PILOT'S OPERATING HANDBOOK
and
FAA APPROVED
AIRPLANE FLIGHT MANUAL

Mooney M20K

NOTE:

THIS HANDBOOK INCLUDES THE MATERIAL REQUIRED TO BE FURNISHED TO THE PILOT BY FAR, PART 23, AND MUST BE KEPT IN THE AIRPLANE AT ALL TIMES.

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SERIAL NUMBER _____

REGISTRATION NUMBER _____

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Always destroy superseded pages when inserting revised pages.

Title Page	E
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i and ii	E
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E

PILOT'S OPERATING HANDBOOK AND AIRPLANE FLIGHT MANUAL

LOG OF REVISIONS

WARNING: This manual may not include the latest revisions.

Revision Number	Revised Pages	Description of Revision	FAA Approved	Date
E	Title Page	Revised Effectivity	C L Stone	9-21-83
	i, ii	Revised Data		
	iii/iv BLANK	Revised Page No.		
	v/vi BLANK	Revised Data		
	vii/viii BLANK	Revised Page Number		
	3-1, 3-2	Revised and Relocated Data		
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SECTION III.

EMERGENCY PROCEDURES

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INTRODUCTION

This section provides the recommended procedures to follow during adverse flight conditions. The information is presented to enable you to form, in advance, a definite plan of action for coping with the most probable emergency situations which could occur in the operation of your airplane.

As it is not possible to have a procedure for all types of emergencies that may occur, it is the pilot's responsibility to use sound judgement based on experience and knowledge of the aircraft to determine the best course of action. Therefore, it is considered mandatory that the pilot read the entire manual, especially this section before flight.

When applicable, emergency procedures associated with optional equipment such as autopilots are included in Section 9.

NOTE

All airspeeds in this section are indicated (IAS) and assume zero instrument error unless stated otherwise.

ANNUNCIATOR PANEL WARNING LIGHTS

Warning Light (Red)	Fault & Remedy
Gear Unsafe	Landing gear is not in fully extended/ retracted position refer to "Failure of landing gear to extend electrically" procedure on page 3-14 or "Failure of landing gear to retract after take-off" procedure on page 3-15.
Left or Right Fuel Low	2 1/2 to 3 gallons of usable fuel remain in the respective tanks. Switch to fuller tank.
VAC (Flashing)	Suction is below 3.75 inches of mercury.
OR	
VAC (Steady)	Suction is above 5.7 inches of mercury. Attitude and directional gyros are unreliable. Vacuum system should be checked and/or adjusted as soon as practicable.
Volts (Flashing)	Low voltage.
OR	
Volts (Steady)	Overvoltage or trippage of voltage relay. Refer to "Alternator Failure" on page 3-14.
Alt. Air	Alt. air door open.

ENGINE

POWER LOSS - DURING TAKEOFF ROLL

1. Throttle - Closed.
2. Braking - Maximum.
3. Fuel Selector - Off.
4. Magneto/Starter Switch - Off.
5. Master - Off.

POWER LOSS - IN FLIGHT (High Altitude or With Alternate Air On).

CAUTION

Operating the engine at too high an RPM before reaching minimum oil temperatures may cause loss of oil pressure.

CAUTION

Should the engine excessively cool during engine out, care should be exercised during restart to avoid excessive oil pressure. Allow the engine to warm up at minimum governing RPM and 16-18 inches MP.

CAUTION

At altitudes above 12,000 feet engine restart will take 13 seconds or longer when switching from an empty fuel tank to a full tank.

POWER LOSS - IN FLIGHT (CONT)

CAUTION

With a normally operating engine, operation of the High or Low Boost Pump with low power settings may result in loss of engine power due to an overrich condition. The High Boost Pump Switch is guarded to prevent inadvertent operation, but can be held on for momentary operation without removing the guard. Rotate guard clockwise to enable switch to be placed in the ON position.

1. Throttle - Full Forward.
2. Propeller - 2700 RPM.
3. If alternate air light on, proceed to POWER LOSS-AIR FILTER BLOCKAGE below.
4. High Fuel Boost Pump - On.
5. Fuel Selector - Other Tank (Fullest Tank).
6. Magneto/Starter Switch - Check on "Both".
7. If engine does not restart - Mixture - Idel Cutoff.
8. Alternate Air - Pull Open.
9. Mixture - Advance Slowly Toward Rich Until Engine Starts.
10. When engine starts retard throttle to desired power setting.
11. High Boost - Off - If engine fails suspect engine driven fuel pump failure - proceed to ENGINE DRIVEN FUEL PUMP FAILURE, page 3-8.
12. Alternate Air - Push Closed.
13. If Engine does not Restart - Descend Below 12000 ft. and repeat.
14. If Engine Does Not Restart - Proceed to POWER OFF LANDING, page 3-10.

