CESSNA

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

CESSNA AIRCRAFT COMPANY
WICHITA KANSAS

CESSNA

MORE PEOPLE BUY AND
FLY CESSNA AIRPLANES
THAN ANY OTHER MAKE

1969

THE WORLD'S LARGEST
PRODUCER OF GENERAL
AVIATION AIRCRAFT
SINCE 1956

MODEL 310

OWNER'S MANUAL

PERFORMANCE AND SPECIFICATIONS

GROSS WEIGHT	5200 lbs
SPEED: BEST POWER MIXTURE	
Maximum at Sea Level	237 mph
Maximum Recommended Cruise	
75% Power at 6500 ft.	222 mph
RANGE: NORMAL LEAN MIXTURE	
Maximum Recommended Cruise	
75% Power at 6500 ft.	777 mi
100 Gallons, No Reserve	3.55 hrs
	219 mph
75% Power at 6500 ft.	1086 mi
140 Gallons, No Reserve	4.96 hrs
	219 mph
75% Power at 6500 ft.	1395 mi
180 Gallons, No Reserve	6.37 hrs
	219 mph
Maximum Range at 10,000 ft.	
100 Gallons, No Reserve	966 mi
	5.4 hrs
	179 mph
140 Gallons, No Reserve	1351 mi
	7.55 hrs
	179 mph
180 Gallons, No Reserve	1739 mi
	9.71 hrs
	179 mph
RATE OF CLIMB AT SEA LEVEL:	
Twin Engine	1540 fpm
Single Engine	330 fpm
SERVICE CEILING:	
Twin Engine	19,900 ft
*Single Engine	6850 ft
TAKEOFF PERFORMANCE: Takeoff Speed 89 MPH	
Ground Run	1451 ft
Total Distance over 50 ft. obstacle	1716 ft
LANDING PERFORMANCE: Approach Speed 102 MPH	
Landing Roll	558 ft
Total Distance over 50 ft. obstacle	1673 ft
EMPTY WEIGHT (Approximate)	3170 lbs
BAGGAGE ALLOWANCE:	600 lbs
WING LOADING:	29.1 lbs/sq ft
POWER LOADING:	10.0 lbs/hp
FUEL CAPACITY: Total	
Standard	102 gal
Optional Auxiliary Tanks	143 gal
Optional Auxiliary and Wing Locker Tanks	184 gal
OIL CAPACITY: Total	6.5 gal
POWER: Two Continental, 6-Cylinder, Fuel Injection, IO-470-V-O Engines, 260 Rated Horsepower at 2625 rpm	
PROPELLER: Constant Speed, Full Feathering	
Two Bladed, 81" Dia.	D2AF34C71/84JF-3

*Single Engine Service Ceiling increases 425 feet each 30 minutes of flight.

SERVICING REQUIREMENTS

310P

FUEL:

AVIATION GRADE -- 100/130 MINIMUM
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 30 OR SAE 10W30 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. THE AIRCRAFT IS DELIVERED FROM THE FACTORY WITH STRAIGHT MINERAL OIL.)
CAPACITY EACH ENGINE SUMP -- 12 QUARTS EXCLUDING OIL FILTER
(DO NOT OPERATE ON LESS THAN 9 QUARTS. FILL TO 10 QUART LEVEL FOR NORMAL FLIGHTS OF LESS THAN 3 HOURS, AND FILL TO CAPACITY IF EXTENDED FLIGHT IS PLANNED. IF OPTIONAL OIL FILTER IS INSTALLED, ONE ADDITIONAL QUART IS REQUIRED WHEN THE FILTER ELEMENT IS CHANGED.)
OPTIONAL OIL FILTER ELEMENT -- C294505-0102

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 -- 60 PSI
NOSE WHEEL -- 24 PSI

VACUUM AIR FILTER:

ELEMENT -- C294501-0203

WARRANTY

The Cessna Aircraft Company ("Cessna") warrants each new aircraft manufactured by it, and all new aircraft equipment and accessories, including Cessna-Crafted Electronics (as herein defined), and all new service parts for such aircraft, aircraft equipment and accessories sold by it, to be free from defects in material and workmanship under normal use and service for a period of six (6) months after delivery to the original retail purchaser or first user in the case of aircraft, aircraft equipment and accessories (except Cessna-Crafted Electronics as herein defined) and service parts therefor, and for a period of one (1) year after such delivery in the case of Cessna-Crafted Electronics (which term includes all communication, navigation and autopilot systems bearing the name "Cessna", beginning at the connection to the aircraft electrical system (bus bar) and including "black boxes", antennas, microphones, speakers and other components and associated wiring but excluding gyro instruments used in connection with autopilot and navigation systems) and service parts therefor.

Cessna's obligation under this warranty is limited to repairing or replacing, at its option, any part or parts which, within the applicable six (6) or twelve (12) months period as above set forth, shall be returned transportation charges prepaid to Cessna at Wichita, Kansas, or to any Cessna appointed or Cessna Distributor appointed dealer authorized by such appointment to sell the aircraft, equipment, accessories and service parts of the type involved and which upon examination shall disclose to Cessna's satisfaction to have been thus defective. (A new warranty period is not established for replacements. Replacements are warranted for the remainder of the applicable six (6) or twelve (12) months original warranty period). The repair or replacement of defective parts under this warranty will be made by Cessna or the dealer without charge for parts, or labor for removal, installation and/or actual repair of such defective parts. (Locations of such dealers will be furnished by Cessna on request).

The provisions of this warranty do not apply to any aircraft, equipment, accessories (including Cessna-Crafted Electronics) or service parts therefor manufactured or sold by Cessna which have been subject to misuse, negligence, or accident, or which shall have been repaired or altered outside of Cessna's factory in any way so as in the judgment of Cessna to affect adversely its performance, stability and reliability, nor to normal maintenance services (such as engine tune up, cleaning, control rigging, brake and other mechanical adjustments, maintenance inspections, etc.) and the replacement of service items (such as spark plugs, brake linings, filters, hoses, belts, tires, etc.) made in connection with such services or required as maintenance, nor to normal deterioration of soft trim and appearance items (such as paint, upholstery, rubber-like items, etc.) due to wear and exposure.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED IN FACT OR BY LAW, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AND OF ANY OTHER OBLIGATION OR LIABILITY ON THE PART OF CESSNA TO ANYONE OF ANY NATURE WHATSOEVER BY REASON OF THE MANUFACTURE AND/OR SALE OR THE USE OF SUCH AIRCRAFT PRODUCTS, INCLUDING LIABILITY FOR CONSEQUENTIAL OR SPECIAL DAMAGES, AND CESSNA NEITHER ASSUMES NOR AUTHORIZES ANYONE TO ASSUME FOR IT ANY OTHER OBLIGATION OR LIABILITY IN CONNECTION WITH SUCH AIRCRAFT PRODUCTS.

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 Model 310P. It contains information about your Cessna's equipment, operating procedures, 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. World-wide, the Cessna Dealer Organization, backed up by the Cessna Service Department, stands ready to serve you. The following services are offered by most Cessna Dealers:

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.

