HYDRAULIC SYSTEM

Both the tanker and cargo airplanes are equipped with three separate hydraulic systems. The following titles will be used in all future references to these systems. Only the main system is discussed in this Section.

Main Hydraulic System	Rudder Boost Service Brakes Emergency Brakes Nose Wheel Steering Windshield Wipers
▼ Air Refueling Hydraulic Systems (See Section IV)	Pressure System Boom System Fuel Pump System Isodraulic System
Forward Cargo Door Hydraulic System (See Section IV)	Cargo Door
● Aft Cargo Door Hydraulic System (See Section IV)	Cargo Door

MAIN HYDRAULIC SYSTEM

The main hydraulic system supplies power to operate the rudder boost, service brakes, nose wheel steering and windshield wipers; main system pressure is also used to charge the emergency brake system. On airplanes 22737 ▶ the main hydraulic system also drives a pump motor combination which provides pressure to the A/R boom system. Pressure is supplied by two-engine-driven pumps, one on each of No. 2 and No. 3 engines. The pumps are set to maintain 1500-1650 psi, and a check valve in each pump pressure line prevents loss of system pressure in the event one pump becomes inoperative. Both engine-driven hydraulic pumps are self lubricated by the flow of hydraulic fluid. Should fluid flow to the pump be stopped for any reason, damage to the pump will result. However, it is not advisable to stop an engine in flight in an effort to save a hydraulic pump. A fluid reservoir in the control cabin holds a normal operating supply of 3.5 US gallons including a 0.5 US gallon reserve for the hand pump. A hand pump is provided to supply pressure to the service brake system in the event of failure of both engine-driven pumps. The hand pump can also be used to recharge the emergency brake system. During in-flight operation the hydraulic system may be depressurized by manually actuating a depressurization valve. The emergency brake system pressure is isolated from the main system by a check valve and is not affected by depressurization.

Depressurization And Emergency Charging Valve Handle

This is a three position valve handle (12, figure 1-15) on the copilot's auxiliary panel and is mechanically linked to a control valve. The three positions are: NORMAL--EMERGENCY BRAKE CHARGING--DEPRESSUIRZED POSITION. With the handle in the NORMAL position, the emergency brake system is isolated and both hydraulic pumps supply pressure to the entire main system. Moving the valve handle to the EMERGENCY BRAKE CHARGING position, system pressure or service brake pressure, whichever is higher, will charge the emergency brake accumulator and in this position pressure will still be supplied to the entire hydraulic system. When the valve handle is moved to the DEPRESSURIZED POSITION main system pressure is discharged directly into the return system leaving only the emergency brake system pressurized. The DEPRESSURIZED position is to be used in flight in the event of a line rupture to save hydraulic fluid and to reduce the danger of fire due to hydraulic fluid contacting electrical equipment.

Hand Pump

A hand pump (4, figure 1-8) below the copilot's auxiliary panel is provided to supply pressure to the service brakes in the event of failure of both engine-driven pumps. The hand pump can also be used to recharge the emergency brake system by first placing the depressurization and emergency charging valve handle in the EMERGENCY BRAKE CHARGING position.

Hydraulic System Pressure Gages

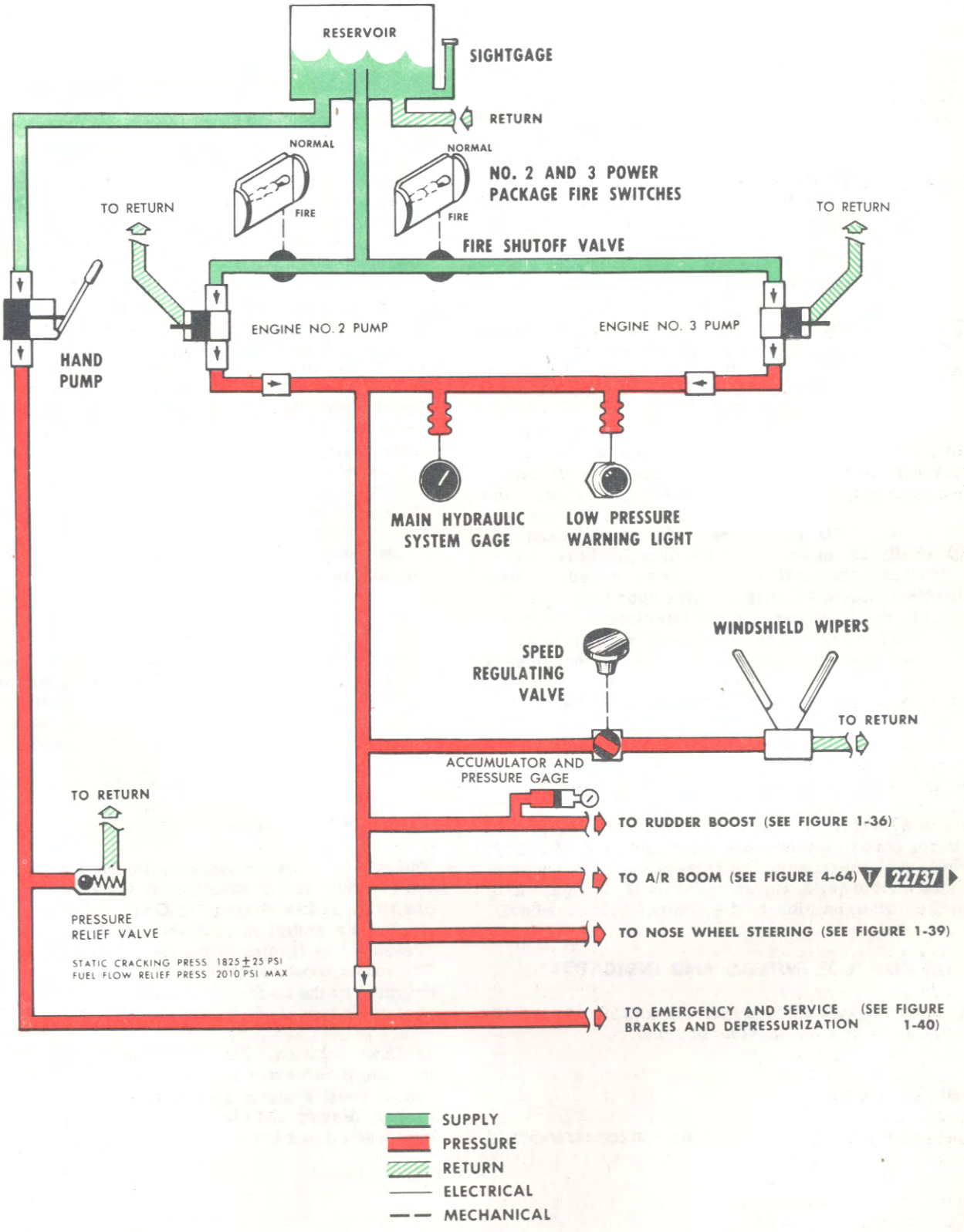
Three gages are provided. Two are on the pilots' instrument panel: one indicates main system pressure (32, figure 1-9) and the other indicates service brake system pressure (29, figure 1-9). A gage (1, figure 1-15) on the copilot's auxiliary panel indicates emergency brake system pressure. All hydraulic pressure gages read in psi, and receive 26 volt AC power through fuses on the AC power panel (figure 1-34).

Hydraulic System Low Pressure Warning Lights

An amber light (31, figure 1-9), adjacent to the main hydraulic system pressure gage will illuminate whenever system pressure falls below 900 psi. Two other lights in the hydraulic system are described in BRAKE SYSTEM in this Section. The warning light is operated by 28 volt DC power from a circuit breaker on the overhead circuit breaker panel (figure 1-34).

HYDRAULIC FLUID SPECIFICATION

Refer to Servicing Diagram (figure 1-47) for hydraulic fluid specification.



MAIN HYDRAULIC SUPPLY SYSTEM

Figure 1-35

FLIGHT CONTROL SYSTEM

The airplane is controlled in flight from either the pilot's or copilot's station by conventionally operated aileron, wing flap, elevator and rudder surfaces. The surfaces are cable-operated except the wing flaps which are operated electrically and the rudder which has a hydraulic boost system in addition to the cable. The rudder cables move the rudder trim tab which aerodynamically positions the rudder surface. Wing flap and rudder boost circuit breakers are on the overhead circuit breaker panel (figure 1-34).

SURFACE LOCK HANDLE

This red handle (6, figure 1-16) on the forward end of the control stand is provided to lock the control surfaces, partially lock the throttles and turn off rudder boost pressure when the surfaces are locked. The handle has UP-LOCKED--DOWN-UNLOCKED positions. Before the lock is effective in the UP-LOCKED position, the ailerons and rudder must be in neutral, the elevators down, and at least two throttles closed for engines on opposite sides of the fuselage (engines 1 and 4 or 2 and 3 etc.). When the surface lock handle is in the UP-LOCKED position the surfaces are locked mechanically and movement of the throttles is restricted to prevent a takeoff with surfaces locked; all four throttles can be advanced to give approximately fifty percent engine power, but the interlock prevents two throttles for engines on the same side of the airplane from being advanced beyond this point. When the surface lock handle is in the DOWN-UNLOCKED position the surfaces are unlocked, throttle movement is unrestricted, and rudder boost can be turned on.

CONTROL COLUMN AND WHEEL

The dual control columns and wheels for elevator and aileron control are conventional. Each control column wheel contains an autopilot release switch and microphone switch (4, 3, figure 1-7) and (2, 3, figure 1-8) on the outboard side of the control column wheels.

TRIM CONTROL WHEELS AND INDICATORS

Trim control wheels and indicators (3, 9, 33, and 41, figure 1-16) are on the control stand.

RUDDER PEDALS

The rudder pedals are conventional in appearance and operation and are hinged for toe operation of the hydraulic brakes. A latch on the outside edge of each rudder pedal permits fore and aft adjustment of the pedal.

