CESSNA

MORE PEOPLE BUY AND FLY CESSNA AIRPLANES THAN ANY OTHER MAKE

1973

WORLD'S LARGEST PRODUCER OF GENERAL AVIATION AIRCRAFT SINCE 1956

MODEL 402B BUSINESSLINER and UTILILINER

OWNER'S MANUAL

PERFORMANCE AND SPECIFICATIONS

GROSS WEIGHT:	
Takeoff	6300 lbs.
Landing	6200 lbs.
SPEED BEST POWER MIXTURE:	
Maximum 16,000 ft.	261 mph
Maximum Recommended Cruise 75% Power at 20,000 ft.	240 mph
RANGE NORMAL LEAN MIXTURE	
Maximum Recommended Cruise	
75% Power at 10,000 ft. 600 lbs., No Reserve	660 mi. 3.05 hrs. 216 mph
75% Power at 10,000 ft. 840 lbs., No Reserve	924 mi. 4.27 hrs. 216 mph
75% Power at 10,000 ft. 1080 lbs., No Reserve	1185 mi. 5.49 hrs. 216 mph
75% Power at 20,000 ft. 600 lbs., No Reserve	694 mi. 2.94 hrs. 236 mph
75% Power at 20,000 ft. 840 lbs., No Reserve	972 mi. 4.12 hrs. 236 mph
75% Power at 20,000 ft. 1080 lbs., No Reserve	1248 mi. 5.29 hrs. 236 mph
Maximum Range	
10,000 ft., 600 lbs., No Reserve	806 mi. 4.70 hrs. 172 mph
10,000 ft., 840 lbs., No Reserve	1131 mi. 6.58 hrs. 172 mph
10,000 ft., 1080 lbs., No Reserve	1453 mi. 8.45 hrs. 172 mph
25,000 ft., 600 lbs., No Reserve	808 mi. 3.75 hrs. 215 mph
25,000 ft., 840 lbs., No Reserve	1131 mi. 5.26 hrs. 215 mph
25,000 ft., 1080 lbs., No Reserve	1454 mi. 6.76 hrs. 215 mph
RATE OF CLIMB AT SEA LEVEL	
Twin Engine	1610 fpm.
Single Engine	225 fpm.
SERVICE CEILING	
Twin Engine	26,180 ft.
Single Engine	11,320 ft.
TAKEOFF PERFORMANCE Takeoff Speed (105 MPH)	
Ground Run	1695 ft.
Total Distance Over 50-foot Obstacle	2220 ft.
LANDING PERFORMANCE Approach Speed (115 MPH)	
Ground Run	777 ft.
Total Distance Over 50-foot Obstacle	1765 ft.
EMPTY WEIGHT (Approximate)	3719 lbs.
BAGGAGE ALLOWANCE:	330 lbs*
WING LOADING:	32.2 lbs./sq. ft.
POWER LOADING:	10.5 lbs./hp.
FUEL CAPACITY: TOTAL	
Standard	102 gals.
Optional Auxiliary Tanks	143 gals.
Optional Auxiliary Tanks and Wing Locker Tanks	184 gals.
OIL CAPACITY: TOTAL	6.5 gals.
ENGINES:	
Continental 6-Cylinder Turbocharged Fuel Injection Engines	TSIO-520-E
300 Rated HP at 2700 Propeller RPM and 31.5" MP to 16,000 ft.	
PROPELLERS:	
Constant Speed, Full Feathering, Three Bladed 76.5" Diameter	3AF32C87M/82NC-5.5

*590 lbs. for the Utiliner

CONGRATULATIONS . . . .

Welcome to the ranks of Cessna owners! Your Cessna has been designed and constructed to give you the most in performance, economy, and comfort. It is our desire that you will find flying it, either for business or pleasure, a pleasant and profitable experience.

This Owner's Manual has been prepared as a guide to help you get the most pleasure and utility from your aircraft. It contains information about your Cessna's equipment, operating procedures, and performance; and suggestions for its servicing and care. We urge you to read it from cover to cover, and to refer to it frequently.

Our interest in your flying pleasure has not ceased with your purchase of a Cessna. Worldwide the Cessna Dealer Organization backed by the Cessna Service Department stands ready to serve you. The following services are offered by most Cessna Dealers:

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a. No exclusions
b. Coverage includes parts and labor
c. Available at Cessna Dealers worldwide
d. Best in the industry

Specific benefits and provisions of the warranty plus other important benefits for you are contained in your Warranty and Owner's Service Policy Booklet supplied with your aircraft. Warranty service is available to you at any authorized Cessna Dealer throughout the world upon presentation of your Warranty and Owner's Service Policy Booklet which establishes your eligibility under the warranty.

FACTORY TRAINED PERSONNEL to provide you with courteous expert service.

FACTORY APPROVED SERVICE EQUIPMENT to provide you with the most efficient and accurate workmanship possible.

A STOCK OF GENUINE CESSNA SERVICE PARTS on hand when you need them.

THE LATEST AUTHORITATIVE INFORMATION FOR SERVICING CESSNA AIRCRAFT, since Cessna Dealers have all of the Service Manuals and Parts Catalogs, kept current by Service Letters and Service News Letters, published by Cessna Aircraft Company.

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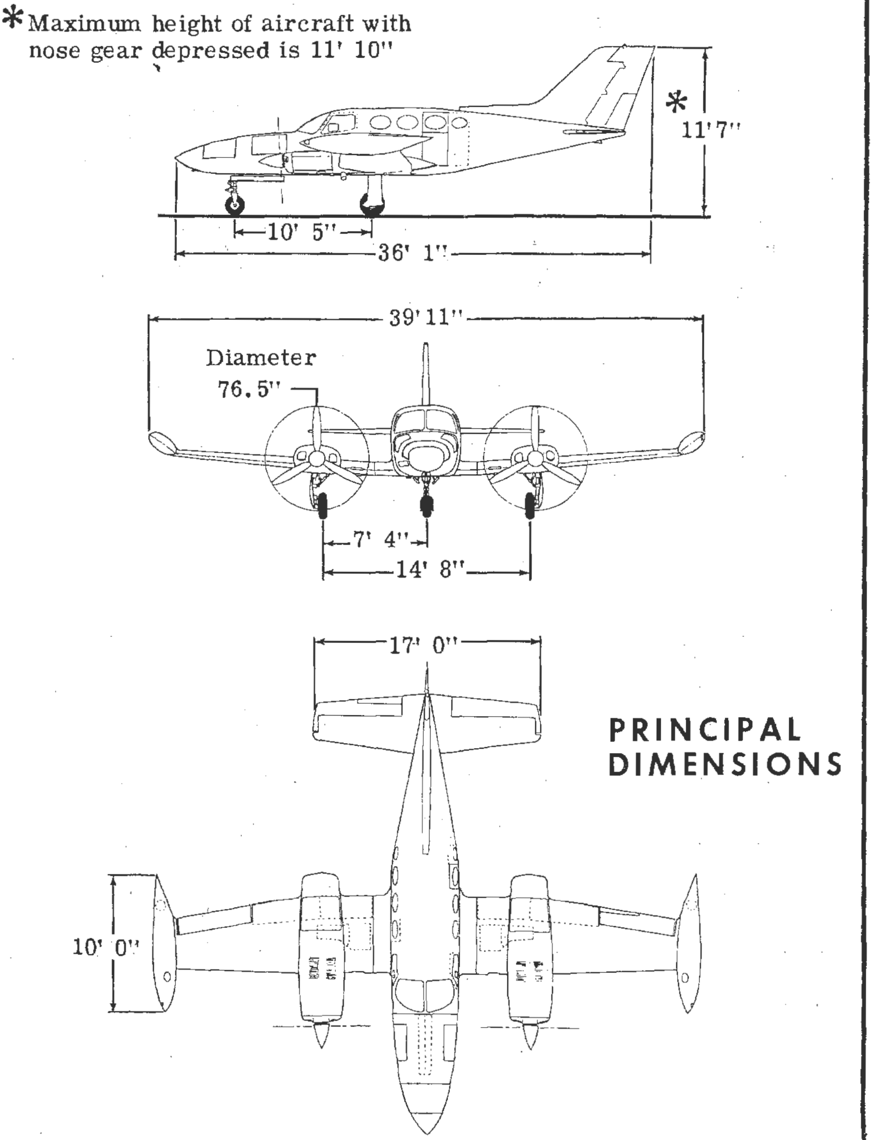

PRINCIPAL DIMENSIONS

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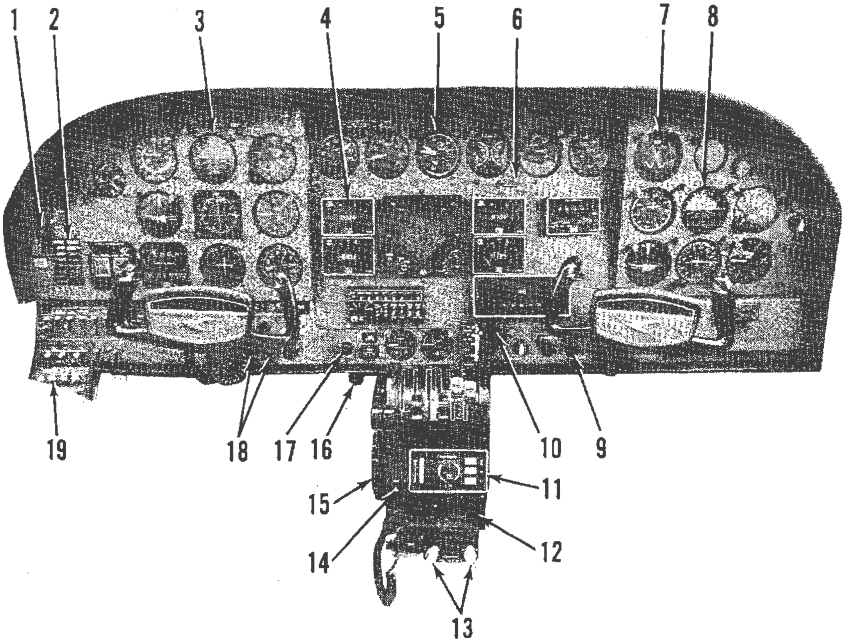

1 LOCATOR BEACON (OPTIONAL)
2 ANNUNCIATOR PANEL
3 FLIGHT INSTRUMENT GROUP
4 AVIONICS CONTROL PANEL (OPTIONAL)
5 ENGINE INSTRUMENT GROUP
6 FUEL QUANTITY SELECTOR SWITCH (OPTIONAL)
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SECTION I
OPERATING CHECKLIST

One of the first steps in obtaining the utmost performance, service, and flying enjoyment from your Cessna Model 402B is to familiarize yourself with your aircraft's equipment, systems, and controls. This can best be done while sitting in the aircraft. Those items whose functions and operation are not obvious are covered in Section II.

Section I lists in Checklist Form, the steps necessary to operate your aircraft efficiently and safely. It covers briefly all the points that you should know concerning the information you need for a typical flight.

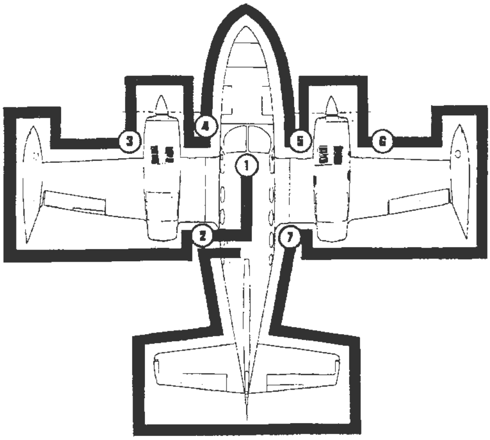
The flight and operational characteristics of your aircraft are normal in all respects. All controls respond in the normal way within the entire range of operation. All airspeeds mentioned in Sections I and II are indicated airspeeds unless otherwise noted. Corresponding calibrated airspeeds may be obtained from the Airspeed Calibration Chart in Section VI.

MAKE A PREFLIGHT INSPECTION IN ACCORDANCE WITH FIGURE 1-1.

BEFORE STARTING THE ENGINES

(1) Preflight Inspection - COMPLETE.
(2) Cabin Door Safety - LATCHED.
(3) Crew Door - (if installed) - CLOSED and LOCKED.
(4) Control Lock - OFF.
(5) Seat, Seat Belts and Shoulder Harness - ADJUST and SECURE.
(6) Landing Gear Switch - DOWN.
(7) Emergency Power Switch - OFF.
(8) Voltage Regulator Switch - MAIN.
(9) Circuit Breakers - IN.
(10) Switches - OFF.
(11) Auxiliary Fuel Pump Switches - OFF.
(12) Radios - OFF.
(13) Magneto Switches - OFF.
(14) Battery and Alternators - ON.

PREFLIGHT INSPECTION



NOTE

Visually check inspection plates and general aircraft condition during walk-around inspection. If night flight is planned, check operation of all lights and make sure a flashlight is available.

1
a. Control Lock - REMOVE and STOW.
b. Parking Brake - SET.
c. All Switches - OFF.
d. Landing Gear Switch - DOWN.
e. Battery Switch - ON.
f. Fuel Gages - CHECK QUANTITY and OPERATION.
g. Flaps - EXTEND.
h. Left Fuel Selector - LEFT MAIN (feel for detent).
i. Right Fuel Selector - RIGHT MAIN (feel for detent).
j. Trim Tab Controls (3) - NEUTRAL.
k. Oxygen - CHECK QUANTITY, MASKS and HOSES - OFF.

2
a. Battery Compartment Cover - SECURE.
b. Wing Locker Baggage Door - SECURE.
c. Flap - CHECK SECURITY and ATTACHMENT.
d. Wing Locker Fuel Sump - DRAIN.
e. Control Surface Lock - REMOVE.
f. Aileron and Tab - CHECK CONDITION, FREEDOM OF MOVEMENT and TAB POSITION.
g. Main Tank Fuel Sump - DRAIN.
h. Fuel Vent and Sniffle Valve - CLEAR.
i. Main Tank Fuel Quantity - CHECK, CAP SECURE.
j. Tip Tank Transfer Pump - LISTEN FOR OPERATION.
k. Stall Warning Vane - CHECK FREEDOM OF MOVEMENT.
l. Wing Tie Down - REMOVE.
m. Auxiliary Tank Fuel Quantity - CHECK, CAP SECURE.
n. Auxiliary Tank and Wing Locker Transfer Line Fuel Sump - DRAIN.
o. Wing Locker Tank Fuel Vent - CLEAR.

Figure 1-1 (Sheet 1 of 2)

3

a. Wing Locker Fuel Tank Fuel Quantity - CHECK, CAP SECURE.
b. Fuel Strainer - DRAIN.
c. Cowl Flap - SECURE.
d. Engine Compartment General Condition - CHECK.
e. Oil Level - CHECK, MINIMUM 9 QUARTS.
f. Propeller and Spinner - EXAMINE FOR NICKS, SECURITY and OIL LEAKS.
g. Cowl Flap - SECURE.
h. Main Gear, Strut, Doors and Tire - CHECK.
i. Leading Edge Air Intake - CLEAR.
j. Cross Feed Line - DRAIN.

4

a. Baggage Door - SECURE.
b. Avionics Bay Door - SECURE.
c. Nose Gear, Strut, Doors and Tire - CHECK.
d. Pitot Cover (If Installed) - REMOVE, Pitot Tube - CLEAR.
e. Tie Down - REMOVE.
f. Heater Inlet - CLEAR.
g. Avionics Bay Door - SECURE.
h. Baggage Door - SECURE.

5

a. Crossfeed Line - DRAIN.
b. Leading Edge Air Intake - CLEAR.
c. Main Gear, Strut, Doors and Tire - CHECK.
d. Cowl Flap - SECURE.
e. Air Conditioning Outlet Air Opening - CLEAR (if installed).
f. Wing Locker Tank Fuel Quantity - CHECK, CAP SECURE.
g. Oil Level - CHECK, MINIMUM 9 QUARTS.
h. Engine Compartment General Condition - CHECK.
i. Propeller and Spinner - EXAMINE FOR NICKS, SECURITY and OIL LEAKS.
j. Cowl Flap - SECURE.
k. Fuel Strainer - DRAIN.

6

a. Air Conditioning Air Inlet Openings - CLEAR (if installed).
b. Wing Locker Tank Fuel Vent - CLEAR.
c. Auxiliary Tank and Wing Locker Transfer Line Fuel Sump - DRAIN.
d. Auxiliary Tank Fuel Quantity - CHECK, CAP SECURE.
e. Wing Tie Down - REMOVE.
f. Main Tank Fuel Quantity - CHECK, CAP SECURE.
g. Tip Tank Transfer Pump - LISTEN FOR OPERATION.
h. Fuel Vent and Sniffle Valve - CLEAR.
i. Main Tank Fuel Sump - DRAIN.
j. Control Surface Lock - REMOVE.
k. Aileron - CHECK CONDITION and FREEDOM OF MOVEMENT.
l. Wing Locker Sump - DRAIN.
m. Flap - CHECK SECURITY and ATTACHMENT.
n. Wing Locker Baggage Door - SECURE.

7

a. Static Port - CLEAR.
b. Control Surface Lock - REMOVE.
c. Tie Down - REMOVE.
d. Static Port - CLEAR.
e. Cabin Door, General Condition and Security - CHECK.
f. Battery Switch - OFF.

Figure 1-1 (Sheet 2 of 2)

NOTE

When using external power source, do not turn on the battery or alternator switches until external power source is disconnected to avoid damage to the alternators and a weak battery draining off part of the current being supplied by the external source.

(15) Parking Brake - SET.
(16) Lighting Rheostats - OFF.
(17) Cowl Flaps - OPEN.
(18) Altimeter and Clock - SET.
(19) Annunciator Light Panel - PRESS-TO-TEST.
(20) Cabin Door Not Locked Light - OFF.

NOTE

If top half of door is still open, the light will not go out.

(21) Landing Gear Position Indicator Lights - Check green lights ON.
(22) Wing Flaps - UP.
(23) Cabin Air Controls - AS REQUIRED.
(24) Fuel Quantity - CHECK.
(25) Throttles - OPEN ONE INCH.
(26) Propellers - FORWARD.
(27) Mixtures - FULL RICH.
(28) Fuel Selectors - Left Engine - LEFT MAIN (feel for detent).
Right Engine - RIGHT MAIN (feel for detent).

STARTING ENGINES (Left Engine First)

NORMAL START (NO EXTERNAL POWER)

(1) Propellers - CLEAR.
(2) Magneto Switches - ON.
(3) Left Engine - START.
    (a) Starter Button - PRESS.
    (b) Primer Switch - Left Engine - LEFT.
    Right Engine - RIGHT.

CAUTION

- If the primer switch is activated for excessive periods of time with the engine inoperative on the ground or during flight, damage may be incurred to the engine and/or aircraft due to fuel accumulation in the induction system. Similar conditions may develop when the engine is shutdown with the auxiliary pump switch in the ON position.

- Should fuel priming or auxiliary pump operation periods in excess of 60 seconds occur, the engine manifold must be purged by one of the following procedures:
  (a) With auxiliary fuel pump switch OFF, allow manifold to drain at least 5 minutes or until fuel ceases to flow out of the drain under the nacelle.
  (b) If circumstances do not allow natural draining periods recommended above, with the auxiliary pump switch OFF, magneto switches OFF, mixture idle cut-off and throttle full open, turn engine with starter or by hand a minimum of 15 revolutions.

(4) Auxiliary Fuel Pump - LOW (to purge vapor from fuel system).
(5) Throttle - 1000 to 1200 RPM.
(6) Oil Pressure - 10 PSI minimum in 30 seconds in normal weather or 60 seconds in cold weather. If no indication appears, shutdown engine and investigate.
(7) Right Engine - START (repeat steps 1 through 6).
(8) Alternators - CHECK.
(9) Regulators - CHECK.
(10) Radios - ON.

STARTING ENGINES (Left Engine First)
WITH EXTERNAL POWER SOURCE

(1) Battery and Alternators - OFF.
(2) External Power Source - PLUG IN.
(3) Propeller - CLEAR.
(4) Magneto Switches - ON.
(5) Left Engine - START.
  (a) Starter Button - PRESS.
  (b) Primer Switch - Left Engine - LEFT.
  Right Engine - RIGHT.

(8) With Optional Electric Gyro Horizon - PULL to erect.
(9) Trim Tabs - SET.
(10) Alternate Air Controls - IN.
(11) Flight Controls - CHECK (free and correct).
(12) Cowl Flaps - OPEN.
(13) Cabin Door and Crew Door (if installed) - LOCKED.
(14) Wing Flaps - 0°.
(15) Engine Instruments - CHECK.

NOTE

The engine oil temperature should be within the normal operating range prior to applying takeoff power. Even cautious power applications with cool oil may result in momentarily exceeding the 34.5 inches Hg. manifold pressure limits.

(16) Fuel Quantity - CHECK.
(17) Flight Instruments and Radios - SET.
(18) Fuel Selectors - RECHECK - Left Engine - LEFT MAIN (feel for detent).
Right Engine - RIGHT MAIN (feel for detent).
(19) Lights - AS REQUIRED.
(20) Auxiliary Fuel Pumps - ON.
(21) Parking Brake - RELEASE.

TAKEOFF

NORMAL TAKEOFF

(1) Power - Full throttle and 2700 RPM.

NOTE

Apply full throttle smoothly to avoid propeller surging and excessive manifold pressures. Do not exceed 34.5 inches Hg. manifold pressure at any time.

