BOMBARDIER
Toronto (de Havilland)
PROPRIETARY INFORMATION

PPS 2.12

PRODUCTION PROCESS STANDARD

Installation of Heli-Coil Screw Thread Inserts

Issue 12
- This standard supersedes PPS 2.12, Issue 11.
- Vertical lines in the left hand margin indicate technical changes over the previous issue.
- Direct PPS 2.12 related questions to michael.wright@aero.bombardier.com.
- This PPS is effective as of the distribution date.

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Prepared By:	(Michael Wright)	July 9, 2014
	Production Process Standards (PPS)	
Approved By:	(L.K. John)	July 9, 2014
	Materials Technology	
	(Adam Gordon)	July 14, 2014
	Quality	

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1 Scope

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for the installation of Heli-Coil screw thread inserts.

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 Turboprops (de Havilland), all materials must be approved and assigned Material Safety Data Sheet (MSDS) numbers by the Bombardier Turboprops (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 Turboprops (de Havilland) Environment, Health and Safety Department.

3 References

3.1 PPS 13.26 - General Subcontractor Provisions.

3.2 PPS 16.01 - Application of Hard and Soft Film Corrosion Preventive Compound.

3.3 PPS 27.05 - Manual Edge Finishing Equipment.

3.4 PPS 32.02 - Manual Application of Alodine.

3.5 PPS 32.07 - Corrosion Protection of Magnesium Alloys.

4 Materials and Equipment

4.1 Materials

4.1.1 Heli-Coil screw thread inserts as specified on the engineering drawing. Refer to Figure 1 for a breakdown of the MS identification for standard size Heli-Coil screwlock inserts. Refer to Table 1 for a breakdown of the Mil. Std. identification for standard size free running Heli-Coil inserts. Refer to Figure 2 for a breakdown of the manufacturer's identification of Heli-Coil screwlock inserts.

