Do's and Don'ts

DO taxi slowly over rough ground. Page 58.

DO hold the control wheel back when taxiing over rough ground. Page 57.

DO check position of landing gear before landing to see that gear is all the way down and the position indicator is in the "DOWN" position. Page 71.

DO open cowl flaps when air speed is under 120 mph. Page 21

DO raise the wing flaps before taxiing. Page 71.

DO NOT use the brakes when taxiing over rough ground. Page 57.

DO NOT attempt to turn the airplane when it is not in motion. Page 57.

DO NOT use excessive power when taxiing over rough ground. Page 58.

DO NOT place the landing-gear switch in the up position before the airplane is airborne and a stabilized climb is obtained. Page 60.

DO NOT let down at excessive speeds in rough air. Page 64.

DO NOT run-up engine when airplane is on loose sand or gravel. Page 58.

DO NOT lower landing gear at over 100 mph. Page 71.

DO NOT lower the wing flaps at over 100 mph. Page 71.

McCORMICK-ARMSTRONG CO., WICHITA LITHO IN U. S. A.

Facts YOU SHOULD KNOW

about the BEECHCRAFT **BONANZA**

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the Bonanza, manufactured by the Beech Aircraft Corporation, is a low-wing, four-place, all-metal airplane powered by a Continental E-185-1 air-cooled engine. Exceptionally clean aerodynamic design and structural efficiency are evident in the all-metal construction. The Bonanza with its inherent flight stability and balance of control forces insures safety and ease of control in all normal flight maneuvers.

The Bonanza has the lowest coefficient of drag of any four-place airplane manufactured today. This feature makes the airplane one of the most efficient in its class because less horsepower is required to give its high performance and speed, thereby making the Bonanza a most economical means of air transportation. The Beech Aircraft Corporation has continually strived to produce the most efficient airplanes. The high efficiency of the Bonanza is attributed to: all windows and windshield flush with the skin; no control-surface hinges or control horns protruding into the air stream; flaps sealed when in the up position to reduce drag caused by turbulent air; the landing gear when retracted completely enclosed by doors fitting flush with the external skin surface. The propeller is especially designed for use on the Bonanza and gives a higher static thrust than any other propeller combination available for this type of airplane. These features all add up to make the Bonanza transportation the most economical air transportation available to the private pilot or executive.

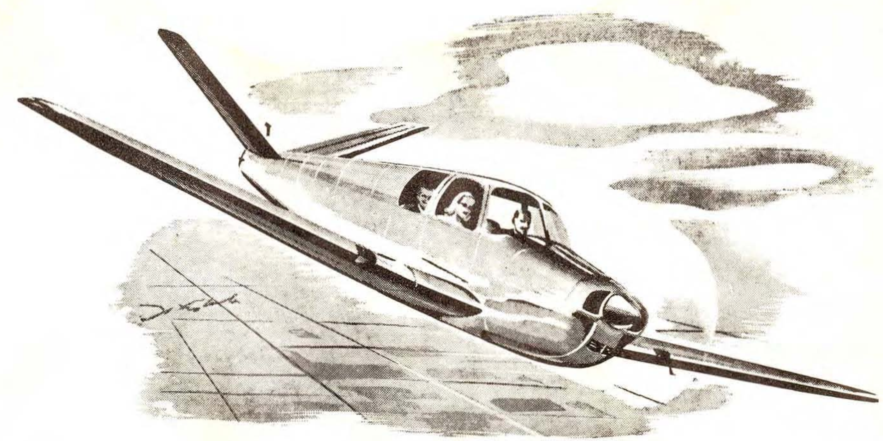
The distinguishing feature of the Bonanza is the "Vee" tail.

This empennage arrangement has only two movable and two fixed surfaces. There is no vertical surface used. Eliminating the vertical surfaces of the empennage reduces the total drag of the airplane, thereby increasing the performance and speed. A conventional set of flight controls is used, and a pilot flying the airplane without looking at the tail would not know he was flying an airplane with an unconventional tail unit. The rudder and elevator controls are conventional and respond exactly as the controls on a conventional airplane.

The Bonanza cabin has plenty of head and body room — no crowded feeling is experienced with four large people in the cabin. There is ample room for the occupants to change position without disturbing the adjacent passengers. The cabin interior and seats are upholstered with high quality fabric, metal trimmed, and the instrument panel is finished with colors that are pleasing and restful to the eyes. The large baggage compartment is ample to hold all the luggage normally carried by four people. The baggage compartment is accessible from the outside of the airplane as well as from the rear seat.

The Bonanza as delivered is completely equipped for nonscheduled passenger and cargo operation. To use the airplane for nonscheduled passenger operation for hire at night, it will be necessary to equip the airplane with three 1 ½ minute parachute flares. The structural provisions and brackets for the flare installation are in the airplane when it is delivered.

The Bonanza is designed for operation in two categories, normal and utility. The basic category for which the airplane is designed is the normal category. When operated in the normal category the airplane may be used for nonscheduled passenger and cargo operation. When flown in the utility category the airplane may be used for all normal and for limited acrobatic flight maneuvers used for pilot training, except snap or inverted flight maneuvers and spins which are prohibited.



These Features

- Special Soundproofing
- Unique Vee Tail
- Exceptional Performance Per Horsepower
- Stall Warning Light
- Landing-Gear Safety Switch
- Retracting Passenger-Entrance Step
- Cabin Loud-Speaker
- Form-Fitting Foam-Rubber Seat Cushions
- Large Baggage Compartment Accessible in Flight
- Exceptional Visibility for Pilot
- Pilot's Storm Window
- Glove Compartment
- Map Case
- Efficient Heating and Ventilating System
- Adjustable Instrument Lighting
- Trip-Free Circuit Breakers
- Two-Way Motorola Radio
- Automatic Trailing Antenna
- Novel Automatic-Reserve Fuel System
- Landing-Gear Emergency Lowering Handcrank
- Landing-Gear Warning Lights and Horn
- Adjustable Rudder Pedals
- Adjustable Throw-Over Control-Column Wheel
- Floor Space Unobstructed by Operating Controls

The Airplane

LANDING GEAR — The Bonanza's landing gear is retractable and is fully enclosed when retracted. The main landing-gear doors are closed when the landing gear is extended. As the landing gear is retracted the doors open to allow the wheels to pass into the wings and then close again. Since the main landing-gear doors are closed when the landing gear is down they are protected from buffeting by the propeller when the engine is run-up on the ground. Also, the doors will not come in contact with brush, high grass, and other ground obstructions.

The wheel base is long to minimize galloping when taxiing or landing on rough fields. The patented rebound control used in the shock struts reduces bouncing to a minimum.

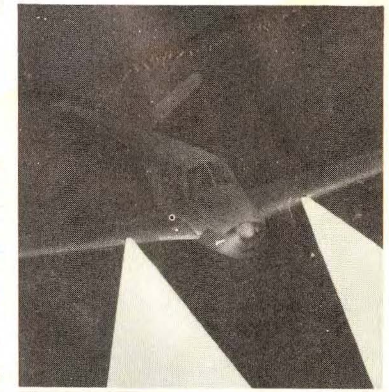
CONTROL SURFACES — The statically and dynamically balanced flight control surfaces require a minimum of maintenance and repair to keep them airworthy.

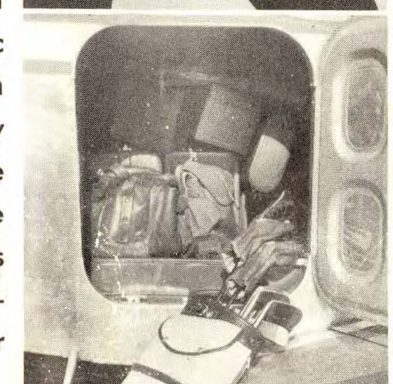
ENTRANCE STEP — A retractable assist step aids in ascending to the wing walk. This step, together with the handhold mounted on the fuselage, makes it easy for women pilots or passengers to step up on the wing walk.

PROPELLER — The BEECHCRAFT controllable propeller was especially designed and developed to meet the requirements for high performance and speed of the Bonanza. This propeller combination produces the highest static thrust per horsepower of any propeller available for engines of this horsepower. The propeller is electrically controlled. Pitch or change in rpm is obtained

by placing the propeller selector switch into "HI" or "LO" rpm until the desired engine rpm is obtained.

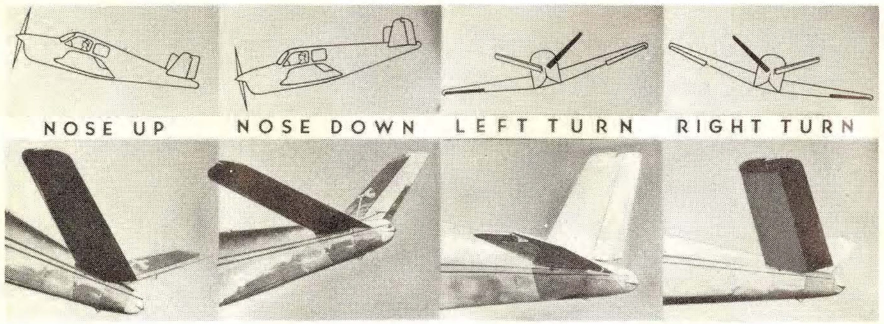
LANDING LIGHTS — Two General Electric sealed-beam landing lights are provided, one in each wing leading edge. The lights are focused to illuminate the landing area for safe night take-off and landings, and are shielded so there is no glare reflected from the propeller into the pilot's face.



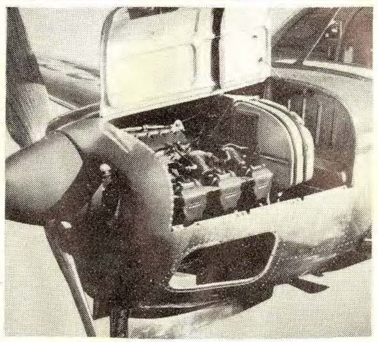


BAGGAGE COMPARTMENT — The capacious baggage compartment is located aft of the passenger cabin and is accessible from either the cabin or the large baggage-compartment door located in the right side of the fuselage. Its 16.5-cubic foot capacity is amply large enough to hold all the baggage normally carried by four people. The same key that fits the ignition switch fits the baggage-compartment door. Articles may be removed from the compartment during flight by lifting the cover back of the rear seat.

VEE TAIL — This is one of the Bonanza's distinguishing features. The operation of the "Vee" tail is conventional from the pilot's cockpit; however, the conventional vertical tail surfaces are not used in this arrangement. The two movable surfaces produce both elevator and rudder action. The operation of the "Vee" tail is as follows: for nose-up the movable surfaces move up together; for nose-down the movable surfaces move down together; for a right turn the right movable surface moves down and the left surface moves up; for a left turn the left movable surface moves down and the right surface moves up.

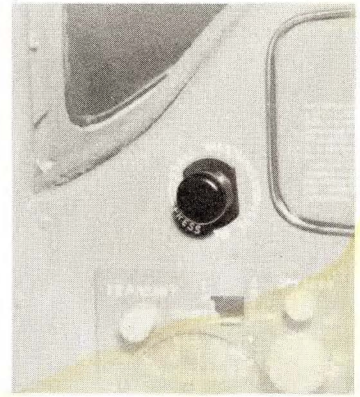


ENGINE — The engine is easily accessible for servicing, maintenance, and inspection by raising the engine cowling. Stay rods are provided to hold the cowl in the raised position while the engine is being serviced.

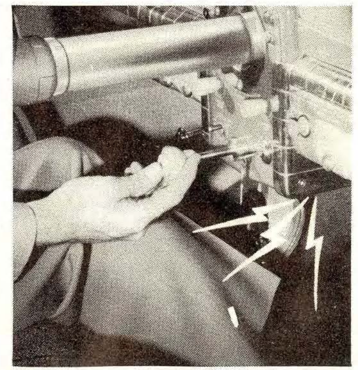


Safety Features

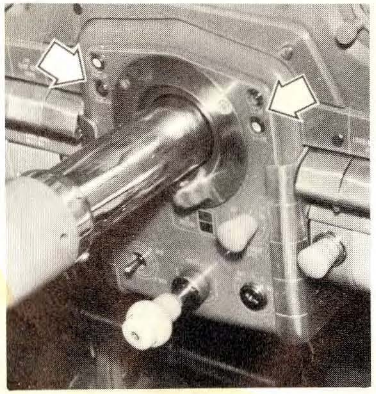
STALL WARNING — A stall warning signal located on the instrument panel, directly in front of the pilot, flashes red approximately 5 to 10 mph above the airplane stalling speed to warn the pilot when he is approaching a stall. The light is operated by a switch located ahead of the flap on the left wing. When turbulent air flows over the operating vanes, the switch closes the circuit and turns the light on.



WARNING HORN — A warning horn located under the instrument panel sounds when the throttle is closed and the landing gear is not fully extended. This warns the pilot when the landing gear is not in position for a safe landing.

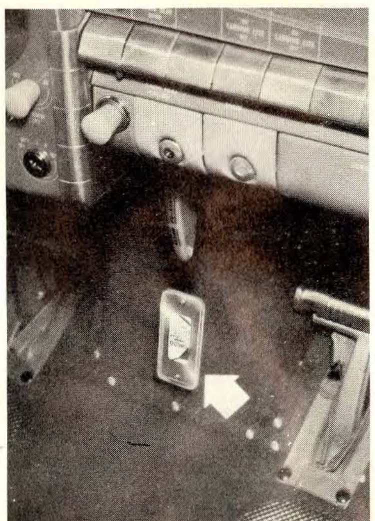


POSITION LIGHTS — Landing-gear and flap position lights tell the pilot the position of the landing gear and flaps at all times. When the red landing-gear position light is on, the landing gear is fully retracted. When the green landing-gear position light is on, the



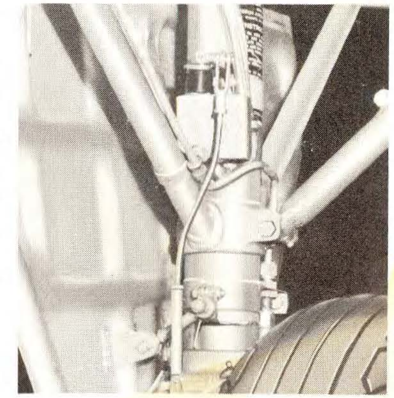
gear is fully *extended*. When neither landing-gear position light is on, the landing gear is in an intermediate position.

When the *red* flap position light is on, the wing flaps are in the *landing position*. When the *green* flap position light is on, the wing flaps are in the *up position*. When neither light is on, the flaps are in an intermediate position.

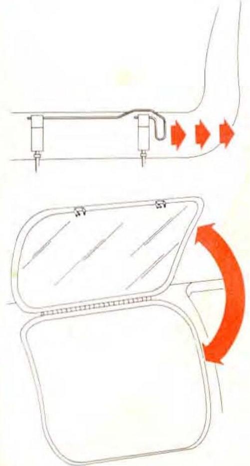


LANDING-GEAR POSITION INDICATOR — A mechanical landing-gear position indicator is located in the center of the airplane just above the floor in front of the pilot's and copilot's seat. This indicator permits the pilot to make a visual check of the position of the landing gear.

LANDING-GEAR SAFETY SWITCH — A safety switch connected in series in the up landing-gear circuit is located on the right landing-gear strut. This switch is designed to prevent accidental retraction of the landing gear while the airplane is on the ground.