RUDDER BOOST SYSTEM

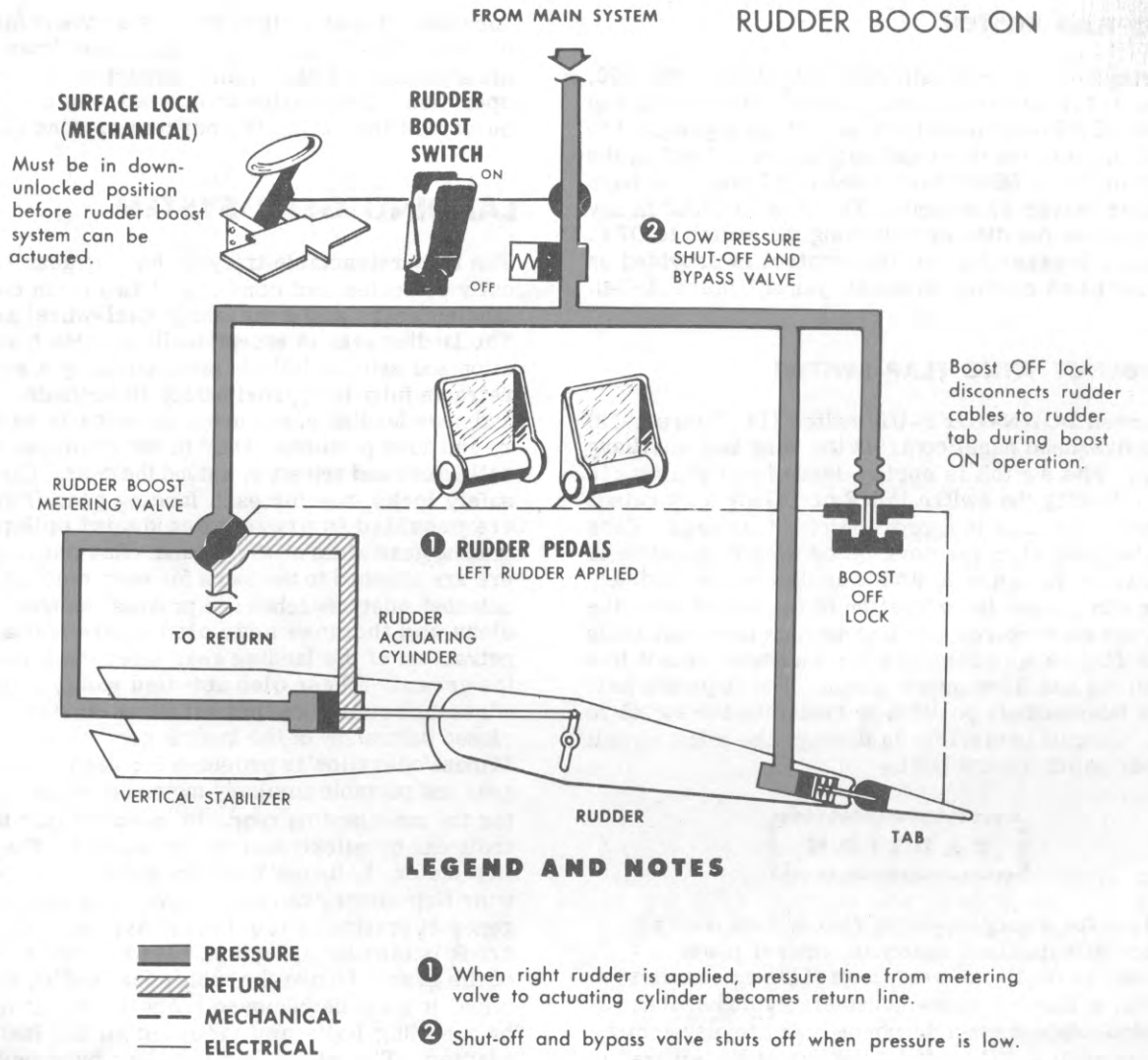
The primary purpose of the rudder boost system (figure 1-36) is to provide effective rudder control at low airspeeds with unsymmetrical power as would occur if an engine failed during takeoff or landing. The main hydraulic system (figure 1-35) provides pressure to operate the rudder boost system. With rudder boost turned on, movement of the rudder pedals controls a metering valve connected to the cables. Hydraulic pressure from the metering valve operates an actuating cylinder which moves the rudder surface. The trim tab is automatically disconnected and locked in a centered position; operation of the rudder trim control wheel adjusts the metering valve for rudder trim during boost on. Since hydraulic pressure supplies the total force required to operate the rudder surface, artificial feel is induced in the rudder boost system by means of coil springs. For a given amount of pedal deflection the rudder surface will assume different positions for the conditions of boost on and boost off; therefore, the rudder boost system should not be turned on or off during any maneuver requiring rudder operation.

NOTE

If pressure from the main hydraulic system to the rudder boost systems falls below 800 psi, a shutoff and bypass valve (figure 1-36) will stop hydraulic pressure from entering the rudder boost system, and allow normal boost-off operation of the rudder.

Rudder Boost Switch

The rudder boost pressure switch (2, figure 1-16) on the forward end of the control stand has ON--OFF positions and is guarded to ON. This switch opens or closes a shutoff valve in the main hydraulic system pressure line leading to rudder boost actuating units. The rudder boost switch is wired in series with a switch operated by the surface lock handle. The rudder boost system is turned on by positioning the rudder boost switch to ON and the surface lock handle to DOWN-UNLOCKED position. Placing the switch in OFF closes the shutoff valve and automatically depressurizes the rudder boost system; the rudder tab is then cable operated. Power and circuit protection is through the overhead circuit breaker panel (figure 1-34).



RUDDER BOOST HYDRAULIC SYSTEM

Figure 1-36

WING FLAP SYSTEM

The electrically operated wing flaps are of the Fowler type. Lowering the flaps moves the left elevator trim tab proportionally to prevent a nose-high condition. Raising the flaps moves the left elevator trim tab proportionally to prevent a nose-low condition. An auxiliary motor (3, figure 1-38) mechanically connected to the normal wing flap motor (4, figure 1-38) is used to raise or lower the flaps if the normal motor fails. This motor is portable and is also used for emergency operation of the main landing gear. A warning horn will sound at any flap setting when any combination of two throttles for engines on opposite sides of the airplane are advanced more than three-fourths open except between 22 percent and 44 percent with the weight of the airplane on the landing gear. Operating DC power for the main and auxiliary wing flap motors is through separate current limiters on the main power panel (figure 1-34). Control circuit protection is through the overhead circuit breaker panel (figure 1-34) for the normal wing flap motor and through a circuit breaker on the main circuit breaker panel for the auxiliary wing flap motor.

WING FLAP SWITCH

The wing flaps are normally controlled by a switch (20, figure 1-16) on the control stand. The switch has DOWN--OFF--UP positions, and is spring-loaded to OFF from both the down and up positions. Holding the switch in UP or DOWN fully raises or lowers the flaps in approximately 25 seconds. The flaps are held in any intermediate position by releasing the switch to OFF. A circuit breaker for the flap control is provided on the overhead circuit breaker panel (figure 1-34).

EMERGENCY WING FLAP SWITCH

A guarded DOWN--OFF-UP switch (17, figure 1-12) on the overhead panel controls the wing flap auxiliary motor. The switch is spring-loaded and guarded to OFF. Holding the switch in UP or DOWN fully raises or lowers the flaps in approximately 25 seconds. Care must be used when the emergency wing flap switch is operated as there are no limit switches on the auxiliary motor circuit and the operation of the motor after the stops are encountered will impose high torsional loads on the flap torque tube system and may result in a burned out auxiliary motor clutch. The flaps are held in any intermediate position by releasing the switch to OFF. Circuit protection is through the main circuit breaker panel (figure 1-34).

CAUTION

Since the emergency wing flap system does not incorporate limit switches, impact loads imposed on the flap drive system at the extremities of wing flap travel are considerably higher than those imposed when the normal wing flap system is operated. Therefore, the use of the emergency wing flap switch should be limited except in event of emergency. Refer to Section III for procedure to be used in emergency wing flap training operations.

WING FLAP POSITION INDICATORS

Two wing flap position indicators (33, figure 1-9) on the pilots' instrument panel register flap position in percent. Failure of the wing flap drive mechanism will be indicated by a difference in the instrument readings. A circuit breaker for the wing flap position indicators is on the overhead circuit breaker panel (figure 1-34).

WING FLAP POSITION MARKINGS

There are three orange color stripes painted on the top side of each wing flap, outboard of the inboard nacelles. These stripes provide a means for visually checking the amount of wing flap travel from the scanners position in the main compartment during flight operation. Each stripe is marked with corresponding numerals indicating the percent of wing flap travel.

LANDING GEAR SYSTEM

The fully retractable tricycle landing gear is electrically operated and consists of two main dual-wheel landing gears and a steerable dual-wheel nose gear. The landing gear is exceptionally friction free in operation and extends fully in approximately 4 seconds and retracts fully in approximately 10 seconds. The main and nose landing gears are mechanically locked in the up and down positions. Only motor or manual operation will unlock and retract or extend the gear. Three ground safety locks, one for each landing gear (figure 1-37) are provided to prevent accidental collapse of the landing gear while on the ground. Red warning streamers are attached to the locks for easy recognition. Oleo actuated safety switches are provided on both main gear oleos and the nose gear oleo to prevent accidental retraction of the landing gear when the airplane is on the ground. These oleo actuated safety switches are wired in series, so that all three switches must be closed before any of the landing gear may be retracted. Manual operation is provided for each main and nose gear and portable auxiliary motor operation is provided for the main landing gear. In an emergency these controls can be quickly and easily reached. The auxiliary flap motor (3, figure 1-38) mounted above the normal wing flap motor, can be removed and used for emergency operation of the main gear; however, the hand crank is simpler and quicker for emergency extension of the gear. To use the motor for landing gear operation, it must be removed from the mounting bracket by the wing bolts and mounted on the landing gear adapter. The motor is controlled by a switch at the top of the motor. The switch has three positions, and is moved in the indicated direction for the required operation. The circuit breaker for the auxiliary flap motor is on the main circuit breaker panel (figure 1-34).

LANDING GEAR SWITCH

A DOWN--OFF--UP switch (8, figure 1-16) on the control stand controls normal landing gear extension or retraction. When the switch is in the UP position, the landing gear will retract provided all wheels are off the ground; when in the DOWN position, the landing gear will extend; and when in the OFF position, the landing gear actuation circuits are de-energized. Three circuit breakers, on the overhead circuit breaker panel (figure 1-34) provide individual circuit breaker protection for each landing gear normal control circuit. Each main landing gear motor receives power

through a current limiter in the main power panel (figure 1-34). The nose gear motor receives power through a circuit breaker on the forward power panel (figure 1-34).

EMERGENCY RETRACTION SWITCH

TCTO 299

The landing gear emergency retraction switch (29, figure 1-12) on the overhead panel will permit the landing gear to be retracted should an emergency occur during the takeoff run or landing roll. The switch is spring-loaded and guarded from SAFETY OVERRIDE to the NORMAL position. Holding the switch in the SAFETY OVERRIDE position will override the oleo safety switch circuit. The normal landing gear switch must be in the UP position before the landing gear emergency retraction switch will energize the system. DC power and circuit protection is through the overhead circuit breaker panel (figure 1-34).

WARNING HORN RELEASE SWITCH

The warning horn, on the ceiling above the copilot, will sound if any landing gear is not extended and locked, and any throttle is retarded to less than 1/5 open. It will also sound at any flap setting when any combination of two throttles for engines on opposite sides of the airplane are advanced more than three-fourths open, in either forward or reverse thrust, except between 22 percent and 44 percent with the weight of the airplane on the landing gear. A NORMAL--HORN RELEASE switch (7, figure 1-16), spring-loaded from HORN RELEASE to the NORMAL position is provided on the control stand. When the switch is actuated to the HORN RELEASE position, the warning horn is silenced until again energized by one of the above conditions. The warning horn will sound for each throttle independent of the others. The warning horn release switch will not silence the horn when the airplane is on the ground. Circuit protection is through the overhead circuit breaker panel (figure 1-34).

EMERGENCY HAND CRANKS

In an emergency, the landing gear can be operated manually by hand cranks. The nose gear crank (2, figure 1-38) is on the underside of the lower nose compartment hatch. The main gear cranks (6, figure 1-38) are adjacent to the emergency operation adapters on each side of the airplane, aft of the rear spar. The number of turns to raise or lower the landing gear are: 490 turns for main gear, 220 turns for nose gear.

CLUTCH HANDLES

Clutch handles (5, figure 1-38) and a clutch lever (1, figure 1-38) are located near the landing gear emergency operation adapters. Operation of the clutches releases the normal landing gear motors and engages the manual systems. The pull handles must be pulled out approximately twelve inches when the manual system is used.

LANDING GEAR POSITION INDICATORS

Three tab-window type indicators (36, figure 1-9) on the pilots' instrument panel show, by interchangeable tabs, the positions of the main and nose gears. When any gear is up and locked, the corresponding UP tab will appear in the window; a landing gear in an intermediate position will be indicated by a tab with slanting alternate red and white stripes; and a down and locked gear will be indicated by a tab showing a symbol of a wheel. When power is off, a slanting red and white stripe tab will show in the window. Power and circuit protection is through the overhead circuit breaker panel (figure 1-34).

