CHAPTER

29

HYDRAULIC POWER

International AeroTech Academy For Training Purpose Only

INTENTIONALLY LEFT BLANK

CHAPTER 29 - HYDRAULIC POWER
LIST OF EFFECTIVE PAGES

CHAPTER SECTION SUBJECT	PAGE	DATE
29-LOEP	1	Sep.21/12
	2	Nov. 15/10
29-TOC	1	Dec. 15/09
	2	Dec. 15/09
29-00-00	1	Dec. 15/09
	2	Dec. 15/09
29-00-00	201	Nov. 15/10
	202	Jan.16/12
	203	Jan.16/12
	204	Jan.16/12
	205	Dec. 15/09
	206	Dec. 15/09
29-00-00	301	Nov. 15/10
	302	Nov. 15/10
29-10-00	1	Dec. 15/09
	2	Dec. 15/09
	3	Dec. 15/09
	4	Dec. 15/09
	5	Dec. 15/09
	6	Dec. 15/09
29-10-00	201	Nov. 15/10
	202	Sep.21/12
	203	Sep.21/12
	204	Sep.21/12
	205	Jan.16/12
	206	Dec. 15/09
	207	Dec. 15/09
	208	Dec. 15/09
	209	Dec. 15/09
	210	Dec. 15/09
	211	Dec. 15/09
	212	Dec. 15/09
29-11-00	1	Dec. 15/09
	2	Dec. 15/09
29-11-00	201	Nov. 15/10

International AeroTech Academy For Training Purpose Only

CHAPTER SECTION SUBJECT	PAGE	DATE
	202	Dec. 15/09
	203	Dec. 15/09
	204	Dec. 15/09
	205	Dec. 15/09
	206	Dec. 15/09
	207	Dec. 15/09
	208	Dec. 15/09
	209	Dec. 15/09
	210	Dec. 15/09
29-20-00	1	Dec. 15/09
	2	Dec. 15/09
29-20-00	201	Nov. 15/10
	202	Nov. 15/10
	203	Dec. 15/09
	204	Dec. 15/09

CHAPTER 29 - HYDRAULIC POWER
TABLE OF CONTENTS

International AeroTech Academy For Training Purpose Only

HYDRAULIC POWER - DESCRIPTION AND OPERATION

1. General

   A. The hydraulic power system supplies normal and emergency hydraulic power to the landing gear and its associated systems (Refer to 32-00-00).

2. Main Hydraulic Power (Refer to 29-10-00)

   A. The main hydraulic power system is a hydraulic power package. The package gives hydraulic power for the landing gear, the nose wheel steering and the wheelbrakes.

   B. The system operates in two modes:

   – A high duty mode for landing gear extension and retraction (Refer to 32-30-00)
   – A low duty mode for nose wheel steering (Refer to 32-50-00) and the wheelbrakes (Refer to 32-40-00).

   The system is disabled when the landing gear is up and locked.

3. Auxiliary Hydraulic Power (Refer to 29-20-00)

   A. The auxiliary hydraulic power system is a handpump for the emergency extension of the landing gear and for extension and retraction of the gear on the ground for maintenance purposes (Refer to 32-00-00 Page block 501).

International AeroTech Academy For Training Purpose Only

INTENTIONALLY LEFT BLANK

MAIN HYDRAULIC POWER - MAINTENANCE PRACTICES

1. General

A. This page block contains the following maintenance practices:

- A removal/installation of the hydraulic pump package
- A removal/installation of the electric motor
- An inspection of the motor brushes for wear
- A removal/installation of the optical level sensor
- A removal/installation of the filler assembly
- A removal/installation of the pressure control unit
- An inspection/check of the isolator mounts
- A removal/installation of the isolator mounts

WARNING: BE CAREFUL WHEN THE HYDRAULIC SYSTEM IS PRESSURIZED.

- PUT ON SAFETY GOGGLES AND PROTECTIVE CLOTHING.
- RELEASE THE PRESSURE SLOWLY.
- A SUDDEN RELEASE OF PRESSURE IS DANGEROUS AND CAN CAUSE INJURY TO PERSONS.

WARNING: BE CAREFUL WHEN YOU USE THE HYDRAULIC FLUID. PUT ON PROTECTIVE CLOTHING. THE HYDRAULIC FLUID IS DANGEROUS IT CAN CAUSE DAMAGE TO YOUR SKIN.

CAUTION: THE HYDRAULIC SYSTEM GROUND TEST MUST BE PERFORMED ONLY WHEN THE HYDRAULIC PACKAGE IS PRESSURIZED.

2. Hydraulic Pump Package - Removal (Ref. to Fig. 201)

A. Fixtures, Test and Support Equipment

Blanking caps	Not specified
Hydraulic drain line	Not specified

Container (For hydraulic oil) 4 liters 1.0 US GALL. | Not specified

B. Referenced Information

Maintenance Manual Chapter 07-00-00
Maintenance Manual Chapter 28-12-00
Maintenance Manual Chapter 29-00-00

C. Procedure

(1) Remove the left auxiliary fuel tank (Refer to 28-12-00, Para. 2).
(2) Remove the access panel 251 A.

International AeroTech Academy For Training Purpose Only

(3) Open, tag and safety these circuit breakers:
- HYD CONT
- LDG GEAR CTRL
- HYDR PRESS WRN

(4) Depressurize the hydraulic system (Refer to 29-00-00).
(5) Disconnect the hand pump line end (17) from the unit (21) and connect the drain line to drain the hydraulic fluid into the container.
(6) Check on the Ground Test Refuel Panel that the HYD LOW LEVEL is on.
(7) Disconnect the following electrical connectors from their respective receptacles:
- The level indicator connector (3)
- The connector (18)
- The connector (19)
- The connector (1)

(8) Put caps on the connectors and the receptacles.
(9) Remove the two nuts (7) and the washers (8) and remove the terminals (9) from the terminal posts (5).
(10) Disconnect the following hydraulic line ends from their respective union adaptors:
- The tank fill connection (10)
- The tank overflow connection (4)
- The steering and brakes return line (22)
- The landing gear down line (16)
- The landing gear up line (15)

(11) Put caps on the line ends and the unions.
(12) Disconnect the air pressurization line end (2) from its union adapter.
(13) Give support to the hydraulic package.
(14) Remove the four bolts (12) and the washers (11) from the mounts (14) and the package. Collect the mount washers (13).
(15) Remove the hydraulic package.

3. Hydraulic Power Package - Installation (Ref. to Fig. 201)

A. Fixtures, Test and Support Equipment

Hydraulic Replenishing rig	Not specified

B. Consumable Materials

Solvent (MEK)	TT-M-261
Lint free cloth	Not specified

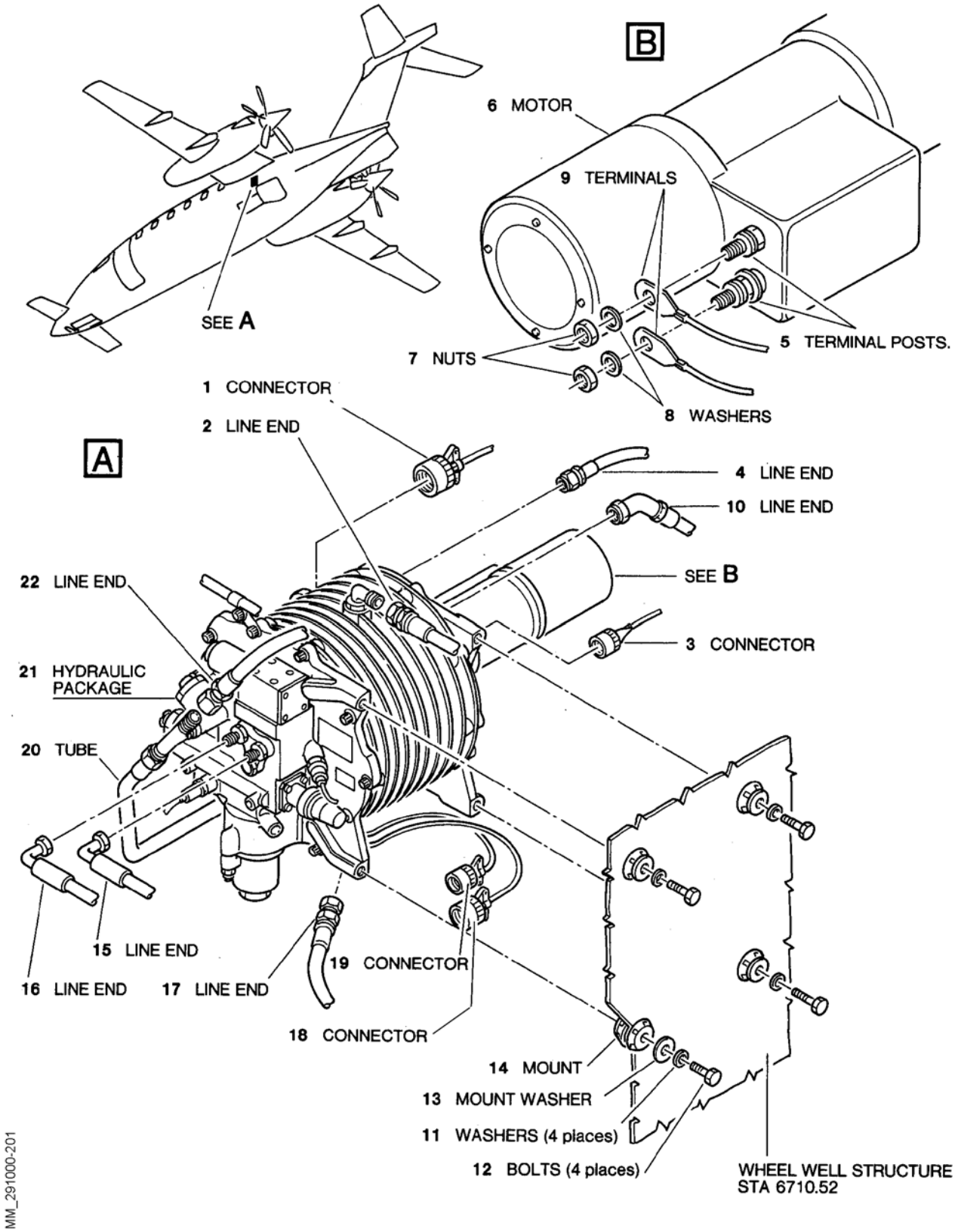


Fig. 201 - Hydraulic Pump Package - Removal/Installation

C. Referenced Information

Maintenance Manual Chapter 07-00-00
Maintenance Manual Chapter 12-00-00
Maintenance Manual Chapter 28-12-00
Maintenance Manual Chapter 29-00-00

D. Procedures

(1) Clean the structure around STA 6710.52 with solvent (Material N° TT-M-261) and a lint free cloth.

NOTE: Use the cleaner sparingly to clean the area.

(2) If a new package is to be installed remove the tube (20) complete with check valve and install them on the new package.
(3) Install the power package and align the mounting holes with the mount holes at STA 6710.52.
(4) Install the mount washers (13) the washers (11) and the bolts (12).
(5) Tighten the bolts (12).
(6) Remove the caps from the line end and the union adaptor and connect the line end (2) to the union.
(7) Remove the caps from the hydraulic line ends and unions.
(8) Connect the following line ends to their respective unions:
- The tank full connection (10)
- The tank overflow connection (4)
- The steering and brakes return line (22)
- The landing gear down line (16)
- The landing gear up line (15)
- The hand pump line (17).

