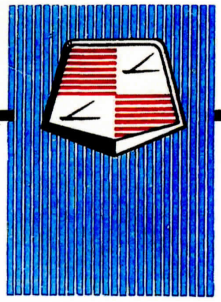
Your '58



CESSNA

180

OWNER'S MANUAL

P-136A—GRIT—2000—12/15/57

Congratulations . . .

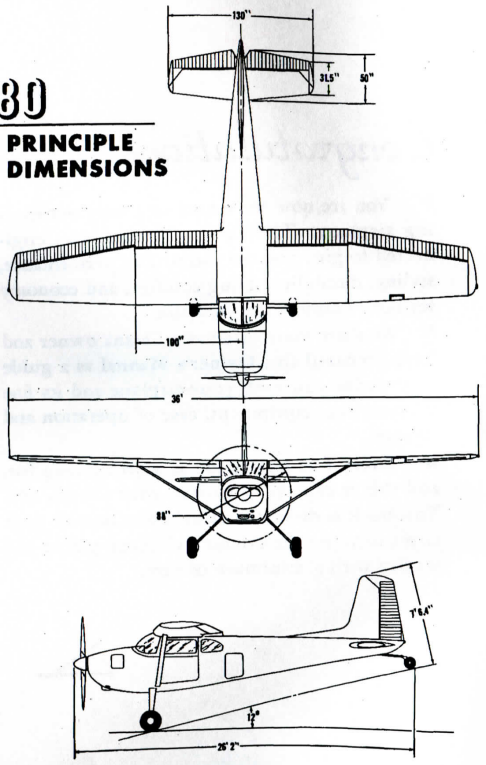
■ You are now the owner of a truly outstanding airplane. The Cessna 180 has been engineered to give you the ultimate in performance, styling, durability, flying comfort, and economy for both business and pleasure.

■ We share your pride as a Cessna owner and have prepared this Owner's Manual as a guide to acquaint you with your airplane and its fine construction, equipment, ease of operation and its care.

■ Every fine possession is worth caring for, and this is especially true of your Cessna 180. This book is dedicated to help you operate your airplane to get the utmost flying enjoyment and service with a minimum of care.

180

PRINCIPLE DIMENSIONS



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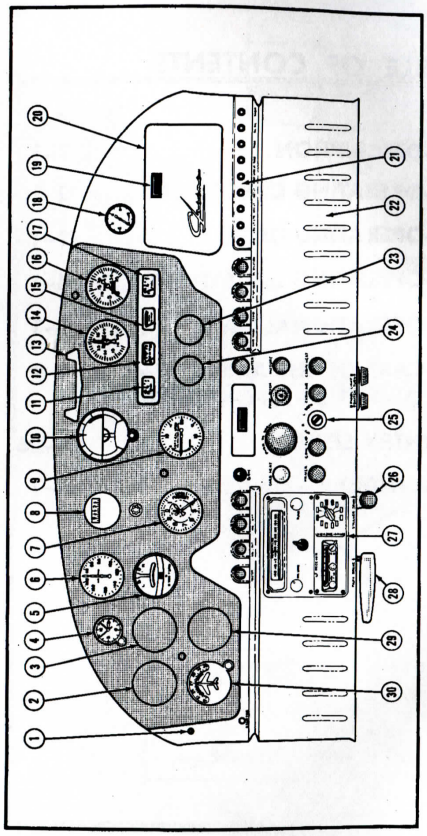


1. Headphone Jack
2. Azimuth Indicator (Opt. Equip.)
3. Speed Control Indicator (Opt. Equip.)
4. Clock (Opt. Equip.)
5. Turn and Bank Indicator (Opt. Equip.)
6. Airspeed Indicator
7. Altimeter
8. Directional Gyro (Opt. Equip.)
9. Rate-of-Climb Indicator (Opt. Equip.)
10. Gyro Horizon (Opt. Equip.)
11. Left Tank Fuel Quantity Indicator
12. Oil Pressure Gage
13. Compass Card Holder
14. Manifold Pressure Gage
15. Oil Temperature Gage
16. Tachometer
17. Right Tank Fuel Quantity Indicator
18. Suction Gage (Opt. Equip.)
19. Glove Compartment Door Handle.
20. Glove Compartment Door
21. Electrical System Control Panel (See figure 5)
22. Optional Radio Space
23. Carburetor Air Temperature Gage (Opt. Equip.)
24. Cylinder Head Temperature Gage (Opt. Equip.)
25. Control Panel (See figure 2)
26. Fuel Strainer Drain Knob
27. Optional Radio
28. Parking Brake Handle
29. Optional Instrument Space
30. Omni Indicator (Opt. Equip.)

Figure 1. Instrument Panel

Section I

description

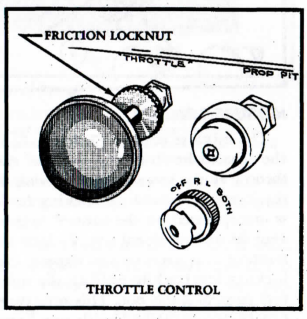
ONE OF THE FIRST STEPS in obtaining the utmost performance, service, and flying enjoyment from your Cessna is to familiarize yourself with your airplane's equipment, systems, and controls. This section will tell you where each item is located, how it operates and its function.

ENGINE.

A six-cylinder, Continental Model 0-470-K, 230 horsepower engine powers your 180. Compact, dependable and efficient, the engine incorporates hydraulic valve-lifters which silence valve operation. Built by a company whose name has become a byword for precision-built, performance-packed aircraft engines, the Continental 230 horsepower engine means top performance for your airplane at low maintenance cost.

THROTTLE.

The throttle (3, figure 2) is centrally located on the lower half of the instrument panel and is easily identified by its large, round knob. Engine power can be increased by pushing the throttle in toward the instrument panel or decreased by pulling the control out. To prevent the throttle from creeping, a knurled, friction-type, lock nut is incorporated on the control to secure it at any desired setting.

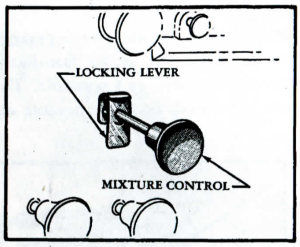


THROTTLE CONTROL

NOTE

Because of the constant speed propeller mechanism, standard equipment on your 180, advancing the throttle will *not* increase the engine rpm. It will increase the manifold pressure. With each power increase, the constant speed propeller automatically takes a larger "bite",

enabling the engine to run at a constant speed at all times. Engine rpm can be changed by adjusting the propeller control. Refer to "PROPELLER PITCH CONTROL" paragraph on page 1-6 for this procedure.



MIXTURE CONTROL.

The mixture control (7, figure 2) is the second knob to the right of the throttle in the lower center portion of the instrument panel. A locking lever is incorporated on the control to prevent its unintentional use. *To lean the mixture,* it is necessary to depress the locking lever while pulling the mixture control knob out. This operation can be accomplished with one hand by using the thumb to press the locking lever in and the index and middle fingers to pull the mixture control knob out. The locking lever is effective only in the leaning operation. Forward movement of the mixture control is not affected by the locking lever. For detailed operating instructions on the use of the mixture control, refer to Section III.

CARBURETOR AIR HEAT CONTROL.

The carburetor air heat control (1 figure 2) is located to the left of the throttle. The push-pull control operates the carburetor air intake butterfly valve which proportions the hot and cold air entering the carburetor. Pulling the control out provides heated air for the carburetor while pushing the control all the way in provides only cold air for the carburetor.

The control has a center button locking device. To move the control, press the lock button in with the thumb and hold while moving the control to the desired position. Lock the control by releasing the thumb pressure on the button.

Air pulled into the heater muffs and subsequently into the engine does not pass through the air filter. For this reason, when taxiing on dirty, dusty, or sandy fields, carburetor heat should not be used until the engine is cleared prior to take-off. After a full stop landing under these conditions, carburetor heat should be returned to full cold in order for the air filter to become fully effective again.

Carburetor ice can form on the ground with the engine idling. Therefore, just before take-off, when you run the engine and test the magnetos, be sure to put the carburetor heat in the "ON" position after the magneto check. Leave it in this position until just before you open the throttle for the take-off run. Then move carburetor heat to the "COLD AIR" position. This gives maximum power for the take-off. Watch engine for any indi-

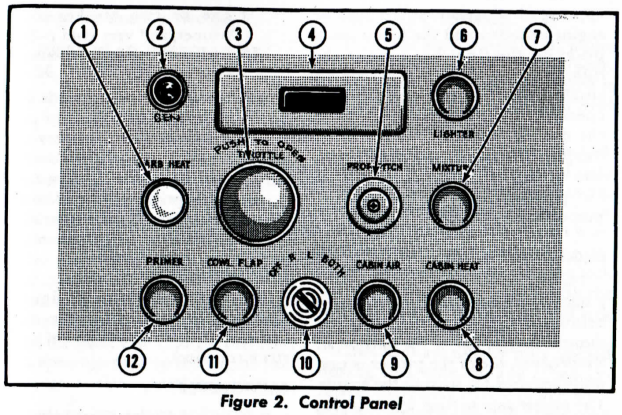


Figure 2. Control Panel

1. Carburetor Air Heat Control
2. Generator Warning Light
3. Throttle
4. Ash Receiver
5. Propeller Pitch Control
6. Cigarette Lighter
7. Mixture Control
8. Cabin Heat Knob
9. Cabin Air Knob
10. Ignition Switch
11. Cowl Flaps Control
12. Engine Primer

cations of ice (roughness or a drop in manifold pressure) during climb and apply full carburetor heat if carburetor begins to ice. (No change will be noticed in the rpm because the constant speed propeller will automatically compensate for this.)

The correct way to use carburetor heat is to first use full heat to remove any ice that is forming. By trial and error, determine the minimum amount of heat required to prevent the ice from forming; each time removing any ice that is formed by applying full heat. On each subsequent trial, increase the amount of heat applied until no ice forms. On approach glide just before reducing power, apply full carburetor heat and leave in this position.

When full carburetor heat is used, the engine may run rough due to too rich a mixture. Therefore, for prolonged cruising flight, it may be necessary to lean the mixture whenever full carburetor heat is used.

IGNITION SWITCH.

The key-operated ignition switch (10, figure 2) is located below and slightly to the right of the throttle. This switch controls the dual-magneto ignition system. The four switch positions are "OFF", "R", "L" and "BOTH". The left magneto fires the

upper spark plugs on the left bank of engine cylinders and the lower spark plugs on the right bank while the right magneto fires the remaining spark plugs. The engine should be operated on both magnetos, because the dual ignition provides a more complete burning of the fuel-air mixture driving the pistons. The "R" and "L" positions are used for checking purposes only.

ENGINE PRIMER.

The engine primer (12, figure 2) is a manual pump type and is located below and slightly to the left of the throttle. Regardless of the outside air temperature, use of the primer is normally required for starting the engine. The primer aids starting by supplying an initial charge of raw fuel to the engine cylinders.

NOTE

Only five cylinders are primed by the engine primer. The right rear cylinder (No. 1) provides the manifold pressure source connection and is not primed.

To operate the primer, proceed as follows:

(1) First, unlock the plunger by turning the knob counterclockwise until the knob pops part way out.

(2) Slowly pull the plunger all the way out and then push the plunger all the way in. This action is termed "one stroke of the primer".

(3) Normal weather will require one or two strokes of the primer, and very cold (-20°F) weather may require three or four strokes.

(4) Normally, the engine is started immediately after the priming operation. In very cold weather it is recommended that the engine be turned over while priming. It may be necessary to continue priming until the engine runs smoothly.

STARTER BUTTON.

A push-button switch (1, figure 5) operates the electrical starter motor and is located at the left side of the instrument panel.

TACHOMETER.

A recording engine tachometer (16, figure 1) is mounted above the engine instrument cluster on the right side of the instrument panel. The tachometer indicates engine RPM and records engine operating hours.

MANIFOLD PRESSURE GAGE.

A manifold pressure gage (14, figure 1) is mounted immediately to the left of the tachometer and above the engine instrument cluster on the right side of the instrument panel. This instrument indicates the pressure of the fuel-air mixture entering the engine cylinders and is calibrated in inches of mercury. By observing the manifold pressure gage and adjusting the propeller and throttle controls, the power output of the engine can be adjusted to any power setting recommended in the operating procedures of Section II or

performance charts of Section V.

CYLINDER HEAD TEMPERATURE GAGE.

A cylinder head temperature gage (24, figure 1) is mounted immediately below the engine instrument cluster on the right side of the instrument panel. The gage is calibrated in degrees Fahrenheit and is electrically operated. However, its sole source of power is a thermocouple mounted under the lower spark plug of the left rear engine cylinder and thus the instrument requires no power from the electrical system. By observing the gage readings, the pilot can change the cowl flap openings to keep the engine temperatures within operating limitations.

COWL FLAPS.

Satisfactory engine performance depends upon operation within temperature limitations, indicated by the green arc on the cylinder head temperature and oil temperature gages. Since engine temperatures depend upon the flow of air passing over the cylinders and through the oil cooler, the control of this air is important. Cowl flaps, adjusted to the need, will meter enough air for the adequate cooling and maximum efficiency of the engine under varying conditions. Opening the cowl flaps, while on the ground, steps up the volume of air necessary for engine cooling. In flight, closing the cowl flaps, as required, restricts the flow of air, thereby reducing the cooling and cowl flap drag to a minimum.

COWL FLAPS CONTROL.

The cowl flaps control (11, figure 2) is located just below the throttle. The control may be set and locked at any position to give the desired cowl flaps opening.

To open cowl flaps, press the lock button in with the thumb and hold while pulling the control knob out to the desired cowl flap setting. Lock control by releasing the thumb pressure on the button.

To close cowl flaps, depress the lock button with the thumb and push the control knob in. The control will lock when pressure is released.

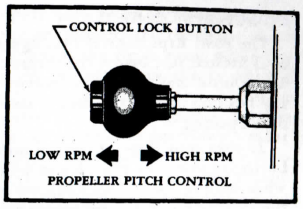
Cowl flaps are usually fully opened during taxi, take-off, and climb except in extremely cold weather. Outside air temperatures will affect cowl flap settings, and your experience will dictate their proper adjustment.

PROPELLER.

A constant speed propeller is standard equipment on your Cessna 180, and provides your airplane with maximum performance at take-off, during climb, and while cruising.

PROPELLER PITCH CONTROL.

The control knob (5, figure 2) to the right of the throttle controls the engine speed. With the control full forward, the propeller is in high rpm position. It is moved through its complete range by pressing in the control lock button in the center of the knob and pulling out the control knob to its full out or low rpm position. For sensitive control, the control knob



can be screwed in or out by turning the knob with the thumb lock in its normal locking position.

In use, the recommended procedure is to move the control full forward (high rpm) for taxiing and take-off. After take-off and climb, screw out propeller control to the desired cruising rpm. When changing rpm settings during cruising flight, it is recommended that control be moved by screwing in or out since a small movement of the control will cause a considerable change in rpm.

Propeller surging (rpm variation up and down several times before engine smooths out and becomes steady) can be prevented by smooth throttle and propeller control operation. *Do not change throttle and propeller control settings with jerky and rapid motions.*

NOTE

If the engine power and rpm are to be increased, increase the propeller control first and then the throttle. If power and rpm are to be decreased, reduce the throttle first and then the propeller control. In this manner, excessive cylinder pressures will be avoided.

OIL SYSTEM.

The Continental 0-470-K engine has a wet sump oil system which utilizes the engine pan as an oil tank. Other major components of the system are an engine-driven oil pump and an oil cooler integrally mounted on the engine.

Oil temperature is regulated automatically in this system by a thermostatically controlled oil cooler. The thermostat shuts off the passage of oil through the cooler whenever the oil temperatures are below 150° F. Ordinarily, the oil cooler is adequate to keep oil temperatures well within the normal operating range as indicated by the green arc on the oil temperature indicator. However, in high outside air temperatures, when the capacity of the cooler is insufficient to maintain normal oil temperatures, the cowl flaps can be opened and set as necessary to provide adequate cooling.

OIL LEVEL.

The oil capacity of the Continental 0-470-K engine is twelve quarts. The quantity can be checked easily by opening the access door on the left side of the engine cowl and reading the oil level on the dipstick, located just aft of the left rear engine cylinder.

The dip stick incorporates a spring lock which prevents it from working loose in flight. The dip stick can be removed by rotating it until the spring lock is disengaged and pulling the dip stick up and out. When replacing the

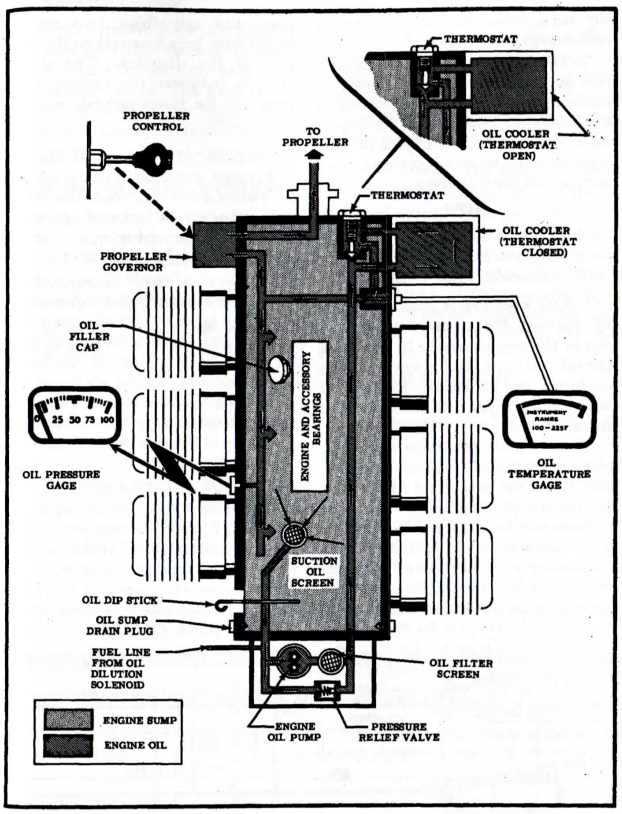


Figure 3. Oil System Schematic

dip stick, make sure that the spring lock is engaged.

To obtain correct oil level readings, it is important that the engine be shut down at least 5 to 10 minutes prior to the oil check. This permits the engine oil to drain out of the engine oil passages into the oil sump giving a more accurate oil level reading.

NOTE

Oil should be added if below nine quarts and should be full if an extended flight is planned.

The oil filler cap is made accessible by opening the access door on the top of the engine cowl. In replacing the oil filler cap, make sure that it is on firmly and turned clockwise as far as it will go to prevent loss of oil thru the filler neck.

Oil level readings for the floatplane and amphibian will register considerably below the equivalent calibrations for the landplane. This is due to the difference in attitude of the airplanes when being serviced (the landplane is inclined approximately 12° in three-point attitude while the floatplane and amphibian are almost horizontal when at rest on the water). To provide accurate oil level readings for the floatplane and amphibian, two asterisk marks have been stamped on the back side of the dipstick. The upper asterisk indicates the twelve quart level and the lower asterisk indicates nine quarts.

OIL SPECIFICATION AND GRADE.

Aviation grade oil is recommended for your Cessna 180 and should be changed every 25 hours of operation. When adding or changing oil, use the grades in the following table:

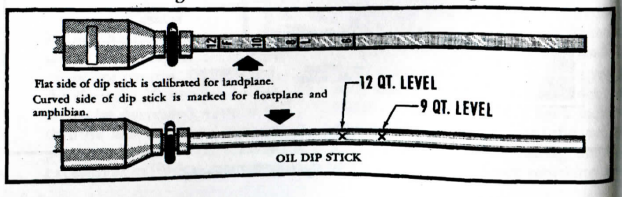
Average Outside Temperature	*Recommended Oil Grade*
Below 40° F.	SAE 30
Above 40° F.	SAE 50

NOTE

During oil changes, remove and clean oil filter screen located on the right side of the engine accessory section.

OIL TEMPERATURE GAGE.

A capillary type, oil temperature gage (15, figure 1) is mounted within the engine instrument cluster on the right side of the instrument panel. A green arc on the gage dial indicates the normal operating range of oil temperatures. Refer to Section IV for instrument markings.



OIL PRESSURE GAGE.

An oil pressure gage (12, figure 1) is mounted within the engine instrument cluster on the right side of the instrument panel. The gage is calibrated in pounds per square inch. Refer to Section IV for instrument markings.

AIR INDUCTION SYSTEM.

Air is ducted to the carburetor from an air scoop located on the bottom of the engine cowl. Dirt and other foreign matter is filtered from the incoming air by a filter screen located in the air scoop. Proper cleaning and servicing of this air filter is important to increase life and maintain top efficiency of the engine. The filter should be serviced every 25 hours (during regular oil change) or oftener when operating in dusty conditions. Under extremely dusty conditions, daily maintenance of the air filter is recommended. Refer to the servicing instructions stamped on the carburetor air filter for the servicing procedure to be used.

FUEL SYSTEM.

Fuel is supplied to the engine from two rubberized, bladder-type fuel cells, one located in each wing. From these tanks, fuel is gravity-fed through a fuel selector valve and fuel strainer to the engine carburetor.

FUEL SPECIFICATION AND GRADE.

Aviation grade fuel should always be used except under emergency conditions. The recommended fuel is 80 octane minimum rating. Highly leaded fuels are not recommended. Filling the fuel tanks immediately after flight will reduce the air space and minimize moisture condensation in the fuel tanks.

FUEL SELECTOR VALVE.

A rotary-type fuel selector valve is located between the front seats at the aft end of the cabin floor tunnel. The valve has four positions labeled "BOTH OFF", "LEFT TANK", "BOTH ON", and "RIGHT TANK". The "BOTH OFF" position shuts off both fuel tanks from the fuel system and allows no fuel to pass the fuel se-

FUEL QUANTITY DATA (U. S. GALLONS).

TANKS	NO	USABLE FUEL ALL FLIGHT CONDITIONS	ADDITIONAL USABLE FUEL FOR LEVEL FLIGHT ONLY	UNUSABLE FUEL	TOTAL FUEL VOLUME EACH
LEFT WING	1	27.5 gal.	3.5 gal.	1.5 gal.	32.5
RIGHT WING	1	27.5 gal.	3.5 gal.	1.5 gal.	32.5

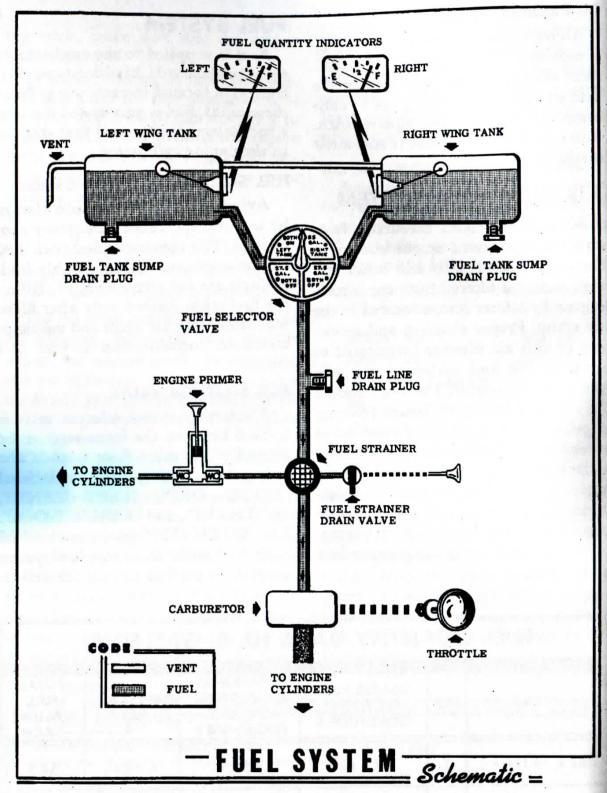


Figure 4.

lector valve. The "LEFT TANK" or "RIGHT TANK" position allows fuel to flow from only one fuel tank at a time, while "BOTH ON" permits simultaneous flow from both tanks. *Important* — The fuel valve *handle* is the pointer for the fuel selector valve and indicates the setting of the valve by its position above the dial. *Take-off should be made in the "BOTH ON" position to prevent inadvertent take-off on an empty tank.*

FUEL STRAINER DRAIN KNOB.

