**ON A/C ALL

29–00–00–001

HYDRAULIC POWER, GENERAL

Introduction

The Dash 8 Q400 has four hydraulic systems, three main systems, and an auxiliary system. The No. 1 and No. 2 independent main systems provide power to operate the:

- Flight Controls
- Landing Gear
- Nose Wheel Steering
- Brake Systems.

The No. 3 main hydraulic system supplies pressure to the left and right elevators if the No. 1 and / or No. 2 hydraulic system(s) fail. The auxiliary hand operated hydraulic system provides power to the emergency main landing gear extension system.

General Description

Refer to Figure 1.

Main hydraulic power is provided by three independent hydraulic systems, designated No. 1 (left), No. 2 (right) and No. 3 (aft) . The No. 1 and No. 2 hydraulic systems are normally pressurized by a single Engine–Driven Pump (EDP) for each system. System pressure is maintained at 3000 ± 50 psi (20684 ± 345 kPa).

The No. 3 hydraulic system is powered by an accumulator that is pressurized by a DC–Motor–Driven–Pump (DCMP). A pressure switch controls the DCMP operation to keep the accumulator pressure to within 2600 to 3250 psi (17926 to 22407 kPa).

An electrically driven Standby Power Unit (SPU) operates as a backup to the No. 1 hydraulic system. The SPU operates during the takeoff and landing phases, or if the No. 1 EDP fails.

A Power Transfer Unit (PTU) operates as a backup to the No. 2 hydraulic system in the landing and take off phases, or if No. 2 EDP or No. 2 engine fails. The PTU is powered by the No. 1 hydraulic system. If a dual engine failure occurs, where both EDPs and the SPU are unavailable, the DCMP in No. 3 hydraulic system provides sufficient hydraulic power to the elevators for pitch control.

The No. 1 system powers the systems that follow:

- Flaps
- Inboard roll spoilers
- Main wheel brakes / Anti–skid
- Rudder (Lower Power Control Unit (PCU))
- Elevators (Outboard PCUs).

The No. 2 system powers the systems that follow:

- Landing gear
- Nose wheel steering
- Outboard roll spoilers
- Emergency / Parking brakes
- Rudder (Upper PCU)

– Elevators.

The No. 3 system supplies backup hydraulic power to the elevators.

– Left Elevator (Inboard PCU)
– Right Elevator (Inboard PCU)

The auxiliary hydraulic system is provided as an alternate landing gear extension system. It supplies hydraulic power to extend the main landing gears when main hydraulic power is not available. A hand pump is used to manually pump up the hydraulic pressure in the auxiliary system, if the landing gear LEFT and/or RIGHT green locked down advisory lights do not turn on.

All systems use a synthetic phosphate ester–based fluid.

The hydraulic system contains the systems that follow:

– Main Hydraulic Systems (29–10–00)
– Auxiliary Hydraulic Systems (29–20–00)
– Indicating (29–30–00)

Hydraulic Panel Switches

Refer to Figures 2 , 3 and 4.

The switches that follow are alternate action switches:

Standby Hydraulic Pressure Switchlight (green)

– PUSH ON segment (green)
– Turns Standby Power Unit (SPU) on manually
– SPU functions as backup source, providing hydraulic pressure to No. 1 hydraulic system
– PUSH ON segment (blank)
– Turns SPU off manually
– ON segment (blank)

SPU will operate automatically if:

– No. 1 hydraulic system fails, or
– Flaps are selected to greater than 0 degrees when park brakes are selected off and No. 1 reservoir is not empty
– Confirmation of operation can be made by observing the STBY HYD PRESS indicator on Multi Functional Display (MFD) 2.

Power Transfer Unit Switchlight (green)

On aircraft without ModSum 4Q126354 and SB84–29–22 incorporated:

– PUSH ON segment (green)
– Turns PTU on
– Indicates PTU is operating
– PTU provides pressure to No. 2 system
– When not selected on, the PTU will turn on automatically if No. 2 system fails, when flap is selected to greater than 0 degrees.

On aircraft with ModSum 4Q126354 or SB84–29–22 incorporated:

– PUSH ON segment (white)

- Turns PTU on
- Indicates PTU is operating
- PTU provides pressure to No. 2 system
- Hashed bar (green)
- Indicates PTU pressure switch senses a pressure of approximately 2700 psi (18615.8 kPa) in the No. 2 system.
- FAIL segment (amber)
- Indicates PTU pressure switch senses a pressure less than 1500 psi (10342.1 kPa) in the No. 2 system, and the PTU stops operating
- When not selected on, the PTU will turn on automatically if No. 2 system fails, when flap is selected to greater than 0 degrees.

HYD #3 ISOL VLV Switchlight (amber)

- PUSH OPEN segment amber
- Opens isolation valve
- Indicates isolation valve is open
- No. 3 system is powering the elevators
- When not selected on, the isolation valve will open automatically if No. 1 and/or No. 2 system fails

Hydraulic Pressures and Quantity Digital Indications

Refer to Figure 5.

Standby Hydraulic Pressure Indicator

- Indicates pressure in No. 1 hydraulic system available from the electrically operated standby pump
- Pressures shown in psi (0 psi) (0 kPa) and indicated in white
- Digits are replaced by white dashes when parameter no longer valid

No. 1 Main Hydraulic Pressure Indicator

- Indicates pressure in No. 1 hydraulic system regardless of pressure source
- Pressures shown in psi (3000 psi) (20684 kPa)
- Digits are replaced by white dashes when parameter no longer valid

No. 2 Main Hydraulic Pressure Indicator

- Indicates pressure in No. 2 hydraulic system regardless of pressure source
- Pressures shown in psi (3000 psi) (20684 kPa)
- Digits are replaced by white dashes when parameter no longer valid

No. 3 Main Hydraulic Pressure Indicator

- Indicates pressure in No. 3 hydraulic system
- Pressures shown in psi (0 psi) (0 kPa)

– Digits are replaced by white dashes when parameter no longer valid

No. 1, 2 and 3 Hydraulic Quantity Indicators

– Indicates relative actual quantity available in the system reservoirs

– Quantities indicated in % where 100 represents the maximum quantity in each reservoir.

Reservoir quantities are as follows:

– No. 1 system 8 US qt (7.57 L)

– No. 2 system 12 US qt (11.36 L)

– No. 3 system 2.6 US qt (2.46 L)

Hydraulic Pressures and Quantity Analog Indications

Refer to Figure 6.

Standby Hydraulic Pressure Indicator

– Indicates pressure in No. 1 hydraulic system available from the electrically operated standby pump

– Scale marked every 1000 psi (6894 kPa) from 0 to 4 and indicated in white

– Reverts to white line when parameter no longer valid.

No. 1 Main Hydraulic Pressure Indicator

– Indicates pressure in No. 1 hydraulic system regardless of pressure source

– Scale is marked every 1000 psi (6894 Pa) from 0 to 4 and indicated in white

– Reverts to white line when parameter no longer valid.

No. 2 Main Hydraulic Pressure Indicator

– Indicates pressure in No. 2 hydraulic system regardless of pressure source

– Scale is marked every 1000 psi (6894 kPa) from 0 to 4 and indicated in white

– Reverts to white line when parameter no longer valid.

No. 3 Main Hydraulic Pressure Indicator

– Indicates pressure in No. 3 hydraulic system

– Scale is marked every 1000 psi (6894 kPa) from 0 to 4 and indicated in white

– Reverts to white line when parameter no longer valid.

– Digital values 0,2,4 are displayed on the right side of the No. 3 scale only.

No. 1, 2 and 3 Hydraulic Quantity Indicators

– Indicate relative actual quantity available in the system reservoirs

- Quantities indicated in % of 100 where 100% represents the maximum quantity in each reservoir

Reservoir quantities are as follows:

- No. 1 system 8 US qt (7.57 L)
- No. 2 system 12 US qt (11.36 L)
- No. 3 system 2.6 US qt (2.46 L)

Detailed Description

Refer to Figure 7.

The hydraulic system reservoirs store hydraulic fluid and supply the necessary fluid volume to the hydraulic systems. The No. 1 hydraulic system reservoir is installed in the left engine nacelle while the No. 2 reservoir is installed in the right engine nacelle. The reservoir uses system output pressure 3000 ± 50 psi (20684 ± 345 kPa) to pressurize itself and provide a 55 psi (379 kPa) suction pressure to the EDPs. Hydraulic fluid over temperature in each reservoir, is indicated by No. 1 or No. 2 HYD FLUID HOT caution light coming on.

The volume of the No. 1 system reservoir is 8 US qt (7.57 L). The volume of the No. 2 system reservoir is 12 US qt (11.36 L).

System Operation

Refer to Figure 8.

Hydraulic fluid, is supplied by the pressurized reservoir through the Firewall Shutoff Valve to the EDP. Fluid under pressure is now directed to its subsystems at a nominal pressure of 3000 ± 50 psi (20684 ± 345 kPa). before returning to the reservoir. Individual hydraulic pressure and quantity indicators are provided to monitor No. 1, No. 2 and No. 3 hydraulic systems. Park brake and standby hydraulic pressure are also monitored. All indicators are presented on the co–pilot's Multi–Function–Display (MFD). If an EDP fails, the #1 or #2 ENG HYD PUMP caution light comes on.

Firewall Shutoff Valves

Refer to Figure 9.

The No. 1 and No. 2 hydraulic systems each have a firewall shut–off valve that, when closed, stops the flow of hydraulic fluid to the EDPs . Two HYD advisory lights for each firewall shut off valve are provided on the Fire Protection Panel, one green and one white. The green advisory light turns on when the firewall valve is OPEN and the white when the valve is closed. If an engine is shutdown due to an engine fire, hydraulic fluid is shut off to the EDP by pulling the ENGINE 1 or ENGINE 2, PULL FUEL/HYD OFF handle out to its stop. The green advisory light will go out and the white advisory light will turn on.

The Firewall Shutoff Valve is powered by the battery bus and will close when:

- ENGINE 1 or ENGINE 2 PULL FUEL/HYD OFF handle is pulled
- No. 1 or No. 2 Hydraulic reservoir fluid quantity is empty
- Hydraulic fluid over–temperature condition has occurred.

Hydraulic System Heat Exchangers

The No. 1 and No. 2 hydraulic systems each include an oil–to–fuel heat exchanger, located in the fuel tank that is used to cool the hydraulic fluid of each system. Hydraulic fluid from the case drain

line, flows through the heat exchanger before returning to the hydraulic reservoir. A heat exchanger bypass valve, controls the flow of hydraulic fluid to and from the heat exchanger. The Engine Driven Pumps (EDPs), the Standby Power Unit (SPU), and the Power Transfer Unit (PTU) together or independently can pressurize the case drain line. The Ground Hydraulic Power Unit (GHPU) does not pressurize the case drain line.

Hydraulic System Isolation Valves

The No. 1 and No. 2 hydraulic systems each include an isolation valve which is normally open. When there is inadequate fluid quantity due to hydraulic fluid loss, the isolation valve closes and the #1 or #2 HYD ISO VLV caution light turns on. This prevents hydraulic power to certain hydraulic sub–systems. Hydraulic power is available only to the following components:

No. 1 system isolation allows hydraulic power to:

- Rudder
- Elevators
- Flaps
- PTU

No. 2 system isolation allows hydraulic power to:

- Rudder
- Elevators

Standby Power Unit

No. 1 hydraulic System, uses a variable frequency AC motor–driven pump (SPU) which functions as a backup source for providing pressurized hydraulic fluid in response to system demand. The SPU supplies backup power to the No. 1 hydraulic system and is selected on for takeoff and landing. The SPU is electrically powered by the right 115 Vac bus. Backup electrical power to the SPU is supplied by the left 115 Vac bus. The SPU is installed in the No. 1 engine nacelle.

NORMAL OPERATION

The SPU is normally selected on for takeoff and landing. When the STBY HYD PRESS switchlight on the HYDRAULIC CONTROL panel is pushed, the SPU is energized on. A green ON legend in the switchlight turns on. When the SPU is activated on automatically, the green ON legend in the switchlight will not turn on. After takeoff, the STBY HYD PRESS switch is selected off to deactivate the SPU. Nominal system pressure is 3000 psi (20684 kPa). If not selected on, the SPU will automatically turn on if:

- No. 1 engine fails during flight
- Flaps are selected to positions greater than 0 degrees when park brakes selected off and hydraulic reservoir No. 1 not empty.

When the STBY HYD PRESS switch is manually selected on confirm green legend in switchlight shows ON. If the SPU pump windings should overheat, the #1 STBY HYD PUMP HOT caution light will turn on.

Priority Valve

A priority valve is included in the No. 1 hydraulic system and is normally open. If the hydraulic pressure in No. 1 system decreases below 2100 psi (14478 kPa) because of system demand, the priority valve closes. This shuts off hydraulic power to the flaps and PTU. Hydraulic pressure is maintained to the elevators, rudder, inboard spoilers and brakes.

Power Transfer Unit

On aircraft without ModSum 4Q126354 and SB84–29–22 incorporated:

Refer to Figure 10.

A Power Transfer Unit (PTU) operates as a backup hydraulic pressure to the No. 2 hydraulic system during takeoff, landing and periods of high system flow demand. The PTU uses hydraulic pressure from the No. 1 system to power a hydraulic motor. The motor then operates a hydraulic pump to pressurize the No. 2 system. Hydraulic fluid is not shared or transferred between No. 1 and No. 2 hydraulic systems during PTU operation. Hydraulic fluid must be available in the No. 2 system for PTU operation.

The PTU may be selected on manually, or is actuated automatically during take off and approach. Manual selection of the PTU is by pushing the PTU CNTRL switchlight on the HYDRAULIC CONTROL panel. A green ON legend in the switchlight turns on.

Manual actuation of the PTU occurs when:

- The PTU CNTRL switchlight on the HYDRAULIC CONTROL panel is “ON”, and No. 2 Hydraulic System Reservoir is not empty on ground, or
- The PTU CNTRL switchlight on the HYDRAULIC CONTROL panel is “ON”, and No. 2 Hydraulic System Reservoir is not empty and No. 1 EDP pressure is not less than 2400 psi (16547.4 kPa).

Automatic actuation of the PTU occurs when:

- No. 2 Hydraulic System Reservoir is not empty, and
- The park brake is selected off, and
- Flaps are selected greater than 0 degrees, and
- No. 1 EDP Pressure Switch indicating high pressure (greater than 2400 psi (16547.4 kPa)), and
- PTU Pressure Switch does not indicate low pressure (less than 1500 psi (10342.1 kPa)) for longer than 30 seconds.

Power Transfer Unit

On aircraft with ModSum 4Q126354 and SB84–29–22 incorporated:

Refer to Figure 10.

A Power Transfer Unit (PTU) operates as a backup hydraulic pressure to the No. 2 hydraulic system during takeoff, landing and periods of high system flow demand. The PTU uses hydraulic pressure from the No. 1 system to power a hydraulic motor. The motor then operates a hydraulic pump to pressurize the No. 2 system. Hydraulic fluid is not shared or transferred between No. 1 and No. 2 hydraulic systems during PTU operation. Hydraulic fluid must be available in the No. 2 system for PTU operation.

The PTU may be selected on manually, or is actuated automatically during single engine taxi operation, take off and approach. Manual selection of the PTU is by pushing the PTU CNTRL switchlight on the

HYDRAULIC CONTROL panel. A white ON legend and green hashed bar in the PTU CNTRL switchlight turns on.

Manual actuation of the PTU occurs when:

- The PTU CNTRL switchlight on the HYDRAULIC CONTROL panel is “ON”, and No. 2 Hydraulic System Reservoir is not empty on ground, or
- The PTU CNTRL switchlight on the HYDRAULIC CONTROL panel is “ON”, and No. 2 Hydraulic System Reservoir is not empty and No. 1 EDP pressure is not less than 2400 psi (16547.4 kPa).

Automatic actuation of the PTU occurs when:

- Flaps are selected greater that 0 degrees and No. 1 EDP pressure is not low and No. 2 Hydraulic System Reservoir is not empty and park brake is selected off, or
- The aircraft is in air and No. 1 EDP pressure is high (greater than 2400 psi (16547.4 kPa)) and No. 2 Hydraulic System Reservoir is not empty and park brake is selected off and No. 2 main oil pressure is low, or
- The aircraft is in air and No. 1 EDP pressure is high (greater than 2400 psi (16547.4 kPa)) and No. 2 Hydraulic System Reservoir is not empty and park brake is selected off and No. 2 EDP pressure is low.

If the PTU does not produce pressure within 5 seconds, the PTU will be turned off for the automatic and manual selection.

No. 3 Hydraulic System

Refer to Figure 11.

The No. 3 hydraulic system is an independent system. It supplies hydraulic power only to the left and right elevator inboard PCUs if No. 1 and No. 2 hydraulic systems fail. The system operates automatically during an emergency condition when the No. 1 and/or No. 2 hydraulic systems fail, or if a dual engine failure occurs. The No. 3 hydraulic system can also be engaged manually by pushing the HYD #3 ISOL VLV switchlight on the HYDRAULIC CONTROL panel. An amber OPEN legend on the switchlight will turn on. An accumulator and an isolation valve are also installed in the No. 3 hydraulic system.

A 28 volt DC Motor Driven Pump (DCMP) operates automatically to pressurize the accumulator and keep the accumulator pressurized from 2600 to 3250 psi (17926 to 22408 kPa). When the DCMP is not operating, the accumulator holds a reserve of pressure. The volume of the No. 3 system reservoir is 2.6 qt (2.46 L). The DCMP operates intermittently and is controlled by two pressure switches installed on the accumulator isolation valve. One pressure switch signals the DCMP to operate if system pressure drops to 2600 psi (17926 kPa) and any one of the following conditions apply:

- No. 3 hydraulic system isolation valve is de–energized, or
- Aircraft is in–Air mode with the parking brake not in "PARK", or
- Either No. 1 or No. 2 engine oil pressure switches indicate high pressure with the parking brake not in "PARK".

The pressure switch commands the DCMP to turn off when system pressure reaches 3250 psi (22408 kPa). The other switch turns on the #3 HYD PUMP caution light if system pressure falls to 900 psi

(6205 kPa), or the DCMP has been operating for longer than 60 seconds on the ground. Electrical power is supplied to the DCMP by the standby battery.

On aircraft with SB84–29–12 or Modsum 4–126281 incorporated:

The automatic operation of the DCMP is inhibited when the parking brake is set to 'PARK'.

Accumulator Isolation Valve

The isolation valve is used in the No. 3 hydraulic system to isolate the elevators from No. 3 hydraulic system pressure. During normal flight operation, the system is in an active standby mode with the accumulator isolation valve (energized) closed. When open, the isolation valve allows hydraulic pressure from the No. 3 hydraulic system to power the elevators. The isolation valve will open in flight if No. 1 and/or No. 2 hydraulic system pressure is lost, or, if No. 1 and No. 2 engines fail. The isolation valve can be manually opened when the HYD #3 ISOL VLV switchlight is pushed. An amber OPEN legend on the switchlight will turn on.

An additional pressure switch is installed downstream of the isolation valve. It turns on the ELEVATOR PRESS caution light if No. 1, No. 2 and No. 3 hydraulic systems are supplying power to all six elevator actuators. If this occurs, airspeed should be reduced to 200 kt (370.6 km/hr) indicated air speed. If the isolation valve malfunctions open, the No. 3 hydraulic system will supply hydraulic power to the elevators, even though No. 1 and No. 2 hydraulic systems are operative. The ELEVATOR PRESS caution light will turn on. The OPEN legend in the switchlight will not turn on. The No. 3 hydraulic system supplies hydraulic pressure to both elevators when:

- No. 1 and No. 2 hydraulic systems fail
- No. 1 or No. 2 hydraulic system fails
- No. 1 and No. 2 engines fail.

Alternate Landing Gear Hydraulic System

Refer to Figure 12.

The alternate landing gear extension system supplies hydraulic power to extend the main landing gears when main hydraulic power is not available.

Hand Pump

The system is operated by the alternate landing gear hand pump. The hand pump is located below the Landing Gear Alternate Extension door in the flight compartment floor, adjacent to the co–pilot's seat. A hand pump lever, behind the copilot's seat, must be installed into the hand pump socket to operate and extend the landing gear, following isolation of the No. 2 hydraulic system. The pump draws hydraulic fluid from an auxiliary reservoir.

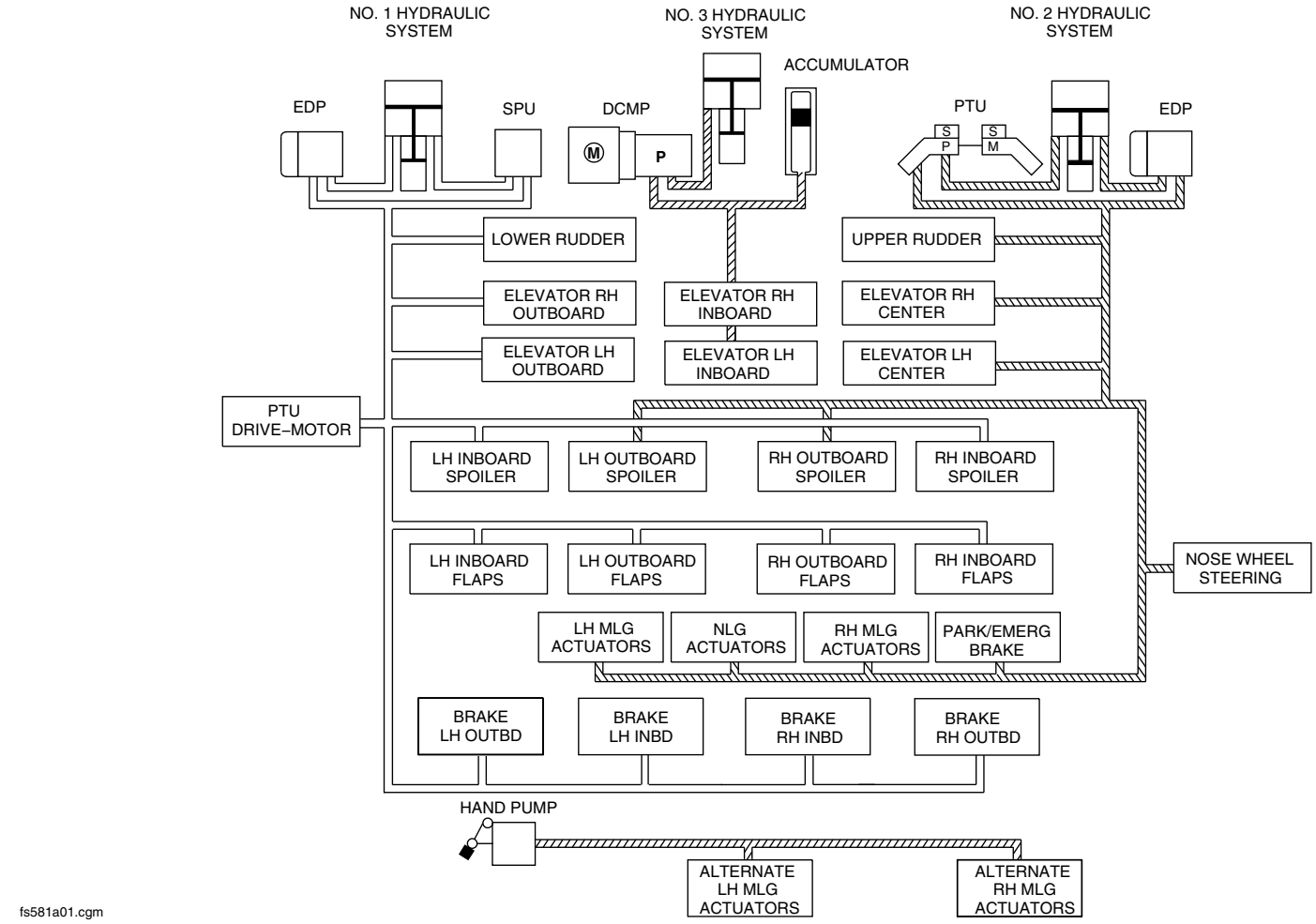
Reservoir

The alternate landing gear system reservoir is located in the nose compartment of the aircraft. The reservoir supplies the hydraulic fluid source for the alternate landing gear extension hand pump. The reservoir capacity is 1 US quart (0.946 L).

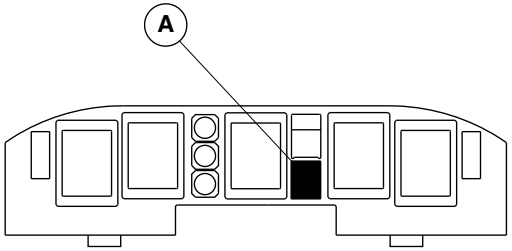
System Operation

The Main Landing Gear (MLG) alternate extension selector valve is located below the flight compartment floor and is normally in the open position. Opening the Landing Gear Alternate Extension door

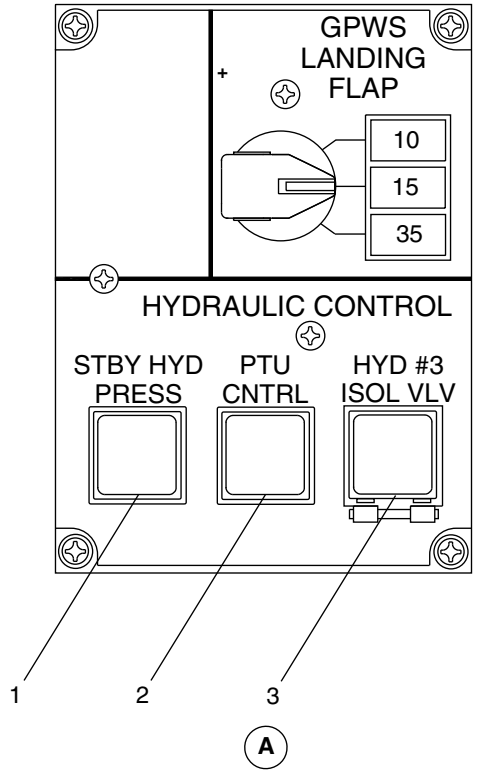
fully, closes the MLG selector valve and allows the hand pump lever to be inserted into the hand pump socket. Stroking the hand pump lever, provides pressure to the alternate landing–gear actuators to extend the gear to the down and locked position.



Hydraulic Systems Block Diagram
Figure 1



MAIN INSTRUMENT PANEL



LEGEND

1. SPU PBA Switch.
2. PTU PBA Switch.
3. Accumulation Isolation Valve PBA Switch.

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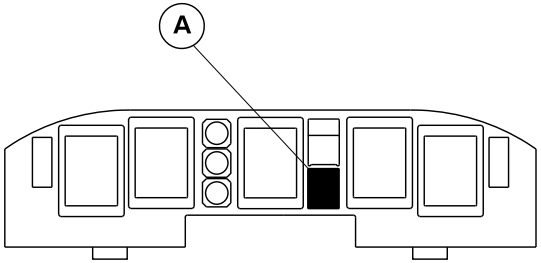
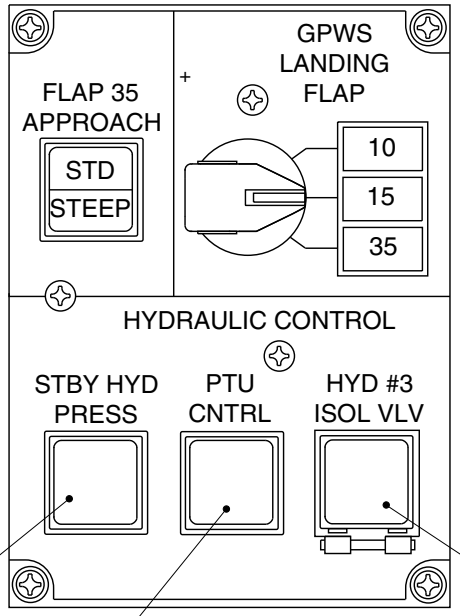
Hydraulic Control Panel
Figure 2



MAIN INSTRUMENT PANEL



LEGEND

1. SPU PBA switch.
2. PTU PBA switch.
3. Accumulation isolation valve PBA switch.

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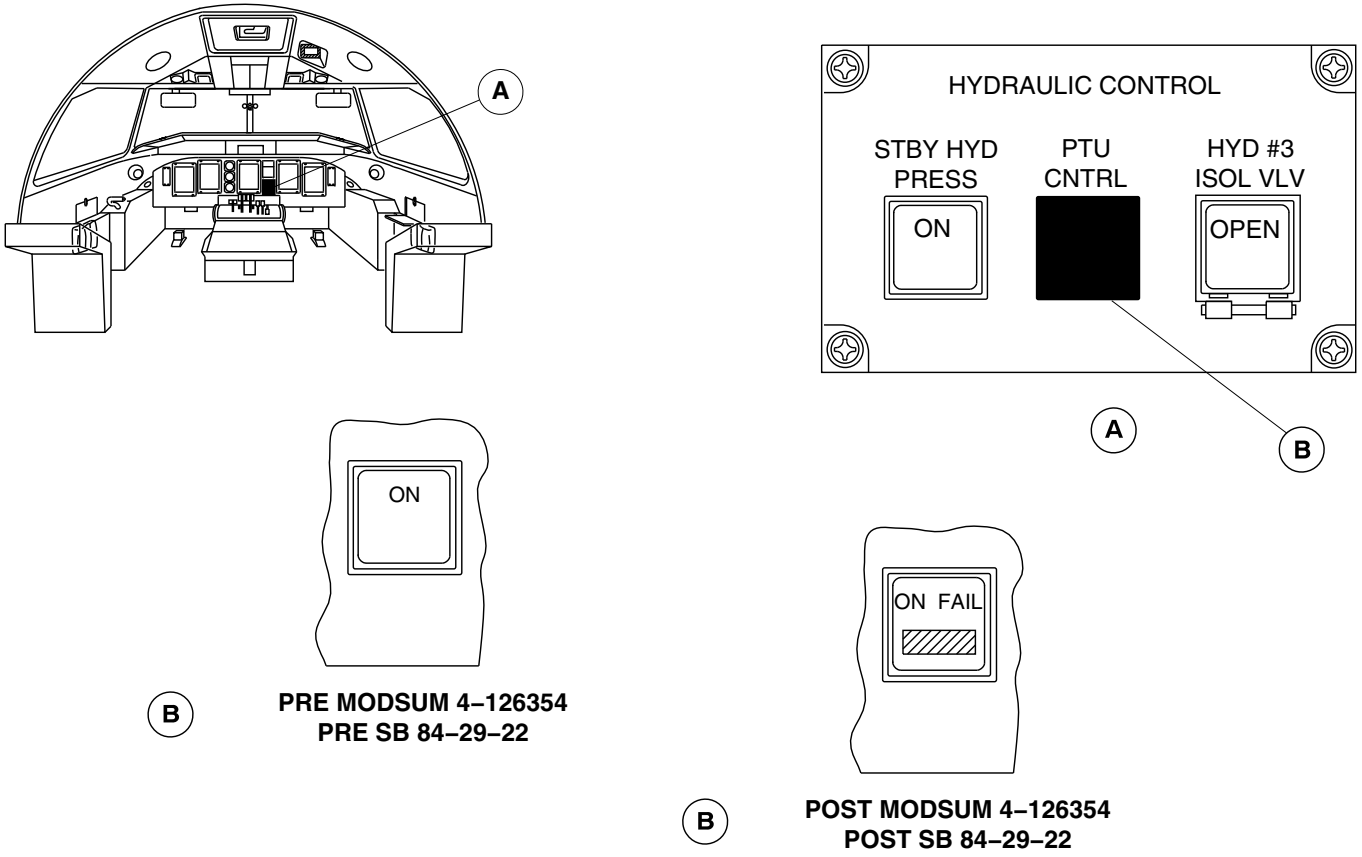
Hydraulic Control Panel (803SO930034)
Figure 3



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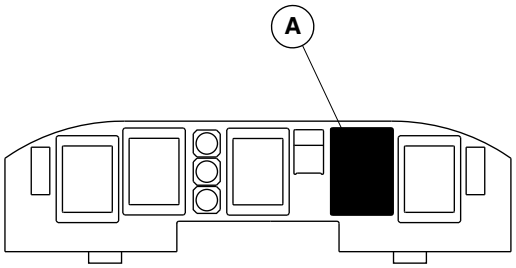
Hydraulic Control Panel Locator
Figure 4



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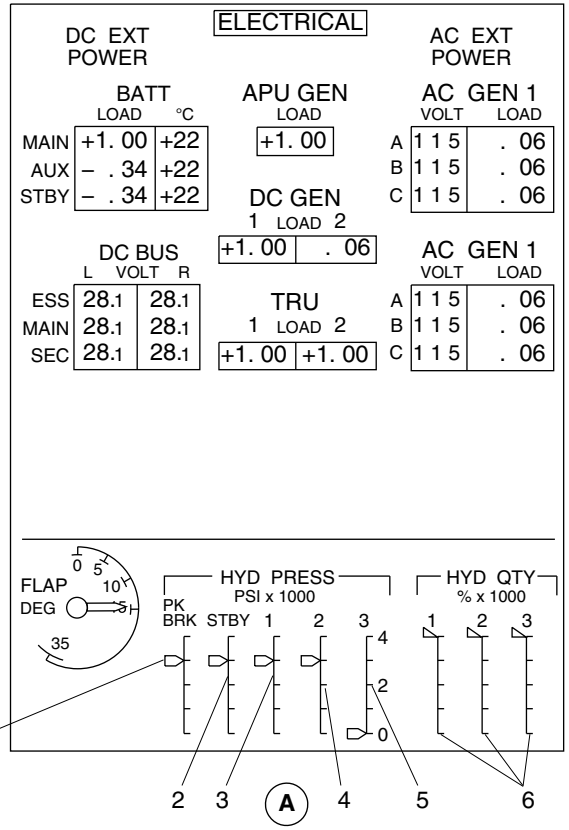

LEGEND

1. Parking Brake Hydraulic Pressure Indication.
2. #1 System Stand–by Pressure Indication .
3. Main System #1 Pressure Indication.
4. Main System #2 Pressure Indication.
5. Main System #3 Pressure Indication.
6. #1/#2/#3 Hydraulic Fluid Quantity Indications.

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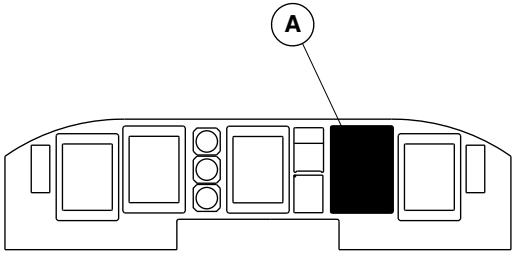
Hydraulic Systems Indications Analog
Figure 5



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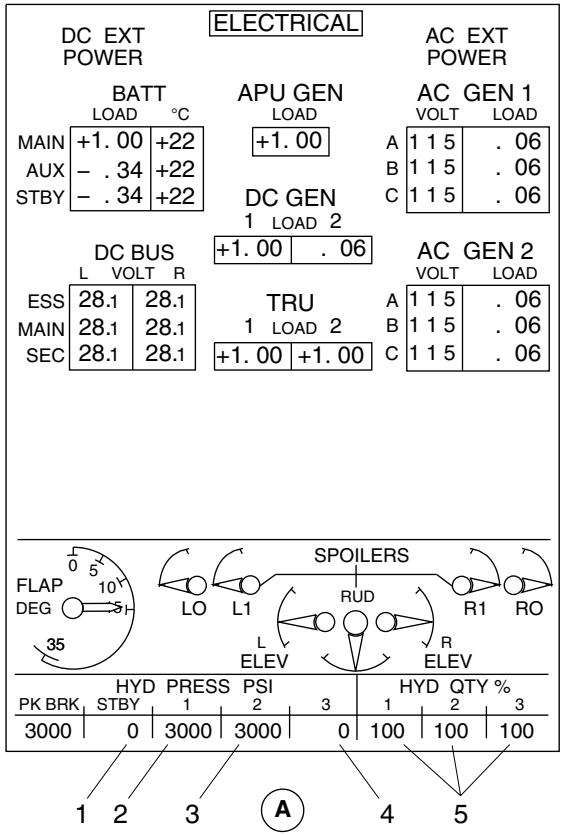

LEGEND

1. Standby Hydraulic Pressure Indicator.
2. No.1 Main Hydraulic Pressure Indicator.
3. No.2 Main Hydraulic Pressure Indicator.
4. No.3 Main Hydraulic Pressure Indicator.
5. No. 1,2 and 3 Hydraulic Quantity Indicators.