(9) Install the terminals (9) over the terminal posts (5) on the motor (6).
(10) Install the washers (8) and the nuts (7). Tighten the nuts.
(11) Install the following electrical connectors to their respective receptacles:
- The level indicator connector (3)
- The connector (18)
- The connector (19)
- The connector (1)

(12) Tighten all connectors and line ends.
(13) Check on the Ground Test Refuel Panel that the HYD LOW LEVEL is on.
(14) Fill the hydraulic system (Refer to 12-00-00).
(15) Remove the safety tags and close these circuit brakers:
- HYD CONT
- LDG GEAR CTRL
- HYDR PRESS WRN.

(16) Install the auxiliary fuel tank (Refer to 28-12-00 Para. 3, from step 1 to step 9).
(17) Bleed the hydraulic system (Refer to 29-00-00).
(18) Do a system test (Refer to 29-00-00).

5. Hydraulic Power - Operational Test

A. Procedure

NOTE: All hydraulic system testing not described below requires the use of the landing gear, nosewheel steering etc. and is described in 32-00-00.

(1) Make sure electrical power is available (Refer to 24-00-00). :

	Action	Result
(a)	Set the BAT SW on BAT position.	The HYD press annunciator comes ON.
(b)	On the HYD panel, located on the instrument panel, set the HYD SW to HYD position.	The HYD press annunciator goes to OFF.
(c)	On the system Test Panel set the Rotary Switch to TEST HYD SYSTEM. Push (in) and release the momentary hold test switch in the center of the rotary switch	On the annunciator panel the HYD press annunciator comes ON for 6 seconds and then goes OFF. On the instrument panel the HYD pressure gauge shows an indication between 2000 psi and 2350 psi and then returns to initial value (about 1000 psi).

(2) Open the ground test/refuel panel 272 A

(3) Continue the test

	Action	Result
(a)	On the ground test panel set the GROUND TEST switch to LAMP and hold it in this position.	The HYD LEVEL and HYD FILTER annunciators come on.
(b)	Release the switch.	The switch returns to the center (off) position. The HYD FILTER light can stay on.
(c)	Set the switch to SYST and hold it in this position.	The HYD LEVEL annunciator comes on within 5 seconds.

NOTE: If either annunciator stays off during the test it indicates a fault in the monitoring system circuit.

International AeroTech Academy For Training Purpose Only

INTENTIONALLY LEFT BLANK

HYDRAULIC POWER - SERVICING

1. Pressurize the Hydraulic System

CAUTION: THE HYDRAULIC SYSTEM GROUND TEST MUST BE PERFORMED ONLY WHEN THE HYDRAULIC PACKAGE IS PRESSURIZED.

A. Fixtures, Test and Support Equipment

Dry, clean air source	Not specified

B. Referenced Information

Maintenance Manual Chapter 24-00-00
Maintenance Manual Chapter 12-00-00

C. Procedure

(1) Make sure electrical power is available (Refer to 24-00-00).
(2) Make sure the hydraulic pump package is full (Refer to 12-00-00).
(3) On the HYD panel in the flight compartment set the HYD switch to HYD. The pressure will increase to between 800 and 1200 psi and the HYD PRESS annunciator on the CWP will go off.
(4) If you are going to do retraction/extension or steering tests on the landing gear do the steps that follow:
  (a) Open the baggage compartment door Zone 840.
  (b) Find the external hydraulic pressurization adaptor just forward of the door.
  (c) Remove the cap from the valve and connect a source of dry, clean air.
  (d) Set the regulator of the air source to give a pressure of 30 - 40 psi.

NOTE: This procedure stops cavitation at the hydraulic pump inlet.

2. Depressurize the Hydraulic System

A. Referenced Information

Maintenance Manual Chapter 12-00-00
Maintenance manual Chapter 24-00-00

B. Procedure

(1) Set the HYD switch to off.
  (a) Turn the external air supply to off.
  (b) Disconnect the supply hose and put the cap on the charging valve.
  (c) Close and lock the baggage bay door.

International AeroTech Academy For Training Purpose Only

(2) If an external air source is in use do the steps that follow.
(3) Operate the toc brakes twice to release the system pressure.
(4) Remove the electrical power (Refer to 24-00-00).

MAIN HYDRAULIC POWER - DESCRIPTION AND OPERATION

1. General

A. The hydraulic power system is a self contained hydraulic power package with an electronic monitoring system. The system is installed in the LH equipment compartment in zone 251.

B. The power package includes these components:

- The reservoir and valve block which has an integral pump and displacement piston
- The electric motor
- The optical level sensor
- Filter assembly
- The directional control valve (DCV)
- The electrical depressurizing valve (EDV)
- The pressure transducer

The system also uses:

- The electronic pressure control unit
- A remote hydraulic filler
- A ground pressurizing port
- A hydraulic switch and pressure gauge on the center switch panel in the flight compartment.

C. The system gives hydraulic power for the landing gear the nose wheel steering and the wheel brakes.

2. Description

A. The reservoir and valve block assembly

(1) The reservoir and valve block assembly has these functions:

- It contains the hydraulic fluid for system operation
- It gives support for the system components and gives fluid passages for system operation
- It contains the hydraulic pump and the pump control mechanism

(2) The reservoir is pressurized with air from the pneumatic system (Refer to 29-00-00).

(3) The assembly has fins on the outside to control the hydraulic oil temperature and keep the hydraulic pump cool.

B. The electric motor

(1) The electric motor drives the hydraulic pump through a splined coupling shaft. It is attached to the reservoir casing with bolts. The unit has integral fan cooling and a thermal cut-out switch which stops the motor if an overheat occurs.

International AeroTech Academy For Training Purpose Only

(2) The 28 Vdc R.GENERATOR BUS supplies electrical power to the motor through a relay. The relay is energised through the landing gear control switch and the hydraulic control switch together with the landing gear limit switches.

C. The optical level sensor

(1) The optical level sensor is installed adjacent to the electric motor. The position of the sensor is at the minimum permisseable reservoir fluid level.

(2) When the fluid level goes below the minimum operating level the level sensor sends a signal to the electronic pressure control unit. When activated it gives an electrical signal to operate the HYD LEVEL annunciator on the ground test/ refuel panel.

D. The EDV

(1) The EDV is on the valve block of the reservoir. It is a solenoid valve spring loaded to a high duty mode position. When the solenoid is energised it moves to a low duty position.

(2) The valve controls the air bleed pressure to a preload piston in the hydraulic pump pressure control system.

E. The DCV

(1) The directional control valve is on the valve block of the reservoir. It is a solenoid valve, spring loaded to the landing gear extend selection. When the solenoid is energised it moves to the landing gear retract selection.

(2) The valve controls the flow of hydraulic fluid to the extension/retraction system.

F. The Pressure transducer

(1) The pressure transducer is on the valve block of the reservoir. It measures the hydraulic pressure at the pump outlet.

(2) It sends an electrical signal proportional to hydraulic pressure to the electrical pressure control unit.

G. The Filter assembly

(1) The filter assembly is on the valve block on the reservoir in the return line. A differential pressure bypass valve bypasses the valve in the case of a filter blockage.

(2) A differential pressure switch operates the HYD FILTER annunciator on the ground test/refuel panel when a blockage is impending.

3. Operation

A. The hydraulic system operates in two modes:

– The high duty mode, for landing gear extension and retraction
– The low duty mode, for operation of the steering and braking system.

There is also a non operational mode when the HYD switch is set to off or when the retraction cycle is complete.

B. Low duty mode

(1) With the HYD switch on the center switch panel set to HYD and the landing gear selector set to ON it makes a circuit to the pump relay coil and the depressurizing valve coil. The electric motor operates and the depressurizing valve energises, depressurizes the piston of the pump control mechanism, and sets system output to 1000 psi.

C. High duty mode

(1) Landing gear up selection.

(a) With the landing gear selector set to UP it makes a circuit to the directional control valve and the DCV energises to port fluid to the landing gear up line. At the same time the circuit to the depressurizing valve opens and the valve de-energises. The piston of the pump control mechanism is pressurized by bleed air and sets the pump to high duty mode (3000 psi).

(b) When the landing gear locks up the up limit switches operate and open the electrical circuit of the pump relay coil. The electrical motor stops and the HYD PRESS annunciator on the annunciator panel comes on.

(2) Landing gear down selection

(a) The depressurization valve is open circuit through the open contacts of the gear down limit switches. When the selector switch is set to ON it makes the circuit to the pump relay coil to operate the pump in high duty mode (because the EDV is still de-energised). The coil of the directional control valve is de.energised and connects the fluid pressure to the gear down lines; the gear extends.

(b) When the gear downlock switches operate they make a circuit to the depressurization valve, which energises and sets the pump to the low duty mode. The pump will operate in the low duty mode until another gear selection is made or the HYD switch is set to OFF.

D. Fault indication

(1) The electronic pressure control unit measures these signals:

– A signal from the coil of the EDV (energised/de-energised)
– A signal from the electric motor relay
– A signal from the hydraulic pressure transducer.

(2) If the signals do not agree with the operating mode set the HYD PRESS caption on the annunciator panel comes on. This shows that for the position of the EDV and the motor coil the actual hydraulic pressure is not correct if a fault exists. To avoid spurious faults the signals must disagree for TBD seconds before a fault will show.