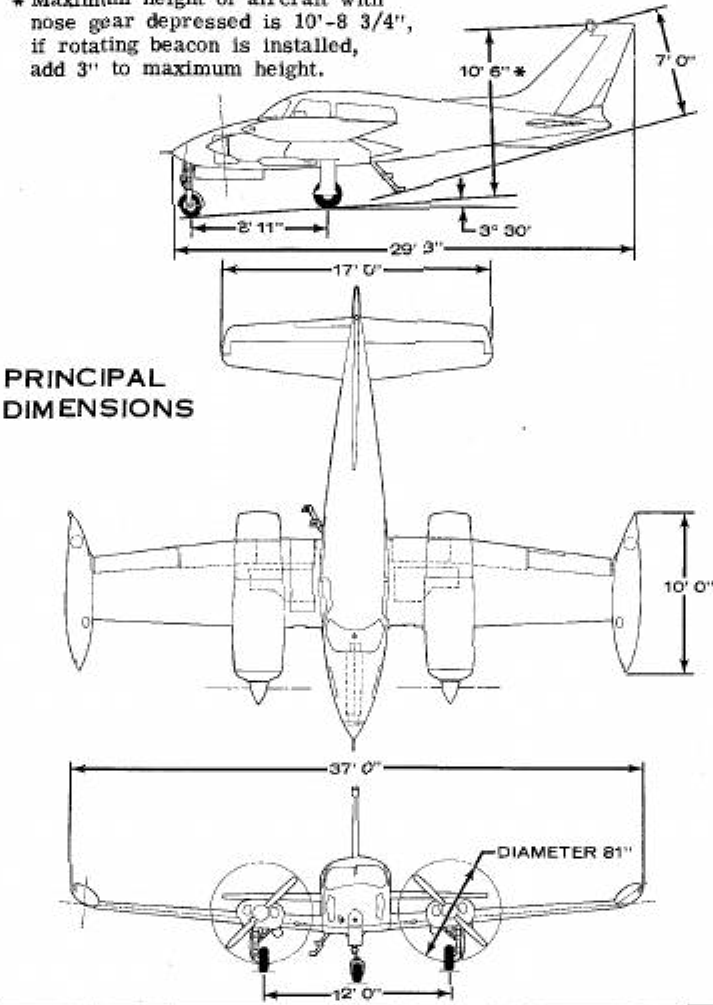
A STOCK OF GENUINE CESSNA SERVICE PARTS on hand when you need them.

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.

We urge all Cessna owners to use the Cessna Dealer Organization to the fullest.

A current Cessna Dealer Directory accompanies your new aircraft. The Directory is revised frequently, and a current copy can be obtained from your Cessna Dealer. Make your Directory one of your cross-country flight planning aids; a warm welcome awaits you at every Cessna Dealer.

* Maximum height of aircraft with nose gear depressed is 10'-8 3/4", if rotating beacon is installed, add 3" to maximum height.



PRINCIPAL DIMENSIONS

T

V

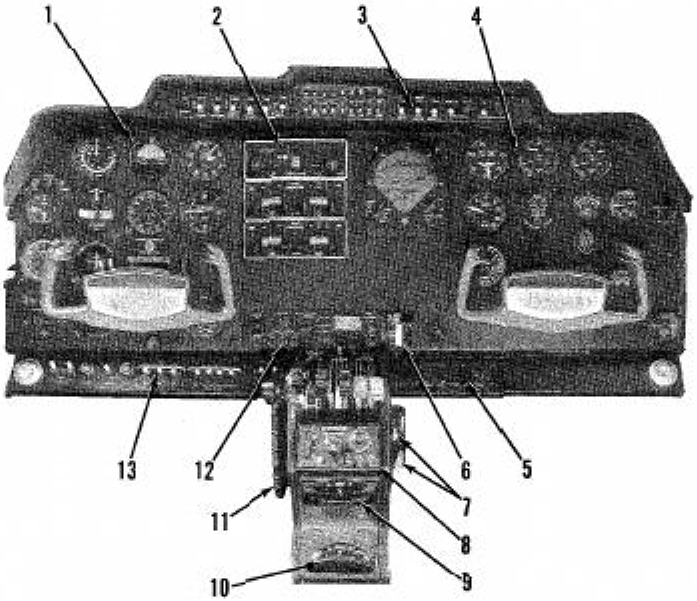
W

TABLE OF CONTENTS

310P

Page

INSTRUMENT PANEL



1. FLIGHT INSTRUMENT GROUPING
2. RADIO COMMUNICATION AND NAVIGATION CONTROL PANEL (OPTIONAL)
3. GLARE SHIELD SWITCH PANEL
4. ENGINE INSTRUMENT GROUPING
5. HEATER AND CABIN AIR CONTROL PANEL
6. FLAP POSITION SWITCH
7. ALTERNATE AIR CONTROL HANDLES
   AUTOPILOT CONTROL HEAD (OPTIONAL)
9. RUDDER TRIM TAB CONTROL WHEEL
10. AILERON TRIM TAB CONTROL WHEEL
11. ELEVATOR TRIM TAB CONTROL WHEEL
12. LANDING GEAR POSITION SWITCH
13. LEFT HAND SWITCH PANEL

G

H

I

L

M

N

SECTION I
OPERATING CHECKLIST

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

Section I lists, in Pilot's 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.

MAKE AN EXTERIOR INSPECTION IN ACCORDANCE WITH FIGURE 1-1.

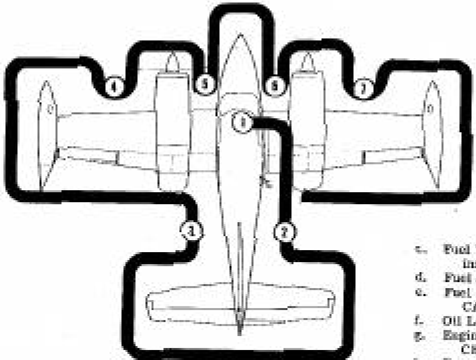
BEFORE STARTING THE ENGINES

(1) Preflight Inspection - COMPLETE.
(2) Control Lock - OFF.
(3) Seats and Safety Belts - ADJUST and LOCK.
(4) Landing Gear Switch - Check DOWN.
(5) Alternate Air Controls - Check IN.
(6) Emergency Power Switch - OFF.
(7) Voltage Regulator Switch - MAIN.
(8) Battery and Alternators - ON.

NOTE

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

EXTERIOR INSPECTION



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. Battery Switch - OFF
   i. Left Fuel Selector - LEFT MAIN (feel for detent)
   j. Right Fuel Selector - RIGHT MAIN (feel for detent)
   k. Trim Tab Controls (3) - NEUTRAL
   l. Oxygen - CHECK QUANTITY MASKS and HOSES - OFF

2. a. Baggage Door - SECURE
   b. Static Port - CLEAR
   c. Control Surface Lock - REMOVE
   d. Tie Down - REMOVE
   e. Static Port - CLEAR

3. a. Wing Locker Baggage Door - SECURE
   b. Battery Compartment Cover - SECURE
   c. Flap - CHECK SECURITY and ATTACHMENT
   d. Fuel Sump (Wing Locker Tank) - DRAIN, if installed
   e. Control Surface Lock - REMOVE
   f. Aileron and Tab - CHECK CONDITION and FREEDOM OF MOVEMENT
   g. Fuel Sump (Main Tank) - DRAIN
   h. Fuel Vent and Sniffle Valve - CLEAR
   i. Fuel Quantity (Main Tank) - CHECK, CAP SECURE
   j. Stall Warning Vane - CHECK FREEDOM OF MOVEMENT
   k. Wing Tie Down - REMOVE

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

5. a. Nose Access Panel - SECURE
   b. Nose Gear, Strut, Doors and Tire - CHECK
   c. Pitot Cover - REMOVE, if installed, Pitot Tube - CLEAR
   d. Tie Down - REMOVE
   e. Heater Inlet - CLEAR
   f. Nose Access Panel - SECURE

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

7. a. Wing Tie Down - REMOVE
   b. Fuel Quantity (Main Tank) - CHECK, CAP SECURE
   c. Fuel Vent and Snifle Valve - CLEAR
   d. Fuel Sump (Main Tank) - DRAIN
   e. Aileron - CHECK CONDITION and FREEDOM OF MOVEMENT
   f. Control Surface Lock - REMOVE
   g. Fuel Sump (Wing Locker Tank) - DRAIN, if installed
   h. Flap - CHECK, SECURITY and ATTACHMENT.
   i. Wing Locker Baggage Door - SECURE

Figure 1-1

ALPHABETICAL INDEX

A

B

C

(8) Alternators -- Check.
(9) Regulators -- Check.
(10) Radios -- ON.
(11) Flaps -- Retract.