4.1.2 Oversize inserts and Twinsert assemblies, as specified by Liaison Engineering.

4.1.3 Refer to Figure 3 for a general description of Heli-Coil insert and Twinsert assemblies.

4.1.4 Lubricant/cutting fluid (e.g., Relton A-9).

INSERT TYPE

MS21209 = Standard screwlock

THREAD SERIES

C = Unified National Coarse
F = Unified National Fine

THREAD SIZE

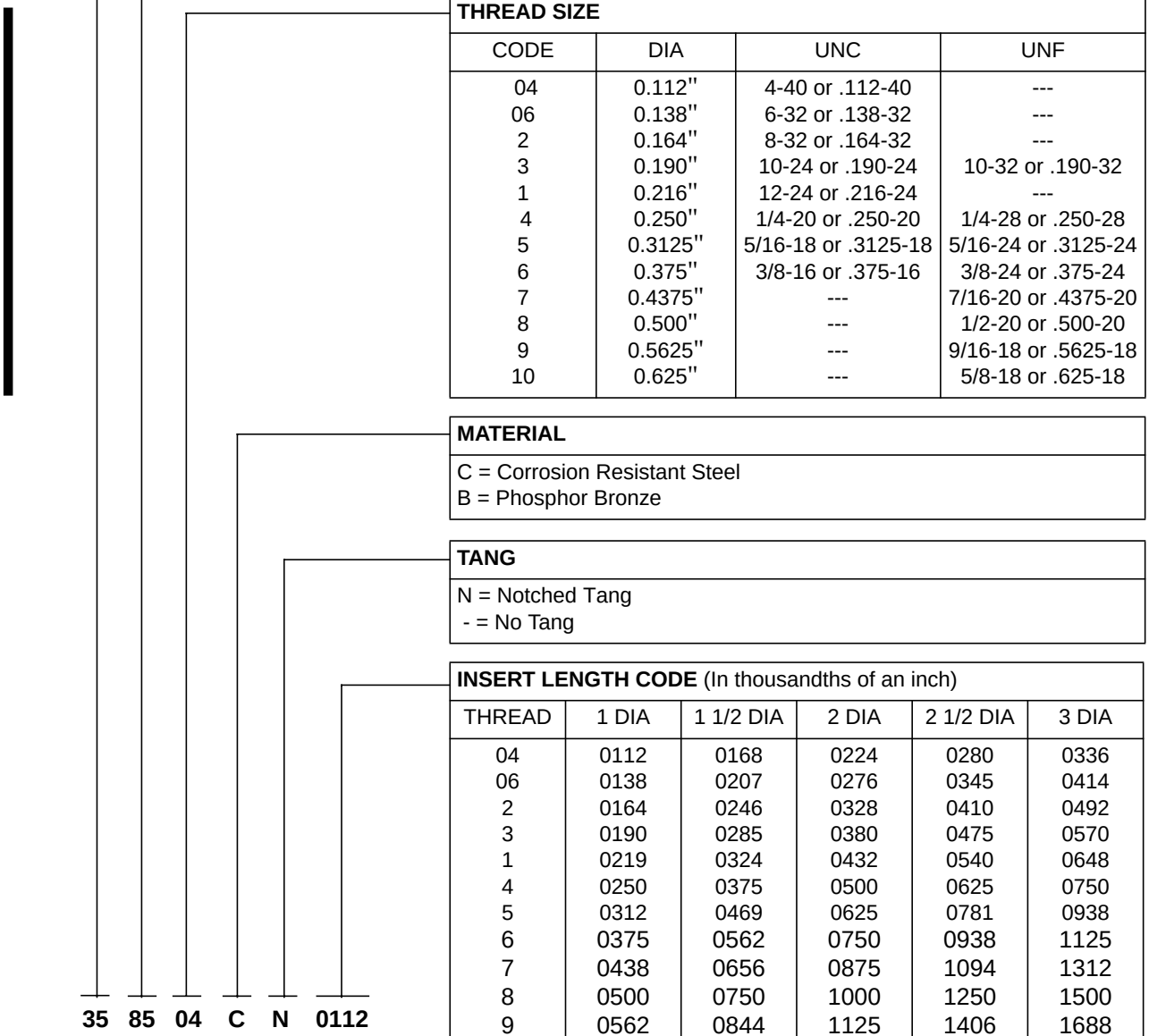
CODE	DIA	UNC	UNF
04	0.112"	4-40 or .112-40	---
06	0.138"	6-32 or .138-32	---
08	0.164"	8-32 or .164-32	---
1	0.190"	10-24 or .190-24	10-32 or .190-32
2	0.216"	12-24 or .216-24	---
4	0.250"	1/4-20 or .250-20	1/4-28 or .250-28
5	0.3125 "	5/16-18 or .3125-18	5/16-24 or .3125-24
6	0.375"	3/8-16 or .375-16	3/8-24 or .375-24
7	0.4375"	---	7/16-20 or .4375-20
8	0.500"	---	1/2-20 or .500-20
9	0.5625"	---	9/16-18 or .5625-18
10	0.625"	---	5/8-18 or .625-18

NOMINAL LENGTH OF INSERT

10 = 1 x thread dia.
15 = 1.5 x thread dia.
20 = 2 x thread dia.
25 = 2.5 x thread dia.
30 = 3 x thread dia.

MS21209 C 04 15

Figure 1 - MS Screw Thread Insert Part Number Breakdown



INSERT TYPE

35 = Standard Size Screwlock
38 = Oversize Screwlock
23 = Twinsert Outer
46 = Twinsert Inner, Screwlock

THREAD SERIES

85 = Unified National Coarse
91 = Unified National Fine

THREAD SIZE

CODE	DIA	UNC	UNF
04	0.112"	4-40 or .112-40	---
06	0.138"	6-32 or .138-32	---
2	0.164"	8-32 or .164-32	---
3	0.190"	10-24 or .190-24	10-32 or .190-32
1	0.216"	12-24 or .216-24	---
4	0.250"	1/4-20 or .250-20	1/4-28 or .250-28
5	0.3125"	5/16-18 or .3125-18	5/16-24 or .3125-24
6	0.375"	3/8-16 or .375-16	3/8-24 or .375-24
7	0.4375"	---	7/16-20 or .4375-20
8	0.500"	---	1/2-20 or .500-20
9	0.5625"	---	9/16-18 or .5625-18
10	0.625"	---	5/8-18 or .625-18

MATERIAL

C = Corrosion Resistant Steel
B = Phosphor Bronze

TANG

N = Notched Tang
- = No Tang

INSERT LENGTH CODE (In thousandths of an inch)

THREAD	1 DIA	1 1/2 DIA	2 DIA	2 1/2 DIA	3 DIA
04	0112	0168	0224	0280	0336
06	0138	0207	0276	0345	0414
2	0164	0246	0328	0410	0492
3	0190	0285	0380	0475	0570
1	0219	0324	0432	0540	0648
4	0250	0375	0500	0625	0750
5	0312	0469	0625	0781	0938
6	0375	0562	0750	0938	1125
7	0438	0656	0875	1094	1312
8	0500	0750	1000	1250	1500
9	0562	0844	1125	1406	1688
10	0625	0938	1250	1562	1875