POWER LOSS - AIR FILTER BLOCKAGE

If engine quits due to induction air blockage (progressive manifold pressure deterioration observed):

1. Establish Best Glide Speed.
2. Alternate Air - PULL OPEN, if "ALT. AIR" light not on.
3. Mixture - IDLE CUTOFF (Initially).
4. Throttle - Full Forward.
5. Fuel Boost Pump - Off.
6. Propeller - High (2700 RPM).
7. Mixture - Advance slowly toward rich until engine starts.

1. Mixture - IDLE CUTOFF.
2. Throttle - FULL OPEN.
3. Propeller - 2700 RPM.
4. Throttle - RETARD TO CRUISE POSITION.
5. Mixture - ADVANCE SLOWLY until engine starts.
6. Mixture - ADJUST to obtain fuel flow appropriate to MP and RPM.
7. Land as soon as practicable.

ENGINE ROUGHNESS

WARNING

The engine may quit completely when one magneto is switched off, if the other magneto is faulty. If this happens, close throttle to idle and mixture to idle cutoff before turning magnetos ON to prevent a severe backfire. When magnetos have been turned back on, proceed to POWER LOSS - IN FLIGHT on page 3-4.

Severe roughness may be sufficient to cause propeller separation. Do not continue to operate a rough engine unless there is no other alternative.

NOTE

Engine roughness above 14000 feet may be encountered when operating at full throttle. To eliminate roughness reduce power to 75% or below and lean.

1. Engine instruments - CHECK.
2. Fuel selector - OTHER TANK.
3. Mixture - READJUST to power setting being used.
4. Ignition - CHECK if mixture readjustment is ineffective.
5. Throttle - RETARD until roughness is minimal.
6. Magneto/Starter - R then L, BOTH. If roughness disappears on single ignition, adjust power and continue.
7. If severe engine roughness cannot be eliminated LAND as soon as practicable.

REDUCTION IN POWER

(Interruption of fuel flow, turbocharger "run-down", engine surging).

1. Mixture Control - Idle Cutoff.
2. Fuel Selector - OTHER TANK.
3. Low Fuel Boost Pump - On 3-5 sec.

4. Throttle - CRUISE POSITION.
5. Propeller - 2700 RPM.
6. Mixture - ADVANCE SLOWLY until engine starts.
7. Boost Pump - OFF.
8. Mixture - ADJUST TO obtain fuel flow appropriate to MP and RPM.
9. If engine does not restart - High Fuel Boost On.
10. If engine does not restart, repeat after descending below 12000 feet.

HIGH CYLINDER HEAD TEMPERATURE

1. Mixture - READJUST to proper fuel flow for power being used.
2. Cowl Flaps - OPEN as required.
3. Airspeed - INCREASE.
4. Power - REDUCE if temperature cannot be maintained within limits.

HIGH OIL TEMPERATURE

NOTE

Prolonged high oil temperature indications will usually be accompanied by a drop in oil pressure. If oil pressure remains normal, then a high temperature indication may be caused by a faulty gage or thermocouple.

1. Cowl flaps - OPEN as required.
2. Airspeed - INCREASE.
3. Power - REDUCE.
4. Prepare for possible engine failure if temperature continues high.

LOW OIL PRESSURE

1. Monitor - Oil temperature and pressure.
2. Pressure below 10 PSI - Expect engine failure, proceed to POWER OFF landing.

ENGINE DRIVEN FUEL PUMP FAILURE

WARNING

When operating the engine at moderate power with the HI BOOST PUMP ON and a failed engine driven fuel pump, the engine may quit when the manifold pressure is reduced below 20 in Hg unless manually leaned.

NOTE

The maximum fuel flow capacity of the HIGH - BOOST PUMP decreases as density altitude is increased, therefore, the maximum available horsepower will also decrease as altitude is increased. At sea level the available fuel flow is approximately 14.1 GPH and by leaning 64 to 76 percent horsepower will be available. At 24000 feet the fuel flow is approximately 6.1 GPH and 29 to 41 percent horsepower will be available.