STARTING ENGINES (Left Engine First)

WITH EXTERNAL POWER SOURCE

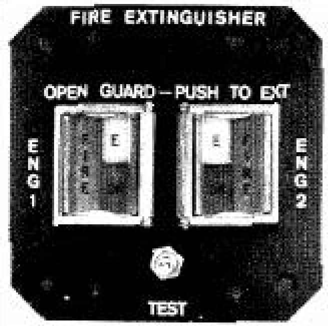
(1) Battery and Alternator Switches -- OFF.
(2) External Power Source -- Plug in.
(3) Propeller -- CLEAR.
(4) Magneto Switches -- ON.
(5) Left Engine -- START.
  (a) Starter Switch -- PRESS.
  (b) Primer Switch -- Left Engine - LEFT.
  Right Engine - RIGHT.

NOTE

- If the primer switch is actuated longer than two or three seconds with the engine inoperative on the ground, damage may be incurred to the engine and/or aircraft due to excessive fuel accumulation.
- During very hot weather, caution should be exercised to prevent overpriming the engines. If there is an indication of vapor in the fuel system (fluctuating fuel flow) with engines running, place the auxiliary fuel pump switch to the LOW position until the system is purged.

(6) Auxiliary Fuel Pumps -- LOW.
(7) Throttle -- 1000 to 1200 RPM.
(8) 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.
(9) Right Engine - START (repeat steps 3 through 8).
(10) External Power Source - UNPLUG.
(11) Battery and Alternator Switches - ON.
(12) Alternators -- Check.
(13) Regulators -- Check.
(14) Radios -- ON.

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 7-5

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 7-5) 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

Before Takeoff

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

WITH WEATHER RADAR INSTALLED

NORMAL STATIC SOURCE

AIRSPEED CORRECTION TABLE

Gear Position Flap Position MPH-CAS	Up 0° MPH-IAS	Down 15° MPH-IAS	Down 35° MPH-IAS
80	69	70	73.5
100	95.5	95.5	97.5
120	117	117	118
140	137.5	137.5	139
160	157.5	158	160
180	178	178.5	
200	198		
220	218		
240	238		

ALTERNATE STATIC SOURCE AIRSPEED CALIBRATIONS

	Pilot's Storm Window Closed Heater Vents "on" or "off"			Pilot's Storm Window Open Heater Vents "on" or "off"		
Gear Position Flap Position MPH-CAS	**Up 0° MPH-IAS**	**Down 15° MPH-IAS**	**Down 35° MPH-IAS**	**Up 0° MPH-IAS**	**Down 15° MPH-IAS**	**Down 35° MPH-IAS**
80	67	71	75	81.5	85	89.5
100	95	97.5	100.5	109.5	112	115
120	118	122.5	122	133	135	136
140	140.5	145	144.5	155	156.5	158.5
160	162	168	167	176.5	179	181
180	184	190.5		199.5	201	
200	206			221		
220	227.5			243		
240	248.8			264.5		

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 7-5);

(15) Flaps -- Retract.

BEFORE TAKEOFF

(1) Parking Brake -- SET.
(2) Throttle Settings -- 1700 RPM.
(3) Alternators -- Check.
(4) Magnetos -- Check (150 RPM maximum drop with a maximum differential of 50 RPM).
(5) Propellers -- Check feathering to 1200 RPM; return to high RPM (full forward position).
(6) Vacuum Source -- Check source and suction (4.75 to 5.25 inches of mercury).
(7) Oil Temperature -- Check green arc.

NOTE

It is important that the engine oil temperature be within the normal operating range prior to applying takeoff power.

(8) If Electrical Gyro is installed, Gyro Power Fail Light Out -- Check.
(9) Trim Tabs - SET.
(10) Alternate Air Controls -- Check in.
(11) Wing Flaps -- 0°.
(12) Flight Controls -- Check (free and correct).
(13) Cabin Door and Windows -- Closed and locked.
(14) Flight Instruments and Radios -- SET.
(15) Engine Instruments -- Check.
(16) Parking Brake -- Released.

TAKEOFF

NORMAL TAKEOFF

(1) Auxiliary Fuel Pumps -- ON.
(2) Power -- Full throttle and 2625 RPM.

NOTE

Apply full throttle smoothly to avoid propeller surging.

(3) Mixtures -- Lean for field elevation.

NOTE

Leaning during the takeoff roll is normally not necessary; however, should maximum takeoff or subsequent engine-out performance be desired, fuel flow should be adjusted to match field elevation.

(4) Elevator Control - Raise nosewheel at 90 MPH IAS.
(5) Minimum Control Speed - 85 MPH IAS.
(6) Break Ground at 105 MPH IAS.
(7) Brakes -- Apply momentarily.
(8) Landing Gear -- Retract.
(9) Climb Speed -- 122 MPH IAS (best twin- engine rate-of-climb speed). (Set up climb speed as shown in "NORMAL CLIMB" paragraph.)
(10) Auxiliary Fuel Pumps -- OFF.

MAXIMUM PERFORMANCE TAKEOFF

(1) Auxiliary Fuel Pumps -- ON.
(2) Wing Flaps -- 15°.
(3) Power -- Full throttle and 2625 RPM.
(4) Elevator Control - Raise nosewheel at 84 MPH IAS.
(5) Minimum Control Speed - 85 MPH IAS.
(6) Break Ground at 89 MPH IAS -- Hold speed until all obstacles are cleared.
(7) Brakes -- Apply momentarily.
(8) Landing Gear -- Retract.
(9) Flaps -- Retract (after obstacles are cleared).
(10) Auxiliary Fuel Pumps -- OFF.

CLIMB

NORMAL CLIMB

(1) Airspeed -- 130-150 MPH IAS.
(2) Power -- 24 inches Hg. and 2450 RPM.
(3) Mixtures -- Adjust to climb fuel flow.
(4) Auxiliary Fuel Pumps -- ON (above 12,000 feet altitude to minimize vapor formation).

WITHOUT WEATHER RADAR INSTALLED

NORMAL STATIC SOURCE

AIRSPEED CORRECTION TABLE

Gear Position Flap Position MPH-CAS	Up 0° MPH-IAS	Down 15° MPH-IAS	Down 35° MPH-IAS
80	74	87	73
100	98	95.5	98
120	119	118	119.5
140	138.5	138.5	140
160	158.5	159	160
180	178.5	179.5	
200	198.5		
220	218		
240	238		

ALTERNATE STATIC SOURCE AIRSPEED CALIBRATIONS

	Pilot's Storm Window Closed Heater Vents "on" or "off"			Pilot's Storm Window Open Heater Vents "on" or "off"		
Gear Position Flap Position MPH-CAS	Up 0° MPH-IAS	Down 15° MPH-IAS	Down 35° MPH-IAS	Up 0° MPH-IAS	Down 15° MPH-IAS	Down 35° MPH-IAS
80	72	68	74.5	86.5	82	89
100	97.5	98.5	101	112	112	115.5
120	120	123.5	123.5	135	136	137.5
140	141.5	146	145.5	156	157.5	159.5
160	163	169	167	177.5	180	181
180	184.5	191.5		200	202	
200	206.5			221.5		
220	227.5			243		
240	248.8			264.5		

WITH WEATHER RADAR INSTALLED

When the optional weather radar is installed, the standard pitot head is deleted and only the two side pitot heads are installed. In this configuration both the pilot and copilot's airspeed indicators are connected to the optional pitot heads. The airspeed calibrations with this configuration are shown in the following tables.

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
5200	102	558	1673	601	1716	647	1762	699	1814
4800	98	468	1583	504	1619	543	1656	586	1701
4400	93	386	1501	416	1531	448	1563	484	1599

NOTE: WING FLAPS 35°, POWER OFF, HARD SURFACE RUNWAY, ZERO WIND MAXIMUM BRAKING EFFORT. REDUCE LANDING DISTANCE 10% for FOR EACH 10 MPH HEADWIND.