Figure 2 - Heli-Coil Part Number Break Down

Table 1 - Military Standard Number Breakdown

MIL.STD NUMBER	INSERT TYPE	THREAD SERIES	THREAD		MATERIAL	TANG	INSERT LENGTH
			DIA	SIZE			
MS124739	Standard Size Free Running	UNF	0.4375"	7/16-20 or .4375-20	Corrosion Resistant Steel	Notched Tang	0.875"

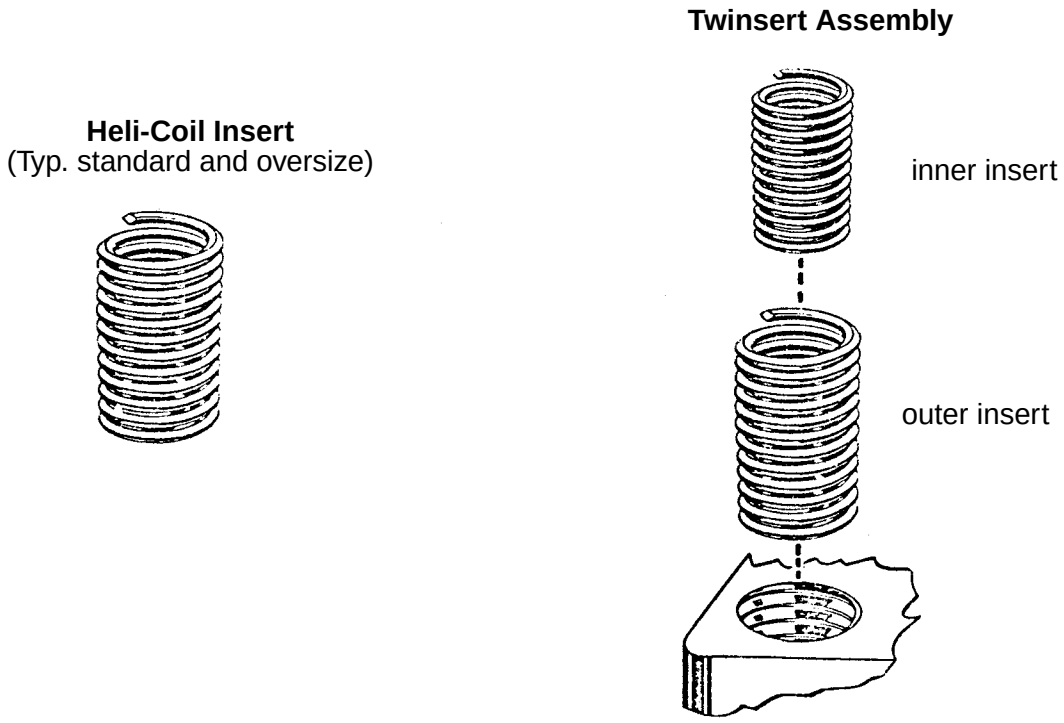


Figure 3 - General Description of Heli-Coil Inserts and Twinserts

4.2 Equipment

4.2.1 Heli-Coil insert taps and thread gauges as listed in Table 3.

4.2.2 Heli-Coil hand inserting tools, tang break-off tools and extracting tools as listed in Table 5.

4.2.3 Heli-Coil power inserting tools as listed in Table 4.

4.2.4 Twinsert taps, inserting tools and tang break-off tools as listed in Table 6.

4.2.5 Chatterless countersinks having a 120° included angle.

4.2.6 Standard thread gauges, Class 3B and Class 2B.

5 Procedure

5.1 General

5.1.1 Heli-Coil inserts are precision formed screw thread coils of stainless steel wire having a diamond shaped cross section. Most of the Heli-Coil inserts used by Bombardier Turboprops (de Havilland) are the SCREW-LOCK type which incorporate a series of chords or flats on one of the insert coils to provide a self locking action on the threaded fastener.

5.1.2 Except for inserts superseded according to EO 7336, install the type, diameter and length of insert specified on the engineering drawing. In many but not all cases, standard size self-locking and free running inserts are superseded and replaced by MS21209 screw lock inserts (refer to EO 7336 for insert substitution part numbers).

