BOMBARDIER
Toronto (de Havilland)
PROPRIETARY INFORMATION

PPS 40.12

PRODUCTION PROCESS STANDARD

Purging and Leak Testing the DASH 8 (Series 100 and Series 300) Oxygen System

Issue 6
- This standard supersedes PPS 40.12, Issue 5.
- 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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1 Scope

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for purging and leak testing the crew fixed oxygen system of DASH 8 Series 100 and Series 300 aircraft. For system testing procedures of DASH 8 Series 400 and subsequent aircraft, refer to the applicable 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 ATP AA/2-30 - Avionics Installation System Functional Acceptance Test Procedure.

3.2 PPS 6.03 - Installation of Fluid Lines and Fittings.

3.3 PPS 6.05 - Closure of Fluid Lines and Fluid System Components.

3.4 PPS 13.11 - General Procedures for Handling Aircraft Oxygen Cylinders and Systems.

3.5 PPS 13.26 - General Subcontractor Provisions.

4 Materials and Equipment

4.1 Materials

4.1.1 Leak detection solution, MIL-L-22567, Type 1 (safe for oxygen) (e.g., Western Enterprises #LT-100).

4.2 Equipment

4.2.1 Oxygen system charging rig, complete with supply cylinders of oxygen to MIL-O-27210 and regulated high and low pressure supply hoses with quick disconnect female fittings (SNAP-TITE AVHN 4-4-56).

4.2.2 Nitrogen system test rig with supply of nitrogen to BB-N-411, Type I, Grade A, Class 1 at 1,800 psig.

4.2.3 Adapter fittings (NPN 270) used to connect oxygen supply hoses to pressure gauge capillary line.

4.2.4 Connector fittings (Robertshaw P/N 525-900-037-03) used to vent oxygen supply outlets to atmosphere.

4.2.5 Blanking plug for cockpit indicator 8SC0117.

4.2.6 Clamp-on type surface temperature thermometer.

5 Procedure

5.1 General

5.1.1 The DASH 8 Series 100 and Series 300 crew fixed-oxygen system is of the diluter/demand type and basically consists of the crew oxygen cylinder assembly, pilot's and co- pilot's oxygen mask/regulator assemblies, cockpit oxygen pressure gauge, overboard discharge indicator and interconnecting lines and hoses (see Figure 1).

5.1.2 The crew fixed system provides the pilot, co-pilot and observer (Series 300) with a source of supplemental oxygen free from the effects of smoke or other harmful gases. Oxygen is supplied from a light-weight oxygen cylinder with a rated capacity of 39 ft^3 (1,100 L) at N.T.P. when charged to 1,800 psi. The supply pressure to the crew outlets is reduced to 70 psi by a pressure reducing regulator installed on the cylinder and a quick disconnect coupling for the oxygen mask is installed at each crew station. The oxygen contents are transmitted to the cockpit by means of a high pressure capillary line running from the cylinder to a direct reading gauge.

5.1.3 The portable oxygen system is installed to provide the crew with protection from the effects of smoke or other harmful gases while combating a fire in compartments other than the flight deck. The cylinder is a regular weight type and has a rated capacity of 11.3 ft^3 (320 L) at N.T.P. when charged to 1,850 psi. A pressure reducer is installed on the cylinder and two low pressure outlets are provided to accommodate the quick disconnect couplings of the crew mask or the attached full face mask.

