BOMBARDIER
Toronto (de Havilland)
PROPRIETARY INFORMATION

PPS 9.13

PRODUCTION PROCESS STANDARD

Terminating Electrical Interconnect Wiring using the Miniature Rectangular (MR) Connector System

Issue 6
- This standard supersedes PPS 9.13, 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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	Quality	

Table of Contents

Sections **Page**

Tables

Figures

1 Scope

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for terminating electrical interconnect wiring assemblies using the Tyco (AMP) Miniature Rectangular (MR) connector system.

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 9.24 - Wire and Cable Stripping.

3.2 PPS 13.26 - General Subcontractor Provisions.

4 Materials and Equipment

4.1 Materials

4.1.1 Electrical wire, Tyco (AMP) MR contacts (see Figure 1) and Tyco (AMP) MR connectors (see Figure 2) as specified on the engineering drawing or wiring list.

4.1.1.1 Contacts and connectors referenced herein as Tyco (AMP) contacts and connectors may have been procured from a number of sources including AMP, Tyco, Tyco Electronics, TE Connectivity, etc.

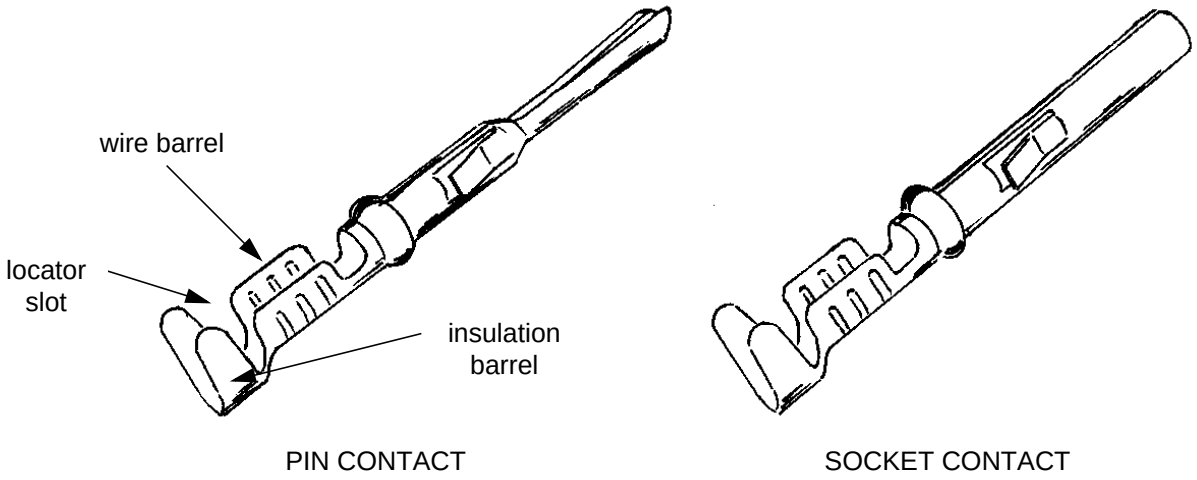


Figure 1 - Tyco (AMP) MR Contacts

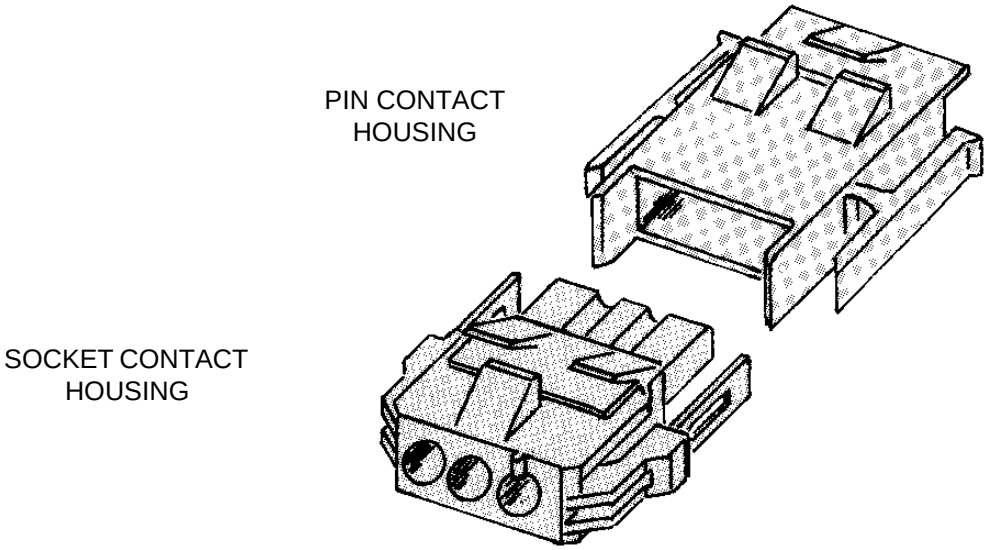


Figure 2 - Tyco (AMP) MR Connector

4.2 Equipment

4.2.1 Crimping tools, hand operated, for MR contacts as specified in Table 1 (see Figure 3). Only tools qualified according to section 6.2 may be used for crimping production parts.

4.2.2 Contact extraction tool to MS24256R20.

5 Procedure

5.1 General

5.1.1 The Tyco (AMP) Miniature Rectangular connector system consists of 3 basic components, as listed below:

- crimp type contacts (sockets and pins)
- pin housing connector - moulded plastic
- socket housing connector - moulded plastic

