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**PITOT HEAT**

The pitot mast is provided with an electric heating element which is turned on and off with a switch on the instrument panel. The switch should be ON when flying in visible moisture. It is not advisable to operate the pitot heating element on the ground except for testing or for short intervals of time to remove ice or snow.

**NORMAL STATIC AIR SYSTEM**

The normal static system provides a source of static air to the flight instruments through a flush static fitting on each side of the airplane fuselage. Aft of the rear closure bulkhead (rear seat panel) is a drain plug, located at the low point of the normal static system. It is provided in order to drain moisture accumulations from the system. The closure bulkhead is held in place with Velcro and may be removed by pulling forward. The drain plug should be removed and the moisture drained from the clear plastic line every 100 hours and after exposure to visible moisture, either in the air or on the ground.

**EMERGENCY STATIC AIR SYSTEM**

An emergency static air source may be installed to provide air for instrument operation should the static ports become blocked. Refer to the EMERGENCY PROCEDURES Section for procedures describing how and when to use this system.

**INSTRUMENT PRESSURE SYSTEM**

Instrument pressure is supplied by an engine driven pressure pump. Pressure is controlled by an adjustable pressure regulator on the forward side of the firewall.

A gage located in the upper right corner of the instrument

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panel indicates the system pressure in inches of mercury. The pressure should be maintained within the green arc for proper operation of the pressure operated instruments.

**STALL WARNING**

A stall warning horn on the forward side of the instrument panel sounds a warning signal (the battery switch must be ON for serials CE-748, CE-772 and after) as the airplane approaches a stall condition. The horn is triggered by a sensing vane on the leading edge of the left wing, and is effective at all attitudes. Irregular and intermittent at first, the warning signal will become steady as the airplane approaches a complete stall.

**ENGINE BREAK-IN INFORMATION**

Use a straight mineral oil, as recommended by the engine manufacturer, throughout the break-in period. Drain the initial oil at 20 to 30 hours. Replace with new mineral oil, which is to be used until oil consumption stabilizes (usually a total of 50 hours).

Drain and replace the engine oil as recommended in the HANDLING, SERVICING, and MAINTENANCE Section. If operating conditions are unusually dusty and dirty, more frequent oil changes may be necessary. Oil changes are more critical during the engine break-in period than at any other time.

Use full throttle at recommended rpm for every takeoff and maintain until at least 400 feet AGL. Then reduce as necessary for cruise climb or cruise. Maintain the highest power recommended for cruise operation during the break-in period, avoiding altitudes above 8000 feet. Interrupt cruise power every 30 minutes by smoothly advancing to take-off power settings for about 30 seconds, then returning to cruise

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**CABIN HEAT control.** The control regulates the amount of cold air that is mixed with the air from the heater muff. When the control is pulled fully out, the cold air is shut off and only heated air enters the cabin. The forward vents, located on the firewall forward of the rudder pedals, deliver heated air to the forward cabin when the CABIN HEAT control is pulled out. To deliver heated air to the aft seat outlets pull the AFT CABIN HEAT control. For maximum heat, the control is pulled fully out. To obtain heated air for defrosting the windshield pull the DEFROST control out. It may be necessary to vary or close the AFT CABIN HEAT control to obtain maximum air flow for defrosting. To close off all air from the heater system, pull the red FIREWALL AIR control located to the extreme left of the pilot's lower subpanel.

**CABIN VENTILATION**

In moderate temperatures, ventilation air can be obtained from the same outlets used for heating, by pushing the CABIN HEAT control full forward. However, in extremely high temperatures, it may be desirable to pull the red FIREWALL AIR control and use only the fresh air outlets described in the following paragraphs.

**CABIN FRESH AIR OUTLETS**

A duct in each wing root is connected directly to an adjustable outlet in the upholstery panel forward of each front seat. Airflow from each outlet is controlled by a center knob. The direction of airflow is controlled by rotating the lowered cover with the small knob on the rim.

**Optional Fresh Air Vent Blower**

An optional fresh air vent blower controlled by an ON-OFF switch on the subpanel is available on serials CE-941 and

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after. It provides ventilation through the individual overhead outlets during both ground and in-flight operations.

**Individual Overhead Fresh Air Outlets**

Fresh ram air from the air intake on the upper side of the aft fuselage is ducted to individual outlets above each seat, including the optional 5th seat. Each outlet can be positioned to direct the flow of air as desired. The volume of incoming air can be regulated by rotating the outlet. A system shutoff valve is installed in the duct between the overhead fresh air scoop and the individual fresh air outlets. The valve is operated by turning a knob on the overhead panel.

**EXHAUST VENT**

A fixed exhaust vent is located in the aft cabin.

**OXYGEN SYSTEM**

The oxygen cylinder is located beneath the cover under the front seats. The system is available with either 4 or 5 outlets and with a 49-cu-ft oxygen cylinder. Supply of oxygen to the system is controlled by a shut-off valve on the oxygen console. The pressure gage indicates the supply of oxygen available (1850 psig is nominal pressure for a full supply in the cylinder).

The system regulator is altitude-compensated to provide a varying flow of oxygen with altitude. Flow is varied automatically from 0.5 liters per minute at 5,000 feet to 2.8 liters per minute at 25,000 feet. The use of oxygen is recommended to be in accordance with current FAR operating rules.

**PITOT AND STATIC SYSTEMS**

**PITOT SYSTEM**

The pitot system provides a source of impact air for operation of the airspeed indicator. The pitot mast is located on the leading edge of the left wing.

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during ground maneuvering.

**NOTE**

Particularly at night, reflections from anti-collision lights on clouds, dense haze or dust can produce optical illusions and intense vertigo. Such lights, when installed, should be turned off before entering an overcast; their use may not be advisable under instrument or limited VFR conditions.

**ENVIRONMENTAL SYSTEMS**

**CABIN HEATING**

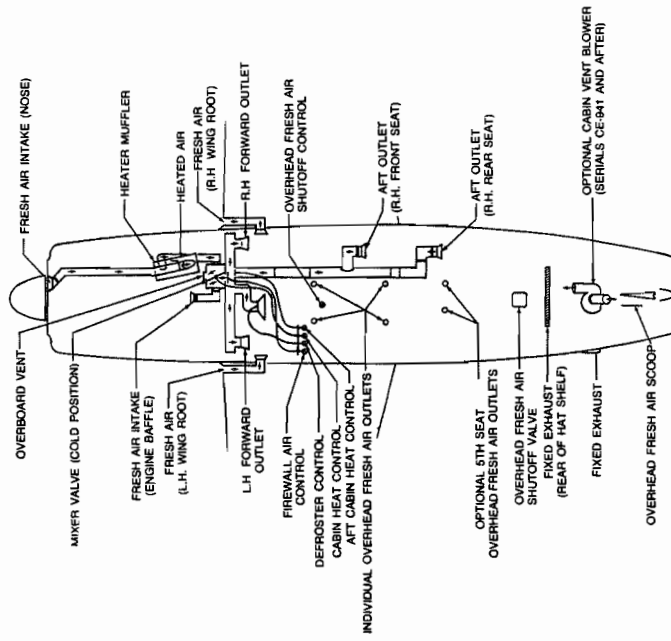
A heater muffler on the right exhaust stack provides for heated air to five outlets in the forward and aft areas of the cabin. The two forward outlets are located above and forward of each set of rudder pedals. The two aft outlets are installed behind the right front seat and the right rear seat. The fifth outlet provides heated air for windshield defrosting.

In flight, ram air enters an intake on the right side of the nose, passes through the heater muffler, then into a mixer valve on the forward side of the firewall. In the mixer valve, the heated air is combined with a controlled quantity of unheated ram air picked up at an intake at the rear engine baffle. Air of the desired temperature is then ducted from the mixer valve to the outlets in the cabin.

**HEATER AND DEFROSTER OPERATION**

The heater controls are located on the lower left pilot's subpanel. To obtain heated air to the cabin outlets, pull the

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**HEATING AND VENTILATING SYSTEM**

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**14-VOLT SYSTEM (CJ-129 THRU CJ-148, CE-674 THRU CE-771 EXCEPT CE-748)**

A 70-ampere, 12-volt, gear-driven alternator is standard equipment. The alternator is designed to maintain approximately 70-amperes output at 1700 rpm, to provide airplane electrical power.

A transistorized electronic voltage regulator adjusts alternator output to the required electrical load, including battery recharge. Charging or discharging of the battery is indicated by the ammeter. A zero reading, which is normal for cruising flight, indicates that the battery is fully charged and that alternator output has been adjusted by the voltage regulator to balance the load of the electrical equipment in use.

The alternator-out warning light can be tested with the warning test switch on the instrument panel adjacent to the light. If an alternator failure occurs the light will illuminate.

**EXTERNAL POWER RECEPTACLE**

The external power receptacle accepts a standard AN-type plug. Before connecting an external power unit, verify that a battery is installed. **The battery switch should be ON, and alternator and avionics equipment OFF.**

**NOTE**

A negative ground external power source is required.

If the external power unit does not have a standard AN type plug, check the polarity and connect the positive lead from the external power source to the positive battery terminal and the negative lead to the negative battery terminal.

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**LIGHTING SYSTEM**

**INTERIOR LIGHTING**

Lighting for the instrument panel is controlled by thumb-rotated, disc-type rheostats, located on the pilot's subpanel to the left of the control column. The first rheostat is labeled

RADIO and ENG and controls the lighting of the avionics panel and the multiple readout engine instrument. The second rheostat, labeled INST, is optional and controls the lighting for the flight instruments and the instrument pressure gage.

On the lower subpanel are two more lighting rheostats. The first, labeled SUB, controls the intensity of the complete subpanel lighting. The second rheostat is labeled FLOOD and controls the glareshield lighting, which illuminates the full upper panel.

The cabin dome light is operated by an ON-OFF switch adjacent to the light. The optional reading lights above the rear seats have individual switches at the lights. The optional map light has a press-type switch on the control wheel. The OAT, map, and compass lights are controlled by a push-on, push-off switch located adjacent to the OAT or on the control wheel.

**EXTERIOR LIGHTING**

The switches for all of the exterior lights are located on the pilot's left subpanel. Each switch is a circuit-breaker-type switch, which will open if it becomes overloaded or shorted.

The exterior lights consist of navigation lights on the wing tips and tail cone, a landing light in the fuselage nose section, and a taxi light attached to the nose strut. The landing light can be used for approach and taxiing. For longer battery and lamp life, use the landing light and the taxi light sparingly; avoid prolonged operation which could cause overheating

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**AUXILIARY FUEL PUMP**

The electric auxiliary fuel pump is controlled by an ON-OFF toggle switch on the control console and provides pressure for starting and emergency operation. Immediately after starting, the auxiliary fuel pump can be used to purge the system of vapor caused by an extremely high ambient temperature or a start with the engine hot. The auxiliary fuel pump provides for near maximum engine fuel requirements, should the engine driven pump fail.

**FUEL TANK SELECTION**

The fuel selector valve handle is located forward and to the left of the pilot's seat. Takeoffs and landings should be made using the tank that is more nearly full.

On airplanes CE-1014 and after, the pilot is cautioned to observe that the short, pointed end of the handle aligns with the fuel tank position being selected. The tank positions are located on the aft side of the valve. The OFF position is forward and to the left. An OFF position lock-out feature has been added to prevent inadvertent selection of the OFF position. To select OFF, depress the lock-out stop and rotate the handle to the full clockwise position. Depression of the lock-out stop is not required when moving the handle counterclockwise from OFF to LEFT MAIN or RIGHT MAIN. When selecting the LEFT MAIN or RIGHT MAIN fuel tank, position handle by sight and by feeling for detent.

If the engine stops because of insufficient fuel, refer to the EMERGENCY PROCEDURES Section for the Air Start procedures.

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**ELECTRICAL SYSTEM**

The system circuitry is the single-wire, ground-return type, with the airplane structure used as the ground return. The battery ON-OFF switch, the alternator ON-OFF switch and the magneto/start switch are located on the left subpanel. The circuit breaker panel is located on the right subpanel and contains circuit breakers for the various electrical systems. Some switch-type circuit breakers are located on the left subpanel.

**BATTERY**

**28-VOLT SYSTEM (CE-748, CE-772 AND AFTER, CJ-149 AND AFTER)**

A 15.5 ampere-hour, 24-volt battery is located on the right forward side of the firewall. Battery servicing procedures are described in the HANDLING, SERVICING, and MAINTENANCE Section.

**14-VOLT SYSTEM (CJ-129 THRU CJ-148, CE-674 THRU CE-771 EXCEPT CE-748)**

A 35-ampere-hour, 12-volt battery is located on the right forward side of the firewall. Battery servicing procedures are described in the HANDLING, SERVICING and MAINTENANCE Section.

**ALTERNATOR**

**28-VOLT SYSTEM (CE-748, CE-772 AND AFTER, CJ-149 AND AFTER)**

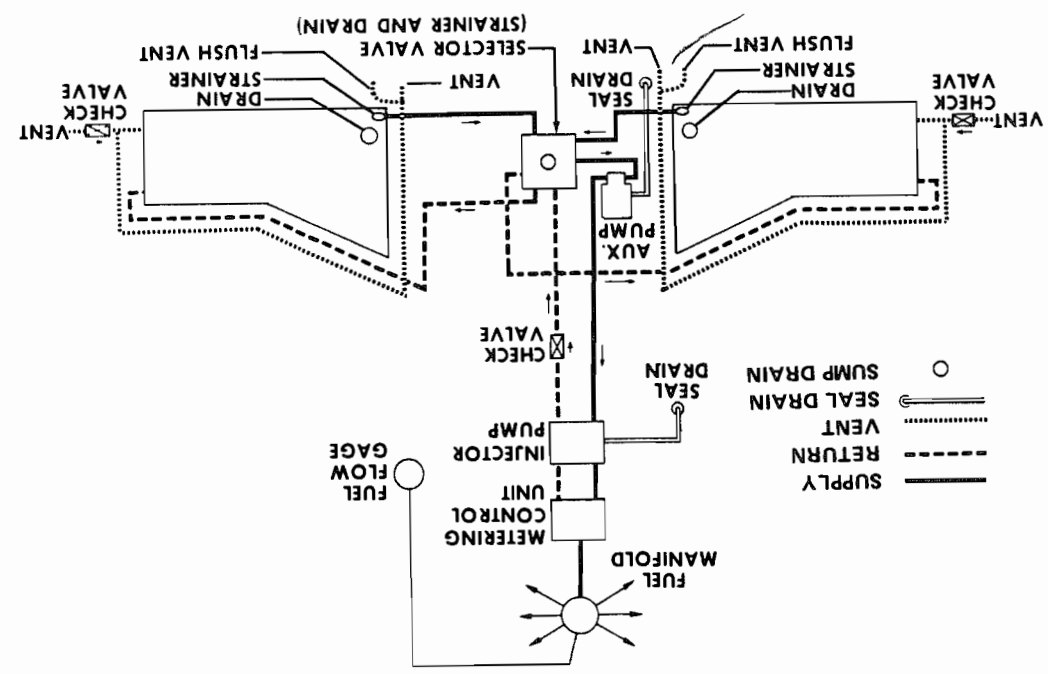
The airplane is equipped with a 50-, 60-, or 100-ampere, gear-driven alternator. The alternators are designed to maintain approximately 50-, 60-, or 100-amperes output respectively at 1700 rpm to provide airplane electrical power.

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**FUEL SYSTEM SCHEMATIC**

**FUEL REQUIRED FOR FLIGHT**

It is the pilot's responsibility to ascertain that the fuel quantity indicators are functioning and maintaining a reasonable degree of accuracy, and to be certain of ample fuel for a flight. Takeoff is prohibited if the fuel quantity indicators do not indicate above the yellow arc. An inaccurate indicator could give an erroneous indication of fuel quantity. A minimum of 13 gallons of fuel is required in each tank before takeoff. The caps should be removed and fuel quantity checked to give the pilot an indication of fuel on board. The airplane must be approximately level for visual inspection of the tank. If it is not certain that at least 13 gallons are in each tank, fuel shall be added so that the amount of fuel will be not less than 13 gallons per tank at takeoff. Plan for an ample margin of fuel for any flight.

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**COWL FLAPS**

The push-to-close, pull-to-open cowl flap control is located above and to the left of the control console on the subpanel. Except in extremely low temperatures, the cowl flaps should be open during ground operation, takeoff, and as required during flight.

**INDUCTION SYSTEM ICING**

The possibility of induction system icing is reduced by the non-icing characteristics of the Bonanza's fuel injected engine and automatic alternate air source. Under certain conditions, however, impact ice can form at several points in the induction system. If the air intake or filter becomes clogged with ice, a spring-loaded door in the air intake duct will open automatically and the induction system will operate on alternate air. If the alternate air source door becomes frozen in the closed position, a pull-and-release T-handle is provided to force the door open.

**LUBRICATION SYSTEM**

The engine oil system is the full-pressure, wet sump type and has a 12-quart capacity. Oil operating temperatures are controlled by an automatic thermostat bypass control. The bypass control will limit oil flow through the oil cooler when operating temperatures are below normal and will permit the oil to bypass the cooler if it should become blocked.

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control console allows the pilot to select the governor's rpm range.

If oil pressure is lost, the propeller will go to the full high rpm position. This is because propeller low rpm is obtained by governor boosted engine oil pressure working against the centrifugal twisting moment of the blades.

**FUEL SYSTEM**

The airplane is designed for operation on 100/130 grade (green) aviation gasoline. However, the use of 100LL (blue) is preferred.

**FUEL CELLS**

On CE-674 thru CE-883, and CJ-129 thru CJ-155 either the 44-gallon usable (50-gallon capacity) or 74-gallon usable (80-gallon capacity) fuel system is available. The 74-gallon usable (80-gallon capacity) system only is available on CE-884 and after, and CJ-156 and after. The fuel system consists of a rubber fuel cell in each wing leading edge with a flush type filler cap. A visual measuring tab is attached to the filler neck of the optional system. The bottom of the tab indicates 27 gallons of usable fuel and the detent on the tab indicates 32 gallons of usable fuel in the tank. The engine driven fuel injector pump delivers approximately 10 gallons of excess fuel per hour, which bypasses the fuel control and returns to the tank being used. Three fuel drains are provided, one in each fuel sump on the underside of each wing and one in the fuel selector valve inboard of the left wing root. These points should be drained daily before the first flight.

**FUEL QUANTITY INDICATION SYSTEM**

Fuel quantity is measured by float operated sensors, located in each wing tank system. These transmit electrical signals to the individual indicators, which indicate fuel remaining in the tank. There are sensors in each wing tank system connected to the individual wing tank indicator.

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**ENGINE CONTROLS**

**THROTTLE, PROPELLER, AND MIXTURE**

The push-pull throttle, propeller, and mixture controls are located on the control console below the center of the upper subpanel. These controls are released for repositioning by pushing a button on the knob. With the button extended, fine adjustments are accomplished by rotating the knob, clockwise to increase and counterclockwise to decrease.

**COWLING**

The Bonanza F33A is equipped with Hartwell latch mechanisms on the right and left upper engine cowling for quick and easy access to the engine compartments without the aid of tools. Each cowl latch is locked and released by a single recessed handle located in the lower cowling panel on each side of the engine. To close the cowling requires only to lower the cowling to the closed position with the handle in the pre-latch position. The handle has three positions: flush with the fuselage - latched; held fully forward - unlatched (open cowling); approximately 90° to the fuselage - pre-latch (ready to close cowl). An audible click denotes the bayonet fittings, located forward and aft on the upper cowl, sliding into the latch safety catch. The cowl is locked by moving the latch handle to the full recessed position. The security of the forward latches can be checked by pulling out on the check tab attached to the lower forward edge of the upper cowling. If the cowling can be moved after latching, open the cowling, check the latch alignment and re-latch.

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**STARTER**

The starter is relay controlled and is actuated by a rotary type, momentary-on switch incorporated in the magneto/start switch. To energize the starter circuit, rotate the magneto/start switch beyond the BOTH position to START. After starting, release the switch to the BOTH position.

The warning light placarded STARTER ENERGIZED (CE-919, CE-923, CE-925, CE-927, CE-929 and after; CJ-156 and after) will illuminate whenever electrical power is being supplied to the starter. If the light remains illuminated after starting, the starter relay has remained engaged and loss of electrical power may result. The battery and alternator switches should be turned off if the light remains illuminated after starting. If the light does not illuminate during starting, the indicator system is inoperative and the ammeter should be monitored to ensure that the starter does not remain energized after starting. The starter energized warning light can be tested with the TEST-BRT-DIM-WARN LIGHTS switch adjacent to the warning lights on the floating instrument panel.

**PROPELLER**

Installed as standard equipment on the Bonanza is a constant speed, variable pitch, 84"-diameter propeller with two aluminum alloy blades. The pitch setting at the 30-inch station is 13.3° low and 29.2° high pitch.

An optional McCauley 80"-diameter, three-blade propeller is also available. The pitch setting at the 30-inch station is 13.3° ± .2° low and 29.0° ± .5° high pitch.

Propeller rpm is controlled by a governor which regulates hydraulic oil pressure to the hub. A push-pull knob on the

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**EMERGENCY EXITS**

To open the emergency exit provided by the openable window on each side of the cabin:

Prior to CE-929, Except CE-919, CE-923, CE-925, and CE-927; Prior to C-J-156:

1. Lift the latch.
2. Pull out the emergency release pin and push the window out.

The above procedure is described on a placard installed below the left and right openable windows.

Serials CE-919, CE-923, CE-925, CE-927, CE-929 and after; C-J-156 and after:

1. Remove cover as indicated by placard in the center of the Ventilation/Emergency Exit latch.
2. Rotate handle up as indicated by placard, breaking safety wire, and push window out.

**NOTE**

Anytime the window has been opened by breaking the safety wire on the red emergency latch, the window must be reattached and wired by a qualified mechanic using QQ-W-343, Type S, .020 diameter copper wire prior to further airplane operation.

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**CONTROL LOCKS**

To Install The Control Locks:

1. Rotate control wheel and move column so the hole in the bracket and the column align to accept pin.
2. Push the control column lock pin through the hole provided in the control column hanger and into the hole in the control column tube assembly.
3. Ensure positive retention of the lock pin by positioning the attached red plate on top of the throttle and propeller controls.

**WARNING**

Before starting engine, remove the lock by reversing the above procedure.

**POWER PLANT**

The BEECHCRAFT F33A Bonanza is powered by a Continental IO-520-BA or IO-520-BB six-cylinder, horizontally opposed, fuel-injected engine rated at 285 horsepower.

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**NOTE**

When checking the door latch handle, do not move it far enough to engage the door latch release mechanism.

Press firmly outward at the top rear corner of the door. If any movement of the door is detected, completely open the door and close again following the above instructions.

To open the door from the inside, depress the lock button and rotate the handle clockwise.

**OPENABLE CABIN WINDOWS**

**NOTE**

Windows are to be closed before and during flight.

Prior to CE-929 except CE-919, CE-923, CE-925 and CE-927; Prior to CJ-156:

*To Open Window For Ventilation (Only On Ground):*

Release latch front of bar, pull bar at the bottom of the window out and upward. Window will open approximately two inches.

*To Close Window:*

Pull inward and down on the bar at the bottom of the window. Resistance will be felt as the bar moves downward. Continue moving bar downward to its lowest position. Check that bar is locked by the latch.

**NOTE**

While closing window, ascertain that the emergency release pin (which allows the window to open fully for emergency exit) is securely in place.

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Serials CE-919, CE-923, CE-925, CE-927, CE-929 thru CE-983:

A plastic-covered multipurpose latch on each openable window is used to provide partial opening of the window for ventilation during ground operations, and also quick unlatching for emergency egress.

*To Open Window For Ventilation (Only On Ground):*

**NOTE**

Red handle for emergency exit only.

1. Lift thumb catch (window will release).
2. Push up and outward until mechanism clicks into detent.

*To Close Window:*

— Pull inward and down until locked. (Listen for detent.)

Serials CE-984 and after; CJ-156 and after:

*To Open Window For Ventilation (Only On Ground):*

**NOTE**

Red handle for emergency exit only.

1. Rotate lock handle to UNLOCKED position.
2. Lift thumb catch (window will release).
3. Push latch up and outward to over-center position.

*To Close Window:*

1. Pull latch inward and push down until locked (listen for detent).
2. Rotate lock handle to LOCKED position.

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the third and fourth passenger seats, the inertia reel is attached into the seat back structure and is covered with the seat back upholstery. The strap runs up the seat back and over the outboard corner of the seat back. For the 5th passenger seat, the strap is contained in an inertia reel attached to the upper fuselage side structure, just aft of the seat back and is covered with an escutcheon.

**NOTE**

The seat belt is independent of the shoulder harness, but the outboard seat belt and the shoulder harness must be connected for stowage when the seat is not occupied.

**DOOR, WINDOWS AND EXITS**

**CABIN DOOR**

The outside cabin door handle is spring loaded to fit into a recess in the door to create a flat aerodynamically clean surface. To open the door from the outside, lift the handle from its recess and pull until the door opens.

To close the cabin door from the inside, observe that the door handle is in the open position. In this position, the latch handle is free to move approximately one inch in either direction before engagement of the locking mechanism. Then grasp the door and firmly pull the door closed. Rotate the door handle fully counterclockwise into the locked position. Observe that the door handle indicator is in the CLOSED position (serials CE-1301, CE-1307 and after; CJ-180 and after). When the door is properly locked, the door latch handle is free to move approximately one inch in either direction.

