CL-350

CL-350 TRAINING MANUAL

HYDRAULICS | 04

AIRCRAFT SYSTEMS
TRAINING MANUAL

LOFT.AERO

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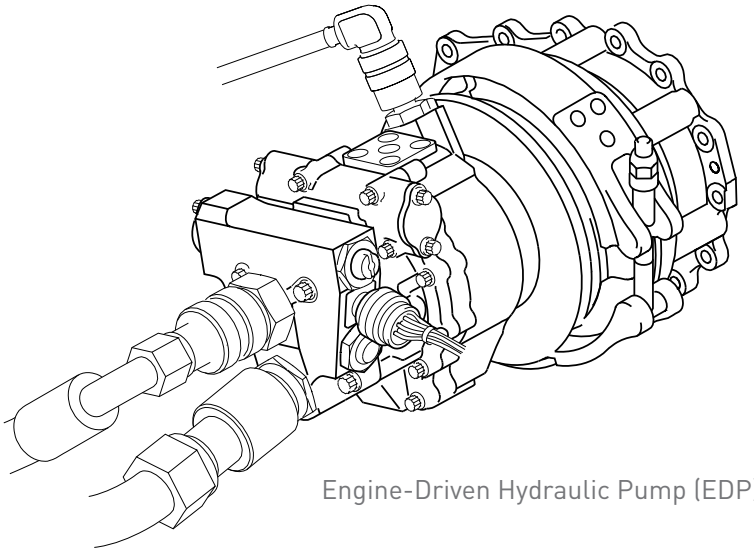
HYDRAULICS

I. INTRODUCTION

The hydraulic system of the Challenger 350 represents a sophisticated and highly redundant design that ensures continued aircraft control and operation even under adverse conditions. Comprised of three independent hydraulic systems—left, right, and auxiliary—this configuration provides multiple layers of safety and operational reliability throughout all phases of flight.

The left and right hydraulic systems operate as completely independent units, each powered by dedicated Engine-Driven Pumps (EDPs) with DC Motordriven Pump (DCMP) backup, while the auxiliary system serves as a critical tertiary backup tied to the right hydraulic system.

Operating at a nominal pressure of 3000 psi and utilizing Fire Resistant Phosphate Ester based MIL-H-5440 Type II fluid, these systems power essential aircraft functions including flight controls, landing gear operation, wheel brakes, thrust reversers, and various other critical subsystems.



Engine-Driven Hydraulic Pump (EDP)

The intelligent design ensures that hydraulic power remains available to vital flight control surfaces even after single or multiple system failures, with the auxiliary system providing power to the lower rudder Power Control Unit (PCU) when primary systems are lost. Understanding the operation, monitoring, and emergency procedures associated with this hydraulic system is fundamental to safe aircraft handling.

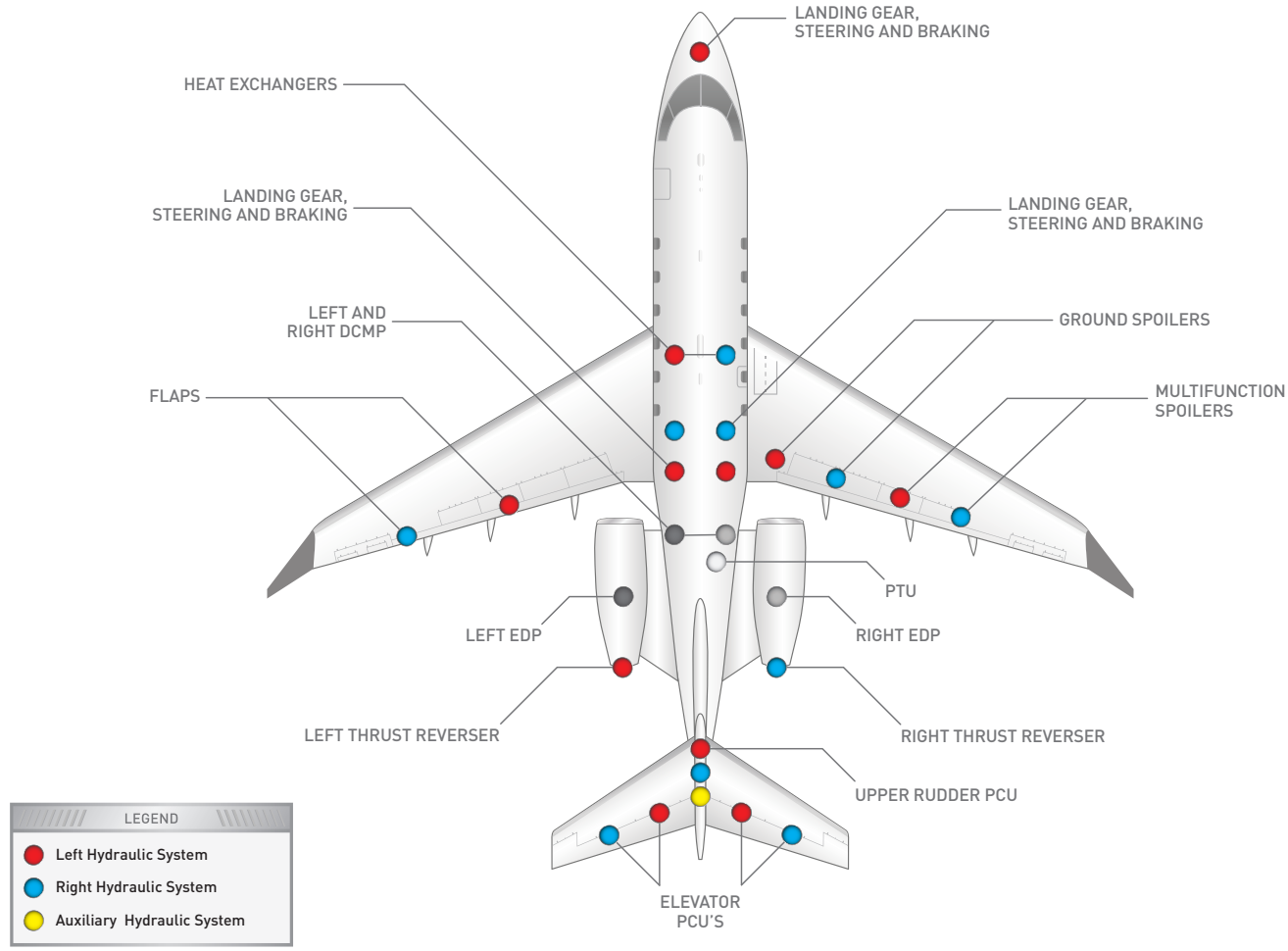
A. HYDRAULIC SYSTEM SPECIFICATIONS

Parameter	Left System	Right System	Auxiliary System
Operating Pressure	3,000 psi	3,000 psi	2,500-3,350 psi
Reservoir Capacity	750 cu in	525 cu in	150 cu in
Fluid Volume	13 quarts	9.1 quarts	—
Primary Pump	Engine-Driven Pump (EDP)	Engine-Driven Pump (EDP)	DC Motor Pump
Backup Pump	DC Motor Pump (DCMP)	DC Motor Pump (DCMP)	—

HYDRAULIC FLUIDS APPROVED FOR USE: Phosphate Ester Fire-Resistant per BAMS 564-003 Type IV, Skydrol LD-4, Hyjet IV-a Plus

B. SYSTEM FUNCTIONS

Left Hydraulic System	Right Hydraulic System	Aux Hydraulic System
Multi-functional spoilers (inboard)	Multi-functional spoilers (outboard)	Low Rudder PCU
Ground spoilers (inboard)	Ground spoilers (outboard)	—
Rudder (upper PCU)	Rudder (lower PCU)	—
Left thrust reverser	Right thrust reverser	—
Inboard brakes, emergency	Outboard brakes	—
Nose wheel steering actuator	Main landing gear assist actuators	—
Elevator (inboard PCUs)	Elevator (outboard PCUs)	—
Alternate FLAPS	Normal FLAPS supply	—
Landing Gear	Power transfer unit	—



II. LEFT AND RIGHT HYDRAULIC SYSTEMS

A. SYSTEM DESCRIPTION

Major Components:

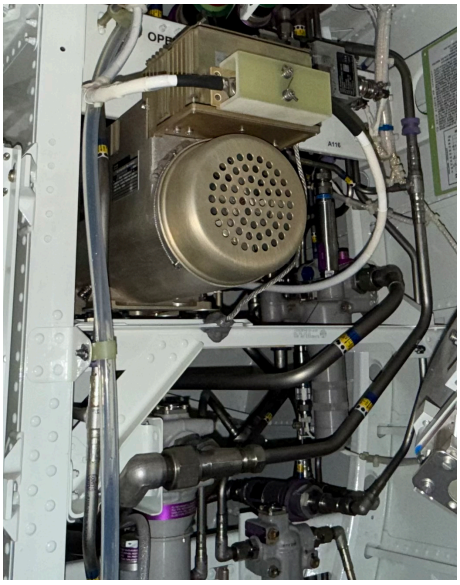
- Engine-Driven Pumps (EDPs)
- DC Motor Pumps (DCMPs)
- Firewall Shutoff Valves (SOVs)
- Control valves
- Fluid reservoirs
- Sensors for monitoring and control