5.1.2 Crimp type contacts are crimped in place using hand operated tools which simultaneously form the wire crimp and wrap/crimp the insulation support lugs around the wire insulation. The tool crimp depth is pre-set and the tool is controlled by a ratchet to ensure complete crimping without further adjustment or set-up. Tyco (AMP) MR contacts are made of thin gauge phosphor-bronze alloy strip and must be handled carefully at all stages of assembly and installation to avoid bending and/or breaking of the contact.

5.2 Stripping of Wire Insulation

5.2.1 Before assembling wire to electrical contacts, strip the wire insulation from the conductor according to PPS 9.24. Take care to avoid nicking or damaging any of the wire strands.

5.3 Crimping of Contacts

5.3.1 Use the Tyco (AMP) crimping tool specified in Table 1 to crimp Tyco (AMP) MR contacts onto the wire as follows.

Step 1. Before any use of a crimp tool, ensure that the tool has been qualified according to section 6.2 and validate that the qualification has not expired (see Figure 5).

Step 2. Squeeze the tool handles together to release the ratchet and fully open the handles.

Step 3. Set the insulation crimp adjustment lever to position No. 2.

Step 4. Insert the contact (insulation barrel first) into the front of the tool and position the contact in the crimp dies so that the locator/insulation stop enters the locator slot (see Figure 4). Ensure that the contact is inserted into the correct crimp section for the particular wire size to be crimped.

Step 5. Holding the contact in position, close the tool handles until the crimp dies just grip the contact.

Step 6. Insert the stripped wire end into the contact from the back of the tool until the wire insulation butts against the locator/insulation stop.

Step 7. Holding the wire in place, squeeze the tool handles fully together to crimp the contact.

Step 8. Release the ratchet to return the handles to the fully open position.

Step 9. Remove the crimped assembly from the tool and visually check the crimped contact for conformance to the requirements of Table 2.