5.1.3 Heli-Coil inserts are used in design applications to provide stronger, wear-resistant threaded holes in light alloy or plastic parts and in situations requiring self locking threaded installations in tapped holes. Standard size Heli-Coil inserts may also be used to repair damaged threads if authorized by Liaison Engineering. Oversize inserts are made from slightly larger wire than standard size inserts and are used to repair standard size insert installations if an oversize, out-of-round or bell mouth condition exists. Twinsert assemblies, consisting of an outer and inner insert, are used to repair discrepancies beyond the range of oversize inserts. Only install oversize inserts or Twinsert assemblies if authorized by Liaison Engineering.

5.1.4 Heli-Coil inserts are larger in diameter, before installation, than the tapped hole. During the installation, the inserting tool applies torque to the tang, reducing the diameter of the leading coil, permitting it to enter the tapped thread. After installation, the insert coils expand outwards like a spring to permanently retain the insert position.

5.2 Preparation of Work

5.2.1 Prepare parts for installation of Heli-Coil inserts as follows:

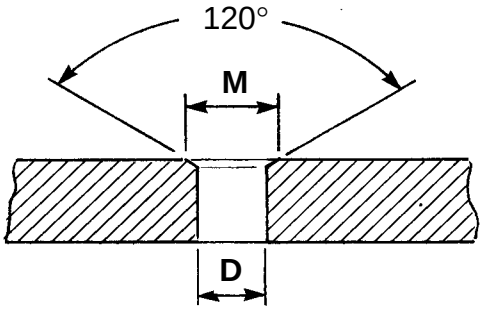
Step 1. Select the correct size drill from Table 2 for the particular insert thread size and drill off holes for inserts. Drill holes according to PPS 1.09. Drill through holes completely through the part. Drill blind holes to the “F” depth listed in Table 2 for the particular insert size and length.

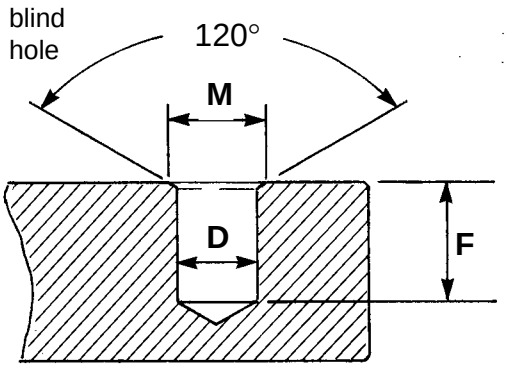
Step 2. Deburr through holes on the exit side according to PPS 27.05.

Step 3. In order to make the installation of the insert easier, countersink all holes on the side from which the insert is to be installed, to the diameter “M” specified in Table 2 using a 120° countersink.

Table 2 - Drilling Data for Heli-Coil Inserts

THREAD SIZE	DRILL SIZE "D"	DRILLED HOLE DEPTH "F" (NOTE 1)					COUNTERSINK DIAMETER "M"
		INSERT LENGTH					
		1 DIA.	1 1/2 DIA.	2 DIA.	2 1/2 DIA.	3 DIA.	
UNIFIED COARSE - THREAD SERIES							
4-40 or .112-40	#31	0.25" - 0.28"	0.30" - 0.33"	0.36" - 0.39"	0.41" - 0.44"	0.47" - 0.50"	0.14" - 0.17"
6-32 or .138-32	#26	0.31" - 0.34"	0.37" - 0.40"	0.44" - 0.47"	0.51" - 0.54"	0.58" - 0.61"	0.18" - 0.21"
8-32 or .164-32	#17	0.33" - 0.36"	0.41" - 0.44"	0.50" - 0.53"	0.58" - 0.61"	0.66" - 0.69"	0.20" - 0.23"
10-24 or .190-24	13/64"	0.41" - 0.44"	0.51" - 0.54"	0.60" - 0.63"	0.70" - 0.73"	0.79" - 0.82"	0.24" - 0.27"
12-24 or .216-24	#1	0.44" - 0.47"	0.55" - 0.57"	0.66" - 0.69"	0.76" - 0.79"	0.87" - 0.90"	0.26" - 0.29"
1/4-20 or .250-20	H	0.52" - 0.55"	0.65" - 0.68"	0.77" - 0.80"	0.90" - 0.93"	1.02" - 1.05"	0.31" - 0.34"
5/16-18 or .3125-18	Q	0.61" - 0.64"	0.77" - 0.80"	0.93" - 0.96"	1.08" - 1.11"	1.24" - 1.27"	0.38" - 0.41"
3/8-16 or .375-16	X	0.71" - 0.74"	0.90" - 0.93"	1.09" - 1.12"	1.28" - 1.31"	1.46" - 1.49"	0.45" - 0.48"
UNIFIED FINE - UNF THREAD SERIES							
10-32 or .190-32	#7	0.36" - 0.39"	0.45" - 0.48"	0.55" - 0.58"	0.64" - 0.67"	0.74" - 0.77"	0.23" - 0.26"
1/4-28 or .250-28	G	0.44" - 0.47"	0.57" - 0.60"	0.69" - 0.72"	0.82" - 0.85"	0.94" - 0.97"	0.29" - 0.32"
5/16-24 or .3125-24	21/64"	0.54" - 0.57"	0.69" - 0.72"	0.85" - 0.88"	1.01" - 1.04"	1.16" - 1.19"	0.36" - 0.39"
3/8-24 or .375-24	25/64"	0.60" - 0.63"	0.79" - 0.82"	0.97" - 1.00"	1.16" - 1.19"	1.35" - 1.38"	0.42" - 0.45"
7/16-20 or .4375-20	29/64"	0.71" - 0.74"	0.93" - 0.96"	1.15" - 1.18"	1.36" - 1.39"	1.58" - 1.61"	0.50" - 0.53"
1/2-20 or .500-20	33/64"	0.77" - 0.80"	1.02" - 1.05"	1.27" - 1.30"	1.52" - 1.55"	1.77" - 1.80"	0.56" - 0.59"
9/16-18 or .5625-18	37/64"	0.86" - 0.89"	1.14" - 1.17"	1.43" - 1.46"	1.71" - 1.74"	1.99" - 2.02"	0.63" - 0.66"
5/8-18 or .625-18	41/64"	0.93" - 0.96"	1.24" - 1.27"	1.55" - 1.58"	1.86" - 1.89"	2.18" - 2.21"	0.69" - 0.72"





