Beechcraft®
Bonanza

MODEL **J35**

OWNER'S MANUAL

Beech Aircraft Corporation Wichita, Kansas

IMPORTANT

(Please attach this Owner's Manual Supplement to the inside cover of the Owner's Manual or other suitable location which is readily available to the pilot.)

OWNER'S MANUAL

SUPPLEMENT

for

35, 35R, A35, B35, C35, D35, E35, F35, G35, H35 and J35

The following information supersedes the usable fuel and range information contained in the Owner's Manual for the above listed airplanes.

1. Maximum usable fuel for each 20 gallon main tank is 17 gallons.

2. The approximate range reductions with full fuel due to the change in usable fuel are as follows:

a. Reduce range for 40 gallons usable by 16% (35, 35R, A35, B35, C35, D35, E35).

b. Reduce range for 39 gallons usable by 16% (F35).

c. Reduce range for 39 gallons usable by 13% (G35, H35 and J35).

d. Reduce range for 57 gallons usable by 10% (J35).

3. In order to account for climb and 45 minutes reserve at 45% maximum continuous power, reduce the ranges additionally as follows:

a. 125 statute miles (35, 35R, A35, B35, C35, D35, E35 and F35).

b. 140 statute miles (G35, H35 and J35).

4. Maximum slip duration is 30 seconds.

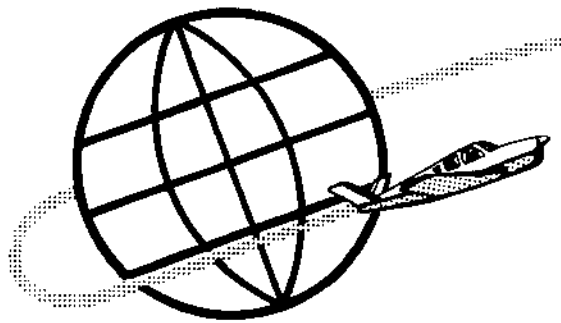
5. Do not take off if main fuel quantity gage indicates in yellow band or with less than 10 gallons in each main tank.

P/N 35-590001-5 Issued: May 12, 1972

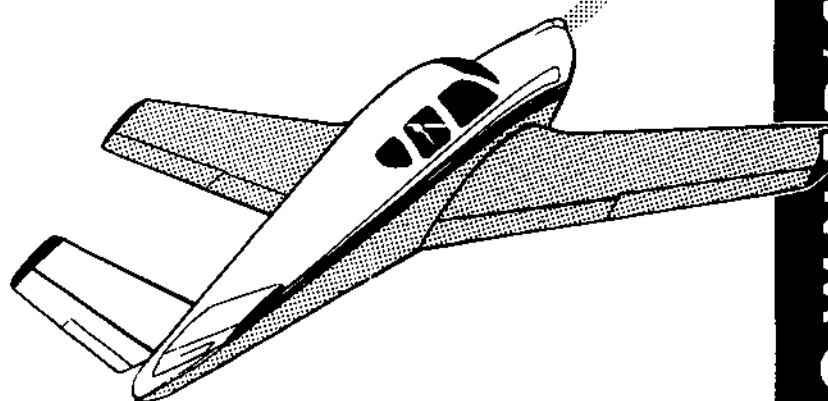
Founded in 1932 by Walter H. Beech

JEFF JACOBS

Beechcraft



J 35



OWNER'S MANUAL

PUBLISHED BY
PARTS AND SERVICE OPERATIONS
BEECH AIRCRAFT CORPORATION
WICHITA, KANSAS

Bonanza

35-590079-2
November 15, 1957

35-590079-2 A3
September 7, 1962

LIST OF EFFECTIVE PAGES

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 137

*Title	A3	September 7, 1962
*List of Effective Pages	A3	September 7, 1962
Preface		Original
i through iv		Original
1 through 11		Original
12	A1	March 20, 1958
13 through 20		Original
21	A1	March 20, 1958
22		Original
23	A1	March 20, 1958
24 through 26		Original
27	A1	March 20, 1958
28 through 32		Original
33	A1	March 20, 1958
34		Original
35	A1	March 20, 1958
36 through 43		Original
44	A1	March 20, 1958
45	A1	March 20, 1958
46	A1	March 20, 1958
47		Original
48	A1	March 20, 1958
49		Original
50 through 51	A2	August 10, 1959
52	A1	March 20, 1958
53 through 63		Original
64	A1	March 20, 1958
65 through 76		Original
77	A1	March 20, 1958
78 through 80		Original
81	A1	March 20, 1958
82 through 91		Original
*92 through 93	A3	September 7, 1962
94 through 122		Original
123	A1	March 20, 1958
124 through 132		Original

* *The asterisk indicates pages revised, added or deleted by the current revision.*

Revised September 7, 1962

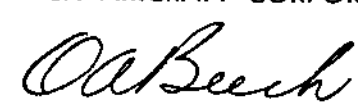
Preface

Welcome to the BEECHCRAFT family! As the owner of a Model J35 Bonanza, you have joined company with over 5,000 others who, since 1947, have found that flying in a Bonanza is a most pleasant and economical way to travel.

If you have owned a BEECHCRAFT previously, you know already of the pride that BEECHCRAFTERS take in their workmanship, and that our interest extends beyond the completion of a sale. The BEECHCRAFT Distributor and Dealer organization, and the Customer Service Division of Beech Aircraft Corporation, are pledged to do all in their power to make your ownership of a Beechcraft a happy experience.

This Owner's Manual, and the other publications included in your Service Information Kit, have been prepared to give you the information you will need to realize all the hours of utility and pleasant flying that have been built into your Beechcraft. From time to time, you will receive other service publications from your BEECHCRAFT Distributor. In your own interest, we hope you will read them all.

BEECH AIRCRAFT CORPORATION



O. A. Beech
President

Table of Contents

PERFORMANCE CHARTS

General Specifications

PERFORMANCE

Maximum cruising speed:	
(a) at 75% power (2450 rpm)	200 mph at 7,000 feet
(b) at 65% power (2450 rpm)	195 mph at 10,000 feet
Economical cruising speed: at 55% power (2300 rpm)	180 mph at 10,000 feet
High speed at sea level: (2600 rpm, full throttle)	210 mph
Rate of climb at sea level: (Rated power, 250 hp)	1,250 ft. per minute
Service ceiling: (Rated power, 250 hp)	21,300 ft.
Stalling speed (landing) with flaps	57 miles per hour
Cruising range: at 180 mph (55% power) at 10,000 ft.	725 miles on 39 gallons 1060 miles on 57 gallons
Maximum range: at 160 mph at 10,000 ft.	760 miles on 39 gallons
Take-off run (20° flaps): at sea level, 10 mph wind	670 feet
Landing run (30° flaps): at sea level, 10 mph wind	400 feet

The above performance figures are dependent upon the proper output of power by the engine; are for airplanes which have had no additional drag-producing items attached to their exterior surfaces; and which are in the condition as received from the factory without any modification by others. Subject to such conditions, these performance specifications are guaranteed within ± 3%.

BAGGAGE

Maximum 270 pounds

WEIGHTS

Gross Weight	2,900 pounds
Empty Weight	1,820 pounds

(Empty weight includes complete set of flight instruments; cabin heating and ventilating system, with windshield deicers; soundproofing; constant speed propeller; navigation, cabin, instrument and landing lights; unusable fuel and oil.)

Useful load	1,080 pounds
Available weight for people and baggage with full tanks	830 pounds

WING AREA AND LOADINGS

Wing area	177.6 square feet
Wing loading, at gross weight	16.3 lbs./sq. foot
Power loading, at gross weight	11.5 lbs./hp

DIMENSIONS

Wing span	32 ft. 10 in.
Length	25 ft. 2 in.
Height	6 ft. 6½ in.

CABIN DIMENSIONS

Cabin length	6 ft. 11 in.
Cabin width	3 ft. 6 in.
Cabin height	4 ft. 2 in.
Passenger door, size	36 in. x 37 in.
Baggage door, size	24 in. x 22 in.
Baggage compartments, size	16.5 cubic feet
Baggage compartment, maximum loading	270 pounds

PROPELLER AND EQUIPMENT

Propeller — Beech, with aluminum alloy blades, hydraulically controlled continuously variable pitch, series 278, diameter 82", with Woodward hydraulic governor and Beech spinner.

ENGINE EQUIPMENT

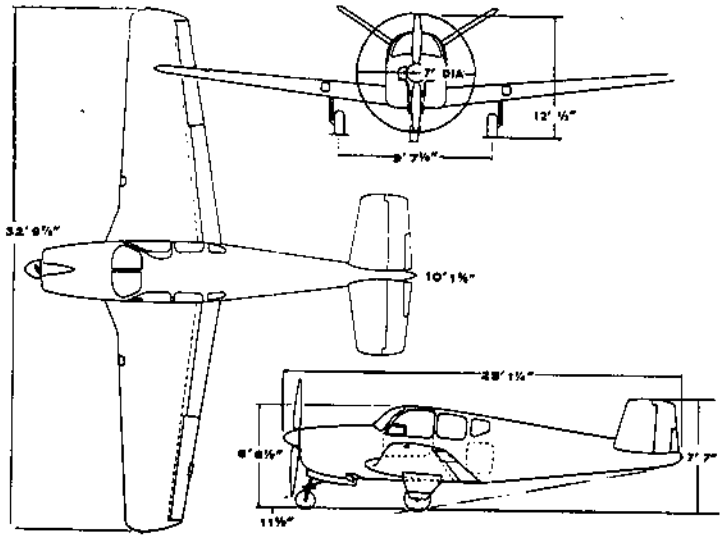
Starter
Generator (50 ampere)
Voltage regulator
Battery relay
Fuel pump
Induction air filter
Mufflers and cabin heaters (stainless steel)
Exhaust Manifolds (stainless steel)
Fuel injection

FUEL AND OIL CAPACITY

Fuel capacity in standard wing tanks.	39 gallons usable
Fuel capacity with optional auxiliary wing tanks	57 gallons usable
Oil capacity	9 quarts

LANDING GEAR

Tricycle type with swivelling steerable nose wheel equipped with shimmy dampener. Beech air-oil struts on all wheels designed for smooth taxiing and to withstand the shock created by landing with a vertical descent component of over 600 feet per minute. Main tires 6.50" x 8" size; nose wheel tire 5.00" x 5" size. Wheels — Goodyear with single disc hydraulic brakes.



About Your Bonanza

The story of your new Bonanza began in 1946, when the first of the Model 35 series made its maiden flight. It was designed and built to a radically new concept in private flying: an airplane which would provide airline speed, safety and comfort at a cost approaching that of a light airplane. Today, over 5,000 Bonanzas are giving their owners that kind of service.

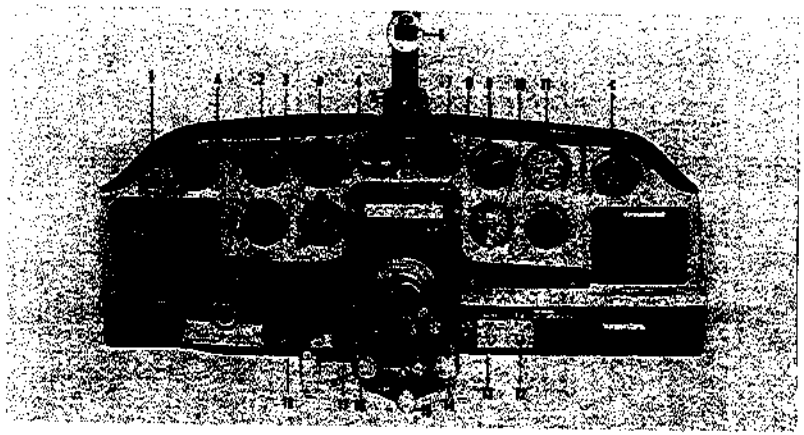
The J35 series is the tenth Bonanza, evolved in a continuous program of improvement within the basic design. Like its predecessors, it is a single-engine, four-place monoplane with tricycle landing gear and the V-tail which distinguishes it at a glance from all other private airplanes. While retaining the aerodynamic cleanness which earned it its reputation as the most efficient airplane in its class, your new Bonanza has several improvements in its power plant and interior.

Although in most instances you will operate your Bonanza in the manner contemplated by the "Normal" category of Civil Air Regulations, Part 03, it was designed to meet the more stringent requirements of the "Utility" category, in which it actually is licensed. Thus, while it may be used for non-scheduled passenger and cargo operations for hire as a normal category airplane, it can be flown also in the utility category for pilot training, including limited acrobatic maneuvers except snap or inverted flight maneuvers and spins, which are prohibited.

On the following pages of this handbook, the important features and characteristics of your Bonanza are described, along with suggested operating procedures, specific requirements and limitations and the

reasons for them, and performance data which will aid you in planning your flights so you may realize the maximum benefit from your investment.

The last pages of this book are devoted to keeping your Bonanza factory-new. In brief form, it contains instructions on lubrication, cleaning, routine inspections—preventive maintenance, intended to correct small troubles before they become large ones. Religiously followed, these procedures will insure that you receive from your Bonanza all the hours of happy flying its designers and builders put into it.



STANDARD EQUIPMENT

1. Stall Warning
2. Air Speed Indicator
3. Altimeter
4. Turn-and-Bank Indicator
5. Clock
6. Magnetic Compass
7. Vertical Speed Indicator
8. Engine Gage Cluster
9. Manifold Pressure Indicator
10. Fuel Pressure Indicator
11. Tachometer
12. Cabin Heat Control
13. Parking Brake Control
14. Propeller Control
15. Mixture Control
16. Throttle
17. Starter Switch
18. Cowl Flaps Control

OPTIONAL EQUIPMENT

A. Directional Gyro
B. Attitude Gyro
C. Suction Gage

FOR YOUR SAFETY . . .

If an airplane is to accomplish its intended purpose, transporting people and their possessions swiftly and comfortably to their destinations, it must be a *safe* airplane; it must have no bad habits that require extraordinary piloting skill, must be structurally sound, and in addition, it should have as many safeguards as are practical against human errors. Your Bonanza, of course, is completely normal to fly and is built to standards of strength far in excess of legal requirements. In addition, it has several features, some exclusively found in BEECHCRAFT airplanes, to assist you in flying it safely and protect you if a mishap should occur.

GOOD VISIBILITY

With increasing congestion around airports, the ability to see about you is vital to safe take-offs and landings. The Bonanza's wide, deep windshields and side windows extending behind the rear seat, combined with the nearly-level ground attitude afforded by its tricycle landing gear, give the pilot an excellent view of his surroundings.

LANDING GEAR AND FLAP INDICATORS

Both direct visual indication and signal lights on the instrument console tell the Bonanza pilot the position of his landing gear and flaps. The flaps are visible through the windows and an illuminated mechanical pointer operated through the nose gear linkage provides a check on the landing gear position lights. Both the landing gear and flap position switches have latches to prevent inadvertent actuation.

LANDING GEAR SAFETY SWITCH

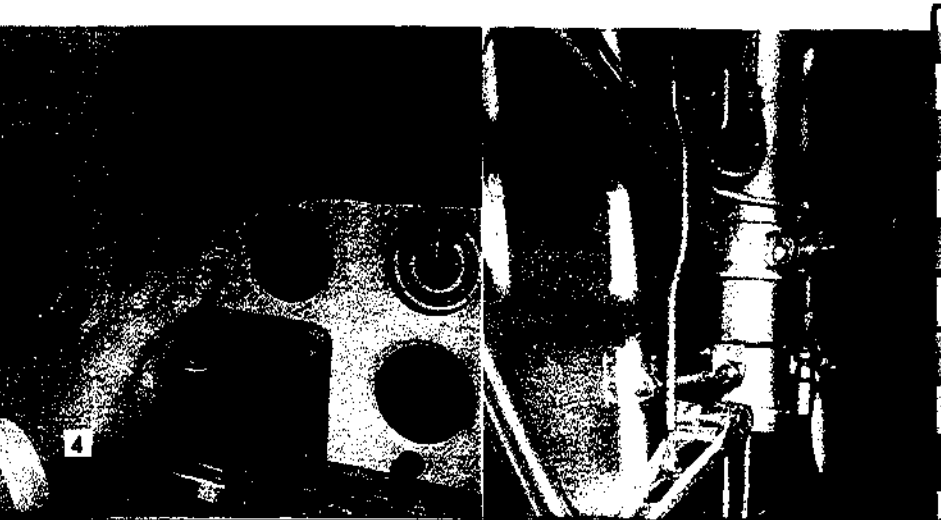
To avoid inadvertent retraction of the landing gear while the airplane is at rest on the ground, a safety switch on the main landing gear is operated by the compression and extension of the shock strut, breaking the landing gear control circuit when the strut is compressed and completing it so the gear may be retracted when the strut extends. The safety switch is not intended to protect the airplane while in motion; before starting to taxi, always make certain that the control switch is down.

STALL WARNING INDICATOR

To prevent accidental stalls, a stall warning indicator sounds a warning horn and flashes a red light on the instrument panel as an incipient stall develops, while there is ample time for the pilot to correct his attitude. The stall warning indicator, triggered by a sensing vane on the leading edge of the left wing, is equally effective in all flight attitudes and at all weights and airspeeds. Irregular and intermittent at first, the warning signal will become steady as the airplane approaches a complete stall.

LANDING GEAR WARNING HORN

The same horn which gives aural indication of a stall also will sound whenever the throttle is retarded below a setting sufficient to maintain flying speed, unless the landing gear has been lowered. The throttle warning signal is a regular intermittent note, to distinguish it from the stall warning indication. Either opening the throttle or lowering the landing gear will shut off the warning horn. There is no silencing switch.



STRUCTURE

The semi-monocoque structure of the Bonanza, of aluminum, magnesium and alloy steel, is riveted and bolted for maximum strength consistent with its weight limitations. The structure is designed for loads far in excess of the requirements of Civil Air Regulations and careful workmanship and thorough inspection make certain that the designed structural strength is in fact achieved.

SHOULDER HARNESS

The Beechcraft High-Strength Shoulder Harness on your Bonanza, by distributing loads evenly between the shoulders and hips, will keep its occupants snugly in their seats in turbulent air or under rapid deceleration. Tests have proved that, properly worn, the shoulder harness will protect its wearer in sudden straight-ahead decelerations approaching 20 Gs. It is mechanically simple, comfortable and permits sufficient freedom of movement to operate all the controls.

Your Bonanza has airline-type quick-release harness buckles which are easily adjusted and fastened. The nylon webbing, in colors complementing the upholstery, is strong, light, soil-resistant and easily cleaned.

INSTRUMENT COWL PAD

A thick pad of foam rubber, covered with dull-finished leather, is formed into a roll around the upper edge of the instrument panel. This pad, coupled with the shoulder harness, affords the occupants of your Bonanza still greater protection from injury during rapid deceleration. In addition, it forms an attractive frame for the instrument panel, and its dull surface prevents annoying reflections and glare.

LANDING LIGHTS

For night flying, sealed-beam landing lights are recessed behind clear plastic lenses in the wing leading edges. The lights are focused to illuminate the landing area from the air as well as on the ground, and are shielded to prevent glare in the cabin which would interfere with the pilot's vision. The landing lights are not intended for ground operations, nor for prolonged use in the air, which will cause them to overheat.

FOR YOUR COMFORT AND CONVENIENCE

In addition to flying safely and economically, your new Bonanza has features for your comfort and convenience found in no other airplane in its class. Within the weight limitations imposed by the fact that it must fly and carry a useful payload, its interior is as attractive, luxurious and durable as skilled artists and engineers can make it.

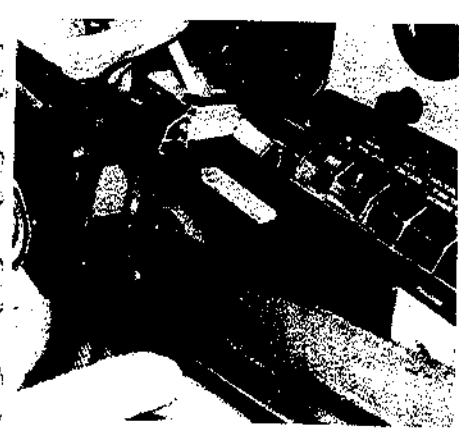
In the following paragraphs you will find brief descriptions of some of the features which contribute to your comfort and convenience. Others, which are optional equipment items, are discussed elsewhere in this handbook.

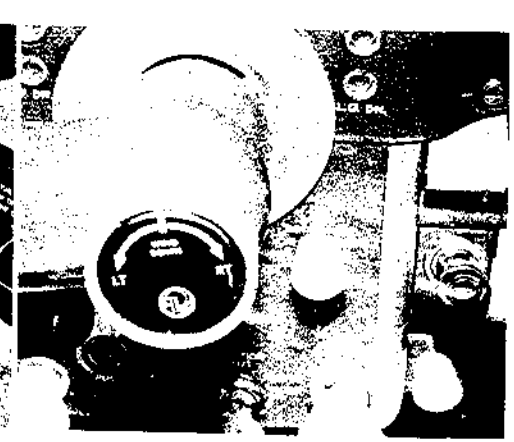
MAP CASE AND GLOVE COMPARTMENT

A map case, conveniently located under the left side of the instrument panel, is the correct size to hold folded airway maps, laid flat. If an ADF unit replaces the map case, maps may be carried in the pocket in the left side panel, beside the pilot's seat. There is a convenient glove compartment set into the right side of the instrument panel, for the surface control lock and other small articles.

ASSIST STEP

An assist step behind and below the trailing edge of the right wing, and a hand grip just above and ahead of the step, make entering the Bonanza cabin a simple matter. To reduce drag, the step automatically retracts and extends with the landing gear.





ARMRESTS AND HEADRESTS

Armrests for both front and rear seat passengers are built into the cabin sidewalls and the door; a cup in the door armrest forms a convenient handle for pulling the door closed. In addition, a center armrest in the rear seat back may be swung down or folded up into the seat back, and a generously-proportioned armrest between the two front seats may be raised into position on a pedestal, or lowered flush with the seat cushions.

All four seat positions have sockets for attaching large, neck-pillow style headrests, two of which are provided as standard equipment. Used in connection with the shoulder harness, the headrests will permit a passenger to doze comfortably on a long flight and lessen the discomfort of flying through rough air.

SUN VISORS

Individual sun visors for the front seats may be adjusted individually to shield each occupant's eyes from the sun. For maximum forward and upward visibility, the visors may be laid back completely clear of the windshields. A small vanity mirror is fastened to the back side of the right visor.

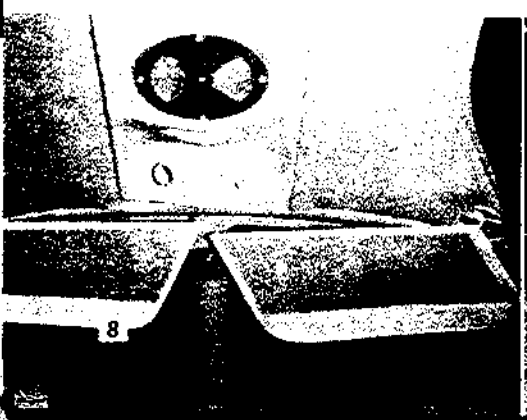
ASH TRAYS AND LIGHTERS

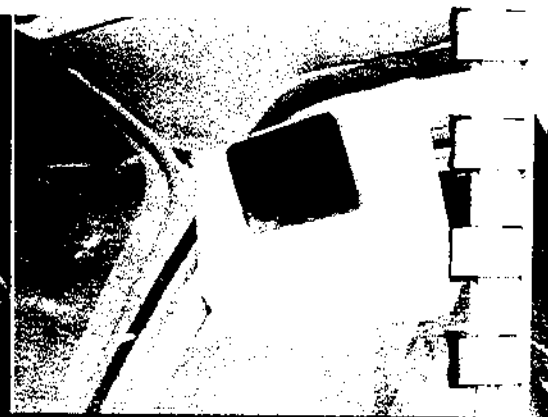
For the convenience of passengers who smoke, there is an electric cigarette lighter on the right subpanel, next to the control console. Pull-out ash trays are incorporated in each side of the subpanels, just outboard of the last switch key on each side, and fitted into the side panels on each side of the rear seat. To remove an ash tray for emptying, depress the snuffer bar and pull the tray out of its mounting.

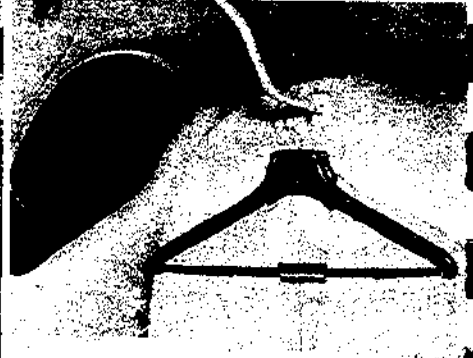
SEAT ADJUSTMENTS

The Bonanza's seats have been designed for the different sizes in which pilots and passengers are apt to come. Both of the individual front seats are adjustable fore-and-aft, by pulling up on the small lever just to the right of each seat cushion and pulling or pushing on the seat. In addition, the front seat backs are adjustable to three angles off vertical, providing a welcome change of position on long flights. The right hand set of rudder pedals are stubs, and fold forward against the floorboards when they are not in use, giving the occupant of that seat the maximum available leg room.

Like the front seats, the back seat may be adjusted to three positions off vertical by pulling forward on the seat back to raise it or pulling forward until the catch releases, then pushing back again, to lower it.



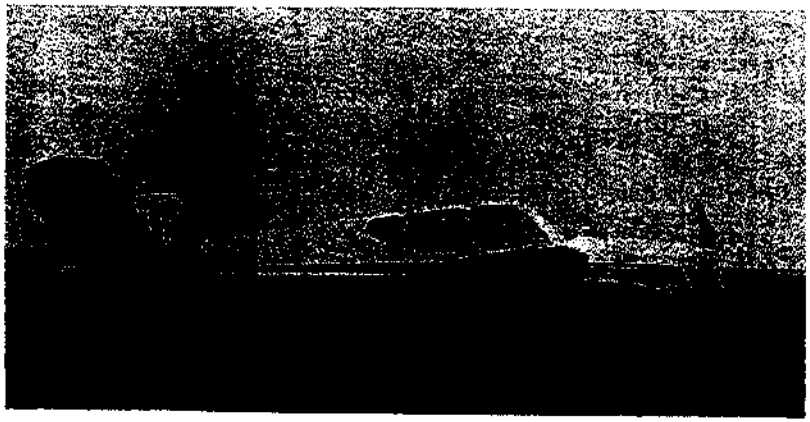




BAGGAGE COMPARTMENT

The baggage compartment, aft of the rear seat, has a capacity of 270 pounds with 16½ cubic feet of space. It is accessible both through the 24-inch by 22-inch door on the right side of the fuselage, and from inside the cabin by unsnapping the boot back of the rear seat. The baggage compartment floor is fitted with tie-down lugs for lashing cargo, and pockets on the back of the rear seat may be used to stow small, loose items.

A coat hanger secured overhead behind the rear seat may be used to hang clothing in the baggage compartment, without folding. Clothing hung here is completely clear of the passenger area, yet readily accessible in flight. The compartment door is locked by the ignition and battery switch key.



OPTIONAL EQUIPMENT

Since it would be virtually impossible to design an airplane which would fit the needs of all operators and all situations, your Bonanza was designed with those features most needed for *average* use as standard equipment, and other equipment items, for special purposes or desired by relatively few people, as optional equipment. The optional equipment items offered by BEECHCRAFT have been designed especially for the Bonanza, and may be installed in it either at the factory when the airplane is assembled, or by your BEECHCRAFT distributor or dealer later on without excessive rework or installation cost, in locations designed for them. Some items, such as super soundproofing and auxiliary wing tanks, are suitable only for factory installation, due to the impracticability of installing them on a completed airplane.

The following paragraphs describe a few of the optional equipment items for your Bonanza, some can be selected when ordering the airplane, others may be obtained from your BEECHCRAFT distributor or dealer at a later date if you find them desirable due to changes in your requirements. Additional accessories and optional equipment are available through your BEECHCRAFT distributor.

FLARES (Kit Only)

To meet Civil Aeronautics Regulations requirements for night operations carrying passengers for hire, three 1½ minute parachute flares are required. The brackets, wiring and circuit breaker and switch provisions for the flares are installed at the factory, to simplify installation of the flares by your BEECHCRAFT distributor or dealer, who will make the complete installation if you desire it. The flares are released by turning on the flare master switch, then firing the flares individually. The switches are mounted in the right circuit breaker panel.

Successful use of the parachute flares in making an emergency landing involves a definite technique, which should be practiced until it becomes familiar. Bulletin No. 17, published by the University of Illinois Institute of Aviation, describes flare technique in detail and should be studied carefully before you find it necessary to use flares to make a landing.

AUXILIARY FUEL CELLS (Factory Installation Only)

An additional 18 gallons of usable fuel may be obtained by installing auxiliary fuel cells in the wings, outboard of the standard cells. Both auxiliary cells are connected to a common port in the fuel selector valve, so that both feed simultaneously when the selector valve is set to AUX. Individual liquidometer units in each auxiliary cell transmit fuel quantity information to the auxiliary fuel cell gage. The fuel level of either cell may be read by switching the auxiliary fuel gage selector switch on the left subpanel to the desired position, R (right) or L (left). Wing auxiliary cells may be ordered only at the time the airplane is ordered from the factory, due to the extensive rework necessary to install them after the wing skins are riveted in place.

HEATED PITOT HEAD (Factory or Kit Installation)

For more reliable instrument indication during adverse weather, an electrically-heated pitot head is available from your BEECHCRAFT distributor or dealer. Controlled by a switch on the subpanel, the heater will prevent the formation of ice on the pitot head, which could cause inaccurate airspeed indications.

EXTERNAL POWER RECEPTACLE (Kit Only)

To save battery power when starting, particularly in cold weather when the starting load is heaviest and the battery least efficient, a standard external power receptacle may be installed on the lower right engine cowl. The external power receptacle also is useful for making checks of radio and other electrical equipment without the necessity of starting the engine to save battery power. The power receptacle is connected to the starter relay and when a power unit or battery cart is connected, the electrical system is energized. Before connecting an auxiliary power source, make certain that it is of negative-ground polarity and see that the landing gear control switch is in the DOWN position. Connecting a power source of positive-ground polarity can result in a battery fire and damage to other electrical equipment. Unless there is a means of limiting the input amperage to a safe charging rate, or you are certain the battery is completely charged, the battery switch should be off when using external power.

INSTRUMENT FLIGHT EQUIPMENT

An important added safety factor of special value when flying on instruments, at night, or under any conditions of marginal visibility, directional and attitude gyro instruments normally will be included among the optional equipment items installed in your Bonanza. The associated vacuum system, including engine-driven vacuum pump, oil separator, relief valve and suction gage are installed with provisions for the gyro instruments in case they are to be installed, by themselves or in conjunction with an autopilot, following factory delivery.

A blind flying kit, for instrument flight practice, consists of orange plastic sheets which may be attached to the windshields and a pair of goggles with blue lenses for the practicing pilot. Since the two colors cancel each other, the wearer of the goggles will be able to see nothing outside the cockpit, while the instruments and controls inside are clearly visible; an instructor or observer, on the other hand, will retain full forward vision and be able to warn the pilot or take control, if the occasion should arise. The windshield coverings need not be installed permanently.

DUAL CONTROLS

For pilot instruction, familiarization and demonstration purposes, your Bonanza may be equipped with a dual control column having two wheels, instead of the standard throwover control arm. Dual brakes, with master cylinders on the right hand rudder pedals as well as the left hand, make the dual control installation complete. The dual brake system includes shuttle valves which automatically transfer brake control from one side to the other.

RADIO EQUIPMENT

To better fit radio equipment to individual owners' preferences, several radio packages suitable for installation in the Bonanza have been developed from Lear, Narco and ARC equipment. The packages are designed to provide VHF communications and navigation, marker beacon, ADF and standard broadcast reception. In addition, long-range low- and intermediate-frequency equipment is available for special purposes.

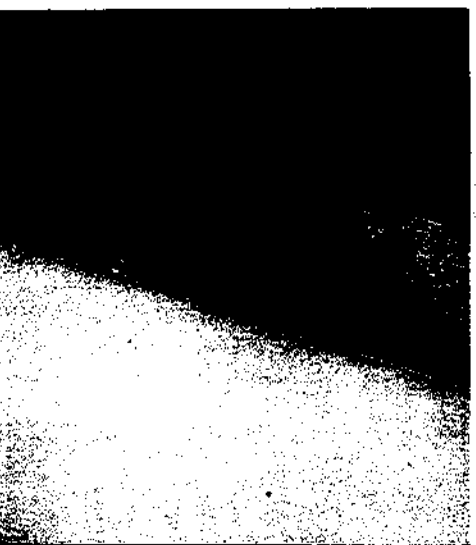
AIR CONDITIONER

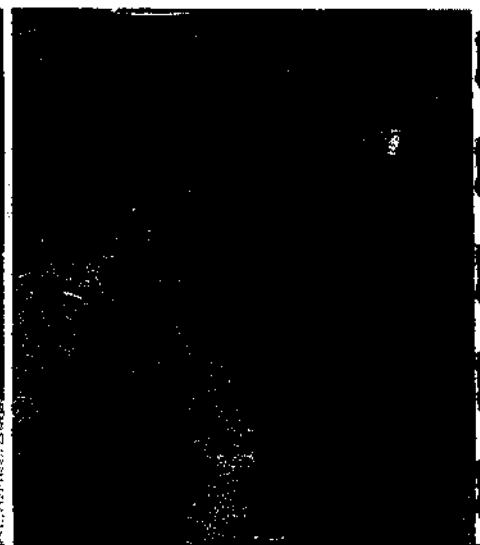
An abundance of cooled, washed air is provided by an evaporative cooler in the cabin overhead. The air conditioner takes in outside air through a scoop in the cabin roof and passes it over a set of mineral wicks which rest in a pan of water. Evaporation of water from the wicks cools the air passing over it, and the damp wicks trap dust and pollen. The cooled, washed air then is distributed to the cabin by four adjustable ball-and-socket outlets in the overhead. The airscoop is hinged and may be opened, closed or placed in an intermediate position to provide the desired airflow, by adjusting a push-pull control placed overhead, just aft of the cabin loudspeaker. Rotating the control handle locks it in the desired position.