A fuel strainer drain knob decaled "STRAINER DRAIN" (26, figure 1) is mounted slightly to the left of center below the instrument panel. The knob provides a quick, convenient method of draining water and sediment that may have collected in the fuel strainer. The fuel strainer is located in the lower aft section of the engine compartment just forward of the firewall.

A two ounce quantity of fuel (approximately 3 to 4 seconds of drain knob operation) should be drained from the strainer before the initial flight of the day or after each refueling operation to insure against the presence of water or sediment in the fuel. The spring loaded drain valve in the strainer is OPEN when the fuel strainer drain knob is *pulled out* all the way. The drain valve automatically *closes* when the knob is *released.*

FUEL TANK SUMP DRAIN PLUG.

A fuel tank sump drain plug is located on the underside of each wing in line with the rear edge of the cabin door and out a few inches from the fuselage. These plugs are used to drain any sediment or water that may collect in the fuel tanks. Under normal operating conditions, it is recommended that the wing tank sumps be drained at each 100 hour inspection period.

FUEL LINE DRAIN PLUG.

A fuel line drain plug is located on the underside of the airplane directly below the fuel tank selector valve. At each 100 hour inspection period, this plug should be removed to drain any sediment or water accumulated in the fuel line.

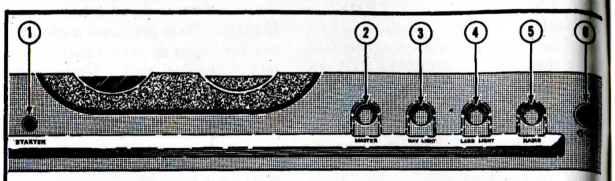
FUEL QUANTITY INDICATORS.

Electrically-operated fuel quantity indicators (11 and 17, figure 1) are mounted below the tachometer within the engine instrument cluster.

NOTE

After the master switch is turned on, a warming period is required before the indicator needles will arrive at the actual reading. Also, the needles will require several seconds to readjust themselves to the actual reading after any abrupt change in flight attitude of the airplane.

The indicators, identified "LEFT" and "RIGHT" indicate the amount of fuel remaining in their respective tank. A red arc extending from the empty to ¼ full range on each indicator dial warns the pilot that the respective tank is ¼ full or less. *Do not take off if the pointer is in the*



1. Starter Button
2. Master Switch
3. Navigation Light Switch
4. Landing Light Switch
5. Radio Switch
6. Generator Warning Light
7. Marker Beacon Switch
8. Radio Switch
9. Pitot Heat Switch
10. Oil Dilution Switch

Figure 5. Electrical

red arc.

ELECTRICAL SYSTEM.

Electrical energy is supplied by a 12-volt, direct-current system powered by an engine-driven generator. A 12-volt storage battery, located aft of the baggage compartment curtain, serves as a stand-by power source, supplying current to the system when the generator is inoperative, or when the generator voltage is insufficient to close the reverse-current relay.

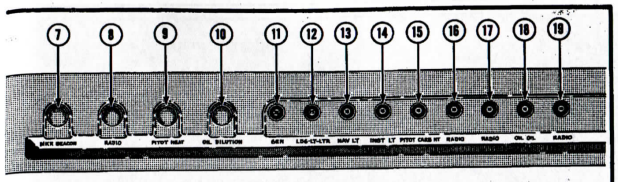
MASTER SWITCH.

The master switch (2, figure 5) is mounted at the left end of the switch row in front of the left front seat. The switch positions are: "ON" (out position) and "OFF" (in position). With the switch on, a solenoid switch is energized and the electrical power of the battery and generator is admitted into the electrical system. In the event of a short or malfunctioning of the airplane's electrical system, the master switch may be turned off and the engine will continue to run on the magneto ignition system.

CIRCUIT BREAKERS.

All the electrical circuits in the airplane are protected by circuit breakers. The stall warning and turn-and-bank indicators are safeguarded by an automatically resetting circuit breaker mounted behind the instrument panel (out of sight of the pilot) immediately to the right of the glove compartment door. The remaining electrical circuits are protected by "push-to-reset" circuit breakers (see figure 5) mounted below the glove compartment on the right side of the instrument panel. The name of the circuit is indicated below each circuit breaker.

If a circuit is inoperative, press the circuit breaker button to reset the breaker. If this does not restore the circuit, it should be checked for shorts, defective parts, or loosened connections. *If a circuit breaker pops out continually,* its circuit should be checked.



11. Generator Circuit Breaker
12. Landing Light & LTR Circuit Breaker
13. Navigation & Dome Light Circuit Breaker
14. Instrument Light Circuit Breaker
15. Pitot & Carburetor Heat Circuit Breaker
16. Radio (Additional Circuit Breaker Space)
17. Radio (Additional Circuit Breaker Space)
18. Oil Dilution Circuit Breaker
19. Radio (Additional Circuit Breaker Space)

System Control Panel

GENERATOR WARNING LIGHT.

A generator warning light (6, figure 5) is located directly above the carburetor air heat control. The light, which is red and is labeled "GEN", gives an indication of generator output. It will remain off at all times when the generator is functioning properly. The light will not show drainage on the battery. It will illuminate: when the battery or external power is turned on prior to starting the engine; when there is insufficient engine RPM to produce generator current; and when the generator becomes defective.

FLIGHT CONTROL SYSTEM.

Conventional wheel and rudder pedal controls are provided to operate the primary flight control surfaces (ailerons, rudder and elevators). The horizontal stabilizer is adjusted manually through the use of the stabilizer trim control wheel located between the two front seats. The rudder trim tab is adjustable on the ground only. The wing flaps are controlled by a hand lever mounted between the front seats.

CONTROLS LOCK.

A controls lock is provided as standard equipment to lock the ailerons and elevators in neutral position. Thus, these control surfaces are protected from damage caused by buffeting in high winds. The controls lock is designed with a large red metal flag which covers the airplane master switch making it impossible to start the engine with the controls lock installed. *To install the controls lock,* pull the control wheel back until the hole in the control wheel shaft is aligned with the hole in the collar assembly mounted on the instrument panel. Position the controls lock on the right side of the control wheel shaft adjacent to the instrument panel so that the lettering on the red flag is

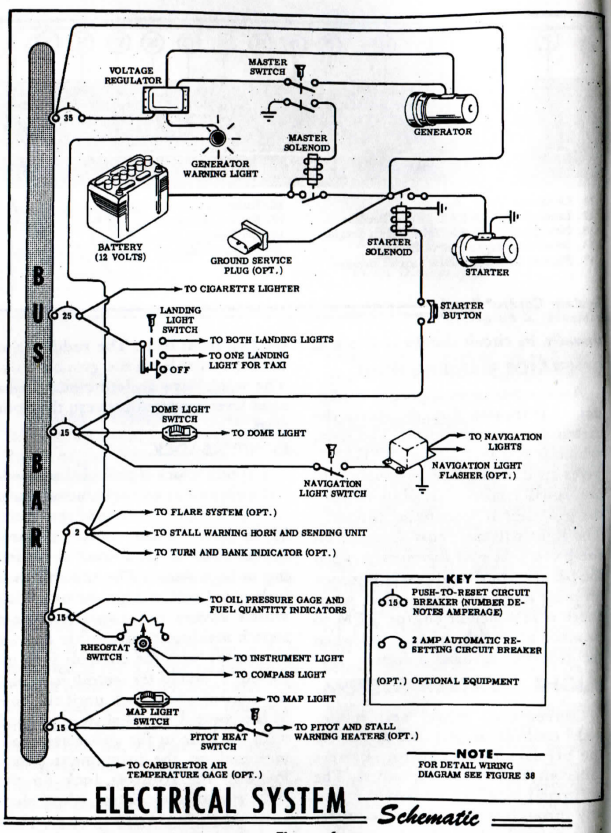


Figure 6.

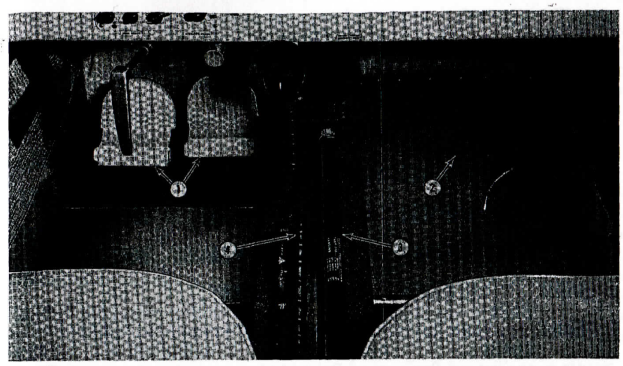


Figure 7. Lower Forward Section of Cabin

1. Pilot's Rudder Pedals
2. Footrest
3. Wing Flap Handle
4. Adjustable Stabilizer Control Wheel

legible. Insert the short shaft of the controls lock down through the holes in the collar assembly and control wheel shaft. Check that the controls lock is fully inserted. *To remove the controls lock,* pull it up and out of the collar assembly and control wheel shaft.

When not in use, the controls lock may be stored in the glove compartment.

CONTROL WHEELS.

The elevator and aileron surfaces are operated by conventional movement of the control wheel. The control wheel is located directly in front of the pilot's seat and operates through the instrument panel. A dual control wheel is available as optional equipment.

RUDDER PEDALS.

A set of rudder pedals (1, figure 7) are provided to operate the rudder. These rudder pedals are located just aft of the firewall directly in front of the pilot's seat. Dual rudder pedals are available as optional equipment.

ADJUSTABLE STABILIZER CONTROL WHEEL.

Design of the airplane enables the entire stabilizer to be trimmed to meet different load and speed conditions. The stabilizer is adjusted by rotating the adjustable stabilizer control wheel (4, figure 7), located to the left of the flap control handle. Nose attitude of the airplane is indicated by a position indicator incorporated in the adjust-

able stabilizer control wheel mechanism. Forward movement of the wheel trims the nose down. Backward movement of the wheel trims the nose up. This allows the elevator forces to be trimmed out for the various load and flight conditions. (Control wheel loads are very heavy when the stabilizer is not properly set.) Take-off is made with indicator in "TAKE-OFF" position.

WING FLAP HANDLE.

The wing flaps are controlled by a wing flap control handle (3, figure 7) mounted between the two front seats. The handle is operated by depressing the thumb button and moving the handle to the desired flap setting. By releasing the thumb button, the handle can be locked to provide 0, 10, 20, 30 and 40 degree flap positions.

The flaps may be lowered or raised during normal flying whenever the airspeed is less than 100 mph. The flaps supply considerable added lift and drag; the resulting action steepens the glide angle of the airplane enabling the pilot to bring the airplane in over an obstruction and land shorter than could be done without flaps.

The use of flaps is not recommended for take-offs in strong cross-winds. For additional information on the use of wing flaps for take-off, refer to page 3-5.

Wing Flap Settings

For take-off.....*Up (0°)*
1st notch (10°)
2nd notch (20°)
For landing.....*3rd notch (30°)*
4th notch (40°)

LANDING GEAR.

MAIN LANDING GEAR.

Your airplane is equipped with Cessna's Safety Landing Gear. It consists of a tapered, spring steel leaf supporting each main wheel. This spring leaf is made from the highest quality chrome-vanadium steel, heat-treated and shot peened for added fatigue resistance.

TAIL GEAR.

The tail gear on your 180 is of a completely new and improved design. In this trim gear, the tailwheel assembly is mounted on a tapered, tubular spring at the aft end of the fuselage. The lightweight, tubular spring is rubber cushioned to cut down landing shock. It is made of high grade, chrome-vanadium steel, shot-peened for additional fatigue resistance. The tail wheel is steerable through an arc of 24° each side of neutral. Beyond this travel, the tail wheel becomes free-swiveling.

AMPHIBIOUS LANDING GEAR.

Your 180 can be equipped with Edo Amphibious landing gear. This gear consists of standard type floats with retractable wheels. Each float has a main wheel and a nose (or bow) wheel, both fully retractable and incorporating air-oil shock struts. The main wheel retracts to a position slightly above and aft of the float step, which shields the wheel hydrodynamically. The nose wheel retracts

up to the bow point of the float where it serves as a bumper for floating docks and obstructions. Each float also has a retractable water rudder. On water and in the air, the 180 Amphibian is operated, in all respects, the same as the 180 floatplane.

AMPHIBIOUS LANDING GEAR SWITCH.

An electrical landing gear retraction switch is provided on the extreme left side of the shock mounted instrument panel. This switch has two positions marked "UP" and "DOWN".

AMPHIBIOUS LANDING GEAR POSITION INDICATORS.

There is a blue indicator light beside the "UP" position of the landing gear switch, which is the wheels retracted or water landing position. This light is on at all times when the gear is retracted and the master switch is on. There is a red indicator light beside the "DOWN" position of the landing gear switch. This light is on at all times when the gear is extended and locked and the master switch is on. When neither light is on, the gear is in an intermediate position.

The position of the gear can be double checked against the indicator lights by noting the position of the latch fitting on the retraction mechanism thru a small plexiglas window in the top of each float. When the locking fitting is completely aft, the gear is down and locked.

AMPHIBIOUS LANDING GEAR CIRCUIT BREAKERS.

The electrical circuit of the retraction system in each float is protected by a push-to-reset type circuit breaker. These two circuit breakers are mounted on the right side of the panel and are labeled as to left and right gear circuits.

BRAKE SYSTEM.

The hydraulic brakes on the main wheels are conventionally operated by applying toe pressure to either the pilot's or co-pilot's rudder pedals. The rotation of the pedals actuates the brake cylinders, resulting in a braking action on the main landing gear wheels. The brakes may also be set by operating the parking brake control.

BRAKE PEDALS.

Conventional toe-type brake pedals are incorporated as the upper part of the pilot's rudder pedals. Two brake cylinders are mounted directly to the pilot's brake pedals. Pressure applied to the co-pilot's brake pedals is transmitted by a mechanical linkage to the pilot's pedals which in turn actuate the brake cylinder.

PARKING BRAKE HANDLE.

The parking brake handle (28, figure 1) is mounted below the instrument panel directly in front of the pilot's seat. The handle locking mechanism is connected, by cables, to the pilot's rudder pedals which actuate the brake master cylinders. Operation of the parking brake handle applies a downward pressure on the rudder pedal, thus actuating the brake master cylinders to apply the main wheel brakes. *To set the parking brake,*

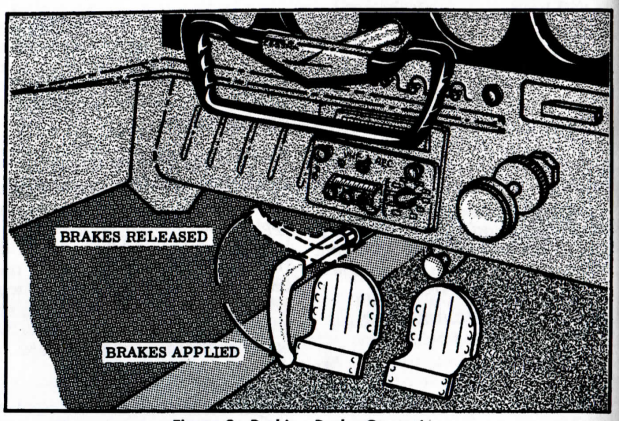


Figure 8. Parking Brake Operation

grasp the handle, and while turning it counterclockwise ¼ turn (handle pointing downward), pull it out using moderate pressure.

Note

Toe pressure may be applied to the rudder pedals to aid in depressing the brake master cylinders if desired; however, this operation is not necessary.

To release the parking brake, turn the handle clockwise ¼ turn and allow it to return to the stowed position.

INSTRUMENTS.

All instruments are mounted on the instrument panel with the exception of the magnetic compass and a free air temperature gage. The magnetic compass is mounted on the windshield centerstrip in full view of the pilot. The free air temperature gage (optional equipment) is located in the right cabin-ventilator. For correct readings, the ventilator must be slightly open.

PITOT- STATIC SYSTEM.

The airspeed indicator (6, figure 1), altimeter (7, figure 1), and rate-of-climb indicator (9, figure 1) are operated by the pitot-static system. This system consists of a pitot tube, mounted under the leading edge of the left wing, and two pressure ports mounted on opposite sides of the fuselage

just aft of the firewall. To keep the pitot tube opening clean, a cover may be placed over the pitot tube whenever the plane is idle on the ground. The static pressure port openings should be kept free of polish, wax, or dirt for proper airspeed indicator operation.

PITOT HEATER (OPTIONAL EQUIPMENT).

If desired, a pitot heater can be installed, as optional equipment, to prevent ice from obstructing the pitot tube opening. This system consists of an electrical heating element mounted within the pitot tube and a pitot heater switch (9, figure 5) installed in the switch row on the left side of the instrument panel. The switch positions are "ON" (out) and "OFF" (in).

TURN AND BANK INDICATOR (OPTIONAL EQUIPMENT).

The turn and bank indicator (5, figure 1) is an electrically operated instrument. Turned on by operation of the master switch, the indicator remains in operation until the master switch is turned off. The indicator has no separate control switch.

STALL WARNING INDICATOR.

A stall warning indicator is mounted on the back of the glove compartment box, next to the firewall. This instrument gives your 180 full and complete protection from inadvertent stalls. It gives warning whenever a stall is approached regardless of speed, attitude, altitude, acceleration or other factors which change the stalling speed. The stall warning horn is set to give an audible warning approximately 5 mph above the normal straight ahead stalling speed. Other attitudes and speeds provide a wider margin.

The only time you may hear the indicator under safe flight conditions will be merely a short beep as you land. Usually no warning will be evident on a properly executed landing because the indicator takes the ground effect into consideration. (If the airplane is leveled off high, however, the indicator will signal.) The indicator automatically cuts out on the ground, although high surface winds may give signals when taxiing. It therefore requires no silencing switch which might be inadvertently left off.

STALL WARNING TRANSMITTER HEATER (OPTIONAL EQUIPMENT).

If desired, a heater can be installed, as optional equipment, to prevent ice from hampering operation of the stall warning system transmitter unit mounted on the leading edge of the left wing. The heater element is installed when an optional pitot heater is provided on your airplane. The heater is operated by the pitot heater switch (9, figure 5).

CLOCK (OPTIONAL EQUIPMENT).

An eight-day, stem-wind, aircraft clock (4, figure 1) may be installed as optional equipment in the upper left hand corner of the instrument panel.

MAGNETIC COMPASS.

A magnetic compass is mounted on

the windshield center strip. The compass correction card is mounted at the top of the instrument panel slightly to the right of the panel centerline for quick and easy reference when reading the magnetic headings.

SEATS.

FRONT SEATS.

The front seats are individually mounted on tracks and are adjustable fore and aft. The seat adjustment handle is located within easy reach on the left front side of each front seat. *To adjust the seat,* simply pull up on the handle and slide the seat to the most comfortable position.

NOTE

Test the front seats for secure latching after adjusting them to the desired position.

REAR SEAT.

The rear seat has provisions to accommodate two people. The back of the seat is hinged at the bottom to permit seat adjustment and easy access to the baggage compartment. A seat adjustment handle is located behind and at the top of the rear seat back.

CABIN TEMPERATURE CONTROL SYSTEM.

The cabin temperature control system was designed to provide fresh air to the cabin at all times, with a means of regulating the air temperature.

Cabin temperature is controlled by a cabin heat knob (8, figure 2) located immediately below the mixture control. With the cabin heat knob pushed full in, unheated air is ducted to the cabin. As the knob is pulled out, more and more heated air is added. With the knob pulled all the way out, all of the air entering the cabin through the cabin temperature control system is heated.

Air outlets are provided in front of the pilot's and co-pilot's rudder pedals and at the door posts. The forward outlets are ten holes in each end of a duct running completely across the firewall. The rear cabin area is heated and ventilated by ducts, one on either side of the cabin, extending along each wall and terminating at the door posts. A defroster outlet, incorporating a slide valve to control the quantity of air through it, is provided on the pilot's side just behind the windshield.

To provide a flow of warm air, pull the cabin heat knob out. *To provide a flow of cool air,* push in the cabin heat knob.

To prevent any air (hot or cold) from entering the cabin through the heater ducts, push the cabin heat knob in and pull out cabin air knob (9, figure 2).

(Never pull the cabin air knob out when the cabin heat knob is out. This may result in overheating of the heater muff hoses.)

CABIN VENTILATORS.

Additional ventilation for the cabin area is provided by manually-adjusted cabin ventilators. Two ventilators are installed: one on each side of the cabin in the upper corner of the windshield.

To provide a flow of air, pull venti-

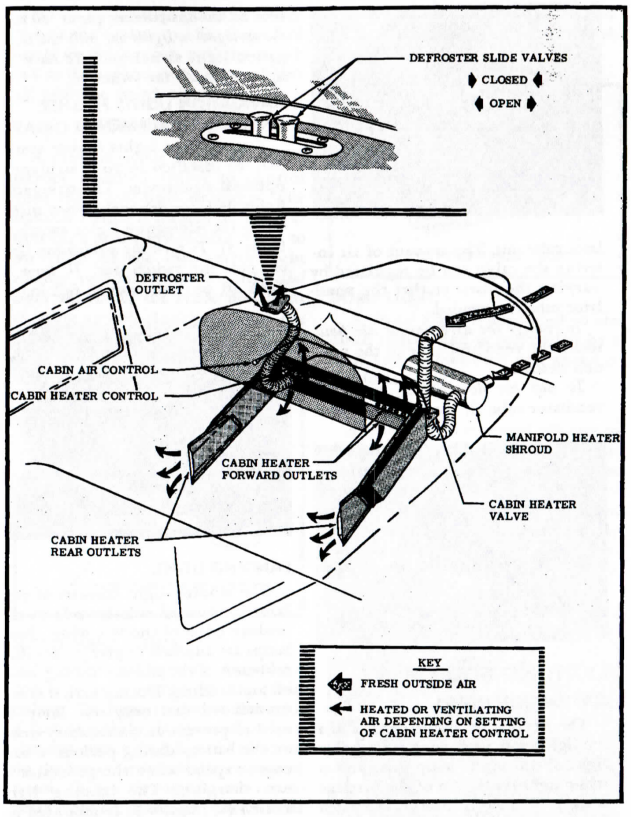
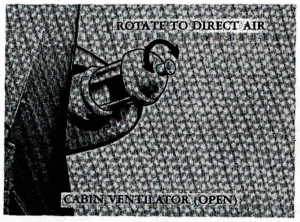


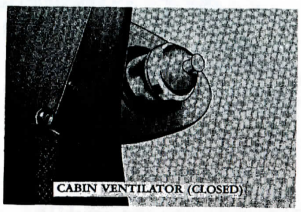
Figure 9. Cabin Air Temperature System



lator tube out. The amount of air entering the cabin can be regulated by varying the distance that the ventilator tube is extended.