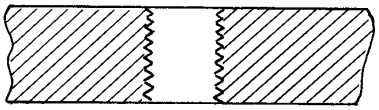
NOTE 1. Dimension "F" applicable only for blind holes.

Step 4. Select the correct Heli-Coil tap from Table 3 for the particular insert thread size and type of installation and tap holes for inserts. Use tapping lubricant/cutting fluid (see Materials section, paragraph 4.1.4) for all tapping operations. Tap through holes completely through using plug taps. Tap blind holes to the minimum "H" depth listed in Table 3 using a bottoming tap; if necessary, initial threads may be pre-cut with a plug tap to assist starting of the bottoming tap.

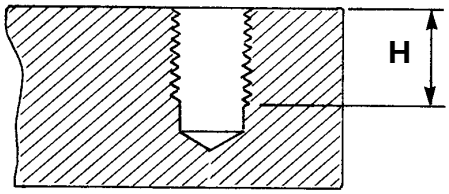
Table 3 - Tapping Data for Heli-Coil Inserts

THREAD SIZE	CLASS 3 HELI-COIL TAPS		MINIMUM TAPPING DEPTH "H" (NOTE 1)					CLASS 3 HELI-COIL THREAD GAUGES
	PLUG TYPE	BOTTOMING TYPE	INSERT LENGTH					
			1 DIA.	1 1/2 DIA.	2 DIA.	2 1/2 DIA.	3 DIA.	
UNIFIED COARSE - UNC THREAD SERIES								
4-40 or .112-40	04CPB	04CBB	0.14"	0.19"	0.25"	0.31"	0.36"	3688-04
6-32 or .138-32	06CPB	06CBB	0.17"	0.24"	0.31"	0.38"	0.45"	3688-06
8-32 or .164-32	2CPB	2CBB	0.20"	0.28"	0.36"	0.44"	0.52"	3688-2
10-24 or .190-24	3CPB	3CBB	0.23"	0.33"	0.42"	0.52"	0.61"	3688-3
12-24 or .216-24	1CPB	1CBB	0.26"	0.37"	0.47"	0.58"	0.69"	3688-1
1/4-20 or .250-20	4CPB	4CBB	0.30"	0.43"	0.55"	0.68"	0.80"	3688-4
5/16-18 or .3125-18	5CPB	5CBB	0.37"	0.53"	0.68"	0.84"	0.99"	3688-5
3/8-16 or .375-16	6CPB	6CBB	0.44"	0.63"	0.81"	1.00"	1.19"	3688-6
UNIFIED FINE - UNF THREAD SERIES								
10-32 or .190-32	3FPB	3FBB	0.22"	0.32"	0.41"	0.51"	0.60"	3694-3
1/4-28 or .250-28	4FPB	4FBB	0.29"	0.41"	0.54"	0.66"	0.79"	3694-4
5/16-24 or .3125-24	5FPB	5FBB	0.35"	0.51"	0.67"	0.82"	0.98"	3694-5
3/8-24 or .375-24	6FPB	6FBB	0.42"	0.60"	0.79"	0.98"	1.17"	3694-6
7/16-20 or .4375-20	7FPB	7FBB	0.49"	0.71"	0.93"	1.14"	1.36"	3694-7
1/2-20 or .500-20	8FPB	8FBB	0.55"	0.80"	1.05"	1.30"	1.55"	3694-8
9/16-18 or .5625-18	38193-9	48193-9	0.62"	0.90"	1.18"	1.46"	1.74"	1694-9
5/8-18 or .625-18	8193-10	10193-10	0.68"	0.99"	1.31"	1.62"	1.93"	1694-10