The air conditioner will provide up to four hours' cooling between refilling, the duration and the temperature reduction depending on the relative humidity of the air. It requires only refilling and a seasonal draining and cleaning of the wicks and pan to keep it in good working order.

ROTATING BEACON

Particularly valuable for operating in and around highly congested airports, the rotating beacon throws two powerful beams of red light, 180 degrees apart, which may be seen in the air for several miles. The beacon, similar to those used on commercial airliners, is installed on the top of the fuselage, just aft of the baggage compartment, where glare in the cabin is minimized. It is controlled by a switch on the right subpanel.





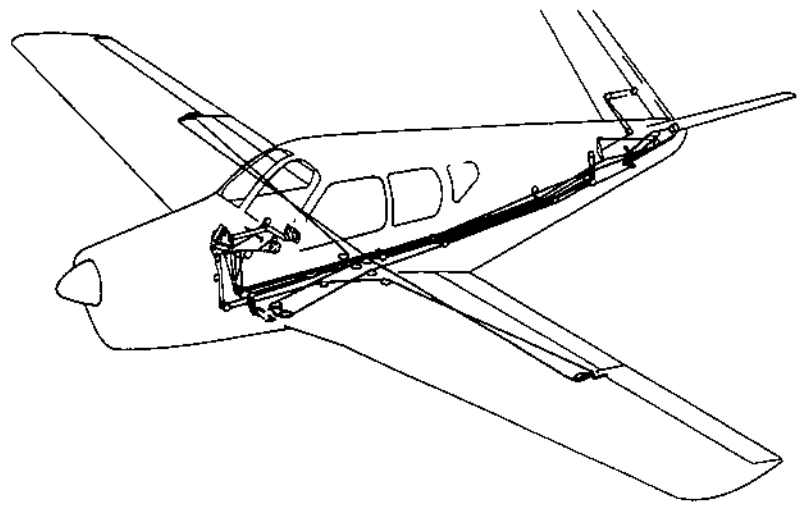
SYSTEMS AND THEIR CONTROLS

To fly your Bonanza intelligently, you should know the several systems—flight controls, power plant, landing gear, electrical—and the location and function of each lever, knob and indicator. You will find it helpful, also, to know in a general way where each component is, how it works and what part its function plays in the over-all operation of the airplane. On the Bonanza, these systems logically fall into four general groups: airframe, power plant, electrical and heating and ventilating, although all four groups are closely inter-related.

FLIGHT CONTROLS

The Bonanza's V-tail surfaces are operated by the conventional rudder pedal—control column combination, through closed-circuit cable systems. The control column moves both tail surfaces together in the same direction, so they act as elevators, while the rudder pedals operate these surfaces in opposite directions to act as rudders. Both controls may be operated simultaneously and the airplane will respond in the same manner as one with a conventional tail.

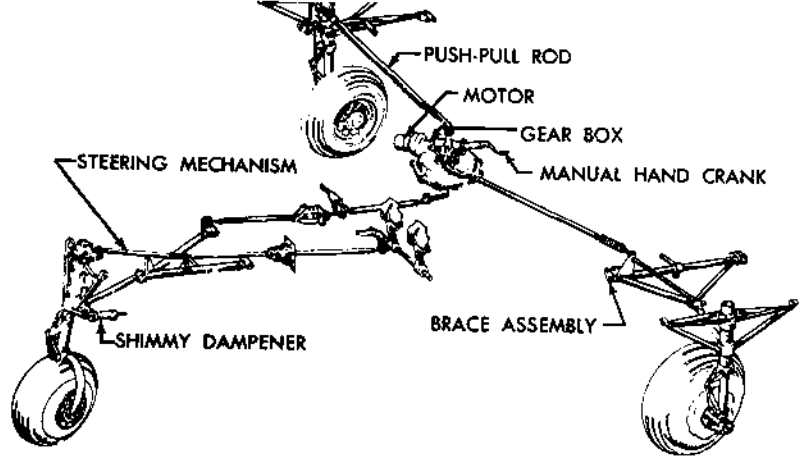
The trim tabs on the tail surfaces operate as elevator trimmers only, and are controlled by a handwheel at the left of the control console; their position is indicated by a drum-type dial in the lower control console, actuated by the handwheel shaft.



The ailerons are actuated by a wheel on the throwover control column through conventional closed-circuit cables. Both ailerons have fixed trim tabs; aileron trim in flight is made with the aileron trimmer on the hub of the control column which may be set to apply a constant load on the control cables in either direction. The trimmer is arranged so that the control wheel will override it in either direction, at any time. If the wheel movements are not large and are made smoothly, the trim setting will remain undisturbed.

The control column is adjustable for two wheel heights in both the pilot's and copilot's positions; to adjust the height of the wheel, or transfer it from one side to the other, pull out on the T-handle latch at the base of the control arm then position the arm as desired. When transferring control from one side to the other, the aileron trimmer should be held until the wheel is repositioned.

The flaps are raised and lowered electrically by jackscrew actuators driven through flexible shafts from a single motor and gearbox under the front seat. The flap position lights on the left side of the control console show green for the up position and red for the full-down landing position; intermediate 20-degree and 10-degree positions for short-field take-off are indicated by lines painted on the nose of the left flap. The intermediate positions are reached when the marks are aligned with the trailing edge of the wing. Limit switches for the up and down positions stop the flaps automatically at the proper point. Intermediate flap positions may be set by moving the control switch to off when the desired setting is reached.

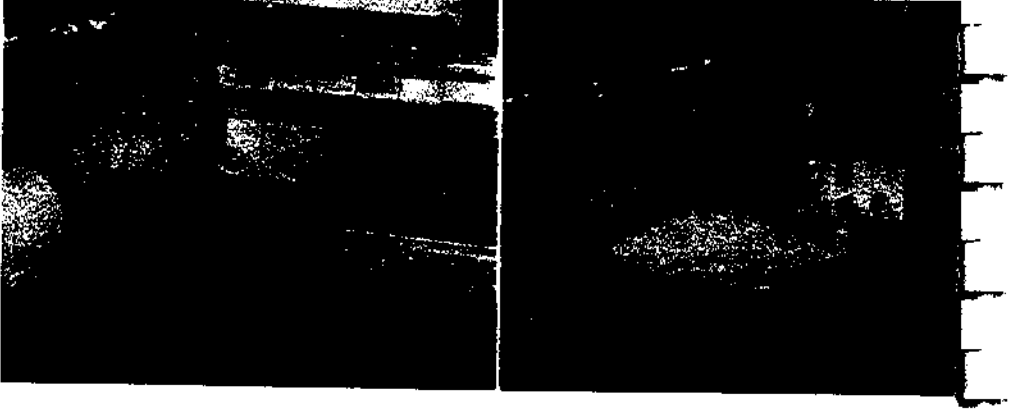


LANDING GEAR

The fully-retractable tricycle landing gear on your Bonanza is operated by a single electric motor through push-pull tubes and a gearbox under the front seat. When retracted, all three wheels are completely enclosed by doors which operate automatically.

The nose wheel of the Bonanza is steerable through linkage connected to the rudder pedals; its maximum deflection with the rudder pedals alone is 17 degrees to either side of center, while with both rudder pedals and brakes the deflection may be increased to 29 degrees on either side. The steering linkage is spring-loaded to absorb shocks and will compensate automatically for rudder applied on crosswind landings. When the rudder pedals are released, the nose wheel will caster and align itself automatically; in addition, to insure proper retraction a roller-and-slot arrangement will correct any misalignment of the wheel as it enters the wheel well. A hydraulic dampener on the nose wheel strut compensates for the tendency to shimmy which is an inherent characteristic of swiveled nose wheels.

The landing gear position indicator lights on the right side of the control console show red when the gear is up, or green when it is down, coming on only when the gear reaches its locked position at either extreme. In addition, a mechanical indicator on the floorboard beneath the control console shows the position of the gear at all times; its pointer is linked by a cable to the actuating mechanism and moves simultaneously with it. Limit switches and a dynamic brake automatically stop the retract mechanism when the gear reaches its full up or full down position. In addition to the position indicators, the



landing gear control circuit has three devices to assist you in operating it safely: a latch on the control switch which must be moved aside to place the switch in the up position; a warning horn which sounds whenever the throttle is retarded below approximately 12 inches Hg manifold pressure with the gear retracted; and the safety switch on the right shock strut which opens the control circuit whenever the strut is compressed by the weight of the airplane. You should bear in mind that these devices are emergency equipment, in the sense that they are intended to avoid an emergency if you should make a mistake. *To be safe all the time, handle the landing gear control switch as though these devices were not installed.*

The Bonanza is fitted with Goodyear single-disc hydraulic brakes on the main wheels, actuated by master cylinders linked individually to the rudder pedals in the familiar toe-pedal manner, so they may be used in steering the airplane on the ground. The standard installation includes master cylinders on the pilot's rudder pedals only.

The brakes are self-compensating, receiving fluid from a reservoir mounted on the engine side of the firewall to make up for the increased volume of the system resulting from lining wear, or losses from leakage. The reservoir is accessible by raising the engine cowl and should be checked occasionally and the fluid replenished if necessary. The parking brake is set by a push-pull control with a center-button lock, just to the right of the control console. Setting the control does not pressurize the brake system, but simply closes a valve in the brake lines so that pressure built up with the toe-pedals is retained and the brakes remain set. Pushing the control in opens the valve, releasing the brakes. The parking brakes can be pressurized only with the pilot's pedals.

ENGINE

The Continental IO-470 engine which drives your J35 Bonanza is the first engine in the light airplane class to use fuel injection in place of a conventional carburetor. Basically identical to other Continental opposed engines, it has increased compression, made possible by the even mixture distribution and precise fuel/air ratio control inherent in fuel-injection and gains increased horsepower without increased displacement.

The fuel injection system used on the IO-470 engine is a continuous-flow type using a special, aerated nozzle at the intake port of each cylinder. Fuel flow is controlled by a pressure-regulating valve basically controlled by linkage to the air throttle in the induction manifold. A manual mixture control arrangement overrides the throttle's control of the pressure regulator to establish a basic mixture setting: once this setting is made by the pilot, the throttle linkage varies fuel pressure to maintain the desired mixture. The fuel pressure gage is connected to the discharge side of the pressure regulator and provides a means of precisely determining fuel flow and mixture strength.

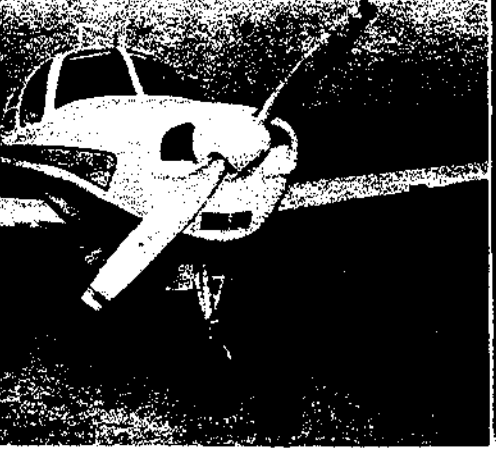
The IO-470 engine is approved for 91/96 octane fuel; never use a lower grade. ***If 91/96 octane fuel is not available, use 100/130 octane. Never use 80/87 octane fuel.***

The correct engine oil grades for various temperature ranges are listed in the maintenance section of this manual.

PROPELLER

The propeller used on the J35 Bonanza is a BEECHCRAFT design, the Model 278, first employed on the BEECHCRAFT Mentor series used by both the United States Air Force and the United States Navy, as well as the military service of several other nations. The Model 278 propeller uses the centrifugal twisting moment of the blades, opposed by boosted, governed engine oil pressure, to change pitch as required. The pitch change mechanism is quite simple, with few working parts, and requires a minimum of repair and maintenance.

In operation, a push-pull control similar to the throttle and mounted to the right of the throttle on the control console is used to set a hydraulic governor for the desired engine rpm. Once the rpm is selected, the governor directs engine oil under high pressure to a



hydraulic cylinder in the propeller hub, or permits it to return to the engine. The cylinder is linked to the propeller blades, so that its movement in and out of the hub results in rotation of the blades and changes their pitch. Oil pressure in the cylinder causes the cylinder to move out, rotating the blades to high pitch, while the opposing twisting moment of the blades rotates them to low pitch. In an overspeed condition, the governor directs sufficient oil pressure to the cylinder to overcome the twisting moment and increases the blade pitch; in an underspeed condition, the governor relieves the oil pressure and the twisting moment then becomes greater, decreasing the blade pitch and returning the oil to the engine. When these opposing forces are balanced, the propeller is on-speed and the oil flow is only a nominal amount for temperature stabilization and lubrication.

PROPELLER GOVERNOR

The Woodward hydraulic governor is of conventional flyweight-and-speeder-spring design, in which the centrifugal force of rotating flyweights and the pressure of the speeder spring are used to operate a pilot valve, directing oil under governor-boosted pressure either to the propeller or back to the engine sump, as required to maintain the selected rpm. Engine speed is selected by the propeller control, which changes tension on the governor speeder spring. Since the action of both governor and propeller is proportional and quite rapid, the engine rpm you select is maintained to close tolerance throughout a wide range of power and load variations. The gear-type boost pump and pressure relief valve for the governor control system are integral parts of the governor.

In addition to its constant-speed control function, the governor may be used in the event of engine failure to quickly bring the propeller blades to their full high pitch position. In full high pitch, the blades present a minimum of surface to the airstream and hence produce minimum drag; the improvement in gliding distance is significant. This feature is used by pulling the propeller control all the way out; the last 1½ inches of control travel, beyond the normal governing range, actuates this feature.

FUEL SYSTEM

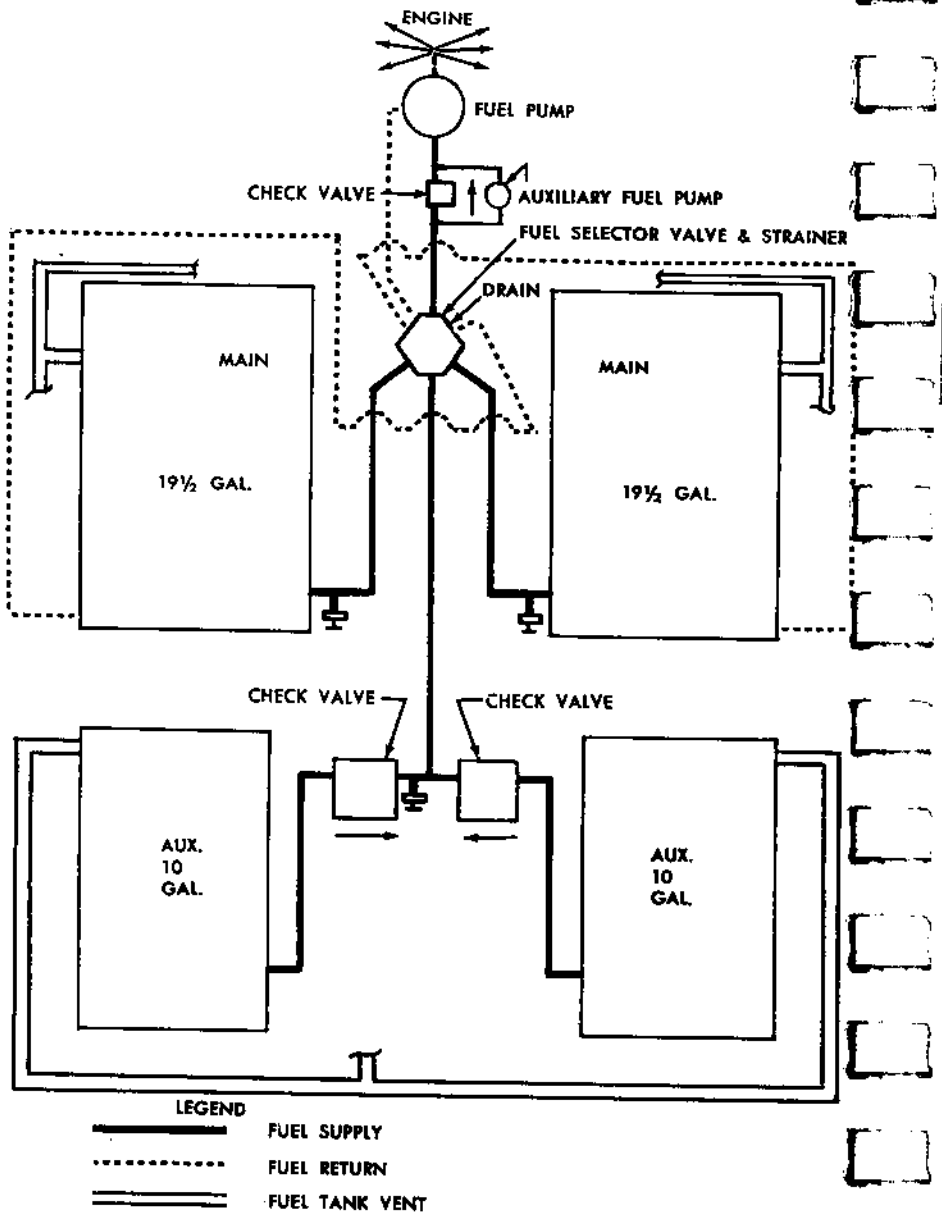
Your Bonanza's fuel supply is carried in two bladder-type cells with a usable capacity of 19½ gallons each, located in the wings just outboard of the fuselage. Fuel is fed from the cells to a selector valve just forward of the front seat, on the left side, then through a strainer to the fuel pumps and the engine. The fuel tank fillers are located in the wing leading edges, where they are accessible for quick servicing.

Since fuel pressure is the governing factor in controlling mixture strength with the fuel injection system, standard equipment on the J35 Bonanza includes both the engine-driven fuel pump and an electrically-driven in-line boost pump between the engine and the selector valve. The electric pump is used both for starting and as an emergency pump to supply fuel in flight if the engine-driven pump fails. The switch for the electric pump has two running positions; one supplies full voltage to the pump, for normal fuel pressure and the other, through a voltage-dropping resistor, supplies a lower voltage to give the reduced pressure needed for starting. There is no separate priming system; the engine is primed for starting when the throttle is opened to the starting position.

Since the fuel injection system returns about 10 gallons per hour of excess fuel, fuel return lines are routed through the selector valve to each main cell; except the auxiliary cells, fuel is returned to the cell from which it is drawn. ***The auxiliary cells return fuel to the left main cell only.*** To provide space for the returned fuel from the auxiliary cells, the left main cell should be used to approximately half full before switching to auxiliary.

Each fuel cell is fitted with a finger strainer and a sump drain and there is an additional sump drain and strainer on the bottom of the

FUEL SYSTEM SCHEMATIC



fuel selector, and a drain on the auxiliary cell interconnect line, at the selector valve. The wing cell drains extend slightly below the lower wing skin; both the strainer and auxiliary fuel line drain are accessible through a door in the lower fuselage, just below the leading edge of the left wing. A small quantity of fuel should be drained from each valve before the first flight each day.

OIL SYSTEM

The Continental IO-470 engine in the Model J35 Bonanza uses a wet-sump oil system, which is an integral part of the engine. The only external component of the oil system is the cooler, which is bolted to the front of the engine case. There are no external tanks or oil lines with this arrangement; oil enters and leaves the cooler through ports which match ports on the oil cooler mounting pad of the engine.

Control of oil temperatures and circulation through the system are completely automatic. The cooler has built-in thermostatic and pressure bypass valves which divert the flow around the radiator section. The bypass valve, set to relieve pressure at a point somewhat higher than the engine pressure relief valve, automatically opens if sludge or congealed oil in the radiator section block the flow through it. The thermostatic valve bypasses the oil when its temperature is below a pre-set minimum. There are no manual oil system controls; oil temperatures are regulated manually only indirectly, by adjusting the cowl flaps to change the flow of cooling air across the engine and through the cooler.

The engine oil sump is serviced through a filler neck on the left side of the engine case, near the nose; there is an access door for that

purpose in the left upper cowl. An oil level dipstick just to the left of the filler neck also is accessible through the door in the cowl. The dipstick ring handle is fitted with a lock ring and must be rotated ¼-turn in either direction to remove it. On replacing the dipstick, press down on the ring handle and rotate it until you feel the dipstick drop into place and the lock ring seat in its groove. The dipstick must be inserted with its markings forward, to lock properly.

ENGINE CONTROLS

The Bonanza's engine and propeller controls, throttle, mixture control, propeller control, starter button and battery and ignition switch, are grouped on the lower control console, within easy reach of a pilot flying the airplane from either side.

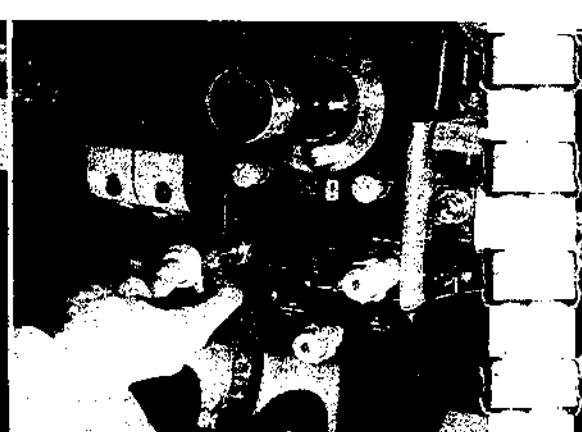
The throttle is pushed in to open, pulled out to close, and locks when the button on the end of the knob is released. With the throttle locked, fine adjustments may be made by rotating the knob.

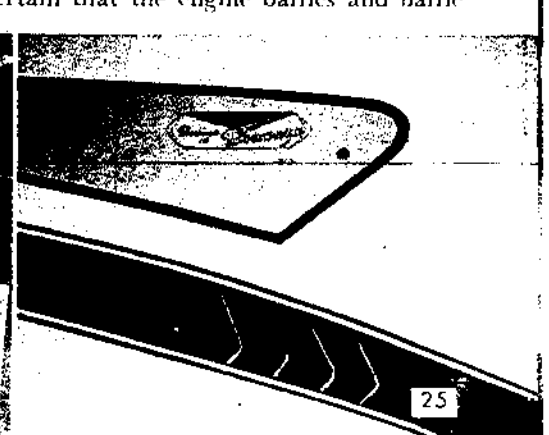
The propeller control is similar to the throttle, incorporating both a locking knob and a vernier arrangement for fine adjustments. The control is pushed in to increase rpm (low pitch) and pulled out to decrease rpm (high pitch). The key switch for the ignition and battery turns the battery on at its first position clockwise from off; the battery remains on through the left, right and both magneto positions. Like the propeller and throttle controls, the mixture control is locked when the button in the center of the knob is released, and it has a vernier arrangement for precise adjustments. The mixture control is pushed in for full rich and pulled out to the end of its travel for idle cut-off. Its vernier control, used with the fuel pressure gage, permits accurate control of fuel pressure and hence fuel flow. By programming your power settings in advance and following your schedule closely, you can make quite accurate predictions of fuel consumption.

ENGINE COOLING

The Bonanza's engine is cooled by air which enters the openings in the nose cowling, flows over the cooling fins on the cylinders and passes out through openings in the lower cowling. To control engine temperatures, the lower cowl openings are fitted with movable flaps which may be opened or closed with a push-pull control on the left instrument subpanel. Except when operating in extremely low temperatures, the cowl flaps should be open during all ground operations. In flight, the cowl flaps may be adjusted as necessary to maintain proper engine temperatures.

Since proper cooling is dependent upon sufficient airflow, derived mostly from the forward movement of the airplane, ground running time should be held to a minimum and engine temperatures watched closely. You should make certain that the engine baffles and baffle

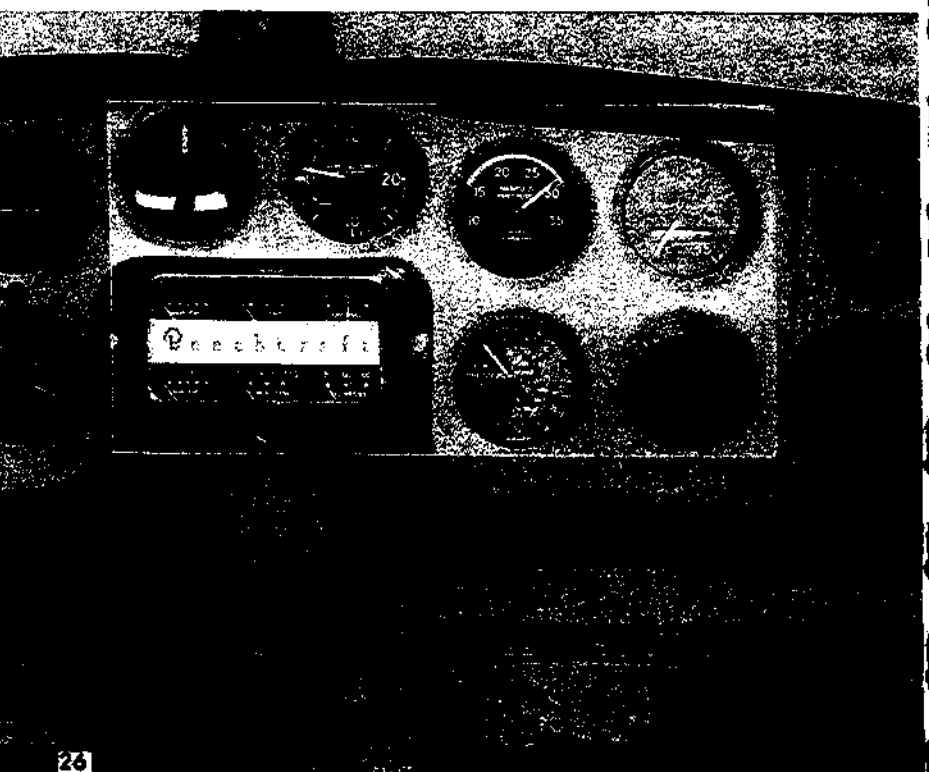




seals are maintained properly and that the cowling fasteners are kept tight, so that the airflow across the engine is undisturbed. The propeller should be kept in full low pitch for ground operations, since the increased airflow derived from higher engine rpm, coupled with the lower cylinder pressures, will help keep engine temperatures within limits.

ENGINE INSTRUMENTS

Except for the tachometer, manifold pressure gage and fuel pressure gage, the power plant instruments are grouped together immediately above the control console. The engine gage cluster includes the fuel quantity gage, oil pressure gage, the oil temperature and cylinder head temperature indicators and the ammeter. The fuel quantity gage is a single instrument; a switch on the left subpanel selects the cell on which you desire a reading. When the two ten-gallon auxiliary wing tanks are installed, an auxiliary fuel quantity gage is added to the cluster. Like the main cell system, a switch on the subpanel selects the auxiliary cell to which the gage is connected.



The manifold pressure gage, fuel pressure gage and tachometer are mounted in the instrument panel proper. The tachometer is driven by a flexible shaft from the engine accessory section. Incorporated in the tachometer is an engine hour meter which automatically records the total engine operating time.

The fuel pressure gage is calibrated in psi and marked for recommended pressure settings for various power requirements. The dial, marked in green, is divided into two portions. The upper portion has segments marked for various percentages of power, for cruising flight; the pressures indicated represent best-power mixture strengths. The lower part of the dial is marked to indicate the best mixture settings for take-off power at various altitudes.

FLIGHT INSTRUMENTS

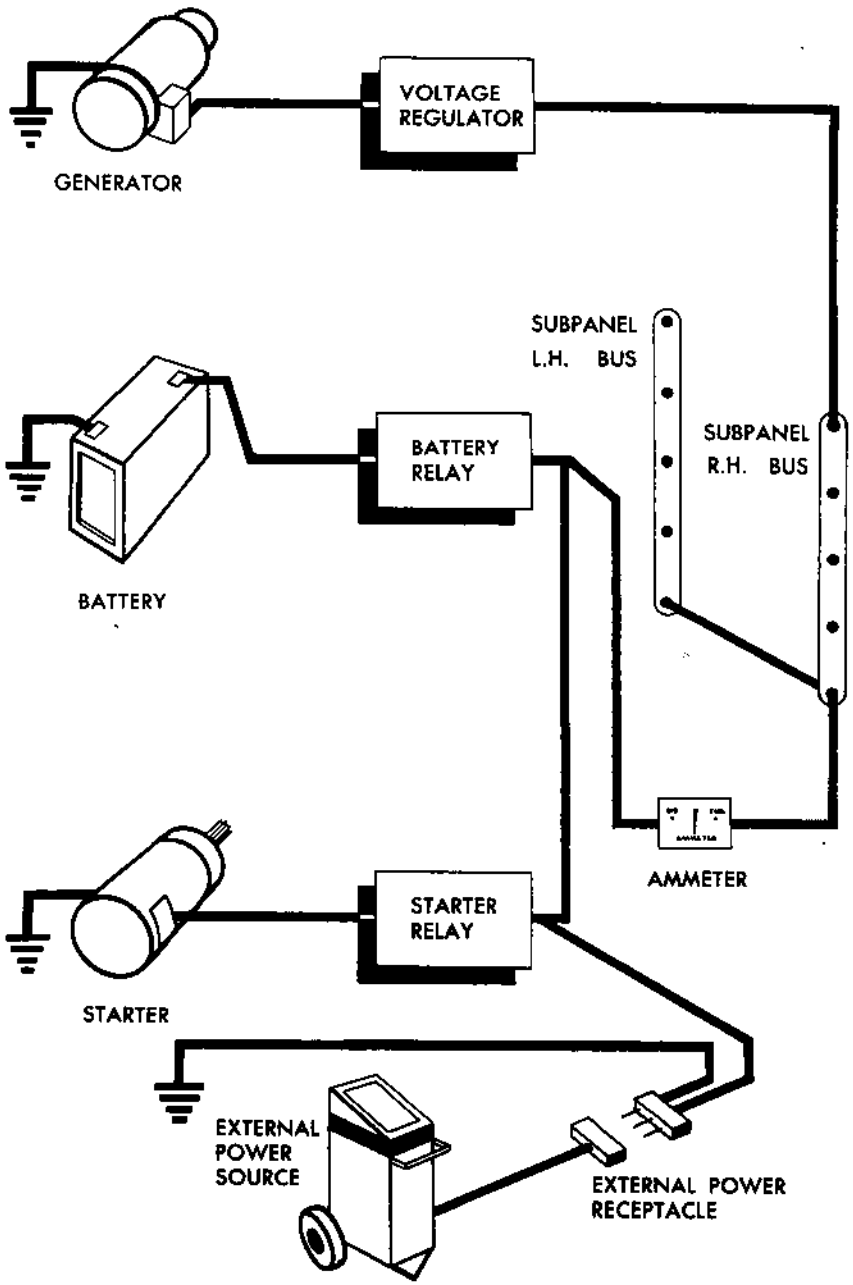
Standard instrumentation on the Bonanza includes an airspeed indicator, altimeter and electric turn-and-bank indicator mounted in the instrument panel; magnetic compass mounted on the windshield divider; a clock built into the instrument cowl pad, and outside air thermometer at the top of the divider.

In addition to several radio-navigation combinations, optional instruments for which openings are provided in the instrument panel include a vacuum-operated directional gyro and attitude gyro and the suction gage necessary when these instruments are installed.

Ram air pressure for the airspeed indicator is picked up by a pitot tube on a mast under the left wing. Static air pressure for the altimeter, rate-of-climb indicator and airspeed indicator is supplied by two static ports on the side of the fuselage just back of the baggage compartment. These ports must be kept clean and the lines open at all times, for correct instrument readings. A check of the ports should be part of your preflight inspection routine, and the static line drain, accessible from the baggage compartment, should be opened occasionally to drain accumulated moisture from the lines.

ELECTRICAL SYSTEM

Direct-current electric power for the Bonanza is supplied by a 12-volt engine-driven generator of 50 ampere capacity, controlled by a voltage-current regulator which automatically adjusts generator output to its load, including recharging the battery. All circuits in the airplane are single-wire, ground-return, in which the airplane structure itself is used as one of the conductors.