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**SEATS, SEAT BELTS, AND SHOULDER HARNESSSES**

**SEAT ADJUSTMENTS**

To adjust any of the four standard seats forward or aft, pull up on the release bar below the seat and slide the seat to the desired position. The seat backs of all standard seats can be placed in any of four positions by operating a release lever on the inboard side of each seat. An option is available that provides for the seat backs on the copilot, 3rd and 4th place seats to be placed in any position from vertical to fully reclined. Outboard armrests for all standard seats are built into the cabin sidewalls. Center armrests can be elevated or positioned flush with the seat cushions. The 3rd- and 4th-place chairs are equipped with a locking back to accommodate the shoulder harness, and the seat back can be folded over for access by rotating the red handle located on the lower inboard side of the seat back. The optional 5th seat can be folded up to provide additional floor space.

**SHOULDER HARNESS INSTALLATION**

The shoulder harness is a standard installation for all seats and should be used with the seats in the upright position. The spring loading at the inertia reel keeps the harness snug but will allow normal movement during flight operations. The inertia reel is designed with a locking device that will secure the harness in the event of sudden forward movement or an impact action.

The strap is worn over the shoulder and down across the body, where it is fastened by a metal loop into the seat belt buckle. For the pilot seats, the harness strap is contained in an inertia reel attached to the side canopy structure of the cockpit. The inertia reel is covered with an escutcheon and the strap runs up from the reel location to a looped fitting attached to the window frame just aft of the pilot seats. For

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**NOTE**

The switch which activates the warning horn/GEAR UP annunciator is operated by the throttle; thus the horn and GEAR UP annunciator will always activate at the same throttle position. The resultant manifold absolute pressure is dependent on altitude and rpm.

**MANUAL EXTENSION**

The landing gear can be manually extended by operating a handcrank at the rear of the front seats. This procedure is described in the EMERGENCY PROCEDURES Section.

**WARNING HORN (SERIALS CE-674 THRU CE-1306, EXCEPT CE-1301; CJ-129 THRU CJ-179)**

With the landing gear retracted, if the throttle is retarded below approximately 12 in. Hg manifold pressure, a warning horn will sound intermittently.

**NOTE**

The switch which activates the warning horn is operated by the throttle; thus the horn will always sound at the same throttle position. The resultant manifold absolute pressure is dependent on the altitude and rpm.

**WARNING**

**WARNING HORN AND GEAR UP ANNUNCIATOR (SERIALS CE-1301, CE-1307 AND AFTER; CJ-180 AND AFTER)**

With the landing gear retracted, a warning horn will sound intermittently and the gear up annunciator will flash if the throttle is retarded below approximately 12 in. Hg manifold pressure or if the flaps are fully extended.

Unless authorized by applicable Department of Transportation regulations, do not carry hazardous material anywhere in the airplane.

Do not carry children in the baggage compartment unless secured in a seat.

**BAGGAGE COMPARTMENT**

The baggage compartment is accessible through the baggage door on the right side of the fuselage. This area extends aft of the pilot and copilot seats to the rear bulkhead. Because of structural limitations, this area is divided into two sections, each having a different weight limitation. Loading within the baggage compartment must be in accordance with the data in the WEIGHT AND BALANCE Section. All baggage must be secured with a Beech approved cargo net.

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**POSITION INDICATORS**

The landing gear position indicator lights are located adjacent to the landing gear switch handle. Three green lights, one for each gear, are illuminated whenever the landing gears are down and locked. The red light illuminates any time one or all of the landing gears are in transit or in any intermediate position. All of the lights will be out when the gear is up.

Testing of the landing gear position indicator lamps, as well as selection of either bright or dim illumination intensity, is accomplished with the warning light control switch located on the pilot's floating instrument panel.

**SAFETY SWITCHES**

Inadvertent retraction of the landing gear on the ground is prevented by compressing the two main strut safety switches (or by retarding the throttle below approximately 17 in. Hg manifold pressure - CE-1301, CE-1307 and after, and CJ-180 and after).

**WARNING**

Never rely on the safety switches to keep the gear down during taxi or on takeoff, landing roll, or in a static position. Always make certain that the landing gear switch is in the down position during these operations.

**NOTE**

On serials CE-1301, CE-1307 and after, and CJ-180 and after, the throttle switch which deactivates the landing gear control circuit will always activate at the same throttle position. The resultant manifold absolute pressure is dependent upon altitude and rpm.

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**BEECHCRAFT Bonanza F33A  
CE-674 and after**

**Section VII  
Systems Description**

**CIRCUIT BREAKER**

The landing gear circuit breaker is located on the right sub-panel. This circuit breaker is a pull-and-reset type breaker. The breaker will pop out under overload conditions.

**BRAKES**

The brakes on the main landing gear wheels are operated by applying toe pressure to the top of the rudder pedals. The parking brake T-handle control is located just left of the elevator tab wheel on the pilot's subpanel. To set the parking brakes, pull the control out and depress each toe pedal until firm. Push the control in to release the brakes.

**NOTE**

The parking brake should be left off and wheel chocks installed if the airplane is to be left unattended. Changes in ambient temperature can cause the brakes to release or to exert excessive pressures.

On serials CE-674 thru CE-838, and CJ-129 thru CJ-149 with shuttle valves installed only the pilot's brake pedals can be used in conjunction with the parking brake system to set the parking brake.

**CAUTION**

On serials CE-674 thru CE-838, and CJ-129 thru CJ-149 with shuttle valves installed, continuous brake application of either the pilot's or copilot's brake pedals, in conjunction with an overriding pumping action from the opposite brake pedals could result in the loss of braking action on the side which continuous pressure is being applied.

November, 1988

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**Section VII**  
**Systems Description**

**BEECHCRAFT Bonanza F33A**  
**CE-674 and after**

**Section VII**  
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If the switch is in the bright (BRT) position, the warning light(s) and the landing gear position indicator lights will light at high intensity whenever they illuminate. This position should be selected during the daytime and at other times when high ambient light levels are present in the cabin.

Limit switches automatically turn off the electric motor when the flaps reach the extremes of travel. Intermediate flap positions can be obtained by placing the switch in the OFF position as the flaps reach the desired position during flap extension or retraction.

The DIM position allows the lamps to illuminate to a lower intensity. This position is generally reserved for night operations. The GEAR UP and STARTER ENERGIZED annunciators (if installed), are the only annunciators that do not dim.

On airplanes CE-816 and after and CJ-150 and after, the wing flaps have three positions; UP (0°), APPROACH (15°), and DOWN (30°), with no intermediate positions. A flap position indicator and a control switch are located on the subpanel, above the power quadrant. The switch must be pulled out of a detent to change the flap position.

**GROUND CONTROL**

Steering is accomplished by use of the rudder pedals through a linkage arrangement which connects the nose gear to the rudder pedal shaft. Nose wheel straightening is accomplished by engagement of a roller with a track as the nose wheel is retracted. The steering link attaches to the steering mechanism on the nose gear with a swivel connection which permits the mechanism to disengage when the nose gear is retracted and operation of the rudder pedals will have no tendency to turn the nose wheel with the gear retracted.

The minimum wing tip turning radius, using full steering, one brake and partial power, is 26 feet 4 inches.

**WING FLAPS**

On airplanes prior to CE-816 and CJ-150 the wing flaps are controlled by a three-position switch, UP, OFF and DOWN, located in the subpanel, above the power quadrant. The switch must be pulled out of detent before it can be repositioned. A dial type indicator has markings for UP, 10°, 20° and DN. The indicator is located to the left of the control column.

**LANDING GEAR**

The landing gear is operated through adjustable linkage connected to an actuator assembly mounted beneath the front seats. The actuator assembly is driven by an electric motor. The landing gear may be electrically retracted and extended, and may be lowered manually.

**CONTROL SWITCH**

The landing gear is controlled by a two-position switch on the right side of the subpanel. The switch handle must be pulled out of the safety detent before it can be moved to the opposite position.

**NOTE**

On S/N CE-1301, CE-1307 and after, and CJ-180 and after, the landing gear will not retract unless the throttle is in a position corresponding to approximately 17 in. Hg manifold pressure or above.

**Section VII**                      **BEECHCRAFT Bonanza F33A**  
**Systems Description**                      **CE-674 and after**

electrical signal which is then interpreted by the fuel flow indicator. The green arc indicates the normal operating range while the red radial indicates the maximum allowable fuel flow.

Fuel flow values at the higher end of the green arc are labeled "TAKE-OFF AND CLIMB" and indicate the approximate fuel flow required for takeoff and climb at sea level, 3000, 5000 and 7000 feet. The pilot should use these markings as a guide only and refer to the tables in the PERFORMANCE section for the exact fuel flow requirements.

**AVIONICS PANEL**

Tuning and selecting equipment for the radios, adjacent to the engine instrument grouping, is mounted in block form with switching on the left edge of the block and radio heads and tuning on the right.

**SWITCHES**

The magneto/start switch and switches for the battery, alternator, pitot heat, propeller deicer, and lights are located on the left end of the subpanel. Flap and tab position indicators, the cowl flap control, and the flap switch are near the center of the subpanel. On the right end of the subpanel are the circuit breakers, as well as the landing gear switch and landing gear position indicator lights. Attached to the lower center section of the subpanel are the powerplant controls and auxiliary fuel pump switch.

**ANNUNCIATOR SYSTEM**

**WARNING LIGHTS** (CE-674 thru CE-928 except CE-919, CE-923, CE-925 and CE-927; CJ-129 thru CJ-155)

A warning light placarded ALT OUT is located on the pilot's floating instrument panel below the flight instruments.

**BEECHCRAFT Bonanza F33A**  
**CE-674 and after**

**Section VII**  
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The warning light for the alternator will illuminate when the output from the alternator is nearly zero or when an alternator overvoltage occurs.

**WARNING LIGHTS** (CE-919, CE-923, CE-925, CE-927, CE-929 and after; CJ-156 and after)

Two warning lights, placarded ALT and STARTER ENERGIZED, are located on the pilot's floating instrument panel below the flight instruments.

The warning light for the alternator will illuminate when the output from the alternator is nearly zero or when an alternator overvoltage occurs.

The starter energized warning light will remain illuminated after starting if the starter relay remains engaged after starting.

On serials CE-1301, CE-1307 and after, and CJ-180 and after, a red GEAR UP annunciator is installed in the glare shield. The GEAR UP annunciator will flash when the gear warning horn sounds (any throttle setting less than 12 in. Hg with the landing gear retracted or full flaps with the landing gear retracted).

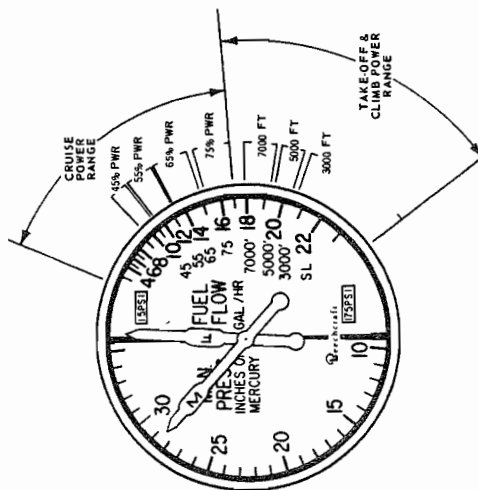
**WARNING LIGHT CONTROL SWITCH**

Located on the pilot's floating instrument panel near the warning light(s) is a switch placarded TEST-BRT-DIM-WARN LIGHTS. When the switch is held upward in the spring-loaded TEST position, the warning light(s) and the four landing gear position indicator lights will illuminate if none of the lamps require replacement. When released, the switch will return to the BRT position.

**Section VII** **BEECHCRAFT Bonanza F33A** **Section VII**  
**Systems Description** **CE-674 and after** **Systems Description**

*For Airplanes With Fuel Pressure Indicating Systems  
 (Serials CE-674 thru CE-928; CJ-129 thru CJ-155)*

The fuel flow portion of the indicator senses fuel pressure at the fuel distributor and is calibrated to indicate fuel flow in gallons per hour. The green arc indicates the normal fuel flow operating range while the red radials indicate the minimum and maximum allowable fuel pressures.



**MANIFOLD PRESSURE AND FUEL FLOW INDICATOR  
 (CE-674 THRU CE-928 AND CJ-129 THRU CJ-155)**

The higher end of the green arc includes a sawtooth segment to indicate the approximate fuel flow required for takeoff and climb at sea level, 3000, 5000 and 7000 feet. The pilot should use performance charts for the exact fuel flow requirements.

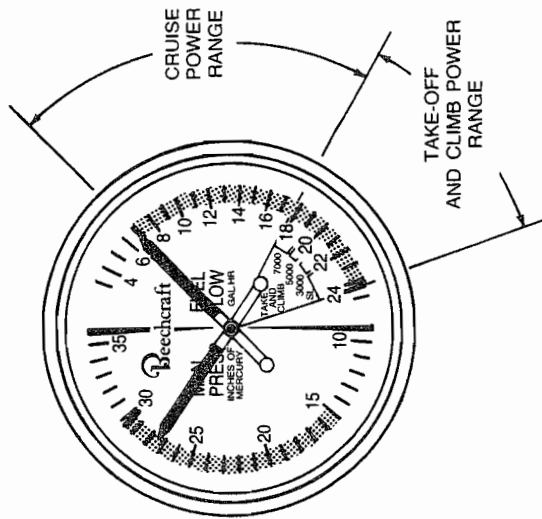
The lower end of the green arc includes a sawtooth segment labeled "CRUISE POWER" which indicates the

**BEECHCRAFT Bonanza F33A** **Section VII**  
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approximate fuel flows for powers ranging from 45% to 75% of max continuous power. The lower fuel flow of each sawtooth corresponds to the cruise - lean fuel flow while the higher fuel flow of each sawtooth corresponds to the best power fuel flow. When power is set in accordance with the cruise power setting tables in the PERFORMANCE section, these sawtooth markings provide approximate percent power information.

*For Airplanes With Fuel Flow Indicating Systems  
 (Serials CE-929 and after; CJ-156 and after)*

The fuel flow portion of the indicator is controlled electrically and indicates fuel flow in gallons per hour. A turbine meter installed in the fuel line rotates in proportion to the fuel flow. The speed of rotation is converted into an



**MANIFOLD PRESSURE AND FUEL FLOW INDICATOR  
 (CE-929 AND AFTER AND CJ-156 AND AFTER)**



**Section VII  
Systems Description**

**BEECHCRAFT Bonanza F33A  
CE-674 and after**

compact circuit breaker group on the right side and switching panel on the left.

**FLIGHT INSTRUMENTS**

The floating instrument panel contains all flight instruments except the magnetic compass. On this panel are the airspeed indicator, gyro horizon, altimeter, turn coordinator, directional gyro, and vertical speed indicator, with provisions for an ADF indicator and a clock. Additional navigation equipment, such as dual omni indicators, can be mounted in the panel directly below the flight instrument grouping.

**ENGINE INSTRUMENTS**

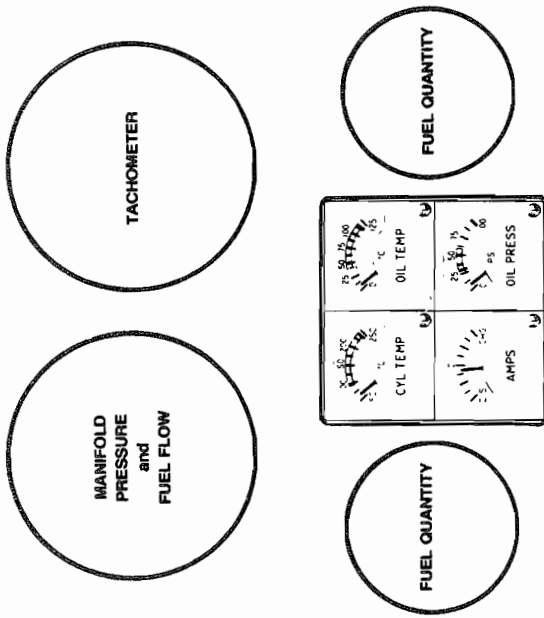
The engine instruments, located on the center panel, include a fuel flow/manifold pressure indicator, an engine tachometer, a fuel quantity indicator for each side, and a cluster which includes an oil pressure indicator, an oil temperature indicator, a cylinder head temperature indicator, and an ammeter.

**CLUSTER TYPE ENGINE INSTRUMENTS**

The cluster type instruments, as shown in the accompanying illustration, are located in the center of the panel just below the fuel flow/manifold pressure indicator and tachometer. Included in the square cluster are the cylinder head temperature and oil temperature (both calibrated in degrees centigrade), ammeter, and oil pressure. A fuel quantity indicator is located on each side of the cluster, the left indicator for the left wing fuel and the right indicator for the right wing fuel.

**BEECHCRAFT Bonanza F33A  
CE-674 and after**

**Section VII  
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**CLUSTER ARRANGEMENT**

**MANIFOLD PRESSURE AND FUEL FLOW INDICATOR**

The manifold pressure portion of this instrument indicates the pressure in the engine manifold and is calibrated in inches of mercury. By observing the manifold pressure indication and adjusting the propeller and throttle controls, the power output of the engine can be adjusted. To avoid excessive cylinder pressures during cruise operations, observe the maximum recommended rpm and manifold pressure limits as indicated on the Manifold Pressure vs RPM graph in the PERFORMANCE Section.

**Section VII**      **BEECHCRAFT Bonanza F33A**      **Section VII**  
**Systems Description**      **CE-674 and after**      **Systems Description**

**RUDDER PEDALS**

To adjust the rudder pedals, press the spring-loaded lever on the side of each pedal and move the pedal to its forward or aft position. The adjustment lever can also be used to place the right set of rudder pedals against the floor (when the copilot brakes are not installed) when not in use.

**TRIM CONTROLS**

Elevator trim is controlled by a handwheel located to the left of the throttle. An elevator tab position indicator dial is located above and to the left of the trim control.

The aileron trimmer on the control column hub displaces the ailerons. Displacement is maintained by cable loads imposed by the trimmer.

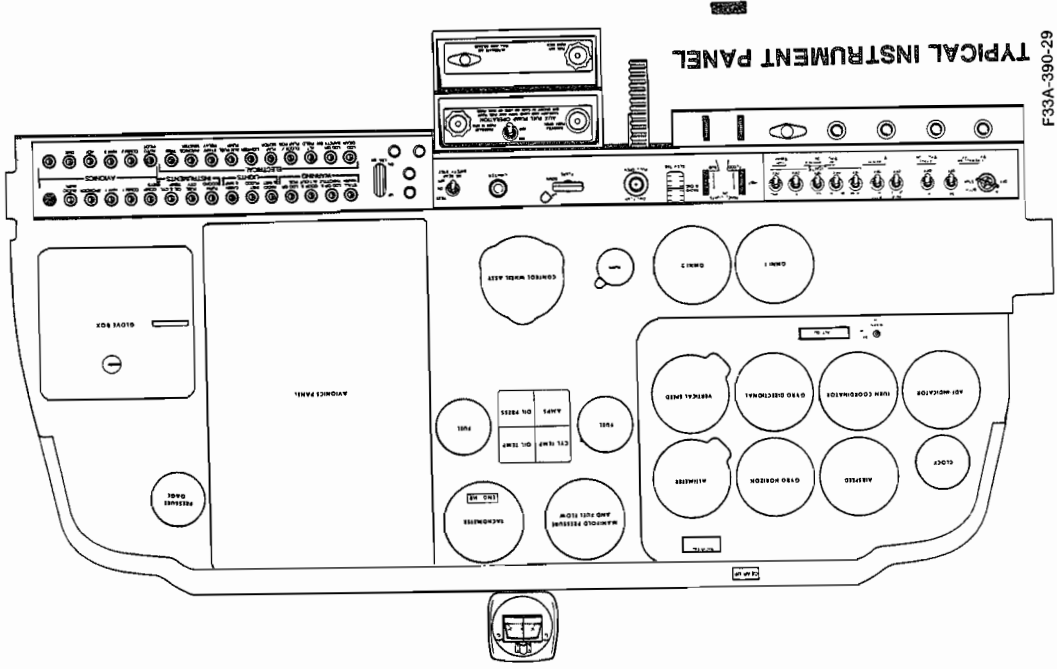
**ELECTRIC ELEVATOR TRIM**

The optional electric elevator trim system controls include the ON-OFF switch located on the instrument panel, a thumb switch on the control wheel and a circuit breaker on the right subpanel. The ON-OFF switch must be in the ON position to operate the system. The thumb switch is moved forward for nose down, aft for nose up, and when released returns to the center OFF position. When the system is not being electrically actuated, the manual trim control wheel may be used.

**INSTRUMENT PANEL**

The standard instrument panel of the Bonanza F33A consists of the floating instrument panel on the upper left portion, the engine instrument grouping on the center of the panel above the control wheel yoke, a radio grouping to the right of the engine instruments, and a subpanel which provides for a

**BEECHCRAFT Bonanza F33A**      **Section VII**  
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**AIRFRAME**

The BEECHCRAFT Bonanza F33A is an all-metal, low-wing, single-engine airplane with retractable tricycle landing gear and conventional horizontal and vertical stabilizers.

**SEATING ARRANGEMENTS**

The Bonanza F33A is a 4- or 5-place airplane. In the standard configuration 4 seats are installed. A 5th seat is optional.

**FLIGHT CONTROLS**

**CONTROL SURFACES**

Control surfaces are operated through push-pull rods and conventional cable systems terminating in bellcranks.

**CONTROL COLUMN**

The throw-over type control column for elevator and aileron control can be placed in front of either front seat. Pull the T-handle latch at the back of the control arm and position the control wheel as desired. The aileron trimmer on the control column hub should be held until the column is repositioned

## SECTION VII SYSTEMS DESCRIPTION

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**Section VI**  
**Wt & Ball/Equip List**

USABLE FUEL		LEADING EDGE TANKS		ARM 75	
GALLONS	WEIGHT	MOM/100	GALLONS	WEIGHT	MOM/100
5	30	23	44	264	198
10	60	45	50	300	225
15	90	68	55	330	248
20	120	90	60	360	270
25	150	113	65	390	293
30	180	135	70	420	315
35	210	158	74	444	333
40	240	180			

**USEFUL LOAD WEIGHTS AND MOMENTS**

AAC AUSTRIAN AIRCRAFT CORPORATION JAA-MOT No. 1-04		Wiegebericht Luftfahrzeugart <b>Flugzeug</b>		Kennzeichen <b>OE-KRH</b>	
Baumuster: <b>Beech F33A</b>		Werk Nr.: <b>CE-1703</b>			
Bezugs-akt.: <b>acc. POH Section VI</b>		Bezugswei.: <b>acc. POH Weight &amp; Balance</b>		Triebwerksöl: <input checked="" type="checkbox"/> Sonstiges: <input type="checkbox"/>	
Angaben aufgrund: <b>POH PN 33-590009-13A10</b>		Wiege id: <b>Ausrüstungsverzeichnis vom 03.09.2004</b>		Treibstoff: <b>red 74 gal</b>	
Wiegepunkt		Abgelesenes Gewicht (kg/lbs)		Tara kg/lbs	
links		529		-	
rechts		525,5		-	
Bug/Heck		224,5		-	
Gesamtgewicht laut Wiegung:		Nettogewicht kg/lbs		Arm m(lb)	
Nichtausfliegender Treibstoff:		1166,23		95,9	
Triebwerksöl:		1158,517		95,9	
Ausfliegender Treibstoff <b>74 gal</b>		494,9327		11,8	
		2819,6834		81,138	
		444		75,0	
		2375,6834		80,28	
Leergewicht laut Wiegung vom:		Mittelwert		195,483	
Gewichtsberichtigung		Gewichtsänderung lt. Bericht vom:			
Luftfahrzeug Kategorie		Verwendungsart			
Einsatzart		Aktuelles Leergewicht		2375,6 lbs	
Zuladung		Maximales Abflug-/Landegewicht		1024,4 lbs	
				3400 lbs	

**LONG** 3.9.2004  
 Ort und Datum der Wiege-/Berichtnahme

*Handwritten signature*

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BEECHCRAFT Bonanza F33A

WEIGHT AND BALANCE LOADING FORM

BONANZA \_\_\_\_\_ DATE \_\_\_\_\_  
SERIAL NO. \_\_\_\_\_ REG NO. \_\_\_\_\_

ITEM	WEIGHT	MOM/100
1. BASIC EMPTY CONDITION		
2. FRONT SEAT OCCUPANTS		
3. 3rd and 4th SEAT OCCUPANTS		
4. 5th SEAT OCCUPANT		
5. BAGGAGE		
6. CARGO		
7. SUB TOTAL ZERO FUEL CONDITION		
8. FUEL LOADING		
9. SUB TOTAL RAMP CONDITION		
10. *LESS FUEL FOR START, TAXI, AND RUN UP		
11. SUB TOTAL TAKE-OFF CONDITION		
12. LESS FUEL TO DESTINATION		
13. LANDING CONDITION		

\*Fuel for start, taxi, and run up is normally 12 lbs at an average mom/100 of 9.

USEFUL LOAD WEIGHTS AND MOMENTS

OCCUPANTS	FRONT SEATS		3RD & 4TH SEATS		5TH SEAT	ARM 154	WEIGHT MOM/100
	FWD. POSITION	AFT POSITION	FWD. POSITION	AFT POSITION			
120	102	107	152	152	20	31	120
130	110	116	165	165	40	62	130
140	119	125	178	178	60	92	140
150	128	134	190	190	80	123	150
160	136	142	203	203	100	154	160
170	144	151	216	216	120	185	170
180	153	160	229	229	140	216	180
190	162	169	241	241	160	246	190
200	170	178	254	254	170	262	200

NOTE: Occupant Positions for Adjustable Seats are shown at their extreme positions. Intermediate Positions will require interpolation of the Moment/100 Values.