An engine driven fuel pump failure is probable when the engine will only operate with the boost pump on. Operation of the engine with a failed engine driven fuel pump and the HIGH - BOOST ON will require smooth operation of the engine controls and corresponding mixture change when the throttle is respositioned or the engine speed is changed. When retarding throttle or reducing engine speed lean the mixture to prevent the engine from quitting from an overrich condition. Enrich the mixture when opening the throttle or increasing engine speed to prevent engine stoppage from a lean condition. Always lean to obtain a smooth running engine. The following procedure should be followed when a failed engine driven fuel pump is suspected:

1. Mixture - Idle Cutoff.
2. Throttle - Cruise Position.
3. High Boost Pump - On.
4. Mixture - Increase until engine starts and adjust for smooth engine operation.
5. Land as soon as practicable.

ENGINE PRIMER FAILURE (IN ON POSITION)

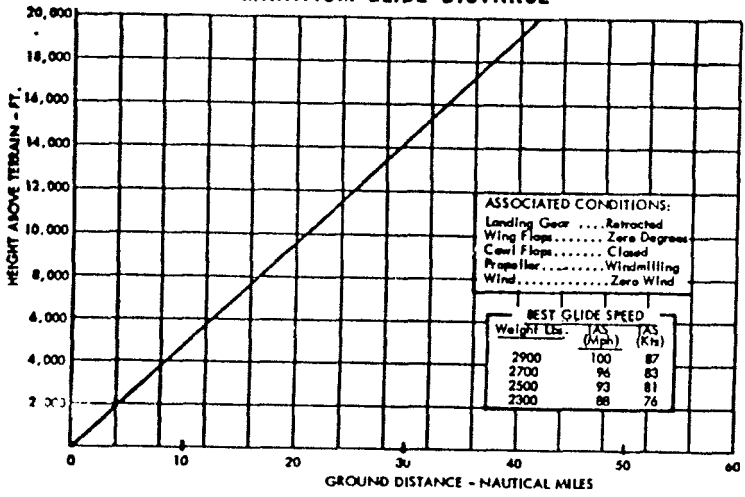
Engine primer failure in "ON" position will cause extremely rough running engine or loss of power. The following procedure will turn OFF the primer: Auxiliary Buss Circuit Breaker - Pull "OFF".

NOTE

When Auxiliary Buss Circuit Breaker is "OFF" all external lights, heated pitot, electric elevator trim, high and low fuel boost, and the ability to turn off radio with the radio master switch will be lost.

GLIDE

MAXIMUM GLIDE DISTANCE



LANDING EMERGENCY

POWER OFF, GEAR RETRACTED OR EXTENDED

1. Emergency Locator Transmitter - As Required.
2. Seat belts and shoulder harnesses - Secure.
3. Cabin door - Unlock.
4. Fuel selector - Off.
5. Mixture - Idle Cutoff.
6. Magneto/Starter - Off.
7. Flaps - Full Down (33°).
8. Gear - Down or up depending on terrain.
9. Approach speed - 86 MPH (75 Knots) IAS.
10. Master - Off, prior to landing.

POWER ON, GEAR RETRACTED

1. Emergency locator transmitter - As Required.
2. Seat belts and shoulder harnesses - Secure.
3. Cabin door - Unlocked.
   When sure of making landing area:

a. Fuel selector - OFF.
b. Throttle - CLOSED.
c. Mixture - IDLE CUTOFF.
d. Magneto/Starter - OFF.
e. Flaps - FULL DOWN (33°).
f. Master - OFF.
g. Approach Speed - AS SLOW AS POSSIBLE.
h. Wings - KEEP LEVEL.

If electrical power is essential for the flight, attempt to identify and isolate the faulty circuit as follows:

1. Master Switch - ON.
2. Select essential switches On one at a time, and permit a short time to elapse before activating an additional circuit.

