)

Warning Annunciator L/R FUEL PRES LO Remains OUT (Before Engine Starts and After Engine Shutdown)

Step 1 Is L/R FUEL PRESS circuit breaker engaged? — **YES** Proceed to Step 2.

NO

Engage L/R FUEL PRESS circuit breaker.

Step 2 Is electrical wiring OK between L/R FUEL PRESS circuit breaker and the fuel pressure switch? — **YES** Proceed to Step 3 and refer to BEECHCRAFT Starship 1 Wiring Diagram Manual.

NO

Repair open electrical wiring.

Step 3 Is Warning Annunciator System OK? — **YES** System should be operational.

NO

Refer to Chapter 31-50-00 for maintenance of the warning annunciator system.

FUEL INDICATING - MAINTENANCE PRACTICES (Effectivity: All)

CAUTION

When working around an open fuel system, observe all fire precautions and safety practices. Refer to Chapter 28-00-00.

NOTE

The fuel quantity probes are precalibrated and sealed by the manufacturer for installation in its intended location. Further calibration is not required.

FORWARD FUEL TANK FWD AND AFT FUEL QUANTITY PROBES REMOVAL (Effectivity: All) (Figure 8)

NOTE

Removal of the fwd and aft fuel probes from the left and right forward fuel tank is typical except as noted.

a. Defuel the left or right wing as applicable to the Fuel Quantity Probe to be removed. Refer to Chapter 12-10-00.

b. Disconnect battery and remove electrical power from the airplane.

c. Disengage LEFT or RIGHT FUEL QTY circuit breaker on the left circuit breaker panel in the cockpit.

d. Remove the wing-to-fuselage fairings as outlined in Chapter 53-50-00.

e. Access to the aft fuel probe is through the root rib access door (fourth door from the forward end of the root rib). Access to the fwd fuel probe is through the fuel filler cap access plate assembly, the horizontal baffle cover door, and the root rib center access door. Refer to FORWARD FUEL TANK ACCESS DOORS REMOVAL, this Chapter for removal of the fuel filler cap access plate assembly and the horizontal baffle cover door.

f. Cut safety wire and disconnect the probe wire bundle connector on the root rib access door. Remove the root rib access door mounting bolts and push the door inward.

g. Open the upper and lower overcenter type clamp assemblies securing the fuel probe to its brackets.

CAUTION

Handle the fuel probe with care during removal. Do not allow the probe to strike other components or the fuel tank. Damage to the fuel probe may result.

h. Remove the fuel probe and the connected access door from the fuel tank.

i. If necessary, remove the fuel probe wire bundle connector from the access door by removing the connector jam nut.

j. If the fuel probe is not to be installed immediately, cover the tank openings to prevent entry of foreign matter.

FORWARD FUEL TANK FWD AND AFT FUEL QUANTITY PROBES INSTALLATION (Effectivity: All) (Figure 8)

Check that the fuel probe is for the position in which it is to be installed. The fuel probes are interchangeable between the left and right fuel tanks; however, they are not interchangeable within the left or right fuel tanks. Refer to the BEECHCRAFT Starship 1 Illustrated Parts Catalog, Chapter 28. Installation of the fwd and aft fuel probes in the forward fuel tank is typical except as noted.

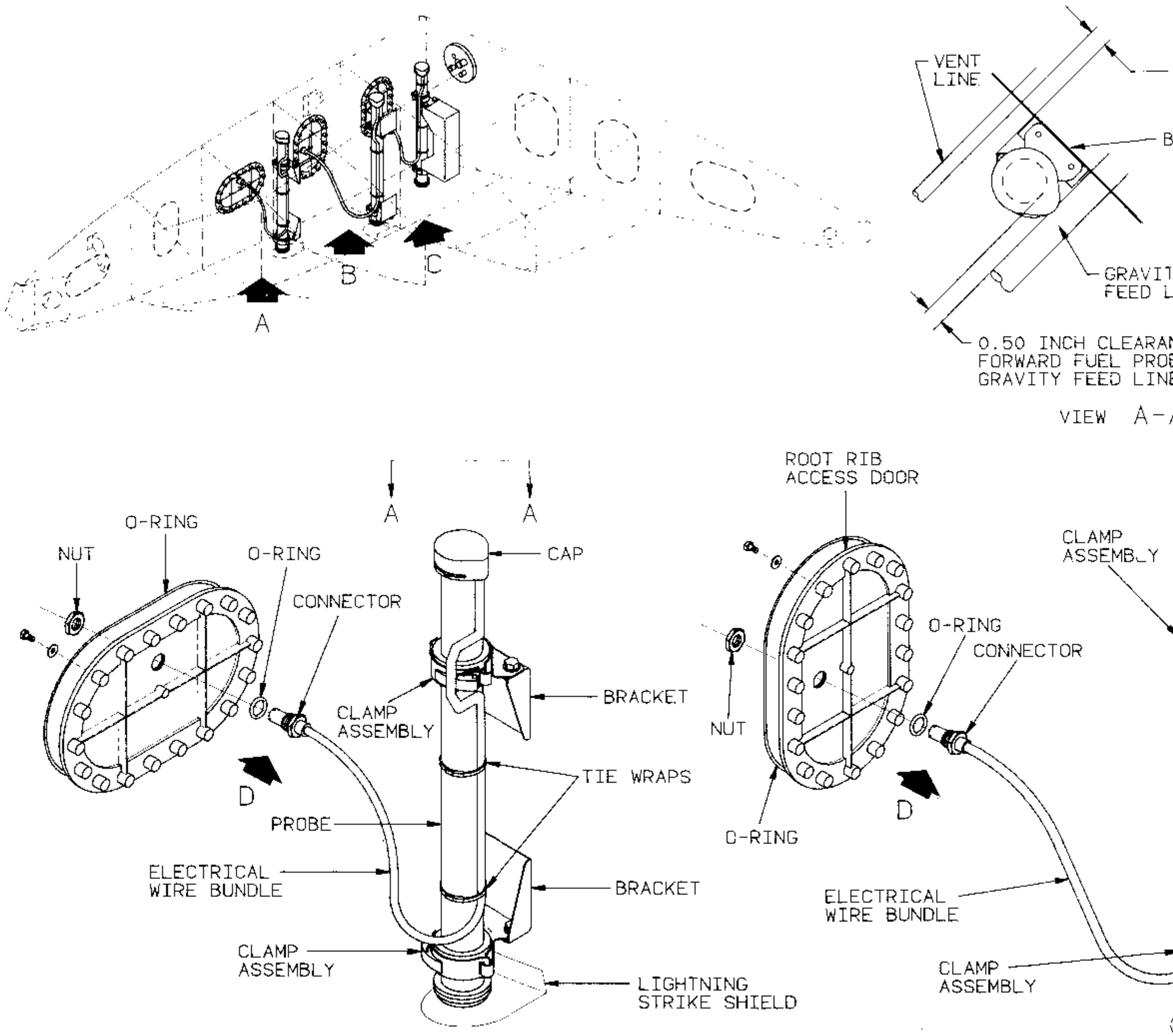
a. If the fuel probe to be installed is a replacement, or the wire bundle connector was removed from the access door, install a new O-ring on the connector. Install the connector in the access door and secure with the connector jam nut.