(2) Elevator Control - Raise nose wheel at 95 MPH IAS.
(3) Minimum Control Speed - 95 MPH IAS.
(4) Break Ground and Climb Out at 105 MPH IAS.

AFTER TAKEOFF

(1) Brakes - APPLY MOMENTARILY.
(2) Landing Gear - RETRACT
(3) Climb Speed - 126 MPH IAS (best multi-engine rate-of-climb speed) or (set up climb speed as shown in Normal Climb paragraph).
(4) Auxiliary Fuel Pumps - OFF.
(5) Cowl Flaps - AS REQUIRED.

CLIMB

NORMAL CLIMB

(1) Power - 29.5 inches Hg. and 2450 RPM.
(2) Airspeed - 130 - 160 MPH IAS.
(3) Mixture - Adjust to climb fuel flow.
(4) Cowl Flaps - AS REQUIRED.
(5) Auxiliary Fuel Pumps - ON (above 12,000 feet altitude to minimize vapor formation).

MAXIMUM PERFORMANCE CLIMB

(1) Power - Full throttle and 2700 RPM below 16,000 feet. Placarded manifold pressure above 16,000 feet.
(2) Airspeed - 126 MPH IAS.
(3) Cowl Flaps - AS REQUIRED.
(4) Auxiliary Fuel Pumps - ON (above 12,000 feet altitude to minimize vapor formation).

CRUISING

(1) Cruise Power - 15-29.5 Inches Hg and 2100 - 2450 RPM.
(2) Mixtures - LEAN for desired cruise fuel flow as determined from your Cessna Model 401B/402B Power Computer. Recheck mixtures if power, altitude or OAT changes.
(3) Cowl Flaps - AS REQUIRED.

(4) Fuel Selectors - MAIN or AUXILIARY after 60 minutes (feel for detent).

   (a) If optional wing locker tanks are installed, fuel selectors - MAIN TANKS or, after wing locker tanks are transferred and main tank quantity is less than 180 pounds each - AUXILIARY TANK.

NOTE

Turn auxiliary fuel pumps to LOW and mixtures to FULL RICH when switching tanks.

   (b) If optional wing locker tanks are installed, crossfeed - SELECT as required to maintain fuel balance after wing locker tank fuel transfer.

(5) Trim Tabs - ADJUST.

LETDOWN

(1) Power - AS REQUIRED.
(2) Mixture - ADJUST for smooth operation with gradual enriching as altitude is lost.
(3) Cowl Flaps - CLOSED.

BEFORE LANDING

(1) Fuel Selectors - Left Engine - LEFT MAIN (feel for detent).
Right Engine - RIGHT MAIN (feel for detent).
(2) Auxiliary Fuel Pumps - ON.
(3) Cowl Flaps - CLOSED.
(4) Alternate Air Controls - IN.
(5) Mixtures - FULL RICH or lean as required for smooth operation.
(6) Propellers - FORWARD.
(7) Wing Flaps - 15° below 180 MPH CAS.
(8) Landing Gear - DOWN below 160 MPH CAS.
(9) Landing Gear Position Indicator Lights - Check green lights ON.
(10) Wing Flaps - 15° - 45° below 160 MPH CAS.
(11) Minimum Multi-Engine Approach Speed - 110 MPH IAS.
(12) Minimum Single-Engine Control Speed - 95 MPH IAS.

LANDING

(1) Touchdown - Main wheels first.
(2) Landing Roll - Lower nose wheel gently.
(3) Braking - AS REQUIRED.

GO-AROUND (Multi-Engine)

(1) Increase engine speed to 2700 RPM and apply full throttle if necessary.
(2) Reduce flaps setting to 15°.
(3) Trim aircraft for climb.
(4) Retract flaps as soon as all obstacles are cleared and a safe altitude and airspeed are obtained.

NOTE

Do not retract landing gear if another landing approach is to be conducted.

AFTER LANDING

(1) Auxiliary Fuel Pumps - LOW (during landing roll).
(2) Cowl Flaps - OPEN.
(3) Wing Flaps - UP.

SECURE AIRCRAFT

(1) Auxiliary Fuel Pumps - OFF.
(2) Radios - OFF.
(3) Throttles - IDLE.
(4) Propellers - FORWARD.
(5) Mixtures - IDLE CUT-OFF.
(6) Fuel Selectors - OFF. (if a long period of inactivity is anticipated)

NOTE

Do not leave the fuel selector handles in an intermediate position as fuel from the main tip tanks will transfer into the auxiliary tanks.

(7) All Switches except Battery, Alternator and Magneto Switches - OFF.
(8) Magneto Switches - OFF, after engines stop.
(9) Battery and Alternators - OFF.
(10) Parking Brake - SET.
(11) Control Lock - INSTALL.
(12) Cabin and Crew Door (if installed) - CLOSE.

Notes ....

SECTION II
DESCRIPTION AND OPERATING DETAILS

The following paragraphs supply a general description of some systems and equipment in the aircraft. This section also covers, in somewhat greater detail, some of the items in Checklist Form in Section I. Only those items of the Checklist requiring further explanation will be covered here.

PREFLIGHT INSPECTION

The preflight inspection, described in Section I, is recommended for the first flight of the day. Inspection procedures for subsequent flights are normally limited to brief checks of the tail surface hinges, fuel and oil quantity, and security of fuel and oil filler caps. If the aircraft has been in extended storage, has had recent major maintenance, or has been operated from marginal airports, a more extensive preflight inspection is recommended.

After major maintenance has been performed, the flight and trim tab controls should be double-checked for free and correct movement and security. The security of all inspection plates on the aircraft should be checked following periodic inspections. Since radio and heater maintenance requires the mechanic to work in the nose compartment, the nose compartment doors are opened for access to equipment. Therefore, it is important after such maintenance to double-check the security of these doors. If the aircraft has been waxed or polished, check the external static pressure source holes for stoppage.

If the aircraft has been exposed to much ground handling in a crowded hangar, it should be checked for dents and scratches on wings, tip tanks, fuselage, and tail surfaces, as well as damage to navigation and landing lights, deice boots, and radio antenna. Outside storage for long periods may result in water and obstructions in airspeed system lines, condensation in fuel tanks, and dust and dirt on the intake air filters and engine cooling fins. Outside storage in windy or gusty areas, or adjacent to taxiing aircraft calls for special attention to control surface stops, hinges and brackets to detect the presence of wind damage.

If the aircraft has been operated from muddy fields or in snow and slush, check the main gear wheel wells and nosewheel for obstructions and cleanliness. Operation from a gravel or cinder field will require extra attention to propeller tips and abrasion on leading edges of the horizontal tail. Stone damage to the outer six inches of the propeller tips can seriously reduce the fatigue life of the blades.

Aircraft that are operated from rough fields, especially at high altitudes, are subjected to abnormal landing gear abuse. Check frequently all components of the landing gear retracting mechanisms, shock struts, tires and brakes.

To prevent loss of fuel in flight, make sure main and auxiliary fuel tank filler caps are tightly sealed. The main fuel tank vents beneath the tip tanks should also be inspected for obstructions, ice or water, especially after operation in cold, wet weather.

The interior inspection will vary according to the mission and the optional equipment installed. Prior to high-altitude flights, it is important to check the condition and quantity of oxygen face masks and hose assemblies. The oxygen supply system should be functionally checked to insure that it is in working order. The oxygen pressure gage should indicate between 300 and 1800 PSI depending upon the anticipated requirements.

Satisfactory operation of the pitot tube, stall warning transmitter and main fuel tank vent heating elements is determined by observing a discharge on the voltammeter when the pitot heat switch is turned ON. The effectiveness of the pitot tube and stall warning transmitter heating elements may be verified by cautiously feeling the heat of both devices while the pitot heat switch is ON.

Flights at night and in cold weather involve a careful check of other specific areas which will be discussed later in this section.

STARTING ENGINES

The left engine is normally started first because the cable from the battery to this engine is much shorter permitting more electrical power to be delivered to the starter. If battery is low, the left engine should start more readily.

When using an external power source for starting, it is recommended the battery and alternator switches be OFF.

NOTE

> Release starter button as soon as engine fires or engine will not accelerate and flooding can result.

The continuous flow fuel injection system will start spraying fuel in the engine intake ports as soon as the primer switch is actuated and the throttle and mixture controls are opened. If the auxiliary pump is turned on accidentally while the engine is stopped, with the throttle open and the mixture rich, solid fuel will collect temporarily in the cylinder intake ports, the quantity depending upon the amount of throttle opening and the length of time the pump has been operating. If this happens, it is advisable to wait a few minutes until the fuel drains away, then turn the propeller through fifteen complete revolutions. This is done to prevent the possibility of engine damage due to hydrostatic lock before starting the engine. To avoid flooding, begin cranking the engine prior to priming the engine.

In hot weather with a hot engine, a fluctuating fuel flow slightly lower than normal may be obtained. This is an indication of vaporized fuel and the starter should not be energized until a steady fuel flow indication is obtained.

NOTE

> Caution should be exercised to prevent overpriming the engine in hot weather.

Engine mis-starts characterized by weak, intermittent explosions followed by black puffs of smoke from the exhaust are the result of flooding or over-priming. This situation is more apt to develop in hot weather, or when the engines are hot. If it occurs, repeat the starting procedure with the throttle approximately 1/2 open, the mixture in the IDLE CUT-OFF and the primer switch OFF. As the engines fires, move the mixture control to FULL RICH and close the throttle to idle.

If an engine is under-primed, as may occur in cold weather with a cold engine, repeat the starting procedure while holding the primer switch ON for 5 to 10 seconds until the engine fires.

If cranking longer than 30 seconds is required, allow starter-motor to cool five minutes before cranking again, since excessive heat may damage the armature windings.

TAXIING

A steerable nosewheel, interconnected with the rudder system provides positive control up to 18° left or right, and free turning from 18° to 55° for sharp turns during taxiing. Normal steering may be aided through use of differential power and differential braking on the main wheels. These aids are listed in the preferred order of use.

NOTE

> If the aircraft is parked with the nosewheel castered in either direction, initial taxiing should be done with caution. To straighten the nosewheel, use full opposite rudder and differential power, instead of differential braking. After a few feet of forward travel, the nosewheel will steer normally.

At some time early in the taxi run, the brakes should be tested, and any unusual reaction, such as uneven braking, should be noted. If brake operation is not satisfactory, the aircraft should be returned to the tie-down location and the malfunction corrected. The operation of the turn-and-bank indicator and directional gyro should also be checked during taxiing.

BEFORE TAKEOFF (Use the Pilot's Checklist)

Use the Pilot's Checklist in the aircraft to prevent the possibility of overlooking an important check item.

Most of the engine warm-up should be done during taxiing, with just enough power to keep the aircraft moving. Engine speed should not exceed 1000 RPM while the oil is cold (additional warm-up before takeoff should be restricted to the checks outlined in Section I).

Full throttle checks on the ground are not recommended unless there is good reason to suspect that the engines are not operating properly. Do not runup the engines over loose gravel or cinders because of possible stone damage or abrasion to the propeller tips.

If the magnetos produce an engine speed drop in excess of 150 RPM or if the drop in RPM between the left and right magneto differs by more than 50 RPM, continue warm-up a minute or two longer, before rechecking system. If there is doubt concerning operation of the magnetos, a check at high engine speed will usually confirm if a deficiency exists. A drop in excess of 150 RPM is not considered acceptable.

A careful check should be made of the vacuum system. The minimum and maximum allowable suctions are 4.75 and 5.25 inches Hg. respectively. Good alternator condition is also important, since satisfactory operation of all radio equipment and electrical instruments is essential. The alternators are checked during engine runup (1700 RPM) by positioning the selector switch in the L ALT and R ALT position and observing the charging rate on the voltammeter.

A simple last minute recheck of important items should include a quick check of all switches, mixture and propeller controls forward, all flight controls free and correct movement, and the fuel selectors properly positioned.

A mental review of all single engine speeds, procedures, and field length requirements should be made prior to takeoff.

TAKEOFF

Since the use of full throttle is not recommended in the static runup, closely observe full-power engine operation early in the takeoff run. The maximum allowable manifold pressure of 34.5 inches Hg. should not be exceeded. Throttle action should be smooth and slow in order that the waste gate can become operative as early as possible. Signs of rough engine operation, unequal power between engines, or sluggish engine acceleration are good cause for discontinuing the takeoff. If this occurs, you are justified in making a thorough full throttle static runup before another takeoff is attempted.

	MULTI-ENGINE AIRSPEED NOMENCLATURE	MPH-IAS
(1)	Multi-Engine Best Rate-of-Climb	126
(2)	Multi-Engine Best Angle-of-Climb	100
(3)	Takeoff and Climb to 50 Ft	105
(4)	Landing Approach From 50 Ft	110

Figure 2-1

Full throttle operation is recommended on takeoff since it is important that a speed well above minimum single-engine control speed (95 MPH IAS) be obtained as rapidly as possible. It is desirable to accelerate the aircraft to 105 MPH IAS (recommended safe single-engine speed) while still on the ground for additional safety in case of an engine failure. This safety may have to be compromised slightly where short and rough fields prohibit such high speed before takeoff.

After takeoff it is important to maintain the recommended safe single-engine climb speed (105 MPH IAS). As you accelerate still further to best single-engine rate-of-climb speed (118 MPH IAS) it is good practice to climb rapidly to an altitude at which the aircraft is capable of circling the field on one engine.

After obstruction height is reached, power may be reduced and climb speeds may be established as described in Section I.

For crosswind takeoffs, additional power may be carried on the upwind engine until the rudder becomes effective. The aircraft is accelerated to a slightly higher than normal takeoff speed, and then is pulled off abruptly to prevent possible settling back to the runway while drifting. When clear of the ground, a coordinated turn is made into the wind to correct for drift.

A takeoff with one tip tank full and the opposite tank empty creates a lateral unblanace at takeoff speed. This is not recommended since gusty air or premature lift-off could create a serious control problem.

Performance data for normal takeoff, accelerate stop distance and single-engine takeoff are presented in Section VI.

AFTER TAKEOFF

To establish climb configuration, retract the landing gear, set climb power, auxiliary fuel pumps off and adjust the mixture for the selected power setting.

Before retracting the landing gear, apply the brakes momentarily to stop the rotation of the main wheels. Centrifugal force caused by the rapidly rotating wheels expands the diameter of the tires, and if ice or mud has accumulated in the wheel wells, the rotating wheels may rub as they enter.

On long runways, the landing gear should be retracted at the point over the runway where a wheels-down forced landing on that runway would become impractical. However, on short runways it may be preferable to retract the landing gear after the aircraft is safely airborne.

Power reduction will vary according to the requirements of the traffic pattern or surrounding terrain, gross weight, field elevation, temperature and engine condition. A normal after takeoff power setting is 29.5 Inches Hg. and 2450 RPM.

CLIMB

Power settings for climb must be limited to 34.5 Inches Hg. with 2700 RPM below 16,000 feet, and placarded manifold pressures above 16,000 feet. However, to save time and fuel for the over-all trip, it is recommended that the normal cruising climb be conducted at 130 to 160 MPH, IAS using approximately 75% power (29.5 inches Hg. and 2450 RPM).

The mixture should be leaned in this type of climb to give the desired fuel flow in the climb dial range (blue segments) which is approximately best power mixture.

If it is necessary to climb rapidly to clear mountains or reach favorable winds at high altitudes, the best multi-engine rate-of-climb speed of 126 MPH IAS should be used with maximum power. During maximum performance climbs, the mixture should remain in the takeoff power range up to the engine critical altitude and at the appropriate climb power range above critical altitude. It is recommended that the auxiliary fuel pumps be ON at altitudes above 12,000 feet for the duration of the climb, and approximately 5 to 15 minutes after establishing the cruising flight. It is also recommended that the mixture remain at the climb mixture setting for approximately 5 minutes after establishing cruising flight before leaning is initiated. These procedures will eliminate fuel vaporization problems likely to occur from rapid altitude changes.

If an obstruction ahead requires a steep climb angle, the aircraft should be flown at the best multi-engine speed with flaps up and maximum power. This speed varies from 100 MPH IAS at sea level to 105 MPH IAS at 16,000 feet. Performance data for maximum climb, cruise climb and single-engine climb are presented in Section VI.

CRUISE

Tabular cruising information, is provided for normal cruising power and altitudes in Section VI. These charts are based on 600, 840 and 1080 pounds of fuel for cruise, normal lean mixture, 6300 pounds gross weight, zero wind, and no fuel reserve. All allowances for warm-up, takeoff and climb, headwinds, variations in mixture leaning technique, and fuel reserve should be estimated and the endurance and range shown in the charts should be modified accordingly. Fuel allowances for takeoff and climb are given in Section VI.

Normal cruising requires between 50% and 70% power. The manifold pressure and RPM settings required to obtain these powers at various altitudes and outside air temperatures can be determined with your Cessna Model 401B/402B Power Computer. A maximum cruising power of approximately 75% (29.5 inches Hg and 2450 RPM) may be used if desired. Various percent powers can be obtained with a number of combinations of manifold pressure, engine speeds, altitudes and outside air temperatures.

To achieve the level flight performance shown in the Cruise Performance Charts in Section VI. lean the mixtures to give the fuel flows shown. This will yield airspeeds slightly below (approximately one to two MPH) those available at best power mixture.

Should maximum speed be desired, the mixture should be leaned to the climb fuel flow range for the power being utilized. This will yield approximate best power mixture with a resulting airspeed of one to two MPH greater and a fuel flow approximately 6 pounds per hour greater than those listed in Section VI. Operation at best power mixture will significantly increase exhaust system, turbocharger and engine valve and ring life, particularly the exhaust system.

For a given throttle setting, select the lowest engine speed in the green arc range that will give smooth engine operation without evidence of laboring.

For best propeller synchronizing, the final adjustment of the propeller controls should be made in a DECREASE RPM direction.

The cowl flaps should be adjusted to maintain the cylinder head temperature near the middle of the normal operating (green arc) range to assure prolonged engine life.

Refer to Auxiliary Fuel System and Optional Wing Locker Fuel System paragraphs in Section VII for proper fuel system management when the Auxiliary Fuel Tanks and/or the Optional Wing Locker Fuel Tanks are used.

ALTERNATE INDUCTION AIR SYSTEM

The induction air system on these engines is considered to be non-icing. However, manually operated alternate induction air is provided to assure satisfactory operation should the induction air filter become obstructed with ice. Should a decrease in manifold pressure be experienced when flying in icing conditions, the alternate air doors should be manually opened. This will provide continued satisfactory engine operation.

Since the higher intake air temperature when using alternate intake air results in a decrease in engine power and turbocharger capability, it is recommended that the alternate intake air not be utilized until indications of intake filter icing are actually observed.

Should additional power be required, the following procedure should be employed:

(1) Increase RPM as required.
(2) Move throttles forward to maintain desired manifold pressure.
(3) Readjust mixture controls for smooth engine operation.

STALL

The stall characteristics of the aircraft are conventional and aural warnings are provided by the stall warning horn between 5 and 10 MPH above the stall in all configurations. The stall is also preceded by a mild aerodynamic buffet which increases in intensity as the stall is approached. The power-on stall occurs at a very steep angle, with or without flaps, and it is difficult to inadvertently stall the aircraft during normal maneuvering.

Power-off stall speeds at maximum weight and various bank angles are presented in Section VI.

NOTE

The stall warning system is inoperative when the battery switch is in the OFF position.

MANEUVERING FLIGHT

No aerobatic maneuvers including spins, are approved in this aircraft. The aircraft is, however, conventional in all respects through the maneuvering range encountered in normal flight.

SPINS

Intentional spins are not permitted in this aircraft. Should a spin occur, however, the following recovery procedures should be employed:

(1) Cut power on both engines.
(2) Apply full rudder opposing the direction of rotation.
(3) Approximately 1/2 turn after applying rudder, push control wheel forward briskly.
(4) To expedite recovery, add power to the engine toward the inside of the direction of turn.
(5) Pull out of the resulting dive with smooth, steady control pressure.

LETDOWN

Letdowns should be initiated far enough in advance of estimated landing to allow a gradual rate of descent at cruising speed. It should be at approximately 500 fpm for passenger comfort, using enough power to keep the engines warm. This will prevent undesirable low cylinder head temperatures caused by low power settings at cruise speed. The optimum engine speed in a letdown is usually the lowest one in the RPM green arc range that will allow cylinder head temperatures to remain in the recommended operating range.

To prevent confusion in interpreting which 10, 000 foot segment of altitude is being displayed on the altimeter, a striped warning segment is exposed on the face of the altimeter at all altitudes below 10, 000 feet.

BEFORE LANDING

If fuel has been consumed at uneven rates between the two main tanks because of prolonged single-engine flight, it is desirable to balance the fuel load by operating both engines from the fullest tank. However, if there is sufficient fuel in both tanks, even though they may have unequal quantities, it is important to switch the left and right selector valves to the left and right main tanks respectively, and feel for detent, for the landing. This will provide an adequate fuel flow to each engine if a full power go-around is necessary.

NOTE

Make sure maximum gross weight does not exceed 6200 pounds before attempting landing.

AIRCRAFT SERIAL NO. 402B0001 THRU 402B0200

Landing gear extension before landing is easily detected by a slight change in aircraft trim and a slight bump as the gear locks down. Illumination of the gear-down indicator lights (green), is further proof that the gear is down and locked. If it is reasonably certain that the gear is down and one of the gear-down indicator lights is still not illuminated, the malfunction could be caused by a burned out light bulb. This can be checked by pushing the press to test button. If the bulb is burned out, it can be replaced with the bulb from either the propeller synchronizer light, auxiliary tank indicator light, or the landing gear up (amber) indicator light.

