SECTION 7
AIRPLANE & SYSTEMS DESCRIPTION

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INTRODUCTION

This section provides description and operation of the airplane and its systems. Some equipment described herein is optional and may not be installed in the airplane. Refer to the Supplements, Section 9 for details of other optional systems and equipment.

AIRFRAME

The airplane is an all metal, four-place, high wing, single engine airplane equipped with tricycle landing gear and is designed for general utility and training purposes.

The construction of the fuselage is a conventional formed sheet metal bulkhead, stringer, and skin design referred to as semimonocoque. Major items of structure are the front and rear carry through spars to which the wings are attached, a bulkhead and forgings for main landing gear attachment at the base of the rear door posts, and a bulkhead with attach fittings at the base of the forward door posts for the lower attachment of the wing struts. Four engine mount stringers are also attached to the forward door posts and extend forward to the firewall.

The externally braced wings, containing integral fuel tanks, are constructed of a front and rear spar with formed sheet metal ribs, doublers, and stringers. The entire structure is covered with aluminum skin. The front spars are equipped with wing-to-fuselage and wing-to-strut attach fittings. The aft spars are equipped with wing-to-fuselage attach fittings, and are partial span spars. Conventional hinged ailerons and single slot type flaps are attached to the trailing edge of the wings. The ailerons are constructed of a forward spar containing balance weights, formed sheet metal ribs and "V" type corrugated aluminum skin joined together at the trailing edge. The flaps are constructed basically the same as the ailerons, with the exception of the balance weights and the addition of a formed sheet metal leading edge section.

The empennage (tail assembly) consists of a conventional vertical stabilizer, rudder, horizontal stabilizer, and elevator. The vertical stabilizer consists of a spar, formed sheet metal ribs and reinforcements, a wraparound skin panel, formed leading edge skin and a dorsal. The rudder is constructed of a formed leading edge skin and spar with attached hinge brackets and ribs, a center spar, a wrap around skin, and a ground adjustable trim tab at the base of the trailing edge. The top of the rudder incorporates a leading edge extension which contains a balance weight.

The horizontal stabilizer is constructed of a forward and aft spar, ribs and stiffeners, center, left, and right wrap around skin panels, and formed leading edge skins. The horizontal stabilizer also contains the elevator trim tab actuator.

Construction of the elevator consists of formed leading edge skins, a forward spar, aft channel, ribs, torque tube and bellcrank, left upper and lower "V" type corrugated skins, and right upper and lower "V" type corrugated skins incorporating a trailing edge cutout for the trim tab. The elevator tip leading edge extensions incorporate balance weights. The elevator trim tab consists of a spar, rib, and upper and lower "V" type corrugated skins.

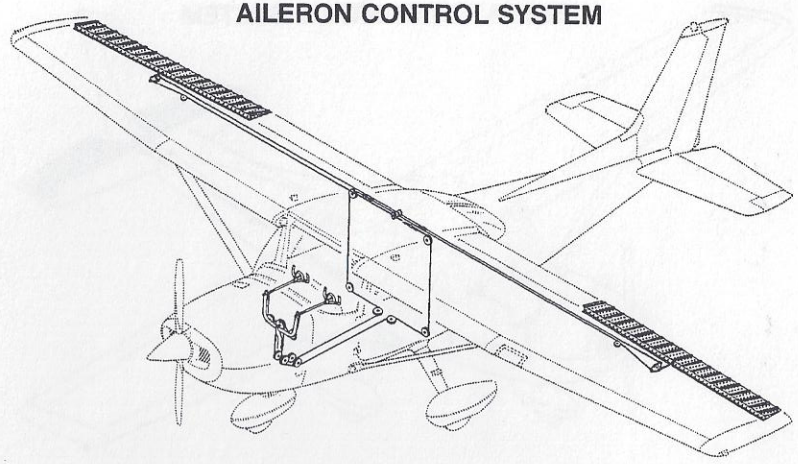
FLIGHT CONTROLS

The airplane's flight control system (Refer to Figure 7-1) consists of conventional aileron, rudder, and elevator control surfaces. The control surfaces are manually operated through cables and mechanical linkage using a control wheel for the ailerons and elevator, and rudder/brake pedals for the rudder.

TRIM SYSTEM

A manually operated elevator trim system is provided (Refer to Figure 7-1). Elevator trimming is accomplished through the elevator trim tab by utilizing the vertically mounted trim control wheel in the cockpit. Forward rotation of the trim wheel will trim nose down; conversely, aft rotation will trim nose up.

AILERON CONTROL SYSTEM



RUDDER CONTROL SYSTEM

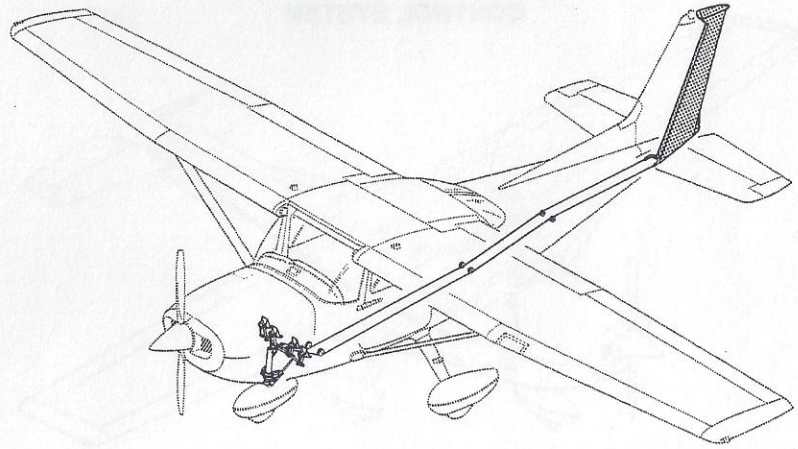


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Figure 7-1. Flight Control and Trim Systems (Sheet 1 of 2)

