BOMBARDIER
Toronto (de Havilland)
PROPRIETARY INFORMATION

PPS 9.41

PRODUCTION PROCESS STANDARD

Termination of Individual Wire Shields at Glenair 550-003 & 557-581 Backshells

Issue 7
- This standard supersedes PPS 9.41, Issue 6.
- Vertical lines in the left hand margin indicate technical changes over the previous issue.
- Direct PPS 9.41 related questions to michael.wright@aero.bombardier.com.
- This PPS is effective as of the distribution date.

- **THIS STANDARD SPECIFIES MANUFACTURING PROCESSES WHICH ARE CRITICAL TO THE LIGHTNING PROTECTION AND TRANSPORT CANADA CERTIFICATION OF BOMBARDIER AIRCRAFT.**
- **IT IS IMPERATIVE THAT THE PROCEDURE SPECIFIED HEREIN BE STRICTLY ADHERED TO.**
- **THE CURRENT ISSUE OF THIS PPS AND ANY SUBSEQUENT REVISIONS TO THE PROCEDURE AND REQUIREMENTS SPECIFIED HEREIN MUST BE AUTHORIZED BY AN UNDERSIGNED TRANSPORT CANADA DESIGN APPROVAL DESIGNEE (DAD).**

(P. Bootsma, DAD 212) — July 11, 2014

Lightning/EMI/HIRF

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1 Scope

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for the assembly of Glenair 550-003 and 557-581 backshells (see Figure 1), including the termination of individual wire shields at the backshell.

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 PPS 9.04 - Assembly and Installation of Electrical and Electronic Wire Assemblies.