EMERGENCY DESCENT PROCEDURE

In the event an emergency descent from high altitude is required, rates of descent of approximately 2,000 feet per minute or greater can be attained with the aircraft in two different configurations. With the gear and flaps retracted and cowl flaps closed an airspeed of 225 MPH (196 knots) will be required for maximum rate of descent. With the gear extended, flaps retracted and cowl flaps closed an airspeed of 150 MPH (130 knots) will also give approximately the same maximum rate of descent. At 150 MPH (130 knots) and the gear extended, the angle of descent will be greater, thus resulting in less horizontal distance traveled than a descent at 225 MPH (196 knots). Additionally, a descent at 150 MPH (130 knots) will provide a smoother ride and less pilot work load. The following procedure should be used for an emergency descent:

1. Power - Retard.
2. Airspeed - 150 MPH (130 knots).
3. Landing Gear - Extend.
4. Wing Flaps - Up.
5. Cowl Flaps - Closed.
6. Power During Descent - As required to maintain Cylinder Head Temperature 250°F (Minimum).

NOTE

Following descent, do not exceed 20" Hg. Manifold Pressure if cylinder head temperature is below 250°F

SMOKE & FIRE

ENGINE FIRE - GROUND

1. Mixture - Idle Cutoff (Full Aft).
2. Fuel Selector Valve Off.
3. Magneto/Starter Switch - Off.
4. Master Switch - Off.
5. Extinguish with Fire Extinguisher.

ELECTRICAL FIRE - IN FLIGHT
(Smoke in Cabin)

WARNING

Stall warning is not available with master switch OFF. Gear warning is not available with master switch OFF.

1. Master Switch - OFF.
2. Cabin Ventilation - Open.
3. Heating Controls - Closed (Control Forward).
4. Circuit Breakers - Check. To identify faulty circuit if possible.
5. Land as soon as practicable.

PROPELLER

PROPELLER OVERSPEED

1. Throttle - RETARD.
2. Oil Pressure - CHECK.
3. Propeller - DECREASE, set if any control available.
4. Airspeed - REDUCE.
5. Throttle - AS REQUIRED to maintain RPM below 2700 RPM.

FUEL

LOW FUEL FLOW

1. Check mixture - ENRICH.
2. Fuel Selector - FULLEST TANK.
3. If condition persists, use Boost Pump if necessary and landing should be made as soon as practicable.

FUEL VAPOR SUPPRESSION (Fluctuating Fuel Flow)

1. Low Fuel Boost Pump - On.
2. Fuel Flow - MONITOR.
3. Low Fuel Boost - OFF (If condition still exists, repeat procedure).

ELECTRICAL

ALTERNATOR FAILURE

(Voltage warning light illuminated)

1. Radio Master - OFF.
2. Master - OFF, then ON.

If warning light is still illuminated, the following steps are required:

3. Alternator Field Circuit Breaker - Pull.
4. Non-essential Electrical Equipment - OFF.
5. Land as soon as practicable.

ALTERNATOR LOW VOLTAGE

(Voltage warning light flashing)

1. Alternator Field Circuit Breaker - RESET ONCE. If warning light still flashing.
2. Alternator Field Circuit Breaker - PULL.
3. Non-essential Electrical Equipment - OFF.
4. Land as soon as practicable.

LANDING GEAR FAILURE TO EXTEND ELECTRICALLY

1. Airspeed - 132 KIAS or less.
2. Landing Gear Actuator Circuit Breaker - Pull.
3. Gear Switch - DOWN.
4. Manual Gear Extension Mechanism - LATCH FORWARD, LEVER BACK.

NOTE

Slowly pull "T" handle 1 to 2 inches (2.5 to 5.1 cm) to rotate clutch mechanism and allow it to engage drive shaft.

15. Mixture Control

The mixture control allows the pilot to adjust the fuel-air ratio (mixture) of the engine. Pushing the control forward richens the mixture. Pulling the control full aft closes the idle cutoff valve shutting down the engine. The control is of the vernier type and fine adjustments of the mixture can be obtained by turning the knob clockwise to richen the mixture, and counterclockwise to lean. The knob should not be turned in any closer than 1/8".

16. Cowl Flap Control

Pulling the cowl flap control full aft opens the cowl flap doors allowing additional airflow to properly cool the engine on the ground and during lowspeed high power climbs. During cruise the cowl flaps can be partially opened (control pulled aft approximately 3 inches) if necessary, to keep oil and cylinder head temperatures within the normal operating ranges (green arc of the temperature gages).

17. Parking Brake Control

Depressing the brake pedals and pulling the parking brake control sets the parking brake. Pushing in the parking brake control releases the parking brake.