Section VI  
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CE-674 and after

WEIGHT AND BALANCE LOADING FORM

BONANZA SERIAL NO. \_\_\_\_\_ DATE \_\_\_\_\_ REG NO. \_\_\_\_\_

ITEM	WEIGHT	MOM/100
1. BASIC EMPTY CONDITION		
2. FRONT SEAT OCCUPANTS		
3. 3rd and 4th SEAT OCCUPANTS		
4. 5th SEAT OCCUPANT		
5. BAGGAGE		
6. CARGO		
7. SUB TOTAL ZERO FUEL CONDITION		
8. FUEL LOADING		
9. SUB TOTAL RAMP CONDITION		
10. * LESS FUEL FOR START, TAXI, AND RUN UP		
11. SUB TOTAL TAKE-OFF CONDITION		
12. LESS FUEL TO DESTINATION		
13. LANDING CONDITION		

\*Fuel for start, taxi, and run up is normally 12 lbs at an average mom/100 of 9.

Section VI  
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USEFUL LOAD WEIGHTS AND MOMENTS

BEECHCRAFT Bonanza F33A  
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BAGGAGE		CARGO	
ARM 150	Fwd of Spar (3rd & 4th Seats Removed) ARM 108	Aft of Spar (3rd, 4th, & 5th Seats Removed) ARM 145	
WEIGHT	MOM/100	MOM/100	MOM/100
10	15	11	15
20	30	22	29
30	45	32	44
40	60	43	58
50	75	54	73
60	90	65	87
70	105	76	102
80	120	86	116
90	135	97	131
100	150	108	145
110	165	119	160
120	180	130	174
130	195	140	189
140	210	151	203
150	225	162	218
160	240	173	232
170	255	184	247
180	270	194	261
190	285	205	276
200	300	216	290
210	315		305
220	330		319
230	345		334
240	360		348
250	375		363
260	390		377
270	405		392

Section VI  
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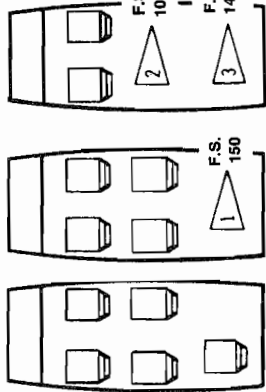
BEECHCRAFT Bonanza F33A  
CE-674 and after

BEECHCRAFT Bonanza F33A  
CE-674 and after

COMPUTING PROCEDURE

SEATING, BAGGAGE AND EQUIPMENT  
ARRANGEMENTS

PILOT & F. PASS	F.S.
FWD. POS.	85
AFT POS.	89
3RD. & 4TH SEAT PASS	F.S. 121
FWD. POS.	127
AFT POS.	F.S. 145
5TH SEAT PASS	F.S. 154



NOTE

The floor structure load limit is 100 pounds per square foot, except for the area between the front and rear spars, where the floor structure load limit is 50 pounds per square foot.

NOTE

All baggage/cargo must be secured with an approved cargo net.

- ① MAXIMUM WEIGHT 270 POUNDS INCLUDING EQUIPMENT AND BAGGAGE WITH 5th SEAT REMOVED OR STOWED.
- ② MAXIMUM WEIGHT 200 POUNDS FORWARD OF REAR SPAR INCLUDING EQUIPMENT AND CARGO WITH 3rd and 4th SEATS REMOVED.
- ③ MAXIMUM WEIGHT 270 POUNDS AFT OF REAR SPAR INCLUDING EQUIPMENT AND CARGO WITH 3rd, 4th and 5th SEATS REMOVED.

1. Record the Basic Empty Weight and Moment from the Basic Empty Weight and Balance form (or from the latest superseding form) under the Basic Empty Condition block. The moment must be divided by 100 to correspond to Useful Load Weights and Moments tables.
2. Record the weight and corresponding moment from the appropriate table of each of the useful load items (except fuel) to be carried in the airplane.
3. Total the weight column and moment column. The SUB-TOTALS are the Zero Fuel Condition.
4. Determine the weight and corresponding moment for the fuel loading to be used. This fuel loading includes fuel for the flight, plus that required for start, taxi, and takeoff. Add the Fuel Loading Condition to Zero Fuel Condition to obtain the SUB-TOTAL Ramp Condition.
5. Subtract the fuel to be used for start, taxi, and takeoff to arrive at the SUB-TOTAL Take-off Condition.
6. Subtract the weight and moment of the fuel in the incremental sequence in which it is to be used from the take-off weight and moment. The Zero Fuel Condition, the Take-off Condition, and the Landing Condition moments must be within the minimum and maximum moments shown on the Moment Limit vs Weight graph for that weight. If the total moment is less than the minimum moment allowed, useful load items must be shifted aft or forward load items reduced. If the total moment is greater than the maximum moment allowed, useful load items must be shifted forward or aft load items reduced. If the quantity or location of load items is changed, the calculations must be revised and the moments rechecked.

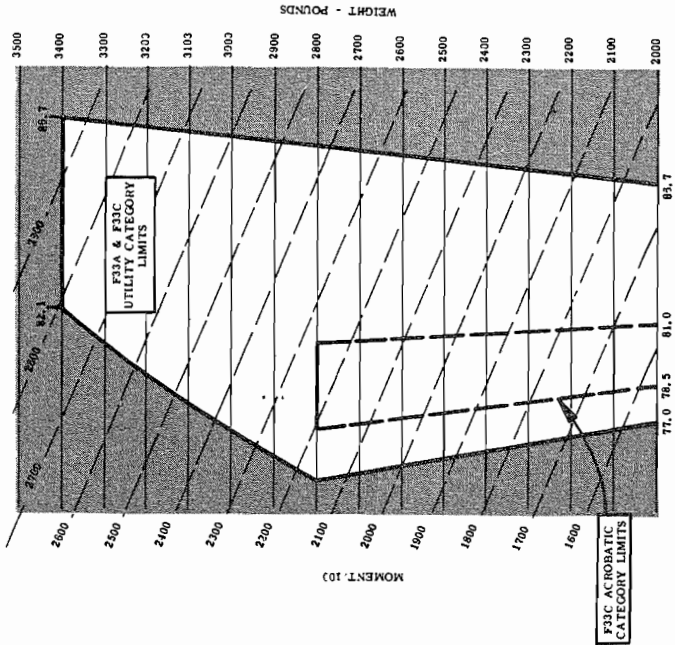


**LOADING INSTRUCTIONS**

It is the responsibility of the airplane operator to ensure that the airplane is properly loaded. At the time of delivery, Beech Aircraft Corporation provides the necessary weight and balance data to compute individual loadings. All subsequent changes in airplane weight and balance are the responsibility of the airplane owner and/or operator.

The basic empty weight and moment of the airplane at the time of delivery are shown on the airplane Basic Empty Weight and Balance form. Useful load items which may be loaded into the airplane are shown on the Useful Load Weight and Moment tables. The minimum and maximum moments are indicated by the heavy border line on the Moment Limits vs Weight graph. These moments correspond to the forward and aft center of gravity flight limits for a particular weight. All moments are divided by 100 to simplify computations.

**MOMENT LIMITS VS WEIGHT**



CENTER OF GRAVITY - INCHES AFT OF DATUM  
ENVELOPE BASED ON THE FOLLOWING WEIGHT AND CENTER OF GRAVITY LIMIT DATA (LANDING GEAR DOWN)

WEIGHT CONDITION	FORWARD C.G. LIMIT		AFT C.G. LIMIT	
	3400 LB. (MAXIMUM TAKE-OFF OR LANDING)	2800 LB. OR LESS	81.1	86.7
F33A & F33C UTILITY CATEGORY	81.1	71.0	86.7	86.7
F33C ACROBATIC CATEGORY	80.3 LB. OR LESS	78.5	81.0	81.0

**Section VI**                      **BEECHCRAFT Bonanza F33A**  
**Wt & Bal/Equip List**                      **CE-674 and after**

**NOTE**

Each new airplane is delivered with a completed sample loading, basic empty weight and center of gravity, and equipment list, all pertinent to that specific airplane. It is the owner's responsibility to ensure that changes in equipment are reflected in a new weight and balance and in an addendum to the equipment list. There are many ways of doing this; it is suggested that a running tally of equipment changes and their effect on basic empty weight and CG is a suitable means for meeting both requirements.

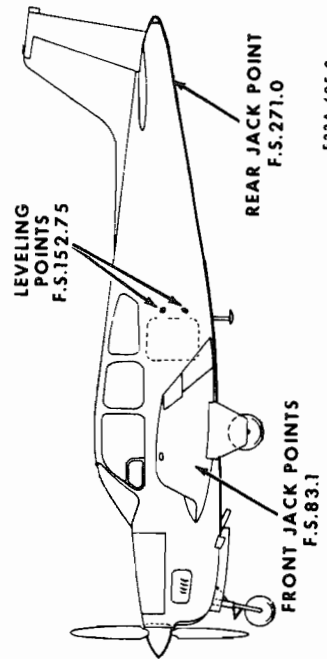
That current equipment list and basic empty weight and CG information must be retained with the airplane when it changes ownership. Beech Aircraft Corporation cannot maintain this information; the current status is known only to the owner. If these papers become lost, the FAA will require that the airplane be re-weighed to establish the basic empty weight and CG and that an inventory of installed equipment be conducted to create a new equipment list.

**Section VI**                      **BEECHCRAFT Bonanza F33A**  
**Wt & Bal/Equip List**                      **CE-674 and after**

en, with the airplane level on the scales, from the reference (a plumb bob dropped from the center of either main jack point) to the axle center line of the main gear and then to the nose wheel axle center line. The main wheel axle center line is best located by stretching a string across from one main wheel to the other. All measurements are to be taken with the tape level with the hangar floor and parallel to the fuselage center line. The locations of the wheel reactions will be approximately at Fuselage Station 96.7 for main wheels and Fuselage Station 12.7 for the nose wheel.

7. Jack point weightings are accomplished by placing scales on the jack points specified in step 1 above. Since the center of gravity of the airplane is forward of Fuselage Station 83.1, the tail reaction of the airplane will be in an up direction. This can be measured on regular scales by placing ballast of approximately 200 pounds on the scales to which the aft weighing point is attached by cable of adjustable length. The up reaction will then be total ballast weight minus the scale reading and is entered in the weighing form as a negative quantity.

8. Weighing should always be made in an enclosed area which is free from air currents. The scales used should be properly calibrated and certified.



**BEECHCRAFT Bonanza F33A**                      **Section VI**  
**CE-674 and after**                      **Wt & Bal/Equip List**

**BASIC EMPTY WEIGHT AND BALANCE**

DATE \_\_\_\_\_ PREPARED BY \_\_\_\_\_  
 REG. NO. \_\_\_\_\_ JACK POINT LOCATION      83.1      Company  
 SER. NO.      MAIN      97      AFT      Signature  
 STRUT POSITION - NOSE      11.8      EXTENDED      13.1      COMPRESSED  
 BONANZA F33A      SER. NO.      96      FORWARD      97

REACTION WHEEL - JACK POINTS	SCALE READING	TARE	NET WEIGHT	ARM	MOMENT
LEFT MAIN					
RIGHT MAIN					
NOSE OR TAIL					
TOTAL (AS WEIGHED)					
<i>Space below provided for additions and subtractions to as - weighed condition</i>					
EMPTY WEIGHT			26	-	638
ENGINE OIL			36	79	2844
UNUSABLE FUEL					
BASIC EMPTY WEIGHT					

## SECTION VI

## WEIGHING INSTRUCTIONS

### WEIGHT AND BALANCE/ EQUIPMENT LIST

Periodic weighing of the Bonanza F33A may be required to keep the Basic Empty Weight current. All changes to the airplane affecting weight and balance are the responsibility of the airplane's operator.

1. Three jack points are provided for weighing: two on the wing front spar at Fuselage Station 83.1 and one on the aft fuselage at Fuselage Station 271.0.

2. Fuel should be drained preparatory to weighing. Tanks are drained from the regular drain ports with the airplane in static ground attitude. When tanks are drained, 1.5 pounds of undrainable fuel remain in the airplane at Fuselage Station 76.0. The remainder of the unusable fuel to be added to a Basic Empty Weight is 34.5 pounds at Fuselage Station 79.1.

3. Engine oil must be at the full level or completely drained. Total engine oil when full is 26 pounds at Fuselage Station 24.5. (Includes 3 pounds undrainable.)

4. To determine airplane configuration at time of weighing, installed equipment is checked against the airplane equipment list or superseding forms. All installed equipment must be in its proper place during weighing.

5. At the time of weighing, the airplane must be level both longitudinally and laterally, and the landing gear must be fully extended. Leveling screws are located on the left side of the fuselage at approximately Fuselage Station 152.25. Longitudinally level attitude is determined with a plumb bob. Laterally level attitude is obtained when the vertical distance from each wing tip to the floor is equal.

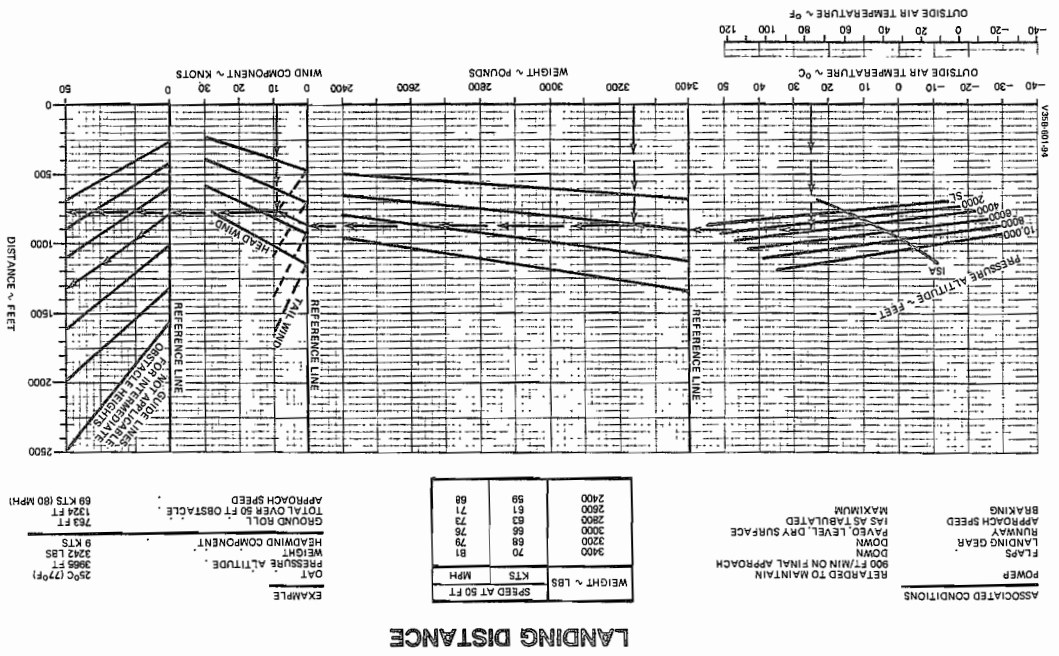
6. Measurement of the reaction arms for a wheel weighing is made using a steel measuring tape. Measurements are tak-

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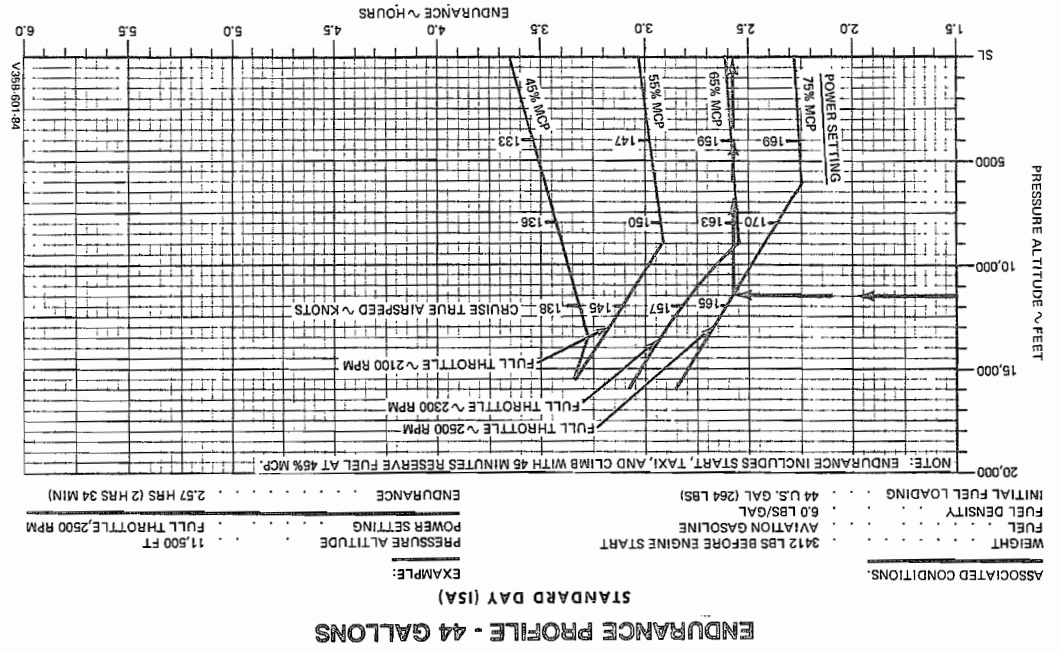
**BEECHCRAFT Bonanza F33A  
CE-674 and after**

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Performance**



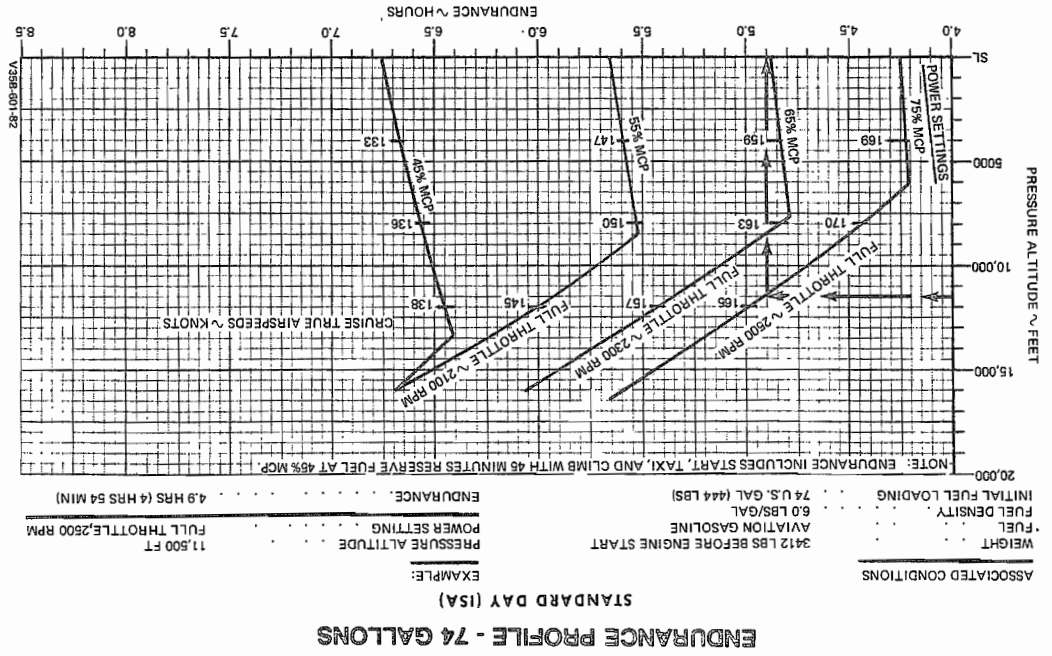
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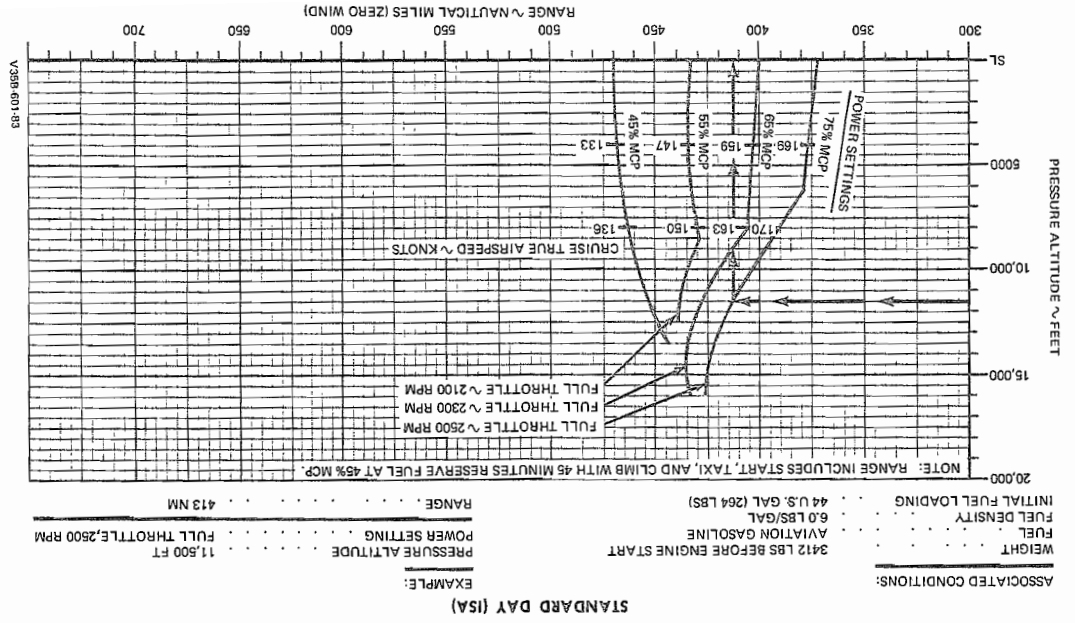
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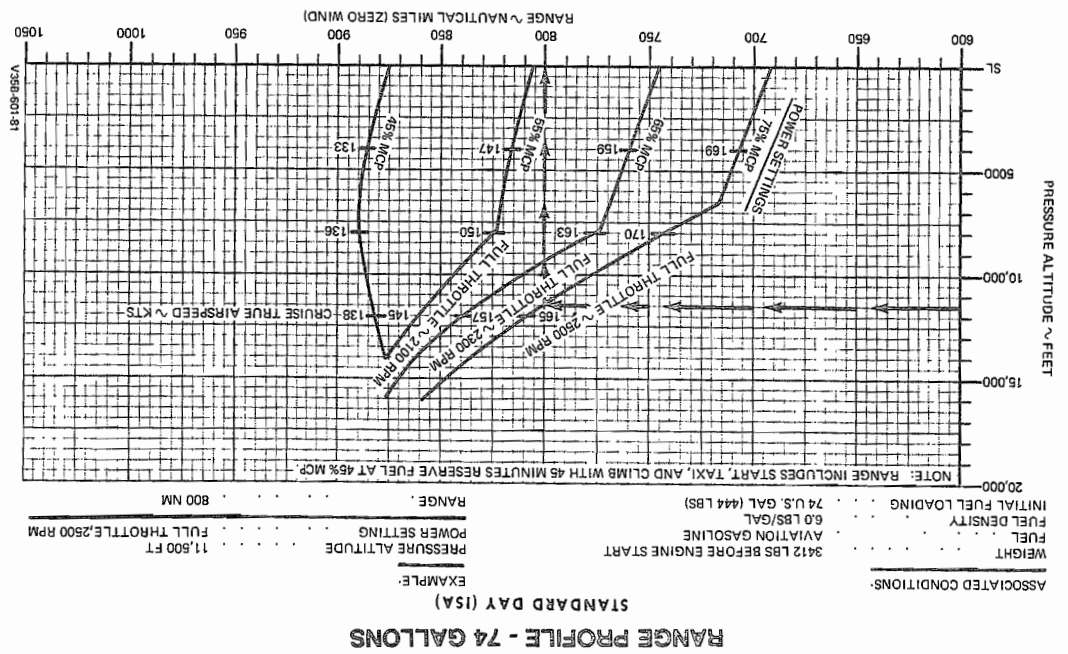
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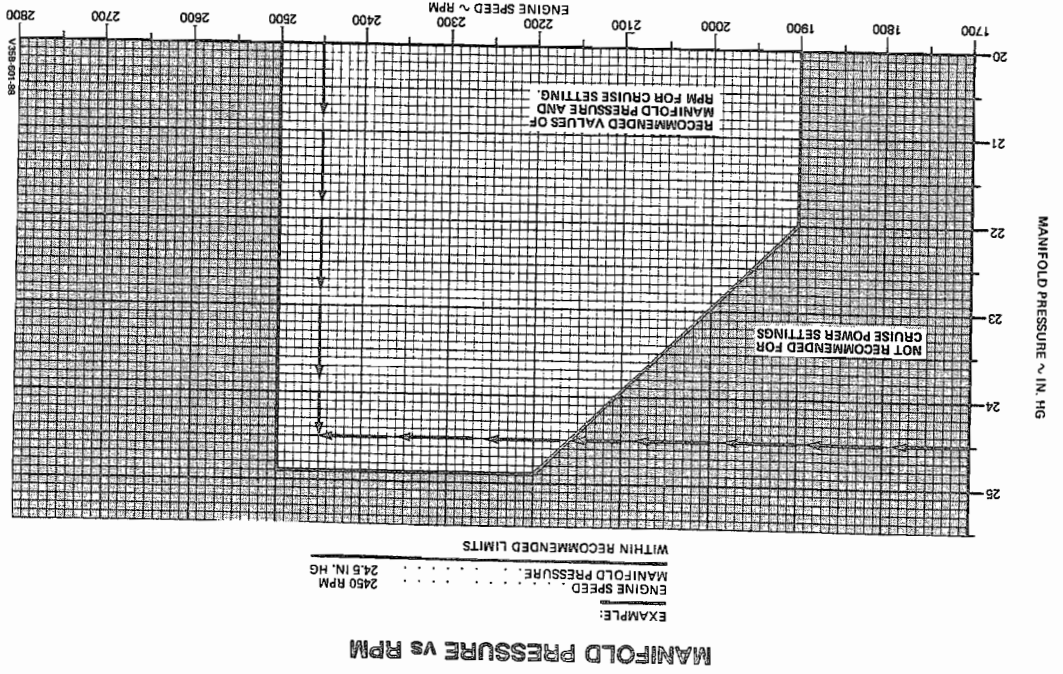
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CE-674 and after



