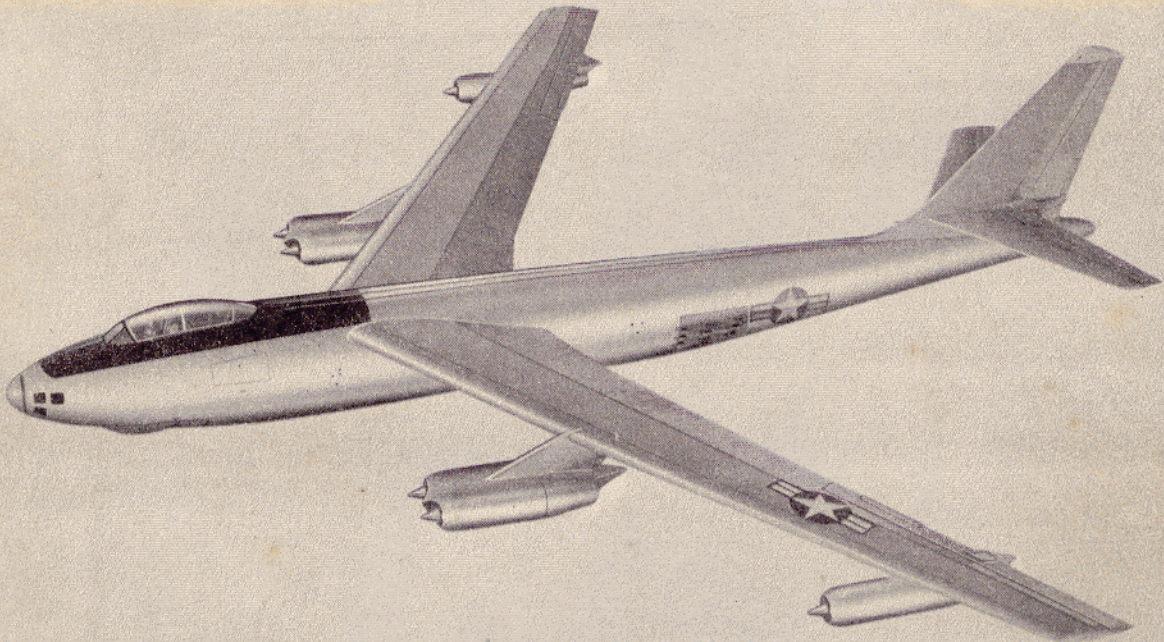


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AN 01-20ENA-1

HANDBOOK
FLIGHT OPERATING INSTRUCTIONS
USAF SERIES
B-47A
AIRCRAFT



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INTRODUCTION

SECTION I DESCRIPTION

The function of this section is to describe the airplane, its equipment, systems, and controls which are essential to flight and which will be needed for one complete noncombat mission in good weather at medium altitude. All emergency equipment which is not part of the auxiliary equipment and all miscellaneous equipment is also covered in this section.

SECTION II NORMAL OPERATING INSTRUCTIONS

This section contains the steps of procedure to be accomplished from the time the airplane is approached by the flight crew until it is left parked on the ramp after accomplishing one complete noncombat mission in good weather at medium altitude.

SECTION III EMERGENCY OPERATING INSTRUCTIONS

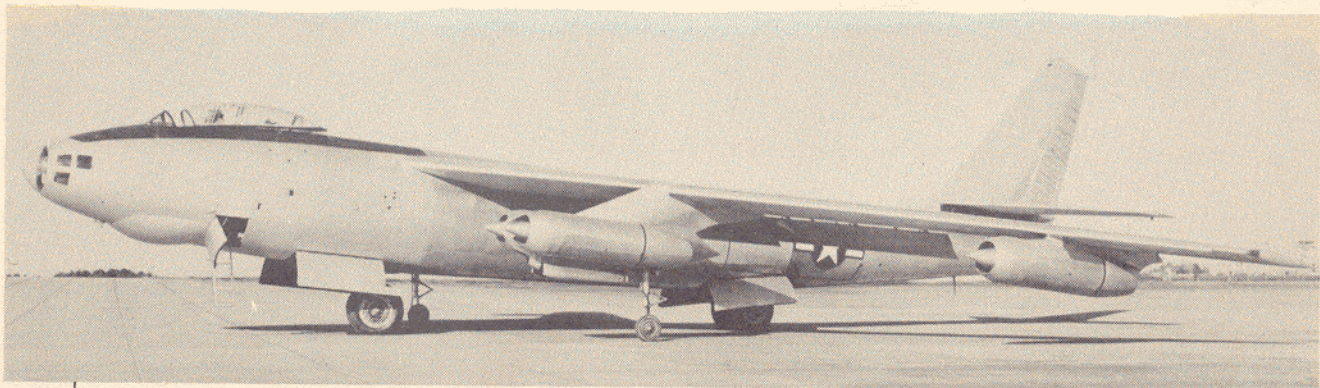
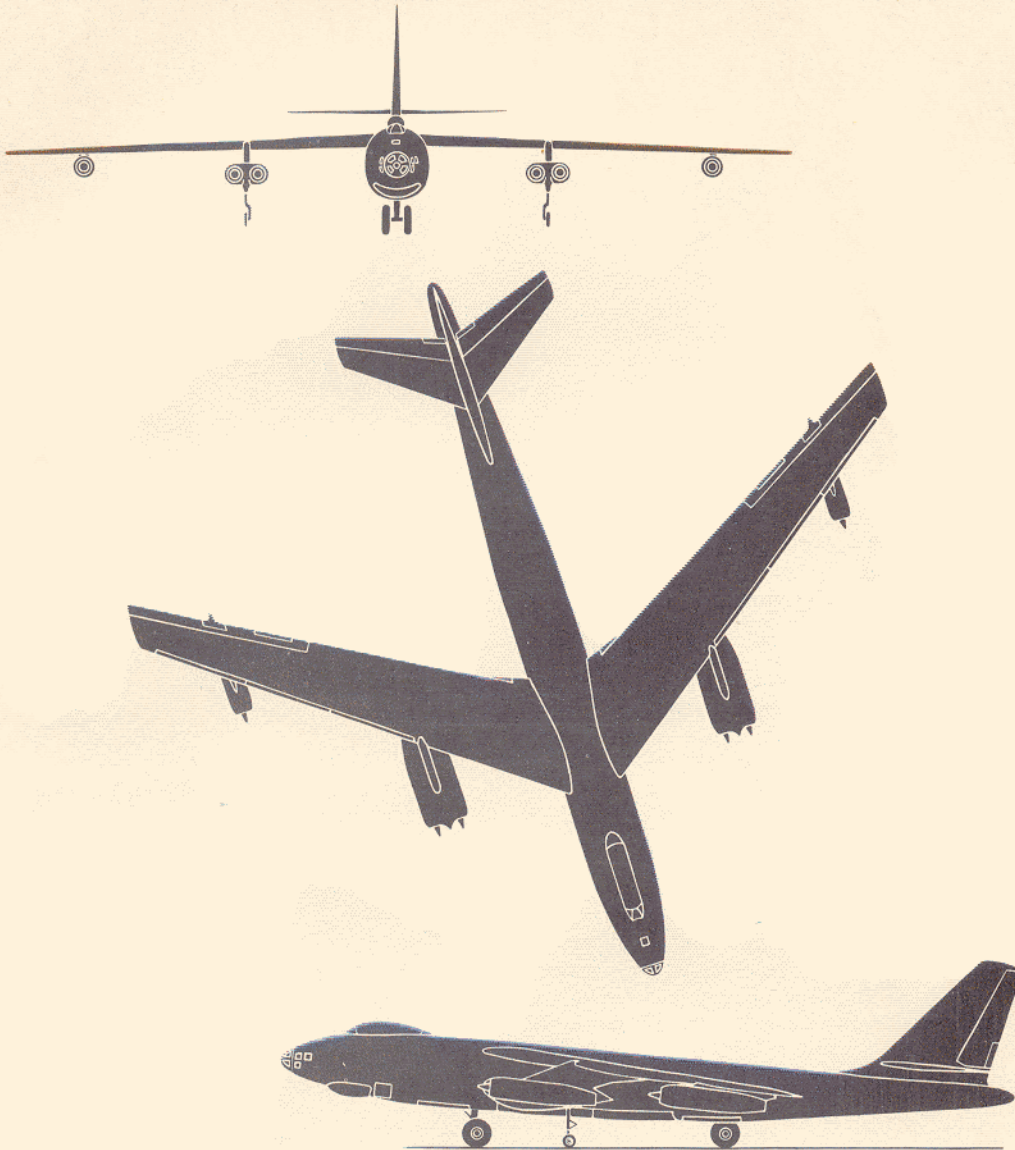
This section clearly and concisely describes the procedure to be followed in meeting any emergency (except those in connection with the auxiliary equipment) that could reasonably be expected to be encountered.

SECTION IV OPERATIONAL EQUIPMENT

This section includes the description, normal operation and emergency operation of all equipment not directly contributing to flight but which enables the the airplane to perform certain specialized functions. Included in this category are such items of equipment as: heating, ventilation, and pressurization systems; anti-icing system; communication equipment; lighting equipment; oxygen system; navigation equipment; bombing equipment; photographic equipment; and gunnery equipment.

APPENDIX I OPERATING DATA

This section contains the necessary charts and graphs for airspeed correction, the instrument dial markings, and graphs for making thrust calculations for take-off.



The Airplane

048005A

SECTION I DESCRIPTION

1-1. AIRPLANE.

1-2. GENERAL.

1-2A. The Boeing B-47A "Stratojet" airplane is a land based, six-engine, jet propelled, medium bomber capable of long range flight at high speeds and high altitudes. The tactical mission of the airplane is the destruction, by bombs, of land or naval material objectives. The normal crew comprises a pilot, copilot, and navigator. The additional duty of gunner is assigned to the copilot while the navigator has the additional duties of bombardier and radar operator.

1-3. OVERALL DIMENSIONS.

Wing Span	116 feet
Fuselage Length	106 feet, 9 inches
Height (to top of fin)	27 feet, 11 inches

1-4. GROSS WEIGHT. The approximate design gross weight of the airplane is 125,000 pounds.

1-5. SPECIAL FEATURES. The airplane is characterized by swept wings and empennage, underslung nacelles, and by its extremely clean appearance throughout. Innovations incorporated include a

bicycle type main landing gear and internally mounted assisted take-off units. Space and structural provisions have been made to accommodate a bomb rack and general purpose bombs up to the 22,000 pound size. Provision has also been made on some airplanes to incorporate a tail turret mounting two, type M-3, caliber .50 machine guns.

1-6. INTERIOR ARRANGEMENT. All normal crew duties are accomplished in the pressurized compartment which extends from a pressure bulkhead aft of the copilot's station, forward to the nose. The pilot and copilot are provided tandem stations under the bubble canopy in the cockpit. The copilot's seat can be swiveled so that the copilot may face aft for his gunnery duties. The navigator is provided a station in the nose of the airplane which includes his navigation, bombing, and radar equipment. A walkway is provided on the left side of the fuselage from the navigator's station aft to the pressure bulkhead. Connecting to this walkway through a pressure door is the main entrance passage located in the lower left side of the fuselage. A crawlway on the left side of the forward wheel well provides access to the bomb bay area. A platform in the bomb bay is the most aft point of access in the airplane during flight.

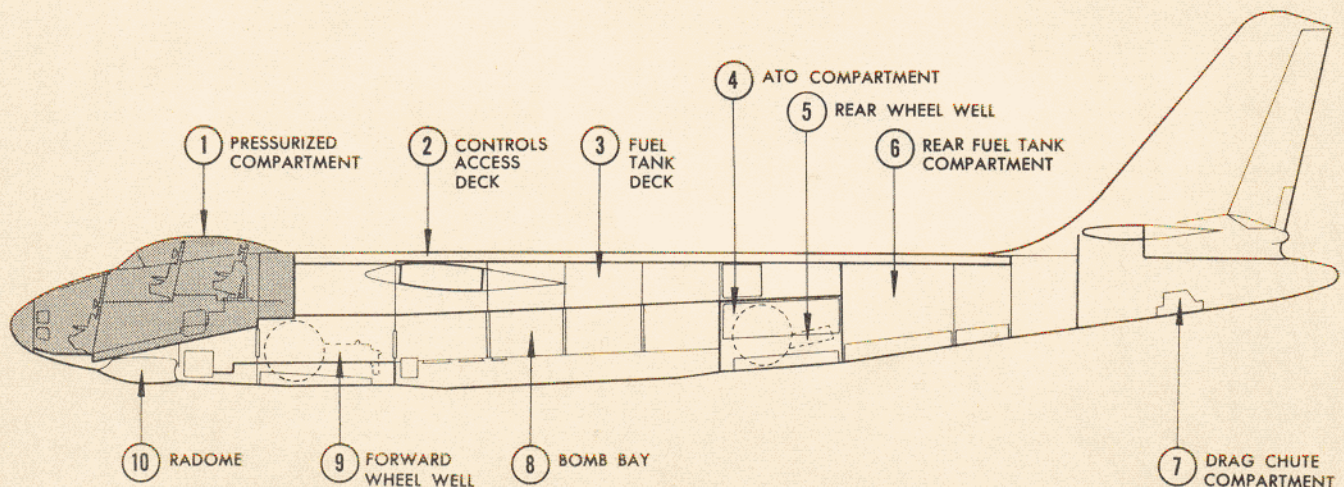


Figure 1-1. Compartments

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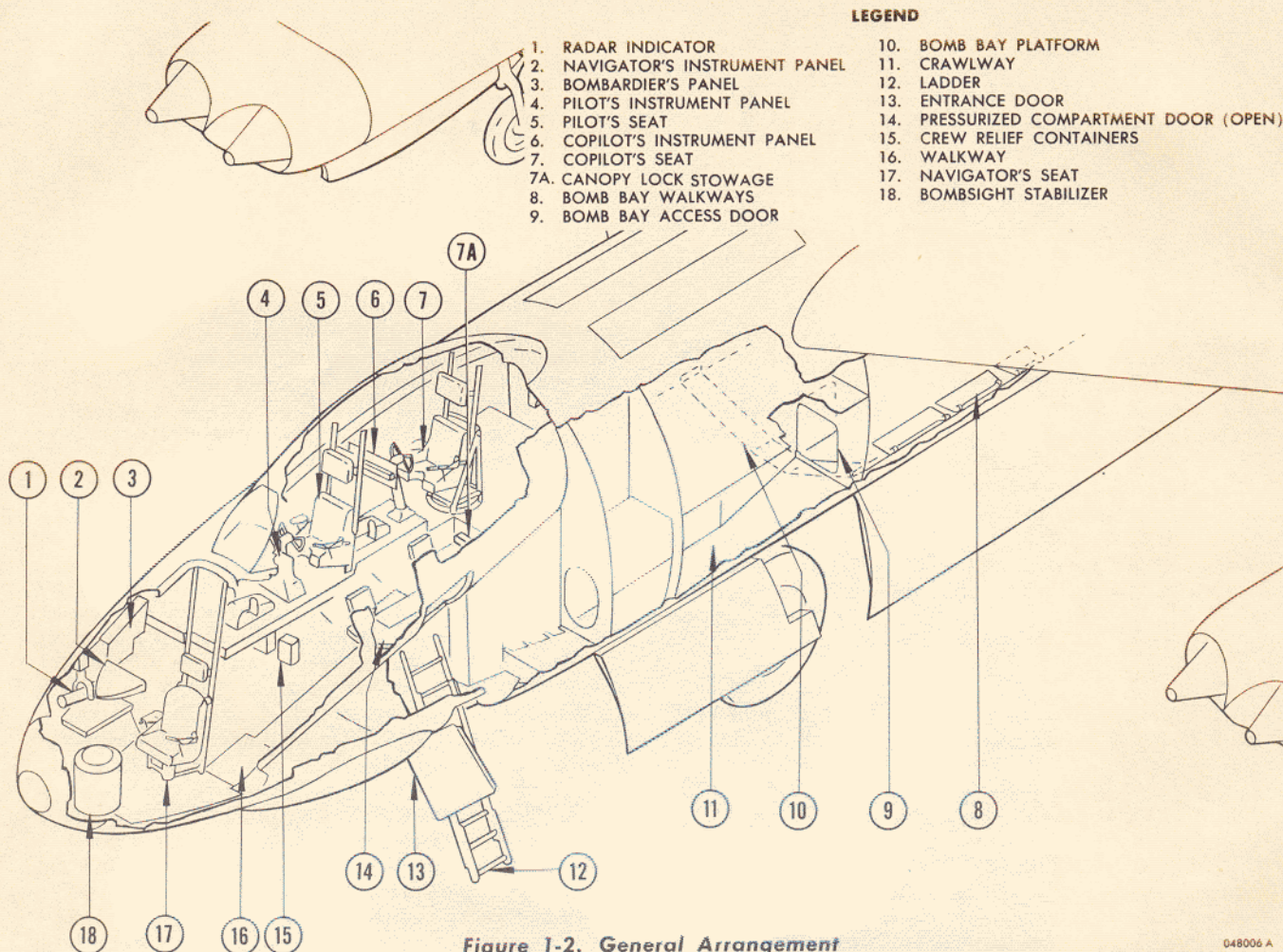


Figure 1-2. General Arrangement

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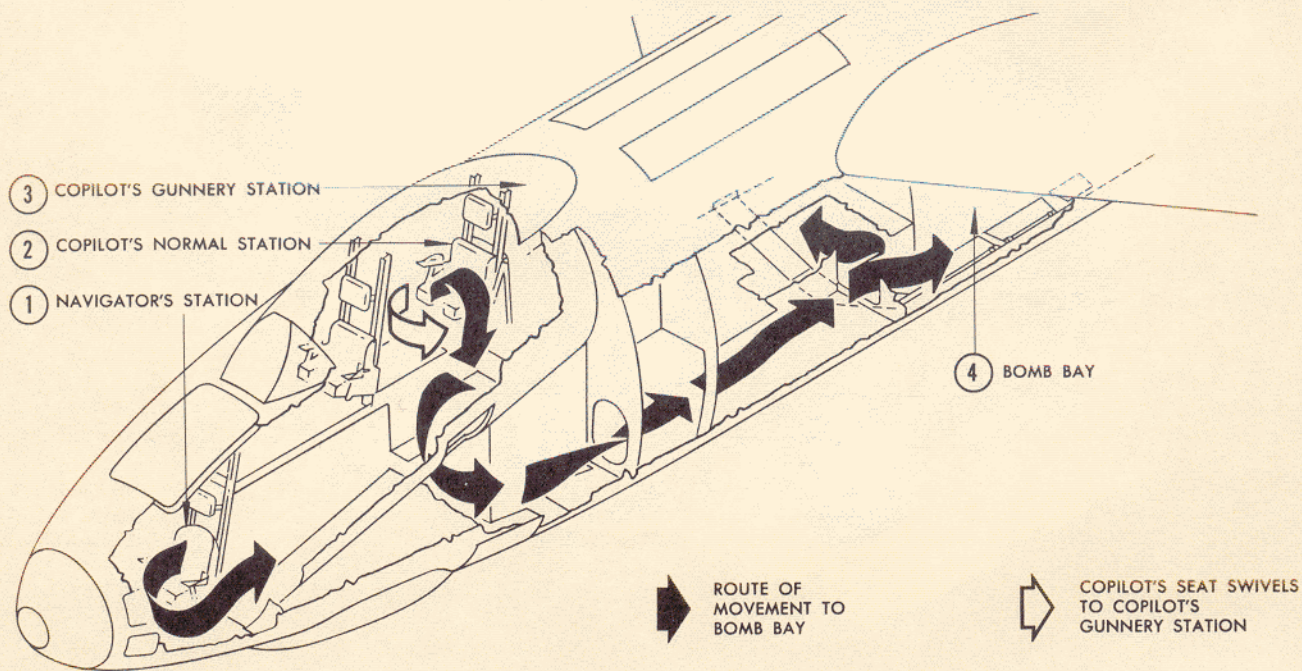


Figure 1-3. Crew Movement

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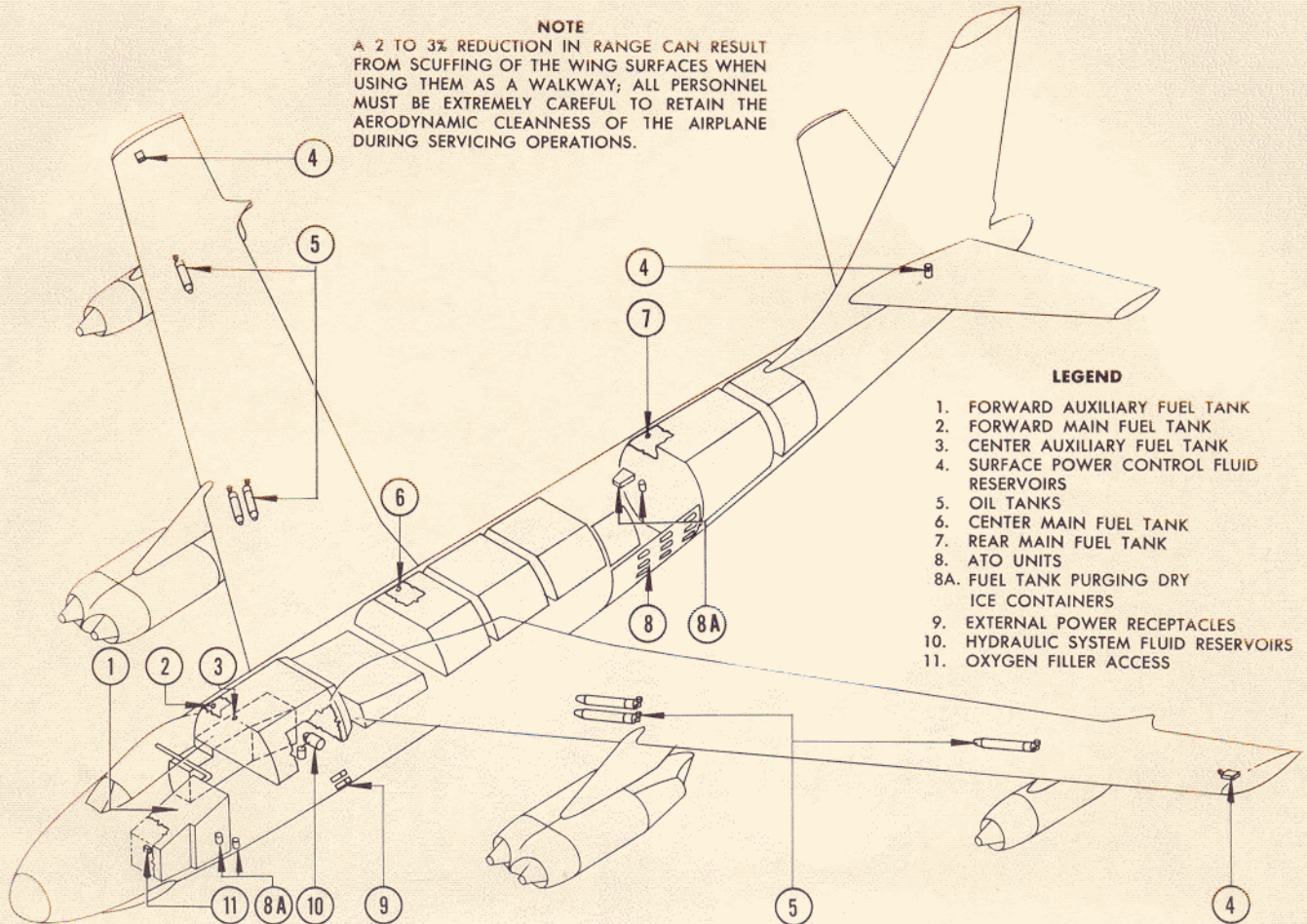


Figure 1-4. Servicing

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1-7. ENGINE.

