# BOMBARDIER
Toronto (de Havilland)

# PPS 40.13

**PRODUCTION PROCESS STANDARD**

## INSTALLATION OF DASH 8 STATIC PORTS

Issue 5
- This standard supersedes PPS 40.13, Issue 4.
- Vertical lines in the left hand margin indicate 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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Production Process Standards (PPS)

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Materials Technology

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Quality

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## 1  SCOPE

1.1    This Production Process Standard (PPS) specifies the procedure and requirements for the installation of the instrument static ports on Dash 8 Series 100, 300 and CT-142 aircraft.

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.  Similarly, the procedure and requirements specified in this PPS are not applicable when use of a BAPS, MPS, LES or P. Spec. is specified.

## 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    PPS 13.26 - General Subcontractor Provisions.

3.2    PPS 16.24 - Application of DSC 216 Fluorocarbon Dispersion Coating.

3.3    PPS 21.16 - Aircraft Weather/Pressure Sealing.

## 4  MATERIALS AND EQUIPMENT

### 4.1  Materials

4.1.1    Fluorocarbon dispersion coating to DSC 216-1.

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### 4.2 Equipment

4.2.1   Profile checking tools:

- EO80466-1-210 (-1 LH/-2 RH) tools for DASH 8 Series 100 and 300 aircraft.
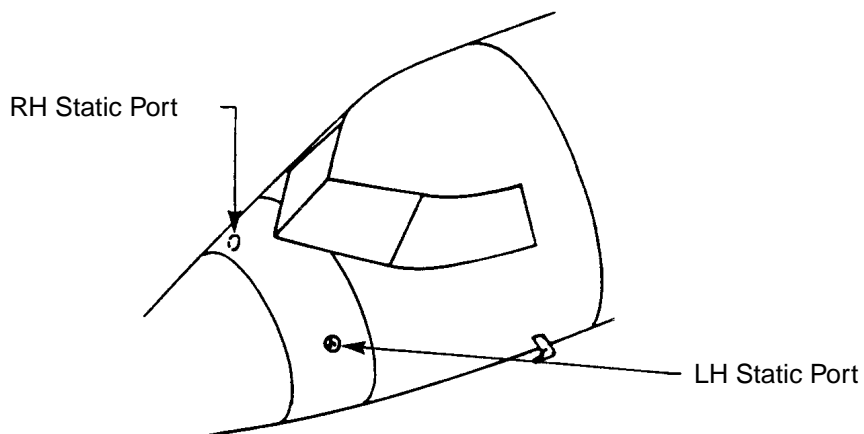- 83410046-001-210 (-1 LH/-2 RH) tools for DASH 8 CT-142 aircraft.

4.2.2   Calibration fixtures:

- EO80466-1-210 (-125) fixture for DASH 8 Series 100 and 300 aircraft.
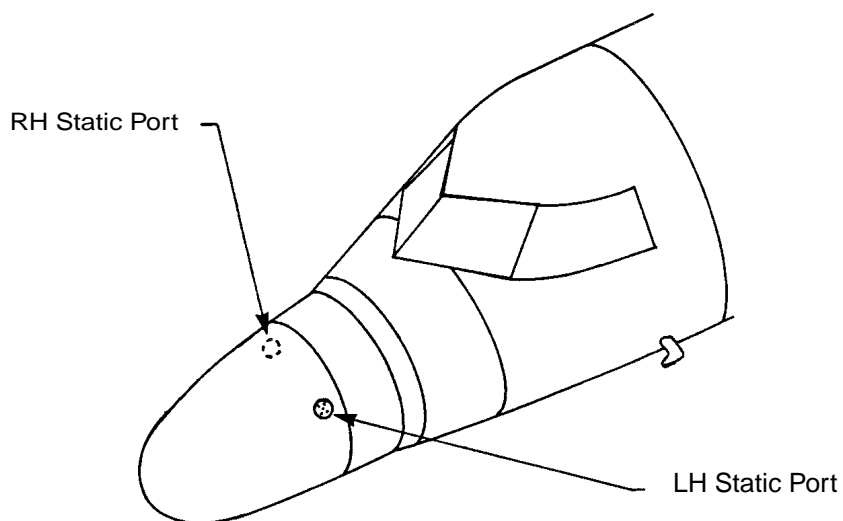- 83410046-001-210 (-123) fixture for DASH 8 CT-142 aircraft.