Through Holes - Use plug tap.



Blind Hole - Use bottoming tap.



NOTE 1 - Minimum full thread depth, blind holes only.

Step 5. Remove chips from the tapped holes by turning the work over or using a vacuum cleaner.

Step 6. Check at least the first and last hole in the pattern for conformance to the required thread dimensions using the Class 3 Heli-Coil thread gauge listed in Table 3. Refer threaded holes gauged over or undersize to Liaison Engineering for disposition.

5.3 Corrosion Protection

5.3.1 If possible, perform anodizing or application of chemical conversion coating of aluminum alloys and dichromate treatment of magnesium alloys after tapping, before installation of the insert. For aluminum parts that are tapped after anodizing or application of chemical conversion coating, touch up tapped hole with alodine according to PPS 32.02. For magnesium parts that are tapped after dichromate treatment, touch up the tapped hole with a 10% selenious acid solution according to PPS 32.07.

5.3.2 For steel parts, apply a thin brush coat of F13 Grade 3 Type I corrosion preventive compound to the threaded hole according to PPS 16.01, immediately before installing the Heli-Coil insert.

5.4 Installation of Inserts Using Power Tools

5.4.1 Power installation tools as listed in Table 4 are available at Bombardier Turboprops (de Havilland) for a limited number of insert thread sizes and may be used if the quantity of inserts to be installed justifies their use. Install insert using power tools as follows:

Step 1. Select the correct front end assembly (prewinder and mandrel) as listed in Table 4 for the insert thread size to be installed.

Step 2. Select the appropriate spacer to be used from Table 4 for the particular insert length.

Step 3. Assemble the spacer, mandrel and prewinder onto power tool as shown in Figure 4. Secure the front end assembly to the tool with the retaining nut.

Step 4. Attach the insertion tool to the shop air supply and adjust the tool regulator to required setting.

Step 5. Squeeze the trigger fully to retract the mandrel and load the Heli-Coil insert into the cut-out of the prewinder, with tang facing forward.

Step 6. Squeeze the trigger to the half-way position so that the mandrel is threaded into the insert to engage the tang and just engage the threads of the prewinder nose and then release the trigger.

Step 7. Place the end of the tool against the prepared hole.

Step 8. Holding the tool square to the face of the work, squeeze the trigger to the half way position to drive the insert into the tapped hole. The tool will automatically stall when the insert has been fully inserted

Step 9. Squeeze the trigger fully to retract the mandrel from the installed insert.

Step 10. Ensure that installed inserts shall meet the depth requirements specified in section 6.