5.1.4 Refer to PPS 13.11 for general procedures to be followed for handling and charging oxygen cylinders and systems.

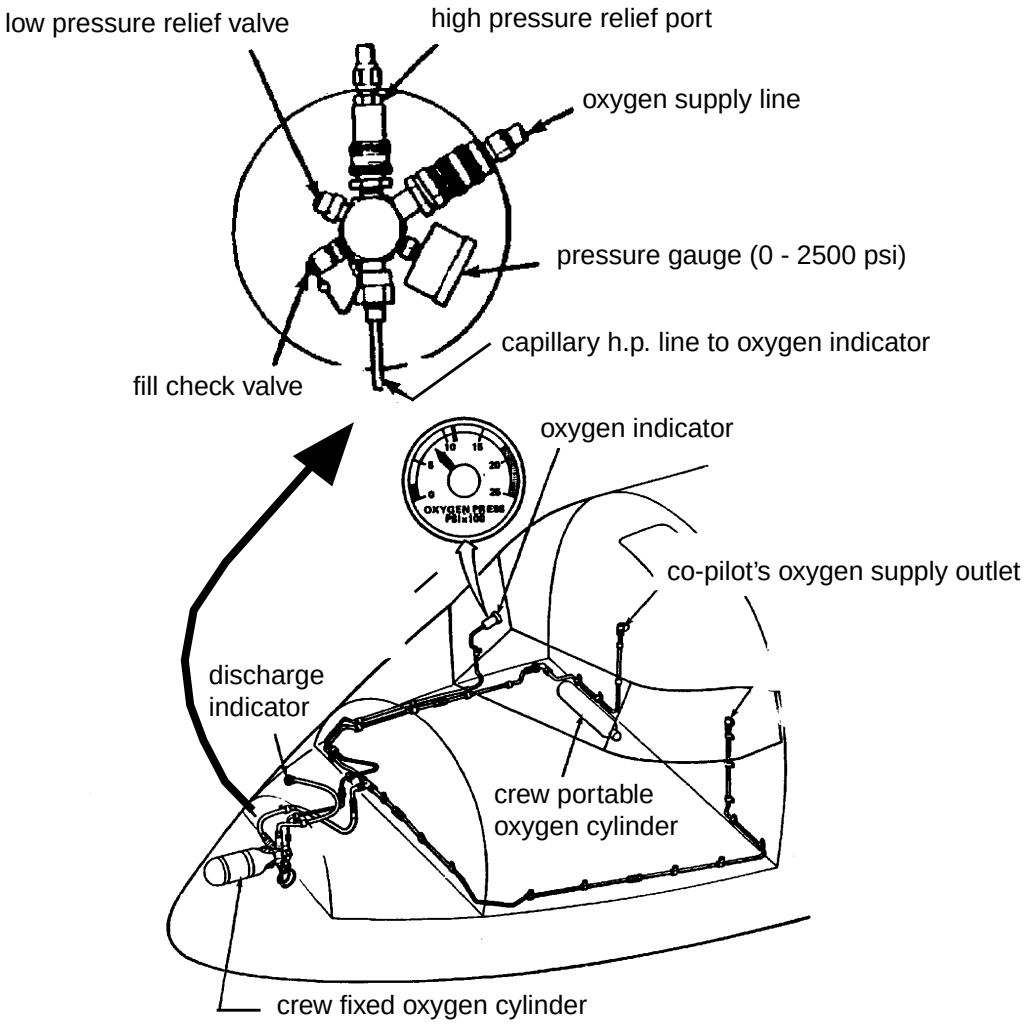

Figure 1 - General Description of Crew Oxygen System

5.2 Preparation of the Aircraft

5.2.1 Perform the leak test as soon as possible after installation of system components and before any other cockpit installation which might affect observation of the tubing. Remaining tests may be performed at a later date.

5.2.2 Do not connect the crew fixed bottle assembly to the system before testing.

5.2.3 After successful completion of tests, recharge the crew fixed bottle to FULL with oxygen to MIL-O-27210.

5.3 Preliminary Purge

5.3.1 Purge the oxygen system as follows:

Step 1. Connect the Robertshaw supply fittings to each of the crew station quick disconnect couplings to open the line.

Step 2. Disconnect the cockpit indicator 8SC0117.

Step 3. Connect the nitrogen test rig to the supply hose using the adapter fittings.

Step 4. Purge the lines at 25 psi for 30 seconds.

Step 5. Connect the nitrogen test rig to the copper capillary line using the adapter fittings.

Step 6. Purge the line at 25 psi for 30 seconds.

Step 7. Reduce the pressure to zero, disconnect the test rig and remove the fittings from the crew station outlets.

5.4 Preliminary Leak Test

5.4.1 After installation of the crew oxygen cylinder and purging of the system according to section 5.3, perform the preliminary leak test as follows:

Step 1. Connect the nitrogen test rig to the supply hose and set the pressure to 150 psi.

Step 2. Blank off the crew disconnect fittings.

Step 3. Apply leak detector solution to all connections and fittings throughout the system including the crew outlets. Apply the solution sparingly over the outlets to avoid clogging.

Step 4. Check for leaks at all joints (indicated by bubbles in the leak detector solution).

Step 5. If leaks are found, close the master cylinder valve and open the vent on the regulator to reduce the pressure to zero. Make the necessary repairs and repeat the leak test until leaks are eliminated from the entire system. Tighten and mark joints according to PPS 6.03 for oxygen fittings.

Step 6. Remove leak detector solution from surfaces with a damp cloth or sponge.

Step 7. Wipe the surfaces dry with a clean dry cloth.

Step 8. Reduce system pressure to zero, disconnect the test rig and remove blanks.

Step 9. Install the blanking plug in the capillary line (instead of the quantity indicator).

Step 10. Repeat Step 1 to Step 8 for the capillary line.

Step 11. Remove the blanking plug.

5.5 Final Purging

5.5.1 Perform final purging as follows:

Step 1. Repeat section 5.3 using the oxygen system charging rig or the crew fixed cylinder as a pressure source.

Step 2. Install a fully charged fixed crew oxygen bottle (1,800 psi at 70°F (21°C)) to the aircraft with securing straps.