LANDING GEAR WARNING LIGHT

A red warning light (38, figure 1-9) on the pilots' instrument panel is illuminated unless all three landing gears are extended and locked or unless all three gears are retracted and locked with all throttles more than 1/5 open. Power and circuit protection is through the overhead circuit breaker panel (figure 1-34).

WHEEL WELL OVERHEAT WARNING LIGHTS

TCTO 558

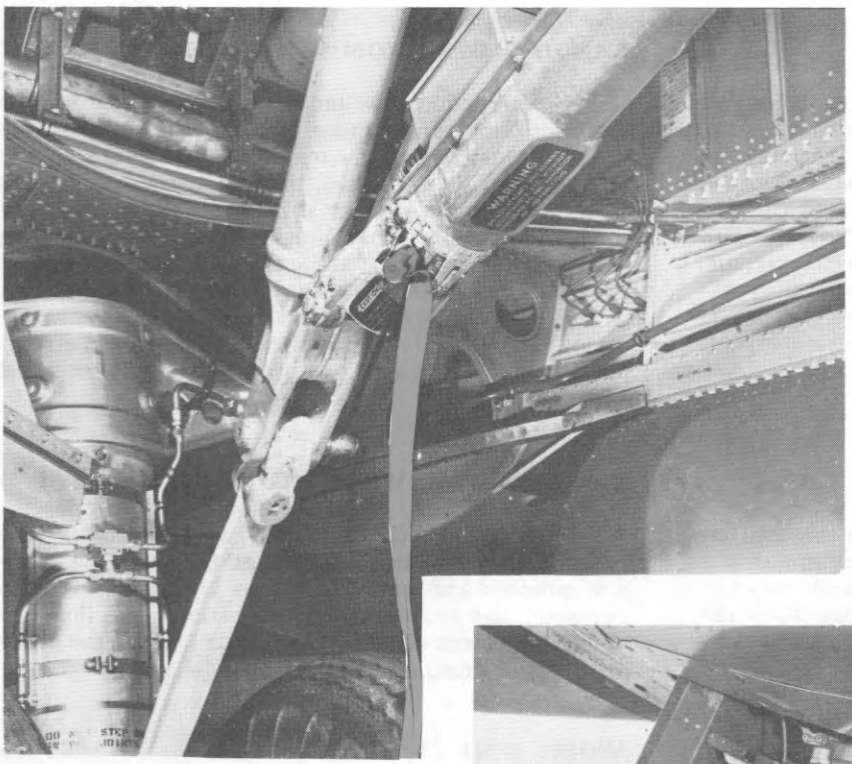
Two wheel well overheat warning lights (22, figure 1-9) located on the pilots' instrument panel, will illuminate if the brakes or tires are overheated when retracted. The overheat condition is sensed by two adjustable detector switches in each main wheel well. These switches are set to close at 200°F. Circuit protection is through the overhead circuit breaker panel (figure 1-34).

NOSE WHEEL STEERING SYSTEM

The nose wheels are steerable to 68 degrees each side of center through hydraulically operated cylinders while the airplane is on the ground. When the nose wheel leaves the ground, hydraulic pressure is shut off by an oleo-actuated valve, and the nose wheel centers itself. In the event of hydraulic pressure failure, the nose gear has a conventional castor action allowing directional control of the airplane by engine and brake operation. See figure 1-39.

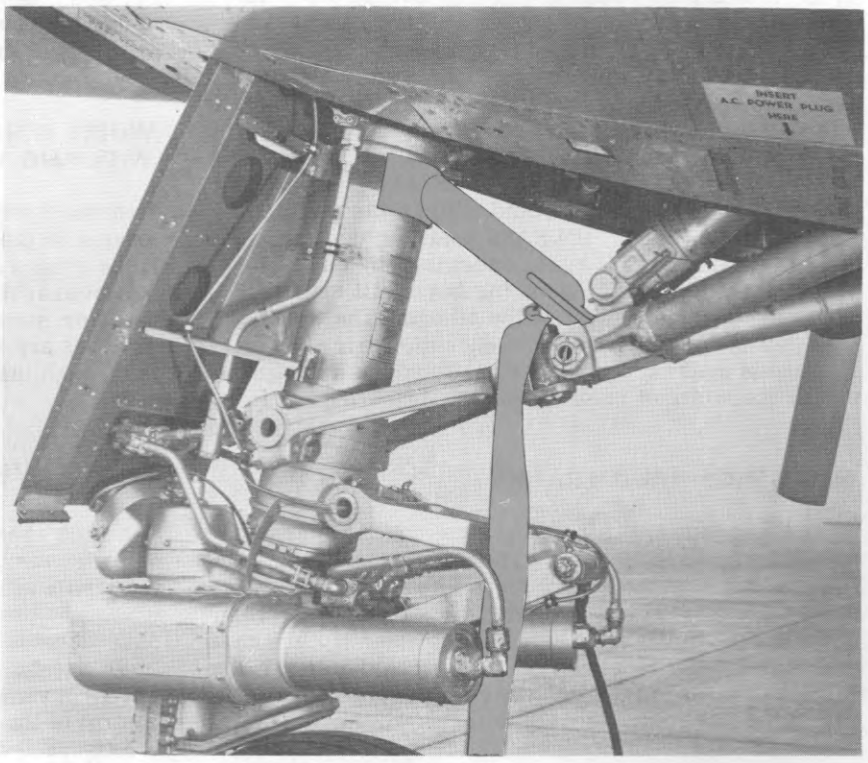
NOSE STEERING WHEEL

Nose gear steering is controlled by a steering wheel (10, figure 1-7) mounted on a pedestal forward and



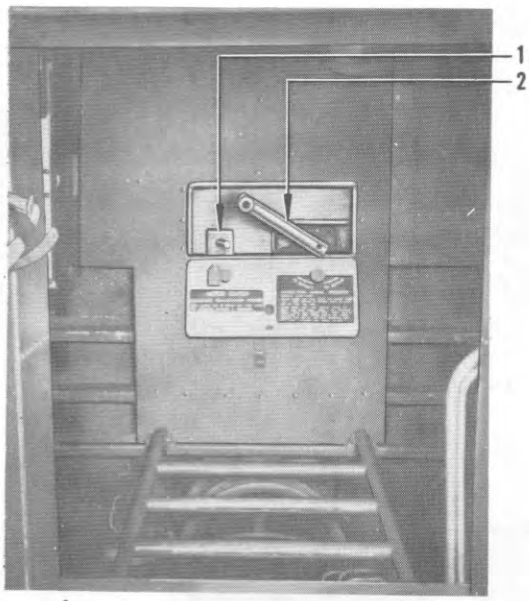
MAIN LANDING GEAR GROUND LOCK

NOSE GEAR GROUND LOCK

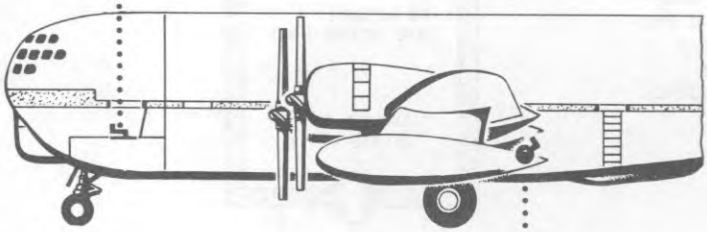


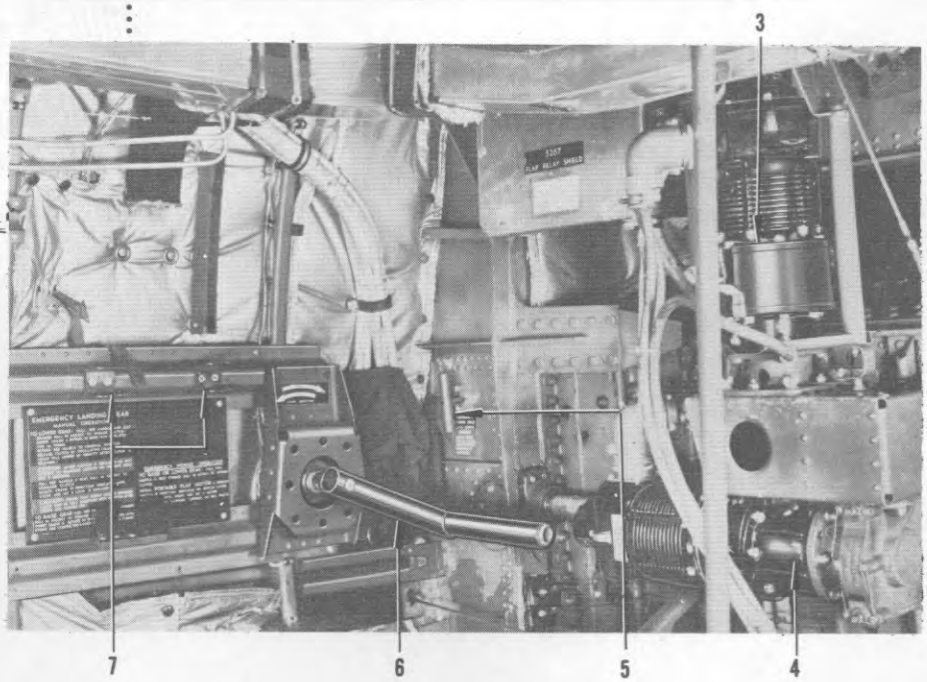
LANDING GEAR GROUND SAFETY LOCKS

Figure 1-37



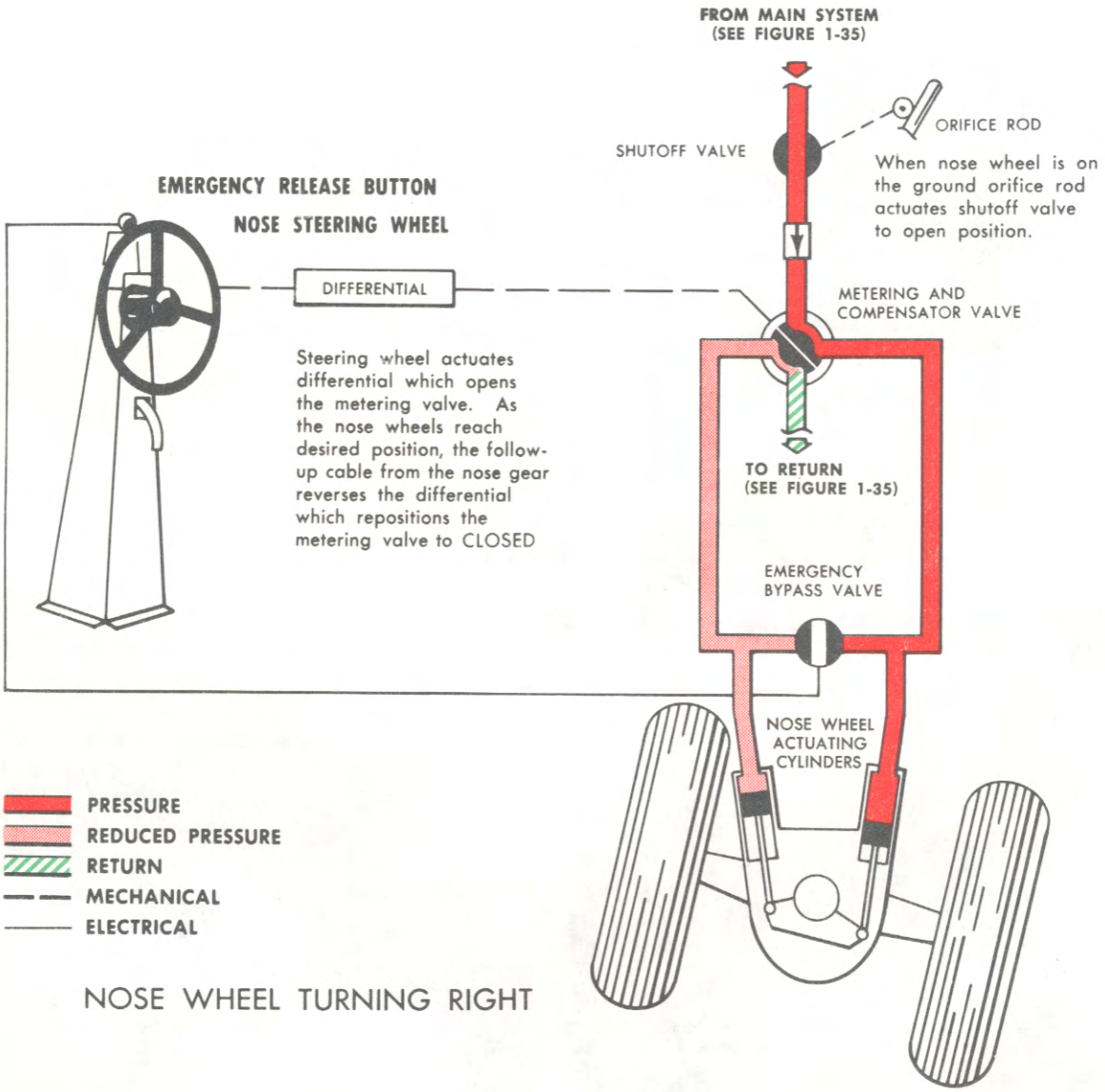
1 CLUTCH LEVER
2 NOSE LANDING GEAR CRANK
3 AUXILIARY WING FLAP MOTOR
4 NORMAL WING FLAP MOTOR
5 LANDING GEAR CLUTCH HANDLE
6 LANDING GEAR CRANK
7 CRANK STOWAGE