3.2 PPS 9.06 - Electrical Bonding and Grounding of Aircraft Structures.

3.3 PPS 9.19 - Automatic Crimping of Size 16 - 22 Electrical Contacts.

3.4 PPS 9.22 - Assembly of Connectors.

3.5 PPS 9.34 - Terminating Electrical Shields.

3.6 PPS 9.36 - Manual Crimping of Size 12 - 22 Contacts.

3.7 PPS 13.26 - General Subcontractor Provisions.

3.8 PPS 13.39 - Bombardier Toronto Engineering Process Manual.

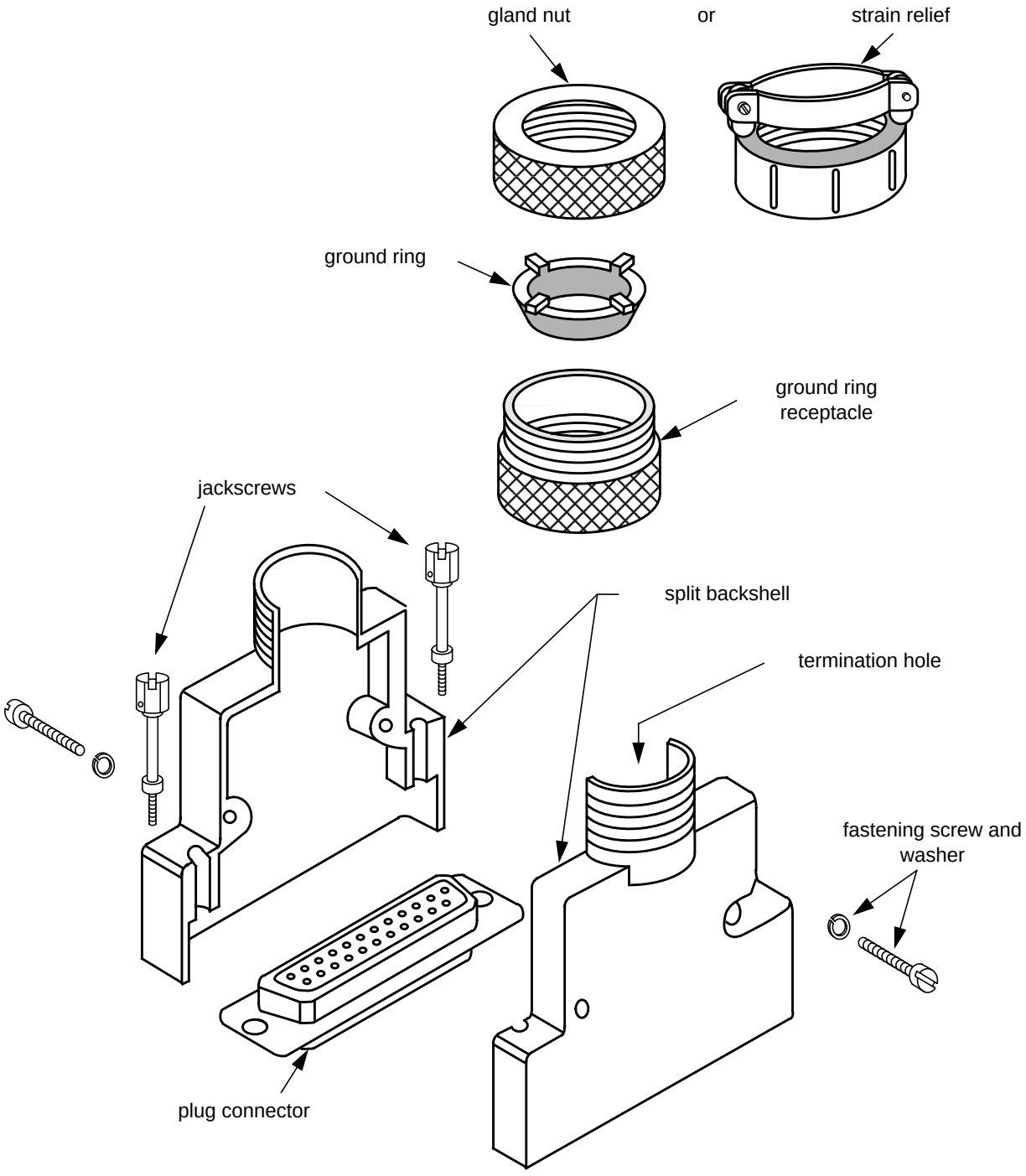


Figure 1 - Glenair 550-003 and 557-581 Top Entry Backshells

4 Materials, Equipment and Facilities

4.1 Materials

4.1.1 Filler tape, fire resistant - Freudenberg-NOK Inc. #52672 Guideline tape or insulation tape to A-A-59163 (e.g., Freudenberg-NOK Inc. #50215).

4.2 Equipment

4.2.1 No equipment specified.

4.3 Facilities

4.3.1 This PPS has been categorized as a “Controlled Special Process” according to PPS 13.39 and as such only facilities specifically approved according to PPS 13.39 are authorized to perform assembly of Glenair 550-003 and 557-581 backshells, including the termination of individual wire shields at the backshell, according to this PPS.

4.3.2 Bombardier subcontractors must direct requests for approval to Bombardier Aerospace Supplier Quality Management. Bombardier Aerospace facilities must direct requests for approval to the appropriate internal Quality Manager.

4.3.3 Facility approval shall be based on a facility report, a facility survey and completion of a qualification test program, if required. The facility report must detail the materials and equipment to be used, the process sequence to be followed and the laboratory facilities used to show compliance with the requirements of this PPS. Any deviation from the procedure or requirements of this PPS must be detailed in the facility report. Based upon the facility report, Bombardier Toronto (de Havilland) Materials Technology may identify additional qualification and/or process control test requirements. During the facility survey, the facility requesting qualification must be prepared to demonstrate their capability. Once approved, no changes to subcontractor facilities may be made without prior written approval from Bombardier Aerospace Supplier Quality Management.

4.3.3.1 Unless otherwise specified by Bombardier Aerospace Supplier Quality Management, for approval of subcontractor facilities to perform assembly of Glenair 550-003 and 557-581 backshells according to this PPS completion of a test program and submission of suitable test samples representative of production parts is required. Test samples must meet the requirements specified in section 6.

5 Procedure

5.1 General

5.1.1 If the engineering drawing or wiring list specifies termination of individual wire shields using solder sleeves with pre-installed **braid straps**, refer to section 5.2 for the shield termination/backshell assembly procedure.

5.1.2 If the engineering drawing or wiring list specifies termination of individual wire shields using solder sleeves with pre-installed **jumper wires**, refer to section 5.3 for the shield termination/backshell assembly procedure.