NOTE: INCREASE DISTANCE BY 25% OF GROUND RUN FOR OPERATION ON FIRM DRY SOD RUNWAYS.

Figure 6-12

(2) Move throttles forward until maximum manifold pressure is reached.
(3) Readjust mixture control 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 inadvertantly 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 resulting dive with smooth, steady control presure.

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.

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-to-test. If the bulb is burned out, it can be replaced with the bulb from either the compass light, turn-and-bank test light, or the landing gear up (amber) indicator light.

A simple last-minute recheck on final approach should confirm that all switches are ON, the gear-down indicator lights (green) are illuminated, and the propeller pitch levers and mixture levers 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

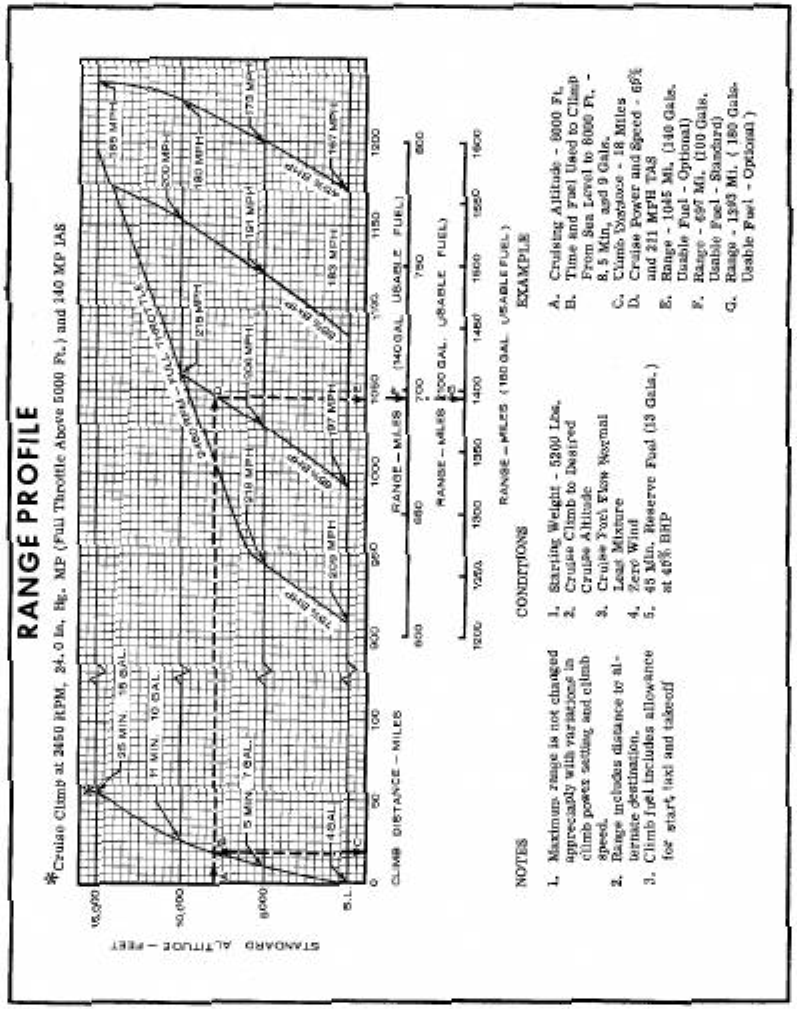


Figure 6-11

CRUISE PERFORMANCE WITH NORMAL LEAN MIXTURE AT 15,000 FT

RPM	MP	%BHP	TAS	Total Gal/Hr	Endurance 100 GAL	Range 100 GAL	Endurance 140 GAL	Range 140 GAL	Endurance 180 GAL	Range 180 GAL
2450	16	33	196	20.2	5.0	972	6.9	1358	8.9	1746
	15	40	183	18.7	5.4	979	7.5	1371	9.6	1762
	14	44	168	17.3	5.8	972	8.1	1359	10.4	1747
2300	16	40	183	18.7	5.4	979	7.5	1371	9.6	1762
	15	44	165	17.3	5.8	952	8.1	1335	10.4	1716
2200	16	44	168	17.3	5.8	972	8.1	1359	10.4	1747

CRUISE PERFORMANCE IS BASED ON STANDARD CONDITIONS, ZERO WIND, NORMAL LEAN MIXTURE, 100, 140 AND 180 GALLONS OF FUEL (NO RESERVE), AND 5200 POUNDS GROSS WEIGHT.

NOTE: See Range Profile, Figure 6-11, for range including climb.

CRUISE PERFORMANCE WITH NORMAL LEAN MIXTURE AT 20,000 FT

RPM	MP	%BHP	TAS	Total Gal/Hr	Endurance 100 GAL	Range 100 GAL	Endurance 140 GAL	Range 140 GAL	Endurance 180 GAL	Range 180 GAL
2450	13.5	46	171	18.0	5.6	949	7.8	1330	10.0	1700

CRUISE PERFORMANCE IS BASED ON STANDARD CONDITIONS, ZERO WIND, NORMAL LEAN MIXTURE, 100, 140 AND 180 GALLONS OF FUEL (NO RESERVE), AND 5200 POUNDS GROSS WEIGHT.

Figure 6-10 (Sheet 3 of 3)

"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 35° flaps from 102 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 flaps switch is identified before placing it in the UP position. The auxiliary fuel pump switches normally are turned to LOW while taxiing to the hangar. The fuel pumps must be turned off prior to stopping 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

TWIN ENGINE CLIMB DATA AT 5200 POUNDS

MAXIMUM CLIMB PERFORMANCE

SEA LEVEL 59°F			5000 FT. 41°F			10,000 FT. 23°F			15,000 FT. 5°F			20,000 FT. -12°F		
Best Climb IAS MPH	Rate of Climb Ft/Min	Gal 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
122	1542	4	121	1178	6.3	120	818	9.0	119	458	12.7	118	93	20.5

NOTE: FULL THROTTLE, 2625 RPM, MIXTURE AT RECOMMENDED FUEL FLOW, FLAPS AND GEAR UP. FUEL USED INCLUDES WARM-UP AND TAKEOFF ALLOWANCE

DECREASE RATE OF CLIMB 20FT/MIN FOR EACH 10° F ABOVE STANDARD TEMPERATURE FOR A PARTICULAR ALTITUDE.

CRUISE CLIMB PERFORMANCE

2450 RPM, 24"MP to 5000 FT.
FULL THROTTLE AFTERWARDS

POWER SETTING		Climb IAS MPH	5000 FT. 41°F			10,000 FT. 23°F			15,000 FT. 5°F		
			FROM SEA LEVEL			FROM SEA LEVEL			FROM SEA LEVEL		
RPM	M.P.		Dist. Miles	Time Min.	Fuel Used Gal.	Dist. Miles	Time Min.	Fuel Used Gal.	Dist. Miles	Time Min.	Fuel Used Gal.
2450	24	140	11.0	4.8	6.5	25.9	11.3	9.7	56.4	24.7	15.0

NOTE: WARM-UP AND TAKEOFF ALLOWANCE 4 GALLONS AT SEA LEVEL. MIXTURE AT RECOMMENDED FUEL FLOW, FLAPS AND GEAR UP.