LANDING GEAR EMERGENCY CONTROLS

Figure 1-38



NOSE WHEEL STEERING HYDRAULIC SYSTEM

Figure 1-39

to the left of the pilot's control column. An arrow on the wheel and a mark on the pedestal indicate when the nose wheel is centered. The nose wheel turns in the direction selected by the steering wheel and remains in that position until the steering wheel is returned to center. A cable follow-up system will return the nose wheel to its original course should the wheel be deflected momentarily by some obstacle. Nose wheel must be centered before gear will retract.

CAUTION

When the airplane is being towed by the nose wheel and the hydraulic system is charged, do not operate the steering wheel as this action will damage the mechanism.

EMERGENCY DISCONNECT BUTTON

When manually depressed, the push-pull button on the steering pedestal (5, figure 1-7) electrically actuates the bypass valve, bypassing hydraulic fluid pressure past the steering cylinders and allowing the nose wheel to caster. This button is used to release the nose wheel in event of steering system malfunction. An indicator light, within the push-pull button, illuminates when the button is depressed. The button must be raised manually to re-engage the steering mechanism. Power and circuit protection is through the forward power panel (figure 1-34).

NOTE

DC power must be available for operation of the emergency nose wheel disconnect.

BRAKE SYSTEMS

SERVICE BRAKE SYSTEM

Main hydraulic system pressure is used to operate the service brakes. See figure 1-40. Toe pressure on the pilot's or copilot's rudder pedals will actuate the brakes in the conventional manner. However, the brake ports of the copilot's brake metering valves are connected to the return ports of the pilot's brake metering valves. Therefore, hydraulic pressure which enters the brake system due to operation of the copilot's brake metering valves must pass through the pilot's metering valves before reaching the brakes. Whenever the pilot applies slight pedal pressure, additional hydraulic pressure is prevented from entering the brake system due to operation of the brakes by the copilot. In addition the hydraulic pressure that is applied by either pilot returns through the copilot's metering valve. Therefore, when the copilot applies brake pressure, only that portion of the hydraulic pressure applied by the pilot which is in excess of that applied by the copilot will return to the reservoir when the pilot releases his brakes. Hydraulic pressures at the brakes are not additive. If equal brake pedal pressure is applied by both pilot and copilot, the hydraulic pressure which reaches the brakes is identical to that which would have reached the brakes if only the pilot has applied pressure.

NOTE

If the pilot has applied pressure to his brake pedals first, the copilot's brake pedals are rendered inoperative until the pilot has released the pressure on his brake pedals.

CAUTION

Brake action normally should be applied by the pilot. If it becomes necessary for the copilot to apply brakes, the pilot must release his brake pedals. This is necessary to allow copilot's braking action to be effective through the pilot's metering valves.

Hydraulic Fuses

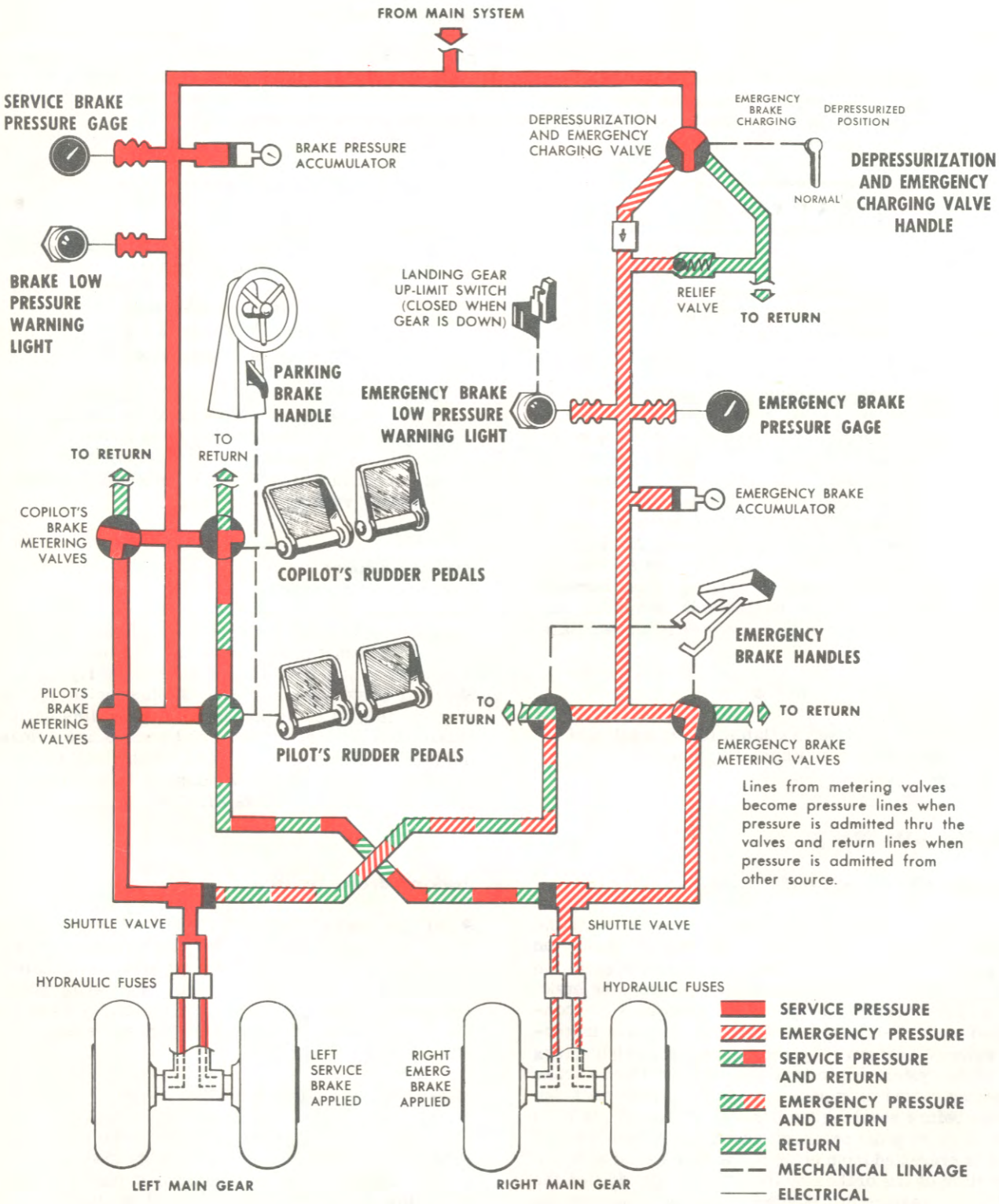
A hydraulic fuse in the brake line to each wheel is designed to shut off the flow of fluid after a quantity of fluid somewhat in excess of that required to operate the brakes has passed the fuse See figure 4-40. Should a brake line rupture, the fuse will close and stop the flow of fluid through the brake line until the brakes are released. When the brakes are released the fuses will reset themselves. If the affected brake is actuated again, a like amount of fluid will be lost until the fuse again shuts off flow.

Parking Brake Handle

A parking brake handle (9, figure 1-7) is on the nose wheel steering pedestal. Parking brakes are set by applying toe pressure to the pilot's rudder pedals and pulling the spring-loaded parking brake handle upward. The parking brakes are automatically relsased when the pilot's rudder pedals are again depressed.

EMERGENCY BRAKE SYSTEM

The emergency brake system (figure 1-40) stores pressure in an accumulator for emergency operation of the service brakes. The accumulator capacity normally will allow three full applications of the brakes. With TCTO 541 incorporated, only two full applications of the emergency brakes are available.



SERVICE AND EMERGENCY BRAKE SYSTEM

Figure 1-40

Emergency Brake Levers

Two emergency brake levers on the ceiling over the pilots' station are mechanically linked to the emergency metering valves. Pulling handles downward meters hydraulic pressure to the brakes. Each handle controls one main landing gear brake. Handles may be used individually or together.

DEPRESSURIZATION AND EMERGENCY CHARGING VALVE HANDLE

This is a three position handle, with EMERGENCY BRAKE CHARGING--NORMAL--DEPRESSURIZED positions (12, figure 1-15). Moving this handle to the EMERGENCY BRAKE CHARGING position, allows main system pressure to charge the emergency brake accumulator. With the valve handle in this position system pressure will continue to be maintained. For NORMAL--DEPRESSURIZED position operation see MAIN HYDRAULIC SYSTEM this Section.

BRAKE SYSTEM PRESSURE GAGE

A pressure gage for the service brake system (29, figure 1-9) is on the pilots' instrument panel, and a gage for emergency brake system pressure (1, figure 1-15) is on the copilot's auxiliary panel. The gages are marked in psi. Circuit protection and 26 volts AC power is through the AC power panel (figure 1-34).

BRAKE SYSTEM LOW PRESSURE WARNING LIGHTS

Two amber warning lights (28 and 25, figure 1-9) on the pilots' instrument panel are provided for the service and emergency brake systems. The service brake system warning light will illuminate whenever hydraulic pressure is below 900 psi, and the emergency brake system warning light will illuminate whenever emergency brake pressure is below 1250 psi. Both lights are wired so that they operate only when the landing gear is extended. The lights are supplied 28 volt DC power through a circuit breaker on the overhead circuit breaker panel (figure 1-34).

INSTRUMENTS

Only those instruments which are not properly a part of a complete system such as fuel system are listed in figure 1-41. The instruments listed include pitot and static operated instruments, alternating current operated instruments, and direct current operated instruments.

