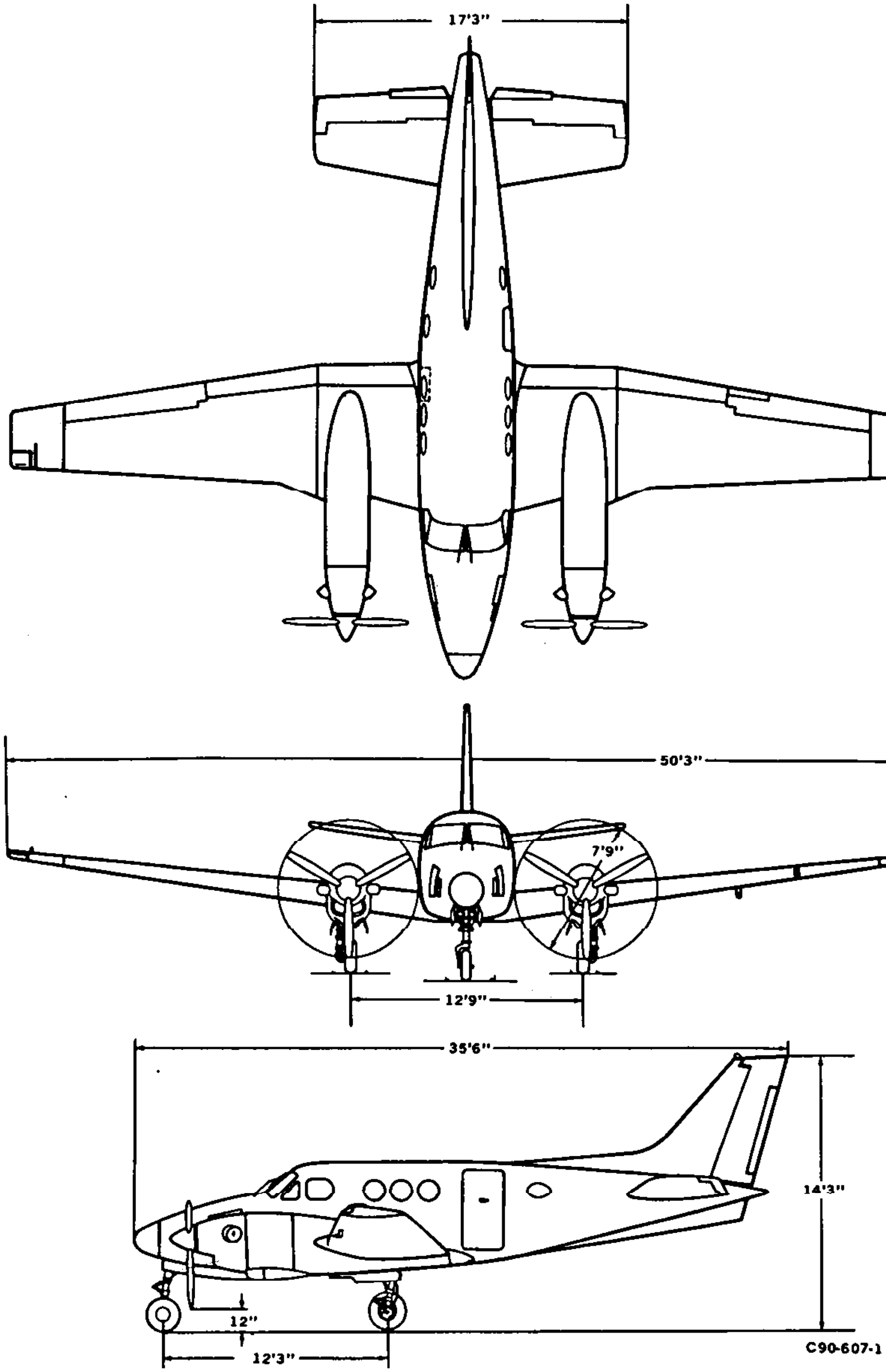


17'3"
50'3"
7'9"
12'9"
35'6"
14'3"
12"
12'3"
C90-607-1

GENERAL SPECIFICATIONS

WEIGHTS

Gross Weight	9650 pounds
Ramp Weight	9705 pounds
Maximum Landing Weight	9168 pounds
Empty Weight (includes standard equipment)	5333 pounds

WING AREA AND LOADING

Wing Area	293.9 sq ft
Wing Loading at gross weight	32.8 lbs/sq ft
Power Loading at gross weight	8.8 lbs/hp

DIMENSIONS

Wing Span	50 ft 3 in
Length	35 ft 6 in
Height to top of fin	14 ft 2 in

CABIN DIMENSIONS

Length	155 in
Height	57 in
Width	54 in
Entrance Door	27 in x 51 1/2 in
Forward Baggage Compartment Weight	315 pounds (including avionics)
Rear Baggage Compartment Volume	26.5 cu ft

FUEL AND OIL CAPACITY

Fuel Capacity in Nacelle Tanks	122 gallons
Fuel Capacity in Wing Tanks	262 gallons
Oil Capacity (each engine)	3.5 gallons

INTENTIONALLY LEFT BLANK

PROPULSION SYSTEMS

ENGINE

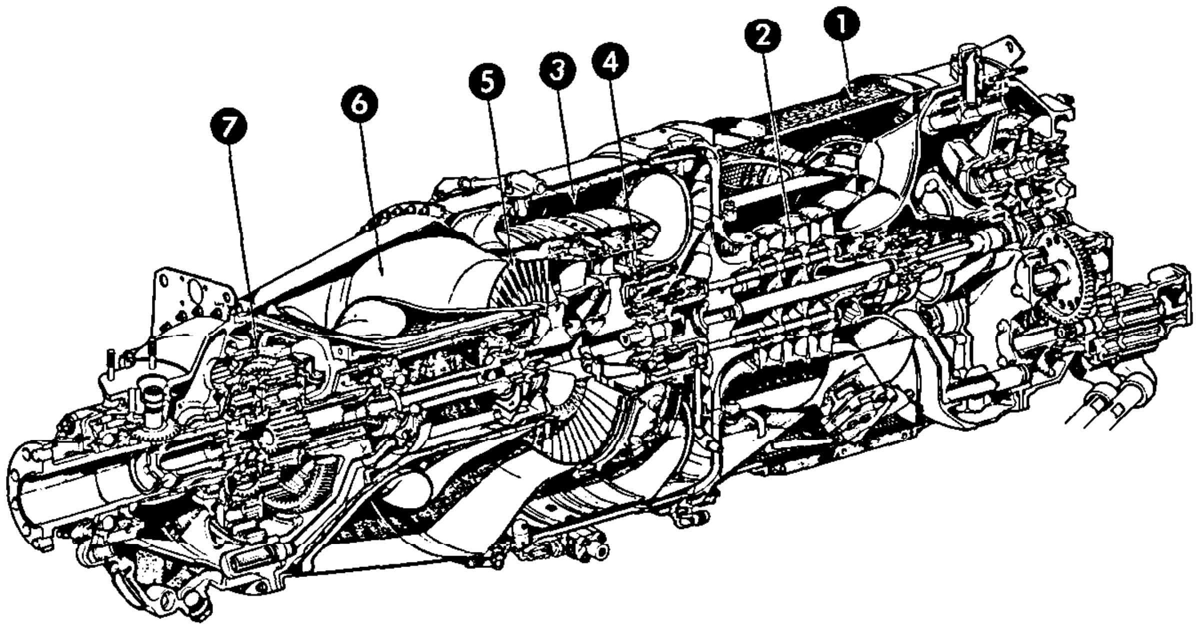
The PT6A-20 engine has a three stage axial, single stage centrifugal compressor, driven by a single stage reaction turbine. The power turbine, another single-stage reaction turbine, drives the output shaft. Both the compressor turbine and the power turbine are located in the approximate center of the engine with their shafts extending in opposite directions. Being a reverse flow engine, the ram air supply enters the lower portion of the nacelle and passes into the engine at the aft end through protective screens. The air is then routed into the compressor. After it is compressed, it is forced into the annular chamber, where it is mixed with fuel being sprayed in through 14 individually removable nozzles mounted around the gas generator case. An ignition unit and two igniter plugs are used to start combustion. A pneumatic fuel control schedules fuel flow to maintain the power set by the gas generator power lever. After combustion, the exhaust leaves the power turbine and is routed through two exhaust ports near the front of the engine. Propeller speed remains constant at any selected propeller control lever position through the action of a propeller governor, except in the beta range where the maximum propeller speed is controlled by the hydraulic section of the propeller governor.

The accessory drive at the aft end of the engine provides power to drive the fuel pump, fuel control unit, oil pump, starter/generator, and tachometer. At this point, the speed of the drive (N_1) is the true speed of the compressor side of the engine, 37,500 rpm at 100% N_1. Maximum permissible operating limit of the engine is 38,100 rpm, which equals 101.5% N_1.

The N_2 gear box forward of the power turbine provides gearing for the propeller, propeller tachometer, primary propeller governor, overspeed governor and fuel topping governor. Prior to gear reduction, the turbine speed on the power side of the engine is 33,000 rpm at 2200 propeller rpm.

Propeller torque value is achieved by measurement of oil pressure created by the force from the propeller shaft driving against a set of beveled gears. The beveled gear with propeller force against it is drawn aft by the torque, which in turn drives a piston aft, which compresses engine oil in the torque cylinder. A torquemeter valve regulates the input of engine oil into the torque cylinder to stabilize the piston position. The pressure created in the torque cylinder is plumbed to the torquemeter to give a relative reading of torque.

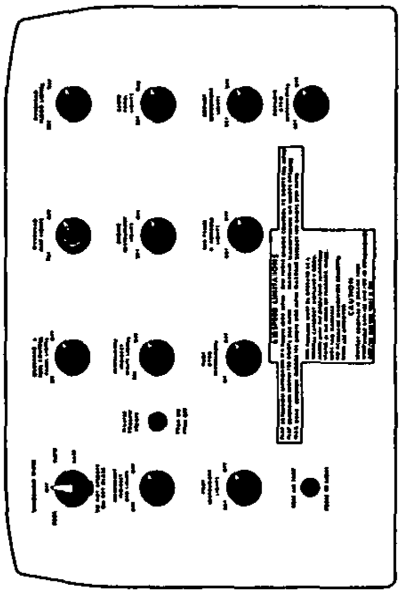
Deceleration on the ground is achieved by bringing the propeller blades through the flat pitch Beta range into a reversing pitch by utilizing the pitch change mechanism. The power levers must be retarded below idle by raising them over a detent. Reversing power is available in direct proportion to the retarding of the levers.

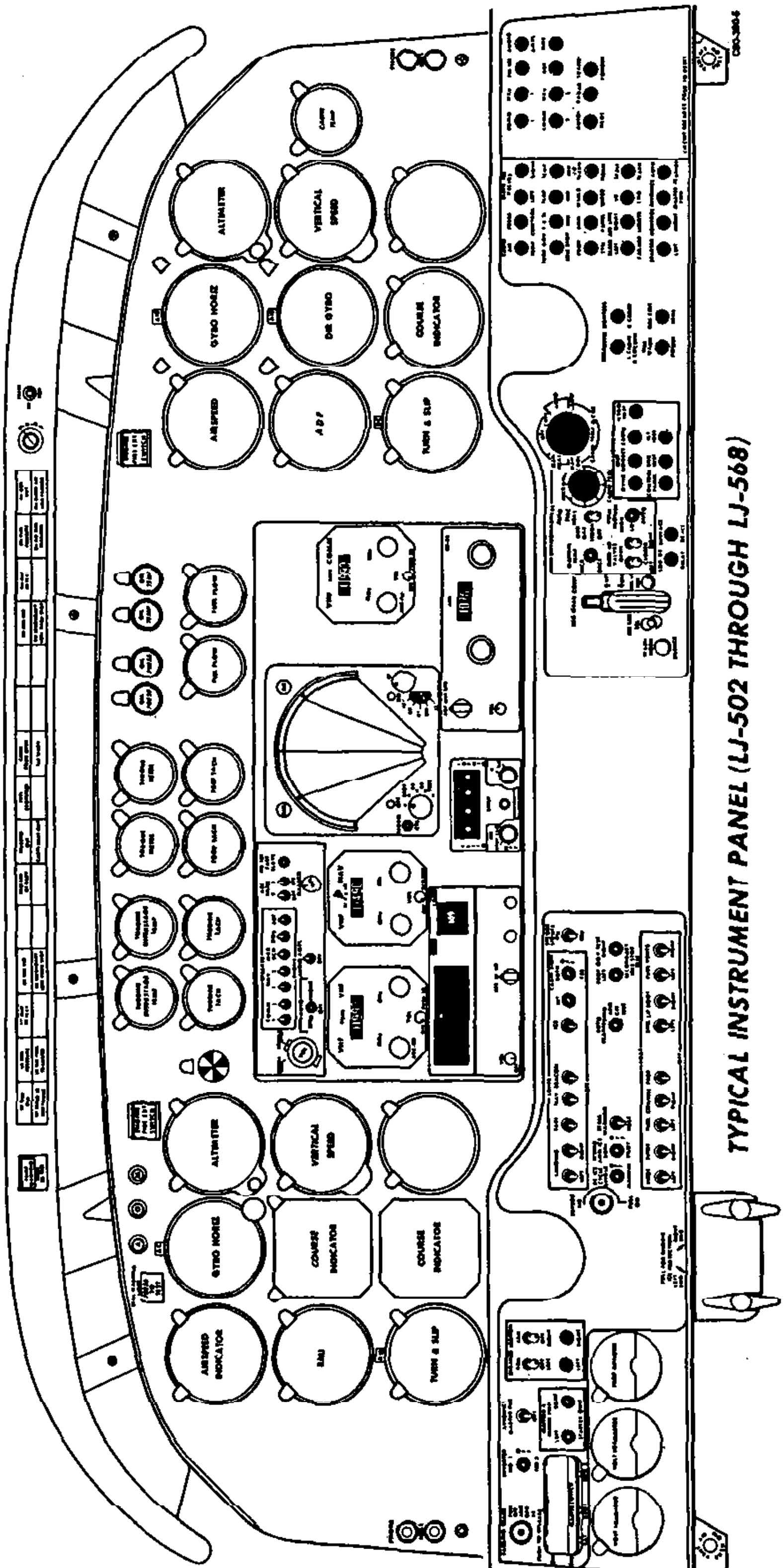


1. Engine Inlet
2. Compressor
3. Combustion Chamber
4. Compressor Turbine
5. Power Turbine
6. Exhaust
7. Reduction Gear

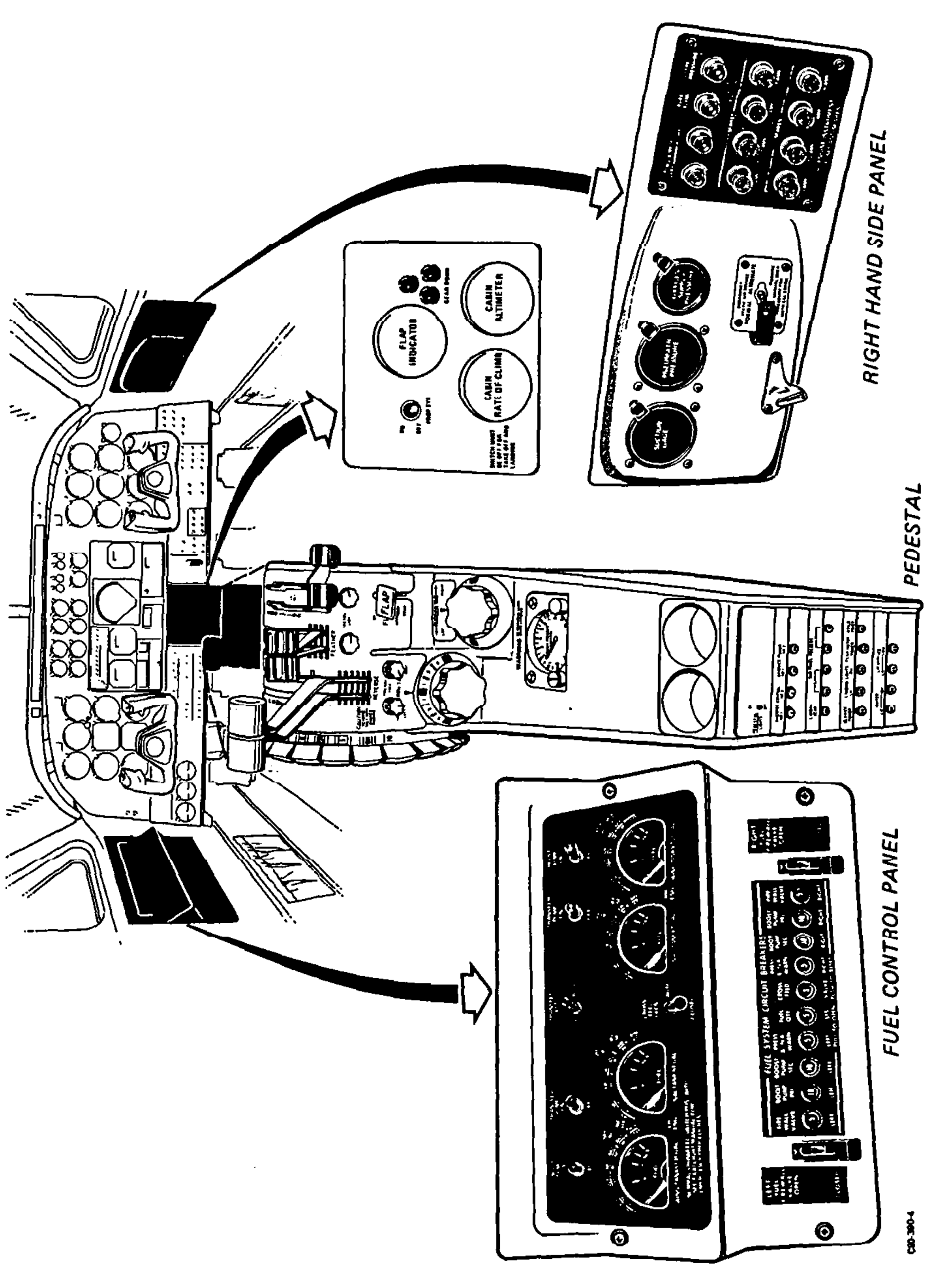
C90-603-100

OVERHEAD LIGHT CONTROL PANEL

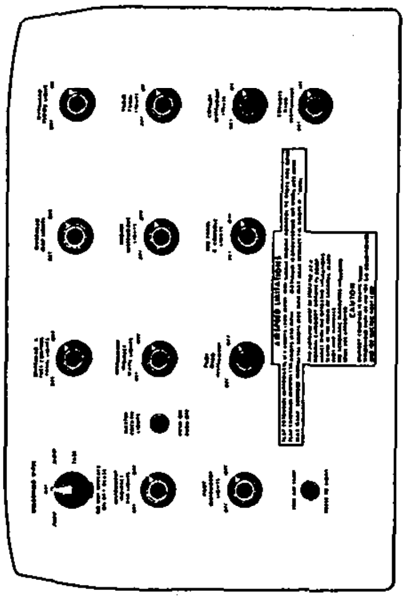


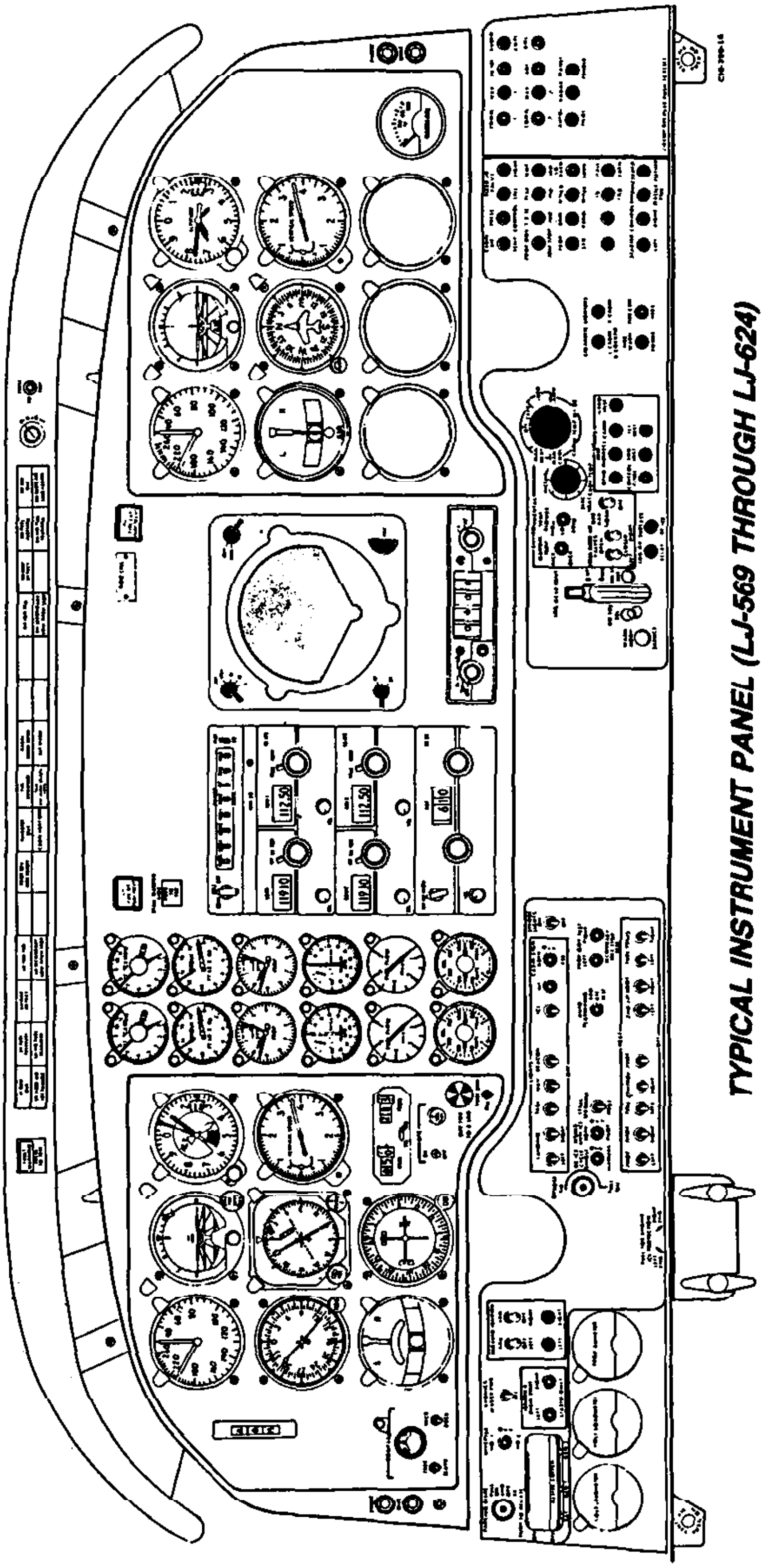


TYPICAL INSTRUMENT PANEL (LJ-502 THROUGH LJ-568)

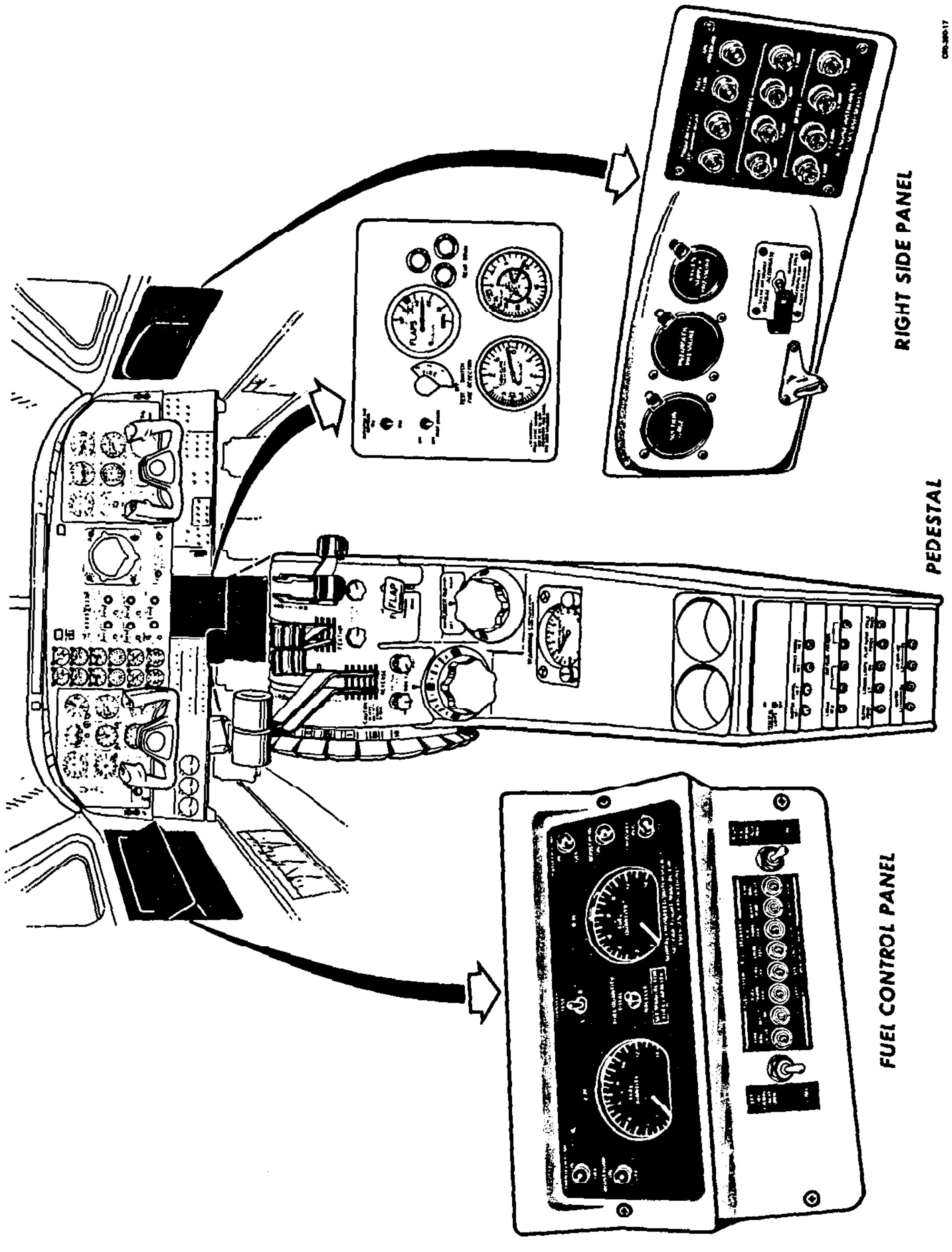

RIGHT HAND SIDE PANEL
FLAP INDICATOR
CABIN ALTIMETER
CABIN RATE OF CLIMB
PEDESTAL
FUEL CONTROL PANEL

OVERHEAD LIGHT CONTROL PANEL





TYPICAL INSTRUMENT PANEL (LJ-569 THROUGH LJ-624)


FUEL CONTROL PANEL
PEDESTAL
RIGHT SIDE PANEL

IGNITION

Each engine is started by a switch located on the left subpanel that is placarded: IGNITION & ENGINE START-STARTER ONLY. When positioned in the IGNITION & ENGINE START mode, each switch completes two separate circuits to the corresponding engine. One circuit activates the starter, the other activates engine ignition to start fuel burning and will signify the ignition action by illuminating the appropriate amber IGNITION light in the annunciator panel. The starter is a 250 ampere starter/generator. When engine power has stabilized above idle speed (51% N_1 or above), the starter drive action is stopped by placing the IGNITION & ENGINE START switch in the center (off) position.