1-8. GENERAL.

1-9. The airplane is powered by six J47-GE-11 axial flow, turbo-jet engines. A single engine is mounted in each outboard nacelle and two parallel engines in each inboard nacelle. When viewed in the direction of flight, the engines are numbered from left to right with the left outboard engine being number one. The conventional jet engine controls and accessories are provided. In addition, on some airplanes, electrically operated nacelle close-off doors are provided in each engine air inlet for use during engine failures or fires.

1-10. CONTROLS.

1-11. **THROTTLES.** The pilot's throttles comprise a master throttle (5, figure 1-6) and six individual throttles (4, figure 1-6). The copilot is provided with only a master throttle (6, figure 1-15) which is cable connected to the pilot's master throttle. All throttle quadrants are marked "CUTOFF" at the aft end of travel, "IDLE" at the approximate idling position, and "OPEN" at the forward end of travel. Prior to forward motion, the individual throttles are

locked in the "CUTOFF" position until released by the throttle knobs being lifted. During aft motion, the individual throttles cannot be retarded below the approximately 35% RPM position until released by the throttle knobs. The throttles cannot be advanced beyond approximately the 52% RPM position when the surface lock lever (6, figure 1-6) is in the "LOCK" position. The master throttles will move all six individual throttles providing the individual throttles are unlocked. The principle function of the throttles is to adjust the fuel regulators to maintain the desired RPM. In addition, the fuel, oil, hydraulic, warning, and ignition systems are partially controlled by microswitches which are actuated by the throttles.

1-12. All throttle microswitches are automatically actuated by throttle motion. The fuel tank valve and fuel fire shutoff valve are closed and the fuel boost pump turned off for an engine when its individual throttle is placed in the "CUTOFF" position. The oil and hydraulic fire shutoff valves for an engine are closed only when its individual throttle is placed in "CUTOFF" and the fire button (11, figure 1-8) is actuated. The fuel tank valve is opened, the boost pump energized, the fuel fire shutoff valve opened, the oil and hydraulic fire shutoff valves opened (if

previously closed), and the ignition transformers energized for an engine when its individual throttle is advanced to the "IDLE" position. The landing gear warning switches are actuated by the individual throttles and the flap warning switch is actuated by the master throttle.

1-13. THROTTLE LOCK LEVER. The throttles are prevented from creeping by a "LOCKED--UNLOCKED" throttle lock lever (18, figure 1-6) on the pilot's control stand. When the lever is in the aft, or "UNLOCKED" position, the throttles are free to move. When the lever is advanced, increasing amounts of friction are applied to the master throttle

directly, and to the individual throttles through master throttle linkage.

1-14. IGNITION SWITCHES. Six "NORMAL--OFF--ALTITUDE START AND TEST" ignition switches (7, figure 1-6) are on the ignition switch panel. When the switches are in the "OFF" position, the ignition transformers and spark plugs are not energized. When the switches have been actuated to the "NORMAL" position, the ignition circuits are armed so that ignition will occur as soon as the starter switches (11, figure 1-11) have been actuated to "START" and the throttles have been advanced to, or beyond the "IDLE" position. "NORMAL" ignition termi-

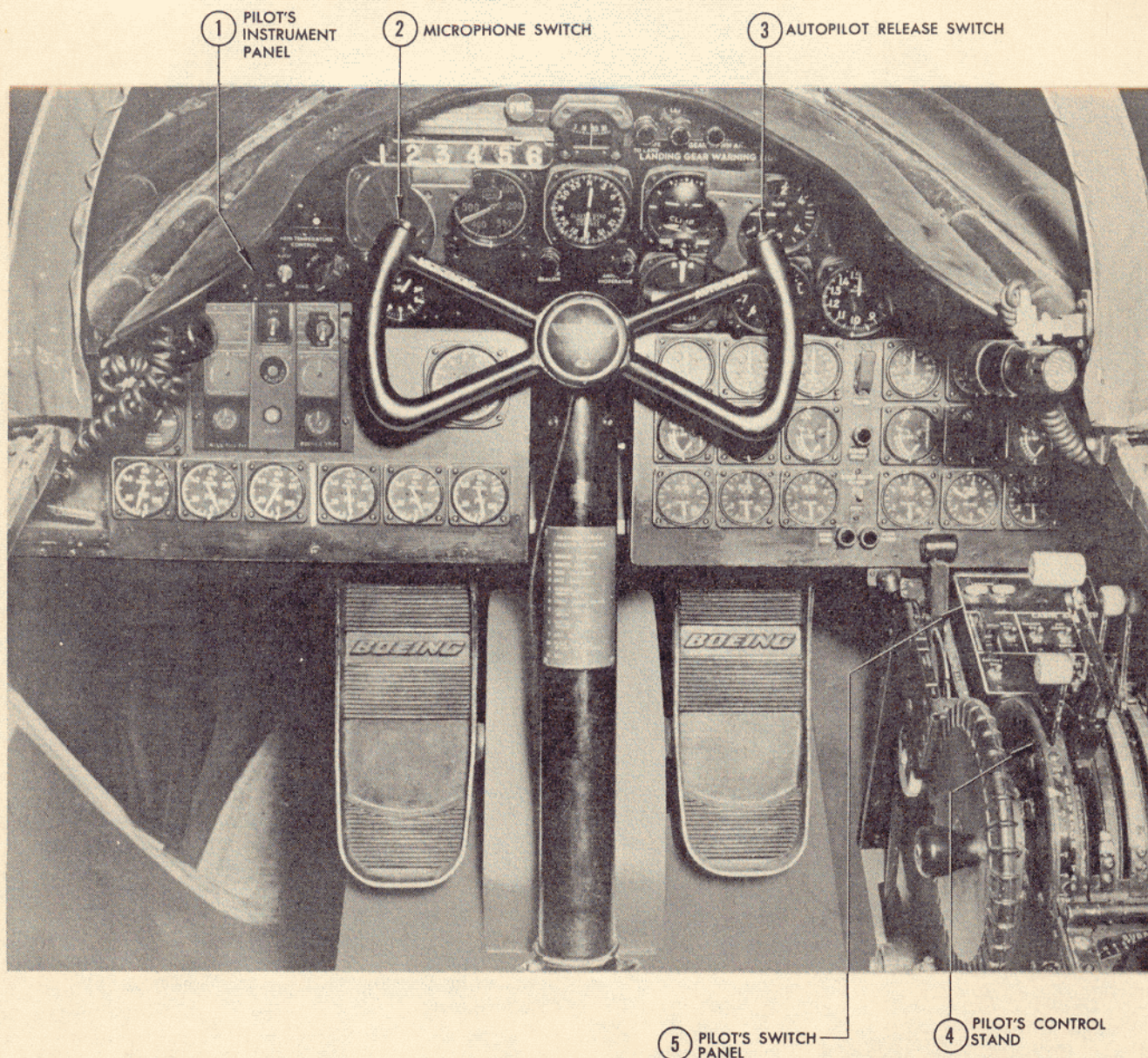
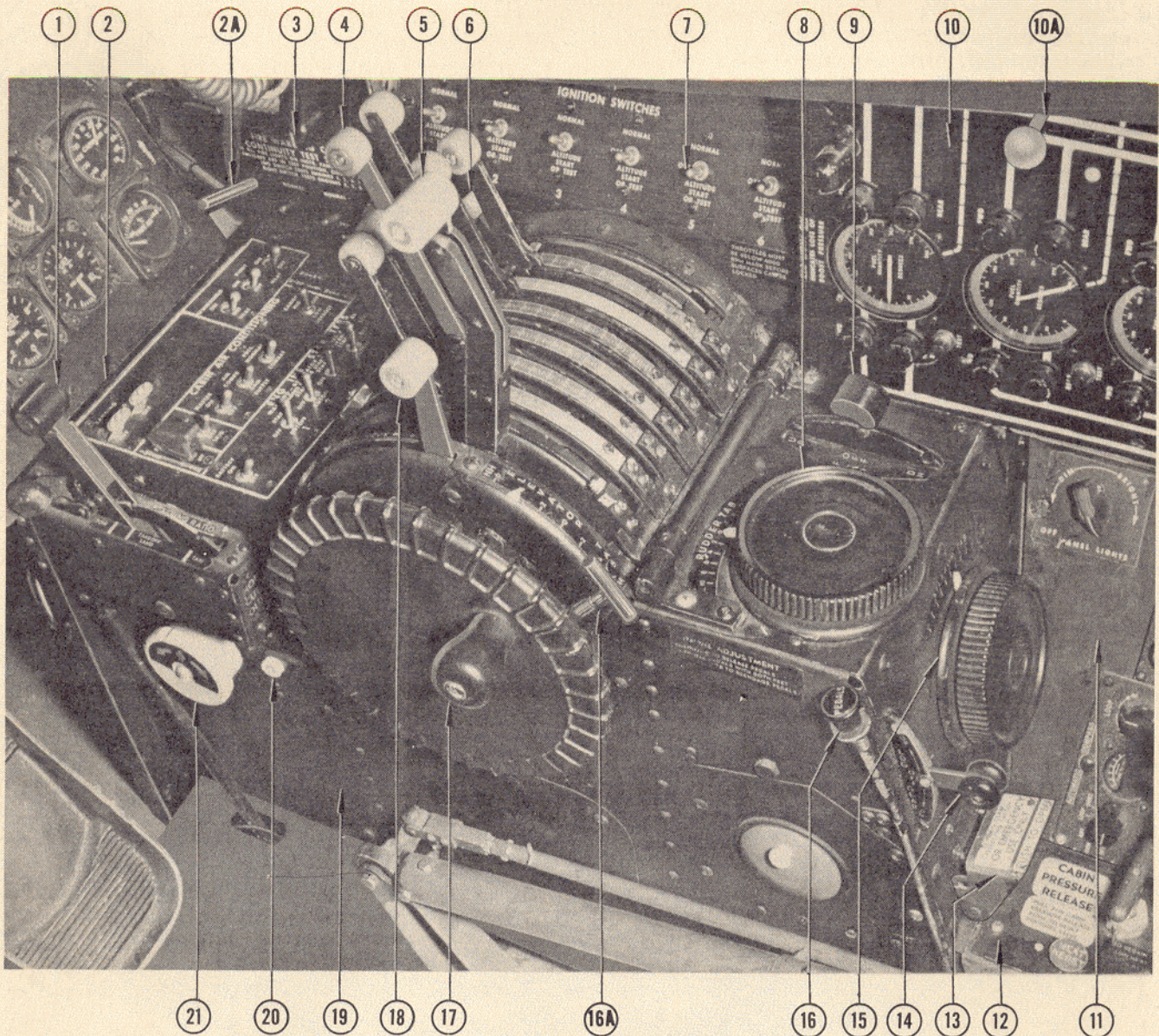


Figure 1-5. Pilot's Station



LEGEND

- | | |
|---|--|
| 1. STEERING RATIO SELECTOR LEVER | 12. SURFACE POWER CONTROL PANEL |
| 2. PILOT'S SWITCH PANEL | 13. LANDING GEAR EMERGENCY RETRACTION SWITCH |
| 2A. DRAG CHUTE DEPLOYMENT HANDLE | 14. LANDING GEAR CONTROL LEVER |
| 3. FIRE WARNING TEST PANEL | 15.AILERON TRIM CONTROL KNOB AND INDICATOR |
| 4. INDIVIDUAL THROTTLES | 16. RUDDER PEDAL ADJUSTMENT KNOB |
| 5. MASTER THROTTLE | 16A. DRAG CHUTE JETTISON HANDLE |
| 6. SURFACE LOCK LEVER | 17. ELEVATOR TRIM CONTROL KNOB AND INDICATOR |
| 7. IGNITION SWITCHES | 18. THROTTLE LOCK LEVER |
| 8. RUDDER TRIM CONTROL KNOB AND INDICATOR | 19. PILOT'S CONTROL STAND |
| 9. WING FLAP LEVER | 20. LANDING GEAR WARNING HORN RELEASE LEVER |
| 10. FUEL CONTROL PANEL | 21. HEAT SELECTOR KNOB |
| 10A. CANOPY LOCK LEVER | |
| 11. PILOT'S RADIO CONTROL PANEL | |

Figure 1-6. Pilot's Station—Right Side

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mates automatically when either automatic or manual cutoff of the starter occurs. When the ignition switches are actuated to the "ALTITUDE START AND TEST" position, the spark plugs are energized continuously regardless of the starter switch and throttle positions. The use of this position is limited to 3 minutes during ground operations.

1-15. STARTER SWITCHES. Six "START--OFF--CUTOFF" starter switches (11, figure 1-11) are on the pilot's switch panel. When the switches are in the "OFF" position, circuits are closed which allow the starter-generators to be used as generators. When in "START" or "CUTOFF," the switches are spring-loaded to "OFF." When the switches are

actuated to the "START" position, the starter-generators are motorized for starting, the ignition circuits are armed, and (on engines 3 and 4 only) the hydraulic pump pressure release valves are opened. When the switches return to the "OFF" positions, the starter-generators remain motorized for starting until an automatic cutoff device shifts them to be used as generators. When external power is disconnected, the "CUTOFF" position provides a manual means of accomplishing cutoff of a starter in the event of automatic cutoff failure. Circuit breakers for the starter control circuit are on the copilot's circuit breaker panel (3, figure 1-24).

1-16. FIRE BUTTON. A push-button switch (11, figure 1-18) on the pilot's instrument panel, when depressed, will close circuits to actuate the oil and hydraulic fire shutoff valves on any engine for which the individual throttle has been retarded to "CUTOFF." When the button is released, the valves will remain closed until the throttle has been advanced to the "IDLE" position. The alternator fields on the engine No. 1 or No. 6 alternators will be de-energized when the No. 1 or No. 6 throttle is retarded to "CUTOFF" and the fire button is depressed. Also, the generator fields

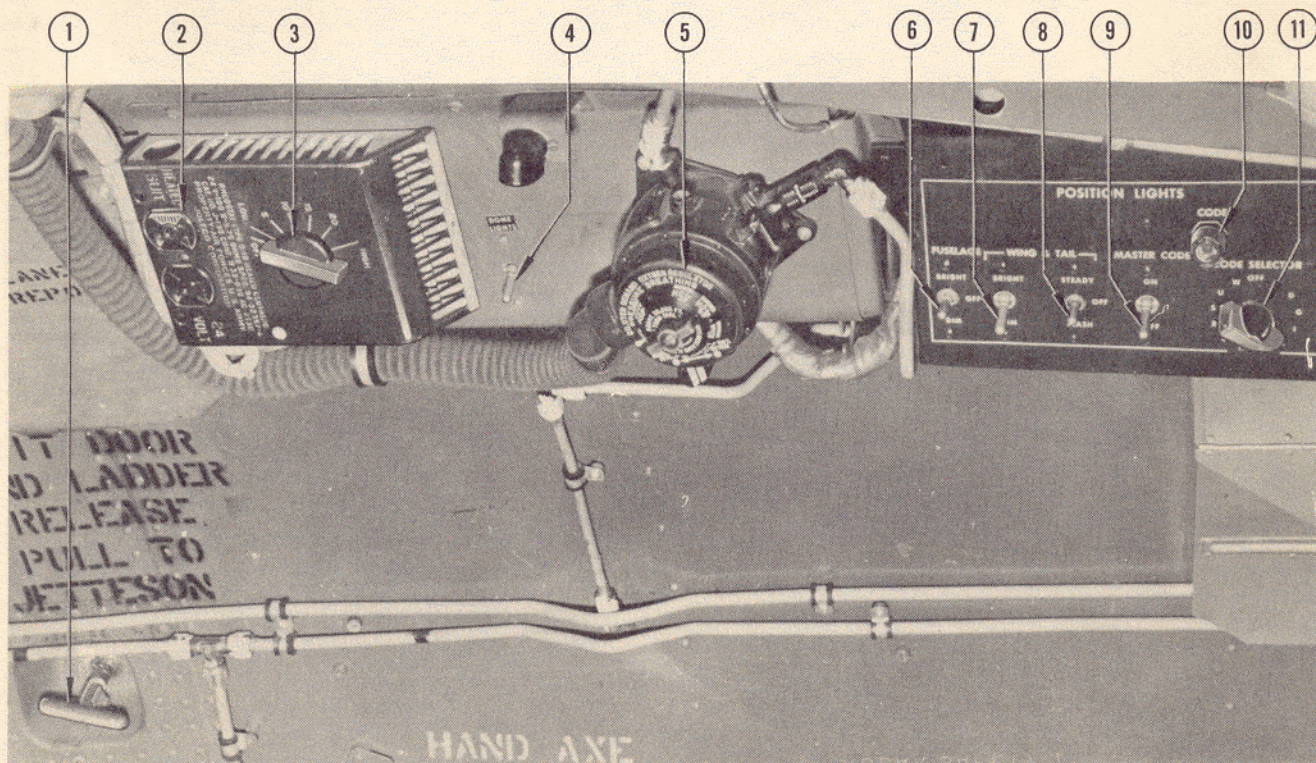
on each engine will be deenergized in the same manner.

1-17. NACELLE CLOSE-OFF DOOR BUTTON. On some airplanes, nacelle close-off doors are provided at each engine air inlet. These doors are electrically operated by placing the desired throttle to "CUTOFF" and actuating a push-button nacelle close-off door switch on the pilot's instrument panel. The doors are automatically reopened when the throttle is returned to the "IDLE" position. Circuit breakers for the system are on the main AC power shield and copilot's circuit breaker panel (1, and 3, figure 1-24).

1-18. INDICATORS.

1-19. TACHOMETERS. Engine speed in per cent of RPM is indicated by 12 tachometers, 6 of which are on the pilot's instrument panel (31, figure 1-8) and 6 on the copilot's instrument panel (4, figure 1-18).

1-20. EXHAUST TEMPERATURE INDICATORS. The temperature of the exhaust gases in degrees centigrade is indicated by six exhaust temperature indicators (28, figure 1-8) on the pilot's instrument panel.