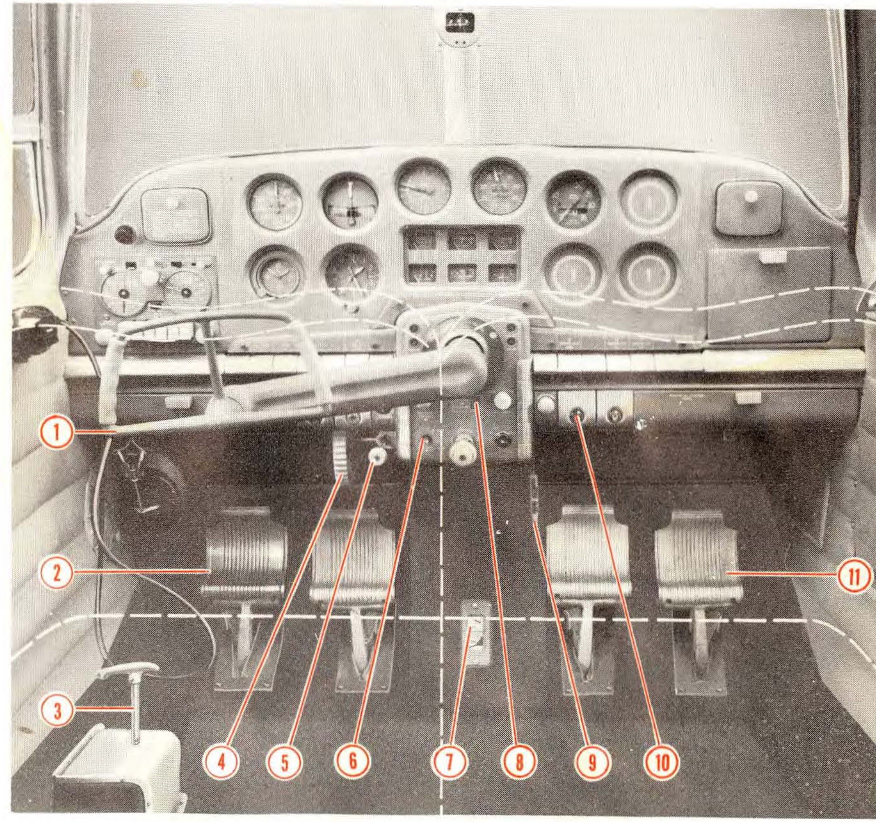


EMERGENCY SMOKE CONTROL — An emergency smoke control is provided to prevent filling the cabin with smoke and fumes in case of a fire in the engine compartment. The control is located in the outboard side of the circuit-breaker panel and when pulled will seal all the engine-compartment heating and ventilating openings.



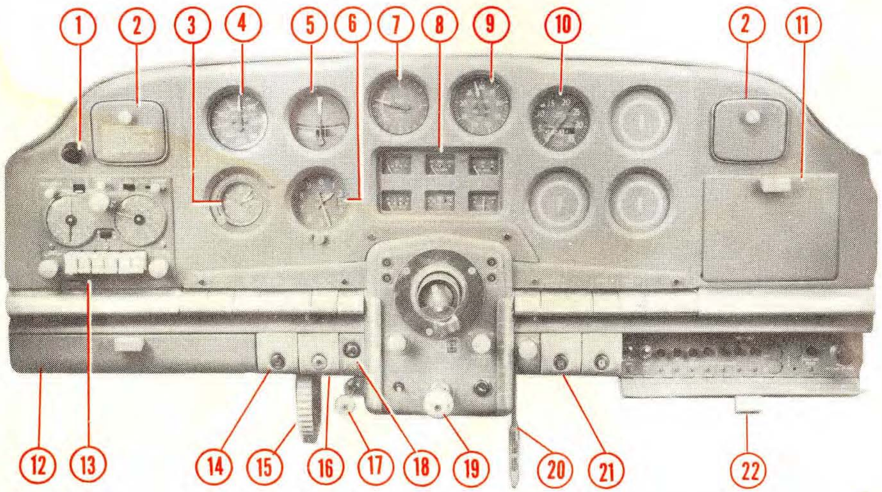
EMERGENCY EXIT — The rear windows may be used for emergency exits by pulling the pin from the opening mechanism and opening the window.

The Interior



1. Control Wheel
2. Pilot's Rudder Pedals
3. Fuel Tank Selector Valve and Wobble Pump
4. Elevator-Tab Control Wheel
5. Mixture Control
6. Propeller-Pitch Control Switch
7. Landing-Gear Position Indicator
8. Elevator-Tab Position Indicator
9. Parking-Brake Handle
10. Cabin Heat Control
11. Copilot's Rudder Pedals

THE COCKPIT — The instrument panel is arranged with the flight instruments directly in front of the pilot. The engine instruments are grouped in the center of the panel. The engine controls and switches most frequently used are grouped below and close to the center of the instrument panel.



1. STALL WARNING LIGHT
2. ASH TRAY
3. CLOCK
4. AIRSPEED
5. TURN & BANK
6. ALTIMETER
7. RATE OF CLIMB
8. ENGINE GAUGE UNIT
9. MANIFOLD PRESSURE
10. TACHOMETER
11. GLOVE COMPARTMENT
12. MAP COMPARTMENT
13. RADIO
14. COWL FLAP CONTROL
15. ELEVATOR TAB CONTROL WHEEL
16. CARBURETOR HEAT CONTROL
17. MIXTURE CONTROL
18. STARTER BUTTON
19. THROTTLE CONTROL
20. PARKING BRAKE HANDLE
22. CIRCUIT BREAKER PANEL DOOR
21. CABIN HEAT CONTROL

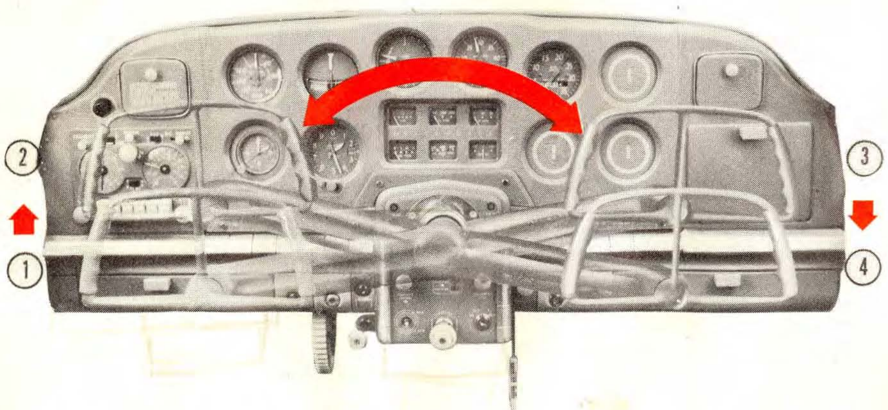
OPTIONAL PANELS

(at additional cost)

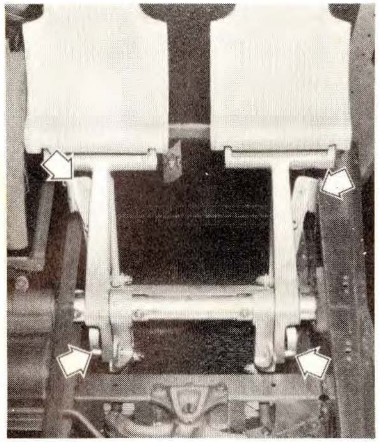
DIRECTIONAL-GYRO PANEL — An instrument panel offered at extra cost which includes a directional gyro in addition to the standard instruments.

ATTITUDE-GYRO PANEL — An instrument panel offered at extra cost which includes an attitude gyro in addition to the standard instruments.

ATTITUDE-GYRO AND DIRECTIONAL-GYRO PANEL — An instrument panel offered at extra cost which includes both the attitude gyro and the directional gyro in addition to the standard instruments.



CONTROL WHEEL — The control wheel is adjustable and has two positions on each side. This permits the pilot to select the most comfortable position of the wheel.

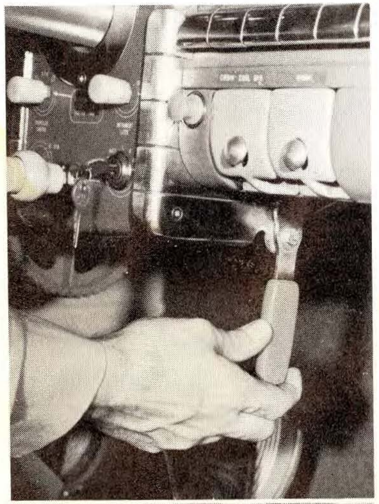


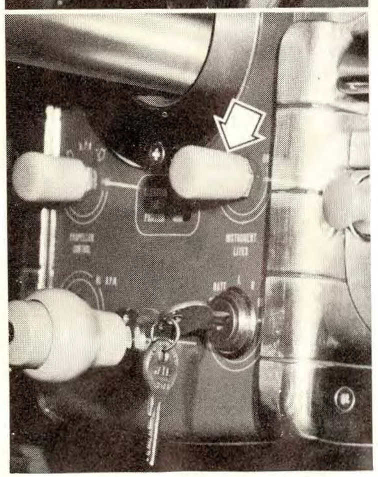
RUDDER PEDALS — The rudder pedals are adjustable fore and aft. The pilot's pedals have two positions and the copilot's pedals have three positions. The third position of the copilot's pedals releases the pedals from the rudder system and they fold down against the floor out of the way. This prevents the occupant in the copilot's seat from inadvertently operating the rudder controls. The third position of the copilot's rudder pedals is eliminated when the optional dual brake system is installed.

EMERGENCY LANDING-GEAR EXTENSION — A handcrank is provided for the manual extension of the landing gear in case of emergency. This handcrank is located between the front seats at the back of the seats. It is operated by first placing the landing-gear circuit-breaker in the "Off" position and the landing-gear position switch in the "Down" position, then removing the safety strap, moving the handle down into the cranking position, and turning it counterclockwise.

Approximately fifty turns are required to extend the landing gear.

NOTE: The landing gear must not be _retracted_ with the emergency handcrank.



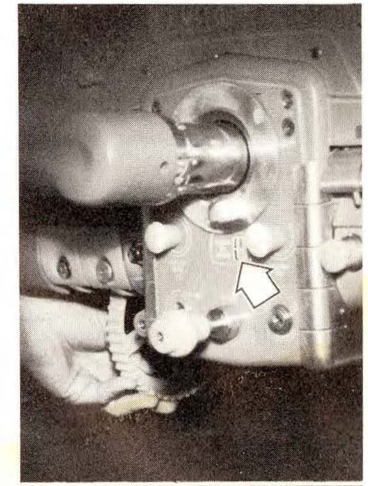


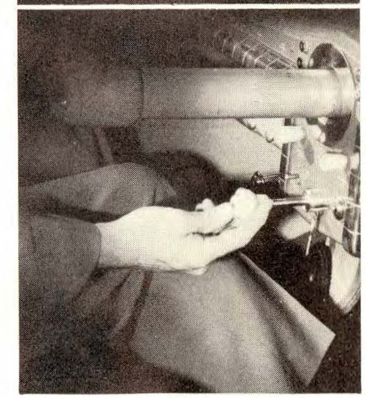
BRAKES — The rudder pedals are equipped with toe brake pedals which are connected directly to the master brake cylinders.

PARKING BRAKE — The parking brake is applied by pulling the parking-brake handle back and pumping the pilot's brake pedals until the desired brake pressure is obtained. It is not necessary to release the parking-brake handle to apply more pressure; it can be obtained by merely pumping the pilot's brake pedals.

INSTRUMENT LIGHTING — The instrument panel is illuminated with a red light for night operation. The intensity of the light is controlled by adjusting the instrument-light switch knob until the desired brilliance is obtained.

ELEVATOR TAB — The elevator tab is operated by the tab control wheel located under and to the left of the center of the instrument panel. Turning the _bottom_ of the wheel forward raises the nose, turning the wheel aft lowers the nose. The position of the tab may be checked by the tab indicator located to the right and below the control column.





Engine Controls

THROTTLE — The throttle control has a micrometer adjustment feature for fine adjustments of the throttle. This adjustment is operated by turning the knob clockwise to increase the engine rpm and counterclockwise to decrease it. The micrometer adjusting feature can be released by pressing the button in the center of the knob, and the throttle may then be opened or closed without turning the knob.

MIXTURE — The mixture control has a friction lock to hold the control at the position it is set by the pilot. It is operated by pressing in the button in the center of the knob, then setting the mixture control to the desired position. Releasing the button locks the control in this position. When the control is in, the mixture is full rich. Pulling the control out leans the mixture. The mixture control must be pulled out about one inch from the full-rich position before any appreciable leaning of the mixture can be obtained.

When the control is pulled out to the extreme travel, the carburetor mixture control is in the idle cut-off position. The mixture control should be in the full-rich position for all take-offs, landings, and descents from higher altitudes at reduced power.

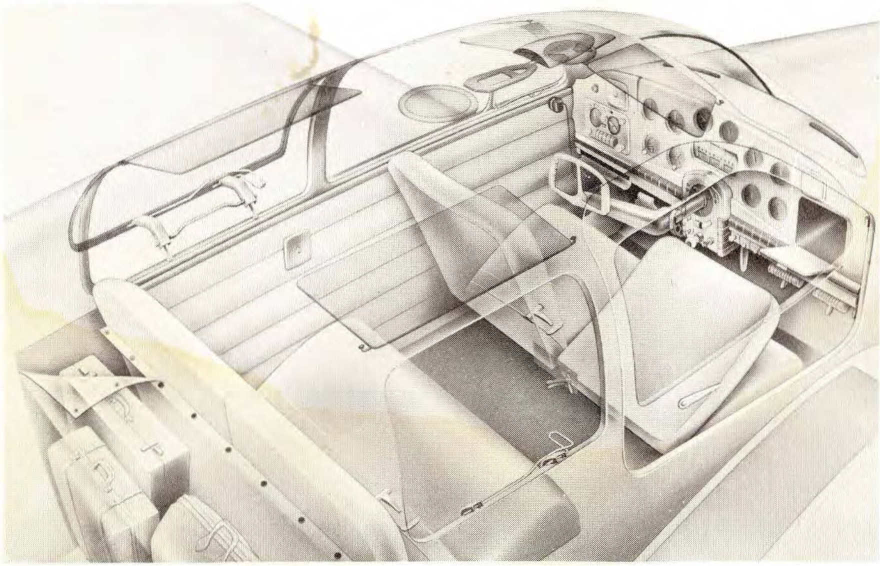
CARBURETOR HEAT — The friction-type carburetor-heat control operates identically to the mixture control. Maximum power is obtained when the carburetor-heat control is in the cold position. Filtered air is also furnished to the carburetor when the control is in this position. Under most operating conditions the carburetor-heat control should be in the cold position; however, under icing conditions such as those causing the engine to operate roughly or the air filter to be blocked with ice it will be necessary to use carburetor heat. The carburetor hot air is obtained from the area under the cylinders and around the exhaust manifold on the right side of the engine. No heater muff is required because the carburetor is a non-icing type.

When making long reduced power glides in outside air temperatures of 20° F. or below, the carburetor-heat control should be pulled out to keep the engine induction system warm. In extremely cold air, 10° F. or below, it may be necessary to keep the control out during taxiing and warm-up, and possibly on take-off, to obtain full acceleration during the initial part of the take-off.

COWL FLAPS — The cowl-flap control operates identically to the mixture control. Pulling out the control opens the cowl flaps and increases the flow of cool air over the engine. It is used to maintain the engine-head temperature within the operating range necessary to obtain the greatest efficiency from the engine. The cowl flaps should be open whenever the indicated air speed is below 100 mph except when operating in very low temperatures.

