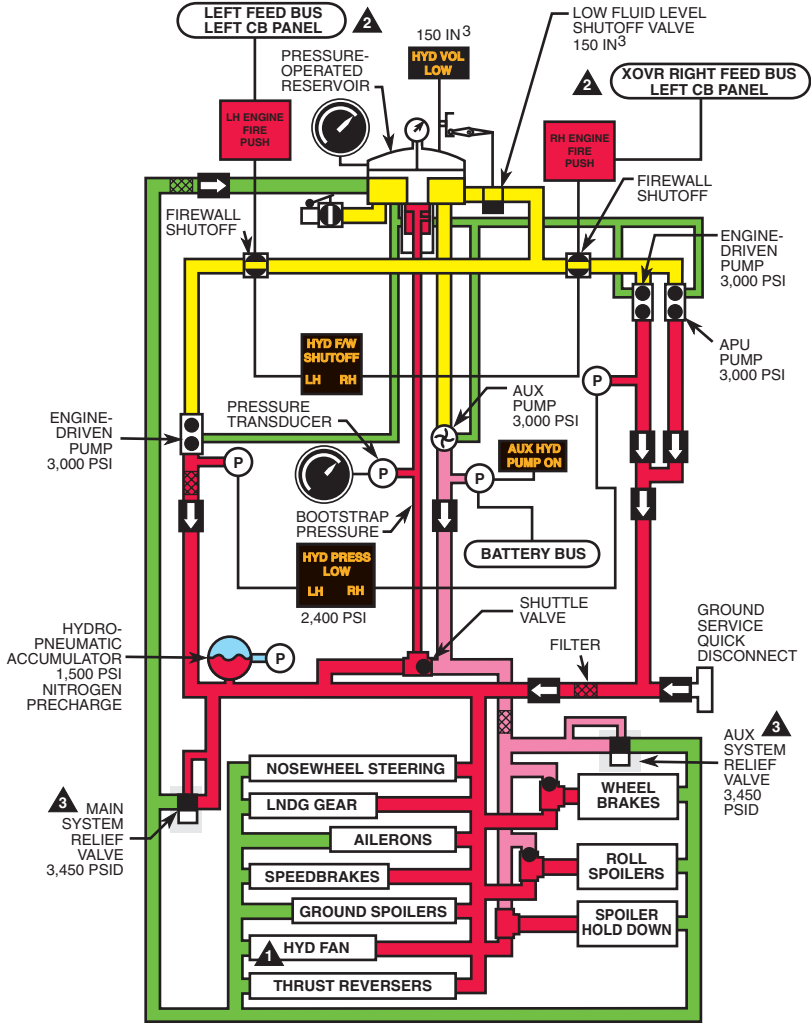


Hydraulic System



- 1 UNITS 001 TO 104 EXCEPT THOSE MODIFIED
- 2 UNIT 152 AND SUBSEQUENT, BOTH FIRE DETECTION SYSTEMS AND BOTH FIREWALL SHUTOFF VALVES RECEIVE 28V DC FROM THE EMERGENCY BUS.
- 3 UNIT 105 AND SUBSEQUENT, AN UNLOADING VALVE FOR EACH PUMP REPLACES THE MAIN SYSTEM RELIEF VALVE. THE VALVES RELIEVE AT 4,000 PSI AND DIRECT FLUID BACK TO THE PUMP. THE UNLOADING VALVES CAN ONLY BE RESET ON THE GROUND.

■ MAIN SYSTEM PRESSURE
 ■ HYDRAULIC RETURN
 ■ AUX SYSTEM PRESSURE
 ■ RESERVOIR FLUID

Hydraulic Systems

A closed-center, constant-pressure hydraulic system pressurizes MIL-H-83282 fluid to approximately 3,000 PSI for the operation of:

- landing gear and brakes
- nosewheel steering
- ailerons, roll spoilers, spoilers, and speedbrakes
- thrust reversers
- environmental control unit hydraulic fan (if installed).

The system can be pressurized by two engine-driven pump, a motor-driven auxiliary pump, or an APU-driven pump (if installed).

Main system, spoiler/speedbrake hold down, and nosewheel steering accumulators charged with nitrogen at 1,500 PSI absorb hydraulic pressure fluctuations, ensure rapid system operation, and store sufficient pressure for short-term system operation if the hydraulic system fails.

If the hydraulic system fails completely, two nitrogen-charged storage bottles provide pressure for landing gear extension and emergency braking only (see Landing Gear and Brakes).

Main System

With the engines running, two variable-displacement, pressure-compensated engine-driven hydraulic pumps obtain fluid from the pressurized 500 cubic inch (8.6 quart/8.2 liter) hydraulic reservoir through a low fluid level shutoff valve and firewall shutoff valves.

If installed, the auxiliary power unit (APU) hydraulic pump obtains hydraulic fluid from the reservoir through the right engine-driven pump supply line and supplies it under pressure through the right pump's pressure lines.

A mechanically driven gage on the reservoir shows fluid level and electrically drives the cockpit HYD VOL indicator. With the system unpressurized, the reservoir gage should indicate ACCUM -425 cubic inches (7.3 quarts/7.0 liters).

If the hydraulic system develops a leak and reservoir level drops to approximately 150 in³ (2.6 quarts/2.5 liters), an emergency level mechanism closes the low fluid level shutoff valve and illuminates the HYD VOL LOW annunciator. When the valve closes, it traps sufficient fluid for operation of essential systems by the auxiliary hydraulic pump.