LEGEND

- | | |
|---|---|
| 1. EMERGENCY DOOR AND LADDER RELEASE HANDLE | 7. WING AND TAIL POSITION LIGHTS DIMMING SWITCH |
| 2. SUIT HEATER RECEPTACLES | 8. WING AND TAIL POSITION LIGHTS SWITCH |
| 3. SUIT HEATER RHEOSTAT | 9. MASTER CODE SWITCH |
| 4. WALKWAY DOME AND ENTRANCE LIGHTS SWITCH | 10. MASTER CODE INDICATING LIGHT |
| 5. OXYGEN REGULATOR | 11. CODE SELECTOR KNOB |
| 6. FUSELAGE POSITION LIGHTS SWITCH | |

Figure 1-7. Pilot's Station—Left Side

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1-21. OIL SYSTEM.

1-22. GENERAL.

1-22A. On this airplane, each engine is provided an independent oil system including an oil tank and two engine-driven oil pumps. Each tank holds 10 U.S. gallons and has an expansion space of 2 U.S. gallons. A combination pressure and scavenge pump supplies clean oil at the proper lubricating temperature through jet nozzles to all bearings and to the accessory section gears. In addition, a scavenge pump is provided to return the oil from the rotor bearing sump to the oil tank. The oil pressure pump also supplies oil to a fuel control regulator from which variable control oil is metered to a fuel pressure regulator. The oil tanks are pressurized by air bled from the wing anti-icing ducts to prevent foaming. Cooling of the return

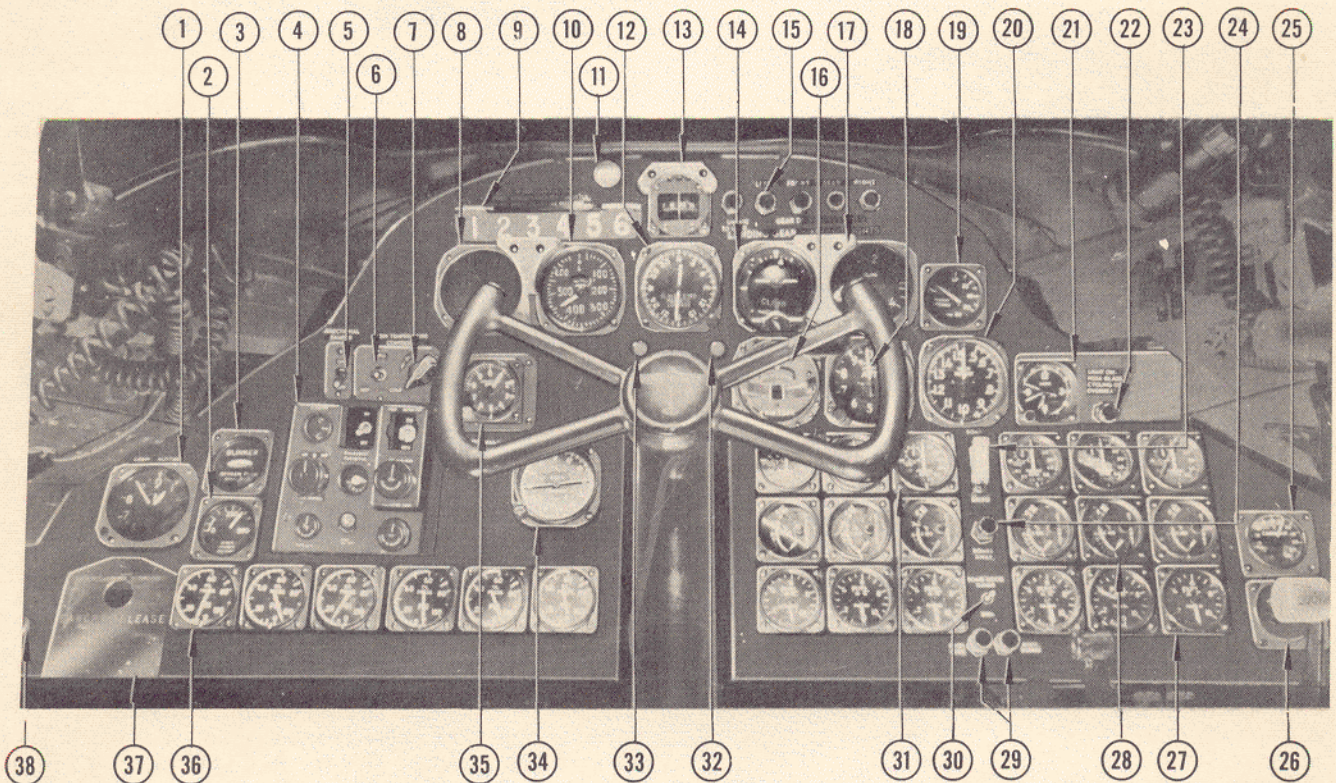
oil is accomplished automatically by transferring the heat from the oil to the fuel flowing into the combustion chambers.

This transfer is accomplished by the use of a heat exchanger between the return oil line and the fuel line.

1-23. OIL SPECIFICATION AND GRADE. The oil used in this airplane shall conform to Specification AF No. 3519, amendment 1, Grade 1005 (summer and winter).

1-24. CONTROLS.

1-25. FIRE BUTTON. An oil system fire shutoff valve is energized to its closed position when a fire button (11, figure 1-8) on the pilot's instrument panel is pressed and the throttle for the malfunctioning



LEGEND

- | | |
|--|---------------------------------------|
| 1. CABIN ALTIMETER | 20. MACHMETER |
| 2. OXYGEN PRESSURE GAGE | 21. CLOCK |
| 3. OXYGEN FLOW INDICATOR | 22. WINDSHIELD OVERHEAT CYCLING LIGHT |
| 4. AUTOPILOT CONTROL PANEL | 23. BOMB SALVO SWITCH |
| 5. DIRECTIONAL DAMPER SWITCH | 24. BOMBS AWAY LIGHT |
| 6. HEAT SELECTOR SWITCH | 25. CABIN AIR THERMOMETER |
| 7. CABIN TEMPERATURE SELECTOR RHEOSTAT | 26. FREE AIR THERMOMETER |
| 8. DATA INDICATOR | 27. FUEL PRESSURE INDICATORS |
| 9. FIRE WARNING LIGHTS | 28. EXHAUST TEMPERATURE INDICATORS |
| 10. MAXIMUM ALLOWABLE AIRSPEED INDICATOR | 29. BOMB DOOR POSITION LIGHTS |
| 11. FIRE BUTTON | 30. BOMB DOOR CONTROL SWITCH |
| 12. GYROSYN COMPASS | 31. TACHOMETERS |
| 13. MAGNETIC COMPASS | 32. ANTI-SKID INOPERATIVE LIGHT |
| 14. ATTITUDE GYRO | 33. MARKER BEACON LIGHT |
| 15. LANDING GEAR WARNING LIGHTS | 34. RADIO COMPASS INDICATOR |
| 16. TURN-AND-BANK INDICATOR | 35. ACCELEROMETER |
| 17. RATE-OF-CLIMB INDICATOR | 36. OIL PRESSURE INDICATORS |
| 18. ALTIMETER | 37. EMERGENCY CANOPY RELEASE HANDLE |
| 19. FLAP POSITION INDICATOR | 38. BRAKE LOCK KNOB |

Figure 1-8. Pilot's Instrument Panel

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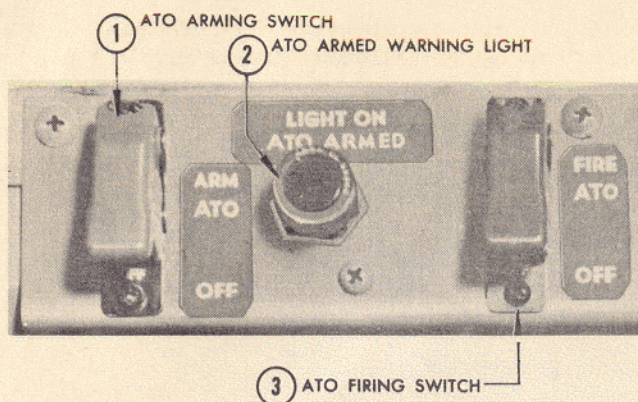


Figure 1-9. ATO Control Panel

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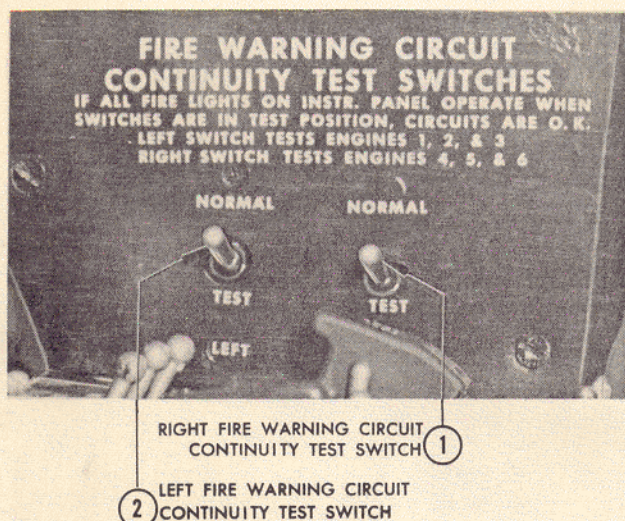


Figure 1-10. Fire Warning Test Panel

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engine has been retarded to the "CUTOFF" position. This valve is automatically energized to its open position when the throttle is again advanced to the "IDLE" position.

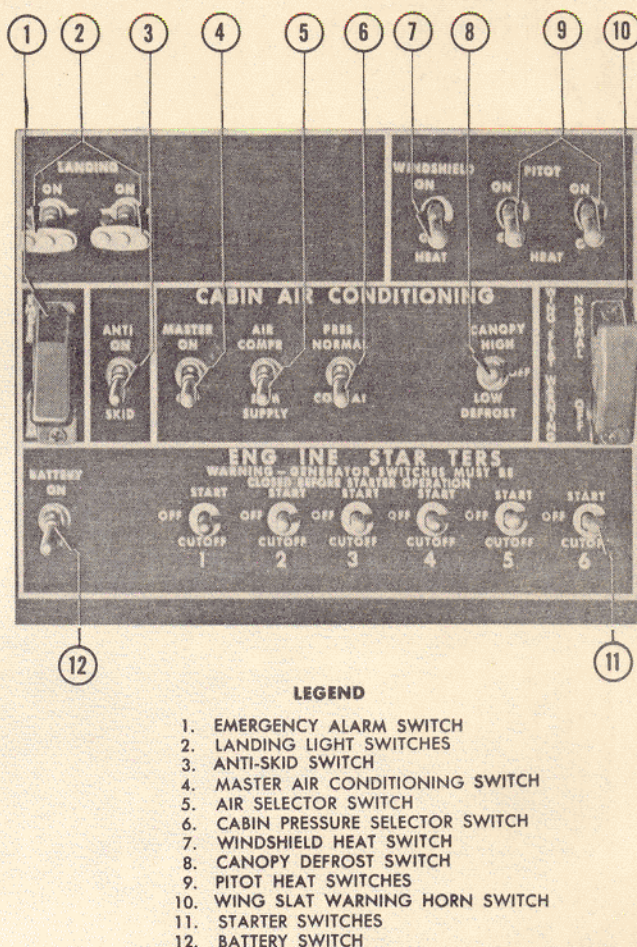
1-26. INDICATORS.

1-27. OIL PRESSURE INDICATORS. Engine oil pressure is indicated by six oil pressure indicators (36, figure 1-8) on the pilot's instrument panel.

1-28. FUEL SYSTEM.

1-29. GENERAL.

1-29A. The main fuel supply consists of three tanks housed within the fuselage structure. Each tank provides fuel for one engine on each side of the airplane. The forward main tank provides fuel for engines No. 1 and No. 6; the center main tank for engines No. 2 and No. 5; and the rear main tank for engines No. 3 and No. 4. All main tanks can



LEGEND

1. EMERGENCY ALARM SWITCH
2. LANDING LIGHT SWITCHES
3. ANTI-SKID SWITCH
4. MASTER AIR CONDITIONING SWITCH
5. AIR SELECTOR SWITCH
6. CABIN PRESSURE SELECTOR SWITCH
7. WINDSHIELD HEAT SWITCH
8. CANOPY DEFROST SWITCH
9. PITOT HEAT SWITCHES
10. WING SLAT WARNING HORN SWITCH
11. STARTER SWITCHES
12. BATTERY SWITCH

Figure 1-11. Pilot's Switch Panel

048037A

be manifolded to supply fuel from any tank to any engine. However, check valves prevent transfer of fuel between main tanks. Two auxiliary tanks are provided; the forward auxiliary tank feeding into the forward main tank and the center auxiliary tank feeding into the center main tank. Each main tank is provided with four boost pumps, one for each side of the airplane in the extreme forward end and the extreme aft end of the tank. One boost pump is provided in each auxiliary tank. A fuel tank valve is mounted on the outlet of each boost pump. Dry ice fuel tank purging is provided for all tanks. Dry ice containers continuously release CO₂ into the air space in the fuel tanks to alleviate any potential fire hazard.

1-30. The normal flow of fuel for each engine is from the boost pumps, through the fuel tank valves and check valves, to a fuel fire shutoff valve. From the fuel fire shutoff valve fuel is delivered to the engine-driven fuel pump which supplies the nozzles in the combustion chambers. A by-pass around the engine-driven fuel pump, through a fuel control valve, controls the pressure to the nozzles. Variable control oil from a fuel regulator in the oil system provides a governing effect on the fuel control valve. The throttle acts on the fuel regulator to set the fuel pressure to which the engine is to be governed.

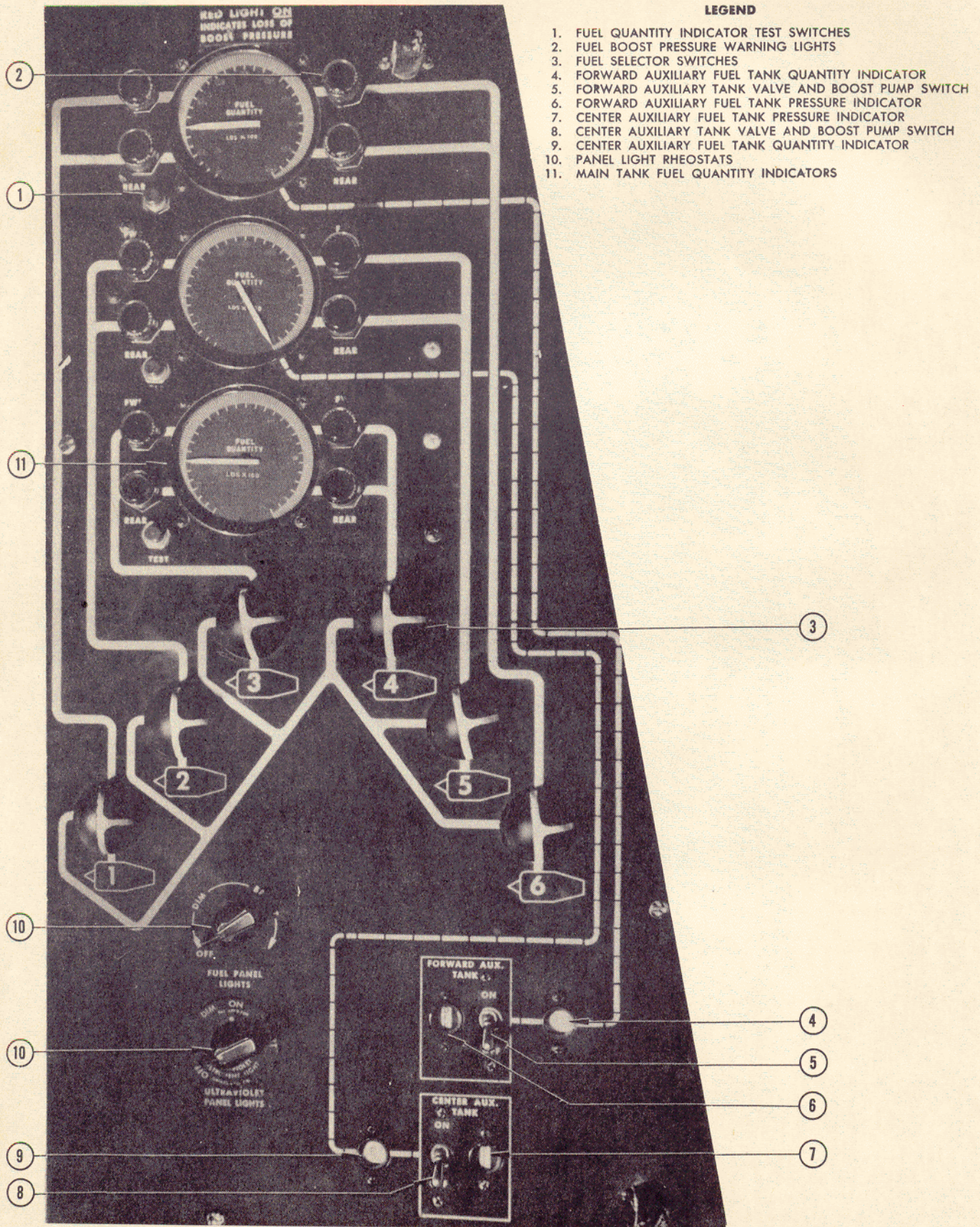
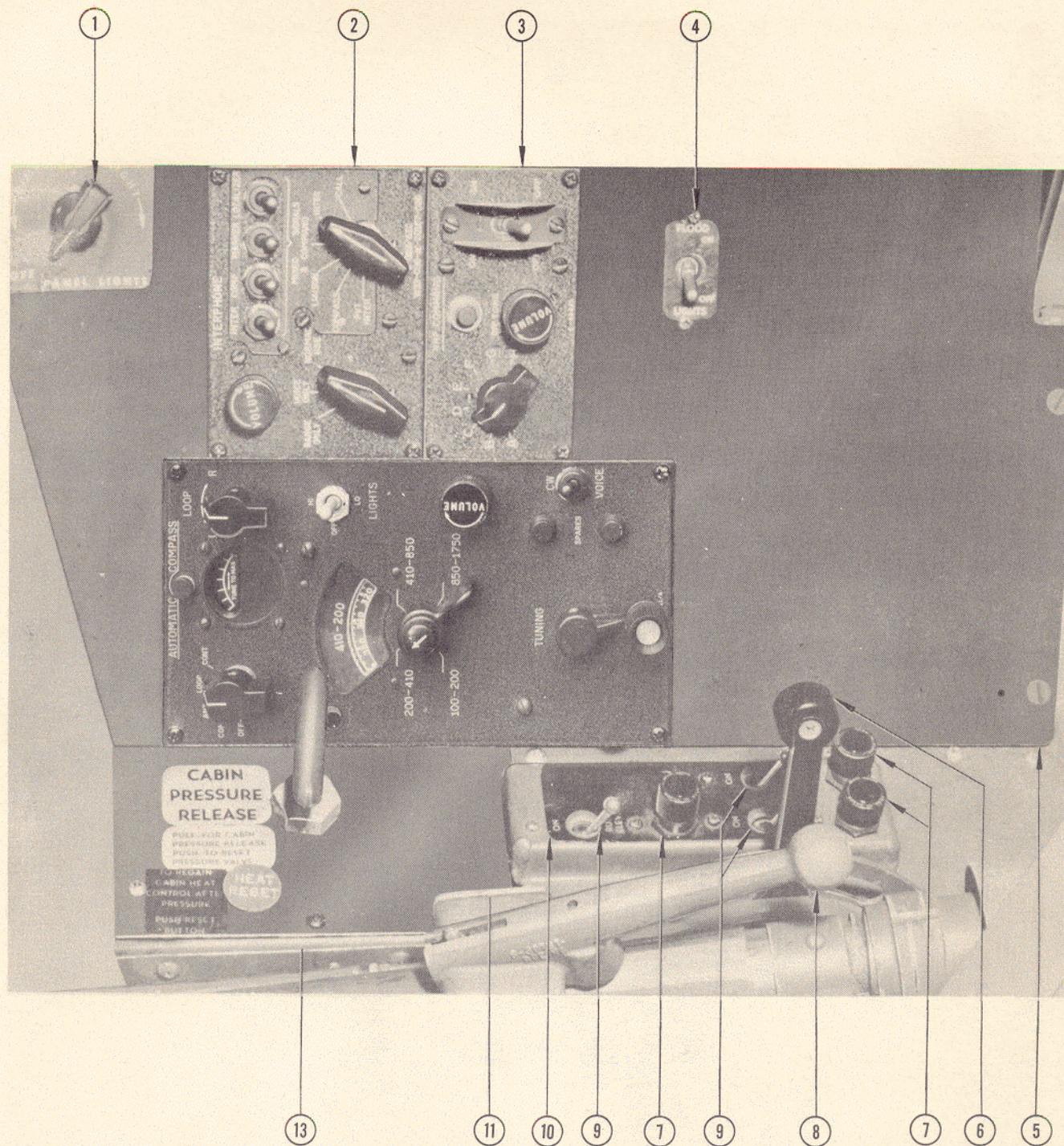