PILOT'S ATTITUDE INDICATOR

The pilot's attitude indicator is installed on the left side of the pilots' instrument panel and is supplied with power from the 115 volt AC pilots' instrument inverters through circuit protection on the AC power panel (figure 1-34). A warning flag marked OFF becomes visible if power

INSTRUMENT	OPERATING POWER	POWER SOURCE	CIRCUIT PROTECTION LOCATION
Airspeed Indicators	Pitot and Static Systems	Pitot and Static Systems	None
Altimeters	Static System	Static System	None
Vertical Velocity Indicators	Static System	Static System	None
❶❷❸ Pilot's Turn and Slip Indicator	DC Electric	DC Power Distribution System	Overhead Circuit Breaker Panel DC Power Panel
❶❸ Pilot's Direction Indicator	Emergency Power AC Electric	Pilots' Instrument Inverter	AC Power Panel
❶❸ Pilots Attitude Indicator	AC Electric	Pilots' Instrument Inverter	AC Power Panel
Outside Air Temperature Gages	DC Electric	DC Power Distribution System	Overhead Circuit Breaker Panel

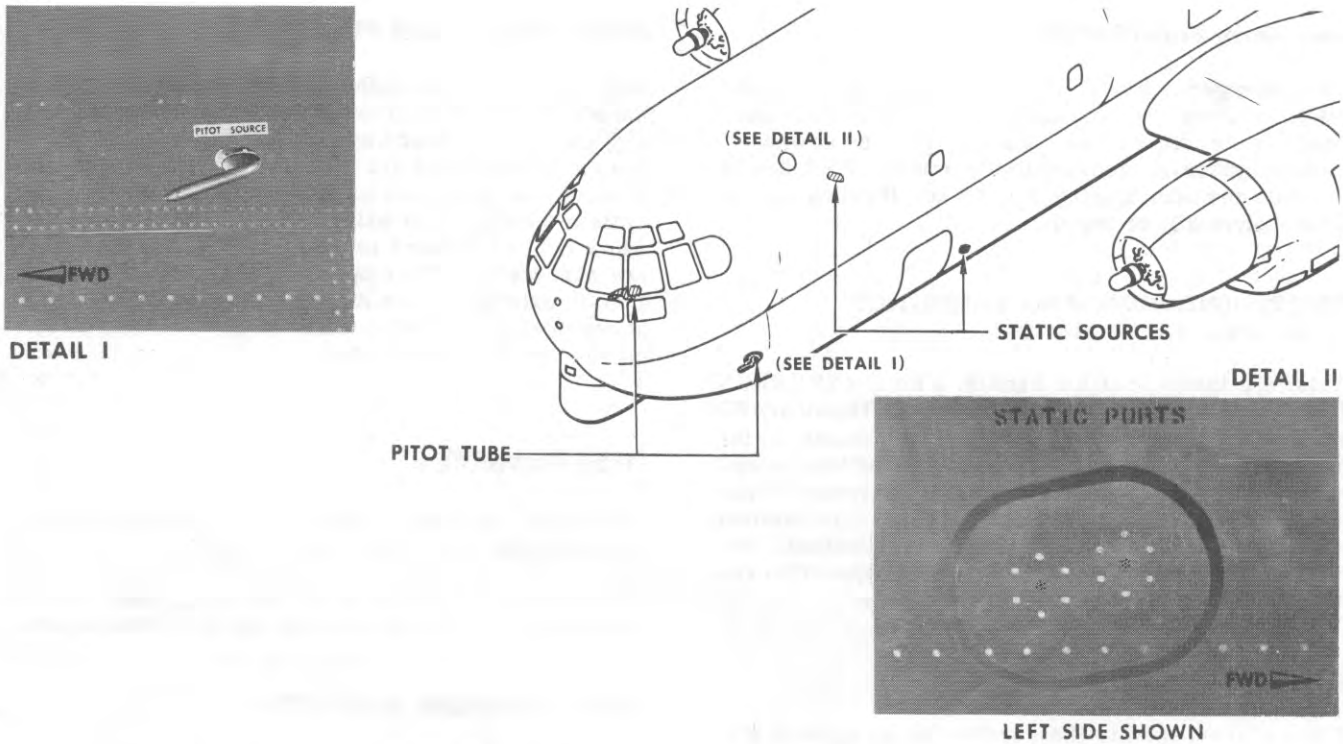
❶ These instruments can be operated by battery power in case of DC power failure if the pilot's instrument inverter emergency power switch is positioned to battery. See figure 1-31.

❷ Pilot's turn-and-slip indicator is calibrated for four minute turns. Copilot's turn-and-slip indicator is calibrated for two minute turns.

❸ For copilot's instruments see figure 1-30 and Autopilot Section IV.

INSTRUMENTS

Figure 1-41



PITOT AND STATIC SOURCES

Figure 1-42

from any phase is cut; however, it does not indicate incorrect readings caused by mechanical malfunction which should be detected by cross referencing the other flight instruments. Should partial or complete power failure occur, the instrument will remain operative until the gyro loses speed, providing adequate time to switch on the gyro instrument emergency power; however, should the instrument become sluggish or the horizon bar waver due to the gyro losing speed, it should be caged until emergency power has been established and the gyro has had sufficient time to regain speed. The instrument may be caged by means of a gyro centering device operated by pulling out the cage knob on the front of the instrument.

On airplanes not incorporating TCTO 563, a type J-8 attitude indicator is installed. The instrument has 360 degrees of freedom in roll and a minimum of ± 80 degrees in pitch. The horizon bar and sphere indicate the degree of climb or dive in reference to a miniature airplane. Maximum horizon bar deflection in climb or dive is approximately 27 degrees. The sphere shows no markings in level flight but CLIMB or DIVE markings appear if the airplnae is climbed or dived over 27 degrees. Concentric lines and circles on the top and bottom of the sphere indicate 70, 80 and 85 degrees of climb and dive. A knob on the front of the instrument adjusts the miniature airplane to indicate zero pitch in a shallow climb or dive. The degree of bank is indicated by the position of the bank index pointer relative to the 10, 20, 30, 60 and 90 degree markings on the case.

On airplanes incorporating TCTO 563, a type MF-2 attitude indicator is installed. It embodies a card type face and a double horizon bar. The degree of climb or dive is indicated by reference of the miniature airplane to the horizon bar. Maximum horizon bar deflection in climb or dive is approximately 27 degrees. A knob on the front of the instrument adjusts the miniature airplane to indicate zero pitch in a shallow climb or dive. The degree of bank is indicated by the position of the

bank index pointer relative to the angle of bank markings on the case.

NOTE

After applying power to the type J-8 and MF-2 attitude indicators, a period of 30 seconds should be allowed for the gyro to attain speed. The instrument should then be caged immediately to prevent unnecessary torque stresses on the instrument mechanism.

CAUTION

- Caging of the J-8 and MF-2 attitude indicators should be kept to a minimum. Care should be exercised when caging the instrument on the ground or in the air to avoid undue stresses to the gyro bearings. The airplane should always be in a straight and level attitude when caging the instrument in flight.
- It is possible for the J-8 attitude indicator to erect in the inverted position; therefore, after the J-8 attitude indicator has been energized at least 30 seconds, cage the attitude prior to takeoff to insure proper erection.

WARNING

A slight amount of pitch error in the indication of the J-8 and MF-2 attitude indicators will result from accelerations or decelerations. It will appear as a slight climb indication after a forward acceleration and as a slight dive indication after deceleration when the airplane is flying straight and level. This error is most noticeable at the time the airplane breaks ground during the takeoff run. At this time, a climb indication error will normally be noticed; however, the exact amount of error will depend upon the acceleration and elapsed time of each individual takeoff, but will generally be approximately 1 1/2 bar widths. The erection system will automatically remove the error after the acceleration ceases.

PILOT'S INSTRUMENT INVERTER EMERGENCY POWER SWITCH

For a description of this switch, see AC POWER SYSTEM in this Section.

ALTIMETER

Altimeters are provided, one each, for the pilot, co-pilot (27, figure 1-9), navigator and on airplanes 22737 ▶ , one for the engineer (20, figure 1-22). The altimeter registers pressure altitude above sea level with compensating mechanisms for variation in station barometric pressure. Three pointers on the altimeter give pressure altitude, the long pointer (4, figure 1-43) indicates hundreds of feet altitude; the broad pointer (2, figure 1-43) indicates thousands of feet, and the small pointer with the triangular index marker on the outer edge of the dial (1, figure 1-43) indicates tens of thousands of feet. The Kollsman window (3, figure 1-43) and the set knob (6, figure 1-43) are interconnected to allow the altimeter to be set to station barometric pressure corrected to sea level pressure. The low altitude warning indicator (5, figure 1-43) is a cross hatched area that comes into view below 16,000 feet.

WARNING

It is possible to misset an altimeter by 10,000 foot increments and still have the proper pressure setting in the Kollsman window. Check all three pointers to be sure the altimeter indicates the proper field elevation before takeoff.

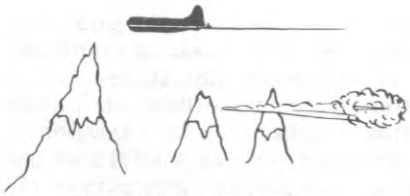
Atmospheric pressure rate of change decreases with altitude. Therefore if an altimeter were misset by plus 10,000 feet at sea level and a takeoff and climb were made to 10,000 feet the misset altimeter would not read 20,000 feet but would read approximately 25,000 feet giving an indication of approximately 15,000 feet more altitude than the airplane actually had. As the airplane climbs higher a greater error would exist. If the altimeter were misread in addition to misset the error could be greater or smaller.

NOTE

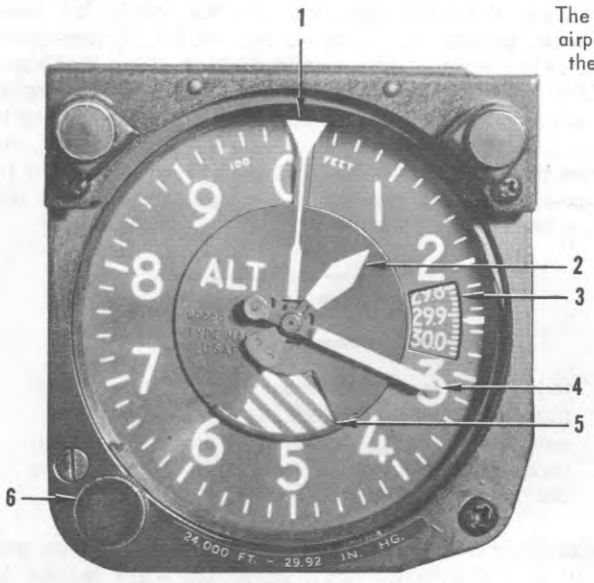
Reset altimeter to 29.92 in Hg when climbing through 23,500 feet. Reset altimeter to current setting when descending through 24,000 feet.

EMERGENCY EQUIPMENT

The location of the emergency equipment, except for the engine fire detection and extinguishing systems, is shown in figure 3-1.



CORRECT READING ALTIMETER

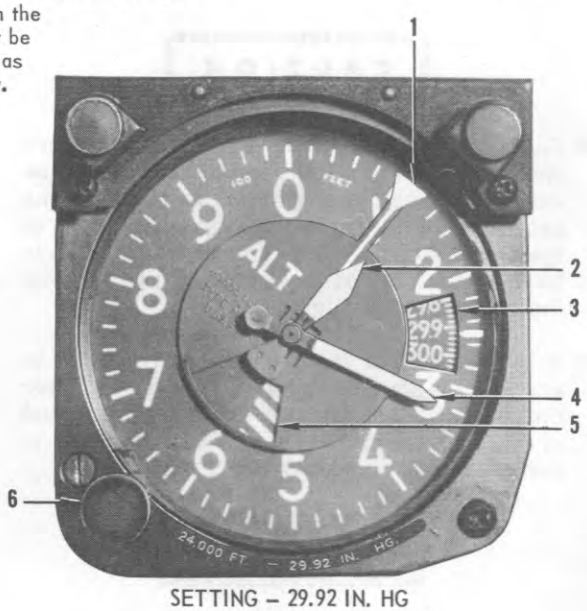


SETTING – 29.92 IN. HG
ALTITUDE – 1320 FEET

NOTE

The altimeters in the airplane may not be the newer type as shown below.