5.1.3 If the engineering drawing or wiring list does not specify the solder sleeve to be used, terminate the individual wire shields using solder sleeves with pre-installed **braid straps** according to section 5.2. Refer to PPS 9.34 for the solder sleeve to be used depending on the type of braided shield to be terminated (i.e., silver/tin or nickel). Only use solder sleeves with pre-installed jumper wires, when explicitly specified by the engineering drawing or wiring list.

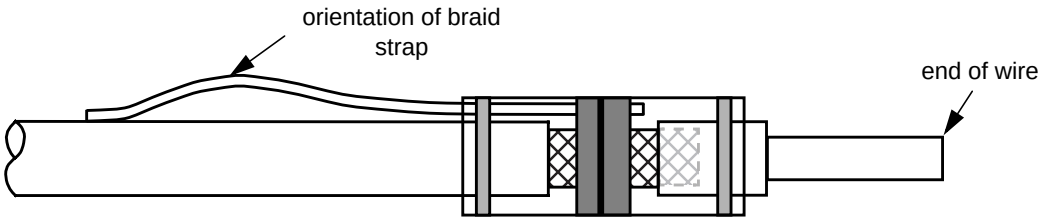
5.2 Termination of Shields using Solder Sleeves with Pre-Installed Braid Straps

5.2.1 If the engineering drawing or wiring list specifies termination of individual wire shields using solder sleeves with pre-installed braid straps, assemble and terminate shields at Glenair 550-003 and 557-581 backshells as follows:

Step 1. Slide the gland nut or strain relief, the ground ring, and the ground ring receptacle onto the wire bundle (in the reverse order to which they are to be assembled to the backshell). If a side entry type backshell is being used, slide the half of the backshell with the termination hole onto the wire bundle as well.

Step 2. Use the solder sleeves with pre-installed braid straps specified by the engineering drawing to terminate the braided shield of each cable in the bundle according to PPS 9.34.

- Terminate the shields so that the solder sleeves will be located within the backshell when the assembly is complete.
- Install the shields so that the braid straps face away from the end of the wire, as shown below:



Step 3. Terminate each of the conductors in the bundle with a crimp contact according to PPS 9.19 (Automatic Crimping of Size 16 - 22 Electrical Contacts) or PPS 9.36 (Manual Crimping of Size 12 - 22 Contacts).

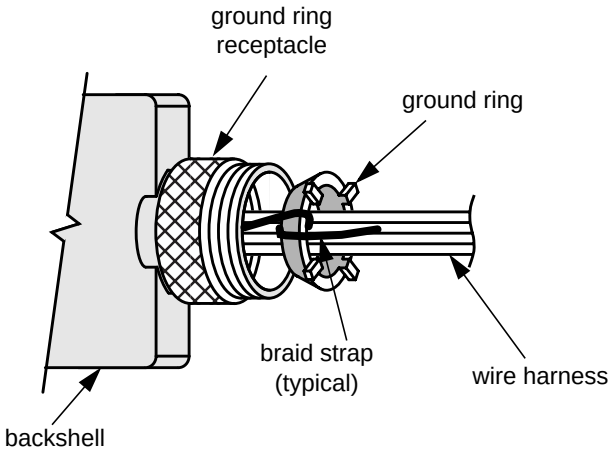
Step 4. Assemble the crimp contacts to the plug connector according to PPS 9.22.

Step 5. Place the plug connector into one half of the backshell, passing the cables and braid straps through the termination hole (if a side entry type backshell is being used, use the backshell half which has already been slid onto the wire bundle).

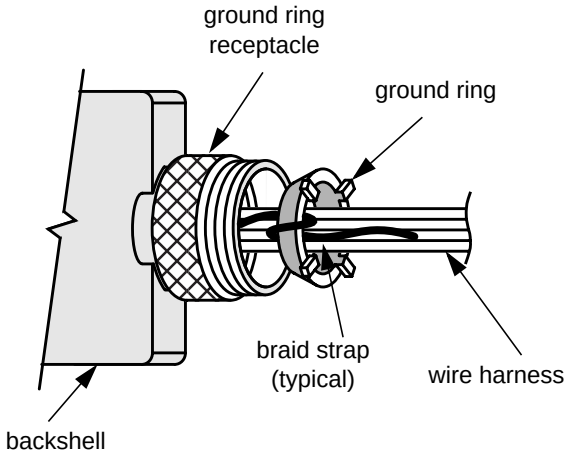
Step 6. Position the two jackscrews in the grooves provided and secure the two halves of the backshell to one another using the fastening screws.