AUTO IGNITION

The auto-ignition system provides automatic ignition to prevent engine loss due to combustion failure. This system should be used for icing flights and night flights above 14,000 feet. To activate the system, move the switches placarded ENG AUTO IGNITION, located on the pilot's subpanel, from OFF to ARM. When the engine torque rises above approximately 425 ft lbs, two green lights, located immediately below the switches, will illuminate and remain lighted while the system is armed. If for any reason the engine torque falls below approximately 400 ft lbs, the igniter will automatically energize and the IGNITION ON light on the annunciator panel will illuminate. Simultaneously, the respective green ARM light will extinguish, giving the dual indication that the ignition system is functioning.

FUEL CONTROL

The basic engine fuel system consists of an engine driven pump, a fuel control unit, and fourteen fuel nozzles. Two automatic fuel dump valves are provided to drain residual fuel after engine shutdown. Engine gas generator and power turbine governors work with a temperature compensating unit to supply information for the fuel control unit which is located on the engine accessory case. This unit is a hydromechanical computing and metering device which determines the proper fuel schedule for the engine to provide the power required, as established by the position of the power levers. This is accomplished by controlling the speed of the compressor turbine. The acceleration fuel schedule of the fuel control unit compensates for variations in compressor inlet air temperature. Engine characteristics vary with changes in inlet temperature and the acceleration fuel schedule must in turn be altered to prevent compressor stall and/or excessive turbine temperature.

PROPULSION SYSTEM CONTROLS

The propulsion system is operated by three sets of controls: the Power Levers, Propeller Levers and Condition Levers. The Power Levers and Condition Levers serve to control engine power. The Propeller Levers are operated conventionally and control constant speed propellers through the primary governor.

The Power Levers provide control of engine power from idle through take-off power by operation of the gas generator (N_1) governor in the fuel control unit. Increasing N_1 rpm results in increased engine power.

Each Propeller Lever operates a speeder spring inside the primary governor to reposition the pilot valve, which results in an increase or decrease of propeller rpm. For propeller feathering, each Propeller Lever manually lifts the pilot valve to a position which causes complete dumping of high pressure oil. Detents at the rear of lever travel prevent inadvertent movement into the feathering range. Normal operating range is 1800 to 2200 rpm.

The Condition Lever has three positions, CUT-OFF, LO IDLE and HI IDLE. This lever controls the idle cut-off function and controls idle speed between 51% and 70% N_1.

PROPELLER REVERSING

When the power levers are lifted over the IDLE detent, they override the secondary low pitch stops and control engine power through the Beta and Reverse range.

CAUTION

Propeller reversing on unimproved surfaces should be accomplished carefully to prevent propeller erosion from reversed airflow and, in dusty conditions, to prevent obscuring the operator's vision.

Condition levers, when set at HI IDLE, keep the engines operating at 70% minimum idle speed for optimum reversing performance. Power levers should not be moved into the reversing position when the engines are not running.

ENGINE INSTRUMENTATION

Engine instruments, located above the avionics panel, are grouped according to their function. On the left, the ITT (Interstage Turbine Temperature) gages and torquemeters are used to set take-off power. Climb and cruise power are established with the torquemeters and propeller tachometers while observing ITT limits. Gas generator (N_1) operation is monitored on the gas generator tachometers. To the right are the fuel flow indicators, oil pressure and oil temperature gages.

The ITT gages give an instantaneous and accurate reading of engine temperature between the compressor drive and power turbines. The temperature reading on this instrument reflects the temperature of the gases coming in contact with the turbine wheels.

The torquemeters give an indication in ft lbs of the power being applied to the propeller. Proper observation and interpretation of these gages provides an accurate indication of engine performance and condition.

The propeller tachometer is read directly in revolutions per minute. The N_1 or gas generator tachometer is read in percent of rpm, based on a figure of 37,500 rpm at 100%. Maximum gas generator speed is limited to 38,100 rpm or 101.5% N_1.

A propeller synchroscope, located to the left of the engine instrument grouping, operates to give an indication of synchronization of propellers. If the right propeller is operating at a higher rpm than the left, the face of the synchroscope, a black and white cross pattern, spins in a clockwise rotation. Left or counterclockwise rotation indicates a higher rpm of the left propeller. This instrument aids the pilot in obtaining complete synchronization of the propellers.

PROPELLER SYNCHROPHASER

The propeller synchrophaser automatically matches the right "slave" propeller rpm to that of the left "master" propeller and maintains the blades of one propeller at a predetermined relative position with the blades of the other propeller. To prevent the right propeller from losing excessive rpm if the left propeller is feathered while the synchrophaser is on, the synchrophaser is limited to approximately ± 30 rpm from the manual governor setting. Normal governor operation is unchanged but the synchrophaser will continuously monitor propeller rpm and reset the governor as required. A magnetic pickup mounted in each propeller overspeed governor and adjacent to each propeller deice brush block transmits electric pulses to a transistorized control box installed behind the pedestal.

The control box converts any pulse rate differences into correction commands, which are transmitted to a stepping type actuator motor mounted on the right engine cowl forward support ring. The motor then trims the right propeller governor through a flexible shaft and trimmer assembly to exactly match the left propeller. The trimmer, installed between the governor control arm and the control cable, screws in or out to adjust the governor while leaving the control lever setting constant. A toggle switch installed on the left center section of the floating panel below the engine instruments turns the system on. With the switch off, the actuator automatically runs to the center of its range of travel before stopping to assure that when next turned on the control will function normally. To operate the system, synchronize the propeller in the normal manner and turn the synchrophaser on. The system is designed for in-flight operations and is placarded to be off for take-off and landings. Therefore, with the system on and the landing gear extended, a light on the annunciator panel, PROP SYNCH ON, will illuminate.

The right propeller rpm and phase will automatically be adjusted to correspond with the left. To change rpm, adjust both propeller controls at the same time. This will keep the right governor setting within the limiting range of the left propeller. If the synchrophaser is on but is unable to adjust the right propeller to match the left, the actuator has reached the end of its travel. To recenter, use the following steps:

a. Turn the switch OFF
b. Synchronize the propellers manually
c. Turn the switch ON

ENGINE LUBRICATION

Engine oil, contained in an integral tank between the engine air intake and the accessory case, cools as well as lubricates the engine. A non-congealing external oil radiator keeps the engine oil temperature within the operating limits. Engine oil also operates the propeller pitch change mechanism and the engine torquemeter system.

The lubrication system capacity per engine is 3.5 gallons, of which 2.3 gallons is contained in the oil tank. The dipstick is attached to the oil filler cap and is marked to measure five quarts for the purpose of adding oil. Approximately 5 quarts are required to fill the lines and cooler, giving a total system capacity of 14 quarts. The engine cannot be completely drained; 1.5 quarts will remain in the engine. Recommended types and procedures for changing oil are listed in the Servicing Section.

MAGNETIC CHIP DETECTOR (IF INSTALLED)

A magnetic chip detector is installed in the nose gearbox drain plug of each engine. When ferrous oil contamination is detected, a red annunciator light (if installed) illuminates to alert the pilot to the condition, which indicates rapid engine deterioration and the probability of imminent power loss.

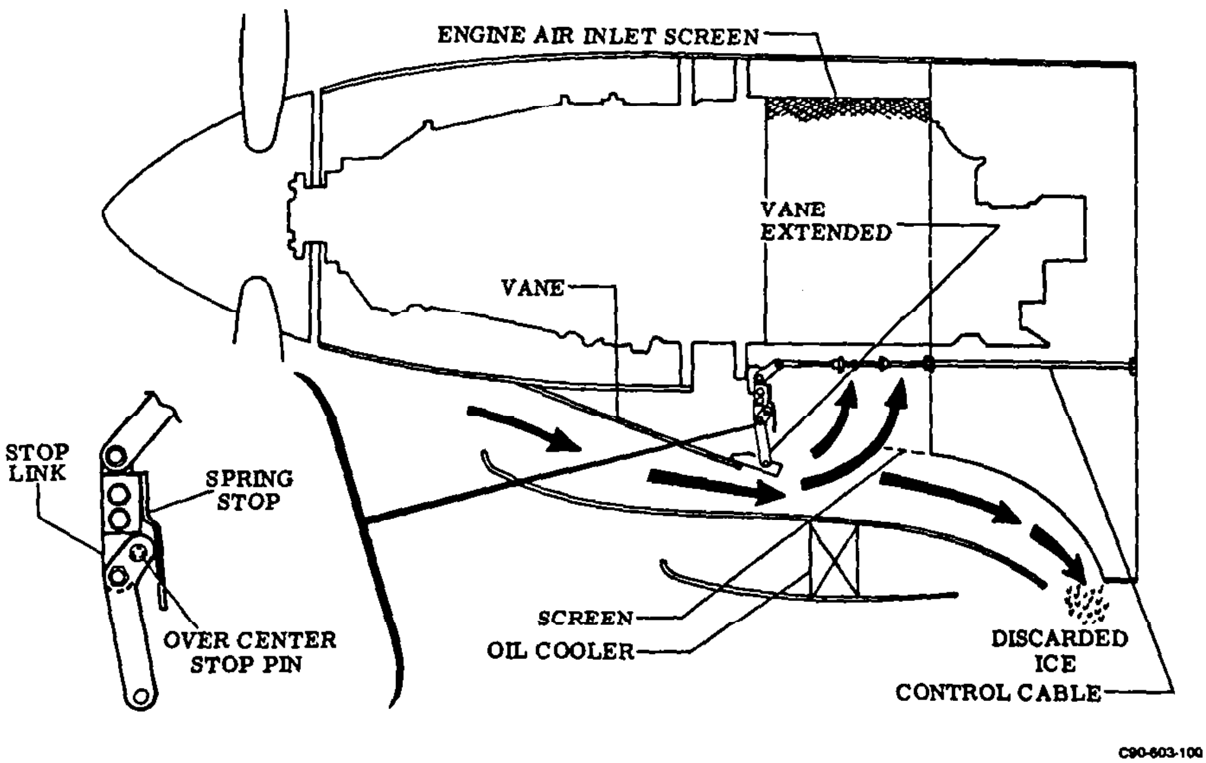
ANNUNCIATOR SYSTEM

The annunciator system consists of an annunciator panel centrally located in the glareshield, an annunciator panel dimming control, a press-to-test switch, and a fault warning light. The illumination of a green or amber annunciator light will not trigger the fault warning system. The dimming control is located adjacent to the press-to-test switch and may be used to increase or decrease the intensity of the annunciator indicator lights to the desired level.

In the event of a fault, a signal is directed to the respective channel in the annunciator panel and lamp intensity rises to the highest level. If the fault requires the immediate attention of the pilot, the fault warning light will flash. The flashing fault warning light may be extinguished by pressing the face of the light to reset the circuit, and if the fault is not, or cannot be, corrected, the indicator light in the annunciator panel will remain lighted at the lowest intensity selected on the dimming control. If an additional fault occurs, the appropriate light in the annunciator panel will illuminate. Lamp intensity will again increase to the highest level of intensity until the circuit is reset as before. If the additional fault requires the immediate attention of the pilot, the fault warning light will once again begin flashing.

ANNUNCIATOR PANEL

NOMENCLATURE	*COLOR*	*PROBABLE CAUSE FOR ILLUMINATION*
LH BLEED AIR LINE FAILURE	Red	Melted or failed bleed air failure warning line.
LH GEN OUT	Red	Left generator off the line.
LH CHIP DETECT (If installed)	Red	Contamination in left engine oil is detected.
LH FUEL PRESSURE	Red	Fuel pressure failure on left side. (Check boost pump)
LH NO FUEL TRANSFER	Red	Wing tank fuel exhausted or transfer pump failure
LH FIRE	Red	Fire in left engine nacelle.
LH IGN IND	Amber	Left ignition and start switch is in the ignition and start mode or the left auto-ignition is activated.
LH SECONDARY LOW PITCH STOP	Red	Left propeller is beyond the primary low pitch stop.
FUEL CROSSFEED	Amber	Crossfeed valve is open.
NOSE BAGGAGE DOOR OPEN	Red	Baggage door not secure.
LH AUTOFEATHER ARM	Green	Autofeather armed with Power Levers advanced above 90% N_1 position.
CABIN DOOR OPEN	Red	Cabin door open or not secure.
PROP SYNCH ON	Amber	Synchrophaser turned on.
INVERTER OUT	Red	The inverter selected is inoperative.
PROP REVERSE NOT READY	Amber	Propeller levers are not in the high rpm, low pitch position.
RH AUTOFEATHER ARM	Green	Autofeather armed with Power Levers advanced above 90% N_1 position.
SMOKE	Red	Presence of smoke in the nose compartment avionics section.
RH SECONDARY LOW PITCH STOP	Red	Right propeller is beyond the primary low pitch stop.
ALT WARN	Amber	Cabin altitude exceeds 10,000 ft
RH FIRE	Red	Fire in right engine nacelle.
RH IGN IND	Amber	Right ignition and start switch is in the ignition and start mode or the right auto-ignition is activated.
RH FUEL PRESSURE	Red	Fuel pressure failure on right side. (Check boost pump)
RH NO FUEL TRANSFER	Red	Wing tank fuel exhausted or transfer pump failure.
RH GEN OUT	Red	Right generator off the line.
RH CHIP DETECT (If installed)	Red	Contamination in right engine oil is detected.
RH BLEED AIR LINE FAILURE	Red	Melted or failed bleed air failure warning line. (Except for low power settings)



INERTIAL SEPARATOR SYSTEM

ENGINE ICE PROTECTION

An oil to fuel heat exchanger, located on the engine accessory case, operates continuously and automatically to heat the fuel sufficiently to prevent freezing of any water in the fuel.

Each fuel control's temperature compensating line is protected against ice by electrically heated jackets. Power is supplied to each fuel control air line heater by two switches, placarded FUEL CONTROL HEAT, on the pilot's subpanel.

The engine air inlet lip boots are electrically heated to prevent the formation of ice and consequent distortion of the airflow. The boots are operated by the two switches on the pilot's subpanel placarded: ENG LIP BOOT, LEFT - RIGHT.

INERTIAL SEPARATORS

An inertial separation system is built into each engine air inlet to prevent moisture particles from entering the engine inlet plenum under freezing conditions. This is done by introducing a sudden turn in the airstream to the engine, causing the moisture particles to continue on undeflected because of their greater momentum and to be discharged overboard.

During normal operation, a movable vane is raised out of the direct ram airstream. For cold weather (+ 5°C or below) operation in visible moisture, it should be lowered into the airstream. The anti-ice vanes are operated by individual T-handle, push-pull controls, located below the left subpanel. The controls are placarded: PULL FOR ENGINE ICE PROTECTION - LEFT ENG - RIGHT ENG. Vane position during operation is indicated by the position of the T-handles, and by a slight decrease in torque with the engine ice protection controls extended. The vanes should be either fully retracted or fully extended; there are no intermediate positions.

PROPELLER SYSTEM

PROPELLER CONTROLS

Conventional Propeller Levers control the standard propeller installation. Full forward lever travel gives low pitch - high rpm, and full aft travel (into the detent) moves the propeller blades through high pitch - low rpm into the feathered position.

STANDARD (NON-REVERSING) PROPELLER

The standard propeller installation includes constant speed, full feathering propellers controlled by engine oil through single-acting, engine-driven propeller governors. Centrifugal counterweights, assisted by a feathering spring, move the blades toward the low rpm (high pitch) position into the feathered position. Oil pressure returns the propeller to the high rpm (low pitch) mechanical stop position. The propellers have no low rpm, high pitch stops; this allows the propellers to feather after engine shutdown.

PROPELLER GOVERNORS

Three governors, one primary and two back-up, control the propeller rpm. The primary governor, mounted on top of the gear reduction housing, controls the propeller through the entire range. If the primary governor should malfunction and request more than 2200 rpm, an overspeed governor cuts in at 2288 rpm and dumps oil from the propeller to keep the rpm from exceeding approximately 2288. A solenoid, actuated by the PROP GOV TEST switch, is provided for resetting the overspeed governor to approximately 1900 to 2100 rpm for test purposes.

If the propeller should stick or move too slowly during a transient condition, the propeller governor might not act in time to prevent an overspeed condition. To provide for this contingency, the power turbine governor acts as a fuel topping governor. When the propeller rpm reaches 2332 rpm, the fuel topping governor limits the fuel flow, reducing N_1 rpm.

OPTIONAL REVERSING PROPELLER

The Hartzell propeller is of the full feathering, constant speed, overcounter-weighted, reversing type controlled by engine oil through single acting, engine driven propeller governors. The propeller is three bladed and is flange mounted to the engine shaft. Centrifugal counter-weights, assisted by a feathering spring, move the blades toward the low rpm (high pitch) position and into the feathered position. Governor boosted engine oil pressure moves the propeller to the high rpm (low pitch) hydraulic stop and reverse position. The propellers have no low rpm (high pitch) stops; this allows the blades to feather after engine shut-down.

PROPELLER GOVERNORS

Two governors, one primary and one back-up, control the propeller rpm. The primary governor, mounted on top of the gear reduction housing, controls the propeller through its entire range. The Propeller Control Lever operates the propeller by means of this governor. If the primary governor should malfunction and request more than 2200 rpm, an overspeed governor cuts in at 2288 rpm and dumps oil from the propeller to keep the rpm from exceeding approximately 2288. A solenoid, actuated by the PROP GOV TEST switch, is provided for resetting the overspeed governor to approximately 1900 to 2100 rpm for test purposes.

If the propeller should stick or move too slowly during a transient condition, the propeller governor might not act in time to prevent an overspeed condition. To provide for this contingency, the fuel topping governor limits the fuel flow when the propeller rpm reaches 2332, to reduce N_1 rpm. During operation in the reverse range, the fuel topping governor is reset to provide a speed slightly below selected propeller speed to prevent governor interaction.

PRIMARY AND SECONDARY LOW PITCH STOPS

Low pitch propeller position is determined by the Primary Low Pitch Stop which is a mechanical monitored hydraulic stop. This mechanism, being hydraulic, allows the blades to rotate beyond the low pitch position into reverse when selected. Beta and reverse blade angles are provided by adjusting the low pitch stop, controlled by the Power Levers in the reverse range. A back-up system, referred to as the Secondary Low Pitch Stop, protects against propeller reversing in the event of malfunction of the primary low pitch stop. The activation of this system also illuminates the red light on the annunciator panel placarded SECONDARY LOW PITCH STOP.

AUTOFEATHER SYSTEM

The automatic feathering system provides a means of immediately dumping oil from the propeller governor to enable the feathering spring to start the feathering action of the blades. Although the system is ARMED by a switch on the sub-panel, the complete arming of the system occurs when both Power Levers are advanced above the 90% N_1 position at which time both the right and left ARMED lights illuminate indicating a fully armed system. The system will remain inoperative as long as either power lever is retarded below the 90% N_1 position. The system is designed for use during take-off and landing. During take-off, should torquemeter oil pressure on either engine drop below a prescribed setting, the oil is dumped from the governor, the feathering spring starts the blades toward feather and the autofeather system of the other engine is disarmed. The disarming of the operating engine's propeller system is further indicated when the armed light of that engine goes out. The autofeather system may be checked as follows:

1. Move the autofeather arm switch to the TEST position with the power levers set at idle. Check that the propellers remain unfeathered and that the AUTOFEATHER ARM lights remain out.

2. With the switch still in the TEST position and the engine controls set to obtain 500 foot-pounds of torque, both AUTOFEATHER ARM lights should illuminate.

3. Slowly retard the left engine power lever and check that the right AUTOFEATHER ARM light extinguishes at approximately 400 foot-pounds of torque. Continue retarding the left engine power lever and check that both the left and right AUTOFEATHER ARM lights are extinguished and that left engine propeller starts to feather at approximately 200 foot-pounds of torque.

NOTE

As the propeller blades rotate toward feather, the torque load will increase above switch setting and the system will cycle during ground test giving a flashing indication on the Armed lights.

4. Repeat the preceding check with the right engine.

5. Return the autofeather arm switch to the ARM position.

FUEL SYSTEM

The fuel system consists of two separate systems connected by a crossfeed system.

Fuel for each engine is supplied from a nacelle tank and four interconnected wing tanks for a total of 192 gallons of usable fuel for each side with all tanks full. The wing tanks supply the center section tank by gravity flow. The nacelle tank draws its fuel supply from the center section tank. A crossfeed system allows a total of 384 gallons to be supplied to either engine for single engine operation.

Each system has two filler openings, one in the nacelle tank and one in the leading edge tank. To assure that the system is properly filled, service the nacelle tank first, then the wing tanks.

The system is vented through a recessed ram scoop vent, coupled to a heated extended vent, located on the underside of the wing adjacent to the nacelle. The external vent is heated to prevent icing. The ram scoop acts as a backup vent should the heated vent become blocked.

BOOST PUMPS

The boost pumps, crossfeed and firewall valves receive their power from a dual power source. If the master switch is turned OFF, these systems will continue to operate from the battery bus. The boost pump and crossfeed switches must be shut off after each flight to prevent discharging the battery.

FUEL TRANSFER PUMP

Automatic fuel transfer from the wing tanks to the nacelle tanks begins when the TRANSFER PUMP switches are turned on, unless the nacelle tanks are full. A TRANSFER TEST switch (placarded L and R) is provided to check the operation of each pump when its tank is full.

The nacelle tank will continue to fill until the fuel reaches the upper transfer limit and a float switch turns the pump off. As the engine burns fuel from the nacelle tank, fuel from the wing tanks transfers automatically into the nacelle tank each time its level drops approximately ten gallons.

When the 132 gallons are used from the wing tanks, a pressure sensing switch reacts to a pressure drop in the fuel transfer line. After 30 seconds, the transfer pump shuts off and the annunciator panel illuminates, showing a NO FUEL TRANSFER light. The NO FUEL TRANSFER light also functions as an operation indicator for the transfer pump. If the light comes on and the wing tank is not empty, the transfer pump has stopped transferring fuel into the nacelle tank. Extinguishing the NO FUEL TRANSFER light is accomplished by turning the transfer switch OFF.

If the transfer pump fails to operate during flight, gravity feed will take over its work. When the nacelle tank level drops to approximately 3/8 full, the gravity feed port in the nacelle tank opens and gravity flow from the wing tank starts. All wing fuel except 28 gallons from each wing will transfer during gravity feed.

FUEL DRAINS

During each preflight, the fuel sumps on the tanks, pumps and filters should be drained to check for fuel contamination. There are four sump drains and one filter drain in each wing and are located as follows:

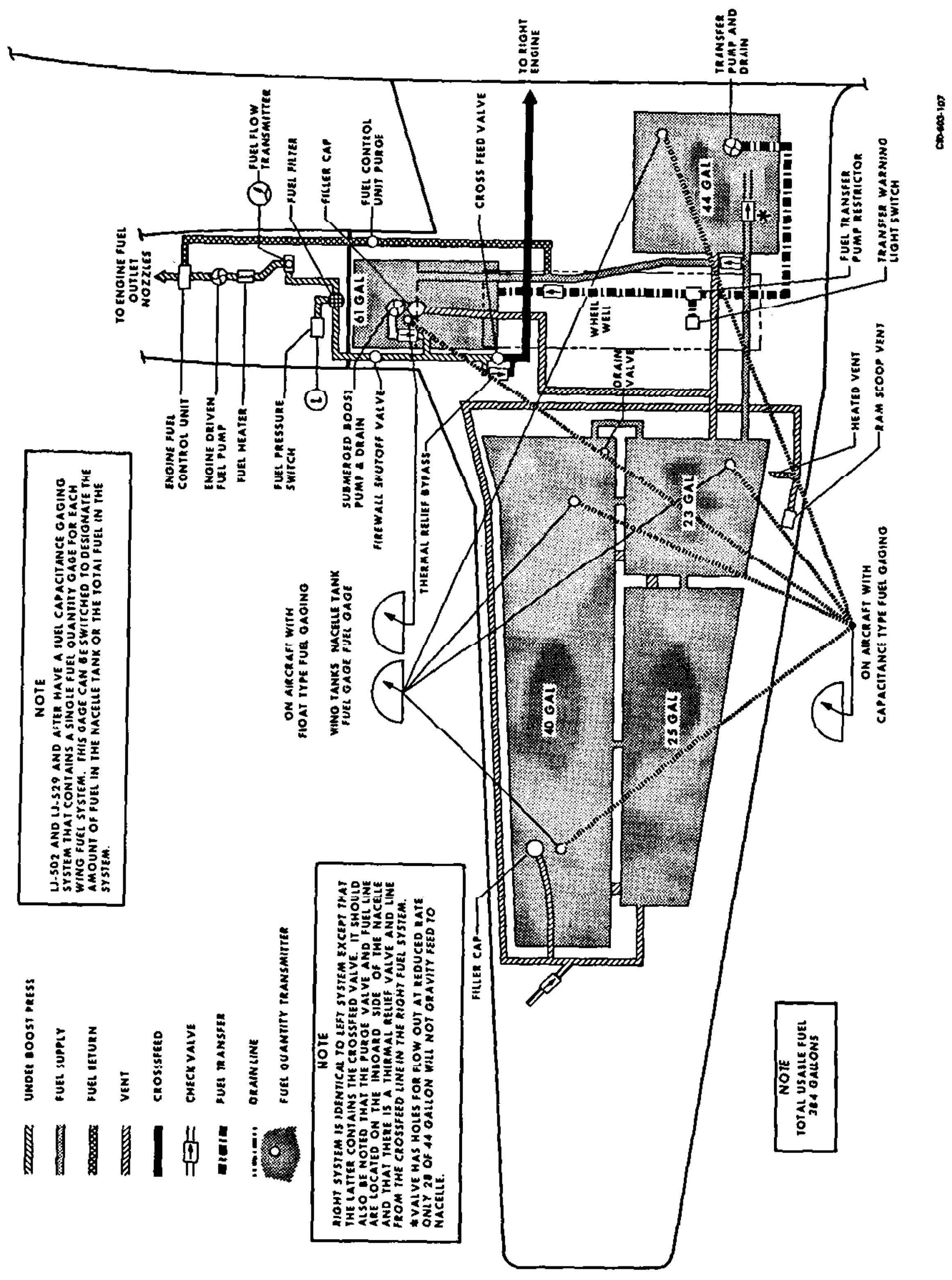
NUMBER	DRAINS	LOCATION
1	Leading Edge Tank	Outboard of nacelle underside of wing.
1	Firewall Fuel Filter Drain	Pull ring located on firewall under cowling cover, right side of engine.
1	Boost Pump	Bottom center of nacelle forward of wheel well.
1	Transfer Pump Filter Drain	Just outboard of wing root, fwd of flap.
1	Gravity Feed Line	Inside wheel well.

CROSSFEED

CAUTION

Operation with the fuel pressure light on is limited to 10 hours between engine pump overhaul and replacement. When operating with Aviation Gasoline, operation on suction lift is permitted up to 8,000 feet for a period not to exceed 10 hours. Operation above 8,000 feet requires boost or crossfeed.

The crossfeed system is controlled by a three position switch placarded: OPEN, CLOSED, and AUTO. The valve can be manually opened or closed, but under normal flight conditions it is left in the AUTO position. In this position,



FUEL SYSTEM SCHEMATIC

fuel pressure switches are connected into the crossfeed control circuit. These switches open the crossfeed valve automatically if boost pump failure causes a drop in line pressure. This allows the remaining boost pump to supply both engines with pressure during emergency operations.