International AeroTech Academy For Training Purpose Only

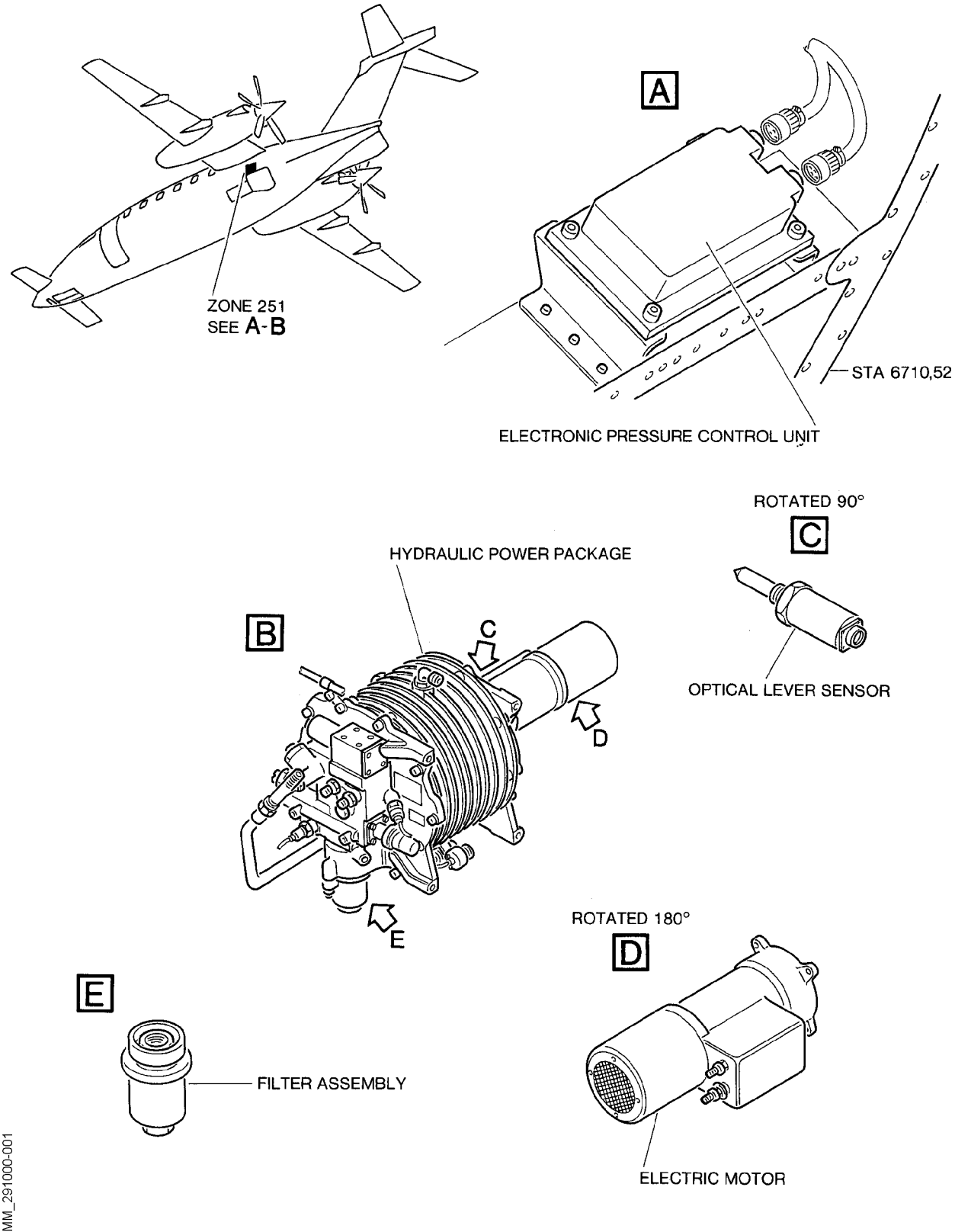


Fig. 1 - Component Recognition/Identification

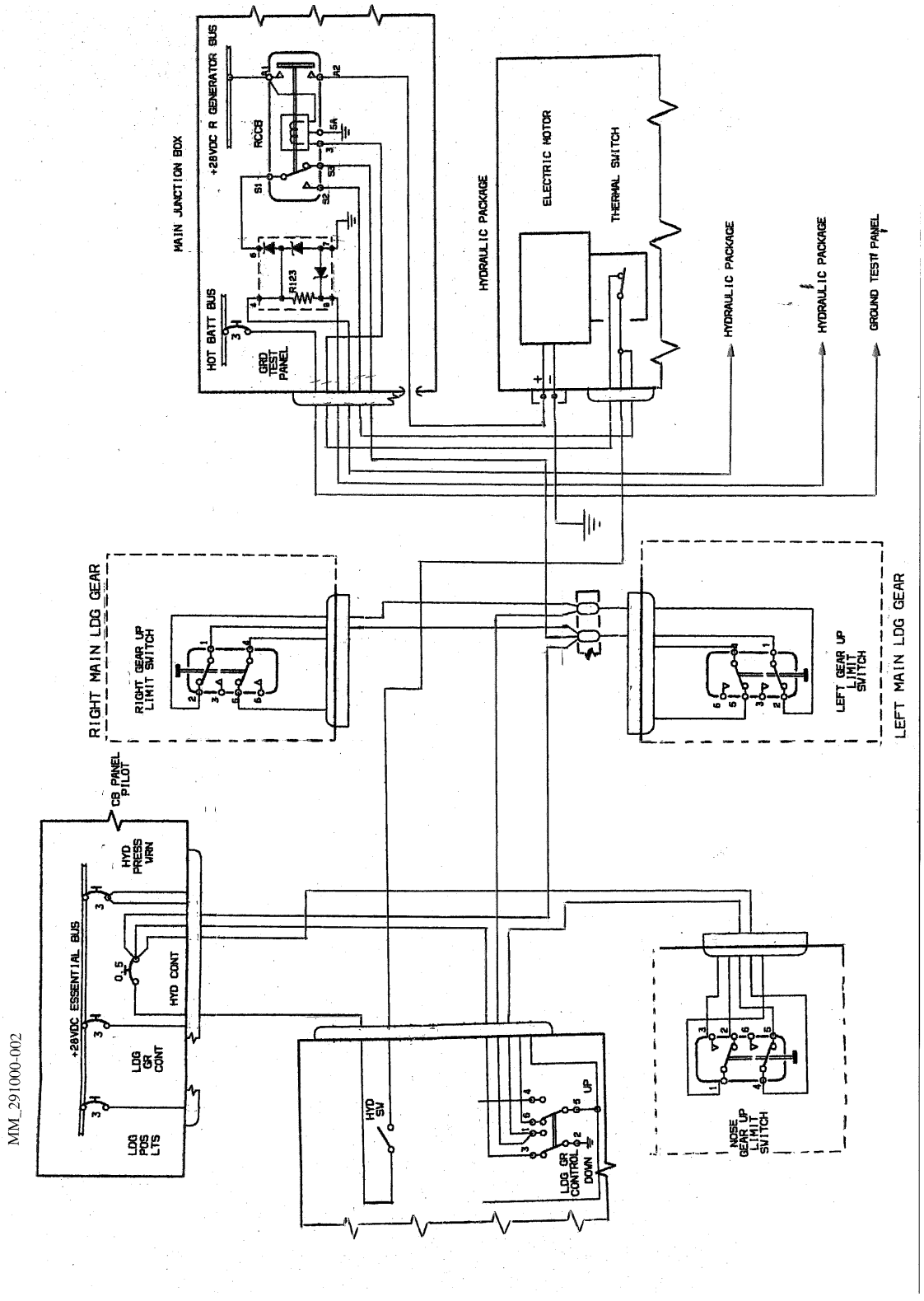


Fig. 2 - Main Hydraulic Power - Electrical Schematic

International AeroTech Academy For Training Purpose Only

INTENTIONALLY LEFT BLANK

MAIN HYDRAULIC POWER - MAINTENANCE PRACTICES

1. General

A. This page block contains the following maintenance practices:

- A removal/installation of the hydraulic pump package
- A removal/installation of the electric motor
- An inspection of the motor brushes for wear
- A removal/installation of the optical level sensor
- A removal/installation of the filler assembly
- A removal/installation of the pressure control unit
- An inspection/check of the isolator mounts
- A removal/installation of the isolator mounts

WARNING: BE CAREFUL WHEN THE HYDRAULIC SYSTEM IS PRESSURIZED.

- PUT ON SAFETY GOGGLES AND PROTECTIVE CLOTHING.
- RELEASE THE PRESSURE SLOWLY.
- A SUDDEN RELEASE OF PRESSURE IS DANGEROUS AND CAN CAUSE INJURY TO PERSONS.

WARNING: BE CAREFUL WHEN YOU USE THE HYDRAULIC FLUID. PUT ON PROTECTIVE CLOTHING. THE HYDRAULIC FLUID IS DANGEROUS IT CAN CAUSE DAMAGE TO YOUR SKIN.

CAUTION: THE HYDRAULIC SYSTEM GROUND TEST MUST BE PERFORMED ONLY WHEN THE HYDRAULIC PACKAGE IS PRESSURIZED.

2. Hydraulic Pump Package - Removal (Ref. to Fig. 201)

A. Fixtures, Test and Support Equipment

Blanking caps	Not specified
Hydraulic drain line	Not specified

Container (For hydraulic oil) 4 liters 1.0 US GALL. | Not specified

B. Referenced Information

Maintenance Manual Chapter 07-00-00
Maintenance Manual Chapter 28-12-00
Maintenance Manual Chapter 29-00-00

C. Procedure

(1) Remove the left auxiliary fuel tank (Refer to 28-12-00, Para. 2).
(2) Remove the access panel 251 A.

International AeroTech Academy For Training Purpose Only

(3) Open, tag and safety these circuit breakers:
- HYD CONT
- LDG GEAR CTRL
- HYDR PRESS WRN

(4) Depressurize the hydraulic system (Refer to 29-00-00).
(5) Disconnect the hand pump line end (17) from the unit (21) and connect the drain line to drain the hydraulic fluid into the container.
(6) Check on the Ground Test Refuel Panel that the HYD LOW LEVEL is on.
(7) Disconnect the following electrical connectors from their respective receptacles:
- The level indicator connector (3)
- The connector C1A (18)
- The connector C2A (19)
- The connector CHB (1)

(8) Put caps on the connectors and the receptacles.
(9) Remove the two nuts (7) and the washers (8) and remove the terminals (9) from the terminal posts (5).
(10) Disconnect the following hydraulic line ends from their respective union adaptors:
- The tank fill connection (10)
- The tank overflow connection (4)
- The steering and brakes return line (22)
- The landing gear down line (16)
- The landing gear up line (15)

(11) Put caps on the line ends and the unions.
(12) Disconnect the air pressurization line end (2) from its union adapter.
(13) Give support to the hydraulic package.
(14) Remove the four bolts (12) and the washers (11) from the mounts (14) and the package. Collect the mount washers (13).
(15) Remove the hydraulic package.

3. Hydraulic Power Package - Installation (Ref. to Fig. 201)

A. Fixtures, Test and Support Equipment

Hydraulic Replenishing rig	Not specified

B. Consumable Materials

Solvent (MEK)	TT-M-261
Lint free cloth	Not specified

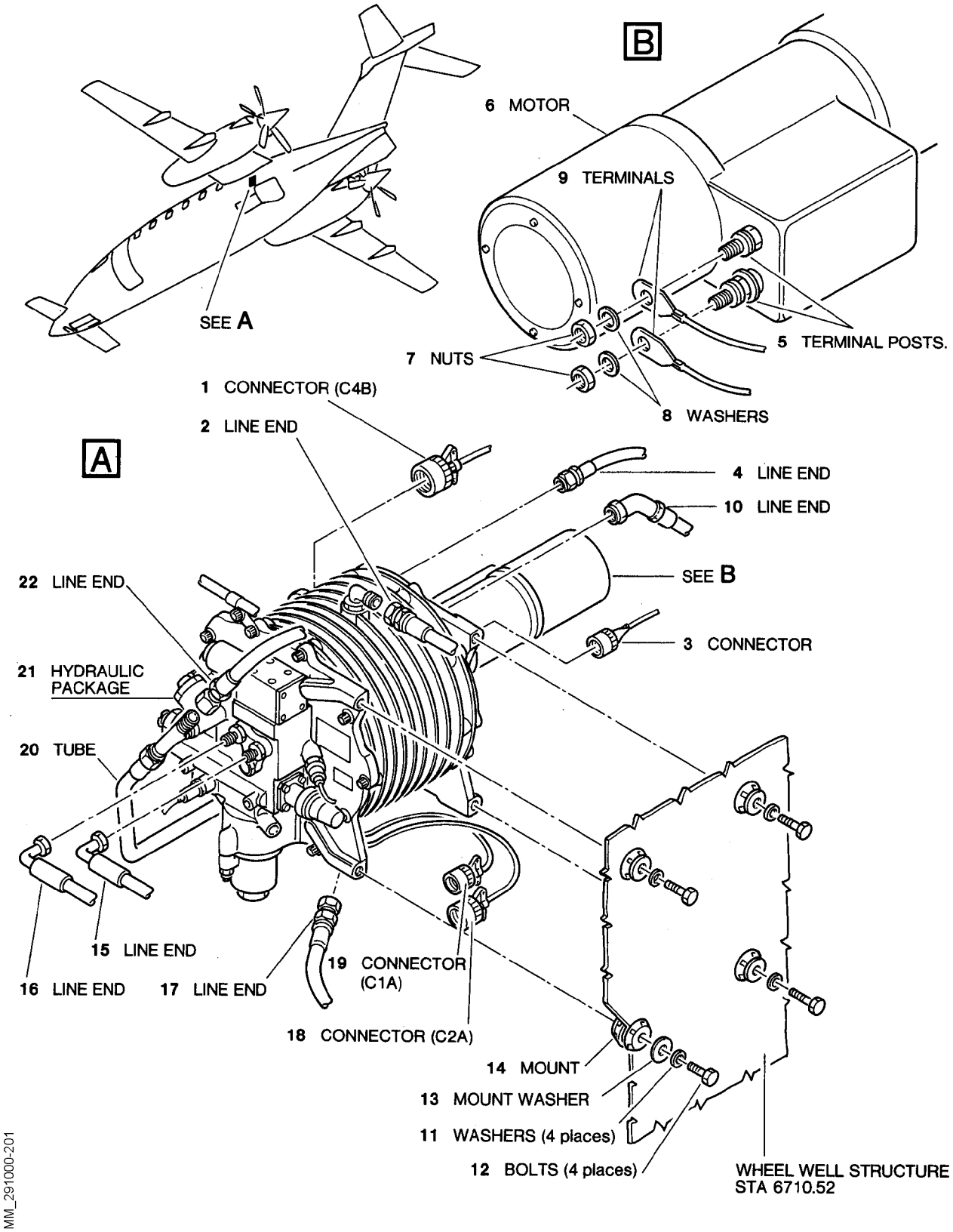


Fig. 201 - Hydraulic Pump Package - Removal/Installation

C. Referenced Information

Maintenance Manual Chapter 07-00-00
Maintenance Manual Chapter 12-00-00
Maintenance Manual Chapter 28-12-00
Maintenance Manual Chapter 29-00-00

D. Procedures

(1) Clean the structure around STA 6710.52 with solvent (Material N° TT-M-261) and a lint free cloth.