## 5   PROCEDURE

### 5.1   General

5.1.1   The static ports are mounted on each side of the forward fuselage (see Figure 1) and are used to measure ambient air pressure (commonly known as "static pressure").  This provides the "static" pressure to the pitot-static system which operates the pilot's and copilot's pneumatic flight instruments.  These include airspeed indicators (ASI), inertial lead vertical speed indicators (IVSI), standby altimeter (STBY ALT), cabin pressure controller and digital air data computers.

5.1.2   The static port measures air pressure by measuring the pressure within the boundary layer.  It is therefore essential to ensure that the boundary layer in the area of the static port is not disrupted by deviations or irregularities in the surface contours of the fuselage or by incorrect installation of the static port.

5.1.3   This standard defines the static port installation procedure.  This procedure compensates for deviations in the local fuselage contour via the adjustment of the static port relative to the skin.  The result is that an acceptable installation may have static ports that protrude beyond the contour.

5.1.4   If it is necessary to fly an aircraft before painting, determine acceptable static port height using the un-painted aircraft target "/$_2$" values.  After painting, re-adjust the static port height using the painted aircraft target "/$_2$" values before further flying.

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RH Static Port

LH Static Port

**DASH 8 Series 100 and 300 Static Port Locations**

RH Static Port

LH Static Port

**DASH 8 CT-142 Aircraft Static Port Locations**

**FIGURE 1 - LOCATION OF STATIC PORTS**

**5.2    Installation of Static Port**

5.2.1    Install static ports as follows:

Step 1.    Mask the front (port) and rear (tube and electrical connection) faces using masking tape (see Figure 2).

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MASK PORT FACE

STATIC PORT

APPLY DSC 216-1 TO SURFACES

MASK TUBE AND ELECTRICAL CONNECTION FACE
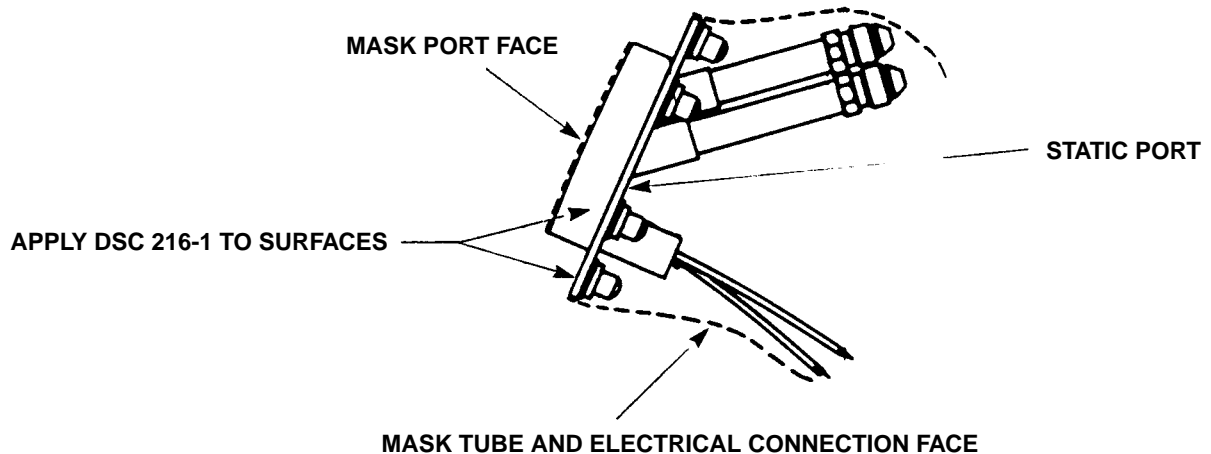
**FIGURE 2 - APPLICATION OF DSC 216-1 FLUOROCARBON DISPERSION COATING**

Step 2.    Apply a thin spray coat of DSC 216-1 fluorocarbon (teflon) dispersion coating to the seat faces of the static port assembly and allow to dry according to PPS 16.24.

Step 3.    Remove the masking tape.

Step 4.    Place a gasket, laminated washer, another gasket and the heat barrier ring onto the static port assembly as shown in Figure 3).  Leave the laminated washer full thickness, as supplied.  Align the screw holes to match the pattern in the static port.

static port (typ.)

gasket

laminated washer

gasket

heat barrier ring

**FIGURE 3 - INSTALLATION OF GASKETS AND LAMINATED WASHERS**

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Step 5.   Locate the static port assembly, from the inside of the fuselage, in the machined mounting ring and align the six attachment screw holes.