If a boost pump fails after take-off, the crossfeed may be closed and engine operation continued on suction feed for a limited time. This type of operation is limited to 10 hours of operation between any overhaul or replacement period of the engine driven high pressure pump.

FIREWALL SHUT-OFF

The system incorporates two firewall shutoff valves controlled by two switches, one on each side of the fuel system circuit breaker panel on the fuel control panel. These switches, respectively LEFT and RIGHT are placarded FUEL FIREWALL VALVE - OPEN - CLOSED. A red guard over each switch is an aid in preventing accidental operation. Like the boost pumps, the firewall shutoff valves receive electrical power from the main buses and also the essential buses which are connected directly to the battery.

Just forward of the firewall shutoff valve is the main fuel filter. From the main fuel filter, the fuel is routed through the fuel flow indicator transmitter, and then through a fuel heater that utilizes heat from the engine oil to warm the fuel. The fuel is then routed to the fuel control unit.

FUEL GAGING SYSTEMS

FLOAT TYPE SYSTEM

The fuel panel for airplanes equipped with the float type fuel gaging systems utilizes four fuel quantity indicators; two for wing tank fuel and two for nacelle tank fuel. These indicators can be read in gallons or pounds.

CAPACITANCE TYPE SYSTEM

On airplanes with capacitance fuel gaging systems, the fuel panel utilizes only two fuel quantity indicators, one for each side. A toggle switch, located between the two fuel quantity indicators, can be placed in the TOTAL position to provide an indication of all fuel in the system, or in the NACELLE position to show fuel quantity in the nacelle tanks only. These indicators read in pounds of fuel.

ELECTRICAL SYSTEM

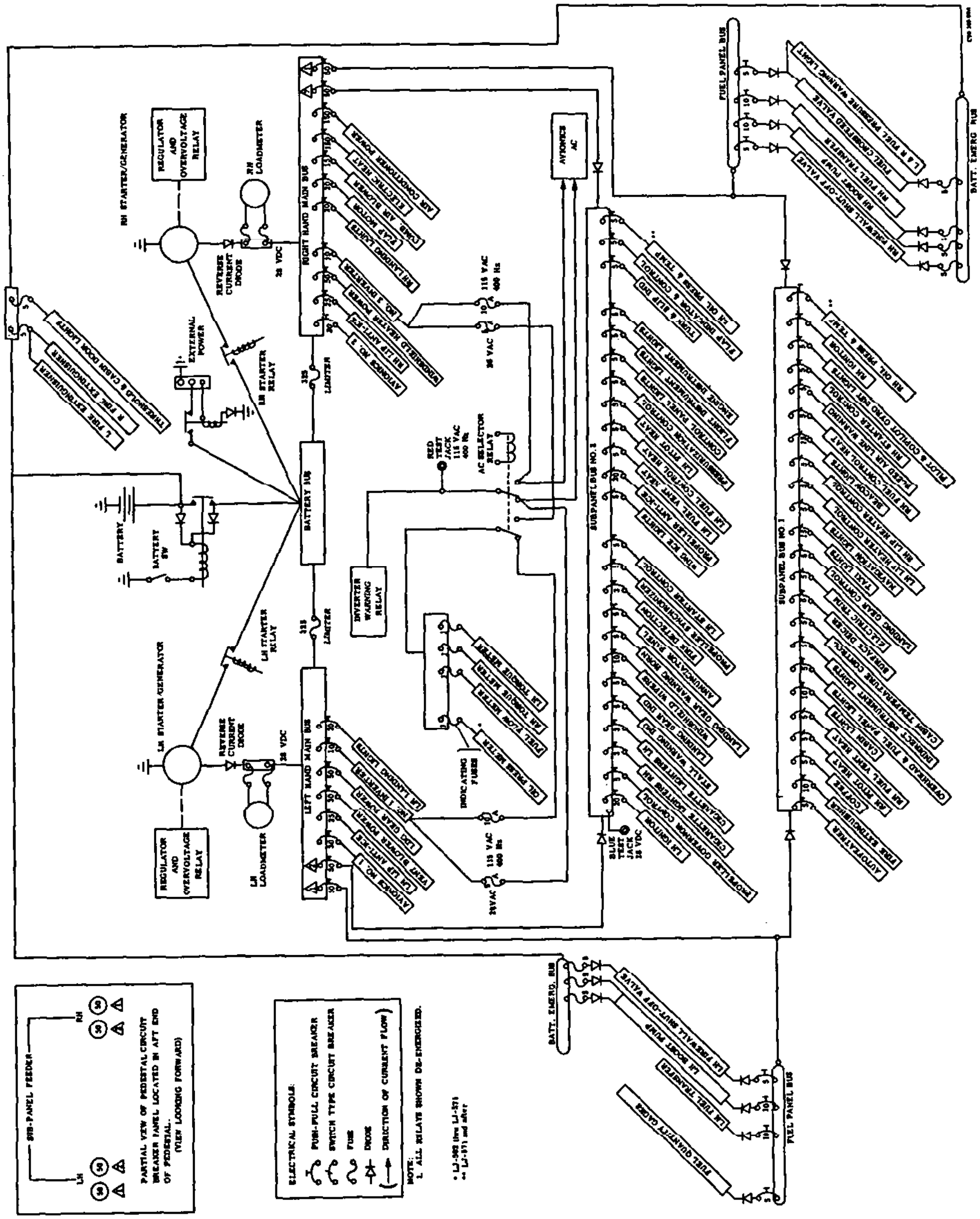
The King Air C90 is equipped with a 24 volt, 45 ampere-hour nickel-cadmium battery, located in the right wing center section, which provides current for starting and essential loads. The battery is directly connected to the battery emergency bus which supplies power for essential loads such as boost pumps and firewall shutoff valves. Essential loads are also provided with a power source from the No. 1 and No. 2 subpanel feeder buses. Diodes, which are solid state electronic devices that permit current flow in one direction only, on each side of the essential components, prevent a failure of one of the circuits from disabling the other. Further protection of the battery emergency bus is provided by a panel of fuses in the underside of the right wing center section just forward of the battery.

A battery relay, controlled by a cockpit switch, connects the battery to the battery bus. Isolation diodes permit the battery relay to be energized by external power or generators in the event the battery charge is insufficient to activate the relay. A normal system potential of 28.25 volts maintains the battery at full charge. An overvoltage relay opens the field circuit at 32 to 34 volts to provide overvoltage protection.

During engine starts, the battery bus is connected directly to the starter/generator by the starter relay. The starter/generator drives the compressor section of the engine through accessory gearing. The starter/generator initially draws approximately 700 amperes and then drops rapidly to about 300 amperes as the engine reaches 20% gas generator speed.

When operated as generators, the two starter/generators provide a capability of 250 amperes each at 28.25 volts. The generators are paralleled by utilizing the voltage developed between the "D" terminal of the generator and ground. This terminal of each generator is connected from its respective voltage regulator to that of the opposite generator through the intervening voltage regulators. The paralleling circuit also includes the overvoltage relays and a paralleling relay. The field power of the generator carrying the higher current is reduced while that of the generator carrying the lower current is increased until the load on each is equal. When one generator is on the line and the other is off the line at the same voltage, the voltage of the former is depressed and that of the latter is increased through the paralleling circuit until both generators are on the line. Should an overvoltage condition occur, the paralleling circuit acts through the overvoltage relays to lower the trip voltage on the overvoltage generator to take the overvoltage unit off the line, leaving the other generator to supply the entire load.

Each generator is connected to its respective bus (see Electrical System Schematic) through reverse current diodes. Both sides of the system are tied together through 325 ampere current limiters at the isolation limiter bus. The right subpanel feeder bus and the left subpanel feeder bus are tied together with diodes to protect the circuits in case either of the current limiters (fuses) blows. No provisions are made for replacing the limiters in flight, but the system is designed so that the loads can be supplied from the opposite buses. The condition of the current limiters can be checked by reducing the electrical load to single generator capacity, turning off the left generator and depressing the loadmeter test button for the left engine. If a loadmeter reading is observed, the current limiter is still good. If no reading is observed, the limiter is bad. The check is the same for the right-hand current limiter using the opposite control switches.



ELECTRICAL SYSTEM SCHEMATIC

Each subpanel feeder supplies two dual buses through 50 ampere feeder circuit breakers and isolation diodes. Thus, both dual subpanel feeder buses can be powered by either generator. The subpanel feeder also provides power, through a 50 ampere circuit breaker, to the essential components with isolation diodes for protection against shorts. The essential components, therefore, are supplied by two sources, the battery emergency bus and the subpanel feeder. This provides for a secondary source of power to supply the essential components in the event of an open fuse from the essential bus. The essential bus fuses may be checked before starting the engines by turning on the boost pumps with the battery switch off and listening for operation of the pump. In addition to supplying the subpanel buses, each main bus directly feeds to a number of large loads. The division of the loads can be seen on the accompanying diagram. Among these loads are the number 1 and 2 inverters. The selector switch and its relay circuitry activates one or the other inverter and connects it to the 115-volt, 400 cps, alternating current (AC) loads. The AC loads are divided into engine instrument and avionics sections, each supplied through a master fuse. The 26-volt AC engine instruments are supplied by an auto-transformer through indicating fuses, located on the right cockpit side wall. A red button appears in the fuse cap if a fuse blows. Inverter warning circuitry is included to alert the pilot in case of an inverter failure or overload shutdown (by circuit breakers or optional thermal limiters).

Volt loadmeters are located to the left of the pilot's control wheel. These meters normally indicate DC generator load in terms of a fraction of the maximum rated load with 1.0 representing 100% load. A spring-loaded push button below each loadmeter may be depressed to give the subpanel feeder voltage.

An external power socket and polarity protection circuitry are provided for use of auxiliary power units. A relay in the external power circuit will close only if the external source polarity is correct. The battery switch should be on when connecting external power in order to absorb voltage transients. Otherwise, the transients might damage the many solid state components in the airplane. For starting, external power sources capable of up to 1000 amperes may be used; greater capacity could damage the starter. The battery master switch and the generator switches are located on the pilot's subpanel under a gang bar for simultaneous cutoff.

AIRFRAME

CABIN APPOINTMENTS

SEATING

The King Air C90 is adaptable to a wide variety of cabin arrangements. The pilot and copilot seats are mounted in a separate forward compartment. They adjust horizontally and vertically with controls located under the seats. The pilot and copilot chair armrests will raise and lower to the position desired.

Various configurations of passenger chairs and the optional two or four place couch installation may be installed on the continuous tracks mounted on the cabin floor. All passenger chairs are placarded on the horizontal leg cross brace as either FRONT FACING ONLY or FRONT OR AFT FACING. Only chairs placarded FRONT OR AFT FACING may be installed facing aft. The passenger chairs utilize movable armrests like those installed on the pilot and copilot seats. Passenger seats also have reclining backs which can be adjusted to suit the individual passenger by a lever on the side of the chair. Each chair can be equipped with an adjustable headrest with a detent in the post for indication of the fully raised position. All aft facing chair backs should be in the full upright position for take-off and landing and the headrest should be in the fully raised position. Passenger seats may be moved fore and aft to suit leg room requirements of individual passengers by lifting the horizontal release bar under the seat.

Aft of the passenger compartment and separated by a sliding-door type partition are the toilet and baggage compartments. The optional toilet is a sliding-drawer chemical type. The baggage compartment is located to the right of the toilet area. The compartment has a 26.5 cubic foot capacity and is equipped with an elastic webb for restraining loose items. Any item stored in the baggage compartment is easily accessible in flight.

SHOULDER HARNESS INSTALLATION

The shoulder harness installation is available for the pilot seats only. The belt is in the "Y" configuration with the single strap being contained in an inertia reel attached to the back of the seat . The two straps are worn with one strap over each shoulder and fastened by metal loops into the seat belt buckle. The spring loading at the inertia reel keeps the harness snug but will allow normal movement required during flight operations. The inertia reel is designed with a locking device that will secure the harness in the event of sudden forward movement or an impact action.

NOSE BAGGAGE COMPARTMENT

On aircraft, serials LJ-569 and after, a nose baggage compartment with a swing-up hinged door provides extra storage room for baggage. The entire compartment is placarded for a maximum weight of 315 pounds which includes the weight of the avionics. A flush handle actuates three bayonet-type latching bolts on the forward, bottom, and aft edges of the door. A push-to-release button adjacent to the handle prevents opening the door without depressing the button. A key lock latch secures the door when the aircraft is unattended. The latching bolt for the forward edge of the door is positioned to actuate a switch; thus when the door is not secure a light will illuminate on the annunciator panel.

AIRSTAIR ENTRANCE DOOR

A swing-down door, hinged at the bottom, provides positive cabin security for flight and a convenient stairway for entry and exit. Two of the three steps are movable and automatically fold flat against the door in the closed position. A plastic encased cable provides support for the door in the open position, a handhold for passengers, and a convenience for closing the door from the inside. An inflatable rubber door seal around the cabin door extends to positively seal the pressure vessel while the aircraft is in flight. Engine bleed air provides the source of pressure to inflate the door seal. A hydraulic damper permits the door to lower gradually during opening.

A locking device is operated by the handle in the center of the door. The inside and outside handles operate simultaneously. When the handle is rotated per placard instructions, two latches hook into the door frame at the top and two lock bolts on each side of the door lock into the frame on the sides. There are four sight openings on the inner facing of the door; one opening over each locking bolt. A green stripe, painted on the locking bolt, aligns with a black pointer in the sight opening when the door is in a locked condition.

A button beside the door handle, both inside and outside the cabin, must be depressed before the handle can be rotated to open the door. Making certain that the button pops out while closing the door will ensure inadvertent opening.

Another safety device is a small round window just above the second step which permits observation of the pressurization safety lock bellows. A placard adjacent to the window instructs the operator to make certain the safety lock arm is in position around the bellows shaft. Pushing the red button switch adjacent to the window illuminates the mechanism inside the door. A safety chain on the door frame is provided to attach into a hook in the door while the door is closed. For security of the aircraft on the ground, the door can be locked with a key.

EMERGENCY EXIT

The emergency exit door is located at the third cabin window on the right side. A flush mounted handle on the inside can be pulled out to open the door. A hinge at the bottom allows the door to swing out and down for emergency exit.

FLIGHT CONTROLS

Conventional dual controls are provided, and nose steering is accomplished by use of the individually adjustable rudder pedals.

Trim tabs on the rudder and left aileron are adjustable from the center pedestal through a cable system which drives jackscrew-type actuators. Position indicators for each of the trim tabs are integrated with their respective controls.

FLAPS

Flap operation is controlled by a three-position switch. A side-loaded detent permits APPROACH position (35%) to be selected on extension, and serves as an OFF position for angles between APPROACH and DOWN (100%). Flap position in percent of travel is shown on an electric indicator at the top of the pedestal. Flap limit switches, mounted on the right inboard flap, stop the flaps at 0%, 35% and 100%. A 20-ampere, push-pull circuit breaker protects the flap motor circuit. To return the flaps to the APPROACH position from the full down position, first raise the flaps to less than 35%, then return the switch to the APPROACH detent.

LANDING GEAR

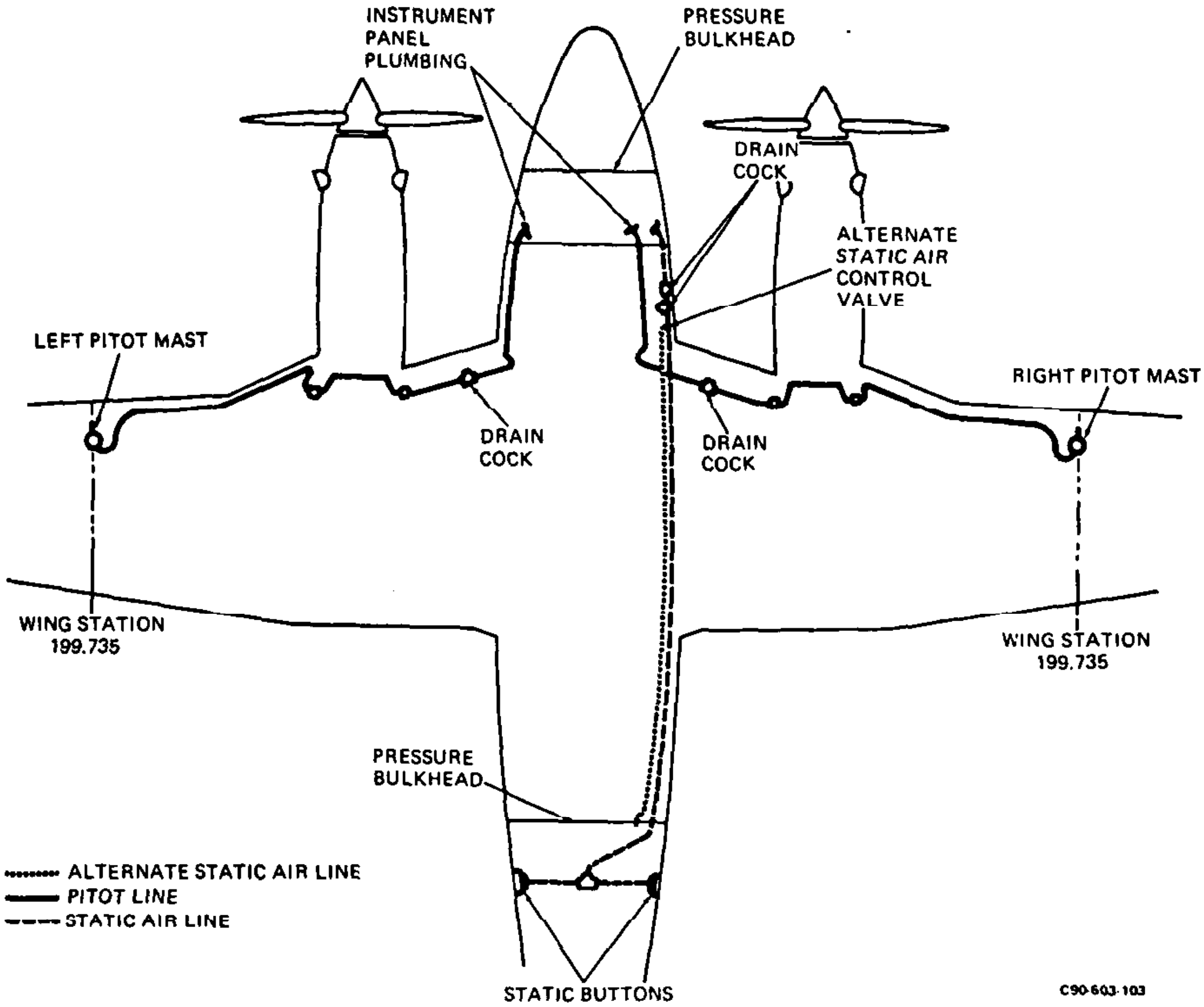
A 28 volt split field motor, located on the forward side of the center section main spar, extends and retracts the landing gear. The motor incorporates a dynamic braking system, through the use of two motor windings, which prevents overtravel of the gear. Torque shafts drive the main gear actuators, and duplex chains drive the nose gear actuator. Spring-loaded friction clutches between the gear box and the torque shafts protect the system in the event of mechanical malfunction. A fifty ampere circuit breaker located on the pedestal circuit breaker panel protects the system from electrical overload.

The Beech air-oil type shock struts are filled with compressed air and hydraulic fluid. Linkage from the rudder pedals allows for nose wheel steering. When the rudder control is augmented by a main wheel brake, the nose wheel deflection can be considerably increased. As the nose wheel retracts, it is automatically centered and the steering linkage becomes inoperative.

A safety switch on the right main strut opens the control circuit when the strut is compressed. The safety switch also actuates a solenoid-operated downlock hook, which prevents the landing gear handle from being raised when the plane is on the ground. The hook automatically unlocks when the plane leaves the ground, but can be manually overridden by pressing down on the red button placarded DN LCK REL.

Visual indication of landing gear position is provided by individual green GEAR DOWN indicator lights for each landing gear. Two red, GEAR UNLOCKED, parallel-wired lights are located in the control handle and may be checked by pressing the HDL LT TEST button to the right of the control handle. These lights illuminate to show that the gear is in transit or unlocked. They also illuminate when the landing gear warning horn is actuated.

When either or both Power Levers are retarded below an engine setting sufficient to maintain flight with the gear not down and locked, a warning horn will sound intermittently. During operations with power retarded, the horn can be deactivated as long as the flaps are UP, by pressing the HORN SILENCE button. The horn will remain silent until



PITOT - STATIC SYSTEM

either the flaps are lowered or the Power Levers are advanced, then retarded again.

EMERGENCY LANDING GEAR EXTENSION

Emergency landing gear extension is provided through a separate, manually powered, chain drive system. Make certain that the landing gear handle is in the down position and pull the landing gear relay circuit breaker before manually extending the gear. A clutch driven by the landing gear motor is disengaged by pulling up on the clutch release handle on the floor to lock it in that position. When the clutch is disengaged, the motor is mechanically disengaged from the system and the emergency drive system is locked in. When the emergency drive is locked in, the chain is driven by a continuous action ratchet which is activated by pumping a handle adjacent to the clutch release handle. Do not continue pumping the ratchet handle after the GEAR DOWN lights illuminate. Excessive pumping may damage the gear drive mechanism and bind the clutch so that the handle will not release it.

After an emergency landing gear extension has been made, the ratchet pump handle may be stowed out of the way by first releasing the clutch release handle and then moving the pump handle to the floor. Leave the circuit breaker pulled and the landing gear handle down.

BRAKE SYSTEM

The dual hydraulic brakes are operated by depressing either the pilot's or copilot's rudder pedals. A shuttle valve adjacent to each set of pedals permits changing braking action from one set of pedals to the other.

Dual parking valves, with a control on the pilot's subpanel placarded PARKING BRAKE - PULL ON AND OPR BK - PUSH TO RELEASE, are installed adjacent to the rudder pedals between the master cylinders of the pilot's rudder pedals and the wheel brakes. After the pilot's brake pedals have been depressed to build up pressure in the brake lines, both valves can be closed simultaneously by pulling out the parking brake handle on the left subpanel. This closes the valve to retain the pressure that was previously pumped into the brake lines. The parking brake is released by depressing the pedals to equalize pressure on the brake lines, and then releasing brakes by pushing the parking brake handle in.

PITOT AND STATIC SYSTEM

The pitot and static system provides a source of impact air and static air for the operation of flight instruments.

A heated pitot mast is located on the bottom side of the outboard section of the left wing. An optional right pitot mast is available for installation in the right wing. Tubing from the mast is plumbed into the cabin to the instrument panel for the instruments. A plumbing drain for the pitot system is inside the leading edge of the center section and is accessible through a hinged door. Open the drain petcock to release moisture. The drain petcock must be closed after draining.

Switches for pitot heat are located on the pilot's subpanel in the "HEAT" group placarded PITOT - LEFT - RIGHT. Pitot heat should not be used on the ground except for brief periods to check operation or thaw the pitot of ice or snow.

The static system provides a source of static air to the flight instruments through static air fittings on each side of the aft fuselage. An emergency static air line, which terminates just aft of the rear pressure bulkhead, provides a source of static air for the flight instruments in the event of source failure from the normal static air line. A control on the right side panel, placarded EMERGENCY STATIC AIR SOURCE, may be actuated to select either NORMAL or ALTERNATE air source by a two position selector valve. The valve is secured in the NORMAL position by a spring clip. Altimeter and airspeed correction graphs are provided in the FAA Performance Section for operation on either normal or emergency system.

There are two drain petcocks for draining the static air lines located below the right side panel and they are protected by an access cover placarded STATIC AIR LINE DRAIN. These drain petcocks should be opened to release any trapped moisture at each 100 hour inspection or more often if conditions warrant and must be closed after draining.

ENGINE BLEED AIR PNEUMATIC SYSTEM

High pressure engine compressor bleed air, regulated at 18 psi, supplies pressure for the surface deice system and the autopilot. Vacuum for the flight instruments is derived from a bleed air ejector. One engine can supply sufficient bleed air for all these systems.

During single engine operation, a check valve in each bleed air line from the engines prevents flow back through the line on the side of the inoperative engine. A pressure gage on the right side panel indicates air pressure available to the deice distributor valve. An instrument air gage, located adjacent to the deice pressure gage, indicates vacuum in in. Hg provided by the bleed air ejector. This instrument is marked with a wide green arc for operation from sea level to 15,000 feet, and a narrow green arc for operation from 15,000 feet to 30,000 feet.

BLEED AIR WARNING SYSTEM

The bleed air lines from the engines to the cabin are shielded with insulation to protect other components from heat. Heat is also dissipated in the air-to-air heat exchanger in the center wing section. The bleed air lines are accompanied in close proximity by plastic tubing from the engines to the cabin. One end of the tubing is plugged off and the other is connected to a bleed air source in the cabin to supply the line with pressure. Since the tubing is vulnerable to heat, any leak or failure of the bleed air line will melt the plastic to the point of failure. Upon release of pressure in the tubing, a normally open switch in the line, located under the copilot's seat, will close, causing a circuit to be completed to the respective BLEED AIR LINE FAILURE light in the annunciator panel. When the indication of bleed air line failure is illuminated in the annunciator, a possible rupture of the bleed air line is indicated.

FLIGHT INSTRUMENTS

The flight instruments are arranged on the floating instrument panel in a standard "T" grouping. Complete pilot and copilot flight instrumentation is available, including dual navigation systems, one electric and one vacuum directional indicator, horizon, and turn and slip indicator.

LIGHTING

COCKPIT

An overhead light control panel, easily accessible to both pilot and copilot, incorporates a breakdown of all lighting systems in the cockpit. Each light group has its own rheostat switch placarded BRT - OFF. The master cockpit light switch controls the overhead and fuel control panel lights, engine instrument lights, radio panel lights, subpanel and console lights, pilot and copilot instrument lights, and gyro instrument lights. The instrument indirect lights, in the glareshield, and overhead map lights are individually controlled by separate rheostat switches. A press-to-light OAT gage light is in the lower left corner of the panel.

CABIN

A two position switch on the pilot's subpanel, placarded INT - OFF, controls the cabin lights. The switch to the right of the interior light switch activates the cabin NO SMOKING/FASTEN SEAT BELT signs and accompanying chimes. This three position switch is placarded CABIN SIGN - BOTH - OFF - FSB.

A threshold light at floor level to the left of the airstair door may be turned on and off with a two position switch adjacent to the light. If this light is not turned off, it will extinguish automatically when the door is closed.

When the interior light switch on the pilot's subpanel is on, individual reading lights along the top of the cabin may be turned on or off by the passengers with a push button switch adjacent to each light.

EXTERIOR

Exterior light switches are located on the subpanel just left of the pedestal. There are two switches placarded LANDING to control the nose gear landing lights, a switch placarded TAXI, for the nose gear mounted taxi light, a switch placarded BEACON, for the upper and lower rotating beacons, and a switch placarded ICE, for the wing ice light. A switch, placarded STROBE LIGHTS, for the optional wing tip and tail strobe lights, if installed, is located in the same area on the subpanel.

STALL WARNING/ SAFE FLIGHT SYSTEM

The stall warning/safe flight system consists of a safe flight indicator mounted on the glareshield above the left instrument panel, a stall warning horn mounted forward of the right instrument panel, a stall warning light on the upper center of the instrument panel, a lift transducer on the leading edge of the left wing, a lift transducer heater element, a circuit breaker, a transistor switch and relay. The heater element is activated by a switch on the pilots subpanel placarded STALL WARNING HEAT.