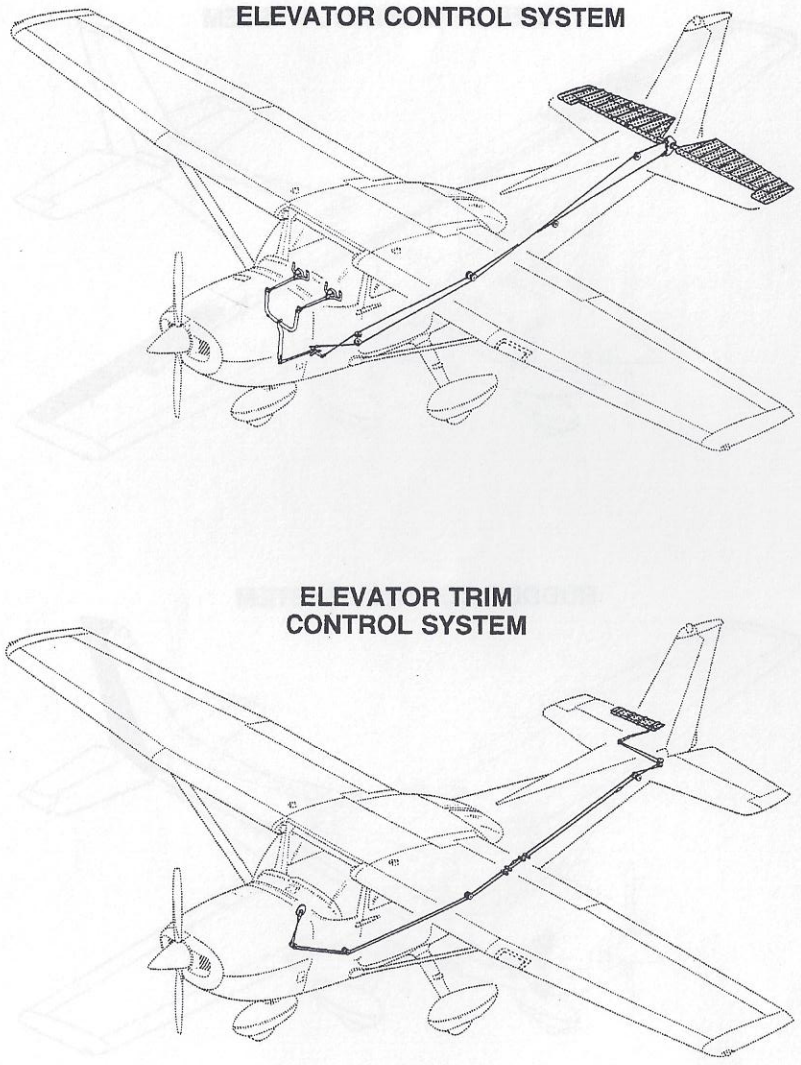

Figure 7-1. Flight Control and Trim Systems (Sheet 2 of 2)

INSTRUMENT PANEL

The instrument panel (Refer to Figure 7-2) is of all-metal construction, and is designed in segments to allow related groups of instruments, switches and controls to be removed without removing the entire panel. For specific details concerning the instruments, switches, circuit breakers, and controls on the instrument panel, refer to related topics in this section.

PILOT PANEL LAYOUT

Flight instruments are contained in a single panel located in front of the pilot. These instruments are designed around the basic "T" configuration. The gyros are located immediately in front of the pilot, and arranged vertically over the control column. The airspeed indicator and altimeter are located to the left and right of the gyros, respectively. The remainder of the flight instruments are clustered around the basic "T". An annunciator panel is located above the altimeter and provides caution and warning messages for fuel quantity, oil pressure, low vacuum and low voltage situations.

To the right of the flight instruments is a sub panel which contains engine tachometer and various navigational heading instruments. To the left of the flight instruments is a sub panel which contains a left/right fuel quantity indicator, an oil temperature/oil pressure indicator, a vacuum gage/ammeter, an EGT/fuel flow indicator, a digital clock/OAT indicator and the avionics circuit breaker panel.

Below the engine and flight instruments are circuit breakers and switches for the airplane systems and equipment. Master, Avionics Master and Ignition Switches are also located in this area of the panel. The parking brake control is positioned below the switch and circuit breaker panel.

CENTER PANEL LAYOUT

The center panel contains various avionics equipment arranged in a vertical rack. This arrangement allows each component to be removed without having to access the backside of the panel. Below the panel are the throttle, mixture, alternate static air and lighting controls.