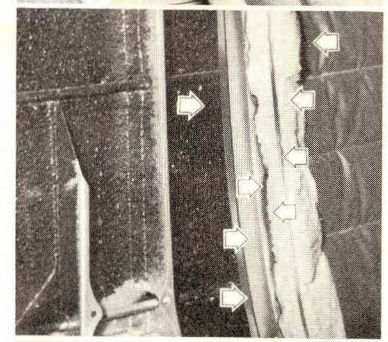
PROPELLER CONTROL — The propeller control is located to the left and below the control column. This control is used for increasing or decreasing the propeller blade angle. The engine rpm is increased by moving the switch to the "HI" rpm position and holding it until the desired rpm is obtained, and decreased by moving the switch to the "LO" rpm position and holding it until the desired rpm is obtained. The propeller pitch may be changed when the engine is not running.

The Cabin Interior



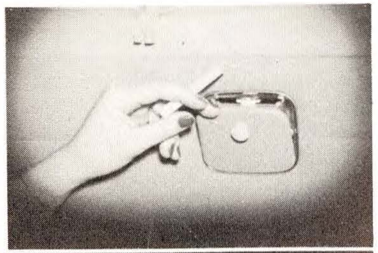
TRIM — The cabin and seats are upholstered in high-quality long-wearing materials. A choice of several smart and pleasing upholstery color schemes is offered. The instrument panel, instrument dials, and all exposed metal are finished in soft harmonizing colors. The floor is covered with wall-to-wall carpeting. The lower portion of the cabin wall is also covered with carpet to protect the upholstery from dirt and scuffing.

SEATS — The form-fitting seats have foam-rubber seat and seat-back cushions to provide the utmost in comfort. The angle of the pilot's and copilot's seat backs is adjustable. A set screw reached by moving the seat back forward can be turned in or out to move the seat back backward or forward to the desired angle.

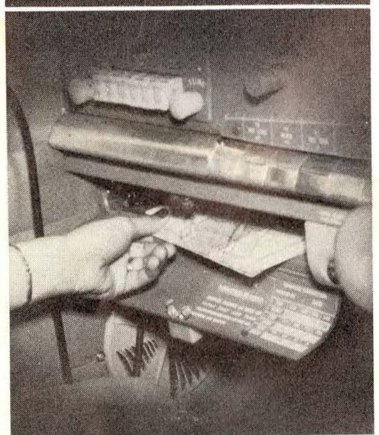


SOUNDPROOFING — The cabin is completely soundproofed with a thick fiberglas blanket. The inside surface of the fuselage skin is covered with a thick coat of asphalt sound-deadening paint to further reduce the noise level in the cabin. The noise level in the cabin is low enough that normal conversation and reception from the loud-speaker can be easily understood.

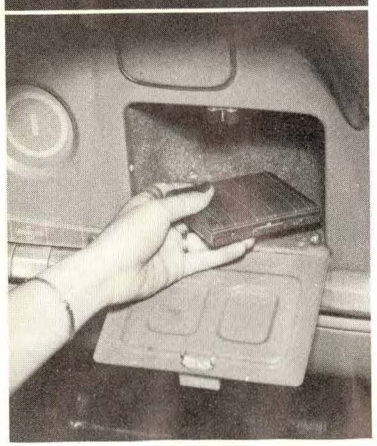
SUN VISORS — Individual sun visors are provided and may be adjusted to shield each occupant's eyes from the sun.



ASH TRAYS AND LIGHTER — Individual ash trays are conveniently located by each seat and a lighter is provided on the right side of the instrument panel.

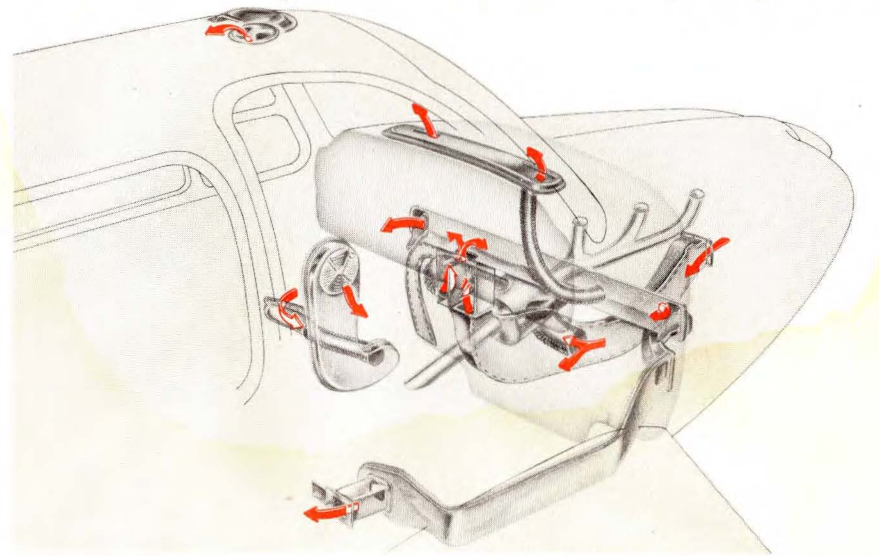


MAP CASE — A map case large enough to hold all the maps required for a trip is conveniently located below the instrument panel directly in front of the pilot.



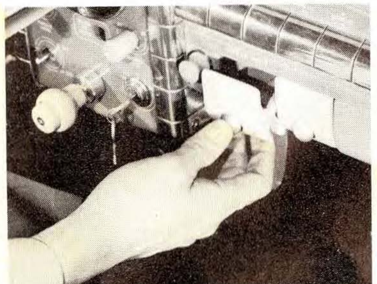
GLOVE COMPARTMENT — A glove compartment large enough to hold the collection of articles usually carried is located on the right side of the instrument panel.

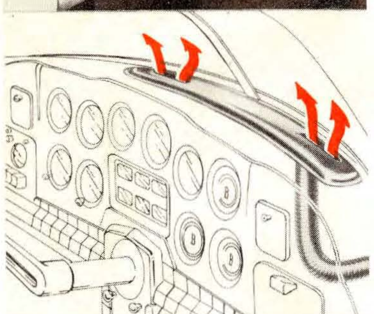
The Heating and Ventilating System



MAIN AIR SUPPLY — The air supply enters an intake just back of the nose cowling. Part of the volume of air is carried by a large air duct directly to the air mixing valve located on the front side of the firewall at the left side of the airplane, and part is deflected through an exhaust heater and then to the mixing valve. The air supply passes from the mixing valve to the heater and defroster distribution outlets.

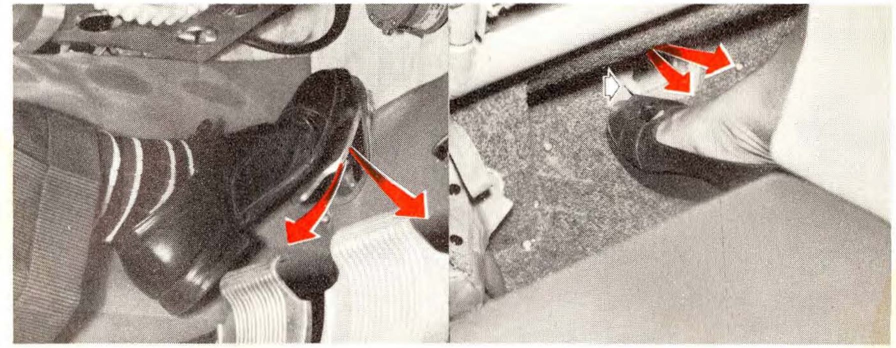
HEATER CONTROL — The temperature of the air supply from the mixing valve to the cabin is governed by a heater control located below the instrument panel just right of the center line. This control operates the air mixing valve. When the heater control is pushed all the way in, the hot air is turned completely off and only cold air comes into the cabin. As the control is pulled out, the cold air is gradually turned off and the hot air is turned on. When the heater control is pulled all the way out, the cold air is turned completely off and only hot air that has passed through the exhaust heater comes into the cabin.





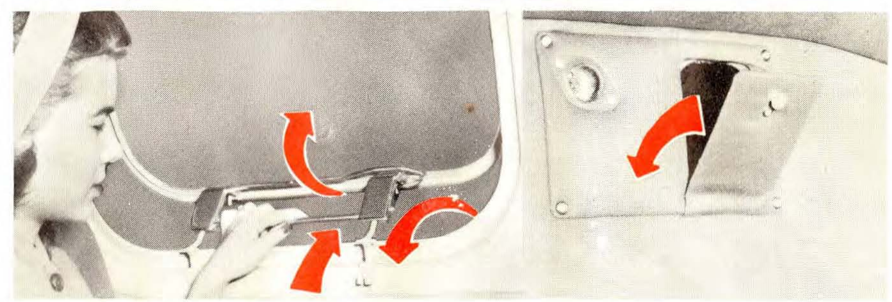
DEFROSTER — A portion of the air supply entering the cabin from the mixing valve passes through the defroster outlets and up along the inside surface of the windshield to prevent frosting or steaming. When the frosting or steaming is severe, the volume of air passing through the defroster outlets can be increased by closing the individual air valves. This is not necessary under normal flight conditions.

CABIN EXHAUST VENTILATOR — A controllable ceiling ventilator easily accessible to pilot or passengers is provided to exhaust the air from the cabin. Opening this ventilator increases the volume of air entering the cabin through the heating and ventilating openings by reducing the air pressure in the cabin.



INDIVIDUAL AIR VALVES — Adjustable foot-operated air valves that can be opened or closed to control the distribution of the air from the mixing valve to suit the individual occupants are provided. The valves for the front seats are located under the instrument panel directly in front of the pilot's and copilot's seats, and the rear-seat valve is under the back of the copilot's seat. The volume of air to the rear seat can be increased by closing down the front-seat openings.

COLD AIR VALVE — A cold air inlet valve located behind the rear seat may be opened to increase the volume of cold air for the occupants of the rear seat if desired.



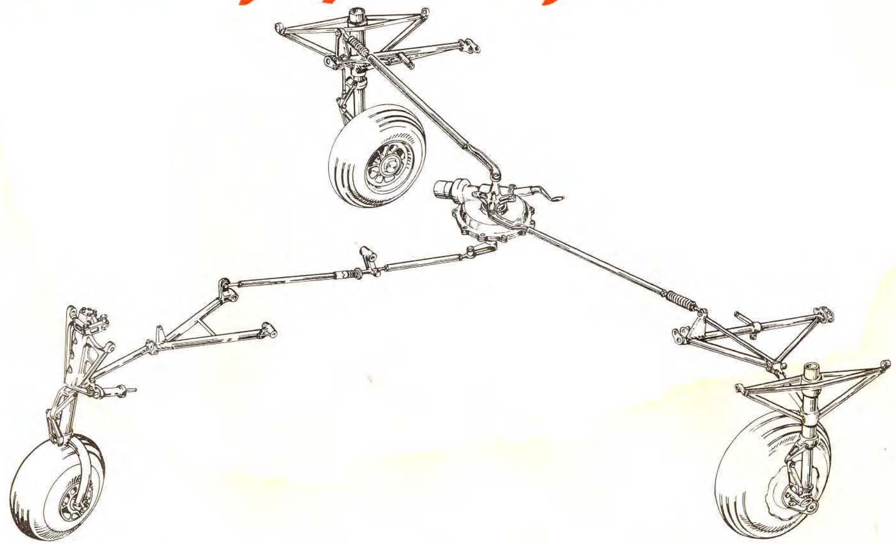
GROUND VENTILATION — The rear windows may be opened to obtain maximum ventilation when the airplane is on the ground. They must be closed before take-off and _must not be opened in flight_.

AUXILIARY COLD AIR VALVE — In extremely hot weather the volume of cold air can be further increased by opening the auxiliary cold air inlet valve located on the left side of the airplane in front of the pilot's seat. The air supply for this valve is obtained through a duct from the leading edge of the left wing.

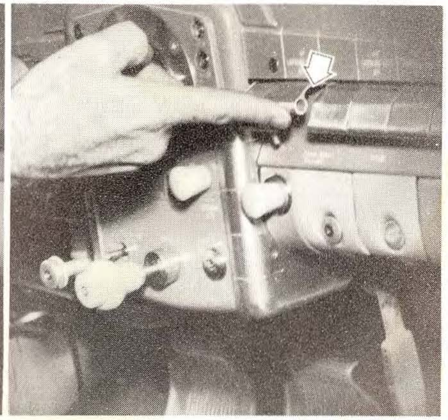
Electrical System

The 12-volt DC electrical system consists of wiring, battery, generator with voltage regulator, distribution panels, switches, and lights. The system is a single-wire ground-return type supplied by a battery maintained by the generator. All circuits are protected by either automatic-resetting or trip-free circuit breakers. The automatic-resetting circuit breakers are located under the glove compartment. The trip-free circuit breakers are located in the circuit-breaker panel and are accessible by opening the circuit-breaker panel door. The 12-volt battery is installed on the right side of the airplane behind the engine. The battery is accessible by raising the right-hand side of the engine cowl. The generator is a 15-volt 25-ampere generator and the output is regulated by the voltage regulator.

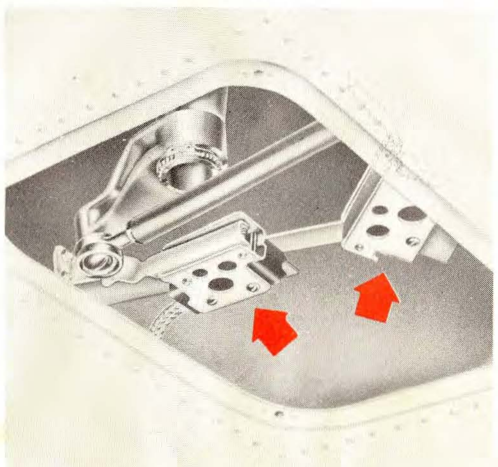
Landing Gear System



The tricycle-type landing gear has two main wheels and a nose wheel. Both the main gear and nose gear are equipped with air-oil type shock struts manufactured by the Beech Aircraft Corporation and are electrically retracted. Power for retraction is obtained from an electric motor driving an irreversible gear. Push-pull rods transmit the power from the retraction arms on the gear box to the retract brace assemblies at each wheel. The landing gear is automatically locked in the down position because the retract brace assemblies are on dead center when the gear is extended.

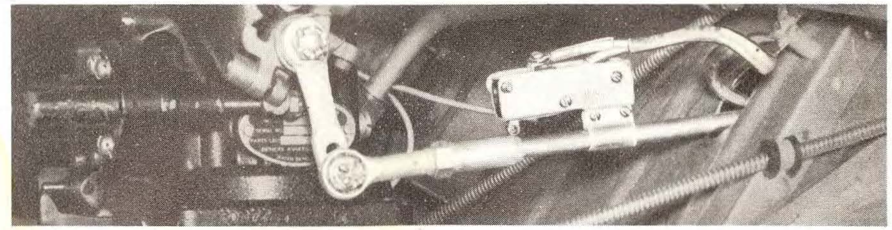
 

LANDING-GEAR POSITION SWITCH—The landing-gear position switch is located at the left end of the right switch panel. The switch is equipped with a safety latch to prevent the switch from accidentally being moved to the up position.



LANDING-GEAR LIMIT SWITCHES—The landing-gear limit switches are located below the gear box and are actuated by the nose-wheel retraction arm.

