BOMBARDIER
Toronto (de Havilland)
PROPRIETARY INFORMATION

PPS 1.31

PRODUCTION PROCESS STANDARD

Drill/Countersink for Flush Head Fasteners

Issue 5
- This standard supersedes PPS 1.31, 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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	Quality	

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Tables

1 Scope

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for drill/countersinking of aluminum alloy parts for the installation of flush head type fasteners using micro-stop drill/countersink tools.

1.1.1 Refer to PPS 1.32 or PPS 1.37, as applicable, for drill/countersinking using Spacematic drillmotors.

1.1.2 Refer to PPS 1.40 for drill/countersinking using Nut Plate Drillmotors.

1.1.3 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.

1.1.4 Refer to PPS 13.26 for the subcontractor provisions applicable to this PPS.

1.1.5 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 1.33 - Countersinking for Flush Head Fasteners.

3.2 PPS 13.26 - General Subcontractor Provisions.

3.3 PPS 27.02 - Edge Finishing Aluminium Alloy Parts.

4 Materials and Equipment

4.1 Materials

4.1.1 Drilling lubricant - Boelube (solid 70200 or liquid 70106), Relton A-9 or BAMS 569-001 Class C or D.

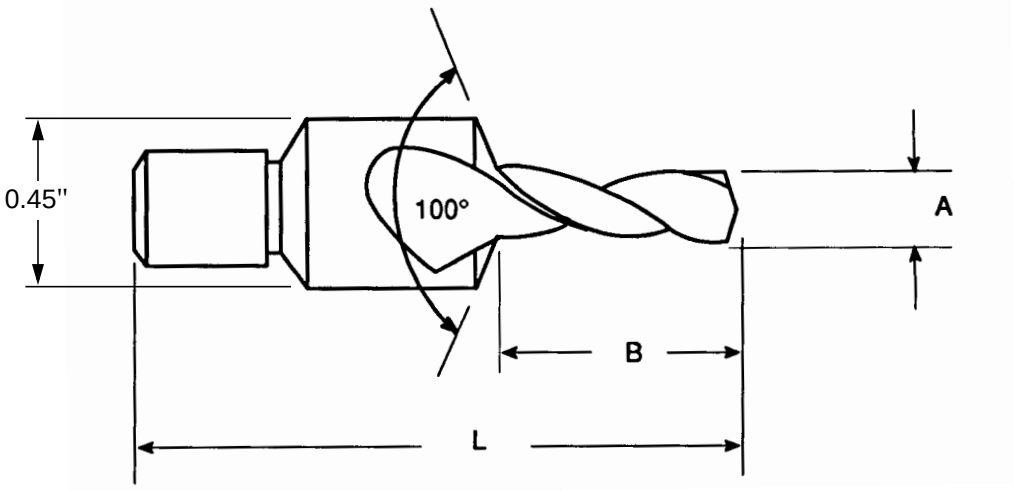
4.2 Equipment

4.2.1 Micro-stop drill/countersink (e.g., Magnavon model 3267 or model 3266).

4.2.2 Drill/countersink cutters with cutting pilots (e.g., TS.561.11.29 as listed in Table 1).

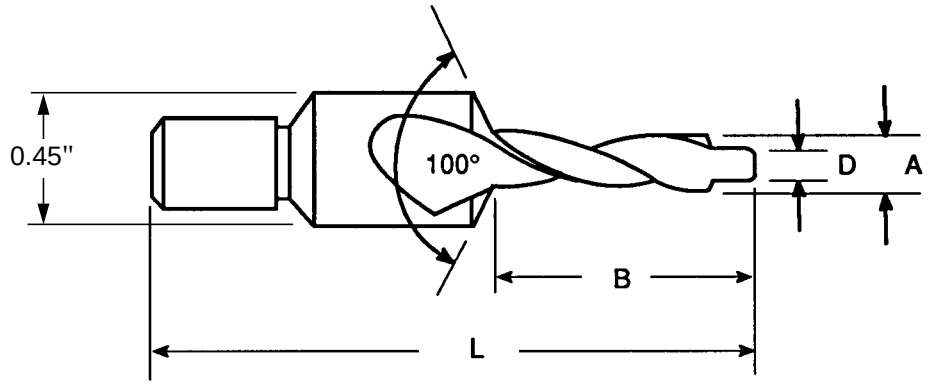
4.2.3 Drill/countersink cutters with non-cutting pilots (e.g., TS.561.11.30 as listed in Table 2).