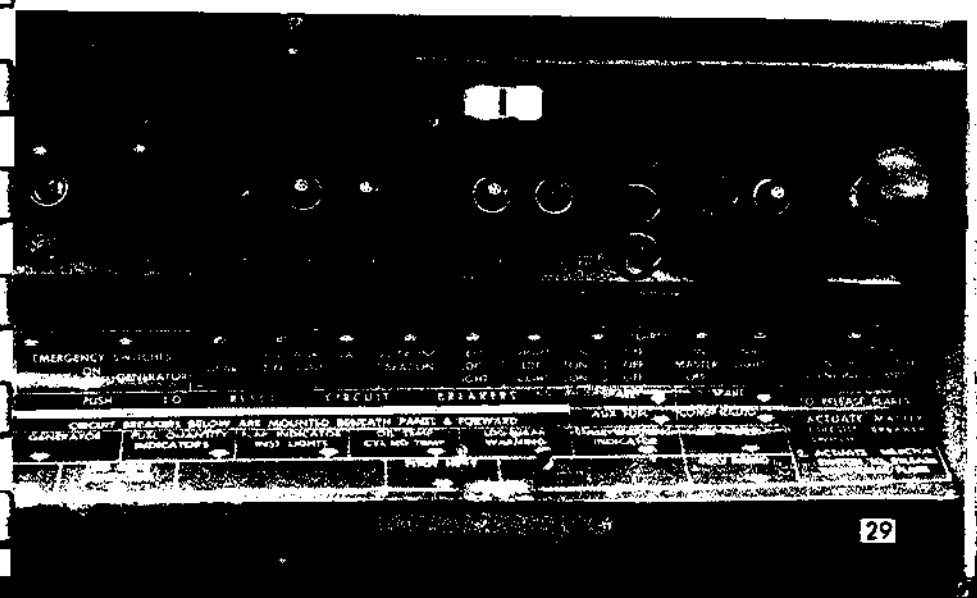


ELECTRIC POWER DISTRIBUTION

All circuits in the airplane are protected by circuit breakers. Two types are used in the Bonanza: the push-to-reset, and the push-pull type which can be tripped manually. Most of the circuit breakers are grouped on a panel under the right side of the instrument panel, covered by a door; on the inside of the door, a placard gives the location and type of each circuit breaker located elsewhere. The figures in the center of the button on the push-to-reset breakers give their individual capacities in amperes for 12-volt operation.

The generator, battery and starter circuits in the Bonanza are relay-controlled, to minimize the length of the heavy cables required to carry the high amperages in these circuits; the switches and circuit breakers in the subpanels for these items, therefore, control the relays rather than the actual components.

The Bonanza's 12-volt battery has a 33-ampere-hour capacity. The battery is mounted in a box just ahead of the glove box and is serviced through an access cover in the firewall. Constructed of acid-resistant material, the battery box has a vent for fumes from the battery and a drain line, both of which run overboard through the cowl flap openings. Electrical power from both the generator and the battery is fed to bus bars along the instrument subpanels, to which the individual circuit breakers are connected; wires then carry the current to their respective units which are grounded to the airframe, forming the completed circuit. In some instances, two or more units are supplied through the same circuit breaker; in these instances, the circuit breaker placard indicates all circuits carried by the breaker in ques-



CIRCUIT BREAKER LOCATIONS

1. — Fuel Quantity Indicator
2. — Generator
3. — Flap Position Indicator and Instrument Lights
4. — Oil Temperature Indicator and Cylinder Head Temperature Indicator
5. — Landing Gear Indicator
6. — Pitot Heat
7. — Navigation Radio
8. — Landing Gear Warning
9. — Stall Warning
10. — ADF Radio
11. — Auxiliary Fuel
12. — Command Radio
13. — Spare
14. — Spare

tion. The battery is connected to the bus through the battery relay and the ammeter; generator to bus connection is through the voltage regulator.

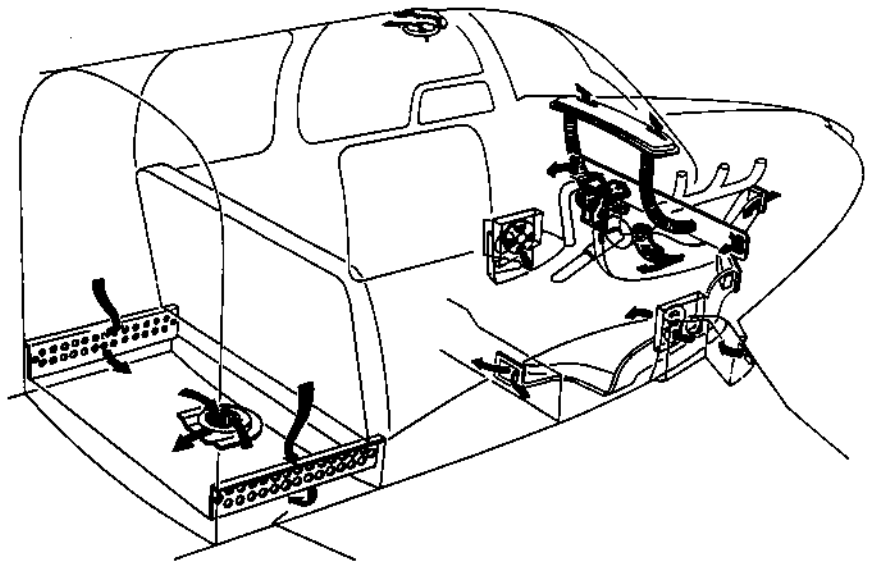
In addition to the circuit breakers in the instrument subpanels, a horizontal panel beside the glove box carries push-to-reset circuit breakers for the following units: generator; landing gear position indicator; radio; flap position indicator and instrument lights; oil temperature and cylinder head temperature indicators; landing gear warning horn; stall warning horn; and fuel quantity indicator. The circuit breakers are mounted vertically, with their reset buttons pointing down; spaces are provided in the panel for additional circuit breakers to protect equipment which may be installed later.

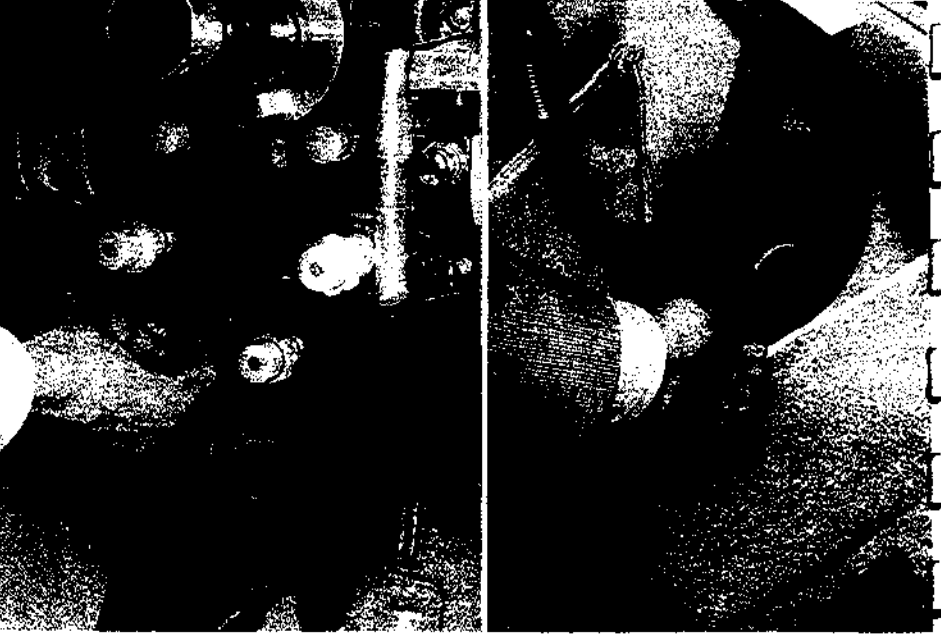
The Bonanza's ammeter is of the conventional charge-discharge type, actually showing the rate of charge or discharge of the battery. A plus reading indicates that the generator output is in excess of the load and current is being stored in the battery, while a minus reading indicates that the load is greater than the generator output and current is being drawn from the battery to make up the deficit. A zero reading, which should be the normal condition for a Bonanza in cruising flight, indicates that the battery is fully charged and the generator output has been adjusted by the regulator to balance the load of electrical equipment then in use.

HEATING AND VENTILATING SYSTEM

Hot air for warming the cabin and defrosting the windshield is supplied by a heater muff on the left engine exhaust stack. Air picked up through an intake on the left side of the nose passes through the heater and into a mixer box where it is blended with cold air to obtain the desired temperature, the blending being controlled by valves operated by a push-pull control on the instrument subpanel. The valve linkage is arranged so that with the control pushed in, the hot air valve is closed and the cold air valve open; as the control is pulled out, the hot air valve opens and the cold air valve closes, until at the end of the control travel the cold air valve is fully closed and the hot air valve full open.

Air from the mixer box is distributed to an outlet in the back of the front seat and two outlets just above the rudder pedals, as well as to the two windshield defroster outlets. There is no separate defroster control, since circulation from the defroster outlets improves cabin ventilation, but if increased defroster heat is necessary, more air can be diverted to the defrosters by closing the valves on the front seat hot air outlets. Slightly better air circulation in the cabin





may be obtained by closing the valve on the left duct and diverting more air to the right duct and rear seat duct, when intermediate control settings are used. The front seat outlets are regulated by push-pull controls under the control console.

In addition to the cold air supplied through the mixer box, ducts in each wing root are connected directly to outlets in the side panels, just below the instrument panel. The small outlet on the right side has a valve which is opened or closed by turning the large knob in the center of the outlet. The large outlet on the left may be opened or closed and the direction of the airflow changed by rotating its cover with the small plastic knob on its rim. The large knob in the center of this outlet is a friction lock which may be tightened to hold the valve position selected.

Air is exhausted from the cabin through two vents in the sides of the baggage compartment which communicate with an exhaust vent in the belly, and through an adjustable vent in the overhead above the front seat. For additional ventilation on the ground, the rear cabin windows may be opened; these windows, however, must be closed and latched before the take-off run is started, and must not be opened in flight.

Flying Your Bonanza

Your Bonanza was designed as a means of fast, safe, comfortable and economical transportation for people and things. It is easy and pleasant to fly, for handling ease is a fundamental requirement of BEECHCRAFT airplanes, and you will find that flying your Bonanza is a happy experience from the time you start the engine until you taxi up to the hangar and set the parking brake again. Its excellent visibility and steerable nose wheel makes taxiing simple and easy; there is no need to S-turn for adequate forward vision and from the side windows you can see both tail surfaces nearly to their roots. In the air, you will find the Bonanza responds to light touches on the controls and behaves just as an airplane should, without any disconcerting tricks.

The information in this section of the handbook may be divided roughly into three classes: limitations, performance data, and procedural suggestions. The limitations and performance data have been established by flight tests and engineers' calculations; the limitations have been approved by the CAA and are mandatory. The procedural suggestions, on the other hand, are intended merely to assist you in developing a good flying technique for your Bonanza; they constitute the manner in which a good pilot would fly a Bonanza on an average mission under average conditions. As you become familiar with your own airplane, and the individual circumstances under which you fly it, you may find that variations in these techniques will better suit your requirements or personal preferences; remember, though, that operating your Bonanza "in the green" at all times is the best way to realize the most flying for your money.

BEFORE YOU TAKE OFF

A good flying technique begins with a careful ground inspection, before you enter the airplane, and a planned routine of starting, warm-up and taxiing checks which will assure you that your Bonanza is operating properly while there still is an opportunity to correct any trouble which may appear. If well-organized, these checks may be made quickly and shortly will become matters of habit; the appearance, sound and even the smell of things about your airplane will become familiar to you, and the unfamiliar will alert you that something is at least not as it has been.

PREFLIGHT INSPECTION

Your external inspection should start as you approach the airplane. Check the general appearance: wings level, control surfaces normally positioned, no external signs of damage such as dents or scratches, no access doors open or their fasteners loose. Glance under the airplane, to check for dripping oil and dye stains from fuel leaks. In addition, make the following specific checks:

1. Ignition switch — off.
2. Engine oil sump — full.

NOTE

The oil sump dipstick ring handle, just outboard of the oil filler pipe, must be twisted ¼ turn either way to release the latch. Replace dipstick with loop to rear and push until the latch is engaged.

3. Cowl fasteners — tight.
4. Induction air filter — clean and clear.
5. Propeller blades—free from nicks and obvious damage.

NOTE

Repair minor nicks and scratches on the leading edge before take-off.

6. Shock struts and tires — properly inflated.

NOTE

Dirt on the shock strut pistons should be wiped off with a cloth moistened in hydraulic fluid.

7. Pitot tube and static pressure buttons—openings unobstructed.
8. Fuel tanks — remove caps and check quantity in each.
9. Fuel sumps — drained.

NOTE

A few ounces should be drained from each sump daily, before the first flight.

As you enter the airplane, check the cabin for loose articles which might become troublesome if you encountered turbulence. Adjust the seat, rudder pedals and control column to your own preference, then slip the shoulder harness on and adjust it for correct fit. Before turning on the battery switch and starting the engine, check the following:

1. Parking brake — set.
2. Check circuit breakers.
3. Landing gear position switch — down.

NOTE

In the down position, the switch aligns with the subpanel trim strip.

4. Flap position switch — neutral.

NOTE

If the flaps are down, run them up before starting the engine.

5. Check flight controls for full travel and free and smooth operation.

NOTE

Elevator is held in full down position by the down spring.

6. Check door and windows—properly latched.

STARTING THE ENGINE

Whenever possible, you should have your Bonanza headed into the wind when the engine is started, although it is mandatory to do so only when the wind velocity is high or gusty.

1. Turn on battery and generator master switches.
2. Check fuel quantity in each tank.
3. Turn fuel selector to left main tank.
4. Open cowl flaps.
5. Set mixture control in full rich.
6. Place propeller in high rpm.
7. Open throttle two or three turns of the vernier.
8. Turn ignition switch to BOTH.
9. Turn auxiliary fuel pump switch to LOW position.
10. When normal starting fuel pressure (2 to 2.5 psi) is registered, press starter button until engine fires.
11. Turn off auxiliary fuel pump when engine runs smoothly.

NOTE

If external power is used, leave master switches off until external power is disconnected. Make sure the power unit has a negative-ground polarity.

NOTE

If the left tank is half full or less, use the fullest tank.

NOTE

If starting pressure is low, switch to EMERGENCY, then back to LOW when pressure comes up.

Watch the oil pressure gage as the engine starts. It should register at least 10 pounds pressure in the first 30 seconds; if it does not, stop the engine and investigate.

In very hot weather, if there is an indication of vapor in the fuel system (fluctuating fuel pressure) turn the auxiliary pump on LOW until the system is purged.

WARM-UP

Set the throttle for 1,000 to 1,200 rpm and warm the engine until the oil temperature gage moves off the peg, and the engine will accelerate without hesitation. The cowl flaps should be open. Avoid excessive warm-up particularly in cold weather, since the heads may overheat as you attempt to bring the oil temperature up. The engine is warmed sufficiently for take-off when the head temperature reaches 300°F and the oil pressure is not over 80 psi.

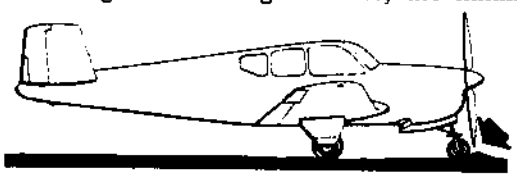
While the engine is warming up, check the radio, get the field altimeter setting and correct time from the tower and set the altimeter and clock.

TAXIING

NEVER TAXI WITH A FLAT SHOCK STRUT!

Make sure the parking brake is released before applying power to taxi. Normally, you can turn as much as necessary by applying pressure to the rudder pedal in the direction you wish to turn, steering entirely with the nose wheel. For shorter turns, use some brake on the inside wheel; the Bonanza will turn in an inside wheel radius as short as two feet without sliding the nose wheel tire. Short turns, however, should be made slowly since they apply heavy side loads on the nose wheel strut.

In taxiing your Bonanza, bear in mind that the weight of the airplane is behind the nose wheel and pushes it; when the nose wheel strikes an obstruction or hole, almost the entire weight of the airplane is brought to bear on it. The nose wheel load also is increased when the brakes are applied with the airplane in motion. When taxiing over a rough surface, use minimum power, permitting the



CAUTION — Taxiing over a 4 inch obstruction at 15 m.p.h. will impose a load on the nose wheel 42% greater than the design load.

When taxiing over rough ground do not use the brakes or excessive power. Let airplane coast over the rough surface and hold the wheel back to reduce the load on the nose wheel.

airplane to coast over obstructions, and do not apply the brakes unless absolutely necessary. Holding the control column back will minimize the loads on the nose wheel.

TAKE-OFF

Before you take off, particularly if the wind is below 15 mph, make sure that you will not follow too closely a large multi-engine or jet airplane, so that you encounter the extreme turbulence in his wake. This turbulence has been observed for as much as several minutes after a large airplane takes off or lands, especially in a calm, and it is severe enough to cause even large airplanes to become uncontrollable.

Before starting your take-off roll, make the checks outlined below. This will be your last opportunity to check the airplane before you are airborne, and these checks should be performed carefully and thoroughly:

1. Flight controls — free and smooth with full travel.
2. Wing flaps — up.
3. Elevator tab — zero, or 3° nose up if only front seat is occupied.

NOTE

See comment on page 40 for aft C.G. loadings.

4. Aileron trimmer — neutral.
5. Check magnetos at 1900 rpm. Drop should not exceed 100 rpm on either magneto.
6. Open throttle and set mixture for field elevation take-off power.

CAUTION

Do not run up the engine on loose sand or dirt.

NOTE

To allow for pressure increase with take-off rpm, set the pressure to the low side of the dial range.

7. Check static rpm at full throttle.
8. Oil temperature — 70°F. to 225°F.

NOTE

Never start your take off with an oil temperature higher than 215°F, to allow for the rise during your run.

9. Oil pressure — 30 to 80 psi.

NOTE

Minimum oil pressure should occur only when oil temperature is over 190°F.

Static rpm is influenced by three factors: the propeller low pitch setting, the condition of the engine, and the weather. Except for a first run-up after the propeller has been disassembled, it rarely will be responsible for an abnormal static rpm; and in those instances, it usually will be a high rather than a low reading. Actually, the static rpm is an indicator of engine condition, specifically its ability to deliver full power, and the other engine instruments should be checked during the run-up also, particularly if there is a variation in engine rpm. A low static rpm may be due to an ignition or fuel system malfunction, or simply to poor general engine condition. It also may be due to the weather, since temperature and barometric pressure affect directly the weight of air which the engine can pump, and hence the power it can deliver. You cannot expect to get full power on a hot day with low barometric pressure; on the other hand, at or near sea level, with low temperatures and high barometric pressure it is theoretically possible to exceed the engine limits if pressure drop in the air filter and ducts are ignored.

When you are ready to start the take-off run, release the brakes and as the airplane accelerates, open the throttle smoothly. Do not exceed 2600 rpm. For the smoothest take-offs, accelerate to about 60 mph IAS, then use just enough back pressure to bring the wings to a slightly positive angle of attack. The airplane should fly off at approximately 65 mph. Avoid using too much back pressure on the take-off; if the airplane is heavily loaded, especially with considerable weight in the rear seat and baggage compartment, you may raise the nose too high and cause the angle of attack to become so great that, although you attain considerable airspeed the wing will remain stalled and the airplane will not leave the ground. If you find a loading with the center of gravity near the aft limit unavoidable, a few degrees of nose down trim on the take-off may assist you in breaking ground smoothly. As soon as you have established a stabilized climb at 75 to 80 mph, retract the landing gear.

CLIMB

As soon as the landing gear is retracted and you are in the clear, reduce power to establish a cruising climb speed around 130 mph IAS

and approximately 500 fpm rate of climb. Set the elevator trim tab to relieve pressure on the column and adjust the cowl flaps to maintain cylinder head temperatures within limits. The recommended climb speed is higher than the best rate-of-climb speed, but will give you a good ground speed while climbing, with comfortable safety margins; unless the terrain obliges you to do otherwise, there is no good reason for not putting some distance behind you while climbing to altitude.

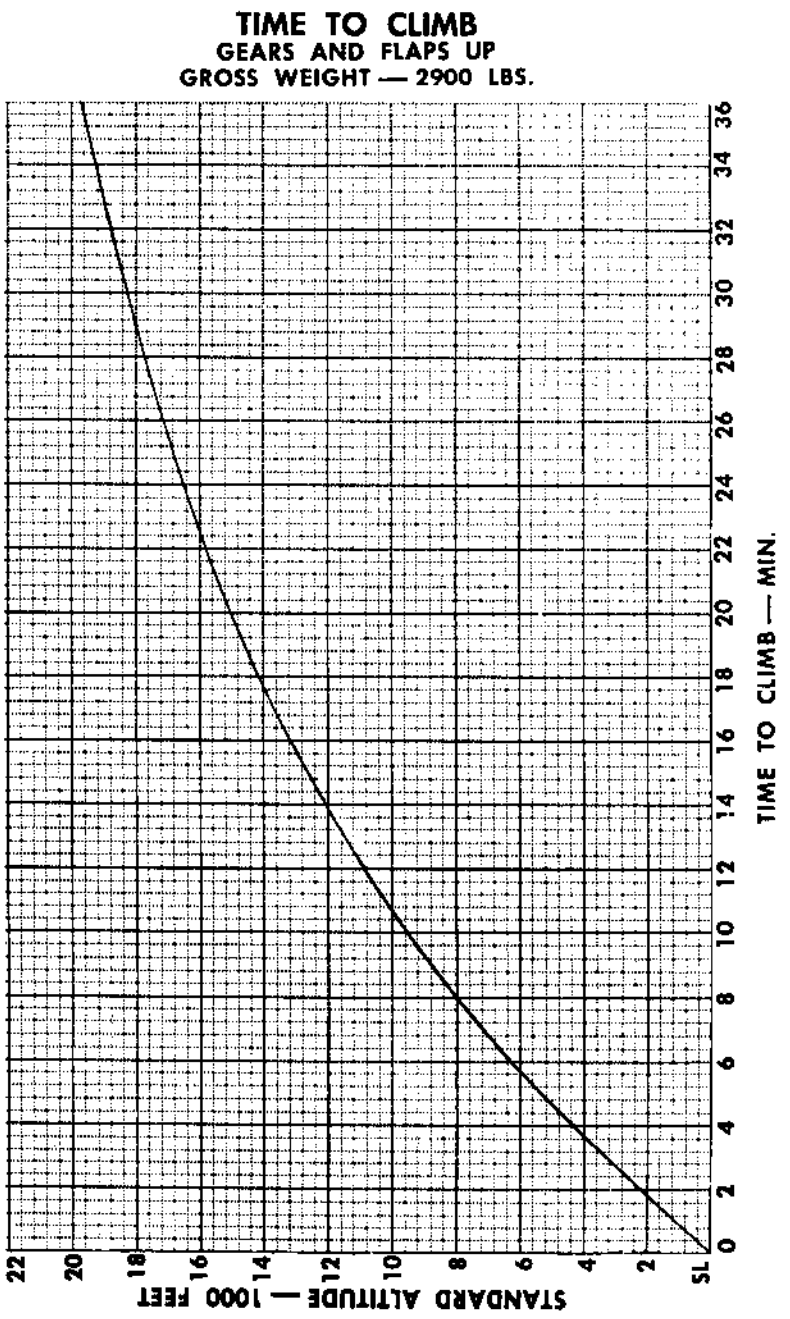
The J35 Bonanza's best rate-of-climb at sea level and full gross weight occurs at 103 mph IAS, with full throttle and 2600 rpm. This speed will reduce slightly with altitude, approximately 1 mph IAS per 2,000 feet: for example, 101 mph IAS at 4,000 feet. If you plan to take advantage of a tailwind at your cruising altitude, it may be to your advantage to climb at the best rate-of-climb speed, rather than at a cruising climb speed, sacrificing some forward mileage for the sake of reaching your tailwind in a shorter time.

During both climb and cruise, observe the rpm and manifold pressure limits shown in the power setting chart, to avoid excessive cylinder pressures. As a rule of thumb, never use over 24 inches Hg manifold pressure with 2450 rpm or less. When increasing power, set rpm first, then manifold pressure. Make power reductions with manifold pressure first, then rpm.

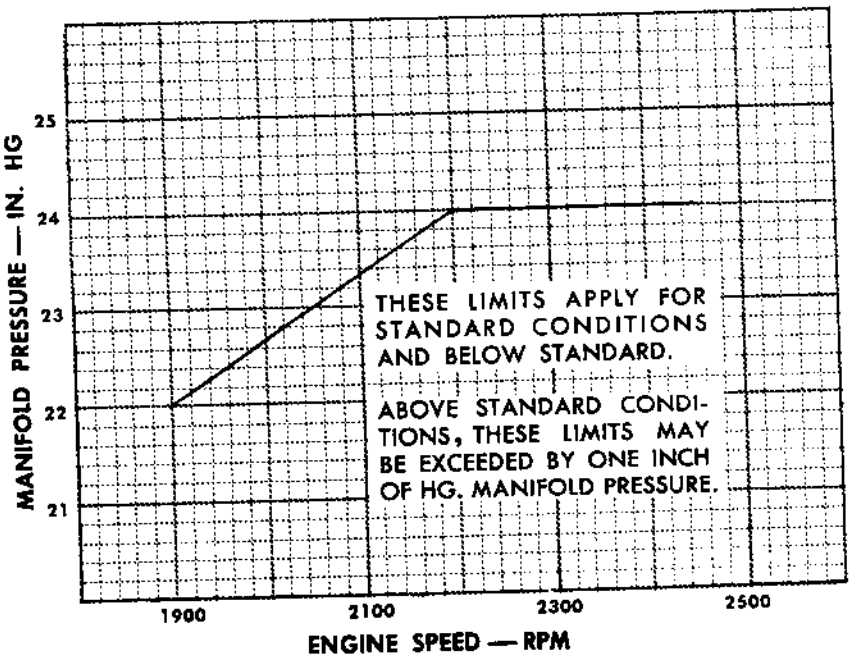
CLIMB POWER MANAGEMENT

With the J35 Bonanza's fuel injection system, fuel pressure for a given horsepower remains constant, no matter what combination of rpm and manifold pressure is used to obtain that horsepower. Thus, in a climb the simplest method of power management is constant-power; i.e., setting the propeller, throttle and mixture controls for the desired rpm and fuel pressure in your first power reduction after take-off, then opening the throttle as you ascend, to maintain the correct manifold pressure. You may, of course, set the throttle and rpm and reduce fuel pressure as your manifold pressure drops off; however, this method is less accurate. Using a constant-horsepower procedure, you can estimate your fuel consumption quite accurately.

In the section entitled "Unusual Situations" you will find a discussion of short-field take-offs and obstacle take-offs, with graphs showing the best rate-of-climb and angle-of-climb, and the speeds at which this type of performance is achieved.



MANIFOLD PRESSURE VS. RPM



CRUISE

When you have reached your desired altitude, set your power and trim for the airspeed you have selected. There are many factors to be considered in deciding how fast is fast enough: weight, altitude, the length of the flight, weather conditions, and, of course, the time you have available to reach your destination. Generally speaking, lower cruising airspeeds will be more comfortable, and due to the lower power settings required, will consume less fuel. On the other hand, you invested in a Bonanza to give you a means of rapid transportation and under normally good conditions, there is no reason why you should not cruise at or near the maximum allowable cruising speed, when the time saved will justify the additional fuel.

Using 65% power (162.5 horsepower) at 2450 rpm for cruising will give you a critical cruising altitude of about 10,500 feet. At this altitude, true airspeed will average 19 mph over the sea level value, and due to the Bonanza's excellent rate of climb and the speed improvement gained with altitude, you will find it usually pays to go to altitude, even for flights of an hour or less.

In cruising flight, you will find a constant-horsepower procedure has the same advantages that it does in a climb; you can predict your speed and fuel consumption and make accurate estimates of your range. The horsepower you select will, of course, depend on a number of variable factors; in the section, "Getting the Most from Your Bonanza," these factors are discussed. You will find your problems of speed, range and fuel consumption greatly simplified, however, if you select power settings which are shown in the range, cruising operation and fuel consumption graphs, determining the rpm, manifold pressures and fuel pressures with your horsepower calculator.

You will find the Bonanza handles nicely in cruising flight, responding instantly to the controls. With the elevator tab and aileron trimmer, it can be trimmed hands-off, and even in rough air you can hold it on course and make good turns with the ailerons alone. Careful trimming, and closing the cowl flaps completely, or as far as possible without overheating the engine, will improve over-all performance.

Your Bonanza's fuel system is arranged so that there is very little unusable fuel in the tanks, in level flight attitude, and there is no

reason for not running a cell dry before switching. However, if the engine is allowed to stop firing, the throttle should be retarded as the engine picks up. With power off, the propeller governor will bring the blades to full low pitch and unless the throttle is closed, the engine will overspeed. Do not close the throttle *before* the engine resumes firing; with the throttle closed, fuel pickup will be delayed.

INSTRUMENT FLIGHT

Properly equipped, your Bonanza is an instrument airplane, but are you an instrument pilot? If you have an instrument flight rating, with recent practice in instrument flight in your Bonanza, you are. Otherwise, you are a VFR pilot. There can be no compromise on this rule, nor on its corollary: If you are a VFR pilot, don't fly in instrument weather.

The problem of the VFR pilot in instrument weather is more serious than merely getting lost and burning up all his fuel trying to discover where he is and how to get where he's going. Generally, as accident investigations have borne out, VFR pilots caught in weather don't have time to get lost. Rather, they lose control of their airplanes, which go into turns that shortly become spirals, or into dives. The untrained pilot's efforts to correct the situation make it worse, until shortly G-loads on the airplane build up to the point of structural failure. Accidents of this type have happened with all types of modern commercial aircraft.

Even the most careful VFR pilots occasionally will encounter weather conditions beyond their piloting skill, and for this reason, a technique perfected by the University of Illinois Institute of Aviation should be made a part of your own skill. Known as the "180-Degree Turn," it is a technique designed to return the VFR pilot to VFR conditions, safely.

Essentially, the technique consists of (1) increasing drag by lowering the gear—*in an extreme emergency the gear may be lowered at speeds up to 200 mph IAS;* (2) reducing airspeed; (3) trimming the airplane for a predetermined slow-flight speed; and (4) WITH THE HANDS OFF THE WHEEL, making a turn with the rudders only, to a heading 180 degrees from the heading on which you were flying when you lost visual contact.

If you lower the landing gear as an aid to reducing your speed, you should be alert for the changes in spiral control, elevator trim and

rate-of-sink which will result, and make the necessary corrections and allowances. Lower the gear while you still are in level flight, as a preventive measure against excessive speed build-up, rather than attempting it as a corrective measure once the airplane is in a dive.

NOTE

After any emergency extension of the landing gear at high speed, the landing gear doors and supporting structure should be inspected for possible damage.

This technique is simple, but rapid, smooth and precise execution is essential to its success, and you should learn it from a qualified instructor, preferably in your own airplane, so that it can become completely familiar and automatic. We suggest that you contact the University of Illinois for more precise details on this procedure.

INDUCTION SYSTEM ICE

As you glance over the console of your J35 Bonanza, you will notice one control conspicuous by its absence: there is no carburetor heat or alternate air control. One of the chief advantages of fuel injection for an aircraft engine is its freedom from induction system icing. Extensive tests have shown that the only icing problem to be expected is impact ice forming on the air intake and filter, and this problem is managed automatically by two spring-loaded doors in the side of the air intake duct just ahead of the air throttle. If the filter becomes clogged with ice, the doors will be sucked open and the engine will go on running. You will notice only a slight drop in manifold pressure due to the loss of ram effect.

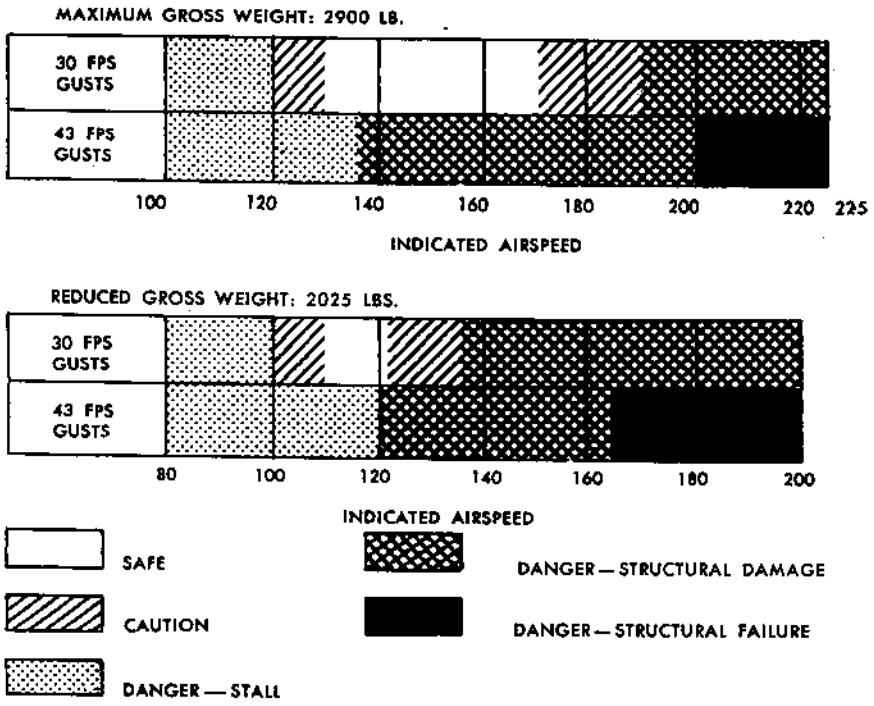
FLIGHT IN TURBULENT AIR

NOTE

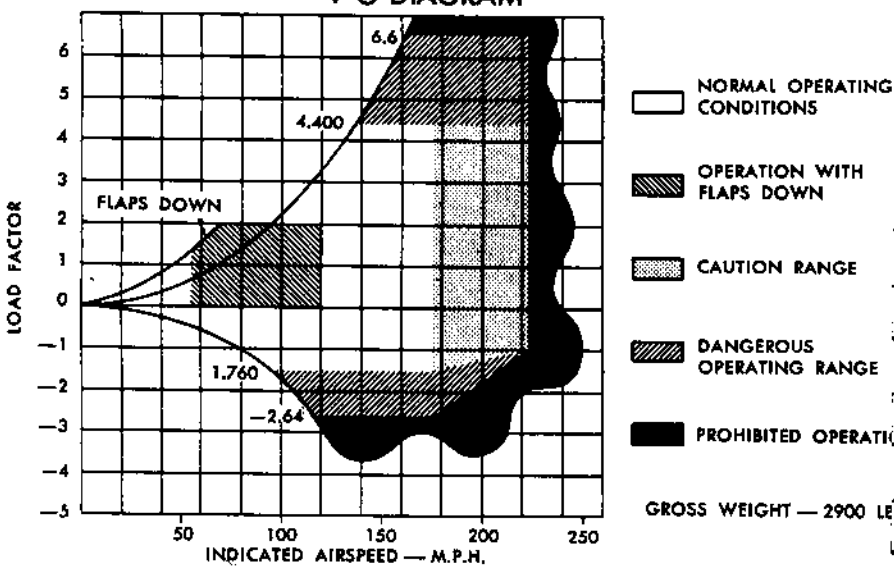
Unless you are a rated instrument pilot with recent instrument experience in the type airplane you are flying, stay out of IFR conditions; however, if you are caught in such conditions, lower the landing gear before entering a cloud bank.