To change the direction of air flow, rotate the ventilator tube to the position desired.

To stop the flow of air, push the ventilator tube all the way in.



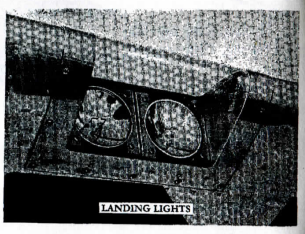
LIGHTING EQUIPMENT.

NAVIGATION LIGHTS.

The navigation lights consist of a red light on the left wing tip, a green light on the right wing tip, and a white light on the tip of the fuselage stinger. The navigation light switch (3 , figure 5) is mounted in the switch row on the instrument panel. *To turn the navigation lights on,* pull the navigation light switch out. *To turn the lights off,* push the switch in.

NAVIGATION LIGHTS FLASHER (OPTIONAL EQUIPMENT).

A navigation lights flasher system may be installed in your airplane as optional equipment. The navigation lights flash continuously when turned on by the navigation lights switch (3, figure 5). *To turn the navigation lights on,* pull the switch out. *To turn the lights off,* push the switch full in.



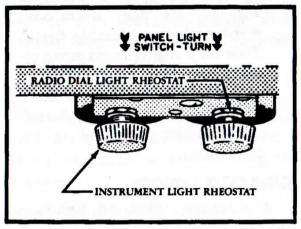
LANDING LIGHT.

The landing light consists of two lamps mounted side-by-side in the leading edge of the left wing. Both lamps are adjusted to give proper illumination of the runway during takeoff and landing. During taxi, it is recommended that only one lamp be used to prevent an unnecessary drain on the battery during periods of low engine speed when the generator is not charging. The landing light switch (4 , figure 5) is mounted on the instrument panel. *To turn one*

lamp on for taxiing, pull the switch out to the first stop. *To turn both lamps on for landing,* pull the switch out to the second stop. *To turn lights off,* push the switch all the way in.

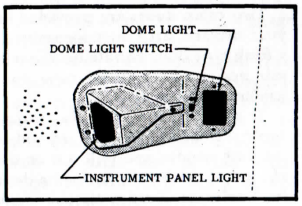
RADIO DIAL LIGHT.

A rheostat switch is provided with factory installed radios to control your radio dial light or lights. The rheostat switch is located on the bottom edge of the instrument panel to the right of the instrument light rheostat switch. *To turn the radio dial light on,* rotate the radio dial light rheostat switch clockwise until the desired illumination is obtained. *To turn the light off,* turn the switch counterclockwise as far as it will go.



INSTRUMENT LIGHTS.

An instrument light incorporating a red lens is mounted in the cabin ceiling. The light, in conjunction with a compass light, is controlled by a rheostat switch (see figure 1) located on the bottom edge of the instrument panel. *To turn the compass and instrument light on,* rotate the instrument light rheostat knob clockwise until the desired illumination is obtained. *To turn the lights off,* turn the knob counterclockwise.

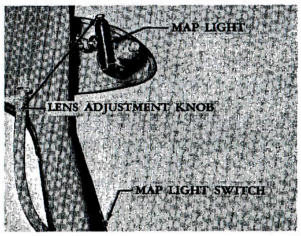


DOME LIGHT.

A dome light is mounted in the cabin ceiling and is controlled by a slide switch mounted just ahead of the dome light.

MAP LIGHT.

A map light is mounted adjacent to the left cabin ventilator and is controlled by a slide switch mounted on the left door post. The light is adjustable to shine in various directions, and a lens adjustment knob, integrally mounted on the light, makes it possible to change the beam from spot to flood illumination.



MISCELLANEOUS EQUIPMENT.

CABIN DOORS.

Two cabin doors are provided on your airplane. Each door incorporates a flush type door handle on the outside and a conventional type door handle on the inside.

To open the door from the outside, apply pressure on the forward end of the flush handle, and pull out on the aft end of the handle until the door latch releases. *To open the door from the inside,* rotate inside door handle down and forward.

NOTE

When closing the door, the inside door handle must be in the unlocked position (neutral). Otherwise, the locking bolt will interfere with the door jamb.

Both cabin doors can be locked from the inside. *To lock either door,* rotate inside door handle aft and up as far as it will go, approximately 90 degrees. *To unlock,* rotate handle down.

The left door can be locked from the outside by means of a key-operated lock. The same key that is used for the ignition is also used to lock the door.

A door stop is incorporated in the front edge of each cabin door to hold the door open for easy loading of your airplane. *To engage door stop,* swing door out to the limit of its travel and release. *To disengage door stop,* simply close door.

CABIN WINDOWS.

The rear cabin windows are of the fixed type and do not open. The cabin door windows are a full door width, providing you with excellent side visibility. They are hinged along the top allowing them to open outward for additional ventilation.

To open these windows, depress the small lock release button and turn the handle upward. The window will open outward without pressure due to spring loaded limit arms in the upper portion of the window assembly.

NOTE

Caution should be exercised when opening these windows during flight since air pressure will tend to "pop" them outward with considerable force. This may result in damage to the limit arms. Therefore it is recommended that you hold firmly to the handle and ease the window outward to its open limit.

CIGARETTE LIGHTER.

A cigarette lighter (6, figure 2) is mounted on the instrument panel as standard equipment.

GLOVE COMPARTMENT.

A glove compartment (20, figure 1) is located on the right side of the instrument panel. *To open,* pull out on glove compartment door knob.

MAP POCKET.

A map pocket is incorporated in the left forward upholstery side panel.

It is readily accessible to the pilot, and is handy for storing maps and flying aids.

ASH RECEIVERS.

Three ash receivers are provided in your airplane. One ash receiver is located in the center of the instrument panel and is used by the occupants of the front seats. The remaining ash receivers are mounted on the cabin walls just aft of the rear door post bulkheads and are accessible to the rear seat passengers.

COAT HANGER HOOK.

For your convenience, a coat hanger hook has been installed in the cabin ceiling above the back of the rear seat. Your coats can be hung, full-length and wrinkle-free, between the back of the rear seat and the baggage shelf, without interfering with the comfort of rear-seat passengers.

ASSIST STRAPS.

Two assist straps are mounted on the front door posts and are used as an aid in entering and leaving the airplane.

BAGGAGE COMPARTMENT.

The baggage compartment is located immediately aft of the rear seat. *To gain access from inside the cabin,* rotate the rear seat adjustment handle (top center of rear seat back) upward, disengaging the adjustment bars from the retaining brackets. The seat back can then be rotated forward and down providing access to the baggage compartment.

Access to the compartment from the exterior is gained thru the baggage compartment door. The baggage door has the same flush type handle as the cabin doors and is locked or unlocked with the same key. A limit chain keeps the door from being opened back against the fuselage.

UTILITY SHELF.

A utility shelf is located just above the baggage compartment. This shelf will prove very handy for storing hats, brief cases, and small articles.

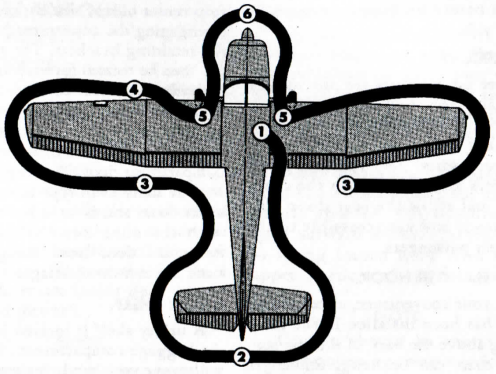
LOADING YOUR CESSNA.

There are several different ways to "load" your Cessna, all of which are satisfactory. However, from experience, we have found the following sequence of steps to be most satisfactory under average loading conditions:

First, load your baggage in the baggage compartment.

Next, load the front seats.

Finally, load the rear seat.



① a. Check quantity of fuel (2 gages).
b. Make sure master and ignition switches are off.
c. Remove control lock or safety belt from control wheel, if installed.
d. On first flight of day, operate fuel strainer drain knob (pulled out for approximately four seconds) to clear fuel strainer of any water or sediment.

② a. Remove rudder lock, if installed.
b. Inspect tail surface hinges and hinge bolts.
c. Disconnect tie-down chain.
d. Inspect tail wheel spring, steering arms, steering chains and tire inflation.

③ a. Remove aileron lock, if installed.
b. Check aileron and flap hinges.

④ a. Remove pitot tube cover, if installed.
b. Inspect pitot tube opening for stoppage.
c. Check fuel tank vent opening for stoppage.

⑤ a. Check main wheel tire for cuts, bruises, and proper inflation.
b. Inspect airspeed static source hole on side of fuselage for stoppage.
c. Remove fuel tank cap and check fuel level.
d. Disconnect tie-down chain.

⑥ a. Check propeller and spinner for nicks and security.
b. Examine propeller for oil leakage.
c. Make visual check to insure that drain valve is closed after draining operation.
d. Check oil level. Do not operate on less than nine quarts. Fill for extended flight. For floatplane, refer to "OIL LEVEL" paragraph in Section I.
e. Check carburetor air filter for restrictions by dust or other foreign matter.
f. Inspect cowl access doors for security.

Repeat steps 3 and 5.

Figure 10. Exterior Inspection Diagram

Section II

operating check list

AFTER FAMILIARIZING YOURSELF with the equipment of your Cessna 180, your primary concern will normally be the operation of your airplane. This section lists, in Pilot's Check List form, the steps necessary to operate your Cessna efficiently and safely. It is not a check list in its true form as it is considerably longer, but it does cover briefly all of the points that you would want to or should know concerning the operation of your Cessna 180.

The flight and operational characteristics of the Model 180 Cessna are normal in all respects. There are no "unconventional" characteristics of operations that need to be mastered. All controls respond in the normal way within the entire range of operation of the airplane.

BEFORE ENTERING AIRPLANE.

(1) Perform an exterior inspection in accordance with figure 10.

BEFORE ENTERING AMPHIBIAN.

(1) Perform an exterior inspection of the applicable items in figure 10.
(2) Inspect the floats for dents, cracks, scratches, etc.
(3) Remove the cover plates and inspect the floats for water, following water operations.
   a. If water is found in any of the bays it may be readily removed using a sponge.
   b. Tighten the cover plates securely in place after inspecting each bay.
(4) Check the wheel struts for proper inflation.

BEFORE STARTING ENGINE.

(1) Adjust seat to a comfortable position, check to see that seat locking mechanism is secure, and fasten safety belt.
(2) Check rudder, ailerons, and elevators for free and correct movement.
(3) Landing gear switch "DOWN" (Amphibian on land).
(4) Check wing flaps at all positions.

(5) Water rudders "UP" (Amphibian on land).
(6) Pull cowl flap control to full open position.
(7) Turn fuel selector valve to "BOTH". (Take-off on less than ¼ tank is not recommended.)
(8) Rotate adjustable stabilizer control wheel so that indicator is in "TAKE-OFF RANGE".
(9) Set altimeter and clock.
(10) Test operate brakes and set parking brake.
(11) Make sure radio switches are "OFF".
(12) For night flights, test operate all exterior and interior lights. Make sure flashlight is on board in usable condition.

STARTING ENGINE.

(1) Set mixture control to "FULL RICH" (full in).
(2) Set carburetor heat to "COLD" (full in).
(3) Set propeller control for "HIGH RPM" (full in).
(4) For an initial start in normal air temperatures, use one stroke of the engine primer. To start a warm engine, use ¼ stroke of primer.
(5) Turn master switch "ON".
(6) Open throttle approximately ½ inch.
(7) Turn ignition switch to "BOTH".
(8) Clear the propeller.
(9) Push starter button until engine fires.

NOTE

If engine has been over-primed, start engine with throttle opened ¼ to ½ full open. Be sure to reduce throttle to idle position when engine fires.

WARM-UP AND GROUND TEST.

(1) Adjust engine speed to 800 to 1000 rpm.
(2) Check for an oil pressure indication within 30 seconds in normal weather and 60 seconds in cold weather. If no indication appears, shut off engine and investigate.
(3) Avoid the use of carburetor heat unless icing conditions prevail.
(4) Continue the warm-up while taxiing out to the active runway.
(5) Check the rpm drop on each magneto at 1700 rpm. The maximum allowable drop is 100 rpm.
(6) Check carburetor heat by noticing rpm drop when heat is applied.
(7) a. Hartzell Propeller — Check propeller operation in high and low pitch at 1700 rpm. Return control to low pitch (full in) and reduce power.

b. McCauley Propeller — At 1700 rpm move propeller control out until a slight drop in rpm is noticed. Then return propeller to low pitch (full in) position. This drop in rpm shows that governor operation is satisfactory.

(8) If engine accelerates smoothly and oil pressure remains steady at some value between 30 and 60 psi, the engine is warm enough for take-off.

BEFORE TAKE-OFF.

(1) Recheck free and correct movement of flight controls.
(2) Recheck adjustable stabilizer control wheel setting.
(3) Recheck cowl flaps "OPEN".
(4) Turn carburetor heat "OFF" (full in) unless extreme icing conditions prevail.
(5) Recheck propeller in low pitch (full in).

TAKE-OFF.

NORMAL TAKE-OFF.

(1) Apply full throttle smoothly to avoid propeller surging.
(2) Maintain a moderately tail-low attitude throughout the take-off run.
(3) Keep heels on floor to avoid dragging brakes.
(4) Level off slightly after take-off to accelerate to an efficient climb speed.

MINIMUM RUN TAKE-OFF.

(1) Wing flaps 20° (second notch).
(2) Hold brakes while applying full throttle.
(3) Release brakes and hold tail-low attitude during take-off run.
(4) Keep heels on floor to avoid dragging brakes.
(5) Fly airplane off ground in almost 3-point attitude.

AMPHIBIAN TAKE-OFF ON LAND.

(1) Wing flaps 20° (second notch).
(2) Apply full throttle smoothly to avoid propeller surging.
(3) Keep heels on floor to avoid dragging brakes.
(4) When amphibian feels light, (60-70 mph) apply light back pressure to control wheel and allow aircraft to fly off smoothly.
(5) After take-off, level off slightly and accelerate to an efficient climb speed and retract landing gear.

OBSTACLE CLEARANCE TAKE-OFF.

(1) Wing flaps 20° (second notch).
(2) Hold brakes while applying full throttle.
(3) Release brakes and maintain a moderately tail-low attitude during take-off run.

(4) Keep heels on floor to avoid dragging brakes.
(5) Level off slightly to accelerate to best angle-of-climb speed(60 I.A.S.).

AMPHIBIAN OR FLOATPLANE TAKE-OFF ON WATER.

(1) Wheels "UP" (Amphibian).
(2) Water rudders "UP".
(3) Wing flaps 20° (second notch).
(4) Apply full-up elevator and advance throttle slowly to full throttle.
(5) Place airplane on float step by releasing control wheel back pressure after bow wave source moves aft of the wing strut.
(6) When airplane feels light, apply light control wheel back pressure and allow airplane to fly off smoothly.

TAKE-OFF IN STRONG CROSSWIND.

(1) Apply full throttle.
(2) The nose of the airplane is pointed into the wind, placing the airplane in a crabbed attitude. (The angle of crab depends on the velocity and direction of the wind).
(3) Guide the airplane down the center of the runway in the crabbed attitude (using the rudder) with usual acceleration to attain flying speed.

CLIMB.

(1) If no obstacle is ahead, climb out with flaps up at 100-120 mph with 23 inches manifold pressure and 2450 rpm. If maximum climb performance is desired, use full throttle, 2600 rpm, and 90 mph I.A.S. at sea level (see figures 19, 20 and 21). Reduce climb speed about ½ mph for every 1000 feet of altitude above sea level.
(2) To climb over an obstacle with flaps up, the best angle-of-climb speed (70 mph I.A.S.) should be used, (gear retracted on amphibian.)
(3) Cowl flaps are normally "OPEN" for climbs in normal air temperatures.
(4) Mixture should be "FULL RICH" unless engine is rough due to rich mixture.

CRUISING.

(1) Close cowl flaps.
(2) Select cruising power setting from Range Charts (figures 22 thru 25). Maximum power setting for cruising is 23 inches of manifold pressure at 2450 rpm.
(3) After speed is stabilized, trim airplane with stabilizer control wheel.
(4) Lean mixture as follows: pull mixture control out until airspeed starts to drop or engine becomes rough; then, enrichen mixture slightly be-

yond this point. Any change in altitude, power, or carburetor heat will require a change in lean mixture setting. Do not lean mixture with power setting above 23 inches of manifold pressure and 2450 rpm.
(5) Check engine instruments for indications within their normal operation ranges (green arcs).

LET-DOWN.

(1) Set mixture control "FULL RICH" (full in).
(2) Reduce power to obtain desired let-down rate at cruising speed.
(3) Apply enough carburetor heat to prevent carburetor icing if icing conditions exist.

BEFORE LANDING — LANDPLANE.

(1) Set fuel selector valve to "BOTH".
(2) Recheck mixture "FULL RICH" (full in).
(3) Set propeller control for at least 2450 rpm so that high power will be available in the event of a "go-around".
(4) Close cowl flaps.
(5) Apply carburetor heat before closing throttle.
(6) Glide at 80-90 mph I.A.S. with flaps up.
(7) Lower wing flaps at airspeeds below 100 mph.
(8) Maintain 70-80 mph I.A.S. with flaps extended.
(9) Trim airplane with adjustable stabilizer for glide.

NOTE

This is very important because the ability of the airplane to land three-point is dependent upon the stabilizer being adjusted for hands-off trim in the glide.

BEFORE LANDING — AMPHIBIAN ON LAND.

(1) Extend landing gear below 130 mph.
(2) Check for Red landing gear indicator light.
(3) Water rudders "UP".
(4) Set fuel selector valve to "BOTH".
(5) Recheck mixture "FULL RICH" (full in).
(6) Set propeller control for at least 2450 rpm so that high power will be available in the event of a "go-around."
(7) Close cowl flaps.
(8) Apply carburetor heat before closing throttle.
(9) Glide at 85-95 mph with flaps up.
(10) Lower wing flaps at airspeeds below 100 mph.
(11) Maintain 80-90 mph with flaps extended.
(12) Trim airplane with adjustable stabilizer for glide.

BEFORE LANDING — AMPHIBIAN OR FLOATPLANE ON WATER.

(1) Wheels "UP" (Amphibian).
(2) Check for Blue landing gear indicator light (amphibian).
(3) Water rudders "UP".
(4) Set fuel selector valve to "BOTH".
(5) Recheck mixture "FULL RICH" (full in).
(6) Set propeller control for at least 2450 rpm so that high power will be available in the event of a "go-around".
(7) Close cowl flaps.
(8) Apply carburetor heat before closing throttle.
(9) Glide at 90-95 mph with flaps up.
(10) Lower wing flaps at airspeeds below 100 mph.
(11) Maintain 80-85 mph with flaps extended.
(12) Trim airplane with adjustable stabilizer for glide.

LANDING.

NORMAL LANDING — LANDPLANE.

(1) Landing technique is conventional for all flap settings.

NORMAL LANDING — AMPHIBIAN ON LAND.

(1) Land on main wheels first. (Nose slightly above level flight attitude).
(2) Lower nose wheels gently to runway after speed is diminished.
(3) Avoid excessive braking unless obstacle is ahead.

NORMAL LANDING — AMPHIBIAN AND FLOATPLANE ON WATER.

(1) Landing technique is conventional for all flap settings.

SHORT FIELD LANDING — LANDPLANE.

(1) Make a power-off approach at 70 mph I.A.S. with flaps down 40°.
(2) After three-point landing, apply heavy braking.
(3) As speed diminishes, reduce braking to safe amount.

SHORT FIELD LANDING — AMPHIBIAN ON LAND.

(1) Make a power-off approach at 80-85 I.A.S. with flaps 40°.
(2) Land on main wheels first.
(3) Lower nose wheels to ground immediately after touch-down.
(4) Apply heavy braking as required.

LANDING WITH CROSSWIND GEAR IN A STRONG CROSSWIND.

(1) Establish a crab angle during approach and land while crabbing into the wind. The crosswind gear will automatically compensate for the

crabbed position of the airplane.

LANDING IN STRONG CROSSWIND — AMPHIBIAN ON LAND.

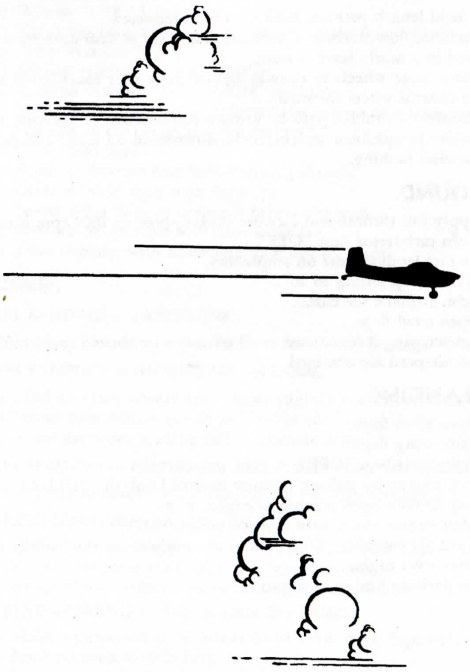
(1) If field length permits, land with flaps retracted.
(2) Use wing low, crab, or combination method of drift correction.
(3) Land in a nearly level attitude.
(4) Lower nose wheels to runway immediately after touchdown and hold the control wheel forward.
(5) Maintain a straight path by using a combination of ailerons, up-wind rudder (amphibian weathercocks downwind on land) and occasional up-wind braking.

GO-AROUND.

(1) Apply full throttle and increase engine speed to 2600 rpm if necessary.
(2) Turn carburetor heat "OFF".
(3) Retract landing gear on amphibian.
(4) Reduce flap setting to 20°.
(5) Trim airplane for climb.
(6) Open cowl flaps.
(7) Retract wing flaps as soon as all obstacles are cleared and a safe altitude and airspeed are obtained.

AFTER LANDING.

(1) Open cowl flaps.
(2) Raise wing flaps.
(3) Carburetor heat "OFF".
(4) Stop engine by pulling mixture control knob to "FULL LEAN" (full out). Do not open throttle as engine stops.
(5) After engine stops, turn ignition switch "OFF".
(6) Turn all switches "OFF". Be sure — otherwise the battery may run down over night.
(7) Set parking brakes, if required.