Table 1 - Non-Piloted Drill/Countersink Cutters



TOOL STANDARD NO. TS.561.11.29	DRILL DIA. "A"	CUTTING LENGTH "B"	TOTAL LENGTH "L"
MK 2	0.128"	0.36"	1.26"
MK 3	0.159"	0.45"	1.35"
MK 4	0.190"	0.54"	1.44"
MK 5	0.098"	0.27"	1.17"
MK 6	0.159"	0.45"	1.35"
MK 7	0.185"	0.54"	1.44"
MK 8	0.164"	0.45"	1.35"
MK 9	0.190"	0.54"	1.44"

Table 2 - Piloted Drill/Countersink Cutters



TOOL STANDARD NO. TS.561.11.30	DRILL DIA. "A"	PILOT DIA. "D"	CUTTING LENGTH "B"	TOTAL LENGTH "L"
MK 2	0.128"	0.098"	0.36"	1.26"
MK 3	0.159"	0.098"	0.45"	1.35"
MK 4	0.190"	0.098"	0.54"	1.44"
MK 5	0.098"	0.067"	0.27"	1.17"
MK 6	0.159"	0.098"	0.45"	1.35"
MK 7	0.164"	0.098"	0.45"	1.35"
MK 8	0.185"	0.098"	0.54"	1.44"
MK 9	0.190"	0.098"	0.54"	1.44"

5 Procedure

5.1 General

5.1.1 Drill/countersink for the installation of flush head fasteners according to this standard using Magnavon micro-stop drill/countersink tools. It is acceptable to use alternative tooling equivalent to that specified in section 4.2, provided that all the requirements of this specification are met.

5.1.2 Drill/countersinking tools have the advantage of drilling holes to the final size and countersinking to the required diameter in one operation. Refer to the fastener PPS for the hole sizes and countersink diameters.

5.1.3 The Magnavon micro-stop drill/countersink runs on a sealed bearing to prevent the flange skirt from rotating during drill/countersinking.

5.1.4 Lubricate drill/countersinks with drilling lubricant as often as necessary.

5.2 Tooling

5.2.1 The micro-stop drill/countersink combination tool is set-up and adjusted according to this standard, and used in portable electric motors, air powered motors or stationary drill presses.

5.2.2 Use the correct size combination drill/countersink cutter with 100° included angle, as applicable.

5.3 Set-Up and Adjustment of Micro-Stop Drill/Countersink

5.3.1 Set-Up and adjust micro-stop drill/countersinks as follows:

Step 1. Select the applicable micro-stop drill/countersink tool (see Figure 1). In limited access areas, use a cut-away flange skirt micro-stop (model 3267).

Step 2. Select the appropriate drill/countersink cutter from Table 1 or Table 2, as applicable. Use non-piloted cutters when none of the parts, or only one part in an assembly is pre-drilled (see Figure 3). Use piloted cutters when the parts are pre-drilled (see Figure 4).

Step 3. Thread the selected combination drill/countersink cutter onto the micro-stop drill/countersink tool. Insert a pin approximately 1/8" diameter into the hole in the cutter and tighten the cutter firmly while holding the shank to prevent it from rotating.

Step 4. When drill/countersinking using piloted cutters, ensure that the pilot is the correct size for the pre-drilled hole to maintain concentricity and prevent chatter marks. Pre-drill holes according to the sizes specified in Table 2.

Step 5. Drill/countersink a test piece of the same material and gauge as the production part and where applicable, pre-drill according to Step 4. For hole sizes, refer to the applicable fastener PPS.

Step 6. To adjust the micro-stop drill/countersink, back off the lock ring completely.

Step 7. Hold the flange skirt and push the slotted adjusting sleeve up and away from the flange skirt to unlock.

Step 8. Rotate the flange skirt clockwise to increase, and counter-clockwise to decrease the diameter of the countersink (see Figure 2). Each division on the adjustment sleeve will effect a change of approximately 0.0025" in the diameter of the countersink.

Step 9. Release the adjustment sleeve and check that it is locked in position with the teeth meshed (see Figure 2).

Step 10. Drill/countersink the test piece using the adjusted micro-stop setting.

Step 11. Measure the test countersink using the applicable Trulock countersink gauge, set-up and adjusted according to PPS 1.33.

Step 12. Repeat the procedure specified in Step 6 through Step 10 until the correct diameter is achieved.

Step 13. After the correct size is determined, perform another drill/countersinking operation on the test piece and check for size to ensure repeatability.

Step 14. Thread the lock ring down against the adjustment sleeve to lock the setting.