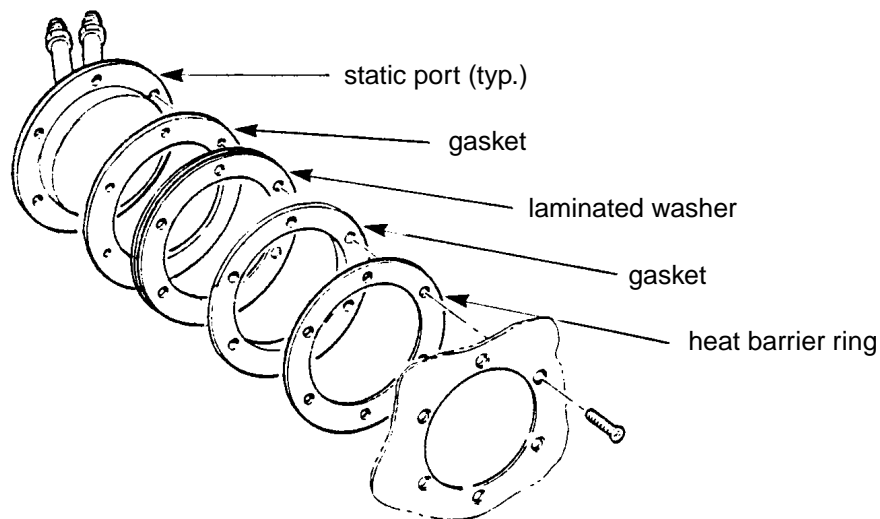Step 6.   Install and tighten the six (6) attachment screws in a criss-cross fashion, alternately tightening opposite fasteners (see Figure 4).  Tighten loosely the first time, then repeat the tightening sequence at least three (3) more times, each time tightening slightly more. Do not install the two blanking hole screws.

Step 7.   Check the height of the static port according to section 5.4 and, if necessary, adjust.
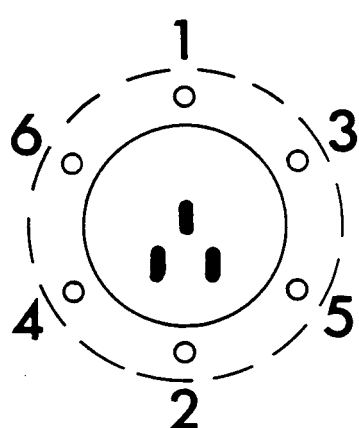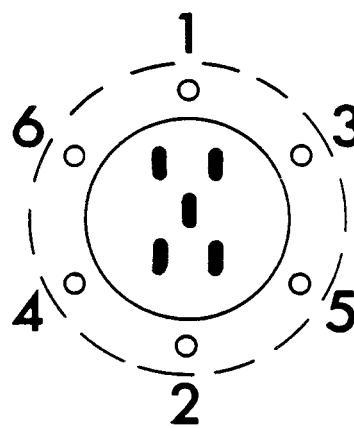
**DASH 8 Series 100 & 300**          **DASH 8 CT-142 Aircraft**

**FIGURE 4 - TIGHTENING SEQUENCE**

## 5.3   Calibration of Profile Checking Tools

5.3.1   For each aircraft installation, calibrate the left hand (LH) and right hand (RH) profile checking tools as follows before checking the aircraft:

Step 1.   Place the profile checking tool to be calibrated on the applicable calibration fixture (see Equipment section, paragraph 4.2.2).

Step 2.   Attach a 1 1/2" long contact point to the appropriate depth indicator.  Ensure that the serial number engraved on the contact point matches the serial number of the depth indicator and that the assembly number marked on the depth indicator matches the profile checking tool assembly number.

Step 3.   Place the depth indicator on the profile checking tool in the middle of the 3" long slot in the tool (i.e., 1 1/2" from the either end).

Step 4.   Rotate the depth indicator cursor ring to "zero" and lock.

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Step 5.   Move the depth indicator to each end of the slot in the profile checking tool and take a reading (see Figure 5).  The reading at both ends of the slot must be within 0.001" of "zero".