NOTE: Use the cleaner sparingly to clean the area.

(2) If a new package is to be installed remove the tube (20) complete with check valve and install them on the new package.
(3) Install the power package and align the mounting holes with the mount holes at STA 6710.52.
(4) Install the mount washers (13) the washers (11) and the bolts (12).
(5) Tighten the bolts (12).
(6) Remove the caps from the line end and the union adaptor and connect the line end (2) to the union.
(7) Remove the caps from the hydraulic line ends and unions.
(8) Connect the following line ends to their respective unions:
- The tank full connection (10)
- The tank overflow connection (4)
- The landing gear return line (22)
- The landing gear down line (16)
- The landing gear up line (15)
- The hand pump line (17).

(9) Install the terminals (9) over the terminal posts (5) on the motor (6).
(10) Install the washers (8) and the nuts (7). Tighten the nuts.
(11) Install the following electrical connectors to their respective receptacles:
- The level indicator connector (3)
- The connector C1A (18)
- The connector C2A (19)
- The connector C4B (1).

(12) Tighten all connectors and line ends.
(13) Check on the Ground Test Refuel Panel that the HYD LOW LEVEL is on.
(14) Fill the hydraulic system (Refer to 12-00-00).
(15) Remove the safety tags and close these circuit brakers:
- HYD CONT
- LDG GEAR CTRL
- HYDR PRESS WRN.

(16) Install the auxiliary fuel tank (Refer to 28-12-00 Para. 3, from step 1 to step 9).
(17) Bleed the hydraulic system (Refer to 29-00-00).
(18) Do a system test (Refer to 29-00-00).

(19) Install the access panel 251A.
(20) Lower the airplane to the ground and remove the jacks (Refer to 07-00-00).

4. Electric Motor - Removal (Ref. to Fig. 202)

A. Referenced Procedures

Maintenance Manual Chapter 29-10-00

B. Procedure

(1) Remove the hydraulic pump package (Refer to Para. 2 above).
(2) Remove the four bolts (2) and the washers (3).
(3) Pull the motor (1) away from the pump package (5) until it is clear of the splined shaft (4).

5. Electric Motor - Installation (Ref. to Fig. 202)

A. Referenced Information

Maintenance Manual Chapter 29-10-00

B. Procedure

(1) Examine the drive shaft coupling for wear, damage or cracking of the shear neck.
(2) If damage has occurred pull the coupling firmly from the pump package.
(3) Push in a new coupling complete with seal and make sure the spring clip engages the locking groove.

NOTE: Normally a light tap with a non metallic hammer will seat the coupling.

(4) Align the motor splines with the splines on the coupling shaft and push the motor onto the mounting flange.
(5) Align the mounting flange and install the four bolts (2) and washers (3).
(6) Tighten the bolts to a torque of 43-53 lbf in (4.8 - 5 Nm).
(7) Install the hydraulic pump power package (Refer to Para. 3 above).

International AeroTech Academy For Training Purpose Only

6. Electric Motor Brushes - Inspection/Check (Ref. to Fig. 202)

A. With the hydraulic power package removed do the steps that follow:

(1) Cut and remove the lockwire from the four bolts (8).

(2) Remove the bolts (8) and the washers (7) and remove the cover (6) and insulator strip from the end of the motor (1).

CAUTION: BE CAREFUL WHEN YOU REMOVE THE BRUSHES. DO NOT PULL THE CONNECTING WIRES YOU CAN DAMAGE THE BRUSHES.

(3) Hold the brush springs away from the brushes and lift the brushes (4 off) out of the brush holders.

(4) Measure the brush length from the end of the brush to the shoulder of the curved face (view A).

(5) If the dimension of any brush is more than 14.38 mm (0.566 in), but there is any cracking or signs of brush disintegration, replace the brush.

(6) If the dimension of any brush is less than 14.38 mm (0.566 in), and more than 10 mm (0.394 in), replace the brushes.

(7) If the dimension of any brush is less than 10 mm (0.394 in) replace the motor. Return the motor to an approved facility for overhaul.

(8) If the brushes are serviceable hold the brush springs open and refit the brushes to their respective holders.

(9) Install the insulating ship and cover (6) with the bolts (8) and washers (7).

(10) Safety the bolts in pairs with lockwire.

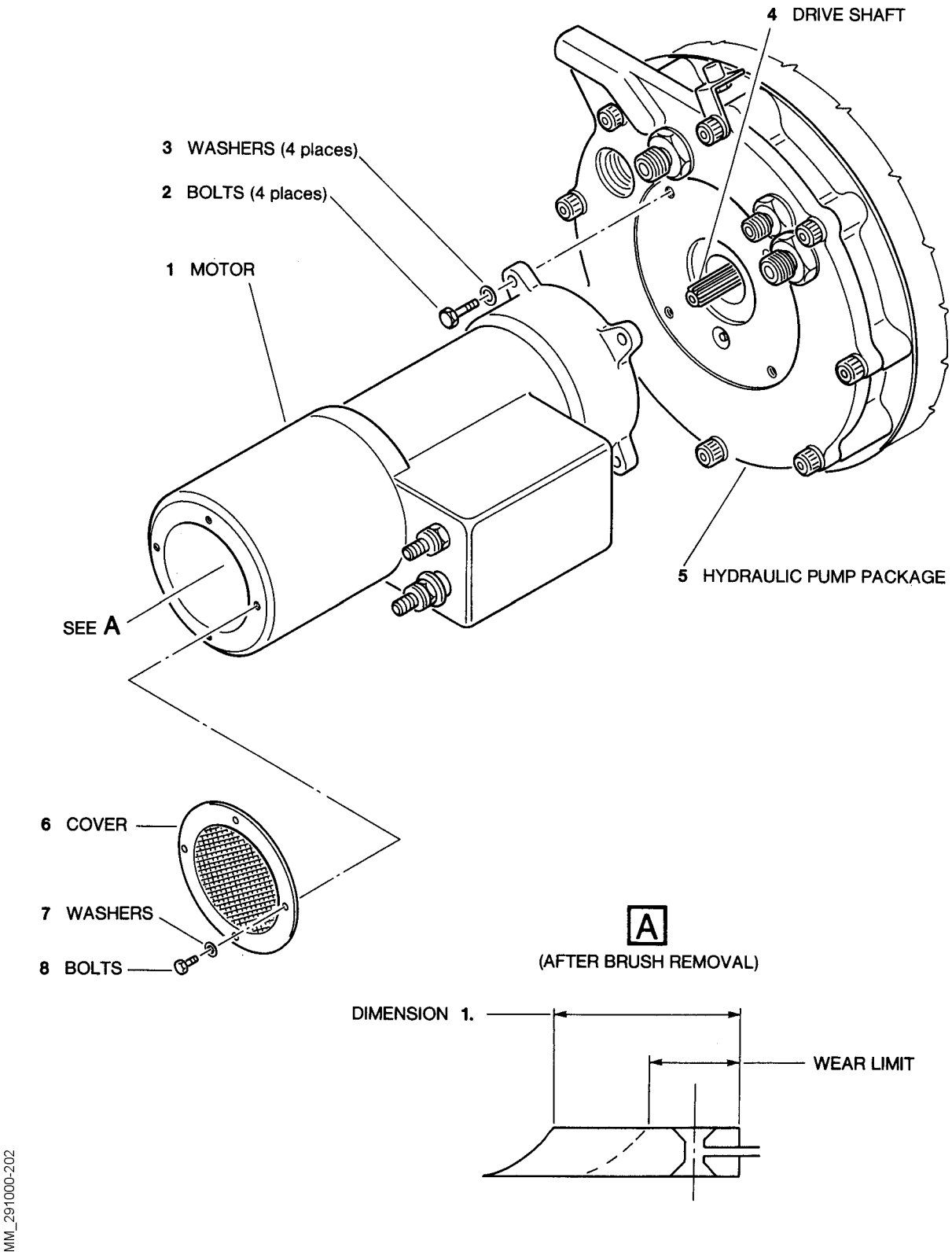


Fig. 202 - Electrical Motor - Removal/Installation

International AeroTech Academy For Training Purpose Only

7. Optical Level Sensor - Removal (Ref. to Fig. 203)

A. Fixtures, Test and Support Equipment

Blanking Caps	Not specified

B. Referenced Information

Maintenance Manual Chapter 29-10-00

C. Procedure

(1) Remove the hydraulic power package (Refer to Para 2. above).
(2) Disconnect the electrical connector (1) from the receptacles on the sensor (2).
(3) Put caps on the connector and the receptacle.
(4) Remove the sensor (2) from the mounting Flange of the package (4).
(5) Remove and discard the packing (3).
(6) Put caps on the sensor and the mounting flange.

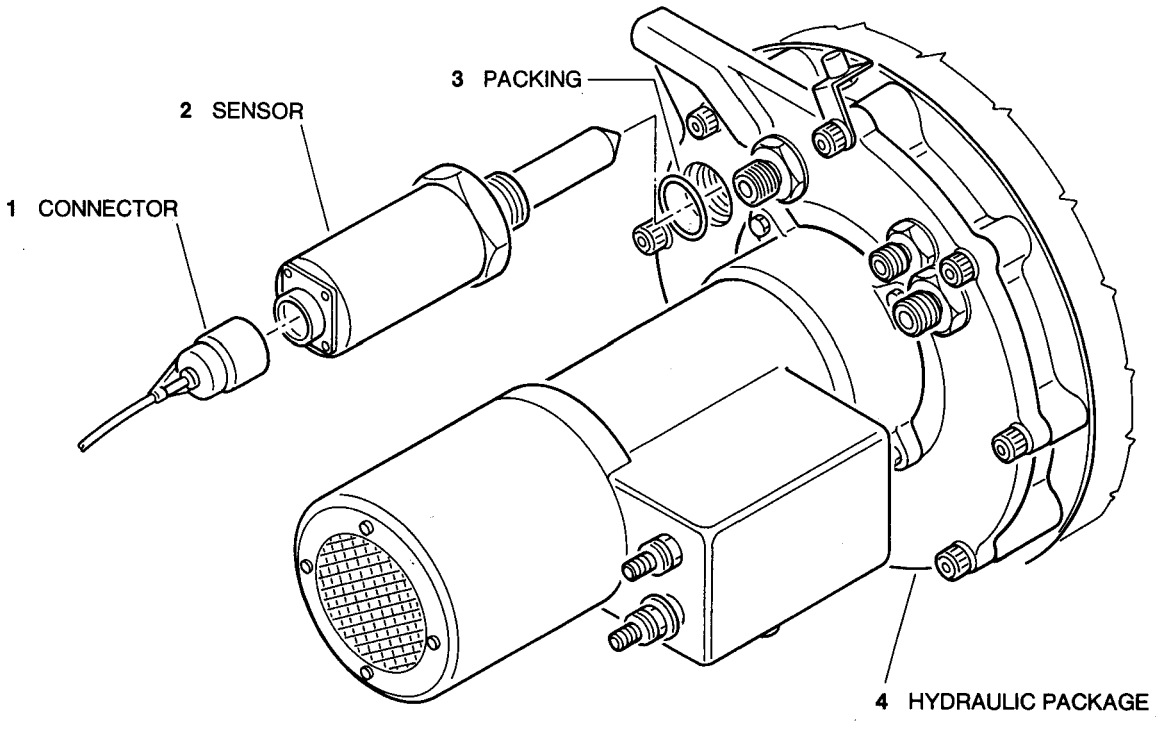


Fig. 203 - Optical Level Sensor - Removal/Installation

8. Optical Level Sensor - Installation (Ref. to Fig. 203)

A. Expendable Parts

ITEM	NOMENCLATURE	IPC-CSN
3	Packing	291001 01-70

B. Referenced Information

Maintenance Manual Chapter 29-00-00
Maintenance Manual Chapter 29-10-00

C. Procedure

(1) Remove the caps from the connector the sensor and the mounting flange.
(2) Install a new packing (3) in the packing groove of the sensor (2).
(3) Install the sensor (2) into the flange of the hydraulic package (4).
(4) Tighten the sensor to a torque of 31.6 to 34.5 Nm (280-305 lbf in).
(5) Connect the electrical connector (1) to the sensor (2).
(6) Install the hydraulic power package (Refer to Para 3. above).