Table 1 - Tyco (AMP) Crimp Tool Selection

TYCO (AMP) MR CONTACT	TYCO (AMP) CRIMP TOOL
350037-1	90242-2
350666-1	90325-1 or 91526-1
640545-1	
641300-1	

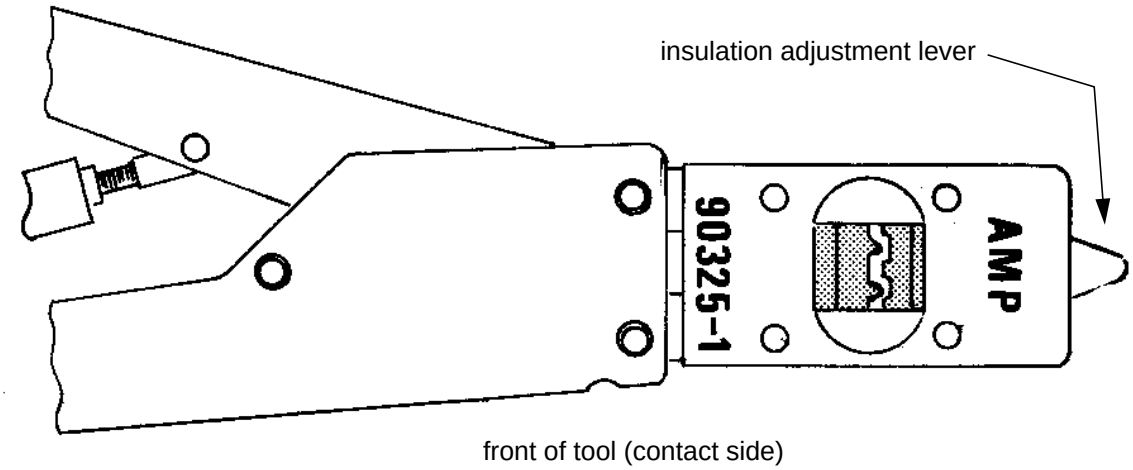


Figure 3 - Tyco (AMP) Crimp Tool

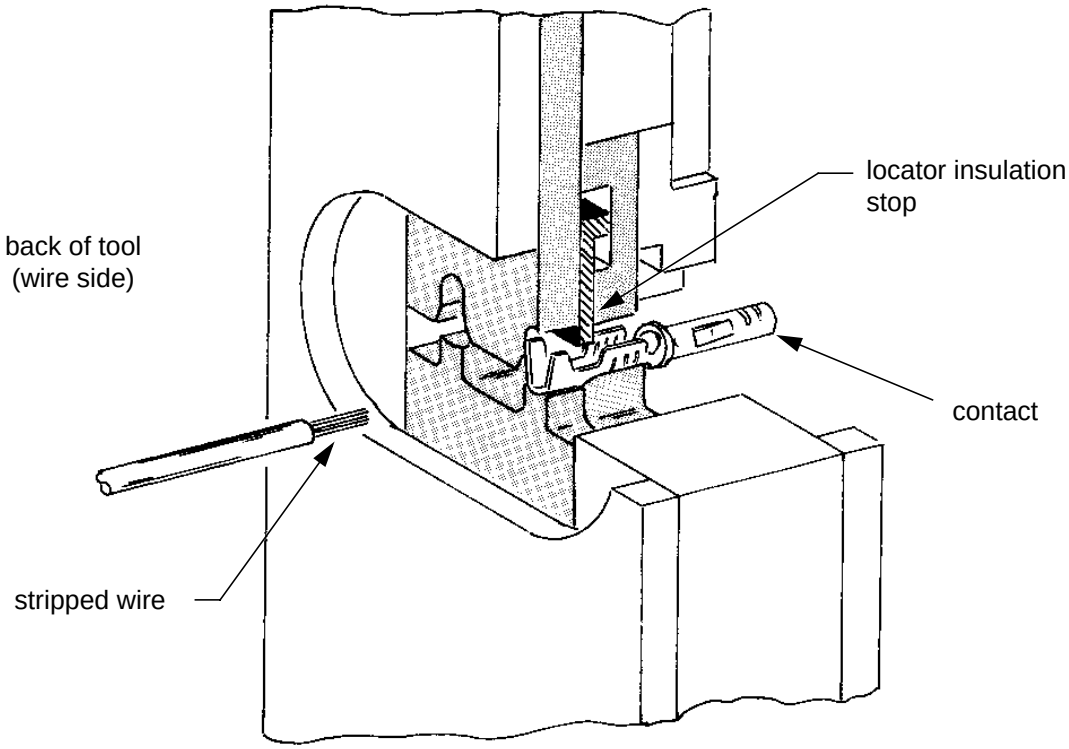


Figure 4 - Crimping Contacts

5.4 Insertion and Removal of Contacts

5.4.1 Insert crimped contacts into the MR connector housing by hand; no tooling is required.

5.4.2 If necessary, remove contacts from the connector using an MS24256R20 contact extraction tool.

6 Requirements

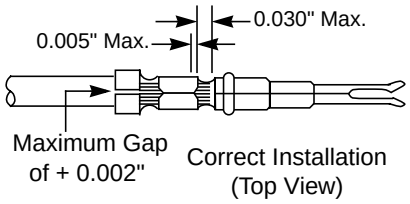
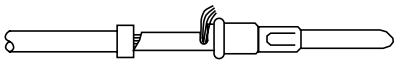
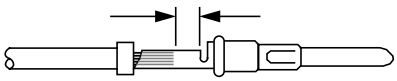
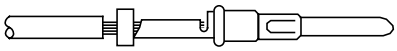
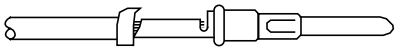
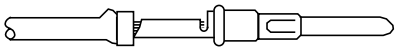
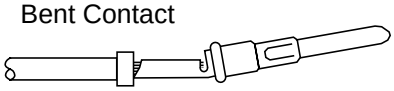
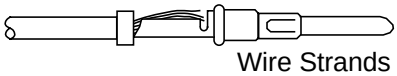
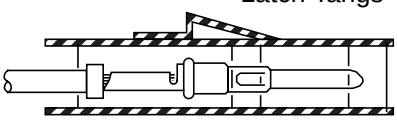
6.1 General