When aerodynamic pressure on the lift transducer vane indicates that a stall is imminent, the transistor switch is actuated to complete the circuit to the stall warning horn.

CAUTION

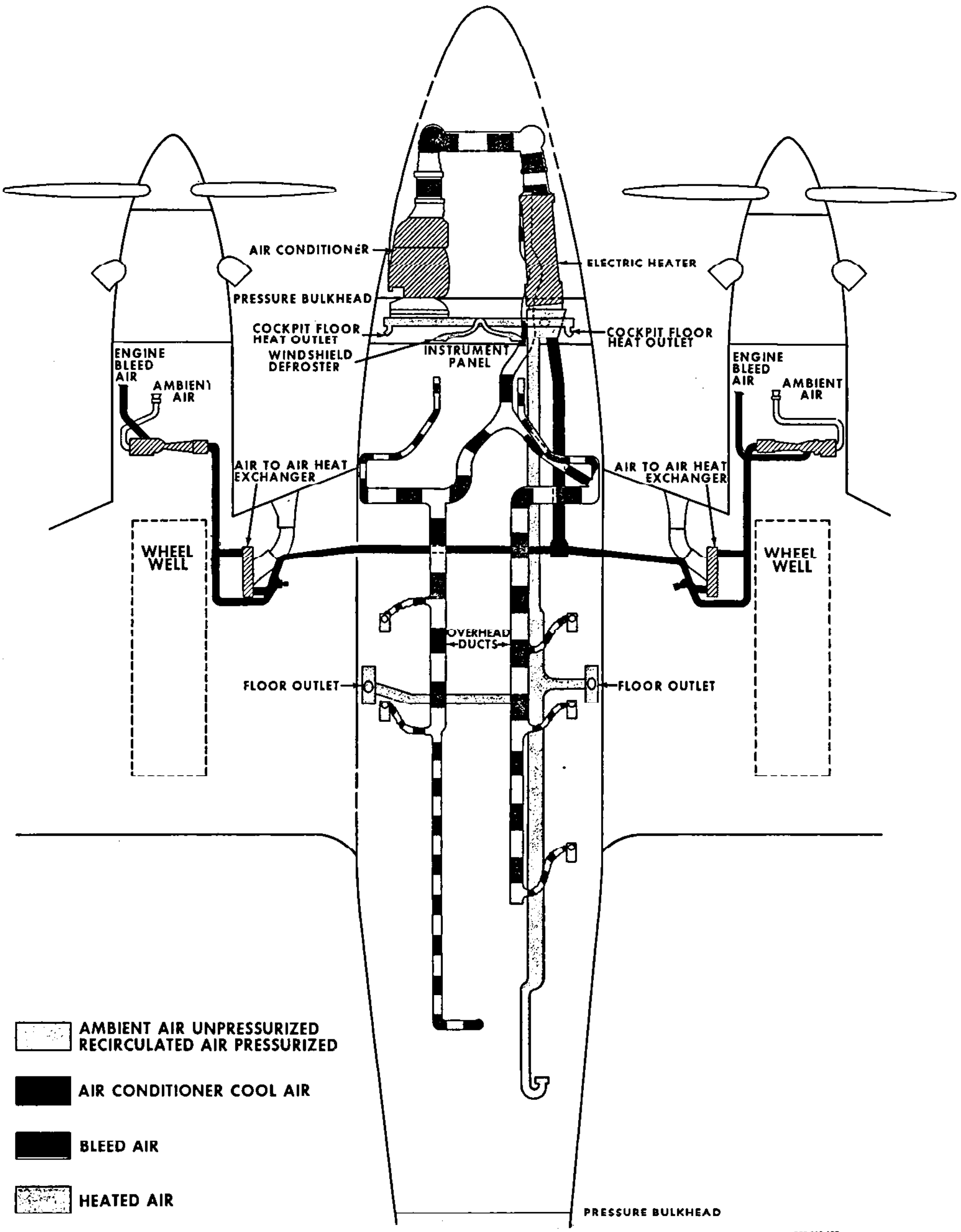
The heater element protects the lift transducer from ice, however, a buildup of ice on the wing may disrupt the air flow and prevent the system from accurately indicating an incipient stall.

The lift transducer also senses the angle of attack for the safe flight indicator. This information is transmitted as a relative speed reading on the linear scale. The best approach speed is indicated when the needle centers on the scale of the indicator. Maximum performance speeds such as lower landing speeds and takeoff with marginal airspeeds, are indicated with the needle near the "W" in "SLOW" on the left end of the scale.

ENVIRONMENTAL SYSTEM

An environmental control section on the copilot's subpanel provides for automatic or manual control of the system. This section, just to the right of the landing gear control, contains all the major controls of the environmental function: bleed air valve switches, a vent blower control switch, a manual temperature switch for control of the heat exchanger valves, an electric heat mode selector switch, a cabin temperature level control, and the mode selector switch for selecting manual or automatic heating or cooling. Bleed air valve switches of the two position, lever lock type, placarded BLEED AIR VALVES - OPEN - CLOSED, actuate electric solenoids in the flow control units at the engines to bring warm, compressed air (bleed air) from the compressor section of the engine to the cabin. To the right of the bleed air valve switches is the vent blower switch placarded VENT BLOWER - HIGH - LO - AUTO. HIGH and LO positions regulate the blower to two speeds for manual operation. In the AUTO position the fan will run at low speed, but when the mode selector switch is placed in the OFF position, the blower will turn off. Just above the bleed air switches is a spring loaded switch placarded MANUAL TEMP - INCR - DECR which controls the motor driven bypass valves downstream of the heat exchangers in the wing center sections. In the automatic mode, the motors are driven to the proper degree of valve opening automatically as regulated by the controller. In the manual mode, the valve opening is controlled manually by moving the switch to INCR or DECR. and holding it in that position until the motor drives the valve to the desired position. To the right of the manual temp switch is the ELEC HEAT switch with three positions: GRD MAX - NORM - OFF. This switch is solenoid held in GRD MAX position when on the ground and will drop down to the NORM position at lift-off when the landing gear safety switch is opened. It provides for maximum electric heat for initial warmup of the cabin. If all the electrical heating elements are not desired for initial warmup as in the GRD MAX position, the switch may be placed in the NORM position for warmup in which only four elements will be utilized. In this position the operation of the four heating elements is automatic in conjunction with the cabin thermostat to supplement bleed air heating. The OFF position turns off all electric heat and leaves cabin heating to be provided by bleed air.

The CABIN TEMP - INCR control adjacent to the electric heat switch provides regulation of the temperature level in the automatic mode. Temperature sensing units in the cabin, in conjunction with the control setting, initiates a heat or cool command to the temperature controller for desired cabin environment. Adjacent to the cabin temperature controller is the mode selector placarded CABIN TEMP MODE. With the selector in the MAN HEAT or MAN COOL position, regulation of the cabin is accomplished manually with the MANUAL TEMP control. In the AUTO position there are two settings, the CKPT setting and the CABIN setting. The CKPT setting allows the pilot or copilot to regulate the temperature by setting the CABIN TEMP control. The CABIN setting allows the



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ENVIRONMENTAL SYSTEM SCHEMATIC

passengers to select the desired temperature level by use of a control located overhead in the forward cabin area.

FLOW CONTROL UNIT

A flow control unit forward of the firewall in each nacelle controls the bleed air from the engine to make it usable for pressurization, heating, and ventilation. This unit is fully pneumatic except for an electric solenoid operated by the bleed air switches on the copilot's subpanel, a normally open electric solenoid operated by the landing gear safety switch, and a pneumatic thermostat which opens and closes with temperature variations. The unit receives bleed air from the engine into an ejector which draws ambient air into the venturi of the nozzle. The mixed air is then forced into the bleed air line which goes through the heat exchanger in the wing center section before reaching the cabin.

A line from the bleed air ejector chamber to the normally closed electric solenoid is under pressure any time the engine is in operation. When the bleed air valve control switch on the copilot's subpanel is moved to OPEN, the electric solenoid valve opens, permitting air to pressurize the line to the reference pressure regulator. Here the air is regulated to a constant value of less than the bleed air pressure supply. All lines downstream from the regulator are provided with orifices to slow the movement of the valves and to allow the aneroid control to function accurately. The aneroid control restricts flow in the supply line to it in order to back up pressure into the ejector flow control actuator. When the bellows in the ejector flow control actuator is pressurized, it opens the ejector to allow more bleed air into the nozzle. Thus, the aneroid control regulates bleed air flow.

The firewall shutoff valve in the bleed air lines is a spring loaded, bellows operated valve that is held in the open position by pressure directly from the pressure regulator. When the electric solenoid is shut off, or when bleed air diminishes on engine shutdown (in both cases the pressure to the firewall shutoff valve is cut off), the firewall valve closes.

The ambient air flow is regulated by a normally open ambient modulator valve upstream from the ejector. This valve is normally open with no pressure on the system and is used to restrict the flow of ambient air to the ejector nozzle. When the aircraft is on the ground and the landing gear safety switch is open, a normally open electric solenoid closes upstream from the pneumatic thermostat, building up pressure to close the ambient modulator valve. On the ground, with bleed air at lower temperatures, no ambient air is allowed to enter the bleed air line. In flight, the solenoid opens and pressure is allowed to bleed off through the pneumatic thermostat, creating a stabilized pressure condition to the ambient modulator valve. As temperatures lower, the pneumatic thermostat begins to close, which in turn closes the ambient modulator valve, shutting off the flow of ambient air to the ejector. Thus, the pneumatic thermostat governs the temperature of the hot air available to the cabin by regulating the amount of cool ambient air into the warm bleed air.

PRESSURIZATION SYSTEM

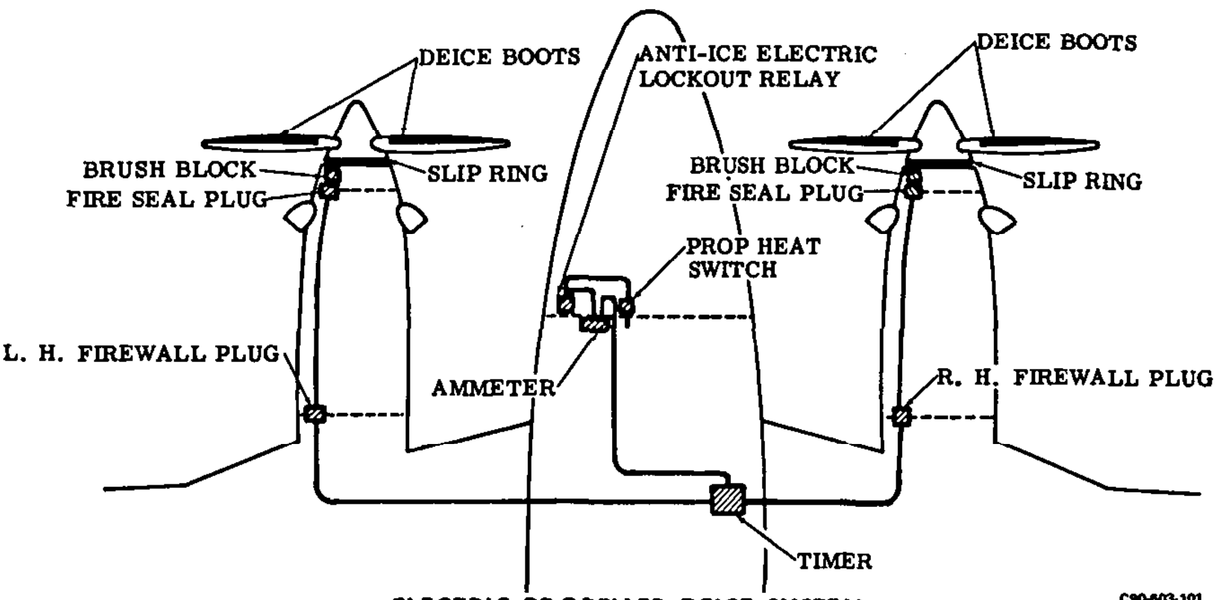
Bleed air from the engine, as described in HEATING and COOLING, is available to the cabin at a rate of 12 pounds per minute for the purpose of pressurization. The flow control unit of each engine, which mixes ambient air with the bleed air, incorporates a solenoid actuated by the landing gear safety switch. On take-off, a time delay relay actuates the solenoid at the left engine first, then the solenoid at the right engine in a delayed sequence to prevent excessive pressure "bump" when activating the pressurization system. A pneumatically operated outflow valve, located on the aft pressure bulkhead, maintains the selected cabin altitude and rate of climb commanded by the cabin rate-of-climb and altitude controller on the pedestal. The outflow valve is equipped with a silencer cone for quiet operation. A safety valve adjacent to the outflow valve is connected to the pressure dump switch on the pedestal and is wired through the landing gear safety switch. If either of these switches is open, or the vacuum source or electrical power is lost, the safety valve will close to atmosphere.

Before takeoff, the safety valve is open with equal pressure between the cabin and the outside air. The safety valve closes on liftoff if the pressure switch on the pedestal below the power control levers is in the PRESS mode. As the aircraft climbs, the controller modulates the outflow valve and increases the cabin pressure until the maximum cabin pressure differential is reached. After this point the cabin altitude begins to climb at approximately the same rate as the aircraft. At the cabin altitude of 10,000 feet, a pressure switch mounted on the pressure bulkhead forward of the left subpanel completes a circuit to illuminate an annunciator light, ALT WARN, to warn of operation requiring oxygen.

Also incorporated into the outflow valve is a negative pressure relief diaphragm to prevent outside atmospheric pressure from exceeding cabin pressure.

COOLING

Bleed air that is used during the cooling mode is passed through the heat exchanger in the wing center section. An air intake on the leading edge of the wing brings ram air into the heat exchanger to cool the bleed air that is being ducted into the cabin. This ambient air, on leaving the heat exchanger, is dumped overboard through louvers on the bottom side of the wing. In the cooling mode, a bypass valve downstream from the heat exchanger routes the bleed air through the heat exchanger. After the air enters the cabin, it is distributed through the ducting system and recirculated. The air conditioner evaporator is mounted in the lower part of the nose forward of the pressure bulkhead. Cooling air is supplied to the air conditioner condenser by being drawn in through a louvered intake in the right side of the nose and exhausted out through louvers in the left side. The unit is electrically driven, has a



ELECTRIC PROPELLER DEICE SYSTEM

rated capacity of 16,000 Btu, and uses a refrigerant gas. The circuit breaker that protects the air conditioner circuit, as well as the circuit for normal electric heat, is located on the cockpit floor just left of the pedestal. It is a large red button and is designed for foot operation.

HEATING

Bleed air from the engine, combined with ambient air through the pressurization and heating flow control unit in the nacelle, is ducted into the cabin for heating and pressurization. While the aircraft is on the ground, a solenoid closes off the ambient air to provide only the warm bleed air to the cabin. An integral electric heater with eight heating elements is provided to supplement the heating of the air within the cabin. The heat of the engine bleed air is usually enough to maintain a comfortable cabin temperature, however additional heat from the electric heater will, if necessary, supplement cabin heat automatically in very cold weather.

There are two modes of heating, manual and automatic. Selection of manual heating imposes continuous operation in that mode with regulation provided through the MANUAL TEMP control. In the automatic mode, the temperature may be regulated with the CABIN TEMP control located on the copilot's subpanel, or with a control on the left sidewall midway of the cabin placarded CABIN HEAT CONTROL. Selecting CKPT or CABIN in the AUTO position of the mode selector activates the control function in the cockpit or cabin respectively.

When the aircraft is airborne, the landing gear safety switch actuates the solenoid that opens a valve allowing ambient air to be injected into the bleed air. The flow of incoming ambient air is controlled by the pneumatic thermostat, assuring that the pressurized air to the cabin is warm enough.

If desired, an external power unit may be used during ground operation to provide initial cabin heating with the electric heater.

OXYGEN SYSTEM

The King Air C90 oxygen system utilizes a 22, 48 or 64 cubic foot cylinder installed aft of the aft pressure bulkhead. The oxygen system pressure regulator and control valve are attached to the cylinder and activated by a remote push-pull knob located to the rear of the cockpit overhead light control panel.

The system is of the constant flow type, based on adequate flow for an altitude of 22,000 or 30,000 feet, depending upon the mask used. Each mask plug is equipped with its own regulating orifice and is color coded either red (3.7 SLPM, approved up to 30,000 feet) or orange (2.7 SLPM, approved up to 22,000 feet). The Oxygen Duration Charts in FAA NORMAL PROCEDURES Section are based upon flow rates of either 2.7 or 3.7 standard liters per minute. The pilot and copilot oxygen masks are stowed under their seats and oxygen outlets are located on the forward cockpit sidewalls. Passenger's masks are stowed in the seat back pockets except in the couch installation, where they are stowed under the seats. The cabin outlets are located adjacent to the reading lights on the upper cabin sidewalls and are protected by a dustcover. All masks are easily plugged in by pushing the mask plug-in firmly into the cabin outlet and turning clockwise approximately one quarter turn. Unplugging is accomplished by reversing the motion.

ICE PROTECTION SYSTEMS

PROPELLER ELECTRIC DEICE SYSTEM

Electrothermal deice boots, cemented to the propeller blades, remove ice from the propellers. Each boot, consisting of one outboard and one inboard heating element, receives its electrical power through a deice timer. The timer directs current to the propeller boots in a cycle of; first, the outboard halves followed by the inboard halves on one propeller, then the outboard halves and inboard halves of the other propeller. Four intervals of approximately 30 seconds complete one cycle.

The propeller ammeter will indicate 14 to 18 amperes with minor fluctuations approximately every 30 seconds during normal operation. For deviations from the normal indications, and the procedures to be followed, see the FAA Approved Flight Manual.

WINDSHIELD ANTI-ICE

Windshield heat for the pilot and copilot windshields is controlled by a toggle switch on the pilot's subpanel placarded WSHLD ANTI-ICE - BOTH - OFF - PILOT. The control circuit of this system is protected by a 1/2 ampere fuse on a panel mounted on the forward pressure bulkhead. Power is used to heat the windshield heating elements buried in the glass. The power circuit of this system is protected by a 50 ampere circuit breaker located on the lower pedestal. A controller with a temperature sensing unit maintains proper temperature at the windshield surface.

On aircraft with heavy electrical loads, an electric heater lockout is incorporated in the relay to assure anti-ice operation in the event of overload of the electrical system. This assures that the elements of the electric heater will be blocked from functioning in favor of load requirements for the windshield anti-ice.

Because of the close proximity of the magnetic standby compass to the windshield, erratic operation of the compass may be expected while windshield heat is being used.

SURFACE DEICE SYSTEM

The surface deice system removes ice accumulation from the leading edges of the wings and the vertical and horizontal stabilizers. Ice removal is accomplished by alternately inflating and deflating the deice boots. Pressure regulated bleed air from the engines supplies pressure to inflate the boots. A venturi ejector, operated by bleed air, creates vacuum to deflate the boots and hold them down while not in use. To assure operation of the system should one engine fail, a check valve is incorporated in the bleed air line from each engine to prevent loss of pressure through the compressor of the inoperative engine. Inflation and deflation phases are controlled by a distributor valve. A three position switch on the pilot's subpanel placarded DE-ICE CYCLE - SINGLE - OFF - MANUAL, controls the deicing operation. The switch is spring loaded to return to the OFF position from SINGLE or MANUAL. When the SINGLE position is selected, the distributor valve opens to inflate the boots. After an inflation period of approximately 7 seconds, a timer delay relay switches the distributor to deflate the boots. When deflation is complete, the cycle is complete. If the switch is held in the MANUAL position, the boots will inflate and remain inflated until the switch is released to return to OFF. Then the boots will deflate and remain in the vacuum hold down condition until again actuated by the switch. Since very thin ice may cling to the boots during the removal attempt, the most effective deicing operation is achieved by allowing a buildup of approximately 1/2 to 1 inch of ice to form before activating the deice boots.

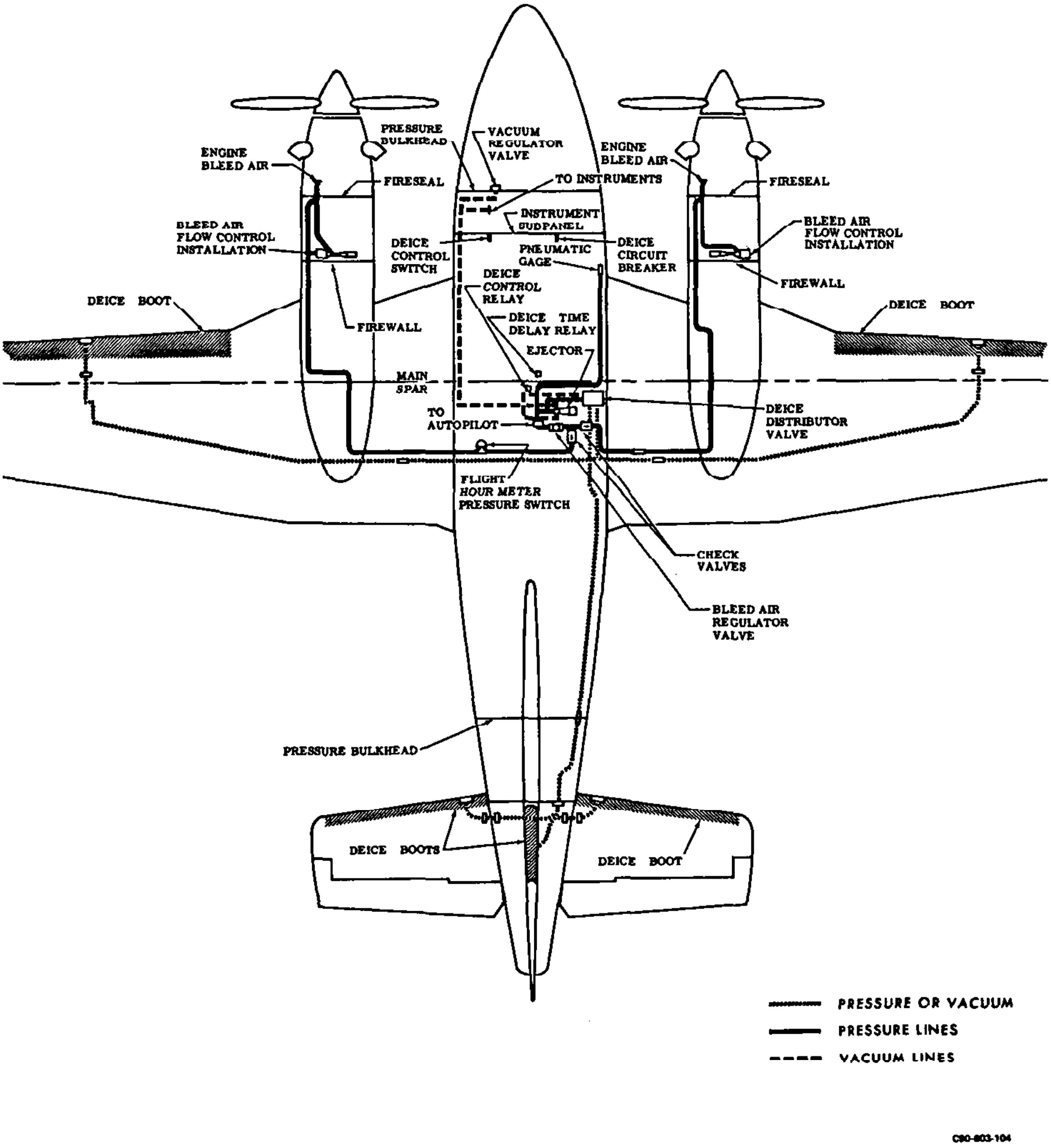
FIRE DETECTION SYSTEM

To provide immediate warning in the event of fire at the engine compartment, a fire detection system is installed. The system consists of three photoconductive cells in each engine nacelle, a control amplifier under the center aisle floor aft of the main spar, two warning lights placarded LH FIRE - RH FIRE on the annunciator panel, a test switch on the upper pedestal and a circuit breaker on the subpanel below the copilot's control column. Flame detectors, sensitive to infrared rays, are positioned in the engine compartments to receive direct and reflected rays, thus viewing the entire compartment with only three cells. Temperature level and rate of temperature rise are not factors in the sensing method. The cell emits an electrical signal proportional to the infrared intensity and ratio in the radiation striking the cell. To prevent stray light rays from signaling a false alarm, a relay in the control amplifier closes only when the signal reaches a preset alarm level. When the relay closes, the appropriate warning light in the annunciator panel illuminates. When the fire has been extinguished, the cell output voltage drops below the alarm level and the relay in the control amplifier opens. No manual resetting is required to reactivate the detection system.

The test switch on the upper pedestal has four positions; OFF, 1, 2, and 3. The system may be tested any time on the ground or in flight by rotating the switch from OFF to any of the positions to activate a corresponding set of flame detectors in each nacelle. The annunciator warning lights should illuminate as the selector is rotated through each of the three positions. Failure of a light to illuminate in any one position indicates trouble in that particular detector circuit.

SMOKE DETECTION SYSTEM

A smoke detector, with a constantly burning light and a photoconductive cell enclosed in a perforated case, is located in the nose avionics compartment to warn of the presence of smoke. Smoke particles entering the case reflect infrared rays from the light into the cell, which transmits a signal to the smoke detector amplifier. The potential of this signal is proportional to the density of the smoke. When the signal strength is sufficient to close the relay in the amplifier located aft of the main spar under the center aisle,



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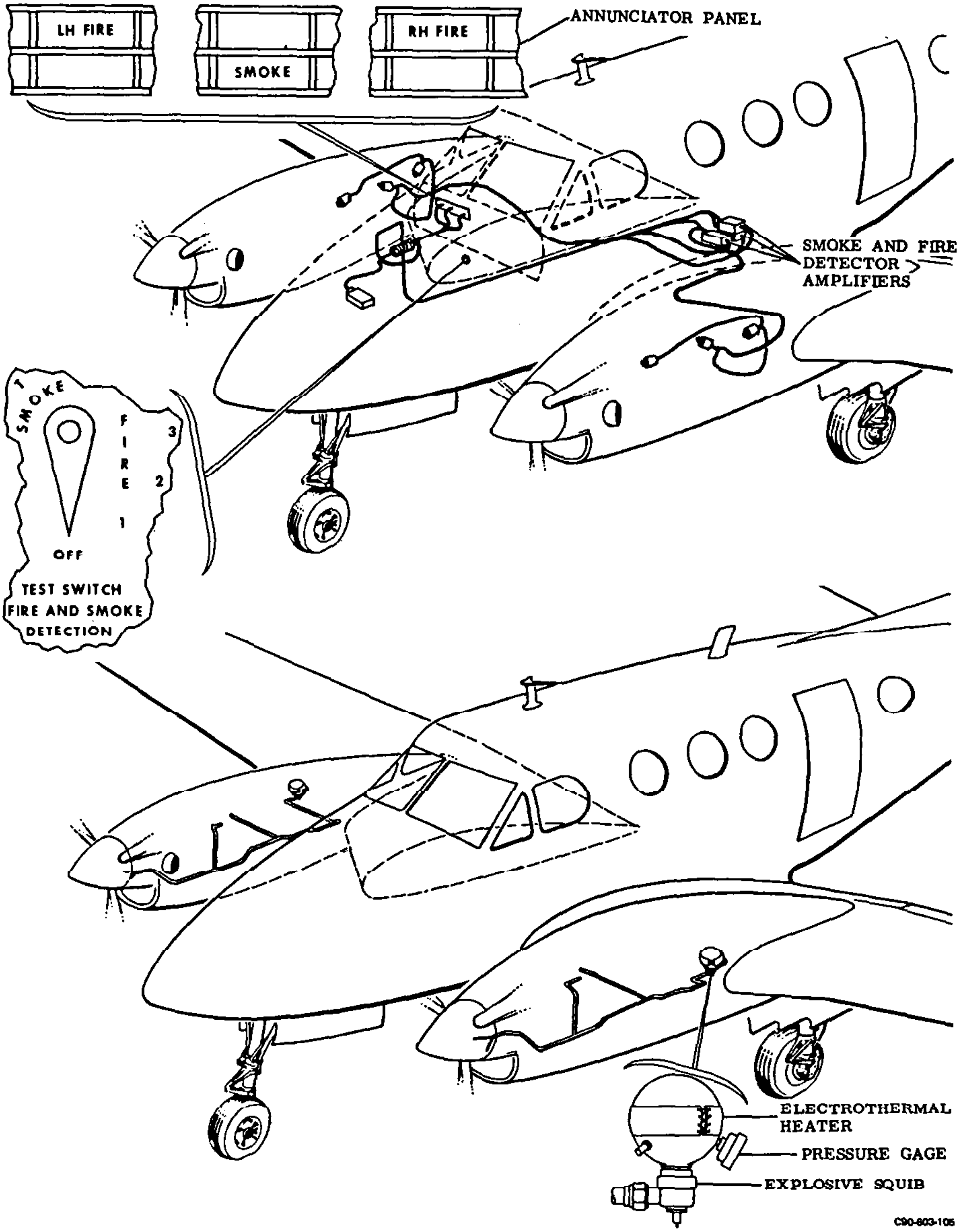
SURFACE DEICE SYSTEM



FIRE EXTINGUISHER SCHEMATIC

the red indicator light on the annunciator panel, placarded SMOKE, illuminates.