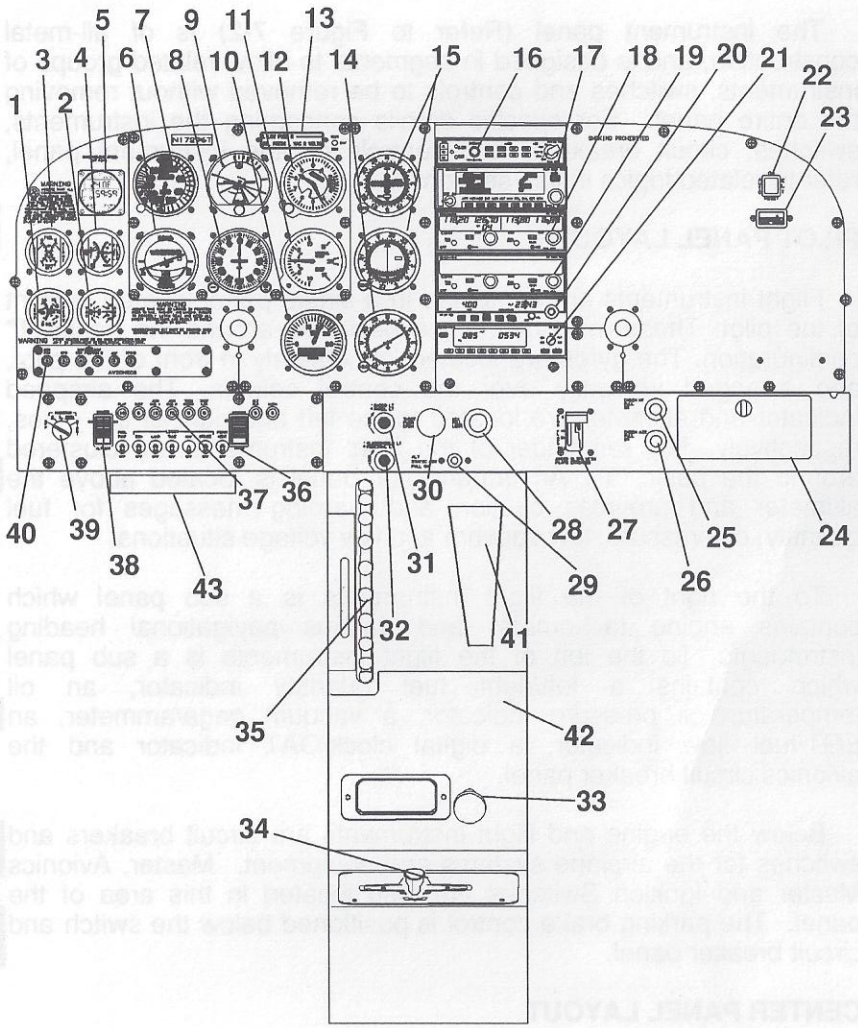

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Figure 7-2. Instrument Panel (Sheet 1 of 2)

1. Oil Temperature and Oil Pressure Indicator
2. Vacuum Gage and Ammeter
3. Fuel Quantity Indicator
4. EGT/Fuel Flow Indicator
5. Digital Clock / O.A.T. Indicator
6. Turn Coordinator
7. Airspeed Indicator
8. Directional Gyro
9. Attitude Indicator
10. Tachometer
11. Vertical Speed Indicator
12. Altimeter
13. Annunciator Panel
14. ADF Bearing Indicator
15. Course Deviation and Glide Slope Indicators
16. Audio Control Panel
17. GPS Receiver
18. Nav/Com Radio #1
19. Nav/Com Radio #2
20. ADF Receiver
21. Transponder
22. ELT Remote Test Button
23. Hour Meter
24. Glove Box
25. Cabin Heat Control
26. Cabin Air Control
27. Flap Switch and Position Indicator
28. Mixture Control
29. Alternate Static Air Control
30. Throttle Control
31. Radio and Panel Dimming Control
32. Glareshield and Pedestal Dimming Control
33. Fuel Shutoff Valve Control
34. Fuel Selector
35. Elevator Trim Control and Position Indicator
36. Avionics Master Switch
37. Circuit Breakers and Switch/Breakers
38. Master Switch
39. Ignition Switch
40. Avionics Circuit Breaker Panel
41. Hand Held Microphone
42. 12 VDC Power Port (Location may vary)
43. Parking Brake

Figure 7-2. Instrument Panel (Sheet 2)

RH PANEL LAYOUT

The RH panel contains the hour meter, ELT switch, and room for expansion of indicators and other avionics equipment. Below this sub panel are the glove box, cabin heat and cabin air controls, and wing flap switch.

CENTER PEDESTAL LAYOUT

The center pedestal, located below the center panel, contains the elevator trim control wheel, position indicator, handheld microphone bracket and fuel shutoff valve control. The fuel selector valve handle is located at the base of the pedestal.

GROUND CONTROL

Effective ground control while taxiing is accomplished through nose wheel steering by using the rudder pedals; left rudder pedal to steer left and right rudder pedal to steer right. When a rudder pedal is depressed, a spring loaded steering bungee (which is connected to the nose gear and to the rudder bars) will turn the nose wheel through an arc of approximately 10° each side of center. By applying either left or right brake, the degree of turn may be increased up to 30° each side of center.

Moving the airplane by hand is most easily accomplished by attaching a tow bar to the nose gear strut. If a tow bar is not available, or pushing is required, use the wing struts as push points. Do not use the vertical or horizontal surfaces to move the airplane. If the airplane is to be towed by vehicle, never turn the nose wheel more than 30° either side of center or structural damage to the nose gear could result.

The minimum turning radius of the airplane, using differential braking and nose wheel steering during taxi, is approximately 27 feet. To obtain a minimum radius turn during ground handling, the airplane may be rotated around either main landing gear by pressing down on a tailcone bulkhead just forward of the horizontal stabilizer to raise the nose wheel off the ground. Care should be exercised to ensure that pressure is exerted only on the bulkhead area and not on skin between the bulkheads. Pressing down on the horizontal stabilizer is not recommended.

WING FLAP SYSTEM

The single-slot type wing flaps (Refer to Figure 7-3), are extended or retracted by positioning the wing flap switch lever on the instrument panel to the desired flap deflection position. The switch lever is moved up or down in a slotted panel that provides mechanical stops at the 10°, 20° and 30° positions. To change flap setting, the flap lever is moved to the right to clear mechanical stops at the 10° and 20° positions. A scale and pointer to the left of the flap switch indicates flap travel in degrees. The wing flap system circuit is protected by a 10-ampere circuit breaker, labeled FLAP, on the left side of the control panel.