Component Locations:

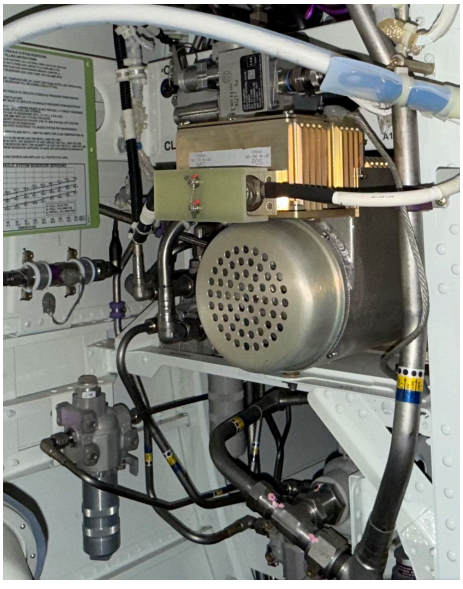
- EDPs mounted on engine accessory gearboxes
- Heat exchangers located in respective wing fuel tanks
- Major components located in aft of the engine rotor burst zone
- Left and right hydraulic system reservoirs installed on respective sides in aft equipment compartment
- AUX hydraulic system installed right side in aft equipment compartment

System Independence:

- Left and right hydraulic systems operate independently
- Hydraulic fluid never mixed between left and right systems
- Each system has separate fuel/hydraulic fluid heat exchangers in wing fuel tank
- AUX system tied to right hydraulic system



Right DC Motor Pump



Left DC Motor Pump

B. HYDRAULIC RESERVOIR

Left Hydraulic Reservoir:

- Fluid volume: 13 quarts
- Capacity: 750 cu in
- Located on left side in aft equipment compartment

Right Hydraulic Reservoir:

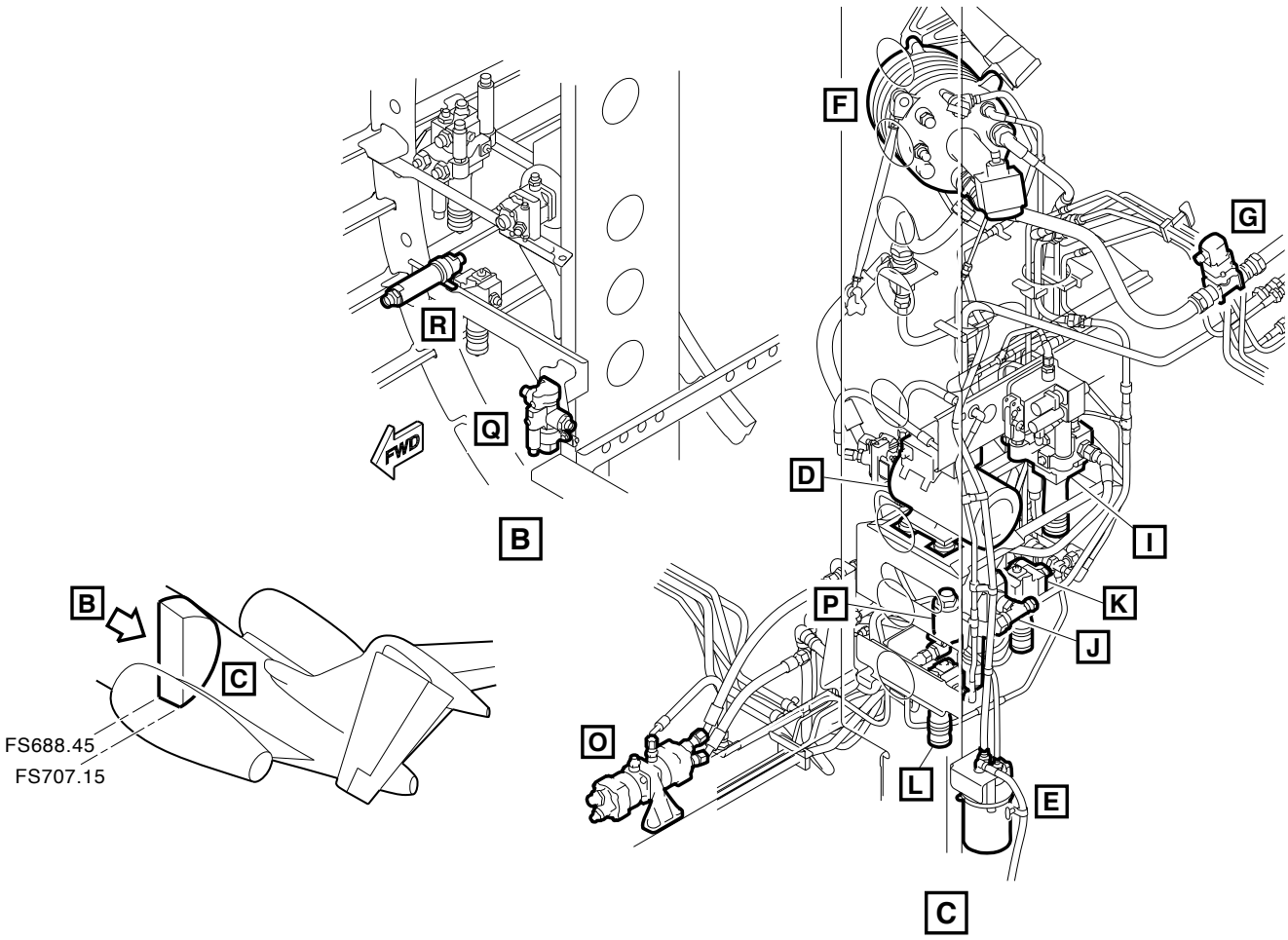
- Fluid volume: 9.1 quarts
- Capacity: 525 cu in
- Located on right side in aft equipment compartment

Reservoir Components:

- Bleed/relief valve for air removal
- Visual quantity indicator (0-100% in 10% increments)
- Suction shutoff valve in pump suction port
- Temperature switch and temperature transducer ports
- Check valve in fluid return port

Reservoir Functions:

- Storage of hydraulic fluid
- Pressurization of pump inlet
- Accommodate fluid volume changes due to thermal expansion/contraction
- System leakage compensation
- Differential area of user actuators (gear, flaps, etc)



ID	Component	ID	Component
D	DC Motor Pump (DCMP)	K	Case Drain Filter Manifold
E	Ecology Bottle	L	Case Drain Filter Manifold
F	Hydraulic Reservoir	O	Power Transfer Unit (PIU)
G	Firewall Hydraulic Shutoff-Valve (SOV)	P	Heat-Exchanger Bypass Valve
I	Pressure Manifold Assembly	Q	PTU Select Valve
J	Return Filter Manifold	R	Balance Relief Valve

C. ENGINE-DRIVEN PUMPS (EDPs)

The left and right hydraulic systems are each powered by an Engine Driven Pump (EDP) that is flange-mounted to the respective engine gearbox and driven through a splined input shaft. These variable-delivery, piston-type pumps maintain a nominal system pressure of 3000 psi and operate continuously whenever the engines are turning.

Each EDP incorporates a solenoid isolation/actuation valve that can reduce discharge pressure and torque when energized, such as during engine windmill restart operations when activated by the FADEC. The EDPs serve as the primary hydraulic power source for their respective systems, with DC motor-driven pumps (DCMPs) providing backup capability.