Step 7. Tighten the ground ring receptacle onto the backshell.

Step 8. Slide the ground ring forward so that it is near the ground ring receptacle and wrap the braid straps around the ground ring. It is acceptable for the braid straps to be wrapped around the ground ring as shown in Method A or Method B; if there are a large number of braid straps, it may be easier to fit the ground ring into the ground ring receptacle if Method B is used. In either case, evenly space the braid straps around the ground ring.

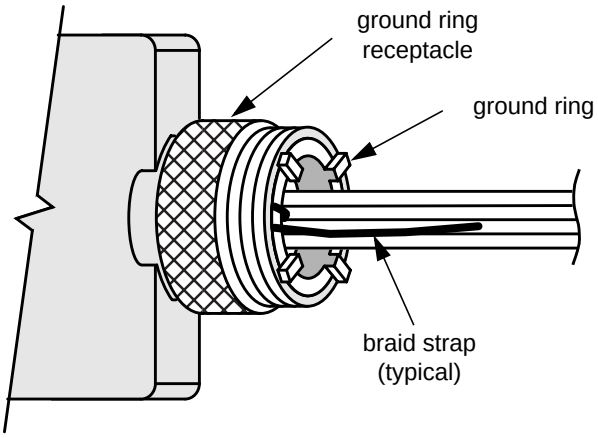


Method A



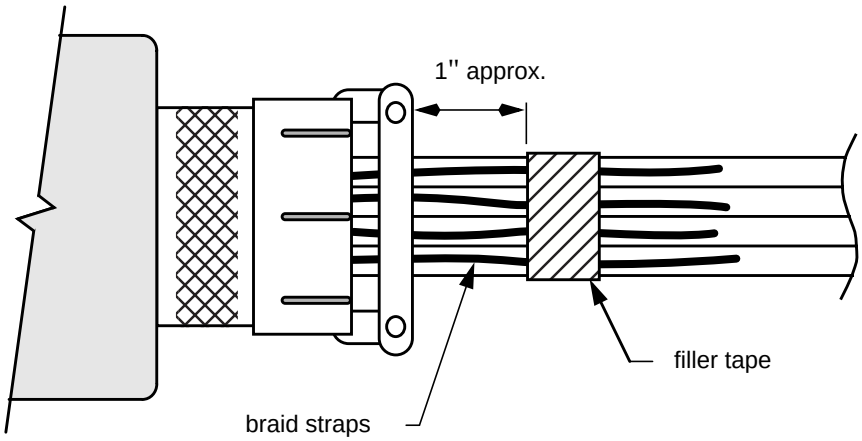
Method B

Step 9. Slide the ground ring all the way into the ground ring receptacle, making sure that the braid straps do not bunch up inside the backshell.



Step 10. Slide the strain relief or gland nut (depending on which is provided) over the braid straps and tighten it onto the ground ring receptacle.

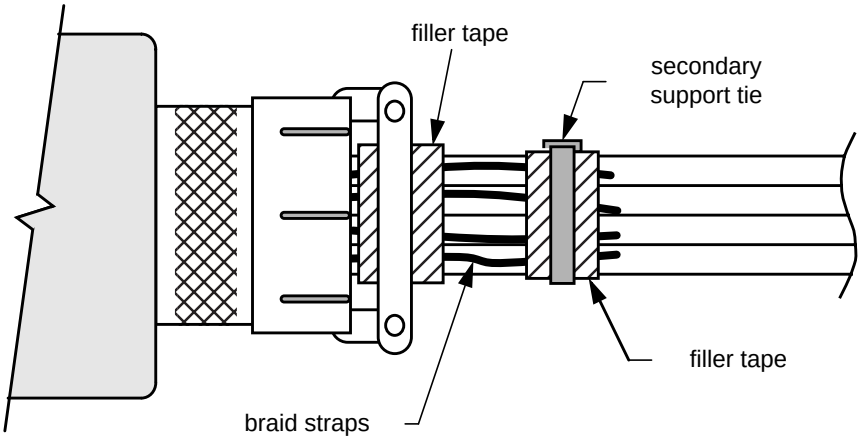
Step 11. Wrap 1 1/2 turns of filler tape (see Materials section, paragraph 4.1.1) around the braid straps and wire bundle approximately 1" from the rear of the strain relief or gland nut.