Flying through turbulent air presents two basic problems, to both of which the answer is proper airspeed. On the one hand, if you maintain an excessive airspeed, you run the risk of structural damage or failure; on the other hand, if your airspeed is too low, you may stall.

TURBULENT AIR PENETRATION SPEEDS



V-G DIAGRAM



Revised March 20, 1958

Your safe operating range, between these two danger zones, varies with the severity of the gusts: the stronger the gusts, the narrower your safe operating range.

The airplane loaded weight also has some influence upon the behavior of your airplane in turbulent air and upon your safe operating speeds.

No single graph can adequately portray the effects of the gusts or turbulence upon any or all portions of the airplane. Lightly loaded airplanes undergo higher accelerations than heavily loaded ones, producing higher stress on the supports of fixed weight structures such as the engines. On the other hand, heavily loaded airplanes are subjected to greater positive wing loads but less negative wing loads than lightly loaded airplanes. The extent of these differences depends also upon the wing fuel loadings which, of course, cannot be predetermined. Therefore, two graphs appear, one for heavily loaded airplanes and one for lightly loaded airplanes.

The two gust intensities shown are for moderately heavy and severe turbulence. No graph is shown for mild turbulence. The 43-foot-per-second gusts are of the magnitude found in thunderstorm centers, while the 30-foot-per-second gusts can be encountered in frontal areas and near thunderstorm centers. Although you may operate near the design cruising speed of 185 mph IAS in ordinary rough air with a reasonable margin of safety, in any turbulence severe enough to cause discomfort to your passengers, you should slow down to approximately 130 mph IAS.

Beware of overcontrolling in attempting to correct for changes in attitude; applying control pressure abruptly will build up G-forces rapidly. You should watch particularly your angle of bank, making turns as wide and shallow as possible, and be equally cautious in applying forward or back pressure to keep the nose level.

The Bonanza's shoulder harness you will find valuable in rough air, not only as a safety measure but to make the trip more comfortable. With the harness snug, your passengers will stay firmly in their seats and ride with the airplane, rather than being jostled about by bumps or sudden changes in attitude.

MANEUVERS

You will find that your Bonanza handles just as nicely in maneuvers as it does in cruising flight. With this in mind, remember that maneuver loads will increase as airspeed increases; and that the same aerodynamic cleanness which gives you efficiency also results in rapid increases in airspeed while you are in a nose-down attitude. You should become familiar with the loads you can impose on the airframe during maneuvers. The load limits are higher on your Bonanza than on any other airplane in its class.

The V/G diagram which accompanies this discussion shows the loads which can be imposed on the airframe with the flight controls at different airspeeds, at a gross weight of 2900 pounds. The upward-curving line on the diagram represents the positive loads at which a stall occurs at different airspeeds. Your safe operating zone is quite large, and as long as you confine your maneuvers to speeds of 142 mph IAS or less, you can bring the airplane to a stall without imposing excessive loads. The thing to keep firmly in mind with any aerodynamically clean airplane is that whenever you get the nose below the horizon, with the gear and flaps up, your airspeed will increase rapidly and in leveling off, you must apply control pressure judiciously to prevent excessive loads.

The following table lists aerobatic maneuvers which are approved for the J35 Bonanza, at its full gross weight of 2900 pounds, when operating in the utility category:

MANEUVER	*RECOMMENDED ENTRY SPEED*
Chandelle	142 mph TIAS
Steep Turns	142 mph TIAS
Lazy Eight	142 mph TIAS
Stalls (except whip stall)	Slow Deceleration
Maximum approved entry speeds	142 mph TIAS

CAR 43:48 AEROBATIC FLIGHT. No pilot shall intentionally fly an aircraft in aerobatic flight carrying passengers unless all occupants are equipped with approved type parachutes.

Spins are prohibited. If an inadvertent spin occurs, apply opposite rudder and ease column forward. Avoid abrupt pull-out upon recovery.

The Bonanza is gentle and well-behaved in a stall, at all conditions of rate-of-approach, position of flaps and landing gear and the amount of power used. With power on, the nose will be very high before the stall occurs; with flaps, considerably more elevator is required to stall, both with and without power. Stall warning with the indicator is provided at roughly 5 mph above the stall, in all conditions and attitudes, the light and horn operating intermittently at first and continuously just before the stall. When stalling with power on, you can hold the airplane straight with right rudder, and in either condition aileron control remains good throughout the stall, so that you can produce or correct roll with them at any time. In a turning-flight stall, there is no tendency to fall off toward the low wing, and you will notice some tail buffeting, also present if you hold the elevator full back during the stall.

After the stall occurs, there will be a definite break and unmistakable dropping of the nose. The most rapid recovery from a stall will be made if the speed is allowed to pick up 15 to 20 mph and the elevator is used gently.

LETTING DOWN

The point in a flight at which you start your let-down, your airspeed during let-down and your rate of descent are influenced by many variable factors. For example, generally a slow descent starting well out from your destination will be more comfortable, and if the airspeed is held down by reducing your power settings, a saving in fuel will result. However, encountering headwinds at a lower altitude could nullify these advantages, and make a shorter let-down more profitable. You should plan this phase of your flight ahead of time, but be prepared to make changes well in advance if conditions, such as en route weather, should change.

Remember that in letting down, your airspeed will increase unless power is reduced. You can let down at cruising speed, but be prepared to slow down to not more than 140 mph IAS and, if necessary, drop the gear if you should encounter turbulence as you descend. Be

especially alert to moderately severe turbulence if you must pass through a haze layer during your descent; reduce your airspeed to a comfortable point and lower your landing gear before you enter the haze layer.

During the let-down, watch your engine temperatures and regulate the cowl flaps accordingly. Since you will have a combination of relatively high airspeed and reduced power settings, the engine will run cooler than in level flight, and particularly in cold weather, temperatures may go below a safe minimum for full power. During your descent, keep the mixture leaned so the best power setting will be ready in case you must go around. *Operating conditions will determine the proper mixture control position for best power; however, use full rich prior to entering the traffic pattern. Refer to Page 82 for Balked Landing procedure.*

Unless you are a qualified instrument pilot, avoid letting down through a solid layer of clouds which will obscure your visual reference with the horizon; if there is any likelihood of encountering solid overcast at your destination, let down below it well in advance. If you are not an instrument pilot and find that in an emergency you must descend through a layer of clouds, use the following procedure:

1. Climb to 500 feet above the cloud layer, slow down to 100 mph IAS and lower your gear.
2. Adjust throttle and elevator tab *while still in clear air* to set up 100 mph IAS and 500 feet per minute rate of descent, *hands-off*.
3. Take proper heading before entering clouds.
4. In clouds, use rudder pedals only and move them gently. Do not touch the wheel or control column until you break out below the clouds.

This procedure is carried on a placard on the inside surface of the glove compartment door.

LANDING

As you approach the airport, check for large multi-engine or jet aircraft taking off or landing, and plan your approach so that there will be sufficient time for severe turbulence in the wake of such airplanes to dissipate before you make your final approach. *Guard against this turbulence, particularly when the wind is below 15 miles per hour.* You can lower the landing gear as soon as you have slowed to 140

mph IAS, using the added drag to help slow the airplane, if you desire. By the time you have entered the traffic pattern, you should have your speed down to approximately 90 mph IAS; the Bonanza's low stalling speed and excellent control will enable you to fly a pattern easily without overrunning slower airplanes. Putting the propeller in high rpm will assist you in decelerating.

Normally, you should use an airspeed of around 80 mph IAS for final approach; make sure, however, that you have sufficient speed to give you good elevator control during your flare-out, particularly on a hot day or if the wind is gusty.

The Bonanza's excellent visibility, positive control, and superb ground handling, combined with the stability of a tricycle landing gear, make landing extremely simple. As with take-off, there are several "best" ways to land the Bonanza. The shortest landing will be made if full flap is used and the airplane held off with the elevator control held full back. If the wind is strong and gusty, flap-up landings are preferable; the airplane may be landed level 3-point if the runway is smooth.

The following check list is intended to start as you approach the flight pattern, and carries through the landing roll:

1. **Fuel tank selector — fullest main tank.**
2. **Propeller — high rpm.**
3. **Landing gear down.**

NOTE

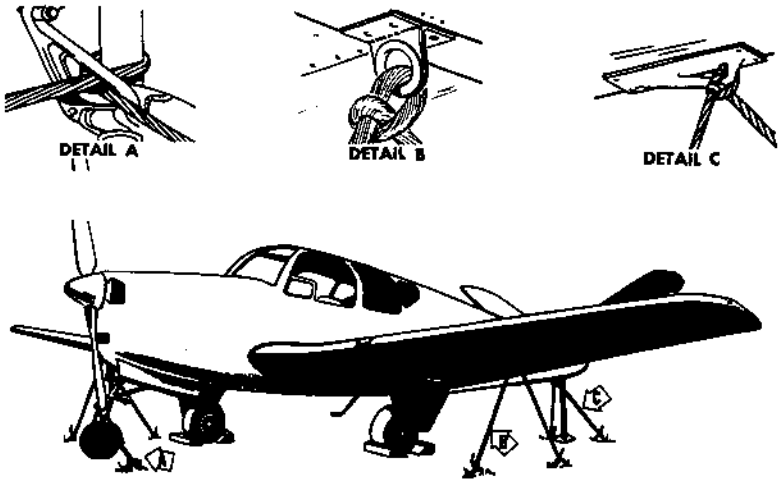
Check both lights and mechanical indication. Horn should not sound when throttle is closed.

4. **Cowl flaps — open.**
5. **Flaps — full down.**

NOTE

Maximum flaps-down speed is 120 mph IAS.

6. **Flaps-up on landing roll.**
7. **Mixture — full rich.**



SECURING YOUR BONANZA

When you have parked your Bonanza, check the propeller in low pitch (high rpm) and pull out the mixture control to the idle cut-off position. When the engine has stopped rotating, turn off all the switches and if the airplane is to remain parked for any length of time, turn off the fuel selector valve. If the brakes are cool and the weather moderate, set the parking brake. Unless the wind is calm and the airplane is to be unattended for only a short time, you should install the control lock. Never leave the cabin door standing open.

Your Bonanza can be maneuvered into a hangar, or on the ramp, with the hand towbar included in the loose equipment kit. The towbar is attached to lugs on the nose gear and gives sufficient leverage to turn the nose wheel for steering. Never pull or push on the propeller, outboard wing or on the tail except at the stabilizer roots. If you leave your Bonanza parked outdoors, wheel chocks should be placed both fore and aft of each main wheel and a vertical tail post secured to the tail skid. A ¾-inch rope should be passed through the tail skid and each end secured to stakes located approximately five feet from the base of the vertical tail post. The stakes should be

placed perpendicular to the center line of the airplane. The tail tie-down ropes should have very little slack. Ties to the wing-mooring lugs should be made in the conventional manner.

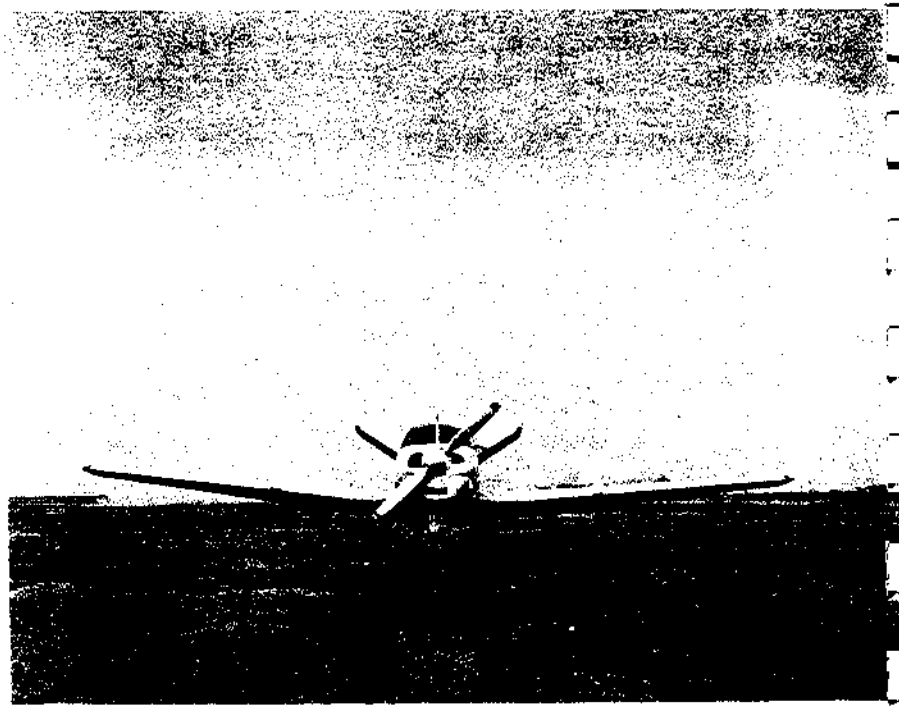
WARNING

Use extreme caution when moving the propeller while the engine is warm, since residual fuel in the intake ports may fire and cause the engine to kick. If the propeller must be moved to attach the towbar, stand clear of its path and turn it *against* its normal rotation. *Be sure the magneto switch is off.*

ON FLYING SAFELY

Safety always has been a paramount consideration in designing and building BEECHCRAFT airplanes, and operated within its marked limits, your Bonanza has ample margins of safety, in excess of the legal minimums, in addition to its unique features designed specifically for your airplane. However, the final responsibility for safe flight falls squarely upon the shoulders of the pilot, and this responsibility is recognized by the Civil Aeronautics Administration; operation of an airplane in excess of its marked limits constitutes a violation of Civil Air Regulations and therefore is illegal, as well as dangerous. *Fly your Bonanza always so that your passengers will get a comfortable ride; generally, discomfort will appear well in advance of danger.*

To help you fly your Bonanza safely, Beech Aircraft Corporation in cooperation with the CAA and other groups maintains a running program of research and experimentation to learn the causes of airplane accidents and ways to avoid them. From time to time, the results of these studies are published in the form of Safety Suggestions which are distributed to pilots and airplane owners. A complete file to date of these Safety Suggestions is included in the Service Information Kit supplied with your Bonanza and future issues will be sent to you as they are published. The situations described in these Safety Suggestions are encountered in *all* airplanes at one time or another, and you will find a careful study of them worth-while.



Getting the Most From Your Bonanza

You may, of course, fill the tanks, load your baggage and passengers, start up and go about your business, and as long as your loading stays within the weight limit and C.G. range, your Bonanza will fly quite nicely and be surprisingly efficient. However, if you wish to realize the *most* your airplane is capable of giving you in fast, economical transportation, try investing a little time and effort in planning your flights to the best advantage. You will find that your Bonanza can not only fly faster than other airplanes in the same class, but it also can fly farther on less fuel.

As in flight planning, the complexity of weight and balance computations is relative: you alone, your brief case and a full fuel load usually should constitute a satisfactory loading. At the other extreme, with full tanks and four people aboard, you may not be able to carry all their baggage and that sack of rough castings the branch plant needs. In the following paragraphs, the weight and balance system used on the Bonanza is explained. You should study this portion of the handbook until you are completely familiar with it.

WEIGHT AND BALANCE

Careful loading will pay dividends not only in safety and handling ease, but in actual performance and over-all economy. Any departure of the center of gravity from the optimum must be compensated by elevator or elevator trim tab deflection, the amount of deflection depending directly on the gross weight of the airplane and the amount of departure from optimum of the center of gravity. Thus, while for safety's sake you must load the airplane within the center of gravity limits, for the sake of efficiency you should load it so the

center of gravity is as close to optimum, or roughly halfway between the two limits, as practical.

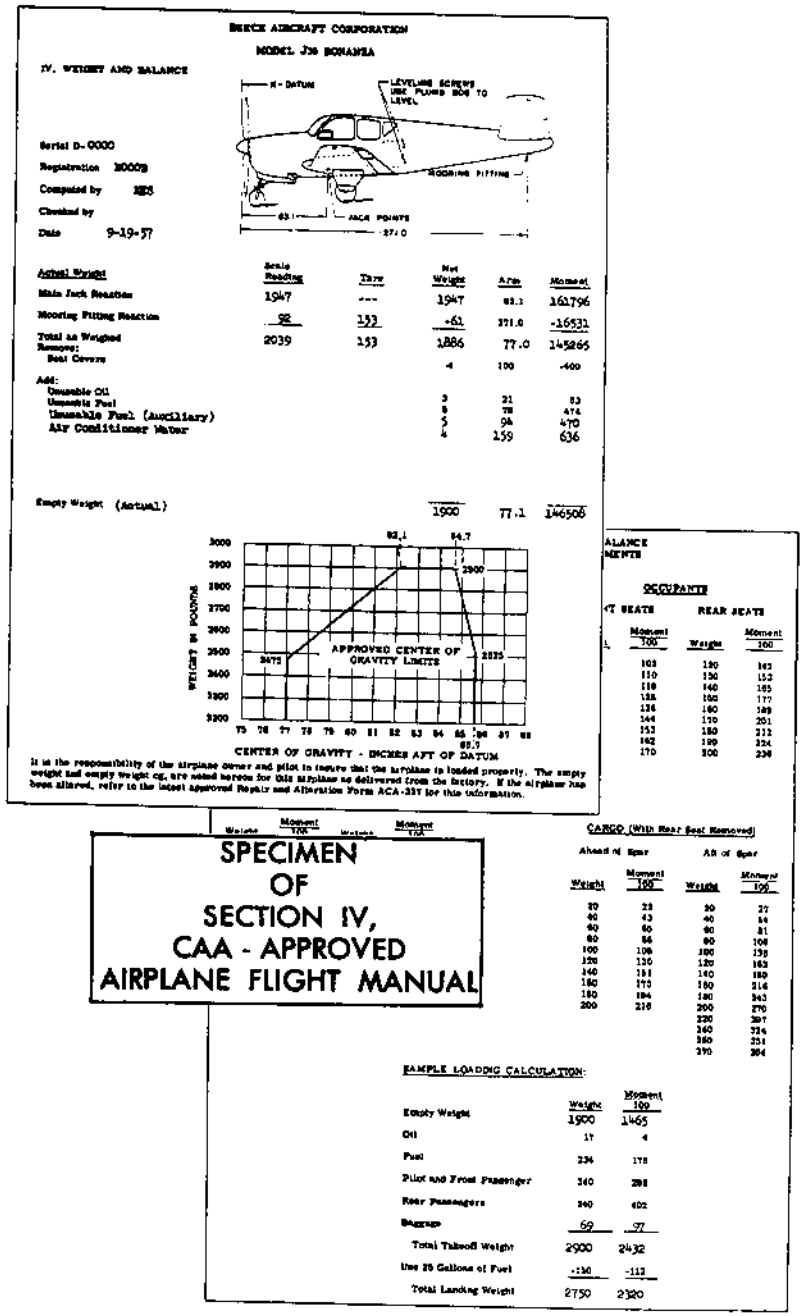
Since proper balance is essential to the safe operation of an airplane, a system of loading and computing the center of gravity is required by the Civil Aeronautics Administration; in order to obtain a license and certificate of airworthiness, the airplane's manufacturer must obtain approval by the CAA of the system of computing balance and the forms he will supply with each airplane. This system, plus a statement of the airplane's empty weight, empty weight center of gravity, equipment list and loading instructions then become a portion of the CAA-Approved Airplane Flight Manual, a document executed individually for each airplane and required by Civil Air Regulations to be kept in the airplane at all times.

WEIGHT AND BALANCE

Section IV Weight and Balance of the CAA-Approved Airplane Flight Manual for your Bonanza contains the following information: a statement of the actual weight, arm and moment of your empty airplane, with a diagram showing the weighing and leveling points; a graph of the center of gravity limits for different gross weights; tables giving the weights and moments of fuel, oil, passengers, baggage and cargo; an equipment list giving the weights and arms of all equipment items installed at the factory and included in the empty weight; and a center of gravity table giving the limits for various weights in terms of moment. The CAA-Approved Airplane Flight Manual will be found in your airplane, usually in the pocket on the back of the pilot's seat or in the map case. Because of the importance of the information it contains, Section IV of the manual is discussed in detail in the following paragraphs and facsimiles of the forms it contains are reproduced here. A thorough study of this information will pay you substantial dividends in safer, more economical flying.

BASIC WEIGHT STATEMENT

The first page of the Weight and Balance Section contains a diagram of the airplane with the datum line, jack points, leveling provisions and other information necessary to properly weigh the airplane. You



BEECH AIRCRAFT CORPORATION

MODEL J35 BONANZA

IV. WEIGHT AND BALANCE

Serial D-0000

Registration N0000B

Computed by RES

Checked by

Date 9-19-57

Actual Weight	Scale Reading	Tare	Net Weight	Arm	Moment
Main Jack Reaction	1947	---	1947	83.1	161796
Mooring Fitting Reaction	92	153	-61	371.0	-16531
Total as Weighed	2039	153	1886	77.0	145265
Remove: Seat Covers			-4	100	-400
Add: Unusable Oil			3	21	63
Unusable Fuel			6	78	474
Unusable Fuel (Auxiliary)			5	94	470
Air Conditioner Water			4	159	636
Empty Weight (Actual)			1900	77.1	146506

CENTER OF GRAVITY - INCHES AFT OF DATUM

It is the responsibility of the airplane owner and pilot to insure that the airplane is loaded properly. The empty weight and empty weight cg, are noted hereon for this airplane as delivered from the factory. If the airplane has been altered, refer to the latest approved Repair and Alteration Form ACA-337 for this information.

OCCUPANTS

Front Seats Moment /100	Rear Seats Weight	Rear Seats Moment /100
103	130	143
110	140	154
118	150	165
125	160	177
136	170	189
144	180	201
153	190	212
162	200	224
170	210	236

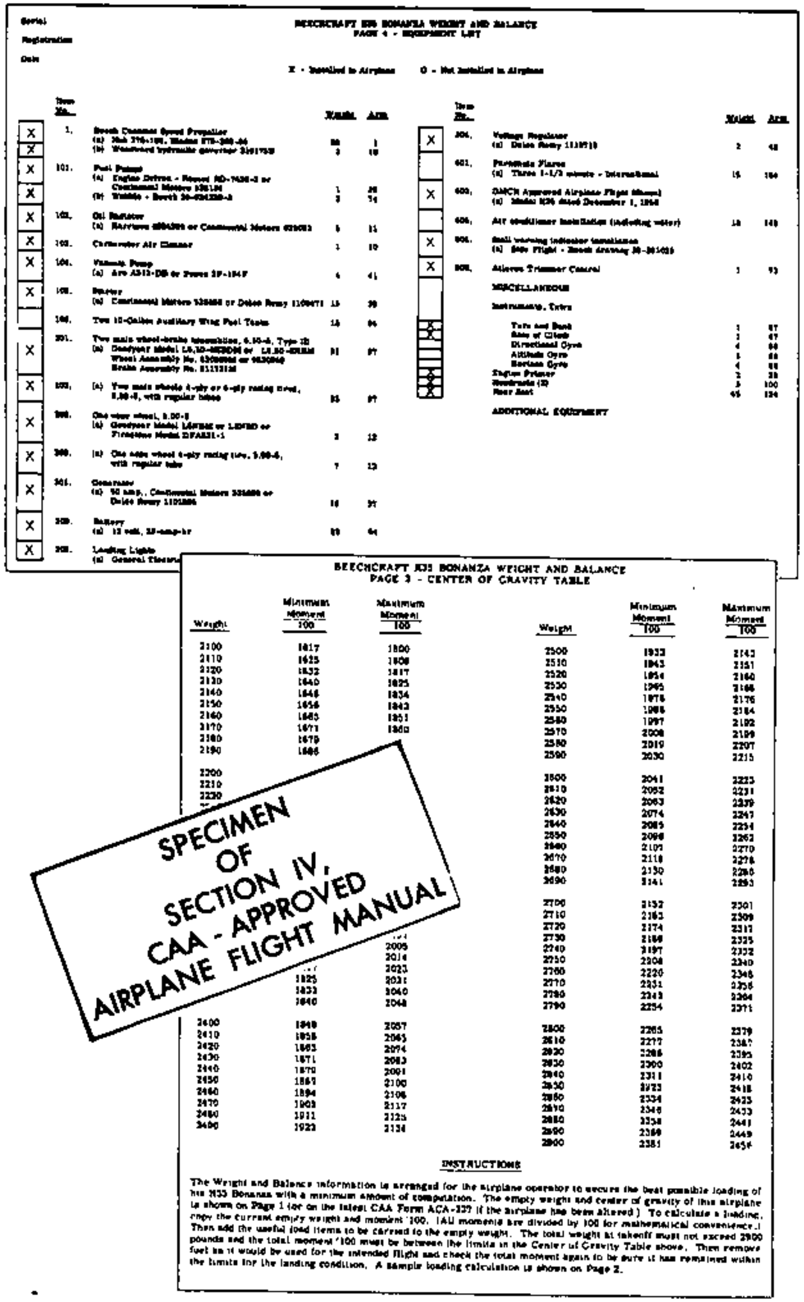
CARGO (With Rear Seat Removed)

Ahead of Spar Weight	Ahead of Spar Moment /100	Aft of Spar Weight	Aft of Spar Moment /100
20	23	80	97
40	43	90	84
60	60	90	81
80	86	90	108
100	108	100	135
120	130	120	162
140	151	140	189
160	173	160	216
180	194	180	243
200	216	200	270
		220	297
		240	324
		250	251
		270	364

SAMPLE LOADING CALCULATION:

	Weight	Moment /100
Empty Weight	1900	1465
Oil	17	4
Fuel	234	178
Pilot and Front Passenger	340	288
Rear Passengers	340	602
Baggage	69	97
Total Takeoff Weight	2900	2432
Use 35 Gallons of Fuel	-150	-112
Total Landing Weight	2750	2320

SPECIMEN OF SECTION IV, CAA - APPROVED AIRPLANE FLIGHT MANUAL



will note that it lists the serial and registration number of your airplane and the initials of the technicians who weighed it and checked the computations. The form lists the actual empty weight and moment of your airplane, when it was delivered from the factory; it is with this weight and moment that your balance computations will begin. The equipment included in the empty weight is shown, along with the weight and arm of each item, in the equipment list, page 4 of the Weight and Balance Section.

The datum, or reference line from which horizontal measurements are taken, is located 83.1 inches forward of the center line through the forward jack points. Moments of useful load items to be added to the airplane are arrived at by multiplying the weight of the item by the arm of the item, that is, the distance from the datum line to the item.

When the airplane is flown at a weight of 2475 pounds or less, the forward center of gravity limit is 77.0 inches aft of the datum and the rear center of gravity limit is 85.7 inches aft of the datum. As the weight increases, the forward center of gravity limit shifts aft in a straight-line variation to 82.1 inches aft of datum at 2900 pounds. The rear center of gravity limit remains at 85.7 inches aft of datum to a gross weight of 2525 pounds; from 2525 pounds to 2900 pounds, it moves forward in a straight-line variation to 84.7 inches aft of datum. These limits are shown on a graph on the basic weight statement.

COMPUTING YOUR LOAD

To simplify the arithmetic necessary to compute the center of gravity, in the system approved by the CAA for BEECHCRAFT airplanes, the weights and arms of the empty airplane, its equipment and the fuel, oil, passengers, baggage and movable equipment are reduced to moments; i.e., the products of the various weights multiplied by their respective arms. All arms are taken from an imaginary point, or datum line forward of the center of gravity and the center of gravity limits are expressed in terms of moments with the datum line as a reaction point. Thus, computing your weight and balance becomes simply a matter of adding to the empty weight and empty weight

moment of the airplane, given in the basic weight statement, the weights and moments of your load — fuel, oil, baggage and passengers. The totals will be your gross weight and total moment and to see if your loading is satisfactory, you have only to compare your totals with the figures in the Center of Gravity Table. If your total weight is not in excess of the allowable gross, and your total moment is between the minimum and maximum moments shown for your total weight, your loading is satisfactory.

USEFUL LOAD WEIGHT AND MOMENTS

The tables on page 2 of the Weight and Balance Section show the weights and moments of variable items such as fuel, passengers, and baggage. The empty weight moment and moments of all useful load items are divided by 100 for mathematical convenience.

CENTER OF GRAVITY TABLE

To assist in loading the airplane, minimum and maximum moments for gross weights from 2100 pounds to 2900 pounds, in 10-pound increments, are listed in the Center of Gravity Table. These moments correspond to the forward and rear center of gravity limits at each listed weight.

The weight and moment are determined with the landing gear down. The moments given in the Center of Gravity Table are such that when the landing gear down C.G. condition falls within the limits shown, the landing gear up condition will be satisfactory also.

SAMPLE LOADING CALCULATION

1. Write down the airplane empty weight and moment/100 as referenced in the Weight and Balance Section or latest Form 337.
2. Add the weight and moment/100 of all useful load items.
3. Check this loading to see that it is within the allowable limits shown in the Center of Gravity Table.
   The total weight at take-off must not exceed 2900 pounds. Obviously, if the total moment/100 is outside the minimum or maximum values in the Center of Gravity Table, some useful load items must be moved, reduced, or omitted to bring the airplane within allowable limits.
4. Remove the weight and moment of fuel as it would be used for the intended flight, and check the total again to be sure it has remained within approved limits for the landing condition.

CRUISE CONTROL

Flight planning, the secret of obtaining maximum use from your Bonanza, depends on a careful, detailed and objective analysis of each trip, in advance. The load, route, weather, starting time, arrival time, and the capabilities of the airplane are but a few of the factors you must consider; the production and execution of a good flight plan which will successfully accomplish your mission are achievements of which any pilot may be proud.

Most of the performance data given in the graphs has been reduced to true airspeed and standard conditions, in accordance with the NACA formulas, in order to present these figures in a form which can be resolved readily into performance under actual conditions. However, to use the graphs to the best advantage, you should understand the conditions shown and their relationship to the readings on your instruments.

No allowances were made in the graphs for reserves, nor for variable factors such as winds and fuel consumed in warm-up and taxiing; you must make allowances for these conditions as they actually exist, from one flight to another. Also, the flight tests from which the performance data was obtained were flown with a new, clean airplane, correctly rigged and loaded and with an engine capable of delivering its full rated power. You can expect to do as well, too, if your Bonanza is kept in the peak of condition.

Two variable factors affect the readings of your altimeter and airspeed indicator: the actual barometric pressure, and outside air temperature. You must allow for these two factors in converting actual indicator readings into standard conditions, or translating a performance figure in the graphs into an indicator reading under your actual conditions. The problem is complicated by the fact that barometric

pressure varies not only at a fairly constant rate with altitude, but most inconsistently, with the weather. The following paragraphs discuss the way in which your day-to-day weather can be taken into account, to calculate actual performance.

Note that two types of altitude are given in the performance graphs, pressure altitude and standard altitude; and that neither represents a reading which you normally will obtain from your altimeter. Pressure altitude is an expression of barometric pressure in terms of feet above sea level, rather than inches of mercury, which enables you to use your altimeter both to determine your actual height above sea level and, for performance purposes, to determine barometric pressure. Standard altitude, used in presenting data on range, speeds, fuel consumption and similar data, is pressure altitude corrected to a standard temperature. However, pressure altitude is used as the basis for the take-off and landing distance graphs and best rate-of-climb speeds; on these graphs, the performance shown by the standard temperature line is density altitude performance.

In order to find your standard altitude at a given time and place, set your altimeter for a barometric pressure of 29.92; it then will read pressure altitude. Note the outside air temperature. On the altitude correction chart, go up the line representing your air temperature to the point where it intersects the curving line representing your pressure altitude. Then read horizontally across the graph to your density altitude. You must set your altimeter to 29.92 (sea level standard pressure) in order to remove any correction made in it for local barometric pressure. This correction is necessary when the altimeter is used as an altitude meter; i.e., to determine your distance above the ground. However, when you are determining pressure altitude, barometric pressure compensation will introduce an error, rather than making a correction. The standard altitude given in the graphs actually is density altitude at the standard temperature represented by the diagonal dotted line on the conversion chart. However, for all practical purposes you may ignore the temperature difference and consider density altitude as standard altitude.