b. Install lightning protection cap over the top of the fuel probe and secure with tie wraps.

c. Place the fuel probe and access door in the fuel tank. Position the fuel probe to its brackets and secure with the upper and lower overcenter clamp assemblies.

NOTE

For the forward fuel probe, the minimum clearance between the fuel probe and the gravity feed line and/or vent line is 0.50 inch.



Forward Fuel Tank Quantity Probes Installation (Effectivity: All)
Figure 8

d. Secure the wire bundle to the fuel probe with two tie-wraps.

e. Install root rib access door with a new O-ring. Ensure that the mounting bolt with a drilled head for safety wire is located near the electrical connector.

f. Connect the fuel probe wire bundle connector to the connector on the access door, and safety wire the connector to the access door mounting bolt.

g. For the forward fuel probe, install the cover door on the horizontal baffle, and the filler cap access plate assembly.

h. Refuel the airplane as outlined in Chapter 12-10-00. Check the access doors for fuel leakage.

i. Install the wing-to-fuselage fairing as outlined in Chapter 53-50-00.

j. Reconnect battery and apply electrical power to the airplane as required.

k. Engage LEFT or RIGHT FUEL QTY circuit breaker. Check that a quantity is indicated on the fuel quantity indicator display.

HOPPER COMPARTMENT FUEL QUANTITY PROBE REMOVAL (Effectivity: All) (Figure 8)

NOTE

Removal of the left and right hopper compartment fuel quantity probes is typical.

a. Defuel the left or right wing as applicable to the fuel probe to be removed. Refer to Chapter 12-10-00.

b. Disconnect battery and remove electrical power from the airplane.

c. Disengage LEFT or RIGHT FUEL QTY circuit breaker on the left circuit breaker panel in the cockpit.

d. Gain access to the fuel quantity probe by removing the access door above the hopper compartment. Remove the wing-to-fuselage fairings as outlined in Chapter 53-50-00.

e. Cut the safety wire and disconnect the fuel temperature sensor and fuel probe electrical wiring from the aft root rib access door.

f. Remove the root rib access door by removing the bolts securing the door. Push the access door inward into the hopper compartment.

g. Open the upper and lower overcenter clamp assemblies securing the Fuel Quantity Probe to its brackets.

CAUTION

Handle the Fuel Quantity Probe with care. Do not allow the probe to strike other components or the tank. Damage to the fuel probe may result.

h. Remove the Fuel Quantity Probe and the connected access door out of the hopper compartment.

i. If necessary, remove the fuel probe wire bundle connector from the access door by removing the connector jam nut.

j. If the Fuel Quantity Probe is not to be installed immediately, cover all openings to the hopper compartment to prevent entry of foreign matter.

HOPPER COMPARTMENT FUEL QUANTITY PROBE INSTALLATION (Effectivity: All) (Figure 8)

Verify the correct fuel quantity probe for the hopper compartment installation. Refer to the BEECHCRAFT Starship 1 Illustrated Parts Catalog, Chapter 28.

NOTE

Installation of the left and right hopper compartment Fuel Quantity Probes is typical.

a. If the Fuel Quantity Probe to be installed is a replacement or the wire bundle connector was removed from the access door, ensure that a new O-ring is on the connector. Install the connector in the access door and secure with the connector jam nut.

b. Install lightning protection cap over the top of the fuel probe and secure with tie wraps.

c. Place the fuel probe and access door in the hopper compartment. Position the fuel probe to its brackets and secure the fuel probe in place with the upper and lower overcenter clamp assemblies.