Figure 6-6

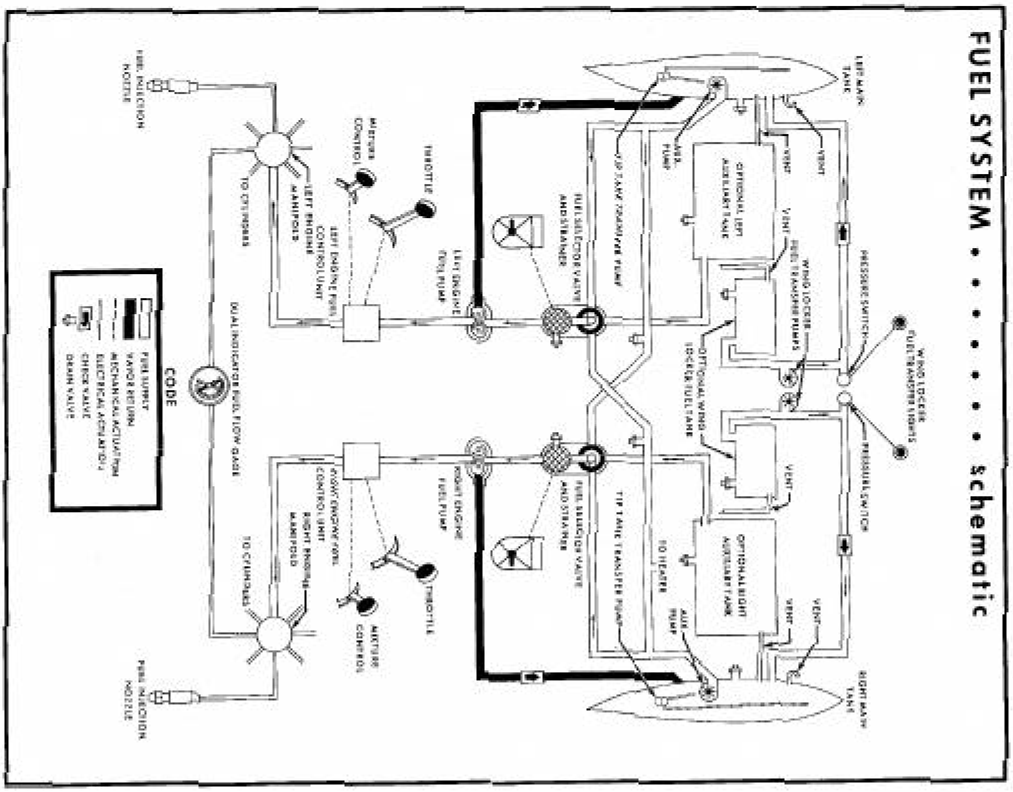


Figure 2-2

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 emergency.

When fuel selector valve handles are changed from one position to another, the auxiliary fuel pumps should be switched to low, the mixture should be in FULL RICH and the pilot should feel for the detent to insure that fuel selector valve is properly positioned.

AUXILIARY FUEL PUMP SWITCHES

The LOW position runs the pumps at low speed, providing 6 gallons per hour fuel flow for 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. The auxiliary fuel pump will not run in any position unless the engine oil pressure on that side is at least 20 PSI.

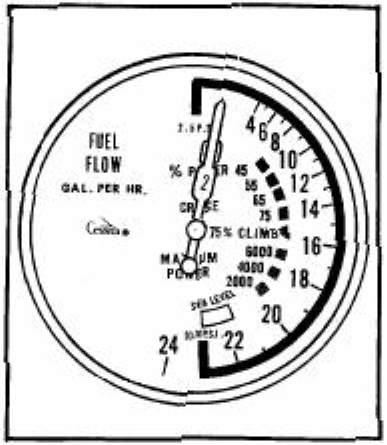


Figure 2-3

NOTE

If the auxiliary fuel pump switches are positioned to ON longer than two or three seconds with the engines inoperative, on the ground, the engines and/or aircraft may be damaged due to excessive fuel accumulations.

