**BOMBARDIER**
Toronto (de Havilland)
**PROPRIETARY INFORMATION**

# PPS 8.06

**PRODUCTION PROCESS STANDARD**

# Installation and Pressure Testing of the DASH 8 Firex System

Issue 7
- This standard supersedes PPS 8.06, Issue 6.
- Vertical lines in the left hand margin indicate technical changes over the previous issue.
- Direct PPS related questions to PPS.Group@aero.bombardier.com or (416) 375-4365.
- This PPS is effective as of the distribution date.

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|---|---|---|
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## Table of Contents

**Sections** **Page**



**Tables**



**Figures**

## 1 Scope

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for installation and pressure testing of the DASH 8 Firex system. For pressure testing of the DASH 8 Series 400 Firex system, refer to the applicable Functional Test Procedure (FTP).

1.1.1 This PPS complements the engineering drawings that specify its use as an authorized instruction. The procedure specified in this PPS must be followed to ensure compliance with all applicable specifications. In general, if this PPS conflicts with the engineering drawing, follow the engineering drawing. The requirements specified in this PPS are necessary to fulfil the engineering design and reliability objectives.

1.1.2 Refer to PPS 13.26 for the subcontractor provisions applicable to this PPS.

1.1.3 Procedure or requirements specified in a Bombardier BAPS, MPS, LES or P. Spec. **do not** supersede the procedure or requirements specified in this PPS.

## 2 Hazardous Materials

2.1 Before receipt at Bombardier Toronto (de Havilland, all materials must be approved and assigned Material Safety Data Sheet (MSDS) numbers by the Bombardier Toronto (de Havilland) Environment, Health and Safety Department. Refer to the manufacturer's MSDS for specific safety data on any of the materials specified in this PPS. If the MSDS is not available, contact the Bombardier Toronto (de Havilland) Environment, Health and Safety Department.

## 3 References

3.1 EHS-OP-012 - Explosives Safety - *Bombardier Toronto (de Havilland) internal Environment, Health & Safety Management Procedure*.

3.2 PPS 6.03 - Installation Of Fluid Lines & Systems.

3.3 PPS 13.26 - General Subcontractor Provisions.

3.4 PPS 14.01 - Torquing & Tightening.

3.5 PPS 19.01 - Safetying Devices.

## 4 Materials and Equipment

### 4.1 Materials

4.1.1 No materials specified herein.

### 4.2 Equipment

4.2.1 Pressure test rig, tool #85000001-001-141.

4.2.2 Digital multimeter with a maximum test current of 10 mA and a 2 ohm full scale resistance range (e.g. John Fluke Co, part number 8012A).

4.2.3 Calibrated weigh scale capable of measuring to three decimal places.

## 5 Procedure

### 5.1 General

5.1.1 Each nacelle has a distribution system for supplying extinguishing agent to each of the fire detection zones. The distribution lines for each nacelle are coupled to outlet valves on two pressurized bottles which are located behind the port side wing in the fuselage fairing.

5.1.2 The extinguishing agent can be released from both pressurized bottles to one nacelle, or singularly to either nacelle.

5.1.3 This PPS specifies procedures for pressure testing of completely installed systems only.

5.1.4 Install fluid system components according to PPS 6.03 and as specified on the engineering drawings.

5.1.5 If necessary, blank off all lines, valves, vents, etc. using the appropriate blanks and adapters for the specific line being tested.

5.1.6 The test procedure shall consist of pressurizing the system lines to the applicable test pressure.

5.1.7 Repair leaks by re-torquing according to PPS 6.03 or replacing components, as necessary.

5.1.8 After leak testing the Firex system, remove all blanking plugs, caps and adapters that were installed to facilitate testing and re-connect all lines and fittings according to PPS 6.03.

5.1.9 Before any use of a pressure test rig, ensure that the rig has been calibrated according to para. 9.1 and validate that the calibration has not expired.

## 5.2 Storage and Preparation of Fire Extinguisher (Firex) Bottles

5.2.1 Firex bottles on DASH 8 Series 100, 200 & 300 aircraft are non-hermetically sealed. Except for the APU firex bottle, firex bottles on the DASH 8 Series 400 aircraft are hermetically sealed. The DASH 8 Series 400 aircraft APU firex bottle is non-hermetically sealed.