EDP Characteristics:

- Variable-delivery, piston type pumps
- Maintain nominal system pressure of 3000 psi
- Flange-mounted to engine gearbox
- Driven through splined input shaft
- Operate anytime engines are turning

EDP Features:

- Solenoid isolation/actuation valve for discharge pressure reduction
- Quick-disconnect fittings on discharge, suction and case drain ports
- Case drain port located on top side near mounting flange
- Maximum case drain cooling of pump components
- Air bleeding assurance after new pump installation

EDP Operation:

- Pressure switches in pump outflow lines provide low-pressure indications
- Solenoid activated by FADEC during engine windmill restart to depressurize pump
- Left EDP flow and left DCMP flow combine in left filter manifold
- Right EDP flow and right DCMP flow combine in right filter manifold

D. DC MOTOR-DRIVEN PUMPS (DCMPs)

DCMP Purpose:

- Pressurize hydraulic systems during engine or EDP failure
- Serve ground maintenance operation purposes
- Backup hydraulic pressure source

DCMP Construction:

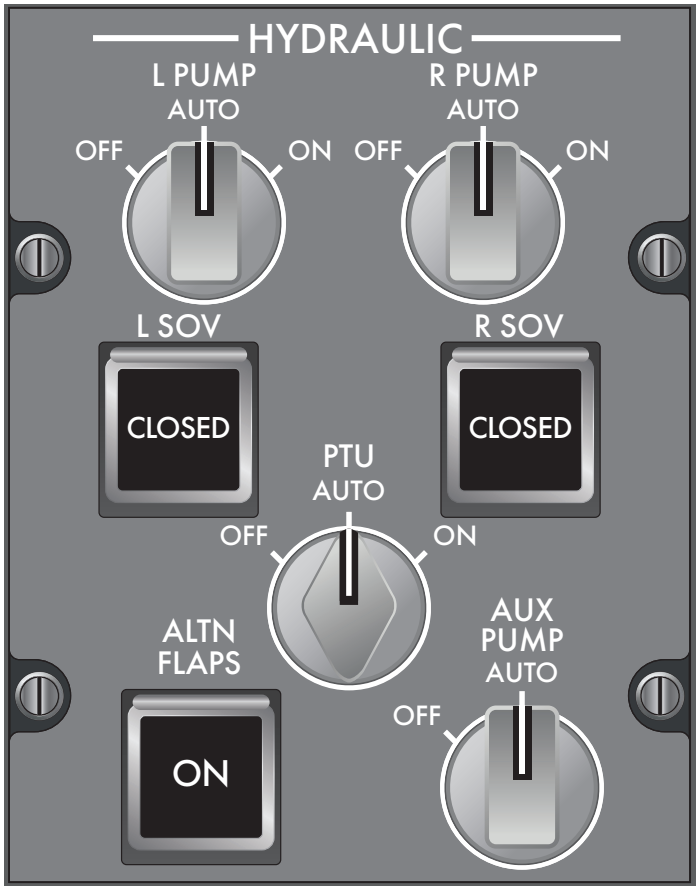
- DC electric motor attached to variable-delivery hydraulic pump
- DC motor operates pump to maintain necessary system pressure
- Can change volume of fluid flow as needed
- Left and right DCMPs installed on respective sides in aft equipment compartment

DCMP Power Supply:

- Electrical power supplied by DC bus through electrical connector
- R DC generator supplies power to left DCMP
- L DC generator supplies power to right DCMP
- Cross-feeding arrangement provides redundancy

DCMP Control:

- Three-position switch: OFF, AUTO, ON
- OFF and ON positions allow manual operation
- AUTO position is normal position for flight
- AUTO position: DCMPs off with flaps up, on with flaps at 10° or greater
- Automatic activation with low hydraulic system pressure detection



Hydraulic Control Panel

E. HYDRAULIC SHUTOFF VALVES (SOVs)

SOV Location and Function:

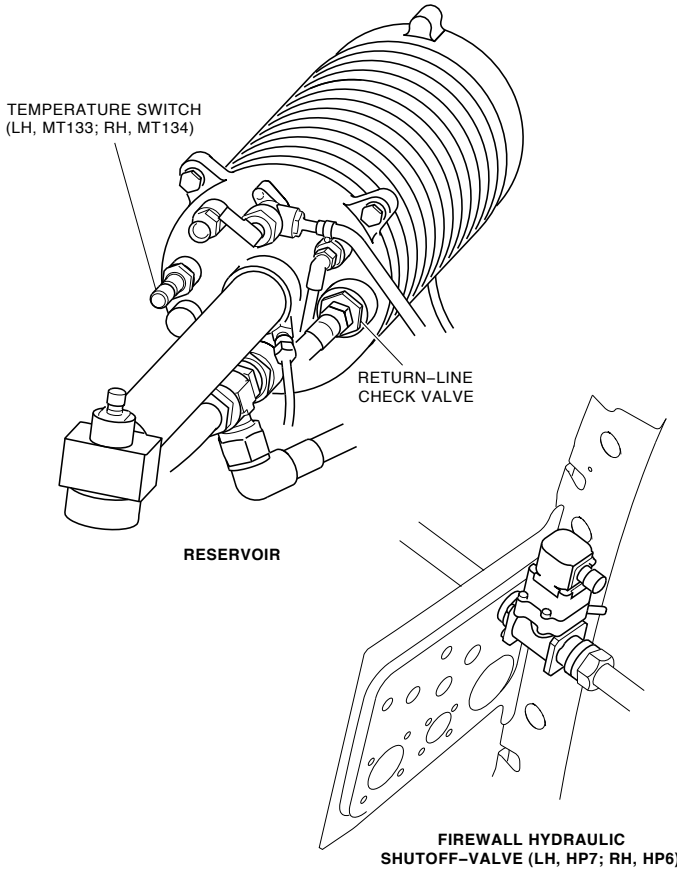
- Each left and right hydraulic system contains firewall shutoff valve
- Placed in EDP suction line outside pylon area
- Closes to stop hydraulic fluid from reaching engine area
- Located inside aft equipment compartment

SOV Operation:

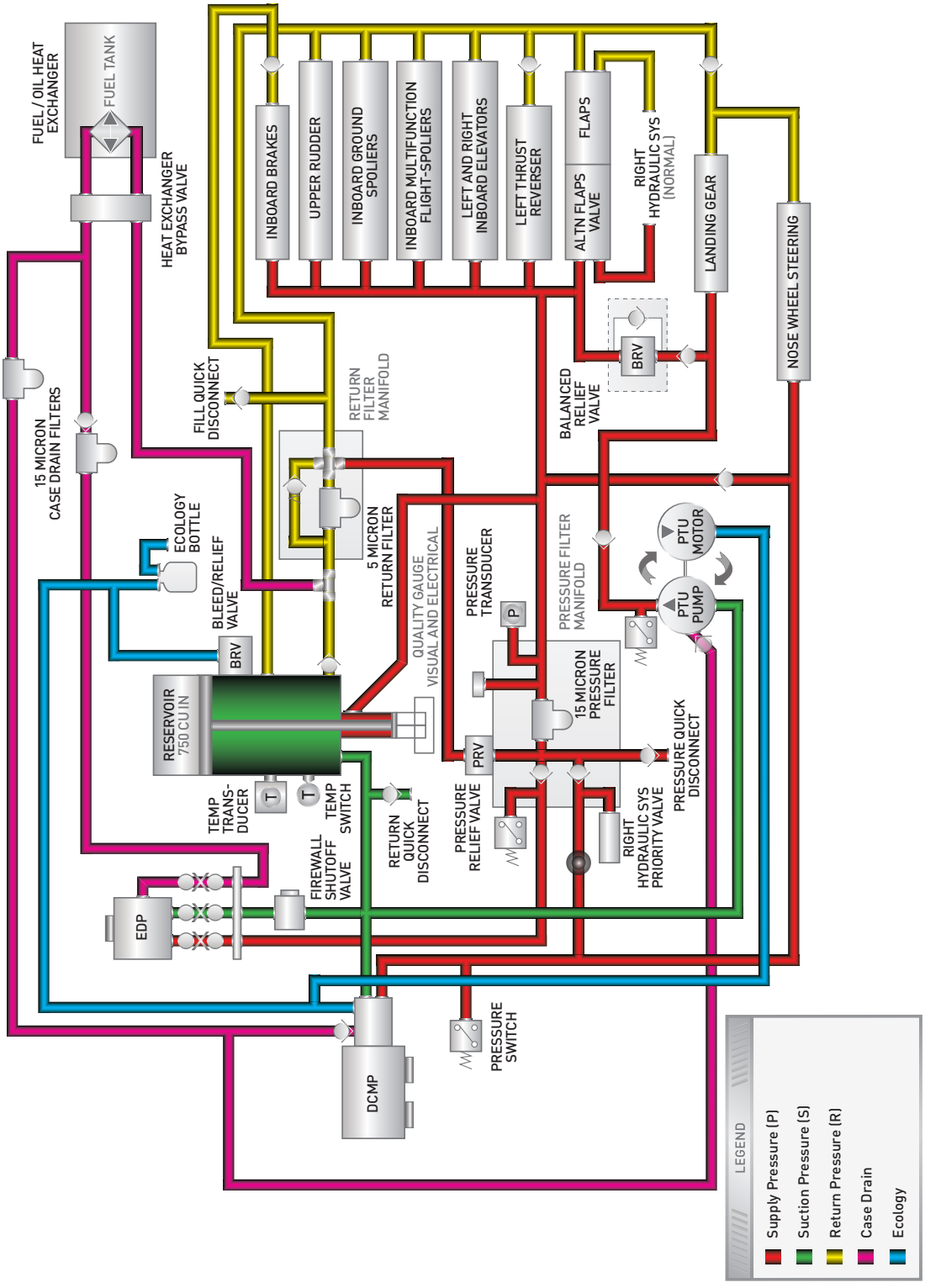
- Normally in open position during flight operations
- Can be closed manually by pressing L (R) SOV push button on hydraulic control panel
- Can be closed by L (R) ENG FIRE switch activation on engine control panel
- Control logic closes valve automatically when system fluid temperature exceeds 275°F