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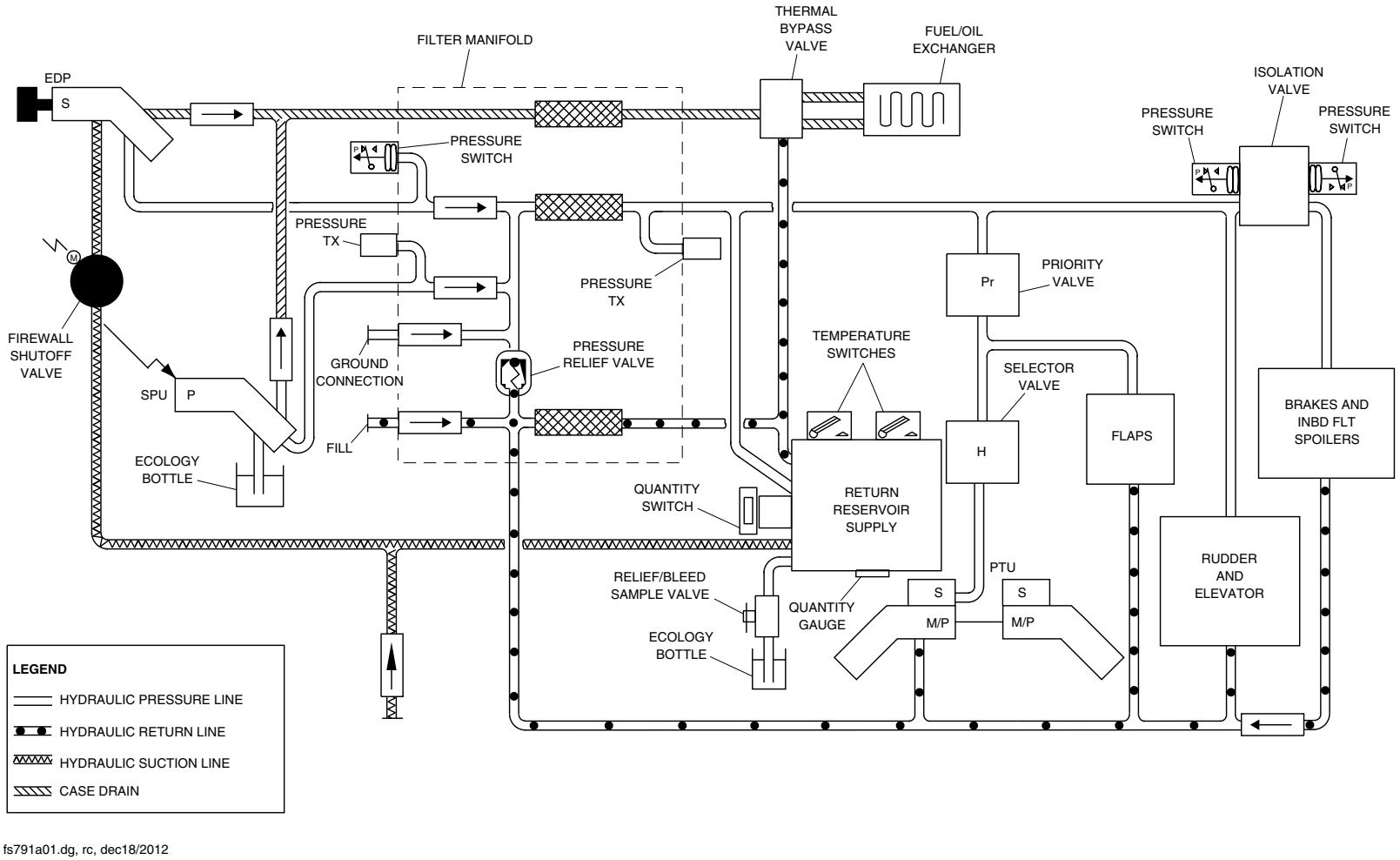
Hydraulic Systems Indications Digital
Figure 6



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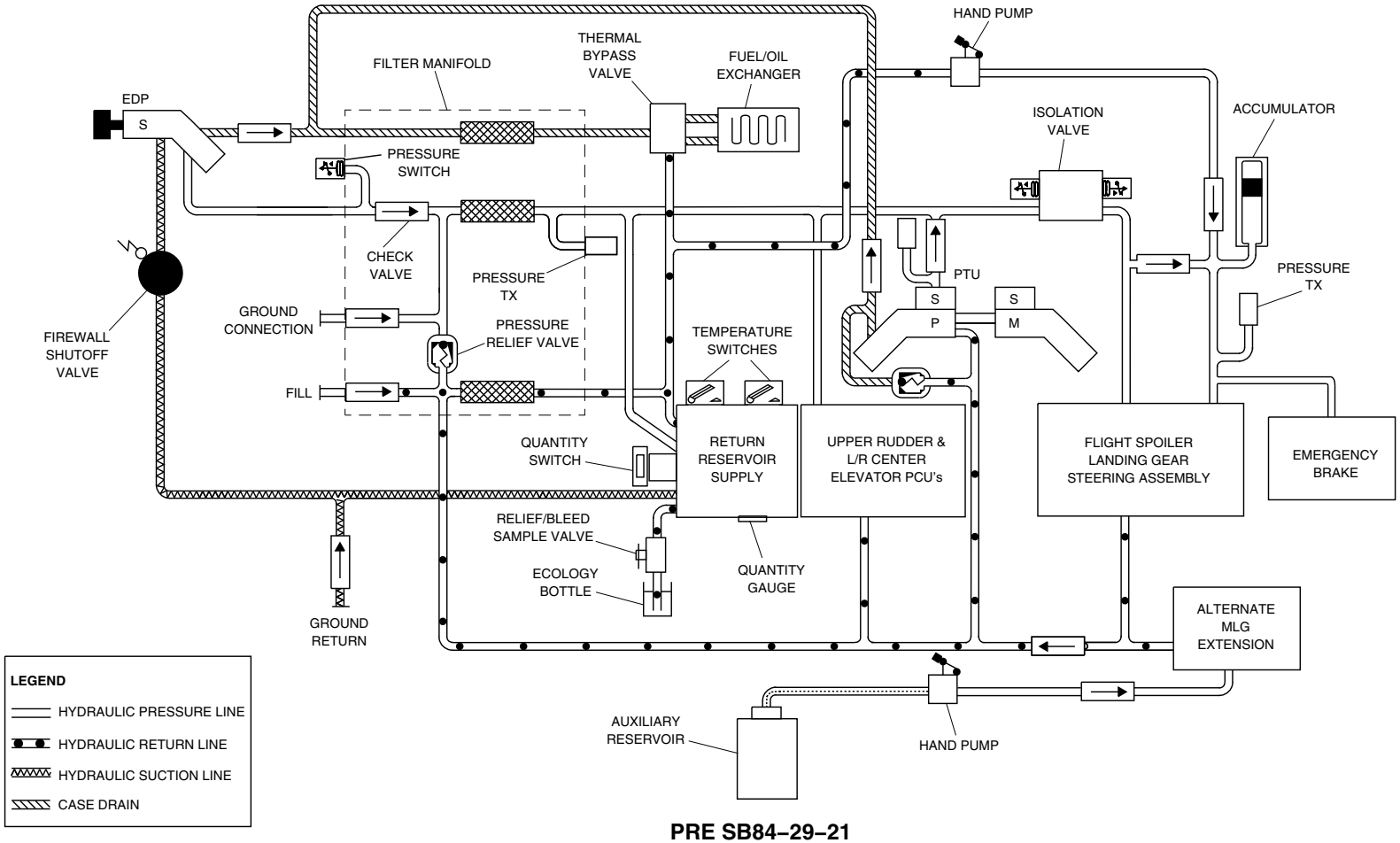
#1 Hydraulic System Schematic
Figure 7



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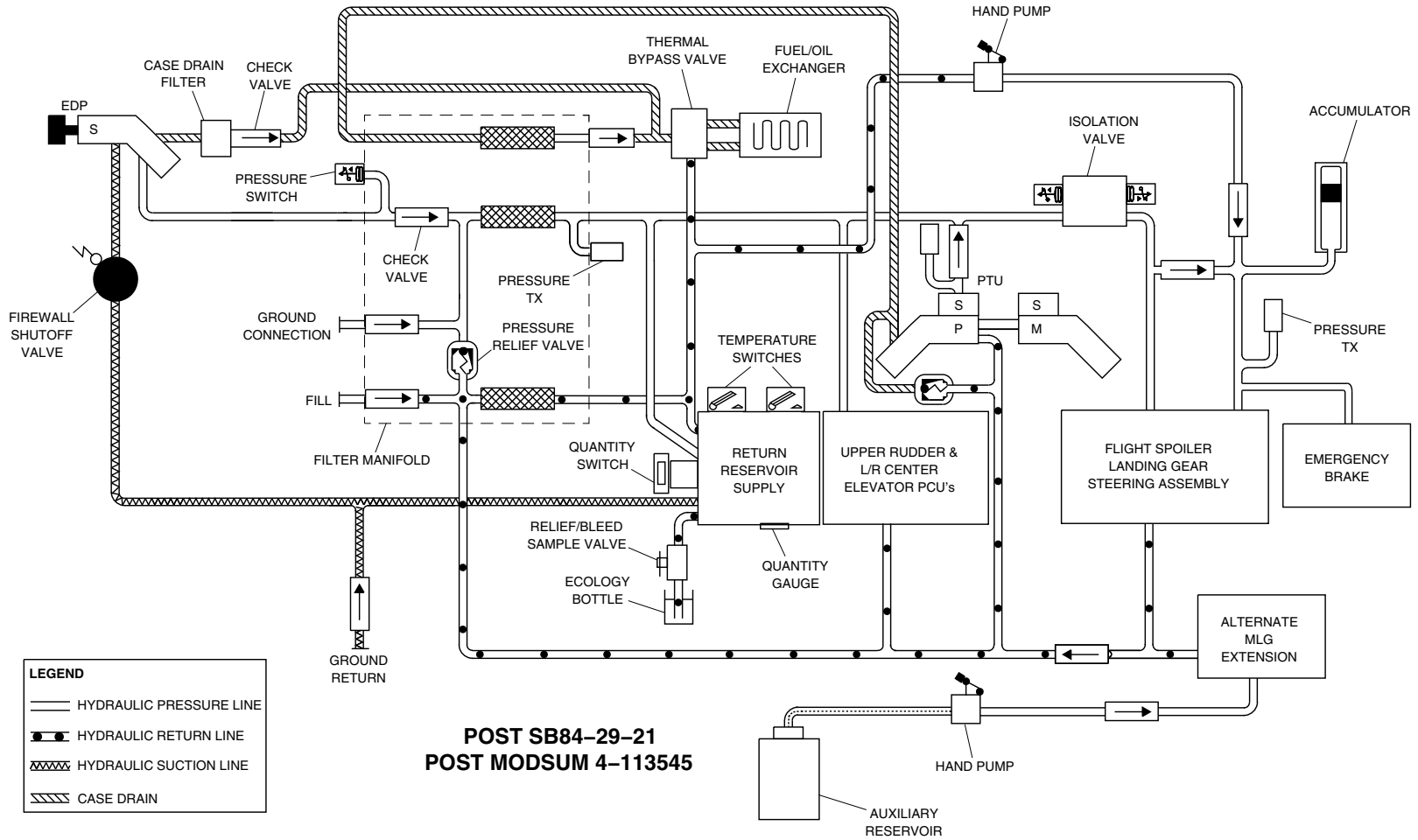
PRE SB84–29–21
PRE MODSUM 4–113545

No.2 Hydraulic System Schematic
Figure 8 (Sheet 1 of 2)



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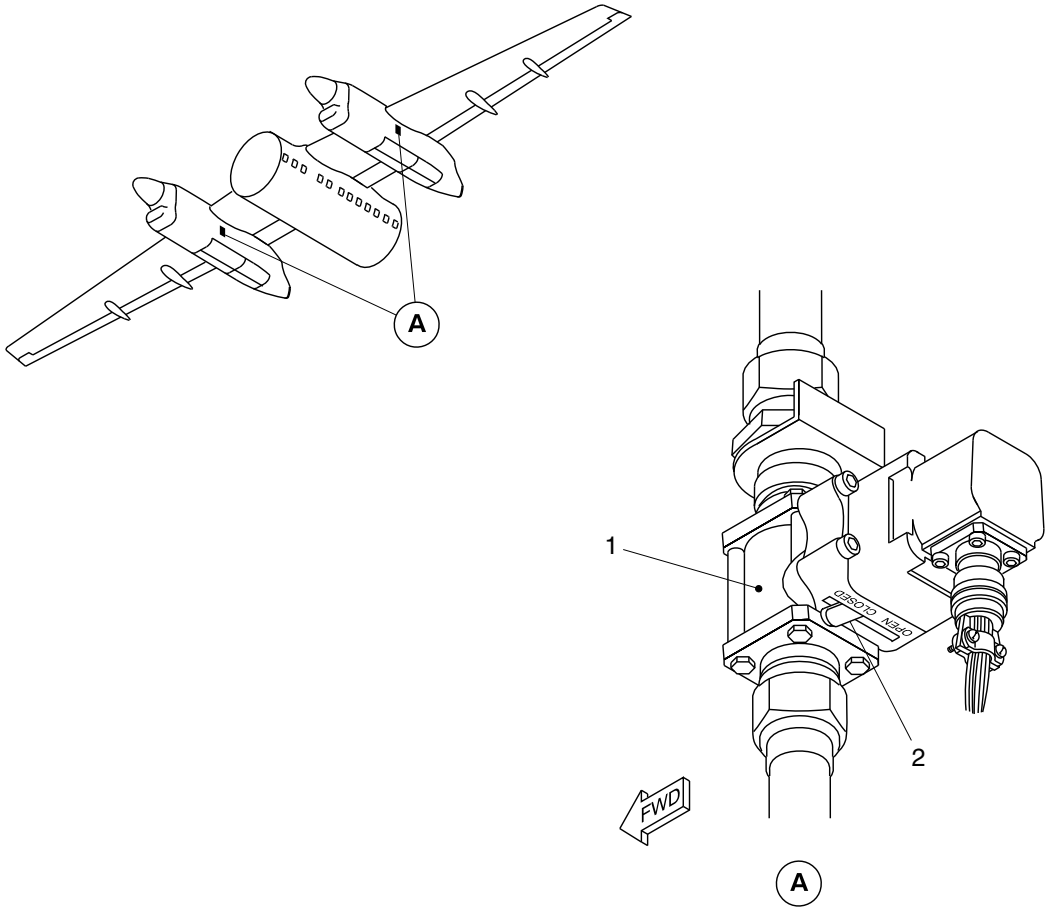
No.2 Hydraulic System Schematic
Figure 8 (Sheet 2 of 2)



LEGEND

1. Firewall shut–off valve.
2. FSOV position indicator arm.

FIREWALL SHUT–OFF HYDRAULIC VALVE

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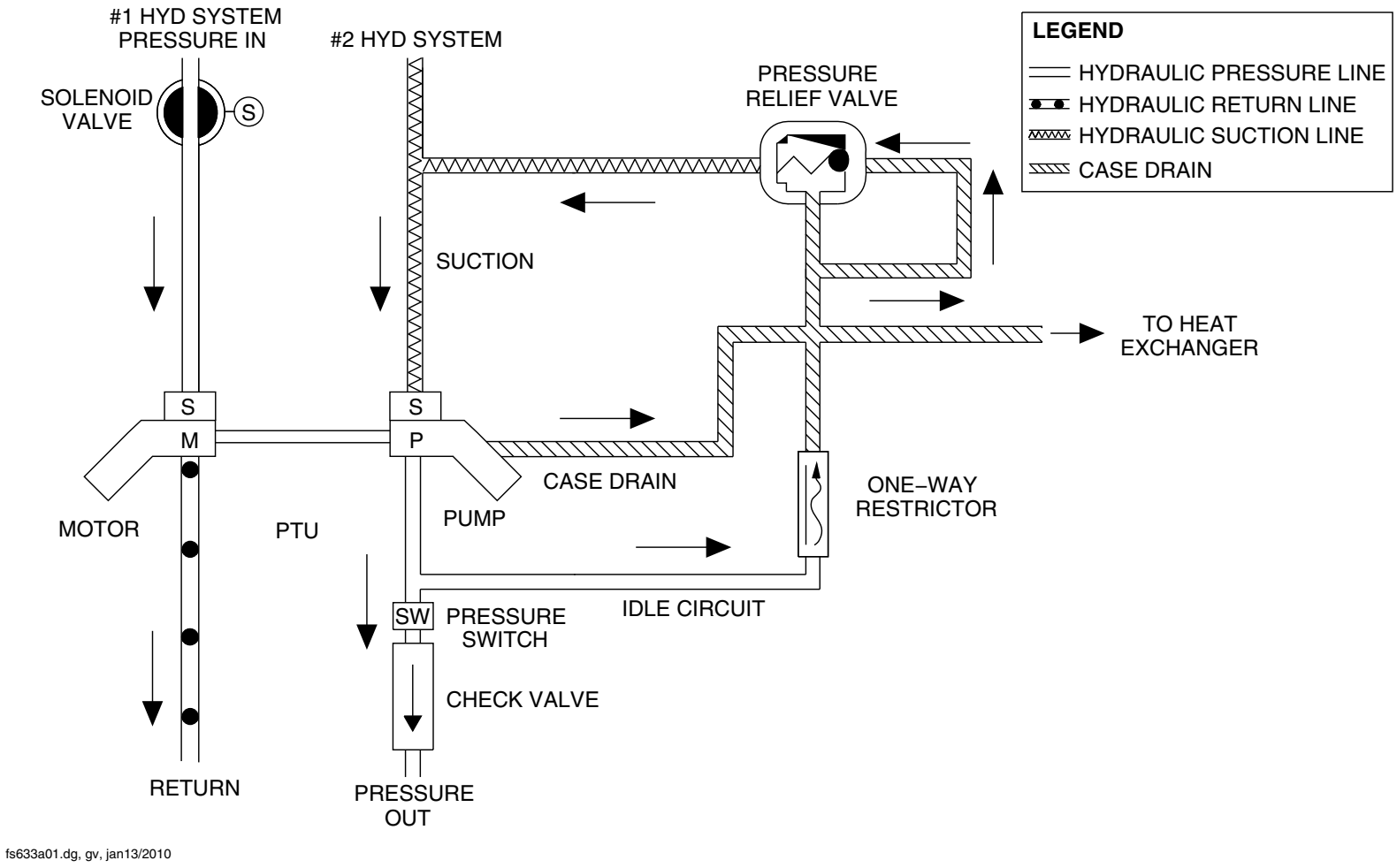
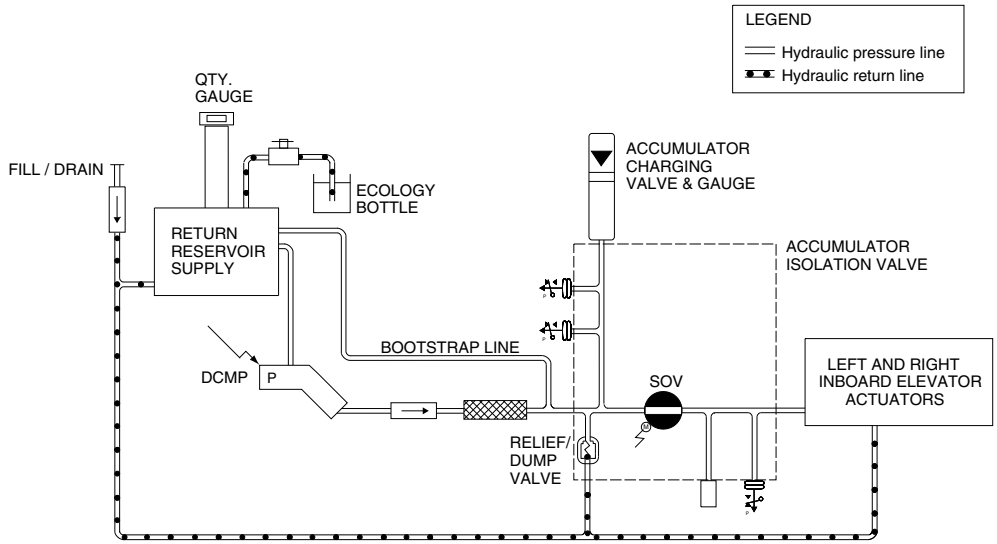
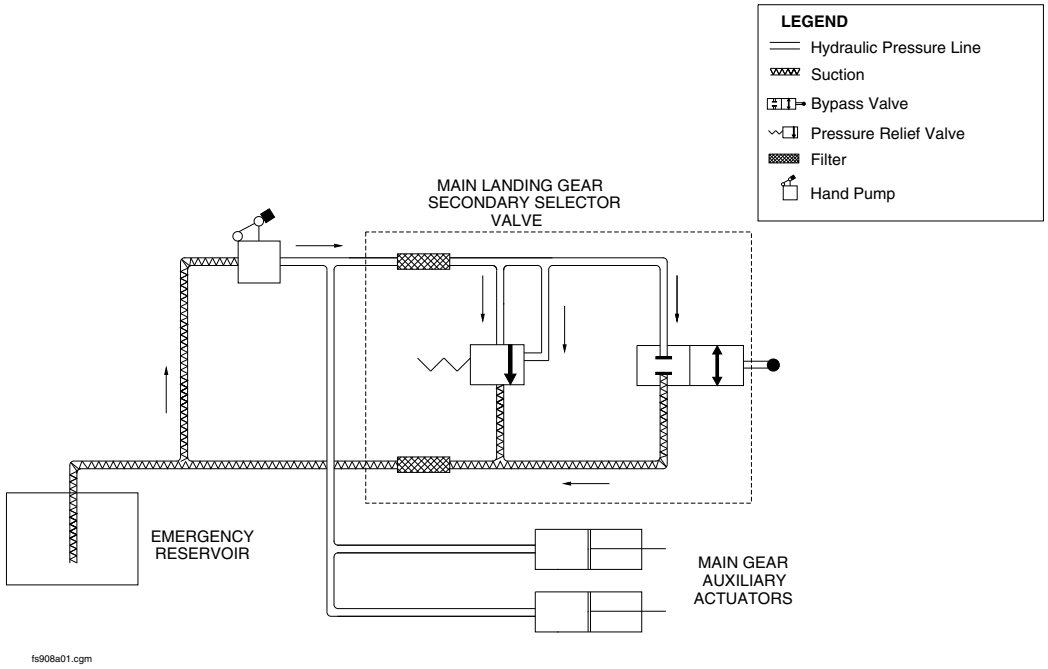
Firewall Shut–off Hydraulic Valve
Figure 9



Power Transfer Unit Schematic
Figure 10



#3 Hydraulic System Schematic
Figure 11



Alternate Landing Gear Hydraulic Schematic
Figure 12

**ON A/C ALL

29–10–00–001

MAIN HYDRAULIC SYSTEMS

Introduction

The main hydraulic power system supplies hydraulic pressure to:

- Flight controls
- Landing gear
- Nose wheel steering
- Brake systems.

General Description

Refer to Figure 1.

The No.1 and No.2 hydraulic systems supply hydraulic fluid of correct pressure, temperature and quantity to the systems that operate with hydraulic pressure.

The No.3 hydraulic system supplies pressure to the Inboard Power Control Units of the left and right elevators if the No.1 and/or No.2 hydraulic system(s) fail.

The Main Hydraulic System includes the systems that follow:

- No.1 and No.2 Hydraulic Systems
- No.3 Hydraulic System.

Detailed Description

Refer to Figures 2 and 3.

The No.1 and No.2 Engine Driven Pumps (EDP) supply the primary power for the hydraulic systems. Secondary No.1 hydraulic system pressure is supplied by the Standby Power Unit (SPU). The SPU operates during takeoff and landing mode and during an emergency EDP1 failure mode. The Power Transfer Unit (PTU) supplies secondary pressure to the No.2 hydraulic system during periods of high system flow demand and takeoff and landing modes. The PTU motor is powered by No.1 hydraulic system. The SPU and PTU can be turned on, by operation of the STBY HYD PRESS and PTU switch lights on the HYDRAULIC CONTROL panel, or set to the “normal” mode.

The No.1 and No.2 hydraulic systems each have a firewall shut–off valve which stops the flow of hydraulic fluid to the EDPs. The firewall shut–off valve will close when any of the following conditions exist:

- PULL FUEL/HYD OFF fire handle is pulled
- A hydraulic fluid high temperature condition causes the 275 °F (135 °C) temperature switch to close.
- The hydraulic fluid reservoir quantity switch gives an empty indication.

No.3 Hydraulic System

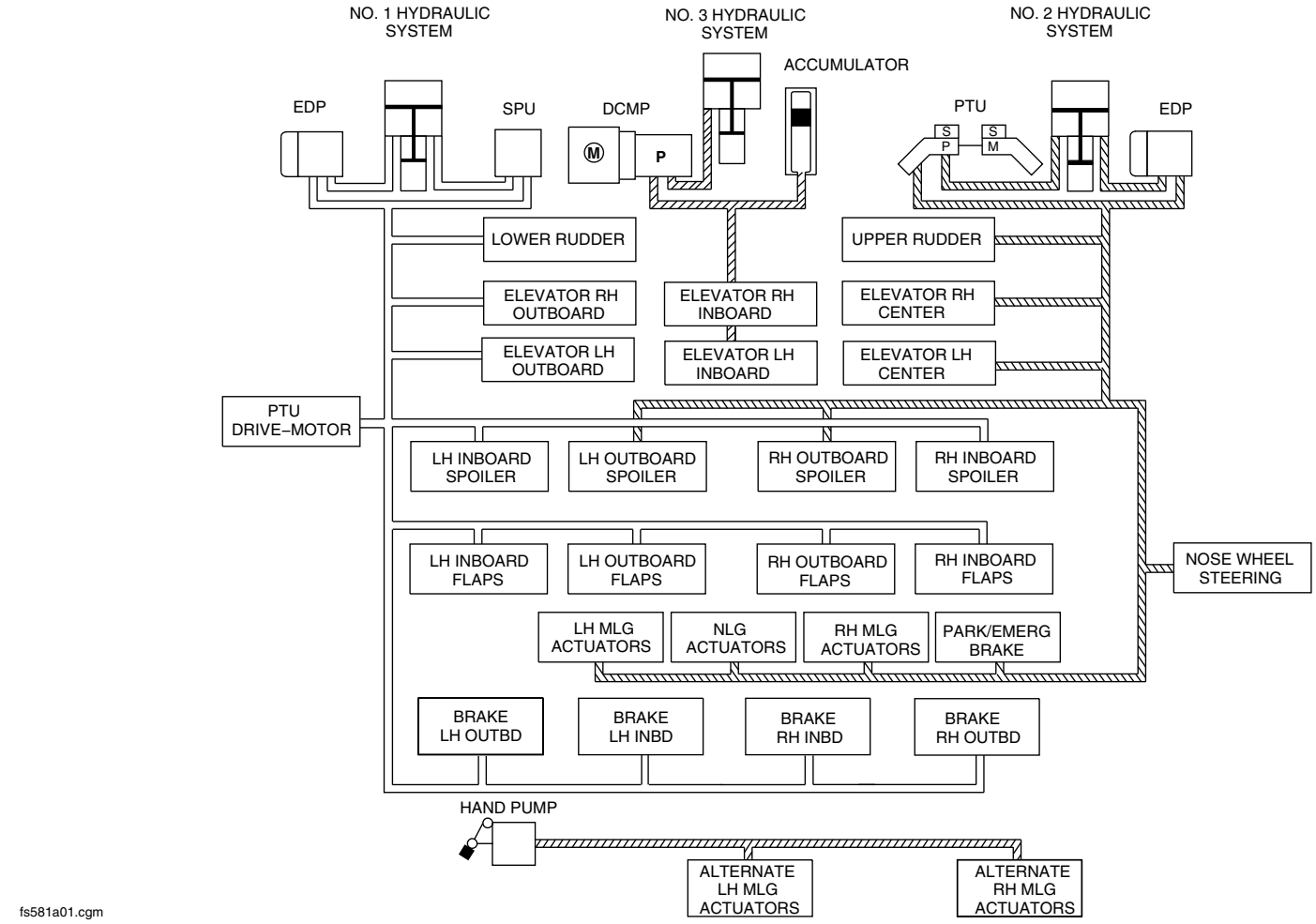
Refer to Figure 1.

A DC Motor Pump (DCMP) operates intermittently to keep the system accumulator charged, with the accumulator isolated from the elevators. When the No.3 hydraulic system isolation valve is commanded open, hydraulic fluid from the accumulator pressurizes

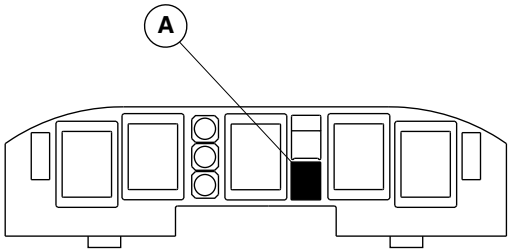
the elevator inboard Power Control Units. The isolation valve can be manually opened by selecting the HYD #3 ISOL VLV switchlight on the HYDRAULIC CONTROL panel.

On aircraft with SB84–29–12 or Modsum 4–126281 incorporated:

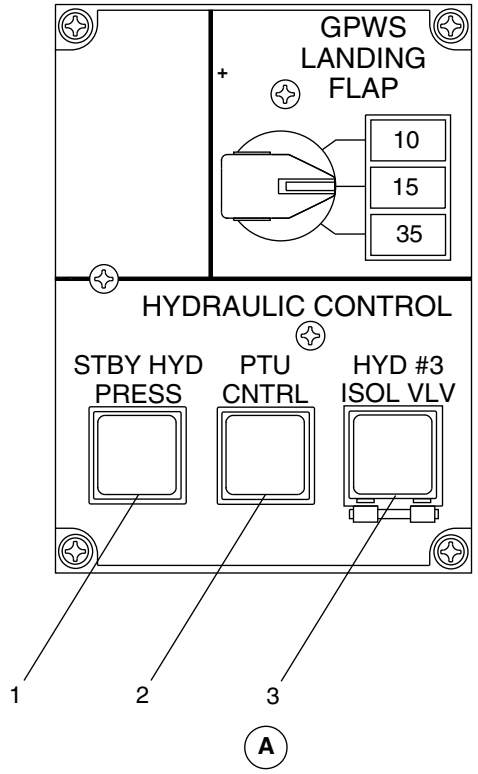
The automatic operation of the DCMP is inhibited when the parking brake is set to ‘PARK’.



Main Hydraulic Power
Figure 1



MAIN INSTRUMENT PANEL



LEGEND

1. SPU PBA Switch.
2. PTU PBA Switch.
3. Accumulation Isolation Valve PBA Switch.

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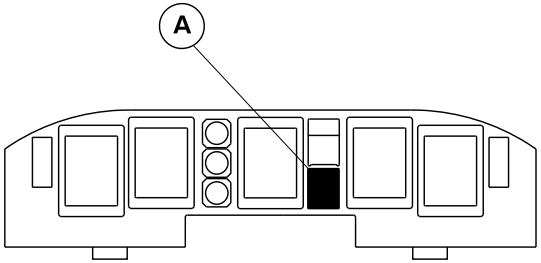
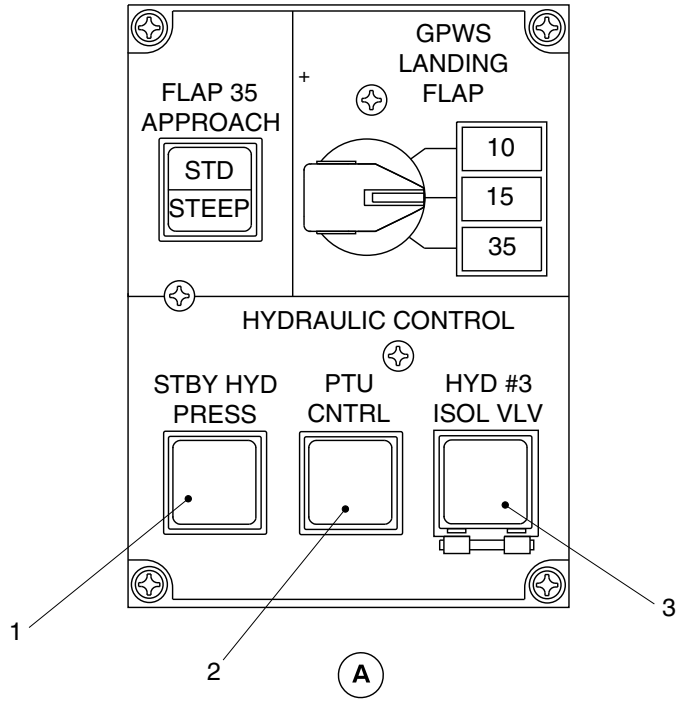
Hydraulic Control Panel
Figure 2



MAIN INSTRUMENT PANEL



LEGEND

1. SPU PBA switch.
2. PTU PBA switch.
3. Accumulation isolation valve PBA switch.

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Hydraulic Control Panel (803SO930034)
Figure 3

**ON A/C ALL

29–11–00–001

MAIN HYDRAULIC SYSTEMS 1 AND 2

Introduction

The No. 1 and No. 2 hydraulic systems supply hydraulic power to:

- Flight controls
- Landing gear
- Brakes
- Nose wheel steering.

General Description

Refer to Figures 1 and 2.

Primary hydraulic pressure is supplied to each system by an Engine–Driven Pump (EDP). Secondary hydraulic pressure for the No. 1 hydraulic system is supplied by a Standby Power Unit (SPU). The SPU is powered by the 115 Vac Variable Frequency right bus, with backup power supplied by the left bus. Secondary hydraulic pressure for the No. 2 hydraulic system is supplied by the Power Transfer Unit (PTU). The No. 1 hydraulic system supplies input power to the PTU pump which pressurizes the No. 2 hydraulic system.

The No. 1 and No. 2 hydraulic systems contain the components that follow:

- Engine–Driven Pumps (29–11–01)
- Firewall Shut–off Valves (29–11–06)
- Isolation Valves (29–11–11)
- No.1 Hydraulic System Reservoir (29–11–16)
- No.2 Hydraulic System Reservoir (29–11–21)
- Ecology Bottles (29–11–26)
- Filter Manifolds (29–11–31)
- Pressure Filter Elements (29–11–32)
- Return Filter Elements (29–11–33)
- Case–Drain Filter Elements (29–11–34)
- Standby Power Unit (29–11–36)
- Heat Exchangers (29–11–41)
- Heat Exchanger Bypass Valves (29–11–46)
- No.1 Hydraulic System Balanced Relief Valve (29–11–51)
- Power Transfer Unit (29–11–61)
- Hydraulic PTU Select Valve (29–11–66)
- 225 °F (107 °C) Temperature Switch (29–30–06)
- 275 °F (135 °C) Temperature Switch (29–11–56)
- No.1 Hydraulic System Port–Mounted Check Valve (29–11–71).