Like the altimeter, your airspeed indicator shows pressure, in this instance the difference between the ram air pressure imposed on the

pitot tube and the ambient barometric pressure picked up by the static air ports, expressing this differential as miles per hour of indicated airspeed. Since variations in both barometric pressure and temperature will affect the pressure differential, and hence the indicated airspeed, the data presented in the graphs has been converted to true airspeed. Converting the data to standard considerably simplifies the job of calculating how far you will actually go at a given indicated airspeed, under actual or forecast conditions. To convert indicated airspeeds to true airspeeds, determine pressure altitude, indicated airspeed and ambient air temperature, then find the true airspeed from the airspeed conversion graph.

Several airspeeds in the performance data are given as indicated airspeeds (IAS) or true indicated airspeed (TIAS), which you read directly from the indicator. In these instances, indicated airspeed is preferable to true airspeed since the performance—rate-of-climb, stalling speeds, etc., is affected by barometric pressure in the same proportion as indicated airspeed so that correction is not desirable. The recommended take-off maneuvering and landing speeds in the check lists and technique discussions throughout the book are given as IAS for the same reason.

The effect of pressure altitude—the actual density of the air in which you are flying—may be seen by applying some hypothetical normal take-off examples to the Normal Take-off graph. If, for example, you take off from LaGuardia, with an altitude near sea level, on a winter day when the temperature is 25°F, you can expect to clear 50 feet approximately 1280 feet from starting, assuming no wind and average piloting techniques. However at Denver the next summer, with a pressure altitude of perhaps 5600 feet and an OAT of 75°F, it will take you 2040 feet to attain the same altitude, under the same conditions.

Reference to the range charts shows that optimum cruising speed and altitude at maximum gross weight is 160 miles an hour at 10,000 feet. Other power and altitude combinations with resultant speeds also can be read from the graph. In general, the best performance is realized at the highest altitude at which the cruise power

to be used is available, since speed increases with horsepower and with altitude.. The airplane will also pick up a little more speed as fuel is burned off. At loadings lighter than the maximum gross weight shown on the graph, speeds will be proportionally higher.

Use your horsepower calculator to arrive at rpm, manifold pressure and fuel pressure settings for cruising flight. Note that the manifold pressure required to obtain a given horsepower will vary with outside air temperature.

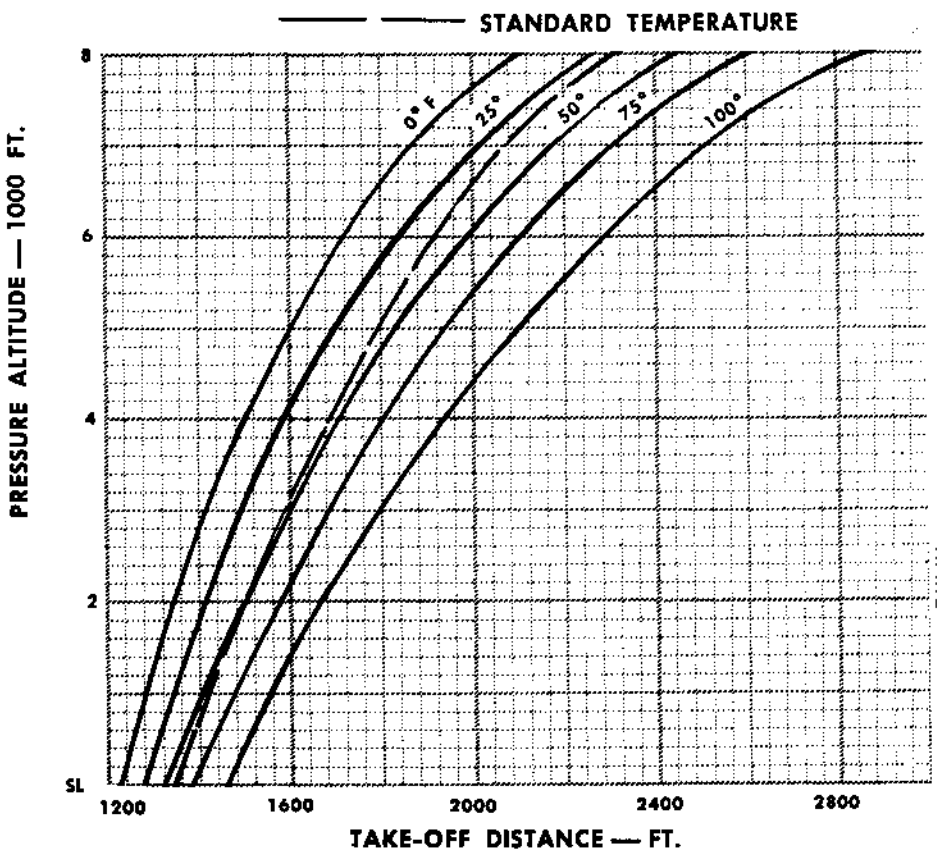
As shown on the fuel consumption graph, fuel consumption will vary with power settings and altitudes. If range rather than speed is your prime concern, try cruising at lower power settings. When cruising at 5000 feet with a setting of 125 horsepower at 2100 rpm, the engine will burn approximately 8.8 gallons per hour, whereas at the same altitude, and at a setting of 162.5 horsepower at 2450 rpm, the engine will burn approximately 11.6 gallons per hour.

Optimum range on the Bonanza occurs between 145 and 170 miles an hour, depending on altitude and power settings. This can be seen on the cruising range graph. Since the graph makes no allowances for wind, navigational error, pilot technique, warm-up, take-off, climb, etc., all of these factors should be considered when using it. The distances given in the range chart, since they are conservative, can be bettered substantially if the occasion demands; however, doing so entails some risk and is considered an emergency procedure. As such, the techniques, conditions under which they should be used and the possible consequences are discussed under "Unusual Operating Procedures."

After you have determined the altitudes, speeds, and power settings best suited for your intended flight, assemble the information on a master chart so that it can be used during your flight.

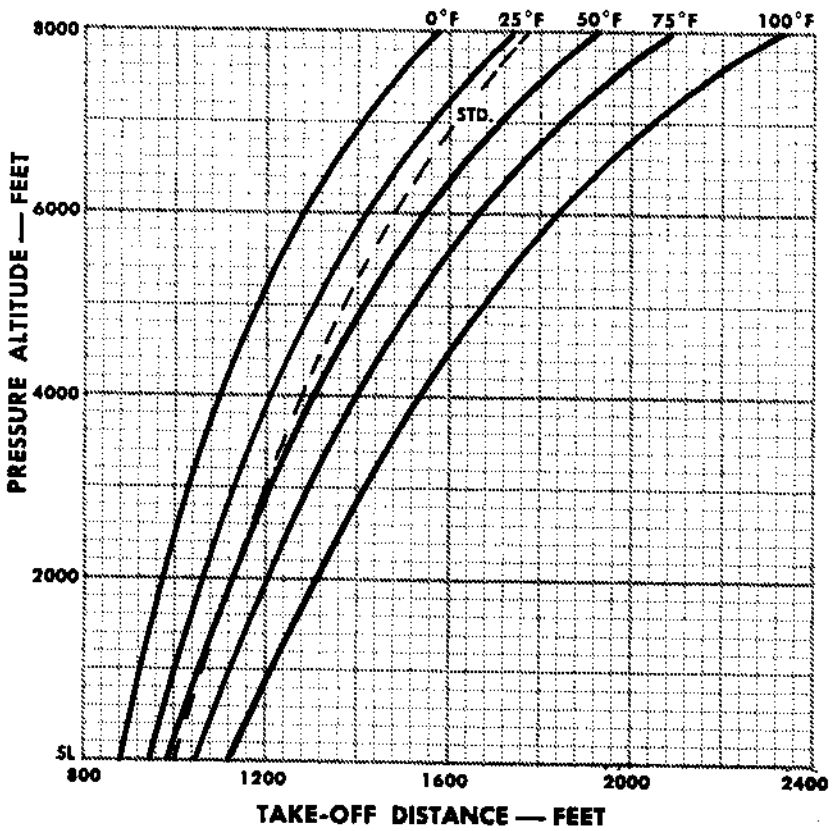
NORMAL TAKE-OFF

TO CLEAR 50 FEET
ZERO WIND — GROSS WT. = 2900 LB.
PAVED LEVEL RUNWAY



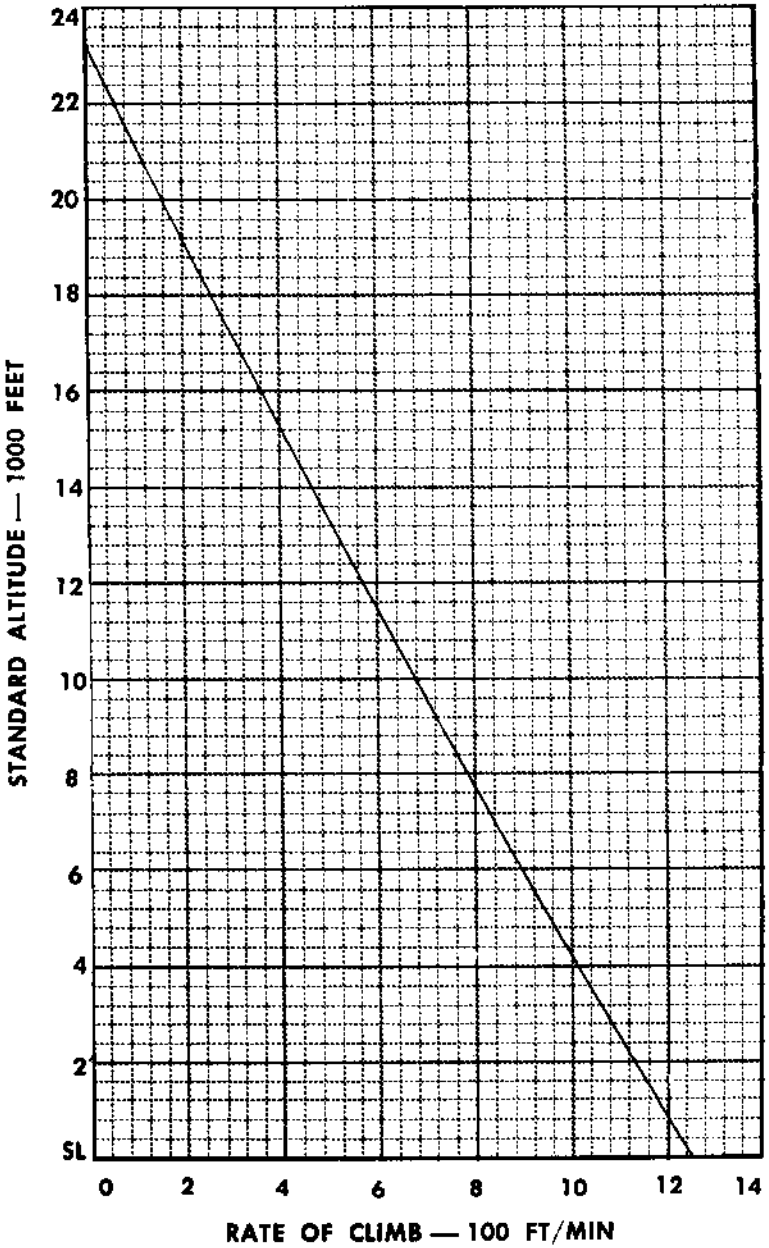
NORMAL TAKE-OFF

TO CLEAR 50 FEET
10 MPH HEADWIND
PAVED LEVEL RUNWAY



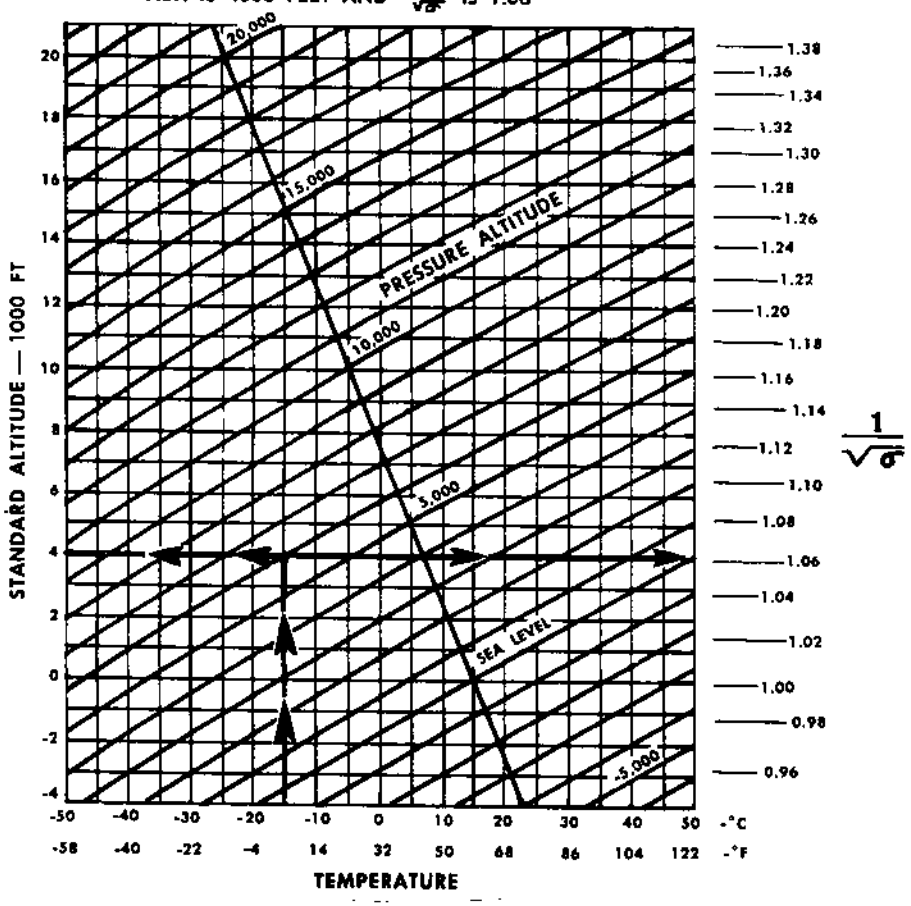
NORMAL CLIMB

GEARS AND FLAPS UP
GROSS WEIGHT — 2900 LBS.



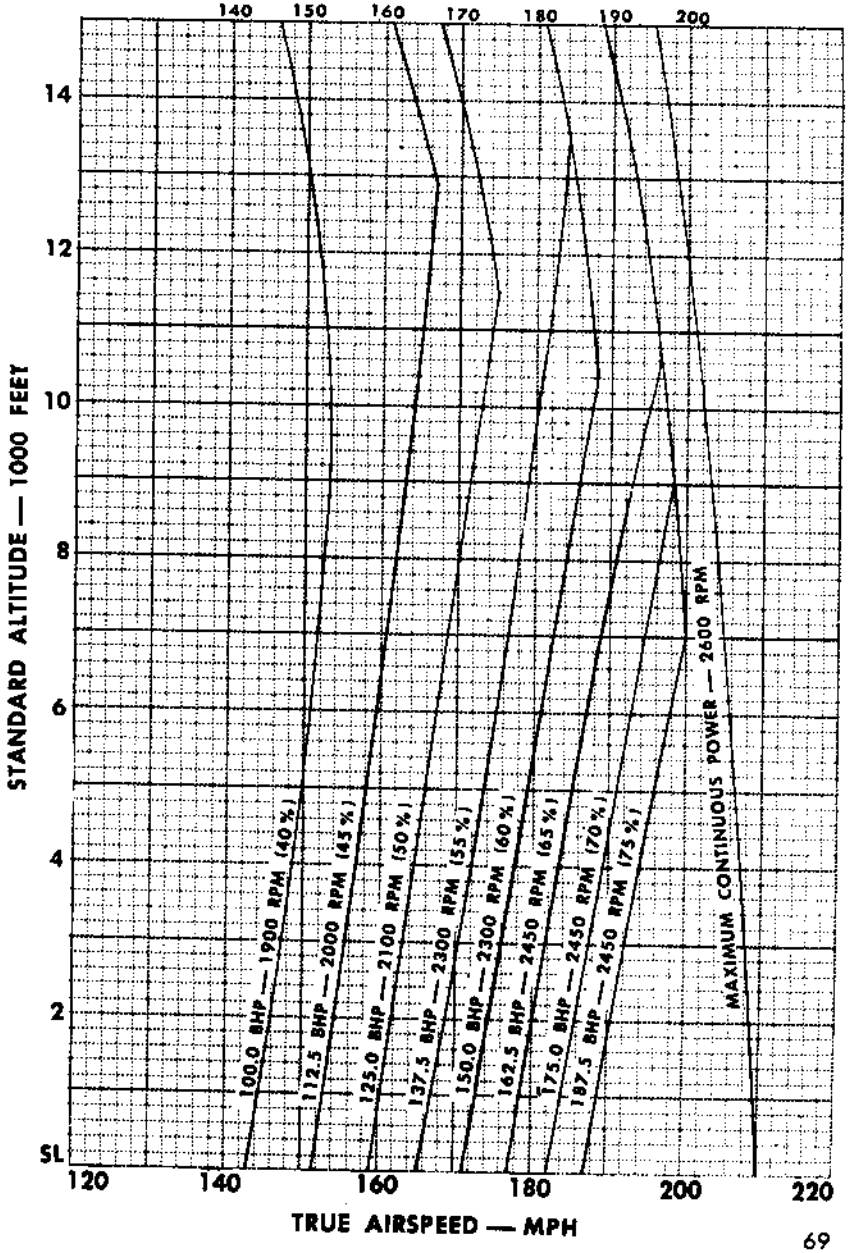
ALTITUDE CONVERSION

EXAMPLE: IF AMBIENT TEMP. IS -15°C AND PRESSURE ALT. IS 6000 FEET, THE STANDARD ALT. IS 4000 FEET AND $\frac{1}{\sqrt{\sigma}}$ IS 1.06

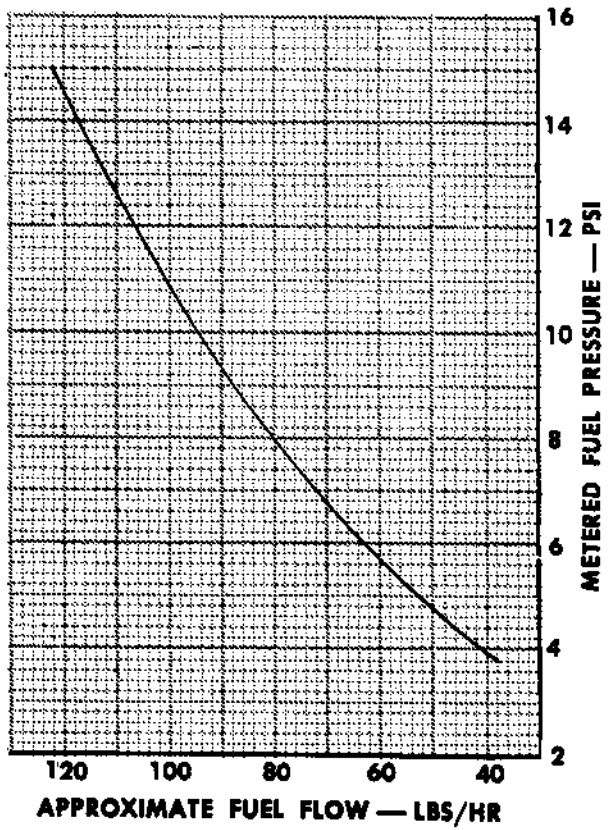


CRUISE

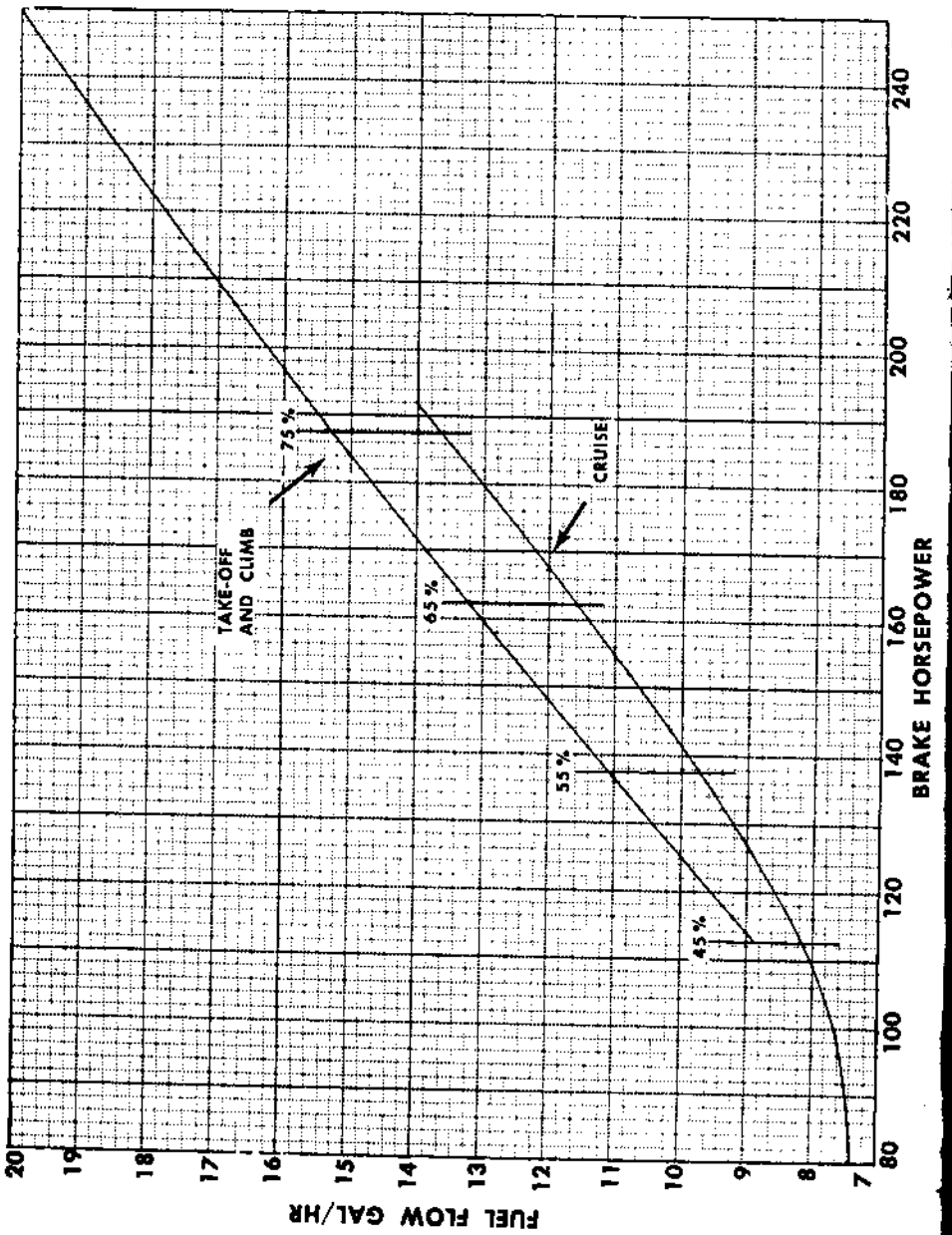
GROSS WEIGHT — 2900 LBS.