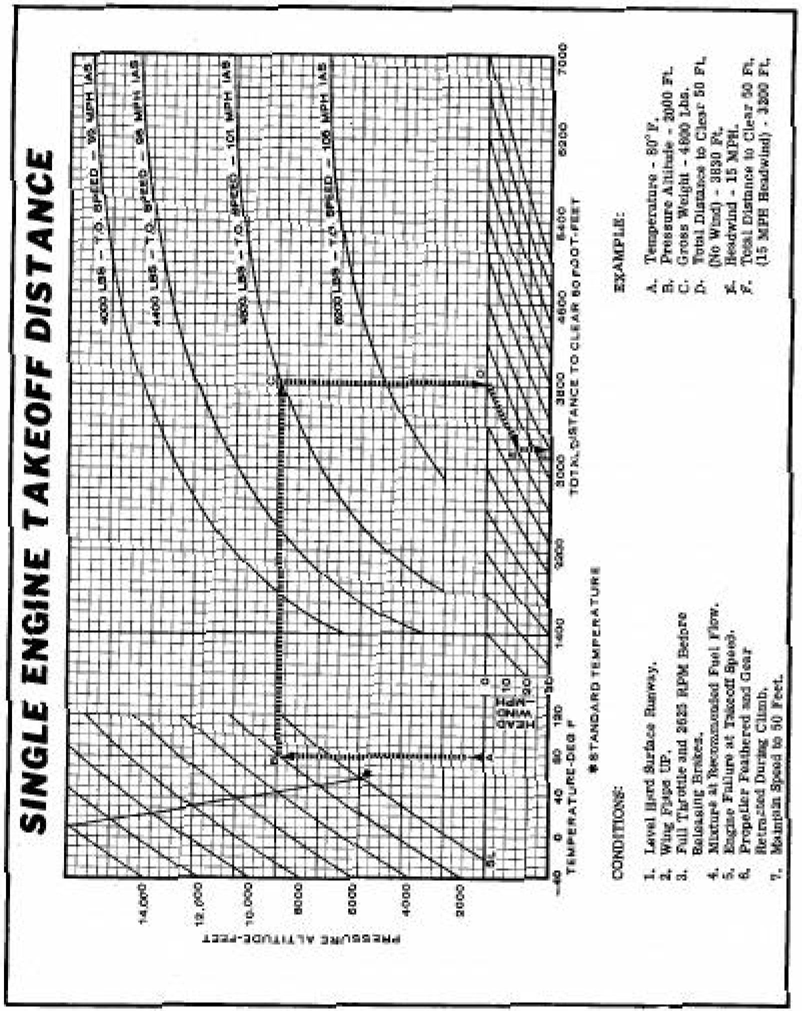


Figure 6-5

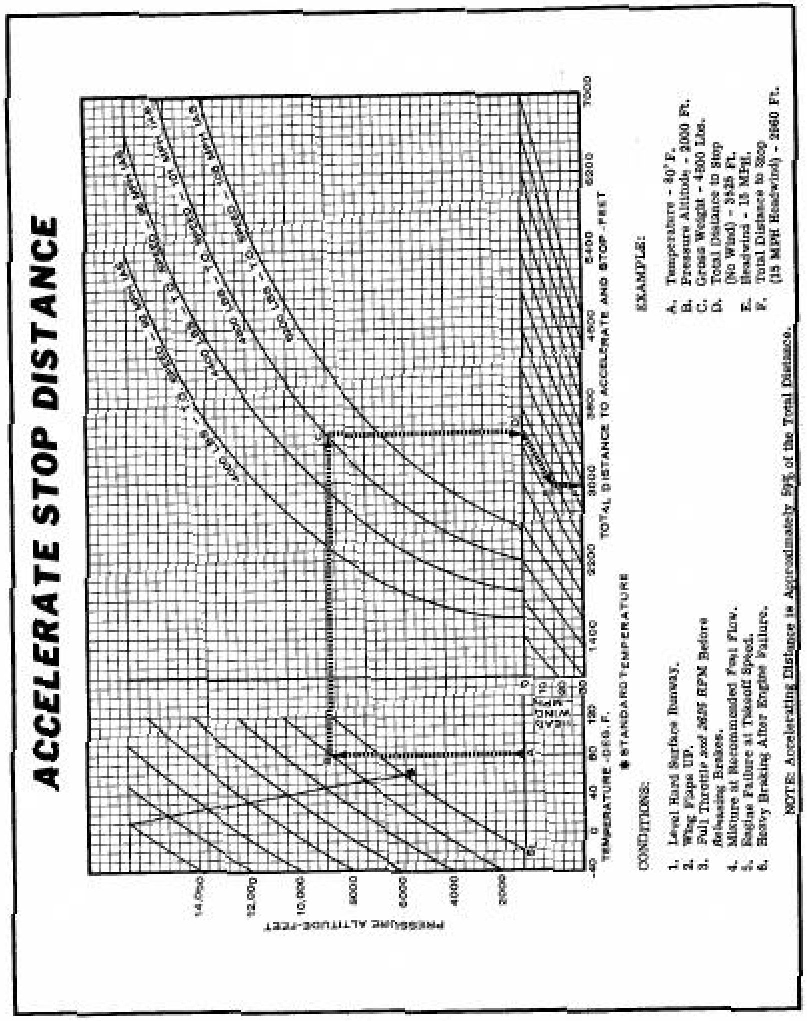


Figure 6-4

FUEL FLOW GAGE

The fuel flow gage is a dual instrument which indicates the approximate fuel consumption of each engine in gallons per hour. The fuel flow gage used with the Continental injection system senses the pressure at which fuel is delivered to the engine spray nozzles. Since fuel pressure at this point is approximately proportional to the fuel consumption of the engine, the gage is marked as a flowmeter.

The gage dial is marked with arc segments corresponding to proper fuel flow for various power settings and is used as a guide to quickly set the mixtures. The gage has markings for takeoff, climb and cruise power settings for various altitudes. The takeoff and climb markings indicate maximum performance mixtures for maximum power available for altitudes shown (2625 RPM and full throttle), making it practical to lean the mixtures on a high-altitude takeoff.

In the cruise power range, normal lean mixtures are attained when the fuel flow pointers cover the green segment for that percentage of power. In the takeoff and climb range, each segment represents a maximum-power mixture for an altitude range; the low flow edge is the setting for the marked altitude and the high flow edge is the setting for a thousand feet lower. The sea level segment represents the range for maximum rated power at sea level.

NOTE

> The fuel flow settings on the takeoff and climb power segments of the dial are for 2625 RPM and full throttle, only. Climb power settings at lower RPM should be taken from the Cessna 310 Power Computer.

FUEL QUANTITY INDICATOR

The fuel quantity indicators are calibrated in pounds and will accurately indicate the weight of fuel contained in the tanks. Since fuel density varies with temperature, a full tank will weigh more on a cold day than on a warm day. This will be reflected by the weight shown on the gage. A gallons scale is provided in blue on the indicator for convenience in allowing the pilot to determine the approximate volume of fuel on board.

FUEL STRAINER AND TANK SUMP DRAINS

Refer to LUBRICATION AND SERVICING PROCEDURES, Section V.

SUPPLEMENTARY INFORMATION CONCERNING ENGINE-OUT DURING TAKEOFF

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

The airspeed indicator is marked with a Red radial line at the minimum single-engine control speed and a Blue 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)	85
(2) Recommended Safe Single-Engine Speed	105
(3) Best Single-Engine Angle-of-Climb Speed	105
(4) Best Single-Engine Rate-of-Climb Speed (Flaps Up) (blue radial)	111

Figure 3-1.

MINIMUM SINGLE-ENGINE CONTROL SPEED. The twin-engine aircraft must reach the minimum control speed (85 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. A more suitable recommended safe single-engine speed is 105 MPH IAS since at this speed, altitude can be maintained more easily while the landing gear is being retracted and the propeller is being feathered.

BEST SINGLE-ENGINE ANGLE-OF-CLIMB SPEED. The best angle-of-climb speed for single-engine operation becomes important when there are obstacles ahead on takeoff, because once the best single-engine angle-of-climb speed is reached, altitude becomes more important than airspeed until the obstacle is cleared. The best single-engine angle-of-climb speed

SECTION V
CARE OF THE AIRCRAFT

If your aircraft is to retain that new-plane performance and dependability, certain inspection and maintenance requirements must be followed. It is wise to follow a planned schedule of lubrication and preventive maintenance based on climatic and flying conditions encountered in your locality.

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

MAA IDENTIFICATION PLATE

All correspondence concerning your Cessna should include the aircraft model and serial number. This information may be obtained from the FAR required MAA (Manufacturers Aircraft Association) plate located just above floor level on the left-hand upholstery panel forward of the main cabin door. Refer to the aircraft Service Manual for an illustrated breakdown of the MAA plate.

GROUND HANDLING

The aircraft should be moved on the ground with the aid of the nose wheel towing bar provided with each aircraft. The tow bar is designed to attach to the nose gear strut fork. Do not tow by tail tie-down fitting.

NOTE

> Remove all rudder locks before ground handling to prevent possible damage to the rudder interconnect pulley bracket. When using the tow bar, never exceed the nose wheel turning radius limits of 55° either side of center. Structural damage may occur if the turn limits are exceeded. Do not push or pull on propellers or control surfaces when moving the aircraft on the ground.

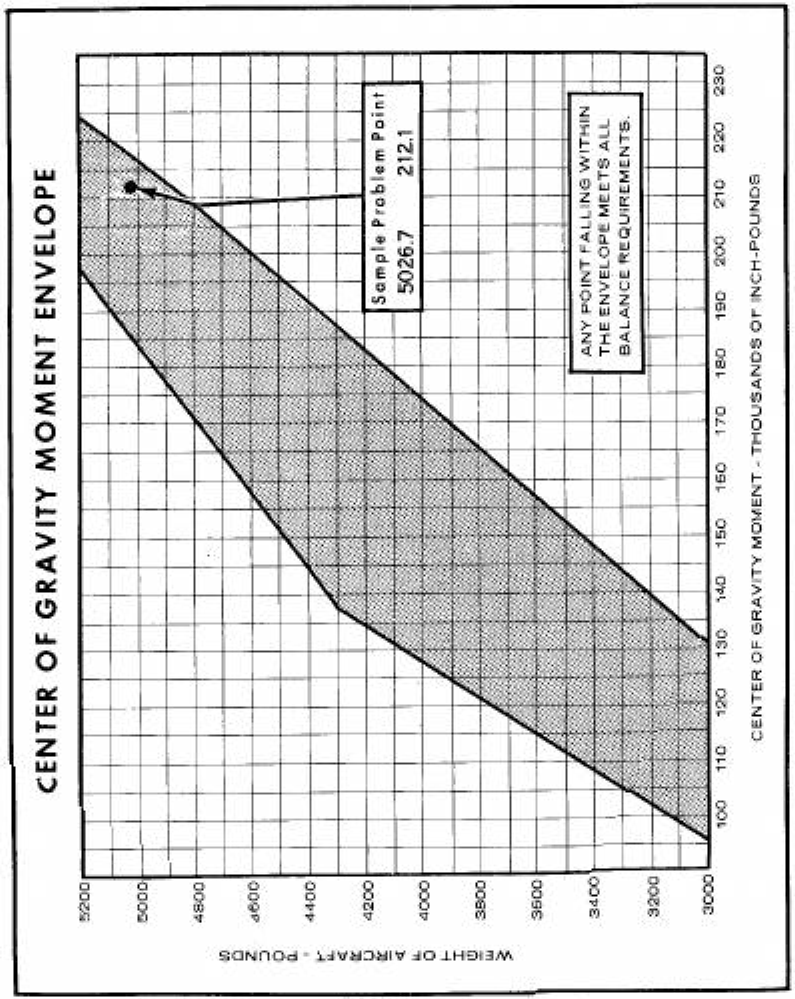


Figure 4-3

is approximately 105 MPH IAS with flaps up.