Begin by "zeroing" the reading at the centre of the slot

Take a reading at this end of the slot

Take a reading at this end of the slot

profile checking tool

Calibration fixture
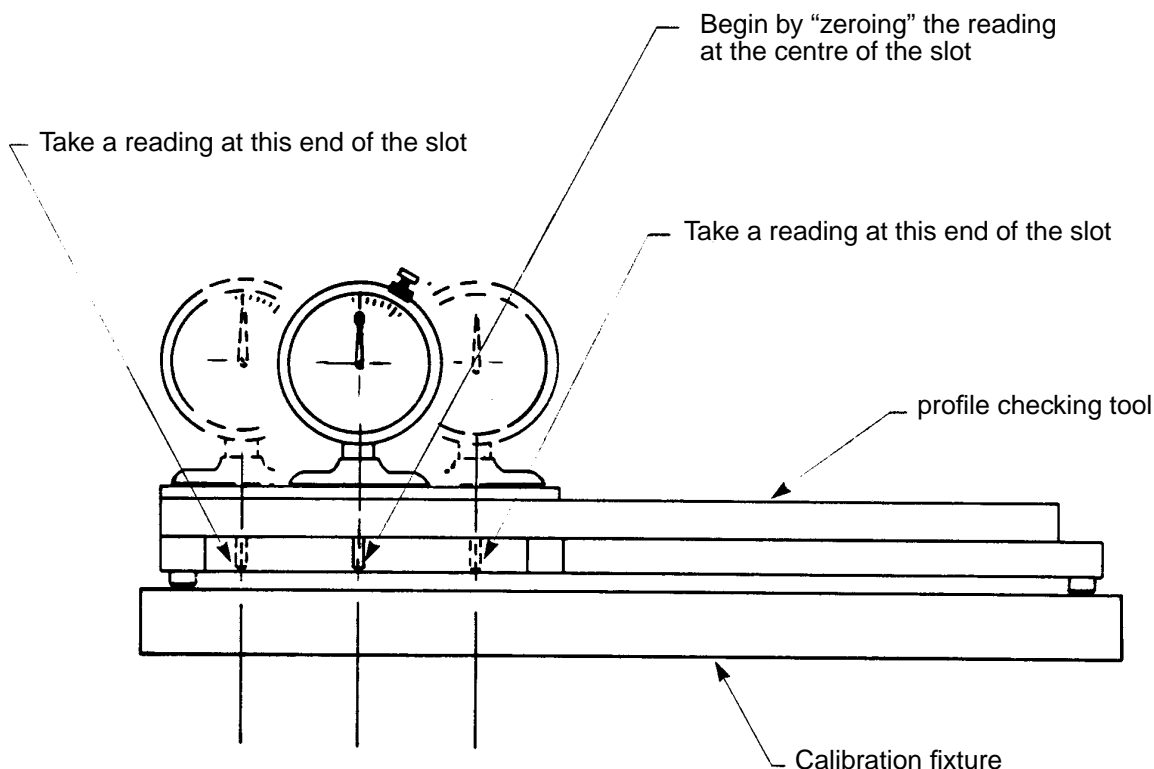
**FIGURE 5 - CALIBRATION OF PROFILE CHECKING TOOL**

**5.4   Checking and Adjusting Static Port Height**

5.4.1   Check the static port height of each static port as follows (see Figure 6 or Figure 7, as applicable):

Step 1.   Locate the applicable calibrated profile checking tool on the skin fuselage at the station position listed in Table I.

**TABLE I - FUSELAGE POSITION OF PROFILE CHECKING TOOL**

| | AIRCRAFT | | |
|---|---|---|---|
| | SERIES 100 | SERIES 300 | CT-142 |
| FRONT FOOT | STA 110 | STA 37 | STA 57 |
| REAR FOOT | STA 123 | STA 50 | STA 66 |

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Step 2. Adjust the tool so that the feet touch the skin in a smooth and level area between the rivet heads. Avoid rivet heads or other surface irregularities.

Step 3. Attach the profile checking tool to the fuselage using the two mounting screws. Do not overtighten so as to bend the tool.

Step 4. Place the appropriate depth indicator on the profile checking tool.