Section III

operating details

THE FOLLOWING PARAGRAPHS cover in somewhat greater detail the items entered as a Check List in Section II. Not every item in the list is discussed here. Only those items of the Check List that require further explanation will be found in this section.

CLEARING THE PROPELLER.

"Clearing" the propeller should become a habit with every pilot. Making sure no one is near the propeller before the engine is started should be a positive action. Yelling "clear" in loud tones is best. An answering "clear" from ground crew personnel is the response that is required.

ENGINE OPERATING PROCEDURE.

You have a new Continental engine made to the highest standards available. This engine has been carefully operated in its run-in and flight tests, so that the engine, as you receive it, is in the best possible condition. Proper engine operation will pay you rich dividends in increased engine life. The following points are mentioned so that you may receive the maximum of trouble-free operation and low maintenance cost.

STARTING ENGINE.

Weak intermittent explosions followed by puffs of black smoke from the exhaust stacks indicate overpriming or flooding. Excess fuel can be cleared from the combustion chambers by setting mixture control in "FULL LEAN" position, throttle "FULL OPEN", ignition switch "OFF", and then cranking the engine through several revolutions.

If engine is underprimed, which is most likely in cold weather with a cold engine, repeat starting instructions.

WARM-UP.

The warm-up should be conducted at 800-1000 rpm while headed into the wind with cowl flaps open. Part of this warm-up should be accomplished during taxi. The engine speed should not exceed 1600 rpm while the oil is cold.

ENGINE OPERATION DURING TAKE-OFF.

Most engine harm results from improper operation before the engine is properly warmed and temperatures

stabilized. For this reason, on your initial take-off, use maximum power only when and as necessary for safe operation of the airplane, reducing power as soon as possible.

ENGINE OPERATION DURING CLIMB.

The instructions given under "ENGINE OPERATION DURING TAKE-OFF" also apply to climbs at low altitudes where high engine power is available. At higher altitudes where relatively low power is obtainable and when the engine has had time to warm up sufficiently, full throttle operation is permissable in climbs.

Engine speeds above 2450 rpm do not increase the rate-of-climb appreciably because part of the extra horsepower taken from the engine is lost due to lower propeller efficiency at high engine speeds. Furthermore, the gain in rate-of-climb at 2600 rpm is accompanied by a sizable increase in fuel consumption.

ENGINE OPERATION DURING CRUISING.

Maximum power for cruise is obtained with 23 inches of manifold pressure and 2450 rpm. Greater range can be obtained at lower power settings as shown in the range charts (figures 22 thru 25). These ranges are based on flight test data with lean mixture at all altitudes. Mixture leaning is accomplished as follows: pull mixture control out until airspeed starts to drop or engine becomes rough; then enrichen mixture slightly beyond this point. Any change in altitude, power, or carburetor heat will require a change in lean mixture setting. Do not lean mixture with power setting above 23 inches of manifold pressure and 2450 rpm.

Application of full carburetor heat in cruising may enrichen the mixture to the point of engine roughness. To avoid this, lean the mixture as instructed in the foregoing paragraph.

ENGINE OPERATION DURING LET-DOWN.

Let-downs should be performed with cowl flaps "CLOSED", mixture "RICH", and enough power to keep engine warm and cylinders clear. To maintain a constant rate of descent, it is necessary to periodically reduce power because, for a given throttle setting, the manifold pressure increases as altitude is lost. The propeller control may be left in a low rpm position for efficiency and low noise level.

IDLING ENGINE.

Your engine is set to idle well below 600 rpm, but at engine speeds below 600 rpm, satisfactory piston lubrication cannot be maintained. Therefore, it is recommended that the engine not be allowed to operate below 600 rpm for long intervals.

STOPPING ENGINE.

Allow sufficient idling time after landing to reduce cylinder temperature below the operating range before stopping the engine. The engine should be stopped by moving the mixture control to lean position (con-

trol full out). After the propeller has stopped, turn the ignition switch "Off", and leave the mixture control full out.

TAXIING.

TAXIING WITH CROSSWIND GEAR.

Taxiing with cross-wind landing gear is performed in essentially the same manner as with conventional gear. Only on rough terrain or with sudden applications of rudder or brakes will the castering be noticed, the effect being similar to skidding a short distance on icy pavement.

NOTE

Fast movement over deep ruts or tracks should be avoided. In the event that the airplane is stopped in a "castered" position, it is necessary to taxi the plane forward slowly one or two revolutions of the wheels to return them to the "centered" position.

NOTE

To familiarize the pilot with the action and response of cross-wind landing gear, it is suggested that the airplane be taxied around the perimeter of a quarter-mile square under windy conditions. In this way the gear will be subjected to all directions of wind pressure; head-on, side (both left and right) and tail wind.

TAXIING (AMPHIBIAN ON LAND).

The bow wheels are full swiveling on this aircraft. Steering is accomplished by use of the brakes which are installed on the main wheels. An occassional tapping of the brakes is all that is required to maintain the desired taxi path under normal conditions.

When taxiing in a strong cross-wind it will be necessary to use a considerable amount of UP-WIND brake since the amphibian weathercocks DOWNWIND on land, which is contrary to the normal tendency of the Model 180. Winds in excess of 30 mph may cause the downwind main strut to "bottom", which will allow the plane to tilt 3° to 5° in that direction. The Amphibian will feel buoyant then since the wind can get under the upwind wing. Although the aircraft has been safely taxied in cross-winds of 40 mph this is recommended only in cases of emergency due to the excessive wear on the brakes.

Taxiing should be done with the propeller in the "HIGH RPM" position and the cowl flaps "FULL OPEN". Carburetor heat should be "OFF" unless icing conditions prevail.

TAXIING (FLOATPLANE AND AMPHIBIAN ON WATER.)

Taxi with propeller in "HIGH RPM", cowl flaps "FULL OPEN", carburetor heat "OFF", and water rudders "DOWN". It is best to limit the engine speed to 800-1000 rpm for normal taxi because water piles up in front of the float bow at higher engine speeds. When taxiing with a forward center-of-gravity loading, choppy water, and a strong tail wind, it is possible to partially submerge the

float bow in a turn when more than 800 rpm is used.

Although taxiing is very simple with the twin water rudders, it is sometimes necessary to "sail" the seaplane in close quarters. In addition to the normal flight controls one may use the wing flaps, ailerons, cabin doors, and water rudders to aid in "sailing".

To taxi great distances, it may be advisable to taxi on the step with the water rudders retracted. Turns on the step may be made with safety providing they are not too sharp and if ailerons are used to counteract the overturning tendency. All water taxiing should be done with the cowl flaps "FULL OPEN", and close attention should be paid to cylinder head and oil temperatures.

Do not taxi the Amphibian in water with the landing gear extended except when beaching the airplane. If the landing gear is extended, there is a much stronger tendency for the bows to submerge while taxiing downwind. In the retracted position, the nose wheels will serve as bumpers for floating docks and obstructions.

SKIPLANE TAXIING.

Taxiing a skiplane is somewhat similar to taxiing a landplane without brakes on soft sod. The tail ski does not turn the airplane as effectively as a tail wheel, therefore it is necessary to allow for a larger turning radius in a turn.

TAKE-OFF.

LANDPLANE AND SKIPLANE NORMAL TAKE-OFF.

Normal take-offs are accomplished with wing flaps up, cowl flaps open, full throttle, and 2600 rpm. Reduce power to 23 inches of manifold pressure and 2450 rpm as soon as practical to minimize engine wear.

AMPHIBIAN ON LAND NORMAL TAKE-OFF.

Normal take-offs are accomplished with wing flaps extended 20° (second notch), cowl flaps open, full throttle and 2600 rpm. As speed increases, the elevator control should be gradually moved to the neutral position and when the airplane feels light (60-70 IAS) a light back pressure on the control wheel will allow the airplane to fly off smoothly.

The landing gear should be retracted when the point is reached where a wheels down forced landing on that runway would be impractical.

LANDPLANE AND SKIPLANE OPTIMUM TAKE-OFF.

The use of 20 degree wing flaps reduces the total take-off distance over a 50-foot obstacle by about 20%. Therefore, for increased take-off performance, the recommended technique is to lower wing flaps 20 degrees (second notch) prior to the start of the take-off run. The airplane should be maintained in a tail-low attitude throughout the run to avoid bouncing on rough fields and to obtain a short take-off distance. Tail-high take-offs are not recommended except in crosswinds because they unnecessarily prolong the take-off runs.

USE OF WING FLAPS FOR TAKE-OFF.

For normal flying conditions, the use of 20 degree (second notch) wing flaps will shorten the take-off distance to clear a 50 foot obstacle. This is a result of slower forward speeds even though the use of wing flaps lessens the rate-of-climb. It is recommended that the take-off charts, (figures 16, 17 and 18), be consulted to determine the distance required for take-off. 30 and 40 degree wing flaps are not recommended at any time for take-off.

REMEMBER

Don't under marginal conditions, leave wing flaps on long enough that you are losing both climb and airspeed. Don't raise wing flaps with airspeed below "Flaps Up" stalling speed. (See stalling speed chart, figure 11.) Do slowly release the wing flaps as soon as you reasonably can after take-off, preferably 50 feet or more over terrain or obstacles.

FLOATPLANE OR AMPHIBIAN WATER TAKE-OFF.

Take-off performance from water is much better with wing flaps 20 degrees throughout the take-off run. Normal procedure is to apply full throttle and 2600 rpm while holding the control wheel fully aft. As the floatplane accelerates, attention should be directed to the point where the bow wave leaves the float. When this bow wave source moves aft of the wing strut, it is time to relax back pressure and allow the floatplane to go up on the step. It is possible to feel acceleration or deceleration caused by proper and improper elevator positions while operating on the step. When the seaplane feels light, apply light back pressure and allow seaplane to fly off smoothly.

Under heavy load and glassy water conditions, it may be advisable to apply abrupt back pressure for breaking away from the surface. Care should be exercised to avoid a stall following this procedure. An alternate procedure is to roll the floatplane over on one float during the run and apply back pressure when the opposite float is clear of the water.

If porpoising is encountered while on the step, apply additional back pressure to correct the excessively nose-low attitude.

CLIMB.

LANDPLANE AND SKIPLANE CLIMB.

Normal climbs are conducted at 100-120 mph with wing flaps up, 23 inches of manifold pressure, 2450 rpm, and cowl flaps opened as required for engine cooling. With full throttle and 2600 rpm, the best rate-of-climb speed varies from 90 mph I.A.S. at sea level to 84 mph I.A.S. at 10,000 feet. If an obstruction dictates using a steep climb angle, the best angle-of-climb speed should be used with wing flaps up, full throttle, and

2600 rpm. The best angle of climb speed is 70 mph, I.A.S.

NOTE

Steep climbs at these low speeds should be of short duration because of poor engine cooling.

If 20 degree wing flaps were used for take-off, they should be left at 20 degrees until all obstacles are cleared. To clear an obstacle with wing flaps 20 degrees, the best angle-of-climb speed (60 MPH, IAS) should be used. If no obstructions are ahead, a best "flaps up" rate-of-climb speed (90 MPH, IAS) would be most efficient. These speeds vary slightly with altitude, but they are close enough for average field elevations.

Upon reaching a safe altitude and airspeed, the wing flaps should be retracted slowly and power adjusted for climb.

In cross-country flying, it is suggested that the airplane be climbed at 120 mph, I.A.S. at low altitude to about 100 mph I.A.S. at high altitude. This type of climb provides good engine cooling and better visibility during a long climb. Also, this higher climb speed is about as efficient in terms of overall trip speed and fuel consumption as a maximum performance climb to cruising altitudes.

It should be remembered that most engine wear occurs at high power and with cold oil. High power is not obtainable at high altitudes, so full throttle operation at high altitude is not harmful to the engine.

FLOATPLANE AND AMPHIBIAN CLIMB.

If no obstructions are to be cleared, climb out at 76 mph, I.A.S., and retract the wing flaps slowly upon reaching a safe altitude. Then reduce power to 23 inches of manifold pressure and 2450 rpm. Normal climbs are conducted at 90-110 mph with wing flaps up and cowl flaps opened as required for engine cooling. If optimum flaps up climb performance is desired, climb at 87 mph I.A.S. at sea level with full throttle and 2600 rpm. Reduce this climb speed about ½ mph for each 1000 feet above sea level.

To climb out steeply over an obstacle, it is best to use the best angle-of-climb speed with wing flaps up. This speed varies from 65 mph I.A.S. at sea level to 76 mph I.A.S. at 18000 feet.

NOTE

Steep climbs at these low speeds should be of short duration because of poor engine cooling.

To clear an obstacle with 20 degree wing flaps, use the best angle-of-climb speed of 50 mph I.A.S. at sea level. Increase this climb speed about ½ mph for each 1000 feet above sea level.

Upon reaching a safe altitude and airspeed, retract the wing flaps slowly, especially when flying over glassy water, because a loss of altitude is not very apparent over such a surface.

CRUISE.

The cruising information in this section is applicable to landplane, skiplane, floatplane, and amphibian.

Cowl flaps are normally closed in cruising flight for the following three reasons:

(1) Open cowl flaps will overcool the engine in cruising flight even in extremely hot temperatures.

(2) Airplane drag is increased considerably due to the increased flow of cooling air through the engine baffles and because of the additional frontal area exposed to the air stream.

(3) Open cowl flaps take severe buffeting in cruise which reduces the service life of these flaps.

Cruising charts are presented in figures 22 thru 25. It can be seen that the speeds for maximum range are much lower than normal cruise speed. Since the main advantage of the airplane over ground transportation is speed, one should utilize the high cruising speeds obtainable. However, if a destination is slightly out of reach in one hop at normal cruising speed, it would save time and money to make the trip non-stop at some lower speed. An inspection of these cruising charts shows the long ranges obtainable at lower cruising speeds.

These charts are based on flight tests with lean mixture and 55 gallons of fuel for cruising. Allowances for fuel reserve, headwinds, take-offs and climb or variations in mixture leaning technique should be made and are in addition to those shown in the charts.

Normal cruising is done at 60% to 70% power. A maximum cruising power of approximately 75% is allowable with 23 inches (mercury) manifold pressure and 2450 rpm. Various percent powers can be obtained with a number of combinations of manifold pressures, engine speeds, altitudes, and outside air temperatures. However, at full throttle and a constant engine speed and a standard air temperature, a specific power may be obtained at only one altitude. For example at full throttle and 2450 rpm the following speeds are obtainable at various % powers and altitudes:

% BHP	ALTITUDE	TRUE AIRSPEED
75	6700	162
70	8400	161
65	10300	159

This table shows that cruising can be done most efficiently at higher altitudes because very nearly the same cruising speed can be maintained at much less power. This means a saving in fuel consumption and engine wear.

STALLS.

The stalling speeds shown in figure 11, are for aft C.G. and full gross weight conditions. Speeds are given as true indicated airspeeds because indicated airspeeds are inaccurate in the low speed range. Other loadings may result in minimum flying speeds

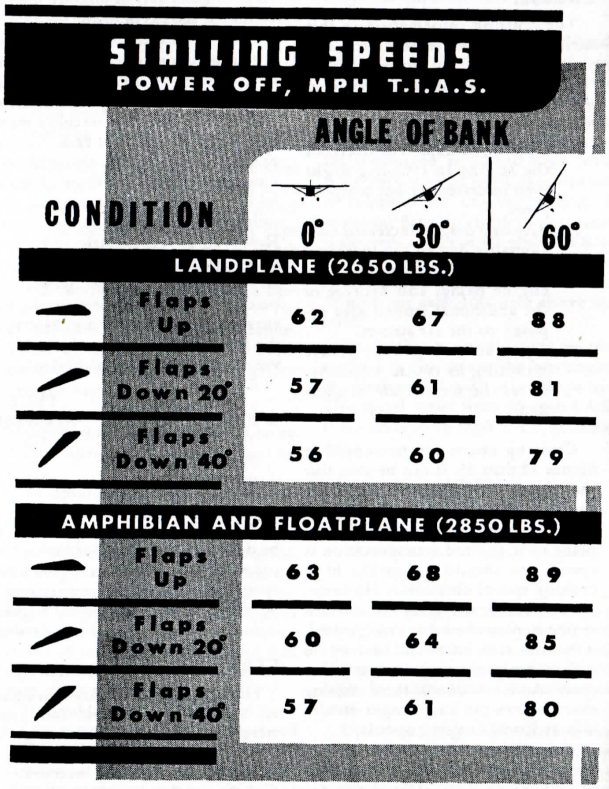


Figure 11. Stall Chart

rather than stalling speeds. The horn stall warning indicator produces a steady signal approximately 5 mph before the actual stall is reached and remains on until the airplane flight attitude is changed. Fast landings will not produce a signal.

The stall characteristics are conventional for the flaps up and flaps down condition. Slight elevator buffeting may occur just before the stall with flaps down.

LANDING.

LANDPLANE AND SKIPLANE LANDING.

Normal landings are made power-off with any flap setting. The approach is steep with full wing flaps, but slips are permissible with wing flaps extended if necessary.

Since the ability of the elevator to produce a stall is dependent upon the adjustable stabilizer being set for "AIRPLANE NOSE UP", it is important that the airplane be completely trimmed in the approach glide. If the airplane fails to land three point with the control wheel fully back, it is probable that the adjustable stabilizer is not adjusted for the landing condition.

Approach glides should be made at 80-90 mph with wing flaps up, or 70 to 80 mph with wing flaps down, depending upon the turbulence of the air.

Heavy braking may be used initially in the landplane ground run if the control wheel is held full back.

AMPHIBIAN GROUND LANDINGS.

Power-off approaches and landings may be made with any flap setting. It is recommended however that a power approach and landing be made to reduce the rapid rate of descent which accompanies the power-off approach. The landing approach attitude and flare is the same as for an aircraft equipped with tricycle gear. The approaches should be made at 85-95 mph with the flaps up and 80-90 with the flaps down, depending upon the air turbulence.

FLOATPLANE AND AMPHIBIAN WATER LANDINGS.

Power-off landing may be made with any wing flap setting. Slips are also permitted with flaps extended. However, with glassy water it is recommended that a power approach and landing be made with zero or 20 degree wing flaps to maintain a low rate-of-descent.

EMERGENCY GEAR PROCEDURE.

The Amphibian is not equipped with an emergency system to operate the landing gear. If the appropriate position light does not show the gear to be in a locked position (either UP or DOWN) a visual check may be made by observing the main landing gear latch fittings in the float inspection windows. The nose gear is partially visible over the float bow when in the retracted position. The landing gear circuit breakers should be checked to determine if the circuit

breaker has been broken. If the circuit has been broken, wait approximately three minutes for the thermal unit to cool, then press the circuit breaker button to reset the breaker.

If pushing the circuit breaker and restoring power to the circuit does not complete the retraction or extension cycle, then a mechanical failure has occurred. The recommended procedure in this case is to retract the other gear, if it was extended, and land on the sod. A damp grassy surface is preferable.

Landings of this sort have produced no tendency to nose over, even when conducted on hard surfaced runways, and will result in little or no damage to the floats.

CAUTION

DO NOT land in the water with the wheels either partially or fully extended. If the landing MUST be accomplished on water and the gear is partially or fully extended, it is suggested that a power ON, full stall landing with full flaps (40°) would be the best procedure.

COLD WEATHER OPERATION.

Prior to starting in cold weather, it is advisable to pull the propeller through several times by hand to "limber" the partially congealed oil, thus conserving battery energy. Precautions which should be taken prior to pulling the propeller through are to check that the mixture is in "Full Lean," the ignition switch is "Off," and the throttle is "Closed" (full out position).

Approximately 4-8 strokes of the primer will be required to start a cold engine. Under extreme conditions it may even be necessary to keep the engine running on the primer until the engine warms up slightly.

Under cold conditions, the warm-up and pre-take-off checks should be lengthened to provide more time to bring the engine up to temperature. This will usually require approximately three minutes warm-up at 800 RPM and an equal amount of time for pre-take-off checks.

During cold weather operations, no indication will be apparent on the oil temperature gage prior to take-off. If the engine accelerates smoothly and the oil pressure remains normal, the engine should be ready for take-off.

Rough engine operation in cold weather can be caused by a combination of an inherently leaner mixture due to the dense air and poor vaporization and distribution of the fuel-air mixture to the cylinders. The effects of these conditions are especially noticeable during operation on one magneto in ground checks where only one spark plug fires in each cylinder.

To operate the engine without a winterization kit in occasional outside air temperatures from 10° F to 20° F, the following procedure is recommended:

(1) Use full carburetor heat during engine warm-up and ground check.

(2) Use minimum carburetor heat required for smooth operation in take-off, climb, and cruise.

(3) Select relatively high manifold pressure and RPM settings for optimum mixture distribution, and avoid excessive manual leaning in cruising flight.

(4) Avoid sudden throttle movements during ground and flight operation.

For continuous operation in temperatures consistently below 20° F the Cessna winterization kit should be installed. This kit consists of an oil cooler shutter, a shutter control, oil cooler cover plate, intake manifold cross-over tube cover and carburetor air intake restrictor cover. The installation of these components will greatly improve engine operation. Winterization kits are available at your dealer for a nominal charge.

The landplane is eligible for use with skis. Your dealer will be glad to give you details on their installation on your airplane.

OIL DILUTION SYSTEM (OPTIONAL EQUIPMENT).

Cold climate starting is made easier by an oil dilution system which may be installed as optional equipment in your airplane. This system, used just before the engine is shut off, allows gasoline to flow into the engine oil — thinning the oil to make the next starting easier.

Basically, the oil dilution system consists of an electrically-operated solenoid valve connected by hoses to the fuel and oil systems. Pressing a push-button switch on the instrument panel operates the valve, allowing gasoline to flow to the inlet side of the oil pump. Here the gasoline mixes with the engine oil and is pumped to all the moving parts of the engine.

During oil dilution the engine should be idled at 1000 rpm. At this speed, when the switch is pressed, gasoline will flow into the oil pump at the rate of one quart every 90 seconds. Pressing the switch for three minutes will normally provide adequate oil dilution for cold weather starts. With the oil at its normal 12 quart level, the switch may be depressed for a maximum of four minutes — further dilution will cause an overflow of the oil sump, resulting in a fire hazard. When severely cold conditions are anticipated, and it is desirable to dilute the oil for longer than four minutes, it will be necessary to drain oil from engine — unless the oil is already below the twelve quart level. Drain one quart of oil for each 90 seconds of oil dilution time required over four minutes.

NOTE

Change engine oil and clean oil screens after the first oil dilution of the season before operating the engine. This will remove any dirt and sludge which have been loosened by the dilution process.

OXYGEN SYSTEM.

An oxygen system, capable of

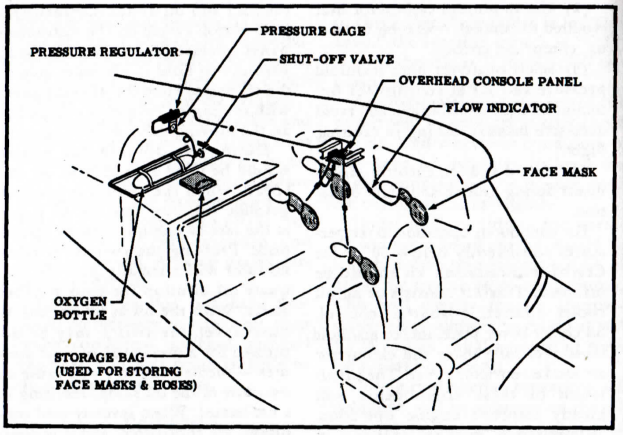


Figure 12. Oxygen System Diagram

supplying oxygen for a pilot and three passengers is available as optional equipment for your airplane. It is completely automatic and requires no manual regulations.