FUEL FLOW VERSUS FUEL PRESSURE

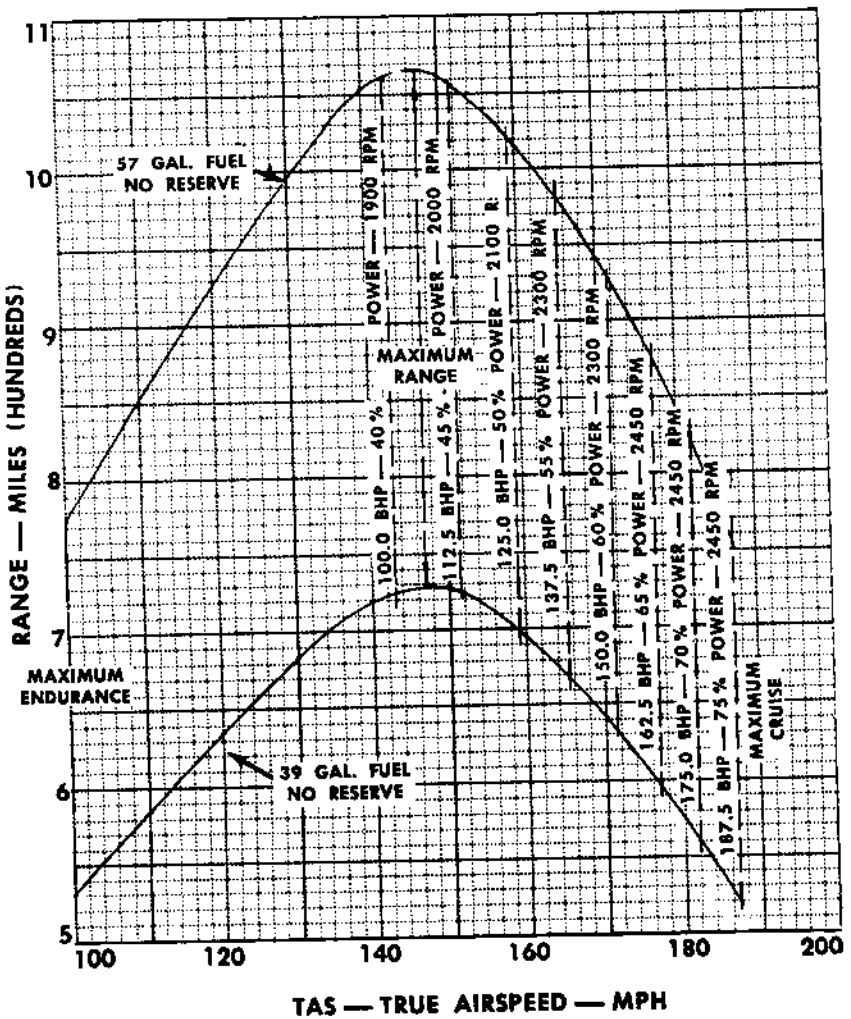


FUEL CONSUMPTION VERSUS HORSEPOWER



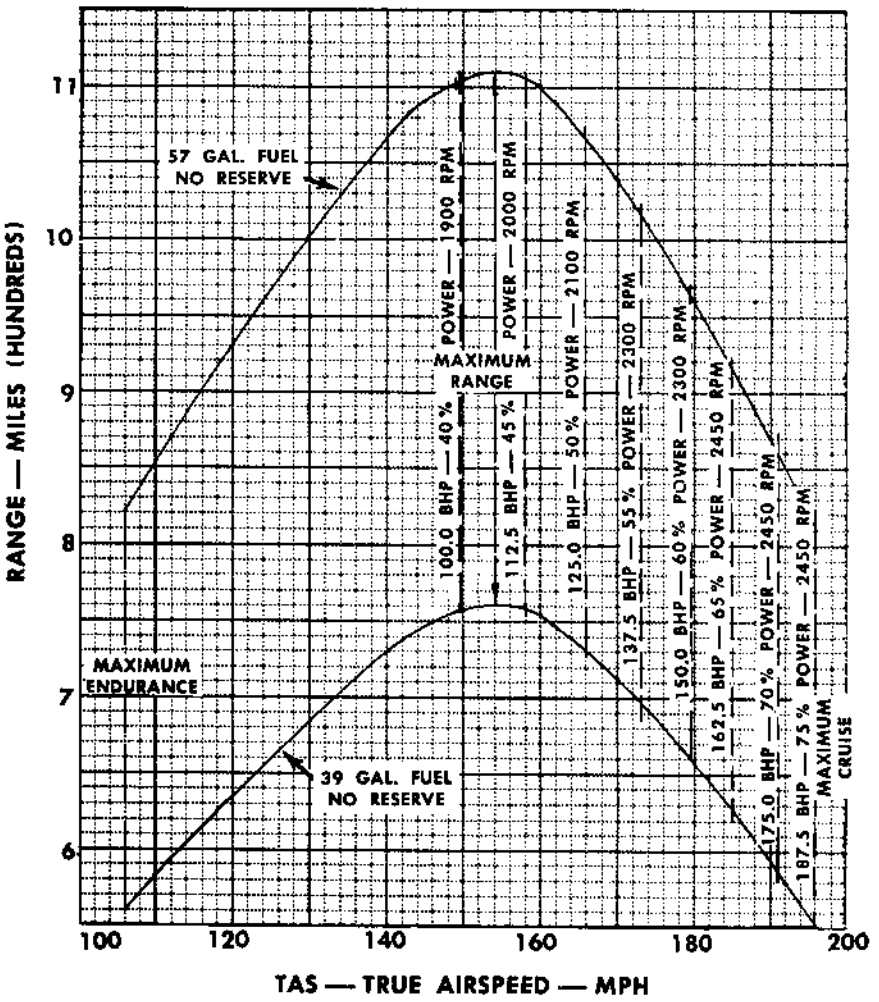
RANGE

SEA LEVEL



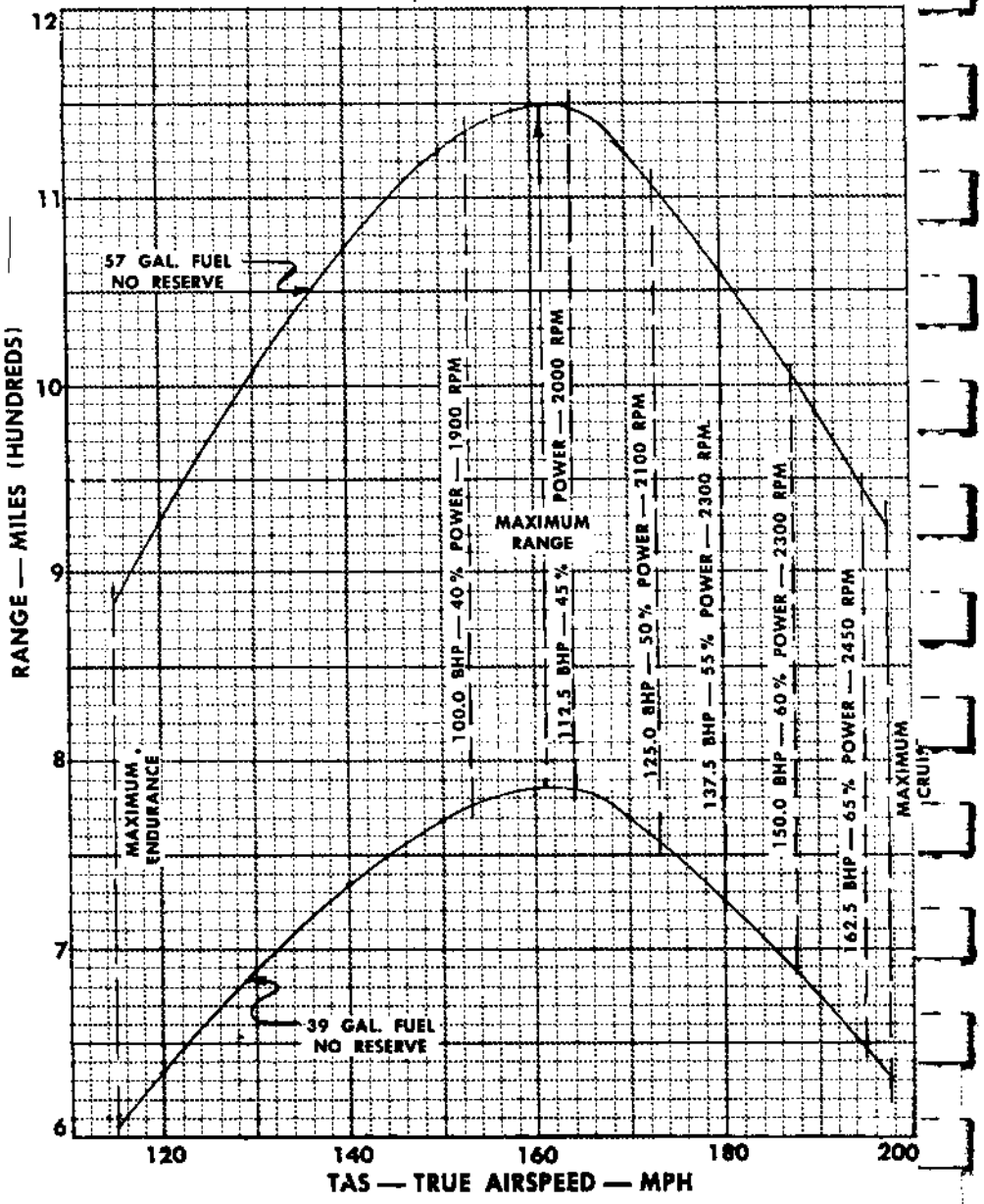
RANGE

5,000 FEET



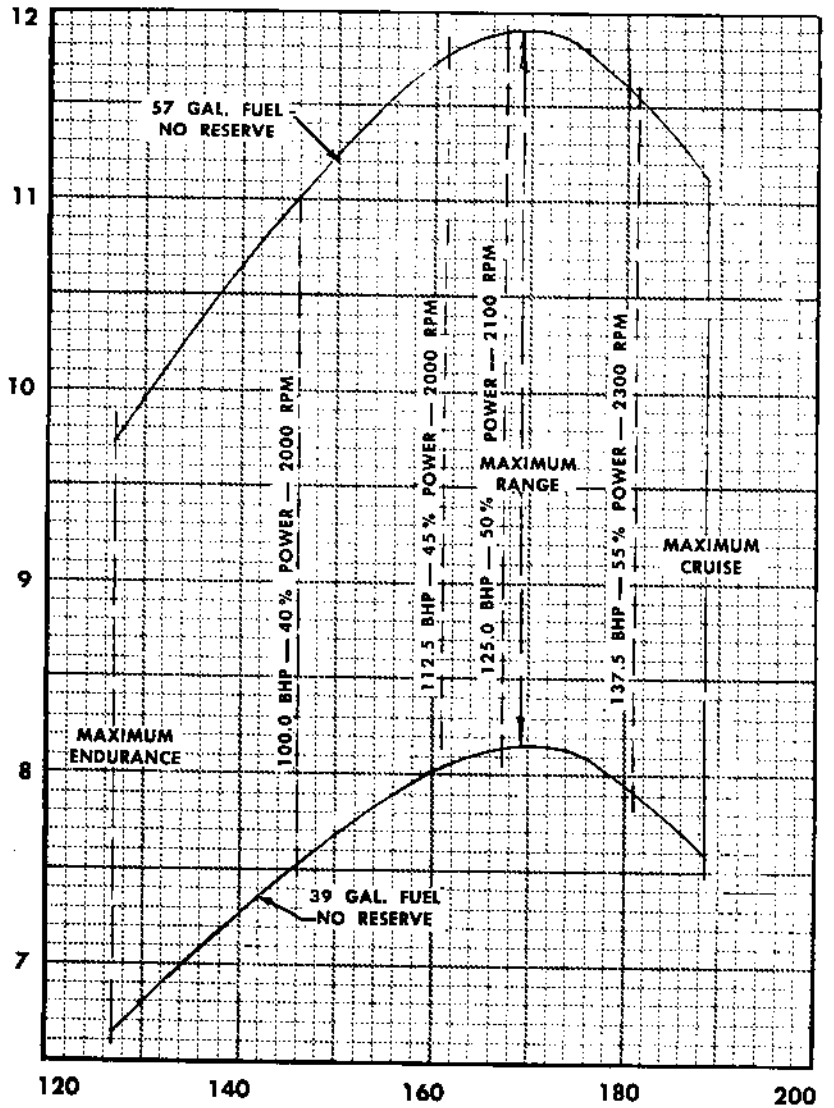
RANGE

10,000 FEET



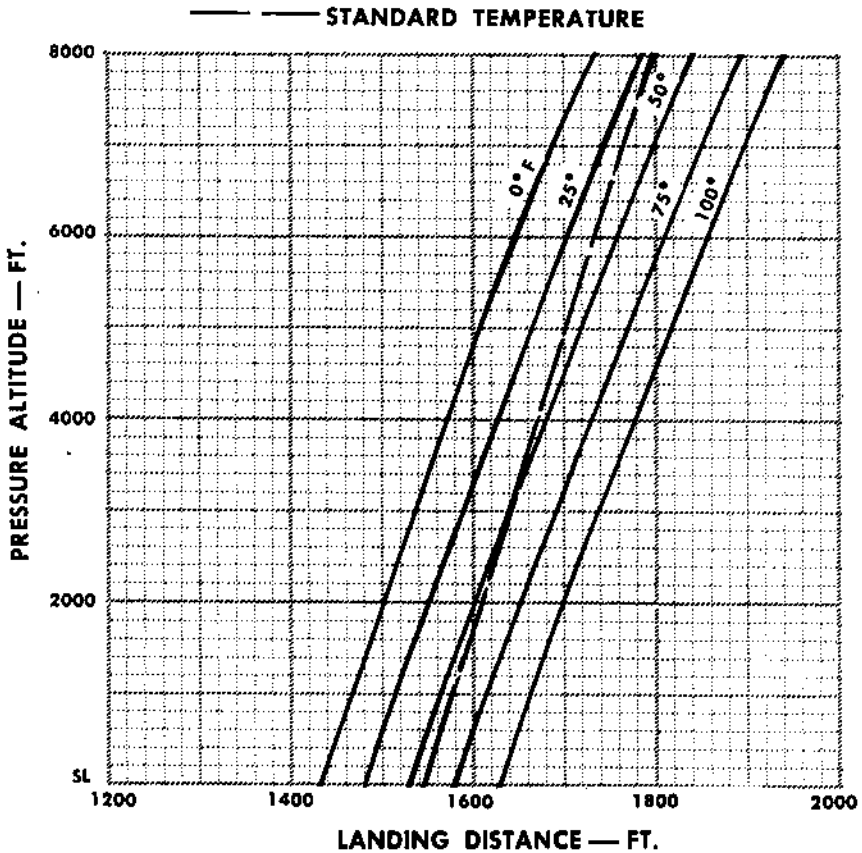
RANGE

15,000 FEET



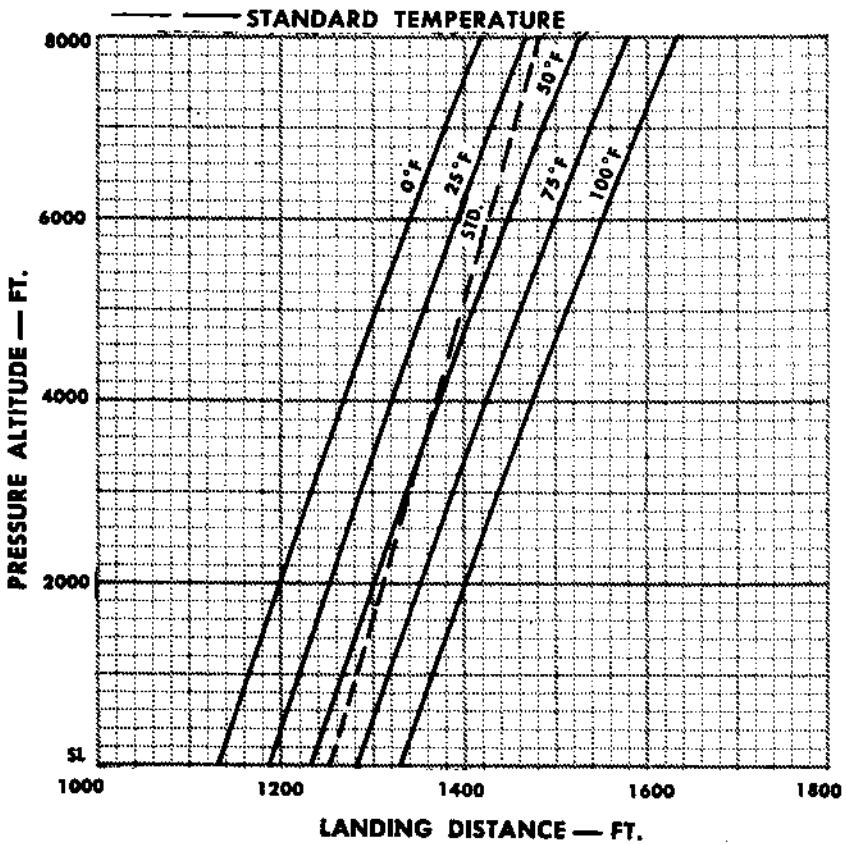
NORMAL LANDING

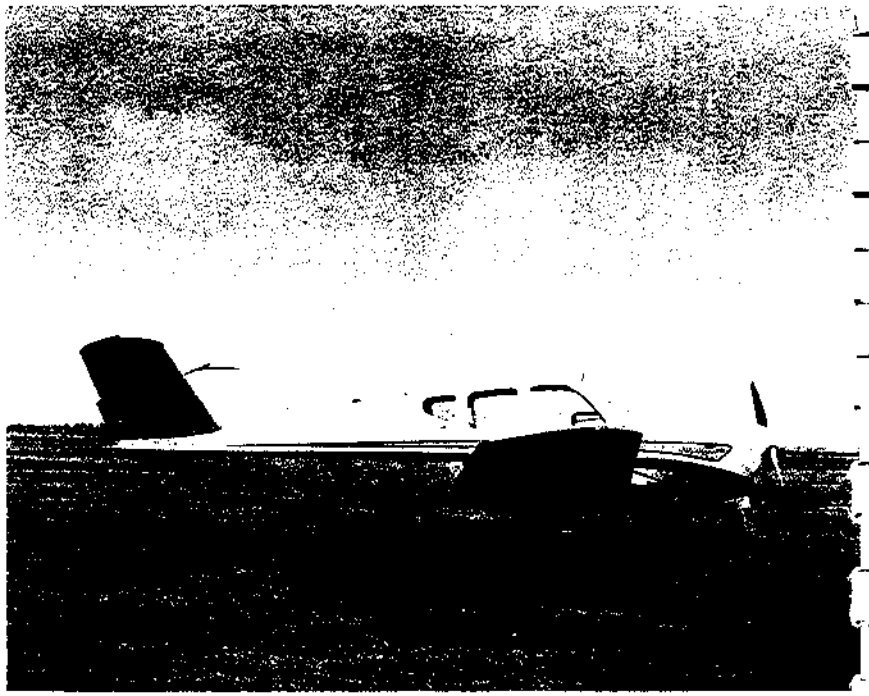
LANDING DISTANCE OVER 50 FT.
POWER OFF APPROACH
FLAPS — 30°, ZERO WIND
GROSS WEIGHT = 2900 LB.
PAVED LEVEL RUNWAY



NORMAL LANDING

OVER 50-FT. OBSTACLE
10 MPH HEADWIND
FLAPS — 30°
GROSS WEIGHT = 2900 LB.
PAVED LEVEL RUNWAY





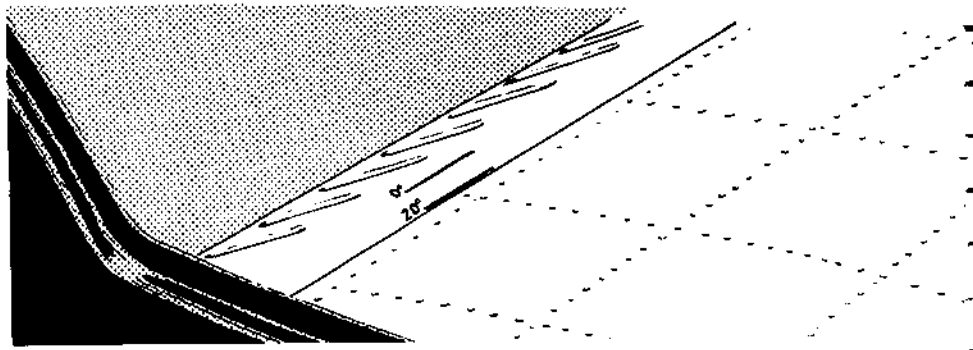
Unusual Operating Conditions

The information in this section of your Bonanza Handbook is presented to enable you to form in advance a definite plan of action for coping with any unusual situation which could reasonably occur in the operation of your airplane. Since a multitude of situations could be classed as "unusual," discussion here is confined only to operations from unimproved fields and over rugged terrain, handling under various flight contingencies, and steps to be taken in several emergencies requiring immediate, positive action. A careful reading of this section will prove invaluable not only in knowing what to do in a particular situation, but also in formulating your own plan of action for any other situation you feel may be encountered.

The altitudes shown in the performance graphs in this section are pressure altitude, which you obtain by adjusting your altimeter to sea level standard. All airspeeds given are indicated airspeeds, since the factors which vary airspeed readings also affect the performance in question in the same manner and at the same rate.

SHORT FIELD TAKE-OFF

For a minimum run take-off, use 20 degree flaps. This extension can be judged quite accurately from the pilot's position by lowering the flaps until the 20 degree line on the leading edge of the left flap lines up with the wing trailing edge. Keep the cowl flaps open, hold the airplane with the brakes and run the engine up to full power; then release the brakes. During the ground run some right rudder will be required, but do not use brakes, since doing so will lengthen the run. At approximately 60 mph indicated airspeed, smoothly and rapidly apply back pressure on the control wheel to assume a nose-high atti-



tude so that you will break ground as soon as the minimum flying airspeed of approximately 65 mph is reached. As soon as you break ground, retract the gear and drop the nose slightly to gain a safe airspeed. Retract flaps only after reaching a safe altitude, and continue with the normal take-off and climb procedure.

OBSTACLE CLEARANCE TAKE-OFF

To clear an obstacle on take-off, when you must obtain maximum altitude in minimum horizontal distance, use the best angle of climb speed shown on the graph for your altitude. As shown on the climb speed graph, this speed will increase gradually with altitude. *Since with the Bonanza, as with any other airplane, the best angle of climb is achieved only slightly above stalling speed, you should consider this an emergency technique.*

Use the same procedures as for a minimum-run, or short field, take-off to the point of assuming a nose-high attitude. Do not assume the nose-high attitude until reaching the minimum flying airspeed of approximately 65 mph. Clear the ground, retract the gear, and as soon as your selected airspeed has been reached, hold it to obtain the maximum angle of climb until the obstacle is cleared. After clearing the obstacle, accelerate to normal climb speed, retract flaps only after reaching a safe altitude, and continue with the normal take-off and climb procedure.

CROSSWIND TAKE-OFF

Use smooth application of power and correct as much as possible for the crosswind by holding upwind aileron and using rudder pedal steering of the nose wheel. If these are not sufficient at the start of the take-off roll, some use of brakes may be necessary; however, brakes should not be used after the take-off roll is under way. Every application of brakes on the take-off roll will lengthen it. Hold the nose wheel on the ground longer than in a normal take-off and use aileron to hold the wings level. Make the pull-off definite, and when airborne, correct for drift by making a coordinated turn into the wind.

MAXIMUM ENDURANCE

The recommended power settings in the normal operating section are intended to provide the best all-around economy: low fuel consumption at reasonable speeds and with minimum wear or risk of damage to the engine. However, as an *emergency* measure if weather or other circumstances demand that you either stay aloft as long as possible or travel as far as possible, you may decrease your fuel consumption by leaning the mixture as far as possible beyond the normal operating range. As you lean past best power, you will notice a drop in airspeed and the engine will roughen slightly. Advance the mixture just enough to stabilize the airspeed. Bear in mind that in doing so you run the risk of damaging your engine, both by leaning it to a point near the detonation range and by building up excessive cylinder pressures through the high manifold pressures and low rpm you will use. To put the problem bluntly, this procedure is one to be used when the choice is between an engine repair bill and a possible disaster.

The techniques for maximum range and maximum endurance differ only in the airspeeds used; for maximum endurance, fly 30 to 40 mph slower than for maximum range. Your airspeed for maximum range should be from 145 to 170 mph, depending on gross weight; the higher the weight, the higher the optimum speed. Emergency leaning can be expected to stretch your fuel; however, as you can see if you figure the amount of fuel you can buy with the price of an engine overhaul, this is no technique for everyday use. In over-all operating cost, it can be far more costly than the conservative power settings recommended for normal operations.

BALKED LANDING

Make the decision to go around as early as possible in the landing approach to provide a safe margin of airspeed and altitude. The go-around procedure is a normal maneuver and does not become an emergency procedure unless it is started too late. Accuracy of judgment and early recognition of the need to go around are important; these are developed by practice. The go-around procedure is as follows:

1. **Throttle — take-off power.**

2. **Landing gear — up.**

WARNING

Do not raise the gear until you are certain the airplane is flying once more.

3. **Cowl Flaps — open.**

4. **Mixture — best power.**

NOTE

At elevations below 3000 feet, use full rich.

5. **Airspeed — 72 to 78 mph IAS.**

NOTE

Climb out at best angle-of-climb speed, which will vary with pressure altitude, until you can level off safely. Remember, however, that you are close to stalling speed.

6. **Trim — hold forward pressure on the column until you have time to retrim.**

7. **Flaps — up.**

NOTE

Raise the flaps only after you have established your climb and gained a safe altitude; then bring them up gradually, letting your airspeed stabilize after each period of retraction.

8. **Elevator trim tab — reset as needed.**

9. **Continue normal climb procedure.**

With the application of full power, particularly with considerable trim and a loading near the forward center of gravity limit, the elevator forces may become quite heavy and you may wish to roll off enough trim immediately, to relieve these forces. Do not attempt to retrim the airplane, however, until you are in the clear.

If circumstances permit you to watch their positioning, bringing the flaps up to 20° as soon as you have applied power will be of some benefit in gaining speed, without sacrifice of lift; the last 10° of flap provide mainly added drag to assist in landing. Do not attempt to raise the flaps, however, if you are in traffic or have obstacles ahead which must be cleared.

CROSSWIND LANDING

Landing in a crosswind presents no special problem except the elimination of drift correction, at the proper moment, to avoid touching down in a skid. Correction for drift may be accomplished by three methods: crabbing, carrying the upwind wing low (a slip), or a combination of both. Usually, crabbing is most successful for landing. Generally, less flap should be used, depending on the velocity and angle of the wind, since stall and ground handling characteristics in a crosswind are less desirable with full flaps. Approach the runway with crab, but eliminate most of the crab on nearing the runway, replacing the crab with an upwind wing-low attitude. Touch down easily onto the low main wheel while flying airspeed remains and allow the airplane to settle smoothly to the runway to preserve directional control. If an excessive amount of crab should remain just prior to touchdown, eliminate it as much as possible at the point of touchdown by the use of rudder. If excessive skidding across the runway appears imminent, make a coordinated turn to realign with the runway and drop your upwind wing to correct the tendency to drift.

OPERATION FROM UNIMPROVED FIELDS

Use brakes with caution when taxiing over soft or uncertain terrain to prevent digging the nose wheel into the ground. On rough ground, hold the control wheel back to reduce loads on the nose wheel, and let the airplane coast over bumpy surfaces. In loose gravel or sand, use a minimum of throttle to prevent damage to the propeller and exterior surfaces of the airplane.

CAUTION

Protection of the propeller is of particular importance when operating from unimproved fields. Hold high power operation to a minimum and if you suspect the propeller has been nicked, investigate it before take-off. Leaning to best power for a high-altitude take-off should be done on the take-off roll, rather than on run-up.

For take-off from unimproved fields, apply slight back pressure on the control wheel at the beginning of the ground roll, maintain enough back pressure to lift the nose wheel off the ground as soon as possible, and continue the take-off using the procedure described for a short-field, or minimum-run, take-off.

The procedure for landing on unimproved fields is similar to that for landing on ordinary fields, but if the surface is very rough, touch down as smoothly as possible to minimize shock loads on the landing gear. If feasible, avoid using full flaps when landing on loose gravel, cinder, or similar surfaces, since particles thrown up by the wheels could damage the flaps.

GLIDING RATIO

The gliding distance table gives the horizontal distance that you can glide, assuming the glide ratios shown, for several different altitudes and wind conditions. The maximum glide distance is obtained with the propeller in the low rpm position and maintaining an optimum IAS of 90 mph. In all cases, ⅛ mile has been subtracted from no wind and head wind glides to get you to your field with 50 feet

GLIDE DISTANCE

Altitude Above Ground	Zero Wind	10 MPH Head-wind	20 MPH Head-wind	30 MPH Head-wind	30 MPH Tail-wind	20 MPH Tail-wind	10 MPH Tail-wind
1000	1¾	1½	1¼	1¼	1¾	1½	1¼
2000	3½	3¼	3	2½	4¼	4	3½
3000	5½	5	4½	4	6¾	6¼	5½
4000	7½	6¾	6	5½	9¼	8½	7½
5000	9¼	8½	7¾	6¾	11¾	11	9¾
6000	11¼	10¼	9¼	8¼	14¼	13¼	11¾
7000	13¼	12	10¾	9¾	16¾	15½	13¾
8000	15	13¾	12½	11	19¼	18	16
Glide Ratio	10.12	9.24	8.36	7.48	13.20	12.32	11.00

altitude, and ⅝ mile has been subtracted from tail wind glides to allow for a turn into the wind, ending the turn at 50 feet altitude. Whether you choose to land with your wheels up or down depends on the field you are going into and how much time you have to look it over before you land. A wheels-up landing will, of course, use up less distance on the ground, and the damage done by landing wheels-up frequently will be less than that resulting from a collision, or nosing over, or damaging the landing gear and structure by running into a ditch or hole at high speed.

GEAR-UP LANDING

If you are to make a gear-up landing, make a normal approach, and if possible choose a hard surface to land on. Avoid a gear-up landing on soft ground, due to the tendency of sod to roll up into chunks and damage the underside of the fuselage. Use the following procedure:

1. Safety harness — secured.
2. Flaps — as required.
3. During flare out — close throttle, move mixture control to IDLE CUT-OFF, and turn fuel selector valve to the OFF position.
4. Just before touchdown — all switches OFF.
5. Get clear of the airplane as soon as it stops.

DITCHING

If, for any reason, it should be necessary to ditch the airplane, plan to touch down before all fuel is exhausted in order to have power for

a controlled approach. Land with the gear and flaps up, and make contact with the water in a fully stalled, nose-high attitude. Deceleration will be very rapid, and the airplane will usually travel about one hundred feet after it touches the water. Assuming that a "good" landing has been accomplished, the airplane will not be substantially damaged and will float approximately six minutes.

The following procedure is outlined for an emergency water landing:

1. **Safety harness — secured.**
2. **Landing gear — up.**
3. **Flaps — up.**
4. **Cowl flaps — closed.**
5. **During flare out — close throttle and pull mixture control to idle cut-off.**
6. **Just before touchdown — all switches off.**
7. **Cabin door — unlatched.**
8. **Clear the airplane as soon as possible.**

ESCAPE

The rear windows may be used for emergency exit by pulling the pin from the opening mechanism and opening the window.

LANDING GEAR EMERGENCY EXTENSION

The landing gear handcrank will lower the gear manually if the electrical system fails or if you wish to do so for some other reason. The handcrank is designed only to lower the gear; you should not attempt to retract it manually. The following procedure should be used:

1. **Landing gear circuit breaker—off.**
2. **Landing gear switch—down position.**
3. **Remove the safety boot from the handcrank handle (at the rear of the front seat), move the handle into the cranking position, and turn it counterclockwise as far as possible.**

NOTE

About 50 turns will be required to get the gear down and locked.

4. **Check mechanical indicator to ascertain that gear is down.**

NOTE

If possible, get a visual check from the tower or another airplane.

LANDING WITH A FLAT TIRE

A flat tire on a main wheel will act as a brake when on the ground, tending to turn the airplane into the flat. Touch down well over to the opposite side of the runway to allow room for a swerve and hold directional control with opposite brake. A flat nose wheel tire will reduce nose wheel stability and hard applications of brake should be avoided. After landing with a flat tire, park the airplane clear of the runway and shut down the engine; do not taxi in with a flat tire.

ENGINE FAILURE

Engine failure is usually preceded by symptoms which will enable you to take preventive action if you are alert to operating conditions at all times. Instant and complete engine failure most often occurs due to failure of fuel flow and/or ignition. This type of failure due to mechanical causes is seldom encountered. Failure due to carelessness or improper operating techniques should be guarded against by constant attention to such things as cylinder head temperature, oil pressure, sound of the engine, manifold pressure and rpm, and by observing the operating limitations. Land as soon as possible if engine failure is indicated.

Immediately on noting any condition which would point to imminent engine failure, such as loss of power, loss of fuel pressure, rough running engine, etc., slow the airplane down, and if altitude permits, proceed as follows:

1. Switch fuel tanks.

NOTE

Many engine failures are the result of fuel starvation due to poor fuel planning. Look at the fuel selector valve handle when switching tanks to avoid inadvertently switching into the OFF position, or an empty tank.

2. Switch on boost pump.
3. Throttle—open about ½ inch beyond present setting.
4. Mixture control—check—full rich.
5. Propeller—full high rpm.
6. Check ignition switch BOTH, battery and generator switches ON.

Should the engine fail completely and if sufficient altitude remains, attempt a restart using the following procedure:

1. Move the mixture control to idle cut-off and turn the fuel selector valve handle to the off position for a few seconds to clear the engine. The throttle may be opened until ready to restart.
2. Turn fuel selector valve handle to fullest tank — adjust throttle approximately ¼ inch open — move mixture control to full rich.

If the engine still fails to start, shut it down and prepare for a forced landing as follows:

1. Mixture control — idle cut-off.
2. Throttle — closed.
3. Ignition switch — off.
4. Fuel selector — off.
5. As speed drops, lower the nose and maintain airspeed for best glide distance.

WING FIRE

If you should have a wing fire, do the following:

1. All electrical circuits into the wing — OFF (landing lights, navigation lights, fuel quantity indicator).
2. Attempt to extinguish the flames by slipping the airplane away from the fire.
3. Prepare for an emergency landing and land as rapidly as practicable.

ENGINE FIRE DURING STARTING

Fire during starting may occur in either the induction or exhaust systems, but the technique involved is the same in both cases — keep the engine turning, trying to get it started in an attempt to blow the fire out through the exhaust system. Should a fire occur:

1. Try to get engine started; open throttle and keep cranking with starter.
2. If fire does not go out and if engine does not start, place mixture control in IDLE CUT-OFF, turn fuel selector valve handle to OFF, push throttle lever to full open and continue cranking.
3. Turn ignition switch to OFF and release starter button. Turn battery and generator switches OFF.

4. **Signal ground attendants to use fire extinguisher.**
5. **Get clear of the airplane.**
6. **Do not restart engine if fire extinguisher is used.**

If engine starts and fire persists, shut engine down, signal for fire extinguishing equipment and clear the airplane.

ENGINE FIRE DURING FLIGHT

In case of fire in the engine compartment while in flight, pull the emergency smoke control, located on the outboard side of the circuit-breaker panel, to seal off all heating and ventilating openings and prevent smoke and fumes entering the cabin. Shut down engine as follows and make a forced landing:

1. **Mixture control — IDLE CUT-OFF.**
2. **Fuel selector valve handle — OFF.**
3. **Ignition switch — OFF.**
4. **Battery and generator switches — OFF.**

NOTE

If a forced landing is possible on a runway, turn the battery switch on long enough to extend the gear, if it appears reasonably safe; otherwise, extend the gear manually or land with gear up.

5. **Throttle — closed.**
6. **Do not attempt to restart engine.**

FUSELAGE FIRE IN FLIGHT

Should a fuselage fire occur in flight:

1. **Reduce airspeed and close off all heating and ventilating openings to minimize draft through the cabin.**
2. **Battery and generator switches — OFF.**
3. **All electrical equipment — OFF.**

4. **Turn battery and generator switches on, one at a time, in an attempt to determine the nature of the fire.**
5. **If generator and battery circuits are all right, monitor the remaining switches one at a time to locate and isolate the defective circuit. If the defective circuit is not located, use only the minimum equipment necessary.**
6. **Land the airplane immediately.**

COLD WEATHER HINTS

In addition to your normal exterior inspection, remove ice, snow, and frost from the wings, tail, control surfaces and hinges, propeller, windshield, pitot tube, and fuel and oil tank vents. Drain any possible water condensation from fuel and oil tank drains to prevent them from being clogged by ice. Check the flight controls for complete freedom of movement, and complete your normal preflight procedures. *Always remove all snow, ice, or hoar frost* from the wings before taking off. If you have no way of removing the deposit — leave the airplane on the ground! It will not blow off. Foreign deposits such as these, since they change the contour of a wing, destroy its lift and increase drag.

Cold engine starts normally require a more retarded throttle setting than usual. Also, moisture forms quickly on the spark plug electrodes during cold weather starts, so if you have made three or four unsuccessful starting attempts, have at least one plug removed from each cylinder. Heat the plugs to dry the electrodes, replace them, and attempt to restart the engine immediately.

Do not taxi through water or slush if it can be avoided. Water or slush splashed on the wing and tail surfaces will freeze, increasing weight and drag and perhaps limiting control surface movement.

Use the brakes sparingly; taxi slowly for best control and for aircraft protection from flying water, slush, or ice.

Run up the engine prior to take-off, then complete your normal take-off check with special emphasis on the following:

1. **Pitot heat — on (if installed).**

2. Close the two front seat hot air outlets, to permit a greater volume of air to pass through the defroster outlets.

3. Run propeller through its pitch range several times to flush cold oil from the actuating cylinder.

Make a normal take-off, but if the gear is wet from running through water or ice, delay retraction until it has had time to dry. If wet gear is retracted, the gear or doors may freeze in the up position. Should propeller icing be encountered during flight, and an accumulation is resulting in rough engine operation, it can sometimes be eliminated by rapidly increasing and decreasing rpm.

During longer flights in cold weather, propeller operation will be more smooth and the propeller will respond more readily and accurately to changes in power or load if it is exercised occasionally. Once power settings are established and the airplane trimmed, the movement of the pitch change mechanism to maintain constant rpm is so slight that congealed oil in the propeller cylinder becomes a possibility. Exercising the propeller flushes the cold oil from the cylinder. When exercising the propeller, reduce the manifold pressure approximately two inches below the selected cruise setting, then smoothly cycle the propeller through a range of approximately 200 rpm above and 200 rpm below the selected cruise setting. After completing the exercise, return to your original power setting. The best indication of the frequency the propeller should be exercised is the rate of rpm change. If the rpm changes rapidly, you may extend the interval, if it changes slowly, the exercising frequency should be more often.

Throughout your descent, monitor cylinder head temperature and manifold pressure. Should you experience overcooling, decrease your rate of descent, lower the gear and add power. Remember, however, manifold pressure increases automatically with decreased altitude.

TERRAIN FLYING

Besides being aware of lower take-off, climb, and landing performance at higher field elevations, you should prepare yourself for unexpected weather conditions and other phenomena which prevail over mountainous, high altitude country.

Standing waves, which occur under the right combination of meteorological and terrain conditions, present severe updrafts, downdrafts, and turbulence. The intensity of the turbulence is variable and may be in the order of that experienced in thunderstorms.

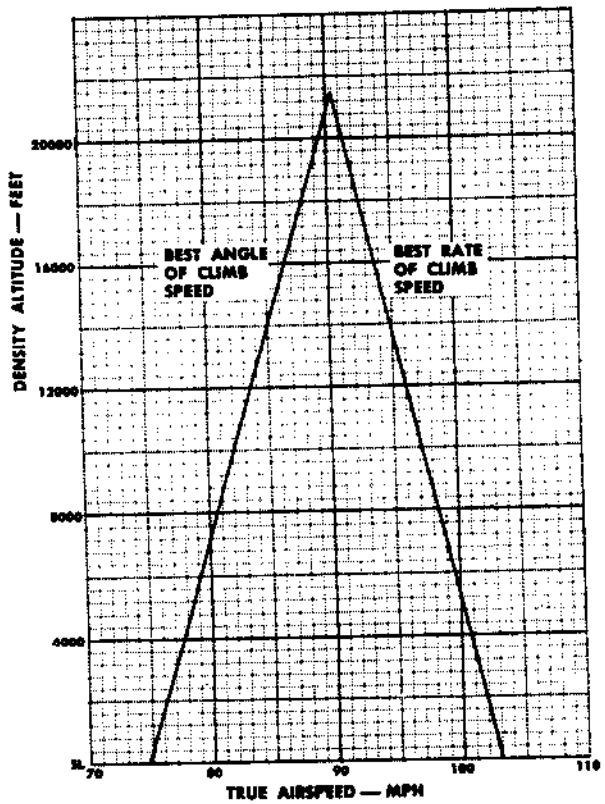
Air flowing over ridges and down slopes produces areas of reduced atmospheric pressure. Since your altimeter and rate of climb indicator are barometric instruments — and the main thing that interests a barometric instrument is pressure — your altimeter will show a reading higher than you actually are, and your rate of climb indicator may be showing a climb when actually you may be losing altitude. Also, the closer you are to a ridge, the greater the error is.

Even if your airplane has several thousand feet of terrain clearance, the velocity of downdrafts could be considerably greater than your rate of climb, and if combined with rough air, may reduce the rate of climb theoretically available by several hundred feet per minute.

Another factor to consider is heavy rain, which causes a film of water on the windshield and changes its refractive characteristics. Under these conditions, a distinct ridge may appear to be lower than it actually is.

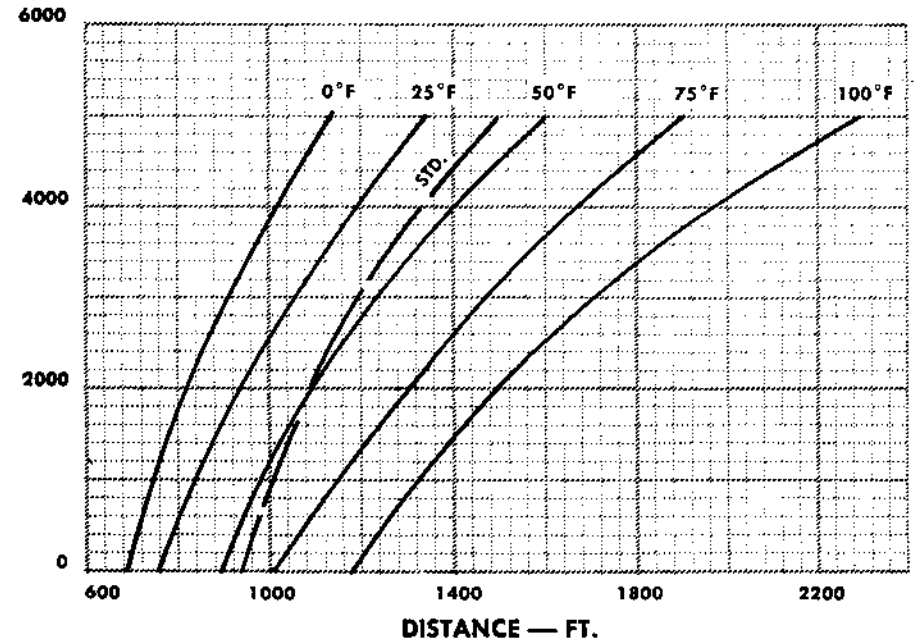
Under adverse weather conditions, allow considerably more altitude clearance than normal when flying over rugged terrain. For further information on this subject, it is suggested that you read *"Terrain Flying,"* obtainable from the Superintendent of Documents, Washington, D.C.