Step 12. Trim the braid straps so that they protrude slightly beyond the filler tape.

Step 13. Install a secondary support tie around the centre of the filler tape according to PPS 9.04. This will secure the braid straps to the wire bundle.

Step 14. If a strain relief clamp is being used, tighten the clamp around the wire bundle and braid straps. If necessary, wrap the wire bundle with filler tape to ensure that the clamp has a secure grip on the bundle.

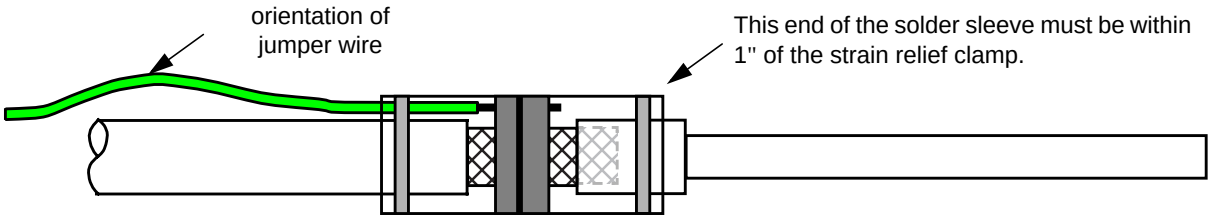


5.3 Termination of Shields using Solder Sleeves with Pre-Installed Jumper Wires

5.3.1 If the engineering drawing or wiring list specifies termination of individual wire shields using solder sleeves with pre-installed jumper wires, assemble and terminate shields at Glenair 550-003 and 557-581 backshells as follows:

Step 1. Use the solder sleeves with pre-installed jumper wires specified by the engineering drawing to terminate the braided shield of each cable in the bundle according to PPS 9.34.

- Terminate the shields so that the end of the solder sleeve closest to the strain relief clamp will be located within 1" of the edge of the strain relief clamp when the assembly is complete.
- Install the shields so that the jumper wires face away from the end of the wire, as shown below:
- Trim the jumper wires to a length of 3" maximum.



Step 2. Terminate each of the conductors in the bundle with a crimp contact according to PPS 9.19 (Automatic Crimping of Size 16 - 22 Electrical Contacts) or PPS 9.36 (Manual Crimping of Size 12 - 22 Contacts).

Step 3. Slide the strain relief, the ground ring and the ground ring receptacle onto the wire bundle (in the reverse order to which they are to be assembled to the backshell). It is necessary to include the ground ring, even though it is not used when terminating the shields using jumper wires. If a side entry type backshell is being used, slide the half of the backshell with the termination hole onto the wire bundle as well.

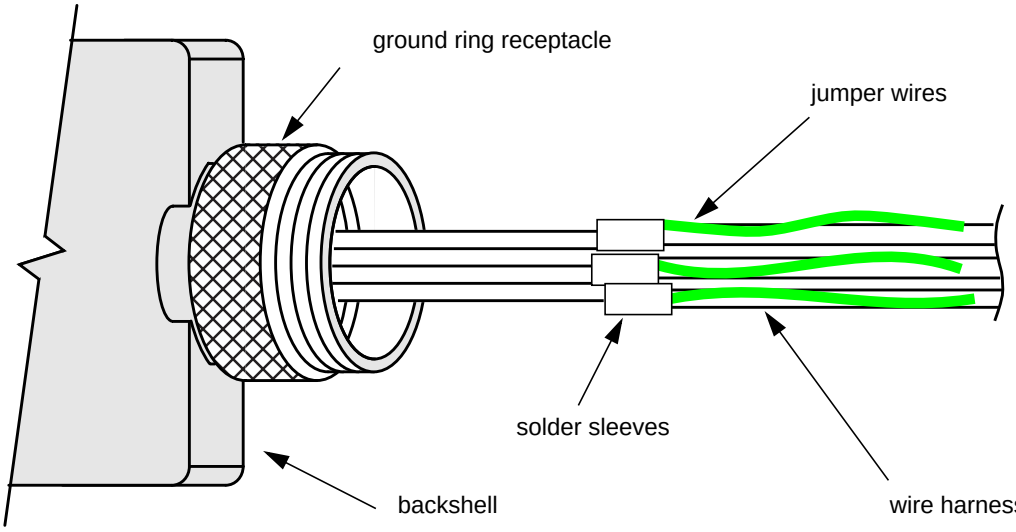
Step 4. Assemble the crimp contacts to the plug connector according to PPS 9.22.