Figure 1-12. Fuel Control Panel



LEGEND

- | | |
|---|---|
| 1. PANEL LIGHT RHEOSTAT | 8. CONTROL COLUMN LATCH LEVER |
| 2. VHF COMMAND RADIO | 9. SURFACE POWER CONTROL SWITCHES |
| 3. INTERPHONE | 10. SURFACE POWER CONTROL PANEL |
| 4. COCKPIT LIGHT SWITCH | 11. RADIO COMPASS |
| 5. PILOT'S RADIO CONTROL PANEL | 12. DELETED |
| 6. CANOPY CONTROL LEVER | 13. EMERGENCY CABIN PRESSURE RELEASE HANDLE |
| 7. SURFACE POWER CONTROL WARNING LIGHTS | 14. HEAT RESET BUTTON |

Figure 1-13. Pilot's Radio Control and Surface Power Control Panels

048039 A

1 COPILOT'S INSTRUMENT PANEL

2 MICROPHONE SWITCH

3 AUTOPILOT RELEASE SWITCH

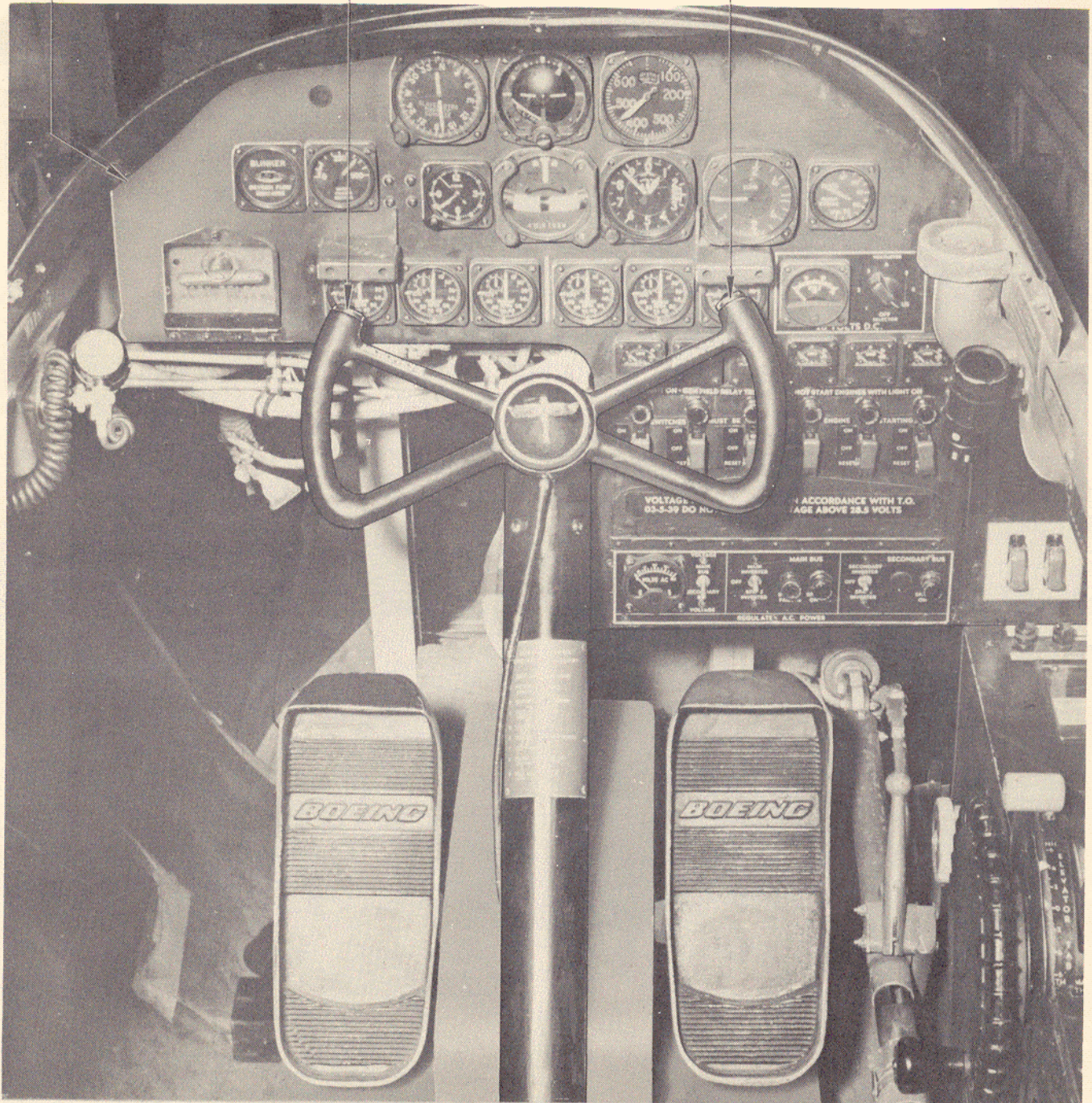


Figure 1-14. Copilot's Station



LEGEND

- | | |
|---|--|
| 1. WING FLAP EMERGENCY SWITCHES | 13. HYDRAULIC CONTROL PANEL |
| 2. DELETED | 14.AILERON TRIM CONTROL KNOB AND INDICATOR |
| 3. LANDING GEAR WARNING LIGHTS | 15. COPILOT'S CIRCUIT BREAKER PANEL |
| 4. LANDING GEAR EMERGENCY RETRACTION SWITCHES | 16. COPILOT'S INTERPHONE CONTROL PANEL |
| 5. AC CIRCUIT BREAKER PANEL | 17. DELETED |
| 6. MASTER THROTTLE | 18. LANDING GEAR CONTROL LEVER |
| 7. ANTI-ICING WARNING LIGHTS | 19. RUDDER PEDAL ADJUSTMENT KNOB |
| 8. WING OVERHEAT WARNING TEST SWITCH | 19A. DRAG CHUTE JETTISON HANDLE |
| 9. WING ANTI-ICING CONTROL SWITCH | 20. EMPENNAGE HEATER SWITCHES |
| 10. EMPENNAGE ANTI-ICING CONTROL SWITCH | 21. ELEVATOR TRIM CONTROL KNOB AND INDICATOR |
| 11. RUDDER TRIM CONTROL KNOB AND INDICATOR | 22. HEAT SELECTOR KNOB |
| 12. WING FLAP LEVER | 23. CONTROL COLUMN LATCH LEVER |
| | 24. DRAG CHUTE DEPLOYMENT HANDLE |

Figure 1-15. Copilot's Station—Right Side

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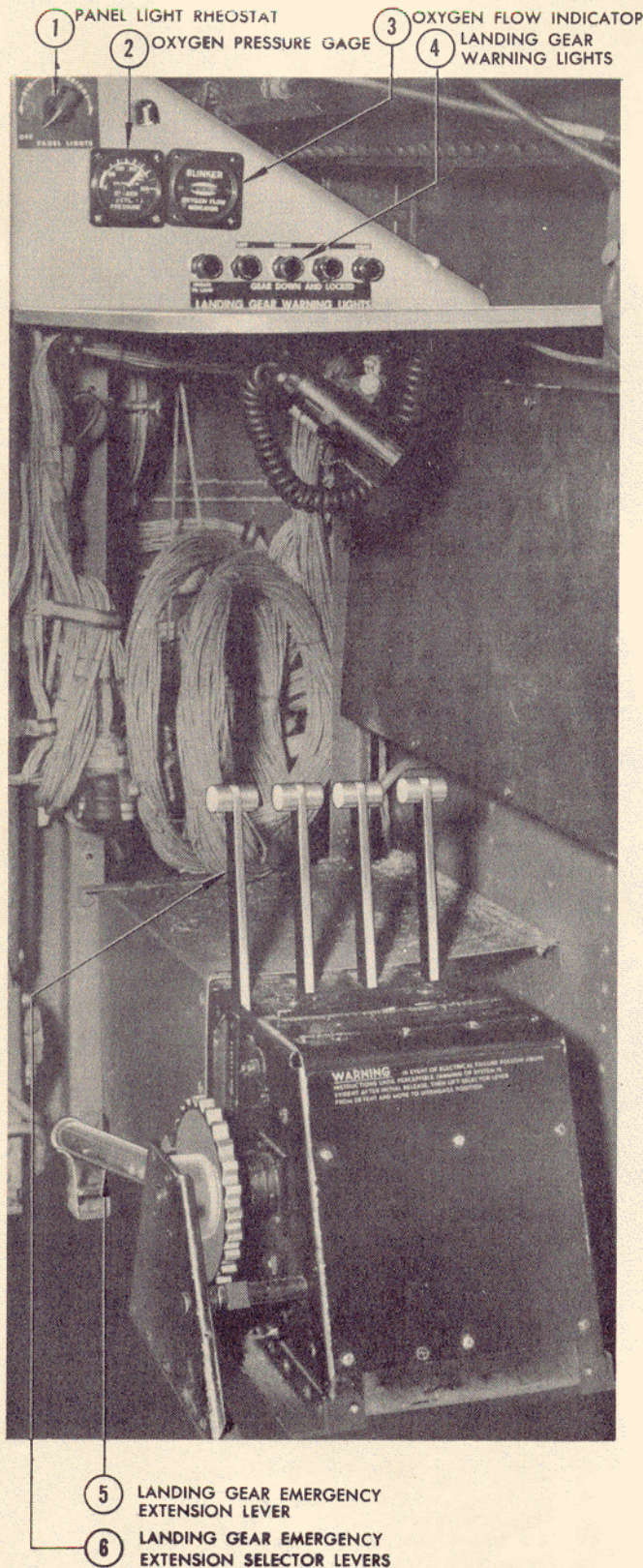


Figure 1-16. Copilot's Gunnery Station

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1-31. FUEL SPECIFICATION AND GRADE. The fuel used in this airplane shall conform to Specification MIL-F-5624, Grade JP-3 (recommended); Specifica-

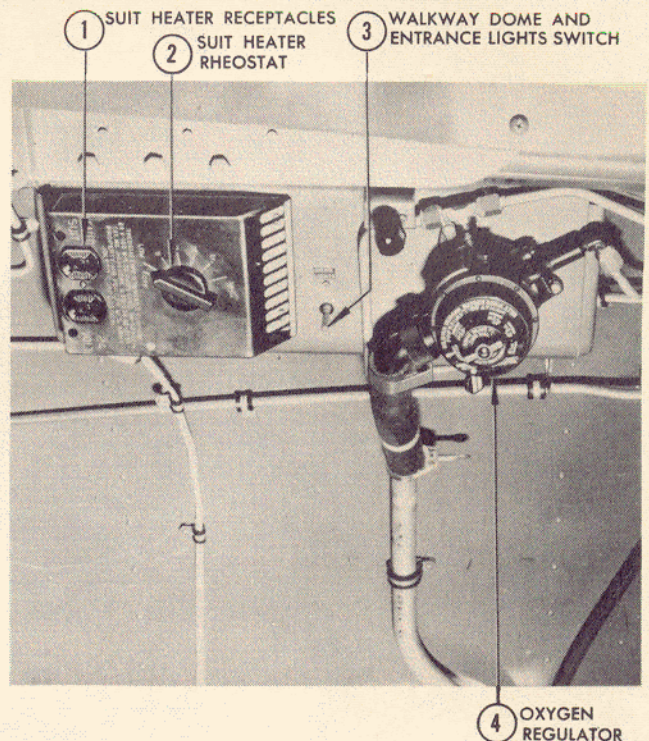


Figure 1-17. Copilot's Station - Left Side

048043 A

tion MIL-F-5616, Grade JP-1 (alternate); or Specification MIL-F-5572 (alternate). For ground ambient temperatures below -35°C (-30°F), only Specification MIL-F-5624 and Specification MIL-F-5572 fuel should be used.

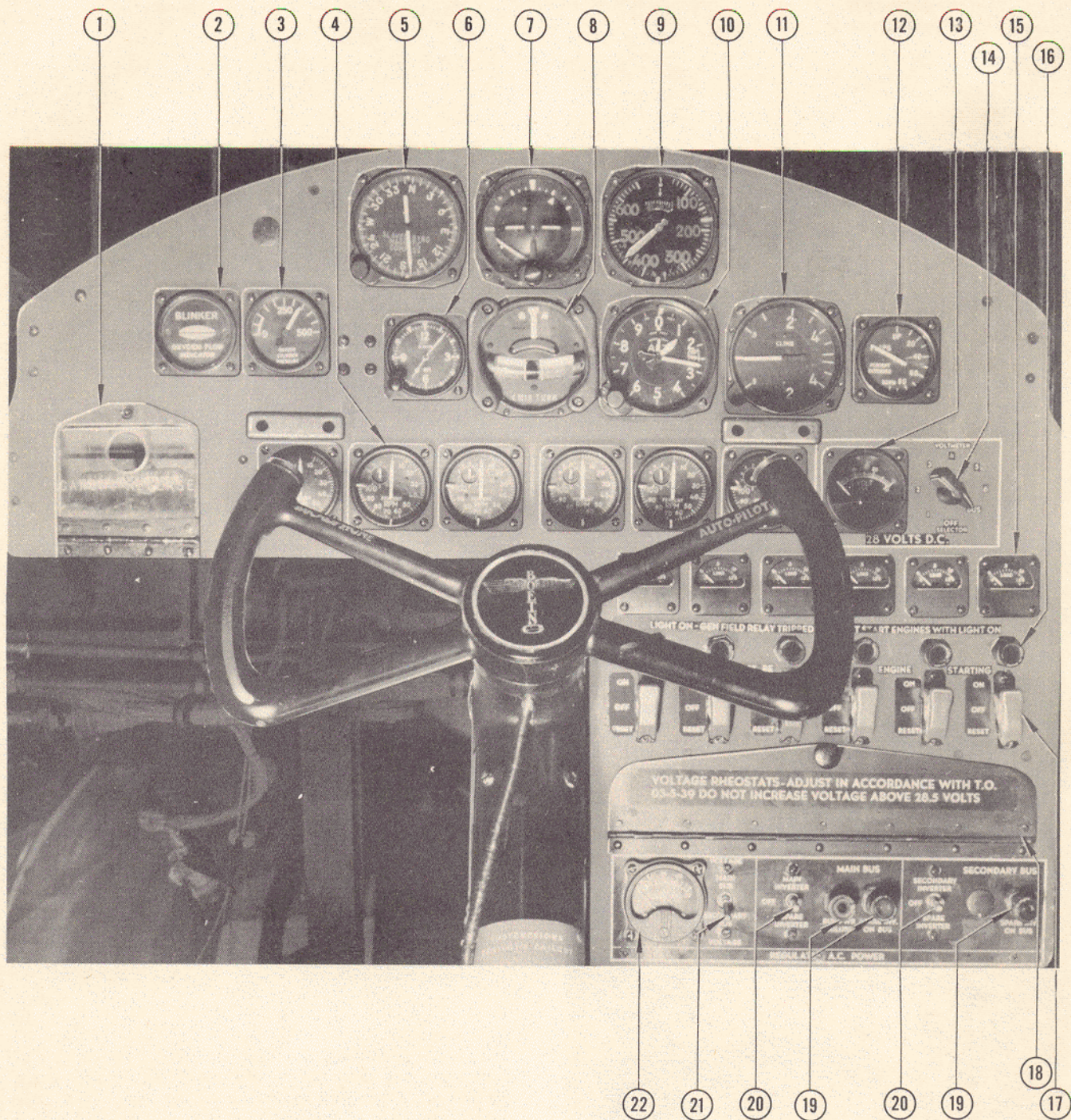
NOTE

Any grade of fuel, Specification MIL-F-5572, may be used; however, the lowest grade available is recommended for economy reasons.

1-32. CONTROLS.

1-33. FUEL SELECTOR SWITCHES. Six rotary-type fuel selector switches (3, figure 1-12) on the fuel control panel provide a means of selecting the supply of fuel from any tank and/or the manifold for any engine. Switch positions are indicated on the panel by a schematic diagram of the courses of fuel flow. These positions are "Tank-to-Engine," "Tank-to-Engine and Manifold," and "Manifold-to-Engine." When the switches are in the "Tank-to-Engine" position, the fuel tank valves will be opened and the boost pumps energized as soon as the throttles are advanced out of "CUTOFF." When the switches are in the "Tank-to-Engine and Manifold" position, the fuel tank valves are opened, the boost pumps energized, and the manifold valves opened regardless of throttle position. When the switches are in the "Manifold-to-Engine" position, the manifold valves are opened regardless of throttle position. The fuel boost warning lights are energized as soon as a tank is selected regardless of throttle position.

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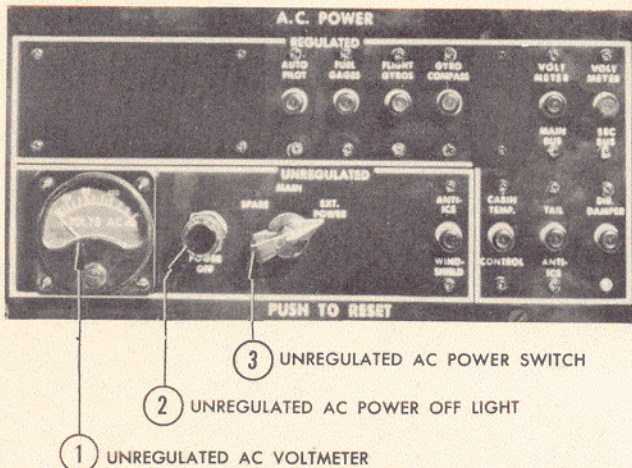
LEGEND

- | | |
|---|--------------------------------------|
| 1. EMERGENCY CANOPY RELEASE HANDLE | 12. WING FLAP POSITION INDICATOR |
| 2. OXYGEN FLOW INDICATOR | 13. DC VOLTMETER |
| 3. OXYGEN PRESSURE GAGE | 14. DC VOLTMETER SELECTOR SWITCH |
| 4. TACHOMETERS | 15. DC LOADMETERS |
| 5. GYROSYN COMPASS | 16. GENERATOR OVERVOLTAGE LIGHTS |
| 6. CLOCK | 17. GENERATOR SWITCHES |
| 7. ATTITUDE GYRO | 18. GENERATOR VOLTAGE RHEOSTAT GUARD |
| 8. TURN-AND-BANK | 19. INVERTER INDICATOR LIGHTS |
| 9. MAXIMUM ALLOWABLE AIRSPEED INDICATOR | 20. INVERTER SWITCHES |
| 10. ALTIMETER | 21. AC VOLTMETER SELECTOR SWITCH |
| 11. RATE-OF-CLIMB | 22. AC VOLTMETER |

Figure 1-18. Coptail's Instrument Panel

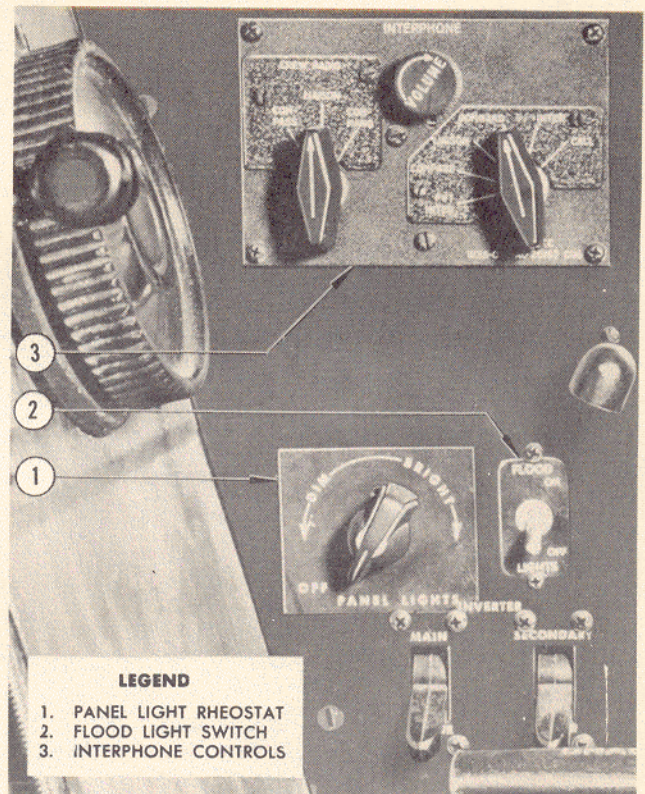
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1-34. AUXILIARY TANK VALVE AND BOOST PUMP SWITCHES. Two "ON-OFF" switches (5, 8, figure 1-12) on the fuel control panel are used to electrically open the auxiliary fuel tank valves and energize the auxiliary fuel tank boost pumps. Overfilling of the main tanks from the auxiliary tanks is prevented by float switches in the circuit. Protection is provided by circuit breakers on the copilot's circuit breaker panel (3, figure 1-24).