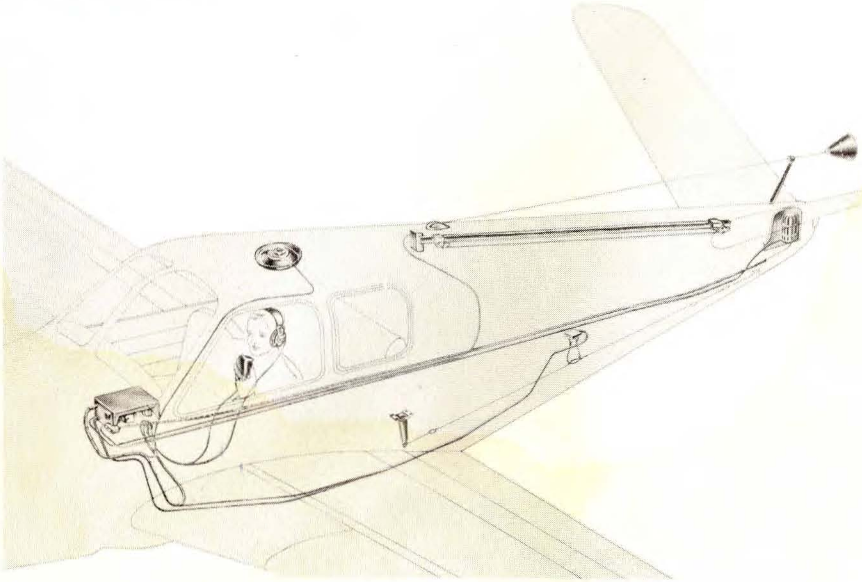
LANDING-GEAR WARNING HORN—The landing-gear warning horn has two switches connected in series; one above



the gear box which is actuated by an angle on the landing-gear actuator spider and the other on the throttle control at the carburetor end. When the gear is not fully extended a circuit is completed through the switch above the gear box. When this circuit is completed because of the partially extended gear, closing the throttle to the point where the manifold pressure is reduced below 12 inches Hg. will throw the throttle switch and cause the warning horn to blow.

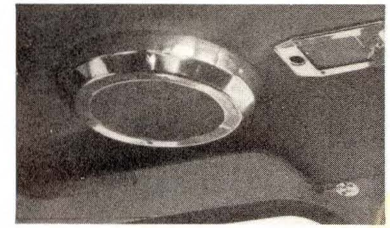
LANDING-GEAR SAFETY SWITCH—The landing-gear safety switch is connected in series in the up circuit of the landing-gear position switch. It is located on the right shock strut and closes the circuit when the shock strut is ⅜ of an inch from the fully extended position. The switch is provided to guard against accidental retraction of the landing gear when the airplane is on the ground.

Radio

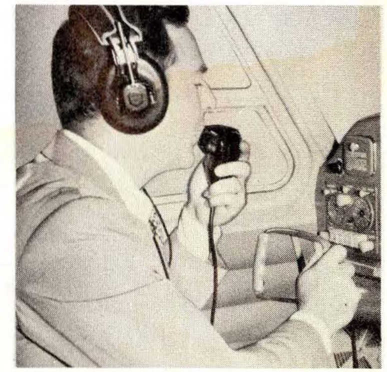


The Motorola "Avigator" is a two-way radio with the receiver and transmitter combined in a single unit. It receives on the 200 to 400 kilocycle range band and the 550 to 1550 kilocycle standard broadcast band. It transmits on a frequency of 3105 kilocycles over a 30 to 50 mile radius, depending upon the atmospheric conditions and the altitude of the plane. Under average atmospheric conditions when the airplane is on the ground, stations 200 to 300 miles away can be received on the broadcast band during the day. "Fan" and "Z" marker signals are received over a separate receiver and fed into the phone circuit of the main receiver. A switch-operated automatic volume control is provided to prevent

fading or build-up of volume when approaching and passing broadcast stations and control towers.



CABIN LOUD-SPEAKER — The loud-speaker is located in the cabin top to furnish excellent radio reception for all occupants. Range stations can be heard over the loud-speaker.



SETTING PUSH BUTTONS — The push buttons are set by first tuning the desired station to its highest intensity and then pulling out the button to be set approximately one inch and pushing it in as far as it will go.

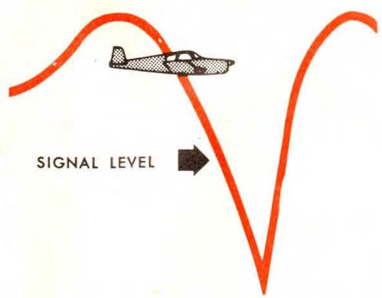
"FAN" AND "Z" MARKER RECEPTION — A 75-megacycle receiver mounted in the belly of the airplane receives the signals emitted by "Fan" and "Z" marker stations and feeds them into the main receiver phone circuit. The "Fan" marker is an intermittent high-pitched 3000-cycle note that locates the different range legs, and the "Z" marker is the same note, but continuous, that is heard when the airplane passes directly over the range-signal station. The signals can be heard over the loud-speaker but better reception and a slight improvement in range is obtained by use of the headset.

RECEPTION IN THE NEIGHBORHOOD OF A THUNDERSTORM — When flying in the neighborhood of a thunderstorm the best reception with the least amount of static is obtained by using the loop antenna. When flying in any form of precipitation, use of the loop antenna will also decrease precipitation static.

BROADCAST STATION RECEPTION — The band switch should be placed in the "BC" position and, if the loud-speaker is to be used, the SPEAKER switch pulled out. For best reception the automatic volume control should be in the "AVC" position.

VOICE RECEPTION — Voice transmission is 1.02 kilocycles below the range-signal transmitter frequency; therefore, if the range-signal strength is reduced by tuning the range station down 1 or 2 kilocycles from its assigned frequency, voice transmission will be heard without interference from the range signal.

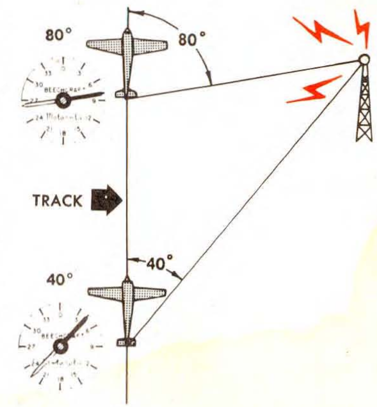
CONE OF SILENCE — The headset should be used to seek the cone of silence of a range station that does not have a "Z" marker. The automatic volume control switch should be "OFF" and the short antenna used.



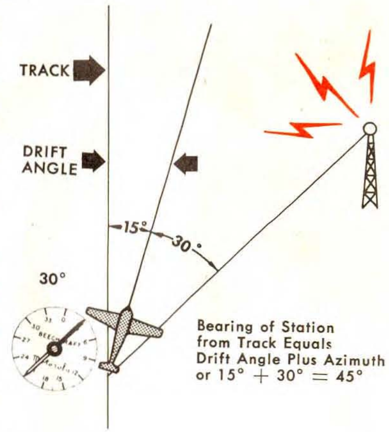
LOOP NAVIGATION — Loop navigation utilizes the aural null. With the AVC switch "OFF," the desired station should be tuned in and identified. The loop should then be rotated until the signal either fades out or reaches a minimum of intensity; this will be

within a very few degrees of the null position.

Assume that a bearing is taken on a broadcast station. When the null position is established the azimuth indicates the direction of the station relative to the nose of the airplane. If the airplane changes its course, the angular bearing of the station relative to the nose of the airplane will change in the exact proportion. The angular bearing of the station relative to the nose also changes when the airplane continues on a course. When a known course is being flown and the airplane is making a definite geographical track, the bearing of the known radio station relative to the nose of the airplane determines its position along the flight track.

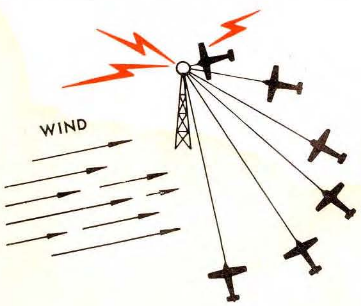


When taking a bearing from a known track, it is necessary to correct for the drift angle, magnetic variation and magnetic deviation. If the airplane is crabbed *toward* the side of the track on which the station lies, the drift angle is *added* to the bearing of the station relative to the nose to find the bearing of the station relative to the track. If the airplane is



Bearing of Station from Track Equals Drift Angle Plus Azimuth or 15° + 30° = 45°

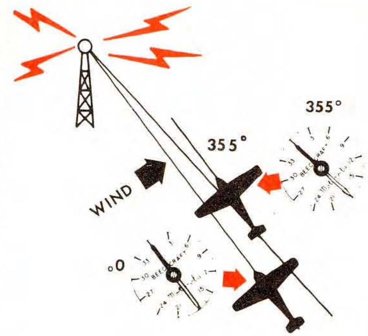
crabbed toward the side of the track *opposite* that on which the station lies, the drift angle is *subtracted* from the bearing of the station relative to the nose. A line drawn through the station at the angular bearing of the station relative to the track will fall across the track or course at the position of the airplane at the time the bearing was taken.



HOMING — When it is desired to point the nose of the airplane directly at a radio station, the azimuth should be set on "0" and the airplane flown so a null signal is constantly heard. If there is a cross wind and no correction for drift is made, the heading of the airplane will change constantly, and the airplane will follow a parabolic course passing over the station directly into the wind. It makes little practical difference whether correction is made for drift insofar as the time required to complete the flight is concerned; however, if dangerously high terrain lies to the down-wind side of the course or there is a possibility of drifting into an airway, a drift angle or crab should be established.

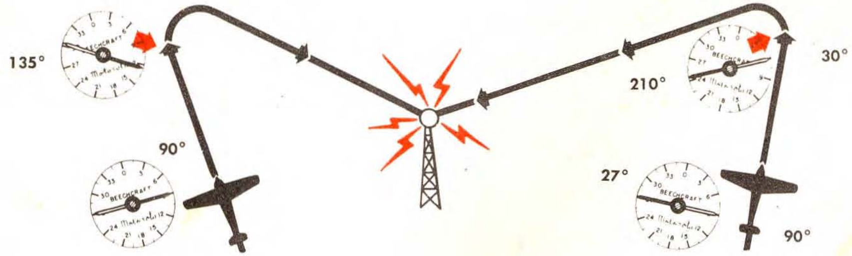
When it is desired to correct for wind drift on a homing flight, the azimuth should be set on "0," the airplane aligned for reception of the aural null, and the compass heading noted. The compass heading should be held a short time, and without altering the compass heading the loop should be rotated to the new aural

null position. If the azimuth indicator is left of "0," the airplane has drifted to the right. The crab or drift angle is established by first noting the number of degrees change on the azimuth in finding the new null, for example 5° to the left, then changing the airplane heading 5° to the left and rotating the loop 5° to the right. The nose of the airplane will then be pointed at the station and the loop to the right of the null position for that station. A little to the left of this new compass heading and somewhere between 0° and 5° right azimuth setting, a new compass heading will be found that gives a constant aural null. When this heading is found, the drift will be accurately corrected for, and the airplane will be flying in a straight line course for the station.



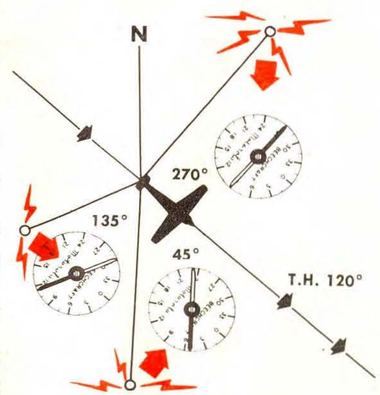
Orientation With Loop Antenna

ORIENTATION BY WING-TIP NULL POSITION — In order to determine on which side of the loop the station lies when orientating the geographic position of the airplane, the azimuth should be turned to 90° or 270° and the airplane turned until an aural null is received (this is commonly called a wing-tip null) and the compass heading noted. While flying this heading, the loop should be rotated to keep the null in constant reception. When a minimum



change of 5° occurs in the null position, the direction of the rotation of the azimuth necessary to maintain a null reception should be noted. If the azimuth rotated clockwise, the station is to the right of the airplane; if the azimuth rotated counterclockwise, the station is to the left. If it is desired to home on this station, the azimuth should be placed on "0," and the airplane turned <u>toward</u> the station until an aural null is received.

ORIENTATION BY TRIANGULATION — The determination of the airplane's geographic position by geometric triangulation is quite simple. This is referred to as a triangulation fix. Several strong signal stations are identified by use of the trailing antenna and set up on the push buttons. The push buttons are used to speed up the process and thus obtain as nearly as possible an instantaneous fix. The airplane's true heading is computed by correcting for magnetic variation and deviation. The loop antenna should be used. A station should



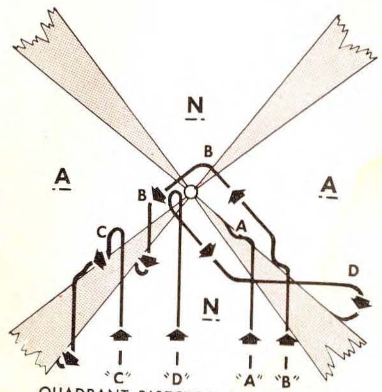
be tuned in with a push button, the loop rotated to the null position, and the reading of the azimuth indicator noted. This procedure should be repeated on the other stations in as rapid sequence as possible. The airplane's true bearing, or the reciprocal thereof, is obtained from each station by adding the airplane's true heading and the azimuth indication for that station; if the sum exceeds 360°, 360° is subtracted to obtain the true bearing. A line should be drawn on the map through each station on the airplane's true bearing from that station. The point at which the lines from two or more stations intersect or form a small triangle is the geographic position of the airplane at the time the bearings were taken.

TIME TO STATION — To find the flying time from a station by use of the loop antenna, the airplane should be turned and the null position followed to a wing-tip position which would be at either 90° or 270° on the azimuth indicator. The time and compass heading should be noted. This compass heading should be flown until the indicator shows a bearing change, by following the null, of at least 5°. The elapsed time for such bearing change should be noted and the flying time from the station determined by the following formula:

$$\frac{60 \times \text{minutes flown between bearings}}{\text{degrees bearing change}} = \text{minutes flying time from station}$$

ORIENTATION ON RADIO RANGE — Orientation on a radio range can be accomplished only by a constant reference to the map. It is greatly simplified by reference to the *Radio Facility Chart* for the particular station.

Once the station has been identified the airplane should be turned to the average bisector heading for the two quadrants identified with the signal being received. Two of these average quadrant bisectors lie on the approximate line of symmetry which divides every radio range; the other two lie on the line at 90° to this line of approximate symmetry.



QUADRANT BISECTOR ORIENTATION

The automatic volume control should be in the "OFF" position and the volume turned as low as is practical for maintaining constant identification. A check should be made for a "build" or "fade" in the signal. Upon a positive check for a "fade" a 180° turn should be executed to head the airplane toward the station and a double check made by checking for a "build."

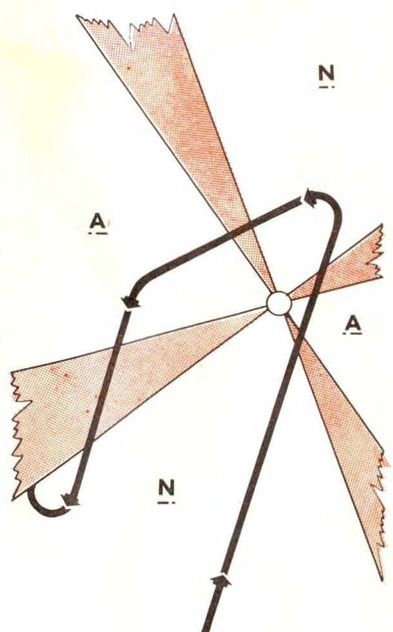
Orientating on the let-down leg from the quadrant bisector heading is accomplished by one of four flight patterns. The choice of pattern is determined by the position of the airplane relative to the station and whether the first leg intercepted is the let-down leg. The airplane should be flown on the bisector course until an "on course" signal is heard. Immediately upon receiving the signal of the quadrant on the opposite side of the leg, a standard rate (one needle width) turn to the left should be started, and the flight pattern chosen as follows.