Detailed Description

Refer to Figures 1 and 2.

No. 1 and No. 2 hydraulic systems have the necessary components for supplying clean, temperature and pressure regulated hydraulic fluid. Hydraulic fluid contamination is controlled by the No. 1 and No. 2 hydraulic system filter manifolds. Each hydraulic system has an oil–to–fuel heat exchanger for cooling of the hydraulic fluid. Each system has an electrically powered firewall shut–off valve installed in the EDP suction line, to stop the flow of fluid to the hydraulic system in engine shutdown, fire or hydraulic emergencies.

No. 1 and No. 2 Hydraulic System Engine–Driven Pumps

Refer to Figures 3 and 4.

The Engine–Driven Pumps (EDPs) are installed on the accessory gearbox on both the No. 1 and No. 2 engines. Each pump supplies full, primary system pressure of 3000 ± 50 psi (20684 ± 345 kPa). The pumps can change the volume of the fluid flow to keep the necessary system pressure. The suction, pressure and case drain ports of the pumps are connected by hoses to the hydraulic systems.

On aircraft with Modsum 4–113690, the EDPs suction, pressure and case drain ports are connected with the self–sealing fitting hose assembly. The self–sealing fitting hose assembly will decrease the loss of hydraulic fluid during the EDP change and bleeding. Also it reduces the bleeding time.

No. 1 and No. 2 Hydraulic System Firewall Shut–Off Valves

Refer to Figures 5 and 6.

The hydraulic firewall Shut–Off Valves (SOVs) are installed in the No. 1 and No. 2 engine nacelles, in the EDP suction line. Each SOV has an electrically operated ball–type shut–off valve and an open/closed position indicator. The SOVs stop the flow of hydraulic fluid to the EDPs if the following conditions exist:

- Fire
- Empty hydraulic reservoir fluid quantity
- Hydraulic fluid over–temperature condition.

No. 1 and No. 2 Hydraulic System Isolation Valves

Refer to Figures 7 , 8 and 9.

The No. 1 and No. 2 hydraulic systems each include an isolation valve. The isolation valve stops the flow of hydraulic fluid to part of the hydraulic system if the reservoir contents drop below 80 in^3 (1311 cm^3). No. 1 hydraulic system isolation only allows fluid flow to the components that follow:

- Flaps
- PTU
- Rudder
- Elevators.

No. 2 hydraulic system isolation only allows fluid flow to the components that follow:

- Rudder

– Elevators.

The isolation valve is operated by spring force and pilot pressure controlled by a reservoir level sensing valve, installed in the reservoirs.

No.1 and No.2 Hydraulic System Reservoirs

Refer to Figures 10 and 11.

The hydraulic system reservoirs store hydraulic fluid and supply the necessary fluid volume to the hydraulic systems. The No. 1 hydraulic system reservoir is installed in the No. 1/left side engine nacelle. The No. 2 hydraulic system reservoir is installed in the No. 2/right side engine nacelle.

The reservoir is a bootstrap type that provides a 55 psi (379 kPa) suction pressure to the EDPs. A pressure bleed/relief valve is installed in the reservoir to supply pressure relief of the hydraulic system at 80 psi (552 kPa). The bleed/relief valve may also be manually opened to bleed air from the reservoir or to take a hydraulic fluid sample. The volume of the No. 1 system reservoir is 8 US qt (7.57 L). The volume of the No. 2 system reservoir is 12 US qt (11.4 L).

No. 1 and No. 2 Hydraulic System Ecology Bottles

Refer to Figure 14.

The No. 1 hydraulic system ecology bottle and the SPU ecology bottle are installed in the No.1/left side engine nacelle. The No. 1 ecology bottle collects leakage from the No. 1 reservoir bleed/relief valve and the balanced relief valve. The SPU ecology bottle collects leakage from the SPU shaft seal. The No. 2 hydraulic system ecology bottle is installed in the No. 2/right side engine nacelle and collects drainage from the No. 2 reservoir bleed/relief valve. Each bottle has a fluid capacity of 0.793 US qt (750 milliliters).

No.1 and No.2 Hydraulic System Filter Manifolds

Refer to Figures 15 and 16.

The No. 1 and No. 2 hydraulic systems each include a filter manifold. The primary function of the filter manifold is to remove contaminates from the pressure, return, case drain, filling and ground power fluid circuits. The filter manifold is also the supply point for flow from the pumps and the collection point for return flow from the system to the reservoir. The No. 1 hydraulic system filter manifold is installed in the No. 1 engine nacelle. The No. 2 hydraulic system filter manifold is installed in the No. 2 engine nacelle. A Differential Pressure Indicator (DPI) is installed for each of the filter bowls on the filter manifold. A red indicator extends to give a visual warning of clogged filter elements or large fluid pressure drops across the filters.

No. 1 and No. 2 Hydraulic System Pressure Filter Elements

Refer to Figure 17.

One pressure filter is installed in each filter manifold. The filter element removes 100% of all contamination particles larger than 5 microns. The filter elements are disposable.

No. 1 and No. 2 Hydraulic System Return Filter Elements

Refer to Figure 18.

One return filter is installed in each filter manifold. The filter element removes 100% of all contamination particles larger than 5 microns. The filter elements are disposable.

No. 1 Hydraulic System Case–Drain Filter Elements

Refer to Figure 19.

One case–drain filter is installed in filter manifold. The filter elements remove 100% of all contamination particles larger than 15 microns. The filter elements are disposable.

No. 2 Hydraulic System Case–Drain Filter Elements

Refer to Figure 19.

One case–drain filter is installed in filter manifold. The filter elements remove 100% of all contamination particles larger than 15 microns. The filter elements are disposable.

On aircraft with Modsum 4–113545 or Post SB84–29–21, two case–drain filters are installed, one in filter manifold and the other one in the forward equipment area of the right engine nacelle. The case–drain filter fitted in the forward equipment area of the right engine nacelle will decrease the back pressure and increase its cooling flow. This will decrease the EDP operating temperature and the number of EDP failures because of overheat. The filter elements remove 100% of all contamination particles larger than 15 microns. The filter elements are disposable.

Standby Power Unit

Refer to Figures 20 and 21.

The No. 1 hydraulic system Standby Power Unit (SPU) supplies backup power to the No. 1 hydraulic system. The SPU operates during takeoff and landing and during a No. 1 engine failure indicated by low oil pressure condition. The SPU is an AC electrically–operated pump normally powered by the right side electrical ac bus. Backup power to the SPU is supplied by the left side electrical bus. The SPU is installed in the No.1/left side engine nacelle.

No. 1 and No. 2 Hydraulic System Heat Exchangers

Refer to Figure 22.

The No. 1 and No. 2 hydraulic systems each include an oil–to–fuel heat exchanger to supply cooling of the hydraulic system. Hydraulic fluid from the pump case drain is sent to the heat exchanger, located in the fuel tank. After flowing through the heat exchanger, the hydraulic fluid returns to the reservoir.

No. 1 and No. 2 Hydraulic System Heat Exchanger Bypass Valves

Refer to Figures 23 and 24.

The heat exchanger bypass valve is installed between the heat exchanger inlet and outlet line on each of the No. 1 and No. 2 hydraulic systems. The valve controls the flow of hydraulic fluid from the case–drain to the heat exchanger as a function of fluid temperature. The valve also functions as a relief valve to let fluid bypass the heat exchanger if there is too much of a pressure decrease. The valve starts to open at 95 °F (35.0 °C) and is fully open at 125 °F (52 °C).

No. 1 Hydraulic System Balanced Relief Valve

Refer to Figure 25.

The No. 1 hydraulic system balanced relief valve (or priority valve) is located in the fuselage–to–wing fairing. During periods of high system flow demand, this valve stops hydraulic fluid flow to the flaps,

and the motor side of the Power Transfer Unit (PTU). Hydraulic pressure is only supplied to the components necessary for flight control.

Power Transfer Unit

Refer to Figures 26 and 27.

The PTU is installed in the fuselage–to–wing fairing. The PTU transfers hydraulic power from the No. 1 hydraulic system to the No. 2 hydraulic system without sharing fluid between the systems. Hydraulic pressure from the No. 1 system powers the PTU motor that operates the pump–side of the PTU to power the No. 2 hydraulic system.

The PTU is a fixed displacement, one–directional device used to supply backup power to the No. 2 hydraulic system. The PTU has two separate constant displacement hydraulic units connected by a drive shaft. The motor side is slightly larger in displacement than the pump side. The output of the pump is 16.6 gpm (63 L/min) at a discharge pressure of 1900 psi (13100 kPa) minimum with an inlet pressure of 50 ±15 psi (345 ±103 kPa). The motor inlet pressure is 2700 psi (18616 kPa) and return pressure is 150 ±25 psi (1034 ±172 kPa).

Pressurized fluid is applied to the pressure port on the motor side of the unit. When the cylinder turns, the angled bearing surface on the cam moves the piston and the shoe subassemblies back and forth. A spline drive shaft transmits the torque to the pump side of the PTU.

The pump has an in–line cylinder barrel, which is attached to and operated by the input shaft. The cylinder barrel contains nine fluid displacement piston and the shoe subassemblies. The piston and the shoe assemblies are held to the bearing surface by compression during the outlet stroke and a retainer plate during the intake stroke.

During the intake stroke of the piston, fluid goes into the cylinder bores through the holes in the port cap, from the inlet port side of the pump. At the end of the intake stroke, the cylinder bore becomes full of fluid. When the cylinder barrel continues to turn, the piston moves towards the port cap and releases the fluid from the cylinder bore. The fluid goes through the port cap and the outlet port to the hydraulic system.

On aircraft with ModSum 4Q126354 or SB84–29–19 incorporated, in the event of the No. 2 engine failure in flight, the PTU comes on. In case of the subsequent depletion of fluid quantity in the No. 2 main hydraulic system, or when the hydraulic system No. 1 pressure decreases, the PTU will automatically shut down. This will prevent the PTU runaway and the confusing sequence of pressure fluctuations. It will also prevent hydraulic system No. 1 caution light from coming on before the hydraulic system No. 1 priority valve can close.

The PTU will latch out if it fails to start in less than 5 seconds after manually, or automatically commanded. The PTU will also latch out if the PTU pressure decreases when it is commanded on.

Hydraulic PTU Select Valve

Refer to Figure 28.

The No. 1 hydraulic system uses a solenoid–operated PTU select valve to control the operation of the PTU motor. The PTU select valve is a 3–way, 2–position, pilot–operated spool valve. The valve is normally closed and pressure–operated to the open position. The PTU select valve is installed in the fuselage–to–wing fairing.

No. 1 and No. 2 Hydraulic System Temperature Switches

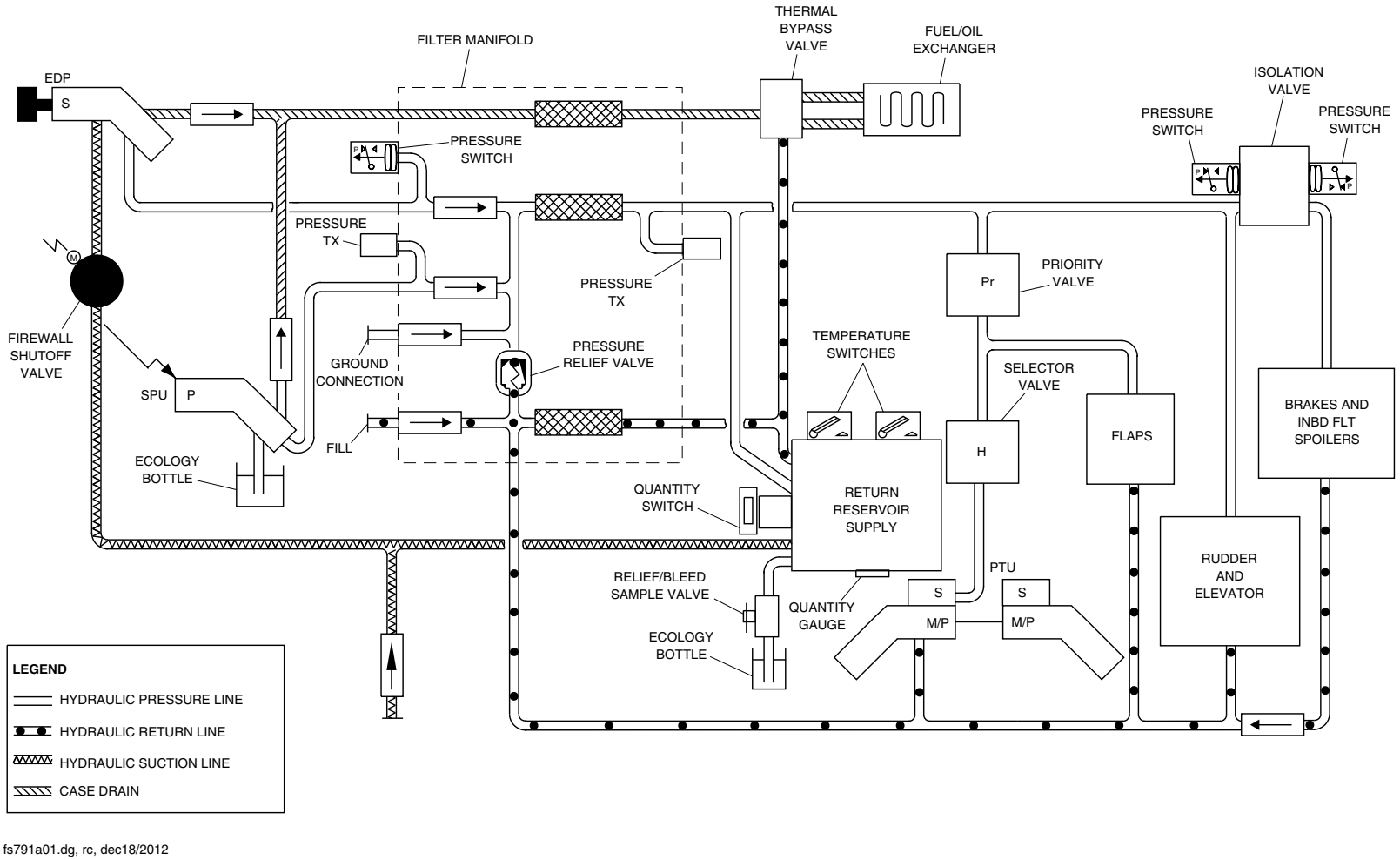
Refer to Figures 12 and 13.

The No. 1 and No. 2 hydraulic systems each contain a 225 °F (107 °C) and a 275 °F (135 °C) temperature switch, installed on the hydraulic system reservoir. The switches monitor the temperature of the hydraulic fluid inside the reservoir. If fluid temperature reaches 225 °F (107 °C) the switch sends a signal to the No. 1 or No. 2 HYD FLUID HOT caution light. If fluid temperature reaches 275 °F (135 °C), the temperature switch sends a signal which closes the firewall shut–off valve.

No. 1 Hydraulic System Port–Mounted Check Valve

Refer to Figure 15.

The No. 1 hydraulic system contains an in–line check valve installed in two ports of the filter manifold. The check valve gives a fluid path to an adjacent port on the filter manifold which contains a pressure switch and a pressure transducer.



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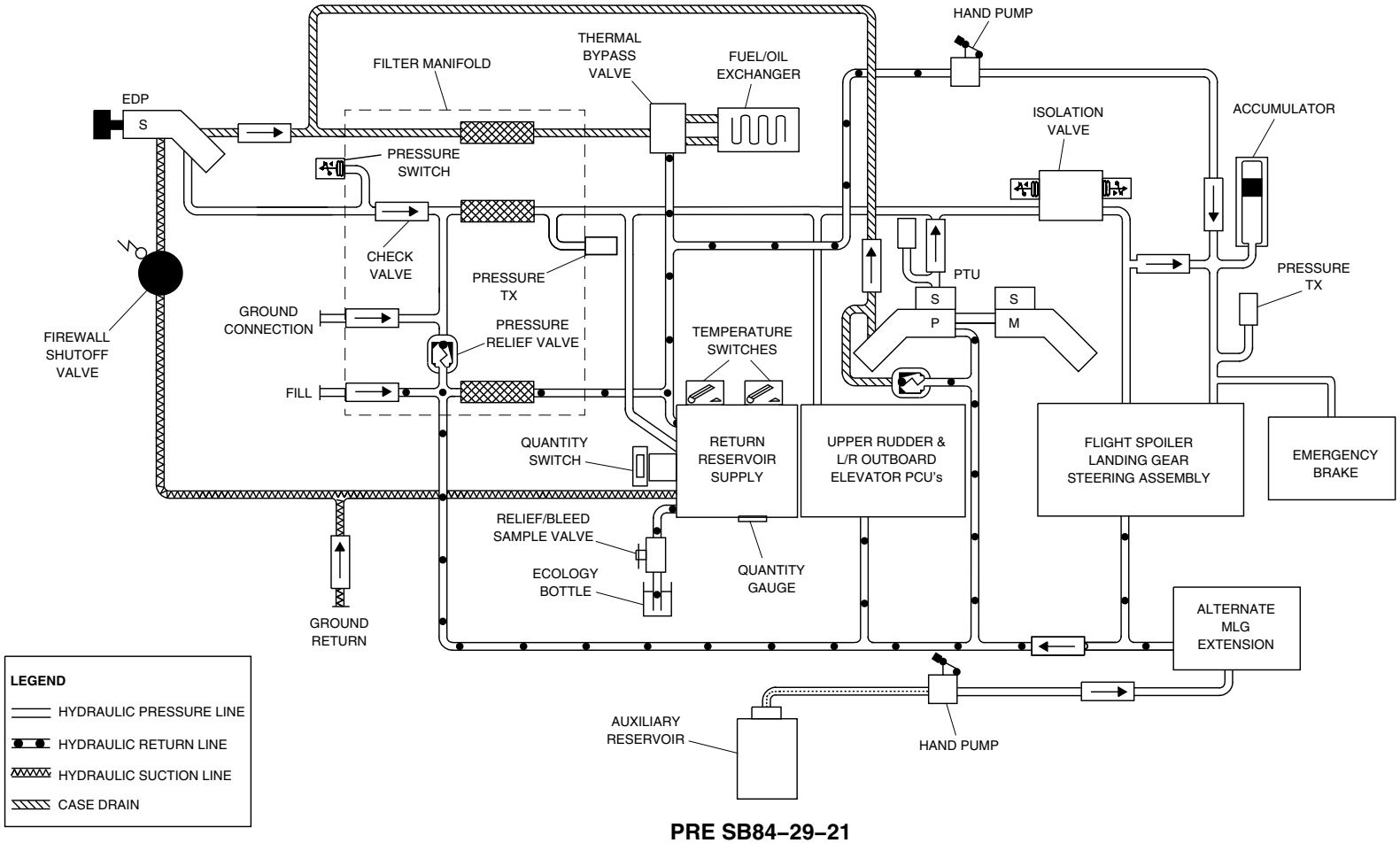
No.1 Hydraulic System Synoptic
Figure 1



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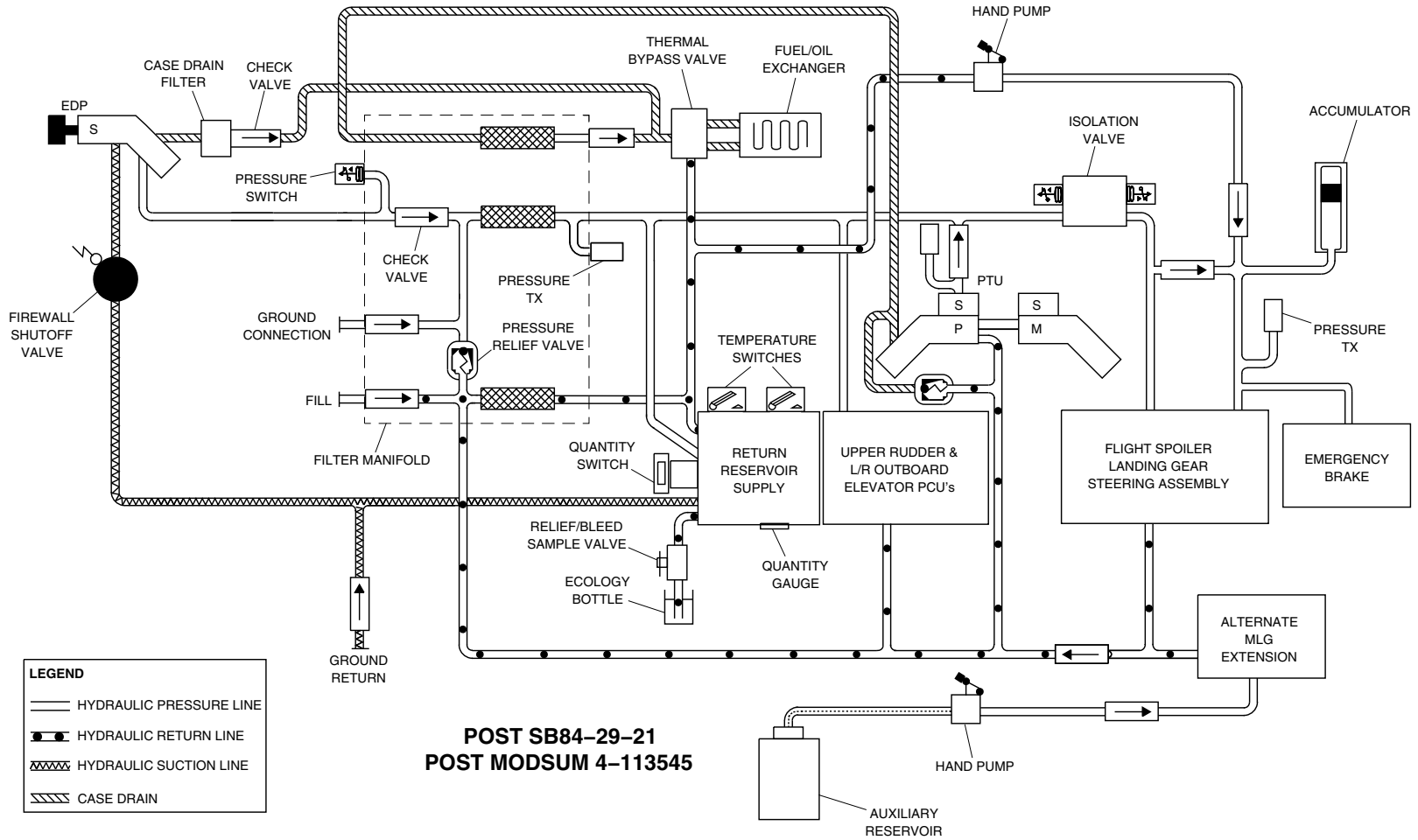
PRE SB84–29–21
PRE MODSUM 4–113545

No.2 Hydraulic System Synoptic
Figure 2 (Sheet 1 of 2)



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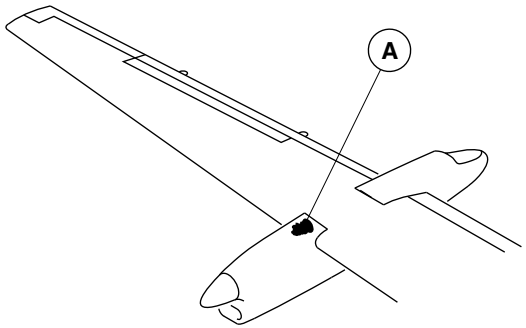
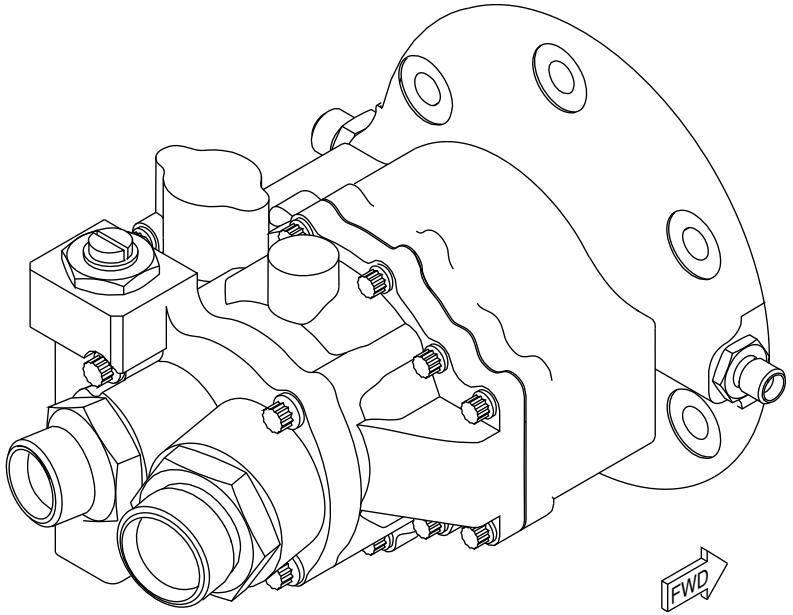
No.2 Hydraulic System Synoptic
Figure 2 (Sheet 2 of 2)



NOTE

Right side shown.
Left side similar.



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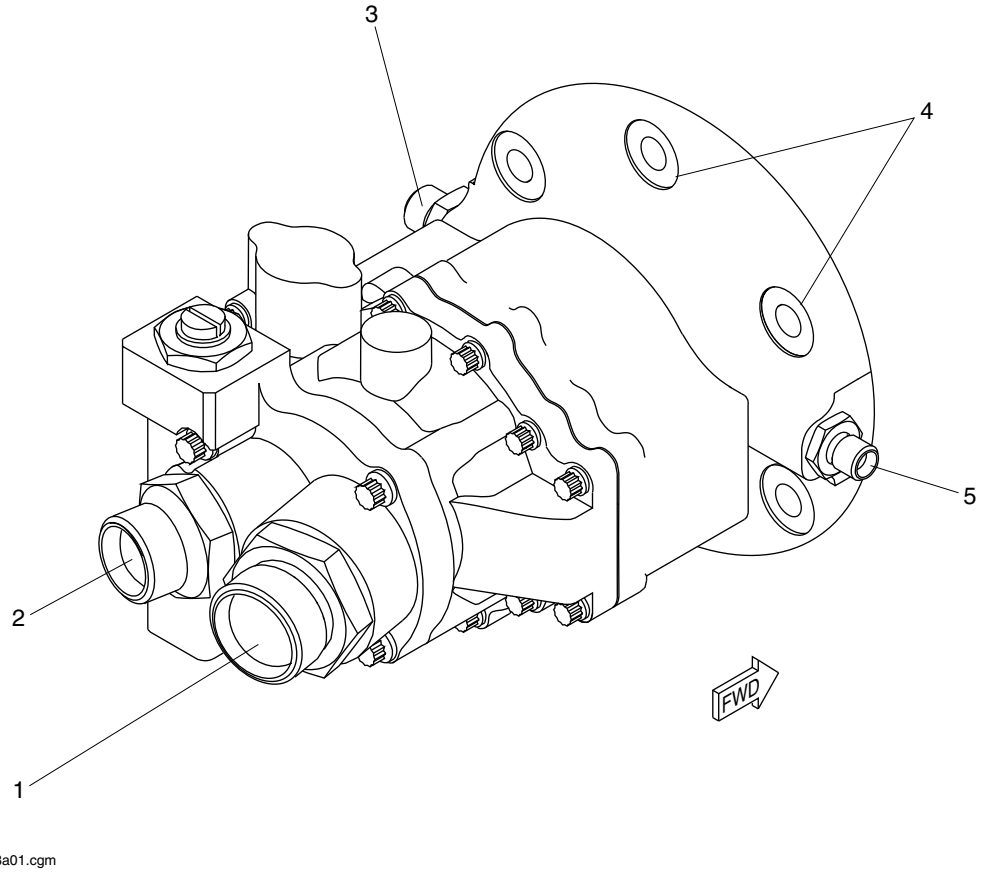
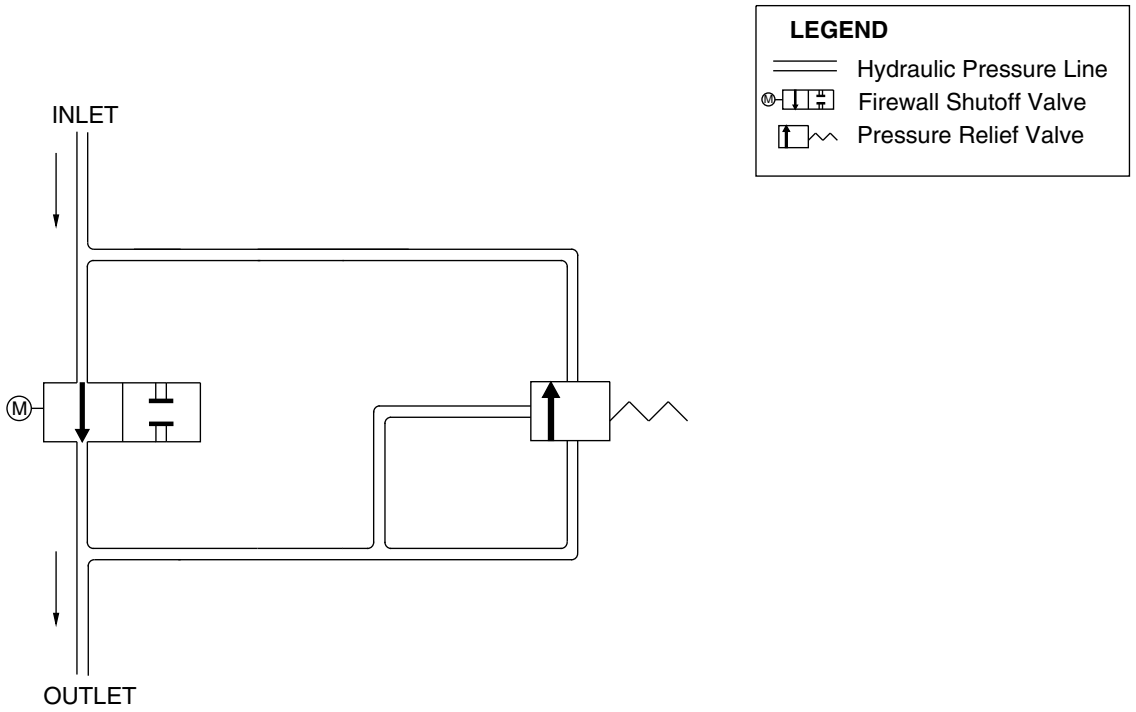
EDP Locator
Figure 3



LEGEND

1. Suction Port.
2. Discharge Port.
3. Case Drain Port.
4. Six Bolt Mounting Pattern.
5. Seal Drain Port.

EDP Detail
Figure 4



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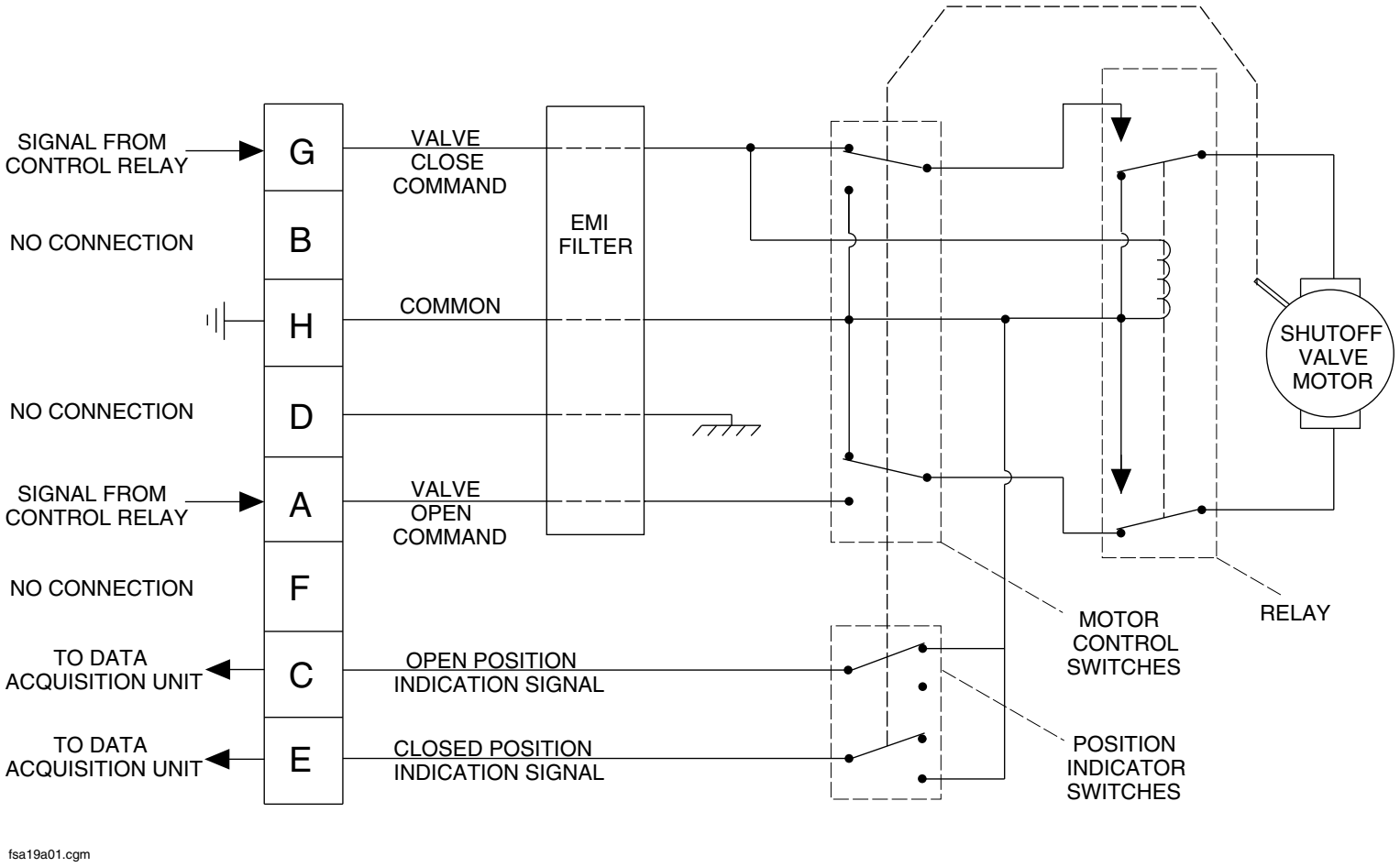
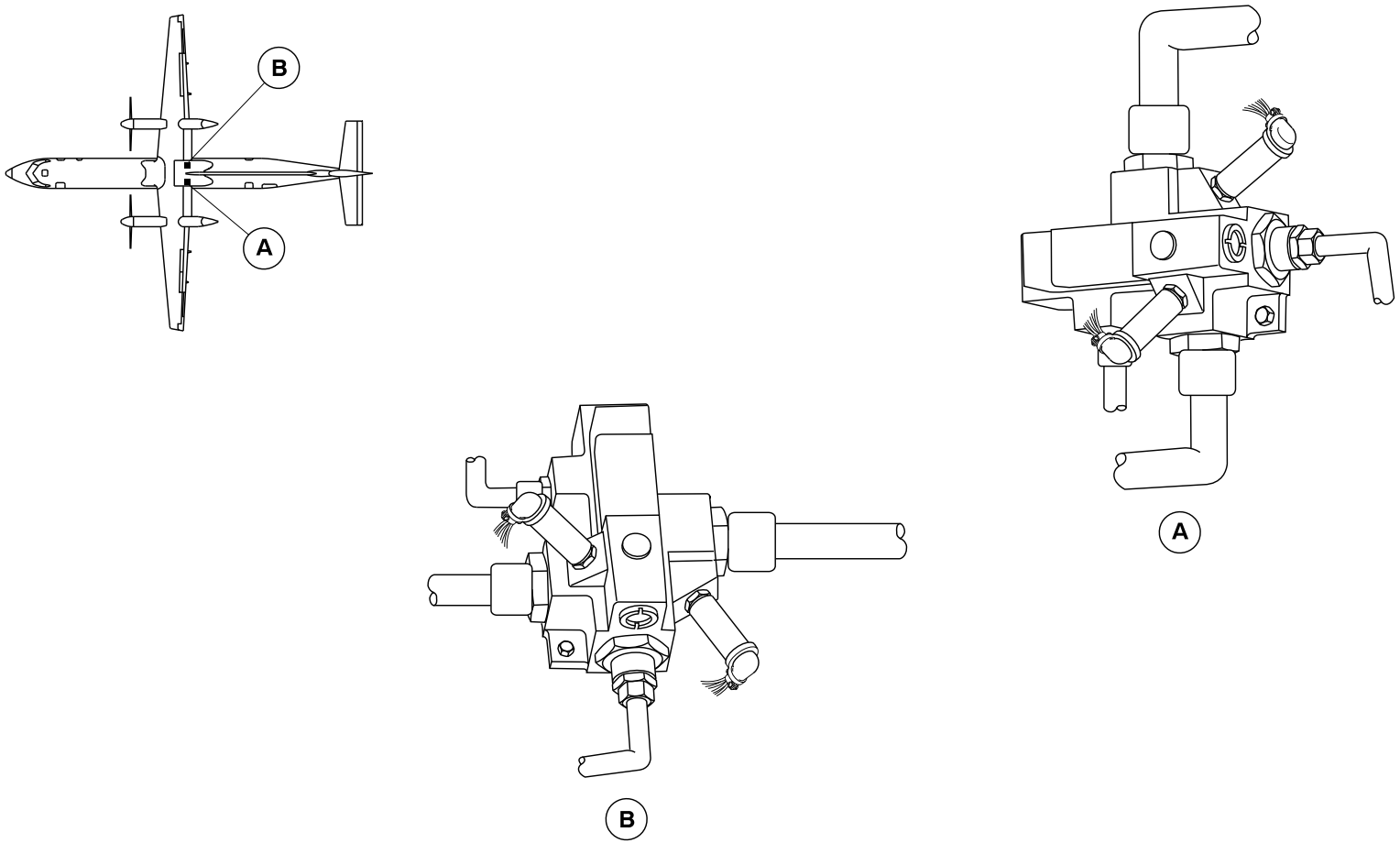
Firewall Shutoff Valve Hydraulic Schematic
Figure 5