The system consists of an oxygen cylinder, a pressure gage, pressure regulator, outlet couplings, and four disposable type oxygen masks, complete with rubber hoses and position indicators. The face masks and hoses are stored in a plastic bag on the baggage shelf when not in use.

The system will provide the duration of operation shown in figure 13.

The supply of oxygen for the system is stored, under high pressure, in an oxygen cylinder located just aft of the baggage compartment. High pressure oxygen flows from the cylinder and is carried through stainless steel tubing through an oxygen pressure gage to an automatic, continuous-flow oxygen regulator. The oxygen is reduced to low pressure by the regulator and is carried through aluminum tubing to four continuous-flow couplings which are mounted in a console panel located in the cabin ceiling. When the oxygen mask hoses are plugged into the couplings, oxygen is permitted to flow through rubber tubing to the oxygen masks. A flow indicator in each hose line disappears from view to show that oxygen is flowing.

WARNING

USE NO OIL! Keep oil and grease away from all oxygen equipment. Also keep equipment free of organic material (dust, lint, etc.). Be sure hands and clothing are free of oil before handling equipment.

OXYGEN SYSTEM OPERATION.

Prior to flight, check to see that valve on the oxygen cylinder is full open (full counterclockwise). Note oxygen pressure gage reading to be sure that there is an adequate supply of oxygen for the trip.

To use oxygen system, proceed as follows:

a. Select mask and hose from plastic bag on baggage shelf.
b. If mask is not connected to hose, attach by inserting short plastic tube securely into oxygen delivery hose.
c. Attach mask to face.
d. Select oxygen coupling in overhead console panel. Push dust cover to one side and insert end of mask hose into coupling. Oxygen will start to flow and no further adjustments are necessary.

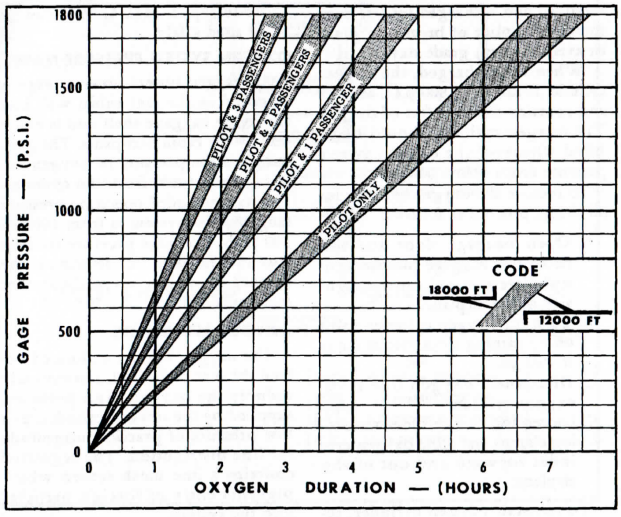


Figure 13. Oxygen Duration Chart

NOTE

If the red oxygen flow indicator for the face mask hose line is out of sight, oxygen is flowing.

OXYGEN CYLINDER.

The oxygen cylinder is equipped with a shut-off valve and can be easily removed and recharged by any commercial supplier of breathing grade or aviation (dry) grade oxygen.

When fully charged, the oxygen cylinder is filled to 1800 p.s.i. at 70° F and contains 48 cubic feet of oxygen. The oxygen cylinder should be refilled whenever the oxygen system pressure drops below 300 p.s.i.

To remove the oxygen cylinder for servicing, proceed as follows:

a. Open baggage door and unfasten rear baggage compartment upholstery panel on the right side of the airplane.
b. Turn the oxygen cylinder valve off by turning clockwise as far as it will go.
c. Disconnect oxygen line from oxygen cylinder.
d. Loosen the two cylinder mounting clamps and slide oxygen cylinder forward and out of the airplane.

To reinstall oxygen cylinder, reverse the above procedure.

WARNING

Lubricants or sealing compounds on the flared tube or compression fittings must not be used. No sealing compound should be used on either the flares or threads to prevent leakage. Oil, grease, soap, or other fatty materials in contact with oxygen constitute a very serious fire hazard and such contact is to be avoided. Only anti-seize and sealing compounds which have been approved under Spec. MIL-C-5542 can be used safely.

OXYGEN SYSTEM PRESSURE GAGE.

An oxygen system pressure gage is installed in the rear cabin wall just above the baggage shelf and is easily read by the cabin occupants. The gage indicates the pressure of oxygen entering the system from the cylinder. The recommended operating pressure range for the system is from 1800 to 300 p.s.i. The gage pressure reading also can be used to determine the amount of oxygen left in the system (see figure 13).

OXYGEN REGULATOR.

The oxygen regulator, located behind the rear cabin wall, automatically reduces the oxygen high pressure, supplied by the oxygen cylinder, to a low pressure of practical magnitude for line distribution. The regulator contains a fine mesh screen which prevents entry of foreign particles into the system.

To relieve the users of the necessity

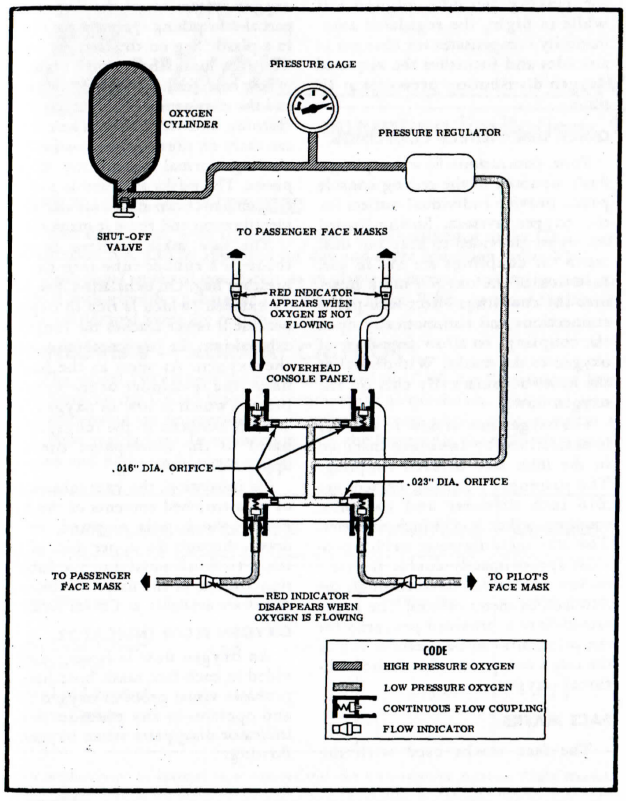


Figure 14. Oxygen System Schematic

for making periodic adjustments while in flight, the regulator automatically compensates for changes in altitudes and furnishes the required oxygen distribution pressures at all times.

QUICK DISCONNECT COUPLINGS.

Four, continuous-flow couplings, flush mounted in the ceiling console panel, provide individual outlets for the oxygen system. Spring-loaded covers are provided to keep out dust when the couplings are not in use. Insertion of the oxygen mask hoses into the couplings effect leak-proof connections and automatically open the couplings to allow free flow of oxygen to the masks. Withdrawal of the hoses automatically cuts off the oxygen flow.

The oxygen rate-of-flow to the user is determined by an orifice installed in the inlet side of each coupling. The passenger coupling orifices are .016 inch diameter and the pilot coupling orifice is .023 inch diameter. The .023 inch diameter orifice provides approximately double the rate-of-flow as that delivered through the .016 inch diameter orifices. The larger rate-of-flow is provided primarily for the pilot, but can be used for any of the cabin occupants who desire additional oxygen.

FACE MASKS.

The face masks used with the oxygen system are of the disposable, partial-rebreathing type and are stored in a plastic bag on the baggage shelf. The face masks have the advantage of low cost, feather lightness, comfort, and the elimination of the necessity of cleaning and sterilizing. Their users can carry on normal conversations including normal use of the microphone. The masks are durable and the frequent user can mark his mask for identification and reuse it many times.

The face mask receives oxygen through a rubber tube into the rebreather bag. On exhalation, the first air exhaled (which is rich in oxygen because it never reaches the lungs) is exhaled into the bag, combining with the oxygen. As soon as the bag is filled, the remainder of the exhaled breath (which is low in oxygen, because it has been in the lungs) is exhaled to the atmosphere through upper sides of the bag.

On inhalation, the user inhales the oxygen-enriched contents of the bag. When the bag is emptied, air is drawn through the upper sides of the mask to finish satisfying the inhalation volume of the user. Additional masks are available at Cessna Dealers.

OXYGEN FLOW INDICATOR.

An oxygen flow indicator is provided in each face mask hose line. It provides visual proof of oxygen flow and operates in any position. A red indicator disappears when oxygen is flowing.

Section IV

operating limitations †

OPERATIONS AUTHORIZED.

Your Cessna 180, with standard equipment as certificated under CAA Type Certification No. 5A6, is approved for day and night operation under VFR.

Additional optional equipment is available to increase its utility and to make it authorized for use under IFR day and night. When operated for hire at night, certificated flares are required.

MANEUVERS — NORMAL CATEGORY.

The model 180 exceeds the requirements of the Civil Air Regulations, Part 3, set forth by the United States Government for airworthiness. Spins and aerobatic maneuvers are not permitted in normal category airplanes in compliance with these regulations. In connection with the foregoing, the following gross weights and flight load factors apply:

	LANDPLANE AND SKIPLANE	FLOATPLANE	AMPHIBIAN
Gross Weight	2650 lbs.	2820 lbs.	2850 lbs.
Flight Load Factor* Flaps Up	+3.8 −1.5	+3.8 −1.5	+3.8 −1.5
Flight Load Factor* Flaps Down	+3.0	+ 3.3	+3.3

†Your airplane must be operated in accordance with the CAA-approved Airplane Flight Manual. If there is any information in this section which contradicts the CAA-approved manual, it is to be disregarded.

*The design load factors are 150% of the above and in all cases the structure meets or exceeds design loads.

AIRSPEED LIMITATIONS FOR LANDPLANE, SKIPLANE AND FLOATPLANE.

The following chart lists the certificated true indicated airspeed limits for the Cessna 180 landplane, skiplane and floatplane.

Never Exceed (Glide or dive, smooth air).....184 mph (red line)
Caution Range.....160-184 mph (yellow arc)
Maximum Structural Cruising Speed.....160 mph (Level flight or climb)
Normal Operation Range.....64-160 mph (green arc)
Maximum Speed Flaps Extended.....100 mph
Flap Operation Range.....55-100 mph (white arc)
Maneuvering Speed*.....122 mph

*(The maximum speed at which you can use abrupt control travel without exceeding the design load factor.)

AIRSPEED LIMITATIONS FOR AMPHIBIAN.

The following chart lists the certificated true indicated airspeed limits for the Cessna 180 amphibian.

Never Exceed (Glide or dive, smooth air).....164 mph (red line)
Caution Range.....130-164 mph (yellow arc)
Maximum Structural Cruising Speed.....130 mph (Level flight or climb)
Normal Operation Range.....64-130 mph (green arc)
Maximum Speed Flaps Extended.....100 mph
Flap Operation Range.....55-100 mph (white arc)
Maneuvering Speed*.....129 mph

*(The maximum speed at which you can use abrupt control travel without exceeding the design load factor.)

ENGINE OPERATION LIMITATIONS.

Power and Speed.....230 bhp at 2600 rpm

ENGINE INSTRUMENT MARKINGS.

OIL TEMPERATURE INDICATOR
Normal Operating Range.....Green Arc
Do Not Exceed.....Red Line
OIL PRESSURE GAGE
Idling Pressure.....10 psi (red line)
Normal Operating Range.....30-60 psi (green arc)
Maximum Pressure.....100 psi (red line)

MANIFOLD PRESSURE GAGE
Normal Operating Range.....15-23 in. Hg (green arc)
CYLINDER HEAD TEMPERATURE
Normal Operating Range.....300-425° F (green arc)
Do not exceed.....500° (red line)
TACHOMETER
Normal Operating Range.....2200-2450 rpm (green arc)
Cautionary Range.....2450-2600 rpm
Do Not Exceed (Engine rated speed).....2600 rpm (red line)

WEIGHT AND BALANCE.

All aircraft are designed for certain limit loads and balance conditions. These specifications for your 180 are charted on page 4-4.

A weight and balance report and equipment list is furnished with each airplane. All the information on empty weight c.g. and allowable limits for your particular airplane, as equipped when it left the factory, is shown. Changes in the original equipment affecting weight empty c.g. are required by the C.A.A. to be recorded in the repair and alteration form 337.

Using the weight empty, c.g. location, and moment from the weight and balance report *for your airplane* and following the example, the exact moment may be readily calculated which, when plotted on the upper chart will quickly show whether or not the c.g. is within limits. Refer to the loading graph for moment values of items to be carried.

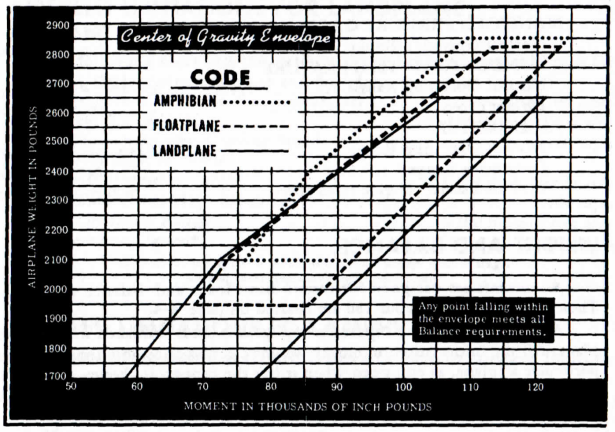
EXAMPLE FOR AN AIRPLANE WITH A LICENSED EMPTY WEIGHT OF 1615 LBS. AND A MOMENT OF 57,305 IN. LBS.

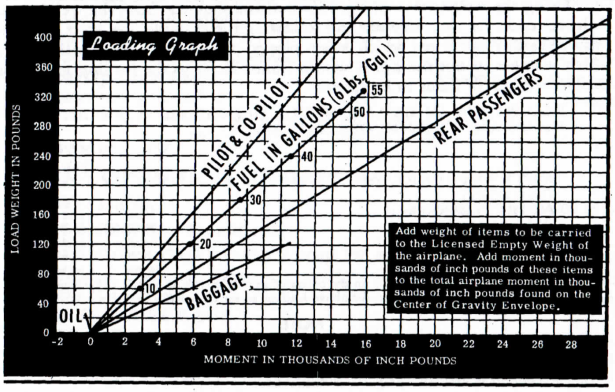
	WT.	MOMENT 1000
EMPTY WEIGHT (LICENSED)	1615.0	+57.3
OIL (12 QTS.)	22.5	− 0.3
PILOT & PASSENGER (1)	340.0	+12.2
REAR PASSENGERS (2)	290.0	+20.4
FUEL (MAXIMUM) 55 GAL.	330.0	+15.7
BAGGAGE (TO MAKE GR. WT.)	52.5	+ 5.0
Total	2650.0	110.3

Locate this point (2650.0-110.3) on the center of gravity envelope graph, and, since the point falls within the envelope, the above loading meets all balance requirements.

NOTE

The above problem is an example of only one of many different loading configurations. To best utilize the available payload for *your* airplane, the loading charts should be consulted to determine proper load distribution.





Section V

operational data

THE OPERATIONAL DATA shown on the following pages are compiled from actual tests with the airplane and engine in good condition and using average piloting technique and lean mixture. You will find this data a valuable aid when planning your flights. However, inasmuch as the number of variables involved precludes great accuracy, an ample fuel reserve should be provided. The graphs make no allowance for wind, navigational error, pilot technique, warm-up, take-off, climb, etc. All of these factors must be considered when estimating reserve fuel.

In addition to the advantages of comfort and safety, airplanes are primarily an exceptionally rapid mode of transportation. Therefore, to realize the maximum usefulness from your Cessna, take advantage of the power your engine can develop. For normal cruising, choose a cruising power setting which gives you a fast cruising speed. If your destination is over 600 miles, it may pay you to fly at lower power settings, thereby increasing your range and allowing you to make the trip non-stop with ample fuel reserve. Use the range charts to solve flight planning problems of this nature.

MODEL 180 LANDPLANE				MODEL 180 FLOATPLANE & AMPHIBIAN			
FLAPS UP		FLAPS DOWN		FLAPS UP		FLAPS DOWN	
IAS	TIAS	IAS	TIAS	IAS	TIAS	IAS	TIAS
60	68	40	56	60	66	40	54
80	82	50	60	80	80	50	59
100	100	60	67	100	98	60	65
120	118	70	74	120	118	70	72
140	138	80	83	140	136	80	81
160	157	90	92	160	155	90	90
180	176	100	101			100	101

Figure 15. Airspeed Correction Table

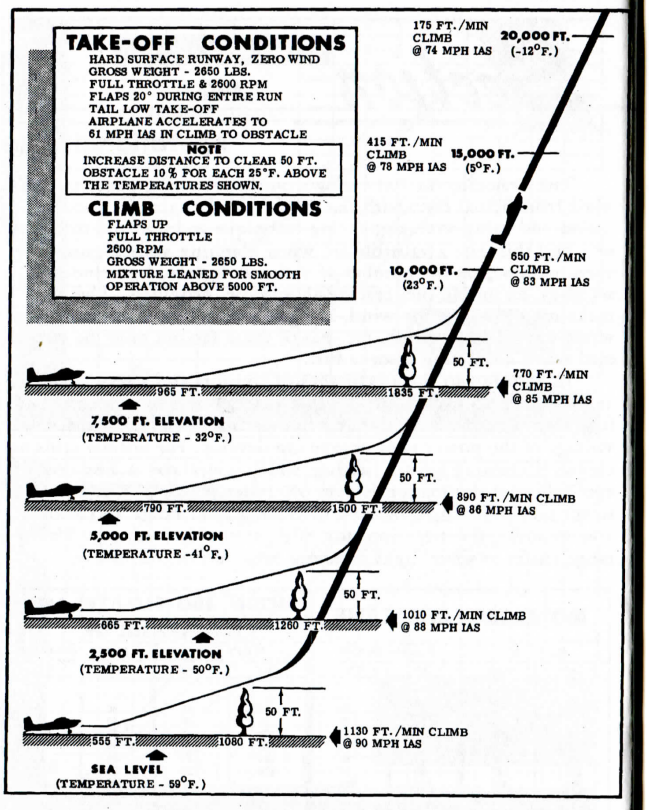


Figure 16. Take-Off Diagram (Landplane)

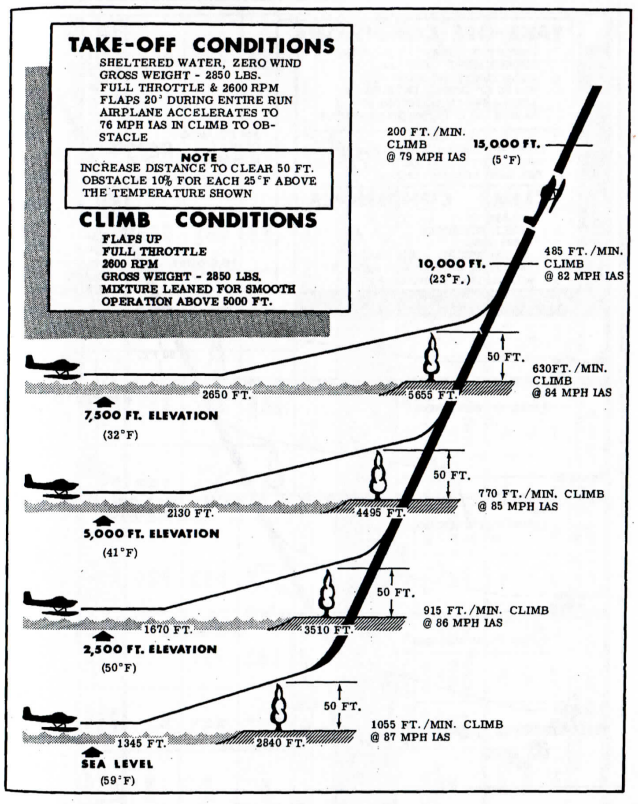


Figure 17. Water Take-Off Diagram (Floatplane & Amphibian)

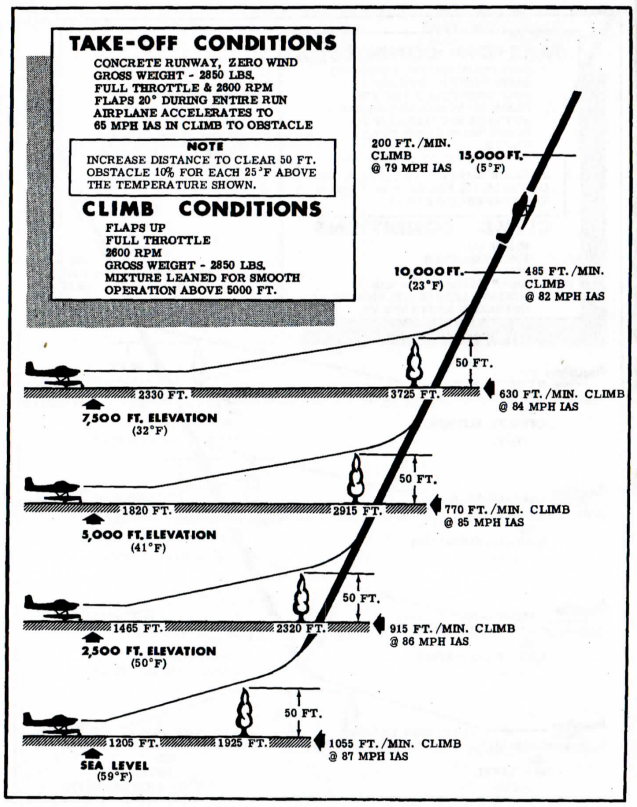


Figure 18. Land Take-Off Diagram (Amphibian)

LANDPLANE TAKE-OFF DATA

TAKE OFF DISTANCE WITH 20° FLAPS FROM HARD SURFACE RUNWAY

GROSS WEIGHT LBS.	HEAD WIND MPH	AT SEA LEVEL & 59°F. GROUND RUN	AT SEA LEVEL & 59°F. TO CLEAR 50' OBSTACLE	AT 2500 FT. & 50°F. GROUND RUN	AT 2500 FT. & 50°F. TO CLEAR 50' OBSTACLE	AT 5000 FT. & 41°F. GROUND RUN	AT 5000 FT. & 41°F. TO CLEAR 50' OBSTACLE	AT 7500 FT. & 32°F. GROUND RUN	AT 7500 FT. & 32°F. TO CLEAR 50' OBSTACLE
2100	0	335	715	390	810	465	935	560	1100
	15	185	465	225	540	270	625	330	745
	30	75	280	95	305	125	365	180	450
2400	0	440	895	525	1040	630	1210	770	1465
	15	255	600	310	700	380	835	475	1030
	30	115	350	150	420	190	510	245	640
2650	0	555	1080	665	1260	790	1500	965	1835
	15	330	735	405	865	490	1050	655	1345
	30	160	445	205	535	255	665	335	845