If the 180° turn cannot be completed before re-entering the "on course" signal, the leg lying to the right of the station has been intercepted. If this leg happens to be one of the holding and let-down legs (Case A), the leg should be bracketed and standard holding and let-down procedure followed. If this leg is not one of the holding and let-down legs (Case B), the leg should be merely paralleled on the right side until a quick succession of quadrant signal, "on course," and the opposite quadrant signal indicates that the station has been passed on the right. A standard rate left turn to the outbound heading of the leg opposite the leg just crossed should then be made. During the turn, or immediately thereafter, the quick succession of quadrant signal, "on course," and opposite quadrant signal will again be heard indicating that the leg opposite the first leg paralleled has been crossed. The leg to whose heading the airplane was turned should be paralleled for a period of two minutes, then a procedure turn through this leg executed.

If the 180° turn can be completed before re-entering the "on course" signal through which the airplane passed on the inbound quadrant bisector heading, the leg to the left of the station has been intercepted. If this leg happens to be one of the holding and let-down legs (Case C), the leg should be paralleled outbound for a period of two minutes and a procedure turn executed to return to the station. If, however, this leg is not one of the holding and let-down legs (Case D), this first turn should be continued until the outbound heading of the leg which lies to the right of the station is reached. This leg should be paralleled for a period of two minutes before a procedure turn is executed through the leg to return to the station.

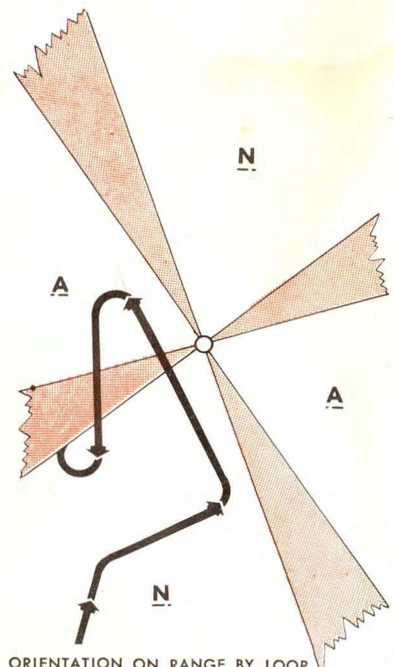
PROCEDURE TURNS — A procedure turn is accomplished in the following manner. A 45° turn to the left (toward the leg) should be executed and the airplane flown through the leg. Forty-five seconds after first detecting the opposite quadrant signal, a standard rate turn to the right should be started. Discounting the effect of the wind, the airplane will reach the inbound heading of the leg on the right-hand edge of the "on course" signal, thus minimizing bracketing.

CLOSE-IN PROCEDURE — If a quick succession of quadrant signal, "on course," opposite quadrant signal, "on course," and quadrant signal is experienced on the first bisector heading, the airplane has passed quite close to the station. The airplane should merely be turned to the outbound heading of the let-down leg lying to the left. This leg should be paralleled for a period of two minutes and a procedure turn executed through this leg to return to the station.



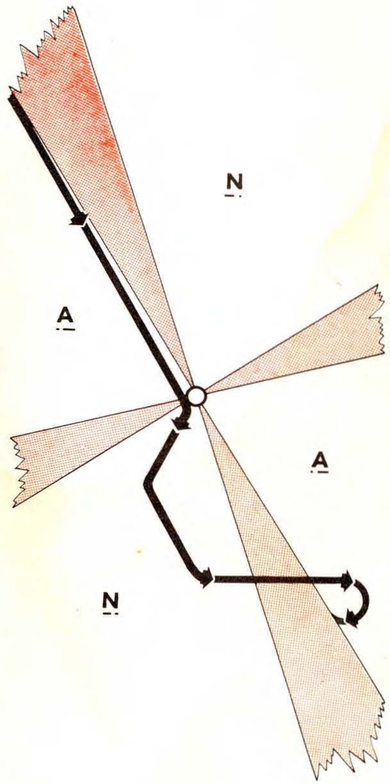
CLOSE-IN PROCEDURE

ORIENTATION ON RANGE BY LOOP — One of the simplest means of orientating on the holding and let-down leg of a radio range is by the use of the loop. Upon positive identification of the station, the airplane is turned to the heading of the holding and let-down leg. The loop is then switched on and rotated to keep it in the null position. After a minimum of 5° change in null position, the direction of null rotation should be noted. If the null rotation is clockwise, the station is to the right of the airplane; if counterclockwise, the station is to the left. The airplane should be turned <u>toward</u> the station to a heading of 90° from that of the holding and let-down leg nearest the airplane. Immediately upon crossing the leg the airplane should be turned 135° left, the first heading of a procedure turn through this leg. The execution of this procedure turn will place the airplane inbound on the right side of the holding and let-down leg. After bracketing the holding and let-down leg, all turns should be procedure turns either to the right or left as recommended by the tower or Radio Facility Chart.

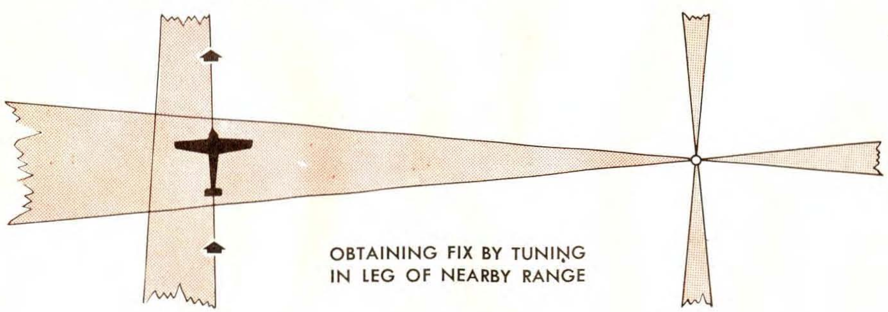


ORIENTATION ON RANGE BY LOOP

WIND EFFECTS — When orientating at any appreciable height above the haze level, strong winds may be encountered which will cause the beams or legs to seem to have shifted in magnetic heading. If climatic conditions or radio instructions preclude orientating nearer the haze level, the wind effect can be "washed out" in a manner similar to that explained in the section on "Homing" on Page 36, using the radio range "on course" signal in conjunction with the compass heading in much the same manner as the aural null is used.



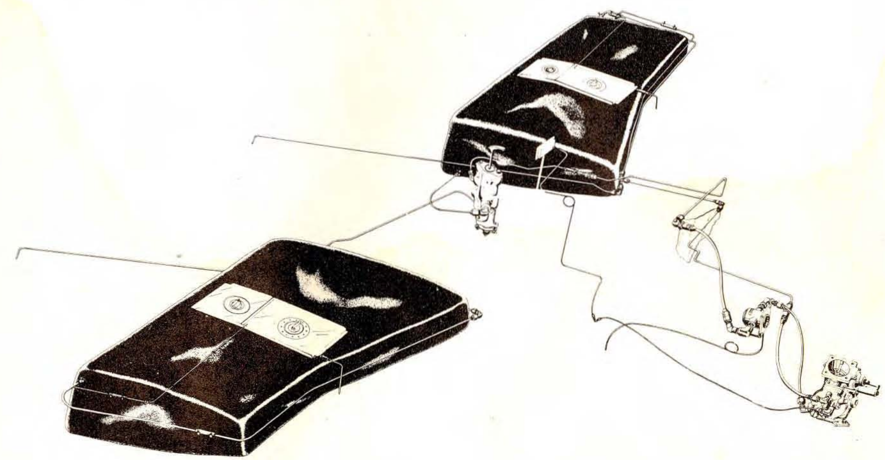
CONE CHECK — If it is suspected that the station has been passed without flying through the cone of silence, the airplane should be turned 45° to the right for 30 seconds. If the station has been passed, the signal of the right far-side quadrant opposite to the signal used for inbound bracketing will be received



OBTAINING FIX BY TUNING IN LEG OF NEARBY RANGE

clear without background. After the cone check is made, the outbound heading should be resumed, paralleling the leg until a turnaround is desired, then a procedure turn through the leg made.

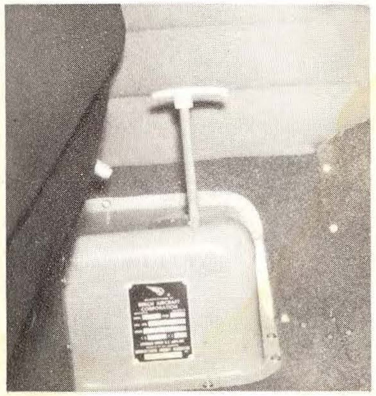
Fuel System



The Bonanza has a 40-gallon fuel capacity, 20 gallons in each wing. The tanks are rubber fuel cells located in the leading edge of each wing just outboard of the fuselage. When the airplane is stored for long periods of time the life of the tanks will be prolonged if the inside of the fuel cells is coated with light engine oil to keep the rubber from drying out.

The fuel should be used <u>from the left tank first</u> because the carburetor-fuel vapor-return line returns approximately three gallons of fuel an hour to this tank. This feature automatically provides a reserve fuel supply of approximately five gallons in the left tank when the right tank has been used.

The fuel-tank selector valve, hand fuel pump, and fuel strainer are combined in one unit. The fuel selector-valve handle also operates the hand fuel pump. The operation of the unit is explained by the placard located adjacent to the handle. Access to the fuel strainer and fuel-strainer drain is through the access door in the bottom of the fuselage.



When the airplane is given a preflight inspection a small quantity of fuel should be drained from the strainer to remove any water or sediment.

Oil System

The engine has a dry-sump lubrication system. The oil tank is located behind the engine on the left side. The tank has a capacity of 2 ½ gallons. The oil cooler is built into the tank. The left engine cowl is raised to check the oil or fill the tank. A dip-stick type oil quantity gauge is attached to the oil filler cap. The oil-tank and engine-sump drains are located in the top of the nose-wheel well. The engine sump should be drained when the oil tank is drained.

Flying the Bonanza

The purpose of this section of the manual is to provide information concerning the performance, range, and fuel consumption of the Bonanza and to point out its flight characteristics. The information necessary to plan flights as well as the operating procedures recommended as standard procedures for more efficient operation of the Bonanza can be obtained from this section.

Flight Characteristics

TAKE-OFF — The Bonanza has excellent take-off characteristics. The pilot will be very appreciative of the excellent control response, smooth positive acceleration, and unexcelled visibility.

For normal take-offs the elevator trim tabs should be set at zero. The shortest take-off runs will be made if the brakes are held until the engine is run up to full throttle, then released. The smoothest take-offs will be made if the airplane is held down until approximately 60 mph IAS is reached.

For short fields or to clear obstructions, 10° wing flap should be used. This can be judged quite accurately from the cabin by extending the flaps until the black line on the left flap-nose lines up with the wing trailing edge. The airplane should be trimmed approximately 5° (nose up), held with the brakes, and the engine run up to full throttle, then the brakes released. Some right rudder will be required. The brakes should not be used as this will lengthen the run. At approximately 50 mph IAS the control column should be moved back just enough to raise the nose wheel off the ground. The pilot should not continue to pull back on the elevators beyond this position. If the airplane is heavily loaded and there is considerable weight in the rear seat and baggage compartment, it is possible to raise the nose too high and cause the angle of attack to become so great that, while considerable air speed may be obtained, the wing will remain in a stalled condition and the airplane will not leave the ground. If the airplane is forced off by high wind velocity or gusty air, it may settle back down on the ground. The airplane should be accelerated to approximately 80 mph IAS and held at this speed until all obstructions are cleared. This procedure will reduce the take-off distance over a 50-foot obstacle by approximately 200 feet compared to a normal flap-up take-off. The cowl flaps should be

open during taxiing and take-off and on an approach after the gear is lowered. On approaches or long reduced power glides or let downs in cold temperatures, the cowl flaps should be regulated to keep the engine properly warm.

CLIMB — The maximum rate of climb occurs at a climb speed of 100 mph IAS at sea level. This speed should be reduced approximately 1 mph per 1000-foot increase in altitude. The best angle of climb (the maximum altitude obtained for a given horizontal distance) is 77 mph IAS. The rate of climb will be less with 10° wing flap, but the angle will increase slightly. The cowl flaps should be open during climb to insure proper engine cooling. Climbing should be done at 2050 rpm with the throttle set to give 70% power after clearing obstructions.

CRUISE — The exceptional cleanness of the Bonanza becomes very apparent in cruising flight. Maximum cruising power is 62.5% (115.5 hp at 2050 rpm) which gives air-line cruising speeds with a fuel consumption of approximately 10 gallons per hour. The quiet cabin makes conversation pleasant and enjoyable. Two-control operation reduces pilot fatigue to a minimum. Good turns can be made and the airplane held on a course even in rough air with the ailerons alone. The light forces and instantaneous response give the pilot finger-tip control.

The unusual feature of rated and cruising rpm being the same gives the Bonanza owner the benefits of a supercharger with an unsupercharged engine.

Using 2050 rpm for cruising gives a cruising critical altitude of slightly less than 10,000 feet. At this altitude true air speed is increased 15 mph over the sea level value. Due to the excellent rate of climb and improvement of speed with altitude, it pays to go to altitude even for flights of one hour or less. Reduction of power will increase the range considerably. For high altitude operation the mixture control should be used. This will not change the rpm on the tachometer, but a saving in fuel will result. The design cruising speed of 160 mph IAS should not be exceeded, especially in rough air. In exceedingly rough air, rough enough to cause the passengers extreme discomfort, the airplane should be slowed down to approximately 130 mph IAS. The limit load factor of 3.8 is much higher than will ever be encountered in normal flying. For efficient operation the pilot should check the cowl flaps, wing flaps, landing gear, and mixture control. For navigation purposes the airspeed indicator may be assumed to have zero error.

STALL — The outstanding impression received when stalling the Bonanza is that it is gentle and well behaved. This holds for all conditions of rate of approach to the stall, position of the flaps, landing gear, and amount of power used. With power on, the nose is very high before the stall occurs. After the stall occurs, there is a definite break and an unmistakable dropping of the nose. Stall warning in all conditions is provided by a red light on the instrument panel. This light flashes at approximately 5 mph

above the stall. As the speed is reduced, the light changes from flashing to steady. It is rigged with the landing-gear safety switch so it does not light when the airplane weight is on the wheels. When the flaps are extended, considerably more elevator is required to stall. When stalling with power on, the airplane can be held straight with the use of the right rudder. Aileron control is maintained throughout the stall. It is possible to produce or correct roll at any time during the stall with the ailerons. In a turning-flight stall there is no tendency to fall off toward the low wing. Stall warning in the form of tail buffeting is present in this condition. 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. If the elevator is held full back in the stall, some elevator buffeting is felt.

LET-DOWN APPROACH — The design cruising speed of 160 mph IAS should not be exceeded during the let down. The cowl flaps should be regulated to maintain the engine temperature. The propeller pitch should be adjusted to prevent exceeding 2050 rpm. The landing gear extended speed is 100 mph IAS. After the gear is extended the speed may be increased to 130 mph to increase the rate of sink if desired. For the approach, moving the propeller into the high rpm position will aid in deceleration. Sufficient time and distance should be allowed to permit the airplane to slow down. The cowl flaps should be open at speeds below 120 mph. The down-wind leg of the pattern can be made at 90 mph IAS, slowing down to 80 mph IAS with flaps full down. A change in trim will be noticed as soon as the gear and flaps are extended. The airplane slips nicely. A mild buffet warns when the slip is made too steep.