18. Alternate Air Control (Manual Operation)

Pulling the alternate air control opens the engine alternate air door manually. The alternate air door will open automatically when air filter is blocked. The alternate air door will remain open as long as the air filter is blocked. Operation of the manual control is overriden by the induction air system suction created by a blocked filter. If the filter becomes unblocked, the suction is eliminated and the door would close by gravity and be magnetically latched, provided the manual control is in the closed (full in) position.

19. Flap Switch and Indicator

The flap switch, in a recess on the right of the console operates the electrically-actuated wide span wing flaps. Holding the spring-loaded switch in the down position lowers the flaps to the desired angle of deflection. A pointer in the center console indicates flap position.

Simply releasing downward pressure on the switch allows it to return to the OFF position stopping the flaps at any desired intermediate position during extension. When flap-up position is selected, flaps will retract to full up position unless the switch is returned to the neutral position for a desired intermediate setting. Pushing the switch to the UP position retracts the flaps.

Wing flap position is mechanically indicated thru a cable mounted directly to the flap jackshaft. A pointer in the flap position indicator indicates flap position. The intermediate mark in the pointer range is the flap TAKEOFF setting (10^{0}).

20. Cabin Heat Control

Pulling the cabin heat control turns on cabin heat. To lower cabin temperature the cabin heat control is pushed forward toward the OFF position. Optimum use of the cabin heat control is described in the Cabin Environment Section.

21. Defrost Control

Pulling the defrost control decreases air flow to the lower cabin and increases air flow to the windshield in the front of the glareshield area. Optimum use of the defrost control is described in the Cabin Environment Section.

22. Cabin Vent Control

Pulling the cabin vent control aft opens the cabin vent, located on the right side of the airplane. Optimum use of the cabin vent control is described in the Cabin Environment Section.

23. Gascolator Control

The gascolator, located to the left of the console on the floorboard, allows the pilot to drain condensed water and any sediment from the lowest point in the fuel line. To activate the gascolator pull the ring upward, to stop drainage release the ring.

ANNUNCIATOR & SWITCH PANEL

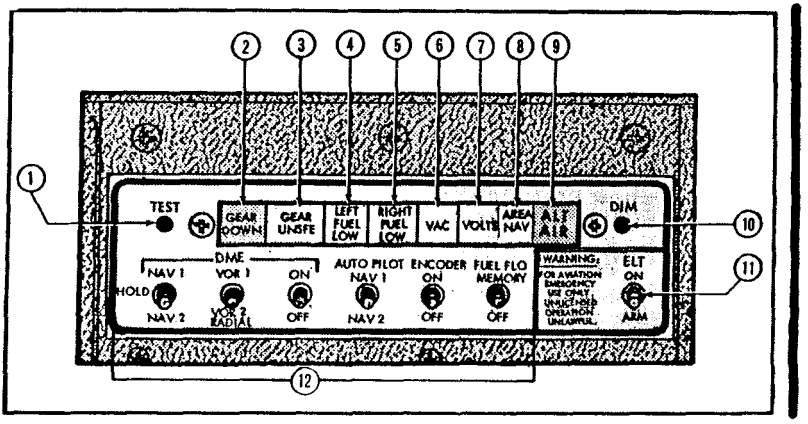


FIGURE 7-3

1. Press-to-Test Switch

   Pressing the red press-to-test switch with the master switch ON will illuminate light bulbs. Defective bulbs should be replaced prior to the next flight.

2. Gear Safety Indicator (Gear Down)

3. Gear Safety Indicator (Gear Unsafe)

   The green GEAR DN light, a red GEAR UNSFE light, and a warning horn provide visual and audible gear position signals. The green light (GREEN DN) shows continuously when the gear is fully extended. With the navigation lights on, the GEAR DN light is dim for night operation. All gear lights are out when the gear is fully retracted.

4. Fuel Low Indicator (Left)

5. Fuel Low Indicator (Right)

   Left and/or right, red, fuel low annunciator light comes on when there is 2-1/2 to 3 gallons of usable fuel remaining in the respective tanks.

6. Vacuum Malfunction Indicator.

The red VAC annunciator light indicates a malfunction of improper adjustment of air suction system. Air suction is available for operation of the attitude gyro and also the directional gyro. The designated suction range is 4.25 ±.25 to 5.5 $^{+0}_{-2}$.0 inches of mercury. The vac light will blink when suction is below 4.25 inches of mercury and gives a steady light when suction is above 5.5 inches of mercury. In either case the gyros should not be considered reliable during this warning time.