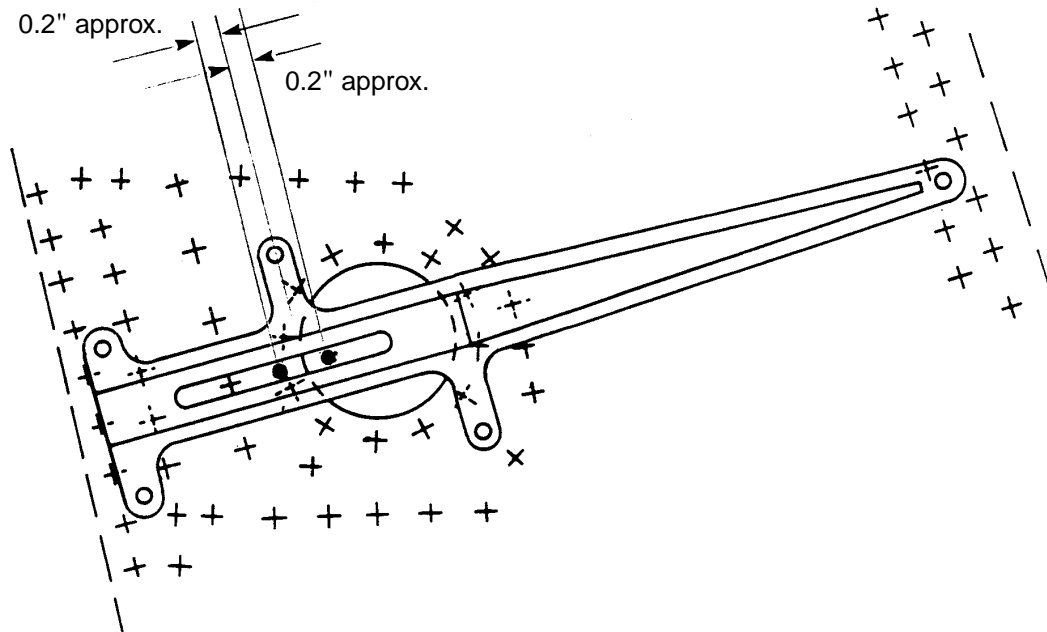Step 5. Measure the "$l_1$" dimension. Take the reading on a smooth and level area of the skin approximately 0.2" forward of the static port. Avoid rivet heads or other surface irregularities.

Step 6. Measure the "$l_2$" dimension. Take the reading on the surface of the static port approximately 0.2" behind the forward edge of the port.

Step 7. Compare the measured "$l_2$" value to the target "$l_2$" value from Table II or Table III, as applicable. The measured "$l_2$" value will normally be greater than the target value indicating that the static port is below flush. If the "$l_2$" value obtained is within -0.016" to +0.003" of the target value and the difference between "$l_1$" and "$l_2$" does not exceed 0.050" for painted aircraft and 0.055" for unpainted aircraft, the installation is acceptable. If the installation is not acceptable, adjust the static port height according to paragraph 5.4.2.

Step 8. If the installation is acceptable, remove the profile checking tool and install two blanking screws in the profile checking tool mounting holes.

5.4.2 If the installation is not acceptable, adjust the "$l_2$" value as follows to fall within the specified range by reducing the thickness of the laminated washer (the washer is made from 0.003" thick laminated shims).

Step 1. Remove the profile checking tool.

Step 2. Remove the static port attachment screws.

Step 3. Remove the static port assembly.

Step 4. Remove the laminated washer and reduce its thickness by peeling off shims. The number of shims which should be removed can be calculated as follows:

$$\frac{l_2 \text{ (measured)} - l_2 \text{ (target)}}{0.003"} = \text{ number of shims to remove (rounded off)}$$

Step 5. Re-install the static port assembly following the procedure specified in paragraph 5.2.1, except that it is not necessary to mask and re-apply DSC 216-1 fluorocarbon (teflon) dispersion coating.

Step 6. Re-check the static port height according to paragraph 5.4.1.

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0.2" approx.

0.2" approx.

STA 100 (series 100 a/c)
STA 37 (series 300 a/c)

Take the "$l_2$" measurement approximately
0.2" behind the forward edge of the
static port

Take the "$l_1$" measurement approximately
0.2" forward of the static port
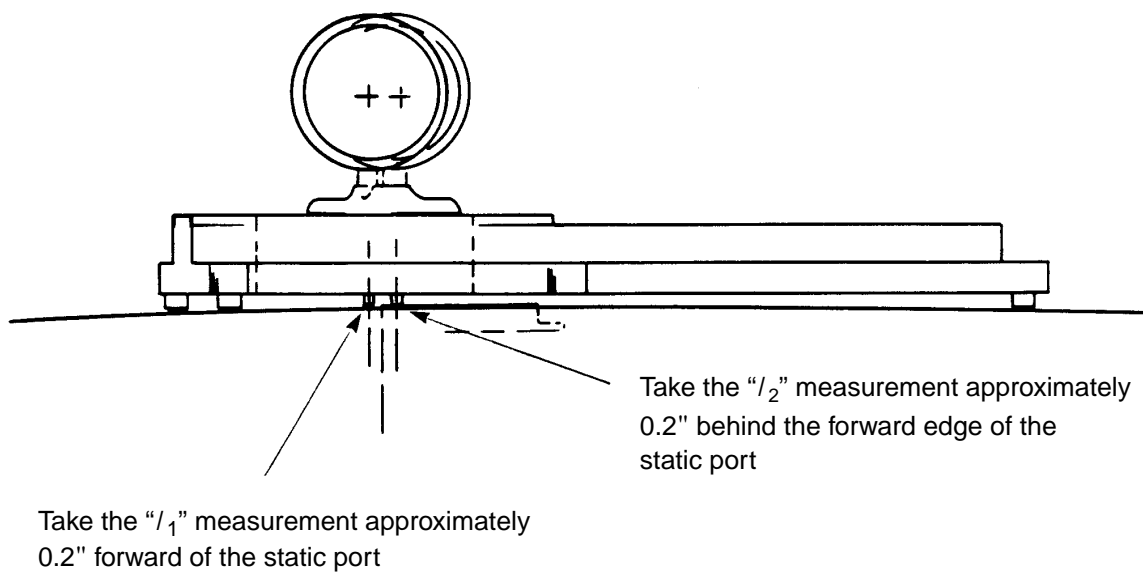
**FIGURE 6 - CHECKING STATIC PORT HEIGHT - DASH 8 SERIES 100 AND 300 AIRCRAFT**