Step 5. Place the plug connector into one half of the backshell, passing the cables and jumper wires through the termination hole (if a side entry type backshell is being used, use the backshell half which has already been slid onto the wire bundle).

Step 6. Position the two jackscrews in the grooves provided and secure the two halves of the backshell to one another using the fastening screws.

Step 7. Tighten the ground ring receptacle onto the backshell.

Step 8. Slide the ground ring all the way into the ground ring receptacle.



Step 9. Slide the strain relief clamp forward and tighten it onto the ground ring receptacle.

Step 10. Terminate the jumper wires with terminal lugs. Unless otherwise specified on the engineering drawing, terminate the jumper wires with the terminal lugs specified in the Table 1 according to PPS 9.01. Provided that the following conditions are met, up to 4 jumper wires may be terminated in a single terminal lug. During the crimping operation, treat multiple jumpers which terminate in a single lug as if they were a single wire.

- The EMC code must be the same for all wires being grounded via a common terminal lug (e.g., all wires carry a digital signal). The EMC code is the last digit in the wire identification code.
- The system code must be the same for all wires being grounded via a common terminal lug (e.g., all wires service the same system on the plane). The system code is comprised of the first four digits in the wire identification code.
- The terminal lug must be capable of accommodating the combined circular mill area of the jumper wires.

Use as few terminal lugs as possible and distribute the wires as evenly as possible (4 maximum per lug) among the terminal lugs.

Table 1 - Terminal Lug Selection

NUMBER OF AWG 22 WIRES BEING TERMINATED	TYPE OF UNINSULATED TERMINAL LUG	GAUGE OF TERMINAL LUG	FILLER WIRES REQUIRED (Note 1)
1 or 2	M7928/7	22 - 18	None
3	M7928/7	16 - 14	One 22 gauge wire
4	M7928/7	16 - 14	None

Note 1. If it is necessary to terminate 3 jumper wires in a single lug, crimp one 22 gauge filler wire along with the jumper wires according to PPS 9.09.

Step 11. Fasten the terminal lugs to the strain relief clamp as shown in Figure 2.

- Distribute the terminal lugs evenly between the left and right sides of the strain relief clamp to ensure that the clamp is balanced.
- If necessary, wrap the wire bundle with filler tape to ensure that the clamp has a secure grip on the bundle.
- A maximum of six terminal lugs (3 terminal lugs on each side) may be terminated at a single strain relief clamp.
- When using the 3 terminal lugs on one side, stack two of the terminals back to back.