Firewall Shutoff Valve Electrical Schematic
Figure 6



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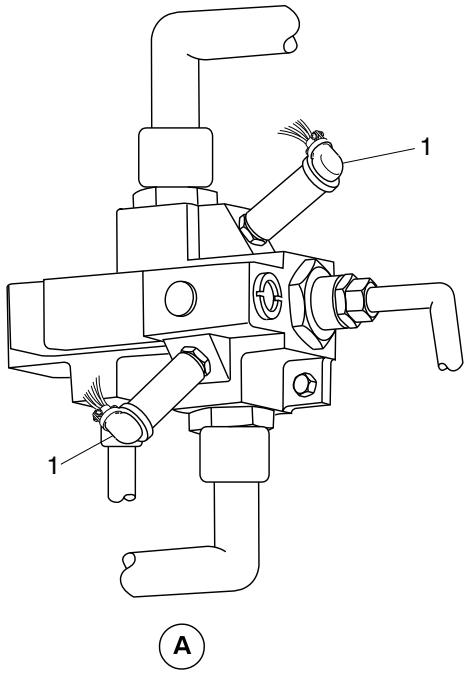
ISOLATION SHUT OFF VALVE LOCATION
Figure 7



LEGEND

1. Connector.

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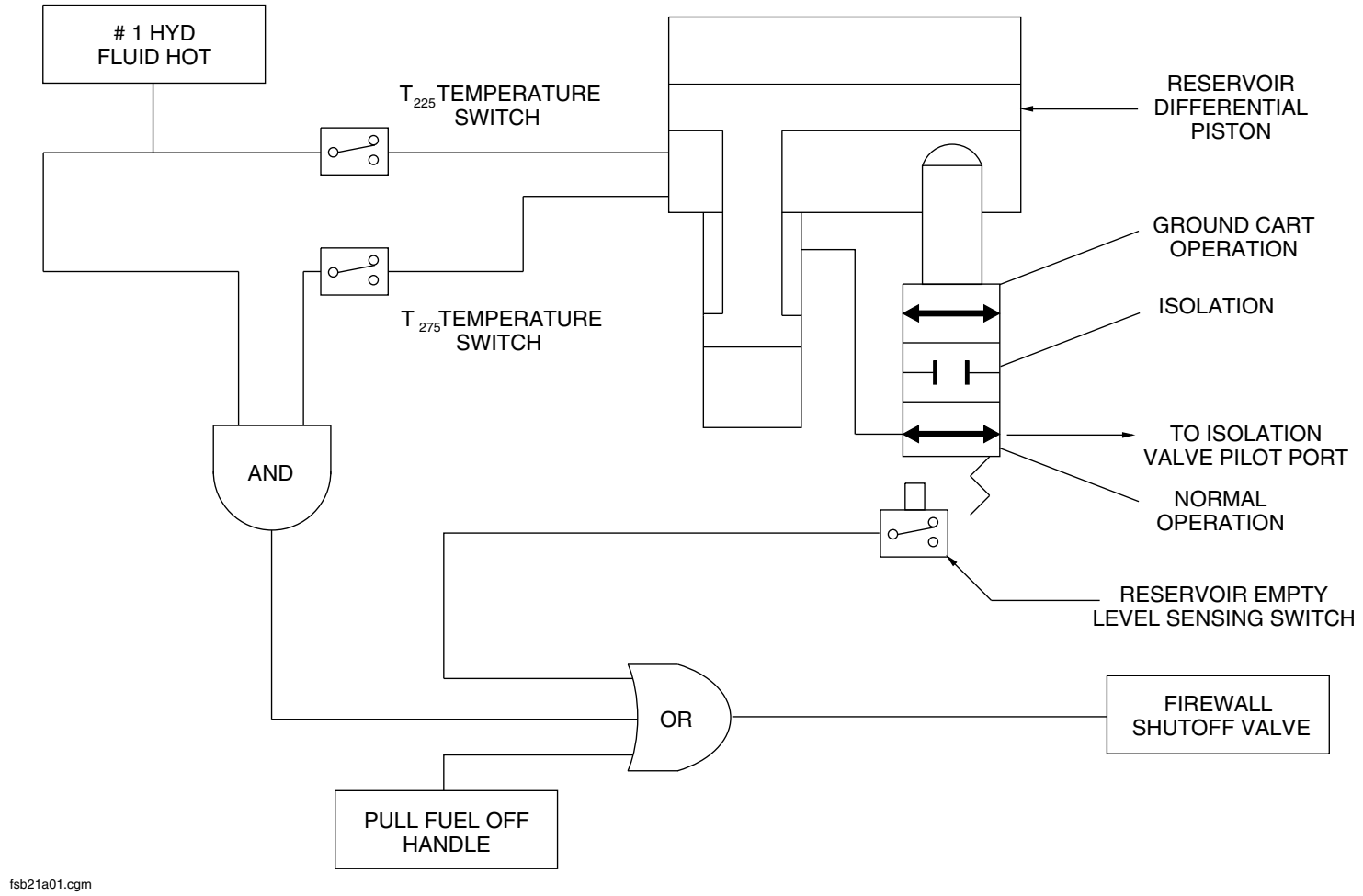
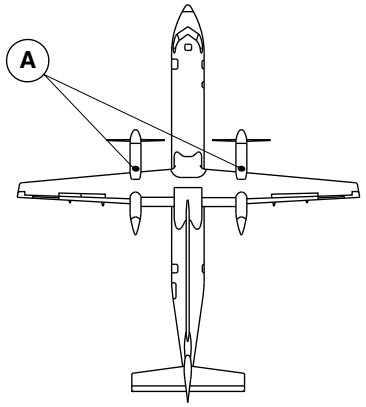
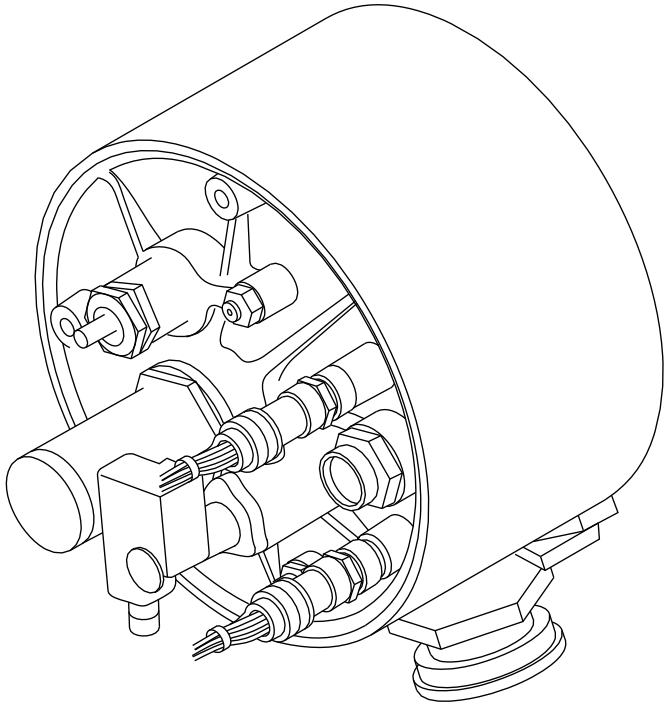
ISOLATION VALVE DETAIL
Figure 8



Reservoir Level Sensing Valve and Temperature Switches
Figure 9





NOTES

Left side shown.
Right side similar.

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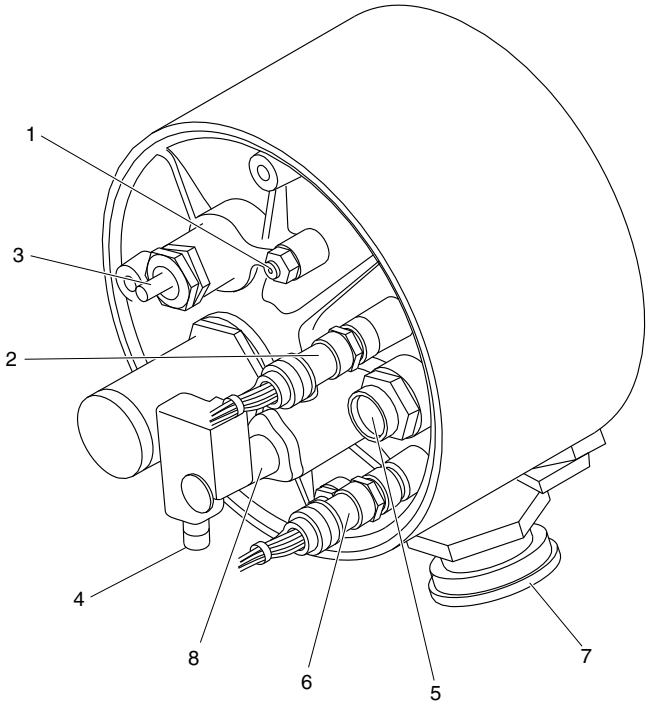
Hydraulic Reservoirs Locator
Figure 10

LEGEND

1.Bleed port.
2.Temperature switch (225^{0}F).
3. Relief Valve.
4. Reservoir empty switch.
5. Return port.
6. Temperature switch (275^{0}F).
7. Fluid level indicator
8. Reservoir level sensing valve.



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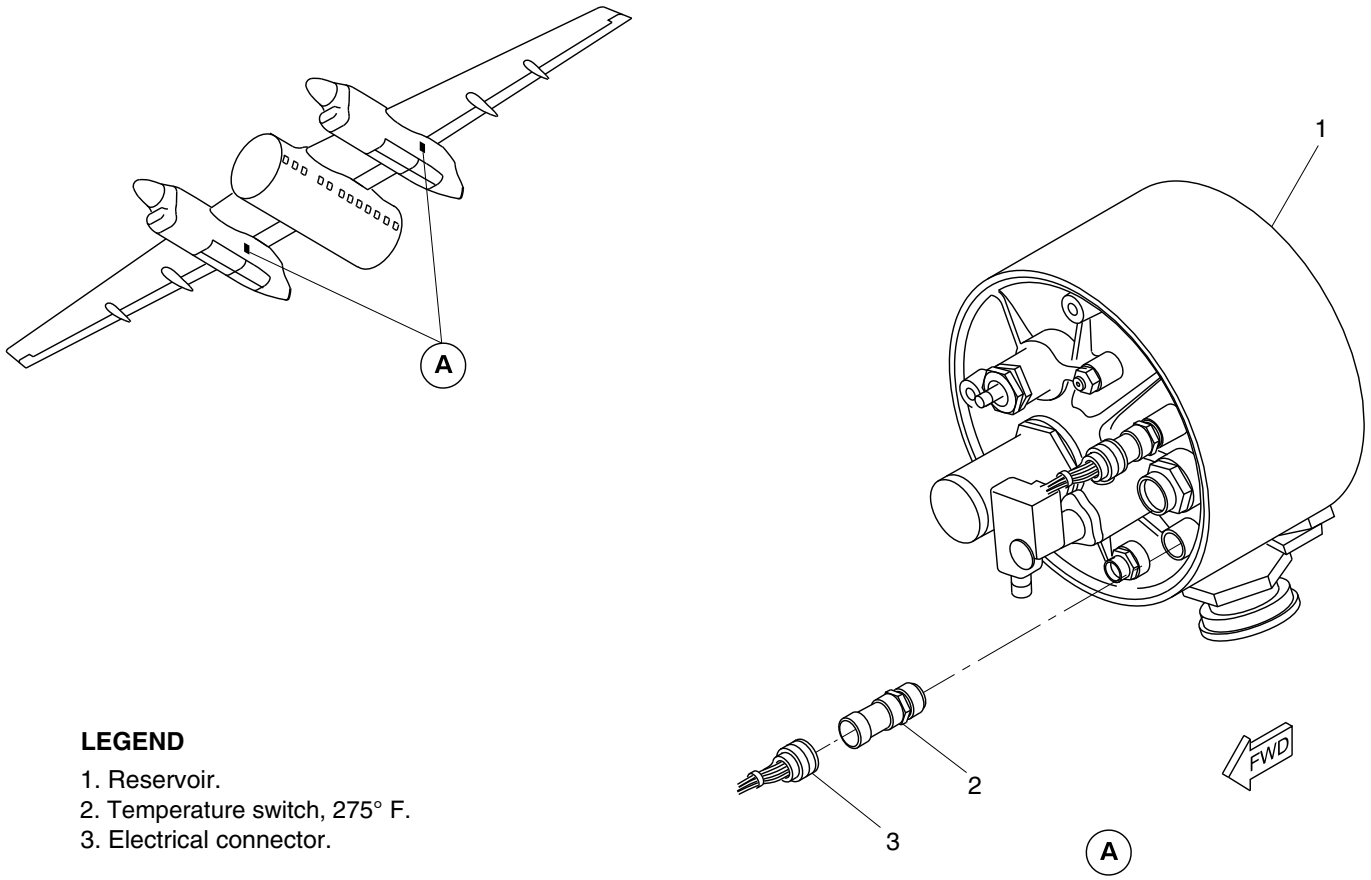
Hydraulic Reservoirs Detail
Figure 11



LEGEND

1. Reservoir.
2. Temperature switch, 275° F.
3. Electrical connector.

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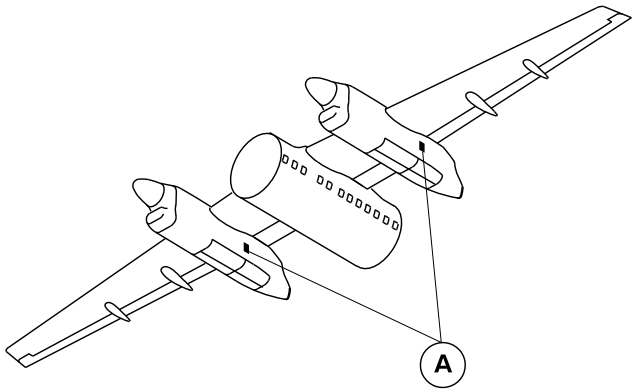
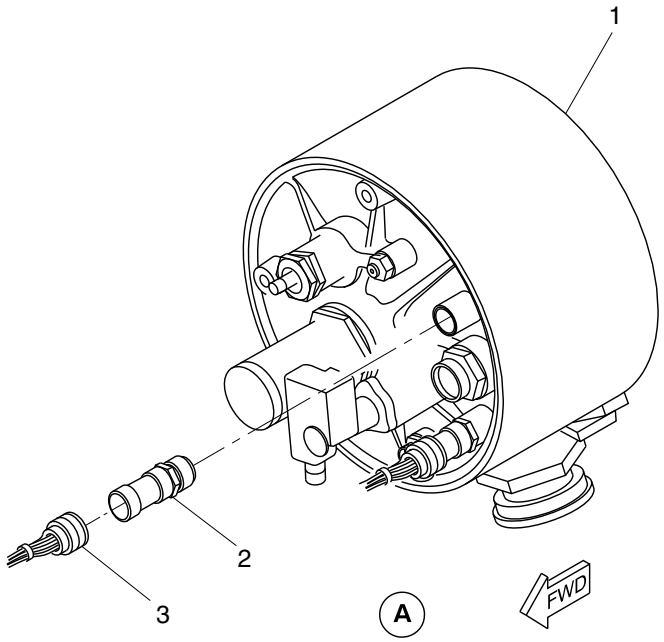
Temperature Switch, 275°F
Figure 12





LEGEND

1. Reservoir.
2. Temperature switch, 225° F.
3. Electrical connector.

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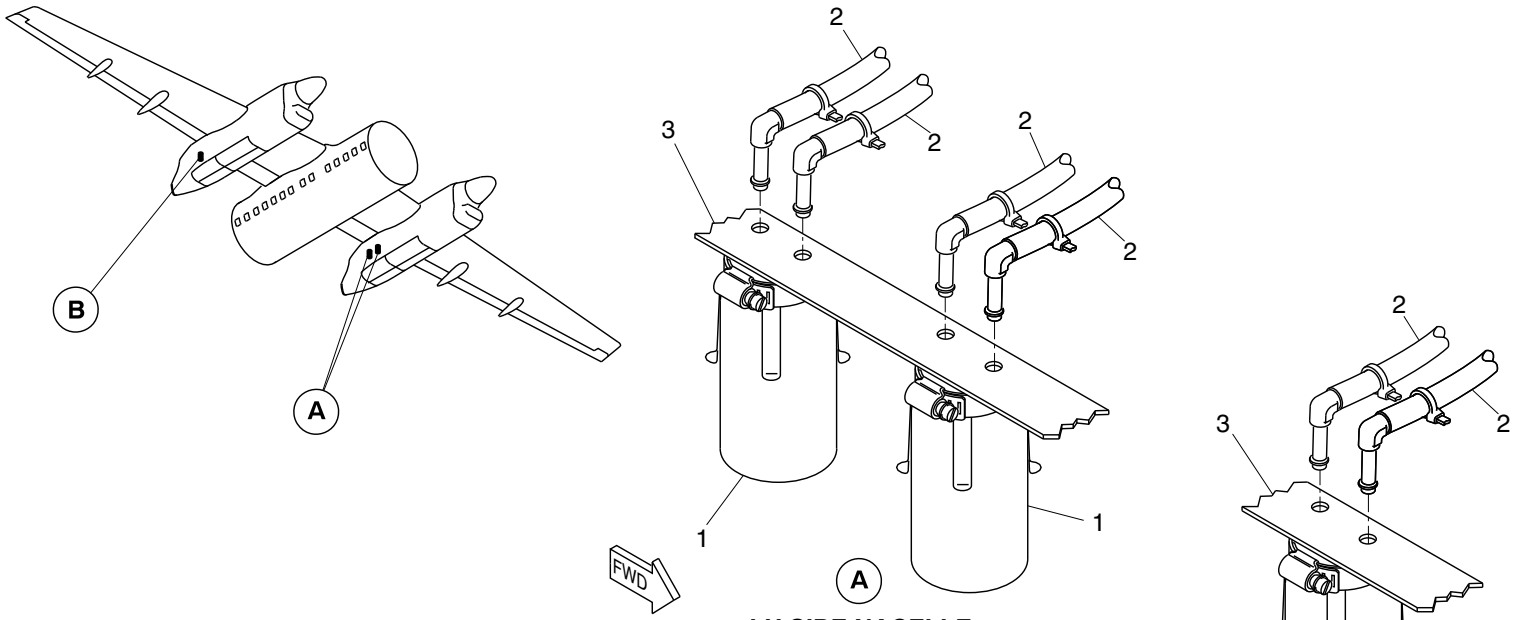
Temperature Switch, 225°F
Figure 13



LH SIDE NACELLE
NO.1 HYDRAULIC SYSTEM

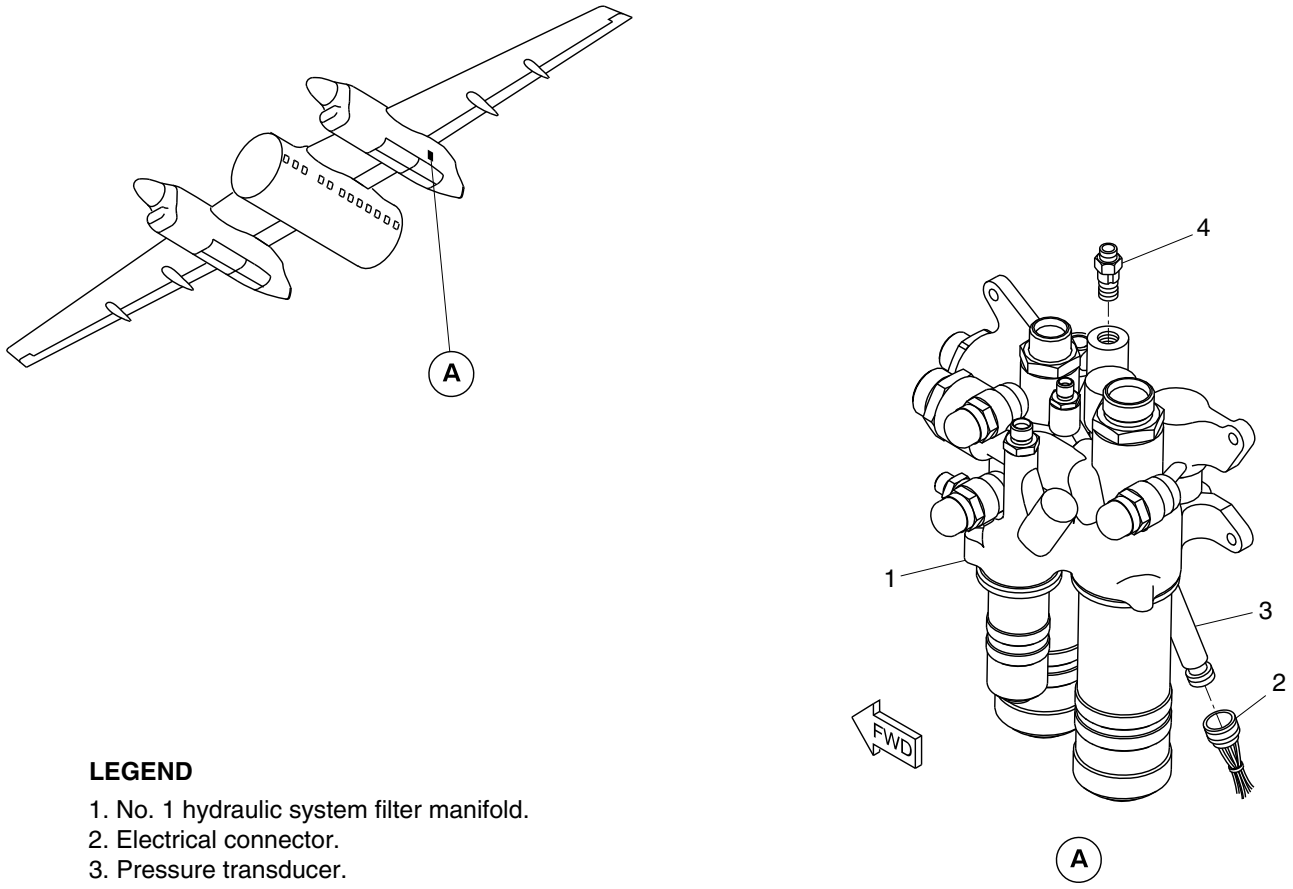
RH SIDE NACELLE
No.2 HYDRAULIC SYSTEM

LEGEND

1. Bottle.
2. Hose.
3. Ecology bottle support tray.

cg1641a01.dg, av, aug30/2011

No.1 and No.2 Hydraulic System Ecology Bottles
Figure 14

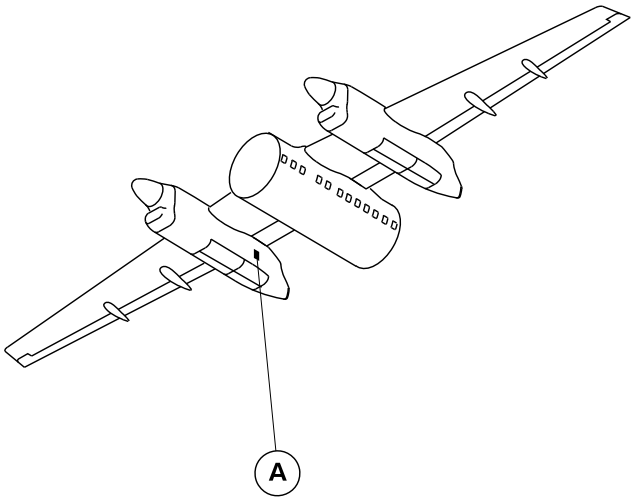


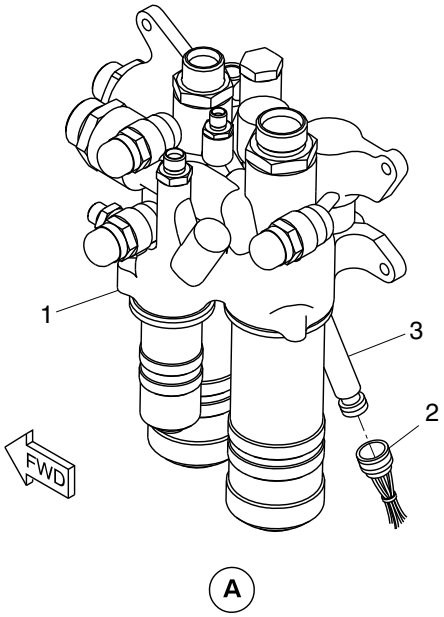
LEGEND

1. No. 1 hydraulic system filter manifold.
2. Electrical connector.
3. Pressure transducer.
4. Check valve, port–mounted.