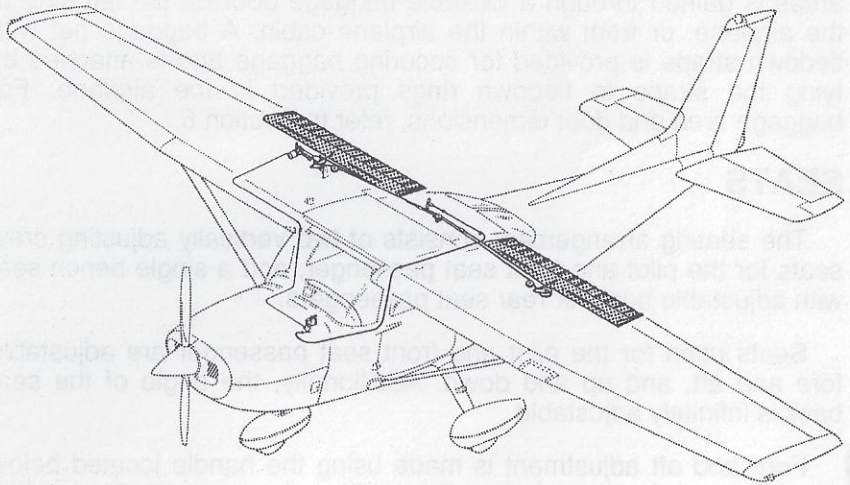

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Figure 7-3. Wing Flap System

LANDING GEAR SYSTEM

The landing gear is of the tricycle type, with a steerable nose wheel and two main wheels. Wheel fairings are optional equipment for both the main and nose wheels. Shock absorption is provided by the tubular spring steel main landing gear struts and the air/oil nose gear shock strut. Each main gear wheel is equipped with a hydraulically actuated disc type brake on the inboard side of each wheel.

BAGGAGE COMPARTMENT

The baggage compartment consists of two areas, one extending from behind the rear passengers seat to the aft cabin bulkhead, and an additional area aft of the bulkhead. Access to both baggage areas is gained through a lockable baggage door on the left side of the airplane, or from within the airplane cabin. A baggage net with tiedown straps is provided for securing baggage and is attached by tying the straps to tiedown rings provided in the airplane. For baggage area and door dimensions, refer to Section 6.

SEATS

The seating arrangement consists of two vertically adjusting crew seats for the pilot and front seat passenger, and a single bench seat with adjustable back for rear seat passengers.

Seats used for the pilot and front seat passenger are adjustable fore and aft, and up and down. Additionally, the angle of the seat back is infinitely adjustable.

Fore and aft adjustment is made using the handle located below the center of the seat frame. To position the seat, lift the handle, slide the seat into position, release the handle and check that the seat is locked in place. To adjust the height of the seat, rotate the large crank under the right hand corner of the seat until a comfortable height is obtained. To adjust the seat back angle, pull up on the release button, located in the center front of seat, just under the seat bottom, position the seat back to the desired angle, and release the button. When the seat is not occupied, the seat back will automatically fold forward whenever the release button is pulled up.

The rear passengers' seat consists of a fixed, one piece seat bottom and a three-position, reclining back. The reclining back is adjusted by a lever located below the center of the seat frame. To adjust the seat back, raise the lever, position the seat back to the desired angle, release the lever and check that the back is locked in place.

Headrests are installed on both the front and rear seats. To adjust the headrest, apply enough pressure to it to raise or lower it to the desired level.

INTEGRATED SEAT BELT/SHOULDER HARNESS

All seat positions are equipped with integrated seat belts/shoulder harness assemblies (Refer to Figure 7-4). The design incorporates an overhead inertia reel for the shoulder portion, and a retractor assembly for the lap portion of the belt. This design allows for complete freedom of movement of the upper torso area while providing restraint in the lap belt area. In the event of a sudden deceleration, reels lock up to provide positive restraint for the user.

In the front seats, the inertia reels are located on the centerline of the upper cabin. In the rear seats, the inertia reels are located outboard of each passenger in the upper cabin.

To use the integrated seat belt/shoulder harness, grasp the link with one hand, and, in a single motion, extend the assembly and insert into the buckle. Positive locking has occurred when a distinctive "snap" sound is heard.

Proper locking of the lap belt can be verified by ensuring that the belts are allowed to retract into the retractors and the lap belt is snug and low on the waist as worn normally during flight. No more than one additional inch of belt should be able to be pulled out of the retractor once the lap belt is in place on the occupant. If more than one additional inch of belt can be pulled out of the retractor, the occupant is too small for the installed restraint system and the seat should not be occupied until the occupant is properly restrained.

Removal is accomplished by lifting the release mechanism on the buckle or by pressing the release button on the buckle and pulling out and up on the harness. Spring tension on the inertia reel will automatically stow the harness.