A simple last-minute recheck on final approach should confirm that all applicable switches are on, the gear-down indicator lights (green) are illuminated, and the propeller and mixture controls are full forward.

AIRCRAFT SERIAL NO. 402B0201 AND ON

Landing gear extension before landing is easily detected by a slight change in aircraft trim and a slight "bump" as the gear locks down. Illumination of the gear-down indicator lights (green) is further proof that the gear is down and locked. The gear unlocked indicator light will illuminate when the gear uplocks are released and will remain illuminated while the gear is in transit. The unlocked light will extinguish when the gear has locked down. If it is reasonably certain that the gear is down and one of the gear-down indicator lights is still not illuminated, the malfunction could be caused by a burned out light bulb. This can be checked by pushing the press to test button. If the bulb is burned out, it can be replaced with the bulb from any post light, or the landing gear unlocked (red) indicator light.

A simple last-minute recheck on final approach should confirm that all applicable switches are on, the gear-down indicator lights (green) are illuminated, the gear unlocked indicator light (red) is extinguished, and the propeller and mixture controls are full forward.

LANDING

Landings are simple and conventional in every respect. If power is used in landing approaches, it should be eased off cautiously near touchdown, because the power-on stall speed is considerably less than the power-off stall speed. An abrupt power reduction at five feet altitude could result in a hard landing if the aircraft is near stall speed.

Landings on hard-surface runways are performed with 45° flaps from 110 MPH IAS approach, using as little power as practicable. A normal flare-out is made, and power is reduced in the flare-out. The landing is made on the main wheels first, and remaining engine power is cut immediately after touchdown. The nosewheel is gently lowered to the ground and braking is applied as required. Short field landings on rough or soft runways are done in a similar manner except that the nosewheel is lowered to the runway at a lower speed to prevent excessive nose-gear loads.

Crosswind landings are performed with the least effort by using the crab method. However, either the wing-low, crab or combination method may be used. Crab the aircraft into the wind in a normal approach using a minimum flap setting for the field length. Immediately before touchdown, the aircraft is aligned with the flight path by applying down-wind rudder. The landing is made in nearly three-point attitude, and the nosewheel is lowered to the runway immediately after touchdown. A straight course is maintained with the steerable nosewheel and occasional braking if necessary.

Landing performance data is presented in Section VI.

AFTER LANDING

Heavy braking in the landing roll is not recommended because skidding the main wheels is probable, with resulting loss of the braking effectiveness and damage to the tires. It is best to leave the flaps fully extended throughout the landing roll to aid in decelerating the aircraft. After leaving the active runway, the flaps should be retracted. Be sure the flap switch is identified before placing it in the UP position. The auxiliary fuel pump switches are turned to LOW while taxiing to the hangar. The fuel pumps must be turned OFF prior to stopping the engines.

Parking is normally accomplished with the nosewheel aligned straight ahead. This simplifies the steering during subsequent departures from the parking area. However, if gusty wind conditions prevail, the nosewheel should be castered to the extreme right or left position. This forces the rudder against the rudder stop which minimizes buffeting of the rudder in gusty wind.

With the mixture levers in IDLE CUT-OFF, the fuel flow is effectively blocked at the fuel metering unit. Thus, it is unnecessary to place the fuel selector valve handles in the OFF position if the aircraft is receiving normal usage. However, if a long period of inactivity is anticipated, the fuel selector valve handles should be turned OFF to preclude any possible fuel seepage that might develop through the metering valve.

NOTE

> Do not leave the fuel selector handles in an intermediate position, as fuel from the main tip tanks will transfer into the auxiliary tanks if auxiliary tanks are installed in your aircraft.

NIGHT FLYING

Before starting the engines for a night flight, the rheostats should be turned on and adjusted to provide enough illumination to check all switches, controls, etc.

Navigation lights are then checked by observing illumination in the small peep holes in inboard leading edges of the wing tip tanks and reflection from the pavement or ground below the tail light. The operation of the rotating beacons should be checked by observing the reflections on the ground and on the tip tanks and wings. The retractable landing lights (the right landing light is optional equipment) may be extended and checked momentarily. Returning the landing light switches to OFF, turns the lights off but leaves them extended ready for instant use.

Before taxi, the interior lighting intensity is normally decreased to the minimum at which all the controls and switches are visible. The taxi light should be turned on prior to taxiing at night. The landing lights, if used during taxiing, should be used intermittently to avoid excessive drain on the batteries. During engine runups, special attention should be directed to alternator operation by individually turning the selector switch to L ALT and R ALT and noting response on voltammeter.

Night takeoffs are conventional, although the gear retraction operation is usually delayed slightly to insure that the aircraft is well clear of the runway.

In cruising flight, the interior lighting intensity is usually decreased further for better outside vision.

COLD WEATHER OPERATION

Whenever possible, external preheat should be utilized in cold weather. The use of preheat materially reduces the severity of conditions imposed on both engines and electrical systems. It is the preferred or best method of starting engines in extremely cold weather. Preheat will thaw the oil trapped in the oil coolers and oil filters, which will probably be congealed prior to starting in very cold weather. When the oil pressure gage is extremely slow in indicating pressure, it may be advisable to fill the pressure line to the gage with kerosene or JP4.

NOTE

> During cold weather operation it is advisable to rotate propellers through four complete revolutions, by hand, before starting engines.

If preheat is not available, external power should be used for starting because of the higher cranking power required and the decreased battery output at low temperatures. The starting procedure is normal; however, if the engines do not start immediately, it may be necessary to position the primer switch to LEFT or RIGHT for 5 to 10 seconds.

After a suitable warm-up period (2 to 5 minutes at 1000 RPM, if preheat is not used) accelerate the engines several times to higher RPM. The propellers should be operated through several complete cycles to warm the governors and propeller hubs. If the engines accelerate smoothly and the oil pressure remains normal and steady, the aircraft is ready for takeoff.

NOTE

> The waste gate actuators will not operate satisfactorily with engine oil temperatures below the lower limit of the operating range (75° F). With oil temperatures near the bottom of the operating range, the throttle motions should be very slow and care exercised to prevent exceeding the 34.5 inches Hg. manifold pressure limit.

During cruise the propellers should be exercised at half-hour intervals to flush the cold oil from the governors and propeller hubs. Electrical equipment should be managed to assure adequate alternator charging throughout the flight, since cold weather adversely affects battery capacity.

During letdown, watch engine temperature closely and carry sufficient power to maintain them above operating minimums.

The pitot, tip tank vents and stall warning heater switch should be turned ON at least 5 minutes before entering potential icing conditions (2 minutes if on ground) so that these units will be warm enough to prevent formation of ice. Preventing ice is preferable to attempting its removal once it has formed.

Refer to Section VII for Optional Cold Weather Equipment.

FUEL SYSTEM

Fuel for each engine is supplied by a main tank (50 gallons usable) on each wing tip. Each engine has its own complete fuel system; the two systems are interconnected only by a cross feed for emergency use. Vapor and excess fuel from the engines are returned to the main fuel tanks. Submerged electric auxiliary pumps in the main fuel tanks supply fuel for priming and starting, and for engine operation as a back up system to the engine-driven pumps. Refer to Figure 2-2 for Fuel System Schematic and Auxiliary, and Optional Wing Locker Fuel Systems paragraphs in Section VII for additional fuel system management information.

NOTE

> During very hot weather, if there is an indication of vapor in the fuel system (fluctuating fuel flow) or anytime when climbing above 12, 000 feet, turn the auxiliary fuel pumps ON until cruising altitude has been attained and the system is purged (usually 5 to 15 minutes after establishing cruising flight). It is recommended that the mixture remain at the climb mixture setting for approximately 5 minutes after establishing cruising flight before leaning is initiated.

A continuous duty tip tank transfer pump is installed in each main tank. The pumps assure availability of all tip tank fuel to the engine supply line

FUEL SYSTEM . . . SCHEMATIC

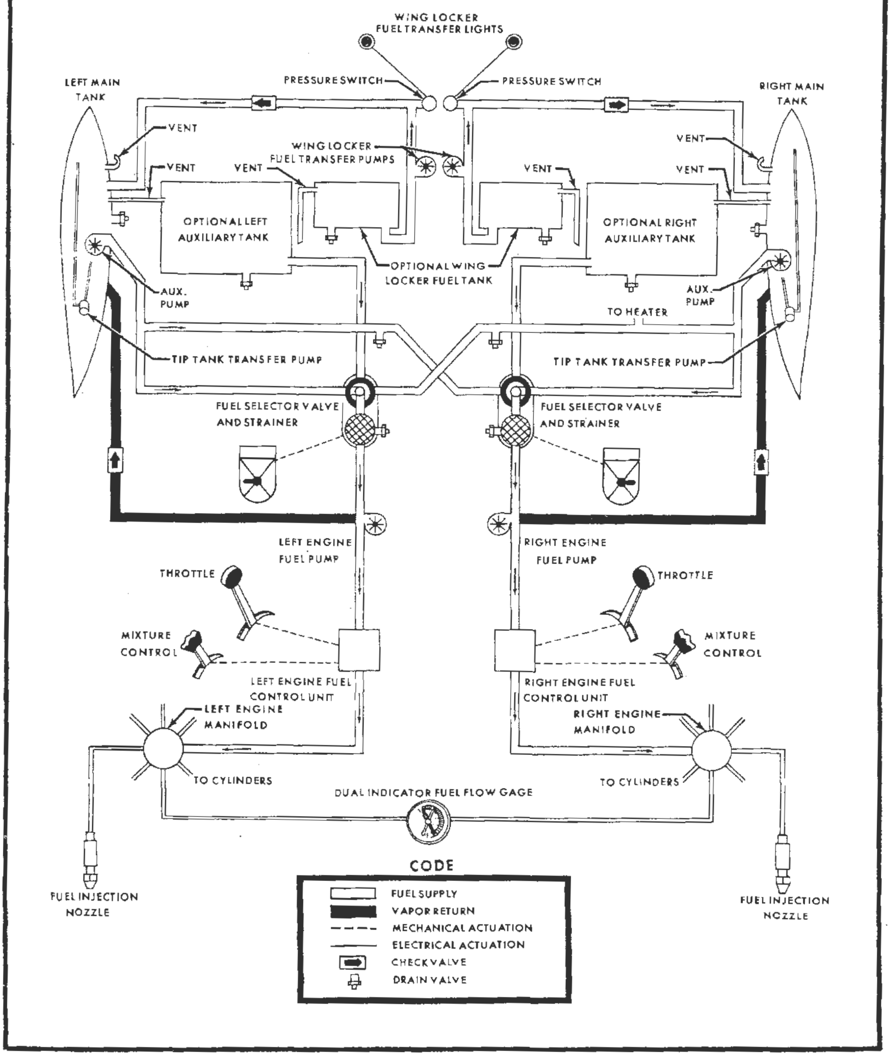


Figure 2-2

during high angles of descent. Each pump is electrically protected by the respective landing light circuit breaker. When the right-hand landing light is not installed, a circuit breaker is installed to protect the right-hand transfer pump. During preflight inspection these pumps can be checked for operation by listening for a pulsing sound emanating from the aft tip tank fairings with the battery switch in the ON position.

FUEL SELECTOR VALVE HANDLES

The fuel selector valve placards are marked LEFT ENGINE OFF, LEFT MAIN and RIGHT MAIN for the left engine selector and RIGHT ENGINE OFF, RIGHT MAIN and LEFT MAIN for the right engine selector. The crossfeed position of each selector valve is the one marked for the opposite main tank.

The fuel selector valve handles form the pointers for the selectors. The ends of the handles are arrow-shaped and point to the position on the selector placard which corresponds to the valve position.

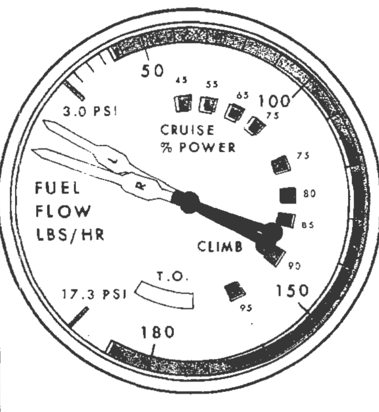
NOTE

- The fuel selector valve handles should be turned to LEFT MAIN for the left engine and RIGHT MAIN for the right engine, during takeoff, landing and all normal operations.

- When fuel selector valve handles are changed from one position to another, (feel for detent) the auxiliary fuel pumps should be turned to LOW and the mixture controls should be in the FULL RICH position.

AUXILIARY FUEL PUMP SWITCHES

The LOW position runs the pumps at low speed, providing 5.5 PSI pressure for the purging. The ON position also runs the pumps at low speed, as long as the engine-driven pumps are functioning. With the switch positioned to ON however, if an engine-driven pump should fail, the auxiliary pump on that side will switch to high speed automatically, providing sufficient fuel for all engine operations including emergency takeoff.



FUEL FLOW GAGE

Figure 2-3

ELECTRICAL SYSTEM

Electrical energy is supplied by a 28 volt, negative-ground, direct current system powered by a standard 50 ampere or one of the optional 100 ampere engine-driven alternators on each engine. A 24 volt battery is located in the left stub wing. An optional external power receptacle may be installed on the underside of the fuselage just forward of the cabin door. The receptacle accepts a standard external power source plug. Refer to Figure 2-4 for Electrical Power Distribution Schematic.

BATTERY AND ALTERNATOR SWITCHES

Separate battery and alternator switches, on the instrument panel, are provided as a means of checking for a malfunctioning alternator circuit and to permit such a circuit to be cut-off. If an alternator circuit fails or malfunctions, or when one engine is not running, the switch for that alternator should be turned off. Operation should be continued on the functioning alternator using only necessary electrical equipment. If both alternator circuits should malfunction, equipment can be operated at short intervals and for a limited amount of time on the battery alone. In either case, a landing should be made as soon as possible to check and repair the circuits.

VOLTAMMETER

A voltammeter, see Figure 2-5, located on the circuit breaker panel, is provided to monitor alternator current output, battery charge or discharge rate and bus voltage. A selector switch labeled L ALT, R ALT, BATT, and VOLTS is located to the right of the voltammeter. By positioning the switch to L ALT, R ALT, or BATT position, the respective alternator or battery amperage can be monitored. By positioning the switch to the VOLTS position, the electrical system bus voltage can be monitored.

OVERVOLTAGE RELAY

An overvoltage relay in the electrical system constantly monitors system voltage. If voltage exceeds a predetermined maximum, the relay will open and both alternators will be disabled. Positioning the regulator selector switch from MAIN to STBY will select the standby overvoltage relay and will reset the main relay.

EMERGENCY POWER SWITCH

An emergency power switch is provided in the alternator system and is located on the aft side of the circuit breaker console. The emergency power switch is used when the alternators will not self excite. Placing the switch in the ON position, provides excitation from the battery even though the battery is considered to have failed.

aircraft is sufficient to compress the strut. The landing gear is operated by a switch, which is identified by a wheel- shaped knob. The switch positions are UP, off (center) and DOWN. To operate the gear, pull-out the switch knob and move to the desired position.

LANDING GEAR POSITION LIGHTS (Aircraft Serial No. 402B0001 Thru 402B0200)

There are four landing gear position indicator lights located beneath the radio control panel just left of the center of the instrument panel. Three of these lights (one for each gear) are green and will illuminate when each landing gear is fully extended and locked. One of the lights is amber and will illuminate when all gears are fully retracted. When the gear up light and gear down lights are not illuminated, the landing gear is in an intermediate position. The lights can be dimmed by turning on the MASTER PANEL switch and utilizing the compass rheostat.

LANDING GEAR POSITION LIGHTS (Aircraft Serial No. 402B0201 And On)

There are four landing gear position indicator lights contained in two modules located beneath the radio control panel just left of the center of the instrument panel. One module contains three of these lights (one for each gear) which are green and will illuminate when each landing gear is fully extended and locked. The other light module is red and will illuminate when any or all the gears are unlocked (intermediate position). When the gear unlocked light and gear down lights are not illuminated, the landing gear is in the UP and locked position. The gear down (green) light module can be dimmed by turning on the MASTER PANEL switch and utilizing the compass rheostat.

LANDING GEAR WARNING HORN (Aircraft Serial No. 402B0001 Thru 402B0200)

The landing gear warning horn is controlled by the throttles, and will sound an intermittent note if either throttle is retarded below approximately 13 inches Hg. manifold pressure with the landing gear retracted. The warning horn is also connected to the UP position of the landing gear switch and will sound if the switch is placed in the UP position while the aircraft is on the ground.

NOTE

> Do not pull landing gear circuit breaker as this will silence the warning horn.

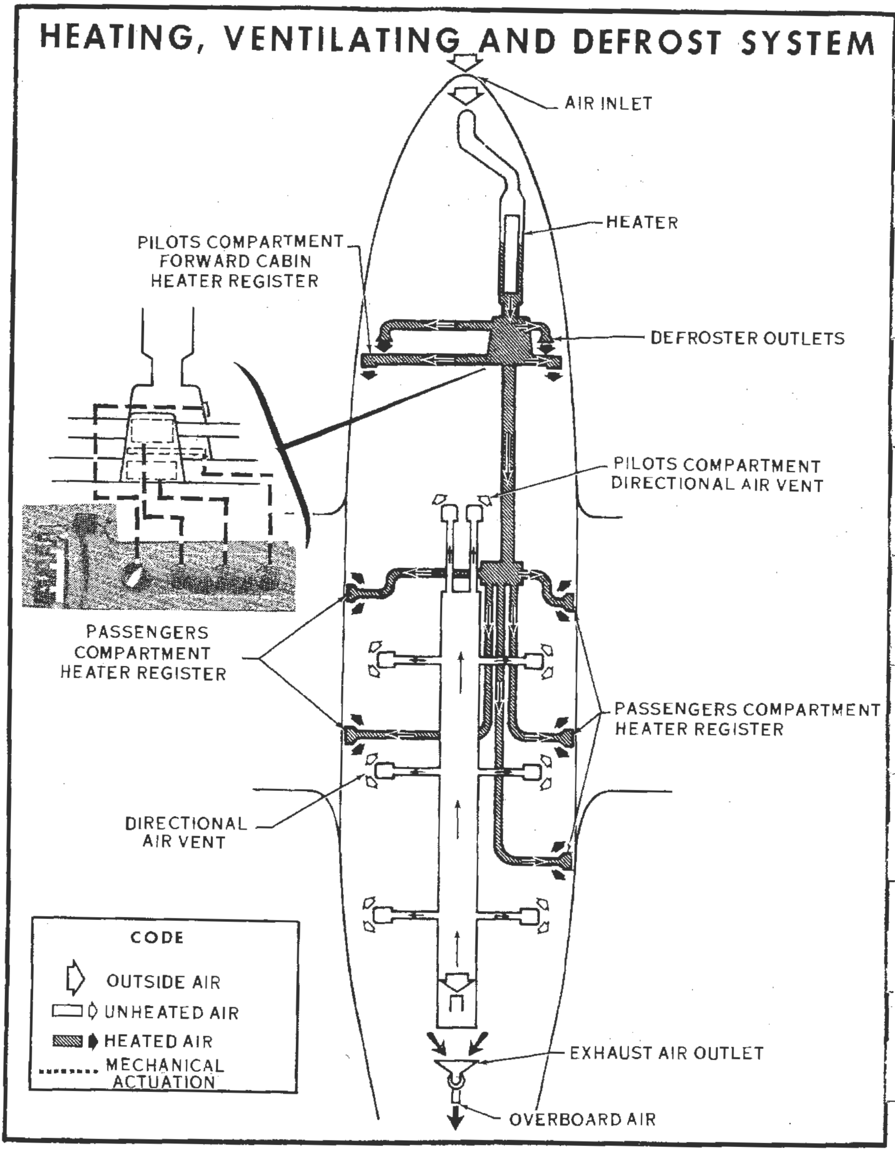

HEATING, VENTILATING AND DEFROST SYSTEM
AIR INLET
HEATER
PILOTS COMPARTMENT
FORWARD CABIN
HEATER REGISTER
DEFROSTER OUTLETS
PILOTS COMPARTMENT
DIRECTIONAL AIR VENT
PASSENGERS
COMPARTMENT
HEATER REGISTER
PASSENGERS COMPARTMENT
HEATER REGISTER
DIRECTIONAL
AIR VENT
CODE
OUTSIDE AIR
UNHEATED AIR
HEATED AIR
MECHANICAL
ACTUATION
EXHAUST AIR OUTLET
OVERBOARD AIR

Figure 2-8

heat registers is completely shut off by pushing the knob all the way in. The knob may be set in any intermediate position to regulate the quantity of air to the cabin.

CABIN HEAT REGISTERS

The cabin heat registers are located on each side of the passenger compartment. Each register is provided with a lever operated rotary-type valve which controls the amount of air coming from the heat registers. Each register is plainly marked for open or closed and may be placed in any intermediate position to regulate the amount of air coming from the registers.

DEFROST KNOB

Windshield defrosting and defogging is controlled by operating a push-pull type knob labeled DEFROST. When the knob is pulled out, air flows from the defroster outlets at the base of the windshield. When the knob is pushed all the way in, airflow to the defroster outlets is shut off. The knob may be set in any intermediate position to regulate the defroster airflow.