5.2.2 Weigh non-hermetically sealed firex bottles in storage at least once every 12 months. For DASH 8 Series 100, 200 & 300 aircraft the maximum permitted weight loss is specified in Table 1. For the DASH 8 Series 400 aircraft APU firex bottle the maximum permitted cumulative weight loss is 0.020 lb. It is not necessary to weigh hermetically sealed Firex bottles while in storage.

5.2.3 Immediately before installation, weigh firex bottles using a calibrated weighing scale. Refer to Table 1 or Table 2, as applicable, for the maximum allowable weight loss from the original charge weight. A slight increase in weight is acceptable provided the maximum bottle weight specified by the engineering drawing is not exceeded.

5.2.4 Immediately before installation, check the pressure gauge on non-hermetically sealed firex bottles to ensure that the pressure indicated is within the range of acceptable pressure values specified on the bottle data plate (pressure/temperature).

**Table 1 - Maximum Permitted Weight Loss for DASH 8 Series 100, 200 & 300 Aircraft Firex Bottles**

| TIME FROM CHARGED DATE (Note 1) | ALLOWABLE DIFFERENCE IN WEIGHT | | TIME FROM CHARGED DATE (Note 1) | ALLOWABLE DIFFERENCE IN WEIGHT |
|---|---|---|---|---|
| 2 months | 0.01 lb | | 11 months | 0.04 lb |
| 3 months | 0.01 lb | | 12 months | 0.05 lb |
| 4 months | 0.02 lb | | 13 months | 0.05 lb |
| 5 months | 0.02 lb | | 14 months | 0.05 lb |
| 6 months | 0.02 lb | | 15 months | 0.06 lb |
| 7 months | 0.03 lb | | 16 months | 0.06 lb |
| 8 months | 0.03 lb | | 17 months | 0.07 lb |
| 9 months | 0.04 lb | | 18 months | 0.07 lb |
| 10 months | 0.04 lb | | 19 months | 0.07 lb |
| | | | 20 months and beyond | 0.08 lb |

Note 1. Charge date is shown on bottle nameplate.

**Table 2 - Maximum Permitted Weight loss for DASH 8 Series 400 Aircraft Firex Bottles**

| WALTER KIDDE PART NO. | MAXIMUM PERMITTED CUMULATIVE WEIGHT LOSS |
|---|---|
| 473951 (see Note 1) | 0.020 lb |
| 473879 | 0.11 lb |
| 473880 | 0.08 lb |
| 474033 | 0.18 lb |
| Note 1. Part number 473951 firex bottles in storage must be weighed at least once every 12 months. | |

## 5.3 Handling of Squib Cartridges

5.3.1 At Bombardier Toronto (de Havilland) transport, store and install squib cartridges according to EHS-OP-012.

5.3.2 Squib cartridges are a pyrotechnic device. Inadvertent detonation could cause injury.

5.3.3 The electrical connection pins on the cartridge must be shorted together. Remove the shorting device only before testing or connection to the aircraft wiring system.