BEST SINGLE-ENGINE RATE-OF-CLIMB SPEED (FLAPS UP). The best rate-of-climb speed for single-engine operation becomes important when there are no obstacles ahead on takeoff, or when it is difficult to maintain or gain altitude in single-engine emergencies. The best single-engine rate-of-climb speed is 111 MPH IAS with flaps up below 16,000 feet. This speed is indicated by a blue radial line on the airspeed indicator. The variation of flaps-up best rate-of-climb speed with altitude is shown in Section VI. For best climb performance, the wings should be banked 5° toward the operative engine.

Upon engine failure after reaching 105 MPH IAS on takeoff, the multi-engine pilot has a significant advantage over a single-engine pilot, for he has the choice of stopping or continuing the takeoff. This would be similar to the choice facing a single-engine pilot who has suddenly lost slightly 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 occurred 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 an 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.

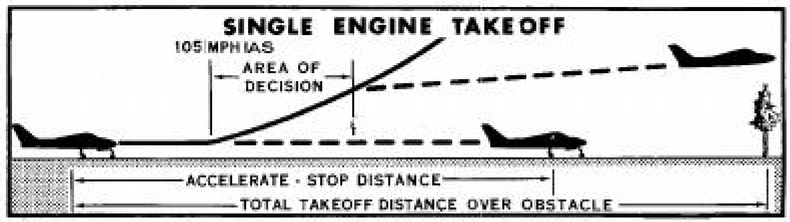


Figure 3-2

At sea level, with zero wind and 5200 pounds gross weight, the distance to accelerate to 105 MPH IAS and stop is 3267 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 4150 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 the single-engine procedure would more than offset the small distance advantage offered by continuing the takeoff. The advantage of discontinuing the takeoff is even more obvious at higher altitudes where the corresponding distances are 3798 and 7994 respectively, at 2500 feet. Still higher field elevations will cause the engine-out takeoff distance to lengthen disproportionately until an 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 a 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.

The following facts should be used as a guide at the time of engine failure: (1) discontinuing a takeoff upon engine failure is advisable under most circumstances; (2) altitude is more valuable to safety after takeoff than is airspeed in excess of the best single-engine climb speed since excess airspeed is lost much more rapidly than is altitude; (3) climb or continued level flight at moderate altitude is improbable with the landing gear extended and the propeller windmilling; (4) in no case should the airspeed be allowed to fall below the engine-out best angle-of-climb speed, even though altitude is lost, since this speed will always provide a better chance of climb, or a smaller altitude loss, than any lesser speed. The engine-out best rate-of-climb speed will provide the best chance of climb or the least altitude loss, and is preferable unless there are obstructions which make a steep climb necessary.

Engine-out procedures should be practiced in anticipation of an emergency. This practice should be conducted at a safe altitude, with full pow-

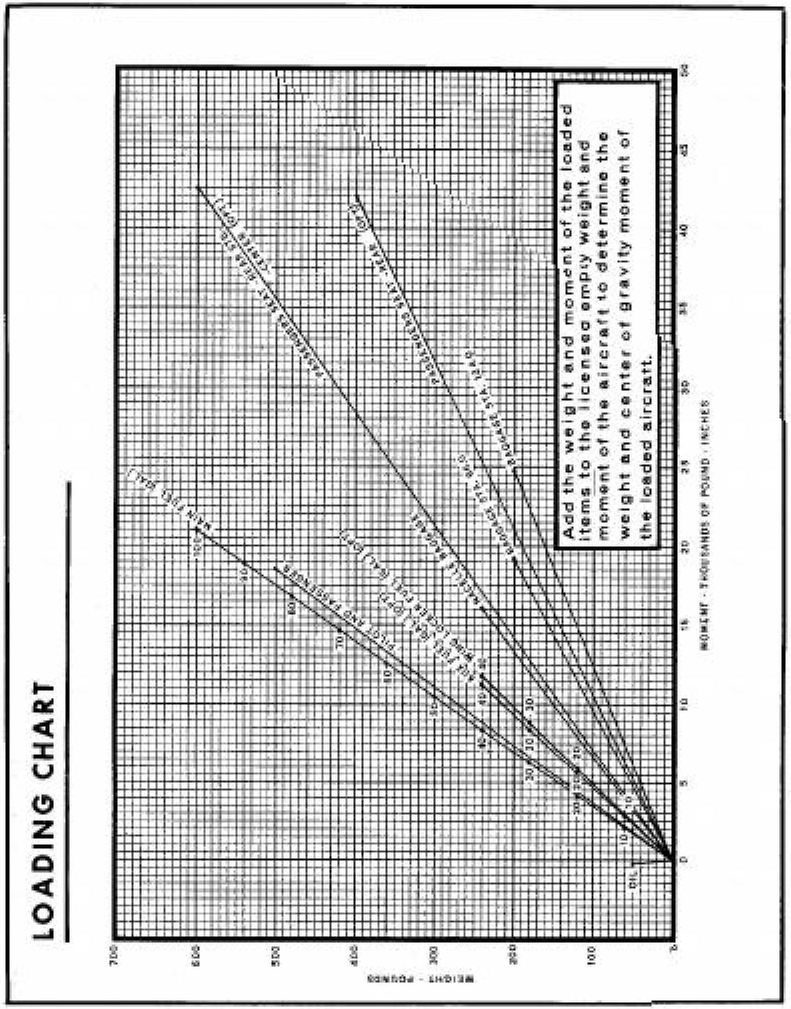


Figure 4-2

(6) Land in a *slightly tail-low* attitude.
(7) Mixture Levers -- IDLE CUT-OFF (both engines).
(8) Magneto Switches -- OFF.
(9) Fuel Selector Valve Handles -- OFF.

Smooth Hard Surface Runway — Main Gear Extended

(1) Move disposable load to baggage area, and passengers to available rear seat space.
(2) Select a smooth, hard surface runway.
(3) *Landing* Gear Switch -- DOWN.
(4) Approach at 107 MPH IAS with flaps down 15°
(5) All Switches Except Magneto Switches -- OFF.
(6) Land in a slightly tail-low attitude.
(7) Mixture Levers -- IDLE *CUT-OFF* (both engines).
(8) Magneto Switches -- OFF.
(9) Hold nose off throughout ground roll - Lower gently as speed dissipates.

DITCHING

(1) Plan approach into wind, if winds are high and seas are heavy. With heavy swells and light wind, land parallel to *swells, being* careful not to *allow wing* tip to hit first.
(2) Approach with landing gear retracted, flaps 35°, and enough power to maintain approximately 200 ft/min. rate-of-descent at approximately 108 MPH at 4600 pounds gross weight.
(3) Maintain a continuous descent until touchdown, *to avoid flaring* and *touching* down tail-first, pitching forward sharply, and decelerating rapidly. Strive for initial contact at fuselage area below rear cabin section (point of maximum longitudinal curvature of fuselage).

SINGLE-ENGINE APPROACH AND LANDING

(1) Approach at 107 MPH IAS with excess altitude.
(2) Delay *extension of* landing gear until within gliding distance of field.
(3) Avoid use of flaps until landing is assured.
(4) Decrease speed below 102 MPH IAS only if landing is a certainty.

FORCED LANDING
(Precautionary Landing with Power)

(1) Drag over selected field with flaps 15° and 105 MPH IAS noting type of terrain and *obstructions.*
(2) Plan a wheels-down landing if surface is smooth and hard (pasture, frozen lake, etc.).
(3) Execute a normal short-field landing, keeping nosewheel off ground until speed is decreased.
(4) If terrain is rough *or soft,* plan a wheels-up landing as follows:
  (a) Select a smooth grass-covered runway, if possible.
  (b) Landing Gear Switch -- UP.
  (c) Approach at 102 MPH IAS with flaps down only 15°.
  (d) All Switches Except Magneto Switches -- OFF.
  (e) *Unlatch cabin* door prior to flare-out.