cg1642a01.dg, av, aug30/2011

Hydraulic Filter Manifold, No. 1 System
Figure 15



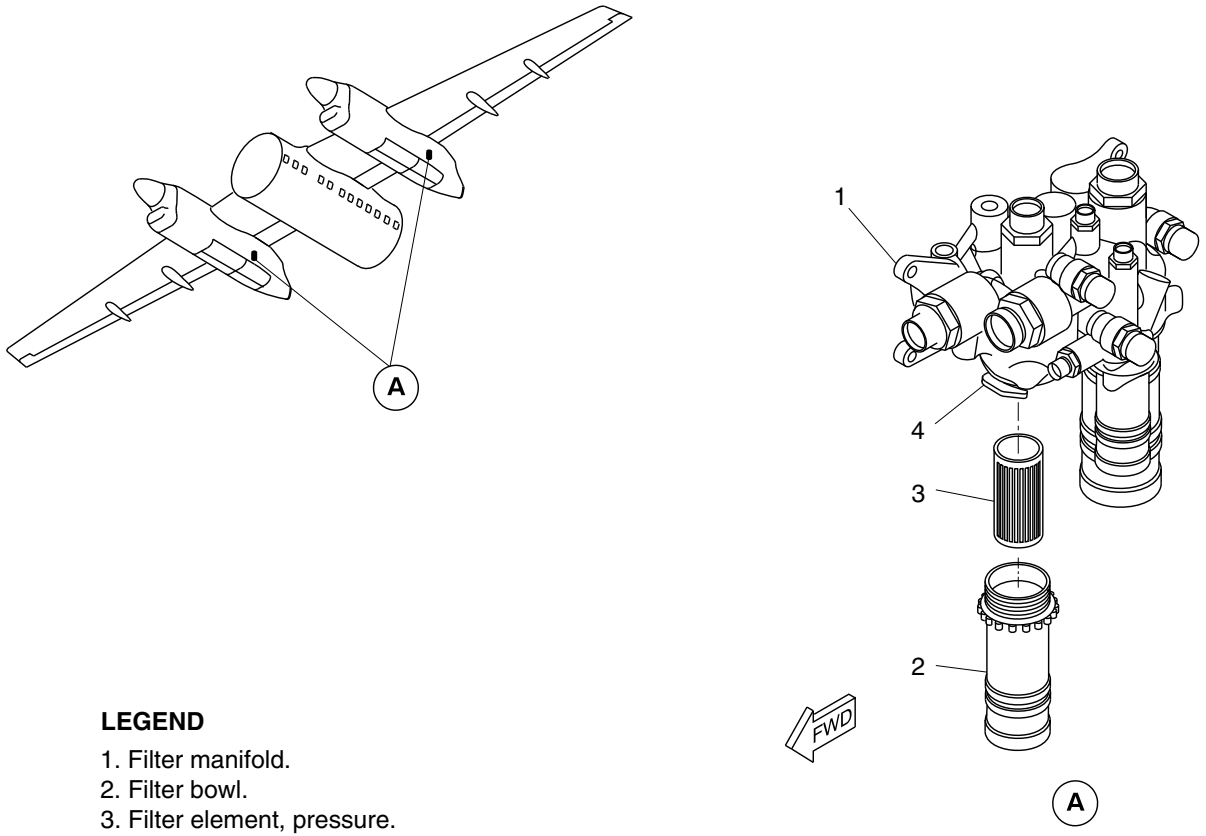


LEGEND

1. No. 2 hydraulic system filter manifold.
2. Electrical connector.
3. Pressure transducer.

cg1643a01.dg, av, aug30/2011

Hydraulic Filter Manifold, No. 2 System
Figure 16

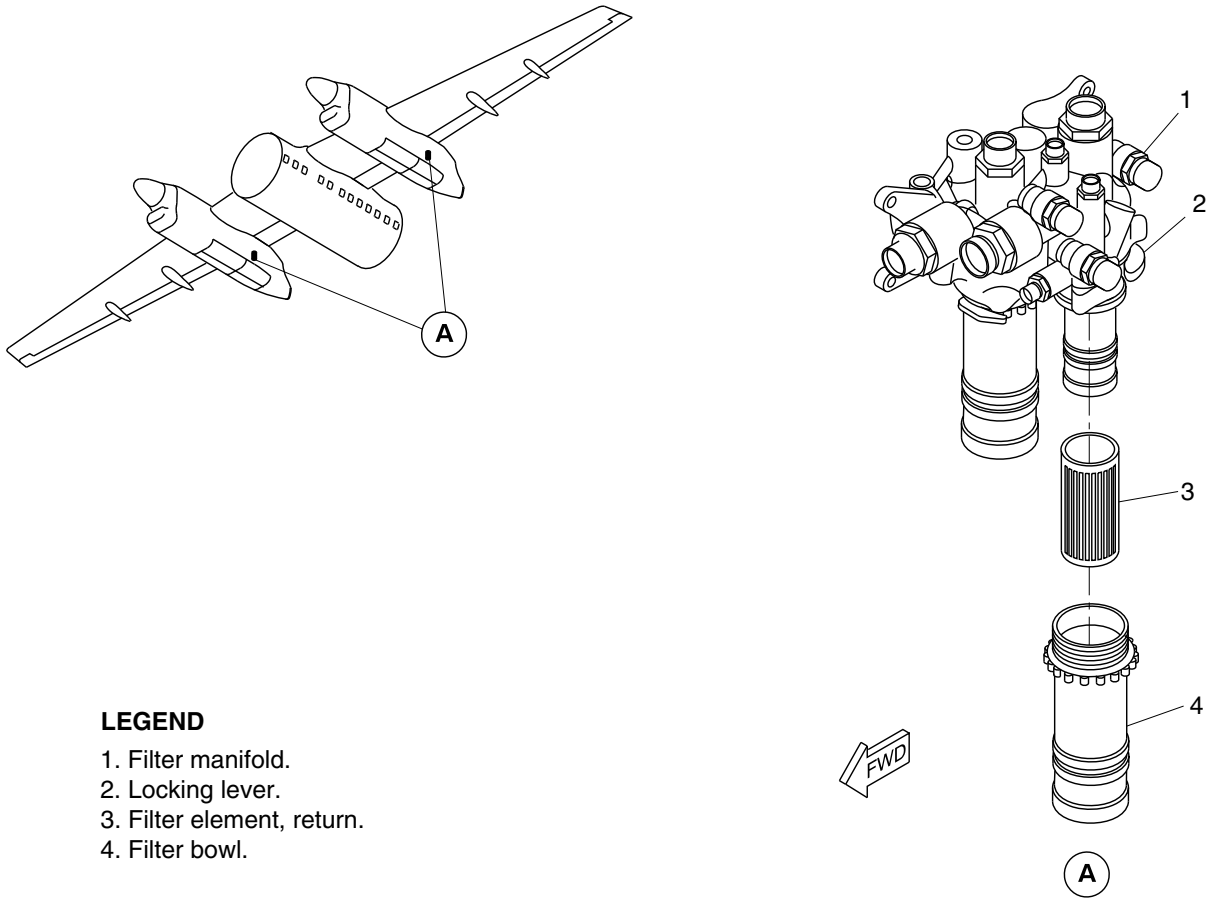


LEGEND

1. Filter manifold.
2. Filter bowl.
3. Filter element, pressure.
4. Locking lever.

cg1644a01.dg, av, aug30/2011

No.1 and No.2 Hydraulic System Pressure–Filter Elements
Figure 17

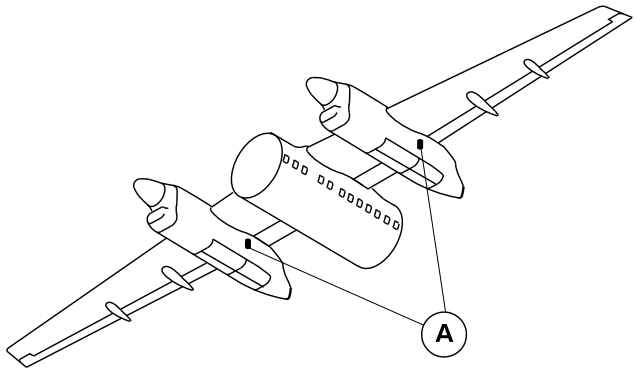


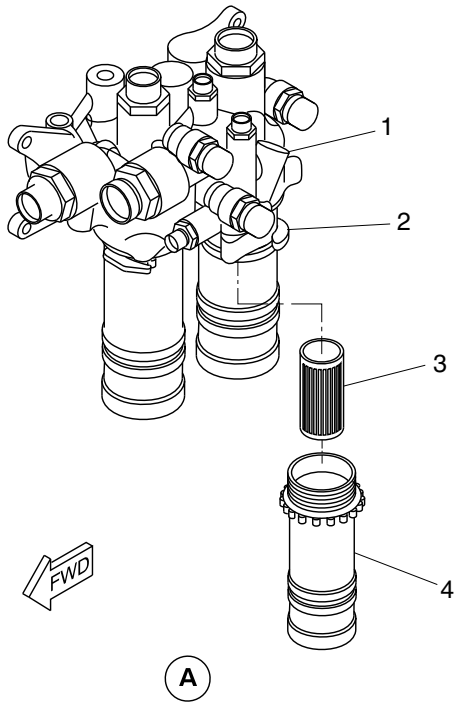
LEGEND

1. Filter manifold.
2. Locking lever.
3. Filter element, return.
4. Filter bowl.

cg1645a01.dg, av, aug30/2011

No.1 and No.2 Hydraulic System Return–Filter Elements
Figure 18



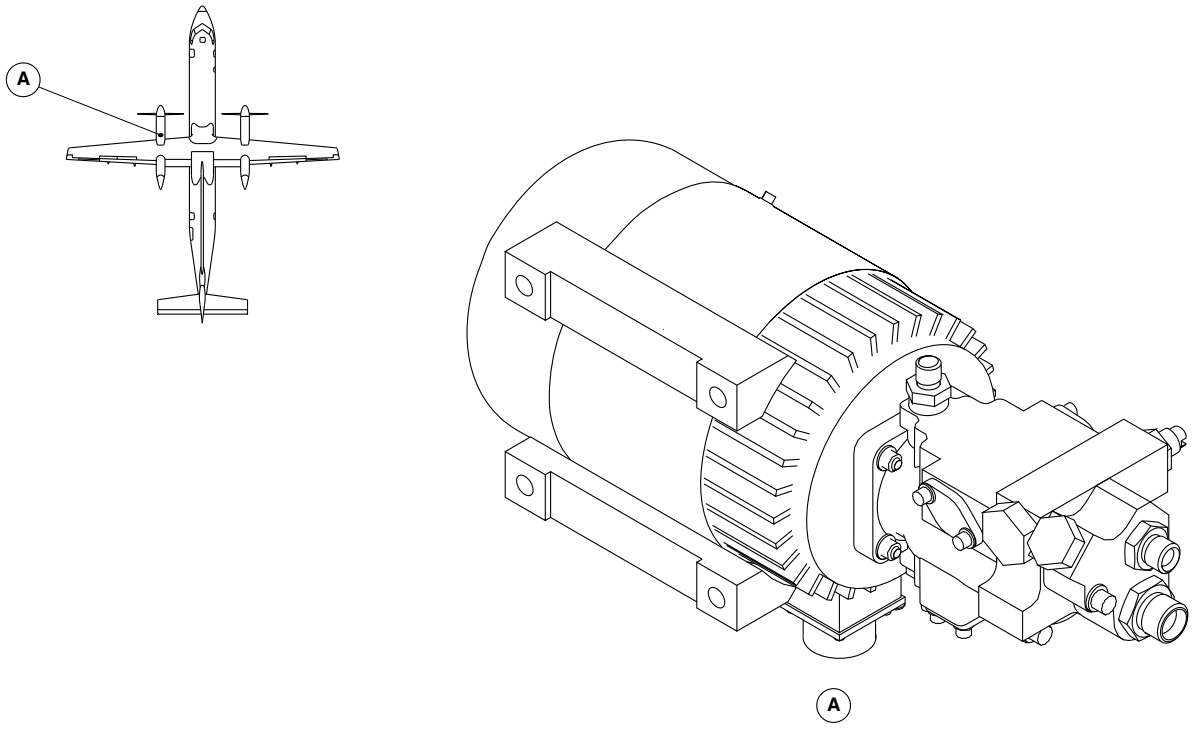


LEGEND

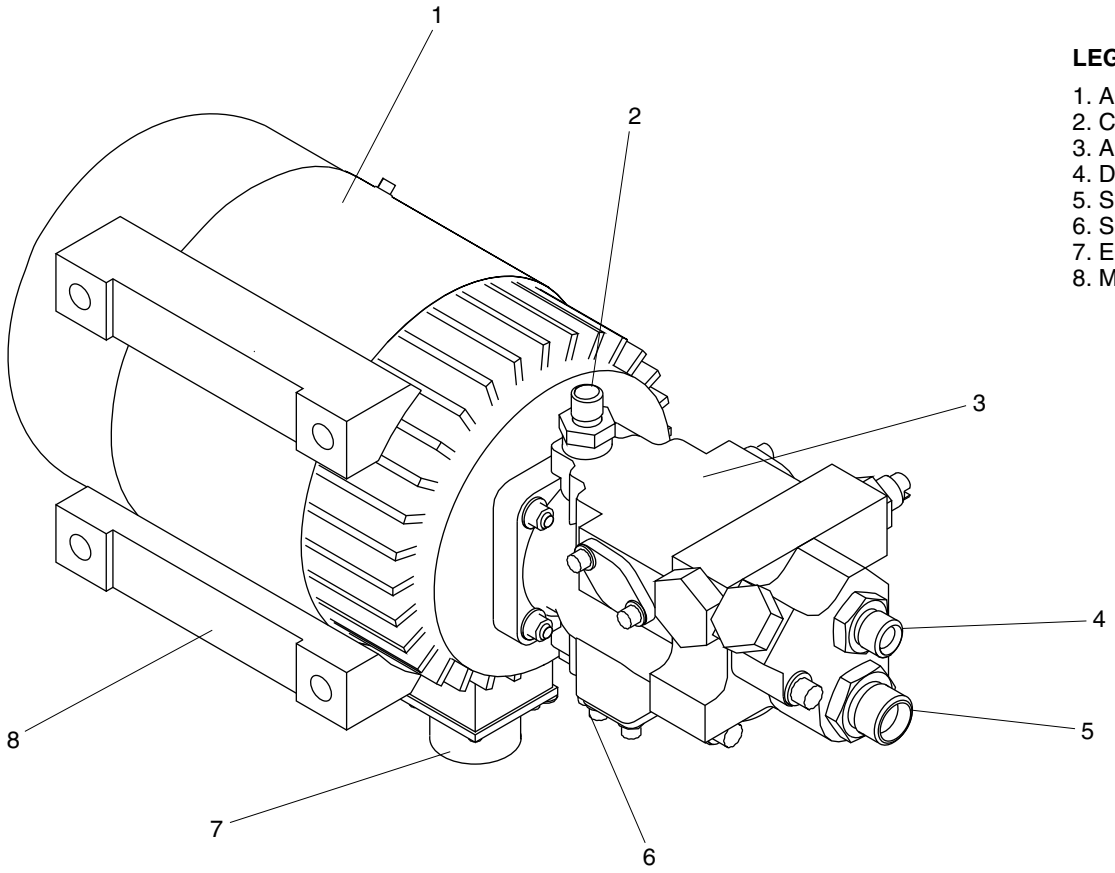
1. Filter manifold.
2. Locking lever.
3. Filter element, case drain.
4. Filter bowl.

cg1646a01.dg, av, aug30/2011

No.1 and No.2 Hydraulic System Case–Drain Filter Elements
Figure 19



SPU Locator
Figure 20



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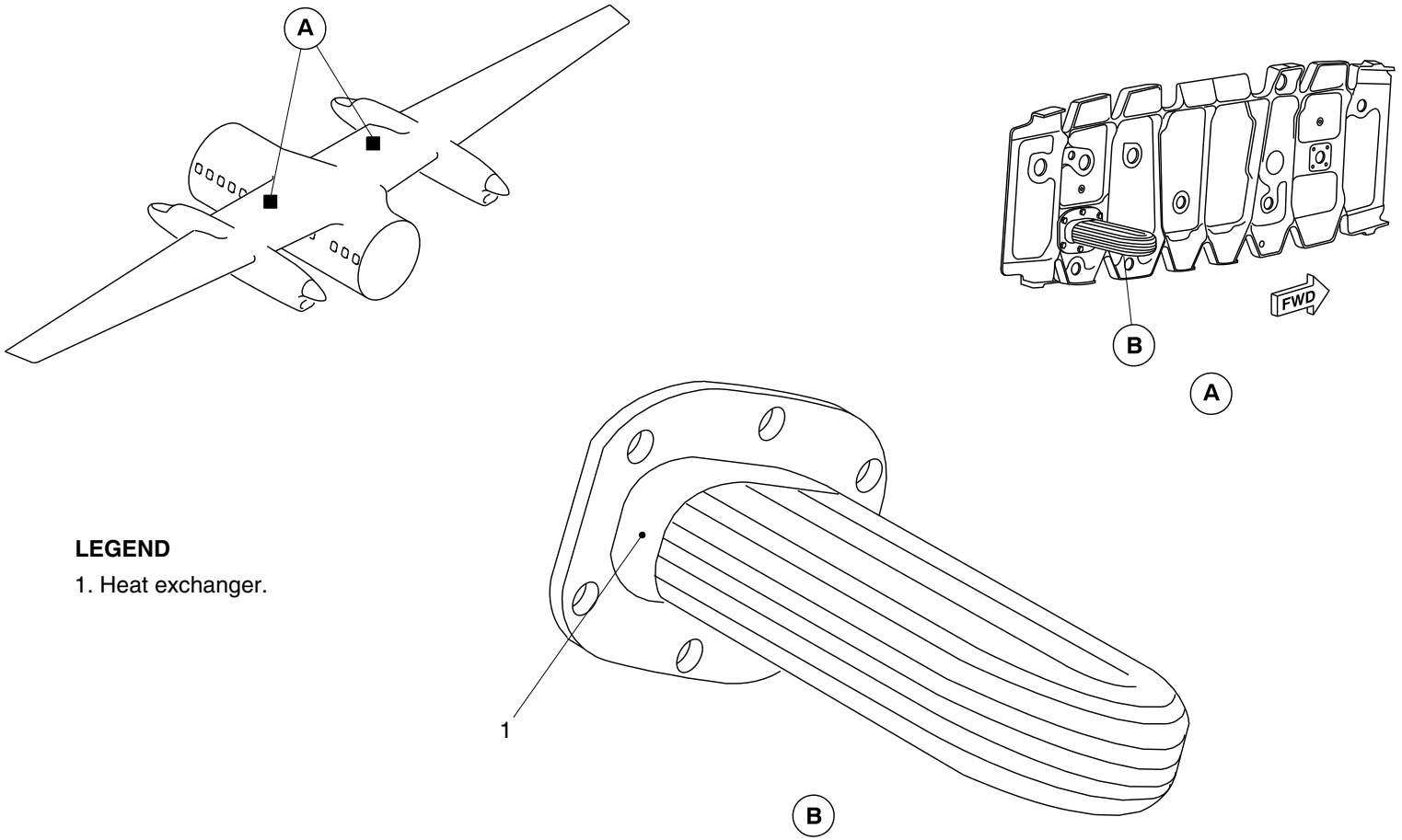
LEGEND

1. AC Motor.
2. Case Drain Port.
3. AP1VC–011 Pump.
4. Discharge Port.
5. Suction Port.
6. Seal Drain (Bottom).
7. Electrical Connector.
8. Mounting.

SPU Detail
Figure 21

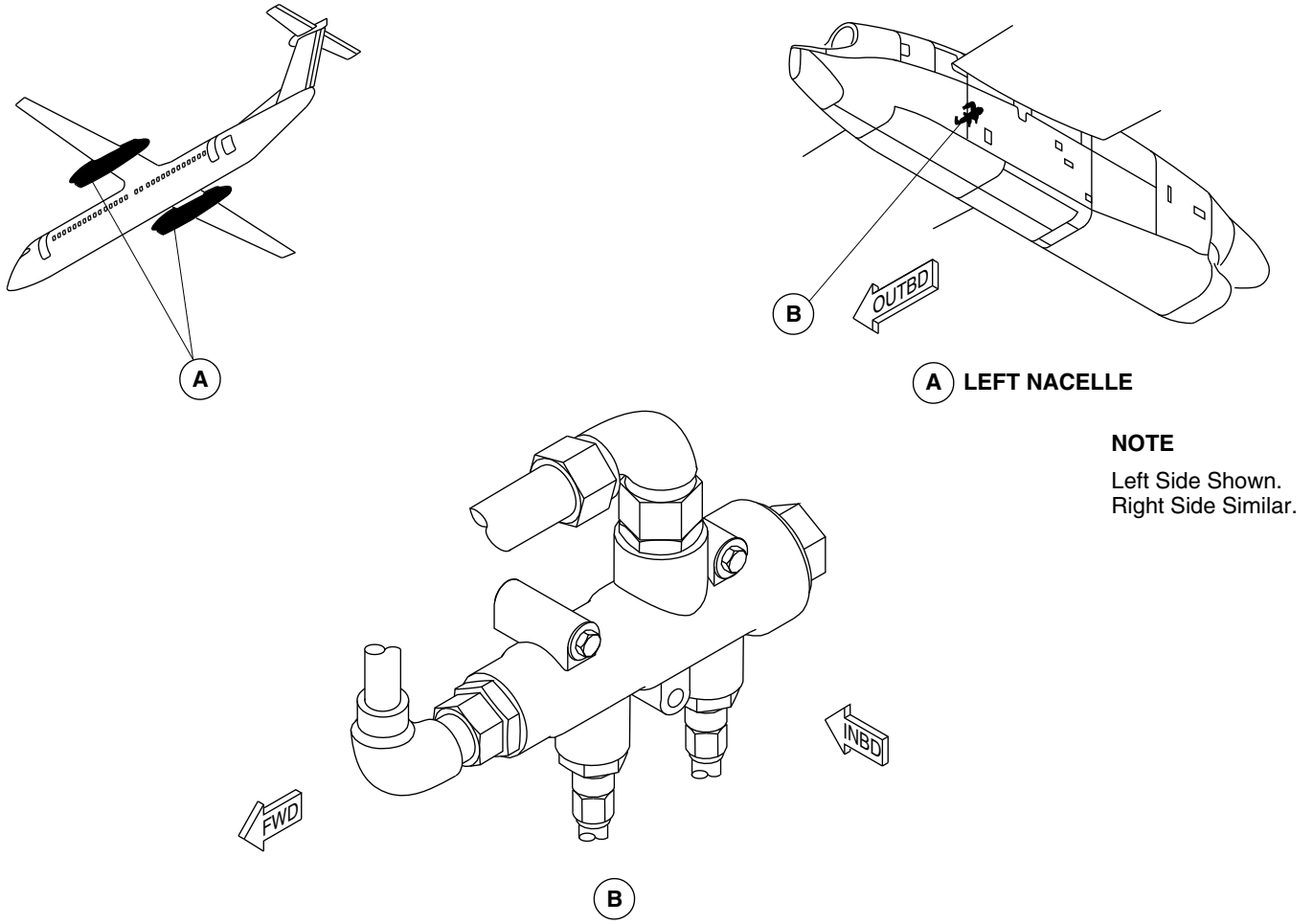


LEGEND

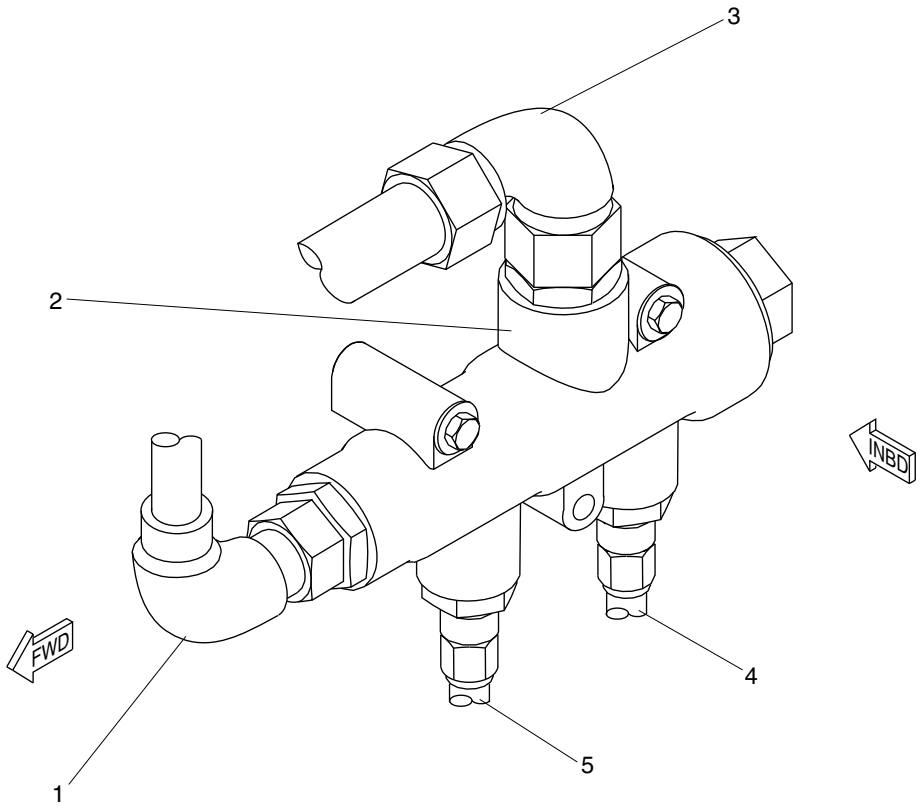
1. Heat exchanger.

cg1647a01.dg, av, aug30/2011

Heat Exchanger
Figure 22



Heat Exchanger Bypass Valve Locator
Figure 23



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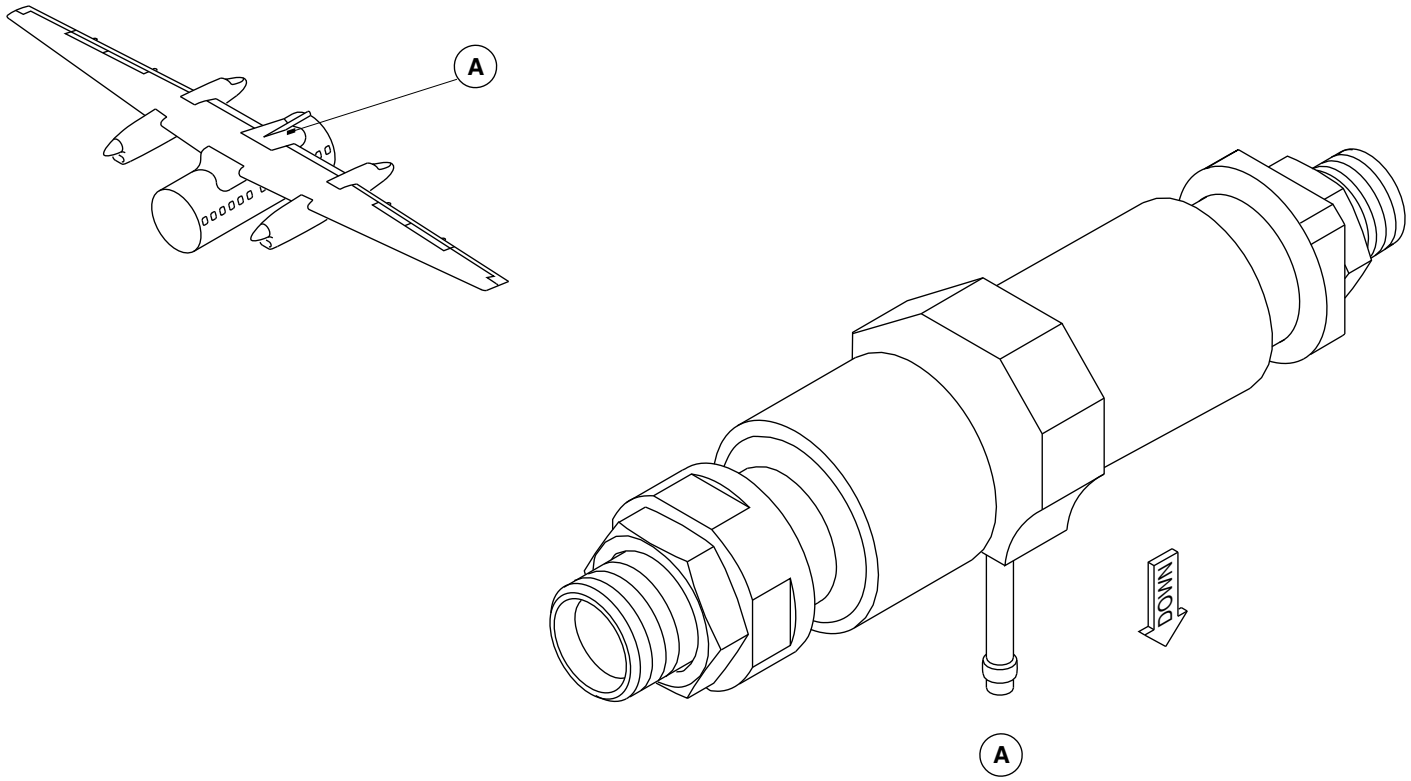
LEGEND

1. Supply Hydraulic Tube.
2. Heat Exchanger Bypass Valve.
3. Return Hydraulic Tube.
4. Hydraulic Outlet Tube.
5. Hydraulic Inlet Tube.

Heat Exchanger Bypass Valve Detail
Figure 24



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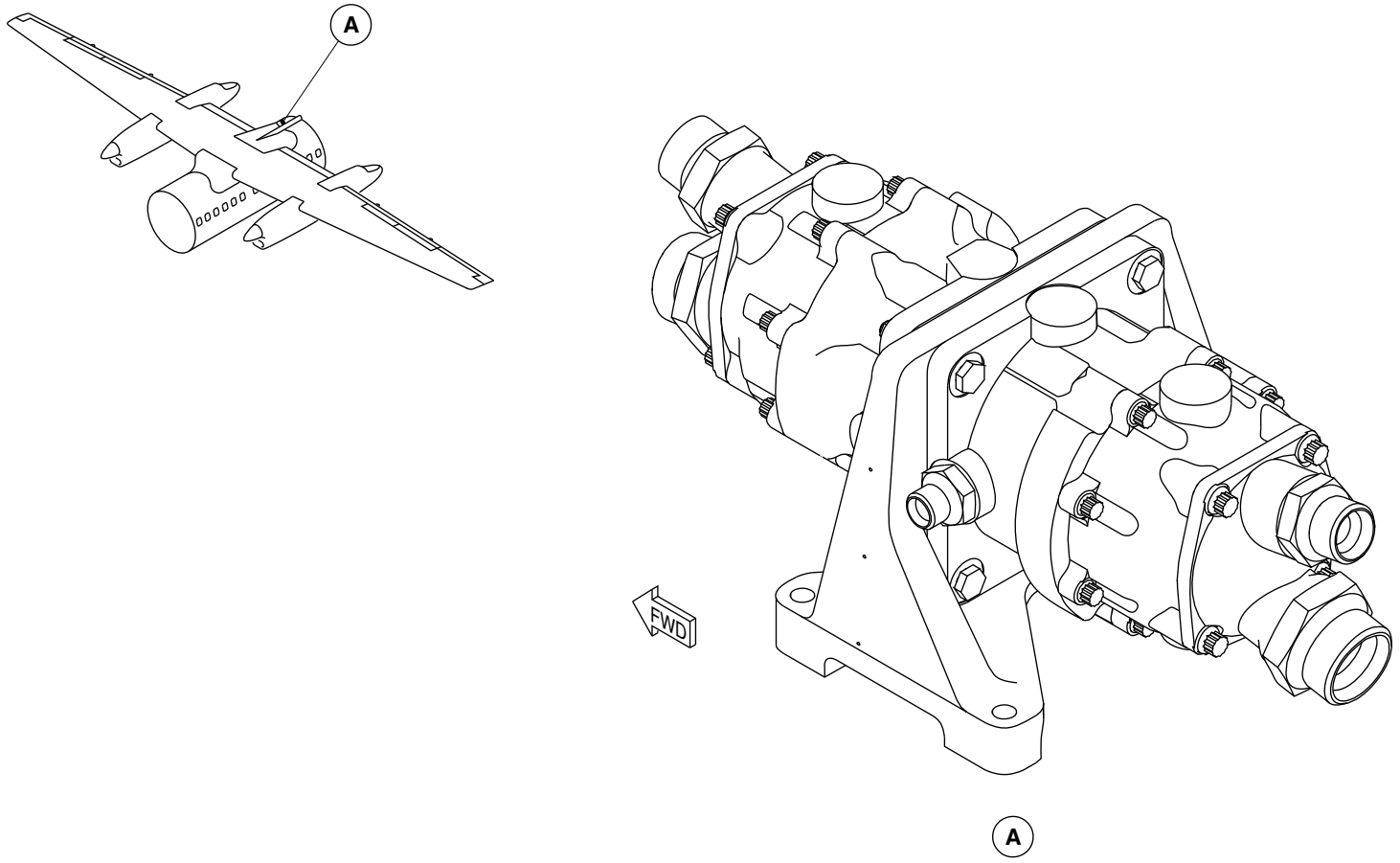
Balanced Relief (Priority) Valve
Figure 25



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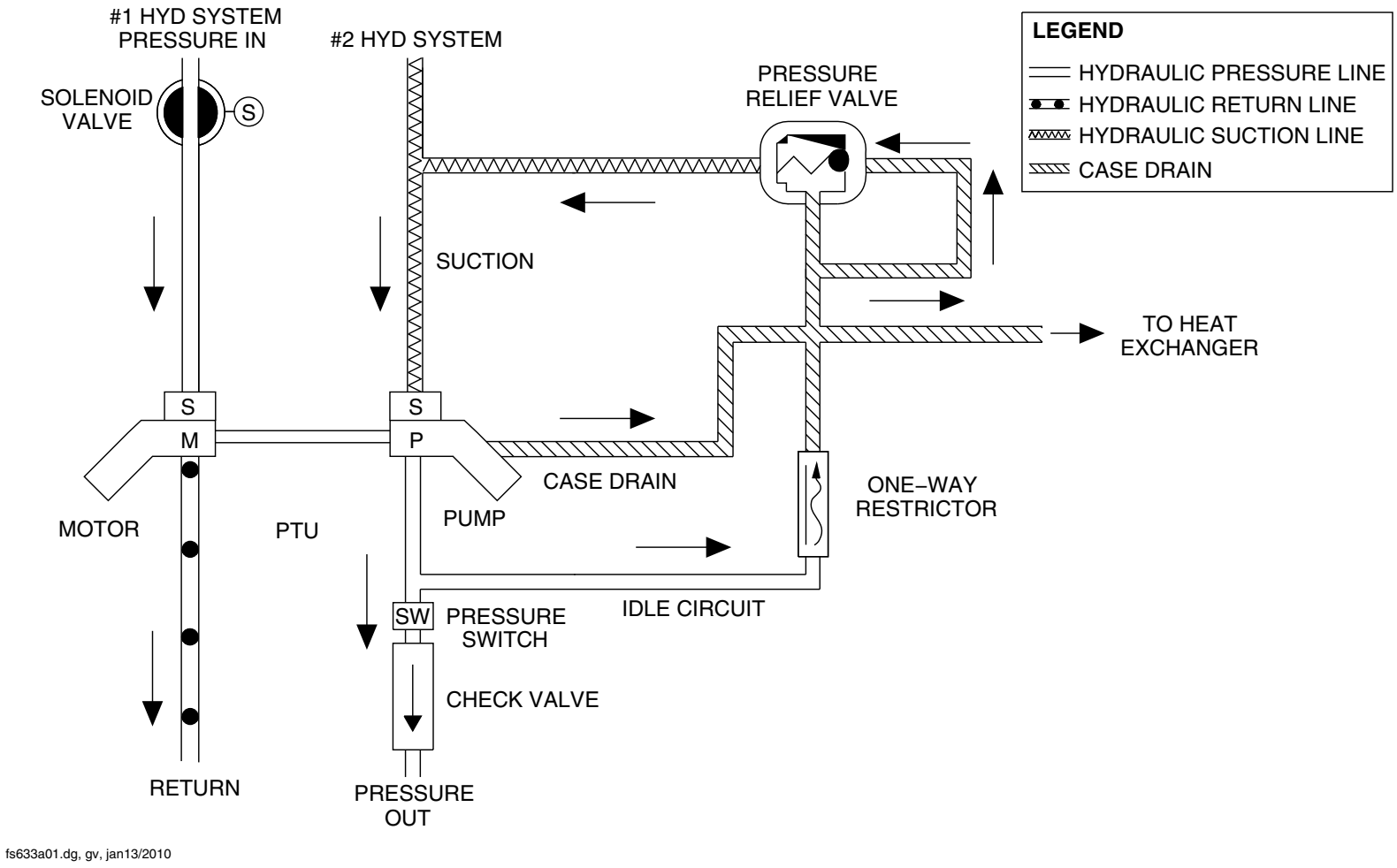
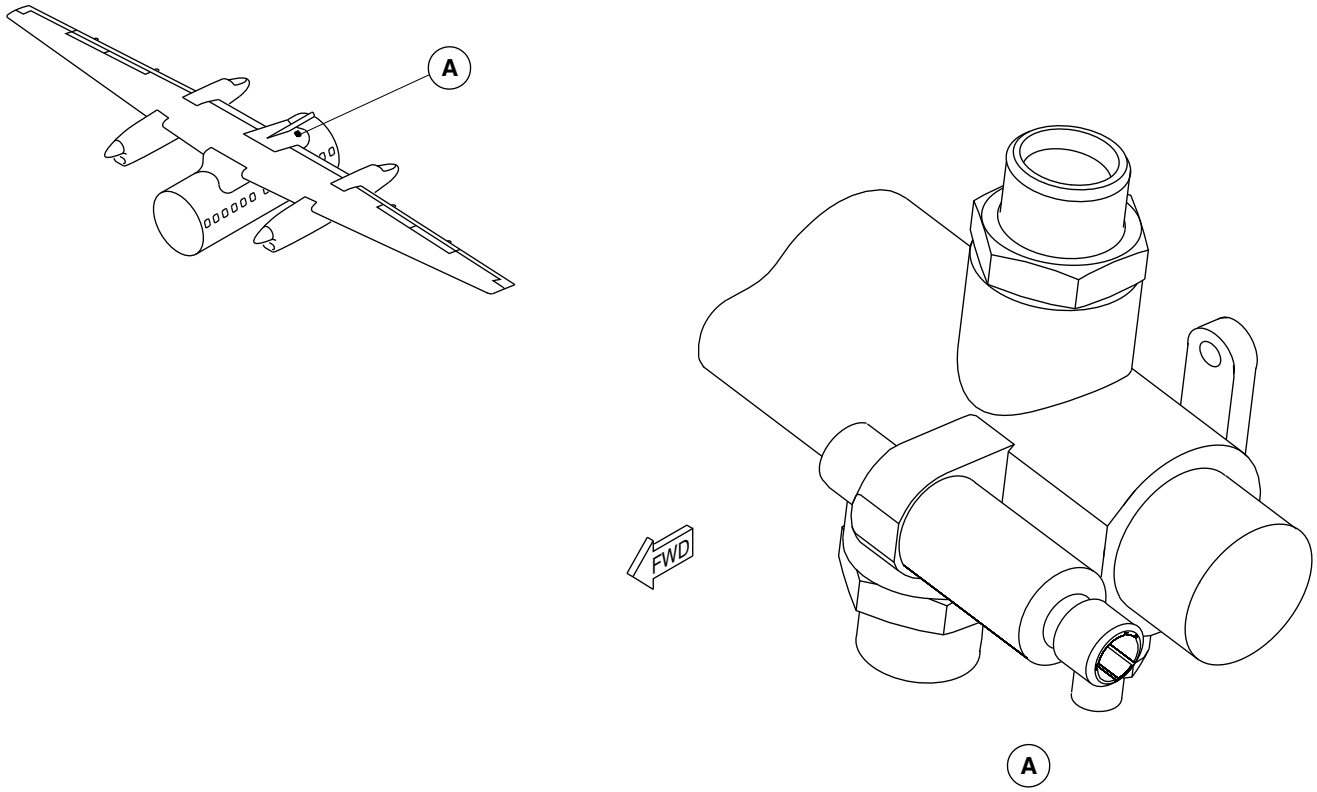
PTU Locator
Figure 26



PTU Hydraulic Synoptic
Figure 27



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PTU Selector Valve Locator
Figure 28

HYDRAULIC SYSTEM 1 RESERVOIR

FILLING INSTRUCTIONS

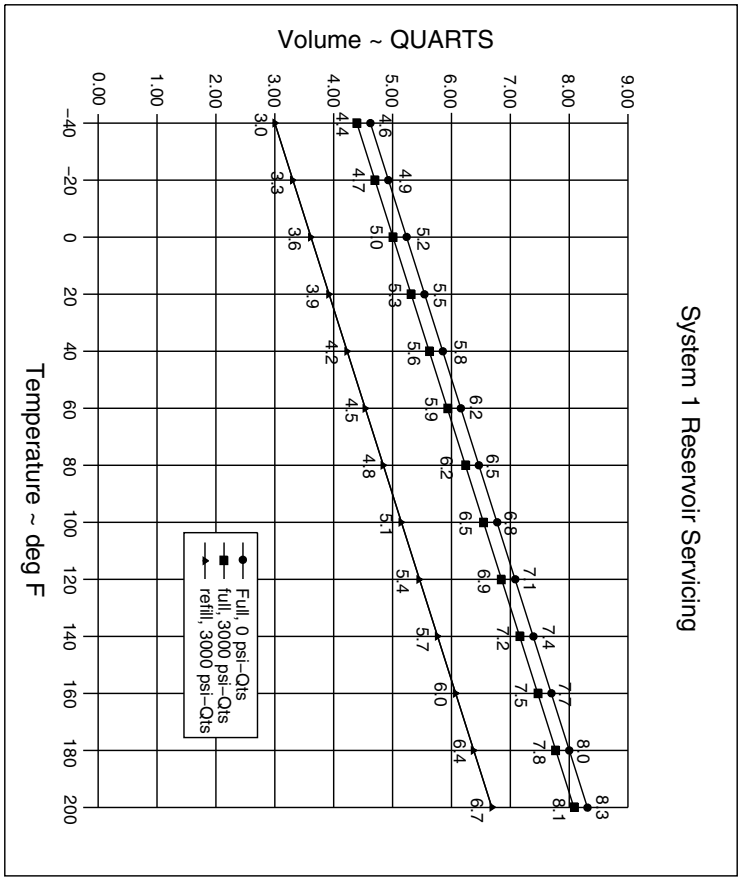
USE ONLY APPROVED PHOSPHATE ESTER FLUID

FILLING SOURCE MUST BE FILTERED AND LIMITED TO
0.5 GPM AND 70 PSI

FOR COMPLETE INSTRUCTIONS SEE MAINTENANCE MANUAL CHAPTER 12

CAUTION: DO NOT OPERATE SYSTEM IF RESERVOIR HAS LESS THAN 2.3 QUARTS WITH SYSTEM UNPRESSURIZED

1. ATTACH THE FILLING SOURCE TO THE RESERVOIR FILL RECONNECTABLE FITTING.
2. NOTE AMBIENT TEMPERATURE AND VOLUME WITH NO SYSTEM PRESSURE
3. FLUID SHOULD BE AT OR NEAR AMBIENT TEMPERATURE (AT LEAST ONE HOUR AFTER LAST OPERATION).
4. CHECK THAT MAIN BRAKES ARE NOT APPLIED AND THAT INBOARD FLIGHT SPOILERS ARE CLOSED.
5. WITH SYSTEM DEPRESSURIZED, ADD FLUID TO RESERVOIR TO FULL, 0 PSI LINE.
6. APPLY EXTERNAL ELECTRIC POWER.
7. START SPU. VERIFY THAT COCKPIT INDICATION SHOWS 2850 TO 3050 PSI.
8. CHECK RESERVOIR QUANTITY ON INDICATOR ON RESERVOIR.
9. IF CHANGE IN VOLUME (Step 8 minus Step 2) EXCEEDS 0.8 QT, BLEED SYSTEM PER MAINTENANCE MANUAL.
10. FLUID LEVEL MUST BE WITHIN FULL, 3000 PSI AND REFILL, 3000 PSI LIMITS FOR FLUID TEMPERATURE AS SHOWN ON GRAPH LOCATED NEAR RESERVOIR.
11. FILLING IS REQUIRED IF THE QUANTITY IS ON OR BELOW THE REFILL, 3000 PSI LINE.
12. IF FILLING IS REQUIRED, PUMP FLUID IN UNTIL THE QUANTITY IS JUST ABOVE THE FULL, 3000 PSI LINE.
13. OPERATE THE BLEED VALVE ON THE RESERVOIR UNTIL THE QUANTITY IS JUST ON THE FULL, 3000 PSI LINE.
14. REPEAT STEPS 12 AND 13 IF FLUID FROM RESERVOIR APPEARS TO HAVE AIR ENTRAINED AS SHOWN BY FROTHY, BUBBLY APPEARANCE.
15. TURN OFF SPU.
16. WHEN COMPLETE, DISCONNECT FILLING SOURCE AND REPLACE ALL PROTECTIVE CAPS.