## 5.4 Installation of Squib Cartridges (see Figure 1)

5.4.1 The test procedure for pre-installation of squib cartridges is as follows:

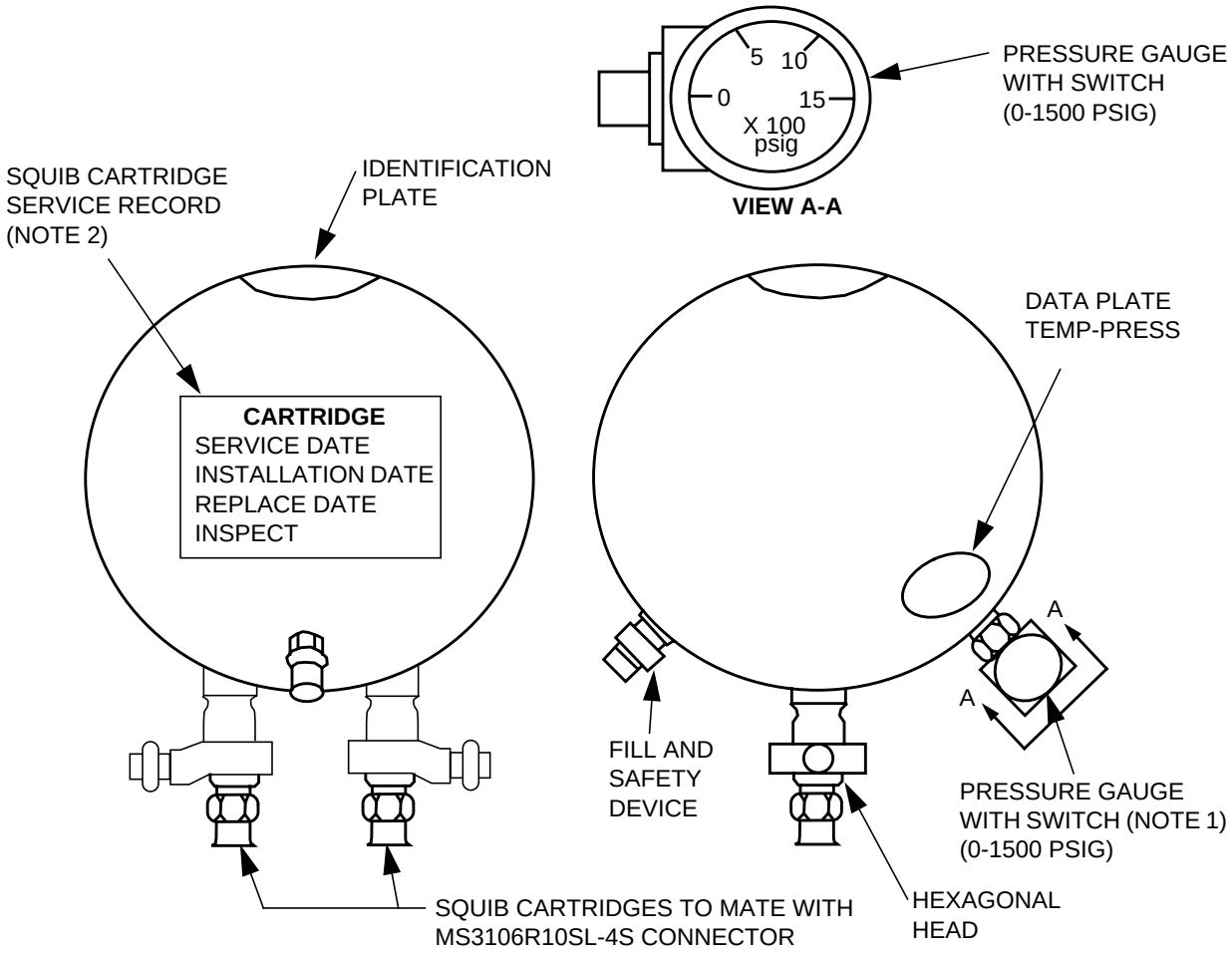
Step 1. For DASH 8 Series 100, 200 and 300 aircraft, check the “replace date” on each of the squib cartridges. If the “replace date” is less than three years from the installation date, reject the cartridges.

For DASH 8 Series 400 aircraft, ensure that the age of the squib cartridges at delivery to the customer does not exceed one year from the date of manufacture (the manufacturing date is on the cartridge). A recommended date at installation is 10 months from the date of manufacture. If the age of the squib cartridges exceeds one year at delivery, refer to Liaison Engineering for disposition.

Step 2. Check the connection pins on the cartridge for security and corrosion. Cartridges with loose pins or showing signs of corrosion are not acceptable.

5.4.2 Issue all squib cartridges on a first in/first out basis.

5.4.3 Since squib cartridges are tested by the manufacturer, resistance checks are neither necessary nor desirable due to their sensitive and explosive nature.




Note 1. On DASH 8 Series 400 aircraft, this pressure gauge is only present on the APU firex bottle.
Note 2. This is not required for DASH 8 Series 400 aircraft firex bottles.

**Figure 1 - Fire Extinguisher (Firex) Bottle**

5.4.4 Install squib cartridges as follows:

Step 1. Install each cartridge with the appropriate seal(s).

Step 2. Ensure that the hexagonal head of the housing is firmly held while tightening the cartridge.

Step 3. Install and torque the cartridge according to PPS 14.01 to the torque value given in Table 3.

Step 4. Apply a torque stripe mark to the cartridge.

Step 5. Wire lock the cartridges according to PPS 19.01.