9. Filter Element - Removal (Ref. to Fig. 204)

A. Materials

Solvent (MEK)	02-009
Lint-free cloth	04-013
Filter paper	Not specified

B. Referenced Information

Maintenance Manual Chapter 07-10-00
Maintenance Manual Chapter 53-60-00
Maintenance Manual Chapter 29-00-00

C. Procedure

(1) Raise the airplane on jacks (Refer to 07-10-00).
(2) Remove the access panel 251A (Refer to 53-60-00).
(3) Depressurize the hydraulic system (Refer to 29-00-00).
(4) Remove the locknut (8) and the locking tab (7).
(5) Remove the filter bowl (6).
(6) Remove and discard the packing (5).
(7) Empty the filter bowl into the filter paper to catch any particles of contaminant in the bowl.
(8) Wash the bowl with solvent MEK and filter the fluid.
(9) Dry the filter bowl with a lint free cloth.
(10) Remove the filter element (4) and wash it with MEK into the filter paper.
(11) Put the filter paper in a suitable place to dry.
(12) Discard the filter element (4).
(13) Do an analysis of the particles as described in 29-00-00.

International AeroTech Academy For Training Purpose Only

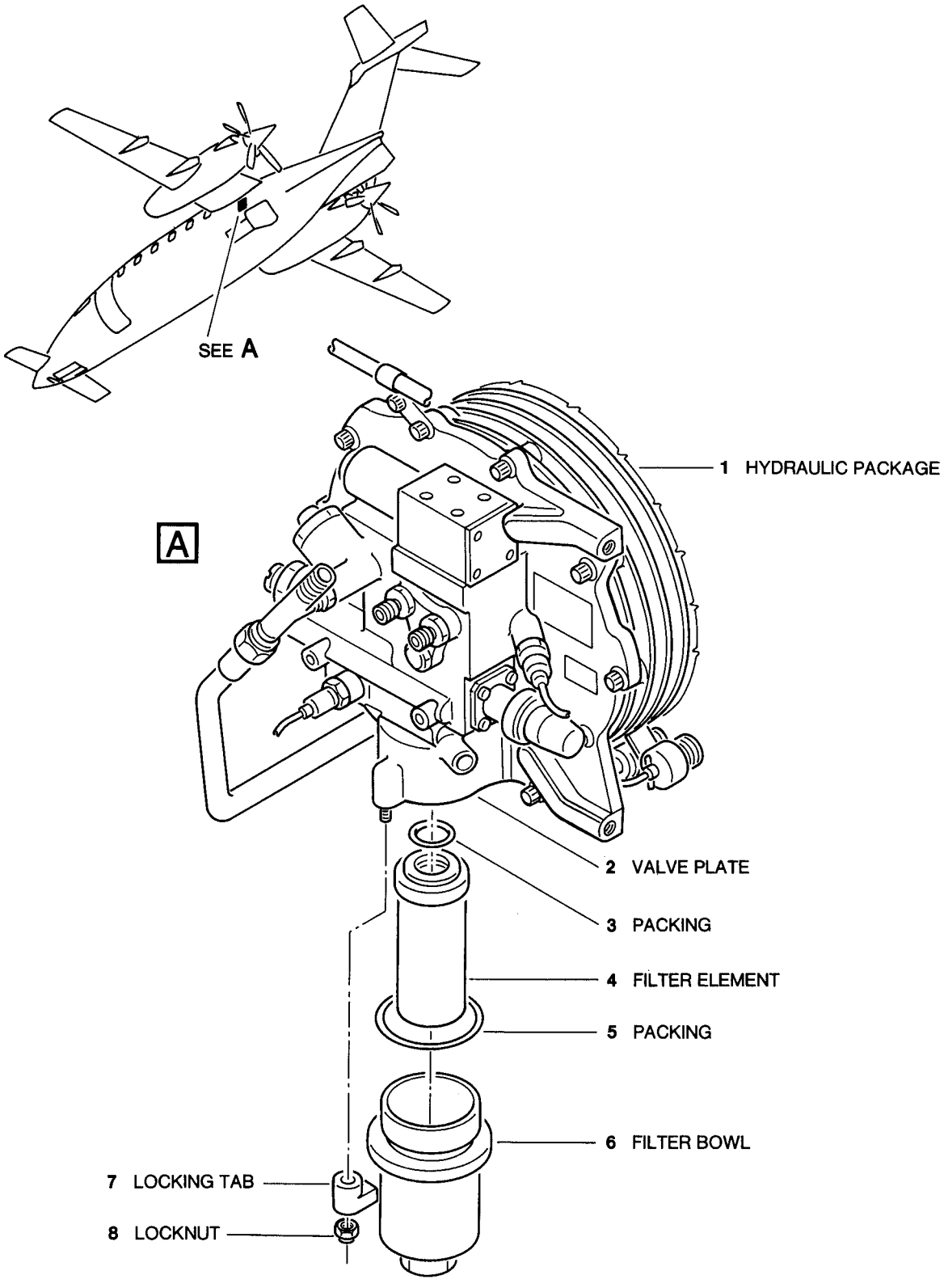


Fig. 204 - Filter Element - Removal/Installation

10. Filter Element - Installation (Ref. to Fig. 204)

A. Tools

Torque Wrench 12.4 - 13.6 Nm (110-120 lbf in)	Not specified
Torque Wrench 5.1 - 6.2 Nm (45-55 lbf in)	Not specified

B. Expendable Parts

ITEM	NOMENCLATURE	IPC-CSN
3	Packing	Supplied with filter element
4	Filter element	291001 01-90
5	Packing	291001 01-80

C. Procedure

(1) Install a new packing (3) into the packing groove of the new filter element (4).
(2) Install the filter into the valve plate (2).
(3) Install a new packing (5) into the packing groove of the filter bowl (6).
(4) Install the filter bowl (6) into the valve plate (2).
(5) Tighten the filter bowl to a torque of 12.4 - 13.6 Nm (110 - 120 lbf in).
(6) Install the locking tab (7) and the nut (8).
(7) Tighten the locknut to a torque of 5.1 - 6.2 Nm (45 - 55 lbf in).
(8) Pressurize the hydraulic system (Refer to 29-00-00).
(9) Do a Leak check of the filter bowl, if a leak occurs replace the packing (5) and check for leaks again.
(10) Install the access panel 251 A (Refer to 53-60-00).
(11) Lower the airplane to the ground and remove the jacks (Refer to 07-10-00).

11. Pressure Control Unit - Removal (Ref. to Fig. 205)

A. Referenced Information

Maintenance Manual Chapter 07-10-00
Maintenance Manual Chapter 53-60-00

B. Procedure

(1) Raise the airplane on jacks (Refer to 07-10-00).
(2) Remove the access panel 251 A (Refer to 53-60-00).
(3) Open, tag and safety the HYD CONT circuit breaker on the pilot circuit breaker panel.
(4) Disconnect the two electrical connectors (2) from the receptacles on the control unit (3).
(5) Put caps on the connectors and the receptacles.
(6) Remove the bolts (1) and remove the control unit (3) from the mounting bracket (4).

International AeroTech Academy For Training Purpose Only

12. Pressure Control Unit - Installation (Ref. to Fig. 205)

A. Referenced Information

Maintenance Manual Chapter 07-00-00
Maintenance Manual Chapter 29-00-00

B. Procedure

(1) Install the control unit (3) on the mounting bracket (4) and align the mounting holes.
(2) Install the four bolts (1) and tighten them.
(3) Remove the caps from the connectors and the receptacles.
(4) Connect the two electrical connectors (2) to the receptacles on the control unit (3).
(5) Install the access panel 251 A.
(6) Do a test of the hydraulic system (Refer to 29-00-00).
(7) Lower the airplane to the ground and remove the jacks (Refer to 07-00-00).

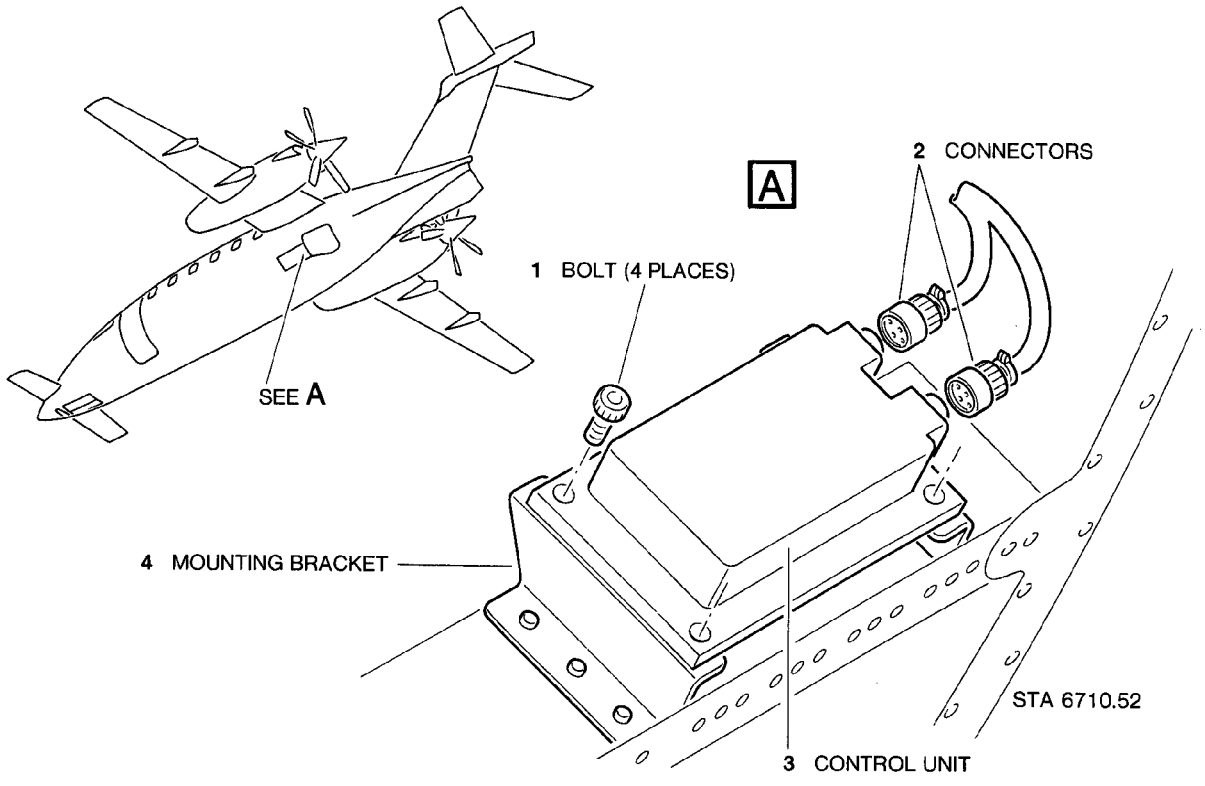


Fig. 205 - Pressure Control Unit - Removal/Installation

HYDRAULIC PRESSURIZATION - DESCRIPTION AND OPERATION

1. Description (Ref. to Fig. 1)

   A. The purpose of hydraulic pressurization is to increase the life of the hydraulic power pack by pressurizing the hydraulic fluid supply to the pump. This reduces the amount of work the pump has to do to achieve system operating pressure and prevents cavitation of the hydraulic fluid.