ERRONEOUS READING ALTIMETER



SETTING – 29.92 IN. HG
ALTITUDE – 11,320 FEET

NOTE

Altimeter setting is 10,000 feet high

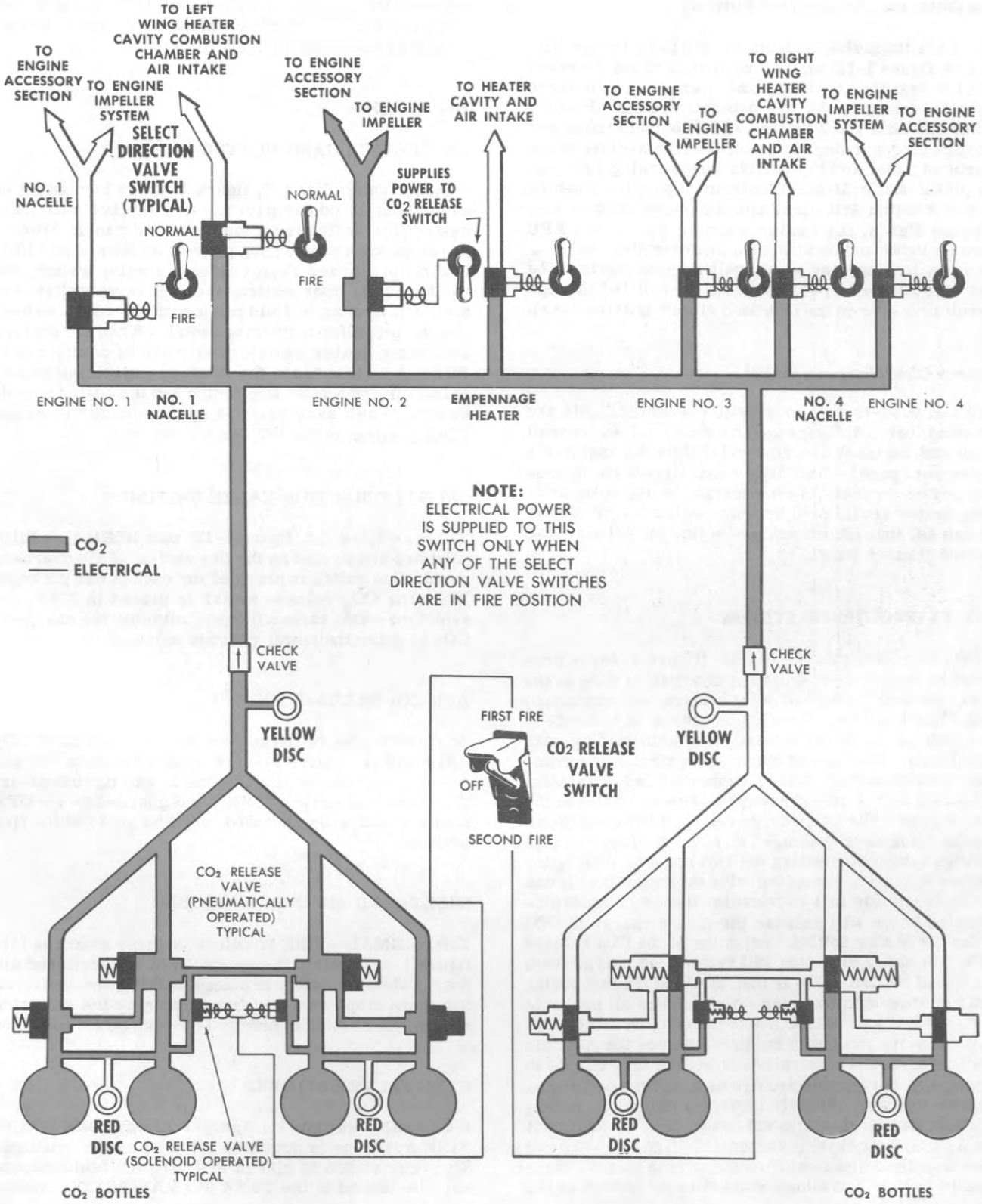
1 TEN THOUSAND FOOT POINTER (INDICATES TENS OF THOUSANDS OF FEET)
2 THOUSAND FOOT POINTER (INDICATES THOUSANDS OF FEET)
3 KOLLSMAN WINDOW
4 HUNDRED FOOT POINTER (INDICATES HUNDREDS OF FEET)
5 LOW ALTITUDE WARNING INDICATOR
6 SET KNOB

ALTIMETER SETTINGS

Figure 1-43

FIRE DETECTOR SYSTEM

An automatic fire detector system is provided to detect a fire condition in any of the power packages or combustion heater areas. The system illuminates red master fire warning lights on the pilots' and engineer's instrument panels if a fire condition exists. The exact area which has a fire condition is indicated by fire warning lights located on the overhead panel (10 and 14, figure 1-12), and on airplanes incorporating TCTO 558 on the pilots' instrument panel (22, figure 1-9). Fire sensing units located behind the exhaust collector ring, around the turbosupercharger, on the engine oil tank, in the accessory section of the power package, in the wing D ducts, in the combustion heater cavities, around the APU and on airplanes incorporating TCTO 558 in the main landing gear wells, cause the fire warning lights to illuminate during a sudden overheat condition such as a fire would cause. The fire detector system is powered from 28 volts DC through circuit breakers on the overhead circuit breaker panel. The master switch must be on to operate the fire detector system. The battery switch must be ON BUS, the master switch must be ON, and the nose gear must be extended and contacting the ground so as to actuate the oleo switch in order to operate the system from battery power.



FIRE EXTINGUISHER SYSTEM

Figure 1-44

Fire Detector System Test Buttons

There are three fire detector system push-to-test buttons (8, figure 1-12) on the fire section of the overhead panel to test the continuity and operation of the three circuits making up the fire detector system. Pushing either circuit 1 and 2 buttons will illuminate the power package fire warning lights on the fire section of the overhead panel and the master fire warning lights on the pilots' and engineer's instrument panels. Pushing circuit 3 button will illuminate the power package fire warning lights, the heater warning lights, the APU warning lights and on airplanes incorporating ICTO 558 the main landing gear wheel well warning lights. The test circuits are operated from 28 volt DC through circuit breakers on the overhead circuit breaker panel.

Master Fire Warning Lights

Two red push-to-test master fire warning lights are provided; one (34, figure 1-9) on the pilots' instrument panel and the other (73, figure 1-22) on the engineer's instrument panel. Both lights will illuminate in case of a sudden increase in temperature in engine or anti-icing heater areas, APU or wheel well area. Power is 28 volt DC through circuit protection on the overhead circuit breaker panel.

FIRE EXTINGUISHER SYSTEM

A CO_2 fire extinguisher system (figure 1-44) is provided to supply two separate charges of CO_2 to the power packages, wing anti-icing heaters, and empennage anti-icing heaters. The CO_2 is stored in two sets of four bottles, each set located in a main landing gear wheel well. Each set of bottles will furnish one complete charge of CO_2. The two upper bottles in each set are fitted with solenoid actuated valves to release the CO_2 charge. The CO_2 charge released from the upper bottles actuates the release valves on the lower bottles through tubing connecting the two bottles. The upper bottles are also connected with tubing so that if one of the solenoids fail to operate, the other solenoid-actuated valve will release the entire charge of CO_2 in the set of four bottles. Actuation of the CO_2 release switch in either direction will release the charge from one set of bottles. CO_2 is then directed through tubing to a common manifold line which serves all probable fire areas. Select direction switches open directional control valves located in the lines between the manifold and fire areas. These valves direct the CO_2 charge to be dispersed in the selected fire area through perforated runs of tubing or directly into the equipment. A CO_2 bottle is also located adjacent to the APU. Actuation of the APU CO_2 release switch (11, figure 1-12) will discharge the entire bottle into the turbine cover. These control switches are located on the fire section of the overhead panel (figure 1-12). All controls are powered by 28 volt DC through circuit breakers on the overhead circuit breaker panel (figure 1-34).

Fire Switches

FIRE SWITCH GANG PLATES

A switch gang plate (12, figure 1-12) is located aft of each group of power package and surface anti-icing heater fire switches on the overhead panel. When a power package switch gang plate is positioned to FIRE, it will actuate the select direction valve switch, the sheltered air door switch, the fuel valve switch, the fuel, oil, hydraulic fluid and cabin air bleed switch, and the propeller feathering switch. When the surface anti-icing heater switch gang plate is positioned to FIRE, it will actuate the surface anti-icing heater select direction valve fire switch and the heater shutoff switch. Each gang plate is spring-loaded from the FIRE position to the NORMAL position.

SELECT DIRECTION VALVE SWITCHES

These switches (15, figure 1-12) with NORMAL--FIRE positions are located on the fire section of the overhead panel. One switch is provided for each power package. When the CO_2 release switch is placed in FIRE, the select direction valve will open, allowing the charge of CO_2 to enter the power package selected.

APU CO_2 RELEASE SWITCH

An on-off toggle switch marked AUX POWER UNIT CO_2 RELEASE (11, figure 1-12), when positioned to ON will release the contents of a CO_2 bottle into turbine cover. The switch is spring-loaded and guarded to the OFF position, and when operated, must be held ON for five seconds.

SHELTERED AIR DOOR SWITCHES

The NORMAL--FIRE positions of these switches (15, figure 1-12) control the operation of the sheltered air door. When the switch is placed in FIRE, the sheltered air door stops ram air from entering the induction system. One switch is provided for each power package.

FUEL VALVE SWITCHES

A fuel valve switch (15, figure 1-12) with NORMAL--FIRE positions is provided for each power package. When the switch is placed in FIRE, the fuel selector valve is turned to the TANK TO MANIFOLD position.

When the switch is returned to NORMAL, the fuel selector valve will return to its originally selected position.

FUEL, OIL, HYDRAULIC FLUID AND CABIN AIR BLEED SWITCHES

One switch (15, figure 1-12), with NORMAL--FIRE positions, is provided for each power package. When the switch is placed in FIRE, fuel, oil, and hydraulic fluid are shut off from the power package and the cabin pressurizing air supply from that power package is shut off.

PROPELLER FEATHERING SWITCHES

The NORMAL--FIRE positions of these switches (15, figure 1-12) control the propellers. When the switch is placed in FIRE, the propeller feathers. This switch is spring-loaded to the NORMAL position and will return to NORMAL when released; however, the propeller will feather in the same manner as if the pilots' propeller feathering button were pressed.

ANTI-ICING HEATER SELECT DIRECTION VALVE SWITCHES

These switches (38, figure 1-12), one for each set of anti-icing heaters, are on the fire section of the fire section of the overhead panel. When the CO_2 release valve switch is placed in FIRE position, it actuates the directional control valve to allow CO_2 charge to enter the heater area from the fire extinguisher system manifold.

ANTI-ICING HEATER SHUTOFF SWITCH

These switches (37, figure 1-12), one for each set of anti-icing heaters, are on the fire section of the overhead panel. The switch, when actuated to FIRE, discontinues heater operation by stopping intake air flow and fuel supply to the heaters and de-energizes the heater ignition circuit.

BODY HEATER FIRE SWITCH

One body heater switch (39, figure 1-12) with NORMAL--FIRE positions on the fire section of the overhead panel is used to discontinue heater operation. When this switch is placed to FIRE position it will shut off the fuel supply to the body heaters besides de-energizing the heater ignition circuit. The APU fuel supply will also be shut off. Body heater fires cannot be extinguished from the airplane's fire extinguisher system, but will have to be extinguished with portable hand extinguishers stowed in the airplane.