LANDING — The 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 suggested, and the airplane may be landed level 3-point if the runway is smooth. The figures in the landing charts shown on Page 72 are based on using the shortest landing technique and full brakes.

Maneuvers

NORMAL CATEGORY — When the Bonanza is operated in the normal category all acrobatics are unauthorized. The most severe maneuver to be executed is a 60° banked turn. The maximum gross weight in the normal category is 2550 pounds.

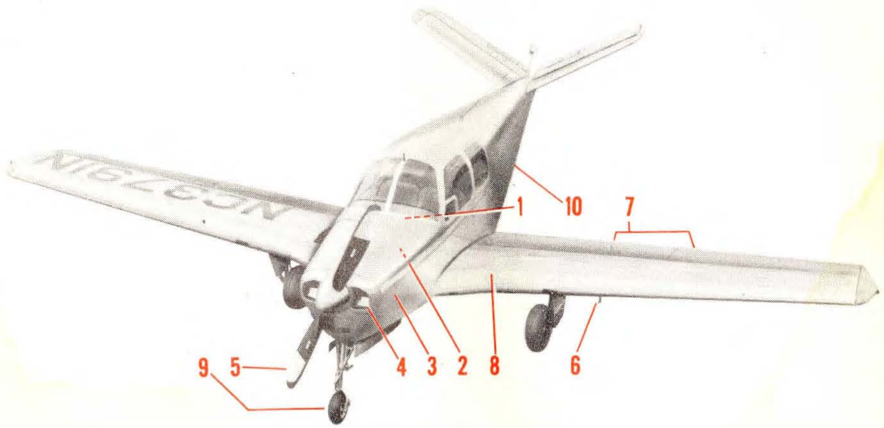
UTILITY CATEGORY — In the utility category, the airplane can be used for normal operation and limited acrobatic maneuvers. The maximum gross weight for this category is 2100 pounds. The following acrobatic maneuvers are approved:

Maneuver	Entry Speed
Chandelle	130 mph
Steep Turn	130 mph
Lazy Eight	130 mph
Stalls (except whip stall)	Slow Deceleration

Spins are prohibited in either the normal or utility category. If an inadvertent spin occurs, use normal spin recovery procedure.

Pre-Flight Inspection

The airplane should be given a visual inspection before flight to determine any damage or obvious defects. The items the inspection should cover are given in the following paragraphs.



BEFORE ENTERING AIRPLANE

1. Check to see that ignition switch is off.
2. Remove filler cap and check engine oil quantity. Securely reinstall filler cap.
3. Check cowling for security of fastening.
4. Check carburetor filter for cleanliness and freedom of obstructions.
5. Check propeller for security of installation, nicks and obvious damage.
6. Check pitot tube to see that opening is clear.
7. Check all control surfaces for security, freedom of movement, and any obvious defects.

8. Remove fuel tank caps and check quantity of fuel in each tank. Reinstall fuel tank caps.
9. Check inflation of shock struts and tires.
10. Check exterior of airplane for cleanliness and any obvious damage.

AFTER ENTERING AIRPLANE

1. Check cabin for loose articles.
2. Set parking brake.
3. Adjust rudder pedals so full rudder travel may be obtained.
4. Check all switches and controls.
5. Check landing-gear and flap position switches for proper position; landing-gear switch in down position, flap switches in neutral position.
6. Set clock and altimeter.
7. Check radio receiver and tune to tower frequency.
8. Check flight controls for free and smooth operation.

(NOTE: The rudder and aileron system will have a slight load when operated to the extreme travels and will have a tendency to return to neutral. This is a normal condition caused by the rudder-aileron coordinating system.)

STARTING THE ENGINE — It is desirable to have the airplane headed into the wind; however, this is mandatory only when the wind velocity is high or gusty.

1. Set parking-brake handle and pump up pressure with brake pedals.

2. Turn ignition switch to "BATT."

3. Check fuel quantity in both tanks.

4. Turn fuel selector valve to left tank. If left tank is less than half full, turn valve to fullest tank.

5. Check to see wing flaps are up.

6. Open cowl flaps.

7. Set mixture control to full-rich position.

8. Place propeller in "HI" rpm position.

9. Open throttle approximately ¼" from closed.

10. Turn ignition switch to "BOTH."

11. Pump up 9 to 10 pounds fuel pressure.

12. Press starter button.

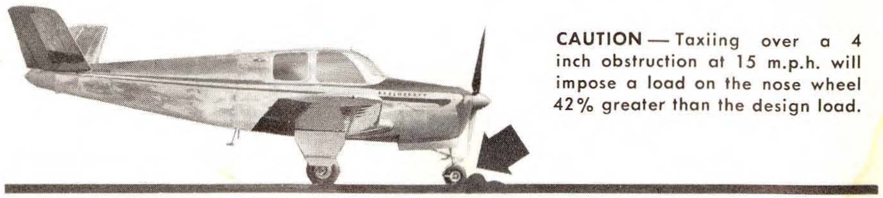
(NOTE: Do not engage starter button while engine is rotating. Airplanes after D-518 are equipped with a latching relay in the starter circuit. If a false start occurs or the starter button is released after the ignition switch is turned to the "BOTH" position, the ignition switch must be turned to the "BATT" position before the starter button will again energize the starter.)

13. Check to see that oil-pressure gauge registers at least 10 pounds oil pressure within thirty seconds.

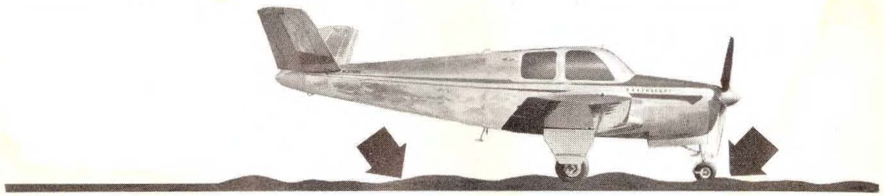
WARM UP — The throttle should be set at 1000 to 1200 rpm and the engine warmed up until the oil has reached a minimum temperature of 100° F. The cowl flaps should be open. On extremely cold days the engine should be warmed up until the head temperature is at least 300° F. and the oil pressure does not exceed 80 pounds.

Taxiing

The parking brake should be released before the airplane is taxied. Steering is accomplished by applying the brakes at slow speeds. When making turns the airplane should be allowed to roll forward before the brakes are applied to prevent unnecessary side loads being imposed upon the nose wheel and nose-wheel fork. Caution should also be used when taxiing over holes or rough parts of an airport. On airplanes with nose-wheel installations the entire weight of the plane is aft of the nose wheel and pushes the nose wheel rather than drags it behind as in a tail-wheel installation; therefore, when the airplane strikes an obstruction or hole a large portion of its weight is imposed upon the nose wheel; also, the load on the nose wheel is increased when the brakes are applied when the airplane is moving. It is a good plan when taxiing or after landing on a rough field to keep the control wheel as far back as possible when on the ground to reduce the load carried by the nose wheel. The amount of up elevator required will vary with the load in the back seat or baggage compartment as the more load rearward, the more effective the up elevator becomes.



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.

Pre-Take Off

1. Check flight controls for free and smooth movement through their full range.
2. Check to see wing flaps are up.
3. Set the elevator tab control to zero.
4. Set throttle to 1600 rpm and check to see the drop does not exceed 75 rpm on either magneto.

CAUTION: Do not run-up engine when airplane is on loose dirt or sand.

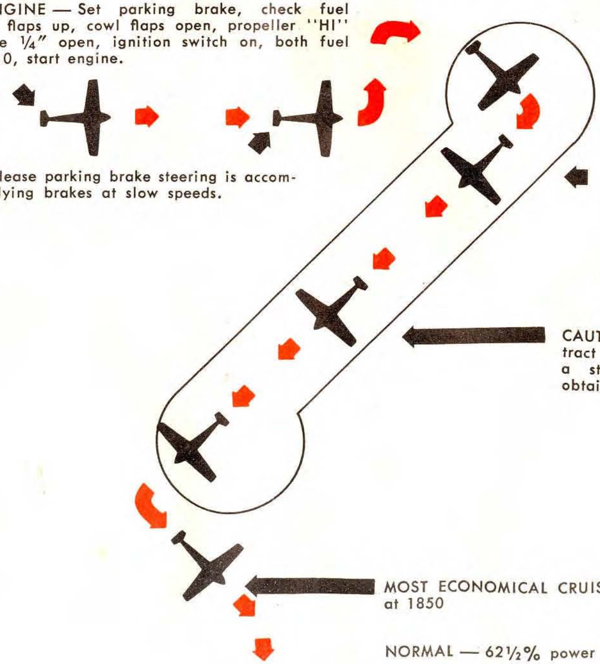
5. Check engine for smooth operation at full throttle.

6. Check to see charging rate of generator is between 2 and 20 amperes.
7. Check to see fuel pressure is between 9 and 14 pounds.
8. Mixture control should be full rich.
9. The carburetor heat should be cold except when operating in very low temperatures.
10. Oil temperature should be between 120° and 180° F. Never take off with an oil temperature greater than 215° F.
11. Check to see oil pressure is between 40 and 80 pounds.
12. The head temperature should not exceed 525° F.

Take-Off

1. Release brakes.
2. Throttle — Full Open. Do not exceed 2300 rpm and 29.6 inches Hg. manifold pressure. Open throttle smoothly as airplane accelerates.
3. When a speed of approximately 55 mph is attained, raise the nose wheel off the ground. The airplane will then fly off at approximately 65 mph.
4. When a stabilized climb at 75 to 80 mph is attained, retract the landing gear.

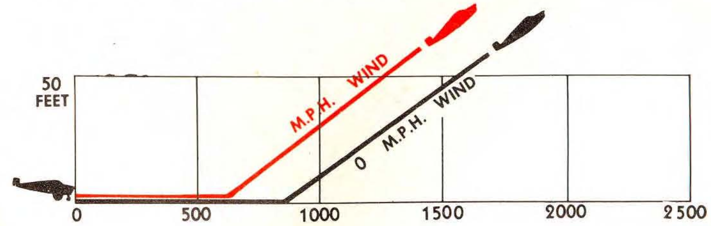
ENGINE FAILURE DURING TAKE-OFF — The nose should be lowered immediately to maintain flying speed. If the engine cannot be restarted, the ignition switch should be turned to "BATT" and the fuel selector valve turned off. The airplane should be landed straight ahead. If the landing area is smooth and long enough for a safe landing, the landing gear should be left extended. If the landing area is not suitable for a safe landing, the landing gear should be retracted and a belly landing made. After making the decision on the gear position and retracting the wheels if necessary, the ignition switch should be turned "OFF."



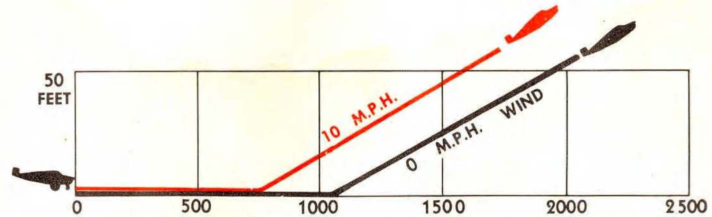
TAKE-OFF PROCEDURE

TAKE-OFF CHARTS

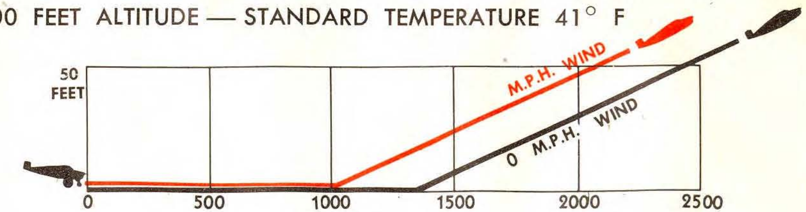
SEA LEVEL STANDARD TEMPERATURE 59° F



2500 FEET ALTITUDE — STANDARD TEMPERATURE 50° F



5000 FEET ALTITUDE — STANDARD TEMPERATURE 41° F



TAKE-OFF CHARTS FOR FULL GROSS WEIGHT
NO WIND — 10 M.P.H. WIND

Take-off distance over 50 foot using 10° wing flap, gross weight 2550 lbs. Add 4% to above for each 10° F above standard temperature.

Climb

1. Climb at full throttle with the propeller in the "HI" rpm position (Do not exceed 2300 rpm).

2. Adjust cowl flaps to maintain head temperature between 420° to 460° F.

3. Adjust the elevator tab to relieve elevator control forces during climb.

The most efficient climb speed is 100 mph using 165 hp at 2050 rpm.

CRUISE — When the desired flight altitude is attained, the propeller should be set to the desired cruising rpm. Then the throttle should be adjusted to obtain the desired power output from the engine. The cowl flaps should be adjusted to maintain the head temperature within the operating range.

ENGINE FAILURE IN FLIGHT — If an engine failure is encountered in flight, the nose should be lowered to maintain flying speed. All switches and controls should be checked to see if some inadvertent movement of a switch or control caused the failure. The fuel-tank selector valve should be checked to see if it is turned to a tank containing some fuel. If the engine cannot be restarted, a suitable landing field should be selected. The ignition switch should be turned to "BATT" and the fuel selector

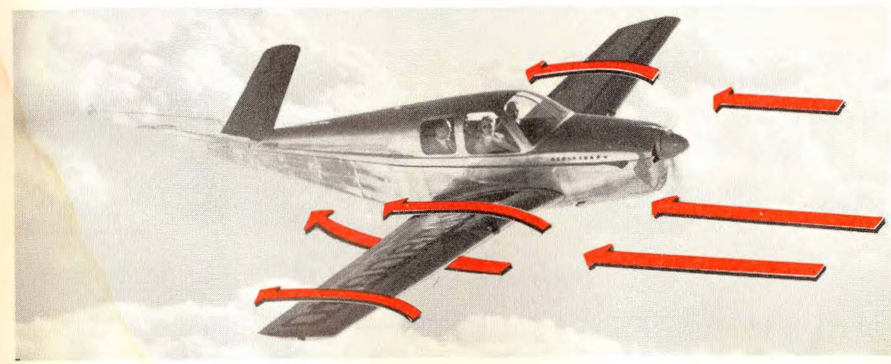
switch turned "OFF." If the field is reasonably smooth and free of obstructions and there is sufficient time to plan a landing, the landing gear should be lowered. When there is no danger of undershooting, the flaps should be lowered and the ignition switch turned "OFF." If the field is rough or has ditches or other such obstructions, the airplane should be landed with the wheels up. If necessary to prevent overshooting, the airplane can be effectively slipped.

LOAD FACTORS ENCOUNTERED IN FLIGHT — It has been well established through research just how strong a wing needs to be to stand the G load factors imposed in normal maneuvering and by gust loads at the cruising speed of the airplane. During the late war the military services accumulated over 25,000 hours of recording-accelerometer readings to show the G load factors encountered when hitting bumps or up currents in the air. This information indicates that the limit load factors are safely adequate for all bumps that will be encountered at <u>cruising speed</u>.