   B. The system comprises the following components:

   – A check valve mounted on the manifold assembly of the bleed air system.
   – A stainless steel "Rigimesh" filter in the supply tube.
   – A swaged T piece to provide a junction for the ground pressurization tube.
   – A 4-way connector with integral metered orifice to reduce the supply pressure.
   – A relief valve to give protection against system overpressure.
   – A second stainless steel "Rigimesh" filter in the tube between the 4-way connector and the bulkhead connector.
   – A charging point for ground pressurization.
   – Various tubes and a flexible hose.

2. Operation (Ref. to Fig. 1)

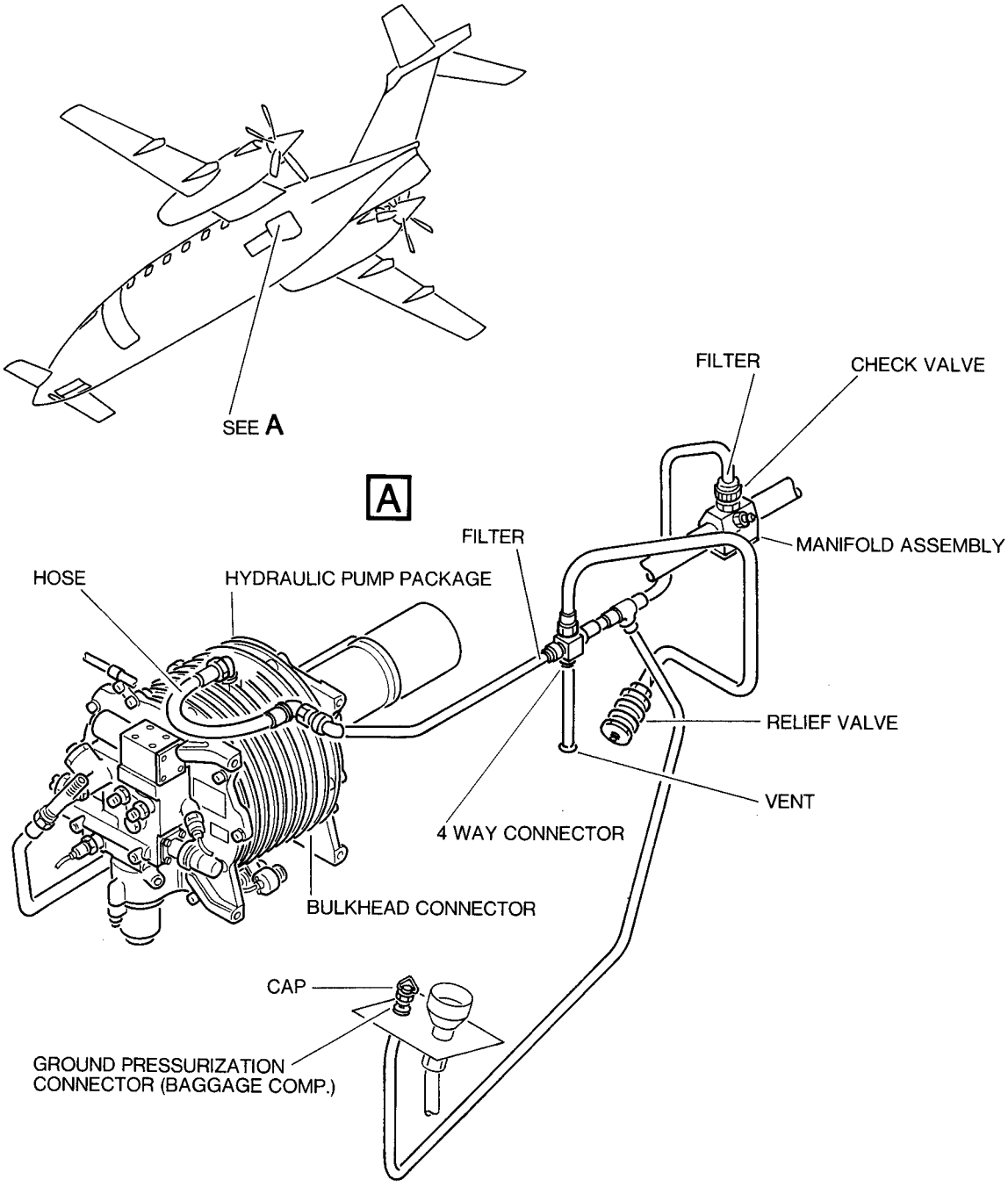
   A. The bleed air from the manifold assembly passes through the check valve and filter to the 4-way connector. The 4-way connector contains a metered orifice to reduce the pressure and flow of the air to the hydraulic power pack. Excess air is vented into the landing gear compartment. A relief valve connected to the 4-way connector opens if the system pressure reaches 24 to 30 psi (1.65-2.0 bar).
   A filter in the outlet tube of the 4-way connector provides filtration downstream of the ground pressurization point. From the filter, the air passes through a tube and hose to the reservoir of the hydraulic power pack.
   The air pressure in the hydraulic reservoir varies according to engine speed but is limited to a maximum of approximately 27 psi (1.86 bar) by the relief valve.

3. Location (Ref. to Fig. 1)

   A. The ground charging point is located in the baggage compartment, forward of the baggage compartment door (Refer to 12-10-01).

   B. The components of the hydraulic pressurization system are located at FS 6710 in the left main landing gear compartment.

International AeroTech Academy For Training Purpose Only



MM_291100-001

Fig. 1 - Hydraulic Pressurization - Component Location

HYDRAULIC PRESSURIZATION - MAINTENANCE PRACTICES

1. General

A. This topic gives the procedures for the Removal/Installation and Inspection/Check of the hydraulic pressurization system components, and the procedure for cleaning the filters. For information about the ground pressurization of the hydraulic pump package refer to 12-10-01.

CAUTION: THE HYDRAULIC SYSTEM GROUND TEST MUST BE PERFORMED ONLY WHEN THE HYDRAULIC PACKAGE IS PRESSURIZED.

2. Air Filters - Removal (Ref. to Fig. 201)

A. Fixtures, Test and Support Equipment

Blanking caps	Not Specified

B. Referenced Information

Maintenance Manual Chapter 52-82-00

C. Procedure

(1) Open, tag and safety these circuit breakers:

Pilot CB Panel:
L ENG START
R ENG START.

(2) Disconnect the left main landing gear rear door (Refer to 52-82-00).
(3) Support the landing gear door in the open position.
(4) Open, tag and safety these circuit breakers:

Pilot CB Panel:
HYDR CONT
LDG GEAR CONT

(5) Disconnect the tube (1) from the check valve (3) on the manifold (4).

NOTE: Access to both filters is through the access hole in the roof of the left main landing gear compartment.

(6) Remove the filter (2) from the tube (1).
(7) Put caps on the line ends.
(8) Disconnect the tube (5) from the 4-way connector (7).
(9) Remove the filter (6) from the tube (5).
(10) Put caps on the line ends.

NOTE: The air filters are manufactured from "Rigimesh". For the cleaning procedure refer to 20-10-04.

3. Air Filters - Installation (Ref. to Fig. 201)

A. Referenced Information

Maintenance Manual Chapter 52-82-00

B. Procedure

(1) Make sure, as necessary that:
- The applicable circuit breakers are open, tagged and safetied
- The system is safe
- Access is available (Refer to the Removal Procedure).

(2) Remove the cap from the tube (1).
(3) Install the new, or cleaned filter (2) in the tube (1).
(4) Remove the cap from the check valve (3).
(5) Install the tube (1) to the check valve (3).
(6) Remove the cap from the tube (5).
(7) Install the new, or cleaned filter (6) in the tube (5).
(8) Remove the cap from the 4-way connector (7).
(9) Install the tube (5) to the 4-way connector (7).
(10) Remove the safety tags and close these circuit breakers:

Pilot CB Panel:

HYDR CONT
LDG GEAR CONT

(11) Remove the support and connect the main landing gear rear door (Refer to 52-82-00).
(12) Remove the safety tags and close these circuit breakers:

Pilot CB Panel:

L ENG START
R ENG START.