Step 6. Except for DASH 8 S400 aircraft, record the service, installation and replacement dates on the squib service record label. A squib service record label is not required for DASH 8 S400 aircraft firex bottles. DASH 8 S400 firex bottles and cartridges are manufactured and supplied by Walter Kidde Aerospace and these components have a useful life of 10 years, after which these components must be discarded and replaced by new units regardless of their conditions. The 10 years period of the useful life of the components starts from the date of manufacture (Note: The manufacturing date is stamped on the units by the manufacturer).

**Table 3 - Squib Cartridge Torque Values**

| SQUIB CARTRIDGE LOCATION | TORQUE VALUE |
|---|---|
| Series 100, 200 and 300 (all locations) | 90 - 100 in·lbs |
| Series 400 engine and aft baggage compartment | 80 - 100 in·lbs |
| Series 400 APU | 150 - 200 in·lbs |

## 5.5 Pressure Test Procedure (Series 100, 200 and 300)

5.5.1 Pressure test Series 100, 200 and 300 nacelle discharge lines as follows (see Figure 2):

Step 1. Disconnect the 1/4" discharge indicator lines from the welded pipe assemblies.

Step 2. Connect the pressure test rig to the #1 nacelle discharge line.

Step 3. Apply a pressure of 100 psi.

Step 4. Ensure air is transmitted through the line and exits at all 10 nozzles throughout the four nacelle fire detection zones.

Step 5. Verify that all piping connections and fittings are tight and not leaking.

Step 6. Connect the pressure test rig to the #2 nacelle discharge line.

Step 7. Apply a pressure of 100 psi and check that air is transmitted through the line and exits at all 10 nozzles located throughout the four nacelle fire detection zones.

Step 8. Verify that all piping connections and fittings are tight and not leaking.