CO_2 Release Switch

This guarded switch (13, figure 1-12) on the fire section of the overhead panel, releases the two charges of CO_2 when one or more select direction valve switches are positioned to FIRE. It has three positions, FIRST FIRE--OFF--SECOND FIRE. By moving and holding the switch at least 5 seconds to FIRST FIRE position, the charge of CO_2 from the left set of the CO_2 bottles will be released to the predetermined fire area. By moving and holding the switch to SECOND FIRE position for at least 5 seconds the remaining charge of CO_2 will be released.

NOTE

The select directional valve switches must be ON to release the CO_2 charges. The 5 second holding of the CO_2 release switch allows positioning of the CO_2 release valve.

In order to use battery power to release the CO_2 charges; the master switch must be ON, the battery switch must be ON BUS, and the nose gear must be extended and contacting the ground so the oleo switch is actuated.

CO_2 Discharge Indicator Discs

Discharge indicator discs are provided on the left hand side of the inboard nacelles to visually determine if the CO_2 charge has been released from either set of bottles or any bottles within the set. A ruptured or missing yellow disc indicates the complete set of bottles have been discharged and needs replacing. Missing red discs indicate the bottles have been discharged by thermal expansion. A ruptured or missing aft red disc indicates the outboard bottles have been discharged and need replacing and a ruptured or missing forward red disc indicates the inboard bottles have been discharged and need replacing. There is also a discharge disc for the APU CO_2 bottle located in the skin adjacent to the APU exhaust. If the disc is ruptured or missing the bottle needs replacing.

HAND FIRE EXTINGUISHERS

Airplanes 17260▶2859 in the tanker configuration have seven hand fire extinguishers (6, figure 3-1) and airplanes 2860▶ in the tanker configuration have eight. Airplanes 17260▶2859 in the cargo configuration have six hand fire extinguishers and airplanes 2860▶ in the cargo configuration have seven. These are charged with bromochloromethane which is effective in combating all types of fires. The effective range of the extinguishers is 25 feet, when operated vertically to within 15 degrees from horizontal. One extinguisher is on the pilot's auxiliary panel in the control cabin. In the main compartment, one extinguisher is mounted on the forward bulkhead, another is mounted

on the right side of the fuselage just aft of the forward cargo door, another is mounted on the miscellaneous equipment panel at the aft end of the compartment, and a fifth extinguisher is mounted on the right side of the fuselage across from the miscellaneous equipment panel. One extinguisher is located at the boom operator's station, and another on the aft entry door in the lower aft compartment. On airplanes 17260 ▶ 2859 , the extra extinguisher is mounted on the forward bulkhead in the lower forward compartment.

On airplanes incorporating TCTO 566 the lower forward compartment fire extinguisher is mounted on the fire fighters panel on the aft side of the radio rack in the lower forward compartment.

WARNING

Repeated or prolonged exposure to high concentrations of Bromochloromethane (CB) or decomposition products should be avoided. CB is a narcotic agent of moderate intensity but of prolonged duration. It is considered to be less toxic than carbon tetrachloride, methyl bromide, or the usual products of combustion. In other words, it is safer to use than previous fire extinguishing agents. However, normal precautions should be taken including the use of oxygen when available.

EMERGENCY ALARM BELL

The emergency alarm bells in the airplane are controlled by a single ON-OFF switch (16, figure 1-12) on the overhead panel. One alarm bell is located aft of the forward hatch on the ceiling of the lower forward compartment; another is located on the right side of the main compartment over the wing center section; another is located forward of the lower aft compartment entrance ladder in the lower aft compartment; another is located in the control cabin near the pilot's control column. On Code T airplanes, a fifth alarm bell is located aft of the boom operator's station. On Code C airplanes, the fifth alarm bell is located aft of the aft cargo doors. When the switch is positioned to ON, power is supplied from the emergency bus on the forward power panel or from the battery shield causing the bells to ring simultaneously. Circuit protection for the bell is on the forward power panel (figure 1-34).

AXES

There are two hand crash axes. One is located on the pilot's auxiliary panel (18, figure 1-11) and one is located on the miscellaneous equipment panel (8, figure 3-1) at the left side of the main compartment in the rear of the airplane.

EMERGENCY EXITS

Two emergency escape hatches (figure 3-7) are provided on each side of the fuselage. On airplanes not incorporating TCTO 529 the escape hatches are opened inboard by pulling a bar on the lower part of each hatch. On airplanes incorporating TCTO 529 , the escape hatches are opened inboard by pulling a lever marked PULL, located on the upper section of each hatch. See Section III for escape hatch operation. The pilot and copilot are each provided with an emergency exit window. These windows can be opened by pulling a handle inboard and sliding the window aft along a set of tracks. The aft entry door is provided with an emergency release handle for jettisoning the door during flight. The release mechanism overrides the latch and disconnects the winch cable and support arm. The door hinge design is such that as the door falls past the full open position, the hinge will disengage, allowing the door to fall free.

ESCAPE ROPES

Three escape ropes, stowed in bags (1, figure 3-1) are provided for use of crew members to lower themselves from the airplane in an emergency. One is located at the pilot's sliding window, one at the copilot's sliding window, and one at the left escape hatch aft of the trailing edge of the wing.

SIGNAL LAMPS

An interairplane signal lamp (19, figure 4-16) is located on the aft bulkhead on the left side of the control cabin and another is located just aft of the rear escape hatch on the right side of the main compartment. The signal lamp may be plugged into any convenient DC outlet receptacle.

LIFE RAFTS

On airplanes incorporating TCTO 239 four twenty man life rafts (9, figure 3-1) are located throughout the main compartment over the A/R tanks. The rafts are

held in place by two straps. There are no special provisions for automatic launching of the rafts. Therefore, in order to launch the rafts, the straps must be unfastened and the rafts must be removed from the airplane through the escape hatches over the wing. After the rafts have been removed from the airplane, they can be inflated by pulling the CO_2 release cable.

DINGY RADIOS

There are two dinghy radios (10, figure 3-1) located on the top left side of the fuselage opposite the aft edge of the forward cargo door. The radios are held in place by straps. To remove the radios, unhook the straps and lower radios.

FIRST AID KITS

17260▶22628

There are positions for eight first aid kits (4, figure 3-1) in the airplane. Two first aid kits are in the control cabin: one on the pilot's auxiliary panel, and one on the right side of the cabin to the left of the water tank. Six first aid kits are in the main compartment: two on each side of the fuselage over the wing center section, one on the left side of the forward bulkhead, and one on the miscellaneous equipment panel.

22629▶

There are positions for fifteen first aid kits (4, figure 3-1). Two first aid kits are in the control cabin: one on the pilot's auxiliary panel and one on the right hand side of the cabin to the left of the water tank. There are twelve first aid kits in the main compartment: one is on the left side of the forward bulkhead, two are located just aft of the forward cargo door, three are located on the right hand side of the fuselage over the wing center section, and two are on the left hand side of the fuselage above the escape hatch over the wing center section, two are located over the aft escape hatch on the right hand side, one is located over the aft escape hatch on the left hand side, and one is on the miscellaneous equipment panel forward of the boom operator's station. One first aid kit is in the lower forward compartment opposite the forward entry door.

PYROTECHNIC PISTOL

A single-shot breech-loading double-action, pyrotechnic pistol (12, figure 3-1) and various colored flares are stowed in containers at the forward end of the navigator's table. The pistol is fired from a mount that is protected against cabin pressure loss by a manually operated external door. The pistol can be reloaded and refired repeatedly without removing it from the mount.

LANDING FLARES

Two flare tubes (6, figure 3-1) each containing one three-minute night landing parachute flare, are provided in the tail compartment. The flares are released electrically by actuating two flare release switches (35, figure 1-12) on the overhead panel.

FIRE FIGHTERS OXYGEN SETS

1510 566

Two sets of oxygen equipment, for use in fighting in-flight fires, are installed in the airplane. One is located on the aft side of the main compartment bulkhead to the right of the doorway, and the other on the aft side of the radio rack in the lower forward compartment. Each set consists of a portable oxygen cylinder equipped with a demand type oxygen regulator and a cylinder pressure indicator. A full-face type oxygen mask, stowed in a canvas container attached to the cylinder harness, incorporates a microphone and plug-in cord providing means of communication.

ENTRY DOORS

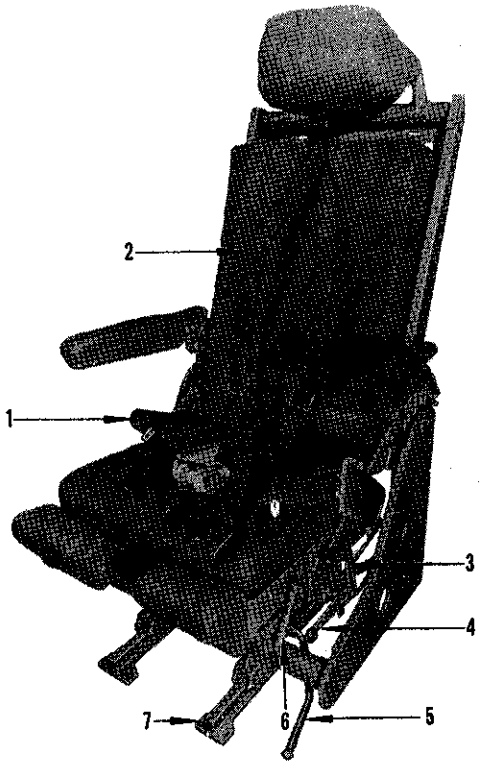
Entrance to the airplane is gained through the two entry doors on the left side of the fuselage. The forward entry door gives access to the lower forward cargo compartment and the aft entry door gives access to the lower aft compartment. These doors may be opened from the outside by placing the hand through an opening, which is covered by a flush type spring-loaded plate on the door, and pressing a trigger on the inner portion on the door. This procedure releases the handle on the outside of the door and it is then slowly lowered to the ground. Steps are built-in the door to allow ease of climbing into the airplane.

SEATS

CREW SEATS AND SAFETY BELTS

The pilot and copilot are provided with identical seats except that the seat controls for the pilot are on the left and for the copilot are on the right. These seats are fully adjustable for height and fore-and-aft-move-

1 SAFETY BELT
2 SHOULDER HARNESS
3 SEAT BACK ADJUSTMENT LEVER
4 SEAT ELEVATION LEVER
5 SEAT FORE AND AFT ADJUSTMENT LEVER
6 SHOULDER HARNESS INERTIA REEL LOCK HANDLE
7 SEAT TRACKS



PILOT'S SEAT

Figure 1-45

ment (figure 1-45). The engineer's and navigator's seats are adjustable for vertical, fore-and-aft and radial movements. (See figure 1-46.) These seats are provided with safety belts and shoulder harnesses. See Section IV for other seats.

