BOMBARDIER
Toronto (de Havilland)
PROPRIETARY INFORMATION

PPS 13.06

PRODUCTION PROCESS STANDARD

Use of Screwdrivers for the Installation of Aircraft Bolts and Screws

Issue 4
- This standard supersedes PPS 13.06, Issue 3.
- 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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	Quality	

Signed original on file. Validation of paper prints is the responsibility of the user.

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1 Scope

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for the use of screwdrivers for the installation of aircraft bolts and screws.

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 2.20 - Installation of Bolts and Screws.

3.2 PPS 13.26 - General Subcontractor Provisions.

3.3 PPS 27.01 - Repair of Surface Defects in Aluminum Alloy Sheet.

4 Materials and Equipment

4.1 Materials

4.1.1 Bolts or screws as specified on the engineering drawing.

4.2 Equipment

4.2.1 Flat-bladed screwdrivers.

4.2.2 Phillips screwdrivers (e.g., as listed in Table 1).

4.2.3 Tri-Wing screwdriver bits (e.g., as listed in Table 2).

4.2.4 Suitable screwdriver handles (e.g., 1/4" magnetic socket, for use with Tri-Wing bits).

5 Procedure

5.1 General

5.1.1 Refer to Figure 1 for a general description of the screwdriver slots and recesses used at Bombardier Toronto (de Havilland).

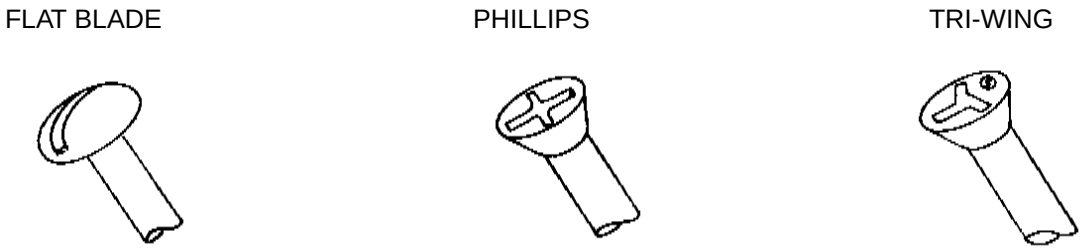

Figure 1 - General Description of Screwdriver Slots and Recesses

5.1.2 The various types of screwdrivers are available in a variety of sizes, either as individual, single-size units or handles having interchangeable bits to fit the particular type and size of bolt or screw being installed.

5.1.3 ACR driver bits contain anti-camout ribs (ACR) on each of the backout faces of the driver which engage the recess in the bolt or screw to help prevent camout during removal.

5.1.4 Install aircraft bolts and screws according to the requirements of PPS 2.20.

5.1.5 In order to prevent damage to the head of the fastener or the screwdriver tool, always use the correct size screwdriver for each particular size of screw.

5.1.6 Phillips screwdrivers are available in sizes listed in Table 1 for the particular size of screw to be installed and are available in standard and ACR configurations. The correct size Phillips standard or ACR driver bit will fully engage the driving recess and will show no evidence of clearance between the blade and sides of the recess (see Figure 2). A Phillips screwdriver which is too large will not fully engage the driving recess and one that is too small will provide excessive clearance. In either case, damage to the driver or recess will result.

Table 1 - Phillips Screwdriver Sizes

SCREW THREAD SIZE	STANDARD PHILLIPS NUMBER		PHILLIPS ACR BITS (ZEPHYR PART NO.)			
	PROTRUDING & FLUSH HEADS	REDUCED FLUSH HEAD	PROTRUDING AND FLUSH HEADS		REDUCED FLUSH HEAD	
			INSTALLATION	REMOVAL	INSTALLATION	REMOVAL
0.1120-40	1	…	D1221AARI	D1221AAR	…	…
0.1380-32	2		D1222AARI	D1222AAR		
0.1640-32		2			D1222AARI	D1222AAR
0.1900-32						
0.2500-28	3		D1223AARI	D1223AAR		
0.3125-24	4	3	n/a	n/a	D1223AARI	D1223AAR
0.3750-24		4			n/a	n/a
0.4375-20						
0.5000-20						
0.5625-18						
0.6250-18	5		n/a	n/a		
0.7500-16		5			n/a	n/a
0.8750-14	6		n/a	n/a		
1.000-12		6			n/a	n/a