Step 3. Connect the capillary line to the remote gauge connection on the bottle and when the connection just cracks allowing flow to the cockpit indicator, check that the pressure rises slowly to 1,800 psi (i.e., at least 5 seconds elapse). Fully tighten this connection.

Step 4. Connect the supply hose to the appropriate port on the bottle.

Step 5. Commence purging lines using bottle pressure to indicator and mask outlets (mask outlets use P/N 525-900-037-03 for purging).

Step 6. Refill the bottle as required after completion of the operation.

5.6 Final Leak Check

5.6.1 Perform the final leak check as follows:

Step 1. Connect the cockpit quantity indicator to the capillary line.

Step 2. Install a fully charged fixed crew oxygen bottle (1,800 psi at 70°F (21°C)) to the aircraft with securing straps.

Step 3. Connect the capillary line to the remote gauge connection on the bottle and when the connection opens enough to allow flow to the cockpit indicator, check that the pressure rises slowly to 1,800 psi (i.e. at least 5 seconds elapse). Fully tighten this connection.

Step 4. Connect the supply and vent hose to the appropriate ports on the bottle.

Step 5. Connect crew masks to the crew station outlets.

Step 6. Use leak detector solution to check for leaks at joints not previously checked.

Step 7. Wait 20 minutes for the system to stabilize, then read and record the cylinder pressure, oxygen temperature and quantity gauge reading. The oxygen temperature is as indicated by the bottle surface temperature thermometer.

Step 8. Leave the oxygen system undisturbed for 24 hours. Read and note the cylinder pressure, oxygen temperature and quantity gauge.

Step 9. Check that the pressure drop within the system does not exceed 50 psig in the 24 hour period. If there are any changes in ambient temperature, apply pressure corrections to the maximum allowable pressure drop (see Figure 2).

Step 10. If the system pressure drop exceeds the maximum allowable, repeat the preliminary leak test according to section 5.4 and re-do the final leak check according to this section.

5.7 System Operation Test

5.7.1 Perform the system operation test as follows:

Step 1. Connect the pilot's and co-pilot's masks and, on Series 300, the observer's mask.

Step 2. Don each mask in turn. Breathe on NORMAL mode and then breathe on EMERGENCY mode. Verify that the flow is greater with the EMERGENCY setting and that the flow indicator in line remains green.

Step 3. Switch the A.I.S. controller located on the centre console from the BOOM to the MASK setting. With oxygen flowing, check that audio transmission is not garbled and is of adequate volume as tested by ATP AA/2-30.

Step 4. Reset each mask to NORMAL.

Step 5. Fit a cleanliness bag over each mask.

Step 6. Switch to EMERGENCY and verify that flow is audible and that the visual flow indicator is green.

Step 7. Disconnect the mask supply hose from the cockpit outlets and remove the cleanliness bag.

Step 8. Breathe from each mask in turn and verify that the flow indicator remains red. Verify that when the mask regulator valve closes, breathing becomes difficult.

Step 9. Reconnect the mask supply hose to the cockpit outlet and verify that the indicator is green. Breathe through each mask to ensure oxygen is flowing.

5.8 Portable Unit Test

5.8.1 Perform leak testing of the portable oxygen unit as follows:

Step 1. Disconnect the pilot's, co-pilot's and observer's masks from the installed system outlets and remove them from the mask hanger.

Step 2. Connect both masks to each portable unit outlet and turn the regulator knob to ON. Breathe through each mask to ensure flow is evident and that the indicator is green.

Step 3. Turn the knob to OFF and verify that the indicator is red by breathing through each mask until breathing becomes difficult.

Step 4. Disconnect and exchange masks and outlets.

Step 5. Repeat Step 2 and Step 3.

Step 6. Disconnect each mask from the portable unit and plug them into the installed system outlet. Replace the masks in the mask hanger.

Step 7. Remove the smoke mask from its bag and connect it to the outlet of the portable unit.

Step 8. Turn the knob to ON, breathe through the mask and ensure flow is evident.

Step 9. Turn the knob to OFF and verify that breathing becomes difficult.

Step 10. Disconnect the smoke mask and repeat Step 7 through Step 9 using the other outlet on the portable unit.

Step 11. Disconnect the mask and replace it in its bag.

Step 12. Recharge the portable bottle to the correct pressure with oxygen to MIL-O-27210.

6 Requirements

6.1 Ensure that there is no leakage at fittings or connections in the oxygen system during preliminary leak testing according to section 5.4.

6.2 Ensure that all leak detector solution has been removed and that all surfaces are dry.

6.3 The maximum allowable pressure drop within the system during final leak check according to section 5.6 is 50 psi. If there are any changes in ambient temperature, pressure corrections shall be applied to the maximum allowable pressure drop (see Figure 2).