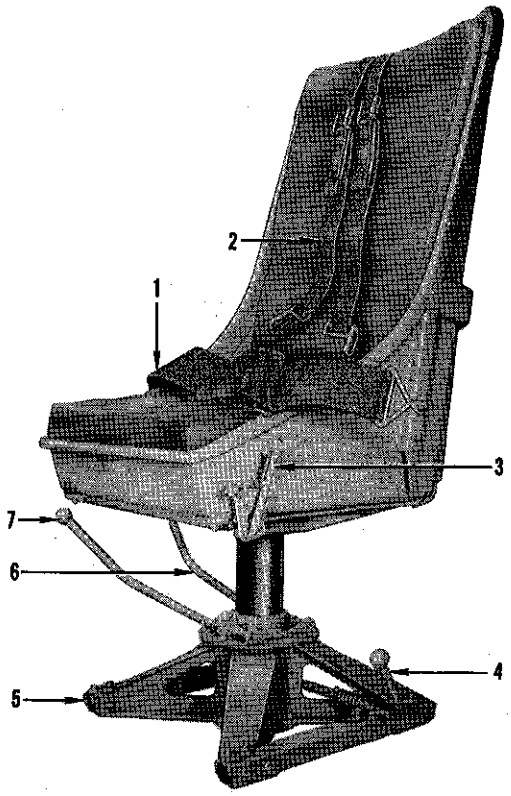
SHOULDER HARNESS INERTIA REEL LOCK HANDLE

A handle with LOCKED and RELEASED positions is located on the left side of the pilots', engineer's and navigator's seats. A latch is provided for positively retaining the handle at either position. By pressing down on the top of the handle, the latch is released and the handle may 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 prevented from bending forward. This position provides an added safety precaution over and above that of the automatic safety lock.

NOTE

It is recommended that the shoulder harness be manually locked during maneuvers and flight in rough air or as an added precaution in event of a forced landing.

1 SAFETY BELT
2 SHOULDER HARNESS
3 SHOULDER HARNESS INERTIA REEL LOCK HANDLE
4 SEAT FORE AND AFT ADJUSTMENT LEVER
5 SEAT TRACKS
6 SEAT ELEVATION LEVER
7 SEAT RADIAL ADJUSTMENT LEVER



ENGINEER'S AND NAVIGATOR'S SEAT

Figure 1-46

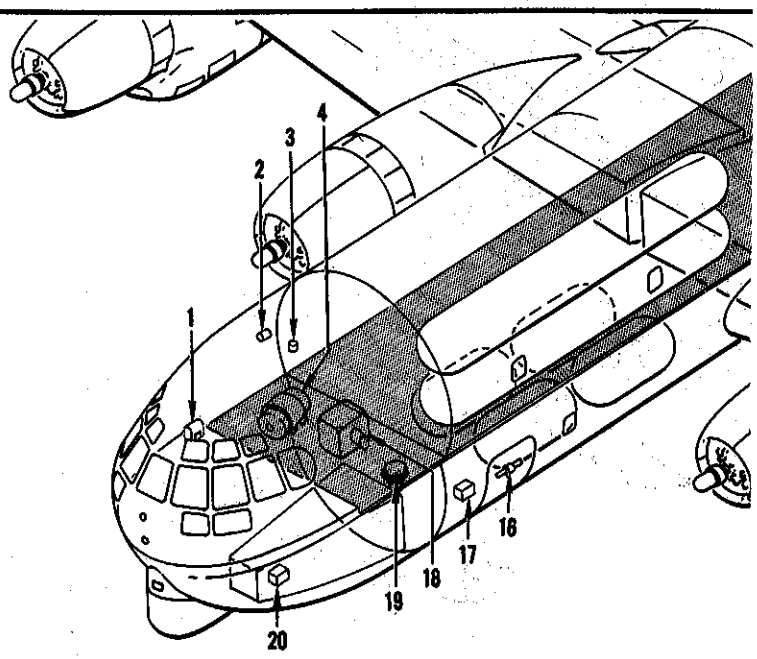
AUXILIARY EQUIPMENT

The following equipment and its operation is described in Section IV, AUXILIARY EQUIPMENT:

1. Cabin Pressurizing, Heating and Ventilating Equipment
2. Anti-Icing Systems
3. Communications and Associated Electronic Equipment
4. Lighting Equipment
5. Oxygen Equipment
6. Autopilot
7. Navigation Equipment
8. Auxiliary Power Unit
9. Single Point Ground Refueling
10. Cargo Loading Equipment
11. Troop Carrying Equipment
12. Air Refueling
13. Miscellaneous Equipment

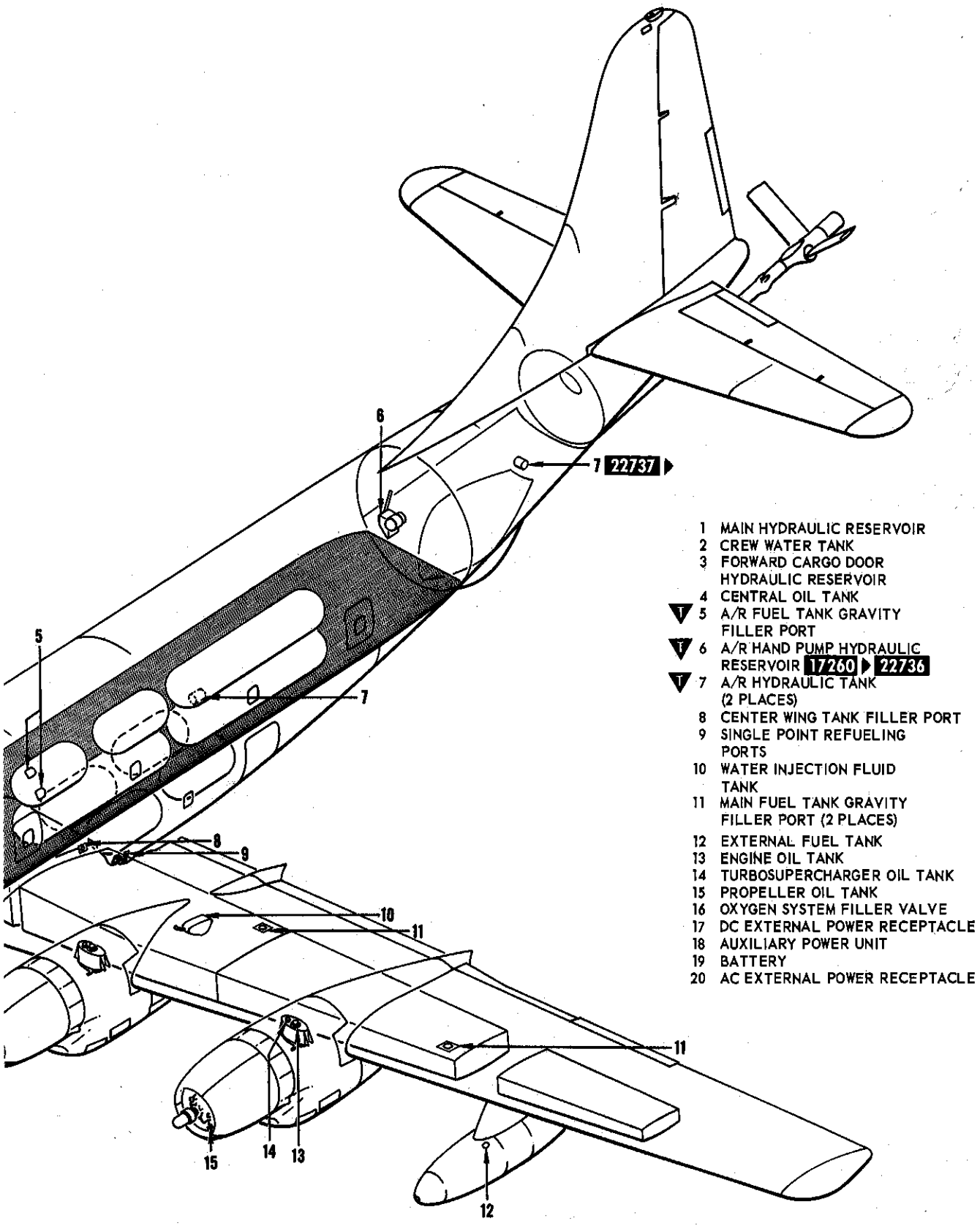
FLUID SPECIFICATIONS

FLUID	SPECIFICATION	NO. OF FILLER POINTS
FUEL	MIL-F-5572, RECOMMENDED GRADE 115/145; ALTERNATE GRADE 100/130	1 CENTER WING TANK 4 MAIN FUEL TANKS 2 EXTERNAL FUEL TANKS 1 SINGLE POINT FOR MAIN TANKS 1 A/R SINGLE POINT 2 A/R GRAVITY
ENGINE OIL	MIL-L-6082, GRADE 1100 — BEFORE SERVICING INSURE THAT THE ENGINES HAVE BEEN PROPERLY SCAVENGED	4 ENGINE OIL TANKS 1 CENTRAL OIL TANK
PROPELLER OIL MIXTURE	50% MIL-O-6081, GRADE 1010 50% MIL-C-6529A TYPE II (3 PARTS MIL-L-6082A AND 1 PART TYPE I CORROSION PREVENTIVE COMPOUND) INTEGRAL OIL CONTROLS NO. 83153 AND 89619 ONLY 80% MIL-O-5606 20% MIL-O-6083 OIL, PRESERVATIVE FOR HYDRAULIC EQUIPMENT TYPE II CONCENTRATE	4
TURBO OIL	ABOVE -9.4°C (15°F) GROUND TEMPERATURE) USE MIL-L-6082, GRADE 1065 BELOW -9.4°C (15°F) (GROUND TEMPERATURE) USE MIL-O-6081, GRADE 1010	4
AUXILIARY POWER UNIT OIL	MIL-L-7808 (TURBINE)	1 (IN APU UNIT)
HYDRAULIC FLUID	MIL-O-5606 (RED)	1 MAIN HYDRAULIC TANK 1 A/R HYDRAULIC TANK 1 FORWARD CARGO DOOR TANK 1 REAR CARGO DOOR TANK
OXYGEN	BB-O-925	1
WATER INJECTION	ABOVE -50°F (-45.5°C) (GROUND TEMPERATURE) USE 50% CLEAN DISTILLED WATER AND 50% ALCOHOL (O-M-232, GRADE A) -50°F (-45.5°C) AND BELOW (GROUND TEMPERATURE) USE 45% CLEAN DISTILLED WATER AND 55% ALCOHOL (O-M-232, GRADE A) ALTERNATE: ABOVE -30°F (-34.4°C) (GROUND TEMPERATURE) USE 50% CLEAN DISTILLED WATER AND 50% ALCOHOL (MIL-A-6091(1) -30°F (-34.4°C) AND BELOW (GROUND TEMPERATURE) USE 33-1/3% CLEAN DISTILLED WATER AND 66-2/3% ALCOHOL (MIL-A-6091(1) FOR INCLUSION OF OIL-EMULSIVE, CORROSION PREVENTIVE SPEC. MIL-C-4339, USE IN THE AMOUNT OF 2/3 OF 1% OF THE TOTAL VOLUME	2



SERVICING

Figure 1-47 (Sheet 1 of 2)



1 MAIN HYDRAULIC RESERVOIR
2 CREW WATER TANK
3 FORWARD CARGO DOOR HYDRAULIC RESERVOIR
4 CENTRAL OIL TANK
▼ 5 A/R FUEL TANK GRAVITY FILLER PORT
▼ 6 A/R HAND PUMP HYDRAULIC RESERVOIR 17260 ▶ 22736
▼ 7 A/R HYDRAULIC TANK (2 PLACES)
8 CENTER WING TANK FILLER PORT
9 SINGLE POINT REFUELING PORTS
10 WATER INJECTION FLUID TANK
11 MAIN FUEL TANK GRAVITY FILLER PORT (2 PLACES)
12 EXTERNAL FUEL TANK
13 ENGINE OIL TANK
14 TURBOSUPERCHARGER OIL TANK
15 PROPELLER OIL TANK
16 OXYGEN SYSTEM FILLER VALVE
17 DC EXTERNAL POWER RECEPTACLE
18 AUXILIARY POWER UNIT
19 BATTERY
20 AC EXTERNAL POWER RECEPTACLE

Figure 1-47 (Sheet 2 of 2)