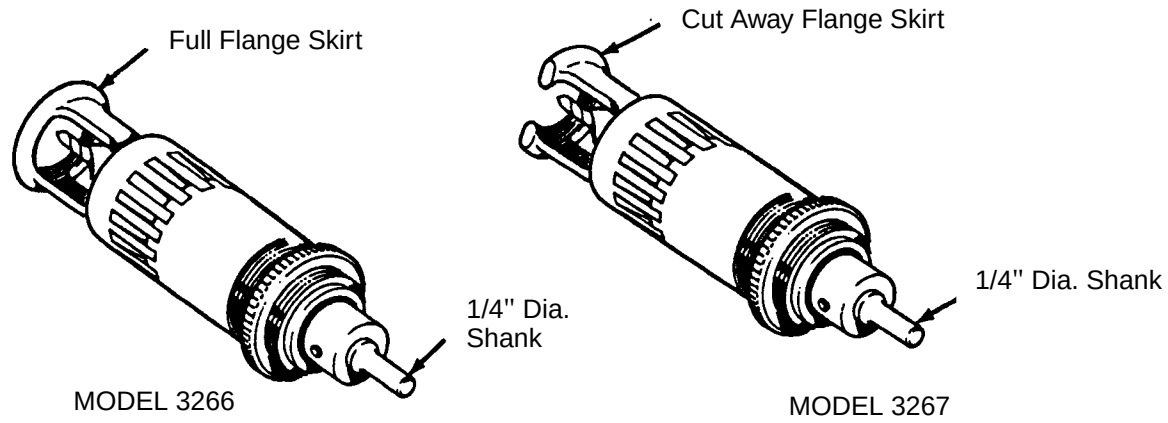


Figure 1 - Magnavon Micro-Stop Drill/Countersinks

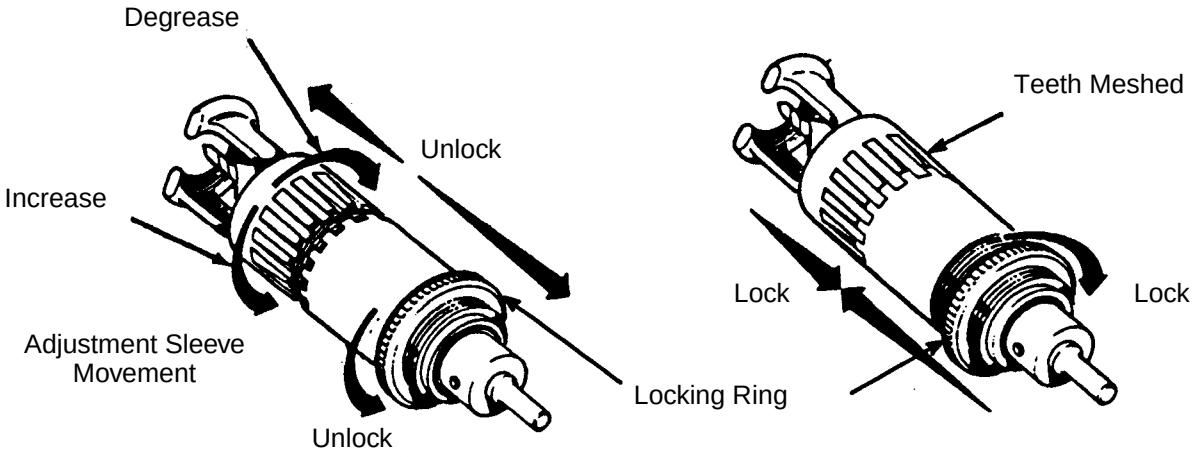


Figure 2 - Adjustment of Magnavon Micro-Stop Drill/Countersink

5.4 Drill/Countersinking

5.4.1 Drill/countersink as follows:

Step 1. If countersinking minimum thickness material, support the far side of the material to prevent enlarging the fastener hole.

Step 2. For non-piloted cutters, align the tip of the cutter with the marked position of the fastener hole or with the existing hole in the top part (see Figure 3). For piloted cutters, align the cutter pilot with the pre-drill hole and bring the flange skirt into contact with the work surface (see Figure 4).