NOTE

Be prepared for a mild tail buffet as the *cabin door is opened.*

  (f) Mixtures -- IDLE CUT-OFF (both engines).
  (g) Magneto Switches -- OFF.
  (h) Fuel Selector Valve *Handles -- OFF.*
  (i) Land in a slightly tail-low attitude.

NOTE

Aircraft will slide *straight ahead* about 500 feet on smooth sod with very little damage.

FORCED LANDING (Complete Power Loss)

(1) Mixtures -- IDLE CUT-OFF.

(2) Feather propellers and rotate them to a HORIZONTAL position with starter, if time permits.
(3) Fuel Selector Valve Handles -- OFF.
(4) All Switches Except Battery Switch -- OFF.
(5) Approach at 107 MPH IAS.
(6) If field is smooth and hard, extend landing gear when within gliding distance of field.
(7) Extend flaps as necessary when within gliding distance of field.
(8) Battery Switch -- OFF.
(9) Make a normal landing, keeping nosewheel off the ground as long as practical.
(10) If terrain is rough or soft, plan a wheels-up landing as follows:
  (a) Select a smooth, grass-covered runway if possible.
  (b) Landing Gear Switch -- UP.
  (c) Approach at 105 MPH IAS with flaps down only 15°.
  (d) Battery Switch -- OFF.
  (e) Unlatch cabin door prior to flare-out.

NOTE

Be prepared for a mild tail buffet as cabin door is opened.

  (f) Land in a slightly tail-low attitude.

GO-AROUND (SINGLE-ENGINE)

(1) If absolutely necessary and speed is above 105 MPH, increase engine speed to 2625 RPM and apply full throttle.
(2) Retract landing gear.
(3) Reduce flap setting to 0° (if extended).
(4) Climb at 111 MPH IAS (105 MPH IAS with obstacles directly ahead).
(5) Trim aircraft for single-engine climb.

SYSTEM EMERGENCY PROCEDURES

FUEL SYSTEM

In the event of an engine-driven fuel pump failure, turn the auxiliary fuel pump switch (on the inoperative side) to ON. This pump will supply sufficient fuel for emergency takeoff; however, the mixture control must be reset.

LANDING WITH DEFECTIVE MAIN GEAR

Reduce the 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 Switch -- DOWN.
(4) Flaps Switch -- 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) Mixture Levers -- IDLE CUT-OFF (both engines).
(9) Use full aileron in landing roll to lighten the load on the defective landing gear.
(10) Apply brake only on the operative landing gear to maintain directional control and minimize the landing roll.
(11) Fuel Selector Valve Handles -- OFF.
(12) 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, or uncertain field conditions where passenger safety, rather than minimum aircraft damage, is the prime consideration.

(1) Select a smooth, grass-covered runway, if possible.
(2) Landing Gear Switch -- UP.
(3) Approach at 107 MPH IAS with flaps down only 15°.
(4) All Switches Except Magneto Switches -- OFF.
(5) Unlatch cabin door prior to flare-out.

NOTE

Be prepared for mild tail buffet as the cabin door is opened.

(3) Fuel Selectors - Left Engine -- LEFT MAIN (feel for detent).
Right Engine -- RIGHT MAIN (feel for detent).

(4) Select a runway with a crosswind from the side *opposite the defective tire*, if a crosswind landing is required.

(5) Landing Gear Switch -- DOWN (below 160 MPH CAS).

(6) Check landing gear down indicator lights (green) for indication.

(7) Flaps Switch -- DOWN. Fully extend flaps to 35°.

(8) In approach, align aircraft with edge of runway opposite the defective tire, allowing room for a mild turn in the landing roll.

(9) Land slightly wing-low on side of inflated tire and lower nosewheel to ground immediately, for positive steering.

(10) Use full aileron in landing roll, to lighten load on defective tire.

(11) Apply brake only on the inflated tire, to minimize landing roll and maintain directional control.

(12) Stop aircraft to avoid further tire and wheel damage, unless active runway must be cleared for other traffic.

LANDING WITH FLAT NOSE GEAR TIRE

If a blowout occured on the nose gear tire during takeoff, prepare for a landing as follows:

(1) Landing Gear Switch -- Leave DOWN.

NOTE

Do not attempt to retract the landing gear if a nose gear tire blowout occurs. The nose gear tire may be distorted enough to bind the nosewheel strut within the wheel well and prevent later gear extension.

(2) Move disposable load to baggage area and passengers to available rear seat space.

(3) Flaps Switch -- DOWN. Extend flaps from 0° to 15°, as desired.

(4) Land in a nose-high attitude with or without power.

(5) Maintain back pressure on control wheel to hold nosewheel off 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 fully aft until aircraft is stopped.

(9) Avoid further tire damage by holding additional taxi to a minimum.

NOTE

If both an engine-driven fuel pump and an auxiliary fuel pump fail on the same side of the aircraft, the failing engine cannot be supplied with fuel from the opposite MAIN tank since that auxiliary fuel pump will operate on the low pressure setting as long as the corresponding engine fuel pump is operative.

ELECTRICAL SYSTEM

ALTERNATOR FAILURE (Single)
(Indicated by illumination of failure light)

(1) If circuit breaker is tripped.
  (a) Shut off affected alternator.
  (b) Reset affected alternator circuit breaker.
  (c) Turn on affected alternator switch.
  (d) If circuit breaker reopens, turn off alternator.

(2) If circuit breaker does not trip.
  (a) Select affected alternator on ammeter and monitor output.
  (b) If output is normal and failure light remains on, disregard fail indication and have indicator checked after landing.
  (c) If output is insufficient turn off alternator and reduce electrical load to one alternator capacity.
  (d) If complete loss of alternator output occurs check field fuse and replace if necessary.
  (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)

(1) If circuit breakers are tripped.
  (a) Reset circuit breakers.
  (b) If circuit breakers reopen prepare to terminate flight.

(2) If circuit breakers have not tripped.
  (a) Switch to standby regulator.
  (b) If still inoperative reduce load to a minimum and turn on emergency power.
  (c) If still inoperative check field fuses and replace as required.
  (d) 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. Increase indicated airspeed approximately 10 MPH and altitudes approximately 80 feet. Refer to Pilot's Checklist for accurate calibration.

ELECTRIC GYRO

If optional electric gyro is installed:

(1) If gyro power fail light illuminates, position gyro power switch to STANDBY.
(2) If light does not go out, check gyro circuit breaker -- IN.

VACUUM PUMP FAILURE

(1) Red indicator on gage will show failure.
(2) Automatic valve will select operative source.

LANDING GEAR SYSTEM

LANDING GEAR WILL NOT EXTEND ELECTRICALLY

When the landing gear will not extend electrically, it may be extended manually in accordance with the following steps:

(1) Before proceeding manually, check landing gear circuit breakers with landing gear switch DOWN. If circuit breakers are tripped, allow 3 minutes for them to cool before resetting.
(2) Landing Gear Switch -- NEUTRAL (center).
(3) Pilot's Seat -- TILT full aft.

(4) Hand Crank -- EXTEND AND LOCK. (Ref. Figure 2-6.)
(5) Rotate Crank -- CLOCKWISE four turns past point where gear-down lights come on (approximately 52 turns).

NOTE

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

(6) Gear-Down Lights -- CHECK.
(7) Gear Warning Horn -- CHECK with throttle retarded.
(8) Hand Crank -- PUSH BUTTON and STOW.
(9) 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.

LANDING EMERGENCIES

LANDING WITH FLAT MAIN GEAR TIRE

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

(1) Landing Gear Switch -- UP.
(2) Fuel Selector Valve Handles -- Turn to main tank on same side as defective tire and feel for detent. Proceed to destination to reduce fuel load.

NOTE

Fuel should be used from this tank first to lighten the load on this wing prior to attempting a landing, if in-flight time permits. However, an adequate supply of fuel should be left in this tank so that it may be used during landing.