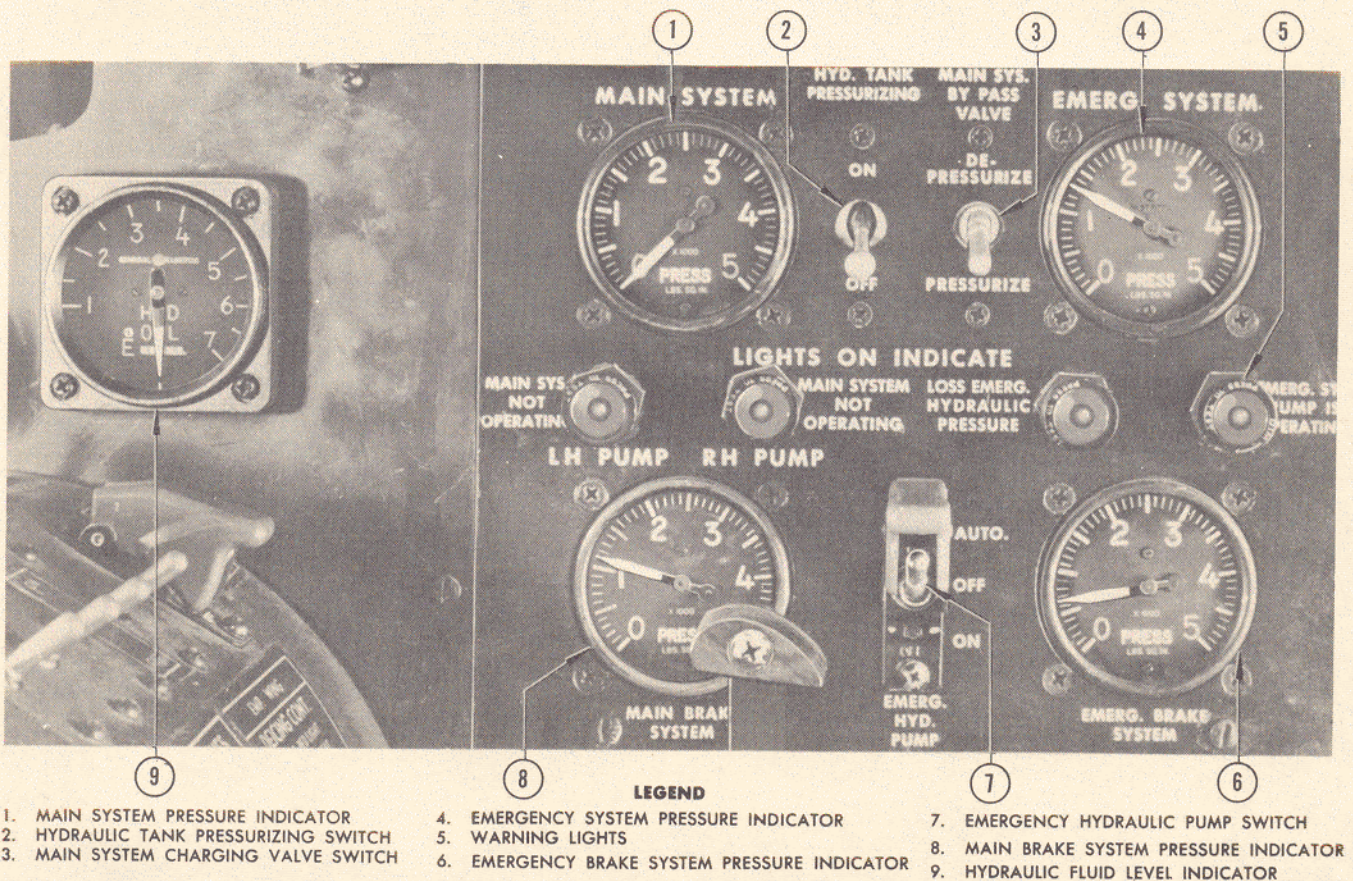
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Figure 1-19. AC Circuit Breaker Panel



048047

Figure 1-21. Copilot's Interphone Control Panel



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Figure 1-20. Hydraulic Control Panel

TANKS	NO.	USABLE FUEL	UNUSABLE FUEL	EXPANSION SPACE	TOTAL VOLUME
FORWARD MAIN	1	16,159	174	440	16,660
FORWARD AUXILIARY	1	3,660	16	113	3,771
CENTER MAIN	1	18,434	391	830	19,010
CENTER AUXILIARY	1	3,081	8	93	3,179
REAR MAIN	1	22,282	168	950	22,970
<p style="text-align: center;">USABLE FUEL TOTALS</p> <p>MAIN TANKS 46,856</p> <p>MAIN TANKS AND FORWARD AUXILIARY TANK 50,525</p> <p>MAIN TANKS AND BOTH AUXILIARY TANKS 53,606</p> <p style="text-align: center;">NOTE</p> <p>Quantities are based on MIL-F-5624 fuel at 6.5 lbs. per gallon; unusable fuel includes the fuel in the lines.</p>					

Figure 1-22. Fuel Quantity Data (Lbs.)

948010A

1-35. INDICATORS.

1-36. FUEL QUANTITY INDICATORS. Three quantity indicators (11, figure 1-12) on the fuel control panel, show the fuel quantity in pounds for the main fuel tanks. Circuit breakers for the indicating circuits are on the AC circuit breaker panel (2, figure 1-24).

1-37. FUEL PRESSURE INDICATORS. Fuel pressure at each engine is indicated by six fuel pressure indicators (27, figure 1-8) on the pilot's instrument panel.

1-38. AUXILIARY FUEL TANK QUANTITY AND PRESSURE INDICATORS. Four tab-window type indicators (4, 6, 7, 9, figure 1-12) on the fuel control panel show, by interchangeable tabs, the condition of fuel quantity and pressure for the two auxiliary

tanks. A full auxiliary tank is indicated by an "F" tab, an empty tank by an "E" tab, and all intermediate quantities by a divided black and white circle tab. No pressure from an auxiliary tank is indicated by an "OFF" tab, low pressure by a "LP" tab, and normal pressure by a "P" tab. The quantity indicating circuits are energized when power is on the airplane. The pressure indicating circuits are energized through the auxiliary tank valve and boost pump switches.

1-39. FUEL BOOST PRESSURE WARNING LIGHTS. Twelve fuel boost pressure warning lights (2, figure 1-12) for the main fuel tank pressure lines are provided on the fuel control panel. The lights will illuminate when the corresponding fuel selector switch is set to a tank and a low pressure exists in the line. The fuel boost pressure warning light circuits are protected by circuit breakers on the copilot's circuit breaker panel (3, figure 1-24).

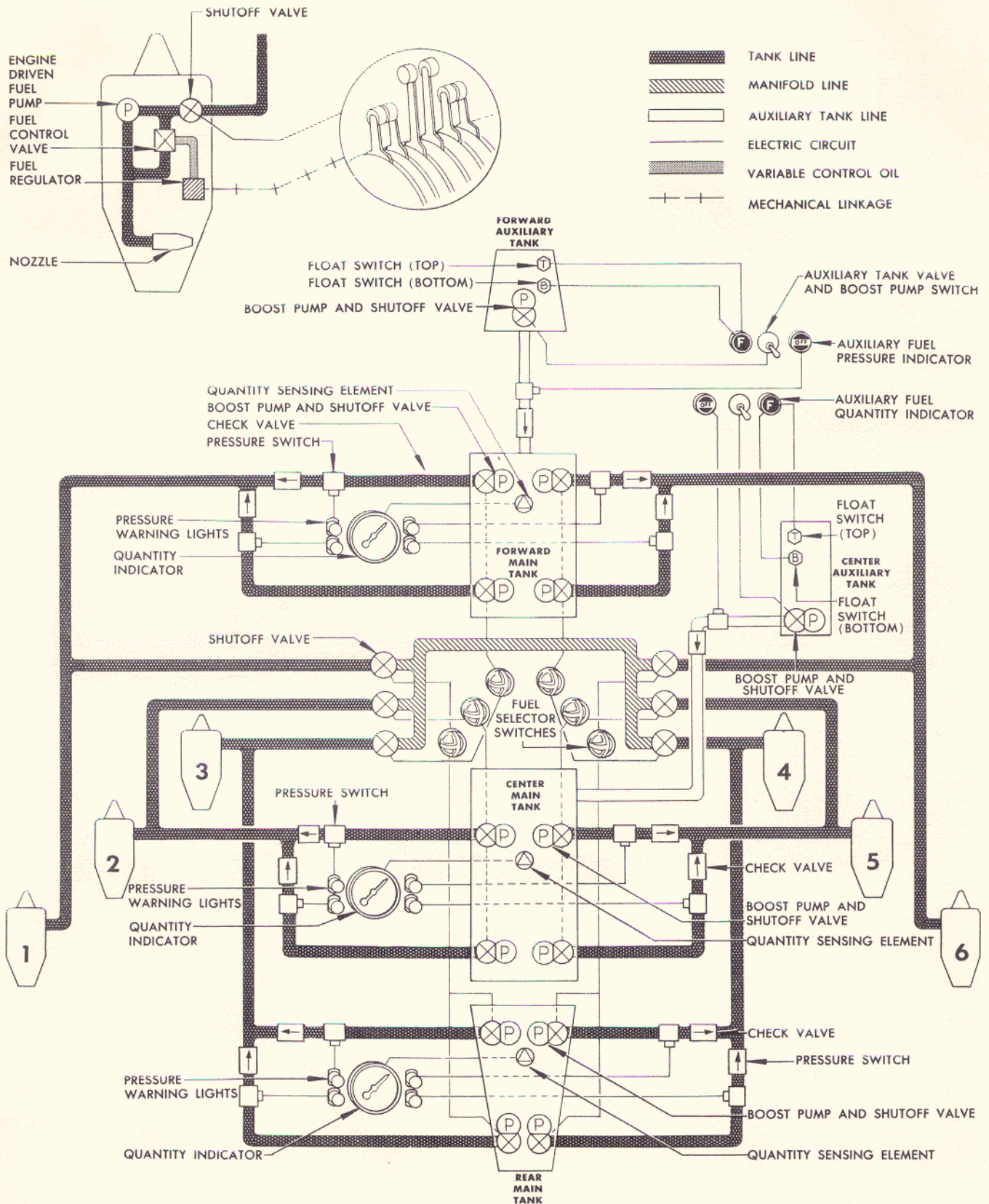


Figure 1-23. Fuel System

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CIRCUIT	PANEL	CIRCUIT	PANEL	CIRCUIT	PANEL
Alternator Power Selector	3	Fuel and Oil Pressure Indicators (Engine No. 4)	1	Inverter, Secondary	5
Alternator Regulator, Main	3	Fuel and Oil Pressure Indicators (Engine No. 5)	1	Landing Gear, Main	3
Alternator Regulator, Main	4	Fuel and Oil Pressure Indicators (Engine No. 6)	1	Landing Gear, Outtrigger	3
Alternator Regulator, Spare	3	Fuel Control, Main (Engine No. 1)	3	Landing Gear Position Warning	3
Alternator Regulator, Spare	4	Fuel Control, Main (Engine No. 2)	3	Landing Gear Retraction, Emergency	3
Anti-icing, Pitot and Windshield	3	Fuel Control, Main (Engine No. 3)	3	Lights, Cabin Dome	3
Anti-icing, Tail	2	Fuel Control, Main (Engine No. 4)	3	Lights, Copilot's and Navigator's Fluorescent	3
Anti-icing, Tail	3	Fuel Control, Main (Engine No. 5)	3	Lights, Flashing Position	3
Anti-icing, Windshield	2	Fuel Control, Main (Engine No. 6)	3	Lights, Flood	3
Anti-icing, Windshield	4	Fuel Gages	2	Light, Left Landing	3
Anti-icing, Wing	3	Fuel Tank, Forward Auxiliary, Control and Warning	3	Lights, Panel	3
Anti-skid	3	Fuel Tank, Center Auxiliary, Control and Warning	3	Lights, Pilot's Fluorescent	3
ATO Power Control	3	Fuel Warning, Main (Engine No. 1)	3	Light, Right Landing	3
Autopilot	2	Fuel Warning, Main (Engine No. 2)	3	Lights, Spot	3
Autopilot	3	Fuel Warning, Main (Engine No. 3)	3	Lights, Steady Position	3
Cabin Air Temperature Control	3	Fuel Warning, Main (Engine No. 4)	3	Lights, Tunnel Dome	3
Cabin Air Valves	3	Fuel Warning, Main (Engine No. 5)	3	Nacelle Air Shutoff Door (No. 1)	1
Cabin Temperature Control	2	Fuel Warning, Main (Engine No. 6)	3	Nacelle Air Shutoff Door (No. 2)	1
Defrosting, Canopy	3	Ground Blower, Cabin	3	Nacelle Air Shutoff Door (No. 3)	1
Defrosting, Nose	3	Gyrosyn Compass	2	Nacelle Air Shutoff Door (No. 4)	1
Directional Damper	2	Gyrosyn Compass	3	Nacelle Air Shutoff Door (No. 5)	1
Directional Damper	3	Hydraulic Standby Control	3	Nacelle Air Shutoff Door (No. 6)	1
Engine Control (No. 1)	3	Hydraulic Oil Quantity	3	Radar Bombing, Navigation-al, and Computing Systems	6
Engine Control (No. 2)	3	Hydraulic Warning	3	Radio Compass	3
Engine Control (No. 3)	3	Interphone	3	Suit Heater, Copilot's	3
Engine Control (No. 4)	3	Inverter Control, Main	3	Suit Heat, Navigator's	3
Engine Control (No. 5)	3	Inverter Control, Secondary	3	Suit Heater, Pilot's	3
Engine Control (No. 6)	3	Inverter Control, Spare	3	Surface Boost	3
Fire Detection Warning	3	Inverter, Main	5	Temperature, Outside Air	3
Flap Control, Emergency (Primary Motor)	3			Turn-and-Bank, Copilot's	3
Flap Control, Emergency Alternate (Secondary Motor)	3			Turn-and-Bank, Pilot's	3
Flap Control, Normal	3			Vibrators, Instrument Panel	3
Flap Position Indicator	3			Voltmeter, Main Bus	2
Flight Gyros	2			Voltmeter, Secondary Bus	2
Fuel and AC Warning	3			Voltmeter, Unregulated AC	4
Fuel and Oil Pressure Indicators (Engine No. 1)	1				
Fuel and Oil Pressure Indicators (Engine No. 2)	1				
Fuel and Oil Pressure Indicators (Engine No. 3)	1				

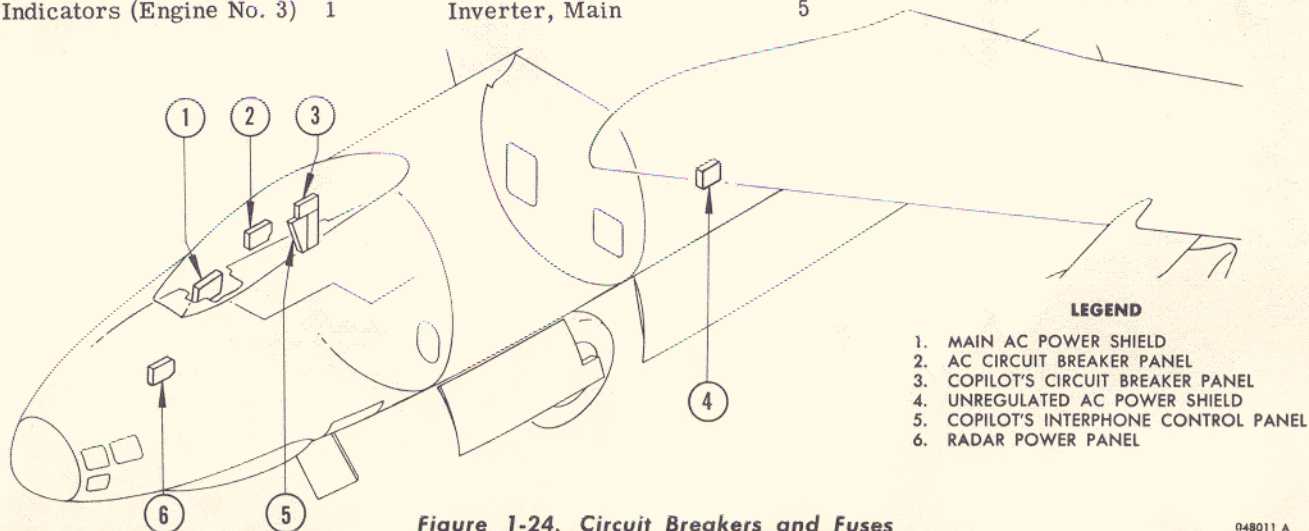


Figure 1-24. Circuit Breakers and Fuses

048011 A

1-40. ELECTRICAL SYSTEM.

1-41. GENERAL.

1-42. DIRECT CURRENT SYSTEM. Direct current power is provided by six 28-volt engine-driven generators. The system is primarily a ground return, single conductor type, except where it is necessary to use two conductors to avoid magnetic deviation. The generators are combination starter-generator units, acting as starters for cranking the engines up to approximately 25% RPM, and thereafter operating as generators. Two 12-volt storage batteries connected in series provide a stand-by power source and may be used for emergency starting of engines only when external power is not available. All electrical equipment and systems, except fuel quantity, fuel and oil pressure, and flight gyro indicating systems, require direct current power for their control or operation. Suit heater receptacles and rheostats are on the oxygen panels at each crew station. Suit heater circuit breakers are on the copilot's circuit breaker panel (3, figure 1-24).

1-43. REGULATED ALTERNATING CURRENT SYSTEM. Regulated 115-volt 400-cycle alternating current is supplied to a main and secondary bus system by three single-phase inverters. One inverter is a spare which will automatically operate, or can be manually selected, to supply power to either bus in the event of failure of the main or secondary inverter. However, if the spare inverter is being used for the main bus load, it cannot be used automatically or manually for the secondary load. Phase adapters provide 115-volt, three-phase power, while 26-volt single-phase power is supplied through a transformer. The following equipment requires regulated alternating current for its control or operation: autopilot; directional damper; nacelle air close-off doors (engines, 2, 3, 4, and 5 only); cabin heating and pressurizing control; empennage anti-icing; gyrosyn compass; flight gyros; fuel quantity, fuel and oil pressure indicating systems; and radar equipment. Some airplanes also have an additional 115-volt three-phase inverter to supply 400-cycle regulated alternating current for some radar equipment.

1-44. UNREGULATED ALTERNATING CURRENT SYSTEM. Unregulated 115-volt alternating current is supplied by one of two engine-driven alternators. The main alternator is driven by the No. 1 engine and the spare alternator is driven by the No. 6 engine. Unregulated alternating current is used for wind-shield deicing and some radar equipment.

1-45. CONTROLS.

1-46. BATTERY SWITCH. The "ON--OFF" battery switch (12, figure 1-11) is located on the pilot's switch panel. The "ON" position of the switch energizes a battery-disconnect relay which connects the batteries to the DC power bus. The "OFF" position causes the relay to be de-energized thus disconnecting the batteries from the power bus.

1-47. GENERATOR SWITCHES. Six individual

generator switches (17, figure 1-18) are on the copilot's instrument panel. The switches are marked "ON--OFF--RESET" and are guarded to the "ON" position. When a switch is in the "ON" position, the generator is delivering power to the direct current bus, provided that the generator voltage is sufficiently high. In the "OFF" position, the switch prevents the reverse current relay from connecting the generator to the bus as a generator. The "RESET" position of the switch is used to reset the field relay to restore generator operation after the field relay has been tripped by generator overvoltage or fire button actuation. When in the "RESET" position, the switch is spring-loaded to "OFF."

1-48. GENERATOR VOLTAGE RHEOSTATS. Six generator voltage rheostats are behind a hinged cover guard (18, figure 1-18), below the generator switches, on the copilot's instrument panel. The rheostats are to be used only for adjusting generator voltages to equalize generator load distribution.

1-49. INVERTER SWITCHES. Two switches (20, figure 1-18) on the copilot's instrument panel control the main, secondary, and spare inverters. The switch for the main regulated AC bus is marked "MAIN INVERTER--OFF--SPARE INVERTER." With the switch in the "MAIN INVERTER" position, the main inverter is energized through an automatic change-over relay to supply alternating current to the main AC bus. If the main inverter should fail to supply power to the main AC bus when the switch is in this position, the automatic change-over relay will start the spare inverter and connect it to the main bus. Also, the spare inverter output will be transferred to the main bus if the spare inverter is being used to supply power to the secondary bus. When the switch is in the "OFF" position, the main inverter, or the spare inverter if operating for the main bus, will be de-energized and disconnected from the main bus. The "SPARE INVERTER" position provides a manual control of the spare inverter for main bus operation in the event that the automatic change-over relay fails to operate. The switch for the secondary bus is marked "SECONDARY INVERTER--OFF--SPARE INVERTER." With the switch in the "SECONDARY INVERTER" position, the secondary inverter is energized through another automatic change-over relay to supply alternating current to the secondary AC bus. If the secondary inverter should fail to supply power to the secondary bus when the switch is in this position, and the spare inverter is not being used to supply power to the main AC bus, the automatic change-over relay will start the spare inverter and connect it to the secondary bus. When the switch is in the "OFF" position, the secondary inverter, or the spare inverter, if operating for the secondary bus, will be de-energized and disconnected from the secondary bus. The "SPARE INVERTER" position provides a manual control of the spare inverter for secondary bus operation, in the event that the automatic change-over relay fails to operate and the spare inverter is not being used for main bus operation.