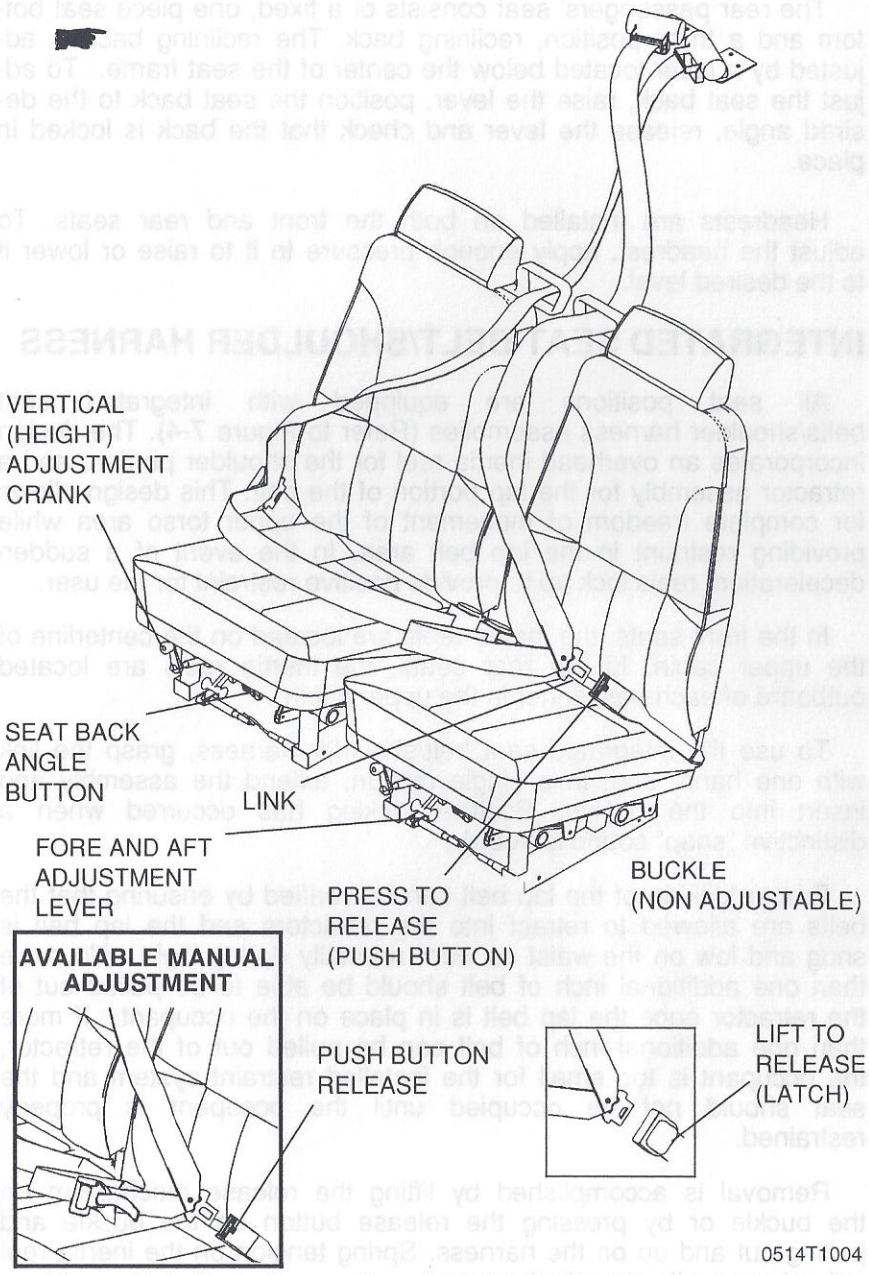

Figure 7-4. Crew Seats, Seat Belts and Shoulder Harnesses

A manually adustable seat belt/shoulder harness assembly is available for all seats.

To use the manually adjustable seat belt/shoulder harness, fasten and adjust the seat belt/shoulder harness first. Lengthen the seat belt as required by pulling on the release strap on the belt. Snap the connecting link firmly into the buckle, then adjust to length. A properly adjusted harness will permit the occupant to lean forward enough to sit erect, but prevent excessive forward movement and contact with objects during sudden deceleration. Also, the pilot must have the freedom to reach all controls easily.

Disconnecting the manually adjustable seat belt/shoulder harness is accomplished by pushing the button on the buckle to release the connecting link.

ENTRANCE DOORS AND CABIN WINDOWS

Entry to, and exit from the airplane is accomplished through either of two entry doors, one on each side of the cabin at the front seat positions (refer to Section 6 for cabin and cabin door dimensions). The doors incorporate a recessed exterior door handle, a conventional interior door handle, a key operated door lock (left door only), a door stop mechanism, and openable windows in both the left and right doors.

NOTE

The door latch design on this model requires that the outside door handle on the pilot and front passenger doors be extended out whenever the doors are open. When closing the door, do not attempt to push the door handle in until the door is fully shut.

To open the doors from outside the airplane, utilize the recessed door handle near the aft edge of either door by grasping the forward edge of the handle and pulling outboard. To close or open the doors from inside the airplane, use the combination door handle and arm rest. The inside door handle has three positions and a placard at its base which reads OPEN, CLOSE, and LOCK. The handle is spring loaded to the CLOSE (up) position. When the door has been pulled shut and latched, lock it by rotating the door handle forward to the LOCK position (flush with the arm rest). When the handle is rotated to the LOCK position, an over center action will hold it in that position. Both cabin doors should be locked prior to flight, and should not be opened intentionally during flight.

NOTE

Accidental opening of a cabin door in flight due to improper closing does not constitute a need to land the airplane. The best procedure is to set up the airplane in a trimmed condition at approximately 75 KIAS, momentarily shove the door outward slightly, and forcefully close and lock the door.

Exit from the airplane is accomplished by rotating the door handle from the LOCK position, past the CLOSE position, aft to the OPEN position and pushing the door open. To lock the airplane, lock the right cabin door with the inside handle, close the left cabin door, and using the ignition key, lock the door.