NOTE: INCREASE DISTANCES 10% FOR EACH 25 DEGREES F. ABOVE STANDARD TEMPERATURE FOR PARTICULAR ALTITUDE

LANDPLANE CLIMB DATA

GROSS WEIGHT LBS.	AT SEA LEVEL & 59°F BEST CLIMB IAS MPH	AT SEA LEVEL & 59°F RATE OF CLIMB FT/MIN	AT SEA LEVEL & 59°F GAL. OF FUEL USED	AT 5000 FT. & 41°F BEST CLIMB IAS MPH	AT 5000 FT. & 41°F RATE OF CLIMB FT/MIN	AT 5000 FT. & 41°F From SL FUEL USED	AT 10000 FT. & 33°F BEST CLIMB IAS MPH	AT 10000 FT. & 33°F RATE OF CLIMB FT/MIN	AT 10000 FT. & 33°F From SL FUEL USED	AT 15000 FT. & 5°F BEST CLIMB IAS MPH	AT 15000 FT. & 5°F RATE OF CLIMB FT/MIN	AT 15000 FT. & 5°F From SL FUEL USED	AT 20000 FT. & -12°F BEST CLIMB IAS MPH	AT 20000 FT. & -12°F RATE OF CLIMB FT/MIN	AT 20000 FT. & -12°F From SL FUEL USED
2100	87	1595	1.5	82	1315	2.7	78	1035	4.1	73	760	5.7	68	480	8.0
2400	88	1315	1.5	84	1065	3.0	80	815	4.7	76	560	6.8	71	305	10.3
2650	90	1130	1.5	86	890	3.3	83	650	5.3	78	415	8.2	74	175	13.4

NOTE: FLAPS UP, FULL THROTTLE, 2650 RPM, & MIXTURE LEANED FOR SMOOTH OPERATION ABOVE 5000 FT. FUEL USED INCLUDES WARM-UP & TAKE-OFF ALLOWANCE

Figure 19. Take-Off & Climb Chart (Landplane)

FLOATPLANE AND AMPHIBIAN WATER TAKE-OFF

TAKE-OFF DISTANCE WITH 20° FLAPS FROM SHELTERED WATER

GROSS WEIGHT LBS.	HEAD WIND MPH	AT SEA LEVEL & 59°F. WATER RUN	AT SEA LEVEL & 59°F. TO CLEAR 50' OBSTACLE	AT 2500 FT. & 50°F. WATER RUN	AT 2500 FT. & 50°F. TO CLEAR 50' OBSTACLE	AT 5000 FT. & 41°F. WATER RUN	AT 5000 FT. & 41°F. TO CLEAR 50' OBSTACLE	AT 7500 FT. & 32°F. WATER RUN	AT 7500 FT. & 32°F. TO CLEAR 50' OBSTACLE
2300	0	905	1595	1090	1930	1365	2410	1685	2975
	15	575	1110	700	1360	895	1720	1120	2160
	30	310	700	395	875	515	1135	670	1450
2600	0	1110	2170	1365	2665	1715	3335	2125	4130
	15	725	1585	905	1945	1155	2455	1450	3065
	30	410	1040	530	1310	700	1690	905	2150
2850	0	1345	2840	1670	3510	2130	4495	2650	5655
	15	900	2100	1125	2620	1465	3405	1860	4340
	30	530	1435	685	1825	915	2415	1190	3135

NOTE: INCREASE DISTANCES 10% FOR EACH 25°DEGREES F. ABOVE STANDARD TEMPERATURE FOR PARTICULAR ALTITUDE.

FLOATPLANE AND AMPHIBIAN CLIMB DATA

GROSS WEIGHT LBS.	AT SEA LEVEL & 59° F. BEST CLIMB IAS MPH	AT SEA LEVEL & 59° F. RATE OF CLIMB FT/MIN	AT SEA LEVEL & 59° F. GAL. OF FUEL USED	AT 5000 FT. & 41° F. BEST CLIMB IAS MPH	AT 5000 FT. & 41° F. RATE OF CLIMB FT/MIN	AT 5000 FT. & 41° F. From SL FUEL USED	AT 10000 FT. & 23° F. BEST CLIMB IAS MPH	AT 10000 FT. & 23° F. RATE OF CLIMB FT/MIN	AT 10000 FT. & 23° F. From SL FUEL USED	AT 15000 FT. & 5° F. BEST CLIMB IAS MPH	AT 15000 FT. & 5° F. RATE OF CLIMB FT/MIN	AT 15000 FT. & 5° F. From SL FUEL USED	AT 20000 FT. & -12° F. BEST CLIMB IAS MPH	AT 20000 FT. & -12° F. RATE OF CLIMB FT/MIN	AT 20000 FT. & -12° F. From SL FUEL USED
2300	83	1480	1.5	81	1150	2.9	78	820	4.8	73	490	7.1	69	160	12.0
2600	85	1230	1.5	83	925	3.2	80	625	5.3	76	325	8.5	73	20	19.1
2850	87	1055	1.5	85	770	3.5	82	485	6.1	79	200	10.8			

NOTE: FLAPS UP, FULL THROTTLE, 2600 RPM, & MIXTURE LEANED FOR SMOOTH OPERATION ABOVE 5000 FT. FUEL USED INCLUDES WARM-UP & TAKE-OFF ALLOWANCES.

Figure 20. Water Take-Off & Climb Chart (Floatplane & Amphibian)

AMPHIBIAN TAKE-OFF—LAND

TAKE-OFF DISTANCE WITH 20° FLAPS FROM CONCRETE RUNWAY

GROSS WEIGHT LBS.	HEAD WIND MPH	AT SEA LEVEL & 59° F. GROUND RUN	AT SEA LEVEL & 59° F. TO CLEAR 50' OBSTACLE	AT 2500 FT. & 50° F. GROUND RUN	AT 2500 FT. & 50° F. TO CLEAR 50' OBSTACLE	AT 5000 FT. & 41° F. GROUND RUN	AT 5000 FT. & 41° F. TO CLEAR 50' OBSTACLE	AT 7500 FT. & 32° F. GROUND RUN	AT 7500 FT. & 32° F. TO CLEAR 50' OBSTACLE
2400	0	710	1135	855	1365	1050	1685	1310	2095
	15	480	765	585	935	730	1170	925	1480
	30	290	460	360	580	465	740	600	965
2600	0	875	1400	1085	1735	1340	2145	1685	2695
	15	610	975	755	1210	940	1505	1210	1935
	30	375	605	480	765	605	970	800	1285
2850	0	1205	1925	1465	2345	1820	2915	2330	3725
	15	835	1340	1030	1650	1305	2085	1695	2715
	30	530	845	670	1070	865	1385	1155	1850

NOTE: INCREASE DISTANCE 10% FOR EACH 25 DEGREES F. ABOVE STANDARD TEMPERATURE FOR PARTICULAR ALTITUDE.

AMPHIBIAN CLIMB DATA

GROSS WEIGHT LBS.	AT SEA LEVEL & 59° F. BEST CLIMB IAS MPH	AT SEA LEVEL & 59° F. RATE OF CLIMB FT/MIN	AT SEA LEVEL & 59° F. GAL. OF FUEL USED	AT 5000 FT. & 41° F. BEST CLIMB IAS MPH	AT 5000 FT. & 41° F. RATE OF CLIMB FT/MIN	AT 5000 FT. & 41° F. From SL FUEL USED	AT 10000 FT. & 23° F. BEST CLIMB IAS MPH	AT 10000 FT. & 23° F. RATE OF CLIMB FT/MIN	AT 10000 FT. & 23° F. From SL FUEL USED	AT 15000 FT. & 5° F. BEST CLIMB IAS MPH	AT 15000 FT. & 5° F. RATE OF CLIMB FT/MIN	AT 15000 FT. & 5° F. From SL FUEL USED	AT 20000 FT. & -12° F. BEST CLIMB IAS MPH	AT 20000 FT. & -12° F. RATE OF CLIMB FT/MIN	AT 20000 FT. & -12° F. From SL FUEL USED
2300	83	1480	1.5	81	1150	2.9	78	820	4.8	73	490	7.1	69	160	12.0
2600	85	1230	1.5	83	925	3.2	80	625	5.3	76	325	8.5	73	20	19.1
2850	87	1065	1.5	85	770	3.5	82	485	6.1	79	200	10.8			

NOTE: FLAPS UP, FULL THROTTLE, 2600 RPM, & MIXTURE LEANED FOR SMOOTH OPERATION ABOVE 5000 FT. FUEL USED INCLUDES WARM-UP & TAKE-OFF ALLOWANCES.

Figure 21. Land Take-Off & Climb Chart (Amphibian)

LANDPLANE CRUISE AND RANGE PERFORMANCE

Altitude	RPM	M. P.	BHP	%BHP	TAS MPH	Gal/Hr.	End. Hours	Mi/Gal.	Range Miles
2500	2450	23	175	76	158	14.2	3.9	11.2	615
		22	166	72	154	13.4	4.1	11.5	635
		21	157	68	151	12.7	4.3	11.9	655
		20	148	63	148	12.0	4.6	12.2	670
	2300	23	164	71	154	13.1	4.2	11.7	645
		22	153	67	149	12.2	4.5	12.3	680
		21	143	62	145	11.5	4.8	12.7	695
		20	135	59	142	11.0	5.0	12.9	710
	2200	23	153	67	149	12.1	4.6	12.4	680
		22	144	63	146	11.4	4.8	12.8	700
		21	135	59	142	10.8	5.1	13.2	725
		20	126	55	138	10.2	5.4	13.5	740
Maximum Range Settings	2000	20	107	47	126	8.7	6.3	14.4	795
		19	99	43	121	8.2	6.7	14.8	810
		18	89	39	113	7.5	7.3	15.0	825
		17	81	35	105	7.0	7.9	15.1	830
5000	2450	23	179	78	163	14.5	3.8	11.2	615
		22	169	73	159	13.6	4.0	11.7	640
		21	161	70	156	13.0	4.2	12.0	660
		20	150	65	151	12.2	4.5	12.5	685
	2300	23	167	73	158	13.4	4.1	11.8	650
		22	158	69	155	12.6	4.4	12.2	675
		21	148	64	151	11.9	4.6	12.7	700
		20	139	60	146	11.2	4.9	13.1	720
	2200	23	157	68	155	12.4	4.4	12.5	685
		22	148	64	151	11.7	4.7	12.9	710
		21	138	60	146	11.0	5.0	13.3	730
		20	131	57	143	10.5	5.2	13.6	750
Maximum Range Settings	2000	19	103	45	126	8.5	6.5	14.9	820
		18	94	41	118	7.9	7.0	15.1	830
		17	86	37	111	7.3	7.5	15.2	835
		16	79	34	103	6.8	8.0	15.1	830
7500	2450	21	163	71	161	13.1	4.2	12.2	670
		20	153	67	157	12.4	4.4	12.7	700
		19	143	62	152	11.7	4.7	13.0	715
		18	133	58	147	11.0	5.0	13.4	735
	2300	21	151	66	156	12.2	4.5	12.7	700
		20	142	62	151	11.6	4.7	13.0	715
		19	133	58	147	11.0	5.0	13.3	735
		18	125	54	142	10.5	5.2	13.5	745
	2200	21	143	62	152	11.4	4.8	13.4	735
		20	134	58	148	10.7	5.1	13.8	760
		19	126	54	143	10.2	5.4	14.0	770
		18	118	51	138	9.7	5.7	14.3	790
Maximum Range Settings	2000	19	107	47	131	8.7	6.3	15.0	825
		18	98	43	123	8.1	6.8	15.2	835
		17	90	39	116	7.6	7.2	15.3	840
		16	82	36	107	7.0	7.8	15.3	840

Cruise performance is based on standard conditions, zero wind, lean mixture, 55 gallons of fuel, no fuel reserve and 2650 pounds gross weight.

Figure 22. Range Chart (Landplane)

LANDPLANE CRUISE AND RANGE PERFORMANCE

Altitude	RPM	M. P.	BHP	%BHP	TAS MPH	Gal/Hr.	End. Hours	Mi/Gal.	Range Miles
10,000	2450	19	146	63	156	11.9	4.6	13.1	735
		18	137	60	152	11.2	4.9	13.5	745
		17	127	55	146	10.6	5.2	13.8	755
		16	118	51	141	10.0	5.5	14.0	770
	2300	19	137	60	152	11.1	5.0	13.7	750
		18	128	56	147	10.5	5.2	14.0	770
		17	118	51	141	9.8	5.6	14.3	790
		16	109	47	134	9.2	6.0	14.5	795
	2200	19	129	56	148	10.4	5.3	14.2	780
		18	120	52	142	9.8	5.6	14.6	800
		17	112	49	136	9.3	5.9	14.7	805
		16	103	45	129	8.7	6.3	14.9	815
Maximum Range Settings	2000	18	102	44	128	8.4	6.5	15.2	835
		17	93	40	120	7.8	7.1	15.4	845
		16	87	38	114	7.4	7.4	15.4	845
		15	80	35	105	6.9	8.0	15.2	835
15,000	2450	16	124	54	150	10.4	5.3	14.4	790
		15	114	50	142	9.8	5.6	14.6	805
		14	105	46	135	9.2	6.0	14.7	810
	2300	16	115	50	143	9.6	5.7	14.8	815
		15	107	47	136	9.1	6.0	15.0	825
		14	98	42	127	8.5	6.5	15.0	825
	2200	16	109	47	138	9.1	6.0	15.2	835
		15	101	44	130	8.6	6.4	15.2	835
		14	92	40	120	8.0	6.9	15.1	830
Maximum Range Settings	2000	16	93	40	122	7.8	7.1	15.7	865
		15	86	37	112	7.3	7.5	15.3	855
		14	78	34	101	6.8	8.1	14.9	820
20,000	2450	13	102	44	133	9.0	6.1	14.9	820
		12	93	40	122	8.3	6.6	14.6	805
	2300	13	96	42	126	8.4	6.6	15.1	830
		12	87	38	113	7.7	7.1	14.6	805
	2200	13	90	39	118	7.8	7.0	15.1	830
		12	81	35	103	7.2	7.7	14.4	790

Cruise performance is based on standard conditions, zero wind, lean mixture, 55 gallons of fuel, no fuel reserve, and 2650 pounds gross weight.

Figure 23. Range Chart (Landplane)

FLOATPLANE AND AMPHIBIAN CRUISE AND RANGE PERFORMANCE

Altitude	RPM	M. P.	BHP	%BHP	TAS MPH	Gal/Hr.	End. Hours	Mi/Gal.	Range Miles
2500	2450	23	175	76	142	14.2	3.9	10.0	550
		22	166	72	139	13.4	4.1	10.4	570
		21	157	68	137	12.7	4.3	10.8	595
		20	148	63	134	12.0	4.6	11.2	615
	2300	23	164	71	139	13.1	4.2	10.6	585
		22	153	67	136	12.2	4.5	11.1	610
		21	143	62	133	11.5	4.8	11.6	640
		20	135	59	130	11.0	5.0	11.8	650
	2200	23	153	67	136	12.1	4.6	11.2	615
		22	144	63	133	11.4	4.8	11.7	645
		21	135	59	130	10.8	5.1	12.0	660
		20	126	55	127	10.2	5.4	12.5	685
Maximum Range Settings	2000	18	89	39	107	7.5	7.3	14.2	780
		17	81	35	101	7.0	7.9	14.5	795
		16	76	33	96	6.6	8.3	14.6	800
		15	67	29	87	5.9	9.3	14.7	810
5000	2450	23	179	78	147	14.5	3.8	10.1	560
		22	169	73	144	13.6	4.0	10.6	580
		21	161	70	142	13.0	4.2	10.9	600
		20	150	65	139	12.2	4.5	11.4	625
	2300	23	167	73	144	13.4	4.1	10.7	590
		22	158	69	141	12.6	4.4	11.2	615
		21	148	64	138	11.9	4.6	11.6	640
		20	139	60	135	11.2	4.9	12.0	665
	2200	23	157	68	141	12.4	4.4	11.4	625
		22	148	64	138	11.7	4.7	11.8	650
		21	138	60	135	11.0	5.0	12.3	675
		20	131	57	132	10.5	5.2	12.6	690
Maximum Range Settings	2000	19	103	45	116	8.5	6.5	13.9	765
		18	94	41	113	7.9	7.0	14.4	790
		17	86	37	107	7.3	7.5	14.6	805
		16	79	34	100	6.8	8.0	14.6	805

Cruise performance is based on standard conditions, zero wind, lean mixture, 55 gallons of fuel, no fuel reserve, and 2850 pounds gross weight.

Figure 24. Range Chart (Floatplane & Amphibian)

FLOATPLANE AND AMPHIBIAN CRUISE AND RANGE PERFORMANCE

Altitude	RPM	M. P.	BHP	%BHP	TAS MPH	Gal/Hr.	End. Hours	Mi/Gal.	Range Miles
7500	2450	21	163	71	146	13.1	4.2	11.1	615
		20	153	67	143	12.4	4.4	11.5	635
		19	143	62	140	11.7	4.7	12.0	660
		18	133	58	136	11.0	5.0	12.4	680
	2300	21	151	66	142	12.2	4.5	11.6	640
		20	142	62	139	11.6	4.7	12.0	660
		19	133	58	136	11.0	5.0	12.4	680
		18	125	54	132	10.5	5.2	12.5	685
	2200	21	143	62	140	11.4	4.8	12.3	675
		20	134	58	136	10.7	5.1	12.7	700
		19	126	54	133	10.2	5.4	13.0	715
		18	118	51	129	9.7	5.7	13.3	730
Maximum Range Settings	2000	18	98	43	117	8.1	6.8	14.4	790
		17	90	39	111	7.6	7.2	14.6	805
		16	82	36	104	7.0	7.8	14.9	820
		15	64	28	83	5.7	9.6	14.5	795
10,000	2450	19	146	63	144	11.9	4.6	12.1	665
		18	137	60	140	11.2	4.9	12.5	685
		17	127	55	136	10.6	5.2	12.8	705
		16	118	51	131	10.0	5.5	13.1	720
	2300	19	137	60	140	11.1	5.0	12.6	695
		18	128	56	136	10.5	5.2	13.0	710
		17	118	51	131	9.8	5.6	13.4	735
		16	109	47	126	9.2	6.0	13.7	755
	2200	19	129	56	137	10.4	5.3	13.1	720
		18	120	52	132	9.8	5.6	13.5	740
		17	112	49	128	9.3	5.9	13.8	760
		16	103	45	122	8.7	6.3	14.0	770
Maximum Range Settings	2000	18	102	44	121	8.4	6.5	14.4	790
		17	93	40	115	7.8	7.1	14.8	810
		16	87	38	110	7.4	7.4	14.9	820
		15	80	35	103	6.9	8.0	14.9	820

Cruise performance is based on standard conditions, zero wind, lean mixture, 55 gallons of fuel, no fuel reserve, and 2850 pounds gross weight.

Figure 25. Range Chart (Floatplane & Amphibian)

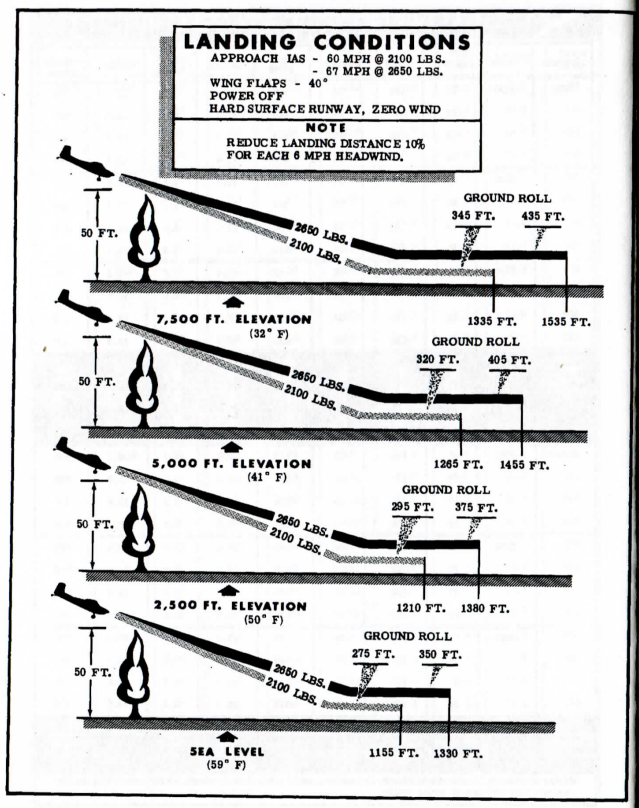


Figure 26. Landing Diagram (Landplane)

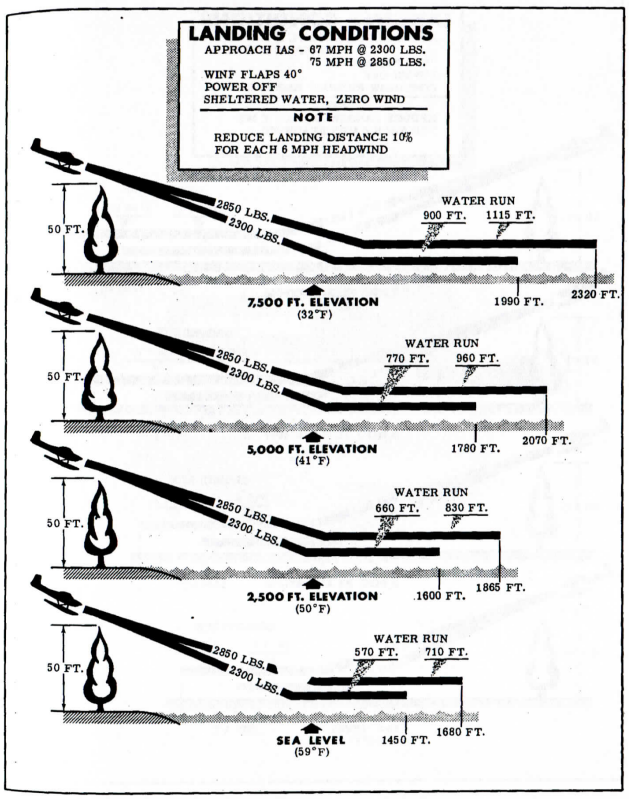


Figure 27. Water Landing Diagram (Floatplane & Amphibian)