1-50. On airplanes using an additional 115-volt 400-cycle three-phase inverter, the "ON--OFF" control

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switch for the K-2 radar power system is located on the bomb primary control assembly support panel at the navigator's station. When the switch is in the "ON" position, an inverter control relay is energized to supply DC power to operate the inverter to supply regulated AC power. When the switch is in the "OFF" position, the control relay is de-energized causing the inverter to be off.

1-51. Control circuit breakers for the single-phase inverter system are on the copilot's circuit breaker panel (3, figure 1-24) and switch-type circuit breakers for the main and secondary inverters are on the copilot's interphone control panel (5, figure 1-24). The control circuit breaker for the three-phase inverter is on the radar power panel (6, figure 1-24).

1-52. UNREGULATED AC POWER SWITCH. A single rotary type switch (3, figure 1-19) on the AC circuit breaker panel is used to select the 115-volt unregulated alternating current power source. The switch positions are marked "SPARE--MAIN--EXT POWER." When the switch is in the "SPARE" position, the output of the No. 6 engine-driven alternator is connected to the unregulated AC power bus. In the "MAIN" position, the output of the No. 1 engine-driven alternator is connected to the unregulated AC power bus. When the switch is in the "EXT POWER" position, the AC external power receptacle is connected to the unregulated AC power bus if an external source of AC power is plugged into the receptacle. Unregulated power system circuit breakers are on the copilot's circuit breaker panel (3, figure 1-24).

1-53. DC VOLTMETER SELECTOR SWITCH. A rotary type switch (14, figure 1-18) on the copilot's instrument panel provides a means of obtaining individual generator and direct current bus voltage readings on a single voltmeter. The switch is marked "OFF--1--2--3--4--5--6--BUS." In the "OFF" position the switch disconnects the voltmeter from any power source. In the "1" through "6" positions, the switch connects the voltmeter to the corresponding generator to indicate individual generator voltage. When the selector switch is in the "BUS" position, the voltmeter is connected to the DC power bus system.

1-54. AC VOLTMETER SELECTOR SWITCH. A toggle switch (21, figure 1-18) on the copilot's instrument panel, with positions marked "MAIN BUS--SECONDARY BUS," connects the regulated AC voltmeter to the bus corresponding to the toggle position. The regulated AC voltmeter circuit breakers are on the AC circuit breaker panel (2, figure 1-24).

1-55. EXTERNAL POWER RECEPTACLES. Two direct current and one unregulated alternating current external power receptacles (9, figure 1-4) are located in the lower left side of the fuselage just aft of the forward main wheel well. A hinged access door is provided to cover the receptacles.

1-56. CIRCUIT BREAKERS AND FUSES. Push-pull, push-to-reset, and switch-type circuit breakers, as well as fuses protect the individual circuits from overload. These circuit breakers and fuses are

located on the main AC power shield, AC circuit breaker panel, copilot's circuit breaker panel, unregulated AC power shield, copilot's interphone control panel, and the radar power panel (1, 2, 3, 4, 5, 6, figure 1-24).

1-57. INDICATORS.

1-58. GENERATOR OVERVOLTAGE LIGHTS. Six generator overvoltage lights (16, figure 1-18) on the copilot's instrument panel indicate, when on, that a generator field relay has been tripped because of high generator voltage or the fire button has been actuated with the corresponding throttle lever at cutoff. To reset the field relay, the individual generator switch must be momentarily actuated to the "RESET" position.

1-59. DC VOLTMETER. A single direct current voltmeter is used to indicate individual generator or bus voltage. The voltmeter (13, figure 1-18) is located on the copilot's instrument panel and is connected to the individual generator or the bus through a rotary type selector switch.

1-60. DC LOADMETERS. Six direct current loadmeters (15, figure 1-18) are on the copilot's instrument panel and are used to indicate individual generator load. The loadmeters are calibrated in per cent of rated generator load.

1-61. INVERTER INDICATOR LIGHTS. Two lights are used to indicate regulated AC power main bus conditions. An amber light will be on when the spare inverter is ready to supply power to the main bus. A red light will be on when the main and spare inverters fail to supply power to the main bus or when the inverter switch for the main bus is in the "OFF" position. An additional amber light is used for the regulated AC power secondary bus to indicate, when on, that the spare inverter is on to supply power to the secondary bus. The inverter indicator lights (19, figure 1-18) are on the copilot's instrument panel.

1-62. REGULATED AC VOLTMETER. A single alternating current voltmeter (22, figure 1-18) on the copilot's instrument panel indicates main or secondary regulated AC bus voltage. The voltmeter is connected to the main or secondary bus by means of a toggle-type selector switch. Regulated AC voltmeter circuit breakers are located on the AC circuit breaker panel (2, figure 1-25).

1-63. UNREGULATED AC POWER OFF LIGHT. A red light (2, figure 1-19), on the AC circuit breaker panel will be on whenever there is no unregulated AC power being supplied to the unregulated AC power bus by either the engine-driven alternators or an external power source. The unregulated AC power warning light circuit breaker is located on the copilot's circuit breaker panel (3, figure 1-24).

1-64. UNREGULATED AC VOLTMETER. One AC voltmeter (1, figure 1-19) on the AC circuit breaker panel indicates unregulated AC power bus voltage. The voltmeter circuit breaker is on the unregulated AC power shield (4, figure 1-24).

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1-65. HYDRAULIC SYSTEM.

1-66. GENERAL.

1-66A. There are two major hydraulic systems and three minor hydraulic systems. The two major systems, main and emergency, supply pressure to operate the front gear steering, brakes, canopy, and bomb doors (figure 1-25). Shuttle valves interconnect the two major systems and allow the system with the highest pressure to supply the actuating units. The minor systems operate the surface power controls.

1-67. MAIN SYSTEM. The main system incorporates a 4 1/2 U.S. gallon reservoir in a 9 U.S. gallon system. The reservoir supplies engine-driven pumps on engines No. 3 and No. 4. A fire shutoff valve in each pump supply line is closed when the throttle for the corresponding engine is placed in "CUTOFF" and a fire button (11, figure 1-8) on the pilot's instrument panel is pushed. Moving the throttle out of "CUTOFF" opens the shutoff valve. The two engine-driven pumps are set to maintain 3000 PSI, and a check valve in each pump pressure line prevents loss of pressure in the event one pump becomes inoperative. When the main landing gear retracts, it actuates an automatic by-pass valve which depressurizes the front gear steering system, and makes possible the depressurization of the entire main system. The system is depressurized by operating the main system charging valve. Extension of the landing gear closes the automatic by-pass valve and pressurizes the main system.

1-68. EMERGENCY SYSTEM. The emergency system provides pressure to operate the front gear steering, brakes, canopy, and bomb doors independent of the main system pumps and lines. A 1 3/4 U.S. gallon reservoir supplies an electrically driven pump which provides 3000 PSI to operate the emergency system. During emergency operation, return flow is automatically directed to the emergency reservoir. Shuttle valves automatically direct emergency system pressure to the actuating units whenever emergency system pressure is greater than main system pressure. Depressurizing the main system does not affect pressures in the emergency system.

1-69. CONTROLS.

1-70. HYD. TANK PRESSURIZING SWITCH. A circuit-breaker type "ON--OFF" switch (2, figure 1-20) is on the copilot's hydraulic control panel. When the switch is "ON," an electrically driven air pump is energized to pressurize the main and emergency system reservoirs. Pressurizing the reservoirs prevents foaming of the hydraulic fluid. When the switch is "OFF," the reservoirs are not pressurized.

1-71. MAIN SYSTEM CHARGING VALVE SWITCH. This switch (3, figure 1-20) is on the copilot's hydraulic control panel. When the landing gear is

retracted, an automatic by-pass valve (figure 1-25) is opened, permitting the main system to be depressurized by placing the charging valve switch in the "DEPRESSURIZE" position. Main system pressure is built up by placing the switch in the "PRESSURIZE" position. The switch controls a system charging valve (figure 1-25) in the main system pressure lines. Extension of the landing gear closes the automatic by-pass valve and builds up system pressure automatically, even though the charging valve switch may be in the "DEPRESSURIZE" position. A circuit breaker for this switch is on the copilot's circuit breaker panel (3, figure 1-24). A similar switch (13, figure 4-8) is on the bombardier's panel.

1-72. EMERGENCY HYDRAULIC PUMP SWITCH.

The emergency system pump is controlled by a guarded "AUTO--OFF--ON" switch (7, figure 1-20) on the copilot's hydraulic control panel. When the switch is in the "AUTO" position, the electrically operated pump (figure 1-25) maintains emergency system pressure between 2700 and 3000 PSI. When the switch is held in the spring-loaded "ON" position, a pressure switch is by-passed and pressures up to the maximum are built up. When the switch is in the "OFF" position, no emergency system pressure will be built up. A circuit breaker for the switch, marked standby control, is on the copilot's circuit breaker panel (3, figure 1-24).

1-73. INDICATORS.

1-74. MAIN SYSTEM PRESSURE INDICATOR. The main system pressure indicator (1, figure 1-20), on the copilot's hydraulic control panel, is connected directly to the main system lines (figure 1-25), and indicates pressure available to the actuating units.

1-75. EMERGENCY SYSTEM PRESSURE INDICATOR. A pressure indicator (4, figure 1-20) on the copilot's hydraulic control panel is connected directly to the air side of the emergency system accumulator (figure 1-25). Emergency system pressure is not available to the shuttle valves until the indication is greater than the minimum value.

1-76. HYDRAULIC FLUID LEVEL INDICATOR.

Fluid level in the main system hydraulic reservoir is indicated on an instrument on the copilot's side wall panel (9, figure 1-20). A circuit breaker for the hydraulic fluid level indicator is on the copilot's circuit breaker panel (3, figure 1-24). A sight gage is provided on the hydraulic tank in the forward wheel well.

1-77. WARNING LIGHTS. Four warning lights are on the copilot's hydraulic control panel (5, figure 1-20). Three of the lights are connected to pressure switches (figure 1-25) in the outlet lines from the main system pumps and the emergency system pump. When pressure from a main pump falls below 2200 PSI, a light is illuminated. The fourth light is illuminated when the emergency pump is operating. 048079A

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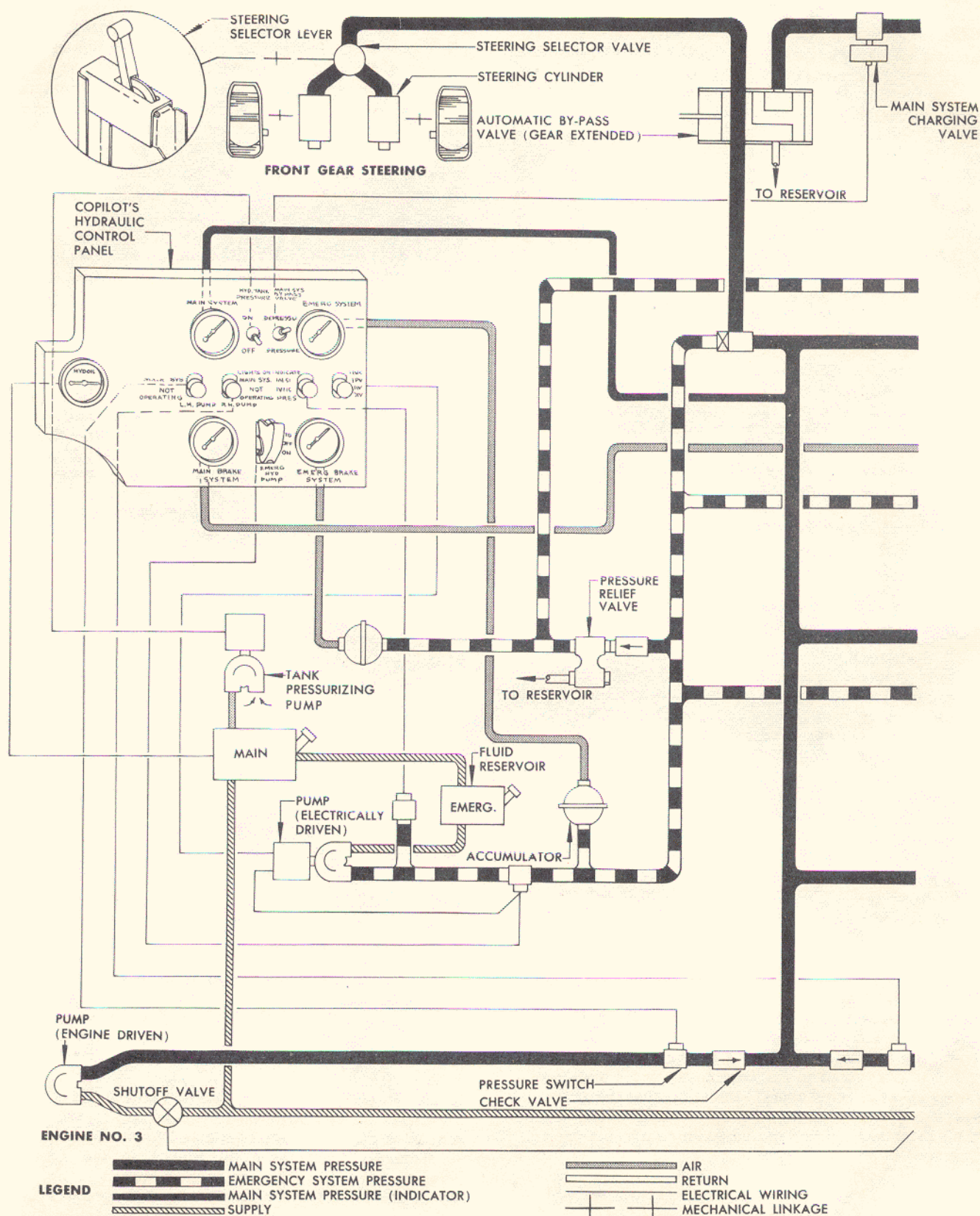


Figure 1-25. (Sheet 1 of 2 Sheets). Hydraulic System

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1-78. FLIGHT CONTROL SYSTEM.

1-79. GENERAL.

1-79A. In this airplane hydraulic pressure is employed as the primary means of actuating the control surfaces, and since hydraulic actuation of the control surfaces relieves the pilot of all control pressures, artificial control pressure, or feel, is induced in the power control system to simulate normal control feel. A conventional cable system operates the power control system and also provides a means of manually operating the control surfaces if the power control system becomes inoperative. Sealed balances at the rudder, elevator, and aileron surfaces reduce the control forces required of the pilot when the surface power control system is not operating. Conventionally operated trim control is coordinated with surface power control in such a manner as to reduce adjustments when changing from surface power control on or off. Two trim tabs are provided for elevator trim. The left tab is actuated by the wing flaps to give automatic trimming to compensate for flap pitching moments. The right tab is operated by the pilot or copilot. An electrically operated directional damper has been incorporated in the rudder surface power control system to prevent directional oscillation during air speeds of less than approximately 347 knots IAS.

1-80. SURFACE POWER CONTROL SYSTEMS.

Three surface power control systems supply hydraulic pressure to operate the rudder, elevators, and each aileron. The aileron power control systems also operate the flaperon. The power control systems are entirely independent of the main and emergency hydraulic systems; each power control system has separate fluid reservoirs, electrically driven pumps, surface actuators, and controls. A single system for rudder and elevator power control is in the empennage; each aileron and flaperon power control system is in its respective wing. The surface power control systems are operated by the pilot's and copilot's flight controls, and switches at the pilot's station. When the control surfaces are locked, the power control systems are automatically de-energized.

1-80A. DIRECTIONAL DAMPER. A directional damper system is provided which is essentially an autopilot acting on the rudder to counteract any yawing or rolling tendencies that might be encountered at high altitudes or low air speeds. When the system is turned on in level flight, no rudder actuation will occur. In a turn, the damper system is cut out to allow coordinated turns to be made.

1-81. WING FLAPS. The wing flaps are designed to provide high lift and low drag, and to operate with a minimum of pilot attention. The flaps are actuated in such a way as to give a fast extension, approximately 20 seconds, and a slow retraction, approximately 40 seconds (figure 1-25A). The slow retraction allows the airplane time to accelerate before the flaps reach the up position. If the flaps retract to the 20% down position before 175 knots IAS is reached, a ram-air pressure switch will prevent further retraction until

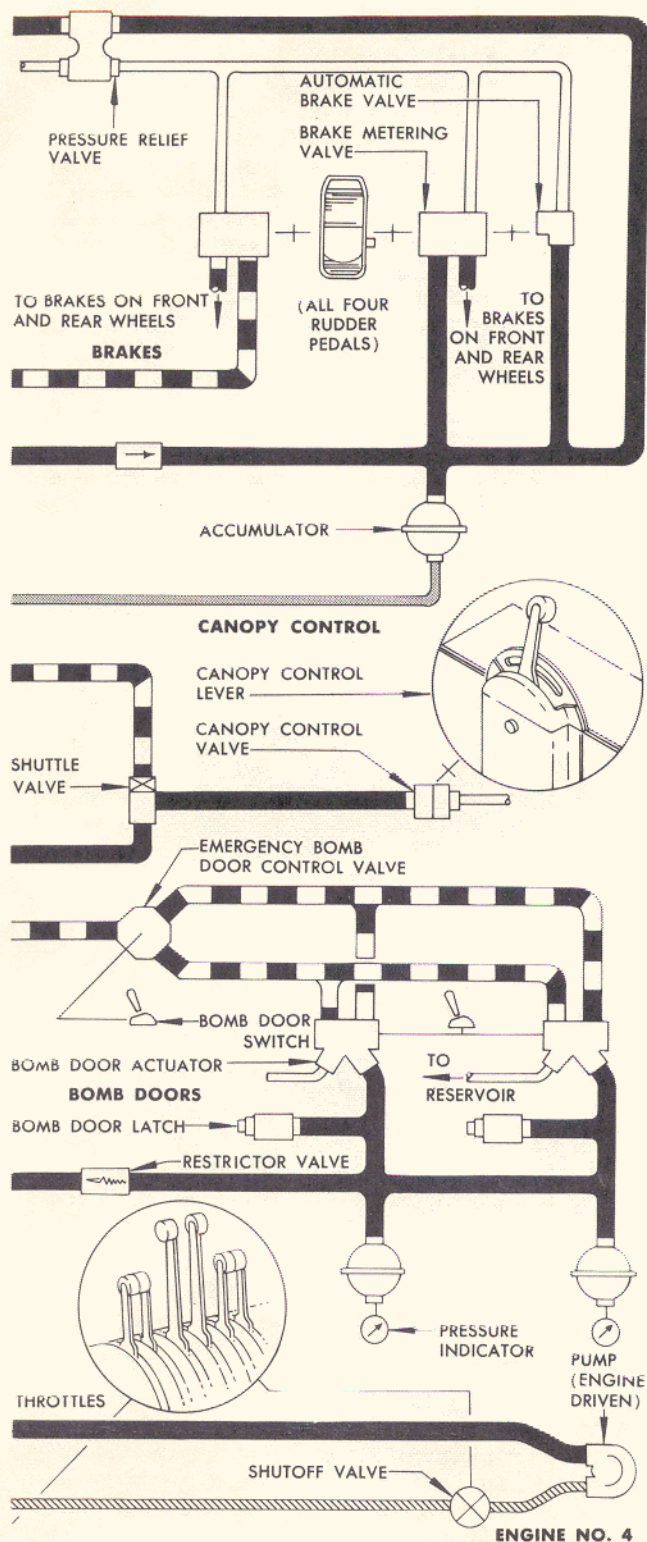


Figure 1-25 (Sheet 2 of 2 Sheets). Hydraulic System

the required air speed is obtained; this prevents the airplane from sinking due to insufficient lift. The wing flaps also operate the left elevator trim tab.

1-82. SLATS. The slats, along the outer leading edge of the wing, provide a smooth air flow over the wing at low air speeds to give good stalling characteristics. The wing slats are operated automatically by the first 25% of wing flap movement. They extend and retract with the flaps. A warning horn will sound if the flaps and slats are retracted during low air speeds.

1-83. FLAPERONS. The outboard flap on each wing operates as a conventional flap with the additional feature of rotating upwards to supplement aileron action. The flaps must be fully extended to obtain flaperon action. Rotating an aileron upward from 6° up to maximum up will result in the corresponding flaperon moving upward from 35° down to 10° down. The left flaperon is hydraulically actuated by the surface power control system that operates the left aileron; the same is true of the right flaperon and aileron. Failure of an aileron power control system results in the corresponding flaperon fully extending to operate only as a conventional flap.

1-84. CONTROLS.