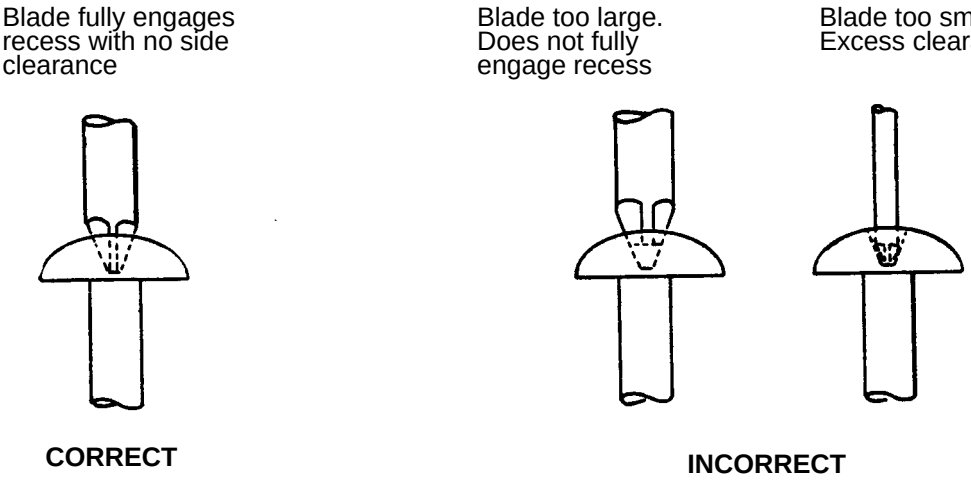

Figure 2 - Phillips Screwdrivers

5.1.7 Flat bladed screwdrivers are normally available in blade width increments of 1/16". Select the screwdriver to fit the slot in the screw head as follows (see Figure 3):

- The correct blade thickness shall be such as to allow the blade to bottom in the slot while providing a minimum amount of clearance between the sides of the slot and the blade.
- Except when installing flush head fasteners, the width of the blade should be approximately equal to the length of the slot in which it is to be used. When installing flush head fasteners, select a screwdriver with a blade width slightly less than the slot length in order to prevent interference between the blade and the countersink or dimple.