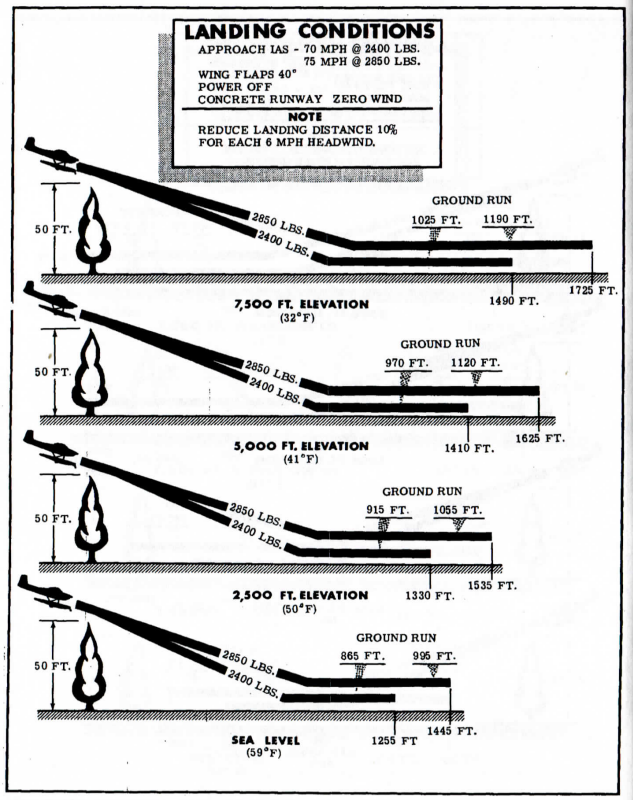
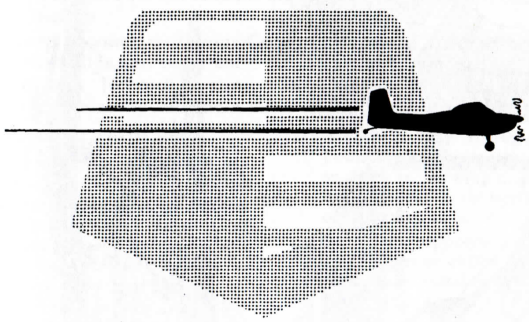


Figure 28. Land Landing Diagram (Amphibian)



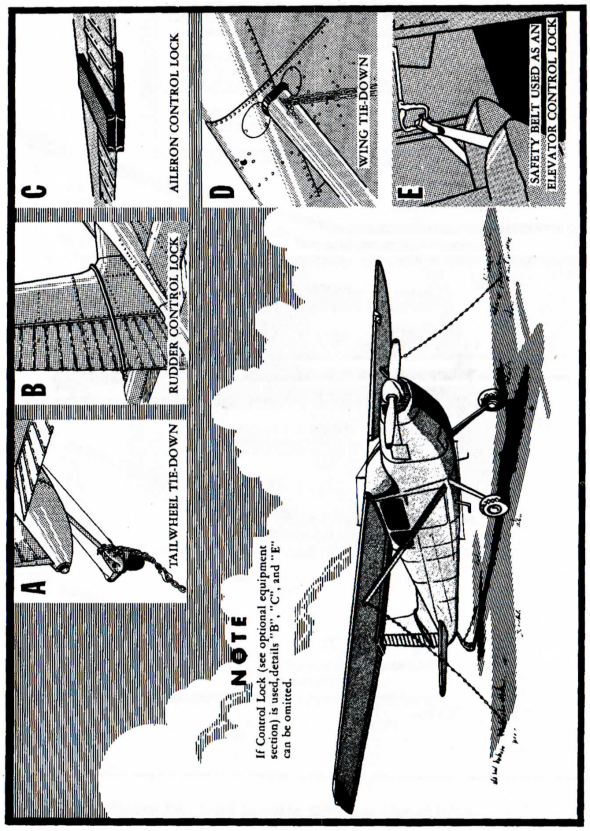


Figure 29. Airplane Tie-Down Procedure

Section VI

care of the airplane— owner's responsibilities

IF YOUR AIRPLANE is to retain that new plane performance and dependability, certain requirements in its care must be followed. It is always wise to follow a planned schedule of lubrication and maintenance based on the climatic and flying conditions encountered in your locality.

Keep in touch with your Cessna dealer and take advantage of his knowledge and experience. He knows your airplane and how to maintain it. He will remind you when lubrications and oil changes are necessary and about other seasonal and periodic services.

GROUND HANDLING.

Proper ground handling will prevent costly repairs due to careless methods of moving the airplane about on the ground. When maneuvering the airplane by hand, push at the front edge of the stabilizer adjacent to the fuselage, at the root of the dorsal fin, and at the landing gear or the strut root fitting. Do not lift the empennage by the tip of the elevator; likewise, do not shove sidewise on the upper portion of the fin.

MOORING YOUR AIRPLANE (See figure 29).

Proper tie-down procedure is your best precaution against damage to your parked airplane by gusty or strong winds. To tie down your airplane securely, proceed as follows:

(1) Tie sufficiently strong (700 pounds tensile strength) ropes or chains to the wing tie-down fittings located at the upper end of each wing strut.

(2) Secure the opposite ends of these ropes or chains to tie-down rings suitably anchored to the ground.

(3) Tie a rope or chain around the tail gear spring and secure the opposite end to a tie-down ring in the ground.

(4) Install surface control locks between the flap and aileron of each wing.

(5) Tie control wheels back with front seat belts if control lock is not available.

(6) Install surface control lock over fin and rudder.

STORAGE.

The all-metal construction in your Cessna makes outside storage practical. Inside storage will increase its life just as inside storage does for your car. If an airplane must remain inactive for a time, cleanliness is probably the most important consideration — whether your airplane is inside or outside. A small investment in cleanliness will repay you many times not only in keeping your airplane looking like new, but in keeping it new. A later paragraph in this section covers the subject in greater detail.

Do not neglect the engine when storing the airplane. Turn it over by hand or have it turned over every few days to keep the bearings, cylinder walls, and internal parts lubricated. If the airplane is outside, leave the propeller in a horizontal position to prevent water from seeping into the hub mechanism. Full fuel tanks will help prevent condensation and will increase fuel tank life.

Airplanes are built to be used and regular use tends to keep them in good condition. An airplane left idle for any great length of time is likely to deteriorate more rapidly than if it is flown regularly, and should be carefully checked over before being put back into service.

LIFTING AND JACKING.

The airplane may be lifted by a sling around the aft section of the fuselage and a sling attached to the engine mount-to-fuselage attachment fitting or to lifting lugs on the engine. The cowl upper half must be removed for application of the sling at the engine mount-to-fuselage attachment fitting.

Jacking point brackets and hoisting rings are available as optional equipment and insure easy, safe handling of the airplane. A block of hardwood sawed at an angle to fit between the fuselage and the landing gear spring may be used as a jacking point to hold the airplane when working on a wheel or tire. *Do not use the brake casting as a jacking point.*

LANDING GEAR, WHEELS, AND TIRES.

The landing gear consists of a single tapered spring steel leaf for each leg which is made from the highest quality chrome-vanadium steel, heat treated and shot peened for added fatigue resistance. No maintenance of this spring is necessary other than paint to prevent rusting.

Correct tire pressure is essential to realize the full benefit of the spring landing gear properties and obtain maximum tire wear. Correct air pressure for a 6.00 x 6 six-ply tire is 28 lbs./sq. inch gage pressure. An accumulation of oil and grease on the tires will have an adverse effect on tire life and should be removed with soap and water. The 6.00 x 6 wheel is a two piece type, cast of magnesium alloy and equipped with a single disc type brake.

Tires are easily removed by jacking up the airplane, removing the wheel, and disassembling the two-piece wheel. Be sure that all of the air is out of the tire and tube before taking the wheel apart. The tire is reinstalled by reversing the procedure. In removing the wheel, it is necessary to remove the brake disc and anti-rattle clips before the wheel can be taken off the axle. The wheel axle nut should be tightened finger tight plus one-half turn. On airplanes equipped with cross-wind wheels, the complete wheel and brake assembly is removed from the airplane and the two wheel halves can be separated in the same manner as the conventional wheels.

The wheel alignment has been properly set at the factory. Wheels should have zero toe-in and zero camber with the airplane in a three-point attitude and loaded with full fuel and oil and two people in the front seats. Excessive tire wear indicates an improper wheel setting for the "on the ground" weight at which you are operating. See your dealer or distributor for re-alignment.

The brake master cylinders, located in the cabin at the rudder and brake pedals, incorporate a reserve reservoir of brake fluid to replace leakage losses. The reservoir should be kept full and should be checked periodically. The brake master cylinders should be serviced, as required, with MIL-O-5606, a petroleum base hydraulic fluid. *(Do not use castor oil base hydraulic fluid.)* Adjustment of the brake is not necessary. Whenever the brakes feel spongy, bleed out the entrapped air from the top of the actuating cylinder at the brake and refill the hydraulic reservoir at the pedals.

The tailwheel, mounting a pneumatic rubber tire, is the full swiveling, steerable type mounted on a tapered tubular spring. The tailwheel tire is removed and replaced by taking the tailwheel apart the same as the main wheel. Correct tailwheel pressure is 35 lbs./sq. inch gage pressure.

FLOAT AND AMPHIBIOUS GEAR.

For all maintenance and lubrication required on Edo floats and amphibious floats, refer to the Edo manuals. These Edo manuals also give proper ground handling, mooring, beaching, lifting and jacking instructions for your float or amphibious airplane. For any maintenance not peculiar to floatplanes and not covered in Edo manuals, follow the requirements listed in this section of your owners manual.

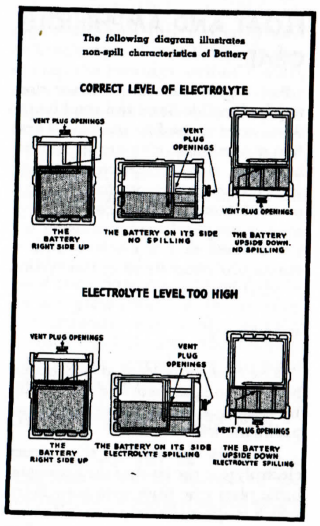
BATTERY.

The battery is located behind the baggage compartment and is accessible by opening the rear baggage compartment wall.

Maintain the level of the battery electrolyte at the level of the horizontal baffle plate (the plate with holes in it), which is approximately two inches be-

low the filler plug, by adding distilled water as required. Obtain the water level but *do not* fill above the plate mentioned above. This water level should be maintained when the battery is in the level position and, therefore, approximately the forward one-quarter of the plate should not be covered when the battery is in the airplane with the airplane in three-point position on the ground.

The space above the horizontal plate is a fluid reservoir when the battery is tipped to the side or inverted. When the electrolyte level is too high, spilling of fluid may result. Sponge off any spilled acid and corrosion products with soda water solution to neutralize the acid, then rinse with clear water. Do not use excessive amounts of soda water.



Keep battery connections tight and clean; otherwise excessive voltage may be generated and damage other electrical equipment. Control of the charging current and voltage is accomplished by the voltage regulator mounted on the firewall. *Only those persons familiar with the operation, adjustment, and repair of the control should be permitted to remove the cover of the device.*

The generator warning light, when on, indicates that the electrical system is receiving current from the battery and the generator is not functioning. Failure of the light to come on, when the master switch is turned on prior to starting the engine, will indicate faulty wiring, a dead battery, or a malfunctioning light. The light should fade out at approximately 700 to 1000 rpm showing that the generator is functioning properly and is supplying the system. If the light should illuminate above this rpm, a malfunctioning generator or voltage regulator, or a short in the generator circuit would be indicated. It is possible, under extreme electrical loads, to draw current from the battery to supplement the current of the generator; however,

the generator warning light will not indicate this drain on the battery as long as the generator is functioning properly. Therefore the generator warning light is not to be used as a battery charge indicator.

Normally, the airplane should not be operated with the master switch in the "OFF" position nor should it be operated without a battery or with battery disconnected. Damage to the generator and the voltage regulator may be the result.

The master switch on the instrument panel operates a solenoid located at the battery. Occasionally, when the battery is allowed to get sufficiently low, it will not have enough energy to actuate the solenoid when the master switch is turned on, resulting in the generator being unable to charge the battery. In this case, the battery should be removed and recharged.

PLEXIGLAS WINDSHIELD AND WINDOWS.

The windshield is a single piece, full floating, "free blown" unit of "Longlife" plastic. To clean plexiglas, wash with plenty of soap and water using the palm of the hand to feel and dislodge any caked dirt or mud. A soft cloth, sponge, or chamois may be used, but only as a means of carrying water to the plastic. Dry with a clean, damp chamois. Rubbing with a dry cloth builds up an electrostatic charge on the glass so that it attracts dust particles from the air. Wiping with a damp chamois will remove this charge as well as the dust and is therefore recommended.

Remove oil and grease by rubbing lightly with a cloth wet with kerosene. *Do not use* gasoline, alcohol, benzene, acetone, carbon tetrachloride, fire extinguisher or de-icing fluid, lacquer thinner or glass window cleaning spray as they will soften the plastic and will cause crazing.

If, after removing dirt and grease, no great amount of scratching is visible, the plexiglas should be waxed with a good grade of commercial wax. Wax will fill in minor scratches and help prevent further scratching. The wax should be applied in a thin, even coat and brought to a high polish by rubbing lightly with a clean, dry, soft flannel cloth.

ALUMINUM SURFACES.

The Alclad 24ST used in the construction of Cessna airplanes requires a minimum in care to keep the surface bright and polished, neat, and trim looking. The airplane may be washed with clear water to remove dirt and with gasoline, carbon tetrachloride or other non-alkaline grease solvents to remove oil, grease and paint. Household type detergent soap powders are effective cleaners, but should be used cautiously since some of them are strongly alkaline. Dulled aluminum surfaces may be cleaned effectively with Bon Ami. A cleaning solution consisting of about two quarts of alcohol, two quarts of water and a package of powdered Bon Ami will be found to be particularly effec-

tive in cleaning the airplane to retain the bright appearance.

ENGINE COMPARTMENT.

The engine section should be kept free of an accumulation of oil, grease, and dirt to prevent a fire hazard. The bulkhead between the cabin and the engine section is stainless steel and may be cleaned with recommended solvent cleaners for grease and oil.

The oil filter screen should be cleaned every 25 hours (during the regular oil change). The carburetor air filter should also be serviced every 25 hours or oftener when operating in dusty conditions. Under extremely dusty conditions, daily maintenance of the air filter is recommended. The air filter should be serviced in accordance with the servicing instructions stamped on the filter.

UPHOLSTERY.

Keeping the inside of your airplane clean is no more difficult than taking care of the rugs and furniture in your home. It is a good idea occasionally to take the dust out of the upholstery with a whisk broom and a vacuum cleaner.

If spots or stains get on the upholstery, they should be removed as soon as convenient before they have a chance to soak and dry. Cleaning fluids having a carbon tetrachloride or a naphtha base are recommended. Soap or detergents and water are not recommended for use on the seats since they will remove some of the fire retardant with which the seats have been treated. When using recommended cleaners, the following method is suggested:

(1) Carefully brush off and vacuum all loose particles of dirt

(2) *Don't use too much fluid.* The seat cushions are padded with foam rubber and, since volatile cleaners attack rubber, these paddings may be destroyed if the material gets soaked with the cleaner.

(3) Wet a small, clean cloth with the cleaning solution and wring out thoroughly. Then open cloth and allow the fluid to evaporate a trifle.

(4) Tap the spot lightly with the cloth, but don't rub it. This will pick up particles which are too embedded to be removed by brushing. Repeat several times, using a clean part of the cloth each time.

(5) Moisten another piece of clean cloth with cleaner and allow to evaporate until barely damp. Now rub the spot lightly, working from the outside in toward the center. (This keeps the spot from spreading and is less likely to leave a ring.) If necessary, repeat several times.

(6) Brush again, to remove any further particles which may have become loosened.

Spots or stains on the side panels are easily removed using a clean cloth slightly dampened with water. A few light strokes over the area usually removes all dirt. Persistent stains, requiring the use of a cleaning fluid, may be removed as described in the preceding steps, 3 through 6.

PROPELLER.

Maintenance of the constant speed propeller on your 180 should offer no problem. Standard, periodic inspection and lubrication of the propeller and spinner will discover any minor propeller troubles before they have a chance to become serious. An occasional wiping of the propeller blades with an oily cloth will result in cleaning off grass and bug stains and will assist materially in corrosion-proofing in salt water areas. Oil and grease stains may be removed with carbon tetrachloride or any non-alkaline grease solvent. Before entering the airplane, examine the propeller for oil leakage and check the blades for nicks and cracks. In ground test, follow the recommended procedure of checking the operation of the propeller through its full range. It is advisable to turn the propeller into a horizontal position when preparing the airplane for tie-down or hangaring. This position prevents water from draining between the clamp and blade into the blade bearing.

CONTROL SYSTEMS.

Figures 30 to 36 inclusive outline the control systems, including control travel limits, location of control stops, and the location of turnbuckles. The use of the single wrap method using .040 monel wire for safetying turnbuckles is satisfactory and CAA approved. Rigging methods for the various systems are outlined below:

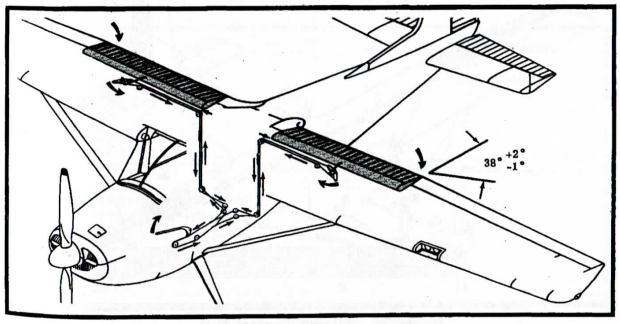


Figure 30. Flap Control System

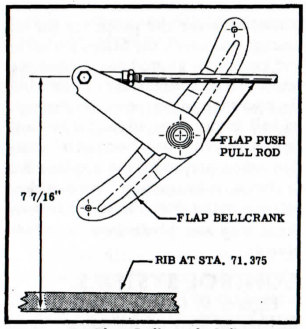


Figure 31. Flap Bellcrank Adjustment

FLAPS (See figures 30 and 31).

(1) Place the flap handle in the 0° flap position.

(2) Hold the flap in the full-up position by applying firm hand pressure upward and forward against trailing edge of flap.

(3) Adjust the flap push-pull rod until the flap bellcrank is in the position shown in figure 31

(4) Release the hand pressure that was applied to the flap trailing edge in step 2 and tighten the flap-up cable turnbuckle located behind the rear cabin door post until the cable has a tension of 20-40 lbs.

(5) Repeat steps 2 thru 4 for the opposite flap.

(6) Move flap handle to the flap full-down position.

(7) Tighten the turnbuckles of the flap-down cables until the cables have a tension of 20 to 40 pounds.

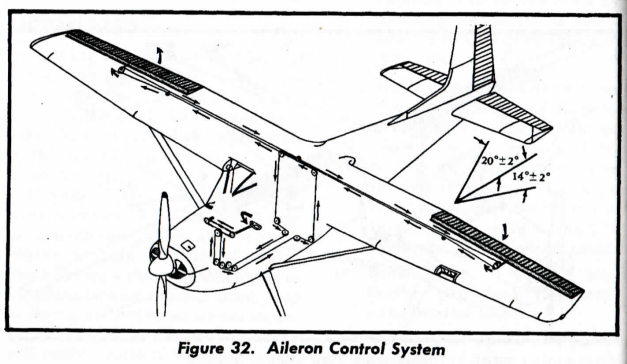


Figure 32. Aileron Control System

AILERONS (See figures 32 and 33).

(1) Place control wheels in neutral position and place a neutral bar across the top of both wheels, using tape or a clamp to secure them. Install chain over sprockets, leaving approximately nine links inboard of the chain guard on each side of the turnbuckle.

(2) String cables back through system.

(3) The ailerons are restricted in travel by a feature built into the bellcranks. Stops in the bellcrank allow a total travel of 34°. In rigging the ailerons, it is important that the bellcranks are neutralized. Connect the cables and adjust bellcrank to a position as shown in figure 33. Cable tension should be approximately 30 pounds with the control wheels in the full-forward position. This position should be maintained in checking the travel.

(4) Adjust ailerons to neutral position by reference to the wing flaps. This adjustment is made by disconnecting the aileron push-pull tube from the bellcrank, and making adjustment on the rod end at the aileron.

(5) Check travel, which should be 20° up and 14° down with a tolerance of plus or minus 2°.

(6) Any correction necessary on the travel can be made by tightening the direct cable and loosening the carry-through cable, or vice versa, whichever the case may be. *Note:* After corrections have been made, check aileron in neutral position and make adjustment per instructions in Step 4.

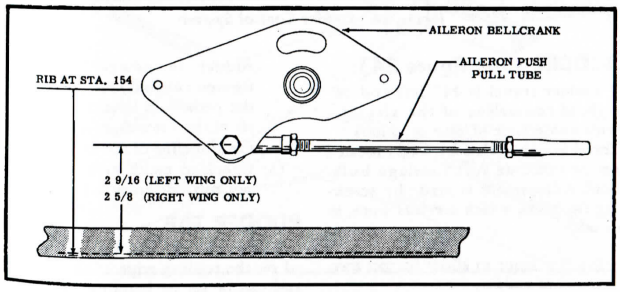


Figure 33. Aileron Bellcrank Adjustment

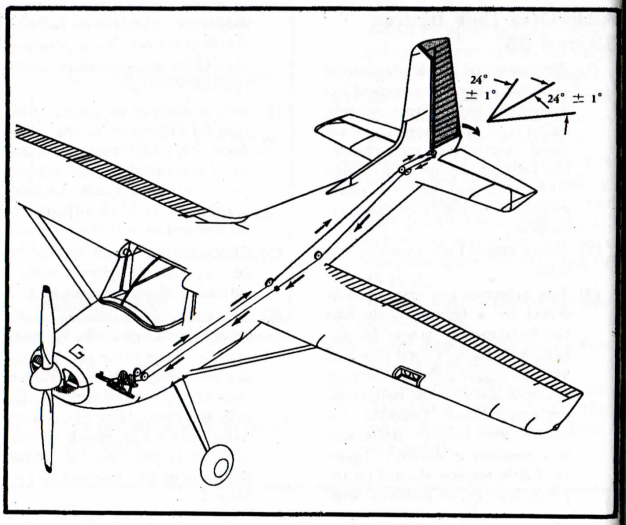


Figure 34. Rudder Control System

RUDDER (See figure 34).

Rudder travel is 24° left and 24° right of centerline of the airplane, with a tolerance of plus or minus 1°. Travel is controlled by stops located on the extreme rear fuselage bulkhead. Adjustment is made by screwing the bolts, which serve as stops, in or out.

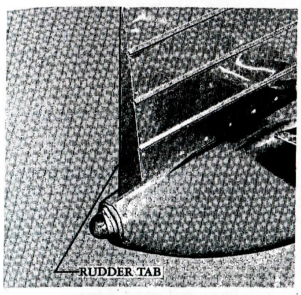
(1) Rig stops to allow correct travel of rudder.

(2) Install cables and, with the rudder in neutral position, tighten turnbuckles until rudder pedals are neutral, 6 inches aft of the firewall, measuring to the hingeline of the brake pedal.

(3) Check to make sure cables do not rub side holes in bulkheads.

RUDDER TAB.

The rudder tab is a fixed tab located on the trailing edge of the rudder and can be set by bending, in either direction, the amount desired.