OPTIMUM CLIMB AIRSPEEDS



SHORT FIELD TAKE-OFF

TO CLEAR 50 FEET
0 MPH HEADWIND
PAVED LEVEL RUNWAY

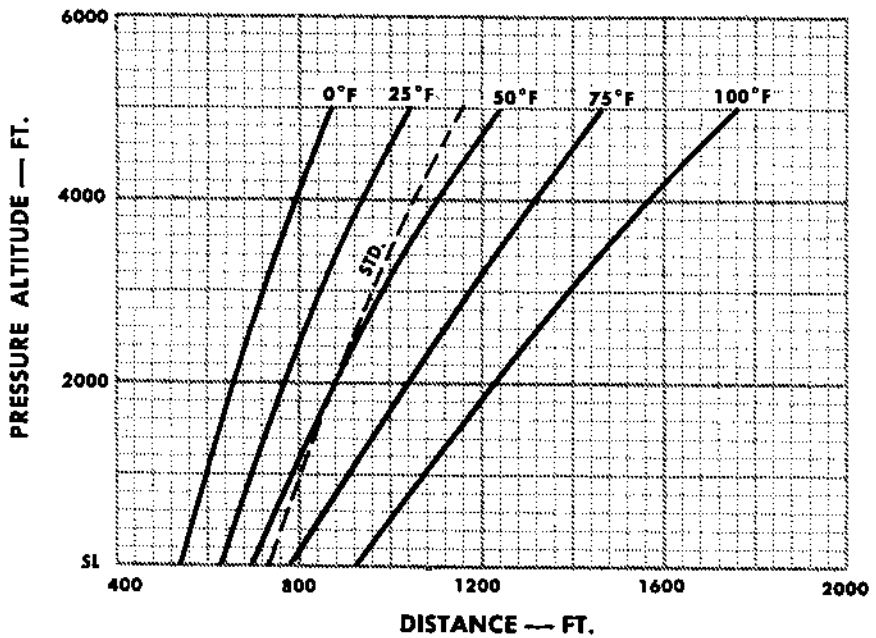


SHORT FIELD TAKE-OFF

TO CLEAR 50 FEET

10 MPH HEADWIND

PAVED LEVEL RUNWAY



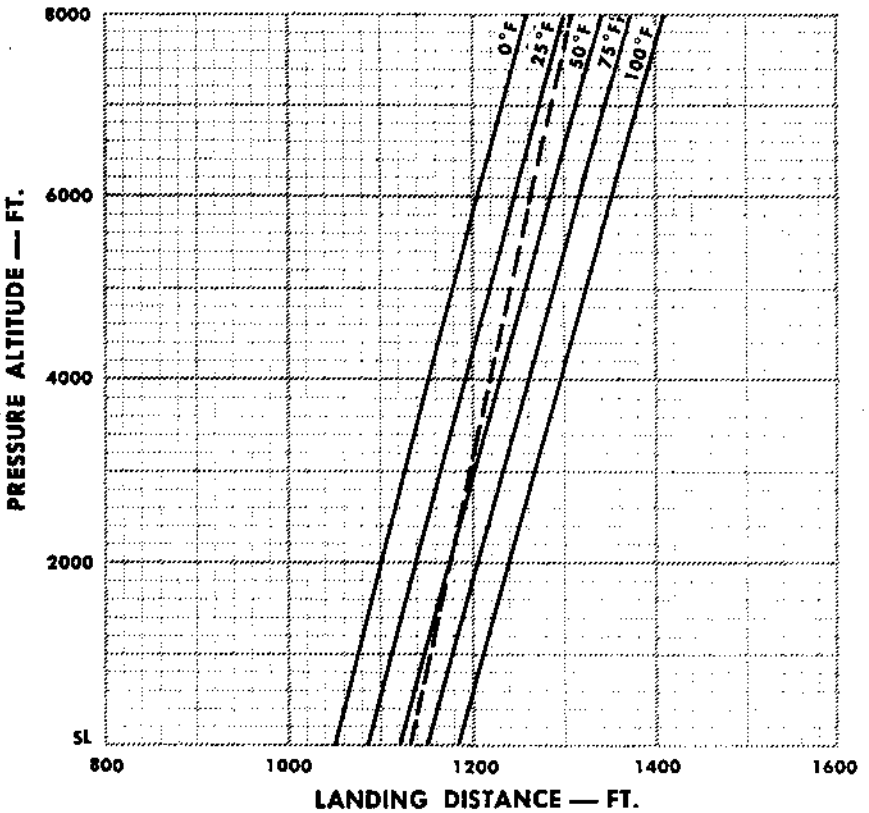
SHORT FIELD LANDING

OVER 50-FT. OBSTACLE

ZERO WIND

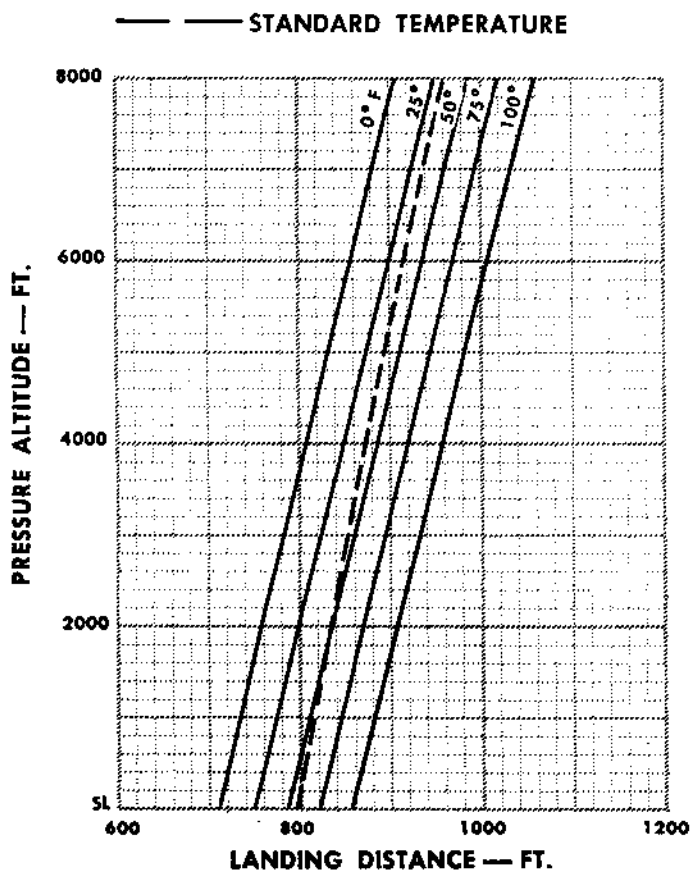
PAVED LEVEL RUNWAY

STANDARD TEMPERATURE

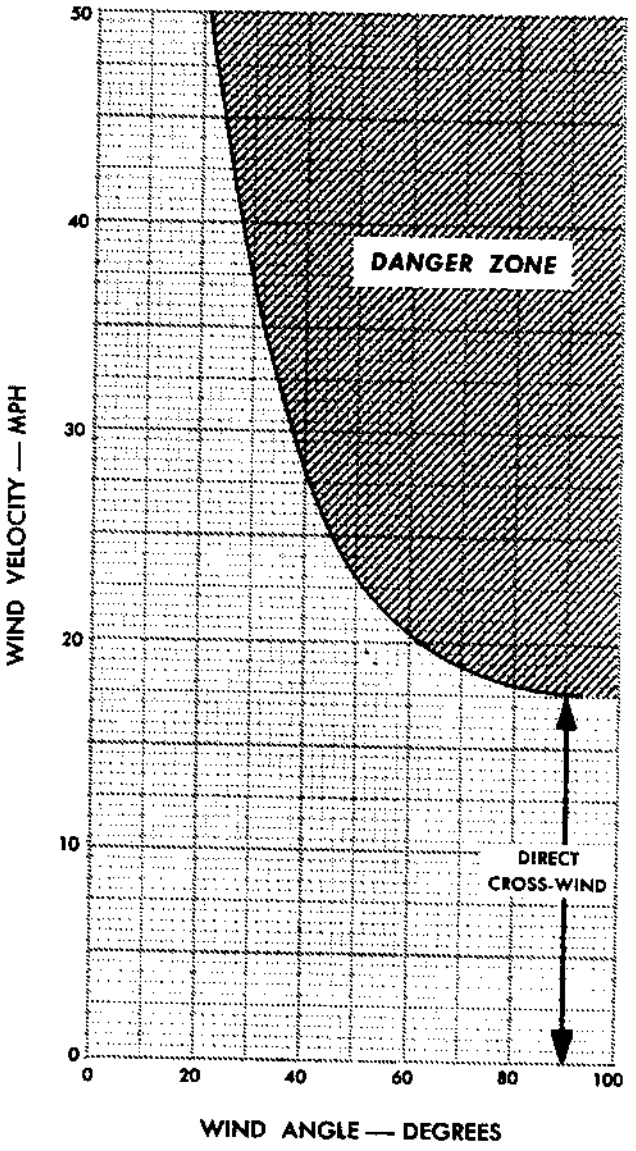


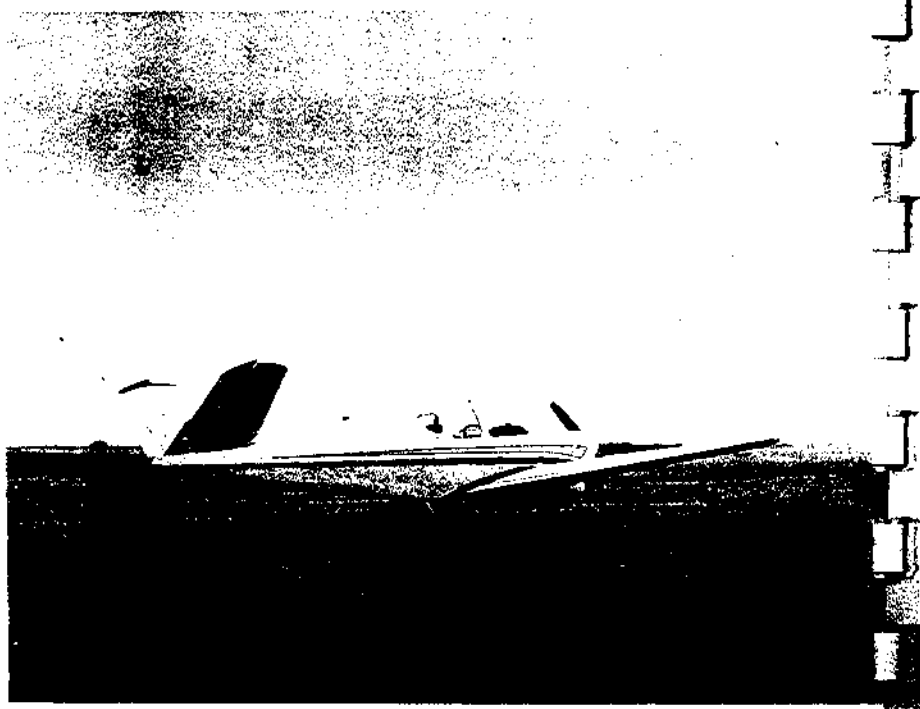
SHORT FIELD LANDING

OVER 50-FT. OBSTACLE
10 MPH HEADWIND
PAVED LEVEL RUNWAY



MAXIMUM SAFE CROSSWIND VELOCITIES





Keeping Your Bonanza New

PREVENTIVE MAINTENANCE

Preventive maintenance is a program designed to keep things from going wrong, or not going at all, or quitting before they should reasonably be expected to quit.

Preventive maintenance is in part the responsibility of the airplane's owner or pilot . . . the best service facility is helpless until the airplane is in the shop with instructions to do the necessary work. The purpose of this section is twofold: first, to provide you with the information necessary for you to decide when the airplane should be sent to a shop; and second, to guide you should you choose or be obliged by circumstances to do some minor servicing yourself. It is in no sense a substitute for the services of your BEECHCRAFT Certified Service Station.

This section includes also information on ground handling, hangar clearances, oil and grease specifications and tire and strut inflation, which will be useful on a strange airport.
Carefully followed, the suggestions and recommendations in this section will help you keep your Bonanza at peak efficiency throughout its long, useful life.

BEECHCRAFT CERTIFIED SERVICE

Aware of our responsibility to our customers to insure that good servicing facilities are available to them, Beech Aircraft Corporation and BEECHCRAFT distributors and dealers have established a worldwide network of Certified Service Stations. Service facilities, to qualify for certification, are required to have available special tools designed to do the best job in the least time, on BEECHCRAFT airplanes; to

maintain a complete and current file of BEECHCRAFT service publications; and to carry in stock a carefully pre-determined quantity of genuine BEECHCRAFT parts. In addition, key personnel must have factory training in BEECHCRAFT servicing techniques, as well as CAA certificates in engine, airframe and radio maintenance. A Certified Service Station must be a CAA-approved repair station or employ an A&E mechanic with inspection authorization.

Certified Service Stations also benefit from frequently scheduled mechanics' training schools held at the factory, and from the visits of factory service representatives, to the end that their personnel are kept informed of the latest techniques in servicing BEECHCRAFTS.

BEECHCRAFT SERVICE PUBLICATIONS

To bring the latest authoritative information to BEECHCRAFT distributors, dealers and Certified Service Stations and to you as the owner of a BEECHCRAFT, the Customer Service Division of Beech Aircraft Corporation publishes and revises as necessary the operating instructions, shop/maintenance manuals and parts catalogs for all BEECHCRAFT airplanes, as well as service bulletins and service letters. All of these publications are available from your BEECHCRAFT distributor or dealer.

SERVICE BULLETINS AND SERVICE LETTERS

BEECHCRAFT Service Bulletins and Service Letters are occasional publications dealing with improved operating techniques, revised servicing instructions, special inspections, and changes in detail parts or equipment. Service Bulletins and Service Letters differ mainly in the degree of urgency of their subject matter: Service Letters usually will announce changes or new equipment which are available for purchase if you choose, or discuss improved operating techniques; Service Bulletins, on the other hand, deal with operating techniques, special

inspections, or changes in the airplane which have a direct bearing on the safety, performance or service life of your Bonanza. Service Bulletins carry definite time intervals for compliance, depending on the urgency of their subjects, and you should see that they are complied with before the expiration of the allotted time. One of the services offered by BEECHCRAFT Certified Service Stations is maintaining a record of all service bulletins complied with by them on your airplane.

YOUR SERVICE INFORMATION KIT

In addition to this handbook and the CAA-approved Airplane Flight Manual, the Service Information Kit you received with your Bonanza contains a copy of the official BEECHCRAFT Certified Service Station Directory, an Abbreviated Check List, a horsepower calculator for reference in flight, several booklets discussing different aspects of flying, of general interest, in addition to a complete set of BEECHCRAFT Safety Suggestions to date.

BEECHCRAFT CUSTOMER SERVICE

Should a special problem arise concerning your Bonanza, your BEECHCRAFT Certified Service Station, dealer or distributor will supply the information, or if necessary, he will enlist the services of factory personnel, through the Customer Service Division. His query will be answered by men who are thoroughly familiar with all parts of your Bonanza, and in addition to their own knowledge, may call on the engineers who designed it and the expert workmen who built it. The Customer Service Division maintains service records containing all information received by the factory on all BEECHCRAFT airplanes.

The work of the Customer Service Division also includes conducting service schools at the factory for BEECHCRAFT mechanics and annual Service Clinics at the facilities of various BEECHCRAFT distributors, to which you will be invited to bring your Bonanza, each year. During the Service Clinic, factory experts will inspect your Bonanza and give you a written report of their findings, without obligation to you.

GROUND HANDLING

Knowing how to handle the airplane on the ground is fully as important as knowing how to handle it in the air. In addition to taxiing, parking and mooring, you may find it necessary to maneuver your Bonanza into a hangar by hand or with a tug; or to jack up a wheel. Doing these jobs is not difficult, but if they are done incorrectly, structural damage may result.

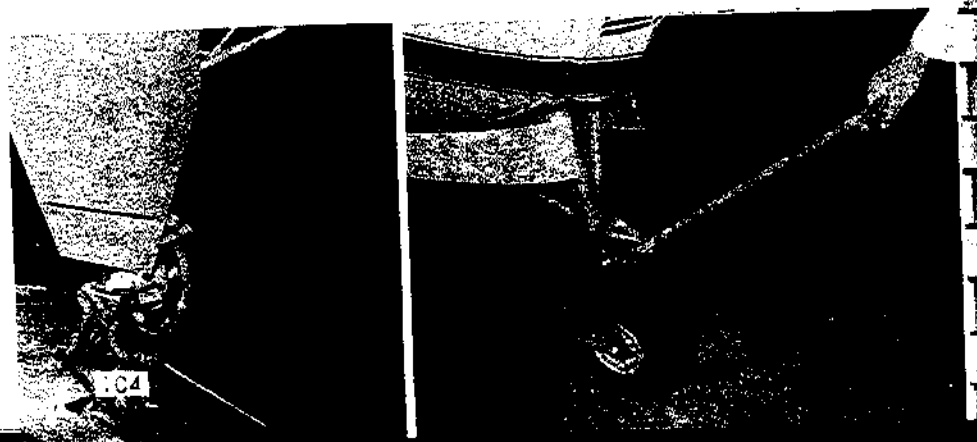
So that you may make certain a strange hangar with doubtful clearances is adequate, the three-view drawing on page *iv* shows the minimum hangar clearances for a standard airplane. You must of course, make allowances for any special radio antennas you have installed; their height should be checked and noted on the drawing for future reference.

MAIN WHEEL JACKING

If it becomes necessary to replace a wheel or tire, proceed as follows: Make certain the shock strut is properly inflated to the correct height. Insert the main wheel jack adapter, furnished with the airplane as part of the loose equipment, into the main wheel axle. If the strut is not inflated to the recommended height it will be impossible to insert the jack adapter into the main wheel axle. Raise and lower the main wheel as necessary. A scissor type jack is recommended. When lowering the airplane care should be taken not to compress the shock strut, thus forcing the landing gear door against the jack adapter.

NOTE

Do not walk on the wing walk while the airplane is on the main wheel jack.



TOWING

To tow the Bonanza, attach the hand tow bar to the tow lugs on the nose gear lower torque knee. One man can easily move the Bonanza on a smooth and level surface with the tow bar.

WARNING

If the engine is warm, and it is necessary to move the propeller to attach the towbar, be sure you are standing clear of the area of rotation and move it against the normal direction of rotation. Be sure the magneto switch is off. While the engine is warm, residual fuel in the intake ports and injectors may ignite and cause the engine to kick.

In the hangar or where movement is restricted, two men can pivot the airplane on the main wheels: one man should be positioned where he can push on the wing leading edge or hold the wing tip, and the other should handle the tow bar.

CAUTION

Do not push on the propeller or control surfaces. Do not place your weight on the stabilizers to raise the nose wheel off the ground.

To tow the airplane with a tractor or tug, secure ropes around both main landing gear struts near the joint of the V-brace and the shock absorber. Place a man in the cockpit to handle the brakes and nose gear steering. Tow the airplane backward to avoid fouling the nose gear, leaving sufficient clearance between the airplane and the power unit to allow the airplane to be stopped safely. Pick up slack in the tow lines slowly and evenly, taking care to avoid jerks.

NOTE

Do not attempt to tow the airplane backward by the fitting in the tail skid. This tail skid was designed only to protect the tail in a tail-low landing and to provide a point to moor the tail.

CAUTION

After moving the airplane, always remove the tow bar and replace it in the baggage compartment. Never turn the engine over with the tow bar attached to the towing lugs, as the propeller will not clear the tow bar.

SERVICING

The following service procedures will keep your Bonanza in top condition between visits to your Certified Service Station. These procedures were developed from engineering information, factory practice and the recommendations of engine and parts suppliers, as well as operating experience with over 5000 Bonanzas. They are the essence of "preventive maintenance."

MAGNETOS

Ordinarily, the magnetos will require only occasional adjustment, lubrication and breaker point replacement, which should be done by your Certified Service Station.

CAUTION

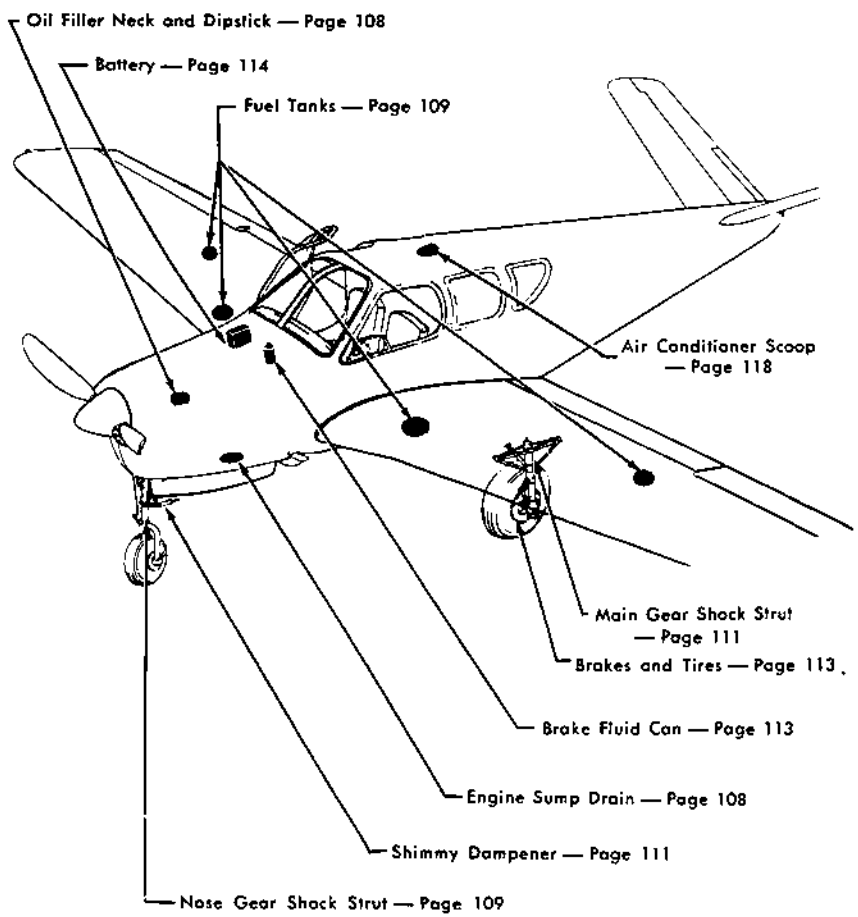
To be safe, treat the magnetos as hot whenever a switch lead is disconnected at any point; they do not have internal, automatic grounding devices. The magnetos may be grounded by replacing the switch lead at the noise filter capacitor with a wire which is grounded to the engine case. Otherwise, all spark plug leads should be disconnected or the cable outlet plate on the rear of the magneto should be removed.

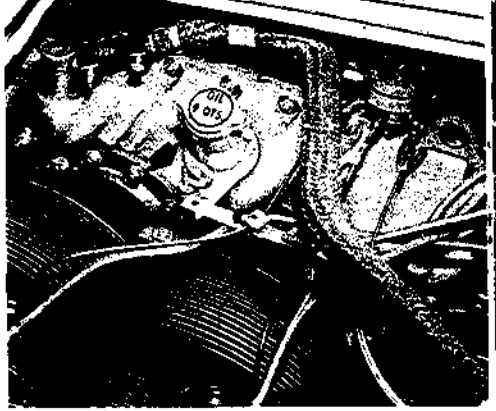
PROPELLER BLADE MAINTENANCE

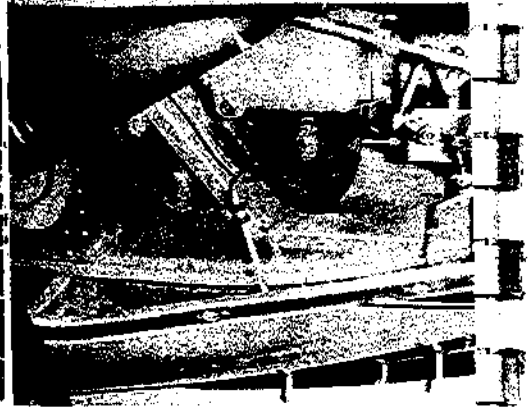
Due to the high stresses to which propeller blades are subjected, their careful maintenance is vitally important. The daily preflight inspection, particularly of the leading edge of each blade from the tip inboard to just beyond the 33-inch station (the crosswise mark on the back of the blade) should never be slighted and all nicks and scratches should be repaired before taking off. Nicks and scratches set up concentrations of stress which can exceed the strength of the blade material and cause a crack to appear in the blade.

Fortunately, good blade maintenance is a simple matter and need consume little time if it is done regularly. Using a fine file and emery

SERVICING POINTS







cloth, carefully smooth out and polish all nicks and scratches; proper dressing of the sharp edges will relieve stress concentrations. The method and limits for this type of repair are explained in the Model 278 Propeller Handbook.

OIL SYSTEM

The oil level should be checked daily or before every flight and replenished as necessary. The oil should be changed every 50 hours under normal operating conditions. Under adverse weather conditions or continuous high power settings, the oil should be changed more frequently. To drain the engine sump, remove the right hand engine access plate, unsafety and remove the sump drain plug at the low point of the engine sump just aft of the engine air intake. Before draining the sump, run up the engine until the oil reaches operating temperature to assure complete draining of the oil. Use the funnel provided with the loose equipment kit to carry the oil into a container under the nose.

The oil viscosity recommendation for a given ambient air temperature, listed in CAA Specification E-273-8 are given below. Use a detergent or non-detergent aviation grade oil in the heaviest weight that will give satisfactory starting. Above 40°F, SAE 50 viscosity should be used; below 40°F, SAE 30 is recommended.

FUEL SYSTEM

Use only 91/96 octane or next highest grade of fuel. Two 20-gallon wing tanks are located in the wings outboard of the root rib and may

be filled after removing the pressure-type filler cap. Two optional 10-gallon auxiliary tanks may be filled after removing the pressure-type filler caps, located aft and outboard of the main tank filler caps. Do not overfill the tanks.

CAUTION

The grounding jack is located just above the leading edge of the wing in the fuselage. Before refueling, make certain the airplane and fuel dispensing unit are properly grounded. Failure to do so creates a fire hazard.

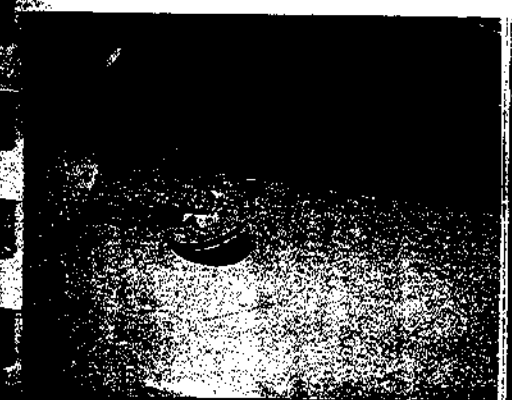
NOTE

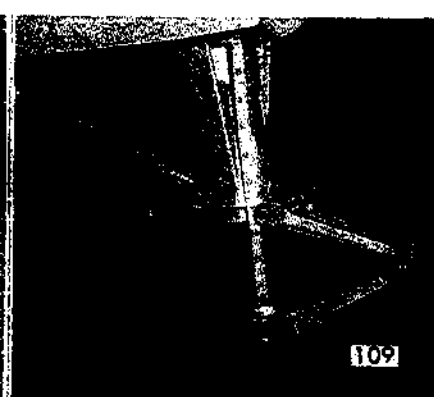
Do not allow the fuel cells to remain completely empty for any length of time, since this may result in cracking and checking of the inner liner of the cell. If fuel cells are to be left empty for longer than a week, a thin coating of light engine oil should be sprayed, flushed or rubbed on the inner liner of the cells.

The fuel strainer on the bottom of the fuel selector valve should be removed and cleaned periodically. Ordinarily, the finger strainers in the fuel cell outlets should not require cleaning unless there is a definite indication of foreign solid material in the cells, or the airplane has been stored for an extended period.

NOSE WHEEL SHOCK STRUT

The nose wheel shock strut is filled with compressed air and MIL-O-5606 hydraulic fluid. To service the strut proceed as follows:





1. Remove the air valve cap and depress the valve core to release the air pressure.

WARNING

Do not unscrew the air valve assembly until all air pressure has been released, otherwise it may be blown off, causing injury to personnel or damage to equipment.

2. Slowly loosen the filler plug, make certain that all air has escaped, and remove the filler plug.
3. With the strut deflated, jack the strut barrel and block in place ¼-inch from the fully compressed position.
4. Fill the strut to the level of the filler plug with MIL-O-5606 hydraulic fluid.
5. Remove the block from the strut and with the strut in the fully compressed position allow the excess oil to drain out.
6. Clean the filler plug, reinstall in the shock strut, and wipe off excess fluid.
7. Inflate the shock strut until 3-3/16 inches of the piston is exposed.

CAUTION

If a compressed air bottle containing air under extremely high pressure is used, care should be taken not to overinflate the strut.

8. Rock the airplane gently to prevent possible sticking or binding.
9. Remove all foreign material from the exposed piston of the shock strut with a cloth moistened with hydraulic oil.

MAIN SHOCK STRUT

The main shock struts are filled with compressed air and MIL-O-5606 hydraulic fluid. The inflation check should be made with the airplane empty except for fuel and oil. Proceed as follows:

1. Remove the air valve cap and depress the valve core to release the air pressure.

WARNING

Do not unscrew the air valve assembly until all air pressure has been released, otherwise it may blow off, causing injury to personnel or damage to equipment.

2. Slowly loosen the filler plug, make certain that all air has escaped, and remove the filler plug.
3. With the strut deflated, jack the strut barrel and block it 1 to 2 inches from the fully compressed position.
4. Fill the strut to the level of the filler plug with MIL-O-5606 hydraulic fluid.
5. Remove the block from the strut and with the strut in the fully compressed position allow the excess oil to drain out.
6. Clean the filler plug, reinstall in the shock strut, and wipe off excess fluid.
7. Inflate the shock strut until 3 inches of the piston is exposed.

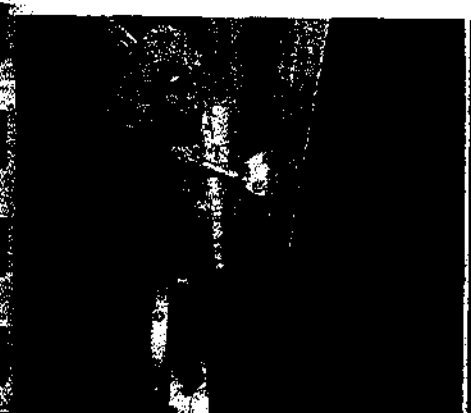
CAUTION

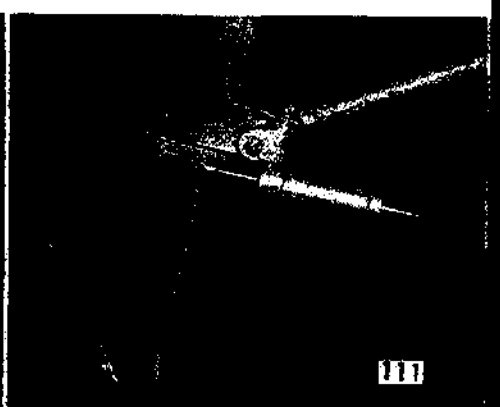
If a compressed air bottle containing air under extremely high pressure is used, care should be taken not to over-inflate the strut.

8. Rock the airplane gently to prevent sticking or binding the strut.
9. Remove all foreign material from the exposed piston of the shock strut with a cloth moistened with hydraulic oil.

SERVICING THE SHOCK STRUT SHIMMY DAMPENERS

The shimmy dampener has a reservoir of fluid carried in the piston rod. Two coil springs installed in the piston rod keep the fluid in shimmy dampener under pressure. As fluid is lost through leakage it is automatically replenished from the reservoir until the reservoir supply is exhausted.





To check the fluid level in the shimmy dampener, insert a wire, approximately 1/32 inch in diameter, through the hole in the disc at the aft end of the piston rod until it touches the bottom of the hole in the floating piston. Mark the wire, remove it, and measure the depth of the insertion. When the shimmy dampener is full, insertion depth is 2⅜ inches, when empty, 3-1/16 inches.

NOTE

The measuring wire should be inserted in the hole in the floating piston rather than against the piston face to give a more accurate reading. To determine if the wire is inserted in the hole in the floating piston, insert the wire several times, noting insertion depth each time. When the wire is inserted in the hole, the depth will be about ¼ inch greater than when it rests against the piston face.