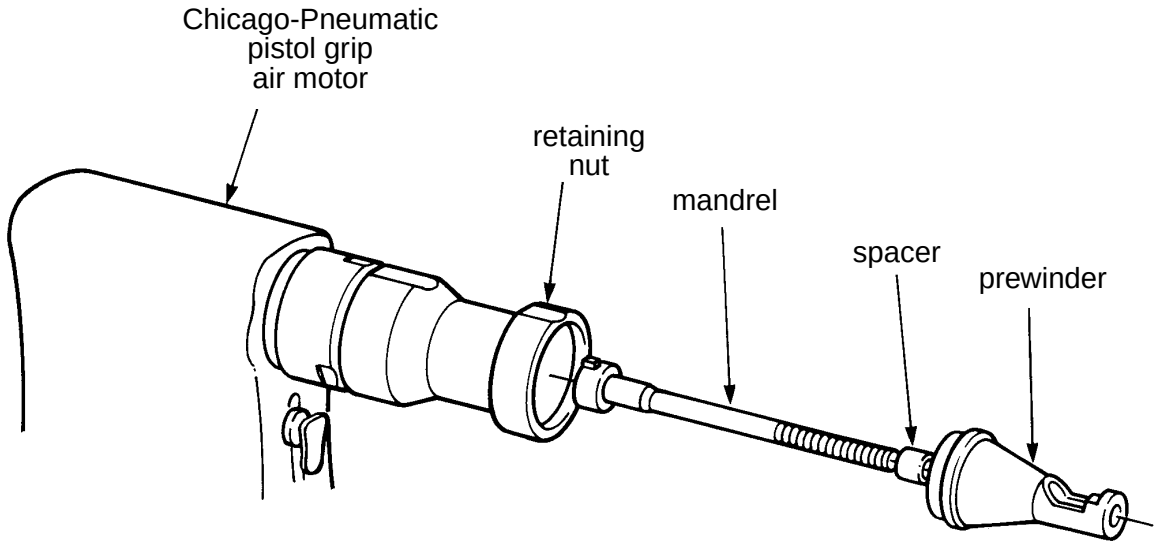


Figure 4 - Assembly Arrangement of Power Inserting Tool

Table 4 - Power Installation Tools

THREAD SIZE	AIR MOTOR ADAPTER (NOTE 1)	FRONT END ASSEMBLY	FRONT END ASSEMBLY COMPONENTS				
			PREWINDER	MANDREL	SPACERS		
					1 DIA.	1 1/2 DIA.	2 DIA.
10-32 or .190-32	8550-H	8552-3	8558-3	8554-3	8559-3	8560-3	8561
1/4-28 or .250-28		8552-4	8558-4	8554-4	8559-4	8560-4	
5/16-24 or .3125-24	8550-1H	8252-5	8258-5	8254-5	8259-5-10	8259-5-15	N/R
3/8-24 or .375-24		8252-6	8258-6	8254-6	8259-6-10	8259-6-15	
Note 1 - Use with chicago pneumatic CP3008-ORH-16 or CP3008-LR-16 air motor.							

5.5 Installation of Inserts Using Hand Tools

5.5.1 Hand installation tools are of two basic types depending on the insert thread size and class of thread. Select the insertion tool to be used from Table 5 for the particular insert size.

Table 5 - Hand Installation/Extraction Tools

THREAD SIZE	INSERTING TOOL	TANG BREAK-OFF TOOL		EXTRACTING TOOL
		PUNCH/HAMMER TYPE	AUTOMATIC PUNCH	
UNIFIED COARSE - UNC THREAD SERIES				
4-40 or .112-40	7551-04	3580-04	3695-04	1227-06
6-32 or .138-32	7551-06	3580-06	3695-06	
8-32 or .164-32	7551-2	3580-2	3695-2	
10-24 or .190-24	7551-3	3580-3	3695-3	1227-6
12-24 or .216-24	7551-1	3580-1	3695-3	
1/4-20 or .250-20	7551-4	3580-4	3695-4	
5/16-18 or .3125-18	7551-5	3580-5	3695-5	
3/8-16 or .375-16	7551-6	3580-6	3695-6	
UNIFIED FINE - UNF THREAD SERIES				
10-32 or .190-32	7552-3	3581-3	3695-3	1227-6
1/4-28 or .250-28	7552-4	3581-4	3695-4	
5/16-24 or .3125-24	7552-5	3581-5	3692-5	
3/8-24 or .375-24	7552-6	3581-6	3692-6	
7/16-20 or .4375-20	7552-7	3581-7	3692-7	1227-16
1/2-20 or .500-20	7552-8	3581-8	3692-8	
9/16-18 or .5625-18	535-9	1196-9	N/A	
5/8-18 or .625-18	535-10	1196-10	N/A	

5.5.2 install inserts using 7551 and 7552 series hand tools (see Figure 5) as follows:

Step 1. Release the stop collar on the prewinder handle, retract the mandrel and place the insert into the cut-out, with the tang facing forward.

Step 2. Holding the insert in place, screw the mandrel into the insert until the insert projects beyond the tool tip by approximately 1 thread.

Step 3. Place the tool squarely against the tapped hole and wind the insert down to the required depth, according to section 6. Depth control can be adjusted by the depth control stop collar.

Step 4. Retract the mandrel by rotating counter-clockwise.

Step 5. Check the depth of the insert and adjust the stop collar if necessary.