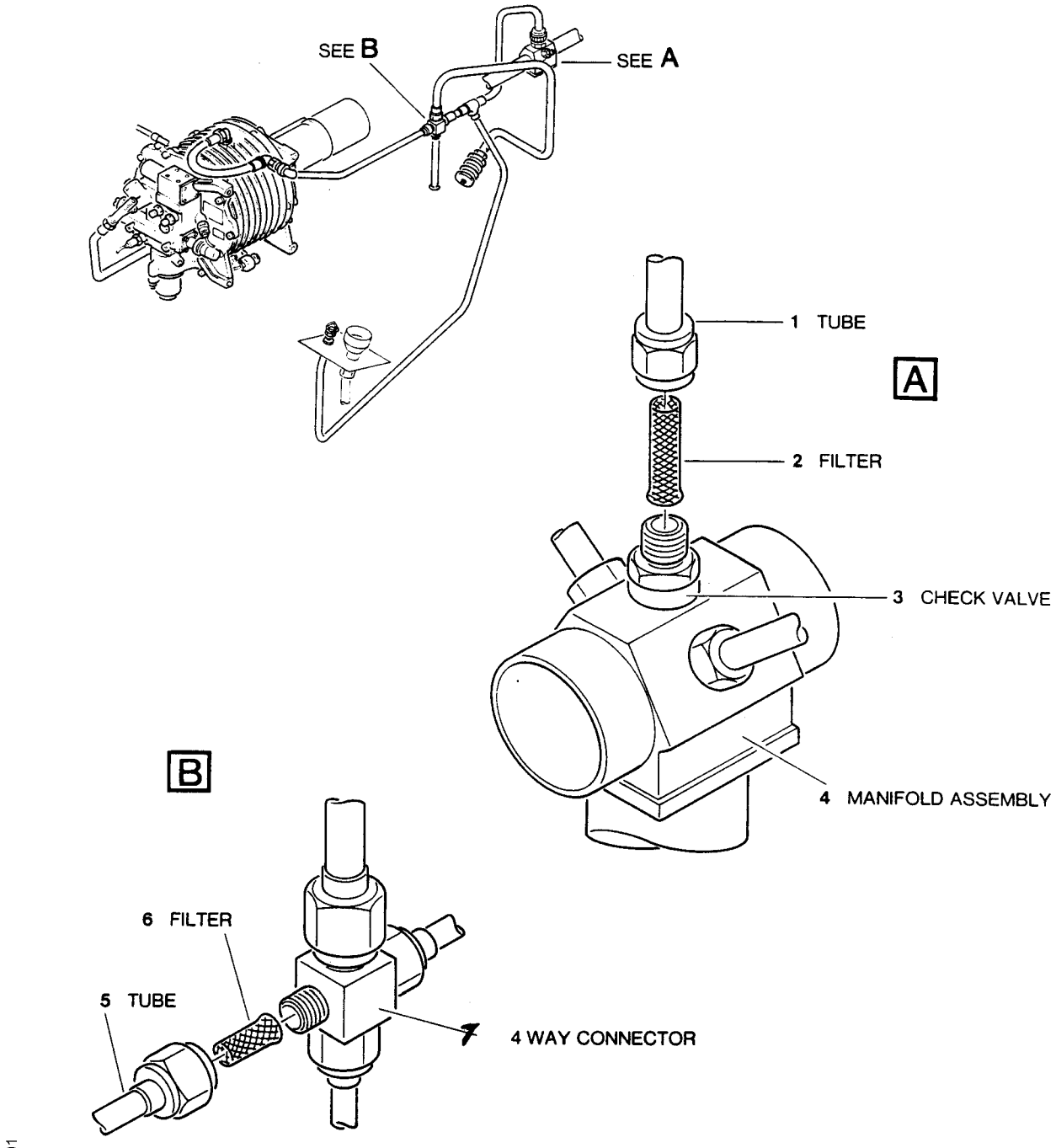


Fig. 201 - Air Filters - Removal/Installation

International AeroTech Academy For Training Purpose Only

4. Check Valve - Removal (Ref. to Fig. 202)

A. Fixtures, Test and Support Equipment

Blanking caps	Not Specified

B. Referenced Information

Maintenance Manual Chapter 52-82-00

C. Procedure

(1) Open, tag and safety these circuit breakers:

Pilot CB Panel:
L ENG START
R ENG START.

(2) Disconnect the left main landing gear rear door (Refer to 52-82-00).
(3) Support the landing gear door in the open position.
(4) Open, tag and safety these circuit breakers:

Pilot CB Panel:
HYDR CONT
LDG GEAR CONT

(5) Disconnect the tube (1) from the check valve (3). Make sure the filter (2) remains installed in the tube (1) and put a cap on the tube (1).
(6) Remove the check valve (3) from the manifold (5). Remove and discard the seal (4).
(7) Put a cap on the hole in the manifold (5).

5. Check Valve - Installation (Ref. to Fig. 202)

A. Referenced Information

Maintenance Manual Chapter 52-82-00
Maintenance Manual Chapter 24-31-00

B. Expendable Parts

ITEM	NOMENCLATURE	IPC-CSN
4	Seal	291000 02-470

C. Procedure

(1) Make sure, as necessary that:
- The applicable circuit breakers are open, tagged and safetied
- The system is safe
- Access is available (Refer to the Removal Procedure).

(2) Remove the Battery (Refer to 24-31-00), to gain a better access to the Check Valve (3).

(3) Remove the cap from the manifold (5).
(4) Put a new seal (4) on the check valve (3) and install the check valve (3) to the manifold (5).
(5) Remove the cap from the tube (1). Make sure the filter (2) remains installed.
(6) Install the tube (1) to the check valve (3).
(7) Remove the safety tags and close these circuit breakers:

Pilot CB Panel:

HYDR CONT
LDG GEAR CONT

(8) Remove the support and connect the left main landing gear rear door (Refer to 52-82-00).
(9) Remove the safety tags and close these circuit breakers:

Pilot CB Panel:

L ENG START
R ENG START.

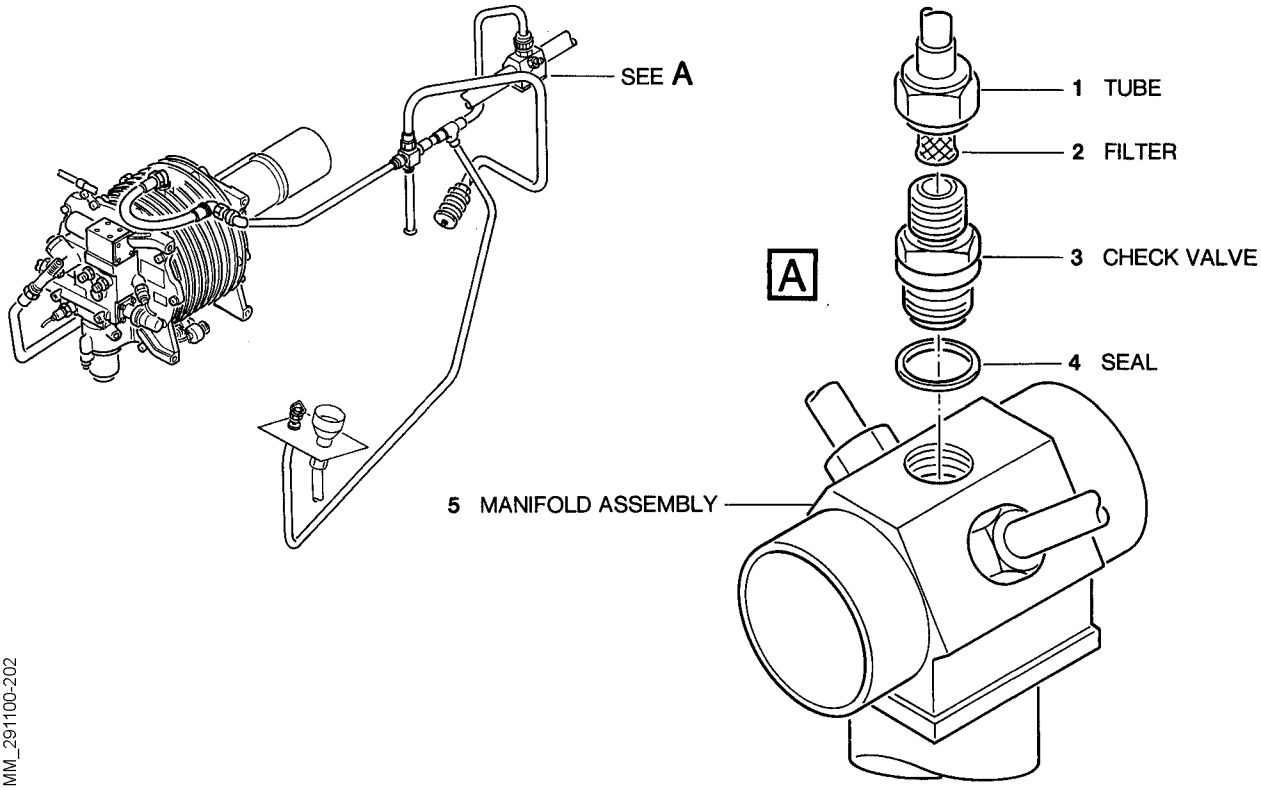


Fig. 202 - Check Valve - Removal/Installation

6. Relief Valve - Removal (Ref. to Fig. 203)

A. Fixtures, Test and Support Equipment

Blanking caps	Not Specified

B. Referenced Information

Maintenance Manual Chapter 52-82-00

C. Procedure

(1) Open, tag and safety these circuit breakers:

Pilot CB Panel:

L ENG START
R ENG START.

(2) Disconnect the left main landing gear door (Refer to 52-82-00).
(3) Support the landing gear door in the open position.
(4) Open, tag and safety these circuit breakers:

Pilot CB Panel:

HYDR CONT
LDG GEAR CONT

(5) Disconnect the tube (2) from the relief valve (1).
(6) Put caps on the line ends.
(7) Remove the bolt (3) and remove the relief valve (1), complete with clamp (4) from the bulkhead.

7. Relief Valve - Installation (Ref. to Fig. 203)

A. Referenced Information

Maintenance Manual Chapter 52-82-00

B. Procedure

(1) Make sure, as necessary that:
- The applicable circuit breakers are open, tagged and safetied
- The system is safe
- Access is available (Refer to the Removal Procedure).

(2) Remove the caps from the line ends.
(3) Install the tube (2) to the relief valve (1).
(4) Attach the relief valve (1) to the bulkhead using the clamp (4) and bolt (3).

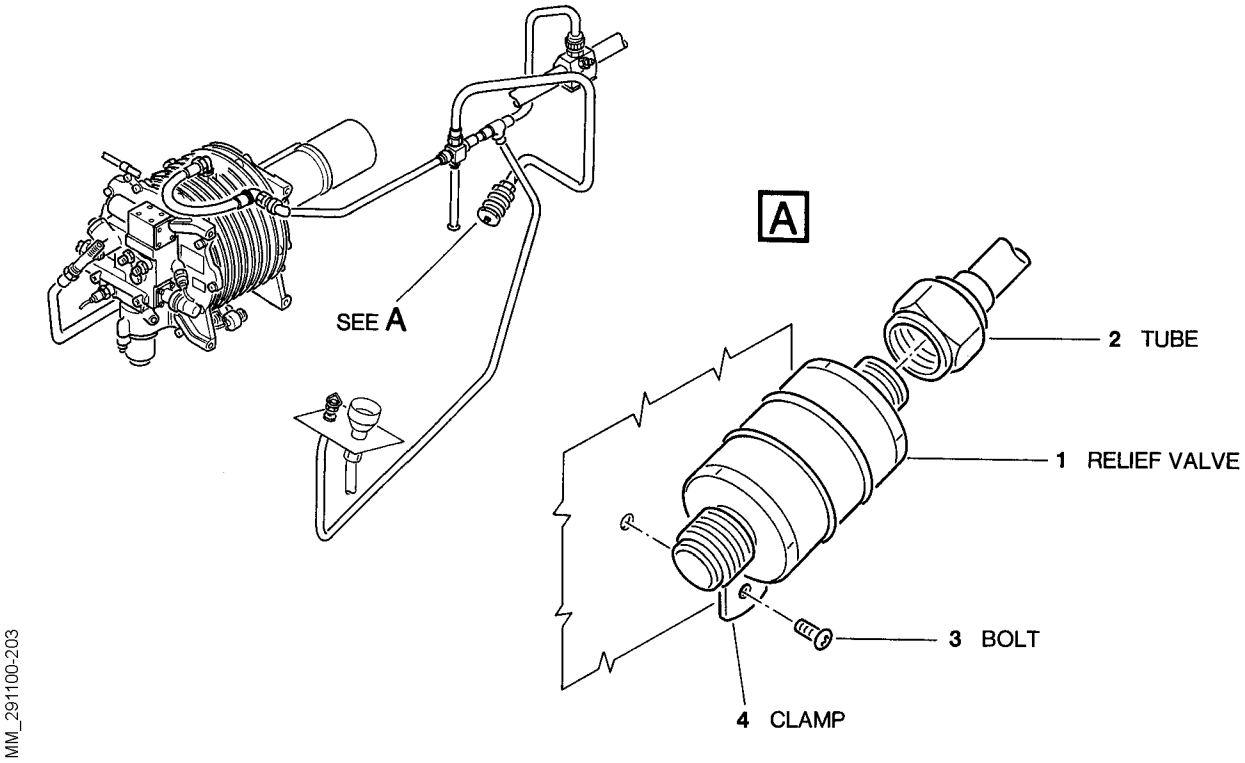


Fig. 203 - Relief Valve - Removal/Installation

(5) Remove the safety tags and close these circuit breakers:

Pilot CB Panel:

HYDR CONT
LDG GEAR CONT

(6) Remove the support and connect the left main landing gear door (Refer to 52-82-00).

(7) Remove the safety tags and close these circuit breakers:

Pilot CB Panel:

L ENG START
R ENG START.