When the smoke detector is installed, the fire detector test switch will have an additional position, placarded SMOKE, available to check the smoke detection circuit. It is checked in the same manner as the fire detection circuits except that the SMOKE annunciator light will illuminate instead of the FIRE annunciator lights.

FIRE EXTINGUISHER SYSTEM

The system utilizes two cylinders charged with two and one half pounds of Bromotrifluoromethane as the extinguishing agent, pressurized with dry nitrogen to 450 psi at 70°F. Lines from the cylinders are routed to strategic points about the engine to provide a network of spray tubes which serve to diffuse the extinguishing agent. On earlier airplanes each supply cylinder is encircled by an electrothermal heater for cold weather operation. When the temperature drops below 35°F, the heater thermostat actuates the heater.

The system may be activated by raising the transparent plastic cover over the press-type switch and depressing the red plastic face of the switch placarded FIRE EXT - PUSH TO EXT. Switches for the respective engines are located on the instrument panel just below the annunciator panel, and are wired in conjunction with the annunciator to provide an additional warning to ensure activation of the proper switch. Each extinguisher gives only one shot to its engine. Do not attempt to restart the engine after the extinguisher has been actuated.

WINDSHIELD WIPERS

The windshield wiper installation consists of a motor, arm assembly, drive shafts and converters located forward of the instrument panel. The system includes a control switch, located in the upper left corner of the overhead panel. The system circuit breaker is located in the right subpanel. The windshield wipers may be operated for flight and ground operations. Do not use on dry glass. The control knob, placarded PARK - SLOW - FAST, controls the wipers with two speeds for light or heavy precipitation. An intermediate position between PARK and SLOW serves as the off position. After the control is turned to PARK to bring the wipers to their most inboard position, spring loading returns the control to the off position.

SECTION X

SERVICING

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INTRODUCTION TO SERVICING

The purpose of this section is to outline the requirements for maintaining the King Air C90 in a condition at least equal to that of its original manufacture. This information sets the time frequency intervals in which the airplane should be taken to the BEECHCRAFT Parts and Service Outlet for periodic servicing and preventive maintenance.

The Federal Aviation Regulations place the responsibility for the maintenance of this airplane on the owner and operator, who should ensure that all maintenance is done by qualified mechanics in conformity with all airworthiness requirements established for this airplane.

All limits, procedures, safety practices, time limits, servicing and maintenance requirements contained in this manual are considered mandatory.

Authorized BEECHCRAFT Parts and Service Outlets will have recommended modification, service, and operating procedures issued by both FAA and Beech Aircraft Corporation, designed to get maximum utility and safety from the airplane.

If a question should arise concerning the care of the King Air C90, it is important to include the airplane serial number in any correspondence. The serial number appears on the model designation placard attached to the aft frame of the airstair door.

WARNING

The BEECHCRAFT King Air C90 is a pressurized airplane. Drilling, modification, or any type of work which creates a break in the pressure vessel, is considered the responsibility of the owner or facility performing the work. Obtaining approval of the work is, therefore, their responsibility.

GROUND HANDLING

TOWING

The tow bar connects to the upper torque knee fitting of the nose strut. The airplane is steered with the tow bar when moving it by hand or an optional tow bar is available for towing the airplane with a tug. Although the tug will control the steering of the airplane, someone should be positioned in the pilot's seat to operate the brakes in case of an emergency. Always ascertain that the control locks are removed before towing the airplane, as serious damage can occur to the steering linkage if towed with a tug with the rudder locks installed. The nose gear strut has turn radius warning marks to warn the tug driver when structure limits of the gear will be exceeded. Damage will occur to the nose gear and linkage if the turn radius is exceeded. When ground handling the airplane, do not use the propellers or control surfaces as hand holds to push or move the airplane.

PARKING

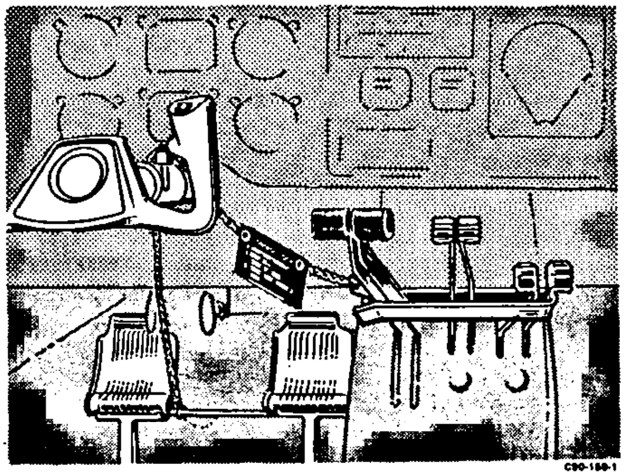
The parking brakes can be set by pulling out the parking brake handle and depressing the pilot's brake pedals. Do not attempt to lock the parking brake by applying force to the parking brake handle: it controls a valve only, and cannot apply pressure to the brake system. To release the brakes, depress pedals to equalize pressure on the brake lines, and then push the parking brake handle in.

NOTE

Do not set the parking brakes during low temperatures when an accumulation of moisture may cause the brakes to freeze, or when they are hot from severe use.

CONTROL LOCK

The control lock, consisting of two pins and a clamp connected together by a chain, holds the power quadrant controls in the closed position, and the elevator, aileron, and rudder in the neutral position. Install the clamp over the power quadrant and the pins in the control column and rudder pedals. Due to the possibility of an attempt to taxi or fly the airplane with the power quadrant clamp removed and the control surface lock pins installed, it is important all three locks be installed or removed at the same time, never leaving the power quadrant unlocked when any of the control surfaces are locked. The power quadrant clamp is installed over the power quadrant levers to prevent movement. The control lock pin is installed vertically from



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CONTROL LOCKS

above, through pilot's control column assembly. The largest of the two pins is installed through the pilot's rudder pedals to hold the rudders in neutral. A placard attached to the chain displays the proper installation procedure.

TIE DOWN

Three mooring eyes are provided, one on each wing and one on the tail. To moor the airplane, chock the wheels fore and aft, install the control lock and tie the airplane down at all three points. Avoid overtightening the rear line and pulling the nose of the airplane up so far that wind will create lift on the wings. If extreme weather is anticipated, it is advisable to nose the airplane into the wind. Install engine inlet and exhaust covers and pitot mast covers when mooring the aircraft.

To tie down your aircraft securely, use the following steps:

1. Chock the wheels fore and aft.
2. Install the control locks.
3. Tie each wing with a nylon line or chain through its mooring eye.
4. Tie the tail with a nylon line or chain through the mooring eye in the ventral fin.

SERVICING

EXTERNAL POWER

The aircraft electrical system is protected against damage from an external power source with reversed polarity by a relay and diodes in the external power circuit. The external power receptacle is located just outboard of the nacelle in the right center section. The receptacle is designed for a standard AN type plug. To supply power for ground checks or to assist in starting, a ground power source capable of delivering a continuous load of 300 amperes and up to 1000 amperes for .1 second is required. Observe the following precautions when using an external power source.

1. Use only an auxiliary power source that is negatively grounded. If the polarity of the power source is unknown, determine the polarity with a voltmeter before connecting the unit to the airplane.
2. Before connecting an external power unit, ensure that a battery is installed in the aircraft and that the battery switch is ON. All other electrical and avionics equipment should be turned OFF to prevent damage from transient voltage spikes.
3. If the unit does not have a standard AN plug, check the polarity and connect the positive lead from the external power unit to the center post and the negative lead to the front post of the airplane's external power receptacle. The small pin of the receptacle must be supplied with +24 VDC to close the external power relay that provides protection against damage by reversing polarity.

BATTERY

The 24 volt nickel-cadmium battery is highly valued because it has the potential for years of reliable service; however, careful maintenance is required to obtain this service. Nickel cadmium batteries are significantly different from lead acid batteries. When service is required for your nickel cadmium battery, it is recommended it be serviced at your BEECHCRAFT Parts and Service Outlets.

LANDING GEAR

TIRES

The King Air C90 is equipped with 8.50 x 10, 8 ply, tubeless tires on the main gear wheels and a 6.50 x 10, 6 ply, tubeless tire on the nose gear.

CAUTION

Tires that have picked up a fuel or oil film should be washed down as soon as possible with a detergent solution to prevent contamination of the rubber.

Maintaining proper tire inflation will help to avoid damage from landing shock and contact with sharp stones and ruts, and will minimize tread wear. When inflating the tires, inspect them for cuts, cracks, breaks, and tread wear. The main tires should be inflated between 52 and 58 psi and the nose tire between 50 and 55 psi.

SHOCK STRUTS

To check the fluid level in the landing gear shock absorbers, deflate the strut by releasing the air through the valve, then remove the filler valve adapter. The fluid level should be at the bottom of the valve standpipe with the struts fully compressed. If the level is low, add MIL-H-5606 hydraulic fluid to reach the standpipe, work the strut slightly to eliminate any trapped air, then add more fluid as necessary.

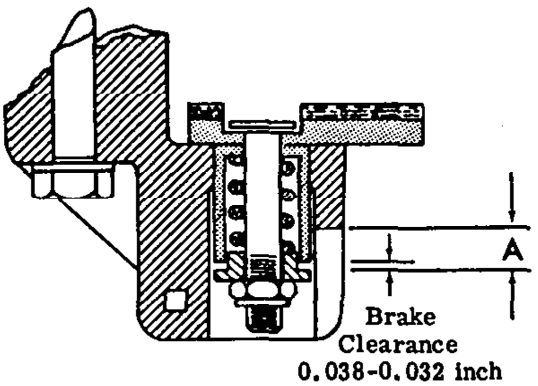
WARNING

Release the air pressure entirely before removing the valve adapter.

With the airplane empty except for fuel and oil, inflate the nose strut until the piston is extended 3 to 3-1/2 inches and the main strut until the piston is extended 3 inches.

BRAKE SYSTEM

Brake system servicing is limited primarily to maintaining the hydraulic fluid level in the reservoir mounted in the upper left corner of the nose radio compartment. A dip stick is provided for measuring the fluid level. When the reservoir is low on fluid, add a sufficient quantity of MIL-H-5606 hydraulic fluid to fill the reservoir to the full mark on dipstick. The only other requirement related to servicing involves the wheel brakes themselves. Brake lining adjustment is automatic, eliminating the need for periodic



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adjustment of the brake clearance. Check brake wear periodically to assure that dimension "A", in the Brake Wear illustration, does not reach zero. When it reaches zero, refer to the BEECHCRAFT Servicing and Maintenance Instructions for King Air brakes and wheels.

OIL SYSTEM

Servicing the engine oil system primarily involves maintaining the engine oil at the proper level, inspecting and cleaning the filter element, and changing the oil at the proper intervals. The filter element should be cleaned at 100 hour intervals. The interval for changing the oil is dependent upon the aircraft utilization. For "typical" utilization (50 hours per month or less) change the oil each 400 hours or 9 months, whichever occurs first. For "high" utilization (more than 50 hours per month) change the oil each 800 hours (1200 hours with 5 Centistoke oils) or 9 months.

CAUTION

Do not mix different brands of oil when adding oil between oil changes, for different brands of oil may be incompatible because of the difference in their chemical structure.

The oil tank is provided with an oil filler neck and quantity dipstick cap which protrude through the accessory gearcase at the eleven o'clock position. The dipstick is marked in U.S. quarts and indicates the amount of oil required to fill the tank. Access to the dipstick cap is gained by opening the aft engine cowl. Service the oil system with oil as specified in the Consumable Materials Chart. Do not mix the oil brands. Oil Tank capacity is 2.3 U.S. gallons with 5 quarts measured on the dipstick as usable, for adding purposes. When a dry engine is first serviced it will require approximately 5 quarts in addition to tank capacity to fill the lines and cooler, giving a total system capacity of 14 quarts. The engine will trap approximately 1.5 quarts which cannot be drained; therefore, when performing an oil change, refill the system with 12 quarts and add additional oil based on dipstick reading.

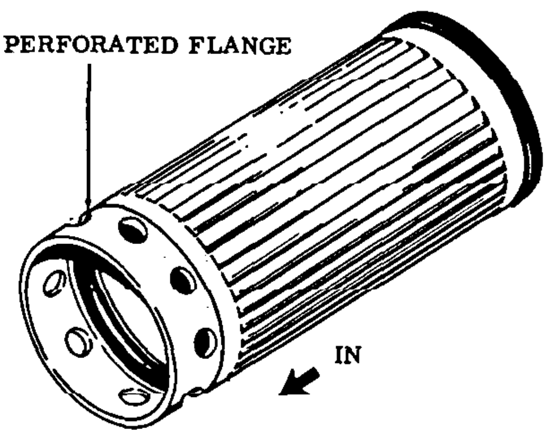
CAUTION

Spilled oil should be removed immediately to prevent possible tire contamination or damage.

CLEANING AND INSPECTING THE OIL FILTER

The engine oil filter is located under the square cover plate at the three o'clock position of the compressor inlet case and just behind the aft fire seal. The filter may be cleaned as follows:

1. Remove the four self-locking nuts and plain washers securing the filter cover to the compressor inlet case. Remove the cover and withdraw the element from the filter housing.
2. Agitate the element for five minutes in clean, unused solvent.
3. Dry the element with clean, filtered air or allow to stand until dry.
4. Visually inspect and repeat the cleaning process if required. The filter should be inspected at 100 hour intervals. Inspect the filter element with a magnifying glass. If more than 5% of the visible passages is blocked, the element must be cleaned and inspected at an approved overhaul facility. If dents or broken wires are found in the filter element screen, the filter element must be replaced. Each time the filter is removed for cleaning or inspection, the "O" ring seal inside the perforated flange must be replaced.



OIL FILTER C90-257-4

CHANGING THE ENGINE OIL

CAUTION

When changing to a different brand of oil, , completely drain the aircraft oil system as indicated in the procedure below. Remove the oil filter and immerse it in the brand of oil to be used. Reinstall the oil filter and drain plugs. Fill the system to the proper level, and ground run the engines for 20 minutes to thoroughly circulate the new brand of oil throughout the system. Completely drain the aircraft oil system and again remove the oil filter and immerse it in the new brand of oil. Refill the aircraft oil system as indicated below. This will thoroughly purge the system of the old oil to prevent chemical interaction between it and the new brand.

1. To gain access to the oil drain plug, remove the fiberglass duct from around the oil cooler and remove the metal bypass duct immediately aft of the oil cooler.
2. Unsafety and remove the drain plug from the oil cooler and drain the oil into a container.
3. Remove the cotter pin from the oil plug retaining pin.
4. Position the oil drain funnel under the oil plug.
5. Remove the drain plug retaining pin and pull the drain plug from the engine. Allow all oil to drain from the engine.
6. Remove the forward engine cowling and unsafety and remove the drain plug from the nose case. Refer to SECTION 4, of the Shop Manual for removal of the lower forward cowling.
7. With all the drain plugs removed, motor the engine over with the starter only (no ignition) to permit the scavenge pumps to clear the engine.

CAUTION

Limit motoring to the time required to accomplish the above because of the limited lubrication available to the engine during this operation. To prevent damage to the fuel control unit, leave the condition lever in IDLE CUT-OFF while motoring the engine.

8. Install a new oil filter element as described in INSPECTING THE OIL FILTER.
9. Coat a new "O" ring seal with engine oil and install it on the engine drain plug.
10. Insert the drain plug into the engine and install the plug retaining pin. Make sure a new cotter pin is installed in the drain plug retaining pin.
11. Reinstall and safety the nose case drain plug. Reinstall the forward cowlings.
12. Reinstall and safety the oil cooler drain plug.

CAUTION

Damage to the threads will result if the drain plug is tightened to a torque exceeding 15 to 20 inch-pounds. Apply MIL-P-17232, Type A, Class 2, anti-seize compound to the drain prior to reinstallation.

13. Fill the engine with the correct amount and type of oil as specified in CONSUMABLE MATERIALS CHART.
14. Ground run engines for 20 minutes if changing brands of oil or sufficiently long enough to distribute new oil and show possible leaks if only changing oil.
15. Check the engine for oil leaks.
16. Refill the engine to the proper level.
17. Reinstall the metal bypass duct immediately aft of the oil cooler with the retaining screws and reinstall the fiberglass duct around the oil cooler on the lower cowl.

FUEL SYSTEM

FUEL HANDLING PRACTICES

All hydrocarbon fuels contain some dissolved and some suspended water. The quantity of water contained in the fuel depends on temperature and the type of fuel. Kerosene, with its higher aromatic content, tends to absorb and suspend more water than aviation gasoline. Along with the water, it will suspend rust, lint and other foreign materials longer. Given sufficient time, these suspended contaminants will settle to the bottom of the tank. However, the settling time for kerosene is five times that of aviation gasoline. Due to this fact, jet fuels require good fuel handling practices to assure that the King Air C90 is serviced with clean fuel. If recommended ground procedures are carefully followed, solid contaminants will settle and free water can be reduced to 30 parts per million (ppm), a value that is currently accepted by the major airlines. Since most suspended matter can be removed from the fuel by sufficient settling time and proper filtration, they are not a major problem. Dissolved water has been found to be the major fuel contamination problem. Its effects are multiplied in aircraft operating primarily in humid regions and warm climates.

Dissolved water cannot be filtered from the fuel by micronic type filters, but can be released by lowering the fuel temperature, such as will occur in flight. For example, a kerosene fuel may contain 65 ppm (8 ounces per 1000 gallons) of dissolved water at 80°F. When the fuel temperature is lowered to 15°F, only about 25 ppm will remain in solution. The difference of 40 ppm will have been released as supercooled water droplets which need only a piece of solid contaminant or an impact shock to convert them to ice crystals. Tests indicate that these water droplets will not settle during flight and are pumped freely through the system. If they become ice crystals in the tank, they will not settle since the specific gravity of ice is approximately equal to that of kerosene. The 40 ppm of suspended water seems like a very small quantity, but when added to suspended water in the fuel at the time of delivery, is sufficient to ice a filter. While the critical fuel temperature range is from 0° to -20°F, which produces severe system icing, water droplets can freeze at any temperature below 32°F.

Water in jet fuel also creates an environment favorable to the growth of a microbiological "sludge" in the settlement areas of the fuel cells. This sludge, plus other contaminants in the fuel, can cause corrosion of metal parts in the fuel system as well as clogging the fuel filters. The King Air C90 uses bladder type fuel cells. All metal parts (except the boost pumps and transfer pumps) are mounted above the settlement areas. The possibility of filter clogging and corrosive attacks on the fuel pumps exists if contaminated fuels are consistently used.

Since fuel temperature and settling time affect total water content and foreign matter suspension, contamination can be minimized by keeping equipment clean, using adequate filtration equipment and careful water drainage procedures, storing the fuel in the coolest areas possible, and allowing adequate settling time. Underground storage is recommended for fuels. Filtering the fuel each time it is transferred will minimize the quantity of suspended contaminants carried by the fuel.

The primary means of fuel contamination control by the owner/operator is careful handling. This applies not only to fuel supply, but to keeping the aircraft system clean. The following is a list of steps that may be taken to prevent and recognize contamination problems.

1. Know your supplier. It is impractical to assume that fuel free from contaminants will always be available, but it is feasible to exercise precaution and be watchful for signs of fuel contamination.
2. Assure, as much as possible, that the fuel obtained has been properly stored, filtered as it is pumped to the truck, and again as it is pumped from the truck to the aircraft.
3. Perform filter inspections to determine if sludge is present.
4. Maintain good housekeeping by periodically flushing the fuel tank system. The frequency of flushing will be determined by the climate and the presence of sludge.
5. Since aviation gas is an alternate fuel, it should be used occasionally as a means to change fuel tank environment, thus destroying a possible microbiological growth pattern. The 150 hours maximum operation of an engine on aviation gas per a "Time Between Overhaul" should be observed.
6. Use only clean fuel servicing equipment.
7. After refueling, allow a three hour settle period whenever possible, then drain a small amount of fuel from each drain.

CAUTION

Jet fuel spilled in ramp areas should be removed immediately to prevent tire contamination and subsequent tire damage.

FUEL GRADES AND TYPES

Jet A, Jet A-1, Jet B, and JP-5 fuels may be mixed in any ratio. JP-1 and aviation gasoline, grades 80/87, 91/96, 100/130 and 115/145, are alternate fuels and may be mixed in any ratio with the normal fuels when necessary. However, use of the lowest octane rating available is suggested due to its lower lead content. The use of aviation gasoline shall be limited to 150 hours operation during each engine Time Between Overhaul (TBO) period.

Page 10-13 gives fuel refiner's brand name, along with the corresponding designations established by the American Petroleum Institute (API) and the American Society of Testing Material (ASTM). The brand names are listed for ready reference and are not specifically recommended by Beech Aircraft Corporation. Any product conforming to the recommended specification may be used.

FILLING THE TANKS

When filling the aircraft fuel tanks, always observe the following:

1. Make sure the aircraft is statically grounded to the servicing unit and to the ramp.
2. Service nacelle tanks of each side first. The nacelle tank filler caps are located at the top of each nacelle. The main filler caps are located in the top of the wing, outboard of the nacelles.

NOTE

Servicing the nacelle tanks first prevents fuel transfer through the gravity feed interconnect lines from the tanks into the nacelle tanks during fueling. If wing tanks are filled first, fuel will transfer from them into the nacelle tank leaving the wing tanks only partially filled. Be sure the nacelle tanks are completely full after servicing the fuel system to assure proper automatic fuel transfer during flight operation. For a complete list of recommended fuels, check the Fuel Listings Chart.

3. Allow a three hour settle period whenever possible, then drain a small amount of fuel from each drain point.

DRAINING FUEL SYSTEM

Open each fuel drain daily to drain off any water or other contamination collected in the low places. Along with the drain on the firewall mounted fuel filter, there are four other drains - the nacelle tank fuel pump drain, center section tank transfer pump drain, wheel well drain, and the inboard end of the wing leading edge tank drain. The fuel pump and tank drains are accessible from the underside of the airplane while the fuel filter drain is reached inside the top cowl door.

CAUTION

The firewall shutoff valve has to be electrically opened to drain large quantities of fuel from the firewall fuel filter drain.

ENGINE FUEL FILTERS

Cleaning Firewall Filters

Clean as follows at intervals of 100 operating hours:

a. Cut the lockwire securing the filter housing retaining nut and remove the nut.
b. Remove the filter housing from the filter body.
c. Remove the filter pack assembly (the packs need not be removed from the center tube.)
d. Inspect the filter pack for foreign material and microbiological sludge.
e. Plug the open ends of the center tube and wash the unit in solvent.
f. Install the filter pack assembly, filter housing, and the filter housing retaining nut. Safety the retaining nut with lockwire.

CHANGING PESCO FUEL PUMP FILTER (EVERY 100 hours)

1. Unscrew and remove filter housing from fuel pump.
2. Remove filter element and discard.
3. Before installing new filter element, unscrew inlet screen cover and withdraw assembly.
4. Remove long bolt, spring, washers and separate screen from cover. Wash the screen with solvent and replace in reverse order of disassembly.
5. Tighten bolt and torque to 20-23 in. lb.
6. Install two new preformed packings on screen cover and assemble screen and cover assembly to pump body.
7. Tighten cover to compress the packing and obtain metal-to-metal contact and then lockwire.
8. After cleaning and reinstalling screen, install a new fuel pump outlet filter. (Check for pressure of preformed packing in internal diameter. The element must be installed so that the preformed packing slides over the spigot in the pump body.)
9. Replace preformed packing on filter housing.
10. Install filter housing and tighten to compress preformed packing to obtain metal-to-metal contact.
11. Lockwire square section of housing to hole on nameplate boss. Check for leaks after engine ground checks.

INSTRUMENT VACUUM AIR

Vacuum for the flight instruments is obtained by operating an ejector with bleed air from the engines. During operation, the ejector draws air in through the instrument filter and the gyros. If the gyros are not using the total vacuum pressure created by the ejector, a vacuum relief regulator handles the remainder.

The instrument filter, located at the top of the radio compartment, is of prime importance and should be replaced every 500 hours, or more often if conditions warrant (smokey, dusty conditions).

The vacuum relief regulator valve, located on the forward pressure bulkhead in the bottom of the radio compartment, is protected by a foam sponge type filter which should be cleaned in solvent at least every 100 hours. If vacuum pressure rises above a normal reading, clean the filter and recheck vacuum pressure before attempting to adjust the valve.