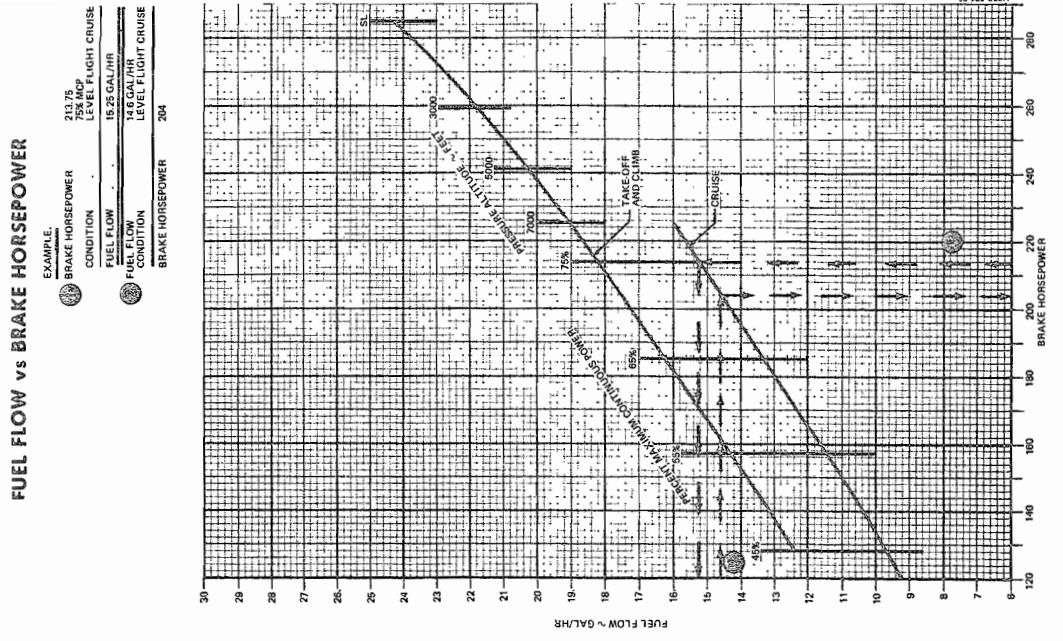
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BEECHCRAFT Bonanza F33A  
CE-674 and after



BEECHCRAFT Bonanza F33A  
CE-674 and after

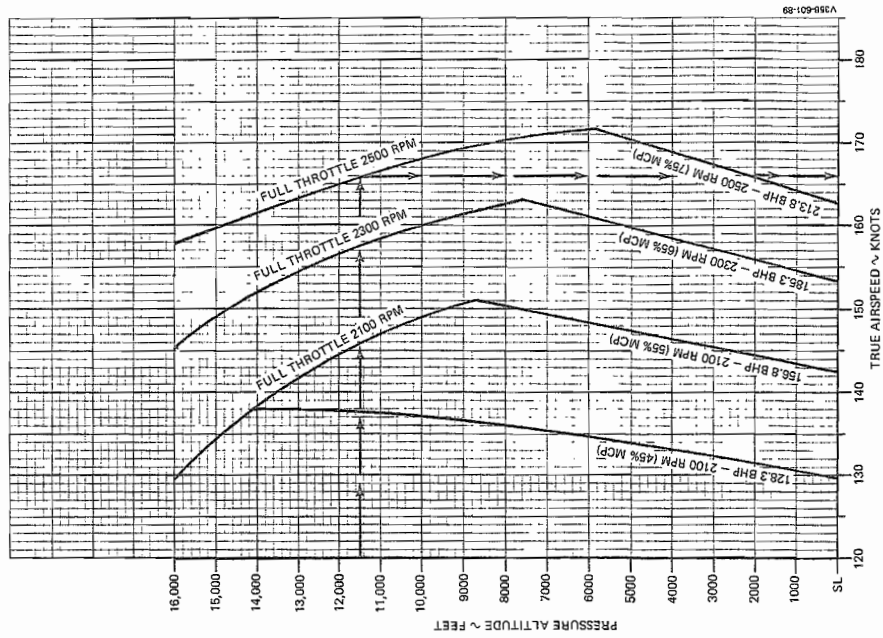
Section V  
Performance





CRUISE SPEEDS

ASSOCIATED CONDITIONS:  
 AVERAGE CRUISE WEIGHT 3200 LBS  
 STANDARD DAY (ISA)  
 TEMPERATURE . . . . .  
 PRESSURE ALTITUDE 11,500 FT  
 POWER SETTING . . . . . FULL THROTTLE 2500 RPM  
 TRUE AIRSPEED 166 KTS



CRUISE POWER SETTINGS  
 45% MAXIMUM CONTINUOUS POWER (OR FULL THROTTLE) 2100 RPM  
 3200 POUNDS

NOTES:  
 1. Full throttle manifold pressure settings are approximate.  
 2. Shaded area represents operation with full throttle.

PRESS ALT.	ISA - 36°F (-20°C)				STANDARD DAY (ISA)				ISA + 36°F (-20°C)				
	FEET	°C	RPM	IN HG	FEET	°C	RPM	IN HG	FEET	°C	RPM	IN HG	
16000	91	-55	2100	15.4	110	-11	2100	16.5	110	91	-55	2100	15.4
15000	87	-53	2100	15.7	108	-9	2100	16.6	108	87	-53	2100	15.7
14000	83	-51	2100	16.0	106	-7	2100	16.7	106	83	-51	2100	16.0
13000	79	-49	2100	16.4	104	-5	2100	16.8	104	79	-49	2100	16.4
12000	75	-47	2100	16.7	102	-3	2100	16.9	102	75	-47	2100	16.7
11000	71	-45	2100	17.0	100	-1	2100	17.0	100	71	-45	2100	17.0
10000	67	-43	2100	17.3	98	1	2100	17.1	98	67	-43	2100	17.3
9000	63	-41	2100	17.6	96	3	2100	17.2	96	63	-41	2100	17.6
8000	59	-39	2100	17.9	94	5	2100	17.3	94	59	-39	2100	17.9
7000	55	-37	2100	18.2	92	7	2100	17.4	92	55	-37	2100	18.2
6000	51	-35	2100	18.5	90	9	2100	17.5	90	51	-35	2100	18.5
5000	47	-33	2100	18.8	88	11	2100	17.6	88	47	-33	2100	18.8
4000	43	-31	2100	19.1	86	13	2100	17.7	86	43	-31	2100	19.1
3000	39	-29	2100	19.4	84	15	2100	17.8	84	39	-29	2100	19.4
2000	35	-27	2100	19.7	82	17	2100	17.9	82	35	-27	2100	19.7
1000	31	-25	2100	20.0	80	19	2100	18.0	80	31	-25	2100	20.0
SL	27	-23	2100	20.3	78	21	2100	18.1	78	27	-23	2100	20.3

Section V  
Performance

BEECHCRAFT Bonanza F33A  
CE-674 and after

BEECHCRAFT Bonanza F33A  
CE-674 and after

Section V  
Performance

55% MAXIMUM CONTINUOUS POWER (OR FULL THROTTLE) 2100 RPM  
3200 POUNDS

**CRUISE POWER SETTINGS**

PRESS ALT	ISA - 36°F (-20°C)				STANDARD DAY (ISA)				ISA +36°F (+20°C)														
	IOAT	ENGINE SPEED	ENGINE MAN. PRESS.	FUEL FLOW	TAS	CAS	IOAT	ENGINE SPEED	ENGINE MAN. PRESS.	FUEL FLOW	TAS	CAS											
FEEET	° F	RPM	IN HG	PPH	KTS	KTS	° F	RPM	IN HG	PPH	KTS	KTS											
SL	26	-3	2100	23.0	68.8	11.5	140	146	62	17	2100	23.6	68.8	11.5	143	149	37	2100	24.2	68.8	11.5	145	149
1000	23	-5	2100	22.8	68.8	11.5	141	144	59	15	2100	23.3	68.8	11.5	144	148	35	2100	24.0	68.8	11.5	146	149
2000	19	-7	2100	22.5	68.8	11.5	142	143	55	13	2100	22.9	68.8	11.5	146	149	31	2100	23.5	68.8	11.5	147	149
3000	16	-9	2100	22.3	68.8	11.5	143	142	52	11	2100	22.9	68.8	11.5	146	147	28	2100	23.5	68.8	11.5	147	148
4000	12	-11	2100	22.1	68.8	11.5	144	141	48	9	2100	22.6	68.8	11.5	147	138	24	2100	23.2	68.8	11.5	148	138
5000	9	-13	2100	21.8	68.8	11.5	145	140	45	7	2100	22.4	68.8	11.5	148	137	21	2100	23.0	68.8	11.5	150	134
6000	5	-15	2100	21.6	68.8	11.5	146	139	41	5	2100	22.1	68.8	11.5	148	136	17	2100	22.7	68.8	11.5	150	133
7000	2	-17	2100	21.3	68.8	11.5	147	138	38	3	2100	21.9	68.8	11.5	149	135	14	2100	22.5	68.8	11.5	151	132
8000	-2	-19	2100	21.1	68.8	11.5	148	137	34	1	2100	21.6	68.8	11.5	150	133	11	2100	22.3	68.8	11.5	151	128
9000	-5	-21	2100	20.9	68.8	11.5	149	135	31	-1	2100	21.4	68.8	11.5	149	132	8	2100	22.1	68.8	11.5	149	126
10000	-8	-23	2100	20.7	68.8	11.5	149	133	27	-3	2100	21.2	68.8	11.5	148	128	5	2100	21.9	68.8	11.5	148	122
11000	-11	-25	2100	20.5	68.8	11.5	149	130	23	-6	2100	21.0	68.8	11.5	147	124	2	2100	21.7	68.8	11.5	147	118
12000	-14	-27	2100	20.3	68.8	11.5	149	126	20	-7	2100	20.8	68.8	11.5	146	121	-1	2100	21.5	68.8	11.5	146	114
13000	-17	-29	2100	20.1	68.8	11.5	149	123	16	-9	2100	20.6	68.8	11.5	145	117	-4	2100	21.3	68.8	11.5	145	110
14000	-20	-31	2100	19.9	68.8	11.5	149	119	12	-11	2100	20.4	68.8	11.5	144	112	-7	2100	21.1	68.8	11.5	144	106
15000	-23	-33	2100	19.7	68.8	11.5	149	114	8	-13	2100	20.2	68.8	11.5	143	107	-11	2100	20.9	68.8	11.5	143	100

NOTES:  
1 Full throttle manifold pressure settings are approximate.  
2 Shaded area represents operation with full throttle.

55% MAXIMUM CONTINUOUS POWER (OR FULL THROTTLE) 2300 RPM  
3200 POUNDS

**CRUISE POWER SETTINGS**

PRESS ALT	ISA - 36°F (-20°C)				STANDARD DAY (ISA)				ISA +36°F (+20°C)														
	IOAT	ENGINE SPEED	ENGINE MAN. PRESS.	FUEL FLOW	TAS	CAS	IOAT	ENGINE SPEED	ENGINE MAN. PRESS.	FUEL FLOW	TAS	CAS											
FEEET	° F	RPM	IN HG	PPH	KTS	KTS	° F	RPM	IN HG	PPH	KTS	KTS											
SL	27	-3	2300	23.3	80.0	13.3	150	156	63	17	2300	23.9	80.0	13.3	154	159	37	2300	24.5	80.0	13.3	155	159
1000	23	-5	2300	23.1	80.0	13.3	152	155	59	15	2300	23.6	80.0	13.3	157	156	33	2300	24.2	80.0	13.3	156	154
2000	20	-7	2300	22.8	80.0	13.3	153	154	56	13	2300	23.4	80.0	13.3	158	153	29	2300	24.0	80.0	13.3	156	150
3000	16	-9	2300	22.5	80.0	13.3	154	153	52	11	2300	23.1	80.0	13.3	159	151	25	2300	23.7	80.0	13.3	156	148
4000	13	-11	2300	22.3	80.0	13.3	155	152	48	9	2300	22.9	80.0	13.3	159	150	21	2300	23.5	80.0	13.3	155	147
5000	9	-13	2300	22.0	80.0	13.3	157	151	45	7	2300	22.6	80.0	13.3	160	148	17	2300	23.3	80.0	13.3	153	146
6000	6	-15	2300	21.8	80.0	13.3	158	150	42	5	2300	22.4	80.0	13.3	160	146	14	2300	23.1	80.0	13.3	153	144
7000	2	-17	2300	21.5	80.0	13.3	159	149	38	3	2300	22.1	80.0	13.3	162	146	11	2300	22.9	80.0	13.3	153	142
8000	-1	-19	2300	21.3	80.0	13.3	160	148	35	1	2300	21.7	80.0	13.3	163	144	8	2300	22.7	80.0	13.3	153	140
9000	-4	-21	2300	21.0	80.0	13.3	162	145	31	-1	2300	21.4	80.0	13.3	164	142	5	2300	22.5	80.0	13.3	153	138
10000	-7	-23	2300	20.7	80.0	13.3	163	143	27	-3	2300	21.2	80.0	13.3	164	139	2	2300	22.3	80.0	13.3	153	136
11000	-10	-25	2300	20.5	80.0	13.3	163	140	23	-5	2300	21.0	80.0	13.3	164	136	-1	2300	22.1	80.0	13.3	153	134
12000	-13	-27	2300	20.3	80.0	13.3	163	137	19	-7	2300	20.8	80.0	13.3	164	133	-4	2300	21.9	80.0	13.3	153	132
13000	-16	-29	2300	20.1	80.0	13.3	163	134	15	-9	2300	20.6	80.0	13.3	164	130	-7	2300	21.7	80.0	13.3	153	130
14000	-19	-31	2300	19.9	80.0	13.3	163	131	11	-11	2300	20.4	80.0	13.3	164	127	-10	2300	21.5	80.0	13.3	153	128
15000	-22	-33	2300	19.7	80.0	13.3	163	128	7	-13	2300	20.2	80.0	13.3	164	124	-13	2300	21.3	80.0	13.3	153	126
16000	-25	-35	2300	19.5	80.0	13.3	163	125	3	-15	2300	20.0	80.0	13.3	164	121	-16	2300	21.1	80.0	13.3	153	124

NOTES:  
1 Full throttle manifold pressure settings are approximate.  
2 Shaded area represents operation with full throttle.

**Section V  
Performance**

**BEECHCRAFT Bonanza F33A  
CE-674 and after**

75% MAXIMUM CONTINUOUS POWER (OR FULL THROTTLE) 2500 RPM  
3200 POUNDS

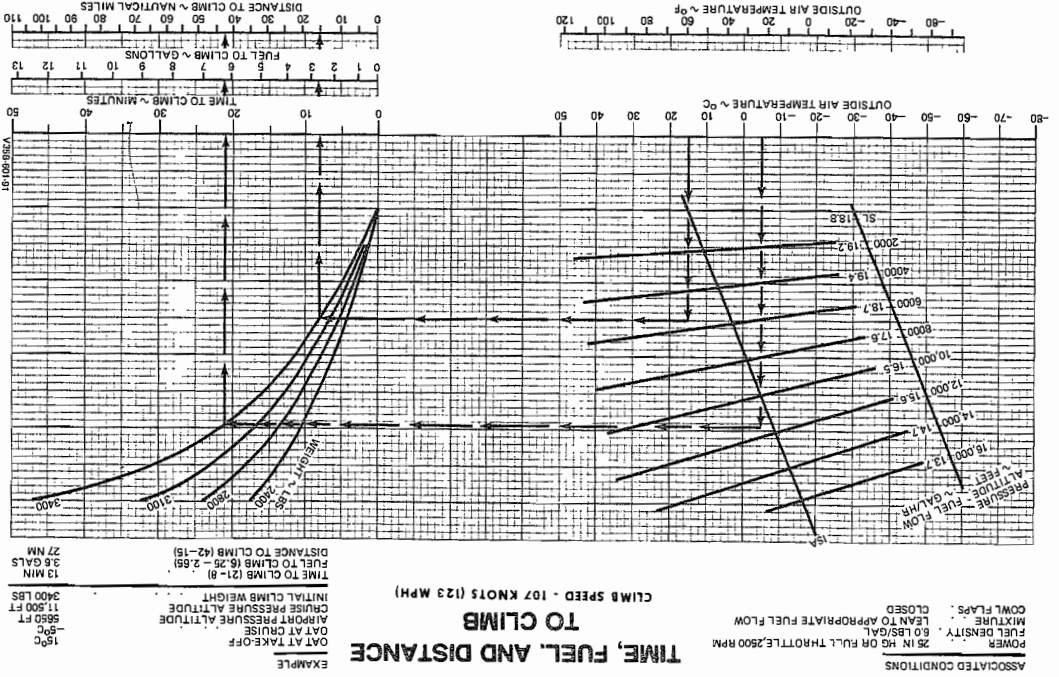
**CRUISE POWER SETTINGS**

1. Full throttle manifold pressure settings are approximate.  
2. Shaded area represents operation with full throttle.

PRESS ALT.	ISA -35°F (-20°C)				STANDARD DAY (ISA)				ISA +35°F (+20°C)			
	FOAT	ENGINE MAN PRESS	FUEL FLOW	TAS	FOAT	ENGINE MAN PRESS	FUEL FLOW	TAS	FOAT	ENGINE MAN PRESS	FUEL FLOW	TAS
15000	30	18.4	2500	15.4	2500	15.4	2500	15.4	2500	15.4	2500	15.4
14000	26	18.2	2500	15.1	2500	15.1	2500	15.1	2500	15.1	2500	15.1
13000	23	18.0	2500	14.8	2500	14.8	2500	14.8	2500	14.8	2500	14.8
12000	20	17.8	2500	14.5	2500	14.5	2500	14.5	2500	14.5	2500	14.5
11000	17	17.6	2500	14.2	2500	14.2	2500	14.2	2500	14.2	2500	14.2
10000	14	17.4	2500	13.9	2500	13.9	2500	13.9	2500	13.9	2500	13.9
9000	11	17.2	2500	13.6	2500	13.6	2500	13.6	2500	13.6	2500	13.6
8000	8	17.0	2500	13.3	2500	13.3	2500	13.3	2500	13.3	2500	13.3
7000	5	16.8	2500	13.0	2500	13.0	2500	13.0	2500	13.0	2500	13.0
6000	3	16.6	2500	12.7	2500	12.7	2500	12.7	2500	12.7	2500	12.7
5000	1	16.4	2500	12.4	2500	12.4	2500	12.4	2500	12.4	2500	12.4
4000	0	16.2	2500	12.1	2500	12.1	2500	12.1	2500	12.1	2500	12.1
3000	0	16.0	2500	11.8	2500	11.8	2500	11.8	2500	11.8	2500	11.8
2000	0	15.8	2500	11.5	2500	11.5	2500	11.5	2500	11.5	2500	11.5
1000	0	15.6	2500	11.2	2500	11.2	2500	11.2	2500	11.2	2500	11.2
SL	0	15.4	2500	10.9	2500	10.9	2500	10.9	2500	10.9	2500	10.9

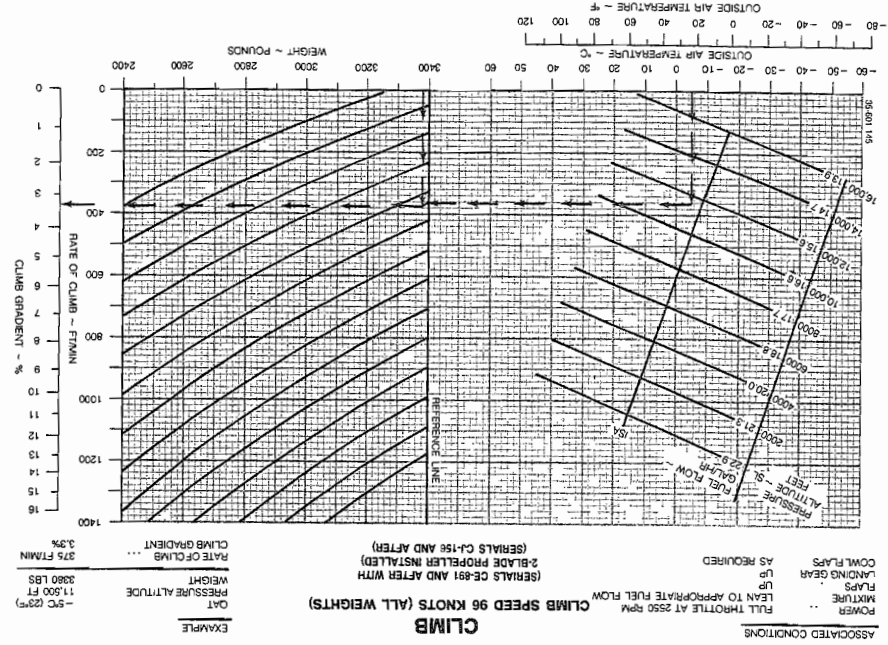
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**BEECHCRAFT Bonanza F33A  
CE-674 and after**



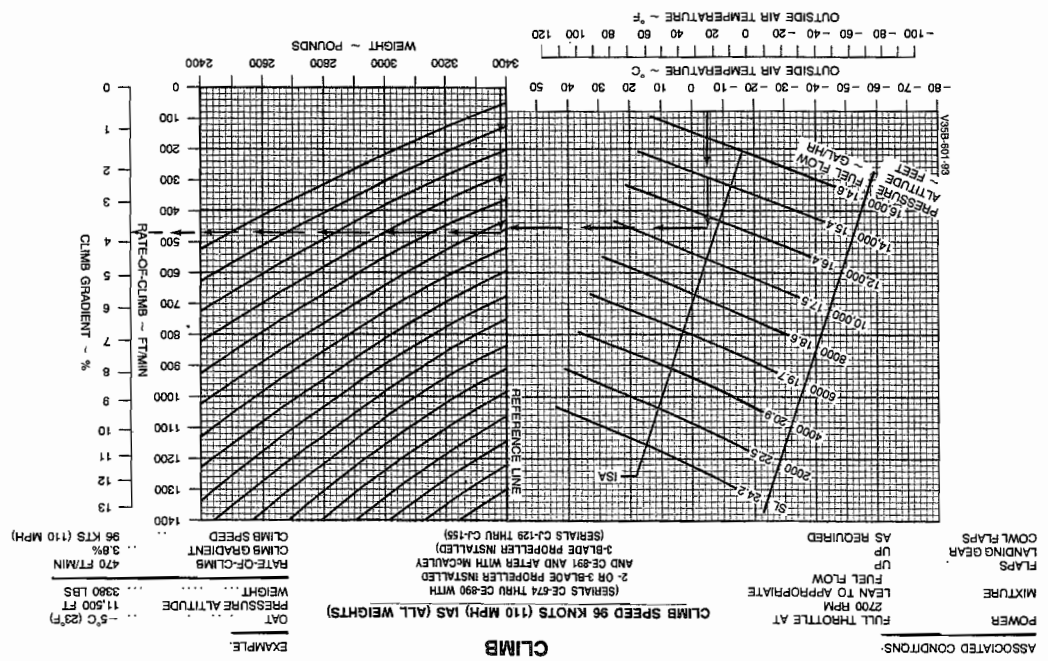
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Performance**

**BEECHCRAFT Bonanza F33A  
CE-674 and after**



**Section V  
Performance**

**BEECHCRAFT Bonanza F33A  
CE-674 and after**



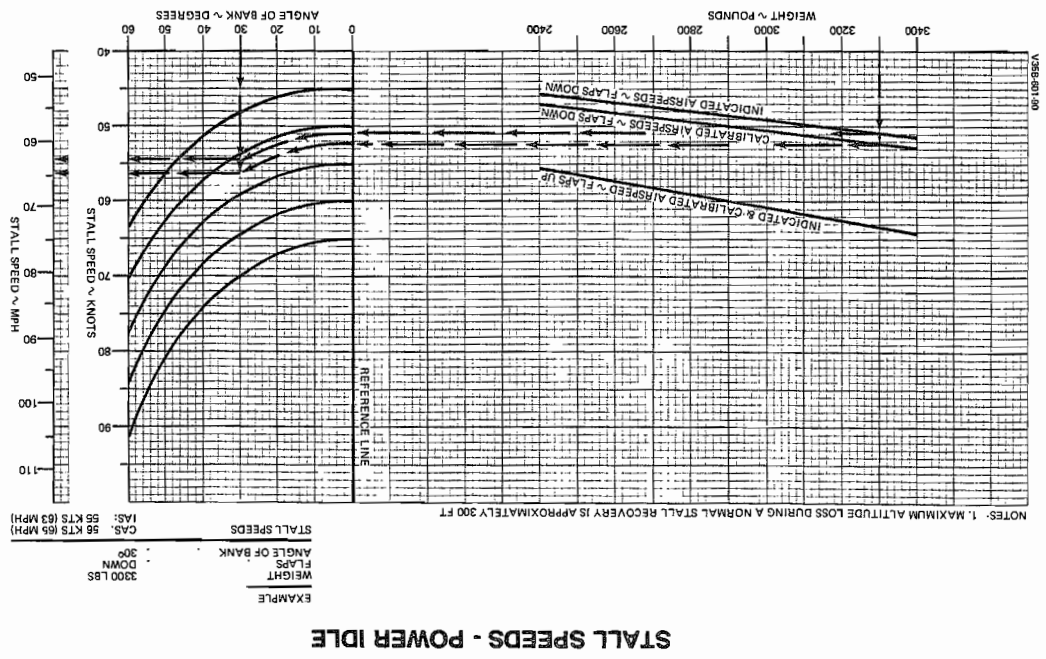
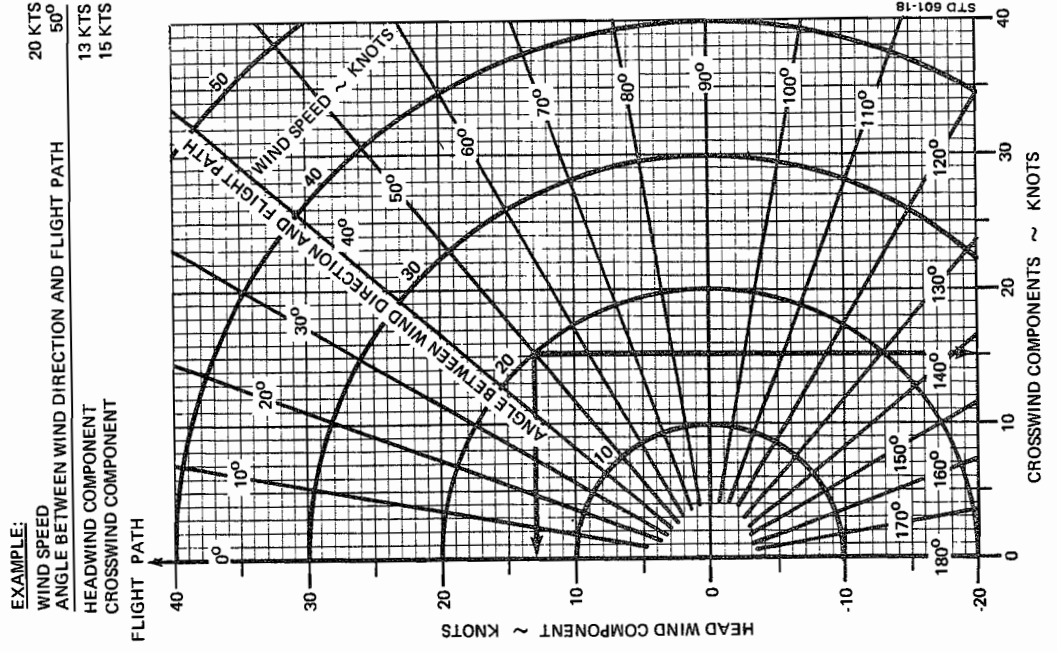
**BEECHCRAFT Bonanza F33A**  
**CE-674 and after**