SOV Effect:

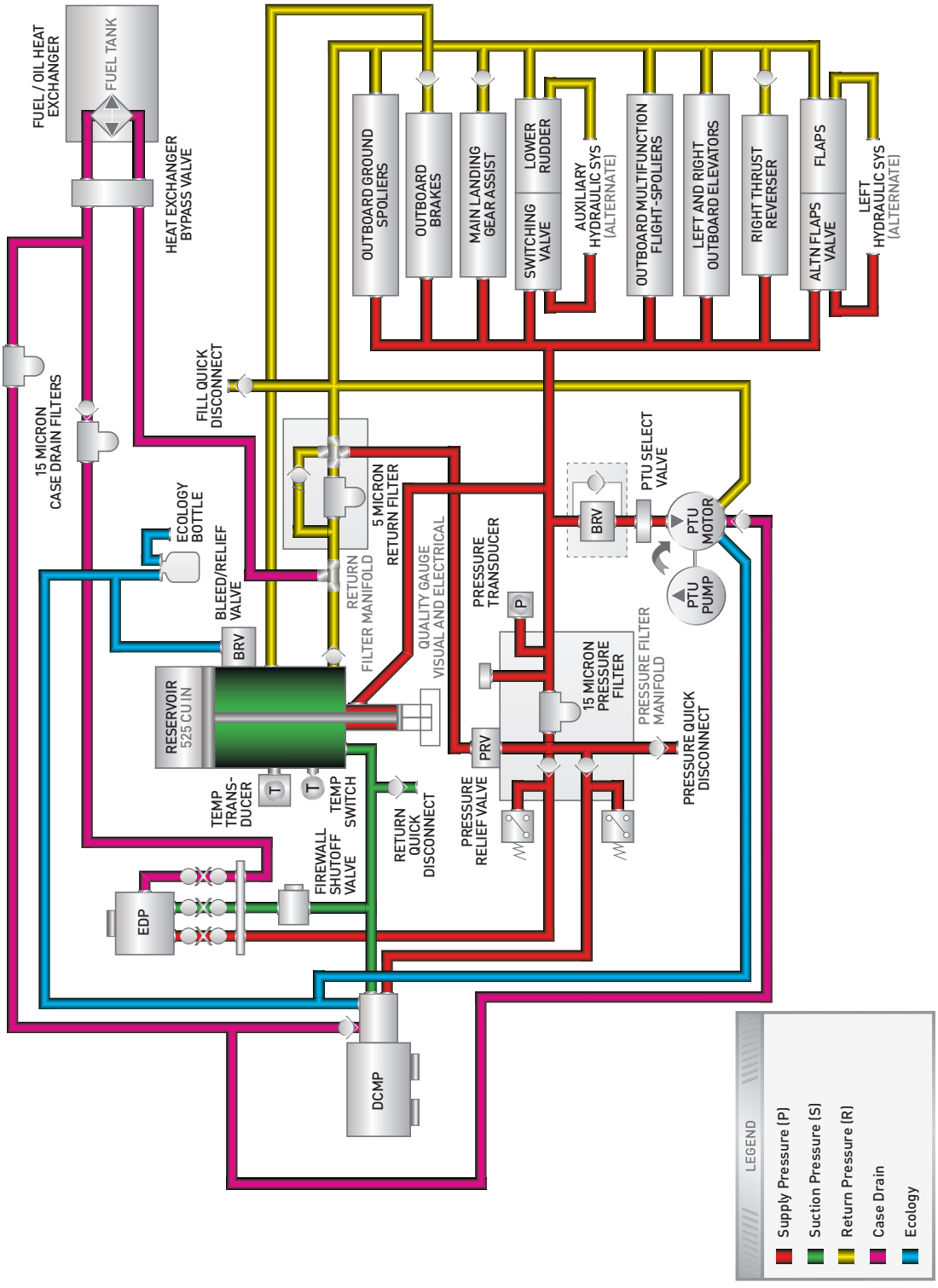
- When firewall SOV is operated, DCMPs provide only the hydraulic pressure source
- Available for left or right hydraulic systems



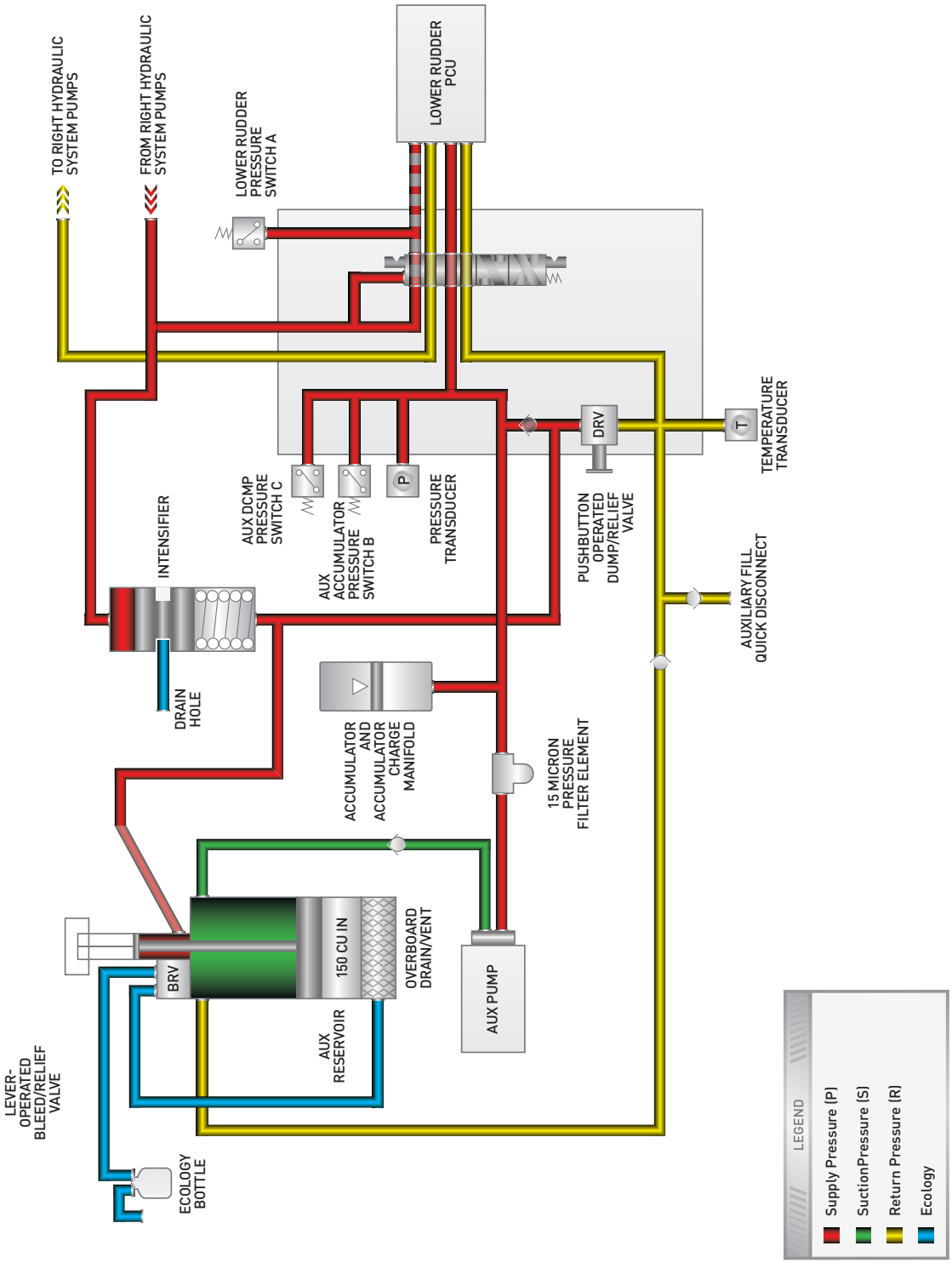
LEFT HYDRAULIC SYSTEM SCHEMATIC



RIGHT HYDRAULIC SYSTEM SCHEMATIC



AUXILIARY HYDRAULIC SYSTEM SCHEMATIC



III. AUXILIARY HYDRAULIC SYSTEM

The auxiliary hydraulic system serves as a backup to provide hydraulic pressure to the lower rudder PCU when the right hydraulic system fails. The system consists of a DC motor-driven pump (DCMP), reservoir, and accumulator, all located aft of the engine rotor burst zone for safety. It operates between 2,500 and 3,350 psi using Fire Resistant Phosphate Ester based fluid and is controlled from the HYDRAULICS panel on the center pedestal. The system features an intensifier that is pressurized by the right hydraulic system to prevent pump cavitation and ensure reliable operation during normal and emergency conditions.