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0.2" approximately

0.2" approximately

STA 57

STA 66

Take the "$l_2$" measurement approximately
0.2" behind the forward edge of the
static port

Take the "$l_1$" measurement approximately
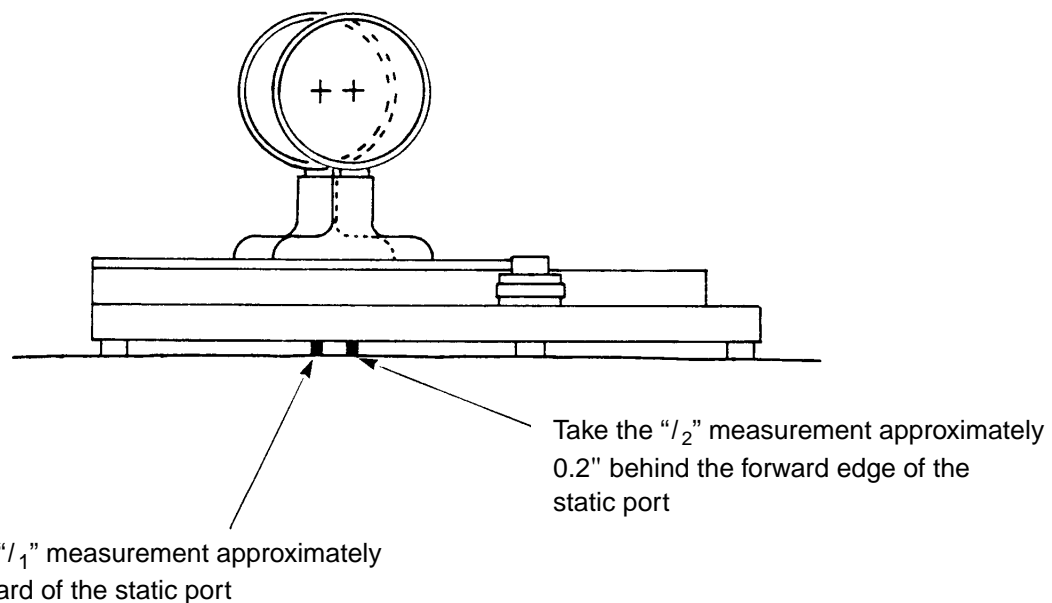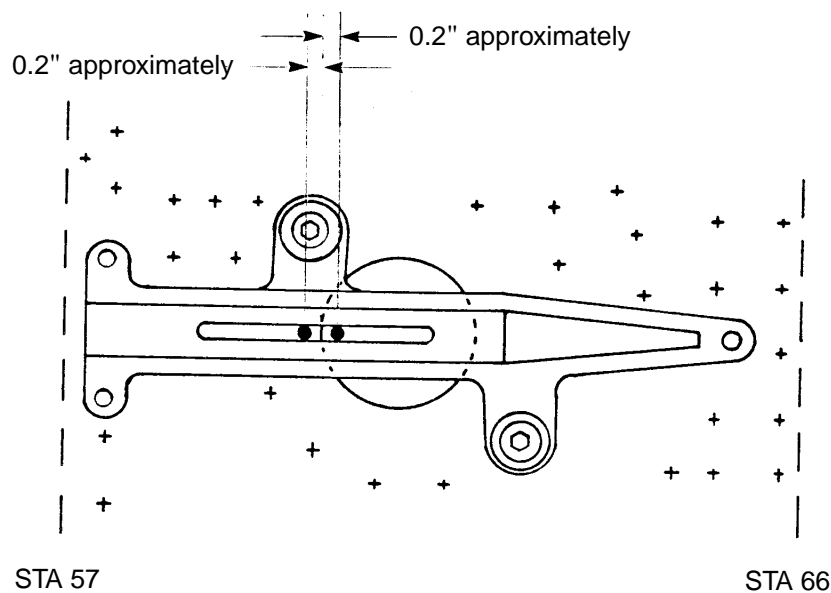0.2" forward of the static port