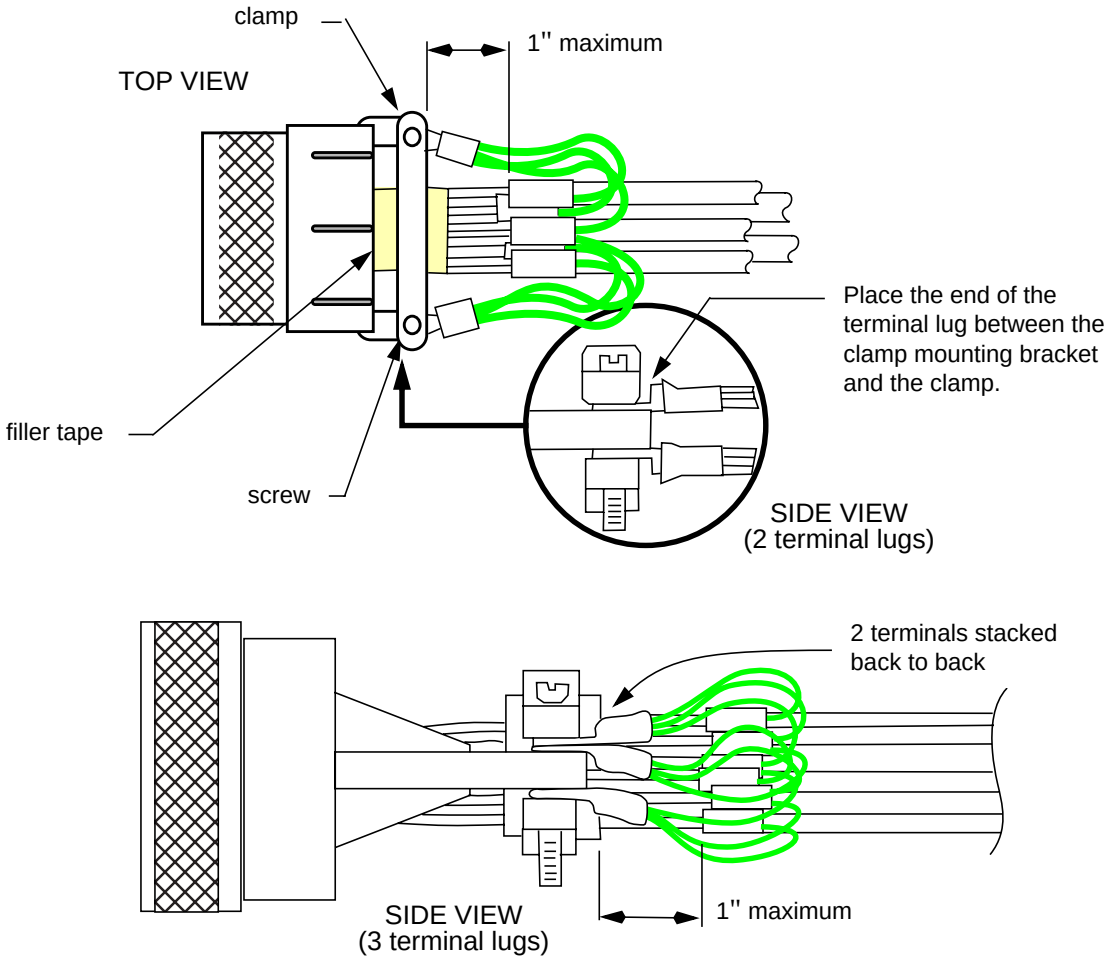


Figure 2 - Assembly of Terminal Lugs at Strain Relief Clamp

6 Requirements

6.1 The cable assembly must pass all electrical bonding tests as specified by PPS 9.06. The tests are required to verify that shields are properly bonded to the backshell in order to maintain effective cable shielding.

6.2 Ensure all wire insulation, braided shields and outer jackets are free of damage before termination.

6.3 There shall be no evidence of looseness of any terminating hardware.

6.4 The terminating hardware shall not be deformed.

6.5 All solder sleeves shall be located within the backshell.

6.6 Braid straps must protrude slightly beyond the filler tape located approximately 1" from the strain relief or gland nut.

6.7 Braid straps must be evenly spaced around the ground ring.

6.8 If a strain relief is being used, it shall have a secure grip on the wire bundle.

6.9 Jumper wires must be distributed as evenly as possible between the fewest possible terminal lugs with no more than 4 jumper wires terminated at a single terminal lug.

6.10 No more than 6 terminal lugs may be assembled to the strain relief (3 per side), with terminal lugs distributed evenly between the sides of the strain relief.

7 Safety Precautions

7.1 The safety precautions specified herein are specific to Bombardier Toronto to meet Canadian Federal and Provincial government environmental, health and safety regulations. It is recommended that other facilities consider these safety precautions; however, suppliers, subcontractors and partners are responsible for ensuring that their own environmental, health and safety precautions satisfy the appropriate local government regulations.

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

8 Personnel Requirements

8.1 This PPS has been categorized as a “Controlled Special Process” by PPS 13.39. Refer to PPS 13.39 for personnel requirements.