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**Section V**  
**Performance**

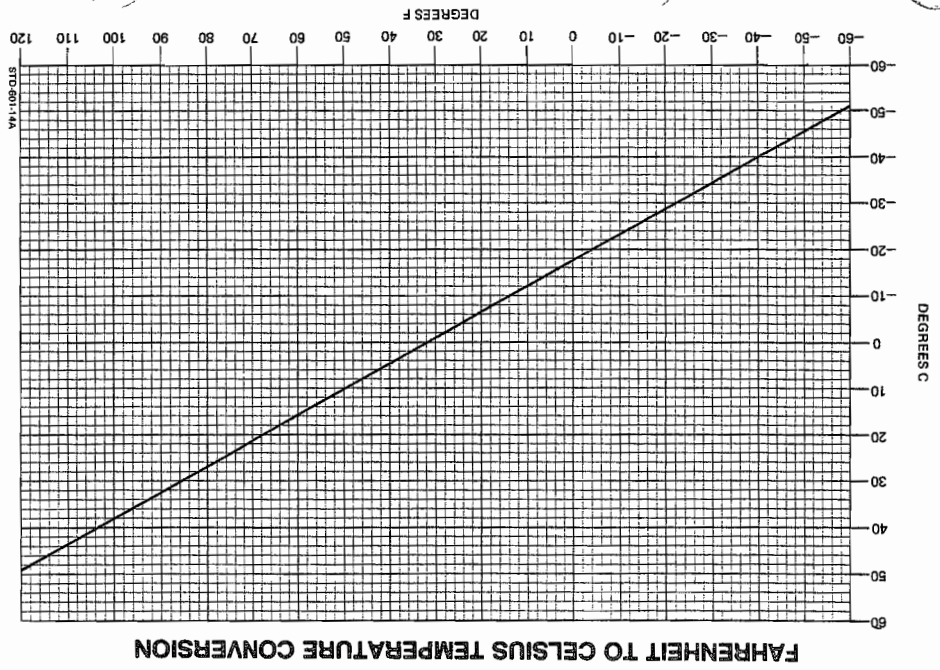
**WIND COMPONENTS**

Demonstrated Crosswind Component is 17 kts



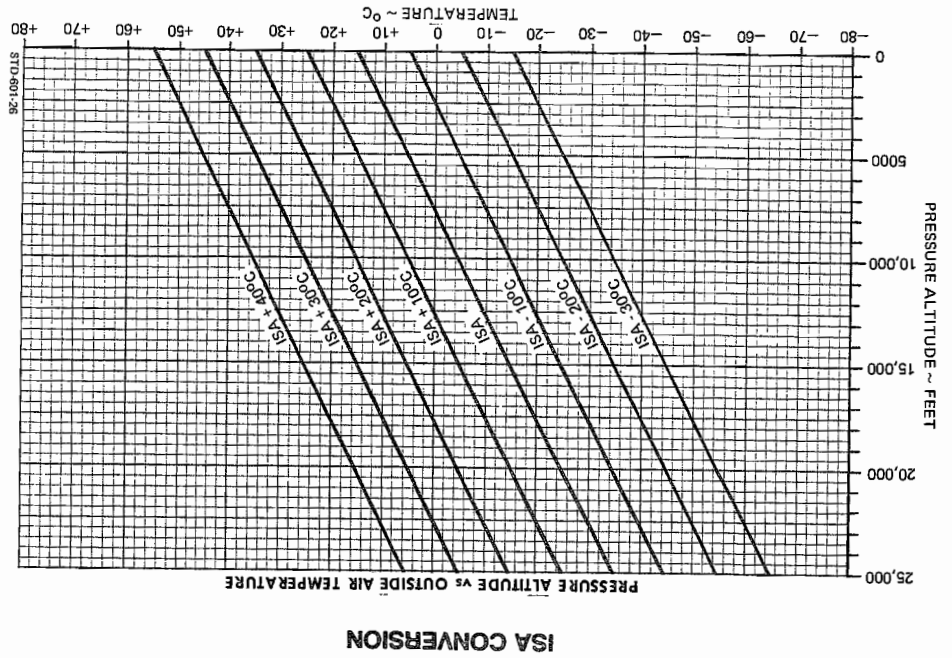
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BEECHCRAFT Bonanza F33A  
CE-674 and after



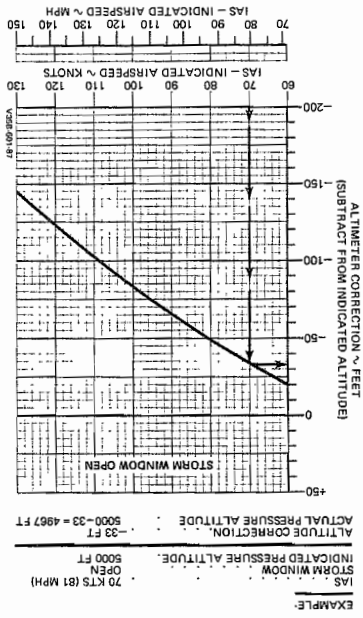
Section V  
Performance

BEECHCRAFT Bonanza F33A  
CE-674 and after

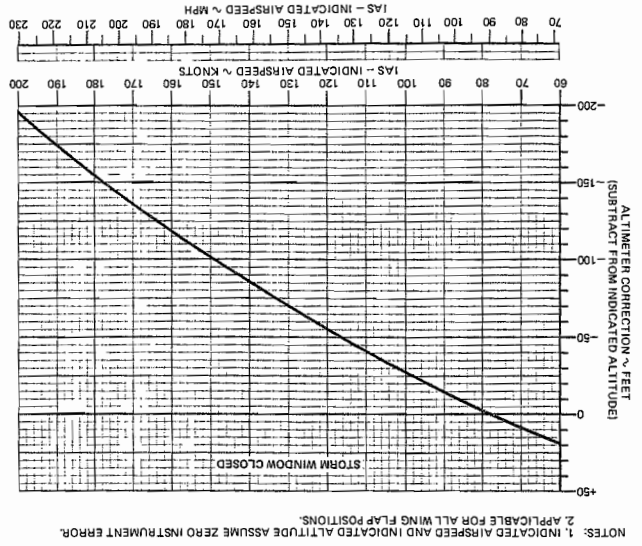


**Section V  
Performance**

**BEECHCRAFT Bonanza F33A  
CE-674 and after**

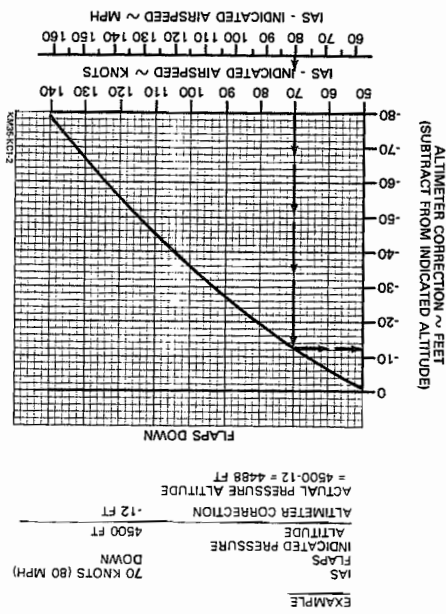


**ALTIMETER CORRECTION - EMERGENCY SYSTEM**

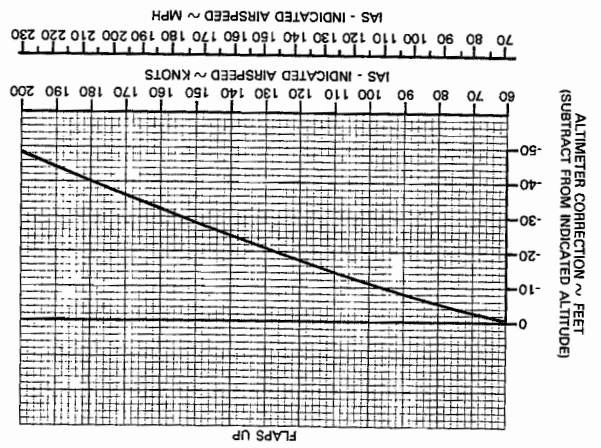


**Section V  
Performance**

**BEECHCRAFT Bonanza F33A  
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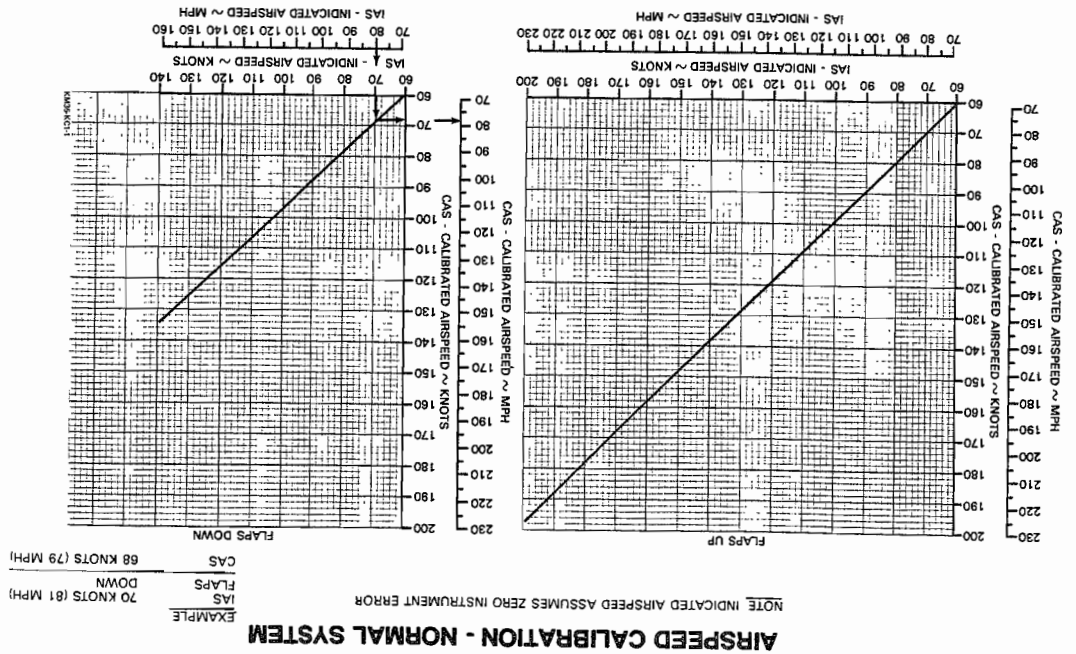


**ALTIMETER CORRECTION - NORMAL SYSTEM**

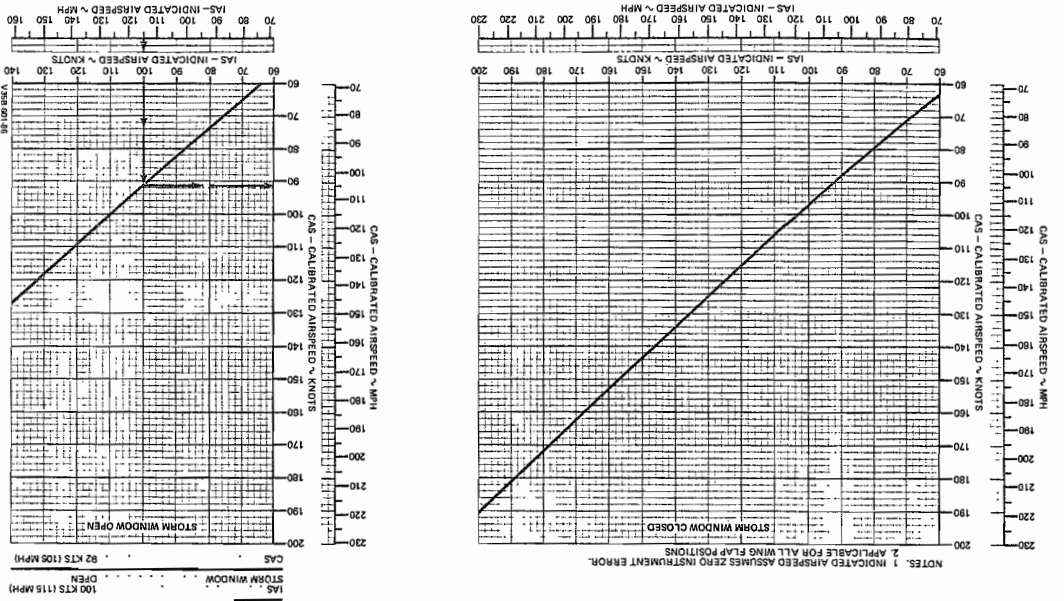


**Section V  
Performance**

**BEECHCRAFT Bonanza F33A  
CE-674 and after**



**AIRSPEED CALIBRATION - EMERGENCY SYSTEM**



**BEECHCRAFT Bonanza F33A  
CE-674 and after**

**Section V  
Performance**



TIME - FUEL - DISTANCE

ITEM	TIME HRS: MINS	FUEL GAL	DISTANCE NM
Start, Runup, Taxi and Take- off acceleration	0:00	2.0	0
Climb	0:13	3.6	27
Cruise	1:50	23.1	294
Total	2:03	28.7	321

Total Flight Time: 2 hours, 3 minutes

Block Speed:  $321 \text{ NM} \div 2 \text{ hours, 3 min.} = 157 \text{ knots}$

Reserve Fuel (45 minutes at 45 percent maximum continuous power)

Enter the cruise power settings table for 45 percent MCP (or full throttle). The fuel flow for 45 percent MCP is 9.6 gallons per hour.

Reserve fuel = (45 min) (9.6 GPH) = 7.2 gallons

Total Fuel =  $28.7 + 7.2 = 35.9$  gallons

The estimated landing weight is determined by subtracting the fuel required for the trip from the ramp weight:

Assumed ramp weight = 3412 lbs

Estimated fuel from DEN to AMA = (28.7 gal) (6 lbs/gal) = 172 lbs

Estimated landing weight = 3412 - 172 = 3240 lbs

Examples have been provided on the performance graphs. The above conditions have been used throughout. Rate of climb was determined for the initial cruise altitude conditions.

COMMENTS PERTINENT TO THE USE OF PERFORMANCE GRAPHS

1. The example, in addition to presenting an answer for a particular set of conditions, also presents the order in which the graphs should normally be used, i.e., if the first item in the example is OAT, then enter the graph at the known OAT.
2. The reference lines indicate where to begin following guide lines. Always project to the reference line first, then follow the guide lines to the next known item.
3. Indicated airspeeds (IAS) were obtained by using the AIRSPEED CALIBRATION-NORMAL SYSTEM Graph.
4. The associated conditions define the specific conditions from which performance parameters have been determined. They are not intended to be used as instructions; however, performance values determined from charts can only be achieved if specified conditions exist.
5. The full amount of usable fuel is available for all approved flight conditions.

**Section V Performance**      **BEECHCRAFT Bonanza F33A CE-674 and after**

Enter the cruise power settings table for 75 percent maximum continuous power (or full throttle) at 11,000 ft. 12,000 ft. ISA and ISA + 20°C.

	TEMPERATURE					
	ISA			ISA + 20°C		
	ALTI- TUDE FEET	MAN. PRESS. IN. HG	FUEL FLOW GPH	TAS KNOTS	MAN. PRESS. IN. HG	FUEL FLOW GPH
11000	19.2	13.1	167	19.2	12.6	167
12000	18.3	12.6	165	18.3	12.2	165

Interpolate for 11,500 feet and the temperature for the appropriate route segment. Results of the interpolations are:

ROUTE SEGMENT	MAN. PRESS. IN. HG	FUEL FLOW GPH	TAS KNOTS
DEN-PUB	18.8	12.8	166
PUB-TBE	18.8	12.7	166
TBE-DHT	18.8	12.5	166
DHT-AMA	18.8	12.5	166

**NOTE**

The above are exact values for the assumed conditions.

**BEECHCRAFT Bonanza F33A CE-674 and after**      **Section V Performance**

Time and fuel used were calculated as follows:

$$\text{Time} = \frac{\text{Distance}}{\text{Ground Speed}}$$

$$\text{Fuel Used} = (\text{Time}) (\text{Fuel Flow})$$

Results are:

ROUTE SEGMENT	DISTANCE NM	EST GROUND SPEED KNOTS	TIME AT CRUISE ALTITUDE HRS: MIN	FUEL USED FOR CRUISE GAL
DEN-COS	*28	195	:09	1.9
COS-PUB	40	192	:13	2.8
PUB-TBE	74	153	:29	6.1
TBE-DHT	87	154	:34	7.1
DHT-AMA	65	156	:25	5.2

\*Distance required to climb has been subtracted from segment distance.

**Section V Performance** **BEECHCRAFT Bonanza F33A**  
**CE-674 and after**

At Amarillo:  
 Outside Air Temperature ..... 25°C (77°F)  
 Field Elevation ..... 3605 ft  
 Altimeter Setting ..... 29.56 in. Hg  
 Wind ..... 180° at 10 kts  
 Runway 21 Length ..... 13500 ft

To determine pressure altitude at origin and destination airports, add 100 feet to field elevation for each .1 in. Hg below 29.92, and subtract 100 feet from field elevation for each .1 in. Hg above 29.92.

Pressure Altitude at DEN:  
 $29.92 - 29.60 = .32 \text{ in. Hg}$

The pressure altitude at DEN is 320 feet above the field elevation.

$5330 + 320 = 5650 \text{ ft}$

Pressure Altitude at AMA:

$29.92 - 29.56 = .36 \text{ in. Hg}$

The pressure altitude at AMA is 360 feet above the field elevation.

$3605 + 360 = 3965 \text{ ft}$

**NOTE**

For flight planning, the difference between cruise altitude and cruise pressure altitude has been ignored.

**BEECHCRAFT Bonanza F33A** **Section V Performance**  
**CE-674 and after**

Calculations for flight time, block speed and fuel requirement:

Cruise Climb:

Enter the graph for Time, Fuel, and Distance to climb at 15°C to 5650 ft and to 3400 lbs. Enter -5°C to 11500 ft and to 3400 lbs. Read:

Time to Climb = 21.0 - 8.0 = 13 min  
 Fuel Used to Climb = 6.3 - 2.7 = 3.6 gal  
 Distance Traveled = 42 - 15 = 27 NM

The cruise power setting is assumed to be at 2500 rpm. Since cruise at 11,500 feet requires full throttle, the manifold pressure and fuel flow should be read from the cruise power setting table for 75 percent maximum continuous power.

The temperatures for cruise are presented for a standard day (ISA); 20°C (36°F) above a standard day (ISA + 20°C); and 20°C (36°F) below a standard day (ISA - 20°C). These should be used for flight planning. The IOAT values are true temperature values which have been adjusted for the compressibility effects. IOAT should be used for setting cruise power while enroute.

Enter the graph for ISA conversion at 11,500 feet and the temperature for the route segment:

DEN-PUB	OAT	=	-5°C
	ISA Condition	=	ISA + 3°C
PUB-TBE	OAT	=	0°C
	ISA Condition	=	ISA + 8°C
TBE-DHT	OAT	=	9°C
	ISA Condition	=	ISA + 17°C
DHT-AMA	OAT	=	10°C
	ISA Condition	=	ISA + 18°C

**Section V  
Performance**

**BEECHCRAFT Bonanza F33A  
CE-674 and after**

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**BEECHCRAFT Bonanza F33A  
CE-674 and after**

**Section V  
Performance**

**INTRODUCTION TO PERFORMANCE AND FLIGHT  
PLANNING**

The graphs and tables in this section present performance information for flight planning at various parameters of weight, power, altitude and temperature. Examples have been presented on all performance graphs. In addition, the calculations for flight time, block speed and fuel required for a proposed flight are detailed below. All examples and calculations utilize the following conditions:

**CONDITIONS**

At Denver:  
 Outside Air Temperature ..... 15°C (59°F)  
 Field Elevation ..... 5330 ft  
 Altimeter Setting ..... 29.60 in. Hg  
 Wind ..... 270° at 10 kts  
 Runway 26L length ..... 10,010 ft

Route of Trip  
 \*DEN-V81-AMA

For VFR Cruise at 11,500 feet

ROUTE SEGMENT	MAGNETIC COURSE	DIST NM	WIND		OAT		ALT FEET	SETTING IN.HG
			11500 FEET	DIR/KTS	11500 FEET	°C		
DEN-COS	161°	55	010/30		-5		29.60	
COS-PUB	153°	40	010/30		-5		29.60	
PUB-TBE	134°	74	100/20		0		29.56	
TBE-DHT	132°	87	200/20		9		29.56	
DHT-AMA	129°	65	200/20		10		29.56	

\*REFERENCE: Enroute Low Altitude Chart L-6

BEECHCRAFT Bonanza F33A  
CE-674 and after

## SECTION V PERFORMANCE

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**Section IV**                      **BEECHCRAFT Bonanza F33A**  
**Normal Procedures**                      **CE-674 and after**

Flyover noise levels established in compliance with FAR 36 are:

Serials CE-891 and after, and CJ-156 and after:

2-Blade Propeller Using MNOP	76.6 dB(A)
3-Blade Propeller	77.3 dB(A)

**NOTE**

Flyover noise levels given are not applicable for Serials CE-674 thru CE-890 and CJ-129 thru CJ-155.

No determination has been made by the Federal Aviation Administration that the noise level of this airplane is or should be acceptable or unacceptable for operation at, into or out of any airport.

**Section IV**                      **BEECHCRAFT Bonanza F33A**  
**Normal Procedures**                      **CE-674 and after**

**ENGINE**

Use engine oil in accordance with Consumable Materials in the HANDLING, SERVICING AND MAINTENANCE Section. Always pull the propeller through by hand, opposite the direction of rotation, several times to clear the engine and "limber up" the cold, heavy oil before using the starter. This will also lessen the load on the battery if external power is not used.

Under very cold conditions, it may be necessary to preheat the engine prior to a start. Particular attention should be given to the oil cooler, engine sump and propeller hub to ensure proper preheat. A start with congealed oil in the system may produce an indication of normal pressure immediately after the start, but then the oil pressure may decrease when residual oil in the engine is pumped back with the congealed oil in the sump. If an engine heater capable of heating both the engine sump and cooler is not available, the oil should be drained while the engine is hot and stored in a warm area until the next flight.

If there is no oil pressure within the first 30 seconds of running, or if oil pressure drops after a few minutes of ground operation, shut down and check for broken oil lines, oil cooler leaks or the possibility of congealed oil.

**NOTE**

It is advisable to use external power for starting in cold weather.

During warm-up, monitor engine temperatures closely, since it is possible to exceed the cylinder head temperature limit in trying to bring up the oil temperature. Exercise the propeller several times to remove cold oil from the pitch change mechanism. The propeller should also be cycled occasion-

**BEECHCRAFT Bonanza F33A**                      **Section IV**  
**CE-674 and after**                      **Normal Procedures**

ally in flight.

During letdown and landing, give special attention to engine temperatures, since the engine will have a tendency toward overcooling.

**ICING CONDITIONS**

Flight in known icing conditions is prohibited.

**NOISE CHARACTERISTICS**

Approach to and departure from an airport should be made so as to avoid prolonged flight at low altitude near noise-sensitive areas. Avoidance of noise-sensitive areas, if practical, is preferable to overflight at relatively low altitudes.

For VFR operations over outdoor assemblies of persons, recreational and park areas, and other noise-sensitive areas, pilots should make every effort to fly not less than 2000 feet above the surface, weather permitting, even though flight at a lower level may be consistent with the provisions of government regulations.

**NOTE**

The preceding recommended procedures do not apply where they would conflict with Air Traffic Control clearances or instructions, or where, in the pilot's judgement, an altitude of less than 2000 feet is necessary to adequately exercise his duty to see and avoid other airplanes.