**FIGURE 7 - CHECKING STATIC PORT HEIGHT - DASH 8 CT-142 AIRCRAFT**

## 5.5   Aerodynamic Sealing

5.5.1   Fillet seal the inside of the static port according to the engineering drawing and
PPS 21.16.

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5.5.2    Before test flying **unpainted** aircraft, fill the gap between the static port and the exterior skin of the aircraft to meet aerodynamic requirements.  Apply the bead of DHMS S3.01/B2 or DHMS S3.01/B1/2 sealant to the gap around the entire circumference of the static port according to PPS 21.16.  Ensure the sealant begins flush with the top surface of the static port and fair the sealant toward the adjacent skin.  The faired sealant must extend a distance of approximately 10X the height of the static port (10:1 slope) to a maximum distance of 0.300" around the circumference (see Figure 8).  After flight testing and immediately before painting, remove the sealant according to PPS 34.11.

5.5.3    Before flying **painted** aircraft, fillet seal the gap between the static port and the exterior skin of the aircraft to capture the forward facing paint edge and to meet aerodynamic requirements.  Apply the bead of DHMS S3.01/B2 or DHMS S3.01/B1/2 sealant to the gap around the entire circumference of the static port according to PPS 21.16.  Ensure the sealant begins flush with the top surface of the static port and fair the sealant toward the adjacent skin.  The faired sealant must extend a distance of approximately 10X the height of the static port (10:1 slope) to a maximum distance of 0.300" around the circumference (see Figure 8).
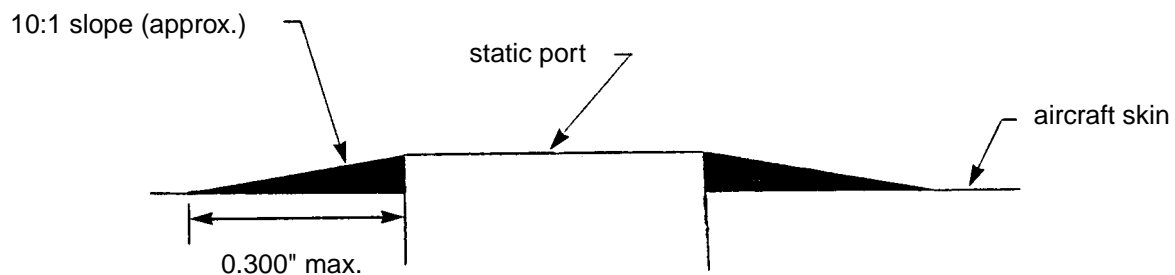
**FIGURE 8 - SEALING STATIC PORT**

## 6   REQUIREMENTS

6.1    Installed static ports must meet the height requirements specified Table II or Table III, as applicable.

6.2    Before flight of painted or un-painted aircraft, static ports must be sealed according to section 5.5.

## 7   SAFETY PRECAUTIONS

7.1    *The procedures specified herein present no specific safety hazard when carried out according to accepted plant safety regulations.*

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## 8   PERSONNEL REQUIREMENTS

8.1   Personnel responsible for installation of DASH 8 static ports must have a good working knowledge of the procedure and requirements as specified herein and must have exhibited their familiarity to their supervisor.

## 9   MAINTENANCE OF EQUIPMENT

9.1   Calibrate depth indicators on a suitable regular schedule.

9.2   Unauthorized modification of profile checking tooling and calibration fixtures is prohibited. All rework must be appropriately approved.

### TABLE II - STATIC PORT TARGET VALUES FOR DASH 8 SERIES 100 AND 300 AIRCRAFT

| $l_1$ (as measured) | $l_2$ Target | | $l_1$ (as measured) | $l_2$ Target | |
|---|---|---|---|---|---|
| | Un-Painted Aircraft | Painted Aircraft | | Un-Painted Aircraft | Painted Aircraft |
| 0.930" | 0.919" | 0.924" | 0.956" | 0.933" | 0.938" |
| 0.932" | 0.920" | 0.925" | 0.958" | 0.934" | 0.939" |
| 0.934" | 0.921" | 0.926" | 0.960" | 0.935" | 0.940" |
| 0.936" | 0.922" | 0.927" | 0.962" | 0.936" | 0.941" |
| 0.938" | 0.923" | 0.928" | 0.964" | 0.937" | 0.942" |
| 0.940" | 0.924" | 0.929" | 0.966" | 0.939" | 0.944" |
| 0.942" | 0.926" | 0.931" | 0.968" | 0.940" | 0.945" |
| 0.944" | 0.927" | 0.932" | 0.970" | 0.941" | 0.946" |
| 0.946" | 0.928" | 0.933" | 0.972" | 0.942" | 0.947" |
| 0.948" | 0.929" | 0.934" | 0.974" | 0.943" | 0.948" |
| 0.950" | 0.930" | 0.935" | 0.976" | 0.944" | 0.949" |
| 0.952" | 0.931" | 0.936" | 0.978" | 0.945" | 0.950" |
| 0.954" | 0.932" | 0.937" | 0.980" | 0.946" | 0.951" |