SERVICING THE OXYGEN SYSTEM

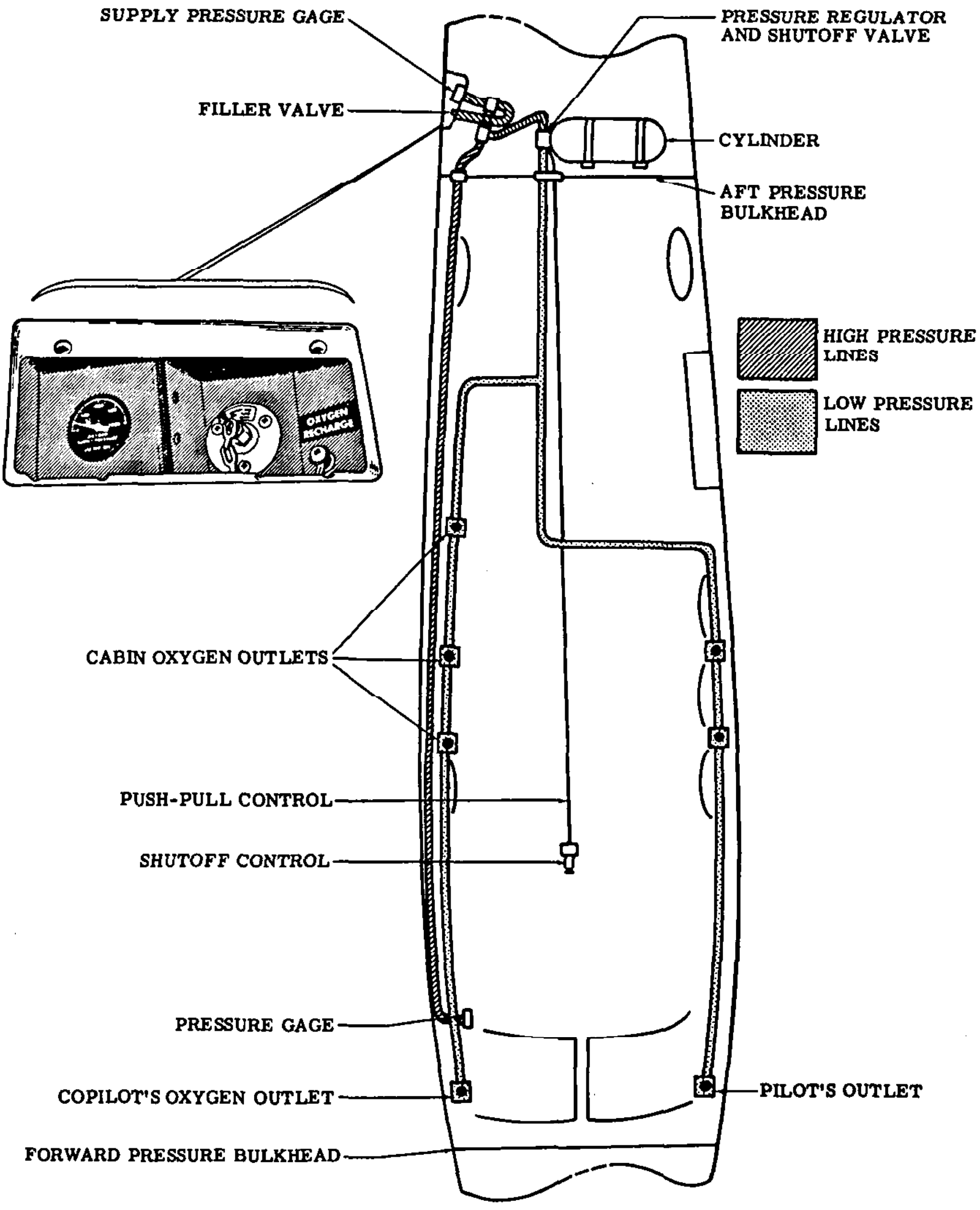
OXYGEN COMPONENTS

Oxygen for high altitude flights is supplied by a cylinder located in the compartment immediately aft of the aft pressure bulkhead. An installation of a 22, a 48 or a 64 cubic foot cylinder may be installed in the King Air. The oxygen system is serviced by a filler valve accessible by removing an access plate on the right side of the aft fuselage. The system has two pressure gages, one located on the right side panel in the crew compartment for in-flight use and one adjacent to the filler valve for checking system pressure during filling. A shut-off valve and regulator, located on the cylinder, controls the flow of oxygen to the crew and passenger outlets. The shut-off valve is actuated by a push-pull type control located aft of the overhead light control panel. The regulator is a constant flow type which supplies low pressure oxygen through system plumbing to the outlets.

OXYGEN SYSTEM PURGING

Offensive odors may be removed from the oxygen system by purging. The system should also be purged any time system pressure drops below 50 psi or a line in the system is opened. Purging is accomplished simply by connecting a recharging cart into the system and permitting oxygen to flow through the lines and outlets until any offensive odors have been carried away. The following precautions should be observed when purging or servicing the oxygen system.

a. Avoid any operation that would create sparks and keep all burning cigarettes or fire away from the vicinity of the airplane when the outlets are in use.
b. Inspect the filler connection for cleanliness before attaching it to the filler valve.
c. Make sure that your hands, tools, and clothing are clean, particularly of grease or oil stains, for these contaminants will ignite upon contact with pure oxygen.



C90-603-108

OXYGEN SYSTEM SCHEMATIC

d. As a further precaution against fire, open and close all oxygen valves slowly during filling.

FILLING THE OXYGEN SYSTEM

Fill the oxygen system slowly by adjusting the recharging rate with the pressure regulating valve on the servicing cart, because the oxygen, under high pressure, will cause excessive heating of the filler valve. Fill the cylinder (22.0 cubic foot cylinder installation) to a pressure of 1800±50 psig at a temperature of 70°F. This pressure may be increased an additional 3.5 psig for each degree of increase in temperature; similarly, for each degree of drop in temperature, reduce the pressure for the cylinder by 3.5 psig. The oxygen system, after filling, will need to cool and stabilize for a short period before an accurate reading on the gages can be obtained. The larger cylinder installations (49.2 cubic foot cylinder, and 65.6 cubic foot cylinder) may be charged to a pressure of 1850±50 psig at a temperature of 70°F. When the system is properly charged, disconnect the filler hose from the filler valve and replace the protective cap on the filler valve.

OXYGEN CYLINDER RETESTING

Oxygen cylinders used in the airplane are of two types. Light weight cylinders, stamped "3HT" on the plate on the side, must be hydrostatically tested every three years and the test date stamped on the cylinder. This bottle has a service life of 4,380 pressurizations or fifteen years, whichever occurs first, and then must be discarded. Regular weight cylinders, stamped "3A", or "3AA", must be hydrostatically tested every five years and stamped with the retest date. Service life on these cylinders is not limited.

AIR CONDITIONING SYSTEM

Servicing the air conditioning system consists of periodically checking the refrigerant level and changing the system air filter.

CHECKING THE REFRIGERANT LEVEL

a. Connect an external power source of at least 300 ampere rating to the airplane.

b. Place the CABIN TEMP MODE switch, located on the copilot's subpanel, to the MANUAL COOL position and allow the system to operate for approximately two minutes.

c. With the system still operating, observe the sight gage window at the aft end of the receiver-dehydrator, mounted on the left side of the nose wheel well. If the window appears milky or bubbles can be seen, the system must be recharged.

RECHARGING THE REFRIGERANT SYSTEM

The refrigerant system in the airplane air conditioning system is essentially the same type system used in automotive and home air conditioners and should be serviced by a qualified air conditioning service agency. The following procedure will enable the service agent to charge the system.

NOTE

The refrigerant system is to be charged only with the approved refrigerant gas as listed in the Consumable Materials.

a. Connect a regulated 28 volt dc power source of at least 300 ampere capacity to the aircraft external power receptacle.

b. Turn all electrical equipment not needed for air conditioner operation and all of the radio equipment off while using external power.

c. Move the CABIN TEMP MODE switch to MANUAL COOL position. This will also automatically activate the VENT BLOWER to the LOW position.

d. Connect a service unit to the service connections, located in the upper fwd end of the nose wheel well.

If the air conditioner, is being recharged after a normal amount of service, refrigerant may be added without a complete check of the system, as some refrigerant will be lost during normal use. However, if the system has been in service only a short period, or recently serviced, a complete check of the system should be made. Leaks may be detected by inspection with a halide torch. Visible oil leaks around the compressor or any part of the system requires correcting the leak and a check of the oil level in the compressor, before the system is recharged with refrigerant. Check the oil level as follows:

1. Crack the discharge valve on the service cart until the pressure on the suction line has dropped to five pounds or less.
2. Unscrew the oil check plug located on the top of the compressor unit five full turns to relieve the pressure in the compressor crankcase.
3. Remove the oil check plug and O-ring, then measure the oil level with the dipstick, (Part No. 65-590019 included in the loose tools and accessories). Make sure the dipstick is bottomed on the oil sump case and not on the compressor crankshaft. (If the dipstick is not available, a copper wire may be used to measure the depth of oil in the compressor sump. The oil level should measure from 1 inch to 1-1/8 inch in the bottom of the sump.)
4. Add Suniso No. 5 or Texaco Capella "E" until the oil level is up to the level prescribed above if the compressor is low on oil.
5. Replace the oil check plug and O-ring seal, being careful not to twist the O-ring, damage the plug threads or the plug's seating surfaces. Do not overtighten the plug if it leaks; instead, either replace the O-ring or clean or repair the plug's seating surface as required to stop the leak.

NOTE

If the refrigerant system is being recharged after replacement of a unit, such as the compressor or other components in the system, evacuate the entire system of the refrigerant gas with a vacuum pump operating to the 125 micron pressure level or below.

e. Charge the system slowly with refrigerant until the cloudy condition and most of the bubbles in the sight glass disappear. After filling to this point an additional 8 to 12 ounces of refrigerant should insure a fully charged system

Charge the system with 4 ±.1 pounds of refrigerant. Approximately 2 pounds of refrigerant may be charged into the system before operation. The remaining 2 pounds can be charged into the system while it is operating to complete the charging. This assures the system will give trouble-free efficient operation.

f. Disconnect the service cart and check the system for proper operation in the cooling mode. Replace the access panel and equipment required for servicing.

AIR CONDITIONER AIR FILTER REPLACEMENT

The air conditioner filter is a flexible, fiber-foam type, that covers the evaporator coil rediator in the air conditioner plenum chamber. It is to be replaced each 300 hours of operation. It may be removed as follows:

a. Remove the access door in the nose wheel well beside the evaporator inlet and outlet line. Remove the evaporator plenum access door, located under the wheel well access door, for access to the evaporator.

b. Pull the filter down and out of the retaining clips on the evaporator coil. Remove the filter carefully so as not to distort the small tubing in the area.

c. Fold the new filter so that it can be inserted through the access door. The filter must be carefully inserted between the radiator and the tubing and secured with the retaining clips at the upper corners of the filter frame.

NOTE

> Check that the flapper valve door from the cabin inlet still has clearance to open between the tubing of the evaporator that might have been disturbed by changing the filter.

d. Replace the access doors.

MISCELLANEOUS MAINTENANCE

AIRCRAFT FINISH CARE

Urethane paint is used on the King Air C90. A finish of this type is necessary because the turbine oil used in the PT6A-20 engines will damage enamel and laquer finishes. Besides forming a tougher protective film, it has a very lustrous sparkle. A good coat of wax will aid in protecting the surface from the elements. Any good automotive polish or wax may be used on the King Air C90.

SURFACE DEICE BOOT CLEANING

The surfaces of the deice boots should be checked for indications of engine oil after servicing and at the end of each flight. Any oil spots that are found should be removed with a non-detergent soap and water solution. Care should be exercised during cleaning to avoid scrubbing the surface of the boots, as this will tend to remove the special coating. The deice boots are made of soft, flexible stock, which may be damaged if gasoline hoses are dragged over the surface of the boots or if ladders and platforms are rested against them.

CLEANING PLASTIC WINDOWS

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

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

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

INTERIOR CARE

To remove dust and loose dirt from the upholstery, headliner, and carpet, clean the interior regularly with a vacuum cleaner.

Blot up any spilled liquid promptly with cleansing tissue or rags. Do not pat the spot; press the blotting material firmly and hold it for several seconds. Continue blotting until no more liquid is taken up. Scrape off sticky materials with a dull knife, then spot-clean the area.

Oily spots may be cleaned with household spot removers used sparingly. Before using any solvent, read the instructions on the container and test it on an obscure place on the fabric to be cleaned. Never saturate the fabric with a volatile solvent, it may damage the padding and backing materials.

Soiled upholstery and carpet may be cleaned with foam-type detergent, used according to the manufacturer's instructions. To minimize wetting the fabric, keep the foam as dry as possible and remove it with a vacuum cleaner.

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

FUEL BRAND AND TYPE DESIGNATIONS

PRODUCT NAME	DESIGNATION
AMERICAN OIL COMPANY	
American Jet Fuel Type A	Jet A
American Jet Fuel Type A-1	Jet A-1
ATLANTIC REFINING COMPANY	
Arcojet-A	Jet A
Arcojet-A-1	Jet A-1
Arcojet-B	Jet B
BP TRADING COMPANY	
BP A.T.K.	Jet A-1
BP A.T.G.	Jet B
CALIFORNIA TEXAS COMPANY	
Caltex Jet A-1	Jet A-1
Caltex Jet B	Jet B
CITIES SERVICE COMPANY	
Turbine Type A	Jet A
CONTINENTAL OIL COMPANY	
Conoco Jet-40	Jet A
Conoco Jet-50	Jet A
Conoco Jet-60	Jet A-1
Conoco JP-4	Jet B
GULF OIL COMPANY	
Gulf Jet A	Jet A
Gulf Jet A-1	Jet A-1
Gulf Jet B	Jet B
HUMBLE OIL COMPANY	
Enco Turbo Fuel A	Jet A
Enco Turbo Fuel 1-A	Jet A-1
Enco Turbo Fuel 4	Jet B
Esso Turbo Fuel A	Jet A
Esso Turbo Fuel 1-A	Jet A-1
Esso Turbo Fuel 4	Jet B
MOBIL OIL COMPANY	
Mobil Jet A	Jet A
Mobile Jet A-1	Jet A-1
Mobile Jet B	Jet B
PHILLIPS PETROLEUM COMPANY	
Philjet A-50	Jet A
Philjet JP-4	Jet B
PURE OIL COMPANY	
Purejet Turbine Fuel Type A	Jet A
Purejet Turbine Fuel Type A-1	Jet A-1
RICHFIELD PETROLEUM COMPANY	
Richfield Turbine Fuel A	Jet A
Richfield Turbine Fuel A-1	Jet A-1
SHELL OIL COMPANY	
Aeroshell Turbine Fuel 640	Jet A
Aeroshell Turbine Fuel 650	Jet A-1
Aeroshell Turbine Fuel JP-4	Jet B
SINCLAIR OIL COMPANY	
Sinclair Superjet Fuel	Jet A
Sinclair Superjet Fuel	Jet A-1
STANDARD OIL OF CALIFORNIA	
Chevron TF-1	Jet A-1
Chevron JP-4	Jet B
STANDARD OIL OF KENTUCKY	
Standard JF A	Jet A
Standard JF A-1	Jet A-1
Standard JF B	Jet B
STANDARD OIL OF OHIO	
Jet A Kerosene	Jet A
Jet A-1 Kerosene	Jet A-1
TEXACO	
Texaco Avjet K-40	Jet A
Texaco Avjet K-58	Jet A-1
Texaco Avjet JP-4	Jet B
UNION OIL COMPANY	
76 Turbine Fuel	Jet A-1
Union JP-4	Jet B

NOTE

Jet A - Aviation Kerosene type fuel with -40°F (-40°C) maximum Freeze Point.

Jet A-1 - Aviation Kerosene type fuel with -58°F (-50°C) maximum Freeze Point.

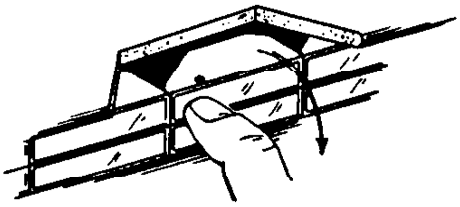
Jet B - Aviation wide-cut gasoline type fuel similar to MIL-F-5624 grade JP-4, but may have Freeze Point -60°F (50°C) instead of maximum -76°F (-60°C).

BULB REPLACEMENT GUIDE

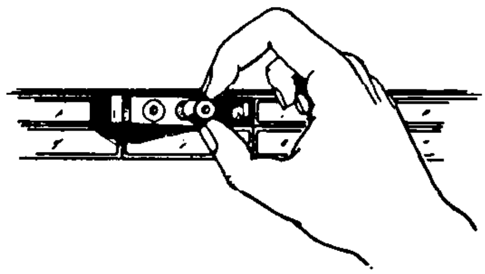
LOCATION	*BULB NUMBER*
Aft Dome Light	307
Airstair Door Threshold Light	354
Aisle Light	354
Annunciator Panel Fault Warning Light	CMB682
Annunciator Panel Light	327
Baggage Compartment Light	303
Cabin door Pressure Lock Light	1864
Cabin Door Warning Light	327
Cabin Interior Light (Fluorescent)	5113WW
Cabin Reading Light	303
Cockpit Overhead Light	303
Compass Light	327
Deice Pressure Gage Light	327
Engine Anti-ice Light	327
Engine Fire Extinguisher Light	327
Engine Fire Warning Light	327
Engine Igniter Light	327
Flight Hour Meter Light	327
Fuel Crossfeed Light	327
Fuel Panel Circuit Board Light	D158-100-5T1
Generator Overvoltage Light	327
Instrument Indirect Light	1864
Instrument Overhead Light	327
Inverter Warning Light	327
Landing Gear Control Knob Light	327
Landing Gear Warning Light	327
Landing Light	4594
Map Light (Pilot's and Copilot's)	1495
Navigation Light	A7512-24
No Smoking and Fasten Seat Belt Light	303R
Outside Air Temperature Light	334
Overhead Light Panel Light	.3158-100-5T1
Oxygen Quantity Indicator Light	327
Pedestal Edge Light	D158-200-5T1
Post Light	327
Pressure Controller Light	327
Propeller Synchroscope Indicator Light	327
Rotating Beacon Light (Upper)	40-0103-15
Rotating Beacon Light (Lower)	A7079B-24
Smoke Detector Warning Light	327
Stall Warning Light	327
Stop Watch Light	327
Strobe Light (Flashtube)	(Grimes) 30-0467-1
Subpanel Edge Light	D158-100-5T1
Tail Navigation Light	1683
Taxi Light	4587
Wing Ice Light	A7079A24
Wing Navigation Light	A7512-24

BULB REPLACEMENT GUIDE (Continued)

ANNUNCIATOR PANEL LIGHTS

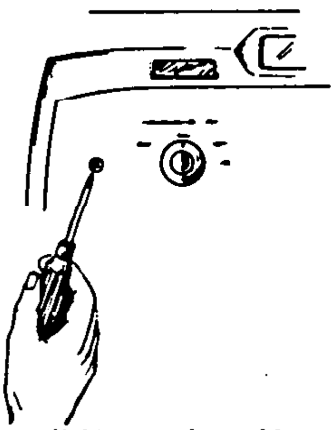


1. Depress left side of indicator panel to rotate in direction shown

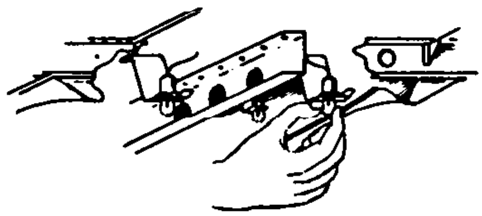


2. Pull bulb from rear of indicator panel

OVERHEAD MAP LIGHTS

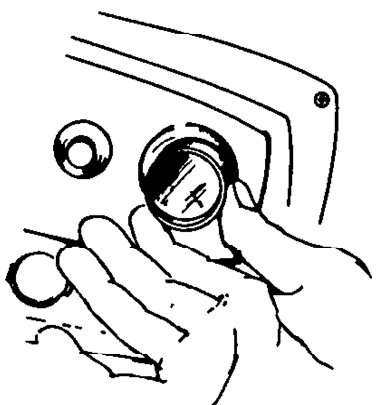


1. Remove light control panel by removing recessed attaching screws

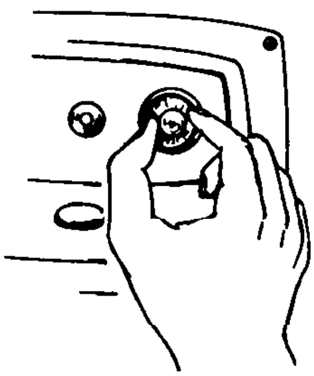


2. Remove bulb from socket under light filter panel

CABIN READING LIGHTS



1. Pull filter from light

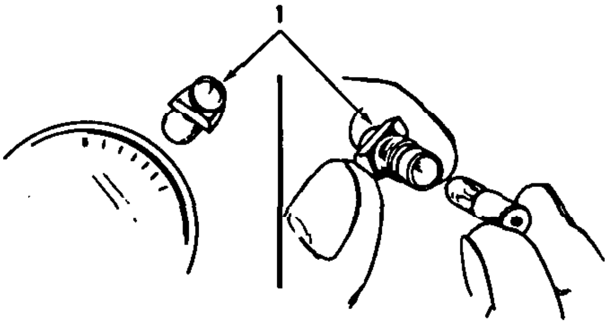


2. Remove bulb from reflector assembly

C90-609-1(SHEET 1)

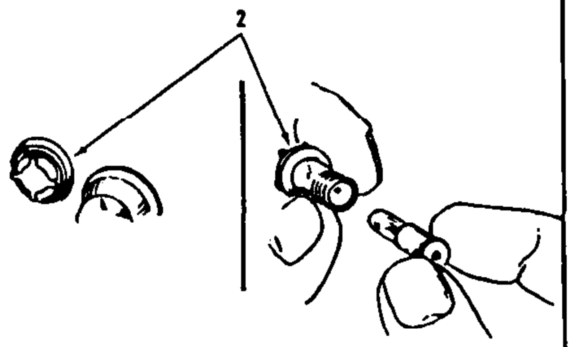
BULB REPLACEMENT GUIDE (Continued)

INSTRUMENT LIGHTS



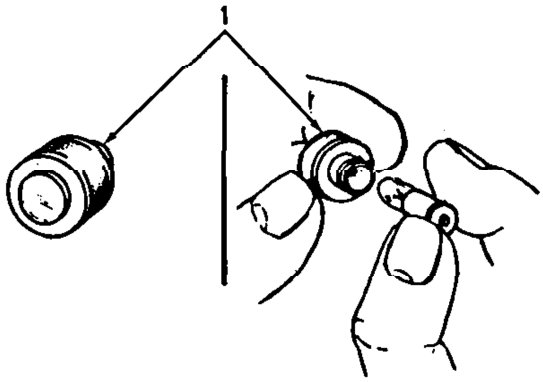
1. Pull light shield (1) from light assembly
2. Remove lamp

SCREW-IN LIGHTS



1. Unscrew cap filter assembly (2)
2. Remove lamp

INDICATOR LIGHTS

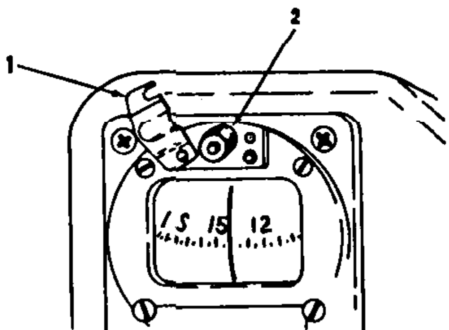


1. Unscrew cap assembly (1)
2. Remove lamp

INDIRECT INSTRUMENT (GLARESHIELD) LIGHTS

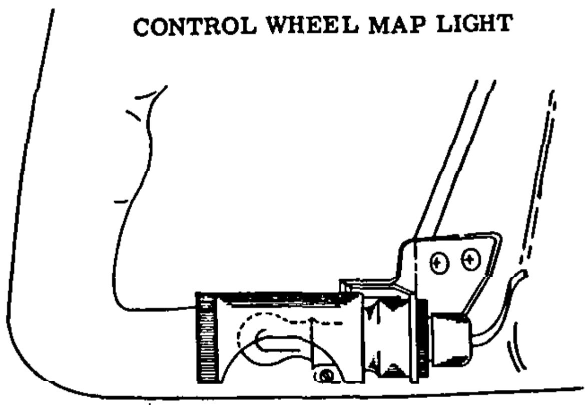
1. Locate faulty bulb under glareshield
2. Remove bulb by turning counter-clockwise

COMPASS LIGHT



1. Swing shield (1) up
2. Remove lamp (2)

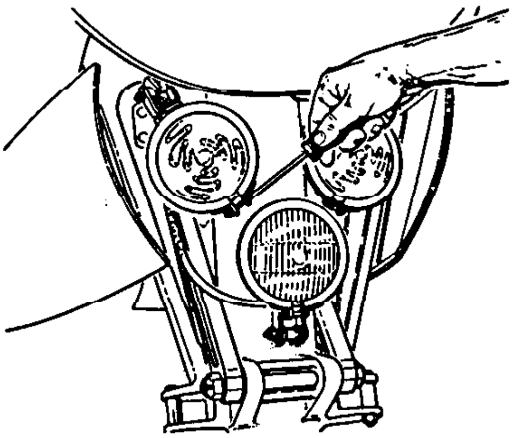
CONTROL WHEEL MAP LIGHT



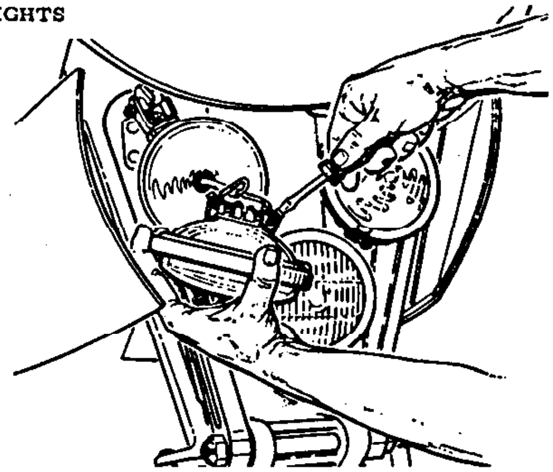
1. Remove light deflector case (1)
2. Remove bulb (2)

C90-609-2(SHEET 2)

LANDING LIGHTS

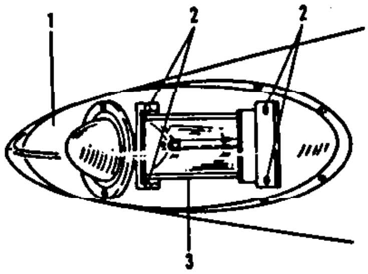


1. Remove retaining ring.



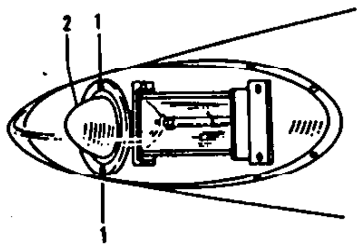
2. Remove old sealed-beam unit and replace with new unit.

TAIL STROBE LIGHT



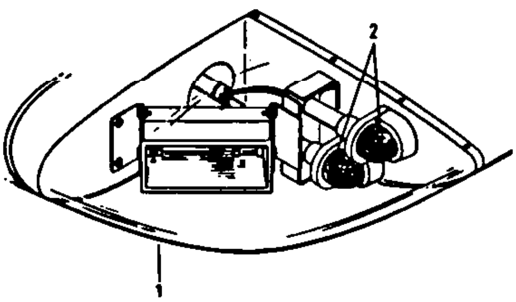
1. Remove transparent shield.
2. Remove four retaining screws and lift out strobe light assembly.
3. Unplug light assembly and replace with new light assembly.

TAIL NAVIGATION LIGHT



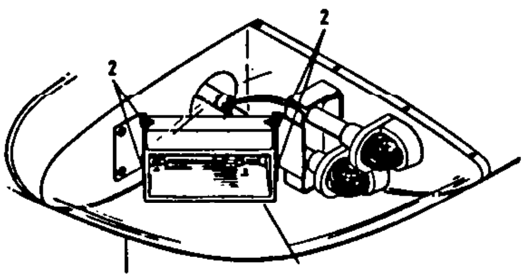
1. Remove retaining screws.
2. Remove bulb and replace with new bulb.