A. SYSTEM DESCRIPTION

Purpose:

- Provide hydraulic pressure to lower rudder PCU during right hydraulic system failure
- Located aft of engine rotor burst zone
- Independent backup system for rudder control

Major Components:

- DCMP (constant displacement)
- Reservoir
- Accumulator
- Pressure intensifier
- All components located aft of engine rotor burst zone

System Operation:

- Right hydraulic system normally powers lower rudder PCU
- During loss of right system pressure, hydraulic switching valve allows auxiliary system to provide pressure to lower rudder PCU
- Left or right hydraulic system may be activated without system already being pressurized
- Auxiliary system has intensifier pressurized by right hydraulic system

Aux Hydraulic System

B. AUXILIARY DC MOTOR-DRIVEN PUMP

Pump Function:

- Maintain fluid pressure in auxiliary system accumulator
- Controlled by two-position AUX PUMP switch (OFF/AUTO)
- Constant displacement DCMP

Pump Operation

- When system pressure decreases to 2,500 psi, external pressure switch turns on pump
- Pump operates until pressure reaches 3,350 psi
- At 3,350 psi, pressure switch deactivates, commanding pump off
- OFF position disables pump
- AUTO position allows pump to activate as needed

C. AUXILIARY SYSTEM ACCUMULATOR AND RESERVOIR

Accumulator Specifications:

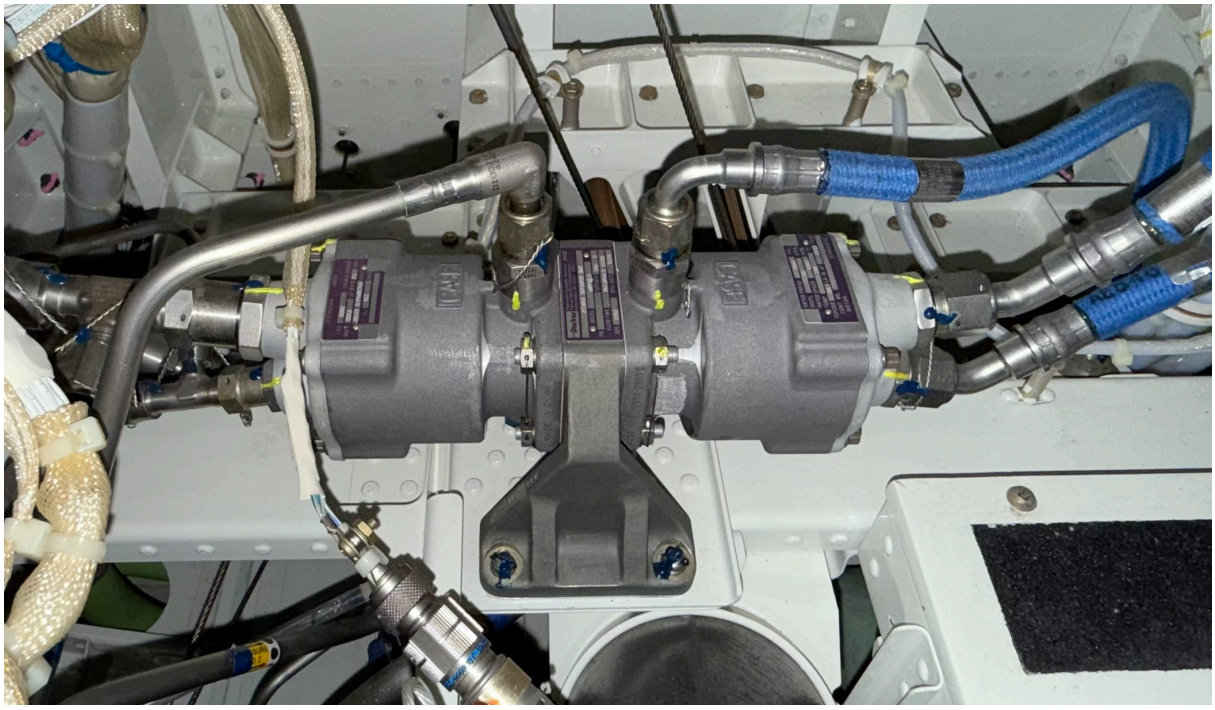
- Nominal gas volume: 50 cubic inches of dry nitrogen
- Pre-charge pressure varies with temperature
- Provides instantaneous hydraulic pressure demands
- Dampens pressure surges within system

Accumulator Function:

- When discharged, accumulator retains sufficient fluid for smooth continuous operation
- Lower rudder operates smoothly as pump comes online at approximately 2,500 psi
- Satisfies instantaneous demands of hydraulic pressure

Intensifier Operation:

- Spring-loaded piston transmits pressure from RH system to pressure side of auxiliary system reservoir
- Augments inlet pressure to auxiliary DCMP to prevent pump cavitation
- DC pumps supply intensifier with pressure before engines start
- AUX DCMP comes on if selected to AUTO, aircraft has power, and aux system accumulator pressure is low
- Once AUX DCMP pressurizes, operation is independent of RH system



Power Transfer Unit

IV. POWER TRANSFER UNIT (PTU)

The Power Transfer Unit (PTU) consists of a hydraulic motor mechanically coupled to a hydraulic pump through a drive shaft. When energized, the PTU uses pressure from the right hydraulic system to drive its motor, which in turn operates the pump connected to the left hydraulic system. The PTU is dedicated to landing gear operation and provides normal gear retraction times when the left enginedriven pump (EDP) or left engine is inoperative. It serves as a critical backup system that prevents excessively slow gear operation that would otherwise occur when relying solely on the DC motor pump (DCMP).

A. PTU DESCRIPTION

PTU Construction:

- Hydraulic motor coupled mechanically through drive shaft to hydraulic pump
- Motor driven by pressure from right hydraulic system
- Pump side connected to left system
- Dedicated to operation of landing gear

PTU Function:

- Used for gear operation when left EDP system or left engine not operational
- Provides pressurization for left hydraulic system reservoir
- Dedicated to retracting and extending landing gear
- Allows normal gear retraction time during left engine failure
- Priority valve protects right system pressure from excessive flow demand

B. PTU OPERATION

PTU Control:

- Three-position switch: OFF, AUTO, ON
- OFF and ON positions: PTU valve manually closed or open
- AUTO position: normal operating mode

AUTO Mode Activation Requirements:

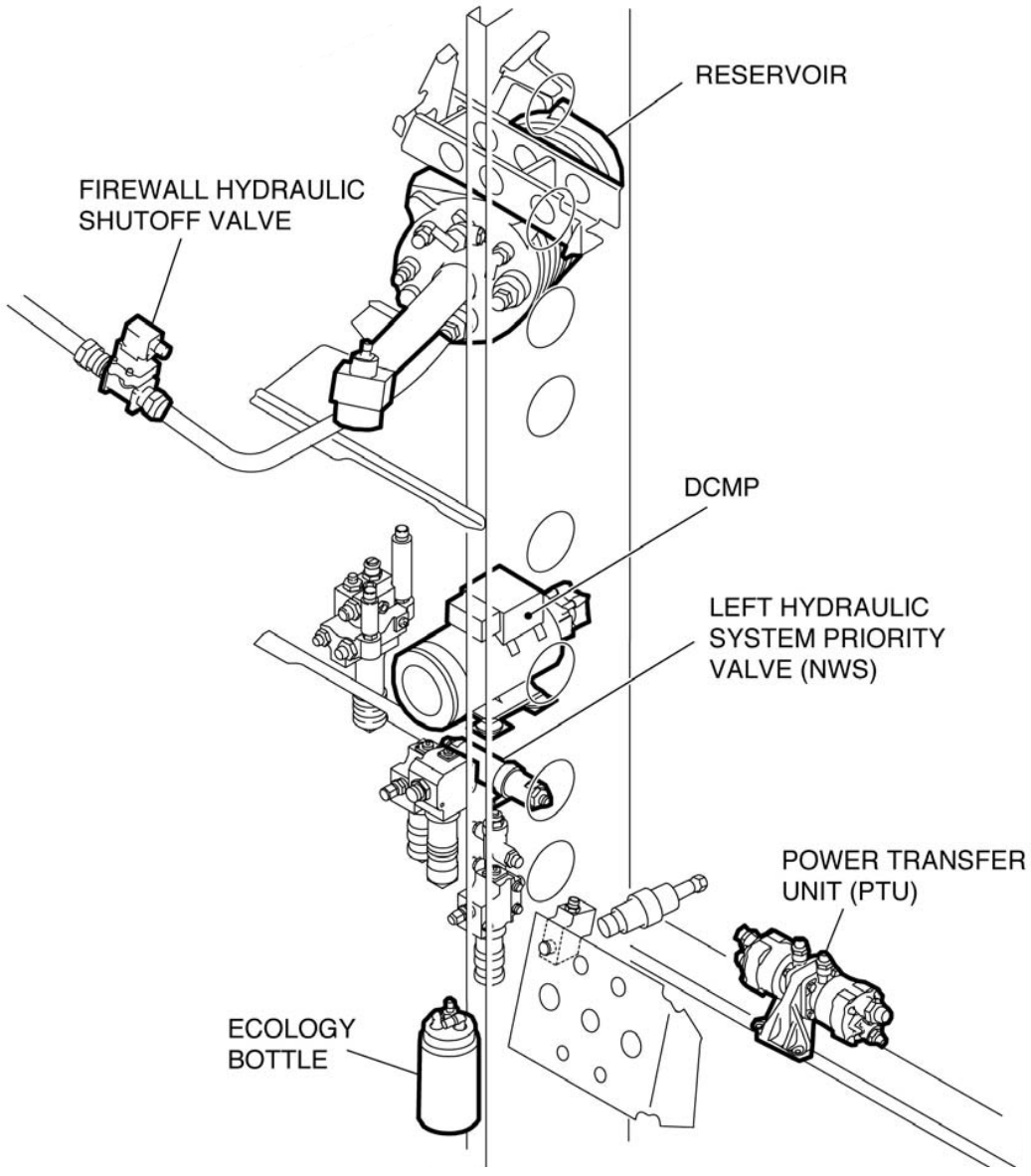
- Left engine or left EDP inoperative or failed
- Right EDP producing pressure
- Gear not in commanded position
- Aircraft in air