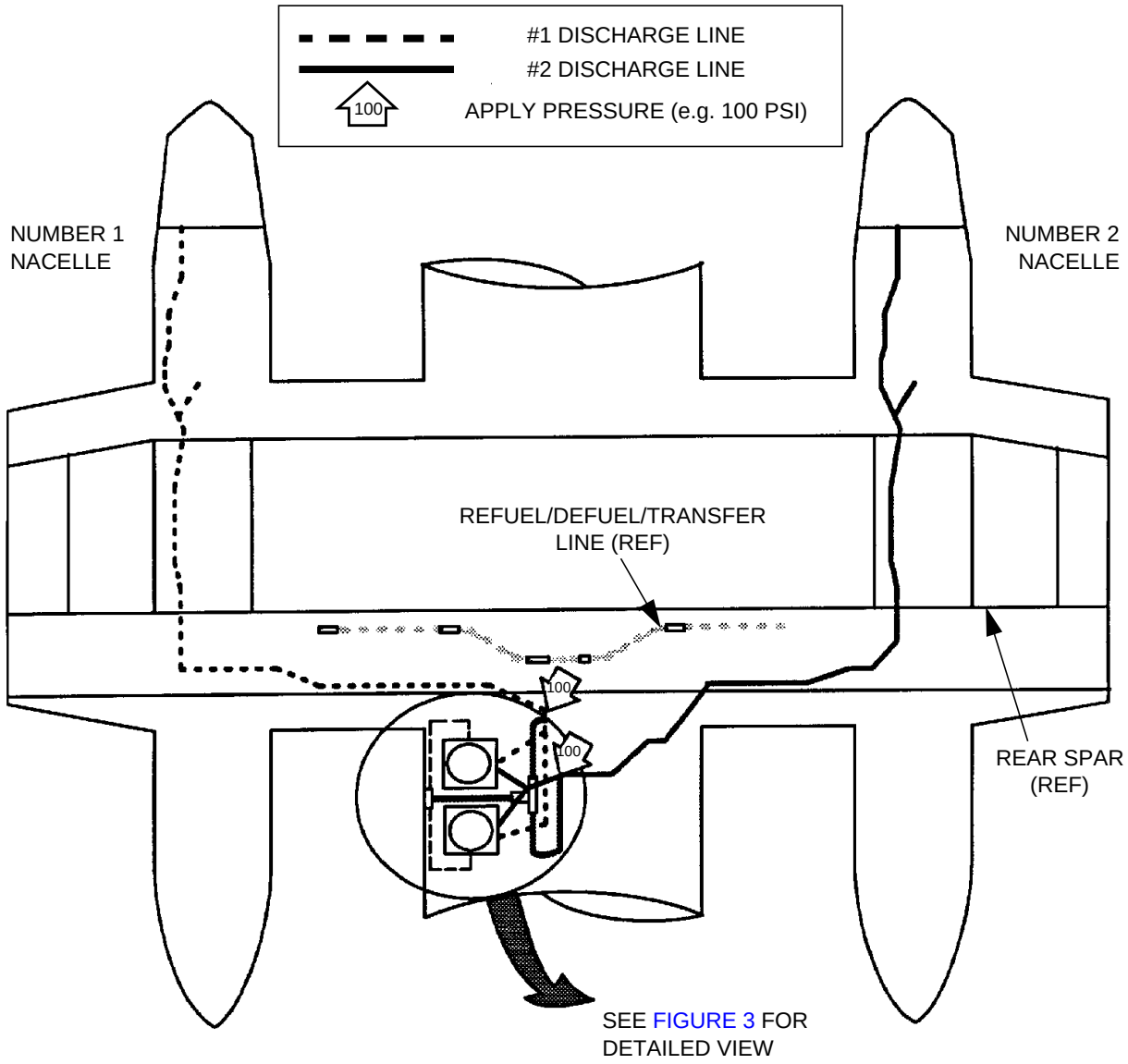



**Figure 2 - Pressure Test of #1 & #2 Nacelle Firex Discharge Lines**

5.5.2 For DASH 8 Series 100, 200 and 300 aircraft, pressure test yellow indicator discharge lines as follows (see Figure 3):

Step 1. Remove the yellow disc indicator and connect the pressure test rig to one side of the double check valve tee fitting (discharge indicator line).

Step 2. Apply a pressure of 25 psi and verify that the indicator piston is operating and is not leaking.

Step 3. Verify that the check valve in the tee fitting is closed and is holding line pressure. The maximum allowable pressure drop is 5 psi in a 30 second period.

Step 4. To verify that the check valve is operating in both directions, disconnect the pressure test rig line and re-connect the test rig line to the opposite side of the tee fitting.

Step 5. Apply a pressure of 25 psi and ensure that there is not more than a 5 psi pressure drop in 30 seconds.

Step 6. Disconnect the pressure test rig line and replace the yellow discharge indicator disc.

5.5.3 For DASH 8 Series 100, 200 and 300 aircraft, pressure test red indicator discharge lines as follows (see Figure 3):

Step 1. Remove the red disc discharge indicator and disconnect the thermal discharge line at the connection on the forward firex bottle.

Step 2. Connect the pressure test rig to the forward thermal discharge indicator line.

Step 3. Ensure that the line is clear and free from any obstructions and that air is transmitted and exits through the red indicator discharge port.

Step 4. Apply 25 psi of pressure.

Step 5. Disconnect the thermal discharge line at the connection on the aft firex bottle.

Step 6. Connect the pressure test rig to the aft thermal discharge indicator line.

Step 7. Ensure that the line is clear and free from any obstructions and that air is transmitted and exits through the red indicator discharge port.

Step 8. Apply 25 psi of pressure.

Step 9. Disconnect the pressure test rig line, re-connect all lines and replace the red discharge indicator disc.