Note 1.  "$l_1$" - skin surface measurement;  "$l_2$" - static port measurement.

Note 2.  If the measured "$l_2$" value is within -0.016" to +0.003" of the target "$l_2$" value and the difference between "$l_1$" and "$l_2$", as measured, does not exceed 0.050" for painted aircraft and 0.055" for unpainted aircraft, the installation is acceptable.

For example:  For a target "$l_2$" of 0.939", the acceptable range for "$l_2$", as measured, would be 0.923" - 0.942".

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**TABLE III - STATIC PORT TARGET VALUES - DASH 8 CT-142 AIRCRAFT**

| $/_1$ (as measured) | $/_2$ Target | | $/_1$ (as measured) | $/_2$ Target | |
|---|---|---|---|---|---|
| | Un-Painted Aircraft | Painted Aircraft | | Un-Painted Aircraft | Painted Aircraft |
| 0.920" | 0.903" | 0.908" | 0.972" | 0.920" | 0.925" |
| 0.922" | 0.904" | 0.909" | 0.974" | 0.921" | 0.926" |
| 0.924" | 0.904" | 0.909" | 0.976" | 0.922" | 0.927" |
| 0.926" | 0.905" | 0.910" | 0.978" | 0.923" | 0.928" |
| 0.928" | 0.906" | 0.911" | 0.980" | 0.925" | 0.930" |
| 0.930" | 0.906" | 0.911" | 0.982" | 0.927" | 0.932" |
| 0.932" | 0.907" | 0.912" | 0.984" | 0.929" | 0.934" |
| 0.934" | 0.908" | 0.913" | 0.986" | 0.931" | 0.936" |
| 0.936" | 0.908" | 0.913" | 0.988" | 0.933" | 0.938" |
| 0.938" | 0.909" | 0.914" | 0.990" | 0.935" | 0.940" |
| 0.940" | 0.910" | 0.915" | 0.992" | 0.937" | 0.942" |
| 0.942" | 0.910" | 0.915" | 0.994" | 0.939" | 0.944" |
| 0.944" | 0.911" | 0.916" | 0.996" | 0.941" | 0.946" |
| 0.946" | 0.912" | 0.917" | 0.998" | 0.943" | 0.948" |
| 0.948" | 0.912" | 0.917" | 1.000" | 0.945" | 0.950" |
| 0.950" | 0.913" | 0.918" | 1.002" | 0.947" | 0.952" |
| 0.952" | 0.914" | 0.919" | 1.004" | 0.949" | 0.954" |
| 0.954" | 0.914" | 0.919" | 1.006" | 0.951" | 0.956" |
| 0.956" | 0.915" | 0.920" | 1.008" | 0.953" | 0.958" |
| 0.958" | 0.916" | 0.921" | 1.010" | 0.955" | 0.960" |
| 0.960" | 0.916" | 0.921" | 1.012" | 0.957" | 0.962" |
| 0.962" | 0.917" | 0.922" | 1.014" | 0.959" | 0.964" |
| 0.964" | 0.918" | 0.923" | 1.016" | 0.961" | 0.966" |
| 0.966" | 0.918" | 0.923" | 1.018" | 0.963" | 0.968" |
| 0.968" | 0.919" | 0.924" | 1.020" | 0.965" | 0.970" |
| 0.970" | 0.920" | 0.925" | | | |

Note 1.  "$/_1$" - skin surface measurement;  "$/_2$" - static port measurement.

Note 2.  If the measured "$/_2$" value is within -0.016" to +0.003" of the target "$/_2$" value and the difference between "$/_1$" and "$/_2$", as measured, does not exceed 0.050" for painted aircraft and 0.055" for unpainted aircraft, the installation is acceptable.

For example:  For a target "$/_2$" of 0.923", the acceptable range for "$/_2$", as measured, would be 0.907" - 0.926".