WING NAVIGATION LIGHT



1. Remove transparent cover (1) and shield (2).
2. Remove bulb.

WING STROBE LIGHT

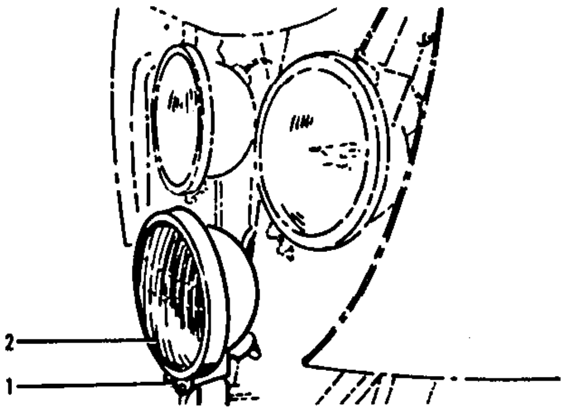


1. Remove transparent shield.
2. Remove four retaining screws and lift out strobe light assembly.
3. Unplug light assembly and replace with new light assembly.

C90-609-3

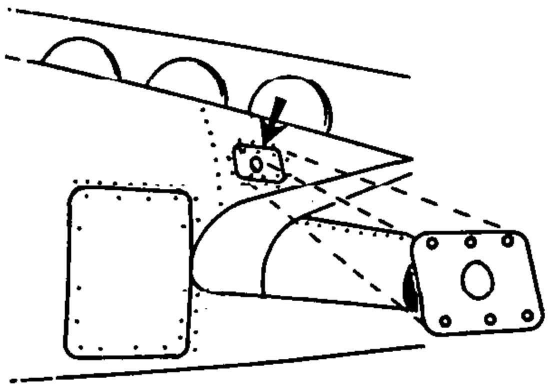
BULB REPLACEMENT GUIDE (Continued)

TAXI LIGHT



1. Remove retaining ring (1)
2. Remove sealed beam unit (2)

WING ICE LIGHT



1. Remove access door
2. remove bulb

C90-609-4

CONSUMABLE MATERIALS

MATERIAL	SPECIFICATION	PRODUCT	VENDOR
Recommended Engine Fuel	Jet A (NATO F-30, F-34) Jet A-1 (JP-5, NATO F-42) Jet B JP-4, NATO F-40) MIL-J-5624		
Alternate (Limited to 150 hours between each overhaul period)	80/87 91/96 100/130 115/145		
Engine Oil		7.5 CENTISTOKE OILS	
		Esso Extra Turbo Oil 274	Esso International Inc., 15 West 51 Street New York, New York 10019
		Aeroshell 750	Shell Oil Company, 50 West 50th Street, New York, New York 10020
		Wakefield Castrol 98 Castrol 98 U.K.	Castrol Inc., 254 Doremus Ave. Newark, New Jersey 07105
		Esso Extra Turbo Oil 274	Humble Oil and Refining Co., Box 2180, Houston, Texas 77001
		Sinclair-S-1048 Improved	Sinclair Refining Co., 600 Fifth Ave., New York, New York 10017
		Castrol 98 U.K.	Stauffer Chemical Co., 299 Park Ave., New York, New York 10017
		Caltex Synthetic Aircraft Turbine Oil 35	California Texas Oil Corp. 380 Madison Ave., New York, New York 10017
		Texaco Synthetic Aircraft Turbine Oil 35	Texaco Inc., 135 East 42nd St., New York, New York 10017
		BP Aero Turbine Oil 40	BPC (North America Ltd., 620 Fifth Ave., New York, New York 10017
		5 CENTISTOKE OILS	
		Monsanto Skylube 450	Monsanto Co Inc., St Louis, Missouri
		Chevron Jet Engine Oil 5	Chevron Oil Co., Western Division, Denver, Colorado 80202
		Esso Turbo Oil 2380	Esso International Inc., 15 West 51 Street, New York, New York 10019
		Aeroshell Turbine Oil 500	Shell Oil Company, 50 West 50th Street, New York, New York 10020
		Castrol 205	Castrol Oil Canada Ltd., P.O. Box 3, New Toronto Postal Station, Toronto, Ontario
		Enco Turbo Oil 2380	Humble Oil and Refining Co., Box 2180 Houston, Texas 77001
		Sinclair Turbo S Oil Type II	Sinclair Refining Co., 600 Fifth Ave., New York, New York 10017
		Stauffer Jet II	Stauffer Chemical Co., 299 Park Ave., New York, New York 10017
		Caltex Sato 7388 Caltex Sato 7730	California Texas Oil Corp. 380 Madison Ave., New York, New York 10017
		Texaco Sato 7388 Texaco Sato 7730	Texaco Inc., 135 East 42nd St., New York, New York 10017

CONSUMABLE MATERIALS (Continued)

MATERIAL	SPECIFICATION	PRODUCT	VENDOR
		Mobile Jet Oil II	Mobil Oil Corporation 150 East 42nd Street, New York, New York 10017
		BP Enerjet 51	BPC (North America) Ltd., 620 Fifth Ave., New York, New York 10017
Lubricating Oil Special Preservative	VV-L-800	Brayco 300	Bray Oil Co. Los Angeles, California 90063
		Royco 308	Royal Lubricants Co. Hanover, New Jersey
		Nox Rust 518 (Code R-62-203-1)	Daubert Chemical Co. Chicago, Illinois 60638
Lubricating Oil General Purposes Low Temperature	MIL-L-7870	Caltex Low Temp Oil	Caltex Oil Products Co. New York, New York
		Sinclair Aircraft Orbitlube	Sinclair Refining Co., 600 Fifth Ave., New York, New York
		1692 Low Temp Oil	Texaco, Inc., 135 East 42nd St., New York, New York
Lubricating Oil		Marvel Mystery	Marvel Oil Company, Inc. 331-337 N. Main St., Port Chester, New York 10573
Lubricating Oil		Aeroshell No. 12	Shell Oil Co., 50 West 50th., New York, New York 10020
Lubricating Oil	MIL-L-10324A	Trojan Gear Oil 6086M	Cities Service Oil Co. New York, New York
		Gear Lubricant SZ9285	American Oil Co., 910 S. Michigan Ave., Chicago, Illinois 60680
		ILCO Lubricant Gear Universal Sub Zero (S-5017)	International Lubricant Corp. P. O. Box 51118, New Orleans, Louisiana 70150
		Ace Lub K-24	Ace-Lub Oil Co. 3983 Pacific Boulevard, San Mateo, California 94403
		RP 95-X Formula No. RP497AA	Mobil Oil Corporation, Paulsboro, New Jersey 08066
Lubricating Oil Heavy Duty	MIL-L-2104	Phillips 66 HDS Motor (Grade 10)	Phillips Petroleum Co. Bartlesville, Oklahoma 74003
		Super Lonet (Grade 10)	Sinclair Refining Company 600 Fifth Ave., New YORK, New York 10020
		PED 3342 (Grade 10)	Standard Oil of California 225 Bush Street, San Francisco, California 94120
Lubricating Grease, General	MIL-G-7711	Regal Starfak Premium 2	Caltex Oil Products Co. New York, New York
		PED-3040	Standard Oil of California 225 Bush St., San Francisco, California 94120
		Aeroshell Grease 6	Shell Oil Co., 50 West 50th., New York, New York 10020
		Regal AFB2	Texaco, Inc., 135 East 42nd., New York, New York

CONSUMABLE MATERIALS (Continued)

MATERIAL	SPECIFICATION	PRODUCT	VENDOR
Lubricating Grease Aircraft and Instruments, Low & High Temperature	MIL-G-23827	Supermil Grease No. A72832	American Oil Company, 910 S. Michigan Ave., Chicago, Illinois 60680
		Royco 27A	Royal Lubricants Co., River Road, Hanover, New Jersey 07936
		Aeroshell 7 Grease	Shell Oil Co., 50 West 50th., New York, New York 10020
		RR-28	Socony Mobil Oil Co., Inc. Washington, D.C.
		Castrolease A1	Castrol Oils Inc. Newark, New Jersey
Lubricating Grease High Temperature	MIL-G-81322	Mobilgrease 28	Mobil Oil Corporation, Shoreham Bldg., Washington, D.C. 20005
Lubricating Grease Molybdenum Disulfide	MIL-G-21164	Castrolease MSA (C)	Castrol Oil Inc. 254-266 Doremus Avenue, Newark, New Jersey 07105
		Electro-Moly/11	Electrofilm, Inc. P.O. Box 3930, 7116 Laurel Canyon Blvd., North Hollywood, California 91605
		Everlube 211-G Moly Grease	Everlube Corporation 6940 Farmdale Ave., North Hollywood, California 91605
		Royco 64C	Royal Lubricants River Road, Hanover, New Jersey 07936
		Aeroshell Grease 17	Shell Oil Company 50 West 50th Street, New York, New York 10020
		Chevron Aviation Grease 44	Standard Oil Company of California 225 Bush Street, San Francisco, California 94120
Lubricating Grease	MIL-G-4343	Cosmolube 615	E. F. Houghton and Co. 303 West Lehigh Ave., Philadelphia, Pennsylvania 19133
		Templube No. 124	National Engineering Products Co. Washington Building, Washington, D.C.
		Royco 43	Royal Lubricants Co. River Rd., Hanover, New Jersey 07936
Grease		Molykote 505 Paste	Dow Corning, S. Saginaw Road, Midland, Michigan 48641
Molybdenum Disulfide	MIL-M-7866	Molykote Z	Haskel Engineering & Supply Co. 100 East Graham Place, Burbank, California 91502
		Molykote Z	Wilco Co., 4425 Bandini Blvd., Los Angeles, California 90023
		Moly-Paul No. 4	K. S. Paul Products Ltd. London, England
Lubricant	MIL-L-8937		Electrofilm, Inc., P.O. Box 106 7116 Laurel Canyon Blvd. North Hollywood, California 91605
			Alpha-Molykote Corporation 65 Harvard Avenue, Stamford, Connecticut

CONSUMABLE MATERIALS (Continued)

MATERIAL	SPECIFICATION	PRODUCT	VENDOR
Grease	MIL-G-10924	Shell A and A Grease	Shell Oil Co., 50 West 50th, New York, New York 10020
		PED 3355	Standard Oil Co. of California 225 Bush St., San Francisco, California 94120
		Cosmolube 506	E. F. Houghton and Company West Lehigh Ave., Philadelphia, Penn. 19133
Lubricant, Powdered Graphite	MIL-G-6711	GP-38	National Carbon Co. New York, New York
Hydraulic Fluid (Brakes and Shock Struts)	MIL-H-5606	3126 Hydraulic Oil	Humble Refining Co., Box 2180, Houston, Texas 77001
		Aeroshell Fluid 4	Shell Oil Co., 50 West 50th, New York, New York 10020
		PED 3337	Standard Oil of California 225 Bush St., San Francisco, California 94120
Oil (Air Conditioner Compressor)		Suniso No. 5	Virginia Chemical & Smelting Co. West Norfolk, Virginia
		Texaco Capella E (500 viscosity)	Texaco Inc., 135 East 42nd St., New York, New York
Air Conditioning Refrigerant		Dichlorodifluoro-methane Racon 12	Racon Inc. Wichita, Kansas
		Genetron 12	Allied Chemical Specialty Chemicals Division, Morristown, New Jersey
		Freon 12	DuPont Inc. Freon Products Division, Wilmington Delaware 19898
Solvent	PD680	Varsol	Esso Standard Eastern, Inc. 15 West 51st St., New York, New York 10019
Anti-Seize Compound	MIL-P-16232 Type M, Class 2		
Grease Stick		Door-Ease	American Grease Stick Company 2651 Hoyt, Muskegon, Michigan 49443
Toilet (Flush Type) Cleaner		Sana-Pak No. 2031	Celeste Co. Loyola Federal Building, Easton, Maryland 21601
Metal Protector		LPS No. 3	LPS Research Laboratories Los Angeles, California 90025
Soap Solution, Oxygen System Leak Testing	MIL-L-25567		
Aviator's Breathing Oxygen	MIL-0-27210		
Anti-ice Additive	MIL-L-27686	Hi-Flo Prist	Hoffman-Taff Inc. P.O. Box 1246 Springfield, Missouri

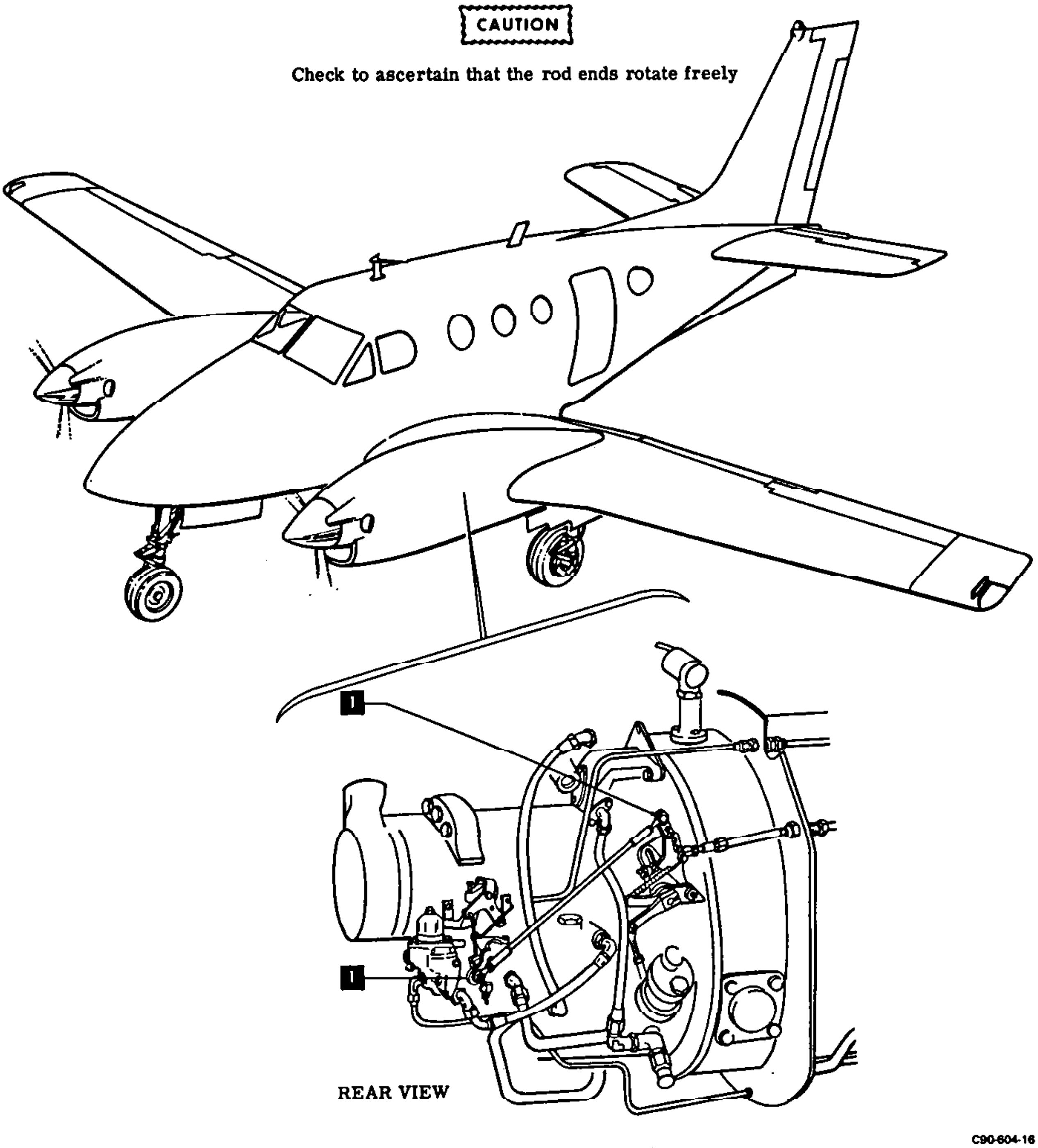
Vendors listed as meeting Federal and Military Specifications are provided as reference only and are not specifically recommended by Beech Aircraft Corporation. Any product conforming to the specifications may be used.

LUBRICATION CHART

INDEX NUMBER	LOCATION	LUBRICANT	INTERVAL IN HRS.
1	Control Rod Ends	MIL-G-23827	100

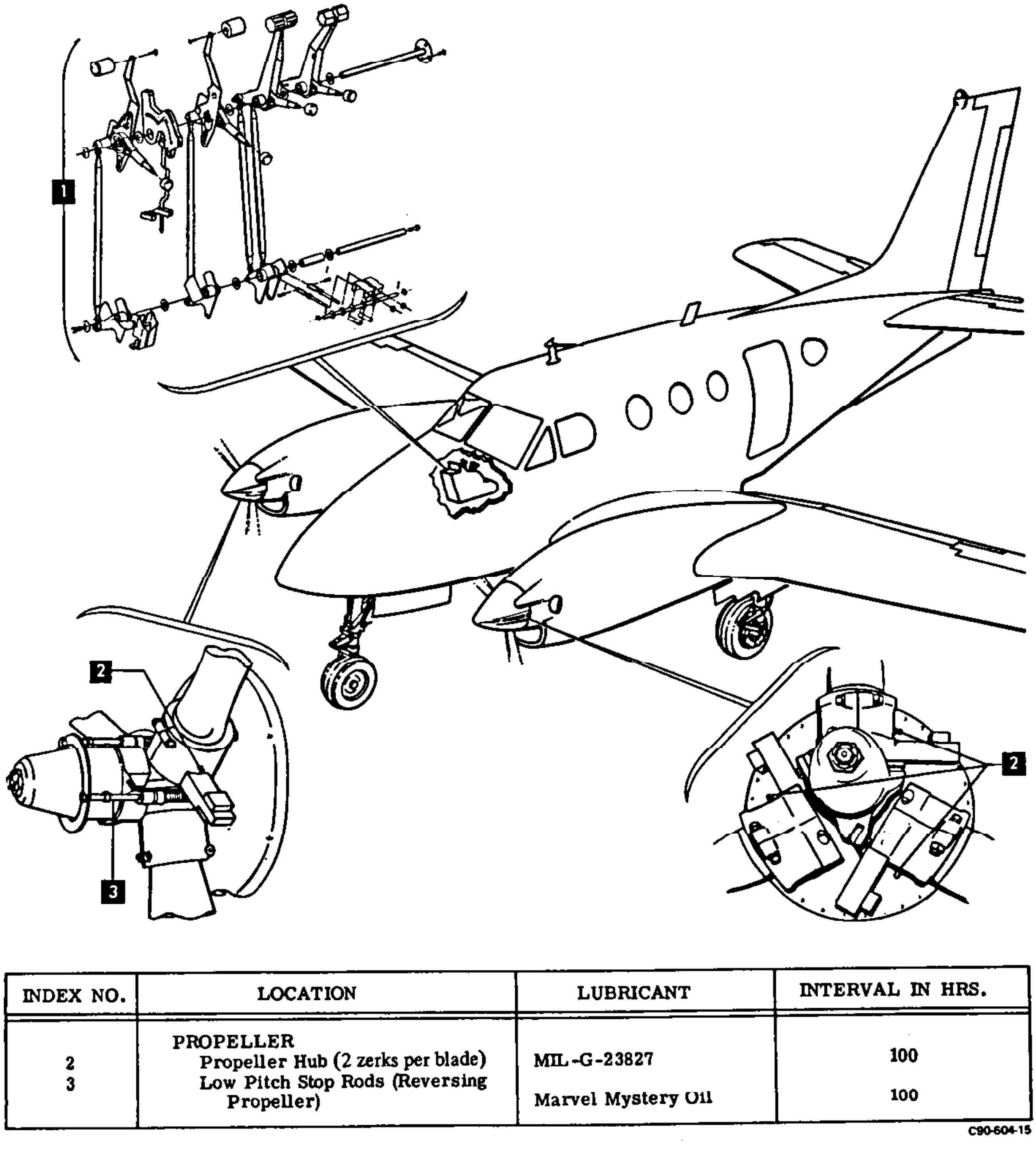
CAUTION

Check to ascertain that the rod ends rotate freely



LUBRICATION CHART

INDEX NO.	LOCATION	LUBRICANT	INTERVAL IN HRS.
1	ENGINE CONTROLS Linkage (All moving parts)	MIL-G-21164 Grease	As required for proper operation



INDEX NO.	LOCATION	LUBRICANT	INTERVAL IN HRS.
	PROPELLER		
2	Propeller Hub (2 zerks per blade)	MIL-G-23827	100
3	Low Pitch Stop Rods (Reversing Propeller)	Marvel Mystery Oil	100

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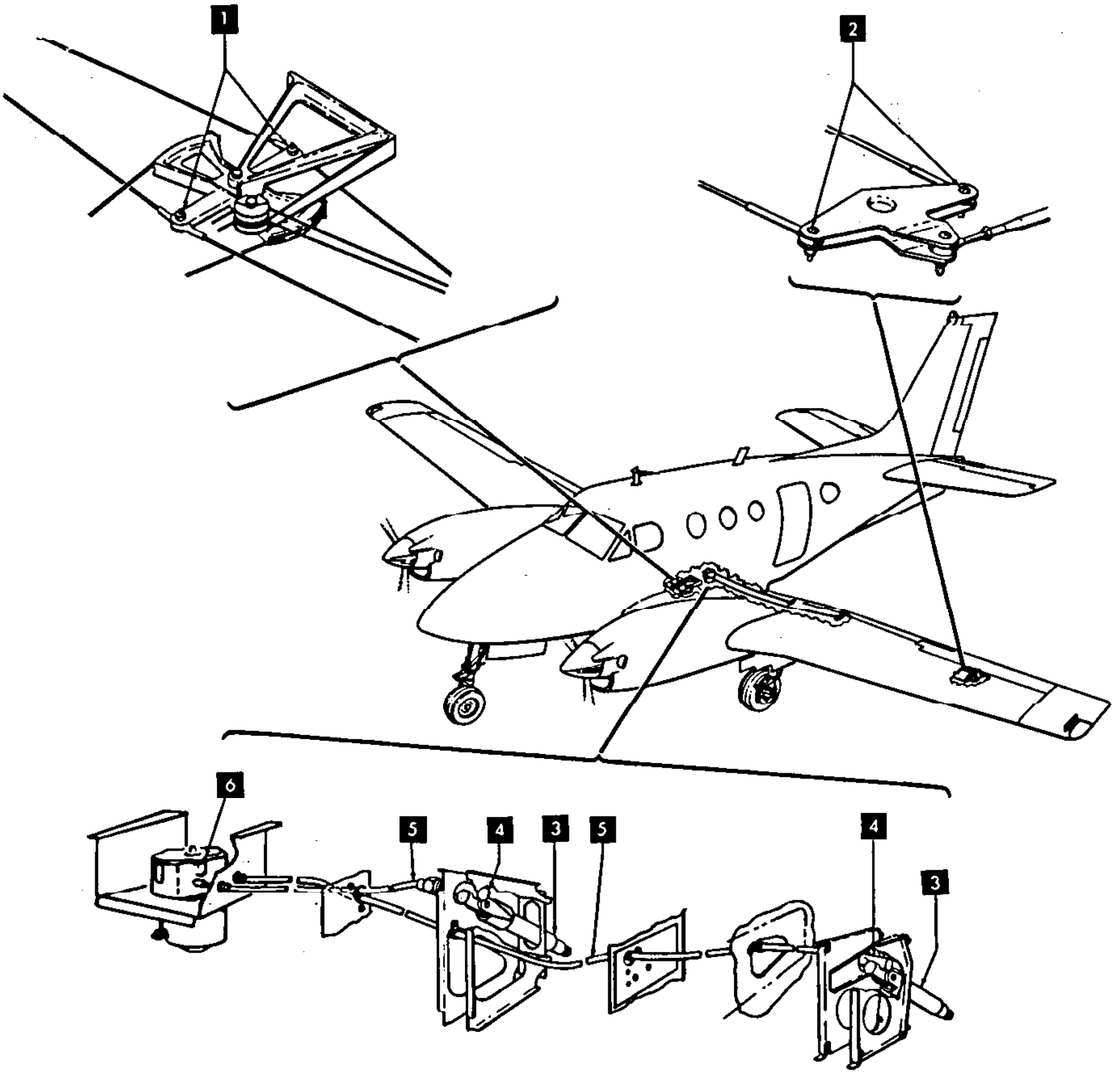
LUBRICATION CHART

INDEX NO.	LOCATION	LUBRICANT	INTERVAL IN HRS.
	AILERON CONTROL SYSTEM		
1	Aileron Quadrant	MIL-L-7870 Oil	200
2	Aileron Bell Cranks	MIL-L-7870 Oil	200



INDEX NO.	LOCATION	LUBRICANT	INTERVAL IN HRS.
	FLAP CONTROL SYSTEM		
3	Screw Jack	MIL-L-10324A Oil	As required
4	Flap Actuator 90° Drives	MIL-G-21164 Grease	1000
5	Flap Actuator Drive Shafts (LJ-1 thru LJ526)	MIL-G-23827 Grease	1000
6	Flap Motor Gearbox	MIL-G-10924	1000

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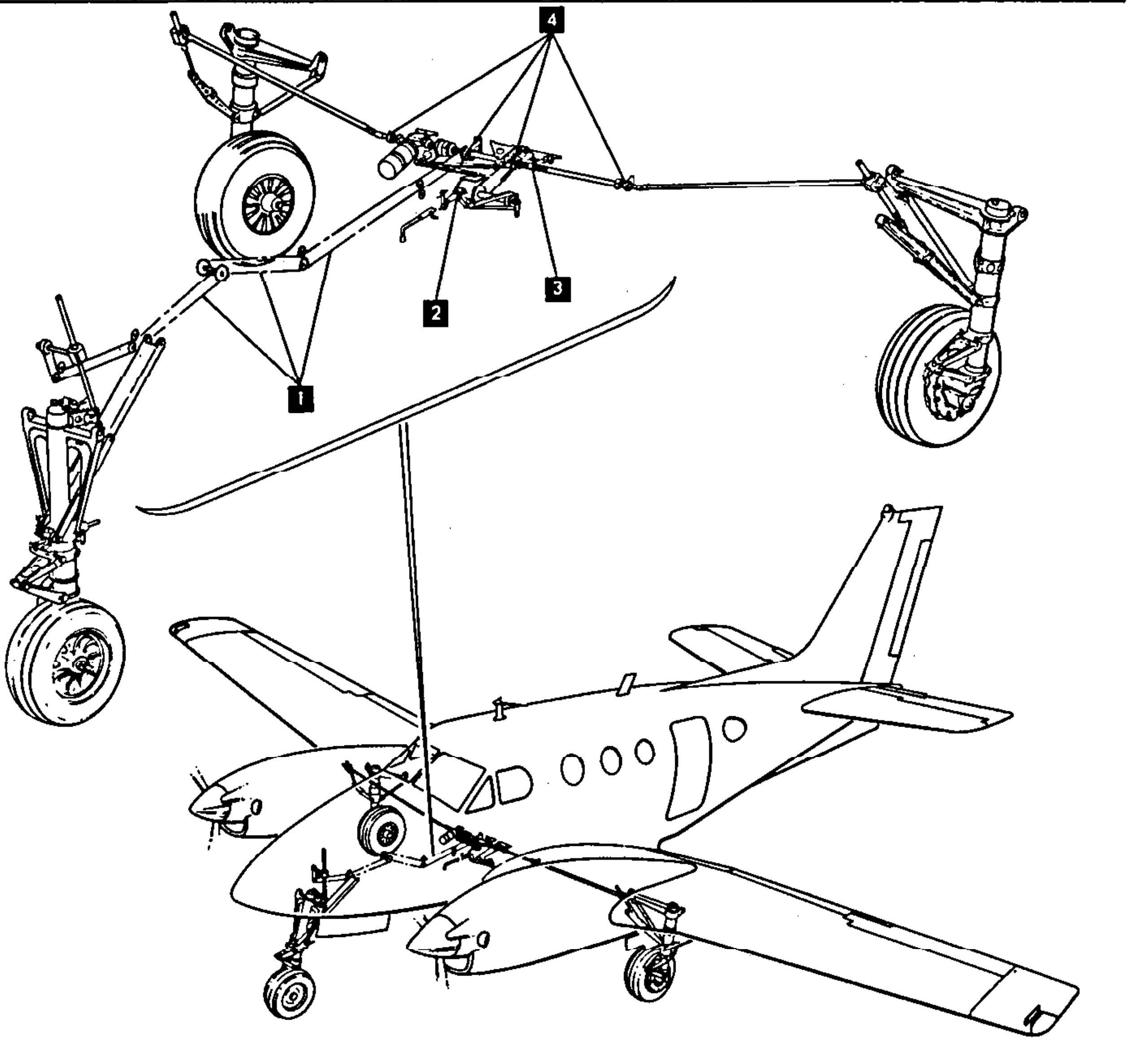
LUBRICATION CHART