NOTE

The minimum clearance between the fuel probe and the motive fuel flow line to the hopper compartment manifold is 1.00 inch.

d. Secure the electrical wire bundle to the fuel probe with two tie-wraps.

e. Install the root rib access door with a new O-ring. Ensure that the mounting bolts with drilled heads for safety wire are located near the fuel probe electrical connector and the fuel temperature sensor.

f. Connect the fuel probe and fuel temperature sensor electrical connectors, and safety wire the connectors to the nearest access door mounting bolts.

g. Install the access door above the hopper compartment.

h. Refuel the airplane and check access doors for fuel leakage.

i. Install the wing-to-fuselage fairing as outlined in Chapter 53-50-00.

j. Reconnect battery and apply electrical power to the airplane as required.

k. Engage LEFT or RIGHT FUEL QTY circuit breaker. Verify that a quantity is indicated on the fuel quantity indicator display.

AFT TANK FUEL QUANTITY PROBE REMOVAL (Effectivity: All) (Figure 9)

NOTE

Removal of the left and right aft tank fuel quantity probes is typical.

a. Defuel the left or right wing as applicable to the fuel probe to be removed. Refer to Chapter 12-10-00.

b. Disconnect battery and remove electrical power from the airplane.

c. Disengage the LEFT or RIGHT FUEL QTY circuit breaker on the left circuit breaker panel in the cockpit.

d. Cut the safety wire and disconnect the fuel probe wire bundle in the main gear wheel well at the electrical connector.

e. Gain access to the aft tank fuel probe by removing the aft tank access cover door (541AB or 641AB) located on the lower wing surface just aft of the main gear wheel well. The fuel cell access door is removed by removing the door mounting bolts. Push the door inward and remove the door and gasket out through the access opening.

f. Remove the fuel probe wire bundle connector at the tank inside sidewall by removing the connector jam nut in the wheel well.

g. In the fuel tank, remove the clamp securing the wire bundle to the vent lines.

h. Open the two overcenter clamp assemblies securing the Fuel Quantity Probe to its brackets.

CAUTION

Handle the Fuel Quantity Probe with care. Do not allow the probe to strike other components or the tank opening. Damage to the fuel probe may result.

i. Remove the fuel probe through the fuel tank access opening.

j. If the fuel probe is not to be installed immediately, close the aft fuel tank opening to prevent entry of foreign matter.

AFT TANK FUEL QUANTITY PROBE INSTALLATION (Effectivity: All) (Figure 9)

Verify the correct fuel quantity probe for the aft tank installation. Refer to the BEECHCRAFT Starship 1 Illustrated Parts Catalog, Chapter 28. Installation of the left and right aft tank quantity fuel probes is typical.

a. If the fuel probe to be installed is a replacement, ensure that a new O-ring is installed on the wire bundle connector.

b. Position the fuel probe to its brackets in the aft tank.

NOTE

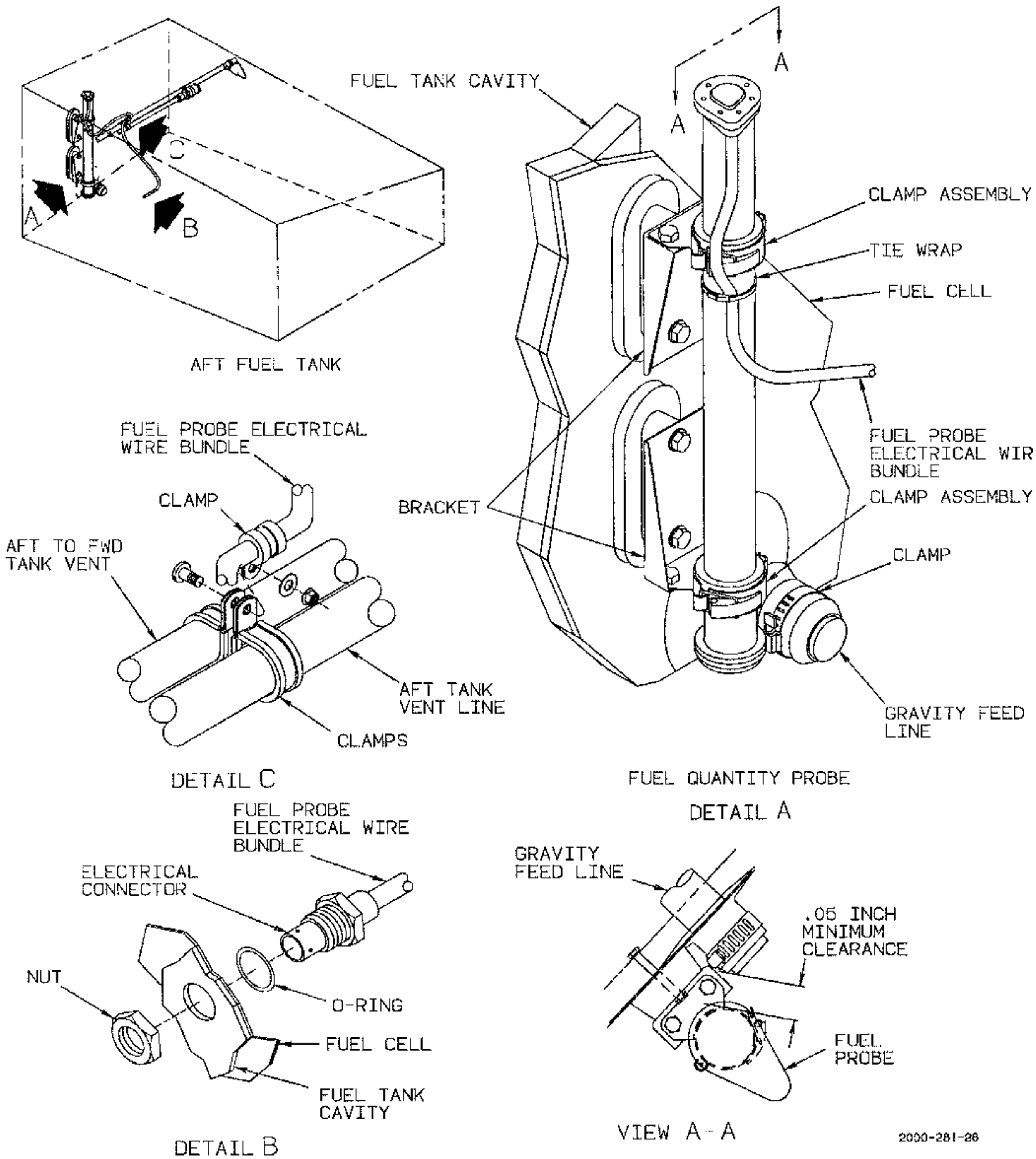
The minimum clearance between the fuel probe and the gravity feed line nipple is 0.50 inch.