International AeroTech Academy For Training Purpose Only

8. Hydraulic Pressurization - Inspection

A. Fixtures, Test and Support Equipment

Strong light source	Not Specified
Inspection mirror	Not Specified

B. Referenced Information

Maintenance Manual Chapter 52-82-00
Preparation

(1) Remove the left inspection panel 251B.
(2) Disconnect the left main landing gear door (Refer to 52-82-00).
(3) Support the left main landing gear door in the open position.
(4) Open, tag and safety these circuit breakers:

Pilot CB Panel:

HYDR CONT
LDG GEAR CONT

C. Procedure

(1) Use the strong light source and inspection mirror to examine the following:
(a) The check valve and filter at the manifold assembly for damage, distortion, corrosion and security of attachment.
(b) The tube between the check valve and 4-way connector for damage, distortion and corrosion. Examine the permaswage T piece for damage, cracks, corrosion and security of attachment to the tubes.
(c) The 4-way connector for damage and corrosion. Make sure the four connectors are tight.
(d) The vent tube for damage, distortion and corrosion. Make sure the vent outlet is clear.
(e) The tube to the relief valve for damage, distortion and corrosion.
(f) The relief valve for damage, corrosion and security of attachment to the bulkhead. Make sure the inlet tube is securely attached to the valve and the vent outlet is clear.
(g) The tube between the 4-way connector and the bulkhead connector for damage, distortion, corrosion and security of attachment.
(h) The hose between the bulkhead connector and the hydraulic power pack for damage, chafing, corrosion and security of attachment.
(i) The tube between the permaswage T piece and the ground pressurization connector in the baggage compartment for damage, distortion and corrosion. Make sure the clips are securely attached to the roof of the landing gear compartment. Make sure the connectors and blanking cap are securely attached.

D. Completion

(1) Remove the safety tags and close these circuit breakers:

Pilot CB Panel:

HYDR CONT
LDG GEAR CONT

(2) Remove the support and connect the left main landing gear door (Refer to 52-82-00
(3) Install the left inspection panel 251B.

9. Relief Valve Secondo Mona SM3326 cleaning

A. Material

MEK	02-009
Pot (MEK Resistant) Specified Nylon Rod (Adequate dia)	Not Specified
Clean and soft mop	Not Specified
Compressed air source	

B. Referenced Information

Maintenance Manual Chapter 91-00-00

C. Procedure

(1) Refer to AMM Chapter 29-11-00 page 204 and remove the relief valve.
(2) Submerge the relief valve in to the pot which must contain a sufficient amount of MEK.
(3) Actuate several times the valve mechanism with the nylon rod.
(4) Leave the valve in the MEK for approximately 5 minutes.
(5) Blow compressed air through the valve in direction of the arrow at a pressure within 30 to 50 PSI.
(6) Dry the valve and wipeoff any trace of MEK with the soft and clean mop.

CAUTION: MAKE SURE THAT THE RELIEF VALVE IS PROPERLY INSTALLED WITH THE ARROW DIRECTED TO THE AMBIENT.

(7) Refer to AMM Chapter 29-11-00 page 205 and install the relief valve.

International AeroTech Academy For Training Purpose Only

INTENTIONALLY LEFT BLANK

AUXILIARY HYDRAULIC POWER - DESCRIPTION AND OPERATION

1. General

A. The auxiliary hydraulic power system is a hydraulic hand pump below the floor is zone 212.

B. The handpump also uses:

- The hydraulic reservoir of the hydraulic pump package (Refer to 29-10-00)
- The emergency gear selector and the hydraulic service valve of the landing gear extension/retraction system (Refer to 32-30-00).

C. The handpump gives a means of landing gear extension when the main hydraulic system is inoperative. It can be used on the ground for landing gear extension and retraction for maintenance purposes (Refer to 32-20-00).

International AeroTech Academy For Training Purpose Only

INTENTIONALLY LEFT BLANK

AUXILIARY HYDRAULIC POWER - MAINTENANCE PRACTICES

1. General

A. This page block contains the removal and installation of the Hand-pump.

WARNING: BE CAREFUL WHEN YOU USE THE HYDRAULIC OIL. PUT ON PROTECTIVE CLOTHING. THE HYDRAULIC OIL IS DANGEROUS AND CAN CAUSE DAMAGE TO YOUR SKIN.

CAUTION: THE HYDRAULIC SYSTEM GROUND TEST MUST BE PERFORMED ONLY WHEN THE HYDRAULIC PACKAGE IS PRESSURIZED.

2. Auxiliary Handpump - Removal (Ref. to Fig. 201)

A. Fixtures, Test and Support Equipment

Blanking cap (pressure type)	Not specified
Blanking caps	Not specified

B. Consumable Materials

Lint-Free cloth	Not specified

C. Referenced Information

Maintenance Manual Chapter 29-00-00

D. Procedure

(1) Remove the access panels 212 BRF and 211 DLF.
(2) Depressurize the hydraulic system (Refer to 29-00-00).
(3) Open, tag and safety these circuit breakers on the co-pilot circuit breaker panel:
- HYDR CONT
- LDG GEAR CTRL

(4) Put lint free cloths below the hydraulic connections of the handpump.

CAUTION: WHEN YOU DISCONNECT THE HANDPUMP SUCTION LINE (5) PUT A CAP ON THE LINE IMMEDIATELY. THE LINE IS AN OPEN LINE TO THE RESERVOIR AND WILL EMPTY THE CONTENTS OF THE RESERVOIR IF IT IS NOT CAPPED.

(5) Disconnect the handpump suction line-end (5), seal the line immediately with a pressure cap.
(6) Disconnect the pressure tube line-end (4) from the union adaptor on the pump (7).
(7) Put caps on the line end and the two hand pump adaptors.
(8) Remove the cloths and clean the area.

International AeroTech Academy For Training Purpose Only

(9) Cut and remove the lockwire from the two bolts (6).
(10) Remove the two nuts (1) and the washers (2).
(11) Give support to the pump and remove the two bolts (6).
(12) Remove the pump (7) from the bracket (3) on STA 920.

3. Auxiliary Handpump - Installation (Ref. to Fig. 201)

A. Consumable Materials

Solvent, (MEK)	TT-M-261
Lint-Free cloth	Not specified

B. Referenced Information

Maintenance Manual Chapter 12-00-00
Maintenance Manual Chapter 32-00-00

C. Procedure

(1) Put cloths below the hydraulic lines.
(2) Install the pump into the bracket (3) and align the attachment holes.
(3) Install the two bolts (6) through the bracket (3) and the lugs of the pump (7).
(4) Install the washers (2) and the nuts (1) to the bolts (6) and tighten them.
(5) Safety the bolts with lockwire.
(6) Remove the caps from the union adapters on the pump.

CAUTION: YOU MUST CONNECT THE HANDPUMP SUCTION LINE IMMEDIATELY WHEN YOU REMOVE THE PRESSURE BLANK. THE LINE IS AN OPEN LINE TO THE RESERVOIR AND WILL EMPTY THE CONTENTS OF THE RESERVOIR IF IT IS NOT CONNECTED QUICKLY.

(7) Remove the pressure blank from the line end (5) and connect and tighten the line end to the adaptor union on the pump (7).
(8) Remove the cap from the line end (4) and connect and tighten the line end to the adaptor union on the pump (7).
(9) Remove all tools, materials and equipment from the work area. Make sure the area is clean.
(10) Remove the safety tags and close these circuit breakers:
- HYDR CONT
- LDG GEAR CTRL

(11) Do a test of the hand pump (Auxiliary) hydraulic system (Refer to 32-00-00).
(12) Make sure that the hydraulic system is Full (Refer to 12-00-00).
(13) Install the access panels 212 BLF and 211 DLF.

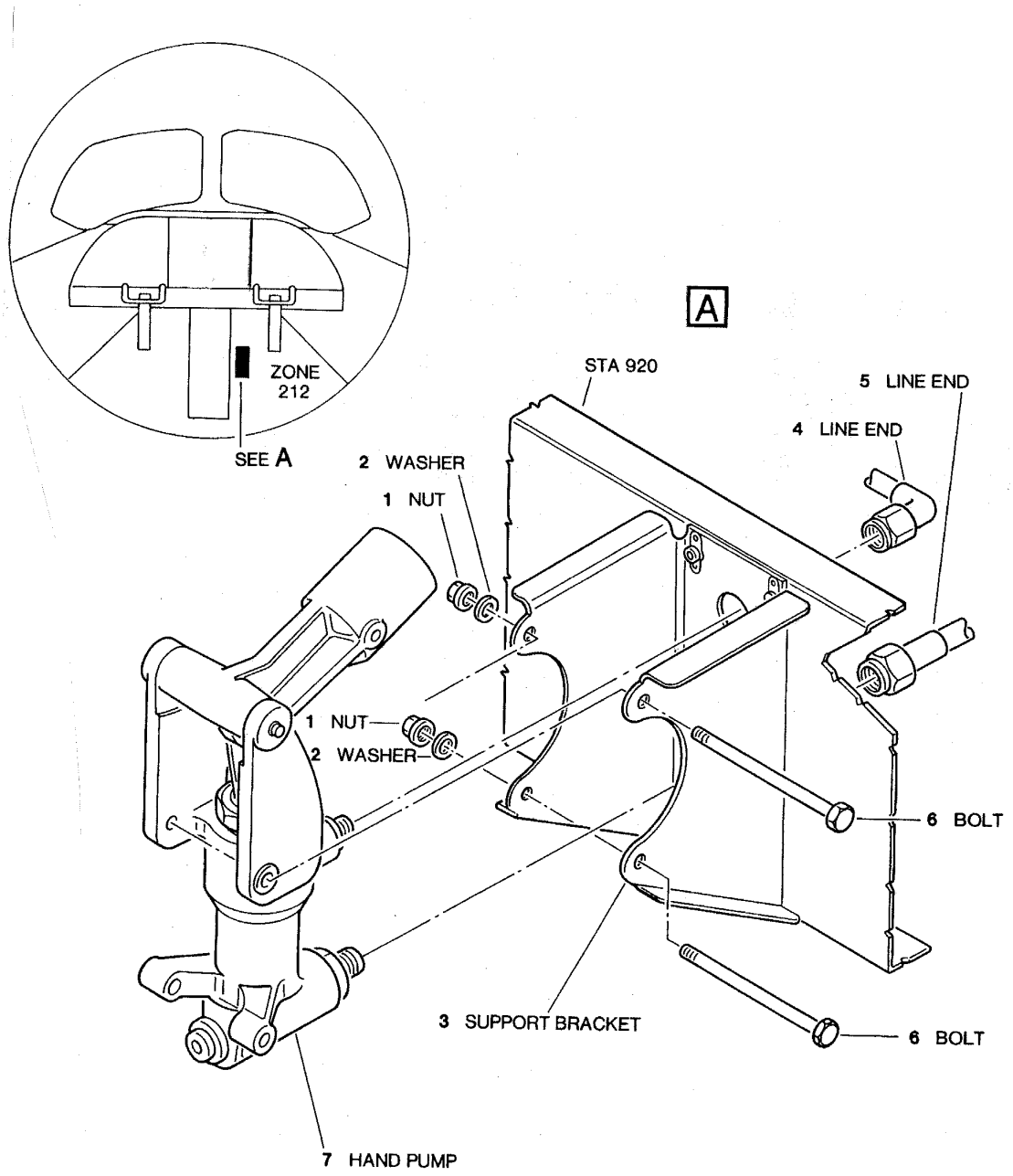


Fig. 201 - Auxiliary Handpump - Removal/Installation

International AeroTech Academy For Training Purpose Only

INTENTIONALLY LEFT BLANK