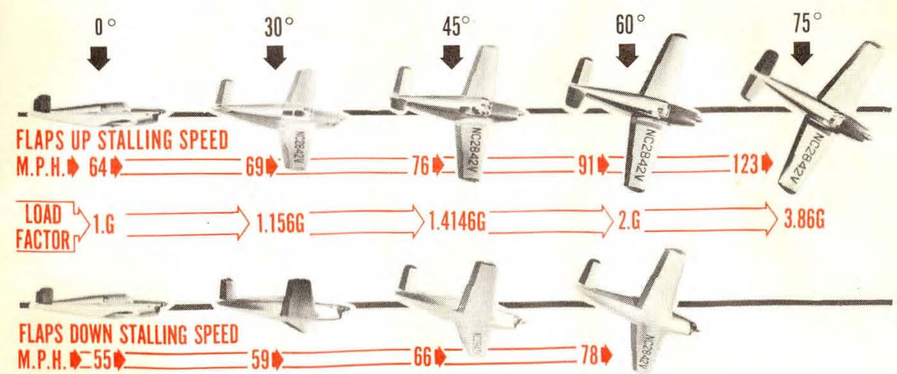
The loads which rough air or turbulence can put on a wing at higher speed is something that must be borne in mind at all times. These problems apply to all aerodynamically-clean airplanes of which the Bonanza is one. Aerodynamically-clean airplanes will pick up speed rapidly when the nose is dropped a little. While letting down from a high cruising altitude when approaching a destination, it is common practice to trim the nose down a little and let the speed build up from 25 to 30 percent above normal cruising speed. This is all right when the air remains smooth, but the pilot must be alert and ready to reduce speed when the haze level is reached and the rough air is beginning to be felt. Also, reduction in speed is imperative at this stage because loads caused by gusts increase with a decreasing gross weight. If a severe bump (30 ft/sec gust) is hit when flying the Bonanza, one of those which at normal cruising speed would give a G load factor of 3.5, a margin of protection of 0.3 will be left due to the limit factor of 3.8. If the same bump is hit at 30 mph over-cruising, a G load factor of not 3.5 but more nearly 4.0 will be reached. At 4 G's there is a real danger of wrinkling the wings and causing permanent structural damage.

Leaving the question of bumps, another problem is the G load factors the pilot can produce on the airplane by moving the elevators. If the stick is suddenly pulled all the way back when flying at 124 mph IAS in the Bonanza which stalls at 64.5 mph (flaps and gear up), a G load factor of 3.8 will be reached which will be on the verge of giving a permanent deformation of the wing. If the stick is suddenly pulled all the way back when flying at 153 mph IAS, a G load factor of 5.7 will be reached which means that in the process of pulling the stick back the wing-failure load factor will have been reached. At 200 mph IAS a sudden elevator pull back will create a G load factor of 7, and a wing failure will be certain.

CAUTION — At excessive speed it is possible for the pilot to pull the wings off by using the elevators. Use elevators with caution at high speeds.



Turns – It is common knowledge that the load on an airplane increases as the angle of bank is increased in a turn. The stalling speed also increases with the angle of bank. A 60° bank with just enough elevator applied to maintain altitude will automatically load the wings to 2 G's. If the angle of bank is increased to 75° in a properly executed turn with no more elevator applied than

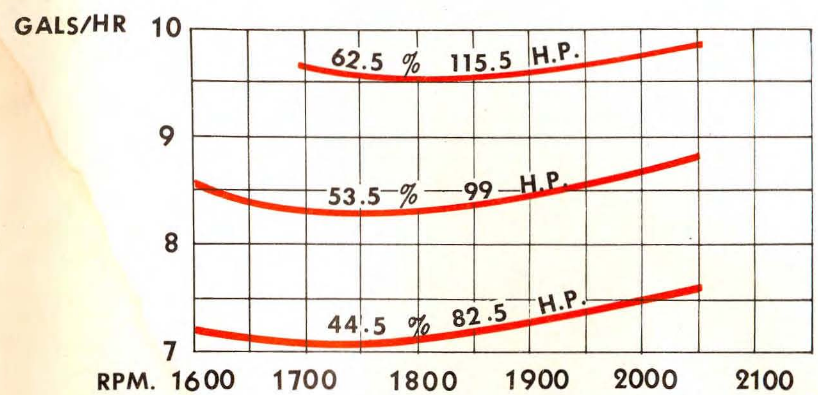


is necessary to maintain altitude, the limit load factor of 3.8 will be exceeded at any given airspeed. When the air is exceedingly rough or turbulent, consideration should be given to the gust loads that will be applied and the turns made accordingly.

Fuel Range

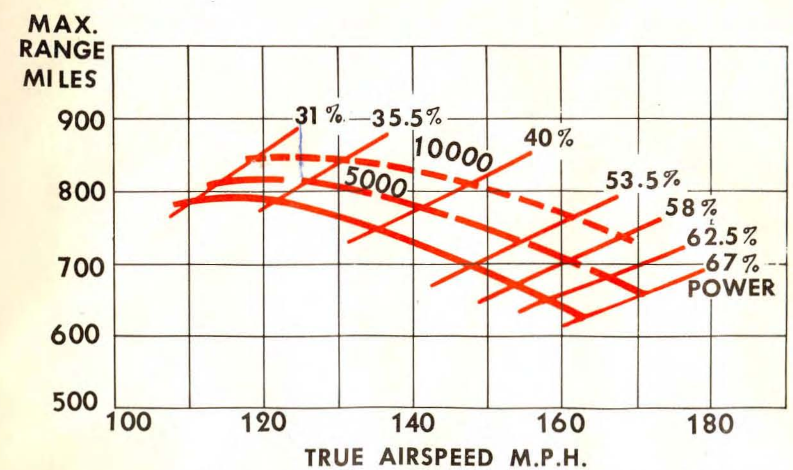
The recommended cruising horsepower is 115.5 horsepower and the fuel consumption at this setting is approximately 9.5 gallons per hour at 2050 rpm. Greater economy can be obtained by cruising at lesser power settings, 99 or 82.5 horsepower for example, and at rpm's in the 1800 to 1900 range. If the aircraft is flown at altitudes above 5000 feet, the mixture control can be used to obtain greater fuel economy. The standard practice is to stabilize the manifold pressure and rpm in perfectly level flight, then draw out the mixture control until there is a slight dropping off of rpm which indicates a too-lean mixture. The control should then be returned to the point where the loss in rpm is regained. In order to secure consistent fuel consumption the horsepower chart should be used. The manifold pressure required to obtain a given horsepower at a given rpm will vary with the temperature as can be noted on the horsepower chart. For example, at 8000 feet a temperature of 10° F. will require 20.5 inches of manifold pressure to secure 115.5 horsepower. At the same altitude, a temperature of 70° F. will require 21.4 inches of manifold pressure to secure the same power output.

FUEL CONSUMPTION



Fuel consumption in gallons per hour at various RPM's and power, mixture control set for best power.

RANGE CHART



Maximum range with changes in power and altitude

BEECH AIRCRAFT CORPORATION

CRUISING HORSEPOWER SETTINGS FOR CONTINENTAL E185-1 ENGINE

Sea Level							2000 Feet		
MP at 2050 RPM	MP at 1950 RPM	MP at 1850 RPM	°F OAT	% Power	HP	°F OAT	MP at 2050 RPM	MP at 1950 RPM	MP at 1850 RPM
22.2	23.1	23.9	30	62.5	115.5	20	21.7	22.6	23.4
20.3	21.0	21.7		53.5	99.0		19.7	20.5	21.2
18.5	19.0	19.6		44.5	82.5		17.8	18.5	19.1
22.3	23.2	24.0	40	62.5	115.5	30	21.8	22.7	23.6
20.4	21.1	21.8		53.5	99.0		19.8	20.6	21.3
18.6	19.1	19.7		44.5	82.5		17.9	18.6	19.2
22.5	23.4	24.2	50	62.5	115.5	40	21.9	22.8	23.7
20.5	21.2	21.0		53.5	99.0		19.9	20.7	21.4
18.7	19.2	19.8		44.5	82.5		18.0	18.7	19.3
22.6	23.5	24.3	60	62.5	115.5	50	22.0	23.0	23.9
20.7	21.4	22.1		53.5	99.0		20.0	20.8	21.5
18.7	19.3	19.9		44.5	82.5		18.1	18.8	19.4
22.7	23.6	24.5	70	62.5	115.5	60	22.2	23.1	24.0
20.8	21.5	22.2		53.5	99.0		20.2	20.9	21.7
18.8	19.4	20.0		44.5	82.5		18.2	18.9	19.5
22.8	23.8	24.6	80	62.5	115.5	70	22.3	23.2	24.2
20.9	21.6	22.4		53.5	99.0		20.3	21.0	21.8
18.9	19.5	20.1		44.5	82.5		18.3	19.0	19.6
23.0	23.9	24.7	90	62.5	115.5	80	22.4	23.4	24.3
21.5	21.7	22.5		53.5	99.0		20.4	21.1	21.9
19.0	19.6	20.2		44.5	82.5		18.4	19.0	19.7
23.1	24.1	24.9	100	62.5	115.5	90	22.6	23.5	24.5
21.2	21.9	22.6		53.5	99.0		20.5	21.2	22.0
19.1	19.7	20.3		44.5	82.5		18.5	19.2	19.8
1000 Feet							3000 Feet		
22.0	22.8	23.6	30	62.5	115.5	20	21.5	22.4	23.2
20.0	20.8	21.4		53.5	99.0		19.6	20.3	21.1
18.1	18.7	19.3		44.5	82.5		17.7	18.2	18.9
22.1	23.0	23.8	40	62.5	115.5	30	21.6	22.5	23.4
20.1	20.9	21.6		53.5	99.0		19.7	20.4	21.2
18.2	18.8	19.4		44.5	82.5		17.7	18.4	19.0
22.3	23.1	24.0	50	62.5	115.5	40	21.8	22.7	23.6
20.2	21.0	21.7		53.5	99.0		19.8	20.6	21.3
18.3	18.9	19.5		44.5	82.5		17.8	18.5	19.1
22.4	23.3	24.2	60	62.5	115.5	50	21.9	22.8	23.7
20.4	21.1	21.9		53.5	99.0		19.9	20.7	21.5
18.4	19.0	19.6		44.5	82.5		17.9	18.6	19.2
22.5	23.5	24.3	70	62.5	115.5	60	22.0	23.0	23.9
20.5	21.3	22.0		53.5	99.0		20.0	20.8	21.6
18.4	19.1	19.8		44.5	82.5		18.0	18.7	19.3
22.7	23.6	24.5	80	62.5	115.5	70	22.1	23.1	24.0
20.6	21.3	22.2		53.5	99.0		20.1	20.9	21.7
18.5	19.2	18.9		44.5	82.5		18.1	18.8	19.5
22.8	23.8	24.7	90	62.5	115.5	80	22.3	23.3	24.2
20.7	21.5	22.3		53.5	99.0		20.2	21.1	21.9
18.6	19.3	20.0		44.5	82.5		18.2	18.9	19.6
				62.5	115.5	90	22.4	23.4	24.4
				53.5	99.0		20.4	21.2	22.0
				44.5	82.5		18.3	19.0	19.7

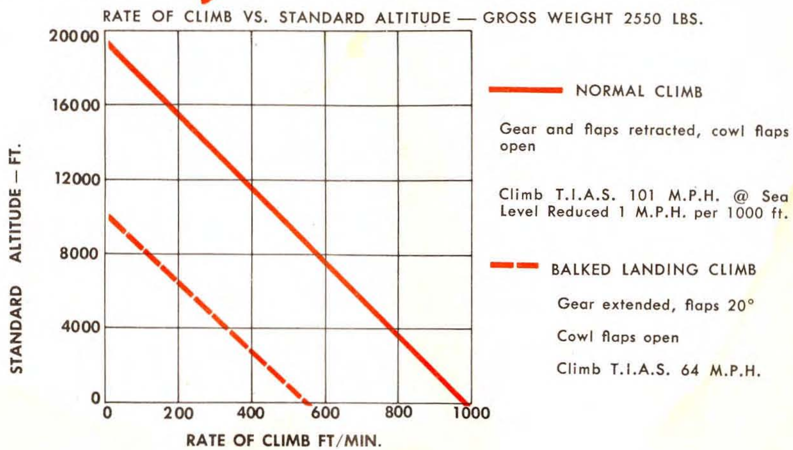
DO NOT EXCEED 2050 R.P.M. FOR CRUISING

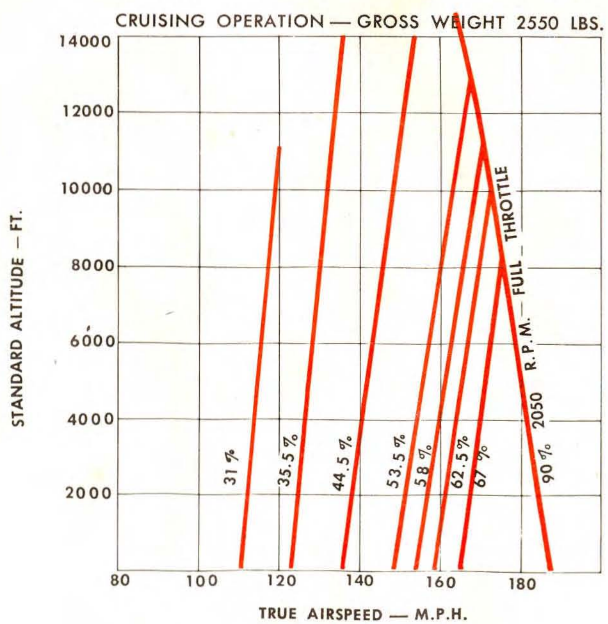
BEECH AIRCRAFT CORPORATION

CRUISING HORSEPOWER SETTINGS FOR CONTINENTAL E185-1 ENGINE

4000 Feet							8000 Feet		
MP at 2050 RPM	MP at 1950 RPM	MP at 1850 RPM	°F OAT	% Power	HP	°F OAT	MP at 2050 RPM	MP at 1950 RPM	MP at 1850 RPM
21.3	22.2	23.1	20	62.5	115.5	0	20.4	21.3	22.4
19.6	20.1	20.9		53.5	99.0		18.4	19.2	19.9
17.5	18.1	18.6		44.5	82.5		16.6	17.1	17.7
21.5	22.3	23.3	30	62.5	115.5	10	20.5	21.4	22.6
19.7	20.2	21.0		53.5	99.0		18.5	19.3	20.0
17.6	18.2	18.7		44.5	82.5		16.7	17.2	17.8
21.6	22.5	23.4	40	62.5	115.5	20	20.6	21.5	22.7
19.8	20.3	21.2		53.5	99.0		18.6	19.4	20.1
17.7	18.3	18.9		44.5	82.5		16.8	17.3	17.9
21.7	22.6	23.6	50	62.5	115.5	30	20.8	21.7	23.9
19.8	20.4	21.3		53.5	99.0		18.6	19.5	20.3
17.8	18.4	19.0		44.5	82.5		16.8	17.4	18.0
21.8	22.8	23.7	60	62.5	115.5	40	20.9	21.8	23.1
19.9	20.5	21.5		53.5	99.0		18.7	19.6	20.4
17.8	18.5	19.2		44.5	82.5		16.9	17.5	18.1
22.0	22.9	23.9	70	62.5	115.5	50	21.1	22.0	23.3
20.0	20.7	21.6		53.5	99.0		18.8	19.7	20.6
17.9	18.6	19.3		44.5	82.5		17.0	17.6	18.3
22.1	23.1	24.0	80	62.5	115.5	60	21.2	22.1	23.4
20.1	20.8	21.8		53.5	99.0		18.9	19.8	20.7
18.0	18.7	19.5		44.5	82.5		17.1	17.7	18.4
22.2	23.2	24.2	90	62.5	115.5	70	21.4	22.3	23.6
20.2	20.9	21.9		53.5	99.0		18.9	19.9	20.9
18.1	18.9	19.6		44.5	82.5		17.1	17.8	18.5
				62.5	115.5	80	21.5	22.4	23.8
				53.5	99.0		19.0	20.0	21.0
				44.5	82.5		17.2	17.9	18.6
6,000 Feet							10,000 Feet		
20.8	21.7	22.6	10	62.5	115.5	0	20.0	21.0	22.0
18.9	19.6	20.4		53.5	99.0		18.0	18.8	19.6
17.0	17.5	18.1		44.5	82.5		16.1	16.7	17.4
20.9	21.8	22.8	20	62.5	115.5	10	20.1	21.1	22.2
19.0	19.7	20.5		53.5	99.0		18.1	18.9	19.8
17.1	17.6	18.2		44.5	82.5		16.2	16.8	17.5
21.1	22.0	23.0	30	62.5	115.5	20	20.3	21.2	22.3
19.1	19.8	20.6		53.5	99.0		18.2	19.1	19.9
17.2	17.7	18.4		44.5	82.5		16.3	16.9	17.6
21.2	22.1	23.2	40	62.5	115.5	30	20.4	21.4	22.5
19.2	20.0	20.8		53.5	99.0		18.4	19.2	20.1
17.2	17.8	18.5		44.5	82.5		16.4	17.0	17.7
21.4	22.2	23.3	50	62.5	115.5	40	20.6	21.5	22.6
19.3	20.1	20.9		53.5	99.0		18.5	19.3	20.2
17.3	18.0	18.6		44.5	82.5		16.5	17.1	17.8
21.5	22.4	23.5	60	62.5	115.5	50	20.7	21.6	22.8
19.4	20.2	21.0		53.5	99.0		18.6	19.5	20.4
17.4	18.1	18.7		44.5	82.5		16.6	17.2	17.9
21.6	22.6	23.7	70	62.5	115.5				
19.5	20.3	21.1		53.5	99.0				
17.5	18.2	18.9		44.5	82.5				
21.8	22.7	23.9	80	62.5	115.5				
19.6	20.2	21.2		53.5	99.0				
17.6	18.3	19.0		44.5	82.5				