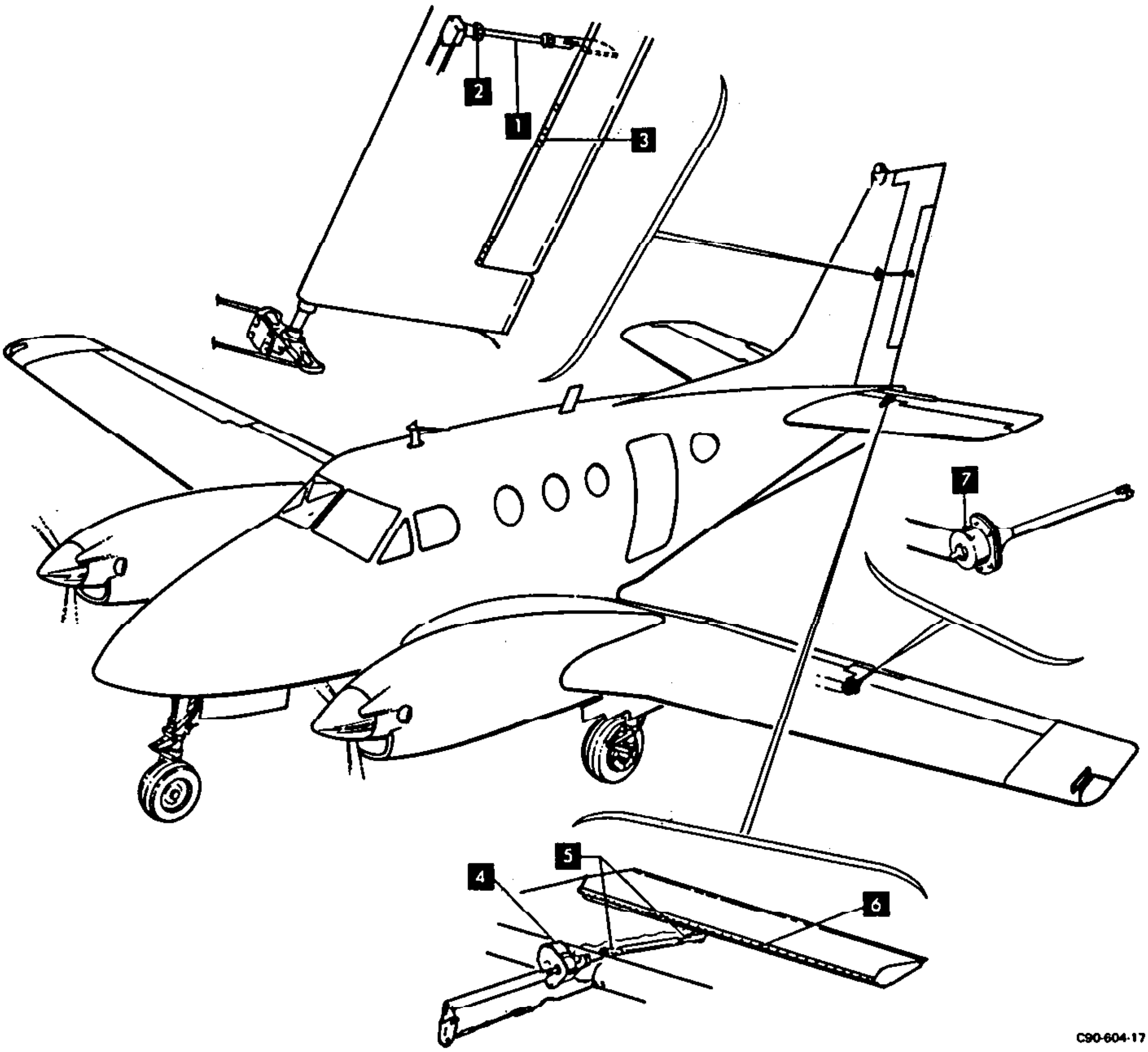
INDEX NO.	LOCATION	LUBRICANT	INTERVAL IN HRS.
	LANDING GEAR RETRACT SYSTEM		
1	Retract Chains	Mix MIL-G-6711 Graphite with naphtha into a paste and apply with a brush.*	100
2	Emergency Extension Mechanism	VV-L-800 Oil	100
3	Limit Switch Screw and Nut	Mix 45 grams Molykote Z per pound of MIL-G-23827 grease. Wipe off all excess.	100
4	Shaft Bearings	MIL-G-7711 Grease	50



*Also acceptable: "Petrochem Chain Life", Ashland Chemical Co., P.O. Box 2260, Santa Fe Springs, Calif. 90670.

LUBRICATION CHART

INDEX NO.	LOCATION	LUBRICANT	INTERVAL IN HRS.
	RUDDER-ELEVATOR-AILERON		
1	Rudder Trim Tab Tube	MIL-L-7870 Oil	100
2	Rudder Trim Tab Actuator	MIL-G-23827 Grease	200
3	Rudder Trim Hinge	Mix MIL-G-6711 Graphite with naphtha into a paste and apply with a brush.	100
4	Elevator Trim Tab Actuator (2)	MIL-G-23827 Grease	200
5	Elevator Trim Tab Control Tubes (4)	MIL-L-7870 Oil	100
6	Elevator Trim Tab Hinges (2)	Mix MIL-G-6711 Graphite with naphtha into a paste and apply with a brush.	100
7	Aileron Trim Tab Actuator (1)	MIL-G-23827 Grease	200

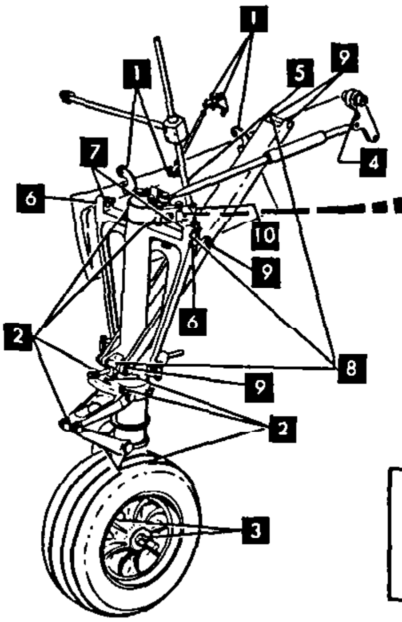


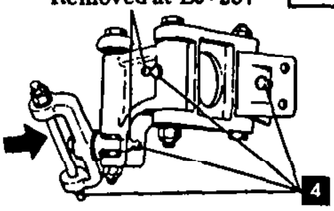
LUBRICATION CHART

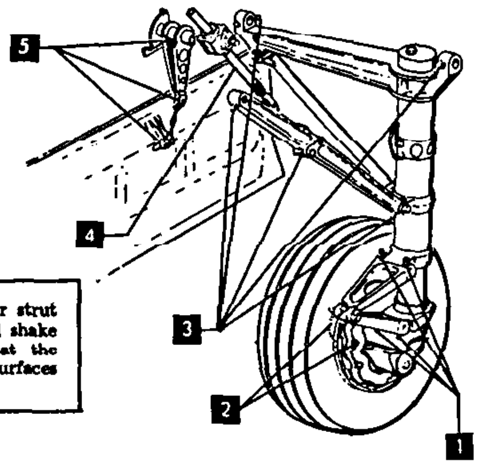
INDEX NO.	LOCATION	LUBRICANT	INTERVAL IN HRS.
	NOSE LANDING GEAR		
1	Door Hinges and Retract Linkage	MIL-L-7870 Oil	100
2	Grease Fittings	MIL-G-7711 Grease	50
3	Wheel Bearings	MIL-G-81322 Grease	100
4	Nose Wheel Steering Mechanism	MIL-G-7711 Grease	50
5	Retract Actuator Jackscrew	MIL-G-21164 Grease	1000
*6	Hinge Bolts and Bushings	LPS No. 3 Metal Protector	6 Months
**7	Grease Fittings	MIL-G-7711 Grease	100
*8	Drag Leg Bolts and Bushings	LPS-*3 Metal Protector	6 Months
**9	Grease Fittings	MIL-G-7711 Grease	100
**10	Drag Leg Stop Bolt Grease Fitting	MIL-G-7711 Grease	100

NOTE

To lubricate the center attachment bolt and bushing of the nose gear drag leg on LJ-577 and after and on earlier aircraft reworked to Service Instruction No. 0516-200, replace the set screw in the bolt with the lubrication fitting included in the loose tools and accessories of the aircraft, then reinstall the set screw when lubrication is completed







NOTE

When lubricating the lower or upper strut bushing, jack the nose wheel up and shake and rotate the wheel to assure that the lubricant penetrates to the contacting surfaces of the bushing.

ITEM NUMBER	LOCATION	LUBRICANT	INTERVAL IN HRS.
	MAIN LANDING GEAR		
1	Grease Fittings (8)	MIL-G-7711 Grease	50
2	Wheel Bearings (4)	MIL-G-81322 Grease	100
3	Retract Grease Fittings (10)	MIL-G-7711 Grease	50
4	Retract Actuator Jackscrew (2)	MIL-G-21164 Grease	1000
5	Door Hinges and Retract Linkage (12)	MIL-L-7870 Oil	100

* Prior to LJ-577 unless reworked to Service Instruction No. 0516-200.

** LJ-577 and after or earlier aircraft reworked to Service Instruction No. 0516-200.

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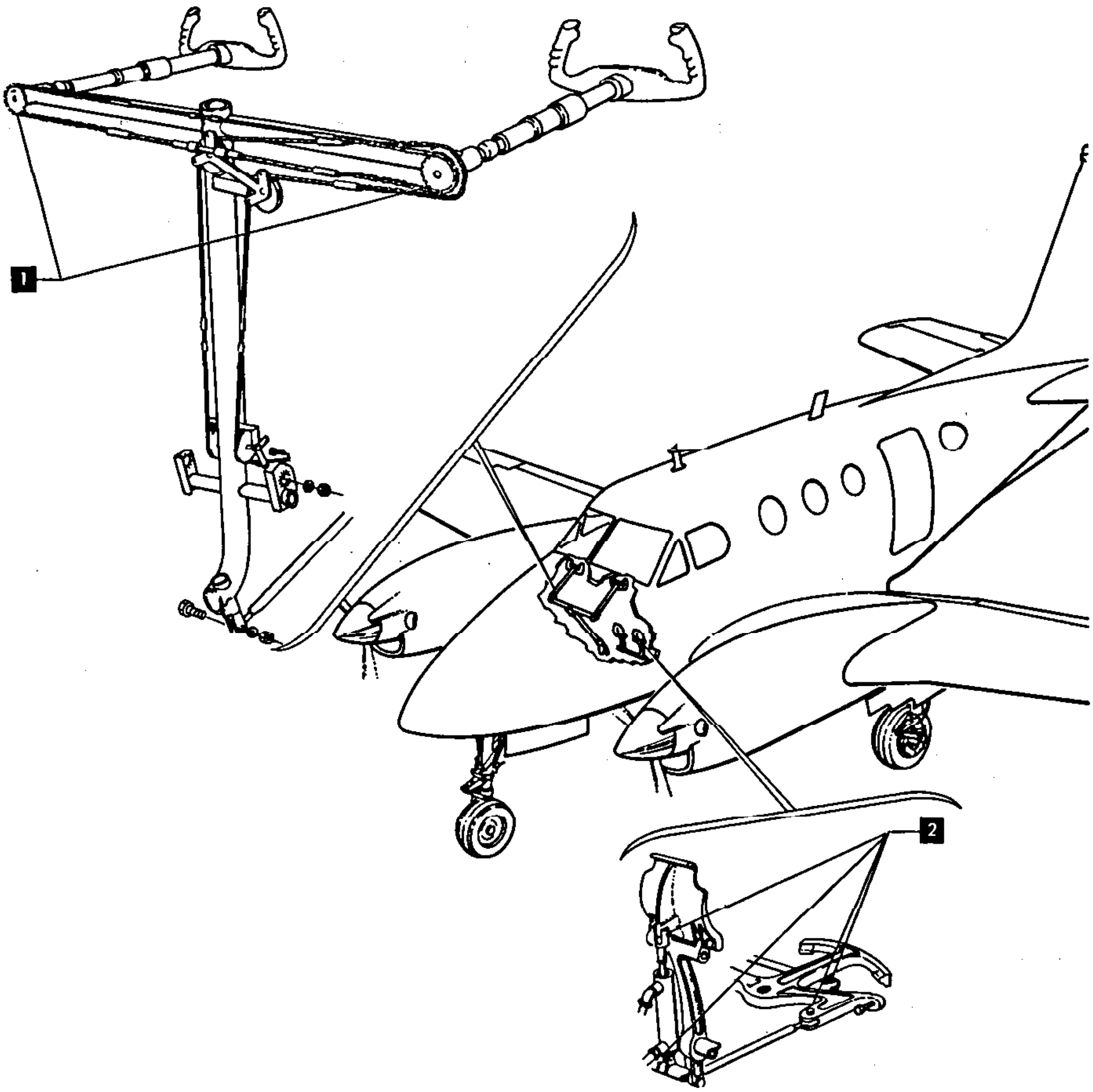
LUBRICATION CHART

INDEX NO.	LOCATION	LUBRICATION	INTERVAL IN HRS.
1	CONTROL COLUMN Linkage	MIL-L-7870 Oil	200



INDEX NO.	LOCATION	LUBRICATION	INTERVAL IN HRS
2	RUDDER PEDALS AND BELLCRANKS Pedal and Bellcrank Linkage	MIL-L-7870 Oil	200

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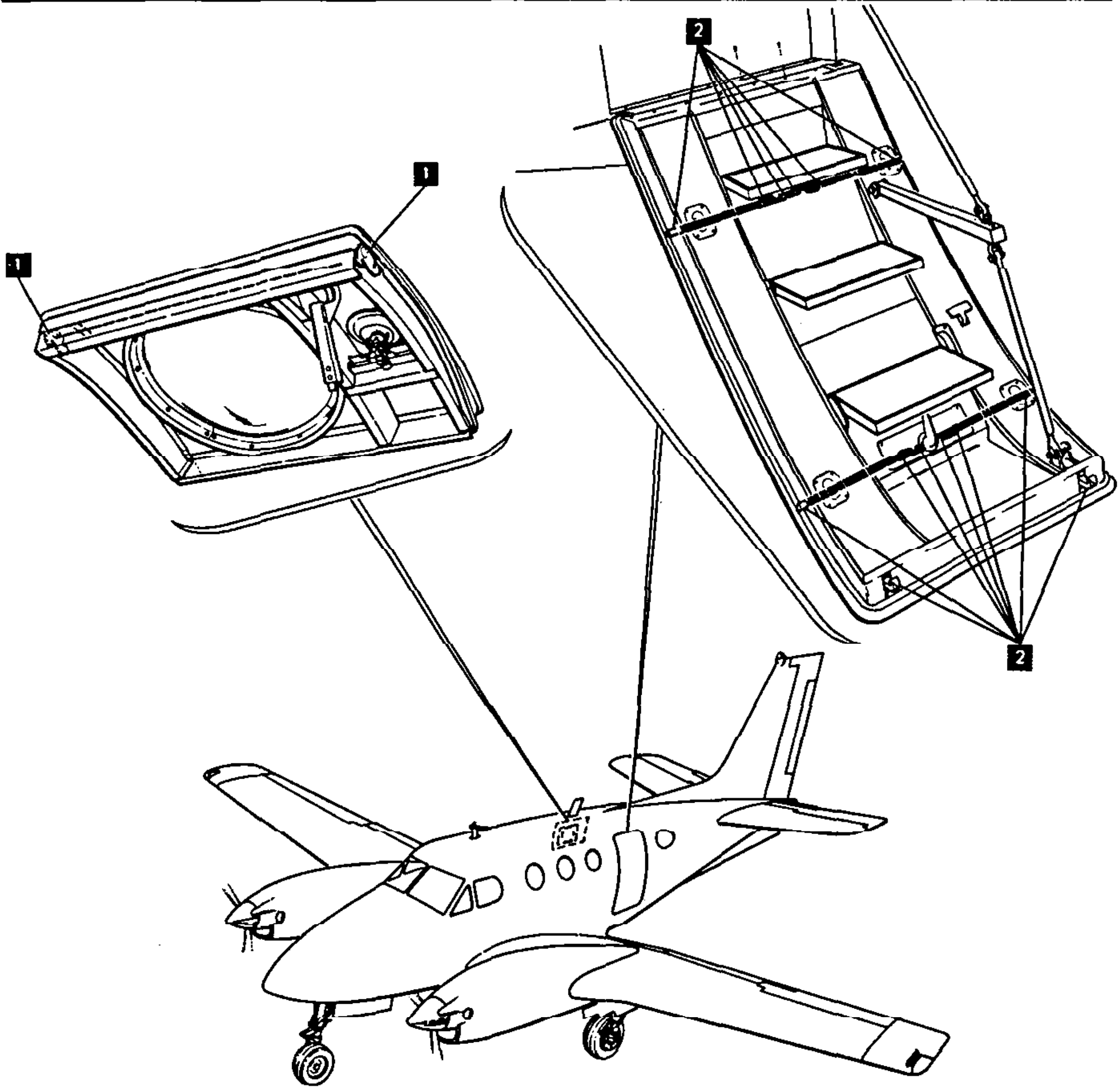
LUBRICATION CHART

INDEX NO.	LOCATION	LUBRICANT	INTERVAL IN HRS.
1	EMERGENCY EXIT DOOR Door Mechanism	MIL-M-7866 Molybdenum Disulfide	500



INDEX NO.	LOCATION	LUBRICANT	INTERVAL IN HRS.
2	CABIN DOOR Latching Mechanism	MIL-L-7870 Oil	200

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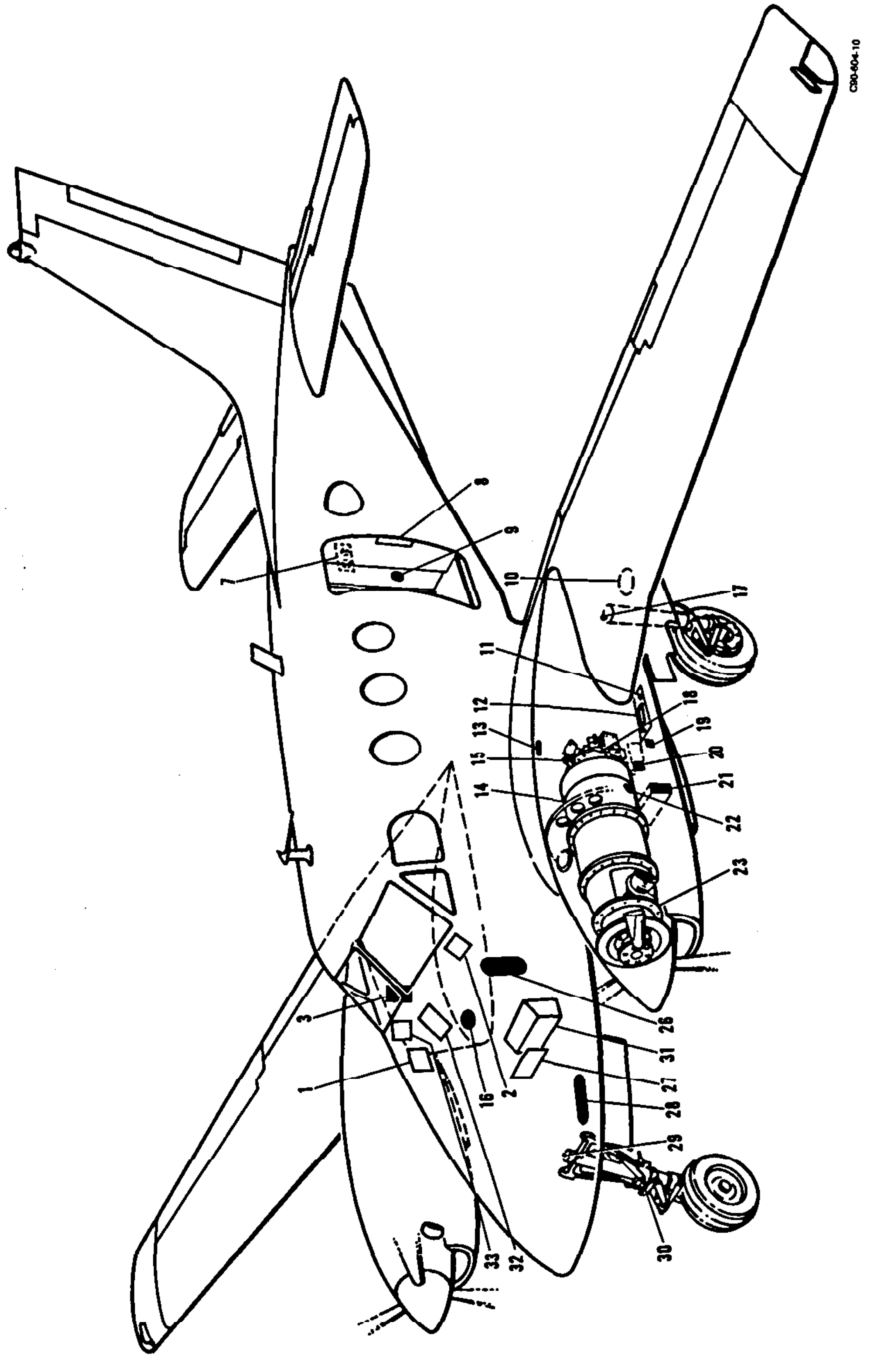

SERVICING POINTS

SERVICING SCHEDULE

ITEM	*LOCATION*	*SERVICE WITH*	*INTERVAL IN HOURS*
CHECK			
Engine Oil Level	15. 11 o'clock position of accessory gear-case	See Engine Oil in Consumable Materials Chart.	Preflight
Refrigerant Level	28. Sight gage window on left side of nose wheel well	See Consumable Materials Chart	100
Pressurization Controller Air Filter	2. Upper left corner of first bulkhead behind instrument subpanel.	Clean all dirty parts except filter cartridge with solvent.	200
Engine Oil Filter	22. 3 o'clock position of compressor inlet case.	Inspect for foreign material.	100
Battery	3. Right wing center section forward of main spar.	Check for clean dry battery free of spillage or corrosion.	50 hours
Wing Attach Bolts	Each Wing Root	Check For proper torque	At first 100 hr inspection and at first 100 hr inspection after each reinstallation of the bolts.
CHANGE			
Engine Oil	15, 20, 21, 23. Remove forward cowlings to gain access to nose case drain. Remove fiberglass duct and oil cooler bypass duct to gain access to engine drain plug, and oil cooler drain plug. Refill at 11 o'clock position on accessory gear-case. CAUTION Do not exceed torque of 15 to 20 inch-pounds when reinstalling oil cooler drain plug.	See Engine Oil in Consumable Materials Chart.	50 hr per month or less: 400 hrs or 9 months whichever occurs first. Over 50 hours per month: 800 hours (1200 hours using 5 Centistoke oils) or 9 months, whichever occurs first.
CLEAN			
Engine Compressor	14. Access through cowling	Turco 4217	As Required
Engine Driven Fuel Pump Screen	18. Right side of engine accessory section	Dry Compressed Air	100

Firewall Fuel Filter	19.	For access to filter on each engine, remove fiberglass duct and oil cooler bypass duct.	Clean with solvent and blow dry with compressed air.	100
Suction Relief Valve Filter	32.	Mounted in nose compartment on left side fwd. of pressure bulkhead.	Clean with solvent and blow dry with compressed air.	100
Air Conditioner Compressor	27.	Access panel in left topside of nose compartment.	Suniso No. 5 or Texaco Capella "E" Grade, 500 viscosity, oil	Whenever system is recharged with refrigerant. Recycle each 100 hours or 30 days whichever occurs first.
Brake Fluid Reservoir	26.	Upper left corner of pressure bulkhead in nose compartment.	MIL-H-5606 Hydraulic Fluid	As Required.
Main Landing Gear Struts	17.	Filler plug at top of each strut of main landing gear.	MIL-H-5606 Hydraulic Fluid	100 hours or As Required.
Nose Landing Gear Strut	29.	Filler plug at top of nose gear strut.	MIL-H-5606 Hydraulic Fluid	100 hours or As Required.
Oxygen Supply Cylinder	7.	Access panel on right side of aft fuselage.	MIL-0-27210 Oxygen	As Required
Shimmy Dampener	30.	Mounted at upper knee of nose landing gear.	MIL-H-5606 Hydraulic Fluid	100 hours or As Required.
Cabin Door Dampener	8.	Mounted on aft side of cabin door.	MIL-H-5606 Hydraulic Fluid	As Required.

DRAIN

Firewall Fuel Filter	19.	Open and close drain valve with ring on right side of firewall.		Preflight
Boost Pumps	11.	Drain cocks on underside of nacelle just forward of the wheel well.		Preflight
Wing Center Section Fuel Tank	13.	Drain cock on underside of wing center section adjacent to the fuselage.		Preflight
Wing Fuel Tank	10.	Drain cock on underside of outboard wing just forward of the main spar.		Preflight
Outflow Valve Control Line Drain	9.	Access panel in upholstery at right lower aft corner of cabin.		100
Pitot Line Drain	16.	Underside of leading edge of wing center section adjacent to fuselage.		100
Static Line Drains	3.	Access panel in upholstery under subpanel beside copilot.		100 hours and after exposure to visible moisture, in the air or on the ground.

SERVICING SCHEDULE (Continued)

ITEM	LOCATION	SERVICE WITH	INTERVAL IN HOURS
REPLACE			
Evaporator Filter	31. Access panel in left side of nose wheel well.		300
Instrument Air Filter	33. Instrument filter mounted on upper right corner of pressure bulkhead in nose compartment.		Every 500 hours, or more often if conditions warrant.

NOTES:

1. Emergency Locator Transmitter
   a. **Rechargeable Batteries: Recharge after one cumulative hour of use or after 50% of the useful charge life.**
   b. **Non-Rechargeable Batteries: Replace after one cumulative hour of use or after 50% of the useful life.**