ELEVATORS (See figure 35).

Elevator travel is 25° ±1° up and 23° ±1° down with the stabilizer in its full-down position. This travel is controlled by two stops located adjacent to the rear elevator bellcrank in the rear of the fuselage.

(1) Move the stabilizer trim wheel until the stabilizer is full-down.

(2) Streamline the elevator with the stabilizer for neutral position.

(3) Set the aft elevator bellcrank stops for an elevator travel of 25° ±1° up and 23° ±1° down.

(4) With elevator in full down position, the measurement from firewall to the edge of the chain sprocket hub on the control column should be ½".

(5) Tighten cables to approximately 30 lbs.

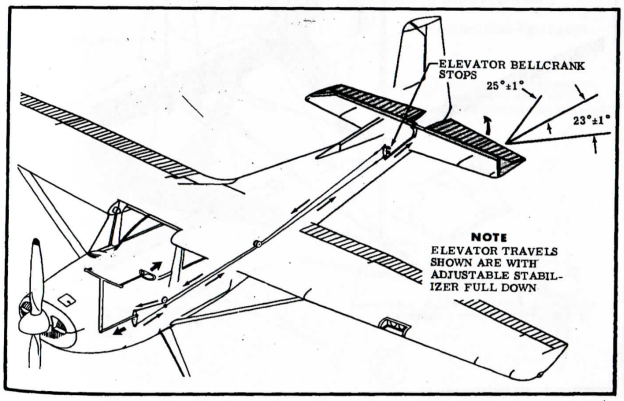


Figure 35. Elevator Control System

STABILIZER TRIM CONTROL (See figure 36).

The stabilizer trim is changed by screw-jack actuators linked by a chain and cable system to the stabilizer control wheel. Down travel of the stabilizer is limited by a horizontal bulkhead and upward travel is limited by a fixed stop. *Note:* The stabilizer must be removed to rig the screw-jack actuators.

(1) Install cables. Turn stabilizer control wheel to full-back position and the screw-jack actuators to full-down position.
(2) Set the chain on the sprockets at the actuators and the control wheel, allowing two chain links to extend forward of the bulkhead in front of the left actuator.
(3) Tighten the cables to a tension of 10 to 15 pounds.
(4) Install stabilizer and fin.
(5) Check the operation of the system by turning the control wheel full forward to see if the stabilizer moves through its full operational range.
(6) Reinstall remaining tail surfaces, tail cone, fairing, and inspection plates removed for the above steps.

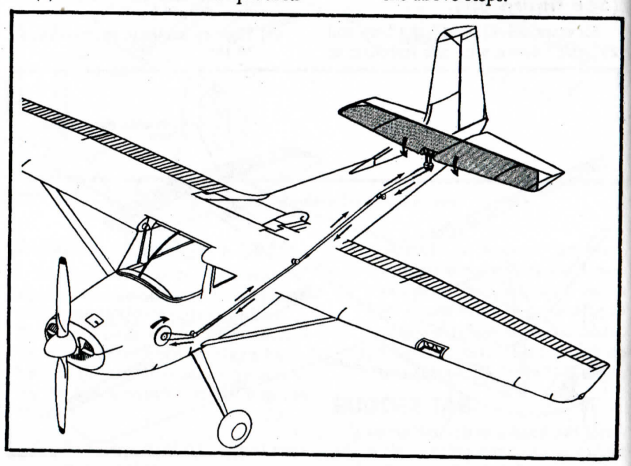


Figure 36. Adjustable Stabilizer Control System

COWL FLAPS

The cowl flaps should be rigged as shown in figure 37.

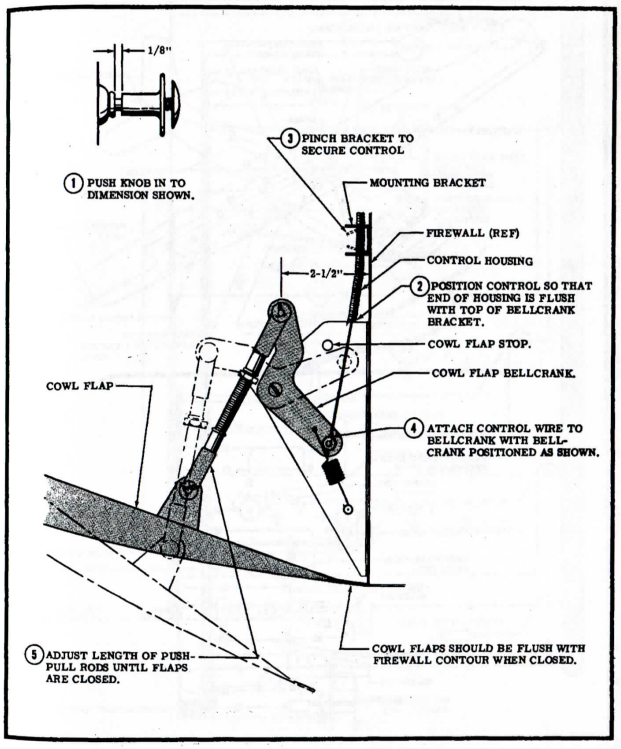


Figure 37. Cowl Flap Adjustment

The numbers indicate wire numbers which can be found on each wire in the airplane.

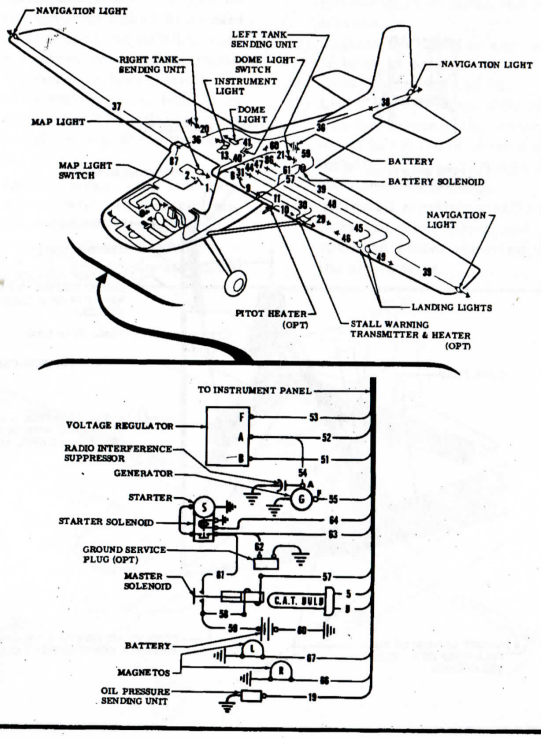
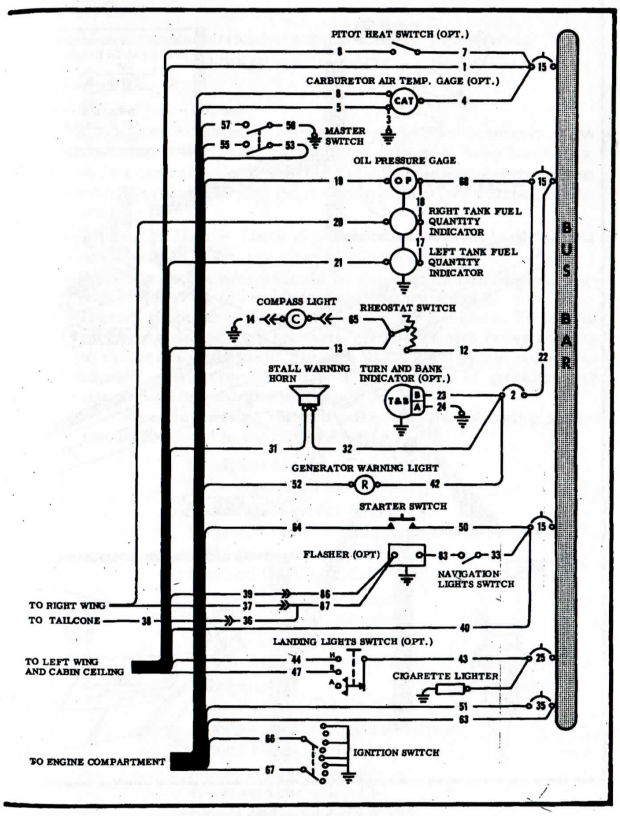


Figure 38. Electrical



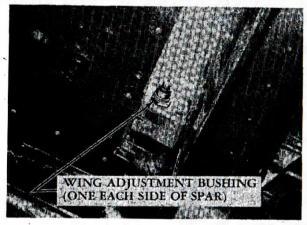
Wiring Diagram

McCauley propeller — On assembly, lubricate propeller with MIL-L-7711 grease. Using a suitable applicator, load the bottom race of each blade retention bearing with lubricant, apply a circumferential ring of lubricant to the preload bearing race of each blade, apply approximately one tablespoon of lubricant in each of the eight pockets on the inside of the hub behind the blade bore diameter, and apply a small amount of lubricant around the outer two retention nut threads in the hub.

F ——Adjustable Stabilizer Jack — Coat threads with MIL-L-7711 grease every 500 hours or whenever stabilizer is removed.

NOTE 1. All pulleys, control surface hinge bearings, bellcrank clevis bolts, flap actuating handle, brake pedal pivots, rudder pedal crossbars, door hinge and mechanism, Bowden controls, throttle, control rod universal (if unsealed) and control column balls, should be lubricated with SAE 20 General Purpose light machine oil as required or every 1,000 hours.

Note 2. In general, roller chains and control cables tend to collect dust, sand, and grit when greased or oiled. More satisfactory operation, except under sea-coast conditions, results when the chains are wiped clean occasionally with a clean dry cloth.



WING ADJUSTMENT.

Initial rigging is accomplished by setting the two eccentric bushings on each rear spar attachment at neutral position. These two eccentric bushings should always be rotated together whenever the setting is changed. Never rotate them separately. If flight test shows excessive wing heaviness, re-rig by rotating the proper bushings, which will increase or decrease the angle of attack of the wing.

AIRPLANE FILE.

There are miscellaneous data, information and licenses that are a part of the airplane file. The following is a check list for that file:

A. To be carried in the airplane at all times:
   (1) Aircraft Registration Certificate (Form ACA 500A).
   (2) Aircraft Airworthiness Certificate (CAA Form ACA 1362).
   (3) CAA approved flight manual.

   (4) Airplane Radio Station License (if transmitter installed).
   (5) Airplane Log Book.
   (6) Engine Log Book.

B. To be maintained but not necessarily carried in the airplane at at all times:
   (1) Weight and Balance Report or latest copy of the Repair and Alteration Form 337.
   (2) Equipment List.
   (3) A form containing the following information: Model, Registration Number, Factory Serial Number, Engine Number and Key Numbers (duplicate keys are available through your Cessna dealer).

INSPECTION SERVICE AND INSPECTION PERIODS.

With your airplane you will receive an Owner's Service Policy. This policy has coupons attached to it which entitle you to an initial inspection and a no-charge 100 hour inspection. If you take delivery from your Dealer, he will perform the initial inspection before delivery of the airplane to you. If you pick up the airplane at the factory, plan to take your Cessna to your Dealer reasonably soon after you take delivery of it. This will permit him to check it over and to make any other minor adjustments that may appear necessary. Also, plan an inspection by your Dealer at 100 hours or 90 days, whichever comes first. This inspection also is performed by your Dealer for you at no charge. While these important inspections will be performed for you by any Cessna Dealer, in most cases you will prefer to have the Dealer from whom you purchase the airplane accomplish this work for you.

The Civil Air Regulations require all airplanes to have an "annual inspection" performed by a person designated by the administrator. In addition, 100 hour periodic inspections made by an "appropriately rated mechanic" are required if the airplane is flown for hire. The Cessna Aircraft Company recommends the 100 hour periodic inspection for your airplane. The procedure for this 100 hour inspection has been carefully worked out by the factory and is followed by the Cessna dealer organization. The complete familiarity of the Cessna Dealer organization with Cessna equipment and with factory-approved procedures provides the highest type of service possible at lower cost.

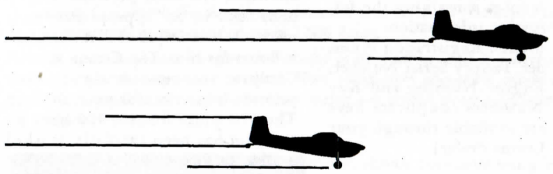
Time studies of the 100 hour inspection at the factory and in the field have developed a standard flat-rate charge for this inspection at any Cessna Dealer. Points which the inspection reveals requiring modification or repairs will be brought to the owner's attention by the dealer and quotations or charges will be made accordingly. The inspection charge does not include the oil required for the oil change.

Every effort is made to attract the

best mechanics in each community to Cessna service facilities. Many Dealers' mechanics have attended Cessna Aircraft Company schools and have received specialized instruction in maintenance and care of Cessna airplanes. Cessna service instruction activity in the form of service bulletins and letters is constantly being carried on so that your enjoyment and safety in your Cessna will be complete and up-to-date when you have your inspection and service work performed by Cessna Dealers' mechanics.

Cessna Dealers maintain stocks of genuine Cessna parts and Service facilities consistent with the demand.

Your Cessna Dealer will be glad to give you current price quotations on all parts that you might need and will be glad to advise you on the practicability of parts replacement versus repairs that might, from time to time, be necessary.



100 HOUR INSPECTION.

Before beginning the inspection, the shop foreman or mechanic runs the engine to check for ignition drop, generator charging rate, oil pressure variation, and to check smoothness and general operation of the engine, propeller, controls, and indicators. He records these facts as an aid to the mechanic. The inspection consists basically of the following procedures:

I. Remove all inspection plates and fairings, consisting of the following:
   1. Remove lower half of wing root fairing (both sides).
   2. Remove the eight inspection plates on underside of each wing.
   3. Remove the two inspection plates on cabin top adjacent to the wing flaps.
   4. Remove tail group fairing and disconnect stinger.
   5. Remove the inspection plate on the underside of fuselage just forward of the stabilizer.
   6. Remove the three inspection plates on the belly of the fuselage.
   7. Remove rear seat back and front seats.

   8. Open upholstery headliner zipper.
   9. Remove scuff plates and rudder pedal shields, roll back floor covering and remove round inspection plates above landing gear bulkhead
   10. Remove adjustable stabilizer control wheel cover and rear center tunnel cover plate.
   11. Remove inspection plates just forward of the rear seat.
   12. Remove curtains at the aft end of the baggage compartment for access to cables, bellcranks, pulleys, battery, and radio units.
   13. Open landing gear fairing at fuselage.
   14. Remove wheel and brake fairings.

II. Engine Check.
   1. Remove engine cowl and propeller spinner.
   2. Visually check engine for oil leaks.
   3. Drain oil from engine, clean oil screen located on rear side of accessory case, and refill with new oil of the recommended weight.
   4. Wash down engine and propeller.
   5. Remove heater muffs. Inspect mufflers and exhaust stacks for possible cracks.
   6. Check carburetor air and heater hoses for holes, collapsed tubes, burning, and security of mounting.
   7. Check magnetos for condition and security of mounting. Check timing of magnetos, if required (22° BTC).

NOTE

Since the engine timing marks are covered by the spinner adapter, the use of a top center gage and clamp-on type timing disc is recommended for timing the engine—otherwise, the propeller must be pulled in order to use the engine timing marks for timing the engine.

   8. Check cylinder base nuts for tightness.
   9. Remove spark plugs, clean, set gap (.016—.018), and test. Check condition of copper gaskets
   10. Check engine mount bolts for security and engine mount tubes and gussets for condition.
   11. Check all wires forward of the firewall.
   12. Check all engine controls for travel and free movement.
   13. Remove and clean fuel strainer bowl and screen.
   14. Clean carburetor air screen, re-oil, and reinstall.
   15. Check cowl flap mechanism for security and condition.

III. Propeller Check.
1. Check propeller track.
2. Check propeller blades, hubs and blade clamps for condition, and rework any nicks or abrasions as necessary.
3. Check guide blocks for cracks and wear.
4. Check jamb nut on blade travel-stops for tightness.
5. Check piston and blade clamps for evidence of leakage.
6. Check propeller tightness on shaft.
7. Examine dowel pins to make sure they have not shifted.
8. Grease propeller at grease fittings.
9. Clean and install engine cowl and propeller spinner.

IV. Wing Inspection.
1. Check front and rear wing bolts attaching wing to fuselage (both wings).
2. Check strut bolts for security (both wings).
3. Check all wing control surfaces for freedom of movement and bolts for security.
4. Check aileron bellcranks and cables for security, conditions, and proper safetying (both sides).
5. Check flap bellcranks, tracks, and pulleys and cables for security, condition and proper safetying (both sides).
6. Drain wing fuel tank sumps and resafety — check for fuel leaks.
7. Check pitot tube for cleanliness and freedom from obstructions.
8. Check landing light window for cracks and cleanliness.
9. Check navigation lights for damage.
10. Check flap travel (0° to 38° $^{+2°}_{-1°}$) and aileron travel (20° ±2° up and 14° ±2° down)

V. Empennage and Surfaces.
1. Check both stabilizer and vertical fin for possible damage.
2. Check attaching bolts on both fin and stabilizer for security.
3. Check rudder and elevator attaching bolts for security and surfaces for freedom of movement.
4. Check elevator and rudder hinges.
5. Check surface travels. Elevator 25° ±1° up and 22° ±1° down from streamlined with the stabilizer in its full-down position. Rudder 24° ±1° left and right. Adjustable stabilizer travel is fixed, but the mechanism should be checked to see that the stabilizer moves its full range between the fixed stops.

6. Check elevator and rudder bellcranks.
7. Check balance weights for security.
8. Check navigation light for damage.

VI. Tail Gear.
1. Hoist tail gear above floor. Shake tail gear spring to check for any sign of looseness and visually inspect fuselage attachment. Tighten any loose bolts and replace rubber bushings if necessary.
2. Lubricate tailwheel fittings.
3. Inspect tailwheel steering mechanism and tire inflation.

VII. Cabin Section.
1. Clean and check condition of:
   a. Plexiglas windshield and windows.
   b. Upholstery — Vacuum if possible.
   c. Instrument glasses.
   d. Ash trays.
   e. Metal cabin trim.
   f. Instrument and control panels.
   g. Decals, control panel lettering, and compass correction card.
2. Check operation and condition of:
   a. Door latches.
   b. Window opening mechanism.
   c. Manifold heating system valves, ducts and louvers.
   d. Control knobs.
   e. Safety belts.
   f. Ventilating system.
   g. Seat adjustment mechanism.
   h. Front seat stop cotter pins on seat rails.
3. Check the primer for leakage and security.
4. On rudder bar and control tee assemblies, check:
   a. Security of mounting.
   b. Cable connection points.
   c. Pulley installations.
   d. Rudder return springs.
5. On battery, check:
   a. Electrolyte level and specific gravity (1.310—1.226)
   b. Cables for security and condition.

   c. Battery security.
   d. Cleanliness of battery box and terminals — clean off and neutralize spilled fluid with soda water solution and rinse with clear water.
6. Drain sediment and water from fuel line at plug located on the belly of the airplane.

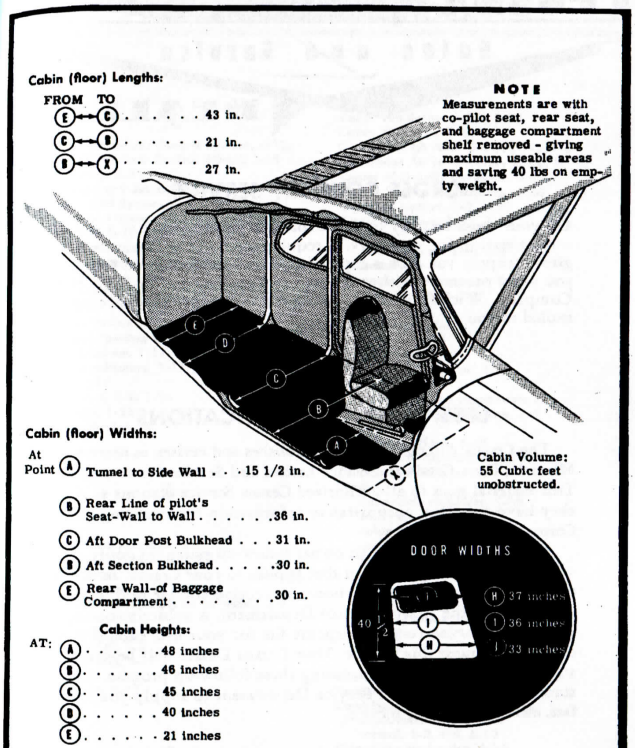
VIII. Main Landing Gear and Brakes.
1. Hoist or jack up airplane to remove weight from landing gear. Shake landing gear and wheels for any sign of looseness and visually inspect fuselage attachment. If necessary, tighten landing gear bolts and wedges. With airplane in 3-point position on the floor visually inspect landing gear spring leaf for cracks. (Remove landing gear wheels and pack with grease at first 100 hours and every 500 hours thereafter unless otherwise designated by owner.)
2. Operate brakes and feel for sponginess. Bleed, and refill brake system if necessary. Check brake linings for wear within permissible limits.
3. Set parking brake and check exposed lines and hoses for deterioration and evidence of leakage of hydraulic fluid.
4. Examine tires for proper inflation, wear, cuts and blisters. Uneven or excessive wear may indicate need for re-alignment of wheels.

IX. Electrical System.
1. Check electrical system by operating the lights, starter, and all accessories which are incorporated in the electrical system.

X. Visual Check for Exterior Surfaces.
1. Clean exposed surfaces.
2. Check:
   a. Condition of exposed aluminum surfaces.
   b. Airspeed static source holes on each side of fueslage for stoppage.
   c. Evidence of leaking fuel or oil — determine cause.
   d. Condition of decorative paint and all markings.

XI. Recowl the engine and install propeller spinner. Replace all inspection plates, fairings and seats. Check cowl flap travel. Rig cowl flaps in accordance with figure 37.

XII. Run engine as in preliminary run-up to check for ignition drop, generator charging rate, oil pressure, smoothness, and general operation of engine, propeller, controls, and indicators.



INTERNAL CABIN MEASUREMENT

CESSNA Sales and Service DEALERS

CROSS COUNTRY SERVICE

On your cross country travels make it a point to stop at a Cessna service station for your service requirements. Your Dealer will be glad to supply you with a copy of a current service station list, or if you wish, you may write to the Service Department, Cessna Aircraft Company, Wichita, Kansas, asking for it and it will be promptly mailed to you.

CESSNA SERVICE PUBLICATIONS

The Cessna Aircraft Company publishes and revises, as necessary, Manuals, Parts Catalogs, Service Letters and Service News Letters. This material goes to all authorized Cessna Service Stations so that they have the latest authoritative information for servicing your Cessna.

Your Cessna Dealer has an owner follow-up system to notify you when he receives information that applies to your Cessna. In addition, if you wish, you may choose to receive similar notification directly from the Cessna Service Department. A subscription card is supplied to you in your airplane file for your use, should you choose to request this service. Your Cessna Dealer will be glad to supply you with details concerning these follow-up programs, and stands ready through his Service Department to supply you with fast, efficient, low cost service.

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