c. Secure the fuel probe in place with the upper and lower overcenter clamps.

d. Secure the electrical wire bundle to the fuel probe with one tie-wrap.

e. Route the wire bundle and secure it to the vent lines with a clamp.

f. Install a new O-ring on the wire bundle connector and install the connector in the tank inside sidewall. Secure the connector with the jam nut in the wheel well. Connect the fuel probe wire bundle connector and safety wire.



Aft Tank Fuel Quantity Probe Installation (Effectivity: All)
Figure 9

g. Install the aft fuel tank access door with a new gasket.

h. Refuel the airplane and check for fuel leakage at the access door. Refer to Chapter 12-10-00.

i. Install the lower wing access cover door.

j. Reconnect battery and apply electrical to the airplane as required.

k. Engage LEFT or RIGHT FUEL QTY circuit breaker.

l. Actuate the AFT TANK QTY switch and verify a quantity of fuel in the aft tank on the respective fuel quantity indicator display.

FUEL QUANTITY PROBE ISOLATION TEST (Effectivity: All)

To confirm that the fuel quantity probe(s) is isolated for static charge protection, perform the following test using a multimeter.

a. Disconnect the electrical connector (plug P375) from the left Fuel System Concentrator.

b. With the multimeter set to the "Meg" scale, measure from the plug backshell to the wire conduit or the wire tray. The meter should indicate an open condition.

NOTE

Failure to obtain an open indication reveals that the Fuel Quantity Probe(s) in the left system is not isolated and each shield should be separated and measured individually.

c. Connect the electrical connector to the left Fuel System Concentrator.

d. Disconnect the electrical connector (plug P376) from the right Fuel System Concentrator.

e. With the multimeter set to the "Meg" scale, measure from the plug backshell to the wire conduit or the wire tray. The meter should indicate an open condition.

NOTE

Failure to obtain an open indication reveals that the fuel quantity probe(s) in the right system is not isolated and each shield should be separated and measured individually.

FUEL SYSTEM CONCENTRATOR REMOVAL (Effectivity: All) (Figure 10)

Each wing fuel system has a Fuel System Concentrator. The Fuel System Concentrators are located in the left and right wings above access door (551AB or 651AB). The Engine Data Concentrator is mounted on the same mounting panel as the Fuel System Concentrator. Removal of the left and right Fuel System Concentrator is typical.

a. Disconnect battery and remove electrical power from the airplane.

b. Disengage LEFT or RIGHT FUEL QTY circuit breaker on the left circuit breaker panel in the cockpit.

c. Gain access to the Fuel System Concentrator by removing the access door located aft of the aft fuel tank on the wing lower surface.

d. Identify, cut safety wires and disconnect the two electrical connectors from the Fuel System Concentrator.

e. Remove the two mounting bolts and washers securing the Fuel System Concentrator to the mounting panel. Note the washer between the Fuel System Concentrator and the mounting panel at each bolt. Retain the washers for reinstallation.

f. Remove the Fuel System Concentrator from the airplane.

FUEL SYSTEM CONCENTRATOR INSTALLATION (Effectivity: All) (Figure 10)

a. Position the Fuel System Concentrator up to the mounting panel, aligning the bolt holes and panel nutplates with a washer between the Fuel System Concentrator and the mounting panel at each bolt hole.