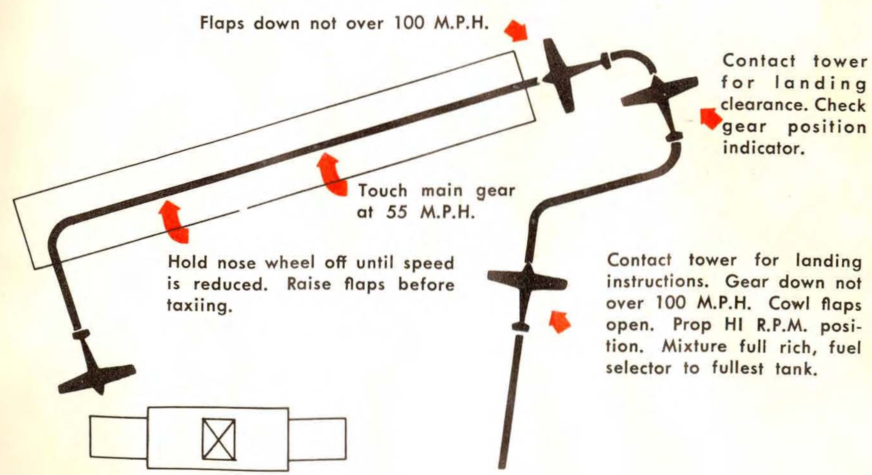
Landing





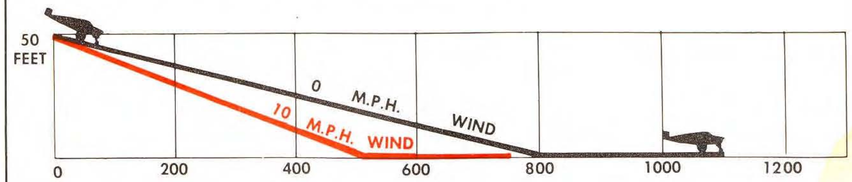
Landing

1. Check to see that mixture control is full rich.
2. Set fuel-tank selector valve to fullest tank.
3. Set propeller to "HI" rpm position.
4. Leave carburetor heat cold (unless icing conditions are indicated).
5. Lower landing gear at not over 100 mph. Check to see that, (1) the green landing-gear position light is "ON," (2) the mechanical landing gear position indicator points "DOWN," and (3) the landing-gear warning horn does not sound when the throttle is closed.
6. Open cowl flaps.
7. When on the approach leg, lower wing flaps at not over 100 mph.
8. After landing and before taxiing, raise wing flaps.

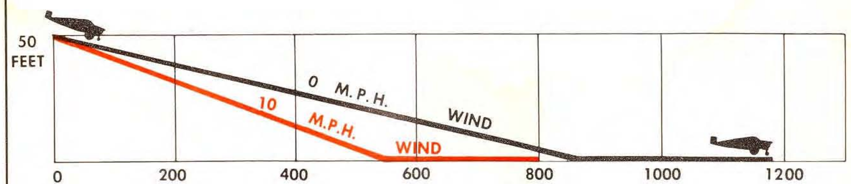


LANDING CHARTS

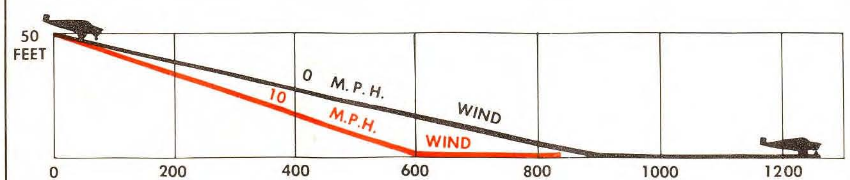
SEA LEVEL STANDARD TEMPERATURE 59° F



2500 FEET ALTITUDE — STANDARD TEMPERATURE 50° F



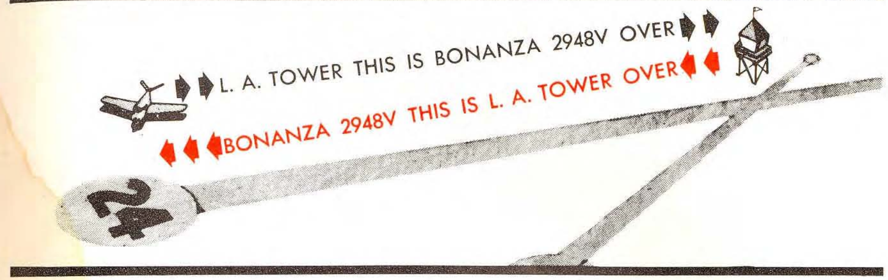
5000 FEET ALTITUDE — STANDARD TEMPERATURE 41° F

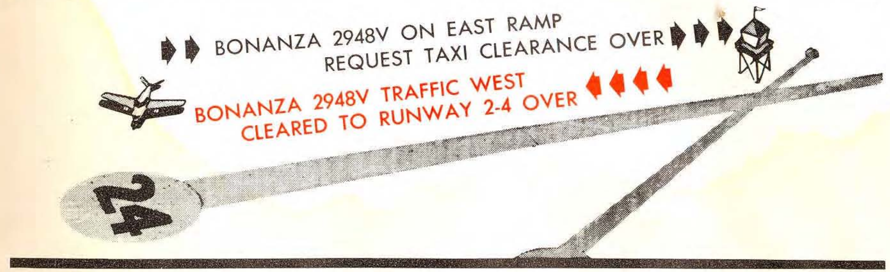


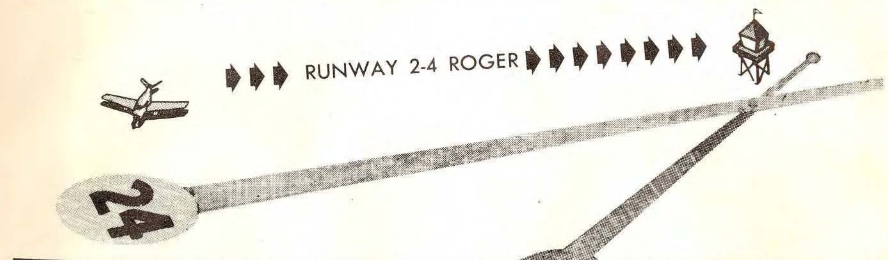
LANDING DISTANCE — FEET

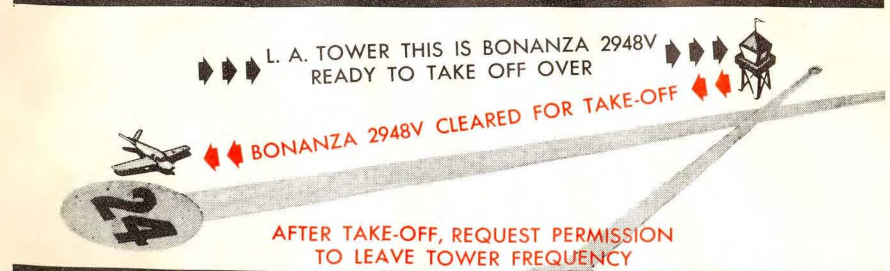
Landing distance over 50 feet with 20° wing flap, gross weight 2550 lbs. add 1½ % to above for each 10° F above standard temperature

RADIO PROCEDURE — TAKE-OFF

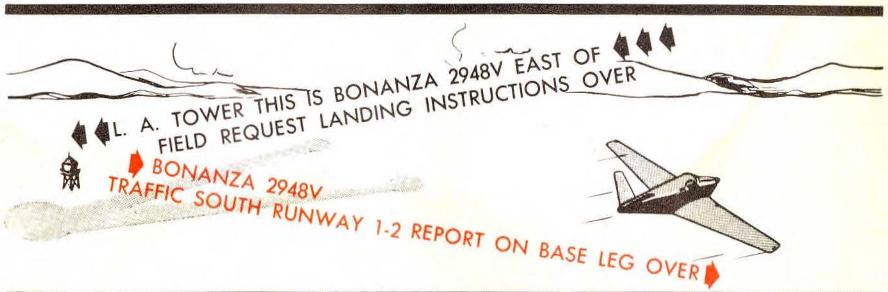


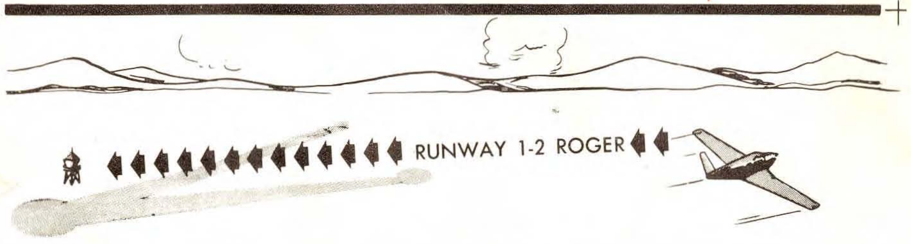




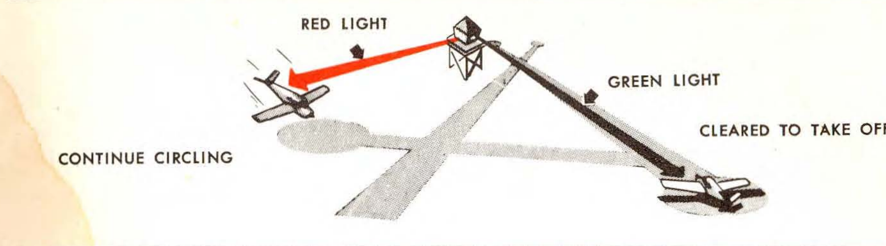


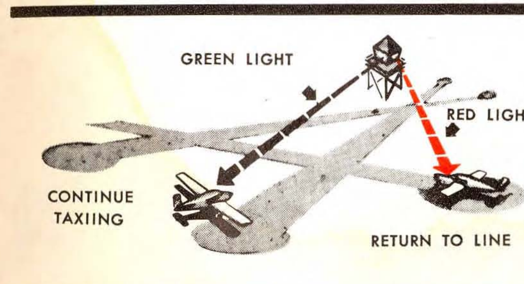
RADIO PROCEDURE — LANDING



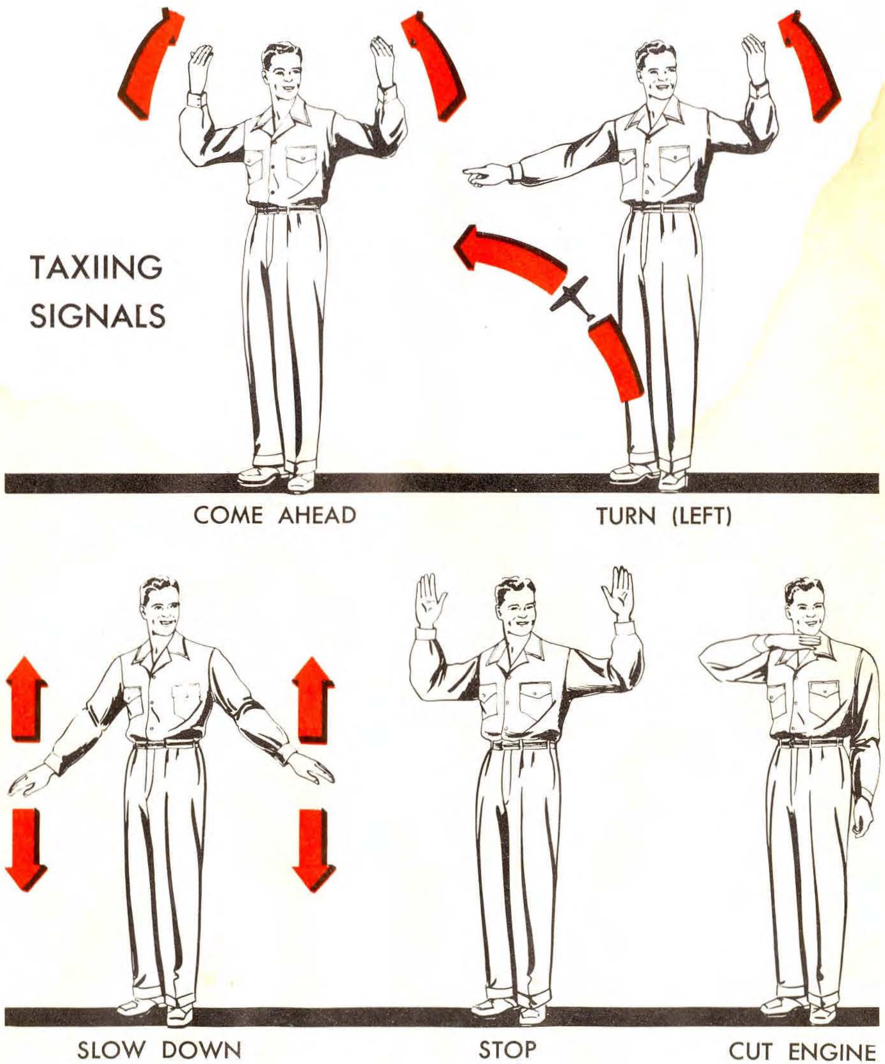


TOWER LIGHT SIGNALS





TAXIING SIGNALS



Stopping Engine

1 Set propeller in "HI" rpm position.

2 Move mixture control to idle cut off and as the engine dies move throttle control smoothly to open position.

3. After engine has stopped rotating, turn off fuel selector valve and all switches.

4. Set parking brake.

5. If airplane is to be left unattended, lock flight controls.

Mooring

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 used around 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.