HEATER OVERHEAT WARNING LIGHT

An amber overheat warning light is provided in the annunciator panel and is labeled HEATER OVHT. When illuminated, the light indicates that the heater overheat switch has been actuated and that the temperature of the air in the heater has exceeded 325°F. Once the heater overheat switch has been actuated, the heater turns off and cannot be restarted until the overheat switch, located in the right forward nose compartment, has been reset. Prior to having the overheat switch reset, the heater should be thoroughly checked to determine the reason for the malfunction.

HEATER OPERATION FOR HEATING AND DEFROSTING

(1) Battery Switch - ON.
(2) Cabin Air Knobs - Full Out.
(3) Defrost Knob - Adjust as desired (if defrosting is desired).
(4) Cabin Heat Knob - MAX or as desired.
(5) Cabin Heat Switch - ON.
(6) Heat Registers - As desired.

NOTE

The pilot should always select the red hose assembly since it provides the highest oxygen flow rate.

OXYGEN SYSTEM OPERATION

The oxygen system is activated by pulling the oxygen knob to the ON position, allowing oxygen to flow from the regulator to all cabin outlets. A normally closed valve in each oxygen outlet is opened by inserting the connector of the mask and hose assembly. After flights using oxygen, the pilot should ensure that the oxygen system has been inactivated by unplugging all masks and pushing the oxygen knob completely to the OFF position.

NOTE

If the oxygen knob is left in an intermediate position between ON and OFF, it may allow low pressure oxygen to bleed through the regulator into the nose compartment of the aircraft.

Before Flight

(1) Oxygen Knob - PULL-ON.
(2) Oxygen Pressure Gage - Check for sufficient pressure for anticipated flight requirements. (See Figure 2-10.)
(3) Check that oxygen masks and hose assemblies are available.

During Flight

WARNING

Permit no smoking when using oxygen. Oil, grease, soap, lipstick, lip balm, and other fatty materials constitute a serious fire hazard when in contact with oxygen. Be sure hands and clothing are oil-free before handling oxygen equipment.

(1) Hose Assembly - Select proper hose assembly for altitude.
(2) Mask - Connect mask and hose assembly and put mask on.

OXYGEN CONSUMPTION RATE CHART

CYLINDER CAPACITY CUBIC FEET	114.9		44.0	
ALTITUDE RANGE FEET	10,000 22,000	22,000 30,000	10,000 22,000	22,000 30,000
HOSE ASSEMBLY COLOR	ORANGE	RED	ORANGE	RED
CONSUMPTION PSI/HR.	83	130	217	338

<u>OXYGEN DURATION CALCULATION:</u>

Total Oxygen Duration (Hours) = oxygen pressure indicator reading ÷ [oxygen consumption (PSI/HR) × number of passengers + pilot consumption rate]

<u>EXAMPLE:</u> (114.9 cu. ft. capacity) (1800 psi, oxygen pressure indicator reading)

1. Planned Flight - Pilot and 6 passengers at 20,000 feet.
2. From Chart - At 20,000 feet altitude, passenger flow rate is 83 PSI/HR. and the pilot flow rate is 130 PSI/HR.
3. Oxygen Duration = 1800 ÷ (6 × 83 + 130) = 2.88 hours

<u>EXAMPLE:</u> (44.0 cu. ft. capacity) (1800 psi, oxygen pressure indicator reading)

1. Planned Flight - Pilot and 3 passengers at 20,000 feet.
2. From Chart - At 20,000 feet altitude, passenger flow rate is 217 PSI/HR. and the pilot flow rate is 338 PSI/HR.
3. Oxygen Duration = 1800 ÷ (3 × 217 + 338) = 1.82 hours

Figure 2-10

PITOT HEAT SWITCH

When the pitot heat switch is placed in the ON position, the heating elements in the pitot tube, stall warning transmitter and the main fuel tank vents are electrically heated to maintain proper operation of the system during icing conditions. The switch should always be in the OFF position while on the ground to prevent overheating of the heating elements.

EMERGENCY EXIT

AIRCRAFT SERIAL NO. 402B0001 THRU 402B0200

For emergency exit, the forward oval cabin window on the right side of the passengers compartment can be jettisoned. Pull off the plastic cover over the emergency release handle under the window and pull the handle to release the bottom pins. Next pull out the red lever to loosen the emergency exit window, then push the window out.

AIRCRAFT SERIAL NO. 402B0201 AND ON

For emergency exit, the forward oval cabin window on the right side of the passengers compartment can be jettisoned. Pull off the plastic cover over the emergency release handle under the window and pull the handle to release the bottom pins, then push the window out.

TURBOCHARGED ENGINE SYSTEM

Your aircraft is equipped with turbocharged engines which make it possible to maintain sea level horsepower to 16, 000 feet.

Except for being turbocharged, the engines work and act just like any normally aspirated engines. However, because the engines are turbocharged, some of the engine characteristics are different. The intent of this section is to point out some of the items that are affected by turbocharging, and outline the correct procedures to be followed so that operation becomes easier and simpler.

For a better understanding of the turbo system, let's follow the induction air through the engine until it is expelled as exhaust gases. Reference should be made to the Turbo System Schematic shown in Figure 2-11 as you read through the following steps.

(1) Engine induction air is taken in through an intake at the leading edge of the wing inboard of the engine at which point it passes through a filter and then into the compressor.
(2) The compressor compresses the induction air.
(3) The pressurized induction air from the compressor then passes into the cylinders through the induction manifold.

ing single-engine climb; however, during multi-engine climbs at higher speeds or with closed cowl flaps, some throttling may be required to maintain placarded manifold pressure. When the waste gate is closed, any change in the turbocharger speed will mean a change in engine operation. Anything that causes an increase or decrease in turbine speed will cause an increase or decrease in manifold pressure. If turbine speed increases, the manifold pressure increases; if the turbine speed decreases, the manifold pressure decreases. Any change in exhaust flow to the turbine or ram induction air pressure, whether it is an increase or decrease, will be magnified approximately 8 to 10 times by the compression ratio and the change in flow through the exhaust system.

TURBOCHARGED ENGINE OPERATING CHARACTERISTICS

MANIFOLD PRESSURE VARIATION WITH ENGINE RPM

When the waste gate is open, the turbocharged engine will react the same as a normally aspirated engine when the engine RPM is varied. That is, when the RPM is increased, the manifold pressure will decrease slightly. When the engine RPM is decreased, the manifold pressure will increase slightly.

However, when the waste gate is closed, manifold pressure variation with engine RPM is just the opposite of the normally aspirated engine. An increase in engine RPM will result in an increase in manifold pressure, and a decrease in engine RPM will result in a decrease in manifold pressure.

MANIFOLD PRESSURE VARIATION WITH ALTITUDE

At full throttle your turbocharger is capable of maintaining the maximum allowable manifold pressure of 34.5 inches Hg., well above 16,000 feet. However, engine operating limitations establish the maximum manifold pressure that may be used. From 16,000 feet to higher altitudes, the turbo system automatically reduces the maximum manifold pressure you will be able to obtain to a ratio of 2.2 x ambient pressure; however, cruise power setting must be manually set.

MOMENTARY OVERBOOST OF MANIFOLD PRESSURE

Under some circumstances (such as rapid throttle movement, especially with cold oil) it is possible that the engine can be overboosted above the maximum allowable manifold pressure of 34. 5 inches Hg. This would most likely be experienced during the takeoff roll or during a change to full throttle operation in flight. Therefore, it is still necessary that the pilot observe and be prepared to control the manifold pressure.

Slight overboosting is not considered detrimental to the engine so long as it is momentary. Momentary overboost of 2 to 3 inches Hg. can usually be controlled by slower throttle movement and no corrective action is required when momentary overboost corrects itself and is followed by normal engine operation. However, if overboosting of this nature persists, or if the amount of overboost goes as high as 4 inches Hg. or more, the controller system should be checked for necessary replacement or adjustment of components.

ALTITUDE OPERATION

Because your turbocharged aircraft will climb faster and higher than a normally aspirated aircraft, fuel vaporization may be encountered and the following items should be remembered:

(1) Turn the auxiliary fuel boost pumps ON when climbing to altitudes above 12, 000 feet. By turning the fuel boost pumps ON when climbing through 12, 000 feet, the vaporization problem is eliminated. The fuel boost pumps should be left ON several minutes after cruise in level flight has been established.

(2) Lean the mixture during the climb to the proper fuel flow for the power being used.

HIGH ALTITUDE ENGINE ACCELERATION

Your engine will accelerate normally from idle to full throttle with full rich mixture at any altitude below 16, 000 feet. At higher altitudes, it is usually necessary to lean the mixture to get smooth engine acceleration from idle to maximum power. At altitudes above 25, 000 feet, and with temperatures above standard, it takes one to two minutes for the turbine to accelerate from idle to maximum RPM, although adequate power is available in 20 to 30 seconds.

Notes................

(11) Inoperative Engine - SECURE, as follows:
   (a) Fuel Selector - OFF.
   (b) Auxiliary Fuel Pump - OFF.
   (c) Magneto Switches - OFF.
   (d) Alternator Switch - OFF.
(12) As Soon as Practical - LAND.

SUPPLEMENTARY INFORMATION CONCERNING ENGINE FAILURE DURING TAKEOFF

The most critical time for an engine failure condition in a multi-engine aircraft is during a two or three second period late in the takeoff run while the aircraft is accelerating to a safe engine failure speed. A detailed knowledge of recommended single-engine airspeeds in Figure 3-1 is essential for safe operation of the aircraft.

The airspeed indicator is marked with a Red radial line at the minimum single-engine control speed and a Blue radial line at the best single-engine rate-of-climb speed to facilitate instant recognition. The following paragraphs present a detailed discussion of the problems associated with engine failures during takeoff.

SINGLE-ENGINE AIRSPEED NOMENCLATURE	MPH - IAS
(1) Minimum Single-Engine Control Speed (red radial)	95
(2) Recommended Safe Single-Engine Speed	105
(3) Best Single-Engine Angle-of-Climb Speed	114
(4) Best Single-Engine Rate-of-Climb Speed (Flaps Up) (blue radial)	118

Figure 3-1.

MINIMUM SINGLE-ENGINE CONTROL SPEED. The multi-engine aircraft must reach the minimum control speed (95 MPH IAS) before full control deflections can counteract the adverse rolling and yawing tendencies associated with one engine inoperative and full power operation on the other engine. This speed is indicated by a Red radial line on the airspeed indicator.

RECOMMENDED SAFE SINGLE-ENGINE SPEED. Although the aircraft is controllable at the minimum control speed, the aircraft performance is so far below optimum that continued flight near the ground is improbable.

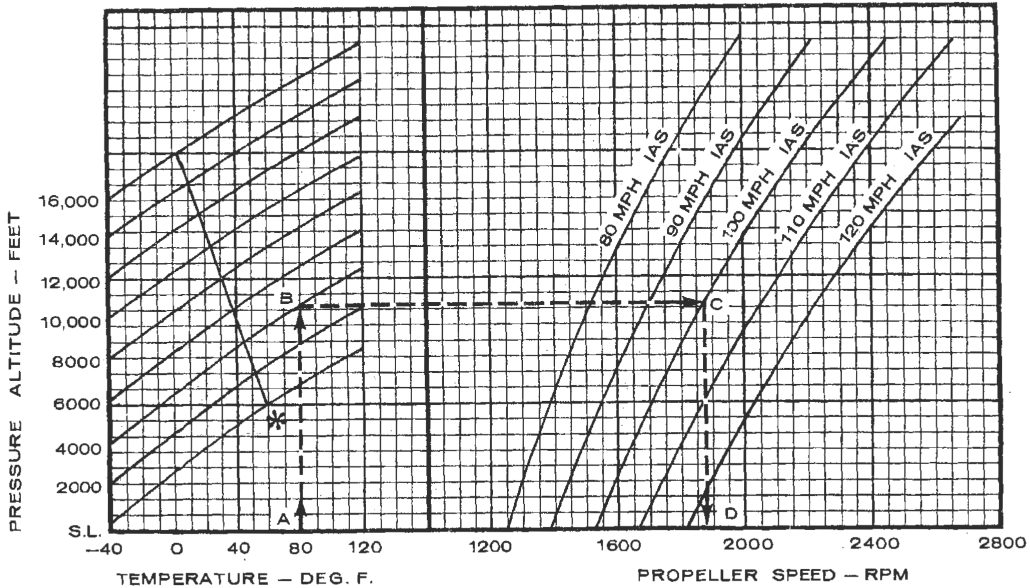
more than half of his takeoff power. In this situation, the single-engine pilot would be extremely reluctant to continue the takeoff if he had to climb over obstructions. However, if the failure occured at an altitude as high or higher than surrounding obstructions, he would feel free to maneuver for a landing back at the airport.

Fortunately the aircraft accelerates through this "area of decision" in just a few seconds. However, to make an intelligent decision in this type of emergency, one must consider the field length, obstruction height, field elevation, air temperature, headwind, and the gross weight. The flight paths illustrated in Figure 3-2, indicate that the area of decision is bounded by: (1) the point at which 105 MPH IAS is reached and (2) the point where the obstruction altitude is reached. An engine failure in this area requires an immediate decision. Beyond this area, the aircraft, within the limitations of single-engine climb performance shown in Section VI, may be maneuvered to a landing back at the airport.

At sea level, with zero wind and 6300 pounds takeoff gross weight, the distance to accelerate to 105 MPH IAS and stop is 3030 feet, while the total unobstructed area required to takeoff and climb over a 50-foot obstacle after an engine failure at 105 MPH IAS is 4800 feet. This total distance over an obstacle can be reduced slightly under more favorable conditions of gross weight, headwind, or obstruction height. However, it is recommended that in most cases it would be better to discontinue the takeoff, since any slight mismanagement of single-engine procedure would more than offset the small distance advantage offered by continuing the takeoff. Still higher field elevations will cause the engine failure takeoff distance to lengthen disproportionately until the altitude is reached where a successful takeoff is improbable unless the airspeed and height above the runway at engine failure are great enough to allow a slight deceleration and altitude loss while the aircraft is being prepared for single-engine climb.

During single-engine takeoff procedures over an obstacle, only one condition presents any appreciable advantage, and this is headwind. A decrease of approximately 1% in ground distance required to clear a 50-foot obstacle can be gained for each 1 MPH of headwind. Excessive speed above best single-engine climb speed at engine failure is not nearly as advantageous as one might expect since deceleration is rapid and ground distance is used up quickly at higher speeds while the aircraft is being cleaned up for climb. However, the extra speed is important for controllability.

RPM TO SIMULATE CRITICAL (LEFT) ENGINE INOPERATIVE AND FEATHERED



*STANDARD TEMPERATURE

CONDITIONS

1. Propeller Controls Full High RPM - Full Low Pitch
2. Manifold Pressure Adjusted to Obtain Proper RPM

EXAMPLE

A. Temperature - 80° F.
B. Pressure Altitude - 4000 Ft.
C. Airspeed - 100 MPH IAS.
D. Propeller Speed - 1880 RPM.

Figure 3-3

NOTE

If start is unsuccessful, turn inoperative engine magneto switches OFF, retard mixture to IDLE CUT-OFF, open throttle fully, and engage starter for several revolutions. Then repeat air-start procedures.

AIRCRAFT WITH OPTIONAL PROPELLER UNFEATHERING SYSTEM INSTALLED

(1) Magneto Switches - ON.
(2) Throttle - FORWARD approximately one inch.
(3) Mixture - FULL RICH.
(4) Propeller - FULL FORWARD.

NOTE

The propeller will automatically windmill when the propeller lever is moved out of the FEATHER position.

(5) Propeller - RETARD to detent when propeller reaches 1000 RPM.
(6) Power - INCREASE after cylinder head temperature reaches 200°F.

SINGLE - ENGINE APPROACH AND LANDING

(1) Mixture - FULL RICH.
(2) Propeller - FULL FORWARD.
(3) Approach at 120 MPH IAS with excessive altitude.
(4) Landing Gear - DOWN when within gliding distance of field.
(5) Wing Flaps - DOWN when landing is assured.
(6) Decrease speed below 110 MPH IAS only if landing is assured.
(7) Minimum Single-Engine Control Speed - 95 MPH IAS.

MAXIMUM GLIDE

In the event of a double-engine failure condition, maximum gliding distance can be obtained by feathering both propellers, and maintaining approximately 133 MPH IAS with landing gear and wing flaps up. Refer to the Maximum Glide Diagram, Figure 3-4, for maximum glide data.

NOTE

The aircraft will slide straight ahead about 800 feet on smooth sod with very little damage.

FORCED LANDING

(Complete Power Loss)

(1) Mixtures - IDLE CUT-OFF.
(2) Propellers - FEATHER.
(3) Fuel Selectors - OFF.
(4) All Switches Except Battery Switch - OFF.
(5) Approach at 120 MPH IAS.
(6) If field is smooth and hard, plan a landing as follows:
  - (a) Landing Gear - DOWN within glide distance of field.
  - (b) Wing Flaps - EXTEND as necessary when within glide distance of field.
  - (c) Battery Switch - OFF.
  - (d) Escape Hatch - REMOVE.
  - (e) Make a normal landing, keeping nosewheel off the ground as long as practical.

(7) If field is rough or soft, plan a wheels-up landing as follows:
  - (a) Select a smooth, grass-covered runway if possible.
  - (b) Landing Gear - UP.
  - (c) Approach at 120 MPH IAS with flaps down only 15°.
  - (d) Battery Switch - OFF.
  - (e) Escape Hatch - REMOVE.
  - (f) Land in a slightly tail-low attitude.

GO-AROUND (Single-Engine)

(1) If absolutely necessary and speed is above 105 MPH IAS, increase engine speed to 2700 RPM and apply full throttle.
(2) Landing Gear - UP.
(3) Flaps - UP (if extended).
(4) Cowl Flaps - OPEN.
(5) Climb at 118 MPH IAS (114 MPH with obstacles directly ahead).
(6) Trim aircraft for single-engine climb.

(d) If complete loss of alternator output occurs check field fuse and replace if necessary. Spare fuses are located on the forward side of the switch and circuit breaker console.
(e) If an intermittent light indication accompanied by ammeter fluctuation is observed - shut off affected alternator and reduce load to one alternator capacity.

ALTERNATOR FAILURE (Dual)
(Indicated by illumination of failure lights)

(1) Electrical Load - REDUCE.
(2) If circuit breakers are tripped.
  (a) Shut off alternators.
  (b) Reset circuit breakers.
  (c) Turn on alternators.
  (d) If circuit breakers reopen prepare to terminate flight.
(3) If circuit breakers have not tripped.
  (a) Switch to standby regulator.
  (b) If still inoperative check field fuses and replace as required. Spare fuses are located on the forward side of the switch and circuit breaker console.
  (c) If still inoperative turn off right alternator and turn on emergency power.
  (d) If still inoperative turn off left alternator, turn on right alternator.
  (e) If still inoperative turn off alternators and prepare to terminate flight.

NOTE

The stall warning system is inoperative when the battery switch is in the OFF position.

FLIGHT INSTRUMENTS

OBSTRUCTION OR ICING OF STATIC SOURCE

(1) Alternate Static Source - OPEN.
(2) Excess Altitude and Airspeed - MAINTAIN to compensate for change in calibration.

(3) Landing Gear Switch - NEUTRAL (center).
(4) Pilot's Seat - TILT full aft (standard) or RAISE (optional).
(5) Hand Crank - EXTEND AND LOCK. (See figure 2-7.)
(6) Rotate Crank - CLOCKWISE four turns past point where gear-down lights come on (approximately 54 turns).

NOTE

During manual extension of the gear, never release the hand crank to let it turn freely of its own accord.

(7) Gear-Down Lights - CHECK.
(8) Gear Warning Horn - CHECK with throttle retarded.
(9) Hand Crank - PUSH BUTTON and STOW.
(10) As Soon as Practical - LAND.

IF LANDING GEAR WILL NOT RETRACT ELECTRICALLY

(1) Do not try to retract manually.

NOTE

The landing gear should never be retracted with the manual system, as undue loads will be imposed and cause excessive wear on the cranking mechanism.

(2) Landing Gear - DOWN.
(3) Gear-Down Lights - CHECK.
(4) Gear Warning Horn - CHECK.
(5) As Soon as Practical - LAND.

AIR INLET OR FILTER ICING

(1) Alternate Air Controls - PULL OUT.
(2) Propellers - INCREASE (2550 RPM for normal cruise).
(3) Mixtures - LEAN as required.

LANDING EMERGENCIES

LANDING WITH FLAT MAIN GEAR TIRE

If a blowout occurs during takeoff, and the defective main gear tire is identified, proceed as follows:

(1) Landing Gear - UP.
(2) Fuel Selectors - Turn to MAIN TANK on same side as defective tire and feel for detent. Proceed to destination, to reduce fuel load.

the ground in landing roll.

(6) Use minimum braking in landing roll.
(7) Throttles - RETARD in landing roll.
(8) As landing roll speed diminishes, hold control wheel full aft until aircraft is stopped.
(9) Avoid further tire damage by holding additional taxi to a minimum.