The left and right cabin doors are equipped with openable windows which are held in the closed position by a detent equipped latch on the lower edge of the window frame. To open the windows, rotate the latch upward. Each window is equipped with a spring-loaded retaining arm which will help rotate the window outward, and hold it there. If required, either window may be opened at any speed up to 163 KIAS. The rear side windows and rear windows are of the fixed type and cannot be opened.

CONTROL LOCKS

A control lock is provided to lock the aileron and elevator control surfaces to prevent damage to these systems by wind buffeting while the airplane is parked. The lock consists of a shaped steel rod and flag. The flag identifies the control lock and cautions about its removal before starting the engine. To install the control lock, align the hole in the top of the pilot's control wheel shaft with the hole in the top of the shaft collar on the instrument panel and insert the rod into the aligned holes. Installation of the lock will secure the ailerons in a neutral position and the elevators in a slightly trailing edge down position. Proper installation of the lock will place the flag over the ignition switch. In areas where high or gusty winds occur, a control surface lock should be installed over the vertical stabilizer and rudder. The control lock and any other type of locking device should be removed prior to starting the engine.

ENGINE

The airplane is powered by a horizontally opposed, four cylinder, overhead valve, air cooled, fuel injected engine with a wet sump lubrication system. The engine is a Lycoming Model IO-360-L2A and is rated at 160 horsepower at 2400 RPM. Major accessories include a starter and belt driven alternator mounted on the front of the engine, and dual magnetos, dual vacuum pumps, and a full flow oil filter mounted on the rear of the engine accessory case.

ENGINE CONTROLS

Engine power is controlled by a throttle located on the switch and control panel above the center pedestal. The throttle is open in the full forward position and closed in the full aft position. A friction lock, which is a round knurled knob, is located at the base of the throttle and is operated by rotating the lock clockwise to increase friction or counterclockwise to decrease it.

The mixture control, mounted adjacent to the throttle control, is a red knob with raised points around the circumference and is equipped with a lock button in the end of the knob. The rich position is full forward, and full aft is the idle cutoff position. For small adjustments, the control may be moved forward by rotating the knob clockwise, and aft by rotating the knob counterclockwise. For rapid or large adjustments, the knob may be moved forward or aft by depressing the lock button in the end of the control, and then positioning the control as desired.

ENGINE INSTRUMENTS

Engine operation is monitored by the following instruments: oil pressure/oil temperature indicator, tachometer and exhaust gas temperature (EGT) indicator. In addition, the annunciator panel contains a red OIL PRESS annunciator which comes on when the oil pressure is low.

See Section 2, Limitations, for engine operating limitations and instrument markings.

Oil pressure signals are generated from an oil pressure line/transducer combination. An oil pressure line is routed from the upper front of the engine case to the rear engine baffle. At the baffle, the oil pressure line is connected to a transducer. This transducer produces an electrical signal which is translated into a pressure reading by the oil pressure gage located on the LH instrument panel.

In addition, a separate low oil pressure indication is provided through the panel annunciator. This annunciator is wired to a pressure switch located on the rear of the engine accessory case. When oil pressure is below 20 PSI, the switch grounds and completes the annunciator circuit, illuminating the red OIL PRESS light. When pressure exceeds 20 PSI, the ground is removed and the OIL PRESS annunciator goes out.

NOTE

The low oil pressure switch is also connected to the hour (Hobbs) meter. When pressure exceeds 20 PSI, a ground is supplied to the hour meter, completing the hour meter circuit.

Oil temperature signals are generated from a resistance-type probe located in the engine accessory case. As oil temperature changes, the probe resistance changes. This resistance is translated into oil temperature readings on the cockpit indicator.

The engine driven mechanical tachometer is located on the instrument panel to the right of the pilot's control wheel. The instrument is calibrated in increments of 100 RPM and indicates both engine and propeller speed. An hour meter in the lower section of the dial records elapsed engine time in hours and tenths. Instrument markings include the normal operating range (green arc) from 1900 to 2400 RPM.

The exhaust gas temperature (EGT) indicator is located on the LH instrument panel as part of the EGT/Fuel Flow indicator. Since exhaust gas temperature varies with fuel-air ration (mixture), density altitude, throttle position and RPM, the instrument is a useful aid in adjusting the mixture for best economy or performance. The EGT indicator allows the pilot to lean (reduce the proportion of fuel in the fuel-air mixture) to a known value using the maximum or "peak" exhaust gas temperature as a reference. An index pointer which can be positioned manually is provided for the pilot to mark the location of the peak. **Never lean using EGT when operating at more than 80% power.**

The EGT system uses a thermocouple in the in the engine exhaust (tailpipe) to supply a voltage proportional to exhaust gas temperature. The EGT indicator responds to the voltage developed by the thermocouple. As the mixture is leaned (from full rich), the exhaust gas temperature will increase to a maximum value as the stoichiometric (most chemically efficient) fuel-air ratio is achieved and will decrease if the mixture continues to be leaned.

NEW ENGINE BREAK-IN AND OPERATION

The engine underwent a run in at the factory and is ready for the full range of use. It is, however, suggested that cruising be accomplished at 80% power as much as practicable until a total of 50 hours has accumulated or oil consumption has stabilized. This will ensure proper seating of the rings.

ENGINE LUBRICATION SYSTEM

The engine utilizes a full pressure, wet sump-type lubrication system with aviation grade oil used as the lubricant. The capacity of the engine sump (located on the bottom of the engine) is eight quarts. Oil is drawn from the sump through an oil suction strainer screen into the engine-driven oil pump. From the pump, oil is routed to a bypass valve. If the oil is cold, the bypass valve allows the oil to bypass the oil cooler and go directly from the pump to the full flow oil filter. If the oil is hot, the bypass valve routes the oil out of the accessory housing and into a flexible hose leading to the oil cooler on the right, rear engine baffle. Pressure oil from the cooler returns to the accessory housing where it passes through the full flow oil filter. The filter oil then enters a pressure relief valve which regulates engine oil pressure by allowing excessive oil to return to the sump while the balance of the oil is circulated to various engine parts for lubrication. Residual oil is returned to the sump by gravity flow.