PTU Performance:

- Allows gear to operate at normal rate
- Slight increase in transit time due to PTU solenoid delays
- Solenoid energizing and PTU coming up to speed causes minor delay

PTU Protection:

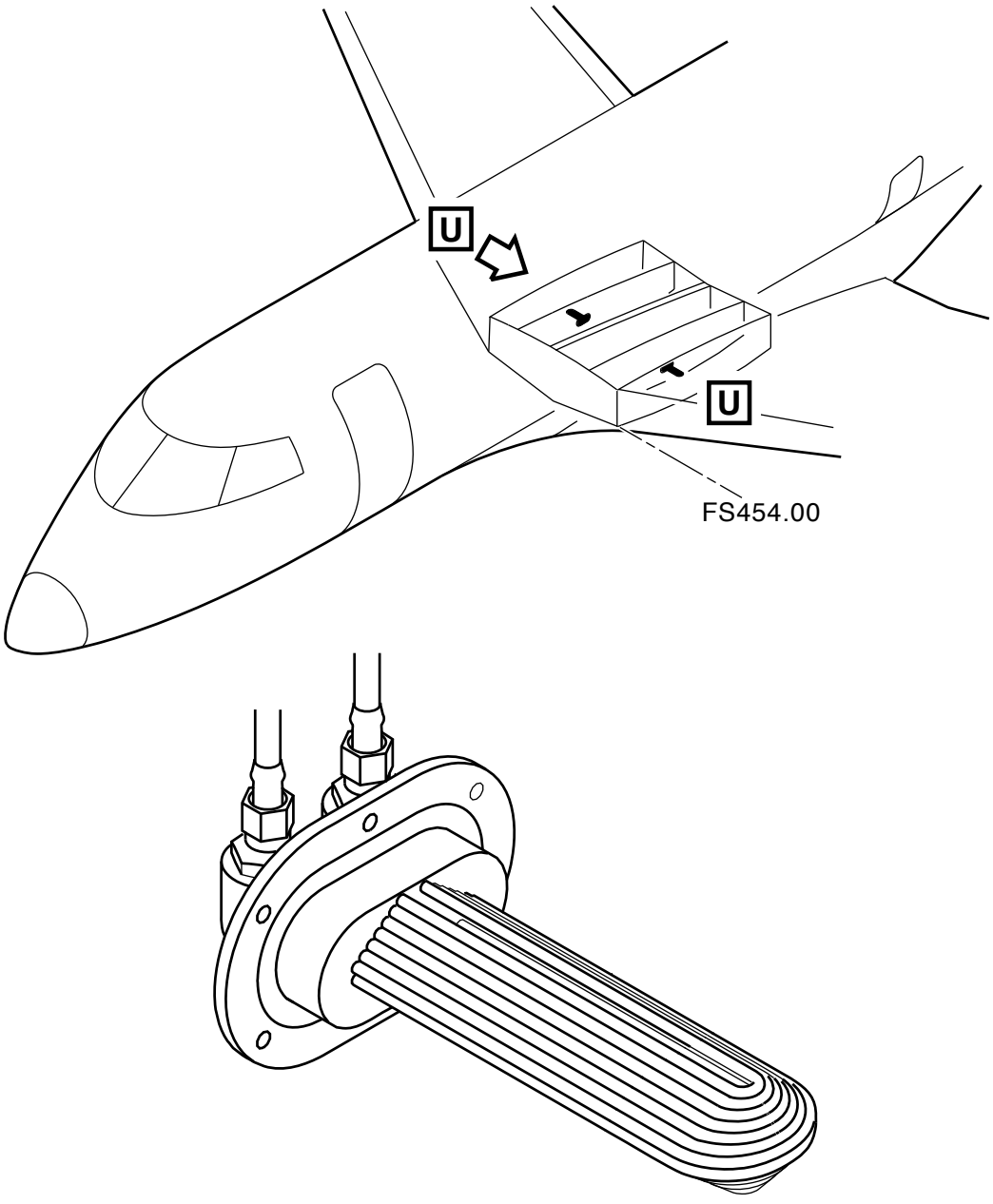
- When in AUTO and does not produce pressure within 15 second, latched off
- Protects load on Right Hydraulic System
- Latch reset if AUTO mode de-selected or power removed from PSEU



V. HYDRAULIC SYSTEM COOLING

The left and right hydraulic systems require cooling due to heat generated by the engine driven pumps (EDPs) and other heat sources within the engine nacelle. Each system utilizes a fuel/hydraulic heat exchanger located in the respective wing tank, with flow controlled by a thermostatically controlled bypass valve that responds to fluid temperature.

At temperatures above 125°F, the valve directs all fluid through the heat exchanger for cooling, while below 125°F it bypasses the heat exchanger and routes fluid directly to the reservoir. If fluid temperature exceeds 212°F (100°C), the **L (R) HYD TEMP** HIGH (C) CAS message is triggered. If fluid reaches 275°F for more than 3 seconds,



HEAT EXCHANGER

U

the shutoff valve closes automatically.

A. COOLING REQUIREMENTS

Heat Sources:

- Heat generated by EDPs
- Heat from other sources within engine nacelle
- Left and right hydraulic systems require cooling

Heat Exchanger Location:

- Fuel/hydraulic heat exchanger in each wing tank
- Left system heat exchanger in left wing fuel tank
- Right system heat exchanger in right wing fuel tank

B. COOLING SYSTEM OPERATION

Bypass Valve Function:

- Thermostatically controlled bypass valve between heat exchanger inlet and outlet line
- Controls flow of pump case drain fluid to heat exchanger as function of fluid temperature
- Acts as thermal bypass valve if pressure drop through heat exchanger becomes excessive

Temperature-Based Operation:

- Above 125°F: valve in full open mode, routes all fluid through heat exchanger for cooling
- Below 125°F: valve in bypass mode, routes all fluid around heat exchanger directly to reservoir
- 275°F for more than 3 seconds: SOV closes and **L (R) HYD TEMP HIGH** (C) CAS message illuminated

VI. HYDRAULIC SYSTEM COMPONENTS

A. ECOLOGY BOTTLES

Location and Purpose:

- Left and right hydraulic systems each contain ecology bottle
- Installed in lower part of rear fuselage
- Transparent bottles to see hydraulic fluid level inside

Ecology Bottle Function:

- Collect hydraulic fluid leakage from DCMP shaft seals
- Collect leakage from PTU seal drain port
- Collect fluid from reservoir bleed/relief valves

Hydraulic System Normal Operating Ranges

System	Normal Upper Level	Normal Lower Level
Left System	85%	30%
Right System	85%	40%
Auxiliary System	85%	20%

B. RESERVOIR QUANTITY PERCENTAGES

Quantity Display:

- Hydraulic reservoir quantity percentages displayed in 2% increments
- Displayed on Summary page and HYDRAULIC synoptic page
- Within normal range: quantity percentages displayed in green
- Above or below normal: percentages displayed in white