LANDING WITH DEFECTIVE MAIN GEAR

Reduce fuel load in the tank on the side of the faulty main gear as explained in paragraph LANDING WITH FLAT MAIN GEAR TIRE. When fuel load is reduced, prepare to land as follows:

(1) Fuel Selectors - Left Engine - LEFT MAIN (feel for detent).
Right Engine - RIGHT MAIN (feel for detent).
(2) Select a wide, hard surface runway, or if necessary, a wide sod runway. Select a runway with crosswind from the side opposite the defective landing gear, if a crosswind landing is necessary.
(3) Landing Gear - DOWN.
(4) Flaps - DOWN.
(5) In approach, align aircraft with edge of runway opposite the defective landing gear, allowing room for a ground-loop in landing roll.
(6) Battery Switch - OFF.
(7) Land slightly wing-low toward the operative landing gear and lower the nosewheel immediately for positive steering.
(8) Start moderate ground-loop into defective landing gear until aircraft stops.
(9) Mixture Levers - IDLE CUT-OFF (both engines).
(10) Use full aileron in landing roll to lighten the load on the defective landing gear.
(11) Apply brake only on the operative landing gear to maintain desired rate-of-turn and minimize the landing roll.
(12) Fuel Selectors - OFF.
(13) Evacuate the aircraft as soon as it stops.

LANDING WITH DEFECTIVE NOSE GEAR

Sod-Runway—Main Gear Retracted

This procedure will produce a minimum amount of aircraft damage on smooth runways. This procedure is also recommended for short, rough

Notes ....

AIRSPEED LIMITATIONS (CAS)

Maximum Structural Cruising Speed	
Level Flight or Climb	230 MPH
Maximum Speed	
Flaps Extended 15°	180 MPH
Flaps Extended 15° - 45°	160 MPH
Gear Extended	160 MPH
Never Exceed (glide or dive, smooth air)	266 MPH
*Maximum Maneuvering Speed	180 MPH

*The maximum speed at which you can use abrupt control travel.

AIRSPEED INDICATOR MARKINGS

The following is a list of the certificated calibrated airspeed (CAS) limitations for the aircraft.

Never Exceed (glide or dive, smooth air) .	266 MPH (red line)
Caution Range	230 to 266 MPH (yellow arc)
Normal Operating Range . .	95 to 230 MPH (green arc)
Flap Operating Range	80 to 160 MPH (white arc)
Minimum Control Speed	95 MPH (red line)
Best Single-Engine Rate of Climb . .	118 MPH (blue line)

ENGINE OPERATION LIMITATIONS

Maximum Power and Speed
(for all operations) 300 BHP at 2700 RPM and 34.5 in. Hg. MP

ENGINE INSTRUMENT MARKINGS

OIL TEMPERATURE

Normal Operating Range . . .	75° to 240° F (green arc)
Maximum Temperature	240° F (red line)

OIL PRESSURE

Idling Pressure	10 PSI (red line)
Normal Operating Range . . .	30 to 60 PSI (green arc)
Maximum Pressure	100 PSI (red line)

WEIGHT AND BALANCE

BUSINESSLINER

To compute the weight and balance for your particular aircraft, use Figures 4-1 through 4-3 and 4-7 as follows:

Take the licensed Empty Weight and Moment/1000 from the Weight and Balance Data Sheet carried in your aircraft and enter them in the proper columns of Figure 4-1. Using Figures 4-2 and 4-7, determine the moments/1000 of each item to be carried and enter them in the proper columns of Figure 4-1. Total the weight and moments/1000, locate this point in Figure 4-3, if this point falls within the envelope the loading is acceptable.

UTILILINER

To compute the weight and balance for your particular aircraft, use Figures 4-4 through 4-7 as follows:

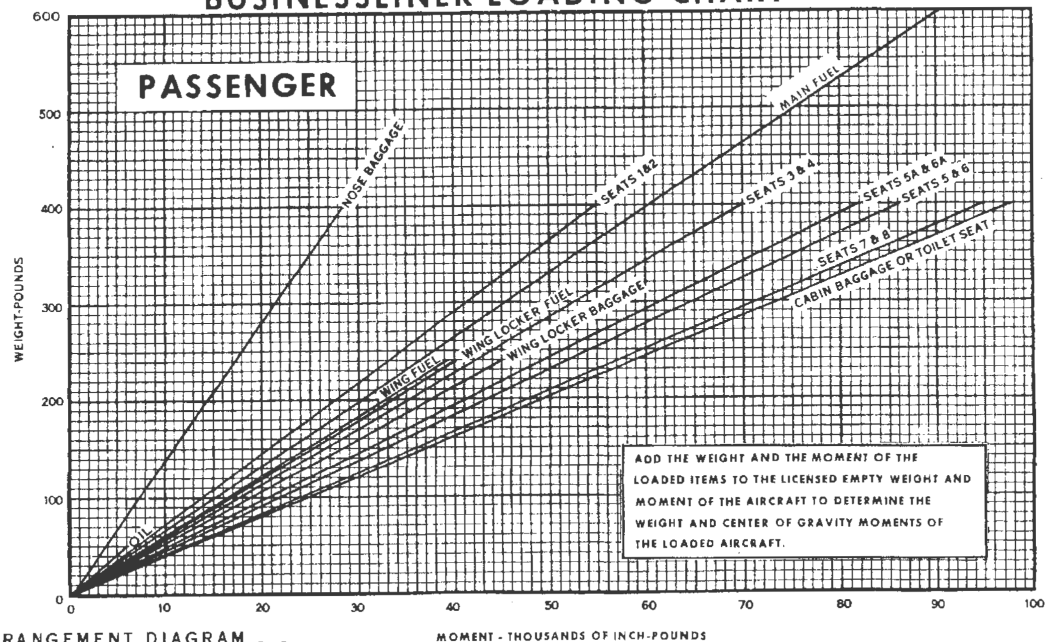
Take the licensed Empty Weight and Moment/1000 from the Weight and Balance Data Sheet carried in your aircraft and enter them in the proper columns of Figure 4-4. Using Figures 4-5 and 4-7, determine the moments/1000 of each item to be carried and enter them in the proper columns of Figure 4-4. Total the weight and moments/1000, locate this point in Figure 4-6, if this point falls within the envelope the loading is acceptable.

PASSENGER LOADING

Due to the differences in installed optional equipment on the aircraft, a wide center of gravity range exists. Under certain passenger loading conditions, it is possible to exceed the CG limits which can lead to tail tipping. To prevent this from occurring, it is recommended that owners and operators study their individual aircraft's weight and balance information to become familiar with its capabilities and limitations. When loading passengers, it is recommended the succeeding steps be followed:

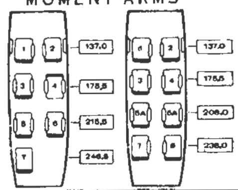
(1) Load the baggage in the nose compartment prior to boarding of the crew and passengers.
(2) Avoid carrying baggage in the aft cabin.
(3) When boarding people, have the pilot or person who is to occupy the copilot seat be the first to board with remaining persons filling the most forward seats first and the aft seats last. Arrange to have the heavier people occupy the most forward seats.
(4) When unloading the aircraft, have one person remain in the copilot or pilot seat while the other flight deck occupant goes aft to open the door. Arrange to have the passengers in the aft seats be the first to deplane.

BUSINESSLINER LOADING CHART



ARRANGEMENT DIAGRAM

MOMENT ARMS



NOTE:

1. The seat positions on the chart guide lines correspond to the seat positions in the arrangement diagram.
2. When positions 7 and 8 are added, positions 5 and 6 become 5A and 6A; therefore, use care when selecting guide lines for seat positions 5, 6, 5A and 6A.

Figure 4-2

MODEL 402B UTILILINER SAMPLE PROBLEM	Sample Aircraft		Your Aircraft	
	Weight (lbs)	Moment (lb. -ins. /1000)	Weight (lbs)	Moment (lb. -ins. /1000)
1. Licensed Empty Weight (Sample Aircraft)	3973. 7	607. 9		
2. Oil *(26 Qts. x 1. 875 lb/qt.)	49. 0	5. 6	49. 0	5. 6
3. Seat 1 and Seat 2	340. 0	46. 6		
4. Seat 3 and Seat 4	340. 0	56. 4		
5. Seat 5 and Seat 6	340. 0	65. 6		
6. Seat 7 and Seat 8	340. 0	74. 8		
7. Seat 9 and Seat 10	170. 0	42. 0		
8. Fuel (gals. x 6 lbs. /gal.) Main Tanks (100 gals.) Auxiliary Wing Tanks (20 gals.) Wing Locker Tanks (20 gals.)	600. 0	91. 2		
9. Baggage Nose Cabin Wing Lockers	107. 3 40. 0	7. 6 7. 4		
10. Cargo A B C D				
11. Total Aircraft Weight (Loaded)	6300. 0	1005. 1		
12. Locate this point (6300. 0 at 1005. 1) on Figure 4-6. Since this point falls within the envelope, the loading is acceptable.				
*Note: Normally full oil may be assumed for all flights.				

Figure 4-4

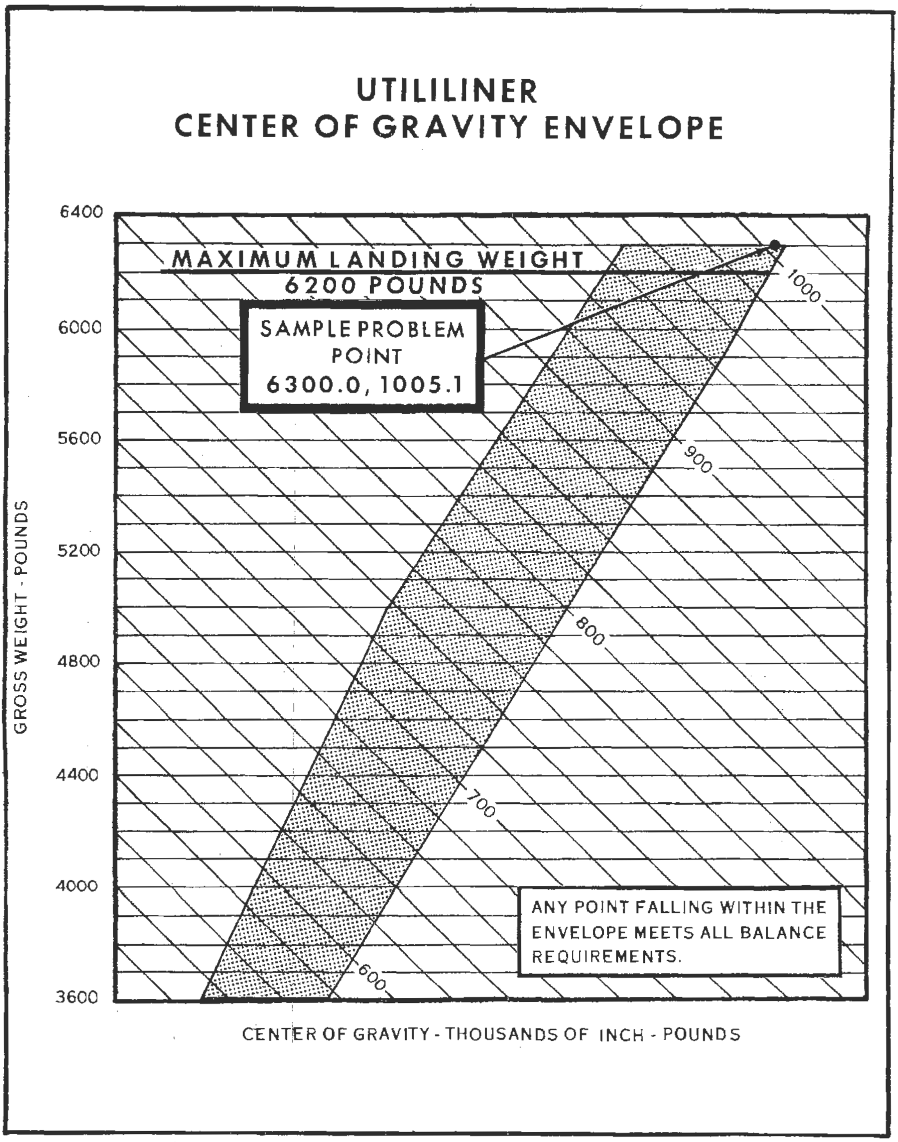

UTILILINER
CENTER OF GRAVITY ENVELOPE
6400
6000
5600
5200
4800
4400
4000
3600
GROSS WEIGHT - POUNDS
MAXIMUM LANDING WEIGHT
6200 POUNDS
SAMPLE PROBLEM
POINT
6300.0, 1005.1
1000
900
800
700
600
ANY POINT FALLING WITHIN THE ENVELOPE MEETS ALL BALANCE REQUIREMENTS.
CENTER OF GRAVITY - THOUSANDS OF INCH - POUNDS

Figure 4-6

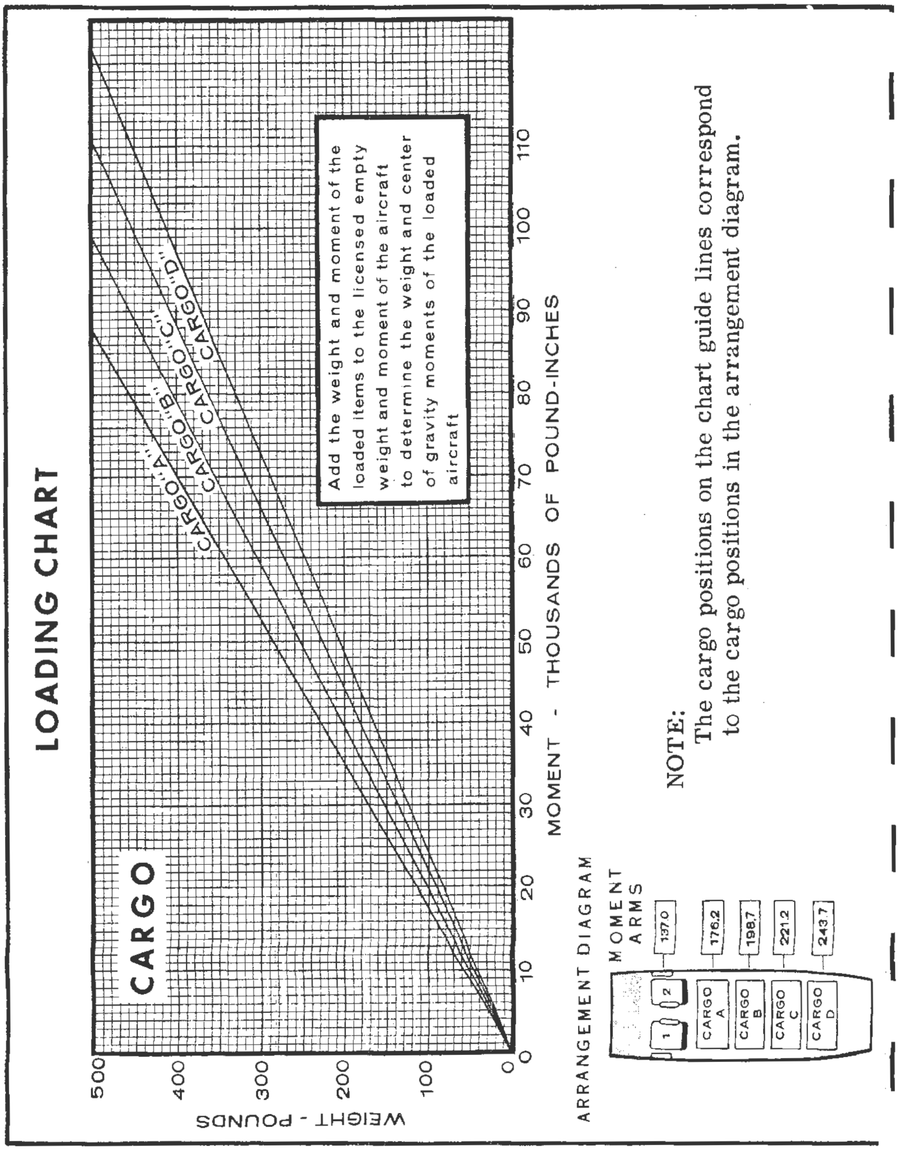

LOADING CHART
CARGO
CARGO "A"
CARGO "B"
CARGO "C"
CARGO "D"
Add the weight and moment of the loaded items to the licensed empty weight and moment of the aircraft to determine the weight and center of gravity moments of the loaded aircraft
WEIGHT - POUNDS
0
100
200
300
400
500
MOMENT - THOUSANDS OF POUND-INCHES
0
10
20
30
40
50
60
70
80
90
100
110
ARRANGEMENT DIAGRAM
MOMENT ARMS
137.0
176.2
198.7
221.2
243.7
1
2
CARGO A
CARGO B
CARGO C
CARGO D
NOTE:
The cargo positions on the chart guide lines correspond to the cargo positions in the arrangement diagram.

Figure 4-7

MOORING YOUR AIRCRAFT

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

(1) Set the parking brake and install control wheel lock.
(2) Tie strong ropes or chains (700 pounds tensile strength) to wing tie-down fittings.
(3) Caster the nose wheel to the extreme left or right position.
(4) Tie a strong rope or chain (700 pounds tensile strength) to the tail skid.
(5) Recommend installation of pitot tube cover.

WINDOWS AND WINDSHIELDS

The plastic windshield and windows should be kept clean and waxed at all times. To prevent scratches and crazing, wash them carefully with plenty of soap and water, using palm of hand to feel and dislodge dirt and mud. A soft cloth, chamois or sponge may be used, but only to carry water to the surface. Rinse thoroughly, then dry with a clean, moist chamois. Rubbing the surface of the plastic with a dry cloth builds up an electrostatic charge which attracts dust particles in the air.

Remove oil and grease with a cloth moistened with kerosene. Never use gasoline, benzine, acetone, carbon tetrachloride, fire extinguisher fluid, lacquer thinner or glass cleaner. These materials will soften the plastic and may cause it to craze.

After removing dirt and grease, if the surface is not badly scratched, it should be waxed with a good grade of commercial wax. The wax will fill in minor scratches and help prevent further scratching. Apply a thin, even coat of wax and bring it to a high polish by rubbing lightly with a clean, dry, soft flannel cloth. Do not use a power buffer; the heat generated by the buffing pad may soften the plastic.

Do not use a canvas cover on the windshield unless freezing rain or sleet is anticipated. Canvas covers may scratch the plastic surface.

PAINTED SURFACES

The painted exterior surfaces of your new Cessna require an initial used according to the manufacturer's instructions. To minimize wetting the fabric, keep the foam as dry as possible and remove it with a vacuum cleaner.

The plastic trim, instrument panel, and control knobs need only be wiped with a damp cloth. Oil and grease on the control wheel and control knobs can be removed with a cloth moistened with kerosene. Volatile solvents, such as mentioned in paragraphs on care of the windshield, must never be used since they soften and craze the plastic.

FLYABLE STORAGE

Flyable storage applies to all aircraft which will not be flown for an indefinite period but which are to be kept ready to fly with the least possible preparation. If the aircraft is to be stored temporarily, or indefinitely, refer to the Service Manual for proper storage procedures.

Aircraft which are not in daily flight should have the propellers rotated by hand, five revolutions at least once each week. In damp climates and in storage areas where the daily temperature variation can cause condensation, propeller rotation should be accomplished more frequently. Rotating the propeller an odd number of revolutions, redistributes residual oil on the cylinder walls, crankshaft and gear surfaces and repositions the pistons in the cylinders, thus preventing corrosion. Rotate propellers as follows:

(1) Throttles - IDLE.
(2) Mixtures - IDLE CUT-OFF.
(3) Magneto Switches - OFF.
(4) Propellers - ROTATE CLOCKWISE. Manually rotate propellers five revolutions, standing clear of arc of propeller blades.

Keep fuel tanks full to minimize condensation in the fuel tanks. Maintain battery at full charge to prevent electrolyte from freezing in cold weather. If the aircraft is stored outside, tie-down aircraft in anticipation of high winds. Secure aircraft as follows:

(1) Secure rudder with the optional rudder gust lock or with a control surface lock over the fin and rudder. If a lock is not available, caster the nose wheel to the full left or right position.
(2) Install control column lock in pilot's control column, if available. If column lock is not available, tie the pilot's control wheel full aft with a seat belt.
(3) Tie ropes or chains to the wing tie-down fittings located on the

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.

OWNER FOLLOW-UP SYSTEM

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 Customer Services Department. A subscription form is supplied in your Owner's Service Policy Booklet 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.

PUBLICATIONS

Included in your aircraft file are various manuals which describe the operation of the equipment in your aircraft. These manuals plus many other supplies that are applicable to your aircraft, are available from your Cessna Dealer, and, for your convenience, are listed below.

- OWNER'S MANUALS FOR YOUR
  - AIRCRAFT
  - ELECTRONICS - 300, 400 and 800 SERIES
  - AUTOPILOT - NAV-O-MATIC 400, 400A and 800
  - AUTOPILOT/FLIGHT DIRECTOR - 400A
- SERVICE MANUALS AND PARTS CATALOGS FOR YOUR
  - AIRCRAFT
  - ENGINE AND ACCESSORIES
  - ELECTRONICS - 300, 400 and 800 SERIES
  - AUTOPILOT - NAV-O-MATIC 400, 400A and 800
  - AUTOPILOT/FLIGHT DIRECTOR - 400A
  - HEATER AND COMPONENTS
  - TURBOCHARGER AND CONTROLS
- COMPUTER
- SALES AND SERVICE DEALER DIRECTORY
- DO'S AND DON'TS ENGINE BOOKLET

LUBRICATION AND SERVICING PROCEDURES

Specific servicing information is provided here for items requiring daily attention. A Servicing Intervals Checklist is included to inform the pilot when to have other items checked and serviced. Refer to inside back cover for Servicing Requirements.