**BEECHCRAFT Bonanza F33A**      **Section IV**  
**CE-674 and after**      **Normal Procedures**

**AFTER USING**

1. Discontinue use by unplugging mask from outlet.

**NOTE**

Closing the control valve while in flight is not necessary due to automatic sealing of the outlet when the mask is unplugged. However, it is desirable to shut off supply when not in use.

2. Oxygen Control Valve - CLOSED (may be accomplished during shut-down)

**HEATING AND VENTILATION**

Refer to the SYSTEMS DESCRIPTION Section for operation of heating and ventilation controls.

**COLD WEATHER OPERATION**

**PREFLIGHT INSPECTION**

All accumulations of ice, snow and frost must be removed from the wings, tail, control surfaces and hinges, propeller, windshield, fuel cell filler caps, crankcase vents, and fuel vents. If such accumulations are not removed completely, the airplane shall not be flown. The deposits will not blow off in flight. While an adverse weight factor is clearly involved in the case of heavy deposits, it is less obvious that even slight accumulations will disturb or completely destroy the designed aerodynamic properties of the airfoils.

The normal preflight procedures should then be completed, with particular attention given to check of flight controls for complete freedom of movement.

**October, 1976**

**4-17**

**Section IV**      **BEECHCRAFT Bonanza F33A**  
**Normal Procedures**      **CE-674 and after**

The following data compiled on the basis of 90% of bottle capacity.

**OXYGEN DURATION CHART**

Duration in minutes at the following altitudes:

Bottle Capacity	Persons Using	12,500	15,000	20,000
		FT	FT	FT
49 cu ft	1	1014	746	507
	2	507	373	253
	3	338	248	169
	4	253	186	126
	5	202	149	101

**WARNING**

**NO SMOKING** when using oxygen.

**IN FLIGHT**

The use of oxygen is recommended to be in accordance with current FAR operating rules.

1. Oxygen Control Valve - OPEN SLOWLY
2. Mask - INSERT FITTING, DON MASK (adjust mask for proper fit)
3. Oxygen - CHECK INDICATOR FOR FLOW

**4-16**

**October, 1976**



**Section IV** **BEECHCRAFT Bonanza F33A** **Section IV**  
**Normal Procedures** **CE-674 and after** **Normal Procedures**

**SHUTDOWN**

1. Brakes - SET
2. Electrical and Radio Equipment - OFF
3. Throttle - CLOSE
4. Mixture - IDLE CUT-OFF
5. Magneto/Start Switch - OFF after engine stops
6. Battery and Alternator Switches - OFF
7. Control Lock - INSTALL if conditions warrant
8. Wheel Chocks - INSTALL; Parking Brake - RELEASE

**ENVIRONMENTAL SYSTEMS**

**OXYGEN SYSTEM**

**PREFLIGHT**

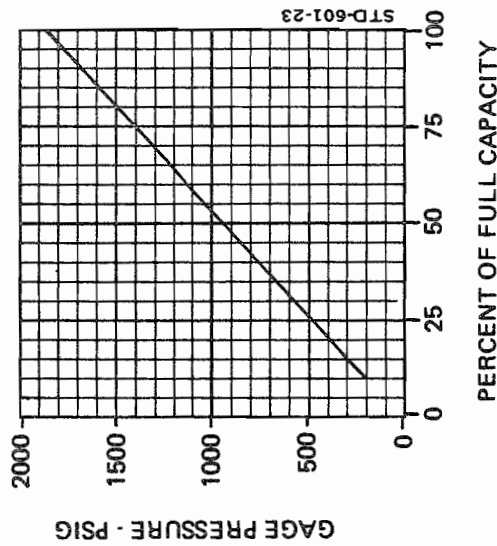
1. Check Oxygen Pressure Gage for pressure reading.
2. Determine percent of full system.
3. Multiply oxygen duration in minutes by percent of full bottle.

**EXAMPLE:**

People.....5  
 Gage Pressure..... 1500 psig  
 Percent Capacity (from chart)..... 80%  
 Cylinder Capacity (full)..... 49 cu ft  
 Altitude (planned flight)..... 15,000 ft  
 Duration (90% full)..... 149 min  
 Duration (80% full)..... 119 min

**BEECHCRAFT Bonanza F33A** **Section IV**  
**CE-674 and after** **Normal Procedures**

**OXYGEN AVAILABLE WITH PARTIALLY FULL BOTTLE**



**OXYGEN DURATION**

The recommended masks are provided with the system. They are designed to be adjustable to fit the average person, with minimum leakage of oxygen.

**CAUTION**

Since 90% of the system efficiency is determined by the fit of the oxygen mask, make certain the masks fit properly and are in good condition.

**BEECHCRAFT Bonanza F33A**      **Section IV**  
**CE-674 and after**      **Normal Procedures**

3. Power - AS REQUIRED (avoid prolonged idle settings and low cylinder head temperatures)
4. Mixture - ENRICH AS REQUIRED

**BEFORE LANDING**

1. Seat Belts and Shoulder Harnesses - FASTENED; Seat Backs - UPRIGHT
2. Fuel Selector Valve - SELECT TANK MORE NEARLY FULL
3. Cowl Flaps - AS REQUIRED
4. Mixture - FULL RICH or as required by field elevation
5. Landing Gear - DOWN AND CHECK (Observe maximum extension speed)
6. Landing and Taxi Lights - AS REQUIRED
7. Flaps - FULL DOWN (Observe maximum extension speed)
8. Airspeed - ESTABLISH NORMAL LANDING APPROACH SPEED
9. Propeller - HIGH RPM

**BALKED LANDING**

1. Power - FULL THROTTLE, 2700 RPM
2. Airspeed - 70 KTS until clear of obstacles, then trim to normal climb speed
3. Flaps - UP
4. Landing Gear - UP
5. Cowl Flaps - OPEN

**AFTER LANDING**

1. Landing and Taxi Lights - AS REQUIRED
2. Flaps - UP
3. Trim Tab - SET TO 0°
4. Cowl Flaps - OPEN

**December, 1982**

**4-13**

**Section IV**      **BEECHCRAFT Bonanza F33A**  
**Normal Procedures**      **CE-674 and after**

**CRUISE**

See Cruise Charts in PERFORMANCE Section

1. Cowl Flaps - CLOSED
2. Power - SET
3. Mixture - SET FUEL FLOW

**LEANING USING THE EXHAUST GAS TEMPERATURE INDICATOR (EGT)**

A thermocouple-type exhaust gas temperature (EGT) probe is mounted in the right side of the exhaust system. This probe is connected to an indicator on the right side of the instrument panel. The indicator is calibrated in degrees Fahrenheit. Use EGT system to lean the fuel/air mixture when cruising at 75% power or less in the following manner:

1. Lean the mixture and note the point on the indicator that the temperature peaks and starts to fall.
  - a. CRUISE (LEAN) MIXTURE - Increase the mixture until the EGT shows a drop of 25°F below peak on the rich side of peak.
  - b. BEST POWER MIXTURE - Increase the mixture until the EGT shows a drop of 100°F below peak on the rich side of peak.

**CAUTION**

Do not continue to lean mixture beyond that necessary to establish peak temperature.

2. Continuous operation is recommended at 25°F or more below peak EGT only on the rich side of peak.
3. Changes in altitude and power settings require the peak EGT to be rechecked and the mixture reset.

**DESCENT**

1. Altitude - SET
2. Cowl Flaps - CLOSED

**4-12**

**September, 1979**

**BEECHCRAFT Bonanza F33A** Section IV  
CE-674 and after Normal Procedures

11. Flaps - UP
12. Doors and Windows - SECURE (serials CE-1301, CE-1307 and after; CJ-180 and after - check cabin door lock indicator - CLOSED)
13. Flight Controls - CHECK PROPER DIRECTION AND FREEDOM OF MOVEMENT
14. Mixture - FULL RICH or as required by field elevation
15. Brakes - RELEASED
16. Instruments - CHECK (Make final check of manifold pressure, fuel flow, and rpm at the start of take-off run.)

**TAKEOFF**

- Take-off Power.....Full Throttle, 2700 RPM
1. Power - SET TAKE-OFF POWER (Mixture - SET as required by field elevation)
  2. Brakes - RELEASE, THEN ACCELERATE to recommended speed
  3. Landing Gear - RETRACT when positive rate of climb is established
  4. Airspeed - ESTABLISH DESIRED CLIMB SPEED when clear of obstacles

**CLIMB**

- Maximum Continuous Power  
(Serials CE-674 thru CE-890 with 2- or 3-Blade Propeller installed, and CE-891 and after with McCauley 3-Blade Propeller installed)  
(Serials CJ-129 thru CJ-155)..... Full Throttle, 2700 rpm  
Maximum Normal Operating Power  
(Serials CE-891 and after with 2-Blade Propeller installed)  
(Serials CJ-156 and after)..... Full Throttle, 2550 rpm  
Cruise Climb Power.....25 in. Hg at 2500 rpm

1. Engine Temperatures - MONITOR
2. Power - SET
3. Mixture - SET FUEL FLOW

**BEECHCRAFT Bonanza F33A** Section IV  
CE-674 and after Normal Procedures

1. Brakes - RELEASE AND CHECK
2. Avionics Equipment - ON, AS REQUIRED
3. Lights - AS REQUIRED

**CAUTION**

Do not operate engine above 1200 RPM until oil temperature reaches 24°C.

**BEFORE TAKEOFF**

1. Seat Belts and Shoulder Harnesses - CHECK
2. Parking Brake - SET
3. Radios - CHECK
4. Engine Instruments - CHECK
5. Flight Instruments - CHECK AND SET

**NOTE**

To ensure adequate gyro pressure when operating two air-driven gyros during ground operation and/or holding prior to takeoff, maintain an engine speed of 700-800 rpm in order to hold a value of 4.3 in. Hg on the instrument pressure gage. With a requirement of three or more air-driven gyros, maintain an engine speed of 1200 rpm.

6. Starter Energized Warning Light (if installed) - CHECK (should not be lit). If light is not installed or is inoperative, check ammeter for stabilized indication between 0 and 25% of full charge at 1000 to 1200 rpm.
7. Throttle - 1700 RPM
8. Propeller - EXERCISE to obtain 300 to 400 rpm drop, then return to high rpm
9. Magnetos - CHECK at 1700 rpm on each magneto (variance between individual magnetos should not exceed 50 rpm; maximum drop should not exceed 150 rpm.)
10. Trim - SET
  - a. Aileron - NEUTRAL
  - b. Elevator - 0° (3° nose up if only front seats are occupied)

**Section IV**                      **BEECHCRAFT Bonanza F33A**  
**Normal Procedures**                      **CE-674 and after**

**STARTING ENGINE USING AUXILIARY POWER UNIT**

1. Alternator, and Avionics Equipment - OFF
2. Battery Switch - ON
3. Auxiliary Power Unit - CONNECT
4. Auxiliary Power Unit - (28-volt system - SET OUTPUT 27.0 to 28.5 volts)  
(14-volt system - SET OUTPUT 13.5 to 14.25 volts)
5. Auxiliary Power Unit - ON
6. Engine START using normal procedures
7. Auxiliary Power Unit - OFF (after engine has been started)
8. Auxiliary Power Unit - DISCONNECT
9. Alternator Switch - ON

**STARTING**

Vernier-type engine controls should not be rotated clockwise after being advanced to the full forward position.

1. Mixture - FULL RICH
2. Propeller - HIGH RPM
3. Throttle - FULL OPEN

**NOTE**

If the engine is hot, and the ambient temperature is 90°F or above, place mixture control in IDLE CUT-OFF, switch aux fuel pump to ON for 30 to 60 seconds, then OFF. Return mixture control to FULL RICH.

4. Auxiliary Fuel Pump - ON until fuel flow peaks then OFF
5. Throttle - OPEN ¼ inch APPROXIMATELY
6. Magneto/Start Switch - START position; release to BOTH position when engine fires.

**BEECHCRAFT Bonanza F33A**                      **Section IV**  
**CE-674 and after**                      **Normal Procedures**

**CAUTION**

Do not engage starter for more than 30-seconds in any 4-minute time period.

7. In Event of Overprime Condition:
  - a. Mixture - IDLE CUT-OFF
  - b. Throttle - OPEN
  - c. Magneto/Start Switch - START position
  - d. As engine fires, reduce throttle to IDLE and advance the mixture control to FULL RICH.

**NOTE**

During hot starts, turn the Auxiliary Fuel Pump ON momentarily after starting to purge the system, then turn OFF.

8. Throttle - 1000 to 1200 RPM
9. Oil Pressure - CHECK
10. External Power (if used) - DISCONNECT
11. Alternator Switch - ON; CHECK FOR CHARGING
12. All Engine Indicators - CHECK
13. Starter Energized Warning Light (if installed) - CHECK; should be illuminated during start and extinguished after start.

**CAUTION**

If starter energized warning light is inoperative or is not installed, the ammeter indication should be less than 25% of full charge at 1000 to 1200 rpm within two minutes, with no additional equipment on. If not, turn off the battery and alternator switches and do not take off.

**AFTER STARTING, AND TAXI**

**CAUTION**

Never taxi with a flat shock strut.

**Section IV  
Normal Procedures**

**BEECHCRAFT Bonanza F33A  
CE-674 and after**

8. NOSE SECTION:
- a. Left Cowl Flap - CHECK
  - b. Engine Oil - CHECK; Cap - SECURE
  - c. Left Cowl - SECURE
  - d. Propeller - CHECK
  - e. Wheel Well Doors, Tire and Strut - CHECK
  - f. Landing and Taxi Lights - CHECK
  - g. Induction Air Intake - CLEAR
  - h. Engine - CHECK GENERAL CONDITION
  - i. Right Cowl - SECURE
  - j. Right Cowl Flap - CHECK
  - k. Chocks - REMOVE

9. RIGHT LANDING GEAR:

- a. Fuel Vent - CHECK
- b. Fuel Sump - DRAIN
- c. Wheel Well Door, Tire and Strut - CHECK

10. RIGHT WING LEADING EDGE:

- a. Cabin Air Intake - CHECK
- b. Tie Down and Chocks - REMOVE
- c. Fuel Tank - CHECK QUANTITY; Filler Cap SECURE

11. RIGHT WING TRAILING EDGE:

- a. Position Light - CHECK
- b. Wing Tip - CHECK
- c. Aileron - CHECK
- d. Flap - CHECK

**BEFORE STARTING**

- 1. Seats - POSITION AND LOCK; Seat Backs - UPRIGHT
- 2. Seat Belts and Shoulder Harnesses - FASTEN
- 3. Parking Brake - SET
- 4. All Avionics - OFF
- 5. Circuit Breakers - IN

**BEECHCRAFT Bonanza F33A  
CE-674 and after**

**Section IV  
Normal Procedures**

- 6. Landing Gear Handle - DOWN
- 7. Flaps - UP
- 8. Cowl Flaps - OPEN
- 9. Light Switches - OFF
- 10. Electric Elevator Trim Switch - OFF
- 11. Fuel Selector Valve - CHECK OPERATION THEN SELECT TANK MORE NEARLY FULL
- 12. Battery and Alternator Switches - ON (if external power is used, turn Alternator Switch - OFF)
- 13. Fuel Quantity Indicators - CHECK QUANTITY

**WARNING**

Do not take off if gages indicate in yellow arc or with less than 13 gallons in each tank.

**EXTERNAL POWER**

The following precautions shall be observed while using external power:

**CAUTION**

Never use external power without a battery installed in the system.

- 1. The Battery Switch shall be ON and all avionics and electrical switches OFF. This protects the voltage regulators and associated electrical equipment from voltage transients (power fluctuations).
- 2. The airplane has a negative ground system. Connect the positive and negative leads of the external power unit to the corresponding positive and negative terminals of the airplane's external power receptacle.
- 3. In order to prevent arcing, no power shall be supplied while the connection is being made.

**BEECHCRAFT Bonanza F33A** Section IV  
**CE-674 and after** Normal Procedures

3. EMPENNAGE:
- a. Control Surfaces - CHECK
  - b. Tie Down - REMOVE
  - c. Position Light - CHECK
  - d. Cabin Air Intake - CHECK

4. LEFT FUSELAGE:
- a. Static Pressure Button - UNOBSTRUCTED
  - b. All Antennas - CHECK

5. LEFT WING TRAILING EDGE:
- a. Flap - CHECK
  - b. Aileron - CHECK
  - c. Wing Tip - CHECK
  - d. Position Light - CHECK

6. LEFT WING LEADING EDGE:
- a. Stall Warning - CHECK
  - b. Pitot Tube - CHECK; Cover - REMOVE
  - c. Fuel Tank - CHECK QUANTITY; Filler Cap - SECURE
  - d. Cabin Air Intake - CHECK
  - e. Tie Down and Chocks - REMOVE

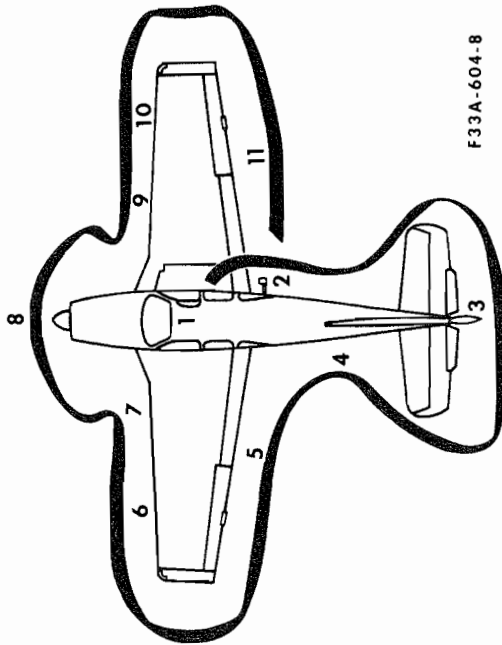
7. LEFT LANDING GEAR:
- a. Wheel Well Door, Tire and Strut - CHECK
  - b. Fuel Vent - CHECK
  - c. Fuel Sump - DRAIN
  - d. Fuel Selector Valve Sump (located under access cover on fuselage) - DRAIN; Cover - SECURE

December, 1962

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**BEECHCRAFT Bonanza F33A** Section IV  
**CE-674 and after** Normal Procedures

**PREFLIGHT INSPECTION**



1. CABIN:
- a. Parking Brake - SET
  - b. Control Lock - REMOVE
  - c. All Switches - OFF

2. RIGHT FUSELAGE:
- a. Baggage Compartment Door - SECURE
  - b. Static Pressure Button - UNOBSTRUCTED
  - c. Emergency Locator Transmitter - ARMED

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October, 1976

## SECTION IV NORMAL PROCEDURES

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All airspeeds quoted in this section are indicated airspeeds (IAS).

### AIR SPEEDS FOR SAFE OPERATION (3400 LBS)

Maximum Demonstrated Crosswind Component . . . . .	17 KTS
Takeoff:	
Lift-off . . . . .	71 KTS
50-ft Speed . . . . .	77 KTS
Best Angle-of-Climb (V <sub>X</sub> ) . . . . .	77 KTS
Best Rate-of-Climb (V <sub>Y</sub> ) . . . . .	96 KTS
Cruise Climb . . . . .	107 KTS
Turbulent Air Penetration . . . . .	134 KTS
Landing Approach (Flaps Down) . . . . .	70 KTS
Balked Landing Climb . . . . .	70 KTS

**Section III**                    **BEECHCRAFT Bonanza F33A**  
**Emergency Procedures**                    **CE-674 and after**

**EMERGENCY SPEED REDUCTION**

In an emergency, the landing gear may be used to create additional drag. Should disorientation occur under instrument conditions, the lowering of the landing gear will reduce the tendency for excessive speed buildup. This procedure would also be appropriate for a non-instrument rated pilot who unavoidably encounters instrument conditions or in other emergencies such as severe turbulence.

Should the landing gear be used at speeds higher than the maximum extension speed, a special inspection of the gear doors in accordance with maintenance manual procedures is required, with repair as necessary.



**Section III**                      **BEECHCRAFT Bonanza F33A**                      **Section III**  
**Emergency Procedures**                      **CE-674 and after**                      **Emergency Procedures**

Whenever any obstruction exists in the Normal Static Air System or the Emergency Static Air System is desired for use:

1. Pilot's Emergency Static Air Source - Switch to ON EMERGENCY.
2. For Airspeed Calibration and Altimeter Correction, refer to PERFORMANCE Section.

**NOTE**

The Emergency Static Air valve should be in the NORMAL position when the system is not needed.

**EMERGENCY EXITS**

Emergency exits, provided by the openable window on each side of the cabin, may be used for egress in addition to the cabin door and the optional cargo door.

**NOTE**

For access past the 3rd and/or 4th seats, rotate the red handle, located on the lower inboard side of the seat back, and fold the seat back over.

**To Open Each Emergency Exit:**

Serials CE-674 thru CE-928, Except CE-919, CE-923, CE-925 and CE-927; CJ-129 thru CJ-155:

An emergency exit placard is installed below the left and right openable windows.

1. Lift the latch.
2. Pull out the emergency release pin and push the window out.

**BEECHCRAFT Bonanza F33A**                      **Section III**  
**CE-674 and after**                      **Emergency Procedures**

Serials CE-919, CE-923, CE-925, CE-927, CE-929 and after; CJ-156 and after:

1. Remove cover as indicated by placard in the center of the Ventilation/Emergency Exit latch.
2. Rotate handle up as indicated by placard, breaking safety wire, and push window out.

**NOTE**

Anytime the window has been opened by breaking the safety wire on the red emergency latch, the window must be reattached and wired by a qualified mechanic using QQ-W-343, Type S, .020 diameter copper wire prior to further airplane operation.

**UNLATCHED DOOR IN FLIGHT**

If the cabin door is not locked it may unlatch in flight. This may occur during or just after takeoff. The door will trail open approximately 3 inches but the flight characteristics of the airplane will not be affected, except that rate of climb will be reduced. Return to the field in a normal manner. If practicable, during the landing flare-out have a passenger hold the door to prevent it swinging open.

**SPINS**

Spins are prohibited. If a spin is entered inadvertently:

Immediately move the control column full forward and simultaneously apply full rudder opposite to the direction of the spin; continue to hold this control position until rotation stops and then neutralize all controls and execute a smooth pullout. Ailerons should be neutral and throttle in idle position at all times during recovery.

**Section III**                      **BEECHCRAFT Bonanza F33A**                      **Section III**  
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**NOTE**

Do not attempt to operate the electric trim system until the cause of the malfunction has been determined and corrected.

**LANDING GEAR MANUAL EXTENSION**

Manual extension of the landing gear can be facilitated by first reducing airspeed. Then proceed as follows:

1. LDG GR MOTOR Circuit Breaker (Right Subpanel) - OFF (pull out)
2. Landing Gear Switch Handle - DOWN position
3. Handcrank Handle Cover (at rear of front seats) - REMOVE
4. Handcrank - ENGAGE and TURN COUNTERCLOCKWISE AS FAR AS POSSIBLE (approximately 50 turns)

**CAUTION**

The manual extension system is designed to lower the landing gear only. **DO NOT ATTEMPT TO RETRACT THE GEAR MANUALLY.**

5. If electrical system is operative, check landing gear position lights and warning horn (check LDG GR RELAY circuit breaker engaged).
6. Handcrank - DISENGAGE. Always keep it stowed when not in use.

**WARNING**

Do not operate the landing gear electrically with the handcrank engaged, as damage to the mechanism could occur.

After emergency landing gear extension, do not move any landing gear controls or reset any switches or circuit breakers until airplane is on jacks, as failure may have been in the gear-up circuit and gear might retract.

**BEECHCRAFT Bonanza F33A**                      **Section III**  
**CE-674 and after**                      **Emergency Procedures**

**LANDING GEAR RETRACTION AFTER PRACTICE MANUAL EXTENSION**

After practice manual extension of the landing gear, the gear can only be retracted electrically, as follows:

1. Handcrank - CHECK, STOWED
2. Landing Gear Motor Circuit Breaker - IN
3. Landing Gear Switch Handle - UP

**NOTE**

On S/N CE-1301, CE-1307 and after, and CJ-180 and after, the landing gear will not retract unless the throttle is in a position corresponding to approximately 17 in. Hg manifold pressure or above.

**INDUCTION SYSTEM ICING**

If the induction system alternate air source door becomes frozen in the closed position, the Alternate Air Pull and Release Control T-handle should be pulled and released to force the door open.

**EMERGENCY STATIC AIR SOURCE SYSTEM**

**THE EMERGENCY STATIC AIR SOURCE SHOULD BE USED FOR CONDITIONS WHERE THE NORMAL STATIC SOURCE HAS BEEN OBSTRUCTED.** When the airplane has been exposed to moisture and/or icing conditions (especially on the ground), the possibility of obstructed static ports should be considered. Partial obstruction will result in the rate of climb indication being sluggish during a climb or descent. Verification of suspected obstruction is possible by switching to the emergency system and noting a sudden sustained change in rate of climb. This may be accompanied by abnormal indicated airspeed and altitude changes beyond normal calibration differences.

**BEECHCRAFT Bonanza F33A**  
**CE-674 and after**

**Section III**  
**Emergency Procedures**

illumination of the warning light, located on the instrument panel below the flight instruments.

The warning light will not illuminate until the alternator output is almost zero. A verification of alternator malfunction would be a discharge shown on the ammeter. There is no indication of overvoltage except that the warning light will illuminate as though the alternator is out.

*Alternator Warning Light Illuminated:*

1. Verify alternator out with ammeter - will show discharge.

**NOTE**

If the ammeter does not show a discharge, a malfunction in the warning light system is indicated, and the alternator switch should be left ON.

2. If ammeter shows a discharge, Alternator Switch - OFF **MOMENTARILY, THEN ON** (this resets the overvoltage relay)

If the warning light does not illuminate, continue to use the alternator.

3. If the warning light illuminates, Alternator Switch - OFF
4. Nonessential Electrical Equipment - OFF to conserve battery power.