1-85. SURFACE POWER CONTROL SWITCHES. Hydraulic pressure to operate the flight control surfaces is selected for the left aileron (and flaperon), right aileron (and flaperon), rudder, and elevator by three "ON--off" switches (9, figure 1-13) on the surface power control panel at the pilot's station. A circuit breaker, marked surface boost, is on the copilot's circuit breaker panel (3, figure 1-24). Placing a surface power control switch to "ON" energizes the selected power control system, when placed in off, the power control system is de-energized and the surfaces are actuated manually.

1-86. DIRECTIONAL DAMPER SWITCH. A directional damper "ON--OFF" switch (5, figure 1-8) is on the pilot's instrument panel. A directional damper circuit breaker is on the copilot's circuit breaker panel (3, figure 1-24). Placing the switch in the "ON" position energizes the damper mechanism without any noticeable effect other than the more desirable flying characteristics. When the switch is in the "OFF" position, the directional damper is inoperative.

1-87. RUDDER PEDALS. The rudder pedals can be adjusted by pull knobs on the pilot's and copilot's control stands (16, figure 1-6 and 19, figure 1-15). When the knob is pulled up, the pedals spring to the aft position. When the pedals are moved to the desired position, and the knob is released, the pedals are latched in position. Movement of the pedals operates the front gear steering, and toe pressure on any one of the four pedals will actuate the brakes.

1-88. CONTROL COLUMN AND WHEEL. Pilot and copilot control columns can be disconnected and stowed in the forward position. Operation of a latch lever (8, figure 1-13 and 23, figure 1-15) on the control column push-rods disengages the control

columns. Adjustment collars on the push-rods permits fore and aft adjustment of the control columns. Microphone and autopilot cutout switches are on the control wheels.

1-89. WING FLAP LEVERS. The wing flaps are normally controlled by levers (9, figure 1-6 and 12, figure 1-15) on the pilot's and copilot's control stands. The handle on each lever is in the shape of a miniature airfoil to facilitate easy recognition. The pilot's wing flap lever has notched "UP--OFF--DOWN" positions. The copilot's lever has similar positions but is not notched. Both wing flap levers are interconnected and controllable from either station. When the lever is in "UP," the flaps retract in approximately 40 seconds; when in "DOWN," the flaps extend in approximately 20 seconds. The flaps are held in any intermediate position by placing the lever in "OFF."

1-90. GROUND OPERATION FLAP SWITCH. Some airplanes have a ground operation flap switch on the copilot's circuit breaker panel (3, figure 1-24). The switch has "off--UP" positions and is guarded in off. Operation of the switch to "UP," retracts the flaps at twice the normal speed. This switch will operate the flaps regardless of normal wing flap lever position.

1-91. WING FLAP EMERGENCY SWITCHES. Two guarded "DOWN--OFF--UP" switches (1, figure 1-15) on the copilot's instrument panel, control the wing flap primary and secondary motors for emergency operation. These switches by-pass all limit, safety, ground operation, and control lever switches. When either switch is placed in "DOWN," both motors operate, and extend the flaps in approximately 20 seconds. When emergency retraction is desired, either the primary or secondary motor is selected by moving the corresponding switch to "UP." Placing one switch to "UP," retracts the flaps in approximately 40 seconds; placing both switches to "UP," retracts the flaps in approximately 20 seconds.

1-92. WING SLAT WARNING HORN SWITCH. A wing slat warning switch (10, figure 1-11) is on the pilot's switch panel. When the switch is in "NORMAL," a warning horn will sound if the flaps and slats are not extended below 175 knots IAS. The horn is prevented from sounding by placing the switch in "OFF."

1-93. TRIM CONTROL KNOBS AND INDICATORS. Conventional trim control knobs and indicators are on the pilot's and copilot's control stands (8, 11, 17, figure 1-6 and 11, 14, 21, figure 1-15).

1-94. SURFACE LOCK LEVER. A surface lock lever (6, figure 1-6) with "LOCK--UNLOCK" positions is on the pilot's control stand. The surfaces are locked by placing the lever in "LOCK" and operating the ailerons, elevators, and rudder until lock plungers seat and surface controls cannot be moved. Rudder and ailerons are locked in neutral, and elevators are locked in full down. The surface lock lever prevents throttles from being opened beyond 52% RPM when surfaces are locked. Surfaces cannot be locked if any throttle is open beyond 52% RPM. When the lock lever is in "LOCK," the surface power control

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WARNING

WITH EITHER MOTOR RUNNING, OUTPUT SHAFT RUNS AT HALF SPEED OF MOTOR; FLAPS RETRACT IN 40 SECONDS. WITH BOTH MOTORS RUNNING, OUTPUT SHAFT RUNS AT SAME SPEED AS MOTORS; FLAPS RETRACT IN 20 SECONDS. ONLY ONE MOTOR SHOULD BE USED FOR RETRACTION.

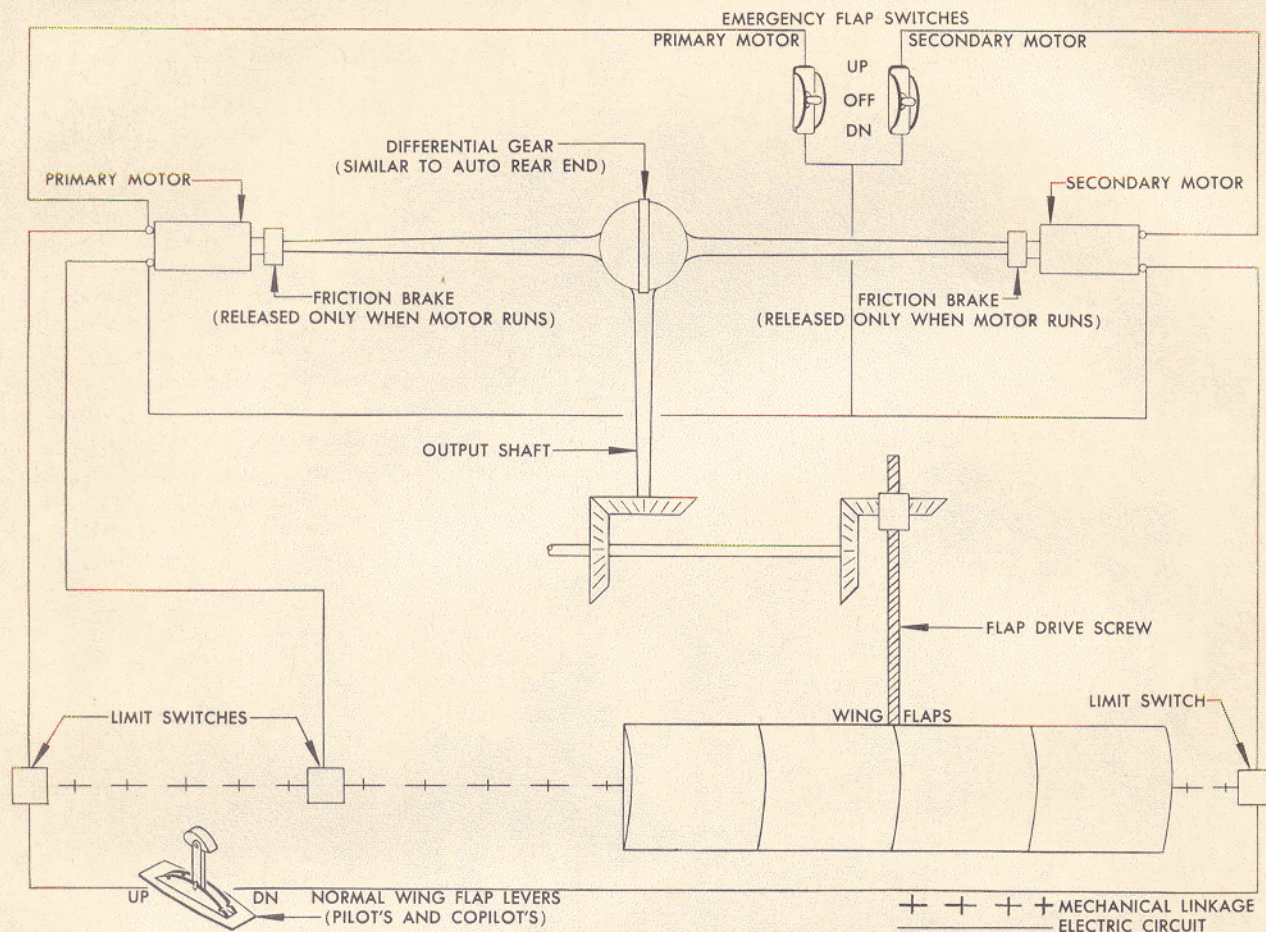


Figure 1-25A. Wing Flap Control System

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systems are inoperative. When the lever is in "UNLOCK," all flight controls and throttles are unlocked, and the surface power control systems can be energized.

1-95. INDICATORS.

1-96. SURFACE POWER CONTROL WARNING LIGHTS. When hydraulic pressure in a surface power control system falls below 350 PSI, the system is automatically disconnected from the control surface, a low pressure warning light (7, figure 1-13) on the surface power control panel is lighted, and the control surface affected is then manually operated by the conventional cable system. Warning lights are provided for each of the three surface power control systems.

CAUTION

Considerable out of trim forces can occur when surface power control goes off.

1-97. WING FLAP POSITION INDICATOR. A wing

flap position indicator (19, figure 1-8), on the pilot's instrument panel, registers flap position in per cent of travel.

1-98. AUTOMATIC PILOT.

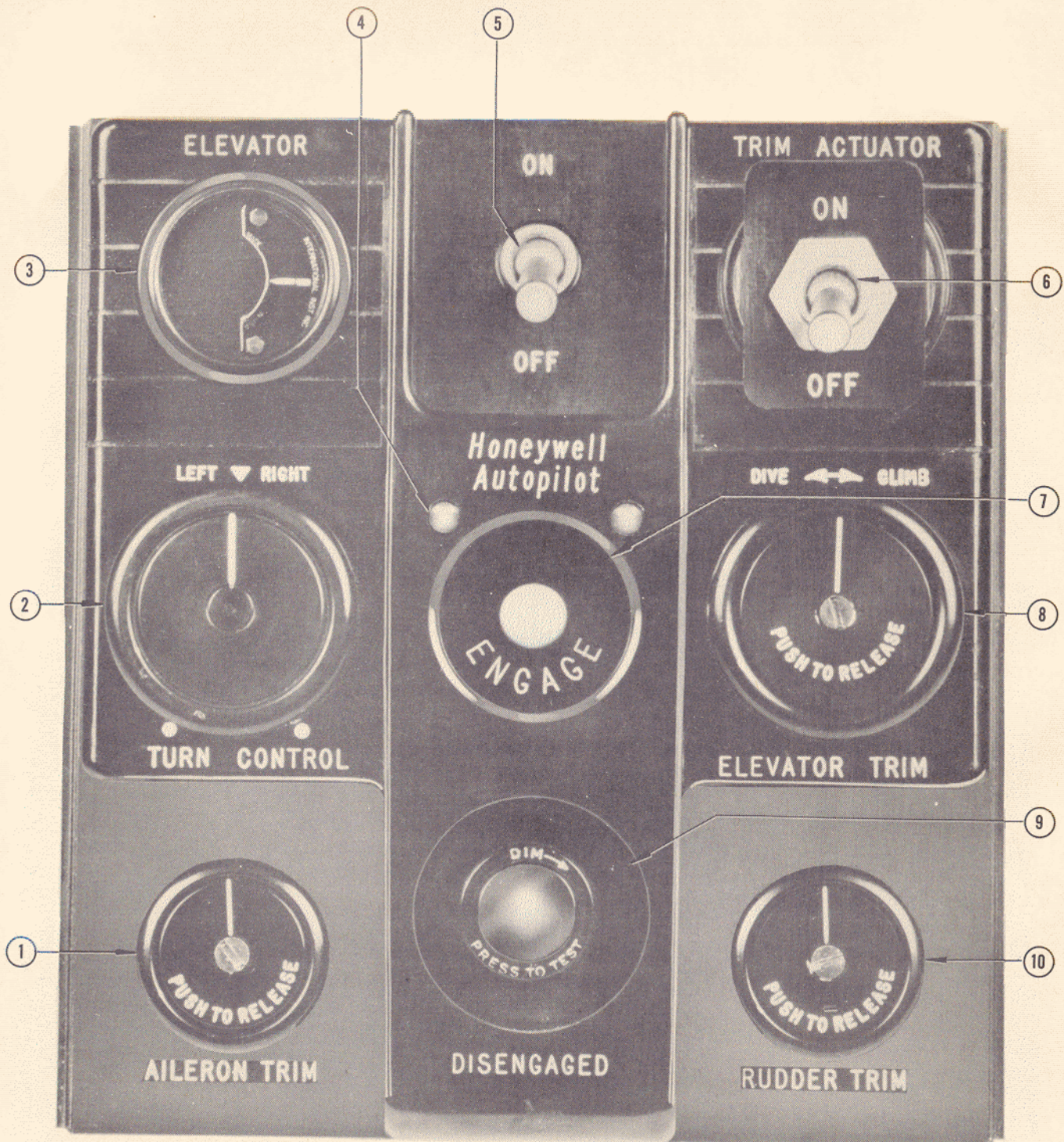
1-99. GENERAL.

1-100. A type MH-7 automatic pilot is provided. Automatic pilot servo motors are connected to the flight control system cables, and operate the control surfaces with surface power control on or off. The autopilot is electrically operated, requiring both direct and alternating current. Circuit breakers are on the copilot's circuit breaker panel (3, figure 1-24) and the AC circuit breaker panel (2, figure 1-24). Normal control of the automatic pilot is accomplished from a control panel (figure 1-25B) on the pilot's instrument panel.

1-101. CONTROLS.

1-102. AUTOPILOT MASTER SWITCH. This switch,

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LEGEND

- | | |
|----------------------------|-------------------------|
| 1. AILERON TRIM KNOB | 6. TRIM ACTUATOR SWITCH |
| 2. TURN CONTROL KNOB | 7. ENGAGE SWITCH |
| 3. TRIM INDICATOR | 8. ELEVATOR TRIM KNOB |
| 4. ENGAGE LIGHTS | 9. DISENGAGED LIGHT |
| 5. AUTOPILOT MASTER SWITCH | 10. RUDDER TRIM KNOB |

Figure 1-25B. Autopilot Control Panel

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(5, figure 1-25B) when placed in the "ON" position, applies power to the autopilot control circuits and units. When "OFF," the autopilot is turned off and disengaged.

1-103. ENGAGE SWITCH. A push-button type switch (7, figure 1-25B) is provided to engage the autopilot after the tubes and equipment have reached their normal operating temperatures and after the equipment has trimmed itself to the flight position of the airplane.

1-104. ELEVATOR, RUDDER, AND AILERON TRIM KNOBS. After the autopilot is turned on and before the engage switch is pushed, these knobs (1, 8, 10, figure 1-25B) automatically trim the autopilot to the flight position of the airplane. After the autopilot is engaged, these knobs are used as required to trim the autopilot manually. The knobs can be pushed to release the autopilot servo motors when it is desired to trim the airplane with normal trim tab controls.

1-105. TRIM ACTUATOR SWITCH. This "ON--OFF" switch (6, figure 1-25B) when placed in "ON" automatically keeps the airplane in trim to compensate for CG shifts, and prevents elevator movement as the autopilot is turned off. When the switch is "OFF," no compensating trim is provided.

1-106. AUTOPILOT RELEASE SWITCH. The pilot and copilot each have an autopilot release switch on their control wheels. The switches are provided to release all autopilot servo motors simultaneously.

1-107. TURN CONTROL KNOB. This knob (2, figure 1-25B) can be turned "RIGHT" or "LEFT" for directional control of the airplane.

1-107A. TURN CONTROL SWITCH. A "BOMBARDIER-PILOT" turn control switch on the pilot's instrument panel, when placed in the "BOMBARDIER" position, transfers directional control of the airplane to the navigator-bombardier's station. When the switch is in the "PILOT" position, the airplane is controlled from the pilot's autopilot control panel.

1-107B. BOMBARDIER'S CONTROLLER. A bombardier's controller on the navigator's table enables the navigator to fly the airplane through coordinated turns. The turn control switch on the pilot's instrument panel must be in the "BOMBARDIER" position.

1-107C. When an "AUTOMATIC-MANUAL" switch on the bombardier's controller is in the "AUTOMATIC" position, turns are made through operation of the bombing equipment; if a turn control knob on the top of the bombardier's controller is moved out of detent, this switch will move to the "MANUAL" position. When the switch is in the "MANUAL" position, turns are made through operation of the turn control knob.

1-108. INDICATORS.

1-109. TRIM INDICATOR. When the trim actuator switch is "OFF" and the autopilot servo motors are

holding the elevators in a position out of trim, this condition will be indicated on the trim indicator (3, figure 1-25B). When the elevators are trimmed, the indicator will be zeroed.

1-110. ENGAGE LIGHTS. Two lights (4, figure 1-25B) adjacent to the engage switch, will glow when the autopilot is warmed up and ready to be engaged. The autopilot cannot be engaged until these lights are illuminated.

1-110A. DISENGAGED LIGHT. A disengaged light (9, figure 1-25B) below the engage switch is illuminated whenever the entire autopilot is disengaged. If any servo motor reaches its full travel, a limit switch will be actuated and the entire autopilot will become disengaged.

1-111. LANDING GEAR SYSTEM.

1-112. GENERAL.

1-113. On this airplane a fast acting, electrically operated landing gear is provided. This gear will retract in 11 seconds and extend in 4 seconds. Bicycle-type front and rear main landing gears are mounted on the fuselage center line and retract forward and upward into the fuselage. Lateral supporting outrigger gears are mounted under, and retract forward into, the inboard nacelles. Steering control of the front main landing gear is hydraulically accomplished by actuation of the rudder pedals. The outrigger gears are free casting up to 28 degrees inboard and 93 degrees outboard. Full swiveling of the outrigger gears for ground handling is accomplished by removing the torsion link quick disconnect pins on each outrigger gear. Two electric motors are provided for each gear. Both motors are energized for normal retraction and one for normal extension. The same motors are energized for emergency retraction through a hot wire electrical system which by-passes all safety and limit switches. Emergency extension of the landing gear is accomplished by a manually operated cable system which unlocks the gear and allows it to free fall.

1-114. CONTROLS.

1-115. LANDING GEAR CONTROL LEVERS. Interconnected "UP--OFF--DN" landing gear control levers are on the pilot's and copilot's control stands. Each control position of the pilot's lever (14, figure 1-6) is fixed by detents. The copilot's lever (18, figure 1-15) is mechanically connected with the pilot's lever. When the levers are in the "UP" position, the landing gear will retract and the brakes will be automatically applied providing the front main gear is centered and all wheels are off the ground; when in the "DN" position, the landing gear will extend; and when in the "OFF" position, the landing gear normal actuation circuits are de-energized. Landing gear control circuit breakers are on the copilot's circuit breaker panel (3, figure 1-24).

1-116. LANDING GEAR EMERGENCY RETRACTION SWITCHES. The pilot can accomplish emergency

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retraction of all landing gears simultaneously by lifting a single guarded switch (13, figure 1-6) on the pilot's control stand. Individual emergency retraction of any main or outrigger gear can be accomplished by holding one of four guarded switches (4, figure 1-15) on the copilot's control stand to its spring-loaded "GEAR UP" position. All landing gear emergency retraction switches will override the oleo safety switches to cause retraction of the landing gear either on the ground or in flight. Emergency landing gear retraction control circuit breakers are on the copilot's circuit breaker panel (3, figure 1-24).

1-117. LANDING GEAR EMERGENCY EXTENSION LEVER AND SELECTOR LEVERS. Emergency extension of all landing gears is largely accomplished by means of gravity forces and air drag. Unlocking of each gear in the retracted position is done by a manually operated cable system. A landing gear emergency extension lever (5, figure 1-16) and four selector levers (6, figure 1-16) are located aft and to the left of the copilot's seat. Emergency extension of each gear is accomplished by moving the corresponding selector lever to "ENGAGE" and moving the emergency extension lever fore and aft to unlock the gear. If air drag fails to lock the gear in the down position, it is possible to crank the emergency extension lever until the gear locks. Each selector lever must be returned to the "DISENGAGE" position before another selector lever is moved to "ENGAGE."

1-118. LANDING GEAR GROUND LOCKS. Accidental collapse of the forward and rear main landing gears is prevented by the insertion of shear pin type ground locks in a hole in the lower end of each main landing gear retracting screw mechanism. Accidental collapse of the outrigger gears is prevented by a strut type ground lock between a lug on the forward side of each outrigger gear strut assembly and a boss on each outrigger gear trunnion support.

1-119. INDICATORS.