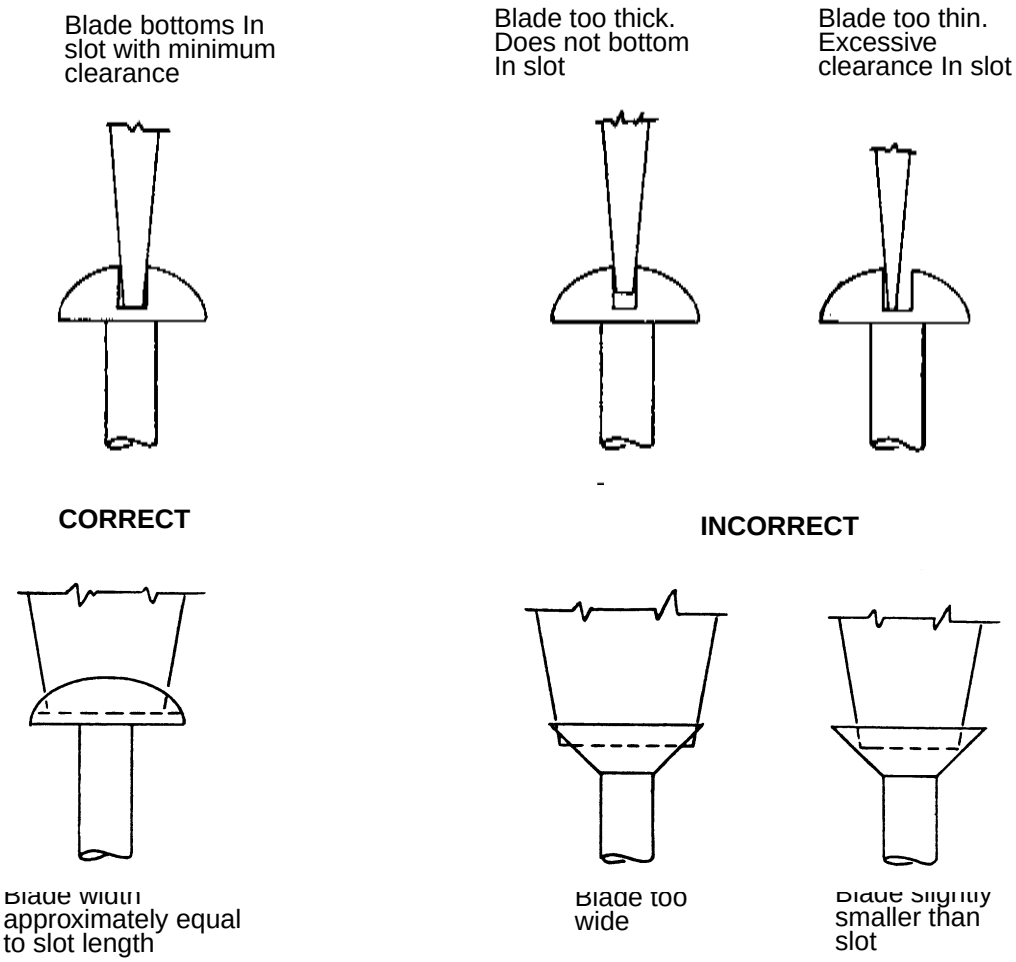

Figure 3 - Flat Bladed Screwdriver

5.1.8 Tri-Wing screwdriver bits are available in standard and ACR configurations in the sizes listed in Table 2 for the applicable size fasteners. The applicable fastener head recess dash number, which each size standard or ACR screwdriver bit fits, is stamped in a circle near the tip of the bit, in numerals slightly larger than other identification markings (see Figure 4). Each NAS fastener incorporating a Tri-Wing recess has the recess dash number stamped in a circle on the fastener head, in numerals slightly larger than other identification markings. The correct size standard or ACR Tri-Wing bit will bottom in the recess without evidence of clearance or angular displacement (rocking of bit in recess).

Table 2 - Tri-Wing Screwdriver Bit Sizes

FASTENER THREAD SIZE	STANDARD NAS 4005 DRIVER DASH NUMBER		ACR DRIVER BIT (ZEPHYR PART NO.)	
	PROTRUDING & FLUSH HEAD	REDUCED FLUSH HEAD	PROTRUDING & FLUSH HEADS	REDUCED FLUSH HEAD
0-80	0	n/a	n/a	n/a
2-56	1	n/a	n/a	n/a
4-40	2	n/a	n/a	n/a
6-32	3	n/a	TW-3DR	n/a
8-32	4	n/a	TW-4DR	n/a
10-32	5	4	TW-5DR	TW-4DR
1/4-28	6	5	TW-6ADR	TW-5DR
5/16-24	7	6	n/a	TW-6ADR
3/8-24	8	7	n/a	n/a
7/16-20	9	8	n/a	n/a
1/2-20	10	9	n/a	n/a
9/16-18	11	10	n/a	n/a
5/8-18	12	11	n/a	n/a
3/4-16	13	12	n/a	n/a
7/8-14	14	13	n/a	n/a
1-12	15	14	n/a	n/a

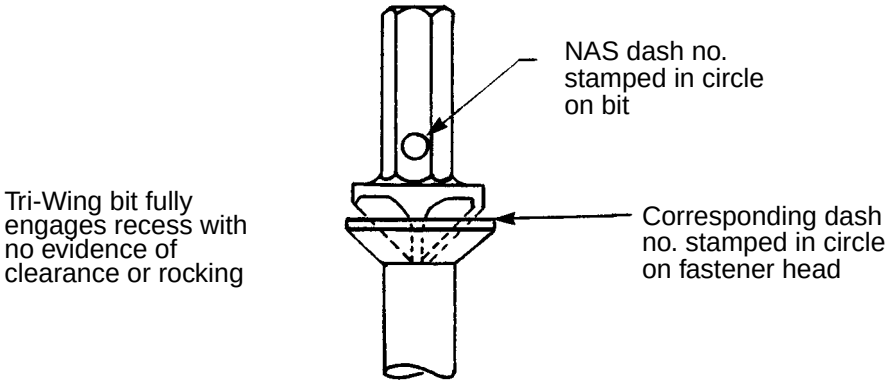

Figure 4 - Tri-Wing Screwdriver

5.2 Use of Screwdrivers

5.2.1 Hold screwdrivers as squarely as possible to the fastener head and shall have only sufficient axial load applied to ensure the following:

- the screwdriver blade or bit bears fully against the slot or recess.
- the blade or bit does not slip out of the slot or recess and damage the surrounding surface.
- the slot or recess is not rounded, stripped or burred by the blade or bit.

5.2.2 It is of the utmost importance that the correct size blade or bit is used for the particular size fastener being installed. If using a Phillips or Tri-Wing screwdriver, if there is any evidence of clearance or lack of engagement in the recess, re-check the screwdriver size against the applicable fastener. If a Tri-Wing recess has been painted over, it may be necessary to clear the recess of paint, using a bit one size smaller, and then engage the fastener using the proper size bit

5.2.3 Do not use worn or damaged screwdriver blades or insert bits as they will damage the slot or recess in the fastener head.

5.2.4 Take care to avoid damage to the surrounding surfaces. Repair accidental damage according to PPS 27.01.

6 Requirements

6.1 Bolts or screws having damaged slots or recesses are not acceptable.

7 Safety Precautions

7.1 The procedures specified herein present no specific safety hazards when performed in accordance with standard plant safety regulations.

8 Personnel Requirements

8.1 Personnel responsible for installation of aircraft bolts and screws using screwdrivers 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 Keep tools clean and free from shop swarf or dirt.

9.2 Check tool blades and bits regularly to ensure they are not worn or damaged. Discard worn or damaged screwdrivers and screwdriver bits.