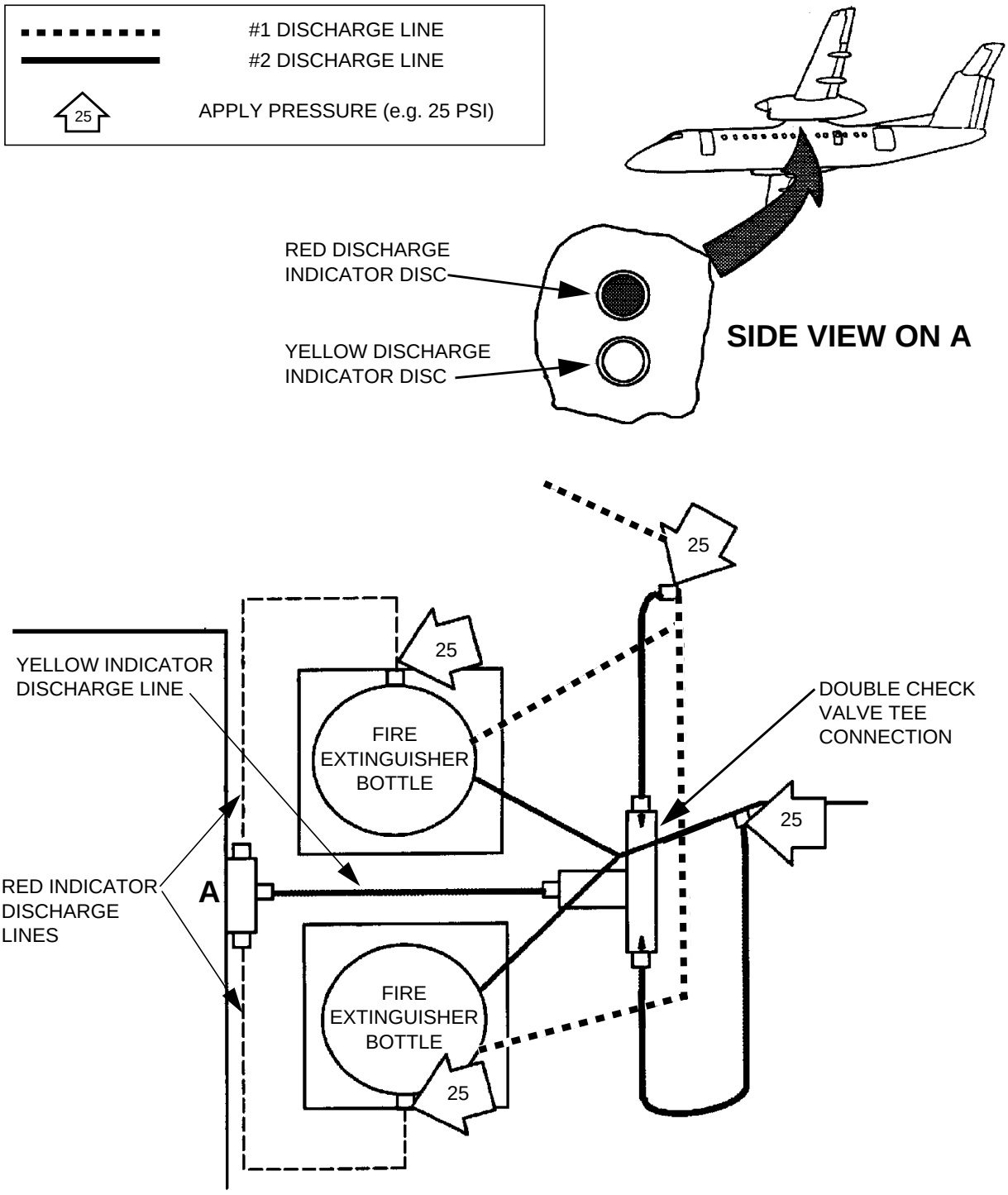



**Figure 3 - Pressure Test of Yellow & Red Discharge Lines**

### 5.6 Set-Up and Operation of Pressure Test Rig

5.6.1 The pressure test rig may be used to test two high pressure line systems simultaneously.

5.6.2 Set-up the pressure test rig as follows (see Figure 4):

Step 1. Ensure that both control levers are in the hold position.

Step 2. Connect a shop air supply and ensure that the external air pressure regulator is set to 100 psi.

Step 3. Set the high pressure gauge to the applicable test pressure by turning the high pressure adjust dial.

Step 4. Connect the test rig pressure line to the line that is to be tested.