An oil filler cap/oil dipstick is located at the right rear of the engine. The filler cap/ dipstick is accessible through an access door on the top right side of the engine cowling. The engine should not be operated on less than five quarts of oil. For extended flight, fill to eight quarts (dipstick indication only). For engine oil grade and specifications, refer to Section 8 of this handbook.

IGNITION AND STARTER SYSTEM

Engine ignition is provided by two engine-driven magnetos, and two spark plugs in each cylinder. The right magneto fires the lower right and upper left spark plugs, and the left magneto fires the lower left and upper right spark plugs. Normal operation is conducted with both magnetos due to the more complete burning of the fuel/air mixture with dual ignition.

Ignition and starter operation is controlled by a rotary-type switch located on the left switch and control panel. The switch is labeled clockwise, OFF, R, L, BOTH, and START. The engine should be operated on both magnetos (BOTH position) except for magneto checks. The R and L positions are for checking purposes and emergency use only. When the switch is rotated to the spring loaded START position, (with the master switch in the ON position), the starter contactor is closed and the starter, now energized, will crank the engine. When the switch is released, it will automatically return to the BOTH position.

AIR INDUCTION SYSTEM

The engine air induction system receives ram air through an intake on the lower front portion of the engine cowling. The intake is covered by an air filter which removes dust and other foreign matter from the induction air. Airflow passing through the filter enters an air box. The air box has a spring-loaded alternate air door. If the air induction filter should become blocked, suction created by the engine will open the door and draw unfiltered air from inside the lower cowl area. An open alternate air door will result in an approximate 10% power loss at full throttle. After passing through the air box, induction air enters a fuel/air control unit under the engine, and is then ducted to the engine cylinders through intake manifold tubes.

EXHAUST SYSTEM

Exhaust gas from each cylinder passes through riser assemblies to a muffler and tailpipe. Outside air is pulled in around shrouds which are constructed around the outside of the muffler to form heating chambers which supply heat to the cabin.

COOLING SYSTEM

Ram air for engine cooling enters through two intake openings in the front of the engine cowling. The cooling air is directed around the cylinders and other areas of the engine by baffling, and is then exhausted through an opening at the bottom aft edge of the cowling. No manual cowl flap cooling system control is required.

PROPELLER

The airplane is equipped with a two-bladed, fixed-pitch, one-piece forged aluminum alloy propeller which is anodized to retard corrosion. The propeller is 75 inches in diameter.

FUEL SYSTEM

The airplane fuel system (see Figure 7-6) consists of two vented integral fuel tanks (one tank in each wing), a three-position selector valve, auxiliary fuel pump, fuel shutoff valve, fuel strainer, engine driven fuel pump, fuel/air control unit, fuel distribution valve and fuel injection nozzles.

⚠ WARNING

UNUSABLE FUEL LEVELS FOR THIS AIRPLANE WERE DETERMINED IN ACCORDANCE WITH FEDERAL AVIATION REGULATIONS. FAILURE TO OPERATE THE AIRPLANE IN COMPLIANCE WITH FUEL LIMITATIONS SPECIFIED IN SECTION 2 MAY FURTHER REDUCE THE AMOUNT OF FUEL AVAILABLE IN FLIGHT.

FUEL TANKS	FUEL LEVEL (QUANTITY EACH TANK)	TOTAL FUEL	TOTAL UNUSABLE	TOTAL USABLE ALL FLIGHT CONDITIONS
Two	Full (28.0)	56.0	3.0	53.0

Figure 7-5. Fuel Quantity Data in U.S. Gallons

FUEL DISTRIBUTION

Fuel flows by gravity from the two wing tanks to a three-position selector valve, labeled BOTH, RIGHT and LEFT and on to the reservoir tank. From the reservoir tank fuel flows through the auxiliary fuel pump, past the fuel shutoff valve, through the fuel strainer to an engine driven fuel pump.

From the engine driven fuel pump, fuel is delivered to the fuel/air control unit, where it is metered and directed to a fuel distribution valve (manifold) which distributes it to each cylinder. Fuel flow into each cylinder is continuous, and flow rate is determined by the amount of air passing through the fuel/air control unit.

Starting at serial number 17281188 and on, and airplanes incorporating MK172-28-01, a fuel return system was added to promote smooth engine operation on the ground during hot weather. The return system carries a metered amount of fuel from the engine fuel-air control unit to the fuel reservoir tank. The increased fuel flow due to the return system, results in lower fuel temperatures at the engine inlet and helps to minimize the amount of fuel vapor generated in the fuel lines during high OAT operations.

FUEL INDICATING

Fuel quantity is measured by two float type fuel quantity transmitters (one in each tank) and indicated by an electrically operated fuel quantity indicator on the left side of the instrument panel. The gauges are marked in gallons of fuel. An empty tank is indicated by a red line and the number 0. When an indicator shows an empty tank, approximately 1.5 gallons remain in each tank as unusable fuel. The indicators should not be relied upon for accurate readings during skids, slips, or unusual attitudes.