6.1.1 Visually examine each crimp for conformance to the requirements of Table 2.

6.1.2 The wire insulation shall be clean cut with no frayed or ragged edges.

6.1.3 Check proper contact seating by **gently** pulling on the wire after insertion of the contact into the connector.

Table 2 - Visual Examination of Crimped Contacts

VISUAL APPEARANCE (Note 1)	DESCRIPTION	CORRECTIVE ACTION
	• Wire strands must be flush with end of wire crimp within -0.005" to +0.030". • All wire strands must be within wire crimp • Wire insulation must be fully through insulation crimp.	• None Required
	• Wire strip length too long, wire strands may foul connector.	• Trim wire strands or replace contact
	• Wire strip length too short. Insufficient wire grip in wire crimp.	• Replace Contact
	• Insulation partially or completely out of insulation crimp.	• Replace Contact
	• Insulation grip lugs not fully crimped onto wire insulation.	• Reset insulation adjustment lever to next higher setting. • Replace Contact
	• Wire insulation bulged or cut due to insulation crimp being too tight.	• Reset insulation adjustment lever to next lower setting. • Replace Contact
Bent Contact 	• Up to 5° Bend	• None Required
	• 5° - 10° Bend	• Straighten Contact
	• More than 10° Bend	• Replace Contact
	• 1 or more wire strands outside of wire crimp.	• Replace Contact
Latch Tangs 	• Contact fails to enter connector or fouls on latch mechanism preventing proper latch sealing.	• Check contact for bent or broken latch tangs. • Replace contact. • Check connector latch mechanism.

Notes 1. Pin and socket contact requirements are identical.

6.2 Qualification of Crimping Tools

6.2.1 Crimping tools used on production parts must be qualified as specified herein at least once every 26 weeks or if doubt exists as to the acceptability of the crimps produced. Qualify crimping tools by preparation and tensile testing of a test sample for each wire size crimped by that tool as follows:

Step 1. Strip the ends from a 3 1/2" - 4" long piece of wire of the appropriate gauge.

Step 2. Crimp contacts to each end of the wire according to the procedure specified herein.

Step 3. Place the test sample in a standard tensile testing machine and apply force gradually and smoothly until either the wire pulls out of the contact, the wire or contact breaks or the minimum load specified in Table 3 is exceeded. For the test, the travel speed of the head must be 1" ± 1/4" per minute. If the wire pulls out of the contact before the minimum tensile strength requirement specified is reached, insufficient crimping force has been applied at the crimp resulting in an under-crimped contact. If the wire or the contact breaks at the crimp before the minimum tensile strength requirement specified is reached, excessive crimping force has been applied at the crimp resulting in an over-crimped contact. If any of the test samples fail to meet the requirements of Table 3, adjust or repair the tool represented by the test sample. After repair or adjustment, prepare and test another set of test samples before using the tool for crimping production parts.

Step 4. Identify tools for which the minimum load is reached or exceeded without the wire pulling out of the crimp or the wire or contact breaking with a suitable qualification label or sticker (e.g., see Figure 5) which includes the qualification expiry date. After the qualification expiry date, tools may no longer be used to crimp production parts until re-qualified. For each tool, maintain a record of tool qualification test results and qualification dates.

Table 3 - Qualification of Tyco (AMP) MR Contact Crimp Tools

WIRE SIZE	26	24	22	20	18
MINIMUM LOAD	5 lbs	9.5 lbs	15 lbs	25 lbs	35 lbs

Figure 5 - Example Tool Qualification Label

7 Safety Precautions

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

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 To maintain the correct depth of crimp, make periodic checks on all crimping tools, to ensure that the closed height of the crimping dies is correct to the manufacturers instructions. Carry out this check with the tool in the fully closed position. Submit crimping tools which fail to meet the dimensional gauging requirements for adjustment or repair, as required.

9.2 Keep crimping tools clean and free from dirt or shop swarf at all times.

9.3 Lightly oil the moving parts of crimp tools periodically, as required. After oiling, wipe off excess oil from all exposed surfaces.