**UNSCHEDULED ELECTRIC ELEVATOR TRIM**

1. Airplane Attitude - MAINTAIN using elevator control
2. Elevator Trim Thumb Switch (On Control Wheel) - MOVE IN DIRECTION OPPOSITE UNSCHEDULED PITCH TRIM to open circuit breaker
3. Elevator Trim ON-OFF Switch (On Instrument Panel) - OFF
4. Manual Elevator Trim Control Wheel - RETRIM AS DE-SIRED

**Section III**      **BEECHCRAFT Bonanza F33A**      **Section III**  
**Emergency Procedures**      **CE-674 and after**      **Emergency Procedures**

**LANDING GEAR RETRACTED - WITH POWER**

If possible, choose firm sod or foamed runway. Make a normal approach, using flaps as necessary. When sure of reaching the selected landing spot:

**NOTE**

On S/N CE-1301, CE-1307 and after, and CJ-180 and after, the landing gear will not retract unless the throttle is in a position corresponding to approximately 17 in. Hg manifold pressure or above.

1. Throttle - CLOSED
2. Mixture - IDLE CUT-OFF
3. Battery, Alternator and Magneto/Start Switches - OFF
4. Fuel Selector Valve - OFF
5. Keep wings level during touchdown.
6. Get clear of airplane as soon as possible after it stops.

**SYSTEMS EMERGENCIES**

**PROPELLER OVERSPEED**

1. Throttle - RETARD TO RED LINE

**NOTE**

On S/N CE-1301, CE-1307 and after, and CJ-180 and after, the landing gear will not retract unless the throttle is in a position corresponding to approximately 17 in. Hg manifold pressure or above.

**BEECHCRAFT Bonanza F33A**      **Section III**  
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2. Airspeed - REDUCE
3. Oil Pressure - CHECK

**WARNING**

If loss of oil pressure was the cause of overspeed, the engine will seize after a short period of operation.

4. Land - SELECT NEAREST SUITABLE SITE and follow LANDING EMERGENCIES procedure.

**STARTER ENERGIZED WARNING LIGHT ILLUMINATED**  
(If installed)

After engine start, should the starter relay remain engaged, the starter will remain energized and the starter energized warning light will remain illuminated. Continuing to supply power to the starter will result in eventual loss of electrical power.

*On the Ground:*

1. Battery and alternator switches - OFF.
2. Do not take off.

*In Flight After Air Start:*

1. Battery and alternator switches - OFF.
2. Land as soon as practical.

**ALTERNATOR-OUT PROCEDURE**

An inoperative alternator will place the entire electrical operation of the airplane except engine ignition on the battery. An alternator failure will be indicated by

Section III  
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BEECHCRAFT Bonanza F33A  
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**ENGINE FIRE**

**IN FLIGHT**

The red FIREWALL AIR control on the outboard side of the left lower subpanel should be pulled to close off all heating system outlets so that smoke and fumes will not enter the cabin. In the event of engine fire, shut down the engine as follows and make a landing:

1. Firewall Air Control - PULL TO CLOSE
2. Mixture - IDLE CUT-OFF
3. Fuel Selector Valve - OFF
4. Battery, Alternator, and Magneto/Start Switches - OFF (Extending the landing gear can be accomplished manually if desired.)
5. Do not attempt to restart engine. (See GLIDE and LANDING WITHOUT POWER Procedures)

**ON THE GROUND**

1. Fuel Selector Valve - OFF
2. Mixture - IDLE CUT-OFF
3. Battery, Alternator and Magneto/Start Switches - OFF
4. Fire Extinguisher - USE TO EXTINGUISH FIRE

**EMERGENCY DESCENT**

1. Power - IDLE
2. Propeller - HIGH RPM
3. Landing Gear - DOWN
4. Airspeed - ESTABLISH 154 KTS

**MAXIMUM GLIDE CONFIGURATION**

1. Landing Gear - UP

**NOTE**

On S/N CE-1301, CE-1307 and after, and CJ-180 and after, the landing gear will not retract unless the throttle is in a position corresponding to approximately 17 in. Hg manifold pressure or above.

2. Flaps - UP
3. Cowl Flaps - CLOSED
4. Propeller - PULL for LOW RPM
5. Airspeed - 105 KTS

Glide distance is approximately 1.7 nautical miles (2 statute miles) per 1000 feet of altitude above the terrain.

**LANDING EMERGENCIES**

**LANDING WITHOUT POWER**

When assured of reaching the landing site selected, and on final approach:

1. Airspeed - ESTABLISH 78 TO 83 KTS
2. Fuel Selector Valve - OFF
3. Mixture - IDLE CUT-OFF
4. Magneto/Start Switch - OFF
5. Flaps - AS REQUIRED
6. Landing Gear - DOWN or UP (depending on terrain)

**NOTE**

On S/N CE-1301, CE-1307 and after, and CJ-180 and after, the landing gear will not retract unless the throttle is in a position corresponding to approximately 17 in. Hg manifold pressure or above.

7. Battery and Alternator Switches - OFF

**Section III**                      **BEECHCRAFT Bonanza F33A**  
**Emergency Procedures**                      **CE-674 and after**

**ENGINE FAILURE**

**DURING TAKE-OFF GROUND ROLL**

1. Throttle - CLOSED
2. Braking - MAXIMUM
3. Fuel Selector Valve - OFF
4. Battery and Alternator Switches - OFF

**AFTER LIFTOFF AND IN FLIGHT**

*Landing straight ahead is usually advisable. If sufficient altitude is available for maneuvering, accomplish the following:*

1. Fuel Selector Valve - SELECT OTHER TANK (feel for detent)
2. Auxiliary Fuel Pump - ON
3. Mixture - FULL RICH, then LEAN AS REQUIRED
4. Magnetos - CHECK LEFT RIGHT, then BOTH ON

**NOTE**

The most probable cause of engine failure would be loss of fuel flow or improper functioning of the ignition system.

*If No Restart:*

1. Select most favorable landing site.
2. The use of landing gear is dependent on the terrain where landing must be made.

**BEECHCRAFT Bonanza F33A**                      **Section III**  
**CE-674 and after**                      **Emergency Procedures**

**ENGINE DISCREPANCY CHECKS**

**CONDITION: ROUGH RUNNING ENGINE**

1. Mixture - FULL RICH, then LEAN as required
2. Magneto/Start Switch - "BOTH" position (check to verify)

**CONDITION: LOSS OF ENGINE POWER**

1. Fuel Flow Gage - CHECK

*If fuel flow is abnormally low:*

- a. Mixture - FULL RICH
- b. Auxiliary Fuel Pump - ON (then OFF if performance does not improve in a few moments)

2. Fuel Quantity Indicator - CHECK for fuel supply in tank being used

*If tank being used is empty:*

Fuel Tank Selector Valve - SELECT OTHER FUEL TANK (feel for detent)

**AIR START PROCEDURE**

1. Fuel Selector Valve - SELECT TANK MORE NEARLY FULL (feel for detent)
2. Throttle - RETARD
3. Mixture Control - FULL RICH
4. Auxiliary Fuel Pump - ON until power is regained, then OFF (Leave On if Engine Driven Fuel Pump is inoperative.)
5. Throttle - ADVANCE to desired power
6. Mixture - LEAN as required

**BEECHCRAFT Bonanza F33A  
CE-674 and after**

**Section III  
Emergency Procedures**

*All airspeeds quoted in this section are indicated airspeeds (IAS).*

**EMERGENCY AIRSPEEDS (3400 LBS)**

Emergency Descent .....	154 KTS
Maximum Glide Range .....	105 KTS
Emergency Landing Approach .....	83 KTS

The following information is presented to enable the pilot to form, in advance, a definite plan of action for coping with the most probable emergency situations which could occur in the operation of the airplane. Where practicable, the emergencies requiring immediate corrective action are treated in check list form for easy reference and familiarization. Other situations, in which more time is usually permitted to decide on and execute a plan of action, are discussed at some length.

**Section III  
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**BEECHCRAFT Bonanza F33A  
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CE-674 and after

## SECTION III EMERGENCY PROCEDURES

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**Section II**  
**Limitations**

**Section II**  
**Limitations**

**BEECHCRAFT Bonanza F33A**  
**CE-674 and after**

*On Handle of Emergency Exit Handle (Serials CE-919, CE-923, CE-925, CE-927, CE-929 and after; CJ-156 and after):*

**ROTATE HANDLE UP  
BREAKING SAFETY  
WIRE  
PUSH WINDOW OUT**

*On Middle Windows (openable):*

**DO NOT OPEN  
IN FLIGHT**

**LATCH WINDOW  
BEFORE TAKE-OFF**

*Above Middle-window Handles (Serials CE-984 and after; CJ-156 and after):*



*On Inside of Cabin Door Adjacent to Door Handle (Serials CE-1301, CE-1307 and after; CJ-180 and after):*



*Above Inside Door Handle:*

**ROTATE HANDLE TO  
FULL LOCKED POSITION**



*On Hat Shelf:*

**HAT SHELF  
NO HEAVY OBJECTS**

*On Inside of Baggage Compartment Door:*

**BAGGAGE COMPARTMENT AND/OR FIFTH SEAT  
LOAD IN ACCORDANCE WITH  
AIRCRAFT FLIGHT MANUAL  
MAXIMUM STRUCTURAL CAPACITY — 270 POUNDS**

**Section II**  
**Limitations**

**BEECHCRAFT Bonanza F33A**  
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**Section II**  
**Limitations**

**BEECHCRAFT Bonanza F33A**  
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*Below Left and Right Middle Windows after compliance with BEECHCRAFT Service Instructions 1241:*

*(Serials CE-674 thru CE-928, except CE-919, CE-923, CE-925, and CE-927; CJ-129 thru CJ-155):*

**EMERGENCY EXIT**  
**LIFT LATCH - PULL PIN**  
**PUSH WINDOW OUT**

*On the Face of Emergency Exit Latch Cover (Serials CE-919, CE-923, CE-925, CE-927, CE-929 and after; CJ-156 and after):*

**EMERGENCY EXIT**  
**PULL COVER**  
**ROTATE HANDLE UP**  
**BREAKING SAFETY WIRE**  
**PUSH WINDOW OUT**

**Section II**  
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**BEECHCRAFT Bonanza F33A**  
**CE-674 and after**

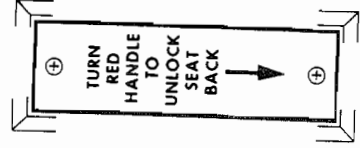
*On Windows Adjacent To Pilot's And Copilot's Seats:*

**SHOULDER HARNESS**  
**MUST BE WORN AT**  
**ALL TIMES WHILE AT**  
**PILOT POSITIONS**

*On Windows, Adjacent To 3rd, 4th & 5th Seats:*

**SHOULDER HARNESS**  
**MUST BE WORN DURING**  
**TAKE-OFF AND LANDING**  
**WITH SEAT BACK UPRIGHT**

*On Inboard Side Of Seat Back For 3rd & 4th Seats:*



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**Section II**  
**Limitations**

**BEECHCRAFT Bonanza F33A**  
**CE-674 and after**

*On Left Side Panel Below Instrument Subpanel When  
Emergency Static Air System is Installed:*

⊕ **WARNING** ⊕  
EMERGENCY AIRSPEED STATIC SOURCE  
ON  
EMERGENCY  
SEE PILOTS CHECK LIST  
OR FLIGHT MANUAL  
EMERGENCY PROCEDURES  
FOR AIRSPEED & ALTITUDE OFF  
CALIBRATION ERROR NORMAL ⊕

*On Instrument Panel When Anti-collision Light is Not  
Installed:*

THIS AIRCRAFT NOT FULLY  
EQUIPPED FOR NIGHT FLIGHT

*Below Controls on Control Console When Winter Baffles  
Are Installed:*

⊕ **NOTICE** ⊕  
REMOVE WINTER  
BAFFLES WHEN  
OAT EXCEEDS 70° F

*On Oxygen Console (optional):*

**WARNING**

DO NOT SMOKE WHILE OXYGEN IS IN USE  
HOSE PLUG MUST BE PULLED OUT TO  
STOP FLOW OF OXYGEN

*Adjacent to Oxygen Outlet when 5th Seat is Installed:*

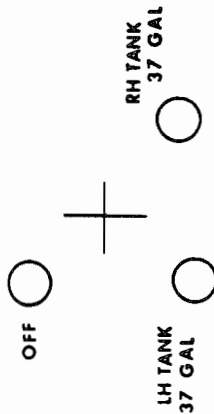
MASK STOWED UNDER  
REAR SEAT

**BEECHCRAFT Bonanza F33A  
CE-674 and after**

**Section II  
Limitations**

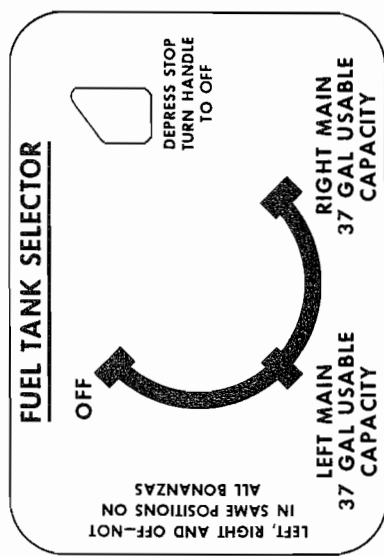
*Optional 74-Gallon System (CE-674 thru CE-883)  
(CJ-129 thru CJ-155)  
Standard 74-Gallon System (CE-884 thru CE-1013)*

**DO NOT TAKE OFF IF FUEL QUANTITY GAGES  
INDICATE IN YELLOW BAND OR WITH LESS  
THAN 13 GALLONS IN EACH MAIN TANK**



*Standard 74-Gallon System (CE-1014 and after) (CJ-156 and after)*

**DO NOT TAKE OFF IF FUEL QUANTITY GAGES  
INDICATE IN YELLOW BAND OR WITH LESS  
THAN 13 GALLONS IN EACH MAIN TANK**



**Section II  
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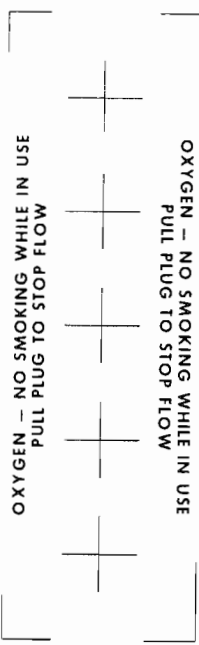
*On Each Oxygen Mask Stowage Container:*

**OXYGEN MASK**

*On Each Passenger Outlet (Prior to CE-929, Except CE-919, CE-923, CE-925, and CE-927; Prior to CJ-156) and  
On All Pilot and Copilot Outlets (All Serials):*



*On Oxygen Manifold (Serials CE-919, CE-923, CE-925, CE-927, CE-929 and after; CJ-156 and after):*



**Section II  
Limitations**

**BEECHCRAFT Bonanza F33A  
CE-674 and after**

On Left Side Panel Near Firewall Air Controls:

⊕  
**IN CASE OF ENGINE FIRE  
PULL FIREWALL AIR  
CONTROL TO CLOSE**  
⊕

On Top of Front Spar Carry-thru Structure Between Front  
Seats:

**EMERGENCY  
LANDING GEAR  
INSTRUCTIONS  
TO EXTEND ⊕**

⊕  
ENGAGE HANDLE IN REAR  
OF FRONT SEAT AND TURN  
COUNTERCLOCKWISE AS FAR  
AS POSSIBLE (50 TURNS)

On Emergency Crank Access Cover:

**LANDING GEAR  
EMERGENCY CRANK**

**PULL OUT  
LIFT UP**

**BEECHCRAFT Bonanza F33A  
CE-674 and after**

**Section II  
Limitations**

On Control Console:

THROTTLE PUSH OPEN	ON ⊕	OFF ⊖	PROPELLER PUSH HI RPM
<b>AUX FUEL PUMP OPERATION</b> TAKE-OFF AND LAND WITH AUX FUEL PUMP OFF EXCEPT IN CASE OF LOSS OF FUEL PRESS			
FUEL MIX PUSH RICH			ALTERNATE AIR PULL AND RELEASE

On Fuel Selector Panel:

Standard 44-Gallon System (CE-674 thru CE-883) (CJ-129  
thru CJ-155)

⊕ **DO NOT TAKE OFF IF FUEL QUANTITY GAGES  
INDICATE IN YELLOW BAND OR WITH LESS  
THAN 13 GALLONS IN EACH MAIN TANK** ⊕

OFF ⊖

LH TANK  
22 GAL

RH TANK  
22 GAL

**Section II  
Limitations**

**BEECHCRAFT Bonanza F33A  
CE-674 and after**

**FUEL**

TOTAL FUEL with left and right wing fuel systems full:

**Standard Fuel System (CE-674 thru CE-883) (CJ-129 thru CJ-156)**

Capacity ..... 50 gallons  
Usable ..... 44 gallons

**Standard Fuel System (CE-884 and after, and CJ-156 and after)**

**Optional Fuel System (CE-674 thru CE-883, and CJ-129 thru CJ-156)**

Capacity ..... 80 gallons  
Usable ..... 74 gallons

**FUEL MANAGEMENT**

Do not take off when Fuel Quantity Gages indicate in Yellow Band or with less than 13 gallons in each wing fuel system.

Maximum slip duration is 30 seconds.

**SEATING**

All occupied seats must be in the upright position for takeoff and landing.

**BEECHCRAFT Bonanza F33A  
CE-674 and after**

**Section II  
Limitations**

**PLACARDS**

On Left Side Panel (Airspeed Values are IAS): (Prior to CE-816 and CJ-150)

**AIR SPEED LIMITATION**  
MAXIMUM SPEED WITH LANDING GEAR EXTENDED (NORMAL) 154 KNOTS.  
MAXIMUM DESIGN MANEUVERING SPEED 134 KNOTS.  
**UTILITY CATEGORY AIRPLANE**  
OPERATE IN ACCORDANCE WITH FAA APPROVED AIRPLANE FLIGHT MANUAL.  
**INTENTIONAL SPINS PROHIBITED**  
NO ACROBATIC MANEUVERS APPROVED EXCEPT THOSE LISTED IN THE AIRPLANE FLIGHT MANUAL.

On Left Side Panel (Airspeed Values are IAS): (CE-816 and after, CJ-150 and after)

**AIR SPEED LIMITATION**  
MAX. LDG GEAR EXTENDED (NORMAL) --- 154 KTS  
MAX. APPROACH FLAPS (15°) --- 154 KTS  
MAX. FULL DOWN FLAPS (30°) --- 123 KTS  
MAX. MANEUVERING --- 134 KTS  
**UTILITY CATEGORY AIRPLANE**  
OPERATE IN ACCORDANCE WITH FAA APPROVED AIRPLANE FLIGHT MANUAL.  
**INTENTIONAL SPINS PROHIBITED**  
NO ACROBATIC MANEUVERS APPROVED EXCEPT THOSE LISTED IN THE AIRPLANE FLIGHT MANUAL.

**Section II**  
**Limitations**

**BEECHCRAFT Bonanza F33A**  
**CE-674 and after**

To enable the pilot to rapidly determine the FAA equipment requirements necessary for a flight into specific conditions, the following equipment requirements and exceptions are presented. It is the final responsibility of the pilot to determine whether the lack of, or inoperative status of a piece of equipment on his airplane, will limit the conditions under which he may operate the airplane.

**WARNING**

**FLIGHT IN KNOWN ICING CONDITIONS IS PROHIBITED.**

**LEGEND**

- (-) Indicates that the item may be inoperative for the specified condition.
- (\*) Refers to the REMARKS AND/OR EXCEPTIONS column for explicit information or reference.

**BEECHCRAFT Bonanza F33A**  
**CE-674 and after**

**Section II**  
**Limitations**

SYSTEM and/or COMPONENT		GENERAL		COMMUNICATIONS		ELECTRICAL POWER	
		Overwater flight	VHF communications system	Battery	DC alternator	DC alternator out indicator light	Standby generator
VFR Day		*	*	1	1	1	*
VFR Night		*	*	1	1	1	*
IFR Day		*	*	1	1	1	*
IFR Night		*	*	1	1	1	*
	Remarks and/or Exceptions	* -Per FAR 91	* -Per FAR 91	-	-	-	-
		* Optional					

**Section II** **BEECHCRAFT Bonanza F33A** **Section II**  
**Limitations** **CE-674 and after** **Limitations**

**MANEUVER LIMITS**

This is a utility category airplane. Spins are prohibited. No acrobatic maneuvers are approved except those listed below. Maximum slip duration is 30 seconds.

**APPROVED MANEUVERS (3400 POUNDS)**

MANEUVER	ENTRY SPEED	
	KCAS	KIAS
Chandelle	132	134
Steep Turn	132	134
Lazy Eight	132	134
Stall (Except Whip)	Use Slow Deceleration	

**Minimum fuel for above maneuvers-10 gallons each main tank**

**FLIGHT LOAD FACTOR LIMITS (3400 POUNDS)**

Positive Maneuvering Load Factors:

Flaps Up ..... 4.4 G

Flaps Down ..... 2.0 G

**MINIMUM FLIGHT CREW**

One (1) Pilot

**KINDS OF OPERATION LIMITS**

1. VFR day and night
2. IFR day and night

**BEECHCRAFT Bonanza F33A**  
**CE-674 and after**

**REQUIRED EQUIPMENT FOR VARIOUS CONDITIONS OF FLIGHT**

Part 91 of the Federal Aviation Regulations specifies the minimum numbers and types of airplane instruments and equipment which must be installed and operable for various kinds of flight conditions. This includes VFR day, VFR night, IFR day, and IFR night.

Regulations also require that all airplanes be certificated by the manufacturer for operations under various flight conditions. At certification, all required equipment must be in operating condition and should be maintained to assure continued airworthiness. If deviations from the installed equipment were not permitted, or if the operating rules did not provide for various flight conditions, the airplane could not be flown unless all equipment was operable. With appropriate limitations, the operation of every system or component installed in the airplane is not necessary, when the remaining operative instruments and equipment provide for continued safe operation. Operation in accordance with limitations established to maintain airworthiness can permit continued or uninterrupted operation of the airplane temporarily.

For the sake of brevity, the Required Equipment Listing does not include obviously required items such as wings, rudders, flaps, engine, landing gear, etc. Also the list does not include items which do not affect the airworthiness of the airplane such as galley equipment, entertainment systems, passenger convenience items, etc. However, it is important to note that ALL ITEMS WHICH ARE RELATED TO THE AIRWORTHINESS OF THE AIRPLANE AND NOT INCLUDED ON THE LIST ARE AUTOMATICALLY REQUIRED TO BE OPERATIVE.



**Section II** **BEECHCRAFT Bonanza F33A** **Section II**  
**Limitations** **CE-674 and after** **Limitations**

**POWER PLANT INSTRUMENT MARKINGS**

**OIL TEMPERATURE**  
 Caution (Yellow Radial).....38°C  
 Operating Range  
 (Green Arc).....38° to 116°C  
 Maximum (Red Radial).....116°C

**OIL PRESSURE**  
 Minimum Pressure (Red Radial).....30 psi  
 Operating Range (Green Arc).....30 to 60 psi  
 Maximum Pressure (Red Radial).....100 psi

**TACHOMETER**

Operating Range (Green Arc)  
 (Serials CE-674 thru CE-890 with 2- or 3-Blade  
 Propeller Installed, and CE-891 and after with McCauley  
 3-Blade Propeller Installed)  
 (Serials CJ-129 thru CJ-155).....1800 to 2700 rpm  
 Operating Range (Green Arc)  
 (Serials CE-891 and after with 2-Blade Propeller  
 Installed)  
 (Serials CJ-156 and after).....1800 to 2550 rpm  
 Maximum rpm (Red Radial).....2700 rpm

**CYLINDER HEAD TEMPERATURE**

Operating Range  
 (Green Arc).....93° to 238°C  
 Maximum Temperature (Red Radial).....238°C

**MANIFOLD PRESSURE**

Operating Range (Green Arc).....15 to 29.6 in. Hg  
 Maximum (Red Radial).....29.6 in. Hg

**FUEL FLOW**

Serials CE-674 thru CE-928; CJ-129 thru CJ-155:  
 Minimum (Red Radial).....1.5 psi

**BEECHCRAFT Bonanza F33A** **Section II**  
**CE-674 and after** **Limitations**

Operating Range (Green Arc).....6.9 to 24.3 gph  
 Maximum (Red Radial).....17.5 psi  
 Serials CE-929 and after; CJ-156 and after:  
 Operating Range (Green Arc).....6.9 to 24.3 gph  
 Maximum (Red Radial).....24.3 gph

**MISCELLANEOUS INSTRUMENT MARKINGS**

**INSTRUMENT PRESSURE**

Operating Range (Green Arc).....4.3 to 5.9 in. Hg

**FUEL QUANTITY**

Yellow Band.....E to 1/2 full (44-gallon system)  
 Yellow Band.....E to 3/8 full (74-gallon system)

**WEIGHT LIMITS**

Maximum Ramp Weight.....3412 lbs  
 Maximum Take-off Weight.....3400 lbs  
 Maximum Landing Weight.....3400 lbs  
 Zero Fuel Weight.....No Structural Limitation  
 Maximum Baggage Compartment Load.....270 lbs

**CENTER OF GRAVITY LIMITS (Landing Gear Extended)**

**FORWARD LIMITS**

77.0 inches aft of datum to 2800 pounds with straight line  
 variation to 82.1 inches at 3400 pounds.

**AFT LIMITS**

86.7 inches aft of datum at all weights.

**REFERENCE DATUM**

Datum is 83.1 inches forward of center line through forward  
 jack points.

MAC leading edge is 66.7 inches aft of datum.

MAC length is 65.3 inches.