7. Voltage Irregularity Indicator

The red VOLTS annunciator light comes on designating improper voltage supply. A red blinking light designates low, or no voltage from the alternator; a steady red light indicates over voltage or tripped voltage relay.

8. Start Power On Indicator

The start power on light illuminates when the starter switch or relay has malfunctioned and the starter is engaged while the engine is running. Shut the engine off as soon as practicable. This light does not come on when "Press-to-Test" switch is pushed.

9. Alternate Air

The "ALT AIR" light illuminates when the alternate air door is opened automatically or manually. In this situation, induction air for the engine is drawn from inside the cowling rather than through the air filter.

NOTE

Use of alternate air will result in loss of power and will reduce the service ceiling.

10. Dim Switch

The DIM switch may be activated when the low fuel lights come on bright. The switch will dim both low fuel lights but will not turn them off. To restore the display to bright, press the test switch.

The filter normally accepts all incoming air from the aircraft intake scoop. Should the filter become blocked for any reason, the alternate air door will open automatically to preclude engine stoppage.

The turbocharger compressor is a high volume air pump connected to the opposite end of the turbocharger turbine (see Turbocharger System). It increases the quantity and pressure of air admitted to the cylinder for combustion. At high compressor discharge pressures, considerable heating of the induction air occurs, due to compression.

The intake manifold system is a six-tube, air distribution system mounted atop the engine. The intake manifold carries induction air to the individual cylinder intake ports.

The cylinder intake ports are cast into the cylinder head assembly. Air from the manifold tube is carried into the intake ports, mixed with fuel from the injection nozzles, and enters the cylinder as a combustible mixture when the intake valve opens.

Overboost protection is provided by a pressure relief valve located between the compressor and the throttle. The relief valve will open to prevent excessive manifold pressure and will close automatically when the manifold pressure is lower.

ICING PROTECTION

Icing protection of the induction system is provided by use of the alternate air system. The alternate air is automatically controlled door down stream of the air filter. When the door is opened, warm air from the engine compartment is admitted into the induction system upstream of the turbocharger.

FILTERING

The air filter is located in the induction system upstream of the turbocharger. The air filter is a dry media, washable paper filter.

cables and connections are shielded to prevent radio interference.

AIR INDUCTION SYSTEM

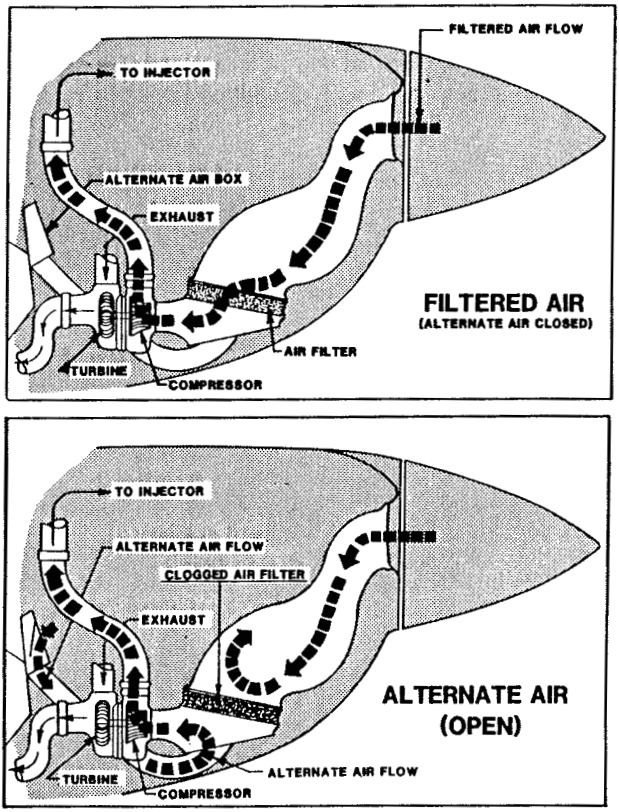


FIGURE 7-5

PATH OF AIRFLOW

The induction system components include the aircraft filter alternate air box, turbocharger compressor, throttle, manifold tube and cylinder intake ports. Air flows through these components in the order they are listed (Fig. 7-5).