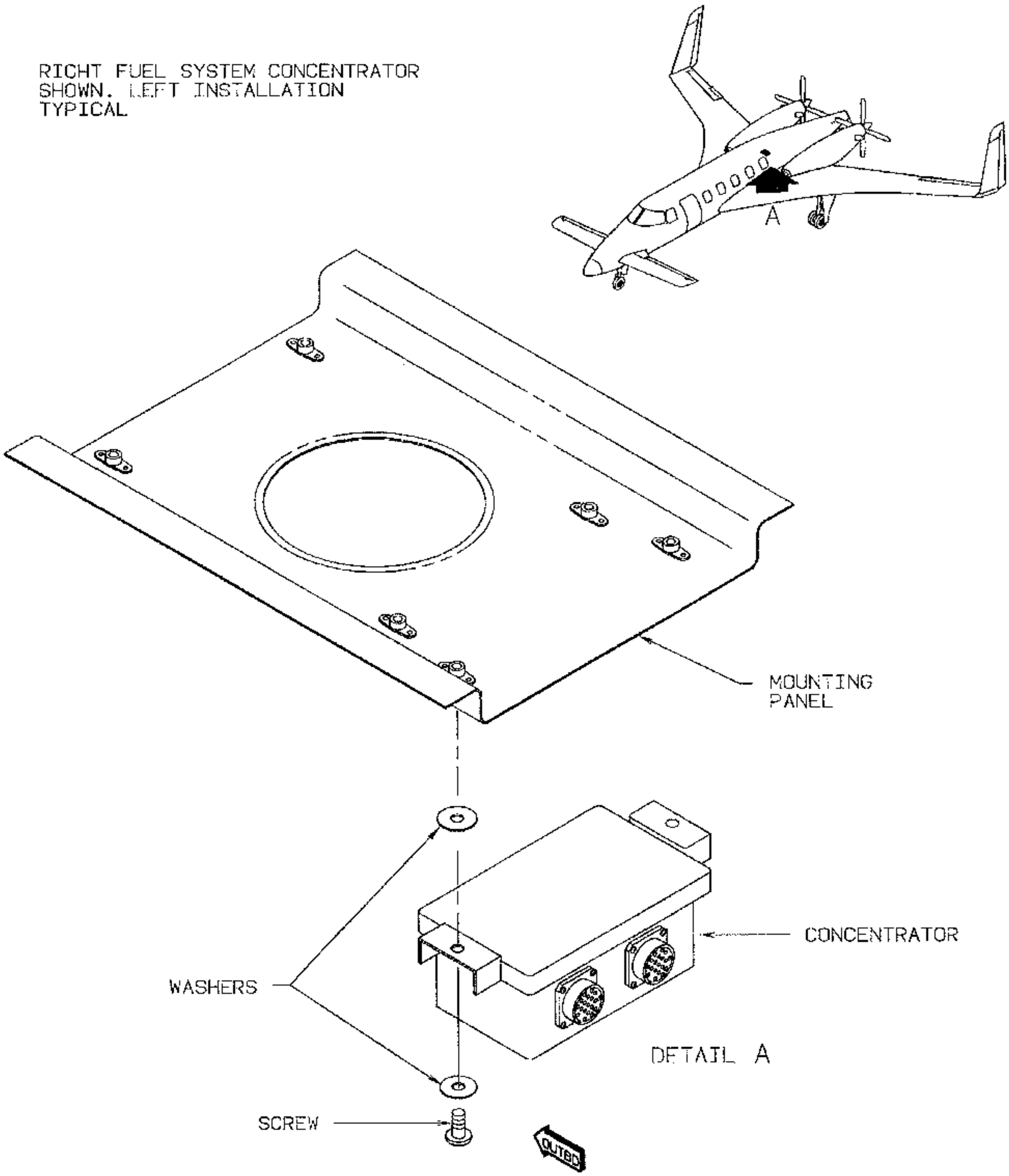
b. Secure the Fuel System Concentrator with the two bolts and washers.

c. Identify and connect the two electrical connectors to the Fuel System Concentrator and safety wire.

d. Install the access door.

e. Reconnect battery and apply electrical power to the airplane as required.

f. Engage the LEFT or RIGHT FUEL QTY circuit breaker.



Fuel System Concentrator (FSC) Installation (Effectivity: All)
Figure 10

FUEL TEMPERATURE SENSOR REMOVAL (Effectivity: All) (Figure 11)

The temperature sensor is located on the left hopper compartment root rib access plate. The sensor penetrates the access plate through a fitting so the end of the sensor is submerged in the fuel.

a. Defuel the left wing fuel tanks to lower the fuel level below the root rib access doors. Refer to Chapter 12-10-00.

b. Disconnect battery and remove electrical power from the airplane.

c. Disengage the fuel TEMP circuit breaker on the left circuit breaker panel in the cockpit.

d. Gain access to the temperature sensor by removing the left lower wing to fuselage fairing as outlined in Chapter 53-50-00.

e. Cut safety wire and disconnect electrical connector from the temperature sensor.

f. Remove the temperature sensor and gasket from the fitting on the access door.

g. To remove the fitting from the access door, remove the access door as outlined in 28-10-00. Cut the safety wire and remove the jam nut and washer. Separate the fitting, washer and O-ring from the access door.

FUEL TEMPERATURE SENSOR INSTALLATION (Effectivity: All) (Figure 11)

a. To install the temperature sensor fitting in the access door, place a new O-ring on the fitting and insert the fitting through the access door. Secure the fitting with a washer and jam nut. Safety wire the jam nut. Install the access door as outlined in 28-10-00.

b. With a new gasket (crush type washer) on the temperature sensor, install and tighten the sensor in the fitting on the access door.

c. Connect the electrical connector to the temperature sensor and safety wire.

d. Refuel the airplane and check for fuel leakage at the access door and temperature sensor.

e. Reconnect battery and apply electrical power to the airplane as required.

f. Engage the fuel TEMP circuit breaker.

g. Install wing to fuselage fairing as outlined in Chapter 53-50-00.