DAILY

FUEL TANK FILLERS -- Service after each flight. Keep full to retard condensation in tanks. Refer to Servicing Requirements table on inside back cover for fuel specification, grade and quantity.

FUEL TANK DRAINS -- Drain before first flight each day and after each refueling.

FUEL STRAINER DRAINS -- Drain about two (2) ounces of fuel from each fuel strainer before first flight each day and after refueling.

FUEL LINE CROSSOVER DRAINS -- Drain about two (2) ounces of fuel from each valve before first flight each day.

OIL FILLERS -- When preflight check shows low oil level, service with aviation grade engine oil; SAE 50 above 40°F and SAE 10W30 or SAE 30 below 40°F. (Multi-viscosity oil with a range of SAE 10W30 is recommended for improved starting and turbocharger controller operation in cold weather.) Detergent or dispersant oil conforming to Continental Motors Specification MHS-24A, must be used.

Your Cessna Dealer can supply approved brands of oil.

NOTE

To promote faster ring seating and improved oil control, your Cessna was delivered from the factory with straight mineral oil (non-detergent). This "break-in" oil should be used only for the first 20 to 30 hours of operation, at which time it must be replaced with detergent oil.

OIL DIPSTICKS -- Check oil level before each flight. Do not operate on less than 9 quarts. To minimize loss of oil through breather, fill to 10 quart level for normal flights of less than 3 hours. For extended flight, fill to capacity which is 13 quarts for each engine sump including oil filter.

OXYGEN CYLINDER -- Check oxygen pressure gage for anticipated requirements before each flight. Refill whenever pressure drops below 300 PSI. Refer to Servicing Requirements table on inside back cover for oxygen specification.

TIRES -- Check tires for proper inflation. Refer to Servicing Requirements table on inside back cover for proper tire pressure.

SERVICING INTERVALS CHECKLIST

EACH 50 HOURS

OIL SUMP DRAINS AND OIL FILTERS -- Change oil, clean screens and remove and replace filters every 50 hours. Change oil at least every four months even though less than 50 hours have accumulated. Reduce these periods for prolonged operation in dusy areas, in cold climates, or where short flights and long idle periods are encountered which cause sludging conditions. Always change oil whenever oil on dipstick appears dirty.

BATTERY -- Check and service. Check more often (at least every 30 days) if operating in hot weather.

INDUCTION AIR FILTER -- Service every 50 hours, more often under dusty conditions.

OIL SEPARATOR FILTER -- Clean and reinstall filter element.

ALTERNATE STATIC SOURCE DRAIN -- Open drain valve to remove accumulated moisture, then close.

EACH 100 HOURS

SHIMMY DAMPENER -- Check and fill as required.

BRAKE MASTER CYLINDERS -- Check fluid level in reservoirs and fill as required through plugs on cylinder heads. Fill with hydraulic fluid (Red).

VACUUM RELIEF VALVE -- Remove breather and clean.

HEATER FUEL FILTER -- Remove and clean with unleaded gasoline.

EACH 500 HOURS

SHOCK STRUTS -- Check and fill as required.

WHEEL BEARINGS -- Lubricate. Lubricate at first 100 hours and each 500 hours thereafter. If more than the normal number of take-offs and landings are made, extensive taxiing is required, or the aircraft is operated in dusty areas or under seacoast conditions, it is recommended that cleaning and lubrication of wheel bearings be accomplished at each 100-hour inspection.

VACUUM SYSTEM FILTER -- Replace.

NOTE

Servicing intervals in the above checklist are recommended by the Cessna Aircraft Company. Depending upon the type of operation, Government regulations may require servicing and inspection of additional items. For these requirements Owner's should check with aviation officials in the country where the aircraft is being operated.

SECTION VI
OPERATIONAL DATA

The operational data graphical charts presented on the following pages are presented for two purposes; first, so that you may know what to expect from your aircraft under various conditions; and second, to enable you to plan your flights in detail with reasonable accuracy.

You will find that using the charts and your Cessna Model 401B/402B Power Computer will pay dividends in over-all efficiency.

The data on these graphical charts has been compiled from actual flight tests with the aircraft and engines in good condition and using average piloting techniques. Note that the cruise performance chart makes no allowance for wind and navigational errors. Allowances for warmup, takeoff, and climb can be obtained from the climb charts and range profile charts provided in this Section.

AIRSPEED NOMENCLATURE SUMMARY
GROSS WEIGHT 6300 POUNDS

MULTI-ENGINE	MPH-IAS	SINGLE ENGINE	MPH-IAS
Takeoff & Climb to 50 Ft. (0° Flaps)	105	Minimum Control Speed	95
Best Angle of Climb Speed	100	Takeoff & Climb to 50 Ft. (0° Flaps)	105
Best Rate-of-Climb Speed	126	Best Angle of Climb Speed	114
Landing Approach Speed (15° - 45° Flaps)	110	Best Rate-of-Climb Speed	118
Maximum Maneuvering Speed	180	Landing Approach Speed (15° - 45° Flaps)	120
Structural Cruise Speed	230	When Landing is Assured	110
Never Exceed Speed (Red Line)	266		

AIRSPEED CORRECTION TABLE					
FLAPS 0°		FLAPS 15° *		FLAPS 45° **	
IAS, MPH	CAS, MPH	IAS, MPH	CAS, MPH	IAS, MPH	CAS, MPH
80	81	80	82	80	81
100	100	90	92	90	91
120	120	100	101	100	100
140	140	110	110	110	109
160	160	120	120	120	118
180	180	130	129	130	128
200	201	140	139	140	138
220	221	150	149	150	149
240	241	160	159	160	159
260	261	170	170	161	160
		180	180		

*Maximum flap speed 180 MPH CAS

**Maximum flap speed 160 MPH CAS

Figure 6-1

STALL SPEED CHART

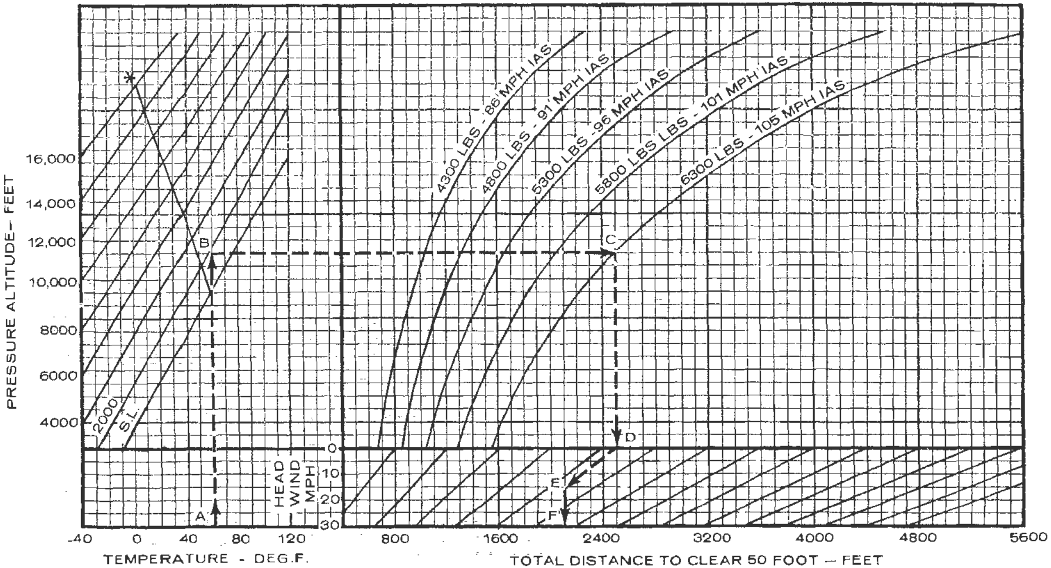
MPH (IAS IS APPROXIMATE)

6300 POUNDS GROSS WEIGHT

CONFIGURATION	ANGLE OF BANK							
	0°		20°		40°		60°	
	IAS	CAS	IAS	CAS	IAS	CAS	IAS	CAS
Gear and Flaps Up	95	95	98	98	108	108	134	134
Gear Down and Flaps 15°	86	87	89	90	98	99	123	123
Gear Down and Flaps 45°	79	80	82	83	90	91	113	113

Figure 6-2

NORMAL TAKEOFF DISTANCE



* STANDARD TEMPERATURE

CONDITIONS:

1. Level Hard Surface Runway.
2. Wing Flaps - Up.
3. Cowl Flaps - Open.
4. 2700 RPM, 34.5 In. Hg. M.P. Before Releasing Brakes.
5. Maintain Speed to 50 Ft.

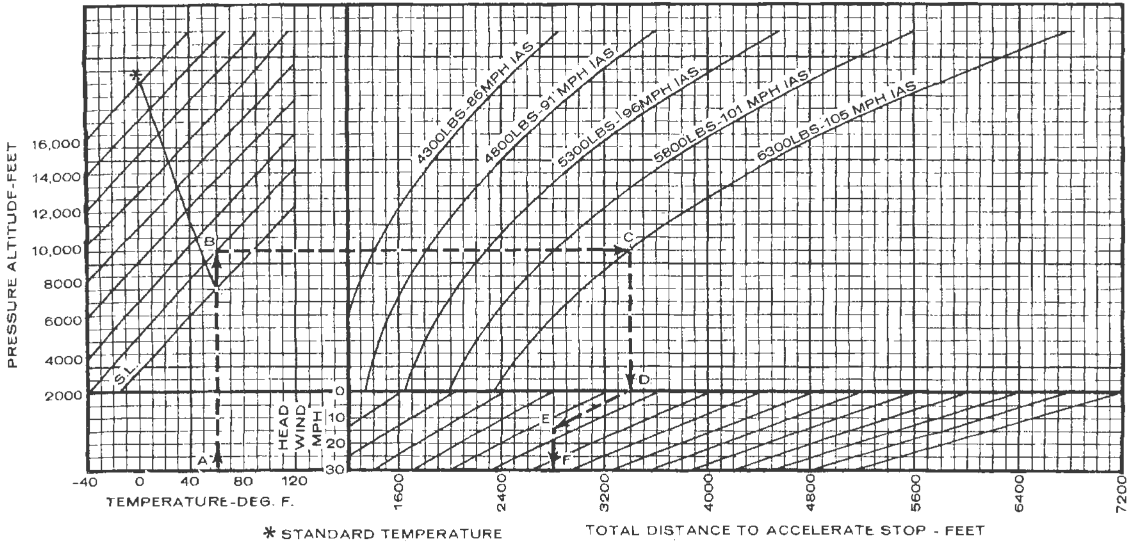
NOTE: Ground run is approximately 76% of Total Distance.

EXAMPLE:

A. Temperature - 60°F.
B. Pressure Altitude - 2000 Ft.
C. Gross Weight - 6300 Lbs.
D. Total Distance to Clear 50 Ft. (No Wind) - 2500 Ft.
E. Headwind - 15 MPH.
F. Total Distance to Clear 50 Ft. (15 MPH Headwind) - 2100 Ft.

Figure 6-3

ACCELERATE STOP DISTANCE



CONDITIONS

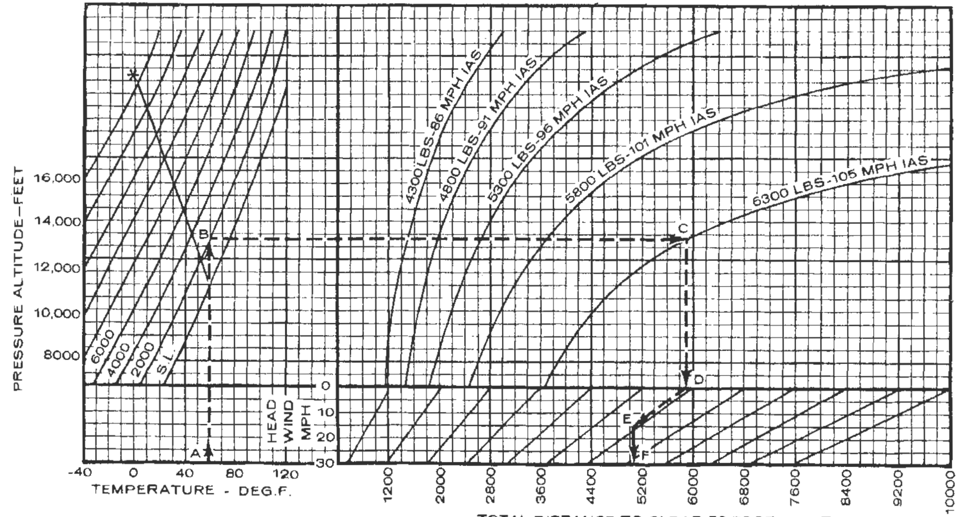
1. Level Hard Surface Runway.
2. Wing Flaps - Up.
3. Cowl Flaps - Open.
4. 2700 RPM, 34.5 In. Hg. M. P. before Releasing Brakes.
5. Engine Failure at Takeoff Speed.
6. Heavy Braking after Engine Failure.

EXAMPLE:

A. Temperature - 60°F.
B. Pressure Altitude - 2000 Ft.
C. Gross Weight - 6300 Lbs.
D. Distance to Stop (No Wind) - 3400 Ft.
E. Headwind - 15 MPH.
F. Distance to Stop (15 MPH Headwind) - 2800 Ft.

Figure 6-4

SINGLE ENGINE TAKEOFF PERFORMANCE



* STANDARD TEMPERATURE

CONDITIONS

1. Level Hard Surface Runway.
2. Wing Flaps - Up.
3. Cowl Flaps - Open.
4. 2700 RPM, 34.5 In. Hg. M.P. Before Releasing Brakes.
5. Engine Failure at Takeoff.
6. Propeller Feathered and Gear Retracted During Climb.
7. Maintain Speed to 50 Ft.

EXAMPLE

A. Temperature - 60° F.
B. Pressure Altitude - 2000 Ft.
C. Gross Weight - 6300 Lbs.
D. Total Distance to Clear 50 Ft. (No Wind) - 5930 Ft.
E. Headwind - 15 MPH.
F. Total Distance to Clear 50 Ft. (15 MPH Headwind) - 5025 Ft.

Figure 6-5

MULTI-ENGINE CLIMB DATA AT 6300 POUNDS

MAXIMUM CLIMB

SEA LEVEL, 59°F			5000 FT. 41°F			10,000 FT. 23°F			15,000 FT. 5°F			20,000 FT. -12°F			25,000 FT. -30°F		
Best Climb IAS MPH	Rate of Climb Ft/Min	Lb of Fuel Used	Best Climb IAS MPH	Rate of Climb Ft/Min	From S. L. Fuel Used	Best Climb IAS MPH	Rate of Climb Ft/Min	From S. L. Fuel Used	Best Climb IAS MPH	Rate of Climb Ft/Min	From S. L. Fuel Used	Best Climb IAS MPH	Rate of Climb Ft/Min	From S. L. Fuel Used	Best Climb IAS MPH	Rate of Climb Ft/Min	From S. L. Fuel Used
126	1610	30	125	1470	48.6	125	1340	69	124	1200	90	122	750	120	119	220	168

NOTE: 34.5 IN. HG. M. P. TO 16,000 FT. PLACARDED M. P. ABOVE 16,000 FT., 2700 RPM, MIXTURE AT RECOMMENDED FUEL FLOW, FLAPS AND GEAR RETRACTED. COWL FLAPS OPEN. FUEL USED INCLUDES 30 POUNDS PRETAKEOFF ALLOWANCE.

CRUISE CLIMB

Power Setting		Climb IAS MPH	Fuel Flow Lb/Hr Per Eng	5000 FT. 41°F FROM SEA LEVEL			10,000 FT. 23°F FROM SEA LEVEL			15,000 FT. 5.5°F FROM SEA LEVEL			20,000 FT. -12°F FROM SEA LEVEL		
RPM	M. P.			Dist. Miles	Time Min.	Fuel Used Lb	Dist. Miles	Time Min.	Fuel Used Lb	Dist. Miles	Time Min.	Fuel Used Lb	Dist. Miles	Time Min.	Fuel Used Lb
2450	29.5	140	102	15	6	48	33.5	13	72	57	22	102	88	32	132

NOTE: FUEL USED INCLUDES A PRETAKEOFF ALLOWANCE OF 30 POUNDS, MIXTURE AT RECOMMENDED FUEL FLOW, FLAPS AND GEAR RETRACTED, COWL FLAPS AS REQUIRED.

Figure 6-6

SINGLE ENGINE CLIMB DATA

Gross Weight Pounds	SEA LEVEL 59°F Best Climb IAS MPH	SEA LEVEL 59°F Rate of Climb Ft/Min	5000 FT 41°F Best Climb IAS MPH	5000 FT 41°F Rate of Climb Ft/Min	10,000 FT 23°F Best Climb IAS MPH	10,000 FT 23°F Rate of Climb Ft/Min	15,000 FT 5.5°F Best Climb IAS MPH	15,000 FT 5.5°F Rate of Climb Ft/Min	20,000 FT -12°F Best Climb IAS MPH	20,000 FT -12°F Rate of Climb Ft/Min
6300	118	225	117	147	117	70	116	-9	114	-278
5800	113	350	112	277	112	202	111	128	109	-142
5300	108	499	107	430	107	360	106	289	104	8
4800	102	680	102	615	101	550	101	484	99	192
4300	97	908	96	850	96	790	95	731	94	424

NOTE: FLAPS AND GEAR RETRACTED, INOPERATIVE PROPELLER - FEATHERED, WING BANKED 5° TOWARD OPERATIVE ENGINE, COWL FLAP CLOSED ON INOPERATIVE ENGINE, 34.5 IN. HG. M. P., TO 16,000 FT., PLACARD M. P. ABOVE 16,000 FT., 2700 RPM, MIXTURE AT RECOMMENDED FUEL FLOW. DECREASE RATE OF CLIMB 15 FT/MIN FOR EACH 10°F ABOVE STANDARD TEMPERATURE FOR A PARTICULAR ALTITUDE.

Figure 6-7

SINGLE ENGINE SERVICE CEILING

BEST CLIMB SPEED APPROXIMATELY 110 MPH IAS (R/C = 50 FPM)

GROSS WEIGHT POUNDS	OUTSIDE AIR TEMPERATURE °F -10	0	10	20	30	40	50
6300	14,200	13,250	12,200	11,150	10,100	9,050	7,950
5800	17,300	16,950	16,700	16,350	15,800	14,750	13,700
5300	19,450	19,100	18,700	18,400	18,000	17,600	17,300
4800	21,700	21,300	20,900	20,600	20,200	19,800	19,450
4300	24,400	24,000	23,650	23,250	22,850	22,450	22,050

NOTE: TABLE PROVIDES PERFORMANCE INFORMATION TO AID IN ROUTE SELECTION WHEN OPERATING UNDER FAR 135.145 AND FAR 91.119 REQUIREMENTS.

INCREASE INDICATED SERVICE CEILINGS 100 FEET FOR EACH 0.10 INCH HG. ALTIMETER SETTING GREATER THAN 29.92.

DECREASE INDICATED SERVICE CEILINGS 100 FEET FOR EACH 0.10 INCH HG. ALTIMETER SETTING LESS THAN 29.92.

Figure 6-8

CRUISE PERFORMANCE WITH NORMAL LEAN MIXTURE AT SEA LEVEL

RPM	MP	%BHP	TAS	Lb/Hr	Endurance 600 Lb	Range 600 Lb	Endurance 840 Lb	Range 840 Lb	Endurance 1080 Lb	Range 1080 Lb
2450	29	71.9	195	188.4	3.18	621	4.46	869	5.73	1117
	27	65.7	187	172.8	3.47	649	4.86	909	6.25	1169
	25	59.2	179	157.2	3.82	683	5.34	956	6.87	1230
	23	53.0	170	142.8	4.20	714	5.88	1000	7.56	1285
2300	29	65.7	187	172.8	3.47	649	4.86	909	6.25	1169
	27	60.2	180	159.0	3.77	679	5.28	951	6.79	1222
	25	54.3	172	145.8	4.12	708	5.76	991	7.41	1275
	23	48.4	163	133.2	4.50	734	6.31	1028	8.11	1322
2200	29	62.1	183	163.8	3.66	670	5.13	938	6.59	1206
	27	56.6	175	151.2	3.97	694	5.56	972	7.14	1250
	25	51.0	165	138.6	4.33	714	6.06	1000	7.79	1285
	23	45.8	159	127.8	4.69	746	6.57	1044	8.45	1344
2100	29	57.6	176	153.0	3.92	690	5.49	966	7.06	1243
	27	52.3	169	141.6	4.24	716	5.93	1002	7.63	1289
	25	47.4	162	131.4	4.57	740	6.39	1036	8.22	1332
	23	42.2	153	120.6	4.98	761	6.97	1065	8.96	1371
	21	37.2	142	111.6	5.37	764	7.53	1070	9.68	1375
	19	32.0	126	102.0	5.88	741	8.24	1037	10.59	1334

CRUISE PERFORMANCE IS BASED ON STANDARD CONDITIONS (59°F), ZERO WIND, 600, 840, and 1080 POUNDS OF FUEL (NO RESERVE).

NOTE: SEE RANGE PROFILE FIGURE 6-10 FOR RANGE INCLUDING CLIMB.