Each fuel tank also incorporates warning circuits which can detect low fuel conditions and erroneous transmitter messages. Anytime fuel in the tank drops below approximately 5 gallons (and remains below this level for more than 60 seconds), the amber LOW FUEL message will flash on the annunciator panel for approximately 10 seconds and then remain steady amber. The annunciator cannot be turned off by the pilot. If the left tank is low, the message will read L LOW FUEL. If the right tank is low, the message will read LOW FUEL R. If both tanks are low, the message will read L LOW FUEL R.

In addition to low fuel annunciation, the warning circuitry is designed to report failures with each transmitter caused by shorts, opens or transmitter resistance which increases over time. If the circuitry detects any one of these conditions, the fuel level indicator needle will go to the OFF position (below the 0 mark on the fuel indicator), and the amber annunciator will illuminate. If the left tank transmitter has failed, the message will read L LOW FUEL. If the right tank transmitter has failed, the message will read LOW FUEL R. If both tanks transmitters have failed, the message will read L LOW FUEL R.

Fuel pressure is measured by use of a transducer mounted near the fuel manifold. This transducer produces an electrical signal which is translated for the cockpit-mounted indicator in gallons-per-hour.

FUEL VENTING

Fuel system venting is essential to system operation. Blockag of the system will result in decreasing fuel flow and eventual engine stoppage. Venting is accomplished by an interconnecting line from the right fuel tank to the left tank. The left fuel tank is vented overboard through a vent line, equipped with a check valve, which protrudes from the bottom surface of the left wing near the wing strut. Both fuel filler caps are also vented.

REDUCED TANK CAPACITY

The airplane may be serviced to a reduced capacity to permit heavier cabin loadings. This is accomplished by filling each tank to the bottom edge of the fuel filler tab, thus giving a reduced fuel load of 17.5 gallons usable in each tank.

FUEL SELECTOR VALVE

The fuel selector valve should be in the BOTH position for takeoff, climb, landing, and maneuvers that involve prolonged slips or skids of more than 30 seconds. Operation from either LEFT or RIGHT tank is reserved for cruising flight.

NOTE

When the fuel selector valve handle is in the BOTH position in cruising flight, unequal fuel flow from each tank may occur if the wings are not maintained exactly level. Resulting wing heaviness can be alleviated gradually by turning the selector valve handle to the tank in the "heavy" wing. It is not practical to measure the time required to consume all of the fuel in one tank, and, after switching to the opposite tank, expect an equal duration from the remaining fuel. The airspace in both fuel tanks is interconnected by a vent line and, therefore, some sloshing of fuel between tanks can be expected when the tanks are nearly full and the wings are not level.

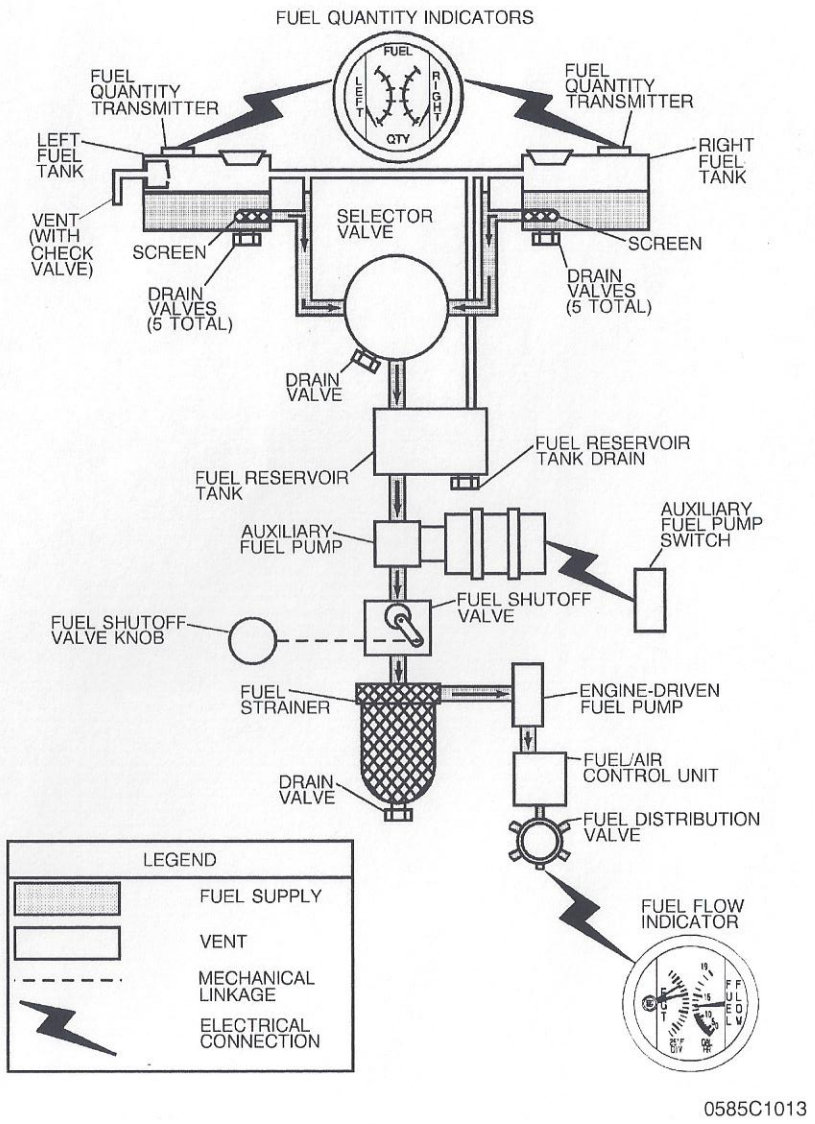

Figure 7-6. Fuel System Schematic
(Sheet 1 of 2)
17280001 thru 17281187