When the shimmy dampener is found empty or nearly empty, it should be refilled as follows:

1. Remove the cotter pin, washer, and spring from the piston rod.
2. Remove the internal snap ring, scraper ring and end seal from the aft end of the barrel (opposite the clevis end).
3. Insert a 6/32 threaded rod into the floating piston and remove the piston. Use extreme care when moving the "O" ring seal of the floating piston past the drilled holes in the piston rod.
4. Push the piston rod to the clevis end of the barrel and fill the barrel with MIL-O-5606 hydraulic fluid.
5. Slowly actuate the piston rod, allowing the fluid to flow into the chamber at the clevis end of the barrel and return the piston rod to the clevis end of the barrel.
6. Refill the barrel as necessary and replace the end seal, scraper ring and internal snap ring.
7. Fill the piston rod with MIL-O-5606 hydraulic fluid.
8. Reinstall the floating piston, spring, washer and cotter pin. Spread the cotter pin to allow clearance for the measuring wire.

SERVICING THE BRAKES

The Bonanza is furnished with Goodyear single-disc hydraulic brakes. No adjustments are required, since the brake pistons simply move outward to compensate for lining wear. The piston should be checked periodically for small nicks or sharp edges which could damage the brake discs. Worn, dished, or distorted brake discs should be replaced. The brake fluid reservoir, located on the forward side of the firewall, should be checked occasionally; maintain a visible fluid level on the dipstick (attached to the reservoir cap) at all times by adding MIL-O-5606 hydraulic fluid as necessary.

In service, the brake discs will lose their green (prime) color and become bright, then will assume a light straw color as the result of heat. These changes in color are normal and need not be a cause for concern. A glazed appearance of the brake linings also is normal; the glaze actually improves the effectiveness of the brakes.

The brake lining wear is indicated by the position of the steel brake disc on the wheel drive keys. Replace linings when the distance from the brake housing (at widest section) to the disc reaches 7/16 inch with the brakes applied. Replace the steel brake disc when the thickness is .170 or below, measured at thinnest section. Also replace the disc when the distance from key to disc key slot reaches .040.

SERVICING THE TIRES

The nose wheel tire is a 5.00-5 4-ply nylon tire and should be inflated to 30 pounds. The main wheel tires are 6.50-8 4-ply nylon tires and should be inflated to 30 pounds. Tires should be maintained at the

proper pressure to minimize tire wear and avoid tire ruptures. Periodically check tires for cracks and breaks.

SERVICING THE BATTERY

A 12-volt, 33-ampere hour battery is located aft of the firewall on the right hand side of the airplane. To service the battery, loosen the Dzus fasteners and open the battery access door. Add distilled water as necessary to maintain the level of the electrolyte. Do not fill battery over ½ inch above the separators. Periodically, check the specific gravity of each cell in accordance with the specifications placarded on the battery. The battery should be kept fully charged: a fully charged battery will resist freezing and will give a longer service life.

To re-charge the battery without removing it from the aircraft, connect a suitable external power source to the external power receptacle and turn the battery master switch on. If the battery is extremely weak, it must be removed and pre-charged before it will be able to close the battery solenoid, thus completing the charging circuit.

ENGINE AIR INTAKE FILTER

The engine air intake supplies air to the air metering section of the fuel injection system. The air filter is located in the nose cowling and should be inspected before the first flight of the day for accumulated foreign matter. If dirty, the filter should be removed and cleaned. To remove the filter, remove the nose cowling grille, loosen the four wing nuts holding the air filter in place and remove it through the nose cowling. Clean with naphtha, Stoddard solvent or unleaded gasoline and blow dry with compressed air.

PRESERVATION OF RUBBER SEALS

If the rubber seals around doors, windows and cowlings begin to stick, coat them with Dow Corning No. 7 Compound. Only a thin coating of the silicone compound need be applied, and care should be taken to avoid getting it on painted metal surfaces, since repainting will be difficult once the silicone has been applied. To give a satisfactory coating, saturate a swab or small cloth and wipe lightly over the surface to be coated. If it is necessary to recement any of the seals, this should be done prior to coating them with silicone.

PITOT AND STATIC SYSTEM

The pitot and static air systems should be frequently cleared of foreign matter and checked for leaks and deterioration of hoses, all of which will cause incorrect instrument readings.

CLEARING THE PITOT LINE

1. Disconnect the pitot line at the airspeed indicator.
2. Remove the screws securing the pitot mast to the underside of the wing and disconnect the pitot mast from the pitot line.
3. Connect a source of low-pressure air to the line where the pitot mast was connected and use low pressure air to clear the line.

CAUTION

Do not under any circumstances force air through the line without first disconnecting the airspeed indicator. Sudden pressure may damage the instrument diaphragm.

PITOT SYSTEM LEAKAGE TEST

1. Clamp a section of soft rubber tubing over the pitot mast inlet, making certain the connection is air-tight.
2. Place a man in the cabin to observe the airspeed indicator.
3. Crimp the end of the rubber tubing and slowly roll it up until the airspeed indicator registers 100 miles per hour.

CAUTION

To avoid rupturing the diaphragm of the airspeed indicator, roll up the rubber tubing slowly and do not build up excessive pressure in the line.

4. Secure the rolled-up rubber tubing so that it will hold the airspeed indicator reading.
5. After 30 minutes, check the reading of the airspeed indicator. If there is no change in the reading, the system may be considered leaktight. Release air pressure slowly by unrolling the rubber tube; a sudden release in air pressure may damage the indicator.
6. If there is a decline in the airspeed indicator reading, check the pitot system plumbing for leaky hoses and loose connections.

Periodically inspect hoses in the pitot system and replace any hoses whose surface is checked or cracked, or any hoses which have become hard.

INSPECTION OF STATIC AIR SYSTEM

1. Check the rubber hoses connecting the static air line to the instrument plumbing and the rubber hose which acts as the static line drain. This hose may be reached through the inspection opening in the baggage compartment wall opposite the baggage compartment door. Hoses whose outer surface is checked or cracked, particularly at bends or connecting points, or which have become hard, should be replaced.
2. Remove one end of the hose which forms the static line drain and permit the system to drain.

NOTE

The static air line should be drained frequently during periods of high humidity. Also drain the line each time the airplane is flown through heavy rain or is washed down.

3. Before reconnecting the static air line drain hose, clear the static air line of foreign matter by forcing low pressure air through the lines which lead to the static air ports. Cover each static air button separately and force air through the line to the opposite button; otherwise only one side may be cleared, resulting in instrument error.

CAUTION

Periodically check the static air buttons for accumulated foreign matter such as dirt, grease, wax, or polish. Contaminated static air buttons can cause the entire static air system to fail. Periodically clean the exposed surface of the static air buttons with a cleansing solution such as carbon tetrachloride to remove any accumulated film. Before washing, waxing, or polishing, mask off the static air buttons.

GYRO INSTRUMENT AIR FILTERS

The attitude gyro, directional gyro, and the vacuum turn and bank indicator are fitted with individual air filters, located in the back side of each instrument case, to remove dust, grit and other foreign matter from the air. The filters should be replaced after every 100 hours of operation, or oftener if the airplane is operated in dusty conditions.

To replace the filters proceed as follows:

1. Remove the screws, lugs, safety wire, and snap rings attaching the filter to the instrument.
2. Remove and discard the old filter.
3. Install a new filter in the instrument.
4. Reinstall snap rings, lugs and screws, and safety wire as formerly.

SERVICING THE HEATER

A thorough inspection of the heat and vent system should be made before flying in cold weather. Inspect the air intake duct leading to the heater; all connections and clamps should be tight and the duct should be free of holes and cracks. Check the screen at the intake duct and if necessary clean it. Inspect the heater muff for cracks or corroded areas which might cause leakage. Seal or tape any holes

or cracks in the firewall to prevent cold air leaks. Use sealing compound, tape, or felt strips to seal any air leaks in the cabin. Inspect the heater control box and the air ducts leading to the windshield defroster and cabin heat outlets for cracks or corroded areas.

WARNING

If exhaust fumes are noticed in the cabin during flight, the heater should be turned off immediately; this condition indicates that the exhaust stack is leaking through into the heater muff. Repair or replace the heater muff as soon as possible.

AIR CONDITIONER

The air conditioner water container holds enough water to last for from 2 to 4 hours, depending upon temperature and humidity of the outside air. To fill the water container, open the air scoop and pour water slowly over the wicks until it flows from the overflow tube located near the retractable step. Use only distilled, demineralized water.

At least two times a year, the water container should be drained and the container and wicks flushed to remove dirt and pollen that has washed in with the airstream.

CLEANING

To clean your Bonanza properly, both outside and inside, follow the instructions below.

EXTERIOR CLEANING

Prior to cleaning the exterior, cover the wheels, making certain the brake discs are covered; attach pitot covers securely; install plugs in or mask off, all other openings. Be particularly careful to mask off both static air buttons before washing or waxing.

CAUTION

Do not apply wax or polish for a period of 60 to 90 days after delivery. This will give the paint a chance to cure by the natural process of oxidation. Waxes and polishes seal the paint from the air and prevent curing. If it is necessary to clean the painted surface before the expiration of the 90-day curing period, use cold or lukewarm (never hot) water and a mild soap. Never use detergents. Any rubbing of the painted surface should be done gently and held to a minimum to avoid cracking the paint film.

The airplane should be washed with a mild soap and water; loose dirt should be flushed away first with clean water. Harsh or abrasive soaps or detergents, which could cause corrosion or make scratches, should never be used. Soft cleaning cloths or a chamois should be used to prevent scratches when cleaning and polishing. Any ordinary automobile wax may be used to polish painted surfaces. To remove stubborn oil and grease, use a rag dampened with naphtha.

CLEANING WINDSHIELD AND WINDOWS

Since the Plexiglass used in the windshield and windows can be very easily scratched, extreme care should be used in cleaning it. Never wipe the windshield or windows when dry. First flush the surface with clean water or a mild soap solution, then rub lightly with a grit-free soft cloth, sponge, or chamois. Use trisodium phosphate completely dissolved in water to remove oil and grease film. To remove stubborn grease and oil deposits, use hexane, naphtha, or methanol. Rinse with clean water and avoid prolonged rubbing.

After the windshield and windows are dry and free of dirt, wax them with a good grade of commercial wax to prevent scratching and cracking. Apply the wax in a thin, even coat and bring to a high polish with a clean, soft cloth.

NOTE

Do not use gasoline, benzene, acetone, carbon tetrachloride, fire extinguisher fluid, de-icing fluid, or lacquer thinners on windshield or windows as they have a tendency to soften and craze the surface.

PROPELLERS

Since propellers are subject to severe wear and atmospheric conditions, blades and hub should be periodically checked for oxidation and corrosion. Brush corroded or oxidized areas with a phosphatizing agent to remove superficial corrosion, then smooth etched and pitted areas by buffing with an aluminum polish.

Take the following precautions while cleaning propellers:

1. Be sure ignition switch is off.
2. Make sure the engine has cooled down completely. When moving the propeller, STAND IN THE CLEAR. There always is some danger of a cylinder firing when a propeller is moved.
3. If a liquid cleaner is used, avoid using excessive amounts because it may spatter or run down the blade and enter the hub or engine.
4. After cleaning, check the area around the hub to be sure all compound is removed.

ENGINE

The engine may be cleaned with kerosene, white furnace oil, Stoddard solvent, or any standard engine cleaning solvent. Spray or brush the solvent over the engine and wipe dry. Blow excess oil off the engine with compressed air.

LANDING GEAR AND TIRES

Emulsion type cleaners are recommended for cleaning the landing gear. These solutions usually contain solvents which are injurious to rubber if allowed to remain in contact for any length of time. If these solvents come in contact with tires as a result of other cleaning operations, the solvent should be removed immediately with a thorough water rinse. To clean the tires, rinse with plain water and scrub with a brush.

WHEEL WELLS

Use a cleaning compound containing an emulsifying agent to remove oil, grease and surface dirt from the wheel wells. These compounds, when mixed with petroleum solvents, emulsify the oil, grease and dirt. The emulsion is then removed by rinsing with water or by spraying with a petroleum solvent. Be sure to cover openings and air scoops before cleaning. If water is used as a rinse in cold weather, blow all water from the wheel well with an air hose. Water allowed to stand may freeze and lock the controls.

INTERIOR CLEANING

The seats, rugs, upholstery panels and head lining should be vacuum-cleaned frequently to remove as much surface dust and dirt as possible. Do not use water to clean fabric surfaces, since it will spot the upholstery surface and will remove the flame-resistant chemical with which the cloth is impregnated. Commercial foam-type cleaners or shampoos can be used to condition rugs, fabrics or upholstery. Mix a small amount of the cleaner in a bucket of water and beat the mixture to a heavy foam. After the upholstery is vacuum-cleaned, apply the foam uniformly over the surface to be cleaned and remove with a vacuum cleaner or wipe off with a brush or cloth.

Unlacquered metal fittings and furnishings can be cleaned with an ordinary commercial metal polish.

For removal of stains from any interior fabric, refer to the Stain Removal Chart, pages 124-125.

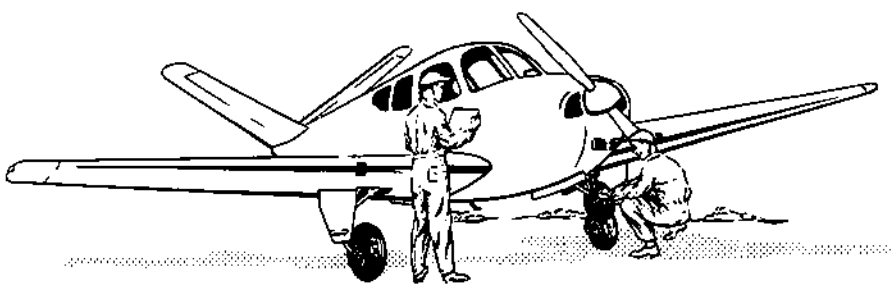
INSPECTIONS

Correct servicing being half the secret of preventive maintenance, the other half is inspection. Proper servicing will prolong the life of your Bonanza and careful, regular inspections will not only assure that servicing has been done correctly, but will disclose minor troubles so they can be corrected before they become malfunctions.

Two inspections are listed here: daily, which should be made before the first flight each day, and after 50 hours of operation. Inspections at intervals greater than 50 hours involve disassembly of the airplane and engine to various degrees and should be made only by a BEECHCRAFT Certified Service Station, where the special tools and equipment for such work, genuine BEECHCRAFT parts and factory-trained mechanics will assure you of a satisfactory job.

The 50-hour inspection should be made by a qualified mechanic, and your BEECHCRAFT Certified Service Station can best perform this operation. However, since it may be impractical occasionally to take your Bonanza to a Certified Service Station, the 50-hour inspection list has been included in this manual.

The daily, preflight inspection you should perform yourself or have performed under your personal supervision. From the standpoint of day-to-day safety and satisfactory operation, it is the most important inspection of all. It need not be time-consuming; principally it consists of look, shake, feel and smell, and the entire inspection can be performed while you walk around the airplane once. The daily check list given here duplicates in part the preflight list given on page 35. However, this list is intended for use before the first flight each day and contains checks which need be performed only once daily.



DAILY INSPECTION

1. Check fuel and oil level.
2. Drain each fuel sump.
3. Inspect engine for evidence of oil leakage.
4. Inspect safetying of all drain plugs and covers.
5. Check intake air filter.
6. Inspect propeller blades, spinner and visible hub parts for damage and cracks.
7. Inspect propeller for grease or oil leakage.
8. Inspect static air buttons for foreign material.
9. Inspect pitot head for freedom from obstructions.
10. Set trim tabs neutral.
11. Check all access doors and inspection openings for security.
12. Inspect all exterior lights for damage.
13. Check tires and shock struts for correct inflation and cleanliness.
14. Check landing gear safety switch for security and obvious damage.
15. Check battery terminals for security and vent hose for obstructions. (Every 7 days, check electrolyte levels).
16. Inspect general over-all condition of the airframe skin.

50-HOUR INSPECTION

In addition to the daily inspection, check the following:

1. Check spark plug elbows and shielding for chaffing and security.
2. Remove and clean oil strainers.
3. Drain oil sump and fill with new oil.
4. Check intake and exhaust systems for leaks, cracks and loose connections.
5. Drain and clean fuel strainers.
6. Check gyro instrument air filters.
7. Clean and replace the air intake filter.
8. Check battery for electrolyte capacity.

STAIN REMOVAL CHART

NOTE

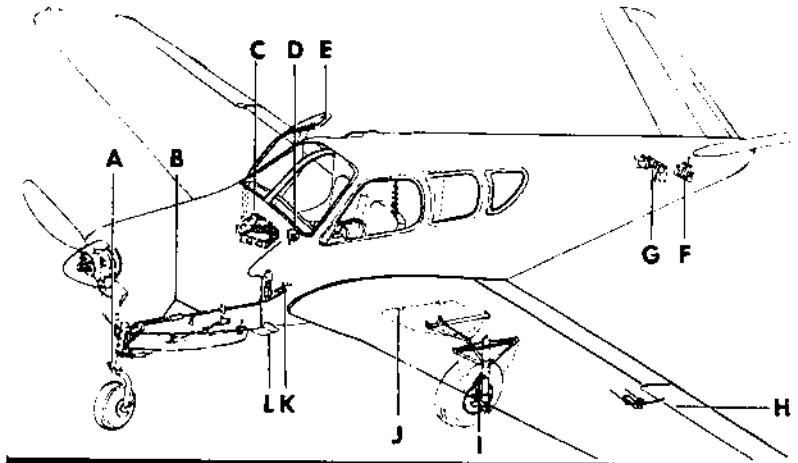
The following information covers general stain removal procedures. When solvents are specified, it is wise to test them before actually working with a stained location on the various fabrics in the Bonanza. Some of the newer fabrics react in different ways to solvents, and damage can be incurred during removal of a stain if caution is not used. When a solvent is specified, test it on a similar piece of fabric in a location that will not show, before proceeding with the actual stain removal.

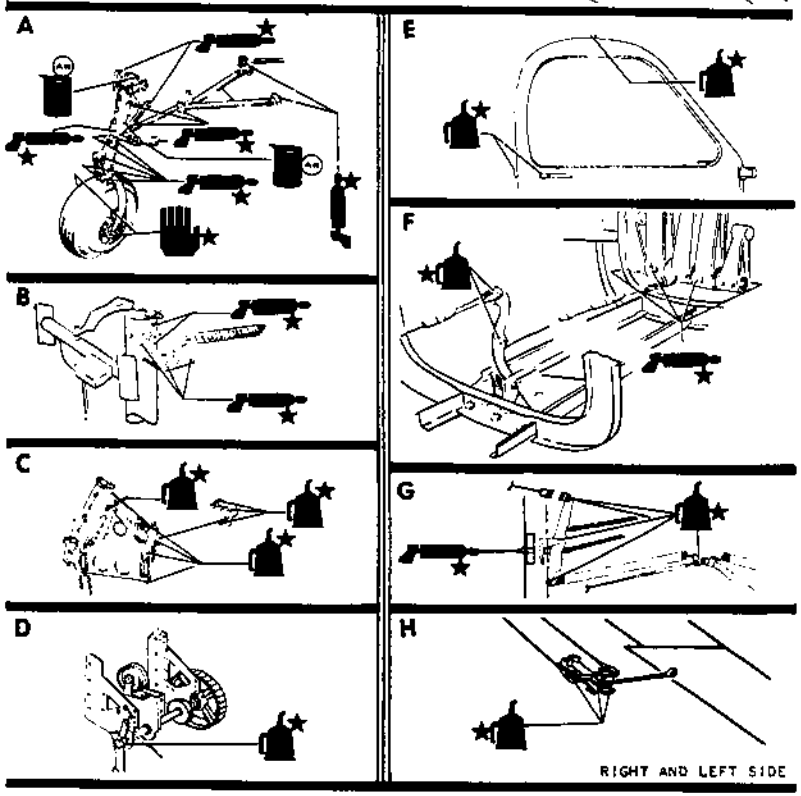
Type of Stain	Cleaning Method
Battery Acid	Saturate spot with diluted solution of household ammonia. Allow to stand for one minute. Thoroughly rinse with cold water. Treat spot as soon as possible after spilling.
Blood	Rub with cold water. If some stain remains, brush with diluted household ammonia, allow to stand for one minute, and rinse with cold water. If some stain still remains, apply thick corn starch paste, allow to dry, pick off dried portion and brush surface to remove starch particles. Do not use hot water or soap.
Candy (except chocolate)	Hot water or cleaning solvent*. For cream-type candy, rub with a cloth soaked in lukewarm soap suds and scrape with a blunt tool.
Chewing gum	Moisten with cleaning solvent* and work off with a blunt tool, or hold a piece of ice against the gum and remove while still cold.
Chocolate	Remove with lukewarm water, rinse with cleaning solvent*.
Coffee	Sponge with soap and water, rinse with clean water.
Milk	Wash with soap and water, rinse with cold water.

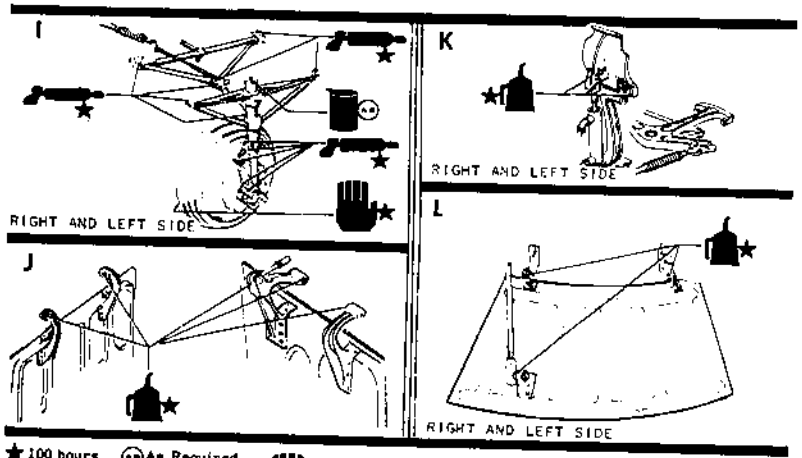
Type of Stain	Cleaning Method
Shoe and rubber markings	Brush with cleaning solvent*.
Tar	Moisten with cleaning solvent*, work off with blunt tool. Rinse with cleaning solvent*.
Fruit	Hot water or cleaning solvent*.
Grease and oil	Sponge with cleaning solvent*, rub with clean cloth.
Ice cream	Hot water. If stain persists, use warm soap suds, rinse with cold water, sponge remaining stains with cleaning solvent*.
Ink	a) Rub Iron Rust soap into stain with fingers, allow to stand for one minute and wipe with dry cloth. Repeat as necessary. Rinse with cold water. b) Apply Ink Eradicator Solution No. 1 to spot with eye dropper, blot with blotting paper. Repeat as necessary. Rinse with cold water. Do not use Solution No. 2.
Lipstick	Apply cleaning solvent*, blot with blotting paper. Repeat until blotting paper no longer shows stain.
Liquor and wine	Sponge with very hot water, rub vigorously. If any stain remains, use cleaning solvent*.

*Use Perchlorethylene, Turco-Solv or Pro-Fresh cleaning solvent.

LUBRICATION POINTS







★ 100 hours (AR) As Required

HAND OR PACK — ZERK FITTING

HYDRAULIC FLUID — SQUIRT CAN

Item	Location	Lubricant	Interval
DETAIL A	Nose shock strut (1)	MIL-O-5606	AR
	Shimmy dampener (1)	MIL-O-5606	AR
	Nose gear hinge points (2)	MIL-L-7711	100 Hr.
	Nose gear linkage (3)	MIL-L-7711	100 Hr.
	Nose gear torque knee (6)	MIL-L-7711	100 Hr.
	Nose wheel door hinges (2)	SAE No. 20	100 Hr.
	Nose wheel bearings (2)	MIL-L-3545	100 Hr.
	Nose gear swivel (2)	MIL-L-7711	100 Hr.
DETAIL B	Steering mechanism linkage (3)	MIL-L-7711	100 Hr.
	Steering mechanism (2)	MIL-L-7711	100 Hr.
DETAIL C	Control column linkage (6)	SAE No. 20	100 Hr.
	Control column head (3)	SAE No. 20	100 Hr.
	Control column aileron link (1)	SAE No. 20	100 Hr.
DETAIL D	Trim tab control (1)	SAE No. 20	100 Hr.
DETAIL E	Door handle (2)	SAE No. 20	100 Hr.
	Door handle (1)	SAE No. 20	100 Hr.
DETAIL F	Differential control arm (2)	SAE No. 20	100 Hr.
	Differential control assembly (4)	MIL-L-7711	100 Hr.
DETAIL G	Elevator tab reel (1)	MIL-L-7711	100 Hr.
	Elevator tab linkage (4)	SAE No. 20	100 Hr.
DETAIL H	Aileron control linkage (6)	SAE No. 20	100 Hr.
DETAIL I	Main shock struts (2)	MIL-O-5606	AR
	Landing gear retract links (8)	MIL-L-7711	100 Hr.
	Landing gear torque knee (12)	MIL-L-7711	100 Hr.
	Main wheel bearings (4)	MIL-L-3545	100 Hr.
DETAIL J	Landing gear door hinges (10)	SAE No. 20	100 Hr.
	Nose wheel door hinges (4) (not shown)	SAE No. 20	100 Hr.
DETAIL K	Control pedals (8)	SAE No. 20	100 Hr.
DETAIL L	Cowl flap hinges (6)	SAE No. 20	100 Hr.

( ) Indicates number of places to lubricate.

NOTE I: MIL-L-7711 grease may be used in the place of MIL-G-3278 grease in all normal climates. In extremely cold climates, MIL-G-3278 grease may be used.

NOTE II: Landing gear components may require lubrication every 25 or 50 hours, depending on operation.

SHORT TERM STORAGE (NOT EXCEEDING TWO WEEKS)

ITEM	PROCEDURE
Mooring	1. If airplane cannot be placed in a hangar, tie down securely. 2. Deflate nose gear strut and place support under tail to create negative angle of attack. 3. Install wing spoilers consisting of fabric bags filled with coarse dry sand. Place spoilers along approximately 75% of wing span.
Engine	1. Run up twice a week.
Fuel	1. Fill to capacity to minimize fuel vapor and protect cell inner liners.
Flight control surfaces	1. Lock with internal and external locks.
Grounding	1. Static ground airplane securely and effectively.
Pitot tube	1. Install cover.
Windshield and windows	1. Close all windows and window vents. 2. Install covers over windshield and windows.
Tires	1. Install covers.

LONG TERM STORAGE (ACTIVE)

Engine	1. Run up twice a week or preserve as follows: a. Drain oil sump. b. Fill crankcase with a suitable mixture of engine lubricating oil and corrosion preventive compound. c. Warm up engine until oil temperature is normal. d. Stop engine and remove air filter. Restart engine and spray preservative oil mixture into air intake until a fog appears at exhaust outlet; stop engine while spray is still in operation. e. Remove spark plugs. Rotate propeller and spray mixture into all cylinders; spray each cylinder after stopping propeller and do not turn propeller thereafter. f. Replace spark plugs with dehydrator plugs in all cylinders. Protect cable terminals.
Fuel cells	1. Fill to capacity to minimize vapor pressure and protect cell inner liners if engine is to be run up regularly. 2. If engine is to be preserved, process fuel cells as follows: a. Drain fuel cells. b. Flush, spray or rub a thin coating of light engine oil on the inner liners of all fuel cells which have contained gasoline.
Instruments	1. Remove magnetic compass.

ITEM	PROCEDURE
Battery	1. Remove and store according to standard practices.
Mooring, flight control surfaces, grounding, pitot tube, windshield and windows and tires	1. See short term storage procedures

EXTENDED STORAGE (DECOMMISSION)

Mooring	1. Follow procedure for short term storage; place support under tail when engine is removed.
Engine	1. Remove and preserve as prescribed by the manufacturer. 2. Cap all lines which were connected to engine.
Propeller	1. Remove and store according to standard practices.
Fuel Cells	1. Drain fuel cells. 2. Flush, spray or rub a thin coating of light engine oil on the inner liners of all fuel cells which have contained gasoline. 3. After 24 hours remove cells and store according to standard practices. Do not remove or handle fuel cells until 24 hours after oil has been applied.
Flight control surfaces	1. Lubricate all flight control surface hinge pins, bearings, bellcranks, chains, control rods and quadrants and coat lightly with corrosion preventive compound. 2. Lock with internal and external locks.
Grounding	1. Static ground airplane securely and effectively.
Pitot tube	1. Apply a thin coating of grease, Specification MIL-G-2108. 2. Install cover.
Windshield and windows	1. Close all windows and window vents. 2. Install covers over windshield and windows.
Tires	1. Install covers. 2. Check air pressure periodically; inflate as necessary.
Wing flap tracks and rollers	1. Coat with corrosion preventive compound. 2. Place flaps in retracted position.
Battery	1. Remove and store according to standard practices.
Instrument panel	1. Cover with barrier material and secure with tape.
Seats	1. Install protective covers.
Landing Lights	1. Cover with barrier material and secure with tape.
Stall Warning Unit	1. Remove and store according to standard practices. 2. Tape connections.
Loose tools and equipment	1. Remove and store in a dry temperate room.
Airframe	1. Cover all openings with barrier material and secure with tape to exclude rain, sun and foreign matter.

ELECTRICAL TROUBLE SHOOTING

In general, electrical troubles will fall in three classes: internal failures in the units themselves, faults in the wiring or failures in the power source. With a few exceptions, such as those components which are relay-controlled, ordinary continuity checks with a test lamp or meter should isolate these faults and the corrections then will be obvious. The trouble-shooting tables given here deal with the more complex electrical systems and contain specific suggestions for isolating and correcting troubles. Certain operations, such as flashing a generator field, should be done only by qualified mechanics—preferably at a BEECHCRAFT Certified Service Station.

TROUBLE	PROBABLE CAUSE	CORRECTION
	BATTERY SYSTEM	
1. No power indicated with battery key switch on.	a. Battery discharged or defective.	a. Test with hydrometer and voltmeter.
	b. Battery master switch off.	b. Turn on.
	c. Open circuit between battery relay and master switch.	c. Check continuity.
	d. Master switch defective.	d. Check switch for operation; replace if necessary.
	e. Defective battery relay.	e. Check relay for operation; replace if necessary.
2. Power on with master switch off.	a. Master switch defective.	a. Check switch for operation; replace if necessary.
	b. Battery relay contacts stuck.	b. Replace relay.
	STARTER SYSTEM	
1. Starter inoperative.	a. Circuit breaker tripped in starter switch circuit.	a. Reset.
	b. Starter relay inoperative.	b. Check continuity of starter system.
	c. Low battery.	c. Test battery. If low, replace or start with external power, if airplane is so equipped.
	d. Loose connection or open circuit between battery positive relay and starter relay.	d. Check connections and continuity.
	e. Defective starter relay.	e. Check relay terminal connections and continuity of solenoid energizing circuit. If energizing circuit is closed and relay does not operate, replace relay.
	f. Poor ground at starter.	f. Test continuity from armature lead to ground. Repair if necessary.
	g. Open circuit.	g. Check continuity to starter.
	h. Defective starting motor.	h. Check brushes, springs, condition of commutator; replace if necessary.
	GENERATOR SYSTEM	
1. No ammeter indication.	a. Engine speed too low.	a. Increase speed.
	b. Loose connection.	b. Check connections throughout system.
	c. Open or shorted field circuit in generator; defective armature.	c. Test resistance of field. Check field circuit connections. Replace generator if defective.
	d. Brushes not contacting commutator.	d. Clean brushes and holder with a clean, lint-free, dry cloth. Replace weak springs.
	e. Brushes worn out.	e. Replace brushes if worn to a length of ½ inch or less.
	f. Dirty commutator.	f. With generator running, clean commutator with No. 0000 sandpaper. Use air jet to remove grit.
	g. Defective voltage regulator.	g. Replace regulator.
	h. Defective voltmeter.	h. Replace voltmeter.
2. No generator output.	a. Circuit breaker tripped.	a. Reset.
	b. Open circuit.	b. Check continuity of circuit.
	c. Loss of residual magnetism.	c. Flash generator field.
	d. Defective generator control switch or reverse current relay.	d. Test switches; replace if defective.
3. Ammeter reads off scale in wrong direction.	a. Generator field magnetized in wrong direction.	a. Flash field.

ABOUT THOSE KEYS

When you took delivery of your new Bonanza you were provided with two keys. Duplicates can be made from these keys to insure that you always have a key when you need it. If the keys are separated and one of them should be lost you can always have a duplicate made from the one you still have on hand. If both keys should be lost a locksmith can prepare a new key working from the lock on your Bonanza. Beech Aircraft Corporation does not keep a record of lock numbers on delivered airplanes.

LAMP REPLACEMENT GUIDE

LOCATION	NUMBER
Wing Navigation Lights	AN3033-1 & 2
Tail Light	#93
Landing Light	#4522
Cabin Dome Light	#89
Overhead Instrument Light	#89
Tab Position Indicator Light	#53
Landing Gear Visual Indicator Light	#53
Compass Light	#330
Stall Warning Light	AN3121-1813
Rotating Beacon	A-7079-12
Landing Gear Position Light	AN3121-1813
Fuel Pump Placard Light	AN3121-1813
Direction Indicator Light	AN3136-323

Elevation	75%	65%	55%	45%
Sea level	23.6/2450	22.8/2300	20.3/2300	20.4/2100
2000	23.6/2450	22.7/2300	20.0/2300	19.9/2100
4000	23.0/2450	22.4/2300	19.7/2300	19.4/2100
6000	22.6/2450	21.9/2300	19.3/2300	19.0/2100
8000	---	21.8/2300	19.1/2300	18.6/2100
10000	---	20.0/2450	18.9/2300	18.3/2100
12000	---	---	18.8/2450	17.6/2300