FUEL LOW LEVEL SENSOR REMOVAL (Effectivity: All) (Figure 12)

Removal of the left and right fuel low level sensor is accomplished in the respective main gear wheel well.

a. Refer to Chapter 12-10-00 and defuel the left or right fuel tanks as applicable to the fuel low level sensor to be removed. The fuel level must be below the sensor and hopper compartment manifold for removal of the sensor.

b. Disconnect battery and remove electrical power from the airplane.

c. Disengage the warning LEFT or RIGHT FUEL QTY circuit breaker on the left circuit breaker panel in the cockpit.

d. Cut safety wire and disconnect the electrical connector from the sensor.

e. Remove the two bolts and washers securing the sensor to the manifold.

f. Remove the sensor and gasket from the manifold. Note the O-ring installed on the sensor.

g. If the sensor is not to be installed immediately, cover the sensor opening in the manifold to prevent entry of foreign matter.

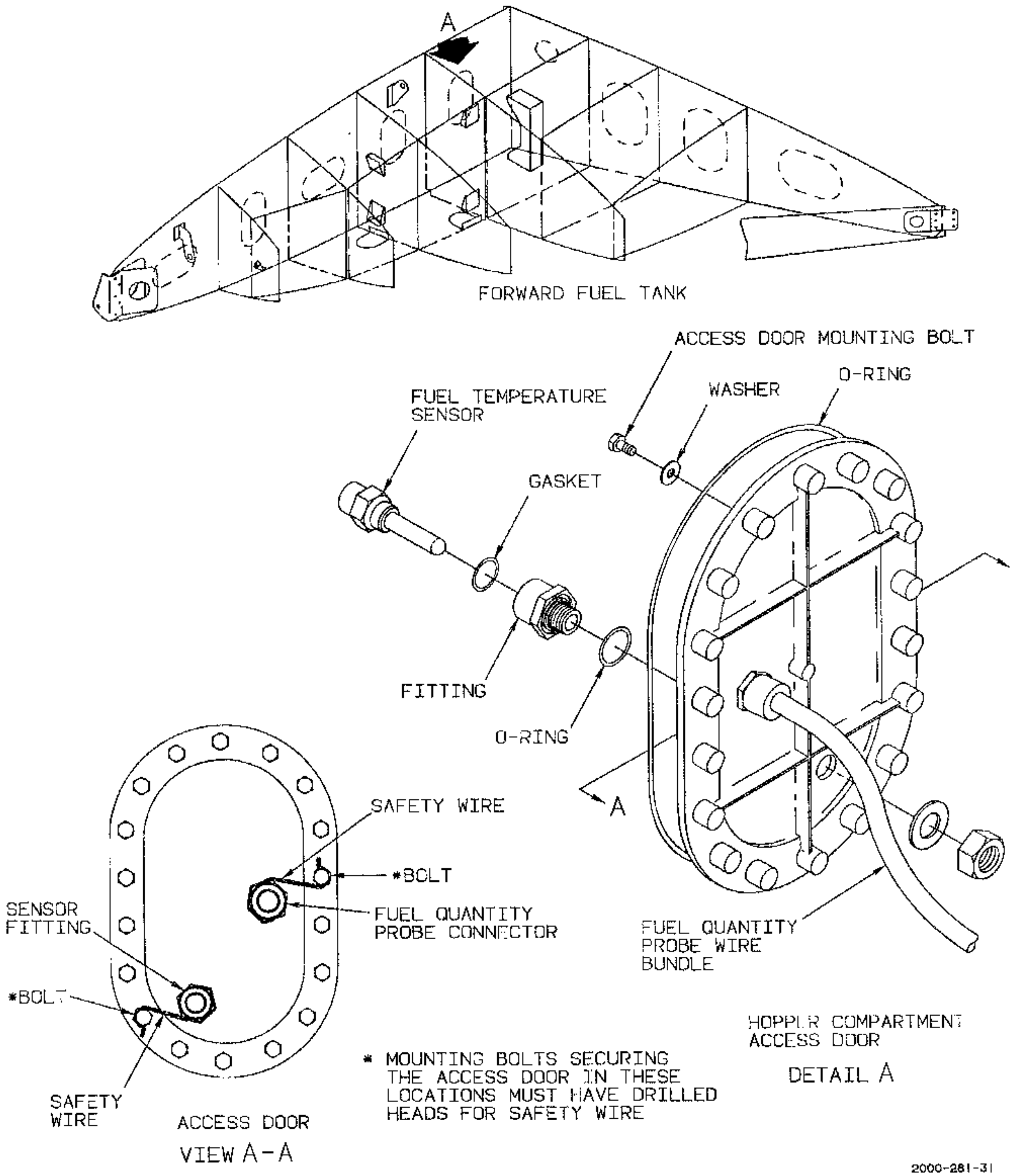
FUEL LOW LEVEL SENSOR INSTALLATION (Effectivity: All) (Figure 12)

Consideration should be given to the cleanliness of the sensor installation. Particular attention should be given to the O-ring and gasket to ensure they are not cut, chaffed or damaged, which can create a fuel leak. The fuel low level sensor installation is accomplished in the main gear wheel well.

a. Check that the fuel low level sensor has a new O-ring installed and a new gasket is positioned on the sensor. The sensor hole in the manifold must be clean and not damaged.

b. Insert the sensor into the manifold and align the gasket and the two flange bolt holes with the inserts of the manifold.

c. Secure the sensor with the two bolts and washers.