fse38a01.dg, gv, nov04/2020

#1 Reservoir Filling Instructions
Figure 29

HYDRAULIC SYSTEM 2 RESERVOIR

FILLING INSTRUCTIONS

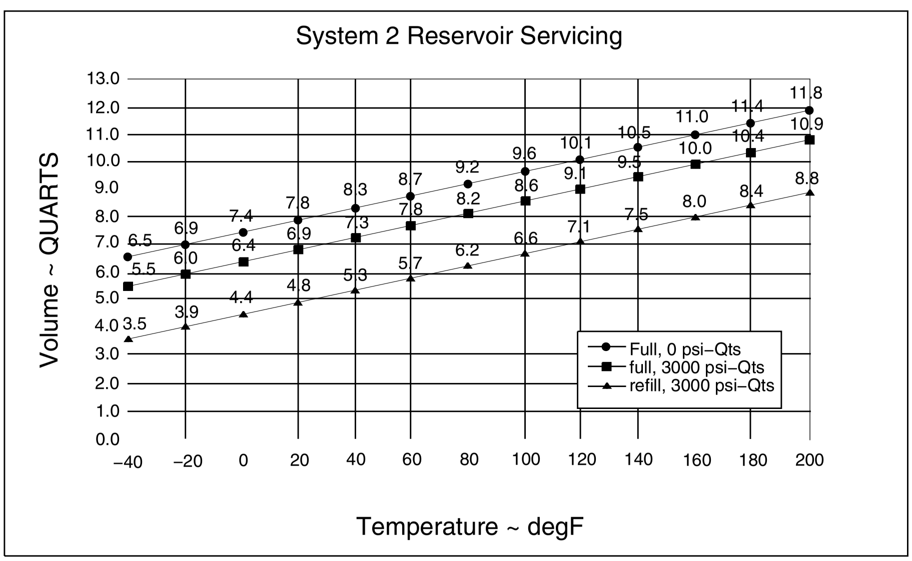
USE ONLY APPROVED PHOSPHATE ESTER FLUID

FILLING SOURCE MUST BE FILTERED AND LIMITED TO
0.5 GPM AND 70 PSI

FOR COMPLETE INSTRUCTIONS SEE MAINTENANCE MANUAL CHAPTER 12

CAUTION: DO NOT OPERATE SYSTEM IF RESERVOIR HAS LESS THAN 2.8 QUARTS WITH SYSTEM UNPRESSURIZED

1. ATTACH THE FILLING SOURCE TO THE RESERVOIR FILL RECONNECTABLE FITTING.
2. NOTE AMBIENT TEMPERATURE AND VOLUME WITH NO SYSTEM PRESSURE
3. FLUID SHOULD BE AT OR NEAR AMBIENT TEMPERATURE (AT LEAST ONE HOUR AFTER LAST OPERATION).
4. VERIFY LANDING GEAR ARE CHOCKED.
5. OPERATE PARKING BRAKE 10 TIMES TO DEPLETE BRAKE ACCUMULATOR.
6. PRECHARGE BRAKE ACCUMULATOR PER PLACARD.
7. WITH LANDING GEAR EXTENDED CHECK THAT PARKING BRAKES ARE NOT APPLIED AND THAT OUTBOARD FLIGHT SPOILERS ARE CLOSED.
8. WITH SYSTEM DEPRESSURIZED, ADD FLUID TO RESERVOIR TO FULL, 0 PSI LINE.
9. APPLY EXTERNAL ELECTRIC POWER.
10. START SPU AND PTU. VERIFY THAT COCKPIT INDICATION SHOWS 2750 TO 3050 PSI FOR SYS2.
11. CHECK RESERVOIR QUANTITY ON INDICATOR ON RESERVOIR.
12. IF VOLUME CHANGE (Step 11 minus Step 2) EXCEEDS 1.3 QTS, BLEED SYSTEM PER MAINTENANCE MANUAL.
13. FLUID LEVEL MUST BE WITHIN FULL, 3000 PSI AND REFILL, 3000 PSI LIMITS FOR FLUID TEMPERATURE AS SHOWN ON GRAPH LOCATED NEAR RESERVOIR.
14. FILLING IS REQUIRED IF THE QUANTITY IS ON OR BELOW THE REFILL, 3000 PSI LINE.
15. IF FILLING IS REQUIRED, PUMP FLUID IN UNTIL THE QUANTITY IS JUST ABOVE THE FULL, 3000 PSI LINE.
16. OPERATE THE BLEED VALVE ON THE RESERVOIR UNTIL THE QUANTITY IS JUST ON THE FULL, 3000 PSI LINE.
14. REPEAT STEPS 15 AND 16 IF FLUID FROM RESERVOIR APPEARS TO HAVE AIR ENTRAINED AS SHOWN BY FROTHY, BUBBLY APPEARANCE.
15. TURN OFF SPU AND PTU.
16. WHEN COMPLETE, DISCONNECT FILLING SOURCE AND REPLACE ALL PROTECTIVE CAPS.



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#2 Reservoir Filling Instructions
Figure 30

**ON A/C ALL

29–12–00–001

MAIN HYDRAULIC SYSTEM 3

Introduction

The No. 3 hydraulic system supplies emergency hydraulic power to the elevators.

General Description

Refer to Figures 1 and 2.

The No. 3 hydraulic system is installed in the aft fuselage. The system operates automatically during an emergency condition when the No. 1 and/or No. 2 hydraulic systems are unavailable, or when both engines indicate low oil pressure. The No. 3 hydraulic system can also be engaged manually when the HYD #3 ISOL VLV switch, located on the HYDRAULIC CONTROL Panel in the flight compartment, is set to OPEN. The No. 3 hydraulic system uses an accumulator which is pressurized by a DC Motor Driven Pump (DCMP).

Refer to Figure 3.

The No. 3 hydraulic system contains the components that follow:

- No. 3 Hydraulic System Accumulator (29–12–16)
- No. 3 Hydraulic Bootstrap Accumulator (29 – 12 – 16)
- No. 3 Hydraulic System DCMP (29–12–01)
- No. 3 Hydraulic System Accumulator Isolation Valve (29–12–21)
- No. 3 Hydraulic System Reservoir (29–12–06)
- No. 3 Hydraulic System Pressure Filter (29–12–26)
- No. 3 Hydraulic System Ecology Bottle (29–12–11)
- No. 3 Hydraulic System Pressure Transducer (29–30–01)
- No. 3 Hydraulic System Pressure Switches (29–30–11)

Detailed Description

During normal flight operation, the system is in an active standby mode with the accumulator isolation valve closed. The DCMP operates intermittently to keep the system pressurized to within the range of 2600 to 3250 psi (17926 to 22407 kPa). In the event of a dual engine failure, when both Engine Driven Pumps (EDPs) and the Standby Power Unit (SPU) are unavailable, or when either system 1 or 2 pressure switches indicate low pressure, the No.3 hydraulic system will power the elevators.

No. 3 Hydraulic System Accumulator

Refer to Figure 4.

The No. 3 hydraulic system accumulator keeps the system pressurized during normal flight operation. The accumulator is charged with dry nitrogen gas. The capacity of No. 3 hydraulic system accumulator is 50 in^3 (819 cm^3). There is an accumulator charging–gauge manifold to charge the accumulator.

The accumulator charging–gauge manifold has a pressure gauge and a charging valve. It has an attachment for an external dry

nitrogen source to supply the gas precharge to the accumulator. A service placard, attached to the charging manifold, provides accumulator charging instructions. Access to the charging–gauge manifold is through a door on the bottom of the rear fuselage.

No. 3 Hydraulic System DCMP

Refer to Figure 5.

The DC Motor Pump (DCMP) is used in the No. 3 hydraulic system, with the accumulator, to pressurize the No. 3 system. Electrical power is supplied to the DCMP by the STBY battery through the dc battery bus. The DCMP will operate intermittently during normal flight to maintain a No. 3 system pressure range of 2600 to 3250 psi (17926 to 22407 kPa). DCMP operation is controlled by two pressure switches installed on the accumulator isolation valve.

On aircraft with ModSum 4–113673 or SB84–29–24 incorporated, the inlet tube is aligned vertically above the outlet tube.

NOTE

The DCMP will operate intermittently on the ground when the dc battery bus is energized by the batteries or external ground power.

On aircraft with SB84–29–12 or Modsum 4–126281 incorporated:

The automatic operation of the DCMP is inhibited when the parking brake is set to ‘PARK’.

No. 3 Hydraulic System Accumulator Isolation Valve

Refer to Figures 3 and 7.

An isolation valve is used in the No. 3 hydraulic system to isolate the elevators from hydraulic pressure. The No. 3 hydraulic system isolation valve is closed (energized) during normal flight operation. When open, the isolation valve allows hydraulic pressure to power the elevators.

The isolation valve will open in flight if the No 1 and/or No. 2 hydraulic system pressure is low or if the No. 1 and No. 2 engine oil pressure is low. The isolation valve can be manually opened from the flight compartment when the HYD #3 ISOL VLV switch on the HYDRAULIC CONTROL Panel is set to OPEN.

No. 3 hydraulic pressure transducer and three pressure switches are installed on the isolation valve.

No. 3 Hydraulic System Reservoir

Refer to Figures 11 and 12.

The No. 3 hydraulic system reservoir supplies the necessary fluid volume to the hydraulic system. The reservoir is a bootstrap type that controls system return pressure. A bleed/relief valve is installed in the reservoir to provide manual bleeding and pressure relief of the hydraulic system. The volume of the No. 3 hydraulic system reservoir is 150 in^3 (2458 cm^3). The major components attached to the reservoir are bootstrap cylinder. a bleed/relief valve, and a mechanical/electrical quantity indicator.

No.3 Hydraulic Bootstrap Accumulator

Refer to Figures 3 and 9.

The bootstrap accumulator provides force to pressurize the No. 3 hydraulic system reservoir. The bootstrap contains a small–area piston exposed to the system pressure, nominally 3000 psi (20684 kPa), which provides force to drive the low–pressure piston in the reservoir and keeps it pressurized. The bootstrap accumulator in association with the relief/dump valve and check valve makes sure that the reservoir remains pressurized after overnight storage.

The bootstrap piston uses two–stage head seals with the interstage cavity vented to return pressure. This arrangement keeps the sealing surface wet and limits the leakage in the event of a seal failure. The proof pressure capability of the bootstrap chamber and associated fittings/components is 4500 psi (31026 kPa) and a capacity of 25 in^3 (410 cm^3).

On aircraft with ModSum 4–190397 or SB84–29–36 incorporated, bootstrap accumulator is not installed.

No. 3 Hydraulic System Pressure Filter

Refer to Figure 6.

The No. 3 hydraulic system pressure filter removes 100% of all hydraulic fluid contamination particles larger than 15 microns. This assembly filters the supply pressure fluid coming from the DCMP. It contains a filter element and bowl, and a differential pressure indicator. The pressure filter is a non–bypass type. A shut–off device stops fluid flow through the filter when the filter bowl is removed.

A Differential Pressure Indicator (DPI) is installed on the pressure filter to give an indication of a clogged filter element. The No. 3 hydraulic system pressure filter bowl is the same as the case drain filter bowls of the No. 1 and No. 2 hydraulic system filter manifolds. These bowls are fully interchangeable.

No. 3 Hydraulic System Ecology Bottle

Refer to Figure 10.

The No. 3 hydraulic system ecology bottle collects hydraulic fluid released from the reservoir bleed/relief valve and leakage from the DCMP shaft seal.

No. 3 Hydraulic System Pressure Transducer

Refer to Figure 3.

The No. 3 hydraulic system has one pressure transducer installed on the accumulator isolation valve which sends system pressure data to the MFD.

No. 3 Hydraulic System Pressure Switches

Refer to Figure 8.

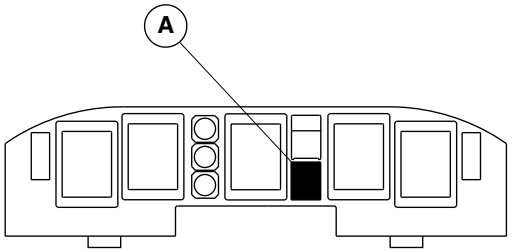
There are three pressure switches installed on the accumulator isolation valve. Two of these pressure switches control the operation of the DCMP. One of the pressure switches signals the DCMP to operate if system pressure drops to 2600 psi (17926 kPa) and any of the conditions that follow exists:

- No. 3 hydraulic system isolation valve is de–energized, or
- Aircraft is in–Air mode with the parking brake not in "PARK", or

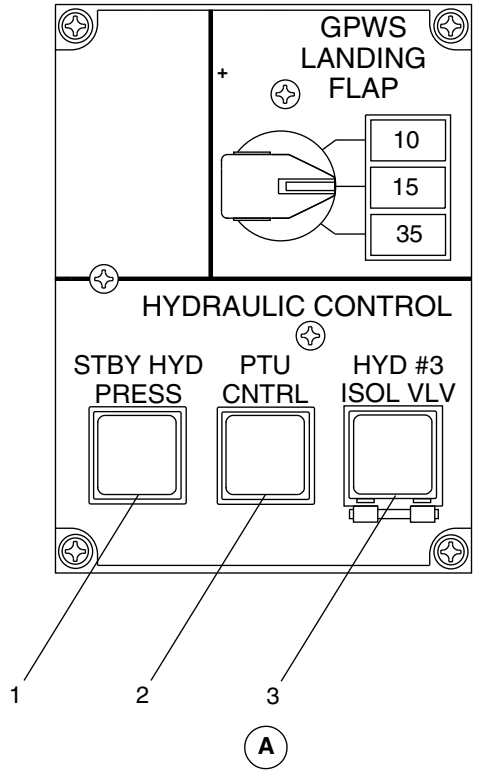
– Either No. 1 or No. 2 engine 2 oil pressure switches indicate high pressure with the parking brake not in "PARK".

The pressure switch commands the DCMP to turn off when system pressure reaches 3250 psi (22408 kPa). The other pressure switch operates the #3 HYD PUMP caution light if the system pressure falls to 900 psi (6205 kPa), or the pump has been operating for longer than 60 seconds on the ground.

An additional pressure switch is installed downstream of the isolation valve and operates the ELEVATOR PRESS caution light on the Caution and Warning panel if all three systems are supplying power to the elevator actuators.



MAIN INSTRUMENT PANEL



LEGEND

1. SPU PBA Switch.
2. PTU PBA Switch.
3. Accumulation Isolation Valve PBA Switch.

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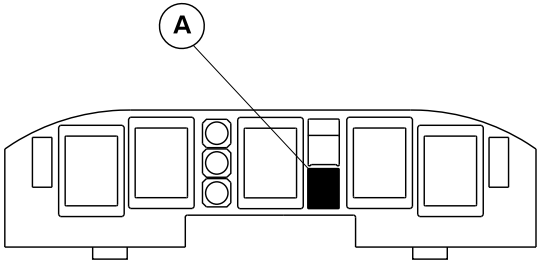
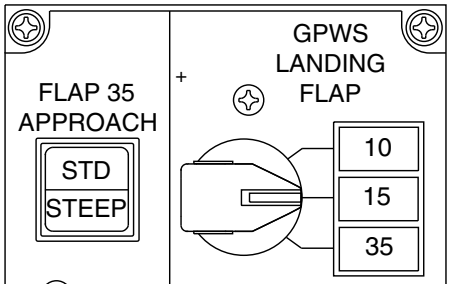
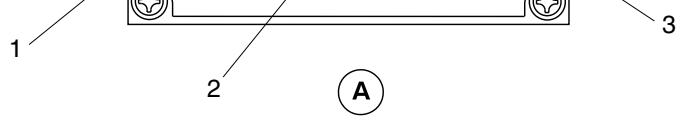
Hydraulic Control Panel
Figure 1



MAIN INSTRUMENT PANEL



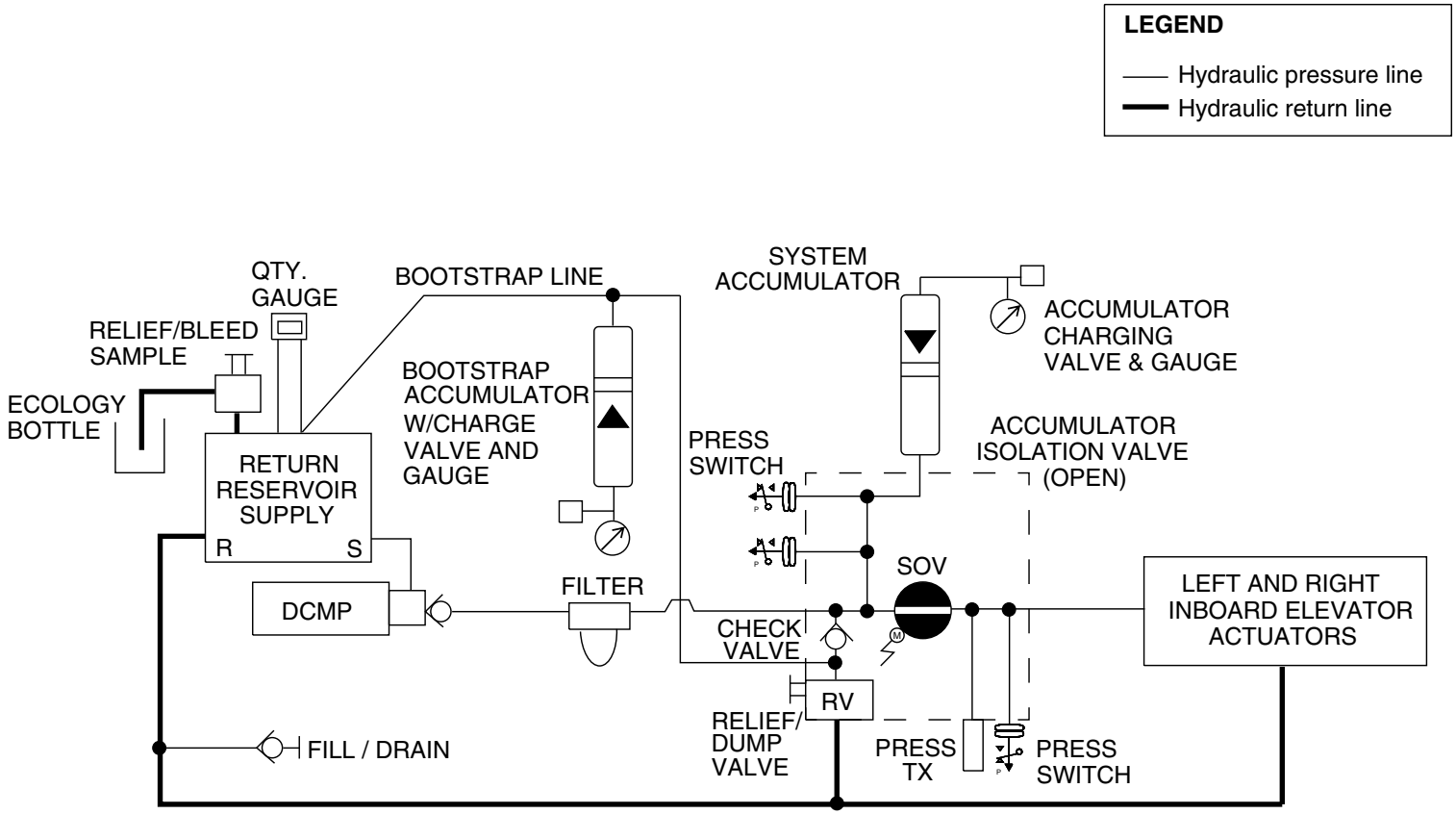


LEGEND

1. SPU PBA switch.
2. PTU PBA switch.
3. Accumulation isolation valve PBA switch.

cg0073a01.dg, dn, jan05/2007

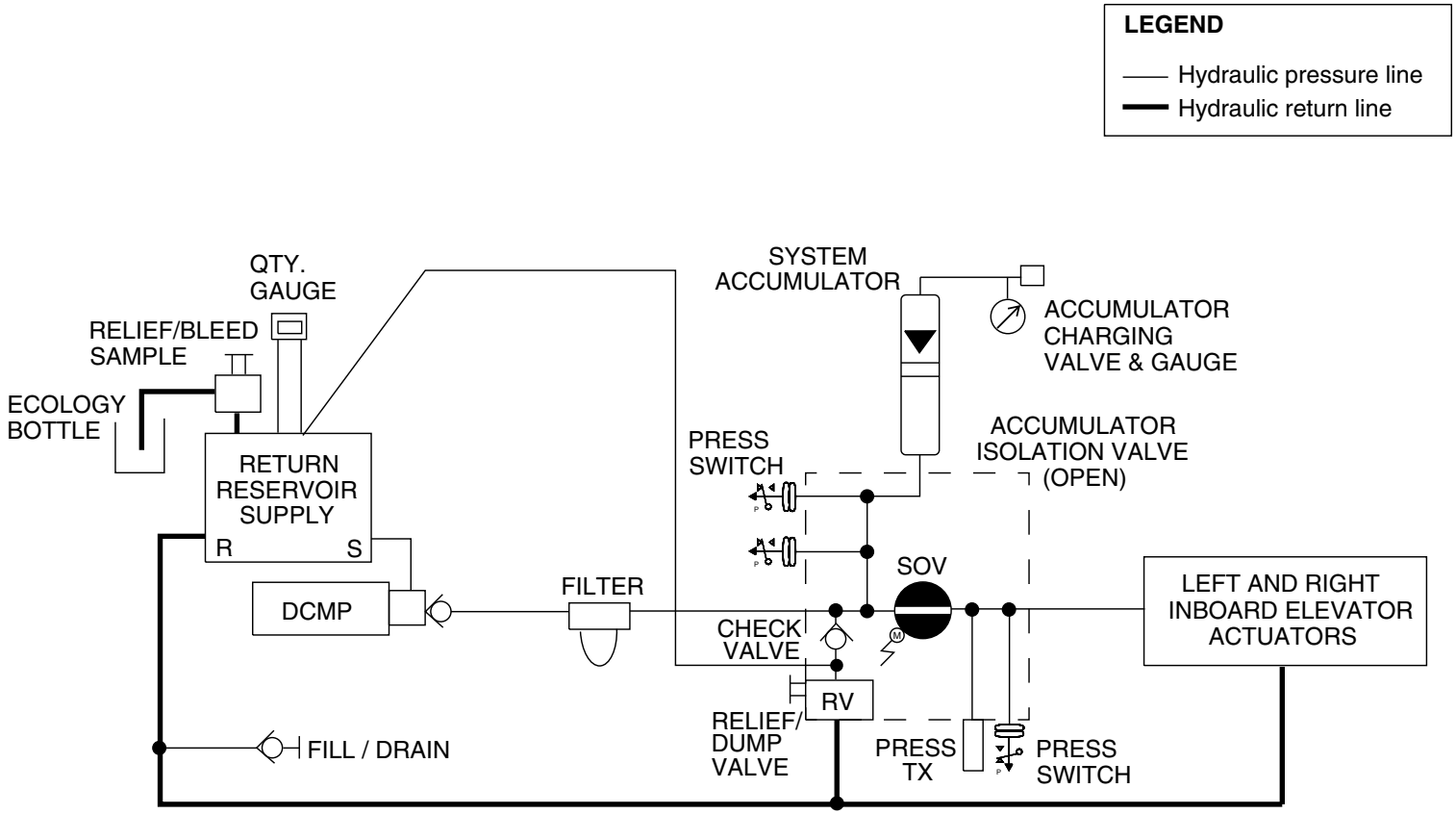
Hydraulic Control Panel (803SO930034)
Figure 2



PRE SB84–29–36
PRE MODSUM 4–190397

cg4653a01.dg, nn, apr13/2016

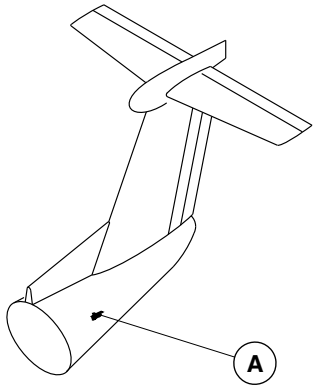
No. 3 Hydraulic System Schematic
Figure 3 (Sheet 1 of 2)



POST SB84–29–36
POST MODSUM 4–190397

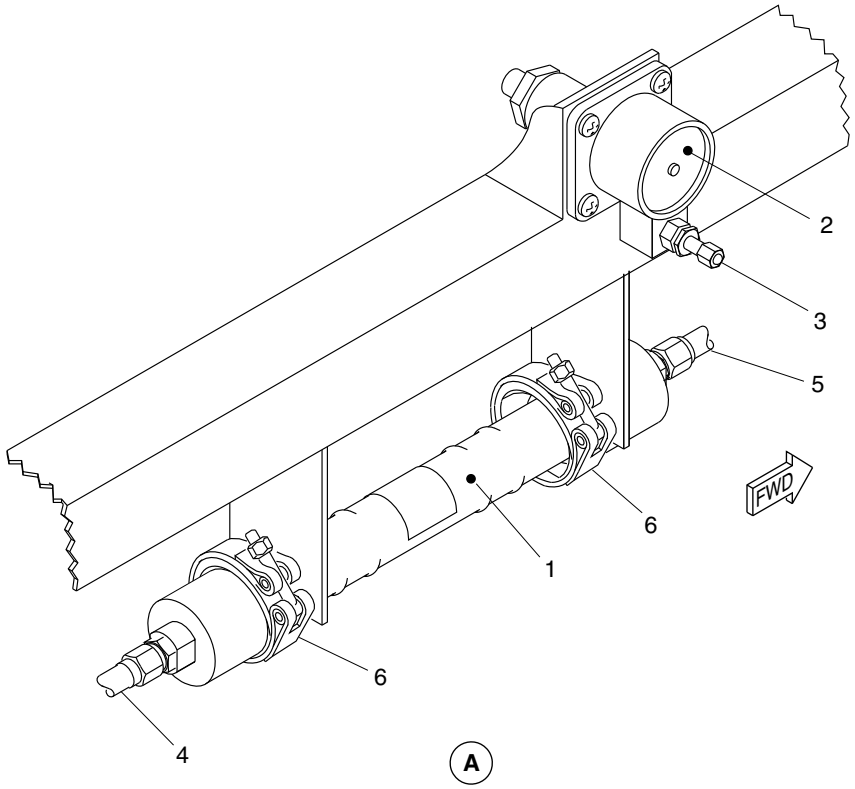
cg4653a02.dg, nn, apr13/2016

No. 3 Hydraulic System Schematic
Figure 3 (Sheet 2 of 2)



LEGEND

1. No. 3 Hydraulic system accumulator.
2. Gauge.
3. Charging valve.
4. Nitrogen charging tube.
5. Hydraulic tube.
6. Clamps.



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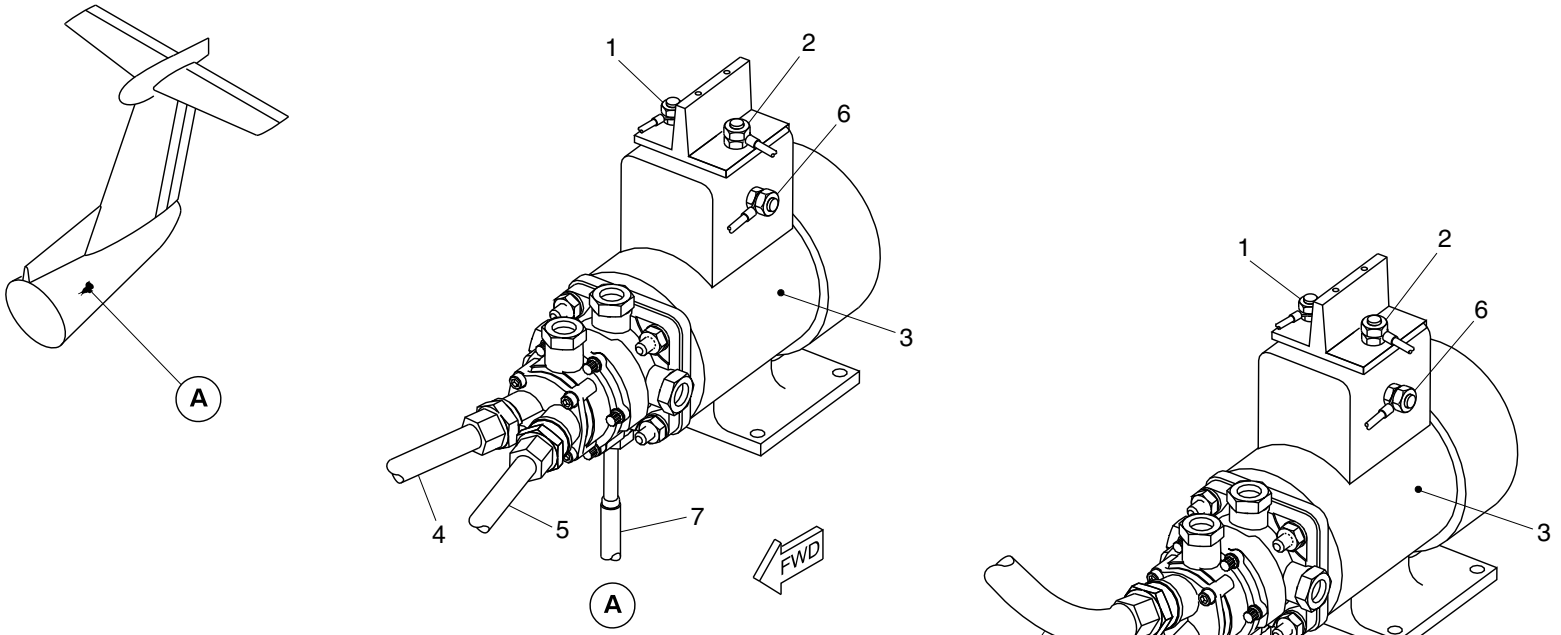
No.3 Hydraulic System Accumulator and Gauge
Figure 4



PRE MODSUM 4–113673 (SB84–29–24)

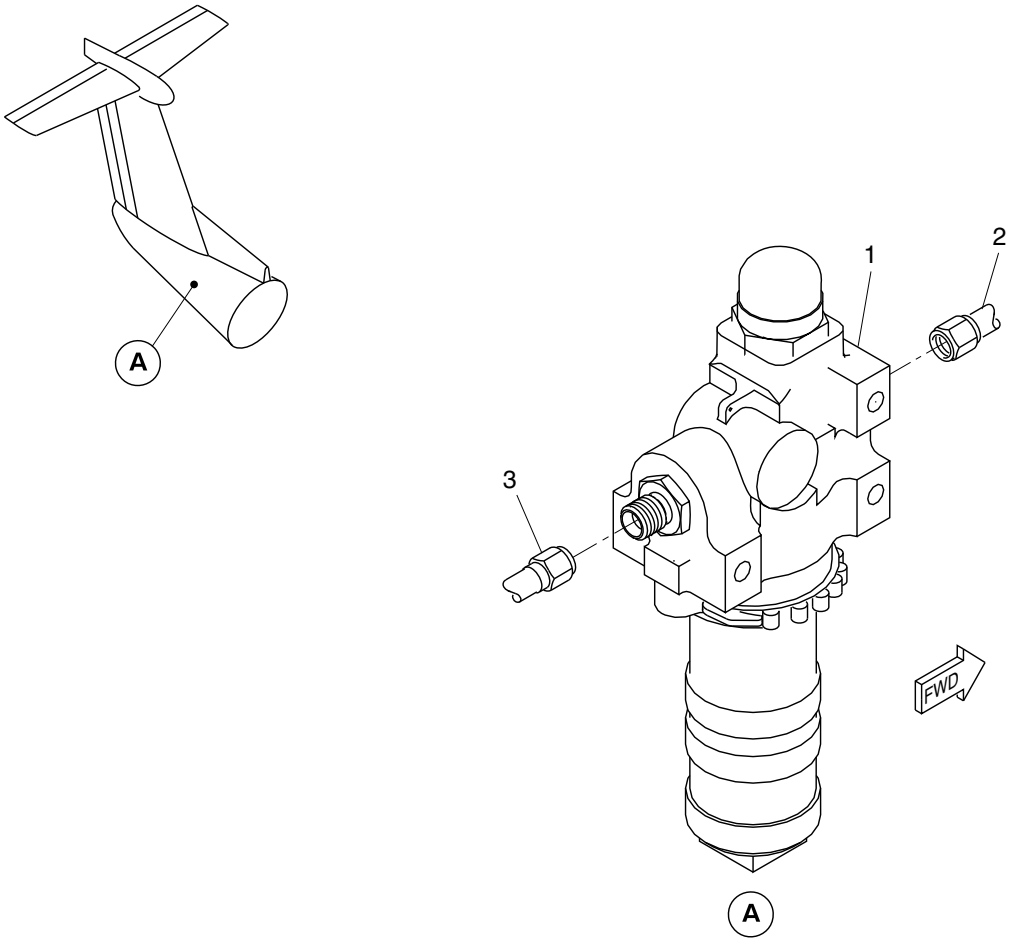
POST MODSUM 4–113673 (SB84–29–24)

LEGEND

1. Terminal connector (negative).
2. Terminal connector (positive).
3. DCMP.
4. Hydraulic inlet tube.
5. Hydraulic outlet tube.
6. Ground wire.
7. Drain tube.

fs969a01.dg, sw/av, sep28/2010

DC Motor Pump
Figure 5

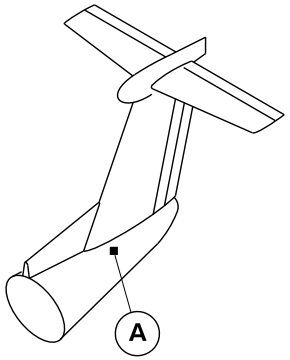


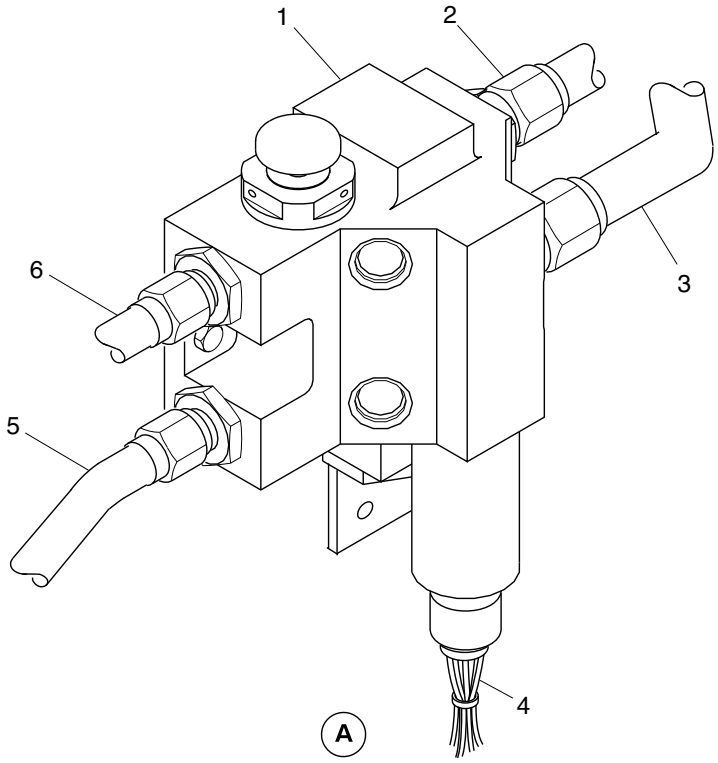
LEGEND

1. Pressure filter manifold.
2. Inlet hydraulic tube.
3. Outlet hydraulic tube.

cg1651a01.dg, av, aug30/2011

No.3 Hydraulic System Pressure Filter Manifold
Figure 6





LEGEND

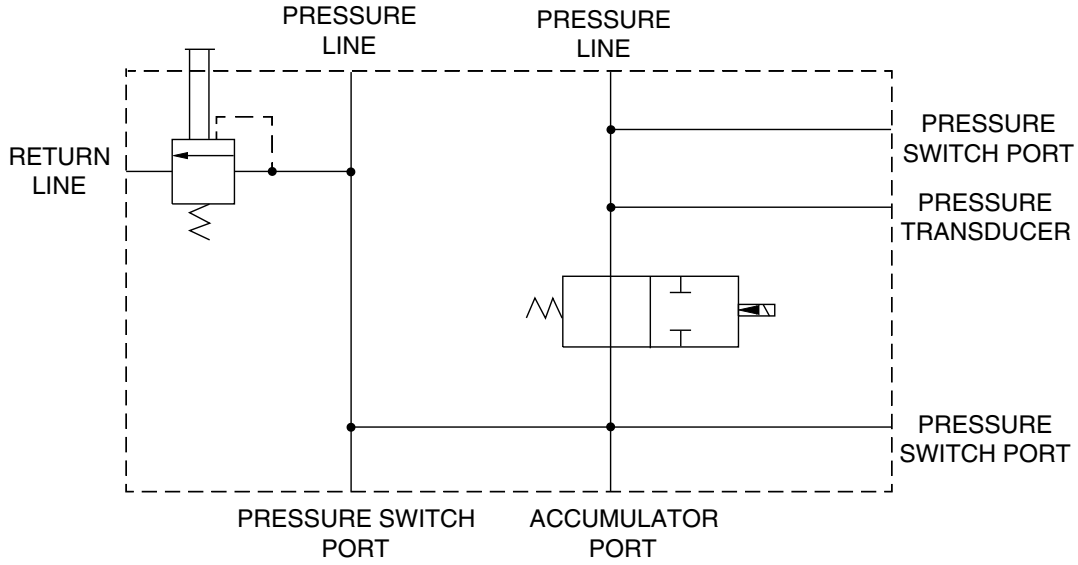
1. Accumulator isolation valve.
2. Pressure inlet line.
3. Pressure outlet line.
4. Electrical connector.
5. Return pressure line.
6. Accumulator pressure line.