If an engine fire occurs, pressing the illuminated LH/RH ENG FIRE PUSH switchlight closes the firewall shutoff valve and illuminates the associated LH/RH HYD F/W SHUTOFF annunciator.

From each engine-driven pump, fluid pressurized to 2,950 ±100 PSI flows past an acoustic filter and pressure switch before flowing through the pressure filter and check valve. At pressures below 2,400 ±75 PSI, the pressure switch closes to illuminate the respective LH/RH HYD PRESS LOW annunciator. If pump pressure exceeds 3,450 +50/-0 PSID, a hydraulic relief valve opens to route system pressure back to the reservoir. The valve closes on a decreasing pressure of 3,250 PSID.

On **Canadian, British, and Brazilian certified units 001 to 104 and unit 105 and subsequent**, if pump output reaches 4,000 ±100 PSI, an unloading relief valve opens to route all pump output back to its suction port to prevent system overpressurization and overheating. When this occurs, the HYD PRESS LOW annunciator illuminates.

Most of the hydraulic fluid flows through the pressure filter before it reaches the manifold. A small portion of this fluid leaks past the pump piston and flows into a case drain. After cooling and cleansing the pump, it flows under pressure through a case drain filter to the hydraulic reservoir. Both the pressure and case drain filters have a relief valve that opens at 100 ± 10 PSID when the filter element clogs.

The left and right engine-driven pump pressure lines combine at a manifold. From the manifold, separate lines supply the using systems, the main system accumulator, left, and right thrust reversers, and the hydraulic reservoir. Downstream of the manifold in the main supply line, a pressure transducer drives the cockpit HYD PRESS indicator.

Pressurized hydraulic fluid from the manifold flows to the hydraulic reservoir bootstrap port. The difference in size between the reservoir's small and large pistons creates a differential pressure that pressurizes the reservoir to approximately 50 PSI. If pressure exceeds 120 PSIG, a relief valve opens to prevent reservoir overpressurization. Pulling the RSVR BLEED handle manually opens the relief valve for system servicing.

After powering the various systems, hydraulic fluid returns to the reservoir through the main system and thrust reverser return filters. These filters have a relief valve similar to the pressure and case drain filters.

Auxiliary System

if main system pressure drops to 1,200 PSI with the AUX HYD PWR in NORM, the hydraulic system low pressure switch closes to supply 28V DC from the Battery bus to the auxiliary hydraulic pump motor. Placing the AUX HYD PWR switch in ON also powers the pump. The pump operates and obtains hydraulic fluid from the reservoir. As pressure builds, it closes the auxiliary hydraulic pump switch to illuminate the AUX HYD PUMP ON or AUX HYD PRESS annunciator.

Under pressure from the auxiliary hydraulic pump, fluid flows through the auxiliary pressure filter and continues to a manifold where separate lines supply the braking system, roll spoiler actuators, and the spoiler holddown system. Under auxiliary system pressure, shuttle valves shift to close off the main system pressure lines. If the filter element clogs, a relief valve opens at 100 ±PSID to bypass the element.

If pump output exceeds 3,450 +50/-0 PSID, a pressure relief valve opens to route system pressure to the reservoir. The valve reseats on a decreasing pressure of 3,250 PSID.

Hydraulic Systems

<p>Power Source</p>	<p>L/R engine-driven pump (2,800 to 3,000 PSI) APU-driven pump (2,800 to 3,000 PSI) Auxiliary electric pump (2,800 to 3,000 PSI) Ground servicing connection</p>
<p>Control</p>	<p>Aileron boost Aileron boost switch Control wheels (force link) Speedbrakes Speedbrake lever Spoiler hold down switch Ground spoilers (panels 4 and 5) Spoiler lever Spoiler hold down switch Roll control spoilers (panels 1 and 8) Control wheels Spoiler levers Auxiliary hydraulic pump switch Spoiler hold down switch ECU fan (units 001 to 104 without Hamilton Standard ECUs) Either PAC switch Either main landing gear squat switch Landing gear Landing gear handle Left squat switch Nose squat switch Nosewheel centering switch Nosewheel steering Nose squat switch Nosewheel steering switch AP/TRIM/NWS switches Wheel brakes Anti-skid switch Rudder pedals (toe brakes) Auxiliary hydraulic pump switch Hydraulic firewall shutoff valve ENG FIRE PUSH (L/R) switches</p>

Control (continued)	Thrust reversers T/R levers Either main gear squat switch Emergency stow switches Firewall shutoff switch (isolation valve)
Monitor	Basic hydraulic system gages HYD PRESS HYD VOL Basic hydraulic system annunciators HYD F/W SHUTOFF HYD PRESS LOW HYD VOL LOW Aileron boost AIL BOOST OFF annunciator Speedbrakes/spoilers Speedbrake indicator SPEEDBRAKE annunciator SPOILERS UP annunciator Spoiler lights (on S/B position indicator) NO TAKEOFF annunciator No takeoff horn Landing gear Green safe lights (3) (LH/NO/RH) Red UNLOCKED light Warning horn Thrust reversers ARMED/UNLOCKED/DEPLOY lights Nosewheel steering Green light in nosewheel steering switch Wheel brakes AUX HYD PUMP ON or AUX HYD PRESS annunciator ANTISKID annunciator
Protection	Hydraulic reservoir pressure relief valve System check valves System filters Main and auxiliary system relief valves Unloading relief valve (British, Brazilian, and Shuttle valves