Fuel Temperature Sensor Installation (Effectivity: All)
Figure 11

d. Connect the electrical connector to the sensor. Safety wire the connector.

e. Reconnect battery and apply electrical power to the airplane as required.

f. Engage the warning LEFT or RIGHT FUEL QTY circuit breaker.

g. Refer to Chapter 12-10-00 and refuel the airplane. Check for fuel leakage at the sensor and manifold.

h. Perform a test of the fuel low level warning system by actuating the LEFT or RIGHT FUEL LO WARN press-to-test switch on the pilot's outboard subpanel. There should be a short delay when the press-to-test switch is actuated, then a yellow "L or R FUEL LEVEL LO" caution message should be displayed on the Engine Instrument, Crew Alerting System (EICAS) display.

LOW FUEL PRESSURE SWITCH REMOVAL (Effectivity: All) (Figure 13)

a. Disconnect battery and remove electrical power from the airplane.

b. Disengage the LEFT or RIGHT FUEL PRESS circuit breaker on the left circuit breaker panel in the cockpit.

c. Gain access to the low fuel pressure switch by removing the lower wing access door (551AB left/ 651AB right)

d. Cut the safety wire and disconnect the electrical connector from the low fuel pressure switch.

e. Remove the nut and washer securing the pressure switch mounting clamp to the stud bonded to the aft spar.

f. Hold the pressure switch and disconnect the fuel pressure line from the low fuel pressure switch.

g. Remove the low fuel pressure switch from the airplane.

h. The fuel pressure line and elbow fitting is removed (if necessary) by disconnecting the fuel pressure line from the elbow fitting; loosen the jam nut on the elbow fitting and remove the elbow fitting from the firewall fuel shutoff valve adapter.

LOW FUEL PRESSURE SWITCH INSTALLATION (Effectivity: All) (Figure 13)

a. If the fuel pressure line and elbow fitting were removed, install and position the elbow fitting on the firewall fuel shutoff valve adapter with a new O-ring and secure the jam nut. Connect the fuel pressure line to the elbow fitting .

b. Position and connect the low fuel pressure switch to the fuel pressure line while holding the pressure switch.

c. Secure the pressure switch to the stud bonded to the aft spar with mounting clamp, washer (under nut), and nut.

d. Connect the electrical connector to the low fuel pressure switch and safety wire the connector.

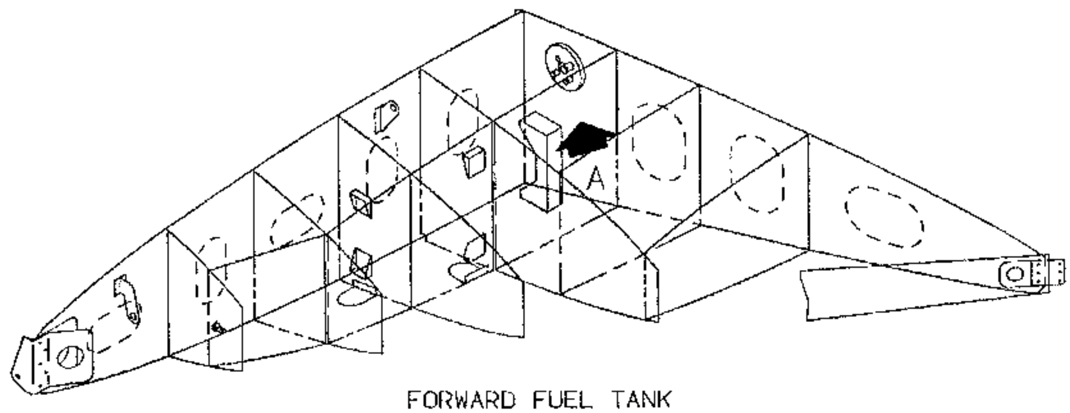
e. Install the lower wing access door.

f. Reconnect battery and apply electrical power to the airplane as required.

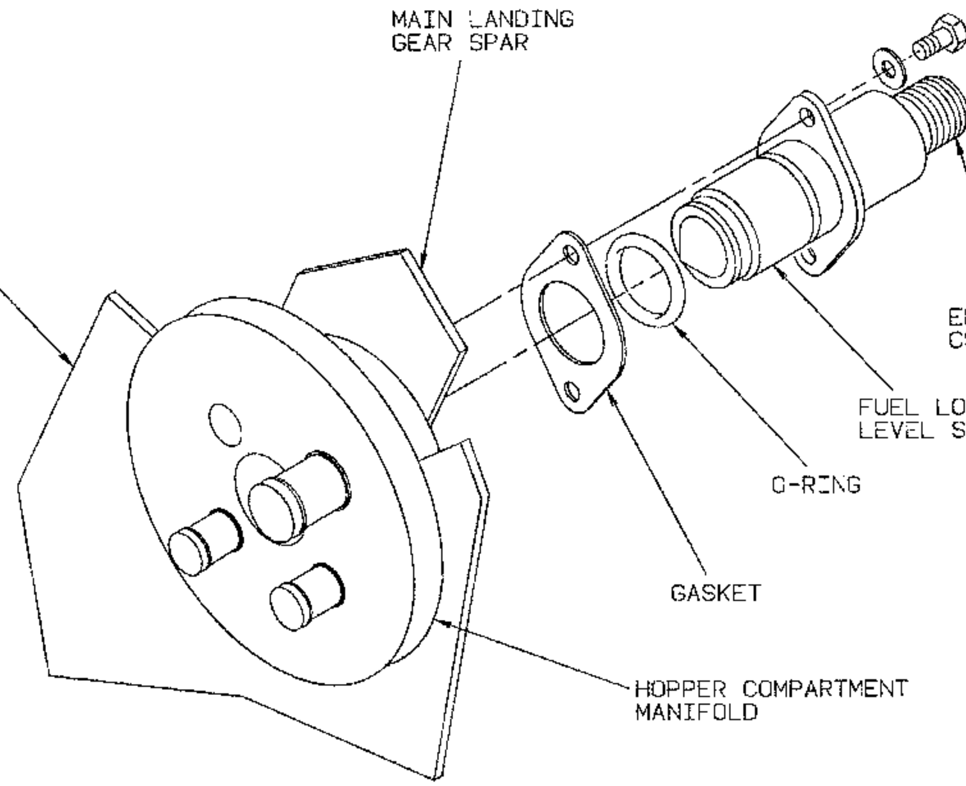
g. Engage the LEFT or RIGHT FUEL PRESS circuit breaker.