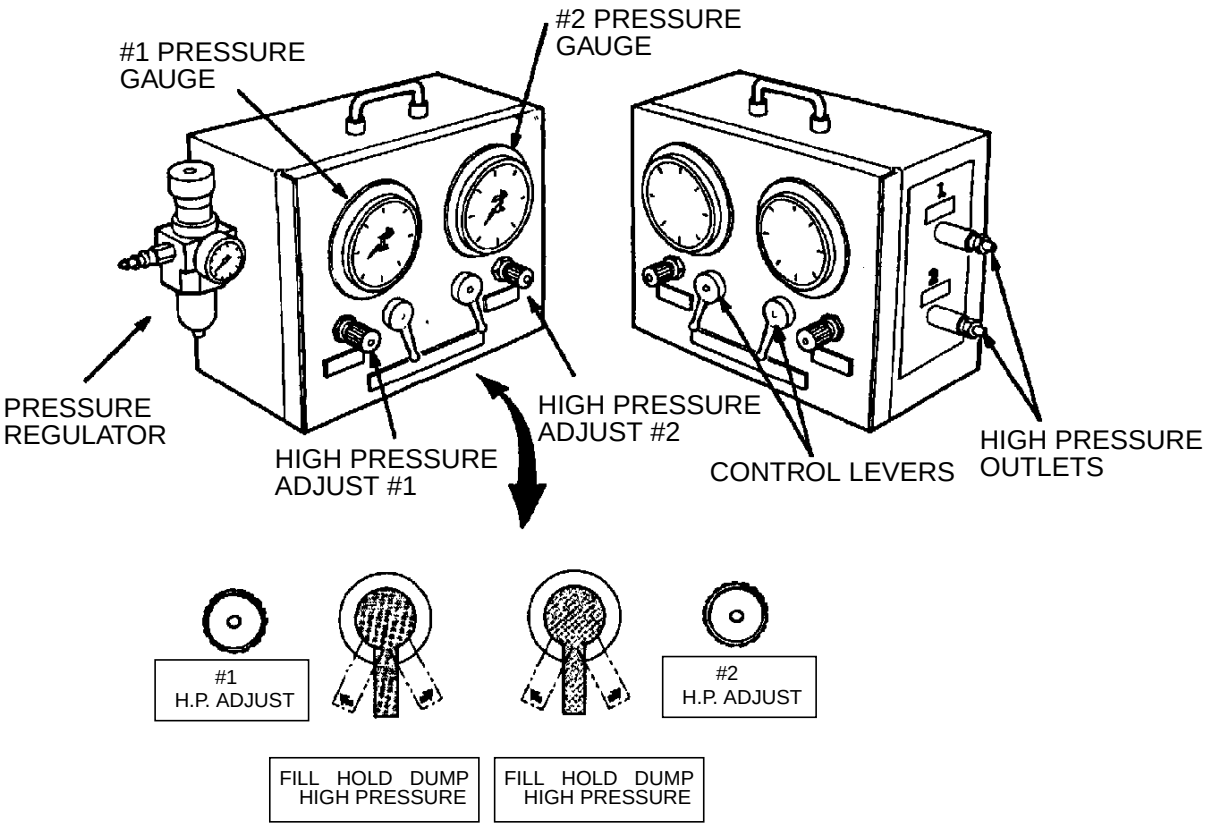



**Figure 4 - Pressure Test Rig**

Step 5. Switch the control lever to the fill position.

Step 6. When the pressure gauge indicates the correct test pressure, switch the control lever to the hold position.

Step 7. Leak test as specified in section 5.5.

Step 8. Switch the control lever to the dump position until the pressure gauge reaches zero.

Step 9. Switch the control lever to the hold position.

Step 10. Disconnect the pressure test rig line.

## 6 Requirements

6.1 When applying pressure to the nacelle Firex discharge lines, all supply nozzles in the nacelle area must be clear and free of any obstructions.

6.2 There shall be not more than a 5 psi drop in pressure during the 25 psi leak test of the double check valve tee connection over a 30 second period.

6.3 Connection pins on squib cartridges must be checked for security and corrosion. Cartridges with loose pins or showing signs of corrosion are not acceptable.

6.4 Since squib cartridges are tested by the manufacturer, resistance checks are neither necessary nor desirable due to their sensitive and explosive nature.

6.5 Squib cartridges must be transported, stored and installed according to HSP 4.17 by trained personnel.

## 7 Safety Precautions

**7.1 Observe general shop safety precautions when performing the procedure specified herein.**

**7.2 Always take extreme care when pressurizing the Firex system, ensure that test rig lines are kept clear of structures, stands, etc., and free of kinks or loops which may restrict air flow through such lines.**

**7.3 Do not leave the pressure test rig unattended while connected to the shop air supply.**

**7.4 Squib cartridges are a pyrotechnic device, inadvertent detonation of which could cause injury. The electrical connection pins on the cartridge must be shorted together.**

**7.5 Wrap cartridges to be stored in aluminum foil with the connection pins shorted. Then, place the wrapped cartridge in a hermetically sealed container with the contents identified.**

**7.6 Do not remove the shorting device except before testing or connection to the aircraft wiring system.**

## 8 Personnel Requirements

8.1 Personnel must have a good working knowledge of the applicable procedure and requirements as specified herein and must have exhibited their competency to their supervisor.

## 9 Maintenance of Equipment

9.1 The pressure test rig must be calibrated every 4 months. The test rig system must be checked for leaks and security of joints. Gauges and pressure relief valves must be checked for accuracy.