NOTE

Shown with pressure switches and pressure transducer removed.

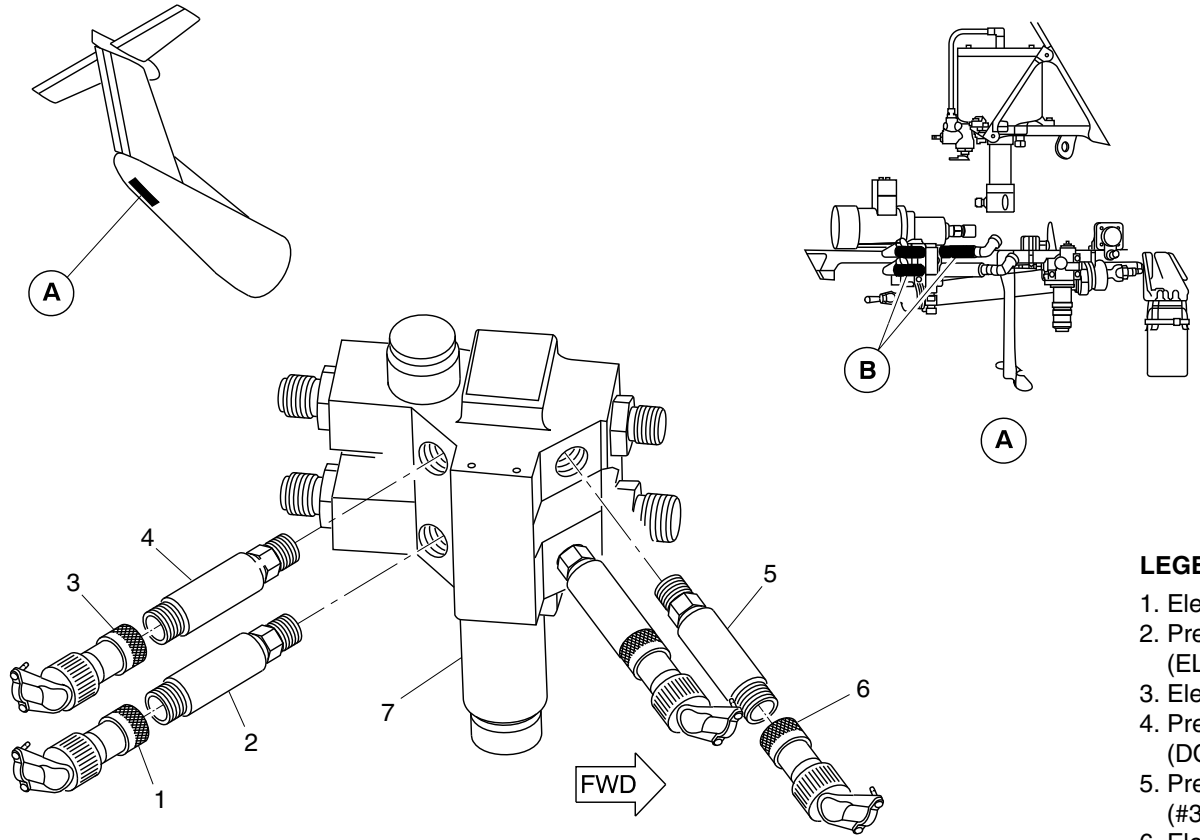
brx194a01.cgm, sw, 06/08/03

No. 3 Hydraulic System Accumulator Isolation Valve/Schematic
Figure 7 (Sheet 1 of 2)



brx194a02.cgm, sw, 06/08/03

No. 3 Hydraulic System Accumulator Isolation Valve/Schematic
Figure 7 (Sheet 2 of 2)



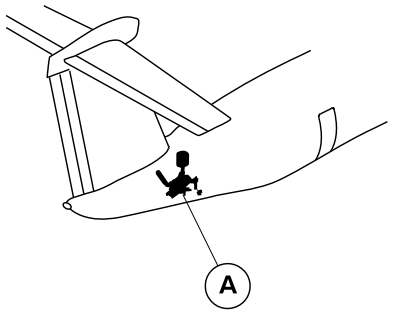
B ACCUMULATOR ISOLATION VALVE PRESSURE SWITCHES

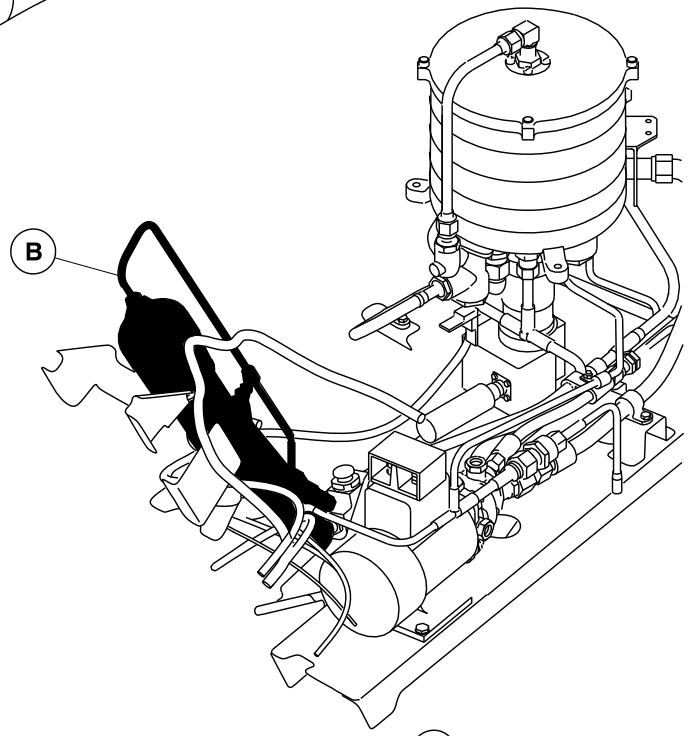
cg1653a01.dg, av/cm, apr29/2013

LEGEND

1. Electrical connector.
2. Pressure switch – C (ELEVATOR PRESS caution light).
3. Electrical connector.
4. Pressure switch – B (DCMP ON/OFF).
5. Pressure switch – A (#3 HYD PUMP caution light).
6. Electrical connector.
7. No. 3 isolation valve.

Accumulator Isolation Valve Pressure Switches
Figure 8





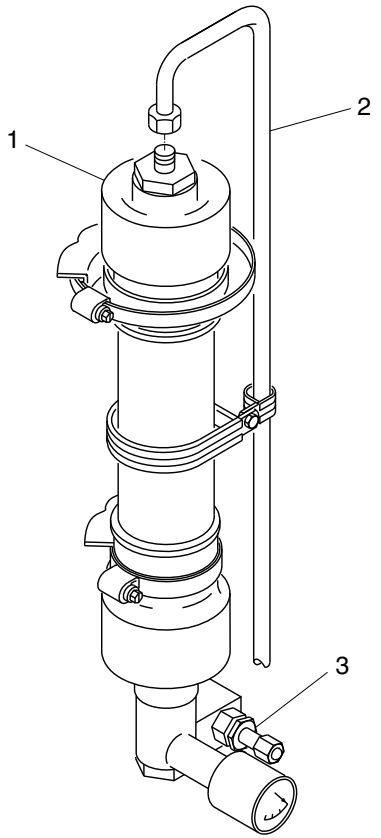
LEGEND

1. Bootstrap accumulator.
2. Tube, hydraulic.
3. Charging valve.

cg1650a01.dg, av/nn, apr13/2016

A

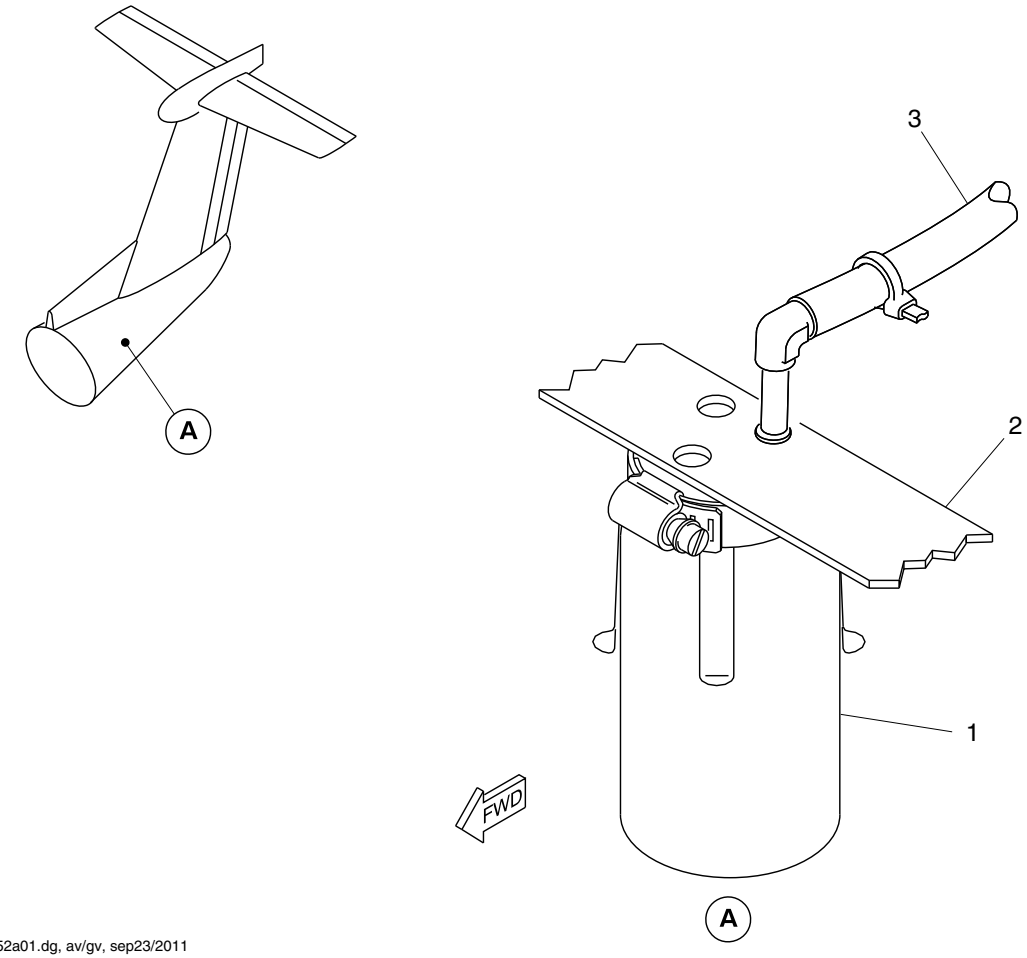
PRE SB84–29–36
PRE MODSUM 4–190397



B

NO. 3 HYDRAULIC SYSTEM BOOTSTRAP ACCUMULATOR

No.3 Hydraulic System Bootstrap Accumulator
Figure 9

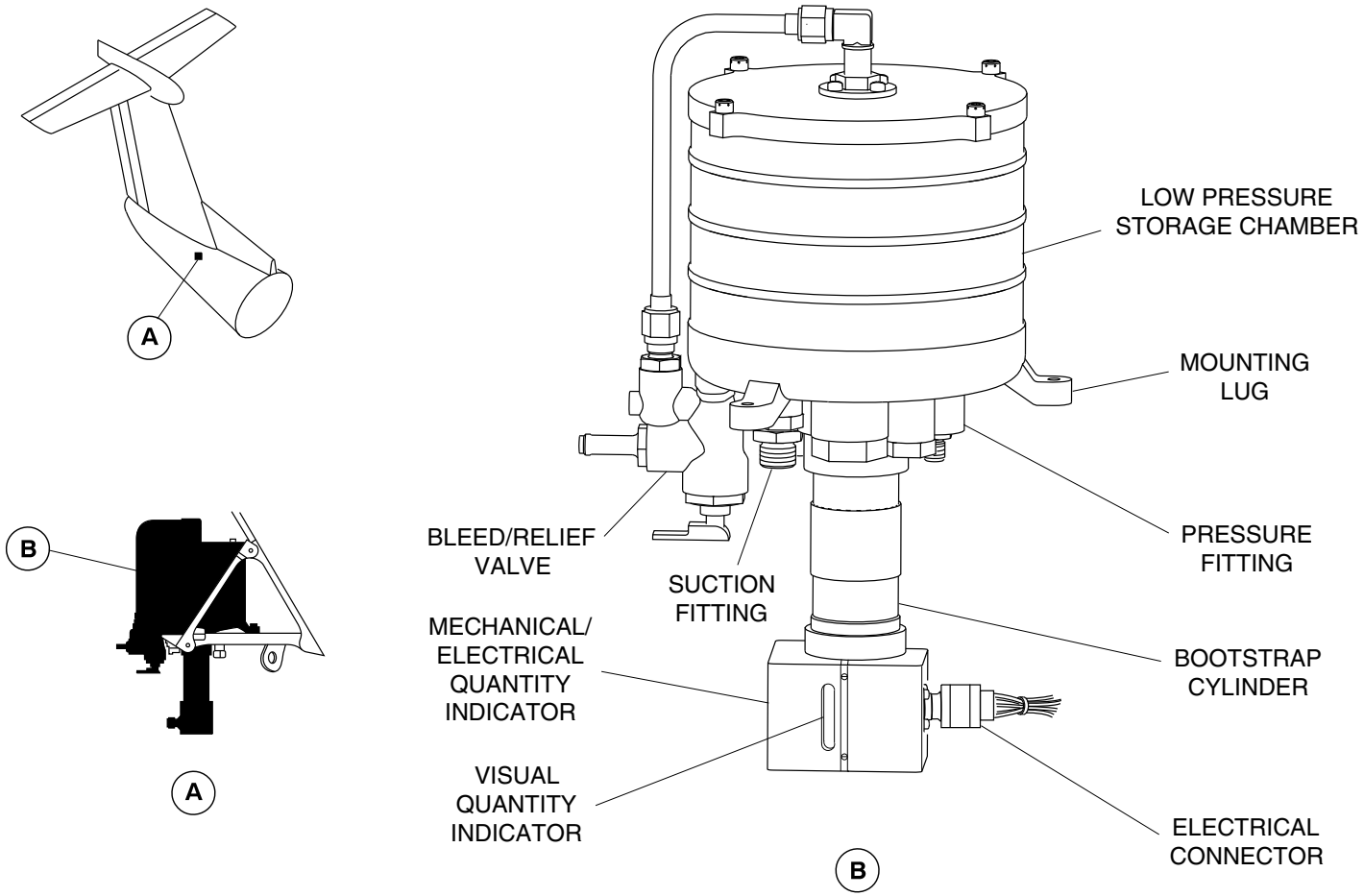


cg1652a01.dg, av/gv, sep23/2011

LEGEND

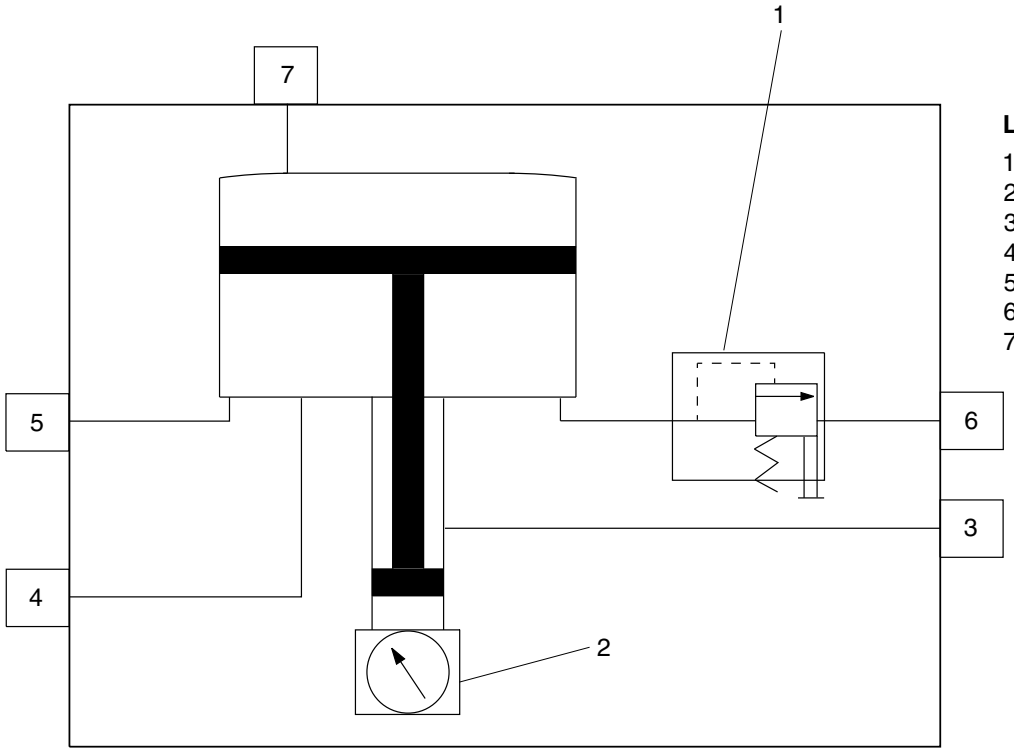
1. Ecology bottle.
2. Ecology bottle support tray.
3. Hose.

No.3 Hydraulic System Ecology Bottle
Figure 10



fs970a01.cg, gw, 06/08/03

No. 3 Hydraulic System Reservoir/Schematic
Figure 11 (Sheet 1 of 2)

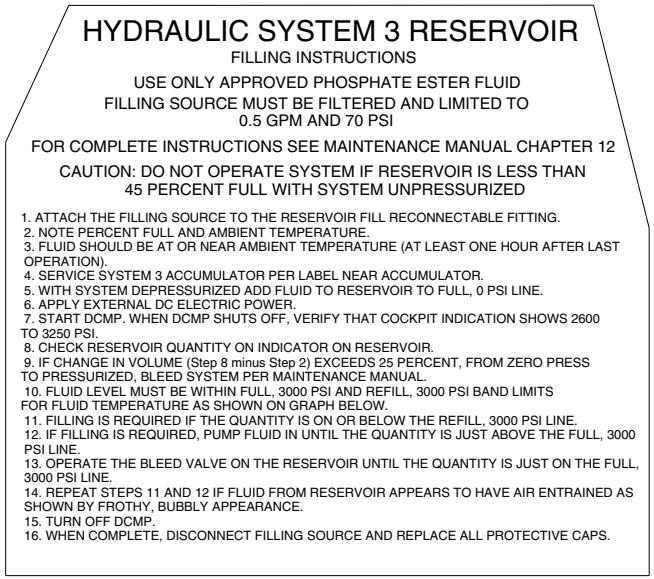


LEGEND

1. Bleed/relief valve.
2. Electrical/mechanical quantity indicator.
3. Bootstrap pressure line.(Pre Modsum 4–190397)
4. Suction outlet.
5. Return inlet.
6. Pressure relief/bleed outlet.
7. Overboard drain/vent.

fs970a02.dg, gw,jm mar29/2016

No. 3 Hydraulic System Reservoir/Schematic
Figure 11 (Sheet 2 of 2)



No.3 Hydraulic Reservoir Filling Instructions
Figure 12

**ON A/C ALL

29–20–00–001

AUXILIARY HYDRAULIC SYSTEMS

Introduction

The alternate landing gear extension system supplies hydraulic power to extend the main landing gears when main hydraulic power is not available.

General Description

Refer to Figure 1.

The alternate landing–gear hand pump is located below an access door in the floor of the flight compartment. The hand pump must be used to extend the landing gear following isolation, or loss, of the No. 2 hydraulic system. The pump draws hydraulic fluid from an auxiliary reservoir located in the nose compartment. Hydraulic fluid pressurizes the alternate landing–gear actuators to extend the gear to the down–lock position.

Detailed Description

The alternate landing–gear extension system contains the components that follow:

- Hydraulic Hand Pump (29–21–01)
- MLG Alternate Extension Selector Valve (29–21–06)
- Alternate Landing–Gear Extension Hydraulic Reservoir (29–21–11)

Hydraulic Hand Pump (29–21–01)

Refer to Figures 2 , 3 and 4.

The hand pump is located below the flight compartment floor, adjacent to the copilot seat. The handpump is used to lower the landing gear following System 2 isolation. The handpump produces 0.75 in^3 (12.29 cm^3) per stroke. A hand pump handle is installed in the flight compartment on the bulkhead behind the copilot's seat. The handle must be installed into the pump to operate it.

MLG Alternate Extension Selector Valve (29–21–06)

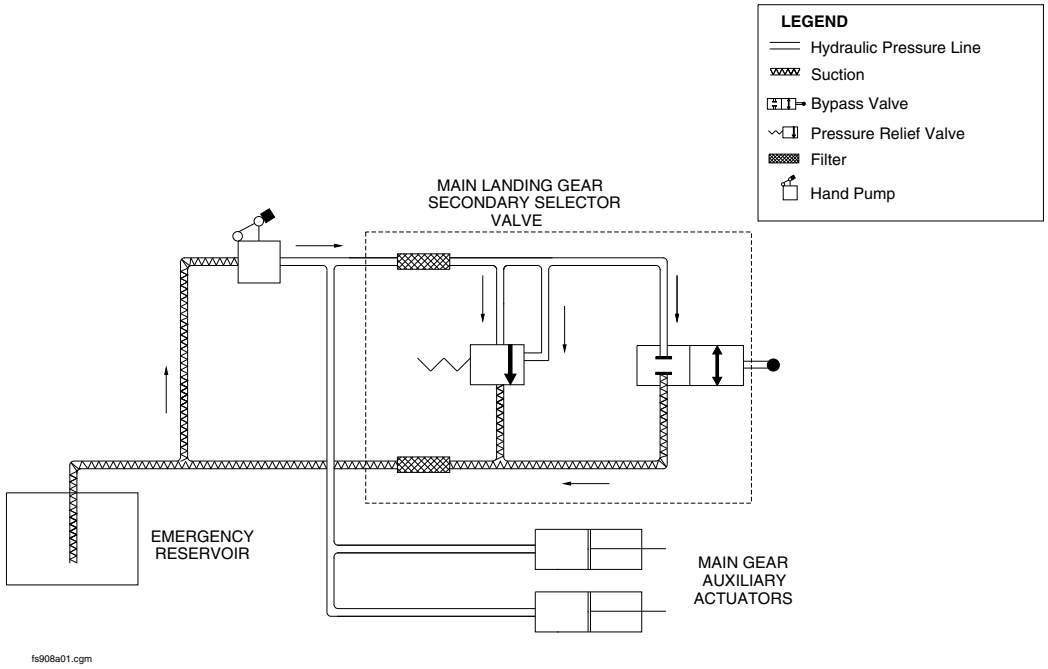
Refer to Figures 5 , 6 and 7.

The Main Landing Gear (MLG) Alternate Extension selector valve is located below the flight compartment floor adjacent to the copilot seat. The valve has a 2–way, 2–position control valve, a pressure relief valve, a filtered inlet and return port. There is a pivoting link that attaches the selector valve to the hand pump access door. The selector valve moves from the normally open position to the closed position when the access door is opened. The pressure relief valve limits the pressure that may be applied to the alternate gear down actuators by relieving handpump pressure to return. The valve cracking pressure is 3150 to 3850 psid (21718 to 26545 kPad), full flow pressure is 3500 to 4300 psid (24132 to 29647 kPad) at 0.50 gal/min (1.89 L/min) and reseat is 2385 to 3465 psid (16444 to 23890 kPad) with leakage of 5 cm^3/min.

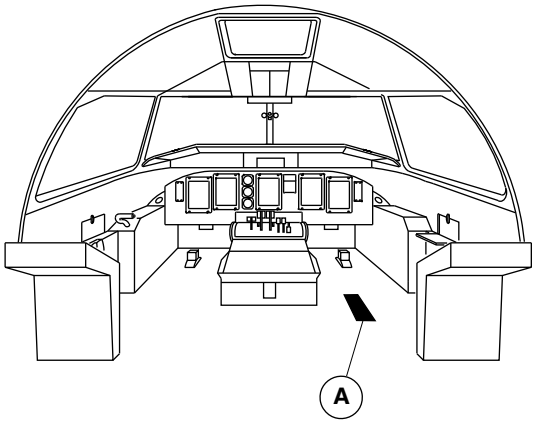
Alternate Landing–Gear Extension Hydraulic Reservoir (29–21–11)

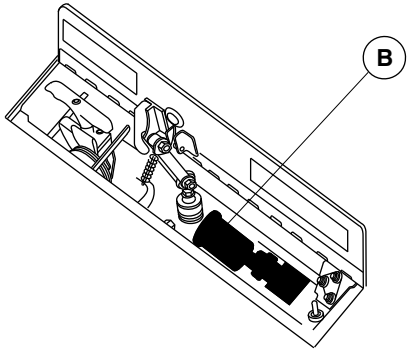
Refer to Figures 8 and 9.

The alternate landing–gear extension hydraulic reservoir is located in the nose compartment of the aircraft. This reservoir supplies the hydraulic fluid source for the alternate MLG extension hand pump. The reservoir is made from aluminum and has a capacity of 1 US qt (0.95 L). The reservoir has a threaded, vented, removable lid which has three fittings installed. One fitting serves as a fill port, the second fitting is the vent and the third fitting is the outlet port to the hand pump. The lid also has a dipstick with minimum and maximum volume markings to allow filling of the reservoir to the correct fluid level.

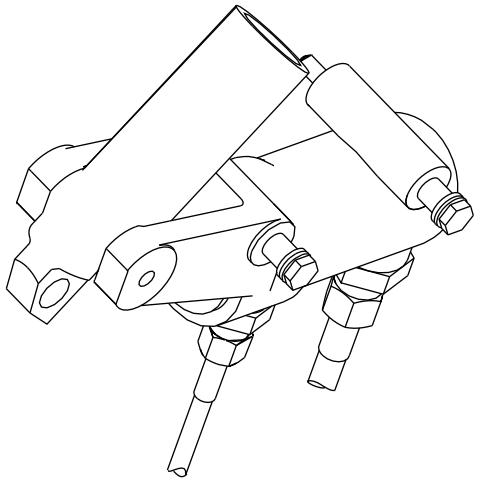


ALTERNATE LANDING–GEAR EXTENSION HYDRAULIC SYSTEM
Figure 1





A LANDING GEAR ALTERNATE EXTENSION DOOR



B

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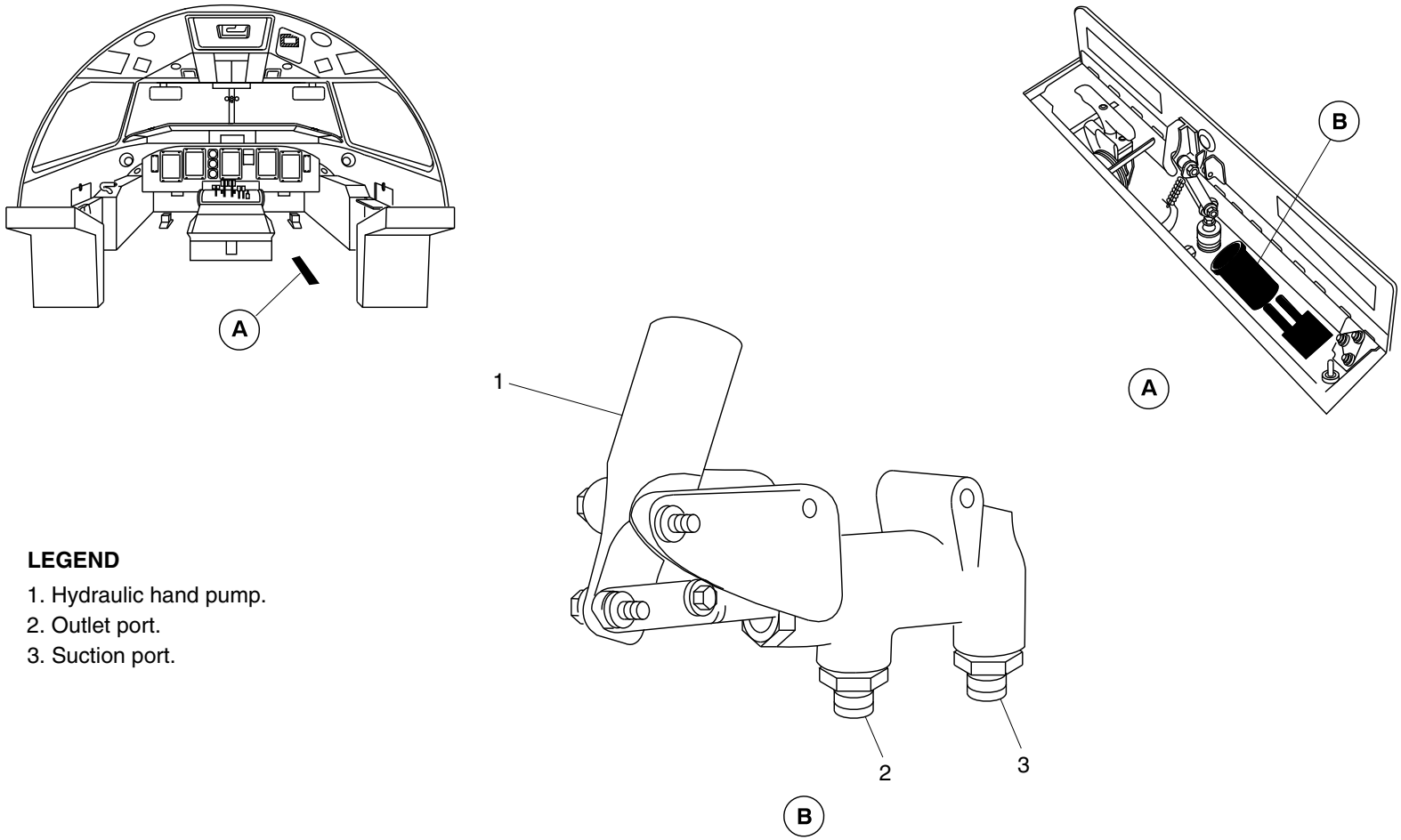
ALTERNATE LANDING–GEAR EXTENSION HYDRAULIC HAND PUMP LOCATOR
Figure 2

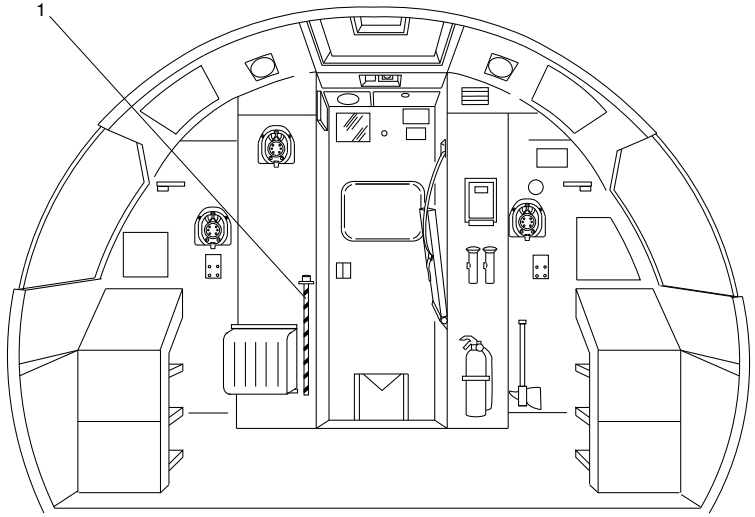


LEGEND

1. Hydraulic hand pump.
2. Outlet port.
3. Suction port.

fsh00a01.dg, av/gv, sep27/2011

ALTERNATE LANDING–GEAR EXTENSION HYDRAULIC HAND PUMP DETAIL
Figure 3



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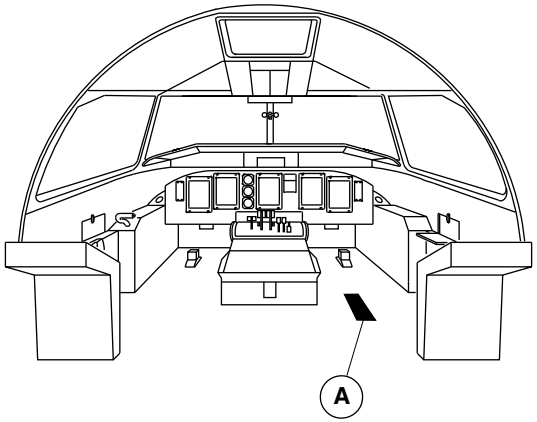
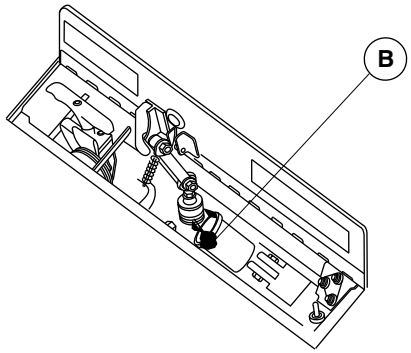
LEGEND

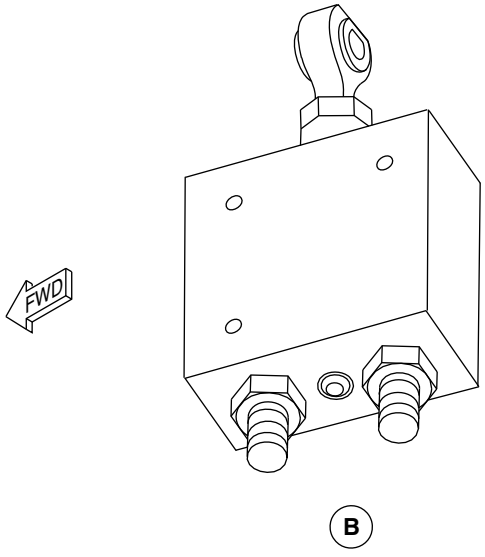
1. Alternate Landing Gear Extension Hand Pump Handle.