CRUISE PERFORMANCE WITH NORMAL LEAN MIXTURE AT 5000 FT

RPM	MP	%BHP	TAS	Lb/Hr	Endurance 600 Lb	Range 600 Lb	Endurance 840 Lb	Range 840 Lb	Endurance 1080 Lb	Range 1080 Lb
2450	29	71.9	204	188.4	3.18	650	4.46	910	5.73	1169
	27	65.7	196	172.8	3.47	681	4.86	953	6.25	1225
	25	59.5	186	157.8	3.80	707	5.32	990	6.84	1272
	23	53.3	178	143.4	4.18	745	5.86	1043	7.53	1340
2300	29	65.7	196	172.8	3.47	681	4.86	953	6.25	1225
	27	60.5	189	160.2	3.75	708	5.24	991	6.74	1274
	25	54.9	180	147.6	4.07	732	5.69	1025	7.32	1318
	23	49.1	171	134.4	4.46	763	6.25	1068	8.04	1375
2200	29	62.5	191	165.0	3.64	695	5.09	973	6.55	1251
	27	56.9	183	151.8	3.95	727	5.53	1012	7.11	1301
	25	51.7	175	140.4	4.27	748	5.98	1047	7.69	1346
	23	46.4	167	129.0	4.65	777	6.51	1088	8.37	1398
2100	29	58.5	185	155.4	3.86	714	5.41	1000	6.95	1286
	27	53.3	178	143.4	4.18	745	5.86	1043	7.53	1340
	25	48.1	169	132.6	4.52	765	6.33	1071	8.14	1376
	23	42.8	159	122.4	4.90	779	6.86	1091	8.82	1402
	21	37.9	147	112.8	5.32	782	7.45	1095	9.57	1407
	19	32.7	124	103.2	5.81	721	8.17	1009	10.47	1298

CRUISE PERFORMANCE IS BASED ON STANDARD CONDITIONS (41°F), ZERO WIND, 600, 840, and 1080 POUNDS OF FUEL (NO RESERVE).

NOTE: SEE RANGE PROFILE FIGURE 6-10 FOR RANGE INCLUDING CLIMB.

Figure 6-9 (Sheet 1 of 3)

CRUISE PERFORMANCE WITH NORMAL LEAN MIXTURE AT 10,000 FT										
RPM	MP	%BHP	TAS	Lb/Hr	Endurance 600 Lb	Range 600 Lb	Endurance 840 Lb	Range 840 Lb	Endurance 1080 Lb	Range 1080 Lb
2450	29	71.9	212	188.4	3.18	675	4.46	945	5.73	1215
	27	66.1	204	173.4	3.46	705	4.84	987	6.23	1271
	25	60.2	195	159.0	3.77	736	5.28	1030	6.79	1324
	23	54.3	186	145.8	4.12	765	5.76	1071	7.41	1378
2300	29	66.1	204	173.4	3.46	706	4.84	988	6.23	1271
	27	60.5	197	160.2	3.75	738	5.24	1033	6.74	1328
	25	55.3	189	148.2	4.05	765	5.67	1071	7.29	1378
	23	49.4	178	136.2	4.41	784	6.17	1098	7.93	1412
2200	29	63.1	200	160.8	3.60	719	5.04	1007	6.47	1294
	27	57.6	192	153.0	3.92	753	5.49	1054	7.06	1356
	25	52.0	183	141.0	4.26	799	5.96	1091	7.66	1402
	23	46.8	173	130.2	4.61	797	6.45	1116	8.29	1434
2100	29	59.2	194	157.2	3.82	740	5.34	1036	6.87	1338
	27	54.3	186	145.8	4.12	765	5.76	1071	7.41	1378
	25	49.1	178	134.4	4.46	795	6.25	1113	8.04	1431
	23	43.5	166	123.6	4.85	806	6.80	1128	8.74	1451
	21	38.5	151	114.0	5.27	795	7.37	1112	9.47	1430

CRUISE PERFORMANCE IS BASED ON STANDARD CONDITIONS (23°F), ZERO WIND, 600, 840, and 1080 POUNDS OF FUEL (NO RESERVE).

NOTE: SEE RANGE PROFILE FIGURE 6-10 FOR RANGE INCLUDING CLIMB.

CRUISE PERFORMANCE WITH NORMAL LEAN MIXTURE AT 15,000 FT										
RPM	MP	%BHP	TAS	Lb/Hr	Endurance 600 Lb	Range 600 Lb	Endurance 840 Lb	Range 840 Lb	Endurance 1080 Lb	Range 1080 Lb
2450	29	71.9	222	188.4	3.18	707	4.46	990	5.74	1274
	27	66.4	214	174.0	3.45	738	4.83	1033	6.21	1329
	25	60.5	205	160.2	3.75	768	5.24	1075	6.74	1382
	23	54.6	195	147.0	4.08	796	5.71	1114	7.35	1433
2300	29	66.4	214	174.0	3.45	738	4.83	1033	6.21	1329
	27	60.8	205	160.8	3.73	765	5.22	1071	6.72	1378
	25	55.6	197	148.8	4.03	794	5.65	1112	7.26	1430
	23	50.0	187	136.8	4.39	820	6.14	1148	7.89	1475
2200	29	63.4	209	167.4	3.58	749	5.02	1049	6.45	1342
	27	57.9	200	154.2	3.89	778	5.45	1089	7.00	1400
	25	52.6	192	142.2	4.22	810	5.91	1134	7.59	1457
	23	47.1	180	130.8	4.59	826	6.42	1156	8.26	1487
2100	29	59.8	204	158.4	3.79	773	5.30	1082	6.82	1392
	27	54.9	195	147.6	4.07	793	5.69	1110	7.32	1427
	25	49.7	185	135.6	4.42	819	6.19	1147	7.96	1473
	23	44.1	173	124.8	4.81	832	6.73	1165	8.65	1496
	21	39.2	151	115.2	5.21	790	7.28	1106	9.38	1416

CRUISE PERFORMANCE IS BASED ON STANDARD CONDITIONS (5.5°F), ZERO WIND, 600, 840, and 1080 POUNDS OF FUEL (NO RESERVE).

NOTE: SEE RANGE PROFILE FIGURE 6-10 FOR RANGE INCLUDING CLIMB.

Figure 6-9 (Sheet 2 of 3)

CRUISE PERFORMANCE WITH NORMAL LEAN MIXTURE AT 20,000 FT

RPM	MP	%BHP	TAS	Lb/Hr	Endurance 600 Lb	Range 600 Lb	Endurance 840 Lb	Range 840 Lb	Endurance 1080 Lb	Range 1080 Lb
2450	29	72.3	233	197.4	3.04	708	4.26	991	5.47	1275
	27	66.4	223	182.4	3.29	734	4.61	1028	5.92	1320
	25	60.8	215	169.8	3.53	760	4.95	1064	6.36	1367
	23	54.9	204	156.6	3.83	782	5.36	1095	6.90	1408
2300	29	66.4	223	182.4	3.29	734	4.61	1028	5.92	1320
	27	61.1	215	170.4	3.52	757	4.93	1060	6.34	1363
	25	55.9	205	158.4	3.79	777	5.30	1088	6.82	1398
	23	50.4	193	146.4	4.10	791	5.74	1107	7.38	1424
2200	27	58.2	210	163.8	3.66	769	5.13	1077	6.59	1384
	25	53.0	200	151.8	3.95	791	5.53	1107	7.11	1422
	23	47.7	186	141.0	4.26	791	5.96	1107	7.66	1425
2100	25	50.0	193	145.8	4.12	794	5.76	1112	7.41	1430
	24	47.7	186	141.0	4.26	791	5.96	1109	7.66	1425
	23	44.8	177	135.6	4.42	783	6.19	1096	7.96	1409

CRUISE PERFORMANCE IS BASED ON STANDARD CONDITIONS (-12°F), ZERO WIND, 600, 840, and 1080 POUNDS OF FUEL (NO RESERVE).

NOTE: SEE RANGE PROFILE FIGURE 6-10 FOR RANGE INCLUDING CLIMB.

CRUISE PERFORMANCE WITH NORMAL LEAN MIXTURE AT 25,000 FT

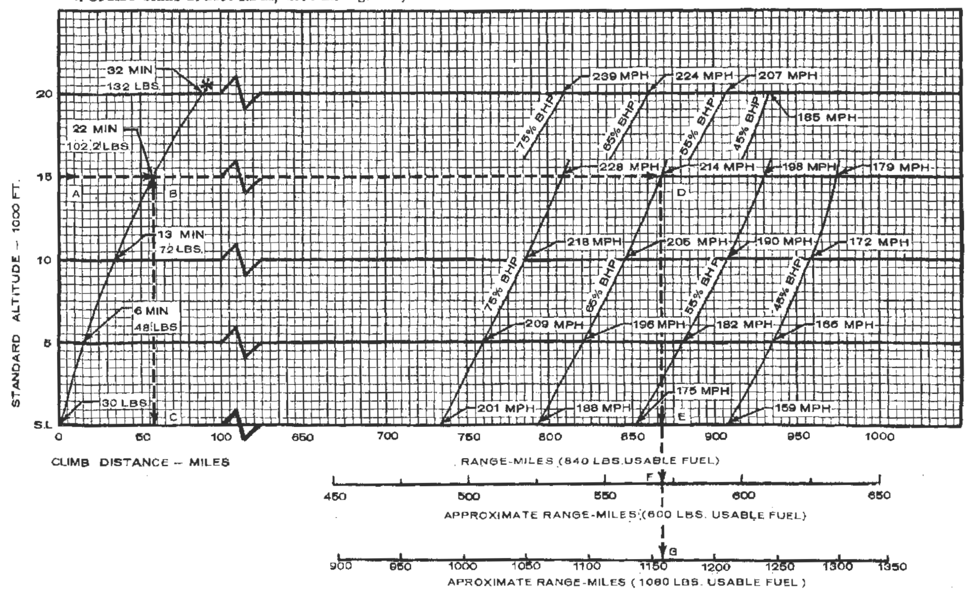
RPM	MP	%BHP	TAS	Lb/Hr	Endurance 600 Lb	Range 600 Lb	Endurance 840 Lb	Range 840 Lb	Endurance 1080 Lb	Range 1080 Lb
2450	23	55.6	212	158.4	3.79	803	5.30	1124	6.82	1446
	22	52.6	205	151.2	3.97	814	5.56	1140	7.14	1464
	21	49.4	194	144.6	4.15	805	5.81	1127	7.47	1449
	20	47.1	184	139.8	4.29	790	6.01	1106	7.73	1422
2300	23	51.0	200	148.2	4.05	810	5.67	1134	7.29	1458
	22	48.4	191	142.8	4.20	803	5.88	1124	7.56	1444
	21	45.5	173	136.8	4.39	759	6.14	1063	7.89	1365
2200	23	48.1	190	142.2	4.22	802	5.91	1123	7.59	1442
	22	45.5	172	136.8	4.39	754	6.14	1056	7.89	1357

CRUISE PERFORMANCE IS BASED ON STANDARD CONDITIONS (-30°F), ZERO WIND, 600, 840, and 1080 POUNDS OF FUEL (NO RESERVE).

Figure 6-9 (Sheet 3 of 3)

RANGE PROFILE

*Cruise Climb at 2450 RPM, 29.5 In. Hg. MP, and 140 MPH IAS



NOTES

1. Maximum Range is not Changed Appreciably with Variations in Climb Power Setting and Climb Speed.
2. Range Includes Distance to Alternate Destination
3. Shift in Range Curves at 16,000 Ft. is due to Increased Fuel Flow.
4. Climb fuel includes allowances for start taxi and takeoff.

CONDITIONS

1. Starting Weight - 6300 Lbs.
2. Cruise Climb to Desired Cruise Altitude.
3. Cruise Fuel Flow Normal Lean Mixture.
4. Zero Wind.
5. 45 Min. Reserve Fuel 90 Lbs. at 40% BHP.

EXAMPLE

A. Cruising Altitude - 15,000 Ft.
B. Time and Fuel Used to Climb From SL to 15,000 Ft - 22 Min. and 102.2 Lbs.
C. Climb Distance - 57 Miles.
D. Cruise Power and Speed - 65% BHP. and 214 MPH TAS.
E. Range - 867 Miles (840 Lbs. Usable Fuel - Optional).
F. Range - 567 Miles (600 Lbs. Usable Fuel - Standard).
G. Range - 1162 Miles (1080 Lbs. Usable Fuel - Optional).

Figure 6-10

LANDING PERFORMANCE

Gross Weight Pounds	IAS at Obstacle MPH	SEA LEVEL 59° F		2500 FT. 50° F		5000 FT. 41° F		7500 FT. 32° F	
		Ground Run	Total Distance Over 50 Foot Obstacle	Ground Run	Total Distance Over 50 Foot Obstacle	Ground Run	Total Distance Over 50 Foot Obstacle	Ground Run	Total Distance Over 50 Foot Obstacle
6200	110	777	1765	837	1825	902	1890	969	1957
5800	105	670	1658	722	1710	779	1767	840	1828
5300	100	550	1538	592	1580	639	1627	690	1678
4800	95	442	1430	476	1464	514	1502	554	1542
4300	90	347	1335	374	1362	403	1391	435	1423

NOTE: WING FLAPS 45°, POWER OFF, COWL FLAPS CLOSED, HARD SURFACE RUNWAY, ZERO WIND, MAXIMUM BRAKING EFFORT. REDUCE LANDING DISTANCE 10% FOR EACH 10 MPH HEADWIND.

Figure 6-11

SECTION VII
OPTIONAL SYSTEMS

This section contains a description, operating procedures, and performance data (when applicable) for some of the optional equipment which may be installed in your aircraft. Contact your Cessna Dealer for a complete list of available Optional Equipment.

AUXILIARY FUEL SYSTEM

Auxiliary tanks (20 gal. usable each wing) are installed in each wing just outboard of each engine nacelle and feed directly to the fuel selector valves. Fuel vapor and excess fuel from the engines are returned to the main fuel tanks. The auxiliary tank is vented into the main tank. The main tank is in turn vented to atmosphere.

When the selector valve handles are in the AUXILIARY position, the left auxiliary tank feeds the left engine and the right auxiliary tank feeds the right engine. The fuel quantity indicator continuously indicates fuel remaining in the tanks selected. When the fuel selector handles are in the AUXILIARY position, AUX TANK indicator lights will illuminate and the fuel quantity gage will indicate the fuel in the auxiliary tanks (pounds in white and gallons in blue). When the fuel selector handles are in the MAIN position, the fuel quantity gage will indicate the fuel in the main tanks. A three-position switch, spring-loaded to OFF, allows checking fuel quantity in the tanks not selected. The switch, adjacent to the auxiliary tank indicator lights, is labeled MAIN, OFF, and AUX. By positioning the switch to the appropriate tank position, the fuel quantity in that tank will be indicated on the fuel quantity gage.

If the auxiliary tanks are to be used, select fuel from the main tanks for 60 minutes prior to switching to auxiliary tanks. This is necessary to provide space in the main tanks for vapor and fuel returned from the engine-driven fuel pumps when operating on auxiliary tanks. If sufficient space is not available in the main tanks for this diverted fuel, the tanks may overflow through the vent line. Since part of the fuel from the auxiliary tanks is diverted back to the main tanks instead of being consumed by the engines these tanks will run dry sooner than may be anticipated.

However, the main tank endurance will be increased by the returned fuel. Since the auxiliary fuel tanks are designed for cruising flight, they are not equipped with pumps and operation near the ground (below 1000 feet) using auxiliary fuel tanks is not recommended.

WING LOCKER FUEL SYSTEM

Optional wing locker fuel tanks (20 U. S. Gallons usable on each wing) are installed in the forward portion of the nacelle wing lockers. There are no separate fuel selector controls for the wing locker fuel tanks. The wing locker fuel is pumped directly into the main tanks with a fuel transfer pump. Indicator lights mounted on the instrument panel are illuminated by pressure switches to indicate fuel has been transferred. The wing locker fuel should not be transferred until there is 180 pounds or less in the main fuel tanks to prevent overflow of the main tank fuel. Fuel should be crossfed as required to maintain fuel balance after wing locker fuel has been transferred.

NOTE

Wing locker transfer pump switches provided on the instrument panel, energize the wing locker fuel transfer pumps for transferring fuel. These switches should be turned ON only to transfer fuel when in straight and level flight and turned OFF when the indicator lights come ON indicating fuel has been transferred.

DEICE BOOT SYSTEM

OPERATING CHECKLIST

Before Entering Aircraft

(1) During the exterior inspection, check the boots for tears, abrasions, and cleanliness. Have boots cleaned and any major damage repaired before takeoff.

During Engine Runup

(1) Position deice switch to ACTUATE and check inflation and deflation cycles. The pressure indicator light (amber in color) should light when the system reaches 10 PSI. The deice system may be recycled as soon as the light goes off, or as required.

NOTE

The deice system is manually controlled. Every time a deicing cycle is desired, the switch must be positioned to ACTUATE. The switch will instantly spring back to OFF, but a 6 second delay action in the switch will complete the deicing inflation cycle.

(2) Check boots carefully for complete deflation to the vacuum hold down position.

NOTE

Complete inflation and deflation cycle will last approximately 30 seconds.

In Flight

(1) When ice has accumulated to approximately 1/2 inch thick on the leading edges, position deice switch to ACTUATE.

After Landing

(1) Check boots for damage and cleanliness. Remove any accumulation of engine oil or grease.

OPERATING DETAILS

Cycling of the deice boots produces no aerodynamic effects in any attitude within the allowable flight limitations. Deice boots are intended to remove ice after it has accumulated rather than preventing its accumulation. If the rate of ice accumulation is slow, best results can be obtained by leaving the deice system OFF until 1/4 to 3/4 inch of ice has accumulated. After clearing this accumulation with one or two cycles of operation, the system should remain OFF until a significant quantity of ice has again accumulated. Rapid cycling of the system is not recommended, as this may cause the ice to grow outside the contour of the inflated boots, preventing its removal.

NOTE

Since wing, horizontal stabilizer, and vertical stablizer deice boots alone do not provide adequate protection for the entire aircraft, known icing conditions should be avoided whenever possible. If icing is encountered, close attention should be given to the pitot-static system, propellers, induction systems and other components subject to icing.

The deice system will operate satisfactorily on either or both engines. During single-engine operation, suction to the gyros will drop momentarily during boot inflation cycle.

DEICE BOOT CARE

Deice boots have a special, electrically-conductive coating to bleed-off static charges which: (1) cause radio interference and, (2) may perforate the boots. Fueling and other servicing operations should be done carefully, to avoid damaging this conductive coating or tearing the boots.

Keep the boots clean and free from oil and grease, which swell the rubber. Wash the boots with mild soap and water, using benzol or unleaded gasoline, if necessary, to remove stubborn grease. Do not scrub the boots and be sure to wipe off all solvent before it dries.

Small tears and abrasions can be repaired temporarily without removing the boots and the conductive coating can be renewed. Your Cessna Dealer has the proper materials and know-how to do this correctly.

ALCOHOL WINDSHIELD DEICE SYSTEM

The alcohol windshield deice system consists of an alcohol tank, a pump, left and right-hand dispersal tubes, and a switch breaker.

The alcohol tank, located in the aft end of the right wing locker, has a 3.0 gallon capacity. The tank should be filled with isopropyl alcohol only. Water dilution of the alcohol is not recommended, as any water contained in the alcohol will reduce the efficiency of ice removal and may freeze on the windshield at very low temperatures. The pump located adjacent to the tank provides positive pressure to the windshield dispersal tubes. The left and right-hand dispersal tubes located at the forward base of the windshield provide flow pattern control throughout the aircraft's speed envelope. Each tube contains five holes which should be inspected and cleaned with a small diameter wire as necessary.

OPERATING CHECKLIST

Before Entering Aircraft

(1) During the exterior inspection, check the windshield dispersal tubes for cleanliness. Check the tank alcohol level. Flow requirements are 3.0 gallons per hour of continuous operation.

During Engine Runup

(1) Position the windshield deice switch breaker to ON. Allow approximately 10 seconds for flow to begin. Assure that each of the five holes in left and right-hand dispersal tubes are flowing alcohol. Return the windshield deice switch breaker to the OFF position.

Normal Operation

To operate the windshield deice system, proceed as follows:

(1) Windshield Deice Switch Breaker - ON.

NOTE

Allow approximately 1/8 to 1/4 inch of ice to accumulate. The windshield deice system can be used as an anti-ice system by continuous use. However, the maximum endurance with a 3-gallon tank is approximately 1.0 hour of continuous operation. Airspeed should be 160 MPH IAS or below for best results.

(2) Windshield - CHECK (allow approximately 10 seconds for alcohol flow to begin).

(3) When windshield ice is removed, windshield deice switch breaker - OFF.

WARNING

The windshield deice switch breaker must be positioned OFF 20 seconds prior to reaching minimum descent altitude. The alcohol film must be allowed to evaporate before a clear field of vision through the windshield is available.

Emergency Operation

Abnormal operation of the alcohol windshield deice system is indicated by the switch breaker tripping to the OFF position or failure of alcohol to flow onto the windshield. Do not leave system on more than 3 minutes without alcohol flow.

PROPELLER DEICE SYSTEM

The propeller deice system consists of electrically heated boots on the propeller blades. Each boot consists of two heating elements "Outboard" and "Inboard", which receive their electrical power through a deice timer. To reduce power drain and maintain propeller balance, the timer directs current to the propeller boots in cycles between elements and between propellers.

NORMAL OPERATION

To operate the propeller deice system proceed as follows:

(1) Battery Switch - ON.
(2) Propeller Deice Circuit Breaker - CHECK in.
(3) Propeller Deice Switch - ON.
(4) Ammeter - CHECK.