1-120. LANDING GEAR INDICATING AND WARNING LIGHTS. Four green down and locked landing gear indicating lights and one red not locked landing gear warning light (15, figure 1-8) are on the pilot's instrument panel. A similar set of lights (4, figure 1-16) are provided near the landing gear emergency extension levers at the copilot's gunnery station. Four amber up and locked landing gear indicating lights and one red not locked landing gear warning light (3, figure 1-15) are on the copilot's control stand. A landing gear warning light and horn circuit breaker is on the copilot's circuit breaker panel (3, figure 1-24).

1-121. LANDING GEAR WARNING HORN. If any one of the landing gears is not down and locked when an individual throttle is retarded below minimum cruising power, a landing gear warning horn will sound. A mechanical horn release lever (20, figure 1-6) will silence the horn.

1-122. FRONT GEAR STEERING SYSTEM.

1-123. GENERAL.

1-124. The front landing gear is steerable through a hydraulic control system operated by the rudder pedals. Hydraulic pressure is supplied by the main or emergency hydraulic systems. When the landing gear is retracted, the steering control system is disconnected, hydraulic pressure is shut off, and no steering motion is transmitted to the front gear. Centering springs center the gear during retraction. Extension of the landing gear automatically aligns the front gear with the rudder pedals after it has cleared the wheel well. The hydraulic steering units also provide for shimmy dampening.

1-125. CONTROLS.

1-126. STEERING RATIO SELECTOR LEVER. The front gear steering ratio selector lever (1, figure 1-6) on the pilot's control stand, when placed in the "TOW" position, actuates a hydraulic disconnect valve. The valve mechanically disconnects the rudder pedals from the front gear steering system. When the selector is in the "TAXI--TAKEOFF, LAND" positions, the rudder pedals are connected to the steering system in ratios best suited for these operations. "TAXI" allows a maximum wheel deflection of 60° right or left, a total of 120°, which will permit turning the airplane within a 180-foot diameter walled-in area. "TAKEOFF, LAND" position allows a maximum wheel deflection of 6° right or left, a total of 12°.

1-127. BRAKE SYSTEM.

1-128. GENERAL.

1-129. Hydraulic pressure to operate the brakes is provided by the main and emergency hydraulic systems. Brakes are on the front and rear main landing gear. Toe pressure on any one of the four rudder pedals will actuate the brakes. Should the main hydraulic system fail, emergency brakes are applied by depressing the rudder pedals farther than is normally necessary. Brakes are applied automatically when the landing gear is retracted. An anti-skid system on each wheel is available to relieve brake pressure when a skid is detected, thus forestalling tire skidding and allowing application of maximum braking.

1-130. CONTROLS.

1-131. BRAKE LOCK KNOB. Parking brakes are set by depressing the rudder pedals and pulling out a brake lock knob (38, figure 1-8) on the pilot's instrument panel.

1-132. ANTI-SKID SWITCH. An anti-skid "ON--OFF" switch (3, figure 1-11) on the pilot's switch panel controls the anti-skid system on both main landing gear wheels. Anti-skid is effective in only the main brake system. Emergency brake pressure by-passes the anti-skid valves.

1-133. INDICATORS.

1-134. MAIN BRAKE SYSTEM PRESSURE INDICATOR. A pressure indicator (8, figure 1-20) on the copilot's hydraulic control panel is connected directly to the air side of the main system brake accumulator (figure 1-25). Main system brake pressure is not available to the brakes until the indication is greater than the minimum value.

1-135. EMERGENCY BRAKE SYSTEM PRESSURE INDICATOR. A pressure indicator (6, figure 1-20) on the copilot's hydraulic control panel is connected directly to the air side of the emergency brake accumulator (figure 1-25). Emergency brake pressure is not available to the emergency brake metering valve until the indication is greater than the minimum value.

1-136. CANOPY CONTROL SYSTEM.

1-137. GENERAL.

1-138. Hydraulic pressure is supplied from the main or emergency hydraulic system to normally open or close the canopy. In an emergency, the canopy may be jettisoned pneumatically. A lock assembly, used for positively holding the canopy in the open position during ground operation, is stowed on the walkway floor at the copilot's station.

1-139. CONTROLS.

1-140. CANOPY CONTROL LEVER. A canopy control lever (6, figure 1-13) on the right side of the pilot's station has "CLOSE--OFF--OPEN" positions. The lever is left in "OFF" except when the canopy is closed and latched hydraulically. When "OPEN", the canopy is unlatched and opened hydraulically.

1-141. CANOPY LOCK LEVER. A canopy lock pin is inserted into the latch mechanism by operation of a "LOCKED--UNLOCKED" canopy lock lever (2, figure 1-15) on the right side of the pilot's station. The lever must be in "UNLOCKED" before the canopy can be opened.

1-142. CANOPY EMERGENCY RELEASE HANDLES. Canopy emergency release handles are on the pilot's and copilot's instrument panels (37, figure 1-8 and 1, figure 1-18). Pulling out a handle unlocks and unlatches the canopy, inserts a hinge pin on the aft end of the canopy, and opens an air bottle. Pneumatic jacks lift the front of the canopy into the air stream, and it is then carried clear of the airplane. As the canopy clears the airplane, cables attached to the canopy pull out safety pins in the pilot's and copilot's seat ejection catapults, readying the latter for firing.

1-143. INDICATORS.

1-144. PNEUMATIC PRESSURE INDICATOR. A pressure indicator on the forward wall of the front wheel well indicates air pressure available for canopy jettisoning.

1-145. DRAG CHUTE SYSTEM.

1-146. GENERAL.

1-147. A 32-foot ribbon-type drag chute is installed in the aft section of the fuselage and is deployed by either the pilot or copilot by actuation of control handles at their stations. The drag chute is provided as a means of exerting large decelerating forces over the first part of the landing roll. A safety bolt in the attachment fitting will fail if the chute is opened at speeds above approximately 175 knots IAS.

1-148. CONTROLS.

1-149. DRAG CHUTE DEPLOYMENT HANDLES. Deployment handles (2A, figure 1-6 and 24, figure 1-15) to open the drag chute are above the control stand at the pilot's and copilot's stations. The handles are connected by cables to the drag chute compartment, and a pull on either handle opens the chute compartment doors and deploys the chute.

1-149A. DRAG CHUTE JETTISON HANDLES. Drag chute jettison handles (16A, figure 1-6 and 19A, figure 1-15) are on the pilot's and copilot's control stands. Pulling either one of these handles through its full travel (approximately 8 inches) jettisons the drag chute.

1-150. ASSISTED TAKE-OFF (ATO) SYSTEM.

1-151. GENERAL.

1-152. Provisions are made for installing 18 solid fuel ATO units, 9 recessed in a shroud on each side of the fuselage at the rear main wheel well. These units supply additional thrust when it is desired to shorten take-off distance. The system is electrically controlled from the ATO control panel (figure 1-9) located on the right side wall adjacent to the pilot's instrument panel. The units are fired simultaneously and, once fired, burn continuously until fuel is exhausted. In addition to the pilot's controls, an ATO safety link and a red ATO warning light are installed on the ATO control shield located in the rear main wheel well. Removal of the safety link opens the power circuit to the igniters and prevents inadvertent firing of the units. The ATO warning light, when illuminated, indicates that the ATO arming switch is in the "ARM" position. When ATO units are not installed, a flush panel may be installed in place of the ATO shroud.

1-153. CONTROLS.

1-154. ATO ARMING SWITCH. The ATO control circuit is armed through a guarded "ARM--OFF" switch (1, figure 1-9) on the ATO control panel. In the "ARM" position power is supplied to the ATO firing switch and the ATO armed warning light. When the switch is in the "OFF" position, the ATO control circuit is disarmed. Power is supplied to the ATO arming switch through a circuit breaker on the copilot's circuit breaker panel (3, figure 1-24).

1-155. ATO FIRING SWITCH. With the ATO arming switch in the "ARM" position and the safety link in place, firing of the ATO units is accomplished by moving a guarded "FIRE--OFF" switch (3, figure 1-9) on the ATO control panel to the "FIRE" position. When the ATO firing switch is in the "OFF" position, the firing circuit is de-energized.

1-156. INDICATORS.

1-157. ATO ARMED INDICATOR LIGHT. A green light (2, figure 1-9) on the ATO control panel, when illuminated, indicates that the safety link is in place and the system is armed. The light will go out when the ATO firing switch is placed in the "FIRE" position or, since the light circuit is completed through a landing gear safety switch, when the airplane leaves the ground.

1-158. INSTRUMENTS.

1-159. Flight instruments are grouped in regulated alternating current, direct current, pitot-static, and miscellaneous instrument classes.

1-160. REGULATED ALTERNATING CURRENT INSTRUMENTS. Regulated alternating current instruments include gyrosyn compasses, radio compasses, and attitude gyros. Circuit breakers for the gyrosyn compasses and attitude gyros are on the AC circuit breaker panel (2, figure 1-24).

1-161. DIRECT CURRENT INSTRUMENTS. Direct current instruments include turn-and-bank and outside air temperature indicators. Circuit breakers for the turn-and-bank and outside air temperature indicators are on the copilot's circuit breaker panel (3, figure 1-24).

1-162. PITOT-STATIC INSTRUMENTS. The air-speed indicators, machmeter, altimeters, and rate-of-climb indicators are connected to pitot-static sources.

1-163. MISCELLANEOUS INSTRUMENTS. Accelerometer and magnetic compass indicators operate independently of the airplane electrical or pitot-static systems. A pilot's data indicator is used with the K-2 radar system.

1-164. INSTRUMENT PANEL VIBRATORS. Due to the low vibration level of the airplane, instrument panels are not shock mounted and vibrators are installed to induce sufficient vibration to prevent indicator pointers from sticking. A circuit breaker for the vibrators is on the copilot's circuit breaker panel (3, figure 1-24).

1-165. MISCELLANEOUS EQUIPMENT.

1-166. CREW SEATS. The pilot, copilot, and navigator are provided with ejection type seats (5, 7, 17, figure 1-2) designed for use with back type ribbon parachutes and one-man seat type life rafts. Head-

rest and seat elevation adjustment is provided on all seats. In addition, the navigator's seat can be swiveled 90° and the copilot's seat 180° to facilitate use of the navigator's table and gunner's station respectively.

1-167. DATA CASES AND CHECK LIST HOLDERS. Airplane data cases are mounted on the left sidewall at the pilot's station and on the rear pressure bulkhead at the copilot's station. In addition, a data drawer is installed under the left side of the pilot's instrument panel. A flight report holder and check list holder are mounted at the pilot's station.

1-168. ASH TRAYS. Ash trays for the crew are conveniently located.

1-169. RELIEF EQUIPMENT. Relief containers (15, figure 1-2) for the crew are stowed under the pilot's floor and are accessible from the crew passageway.

1-170. MAIN ENTRANCE LADDER. An extension type ladder (12, figure 1-2) is installed inside the main entry door to facilitate entrance into the airplane.

1-171. COVERS. Canopy, fuselage nose, pitot tube, and engine nacelle covers are stowed in the flyaway tool kit.

1-172. MOORING PROVISIONS. Demountable mooring eyes for wing fittings are stowed in the flyaway tool kit.

1-173. FLYAWAY TOOL KIT. A flyaway tool kit is stowed in the bomb bay.

1-173A. RAIN REPELLENT KIT. A kit for applying a rain repellent coating to the windshield is stowed in the unpressurized section above the entrance door.

1-174. EMERGENCY EQUIPMENT.

1-175. SAFETY BELTS AND SHOULDER HARNESSES. All crew seats are provided with both safety belts and shoulder harnesses.

1-176. SHOULDER HARNESS INERTIA REEL LOCK HANDLE. A handle with "LOCKED" and "RELEASED" positions is located on the left side of each crew member's seat. A latch is provided for positively retaining the handle at either position of the quadrant. By pressing down on the top of the handle the latch is released and the handle may then be moved freely from one position to the other. When the handle is in the "RELEASED" position, the reel harness cable will extend to allow the crew member to lean forward; however, the reel harness cable will automatically lock when an impact force of 2 to 3 g's is encountered. When the reel is locked in this manner, it will remain locked until the handle is moved to the "LOCKED" position and then returned to the "RELEASED" position. When the handle is in the "LOCKED" position, the reel harness cable is manually locked so that the crew member is pre-

vented from bending forward. The "LOCKED" position is used only when a crash landing is anticipated. This position provides an added safety precaution over and above that of the automatic safety lock.

1-177. EJECTION SEAT MECHANISM. Each crew member's seat is equipped with a seat ejection catapult for ejecting seat and occupant during bailout. Elevation adjustment is made possible by actuation of a lever (10, figure 1-26) on the left side of each seat. Raising the lever pulls keeper pins out of the seat frame, disconnecting the seat from the catapult and permitting the seat to be raised or lowered. When the lever is returned to the normal position, spring pressure assists in seating and retaining the pins in the holes selected. Rotation of the navigator's seat is made possible by raising a rotation latch release lever located under the front edge of the seat. Rotation of the copilot's seat is made possible by pressing a button in the end of a

rotation control lever, located on the right side of the seat, and raising the lever. This action releases the seat for rotation and tilts it to the vertical position in order to clear the airplane structure during rotation.

1-177A. A safety pin in each seat ejection catapult prevents its firing until the canopy or emergency hatch, through which the seat ejects, is clear of the airplane. Once the canopy or hatch has cleared the airplane, seat ejection is accomplished through a firing lever (4, figure 1-26) stowed in each right armrest. Turning a knob on the end of the lever in a counterclockwise direction causes spring pressure to extend the lever, extend footrests, and lock the shoulder harness inertia reel. Raising the firing lever will then fire the catapult. As the seat leaves the airplane, interphone, and oxygen, and suit heater lines are automatically severed at a disconnect mounted on the seat. A ground lock assembly (3, 5, 7, figure 1-26) consisting of a red streamer with

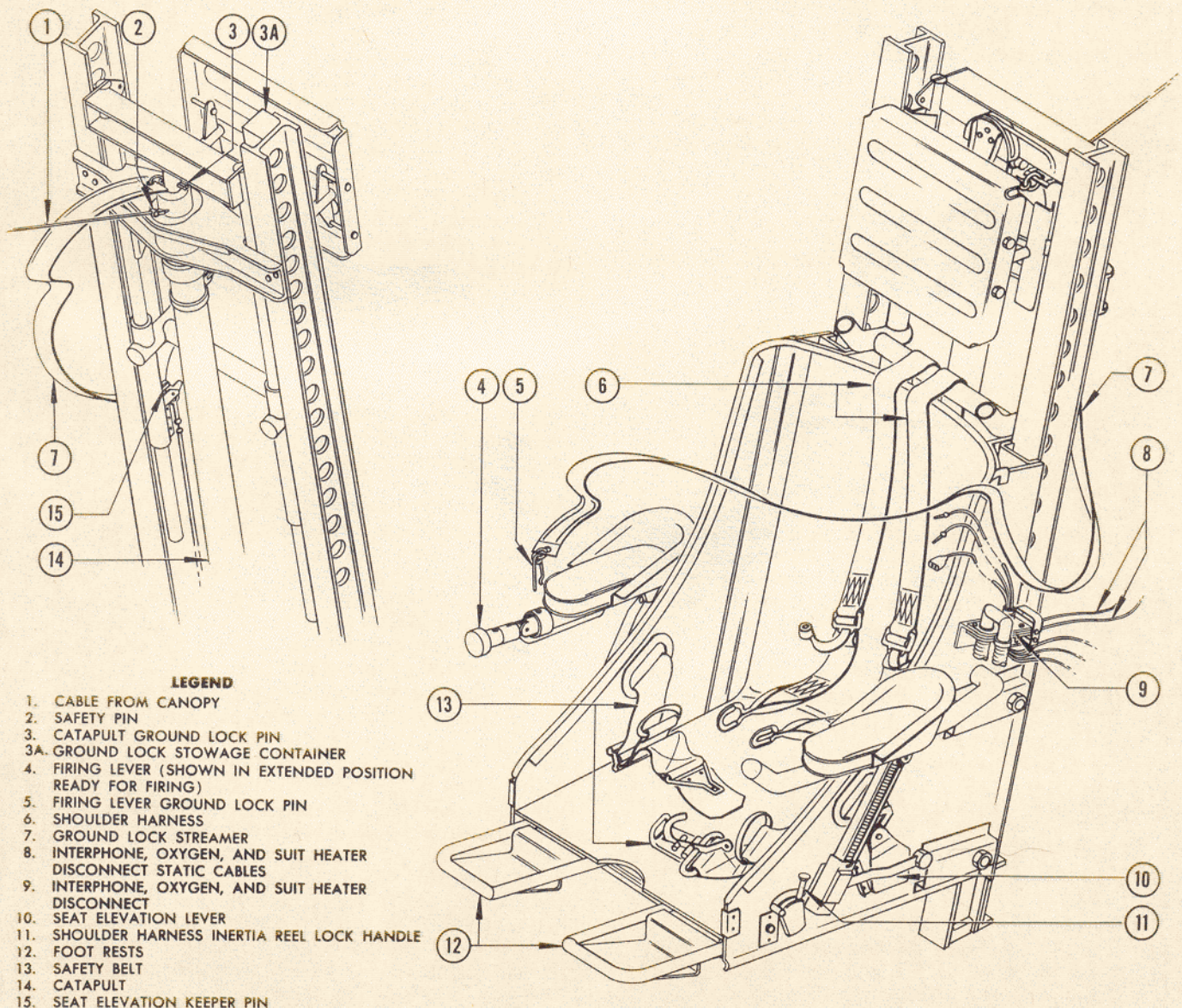


Figure 1-26. Ejection Seat and Controls

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locking pins at each end is used to prevent operation of the firing lever and firing of the catapult while on the ground. One pin is inserted through the firing lever and armrest; the other pin is inserted in the catapult shipping pin hole. Both pins must be removed before take-off and the ground lock assembly stowed in a container provided on the back of each seat headrest. Safety latches on the navigator's and copilot's seats prevent extension of the firing levers when the seats are not in the forward position.

1-178. NAVIGATOR'S EMERGENCY ESCAPE HATCH. An emergency escape hatch (figure 3-2) is installed above the navigator's seat ahead of the pilot's windshield. An emergency hatch release lever is located just outboard of the forward left corner of the hatch. Moving this lever inboard releases the latching dogs holding the hatch and permits a spring-loaded actuator to force the leading edge of the hatch into the air stream. As the hatch clears the airplane, a cable attached to the hatch pulls out a safety pin in the navigator's seat ejection catapult, readying the latter for firing. External means for releasing the hatch is provided by a pull handle which is accessible through a small hinged door in the left side fuselage skin outboard of the hatch. Pulling this handle releases the hatch in the same manner as does the navigator's hatch release lever.

1-179. FIRE FIGHTING EQUIPMENT. A hand operated carbon tetrachloride fire extinguisher (2, figure 3-1) is mounted on the pilot's floor immediately aft of the navigator's seat. No fixed fire extinguishing system is installed.

WARNING

When using a carbon tetrachloride fire extinguisher, only the minimum quantity necessary should be applied at the base of the fire. Exposure to smoke and fumes must be avoided. The fluid is poisonous and the fumes are extremely toxic. The area should be ventilated as soon as possible after fire is extinguished.

1-180. EMERGENCY ALARM. An emergency alarm bell (3, figure 3-1) is located in the walkway imme-

diately aft of the navigator's seat. A guarded "ON--OFF" switch (1, figure 1-11) on the pilot's switch panel controls the bell. In the "ON" position power is supplied directly from the battery to ring the bell. In the "OFF" position the circuit is de-energized.

1-181. FIRST AID KITS. Aeronautic first aid kits (1, figure 3-1) are mounted in the walkway opposite the copilot's seat and on the right side wall at the navigator's station.

1-182. HAND AXE. A small hand axe (4, figure 3-1) is mounted in the walkway opposite the pilot's seat.

1-183. FIRE WARNING SYSTEM. Thermally actuated switch type fire detector units are mounted in the accessory section, air guide section, and tail cone section of each engine nacelle. Six fire warning lights (9, figure 1-8), one for each engine, are on the pilot's instrument panel. When any one fire detector unit is actuated, the warning light for the affected engine is illuminated. Two fire warning circuit continuity "TEST--NORMAL" switches (1, 2, figure 1-10), the left switch for engines 1, 2, and 3 and the right switch for engines 4, 5, and 6, are on the fire warning test panel. When the switches are in the "TEST" position, illumination of the warning lights indicates that the warning circuit continuity is satisfactory. In the "NORMAL" position, the circuit is armed for fire warning and, as a safety factor in the event of an open circuit or wire breakage, an additional circuit for each engine is connected to the fire detector units through the switches. A circuit breaker for the fire warning lights is on the copilot's circuit breaker panel (3, figure 1-24).

1-184. OPERATIONAL EQUIPMENT.

1-185. The following equipment and its operation is described in section IV, "Operational Equipment":

- Cabin Heating, Ventilating, and Pressurizing Systems
- Anti-icing Systems
- Communications and Associated Electronic Equipment
- Lighting Equipment
- Oxygen System
- Navigation Equipment
- Gunnery Equipment
- Photographic Equipment
- Bombing Equipment