h. Check warning annunciator L or R FUEL PRES LO for illumination.

1. Turn ON the left or right standby fuel boost pump as applicable and confirm that the warning annunciator L or R FUEL PRES LO extinguishes.
2. Turn standby fuel boost pump OFF.



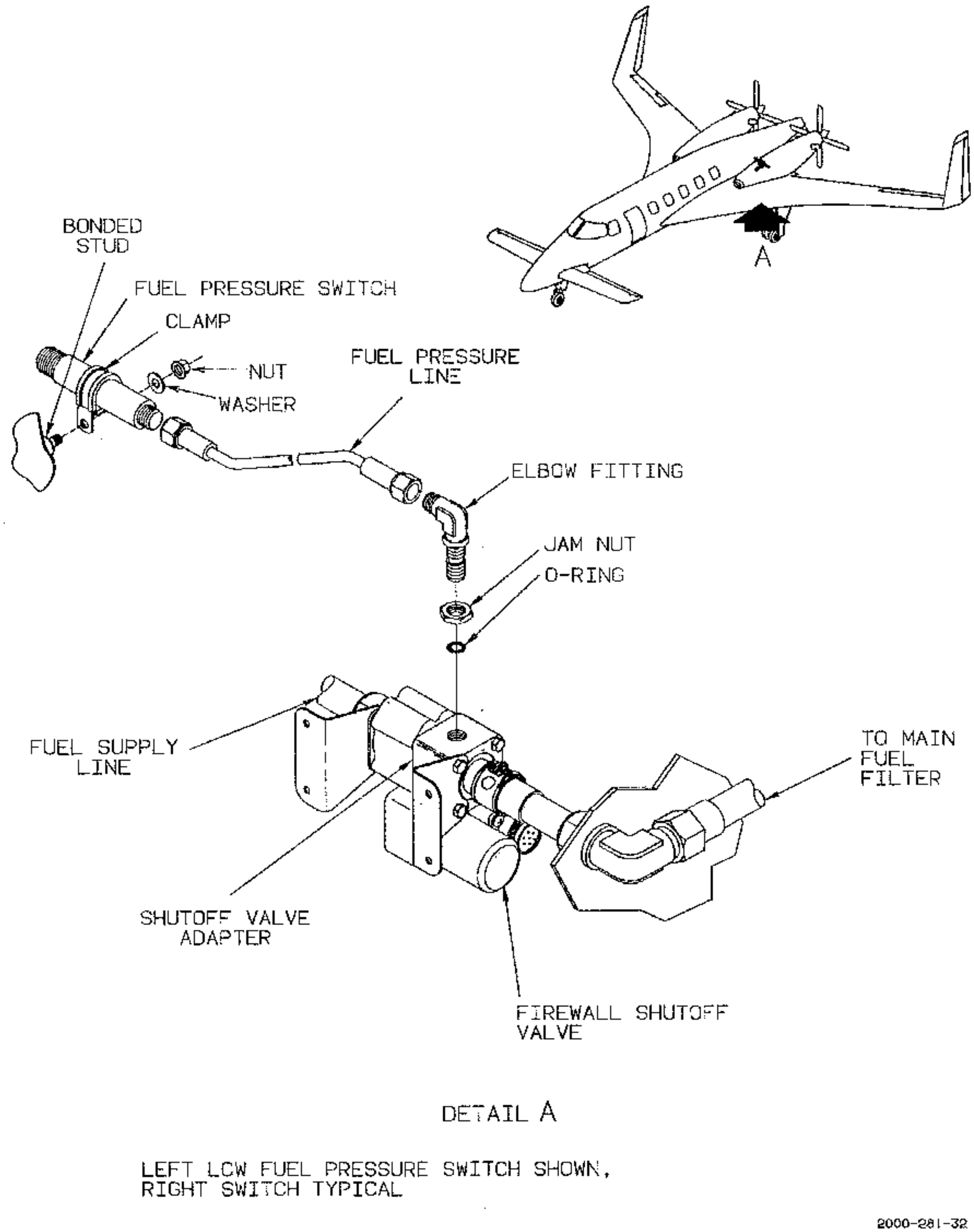
FORWARD FUEL TANK



DETAIL A

2000-281-30

Fuel Low Level Sensor Installation (Effectivity: All)
Figure 12



Low Fuel Pressure Switch Installation (Effectivity: All)
Figure 13