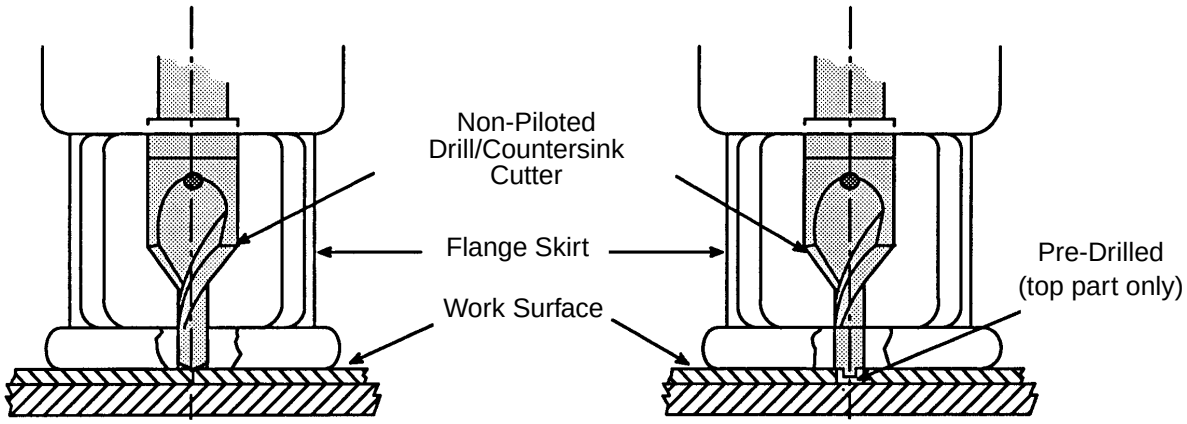


Figure 3 - Use of Non-Piloted Drill/Countersink Cutter

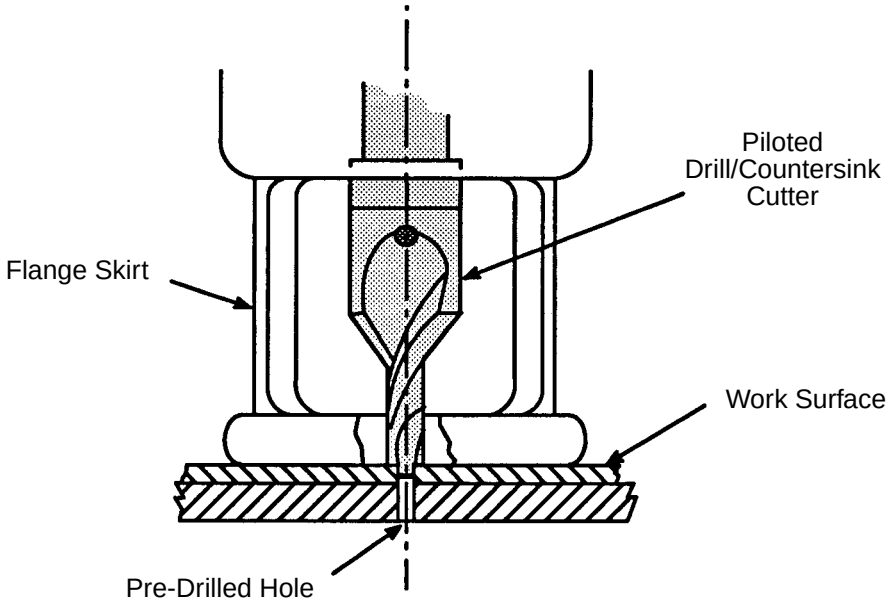


Figure 4 - Use of Piloted Drill/Countersink Cutter

Step 3. Hold the micro-stop drill/countersink tool with the flange square to the surface and start the drillmotor.

Step 4. Depress the drill/countersink cutter by pushing the drillmotor to effect the cutting. Do not use excessive force on the drillmotor. Maintain the flange skirt in contact with and square to the work surface.

Step 5. When the cutter reaches the end of its stroke, withdraw it from the hole.

6 Requirements

6.1 Before drill/countersinking production parts, check the test piece to ensure that the countersink and drilled hole diameters are within the tolerance specified in the fastener PPS.

6.2 Countersinks with burrs, scratches, or tool marks are not acceptable.

6.3 Drilled holes must meet the applicable tolerance requirements for size, concentricity, angularity and finish according to the engineering drawing, work order card or PPS.

6.4 Edge finish fastener holes according to PPS 27.02 or the fastener PPS, as applicable.

7 Safety Precautions

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

7.2 Disconnect the air line before changing the cutting tool or adjusting the depth of cut.

7.3 Operators must wear Bombardier Toronto (de Havilland) approved hearing protectors while operating tools.

8 Personnel Requirements

8.1 Personnel responsible for drill/countersinking for flush head fasteners must have a good working knowledge of the procedure and requirements as specified herein and must have exhibited their competency to their supervisor.

9 Maintenance of Equipment

9.1 Only use sharp drill/countersink cutters. When a cutter become dull, return the cutter for sharpening.

9.2 Send damaged or badly worn micro-stop countersink tools for repair or replacement of parts.

9.3 Any rework or alteration of micro-stop countersink tools is prohibited unless properly authorized.