ALTERNATE LANDING–GEAR EXTENSION HYDRAULIC HAND PUMP HANDLE
Figure 4





A LANDING GEAR ALTERNATE EXTENSION DOOR



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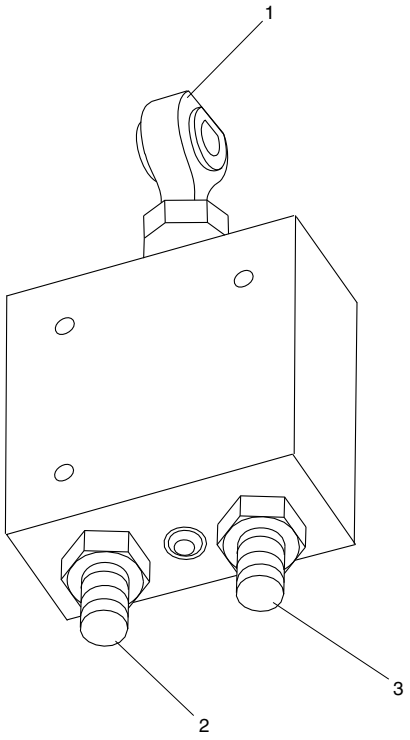
MLG ALTERNATE EXTENSION SELECTOR VALVE LOCATOR
Figure 5



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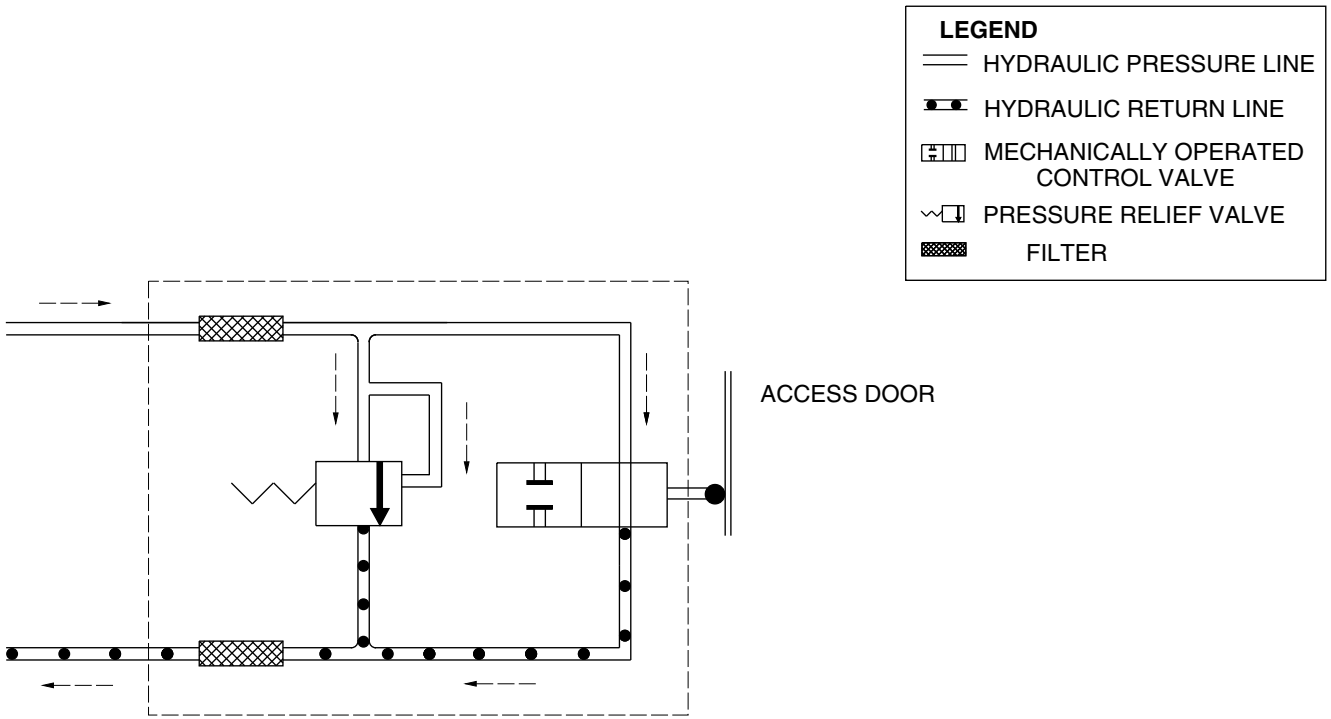
LEGEND

1. Rod End.
2. Return Port.
3. Pressure Port.

MLG ALTERNATE EXTENSION SELECTOR VALVE DETAIL
Figure 6



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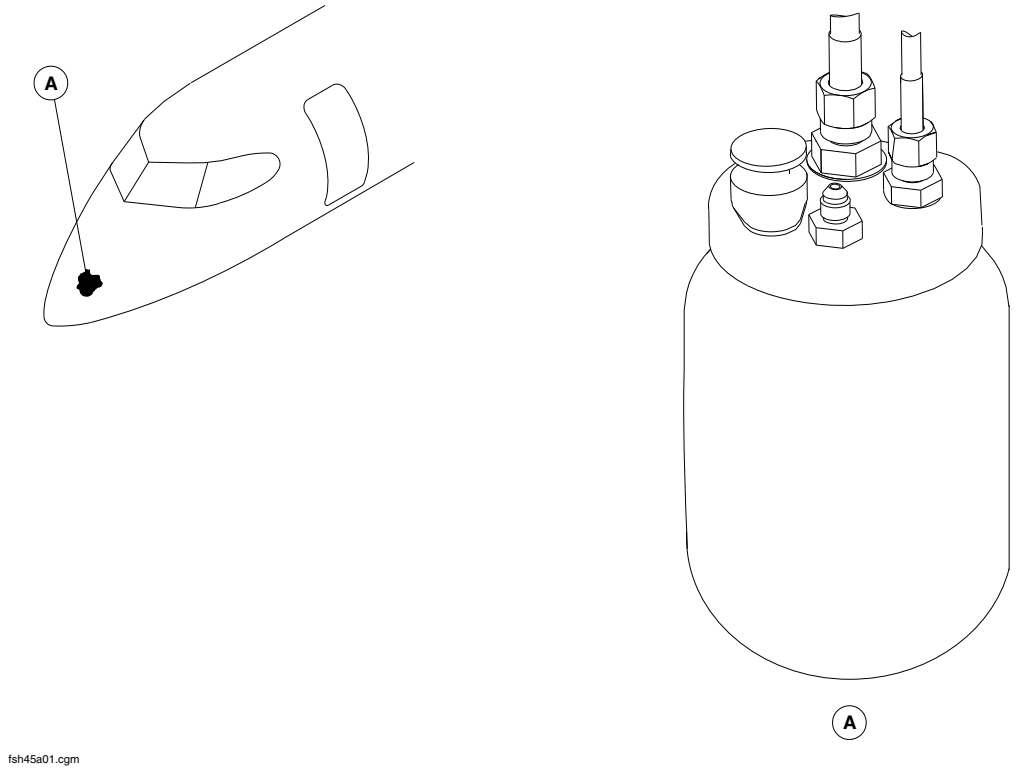
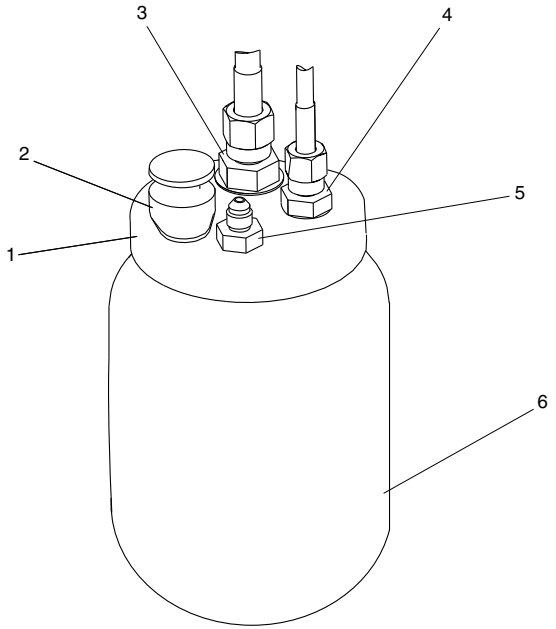
MLG ALTERNATE EXTENSION SELECTOR VALVE SCHEMATIC
Figure 7



ALTERNATE LANDING–GEAR EXTENSION HYDRAULIC RESERVOIR LOCATOR
Figure 8



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LEGEND

1. Lid.
2. Dip Stick.
3. Outlet Port.
4. Fill Port.
5. Vent.
6. Reservoir.

ALTERNATE LANDING–GEAR EXTENSION HYDRAULIC RESERVOIR DETAIL
Figure 9

**ON A/C ALL

29–30–00–001

INDICATING

Introduction

Hydraulic system indications are shown on the Multi–Function Displays (MFDs), Caution and Warning panel, the HYDRAULIC CONTROL panel, and the Fire Protection Panel.

The indicating system shows, in the flight compartment, the indications that follow:

- Hydraulic pressures
- Hydraulic quantities
- System faults
- System operation status.

General Description

Refer to Figure 1.

Hydraulic system indications are shown on the Multi–Function Displays (MFDs), Caution and Warning panel, the HYDRAULIC CONTROL panel, and the Fire Protection panel. Information is sent to the Caution and Warning panel by temperature and pressure switches. Quantity and pressure transducers give inputs to the MFD.

The indicating system has the components that follow:

- Hydraulic Pressure Transducers 29–30–01
- Temperature Switches 225 °F (107 °C) 29–30–06
- Hydraulic System Pressure Switch 29–30–11
- Hydraulic Warning Pressure Switch 29–30–16.

Detailed Description

Refer to Figures 1 and 2.

There are two Multi–Function Displays (MFDs) in the flight compartment that show hydraulic system pressure and fluid quantity. There are three hydraulic system indications:

- System No.1 and No. 2 main pressure
- No.3 hydraulic pressure
- No. 1, No. 2 and No.3 quantity indications.

The copilot's MFD shows data in analog format during normal configuration. The pilot's MFD shows data in digital format on a composite page if the copilot's MFD malfunctions. Hydraulic pressure data is sent to the MFD from pressure transducers. Hydraulic fluid quantity data is sent to the MFD by electrical signals from hydraulic system reservoir quantity transducers.

Refer to Figure 3.

The Caution and Warning panel, shows hydraulic system caution lights. Each hydraulic system includes pressure and temperature switches that turn on caution lights on this panel.

Refer to Figures 4 , 5 and 6.

The HYDRAULIC CONTROL Panel shows operation status for the Standby Power Unit, Power Transfer Unit and the No. 3 hydraulic system Isolation Valve. These three indications are on their related

Push–Button Annunciator (PBA) switch. The SPU isolation valve status shows ON if the PBA switch is pushed. HYD # 3 ISOL VLV shows OPEN if the PBA switch is pushed.

On aircraft without Modsum 4–126354 or SB 84–29–22 the PTU PBA when pushed in, the PTU is manually turned on and the Green ON indication comes on. When not selected on, the PTU will turn on automatically if the No. 2 hydraulic system fails and the flaps are selected to greater than 0 degrees.

On aircraft with Modsum 4–126354 or SB 84–29–22 incorporated, when the PTU PBA is pushed in, the PTU is manually switched on and the PTU ON white indication comes on. The PTU will auto–start upon loss of No. 2 EDP pressure and the flaps are selected to greater than 0 degrees during flight regardless of the PTU PBA switch position. The Green hashed bar illuminates when the PTU is running and the PTU pressure switch senses pressure of approximately 2700 psi (18615.8 kPa). The red FAIL light comes on when the PTU pressure switch senses pressure less than 1500 psi (10342.1 kPa) due to one of the reasons that follow:

- No. 1 EDP pressure loss
- No. 2 hydraulic system fluid loss
- No output from PTU is detected after 5 seconds of PTU starting
- When the aircraft is on weight–on–wheels.

Refer to Figure 7.

The Fire Protection Panel shows the advisory indications for the hydraulic Firewall Shut–Off Valves (FSOVs). During normal operation, an FSOV OPEN green light will be on. When the FSOV is closed, or is manually closed by pulling the PULL FUEL/HYD OFF handle, an FSOV CLOSED white light will come on.

Pressure Transducers

There are two pressure transducers in the No.1 hydraulic system. One transducer sends system pressure data to the MFD. The other transducer sends Standby Power Unit (SPU) discharge pressure to the MFD.

There is one pressure transducer installed in the No. 2 hydraulic system which sends system pressure data to the MFD. The No.3 hydraulic system has one pressure transducer installed in the accumulator isolation valve which sends system pressure data to the MFD.

Quantity Transducers

Each hydraulic system reservoir has a quantity transducer to transmit the quantity of fluid in the reservoir to the flight compartment. The quantity transducers are installed on each of the three hydraulic system reservoirs. The quantity transducer sends an electrical signal to the data acquisition unit which shows system fluid quantity on the MFD.

No. 1 and No. 2 Hydraulic System Pressure Switches

Two pressure switches are installed on each of the No.1 and No. 2 hydraulic system isolation valves. These pressure switches monitor hydraulic pressure at the inlet and outlet ports of the isolation valve. When low pressure (less than 900 psi = 6205 k Pascal) is sensed at the outlet pressure switch, the #1 or #2 HYD ISO VLV caution light comes on.

One EDP pressure switch is installed on each of the No.1 and No. 2 hydraulic system filter manifolds. These pressure switches monitor the pressure output from the EDPs. If the EDP fails, the #1 or #2 ENG HYD PUMP caution light comes on.

One pressure switch is installed in the No. 2 hydraulic system, downstream from the PTU to give a pressure indication at the PTU discharge port.

On aircraft without Modsum 4–126354 or SB 84–29–22 the PTU PBA when pushed in, the PTU is manually turned on and the Green ON indication comes on.

On aircraft with Modsum 4–126354 or SB 84–29–22 incorporated, when the PTU PBA is pushed in, the PTU is manually switched on and the PTU ON white indication comes on. The PTU will auto–start upon loss of No. 2 EDP pressure and the flaps are selected to greater than 0 degrees during flight. Green hashed bar is illuminates when the PTU pressure switch senses pressure of approximately 2700 psi (18615.8 kPa) and the red FAIL light comes on when the PTU pressure switch senses pressure less than 1500 psi (10342.1 kPa).

No. 3 Hydraulic System Pressure Switches

The No.3 hydraulic system has three pressure switches, installed downstream of the accumulator isolation valve. If the No. 1, No. 2 and No.3 system are all supplying power to the elevator actuators, the pressure switch sends a signal to the Caution and Warning panel and the ELEV PRESS caution light comes on.

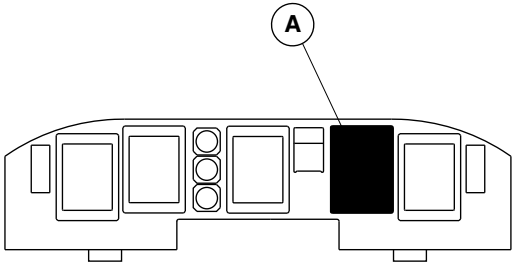
Temperature Switches

The No.1 and No. 2 hydraulic system reservoirs each have a 225 °F (107 °C) temperature switch that monitors hydraulic fluid temperature. At 225 °F (107 °C), a HYD FLUID HOT caution light on the Caution and Warning panel comes on.

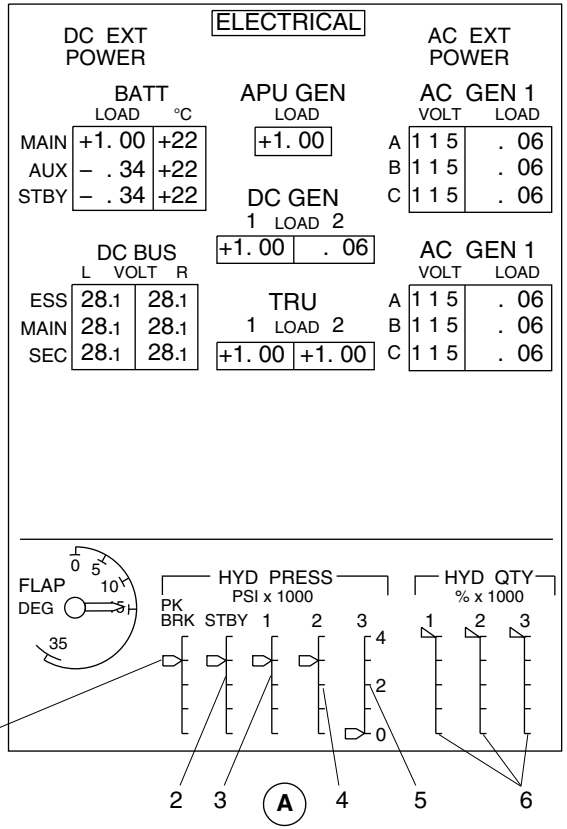
There is a thermal switch in the SPU that turns on the #1 STBY HYD PUMP HOT caution light if the pump windings are hot.

Firewall Shut–off Valve (FSOV) Position Switches

The FSOV position switches in the No.1 and No. 2 hydraulic systems are used to give FSOV position advisory indications on the Fire Protection Panel. The normally OPEN (green light) will go out and the CLOSED (white light) will come on when the FSOV is closed.



MAIN INSTRUMENT PANEL



LEGEND

1. Parking Brake Hydraulic Pressure Indication.
2. #1 System Stand–by Pressure Indication .
3. Main System #1 Pressure Indication.
4. Main System #2 Pressure Indication.
5. Main System #3 Pressure Indication.
6. #1/#2/#3 Hydraulic Fluid Quantity Indications.

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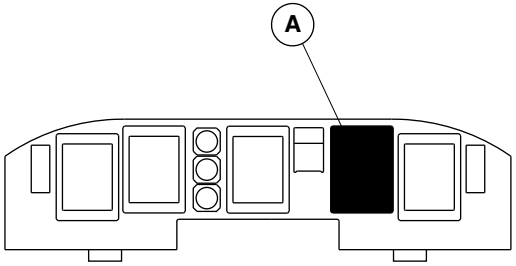
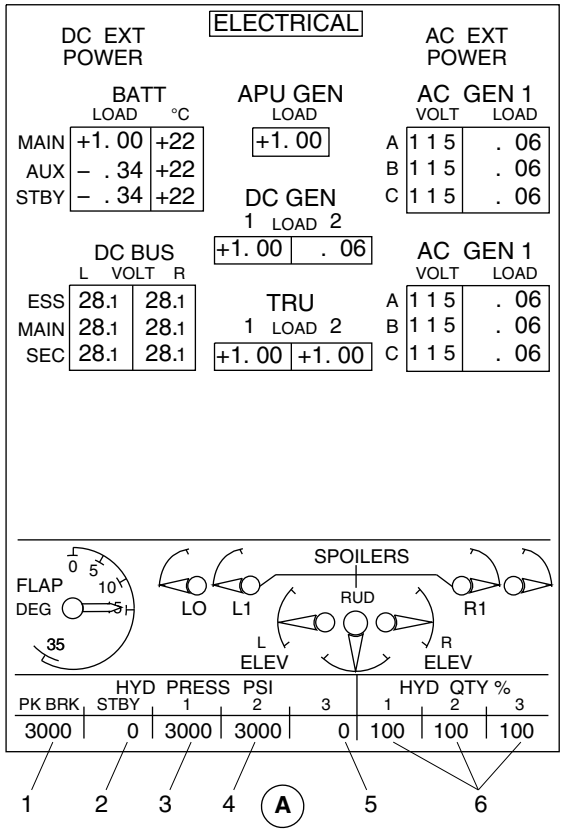
Hydraulic System Indications
Figure 1



MAIN INSTRUMENT PANEL



LEGEND

1. Parking Brake Hydraulic Pressure Digital Indication.
2. #1 System Stand–by Pressure Digital Indication .
3. Main System #1 Pressure Digital Indication.
4. Main System #2 Pressure Digital Indication.
5. Main System #3 Pressure Digital Indication.
6. #1/#2/#3 Hydraulic Fluid Quantity Digital Indications.

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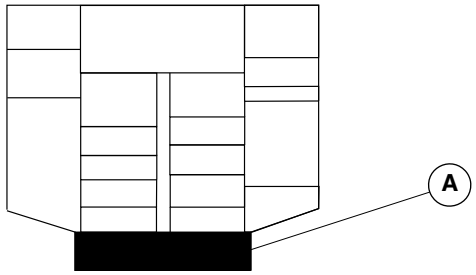
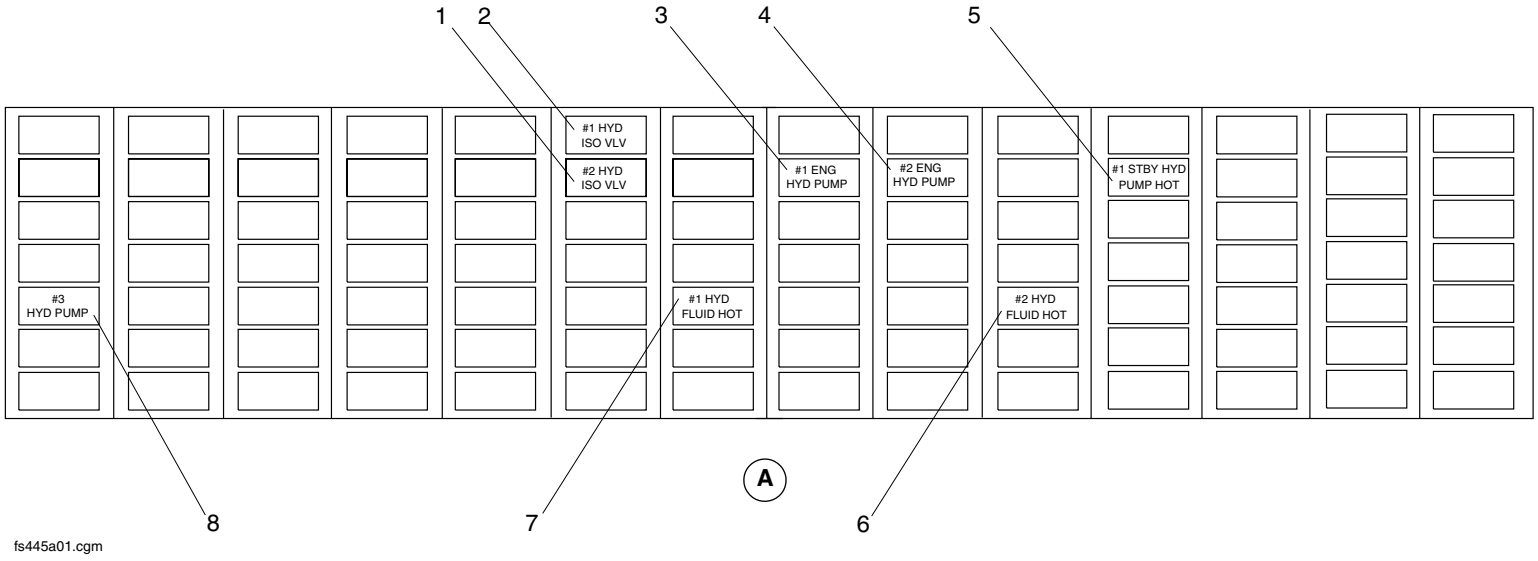
Hydraulic System Indications Reversion Mode
Figure 2



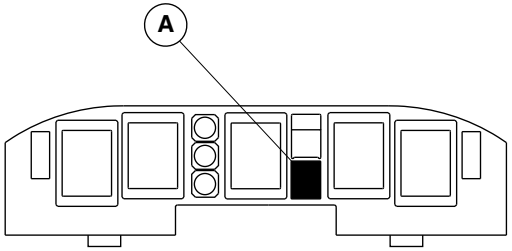
OVERHEAD CONSOLE

LEGEND

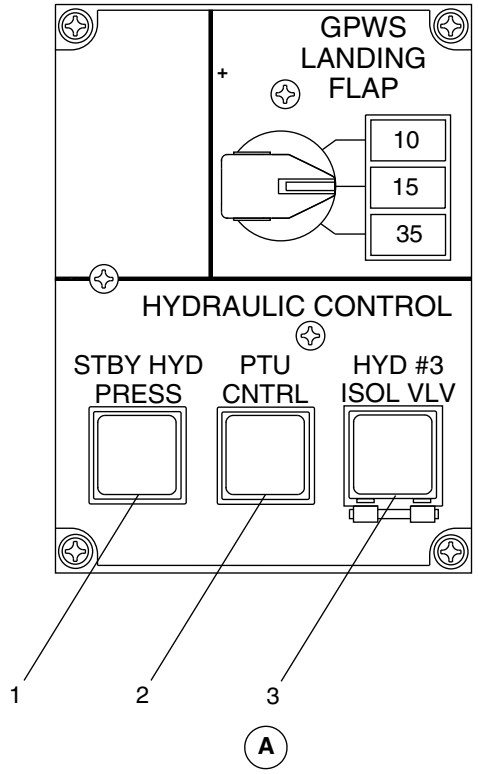
1. # 2 Hydraulic Isolation Valve (Amber).
2. # 1 Hydraulic Isolation Valve (Amber).
3. # 1 Engine Hydraulic Pump (Amber).
4. # 2 Engine Hydraulic Pump (Amber).
5. # 1 Standby Hydraulic Pump Hot (Amber).
6. # 2 Hydraulic Fluid Hot (Amber).
7. # 1 Hydraulic Fluid Hot (Amber).
8. # 3 Hydraulic Pump (Amber).



Hydraulic System Caution Indications
Figure 3



MAIN INSTRUMENT PANEL

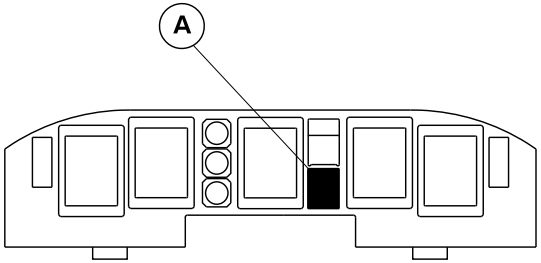


LEGEND

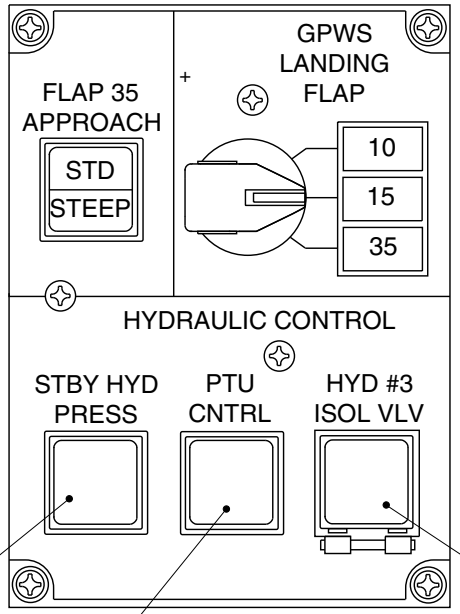
1. SPU PBA Switch.
2. PTU PBA Switch.
3. Accumulation Isolation Valve PBA Switch.

fs362a01.cgm

Hydraulic Control Panel
Figure 4



MAIN INSTRUMENT PANEL

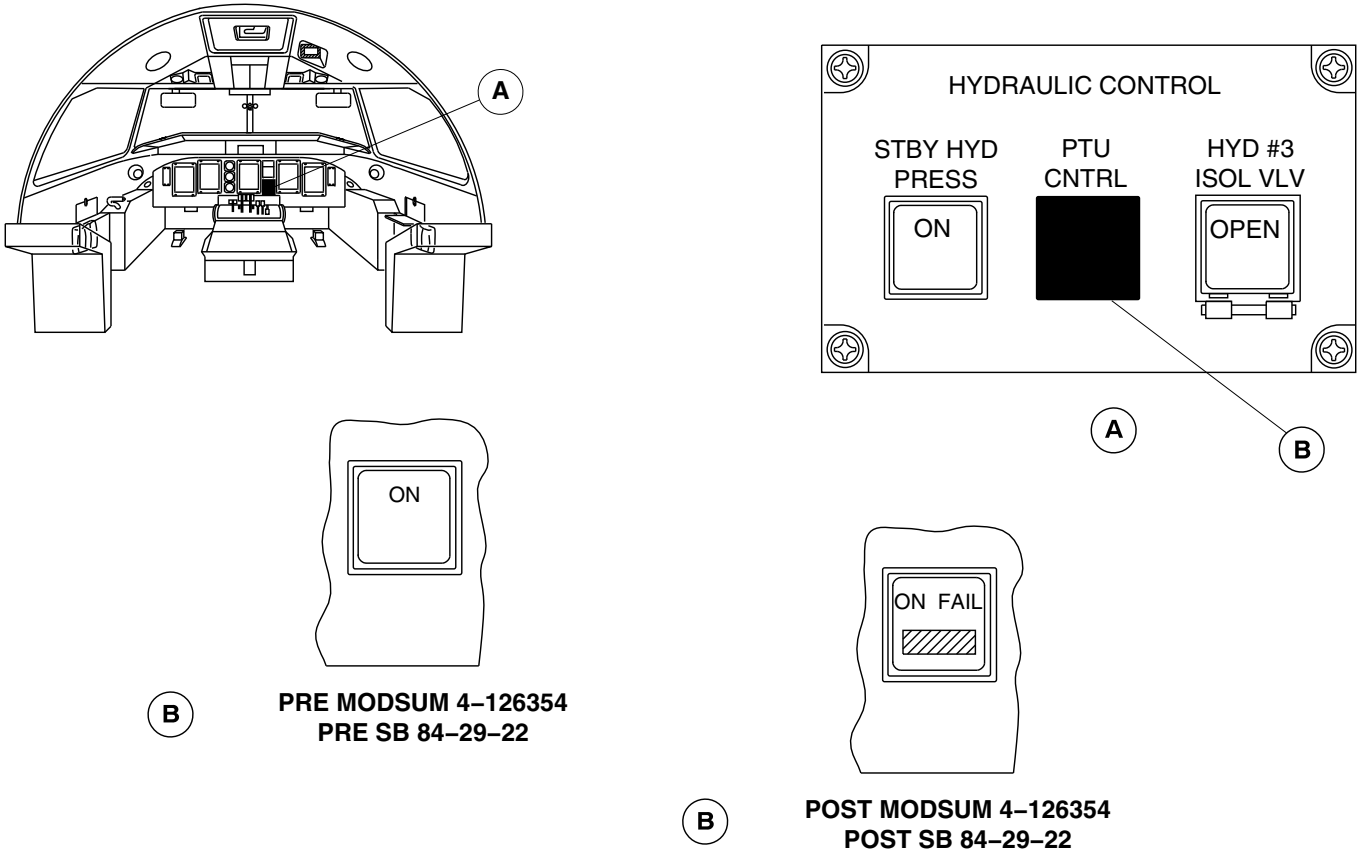


LEGEND

1. SPU PBA switch.
2. PTU PBA switch.
3. Accumulation isolation valve PBA switch.

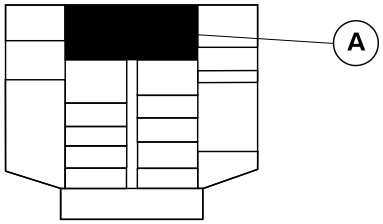
cg0073a01.dg, dn, jan05/2007

Hydraulic Control Panel (803SO930034)
Figure 5



fs361a01.dg, kg, nov21/2008

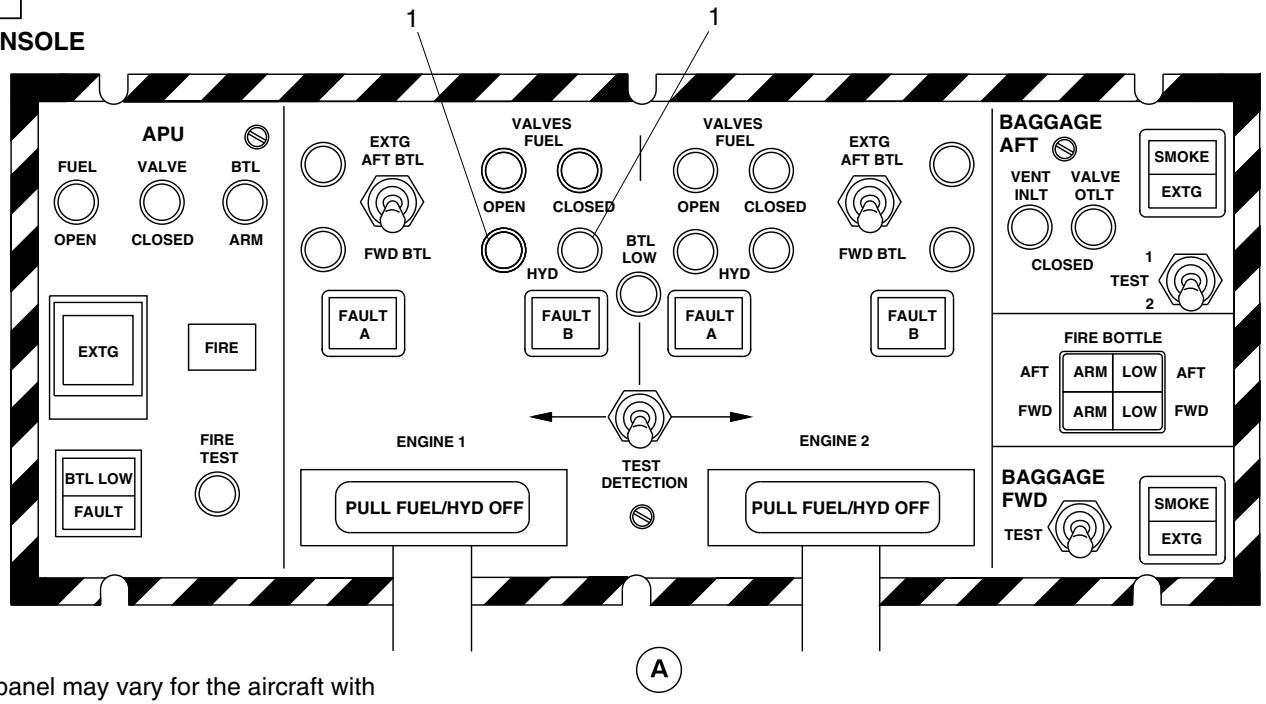
Hydraulic Control Panel Locator
Figure 6



OVERHEAD CONSOLE

LEGEND

1. Hydraulic Emergency Shut Off Valves Open/Closed Lights.



NOTE

The fire protection panel may vary for the aircraft with cargo combi configuration.

fs741a01.dg, ak, dec05/2015

Indicating, Fire Protection Panel
Figure 7

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