Periodic fluctuation (14 to 18 Amps.) of the propeller deice ammeter pointer, indicates normal operation of the deicing elements of first one propeller then the other.

NOTE

> To check all the heating elements of both propellers and the deice timer for normal operation, the system must be left ON for approximately two to two and one-half minutes.

The timer directs current to the propeller boots in cycles between boot elements and between propellers in the following sequence:

Heating Period No. 1 - Outboard Halves - right engine blades.
Heating Period No. 2 - Inboard Halves - right engine blades.
Heating Period No. 3 - Outboard Halves - left engine blades.
Heating Period No. 4 - Inboard Halves - left engine blades.

Each heating period lasts approximately one-half minute.

EMERGENCY OPERATION

Abnormal operation of the propeller deice system is indicated by the circuit breaker popping out, or by the propeller deice switch tripping to the OFF position. Failure of the circuit breaker or switch to stay reset indicates that deicing is impossible for the propellers.

A reading below 14 amperes on the propeller deice ammeter indicates that the blades of the propeller are not being deiced uniformly.

WARNING

When uneven deicing of the propeller blades is indicated, it is imperative that the deice system be turned OFF. Uneven deicing of the blades can result in propeller unbalance and engine failure.

ELECTRIC WINDSHIELD

The electric windshield anti-ice system consists of an electrically heated element in the windshield, a function indicator light, a heat sensor, and a switch breaker.

The heat sensor cycles the power to the windshield, providing temperature control. The green function indicator light will illuminate during each cycle.

NORMAL OPERATION

To operate the electric windshield anti-ice system proceed as follows:

(1) Battery Switch - ON.
(2) Switch Breaker - ON.
(3) Indicator Light - Check.

EMERGENCY OPERATION

Abnormal operation of the windshield anti-ice system is indicated by the switch breaker tripping to the off position or failure of the indicator light to illuminate. Failure of the switch breaker to stay reset indicates that windshield anti-icing is impossible. If the indicator does not illuminate periodically, check the bulb by pressing the "PRESS TO TEST" button. A secondary means of checking proper windshield operation can be made by monitoring the ammeter. An increase in the ampere reading will be noted during each heating cycle.

PROPELLER SYNCHRONIZER

The Propeller Synchronizer matches propeller RPM of the two engines on the aircraft. The propeller RPM of the slave (right) engine will follow changes in RPM of the master (left) engine over a limited range. This limited range feature prevents the slave engine losing more than a fixed amount of propeller RPM in case the master engine is feathered with the synchronizer on. The synchronizer switch in the OFF position will automatically actuate the synchronizer to the center of its range before stopping, to insure that the control will function normally when next turned on. The system indicator light should light when the synchronizer switch is in the ON position.

In addition to maintaining propeller synchronization and elimination of the unpleasant audio beat accompanying unsynchronized operation, the propeller synchronizer can also provide a significant reduction in cabin vibration by maintaining an optimum angular or phase relationship between the two propellers.

With the propellers slightly out of synchronization so that an audio beat is obtained approximately once each 5 seconds, it should be noted that the vibration level of the cabin and instrument panel will increase and decrease at a rate of approximately once each 20 seconds. Optimum operation will be obtained by manually synchronizing the propellers and engaging the synchronizer during the period of minimum vibration. The angular relationship of the propellers should be maintained for extended periods of time unless disturbed by moderate atmospheric turbulence.

NOTE

- Manually synchronize the RPM of the engines prior to switching the propeller synchronizer system ON.

- The propeller synchronizer must be switched off during takeoff and landing and single-engine operation.

ECONOMY MIXTURE INDICATOR

The Cessna Economy Mixture Indicator is an exhaust gas temperature sensing device which is used to aid the pilot in selecting the most desirable fuel-air mixture for cruising flight at less than 75% power. Exhaust gas temperature (EGT) varies with the ratio of fuel-to-air mixture entering the engine cylinders.

OPERATING INSTRUCTIONS

(1) In takeoff and full power climb, lean mixture as indicated by altitude markings on the fuel flow indicator.

NOTE

Leaning in accordance with altitude markings on the fuel flow indicator will provide sufficiently rich mixture for engine cooling. Leaner mixtures are not recommended for climb power settings in excess of 75%.

(2) In level flight (or cruising climb at less than 75% power), lean the mixture to peak EGT, then enrichen, as desired, using Figure 7-1 as a guide.

NOTE

Changes in altitude, OAT or power settings require the EGT to be rechecked and the mixture reset.

MIXTURE DESCRIPTION	EXHAUST GAS TEMPERATURE	TAS LOSS FROM BEST POWER	RANGE INCREASE FROM BEST POWER
BEST POWER (Maximum Speed)	Peak Minus 75° F (enrichen)	0 MPH	0%
NORMAL LEAN (Owners Manual & Computer Performance)	Peak Minus 50° F (enrichen)	2 MPH	10%

Figure 7-1

NOTE

Operation at peak EGT is not authorized for normal continuous operation, except to establish peak EGT for reference. Operating leaner than peak EGT minus 50° F (enrichen) is not approved.

(3) Use rich mixture (or mixture appropriate for field elevation) in idle descents or landing approaches. Leaning technique for cruise descents may be with EGT reference method (at least every 5000 feet) or by simply enriching to avoid engine roughness, if numerous power reductions are made.

ELECTRIC ELEVATOR TRIM

The electric elevator trim system consists of an electrically operated drive motor and clutch assembly, which receives power through a momentary ON two way trim switch and an emergency disengage switch.

NORMAL OPERATION

To operate the electric elevator trim system proceed as follows:

(1) Battery Switch - ON.
(2) Elevator Trim Disengage Switch - ELEVATOR TRIM.
(3) Trim Switch - ACTUATE (AS DESIRED).
(4) Elevator Position Indicator - CHECK.

NOTE

To check the operation of the disengage switch, actuate the elevator trim switch with the disengage switch in the disengage position. Observe that the manual trim wheel and indicator do not rotate when the elevator trim switch is actuated.

EMERGENCY OPERATION

Electric Elevator Trim System Failure:

(1) Elevator Trim Disengage Switch - DISENGAGE.

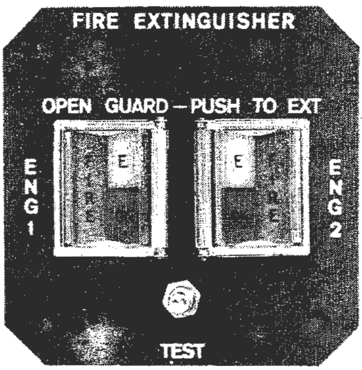
NOTE

The disengage switch removes all power from the system and places motor and clutch circuits to ground.

(2) Manual Trim - AS REQUIRED.

FIRE DETECTION AND EXTINGUISHING SYSTEM

The fire detection and extinguishing system consists of three major components: three heat sensitive detectors located in each engine accessory compartment; an annunciator and actuator panel (see Figure 7-2); and a compressed Freon single shot gas bottle in each engine accessory compartment.



Annunciation		
Legend	Color	Cause of Illumination
Fire	Red	Fire condition existing in engine compartment
E	Amber	Fire extinguisher container empty
OK	Green	Fire cartridge and associated wiring is in operational condition

Figure 7-2

A test function is provided to test the system circuitry. When the test switch is pushed all lights should illuminate, if any light fails to illuminate replace the bulb. If the green light does not illuminate after replacing the bulb, replace firing cartridge in fire extinguisher. Any other light failure, after replacing bulbs and firing cartridge, indicates malfunction in unit or associated wiring.

If an overheat condition is detected, the appropriate FIRE light will annunciate the engine to be extinguished. To activate the extinguisher, open the guard for the appropriate engine and press the FIRE light. Freon, under pressure, will be discharged to the engine and engine accessory compartments. The amber light E (Figure 7-2) will illuminate after the extinguisher has been discharged and will continue to show empty until a new bottle is installed. The FIRE light will remain illuminated until compartment temperatures cool.

OPERATING CHECKLIST

Normal Procedures

Before Takeoff

(1) Press the test switch - all lights should illuminate.

Emergency Procedures

If a fire warning light indicates an engine compartment fire and is confirmed or if a fire is observed without a fire warning light:

(1) Shut down the appropriate engine as follows:
  (a) Mixture control - IDLE CUT-OFF.
  (b) Propeller - FEATHER.
  (c) Magnetos - OFF.
  (d) Fuel selector - OFF.
  (e) Cowl flaps - CLOSED.
(2) Open the appropriate guard and push FIRE light.
(3) Land as soon as practical.

NOTE

Better results may be obtained if the airflow through the nacelle is reduced by slowing the aircraft (as slow as practical) prior to actuating the extinguisher.

SERVICING

The system should be checked each 100 hours or annual inspection, whichever occurs first.

Check the pressure gage on each bottle to ensure the following pressures:

PRESSURE TEMPERATURE CORRECTION TABLE										
Temp F°	-60	-40	-20	0	+20	+40	+60	+80	+100	+120
Gage	110	127	148	174	207	249	304	367	442	532
Actual	134	155	180	212	251	299	354	417	492	582

If these pressures are not indicated, have the bottle serviced.

LOCATOR BEACON

The locator beacon system is a sweep tone emergency radio transmitter incorporating a TEST and EMERGENCY switch, DISARM switch, "G" switch and battery pack all mounted in the dorsal fin. The TEST and EMERGENCY switch is primarily for troubleshooting and should normally be in the NORM position. The DISARM switch enables the beacon to be turned off externally after rescue and should also normally be in the NORM position. A red guarded EMER - NORM switch is located on the instrument panel and should normally be in the NORM position.

The system may be activated either automatically by the "G" switch or manually by switching the red guarded instrument panel switch to the EMER position. The system when acitvated by the panel switch will normally draw its power from the aircraft battery; however, if this supply is interrupted or exhausted, the unit will automatically switch to its internal batteries.

NOTE

> This battery pack should be changed on an annual basis.

NORMAL PROCEDURES

Before Takeoff

(1) Instrument Panel Switch - NORM.

EMERGENCY PROCEDURES

Before Landing

(1) Instrument Panel Switch - EMER.
(2) If time permits monitor 121.5 MHz for signal.

After Landing

(1) Test and Emergency Switch (located in dorsal fin) - ON.

After Rescue

(1) Disarm Switch (located in dorsal fin) - OFF.

AIR CONDITIONING SYSTEM

The air conditioning system consists of a belt driven rotary vane compressor located in the right-hand nacelle. The system is engaged by a magnetic clutch on the compressor. A by-pass valve is used to unload the compressor when less cooling is called for.

The system incorporates two evaporators, one just forward of the pilot and the other just aft of the aft cabin bulkhead on the left-hand side of the aircraft. Each evaporator has a blower. The forward evaporator blower supplies refrigerated air through the forward cabin air outlets and the defroster outlets. The aft evaporator blower supplies refrigerated air to the passengers via a centrally located overhead air chamber.

The system control panel is located on the instrument panel, and consists of two switches, a rheostat and a push-pull control. The system switch placarded COOL-OFF-CIRCULATE, controls the mode of operation. The blower switch placarded HIGH-LOW controls blower speed, the blowers operate whenever the system switch is in either the COOL or CIRCULATE mode. The temperature control rheostat placarded COOLER controls the temperature of the refrigerated air, clockwise rotation of the control lowers the air temperature. The push-pull control placarded PULL FOR A/C PUSH FOR HEAT controls the flow of refrigerated or heated air into the forward cabin air and defroster outlets.

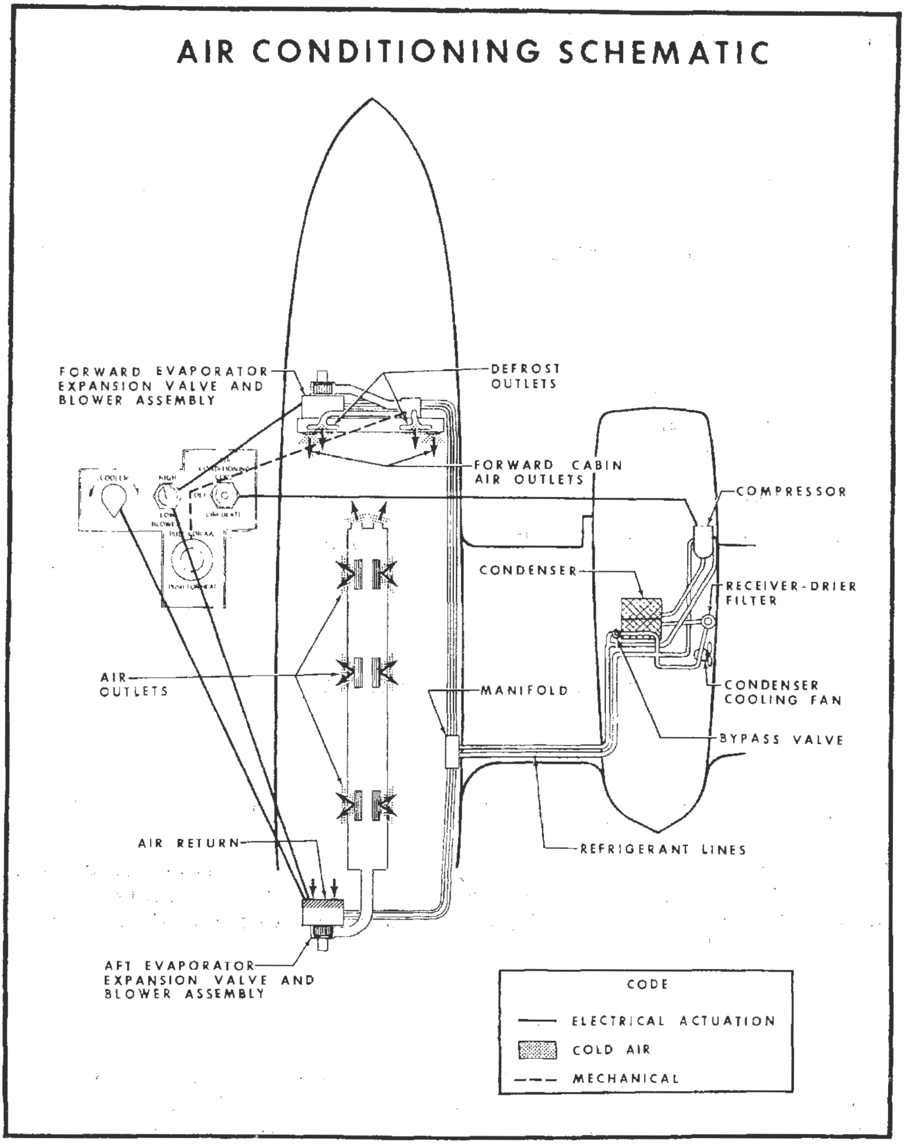

AIR CONDITIONING SCHEMATIC
FORWARD EVAPORATOR EXPANSION VALVE AND BLOWER ASSEMBLY
DEFROST OUTLETS
FORWARD CABIN AIR OUTLETS
COMPRESSOR
CONDENSER
RECEIVER-DRIER FILTER
AIR OUTLETS
MANIFOLD
CONDENSER COOLING FAN
BYPASS VALVE
AIR RETURN
REFRIGERANT LINES
AFT EVAPORATOR EXPANSION VALVE AND BLOWER ASSEMBLY
CODE
ELECTRICAL ACTUATION
COLD AIR
MECHANICAL

Figure 7-3

NORMAL PROCEDURES

Cooling

(1) Right-Hand Engine - START.
(2) Push-Pull Control - PULL.
(3) System Switch - COOL.
(4) Blower Switch - AS REQUIRED.
(5) Temperature Control - AS REQUIRED.

Circulation

(1) Push-Pull Control - PULL.
(2) System Switch - CIRCULATE.
(3) Blower Switch - AS REQUIRED.

LIMITATIONS

Must be OFF or CIRCULATE for takeoff, landing and one engine operation.

EMERGENCY PROCEDURES

(1) Engine Inoperative, Air Conditioner - OFF or CIRCULATE.

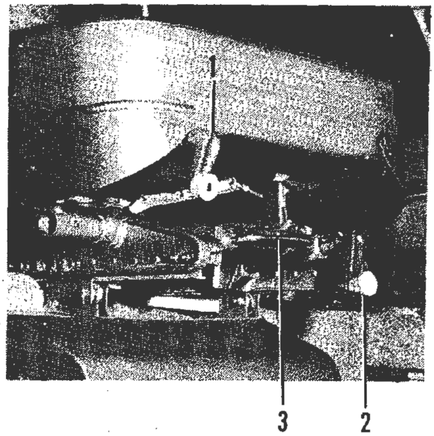
MANUAL AND ELECTRICAL ADJUSTABLE SEATS

The optional manually or electrically adjustable pilot's and copilot's seats are available to add to your flying comfort. Either of these seats may be adjusted fore and aft, vertically, and tilted to any desired position within the limits of the seat.

MANUALLY ADJUSTED SEAT CONTROLS

Controls for the optional manually adjustable seats are located at the forward side of the seat. Rotating the handcrank (1, Figure 7-4), at the forward right-hand corner of the seat, tilts the back. Rotating the handcrank (2, Figure 7-4), at the forward left-hand corner of the seat raises and lowers the seat. The fore and aft adjustment lever (3, Figure 7-4), is located at the forward side of the seat near the center. It is recommended that the seat be moved to the aft position prior to making tilt or vertical adjustments, to provide maximum handcrank clearance.

MANUALLY ADJUSTED SEAT CONTROLS



1. Tilt Adjustment Handcrank
2. Vertical Adjustment Handcrank
3. Fore and Aft Adjustment Lever

Figure 7-4

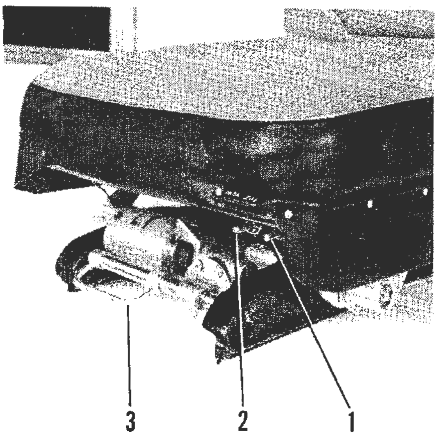
ELECTRICALLY ADJUSTED SEAT CONTROLS

Controls for the optional electrically adjustable seats are located at the forward side of the seat at the left-hand corner. Activating the left-hand switch (1, Figure 7-5), tilts the back. Activating the right-hand switch (2, Figure 7-5), raises and lowers the seat. The fore and aft adjustment lever (3, Figure 7-5), is located at the forward side of the seat near the center. Both engines should be started prior to making tilt or vertical adjustments to the seats to preclude excessive battery drain.

NOTE

It is recommended that the loads on seat backs and bottoms be partially relieved while making vertical or tilt adjustments.

ELECTRICALLY ADJUSTED SEAT CONTROLS



1. Tilt Activation Switch
2. Vertical Activation Switch
3. Fore and Aft Adjustment Lever

Figure 7-5.

ALPHABETICAL INDEX

D

E

F

G

H

V

W

SERVICING REQUIREMENTS

FUEL:

AVIATION GRADE - 100/130 MINIMUM (LOW LEAD FUELS ARE APPROVED FOR USE)
CAPACITY EACH MAIN TANK - 51 GALLONS
CAPACITY EACH AUXILIARY TANK - 20.5 GALLONS
CAPACITY EACH WING LOCKER TANK - 20.5 GALLONS

ENGINE OIL:

AVIATION GRADE - SAE 10W30 OR SAE 30 BELOW 40° F
SAE 50 ABOVE 40° F
(MULTI-VISCOSITY OIL WITH A RANGE OF SAE 10W30 IS RECOMMENDED FOR IMPROVED STARTING IN COLD WEATHER. DETERGENT OR DISPERSANT OIL. CONFORMING TO CONTINENTAL MOTORS SPECIFICATION MHS-24A MUST BE USED.)
CAPACITY EACH ENGINE - 13 QUARTS INCLUDING 1 QUART FOR OIL FILTER. (DO NOT OPERATE ON LESS THAN 9 QUARTS. FILL TO 10 QUART LEVEL FOR NORMAL FLIGHTS OF LESS THAN 3 HOURS. FILL TO CAPACITY FOR EXTENDED FLIGHTS.)
OIL FILTER ELEMENT - 6435683
ENGINE BREATHER SEPARATOR ELEMENT - 0850694-5

HYDRAULIC FLUID: MIL-H-5606A (RED)

OXYGEN:

AVIATOR'S BREATHING OXYGEN - MIL-O-27210
MAXIMUM PRESSURE -- 1800 PSI (EXCEPT WHEN FILLING)

TIRE PRESSURE:

MAIN WHEELS - 62 PSI
NOSE WHEEL - 40 PSI

VACUUM SYSTEM FILTER:

ELEMENT - STANDARD SYSTEM C294501-0103 }
OPTIONAL SYSTEM C294501-0203 } 402B0001 to 402B0101
STANDARD SYSTEM C294501-0301 }
OPTIONAL SYSTEM C294501-0302 } 402B0101 and On

WINDSHIELD DEICE FLUID:

ISOPROPYL ALCOHOL - MIL-F-5566 CAPACITY - 3.0 GALLONS

CESSNA

"TAKE YOUR CESSNA HOME
FOR SERVICE AT THE SIGN
OF THE CESSNA SHIELD".

CESSNA AIRCRAFT COMPANY
WICHITA, KANSAS