**Section II**  
**Limitations**

**BEECHCRAFT Bonanza F33A**  
**CE-674 and after**

**Section II**  
**Limitations**

**\*AIRSPEED INDICATOR MARKINGS**

MARKING	KCAS VALUE OR RANGE	KIAS VALUE OR RANGE	SIGNIFICANCE
White Arc	53-122	52-123	Full Flap Operating Range
White Triangle**	152	154	Maximum Speed for Approach Flaps
Green Arc	64-165	64-167	Normal Operating Range
Yellow Arc	165-195	167-196	Operate With Caution, Only in Smooth Air
Red Line	195	196	Maximum Speed For All Operations

\*The airspeed indicator is marked in IAS values.

\*\*Serials CE-884 and after, and CJ-156 and after.

**POWER PLANT LIMITATIONS**

**ENGINE**

One Teledyne Continental Motors Corporations model IO-520-BA or IO-520-BB engine.

**OPERATING LIMITATIONS**

Take-off and Maximum

- Continuous Power . . . . . Full Throttle, 2700 rpm
- Maximum Normal Operating Power
- Serials CE-891 and after with 2-blade Propeller Installed and Serials CJ-156 and after with 2-blade Propeller Installed . . . . . Full Throttle, 2550 rpm

- Cylinder Head Temperature . . . . . 238° C
- Oil Temperature . . . . . 116° C
- Oil Pressure
- Minimum . . . . . 30 psi
- Maximum . . . . . 100 psi
- Fuel Pressure
- Serials CE-674 thru CE-928; CJ-129 thru CJ-155:
- Minimum . . . . . 1.5 psi
- Maximum . . . . . 17.5 psi
- Fuel Flow
- Serials CE-929 and after; CJ-156 and after:
- Maximum . . . . . 24.3 gph

**FUEL GRADES**

Aviation Gasoline Grade 100LL (blue) or Grade 100 (green) minimum.

**OIL SPECIFICATIONS**

Ashless dispersant oils meeting Teledyne Continental Motors Corporation Specification MHS-24B or the latest revision of MHS-24. Refer to the Approved Engine Oils table in the HANDLING, SERVICING AND MAINTENANCE Section for a list of oils meeting this specification.

**PROPELLER SPECIFICATIONS**

On IO-520-BA and IO-520-BB engines, one McCauley constant-speed, two-blade propeller using 2A36C23 hub with 84B-0 blades. Pitch setting at 30-inch station: low, 13.3°; high, 29.2°. Diameter: Maximum, 84 in.; Minimum, 82 in.

Or:

On IO-520-BA and IO-520-BB engines, one McCauley constant-speed, three-blade propeller using 3A32C76 hub with 82NB-2 blades. Or, on IO-520-BB engines only, one McCauley constant-speed, three-blade propeller using 3A32C406 hub with 82NDB-2 blades. Pitch setting at 30-inch station: low, 13.3° ± .2°; high, 29.0° ± .5°. Diameter: Maximum, 80 in.; Minimum, 78-1/2 in.

## SECTION II

### LIMITATIONS

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#### AIRSPEED LIMITATIONS

SPEED	KCAS	KIAS	REMARKS
Never Exceed $V_{NE}$	195	196	Do Not Exceed This Speed in Any Operation.
Maximum Structural Cruising $V_{NO}$ or $V_C$	165	167	Do Not Exceed This Speed Except in Smooth Air and Then Only With Caution.
Maneuvering $V_A$	132	134	Do Not Make Full or Abrupt Control Movements Above This Speed.
Maximum Flap Extension/ Extended $V_{FE}$ (Prior to CE-816 and CJ-150) (CE-816 and after, CJ-150 and after) Approach (15°) Full Down (30°)	122	123	Do Not Extend Flaps or Operate With Flaps Extended Above This Speed.
Maximum Landing Gear Operating/Extended $V_{LO}/V_{LE}$	152 122	154 123	Do Not Extend, Retract or Operate With Gear Extended Above This Speed, Except in Emergency.

**Section I  
General**

**BEECHCRAFT Bonanza F33A  
CE-674 and after**

- Station**  
A location along the airplane fuselage usually given in terms of distance from the reference datum.
- Arm**  
The horizontal distance from the reference datum to the center of gravity (C.G.) of an item.
- Moment**  
The product of the weight of an item multiplied by its arm (Moment divided by a constant is used to simplify balance calculations by reducing the number of digits.)
- Airplane Center of Gravity (CG)**  
The point at which an airplane would balance if suspended. Its distance from the reference datum is found by dividing the total moment by the total weight of the airplane.
- CG Arm**  
The arm obtained by adding the airplane's individual moments and dividing the sum by the total weight.
- CG Limits**  
The extreme center of gravity locations within which the airplane must be operated at a given weight.
- Usable Fuel**  
Fuel available for flight planning.
- Unusable Fuel**  
Fuel remaining after a runout test has been completed in accordance with governmental regulations.
- Standard Empty Weight**  
Weight of a standard airplane including unusable fuel, full operating fluids and full oil.

**BEECHCRAFT Bonanza F33A  
CE-674 and after**

**Section I  
General**

- Basic Empty Weight**  
Standard Empty Weight plus optional equipment.
- Payload**  
Weight of occupants, cargo and baggage.
- Useful Load**  
Difference between Take-off Weight (or Ramp Weight, if applicable) and Basic Empty Weight.
- Maximum Ramp Weight**  
Maximum weight approved for ground maneuvering. (It includes weight of start, taxi, and take-off fuel)
- Maximum Take-off Weight**  
Maximum weight approved for liftoff.
- Maximum Landing Weight**  
Maximum weight approved for the landing touchdown.
- Maximum Zero Fuel Weight**  
Maximum weight exclusive of usable fuel.
- Tare**  
The weight of chocks, blocks, stands, etc., used on the scales when weighing an airplane.
- Leveling Points**  
Those points which are used during the weighing process to level the airplane.
- Jack Points**  
Points on the airplane identified by the manufacturer as suitable for supporting the airplane for weighing or other purposes.

**Section I  
General**

**BEECHCRAFT Bonanza F33A  
CE-674 and after**

**Station  
Pressure**

Actual atmospheric pressure at field elevation.

**Wind**

The wind velocities recorded as variables on the charts of this handbook are to be understood as the headwind or tailwind components of the reported winds.

**POWER**

**Take-off and  
Maximum  
Continuous**

Highest power rating not limited by time.

**Maximum  
Normal  
Operating  
Power  
(MNOP)**

Highest power rating within the normal operating range. Noise characteristics requirements of FAR 36 have been demonstrated at this power rating.

**Cruise Climb**

Power recommended for cruise climb.

**ENGINE CONTROLS AND INSTRUMENTS**

**Throttle Control**

Used to control power by introducing fuel-air mixture into the intake passages of the engine. Settings are reflected by readings on the manifold pressure gage.

**Propeller Control**

This control requests the propeller governor to maintain engine/propeller rpm at a selected value by controlling propeller blade angle.

**Mixture Control**

This control is used to set fuel flow in all modes of operation and cuts off fuel completely for engine shut down.

**EGT (Exhaust Gas  
Temperature)  
Indicator**

This indicator is used to identify the lean and best power fuel flow mixtures for various power settings during cruise.

**BEECHCRAFT Bonanza F33A  
CE-674 and after**

**Section I  
General**

**Tachometer**

Indicates the rpm of the engine/propeller.

**Propeller  
Governor**

Regulates the rpm of the engine/propeller by increasing or decreasing the propeller pitch through a pitch change mechanism in the propeller hub.

**AIRPLANE PERFORMANCE AND FLIGHT PLANNING**

**Climb Gradient**

The ratio of the change in height during a portion of a climb, to the horizontal distance traversed in the same time interval.

**Demonstrated  
Crosswind  
Velocity**

The demonstrated crosswind velocity is the velocity of the crosswind component for which adequate control of the airplane during take off and landing was actually demonstrated during certification tests. The value shown is not limiting.

**MEA**

Minimum enroute IFR altitude.

**Route Segment**

A part of a route. Each end of that part is identified by: (1) a geographical location; or (2) a point at which a definite radio fix can be established.

**GPH**

U.S. Gallons per hour.

**WEIGHT & BALANCE**

**Reference Datum**

An imaginary vertical plane from which all horizontal distances are measured for balance purposes.

**Section I  
General**

**BEECHCRAFT Bonanza F33A  
CE-674 and after**

**V<sub>LE</sub>**

Maximum Landing Gear Extended Speed is the maximum speed at which an airplane can be safely flown with the landing gear extended.

**V<sub>LO</sub>**

Maximum Landing Gear Operating Speed is the maximum speed at which the landing gear can be safely extended or retracted.

**V<sub>NE</sub>**

Never Exceed Speed is the speed limit that may not be exceeded at any time.

**V<sub>NO</sub>  
or  
V<sub>C</sub>**

Maximum Structural Cruising Speed is the speed that should not be exceeded except in smooth air and then only with caution.

**V<sub>S</sub>**

Stalling Speed or the minimum steady flight speed at which the airplane is controllable.

**V<sub>SO</sub>**

Stalling Speed or the minimum steady flight speed at which the airplane is controllable in the landing configuration.

**V<sub>X</sub>**

Best Angle-of-Climb Speed is the airspeed which delivers the greatest gain of altitude in the shortest possible horizontal distance.

**V<sub>Y</sub>**

Best Rate-of-Climb Speed is the airspeed which delivers the greatest gain in altitude in the shortest possible time.

**1-12**

**October, 1976**

**BEECHCRAFT Bonanza F33A  
CE-674 and after**

**Section I  
General**

**METEOROLOGICAL**

**ISA**

International Standard Atmosphere in which:

- (1) The air is a dry perfect gas;
- (2) The temperature at sea level is 15° Celsius (59° Fahrenheit);
- (3) The pressure at sea level is 29.92 inches Hg (1013.2 millibars);
- (4) The temperature gradient from sea level to the altitude at which the temperature is -56.5°C (-69.7°F) is -0.00198°C (-0.003566°F) per foot and zero above that altitude.

**OAT**

Outside Air Temperature is the free air static temperature, obtained either from inflight temperature indications adjusted for instrument error and compressibility effects or ground meteorological sources.

**Indicated  
Pressure  
Altitude**

The number actually read from an altimeter when the barometric subscale has been set to 29.92 inches of mercury (1013.2 millibars)

**Pressure  
Altitude**

Altitude measured from standard sea-level pressure (29.92 in. Hg) by a pressure or barometric altimeter. It is the indicated pressure altitude corrected for position and instrument error. In this handbook, altimeter instrument errors are assumed to be zero. Position errors may be obtained from the Altimeter Correction graph.

**September, 1979**

**1-13**

**SYMBOLS, ABBREVIATIONS AND TERMINOLOGY**

**GENERAL AIRSPEED**

**CAS** Calibrated Airspeed is the indicated speed of an airplane, corrected for position and instrument error. Calibrated airspeed is equal to true airspeed in standard atmosphere at sea level.

**KCAS** Calibrated Airspeed expressed in knots.

**GS** Ground Speed is the speed of an airplane relative to the ground.

**IAS** Indicated Airspeed is the speed of an airplane as shown on the airspeed indicator when corrected for instrument error. IAS values published in this handbook assume zero instrument error.

**KIAS** Indicated Airspeed expressed in knots.

**TAS** True Airspeed is the airspeed of an airplane relative to undisturbed air which is the CAS corrected for altitude, temperature, and compressibility.

**V<sub>A</sub>** Maneuvering Speed is the maximum speed at which application of full available aerodynamic control will not overstress the airplane.

**V<sub>FE</sub>** Maximum Flap Extended Speed is the highest speed permissible with wing flaps in a prescribed extended position.

**Section I**  
**General**

**BEECHCRAFT Bonanza F33A**  
**CE-674 and after**

**Section I**  
**General**

**STANDARD SYSTEM (CE-884 and after) (CJ-156 and after)**

**OPTIONAL SYSTEM (CE-674 thru CE-883) (CJ-129 thru CJ-155)**

Total Capacity ..... 80 Gallons  
Total Usable ..... 74 Gallons

**OIL**

**OIL CAPACITY**

Total ..... 12 Quarts

**APPROVED OIL TYPES**

Ashless dispersant oils meeting the requirements of Teledyne Continental Motors Corporation Specification MHS-24B or the latest revision of MHS-24. Refer to HANDLING, SERVICING AND MAINTENANCE Section for a list of oils meeting this specification.

**MAXIMUM CERTIFICATED WEIGHTS**

Maximum Ramp Weight ..... 3412 lbs  
Maximum Take-off Weight ..... 3400 lbs  
Maximum Landing Weight ..... 3400 lbs  
Maximum Zero Fuel Weight ..... No Structural Limit  
Maximum Weight in Baggage Compartment ..... 270 lbs

**CABIN AND ENTRY DIMENSIONS**

Cabin Width (maximum) ..... 3 ft 6 in.  
Cabin Length (maximum) ..... 10 ft 1 in.  
Cabin Height (maximum) ..... 4 ft 2 in.  
Cabin Door ..... 37 in. wide by 36 in. high

**BAGGAGE SPACE AND ENTRY DIMENSIONS**

Compartment Volume ..... 35 cu ft  
Door Width (minimum) ..... 18.5 in.  
Door Height (minimum) ..... 22.5 in.  
Volume Above Hat Shelf ..... 1.7 cu ft

**SPECIFIC LOADINGS**

Wing Loading at Maximum Take-off Weight ... 18.8 lbs/sq ft  
Power Loading at Maximum Take-off Weight .... 11.9 lbs/hp

*Fuel capacity (each wing tank)  
with wings level*

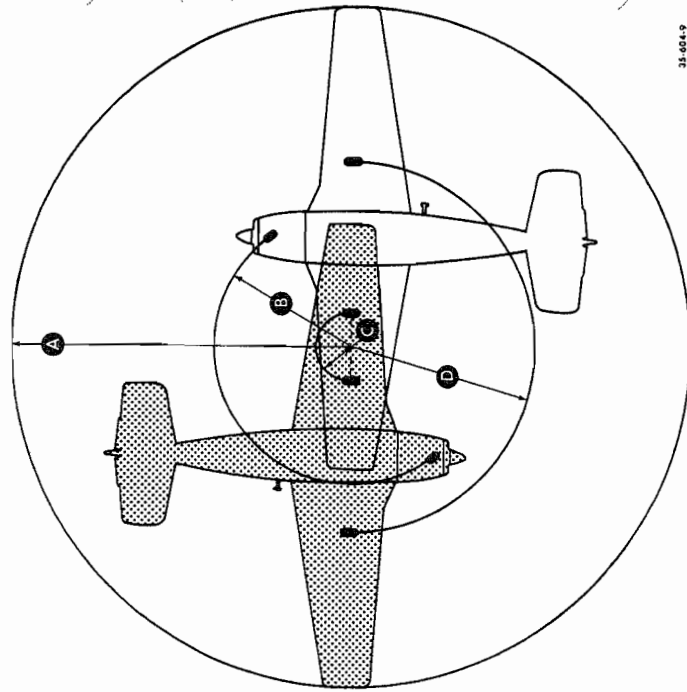
*40 US Gal (37 usable)*

*35 US Gal (32 usable) to tab slot*

*30 US Gal (27 usable) to tab bottom*



GROUND TURNING CLEARANCE



- A Radius for Wing Tip .....26 feet 4 inches
- B Radius for Nose Wheel .....12 feet 2 inches
- C Radius for Inside Gear ..... 5 feet 1 inch
- D Radius for Outside Gear .....14 feet 8 inches

TURNING RADII ARE CALCULATED USING FULL STEERING, ONE BRAKE AND PARTIAL POWER.

DESCRIPTIVE DATA

ENGINE

One Teledyne Continental Motors Corporation engine model IO-520-BA or IO-520-BB. These are fuel-injected, direct-drive, air-cooled, horizontally opposed, 6-cylinder, 520-cubic-inch-displacement, 285-horsepower-rated engines.

Take-off and Maximum  
Continuous Power.....Full Throttle, 2700 rpm  
Maximum Normal Operating Power  
Serials CE-891 and after with  
2-Blade Propeller Installed, and  
Serials CJ-156 and after with 2-Blade  
Propeller Installed .....Full Throttle, 2550 rpm

PROPELLER

On IO-520-BA and IO-520-BB engines, one McCauley constant-speed, 2-blade propeller using 2A36C23 hub with 84B-0 blades; or one McCauley constant-speed, 3-blade propeller using 3A32C76 hub with 82NB-2 blades. Or, on IO-520-BB engines only, one McCauley constant-speed, 3-blade propeller using 3A32C406 hub with 82NDB-2 blades.

FUEL

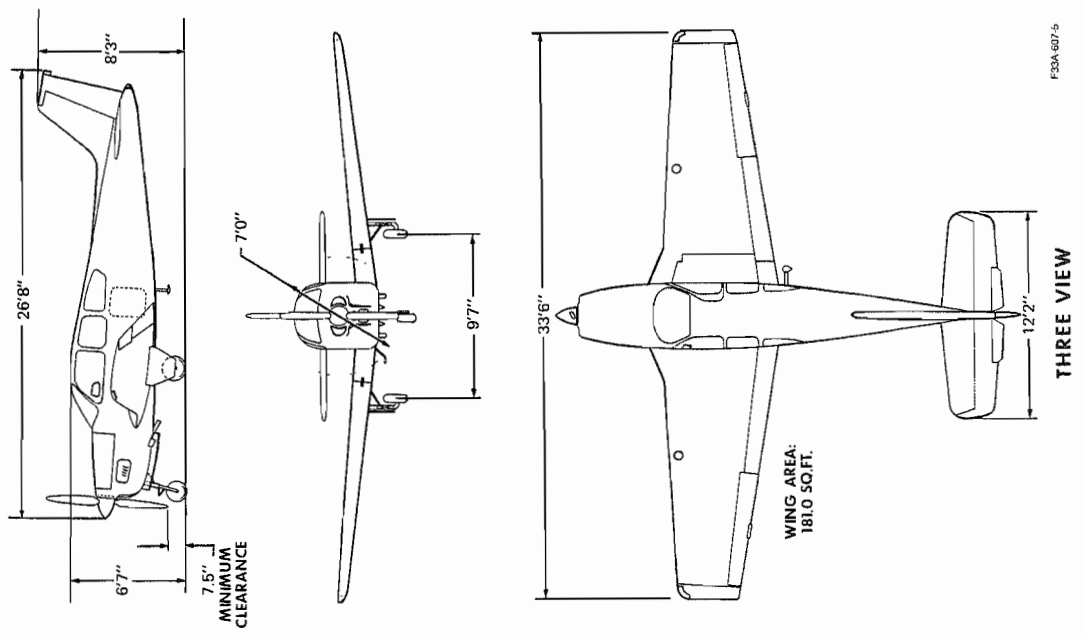
Aviation Gasoline Grade 100LL (blue) or Grade 100 (green) minimum.

STANDARD SYSTEM (CE-674 thru CE-883) (CJ-129 thru CJ-155)

Total Capacity .....50 Gallons  
Total Usable .....44 Gallons

**BEECHCRAFT Bonanza F33A**  
**CE-674 and after**

**Section I**  
**General**



F33A-607-5

This service is free and will be provided only to airplane owners who are listed on the FAA Aircraft Registration Branch List or the BEECHCRAFT International Owners Notification Service List, and then only if listed by airplane serial number for the model for which this handbook is applicable. For detailed information on how to obtain "Revision Service" applicable to this handbook or other BEECHCRAFT Service Publications, consult any BEECHCRAFT Aero or Aviation Center, International Distributor, or International Dealer, or refer to the latest revision of BEECHCRAFT Service Instructions No. 0250-010.

#### REVISING THE HANDBOOK

Immediately following the Title Page is the Log of Revisions" page(s). The Log of Revisions pages are used for maintaining a listing of all effective pages in the handbook (except the SUPPLEMENTS Section), and as a record of revisions to these pages. In the lower right corner of the outlined portion is a box containing a capital letter which denotes the issue or reissue of the handbook. It will be advanced one letter, alphabetically, per reissue. This letter will be suffixed by a number whenever the handbook is revised. When a revision to the handbook is made, a new Log of Revisions will be issued. All Log of Revisions must be retained in the handbook to provide a complete record of material status until a reissue is made.

#### WARNING

When this handbook is used for airplane operational purposes it is the pilot's responsibility to maintain it in current status.

#### SUPPLEMENTS REVISION RECORD

Section IX contains supplements and a Log of Supplements page. On the "Log" page is a listing of supplemental equipment available for installation on the BEECHCRAFT Bonanza F33A. When new supplements are received or existing supplements revised, a new "Log" page will replace the previous one, since it contains a listing of all previous supplements plus the new supplements. The supplemental material will be added to the grouping in accordance with the descriptive listing.

#### VENDOR-ISSUED STC SUPPLEMENTS

When a new airplane is delivered from the factory, the handbook delivered with it contains either an STC (Supplemental Type Certificate) Supplement or a Beech Flight Manual Supplement for every installed item requiring a supplement. If a new handbook for operation of the airplane is obtained at a later date, it is the responsibility of the owner/operator to ensure that all required STC Supplements (as well as weight and balance and other pertinent data) are transferred into the new handbook.

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General**

**NOTES**

In an effort to provide as complete coverage as possible, applicable to any configuration of the airplane, some optional equipment has been included in the scope of the manual. However, due to the variety of airplane appointments and arrangements available, optional equipment described or depicted herein may not be designated as such in every case.

Beech Aircraft Corporation expressly reserves the right to supersede, cancel, and/or declare obsolete, without prior notice, any part, part number, kit, or publication referenced in this manual.

The owner/operator should always refer to all supplements, whether STC Supplements or Beech Supplements, for possible placards, limitations, normal, emergency and other operational procedures for proper operation of the airplane with optional equipment installed.

**NOTICE**

The following information may be provided to the holder of this manual automatically:

1. Original issues and revisions of Class I and Class II Service Instructions
2. Original issues and revisions of FAA Approved Airplane Flight Manual Supplements
3. Reissues and revisions of FAA Approved Airplane Flight Manuals, Flight Handbooks, Owner's Manuals, Pilot's Operating Manuals, and Pilot's Operating Handbooks

**Section I  
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maintain the airplane in a condition equal to that of its original manufacture.

Authorized BEECHCRAFT Aero Centers, Aviation Centers, International Distributors and International Dealers can provide recommended modification, service, and operating procedures issued by both the FAA and Beech Aircraft Corporation, which are designed to get maximum utility and safety from the airplane.

**USE OF THE HANDBOOK**

The Pilot's Operating Handbook is designed to maintain documents necessary for the safe and efficient operation of the Bonanza F33A. The handbook has been prepared in loose leaf form for ease in maintenance and in a convenient size for storage. The handbook has been arranged with quick reference tabs imprinted with the title of each section and contains ten basic divisions:

- Section I General
- Section II Limitations
- Section III Emergency Procedures
- Section IV Normal Procedures
- Section V Performance
- Section VI Weight and Balance/Equipment List
- Section VII Systems Description
- Section VIII Handling, Servicing and Maintenance Supplements
- Section IX Safety Information

**NOTE**

Except as noted, all airspeeds quoted in this handbook are Indicated Airspeeds (IAS) and assume zero instrument error.

**BEECHCRAFT Bonanza F33A  
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**Section I  
General**

THANK YOU for displaying confidence in us by selecting a BEECHCRAFT airplane. Our design engineers, assemblers and inspectors have utilized their skills and years of experience to ensure that the new BEECHCRAFT Bonanza F33A meets the high standards of quality and performance for which BEECHCRAFT airplanes have become famous throughout the world.

**IMPORTANT NOTICE**

This handbook should be read carefully by the owner and the operator in order to become familiar with the operation of the Bonanza F33A. Suggestions and recommendations have been made within it to aid in obtaining maximum performance without sacrificing economy. Be familiar with and operate the airplane in accordance with the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual and/or placards which are located in the airplane.

As a further reminder, the owner and the operator should also be familiar with the Federal Aviation Regulations applicable to the operation and maintenance of the airplane, and FAR Part 91 General Operating and Flight Rules. Further, the airplane must be operated and maintained in accordance with FAA Airworthiness Directives which may be issued against it.

The Federal Aviation Regulations place the responsibility for the maintenance of this airplane on the owner and the operator, who should ensure that all maintenance is done by qualified mechanics in conformity with all airworthiness requirements established for this airplane.

All limits, procedures, safety practices, time limits, servicing, and maintenance requirements contained in this handbook are considered mandatory for continued airworthiness to

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**SECTION I  
GENERAL**

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other hidden damage, not discernible through routine visual or usual nondestructive testing techniques. This may render the part, component or structural assembly, even though originally manufactured by BEECHCRAFT, unsuitable and unsafe for airplane use.

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

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# Beechcraft

## Bonanza

### F33A

CE-674 and After

## ACROBATIC F33C

CJ-129 and After

(See Flight Manual Supplement)

### PILOT'S OPERATING HANDBOOK AND FAA APPROVED AIRPLANE FLIGHT MANUAL

FAA APPROVED IN UTILITY CATEGORY BASED ON CAR 3. THIS DOCUMENT MUST BE CARRIED IN THE AIRPLANE AT ALL TIMES AND BE KEPT WITHIN REACH OF THE PILOT DURING ALL FLIGHT OPERATIONS.

THIS HANDBOOK INCLUDES THE MATERIAL REQUIRED TO BE FURNISHED TO THE PILOT BY CAR 3.

Mfr's Serial No. CE-1703

Registration No. OE-KRH

FAA Approved by *John Kennedy Jr*

W.H. SCHULTZ



THIS HANDBOOK SUPERSEDES ALL BEECH PUBLISHED OWNER'S MANUALS, FLIGHT MANUALS, AND CHECK LISTS ISSUED FOR THIS AIRPLANE WITH THE EXCEPTION OF FAA APPROVED AIRPLANE FLIGHT MANUAL SUPPLEMENTS.

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