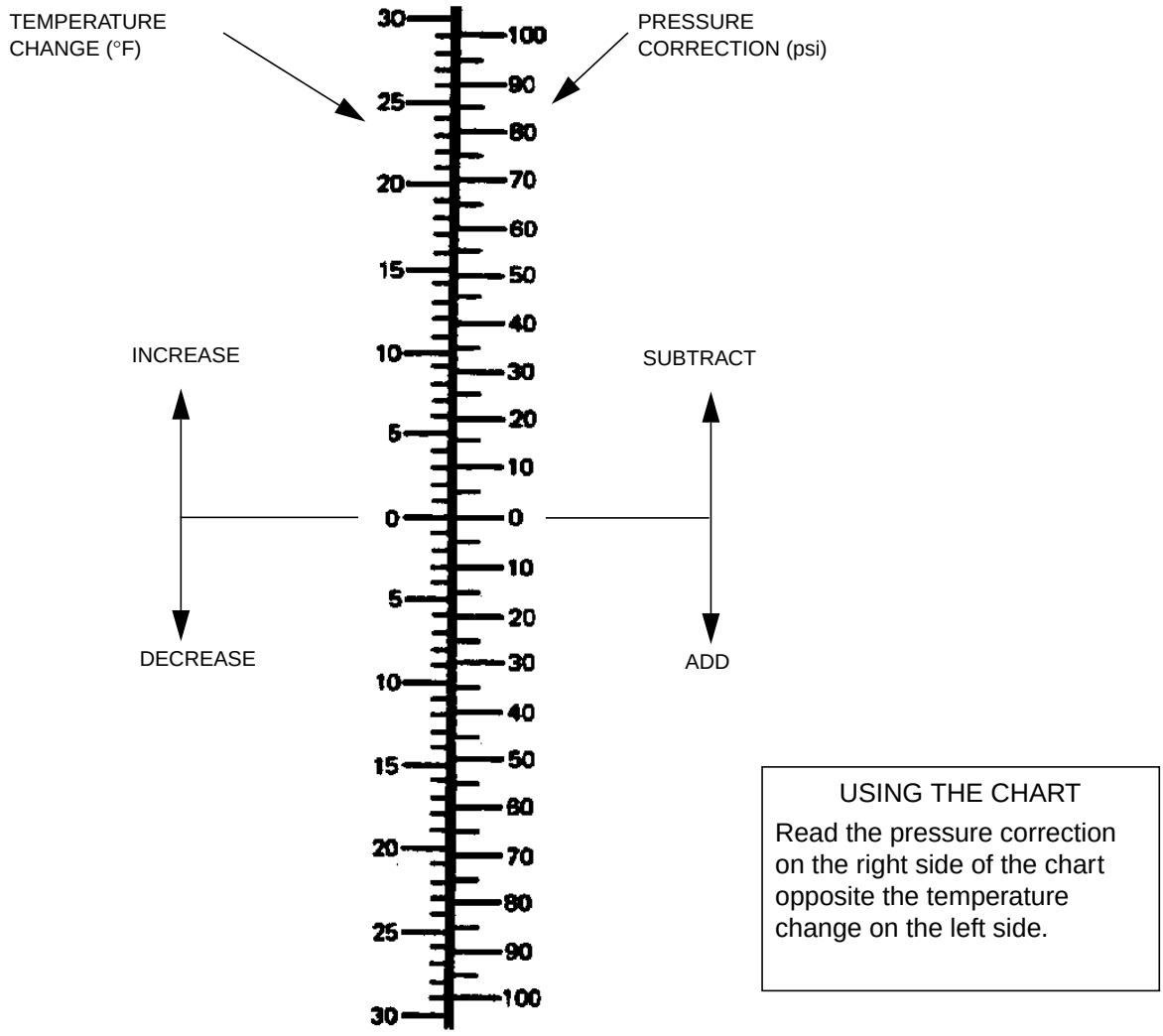

Figure 2 - Pressure Drop Correction

7 Safety Precautions

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

7.2 Only qualified operators familiar with the necessary safety precautions shall be permitted to carry out any operations on oxygen equipment.

7.3 Only operators working with the oxygen system shall be allowed in the aircraft during purging of the system.

7.4 Perform all charging and testing operations in a well ventilated atmosphere away from unshielded electrical equipment and other ignition sources and with the aircraft grounded. Do not smoke within 50 feet of areas where oxygen charging and testing operations are being carried out. Prominently display a placard stating: OXYGEN IN USE, NO SMOKING.

7.5 Ensure that the hands and clothing of operators and all equipment required are free from contaminants. Take extreme care to prevent any oil or grease from coming into contact with fittings or the interior of oxygen system components and the charging rig.

7.6 Cap lines according to PPS 6.05 where unsatisfactory components have been removed.

7.7 Before removal of any component, ensure that the system is not under pressure.

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.