Operational Considerations:

- Approximately 25% of fluid in landing gear hydraulic lines and actuators when gear down
- Quantity percentages show lower but usually stay in normal range with gear down
- Fluid level percentages climb but stay in normal range when gear retracted
- System percentage less than normal lower-level displays in white and should be serviced prior to flight
- No CAS messages associated with percentages above or below normal levels

Hydraulic Reservoir Gauge

C. UNLOADING OF HYDRAULIC PUMP FOR IN-FLIGHT RESTARTS

EDP Depressurization:

- Engine driven pump incorporates depressurization circuit
- Unloads pump and reduces input torque during engine relights
- When reservoir fluid temperature reaches 275°F, PSEU commands FADEC to depressurize EDP

Automatic Operation:

- DCMP automatically continues providing hydraulic pressure to other systems after EDP stops
- No flight crew action required
- Above procedures are automatic

VII. CONTROLS AND INDICATIONS

A. HYDRAULIC CONTROL PANEL

Panel Location:

- Located immediately to right of throttle quadrant on center pedestal
- Provides manual control of hydraulic system components

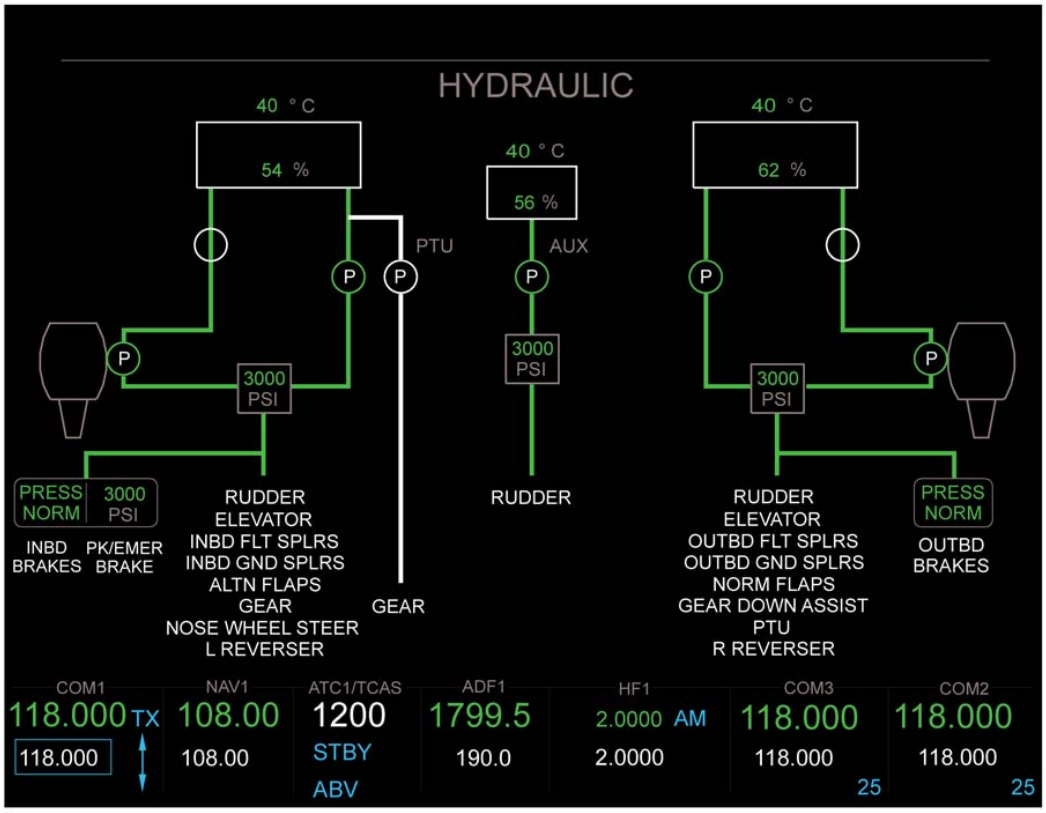
Panel Functions:

- Manual operation of electric hydraulic pumps
- Manual operation of shutoff and selector valves
- Manual operation of power transfer unit
- EICAS monitors and displays hydraulic system information

B. HYDRAULIC SYNOPTIC PAGE

Display Function:

- Hydraulic system operation monitored and status displayed
- Shows system pressures and temperatures
- Displays pump operations and system status
- Fluid quantity percentages shown

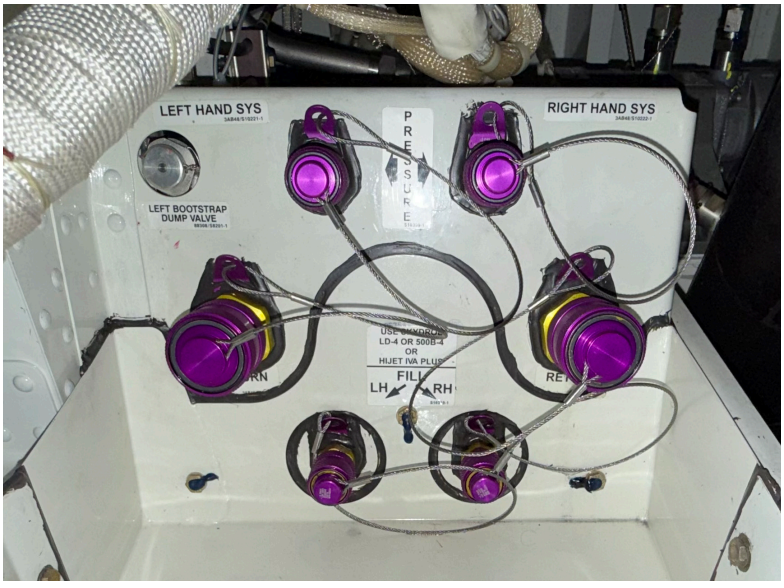


VIII. HYDRAULIC SERVICING

A. SERVICING DESCRIPTION

Ground Service Quick-Disconnects:

- Left and right hydraulic systems each have ground service quick-disconnects
- Ground fill, pressure and return fluid circuits
- Used for ground maintenance tasks



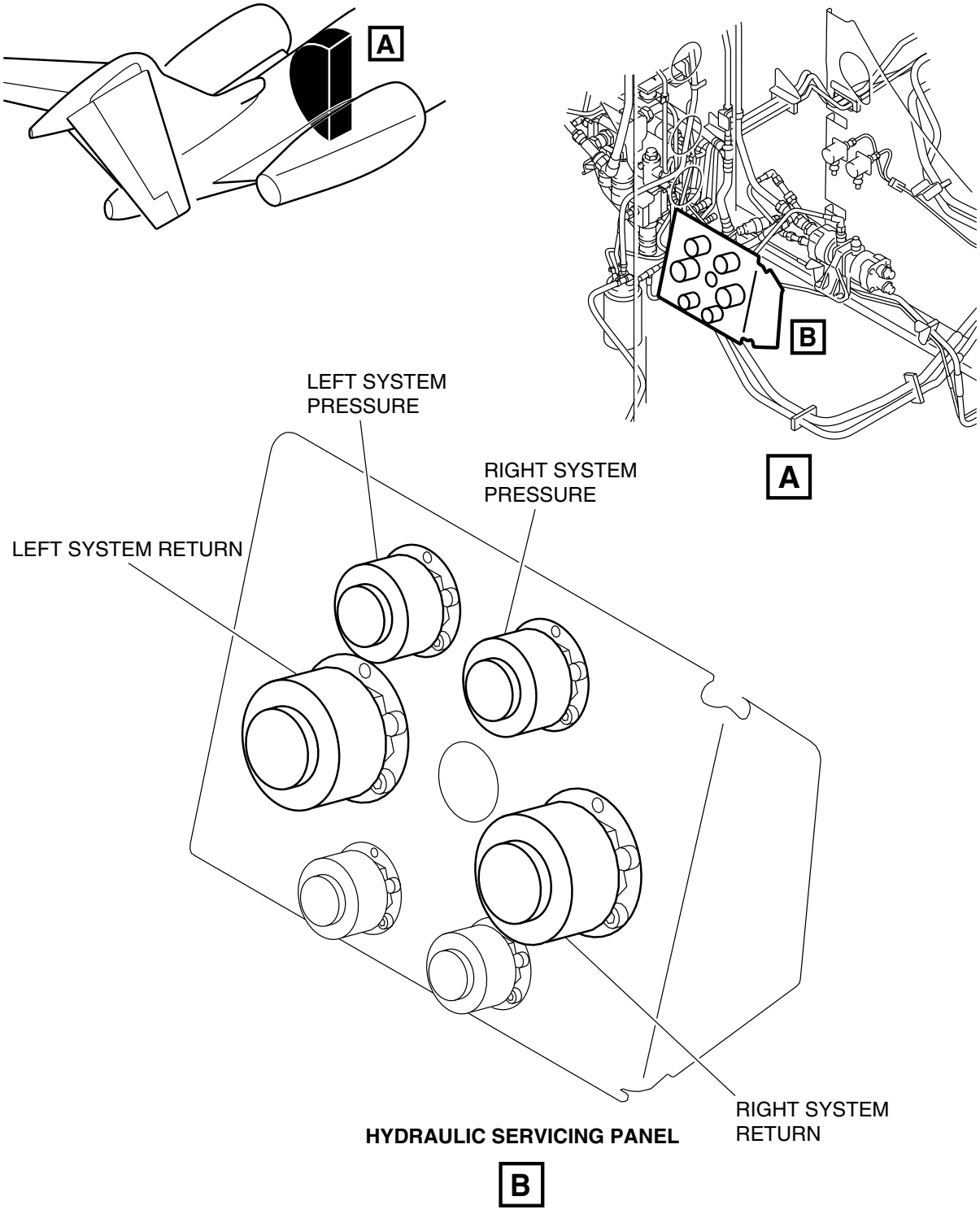
Maintenance Functions:

- System bleeding
- System flushing
- System draining
- Ground pressurization
- Auxiliary system filler has quick-disconnect to add hydraulic fluid to auxiliary reservoir

Quick-Disconnect Location:

- Installed on panels near system access doors

HYDRAULIC SERVICING PANEL



A

HYDRAULIC SERVICING PANEL

B

IX. EICAS MESSAGES – GROUPED BY SEVERITY

A. WARNING MESSAGES

WARNING MESSAGES

Immediate crew action required

Message	Meaning	Inhibits
HYD PRESS LOW	The left and right hydraulic pressures are less than 1,800 psi	—

B. CAUTION MESSAGES

CAUTION MESSAGES

Timely crew awareness/action needed

Message	Meaning	Inhibits
AUX HYD TEMP HIGH	The auxiliary hydraulic fluid system temperature is greater than 135°C	TO/LAND
L (R) HYD PRESS LOW	The affected hydraulic system pressure is less than 1,800 psi	TO/LAND
HYD PTU FAIL	The power transfer unit is not producing pressure when commanded	—
L (R) HYD SOV FAIL	The respective hydraulic shutoff valve did not close when commanded or is closed when it should be open	TO/LAND
L (R) HYD TEMP HIGH	The respective hydraulic system temperature is above 100°C	TO/LAND

C. ADVISORY MESSAGES

ADVISORY MESSAGES

Crew awareness - no immediate action required

Message	Meaning	Inhibits
AUX HYD SYS FAIL	The auxiliary hydraulic pump is not producing pressure when it should	TO/LAND
AUX HYD PUMP FAIL ON	The auxiliary hydraulic pump is running continuously	TO/LAND
L (R) HYD DC PUMP FAIL	The indicated hydraulic DC pump is not producing pressure when commanded	TO/LAND
L (R) HYD ENG PUMP FAIL	The indicated engine-driven hydraulic pump is not producing pressure when the associate engine is running	TO/LAND
L (R) HYD SOV CLOSED	The respective firewall hydraulic shutoff valve is closed (not manually selected/auto closed)	TO/LAND

D. STATUS MESSAGES

STATUS MESSAGES	
Information only - no crew action required	
Message	**Meaning**
HYD PUMP NOT AUTO	At least one HYDRAULIC PUMP (L, R, PTU, or AUX) switch is not in the AUTO position
L (R) HYD SOV CLOSED	The respective firewall hydraulic shutoff valve is closed (manually selected)

NOTES

- All warning messages are accompanied by a triple chime
- All caution messages are accompanied by a single chime
- Voice warnings are continuous until acknowledged
- "TO/LAND" indicates the message in inhibited during takeoff and landing phases
- "TO" indicates the message in inhibited during takeoff only
- L (R) notation indicates the message can appear for either left or right hydraulic system

X. LIMITATIONS

A. HYDRAULIC SYSTEM TEMPERATURE LIMITATIONS

Parameter	Specification
Maximum Operating Temperature (L/R Systems)	100°C maximum
Auxiliary System Maximum Temperature	135°C maximum
Automatic Protection Temperature	275°F (135°C) maximum: SOV closes automatically
Automatic SOV Closure	275°F for more than 3 seconds

B. HYDRAULIC COOLING SYSTEM LIMITATIONS

Parameter	Specification
Above 125°F Operation	Full cooling mode required
Below 125°F Operation	Bypass mode acceptable
Bypass Valve Control	Thermostatically controlled operation mandatory

C. POWER TRANSFER UNIT LIMITATIONS

Parameter	Specification
PTU Automatic Shutoff	If PTU selected to AUTO and does not produce hydraulic pressure within 15 seconds, automatically latched OFF
Latch Reset Requirement	De-select AUTO mode or remove power from PSEU
PTU Operation Requirements	Left engine or left EDP inoperative or failed
	Right EDP producing pressure
	Gear not in commanded position
	Aircraft in air

XI. HYDRAULICS SYSTEM CIRCUIT BREAKERS

Hydraulics System Circuit Breakers

CB Name	Bus	Location
AUX DCMP RCCB	LEFT ESS	CB1-D10
HYD GEN HTR	RIGHT AUX	CB4-B4
HYD GEN PWR/TEST	RIGHT ESS	CB4-B5
HYD PTU	RIGHT ESS	CB2-C10
HYD SYS AUX IND	LEFT ESS	CB1-D9
HYD SYS L IND	LEFT ESS	CB1-C9
HYD SYS R IND	RIGHT ESS	CB2-C8
L DCMP RCCB	RIGHT MAIN	CB2-C11
L HYD SOV	LEFT BATT	CB1-C10
R DCMP RCCB	LEFT ESS	CB1-C11
R HYD SOV	RIGHT BATT	CB2-C9

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XII. HYDRAULICS QUIZ

1. What is the normal operating pressure for the left and right hydraulic systems?

    A) 2500 psi
    B) 3000 psi
    C) 3350 psi
    D) 1800 psi

2. Which type of hydraulic fluid is used in the Challenger 350 hydraulic systems?

    A) MIL-H-5606
    B) MIL-H-83282
    C) Phosphate Ester Fire-Resistant (BAMS 564-003)
    D) Petroleum-based Hydraulic Oil

3. What is the capacity of the left hydraulic system reservoir?

    A) 525 cu in
    B) 750 cu in
    C) 150 cu in
    D) 950 cu in

4. The auxiliary hydraulic system provides backup pressure to which component?

    A) Upper rudder PCU
    B) Lower rudder PCU
    C) Both rudder PCUs
    D) Nose wheel steering

5. At what temperature does the fuel/hydraulic heat exchanger bypass valve operate in full open mode?

    A) Above 100°F
    B) Above 125°F
    C) Above 150°F
    D) Above 175°F

6. What happens when the hydraulic system fluid temperature reaches 275°F for more than 3 seconds?

    A) DCMP automatically starts
    B) PTU activates
    C) SOV closes and L (R) HYD TEMP HIGH message appears
    D) Heat exchanger bypass valve opens

7. The Power Transfer Unit (PTU) is primarily used for:

    A) Flap operation
    B) Landing gear operation
    C) Brake operation
    D) Thrust reverser operation

8. What is the normal range for auxiliary hydraulic system accumulator pressure?

A) 1800-3000 psi
B) 2500-3350 psi
C) 3000-3500 psi
D) 2000-2800 psi

9. Which generator supplies power to the left DCMP?

A) Left DC generator
B) Right DC generator
C) APU generator
D) Both DC generators equally

10. The HYD PRESS LOW warning message appears when:

A) Only the left system pressure is below 1800 psi
B) Only the right system pressure is below 1800 psi
C) Both left and right hydraulic pressures are less than 1800 psi
D) Any hydraulic system pressure is below 3000 psi

11. What is the normal upper level percentage for hydraulic reservoir quantity indication?

A) 100%
B) 90%
C) 85%
D) 80%

12. The ecology bottles are used to:

A) Filter hydraulic fluid
B) Cool hydraulic fluid
C) Collect hydraulic fluid leakage
D) Store emergency hydraulic fluid

13. In AUTO mode, the DCMPs will turn on when:

A) Flaps are set to any position
B) Flaps are set to 10 degrees or greater
C) Landing gear is extended
D) Engine start is initiated

14. If the PTU is selected to AUTO and does not produce hydraulic pressure within how many seconds will it be latched OFF?

A) 10 seconds
B) 15 seconds
C) 20 seconds
D) 30 seconds

15. The left hydraulic system operates which of the following components?

A) Outboard brakes
B) Right thrust reverser
C) Inboard brakes
D) Normal flaps

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