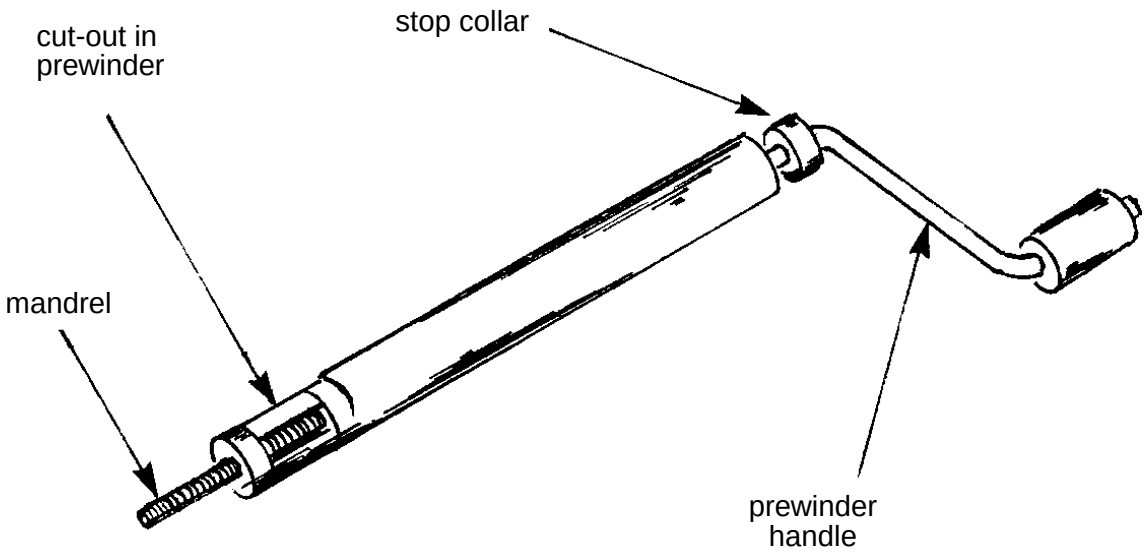


Figure 5 - 7551 & 7552 Series Insertion Tools

5.5.3 Install inserts using 535 series tools (see Figure 6) as follows:

Step 1. Loosen the set screw on the stop collar and slide the mandrel forward until it projects a distance equal to the insert length and re-tighten the set screw.

Step 2. Remove the tool body, place the insert on the mandrel and replace the body.

Step 3. Holding the tool body square to the face of the work, rotate the mandrel until the face of the body contacts the work to install the insert.

Step 4. Retract the mandrel by rotating counter-clockwise.

Step 5. Check the depth of the insert and adjust the stop collar if necessary.

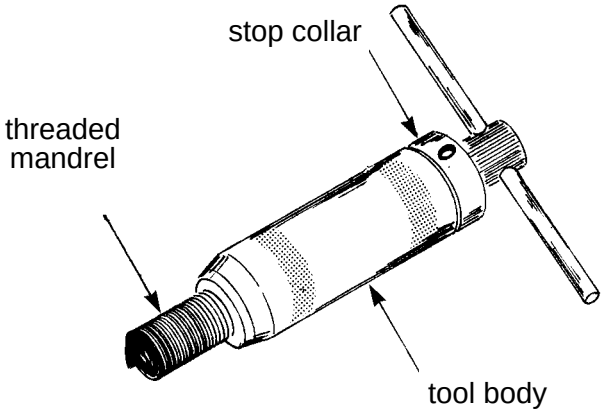


Figure 6 - 535 Series Installation Tool

5.6 Tang Break-Off

5.6.1 Heli-Coil tang break-off tools are either the punch/hammer style or the automatic punch type as listed in Table 5.

5.6.2 When using the punch/hammer tool, place the punch end into the insert so that it contacts the tang. Strike the end of the punch a sharp blow with a hammer to break off the tang.

5.6.3 When using the automatic punch, place the punch end into the insert so that it contacts the tang and push the handle forward until the spring loaded punch is triggered to break off the tang.

5.6.4 For 9/16” diameter and larger Heli-Coil inserts, the tang may be removed by gripping the tang with long nosed pliers and bending up and down slightly until the tang breaks off.

5.6.5 Ensure that broken off tangs are removed from blind holes.

5.7 Removal of Installed Inserts (See Figure 7)

5.7.1 If necessary, remove installed inserts as follows:

Step 1. Select the correct extracting tool from Table 5 for the insert size to be removed.

Step 2. Place the blade of the tool into the insert such that the end of the coil is located half way between the two edges of the blade (see Figure 7-B).

Step 3. Tap the top of tool sharply so that the blade bites into the coil.

Step 4. While maintaining a steady downward pressure, rotate the tool counter-clockwise to unscrew the insert.

Step 5. Discard the removed insert as it is not acceptable to re-use inserts that have been removed.

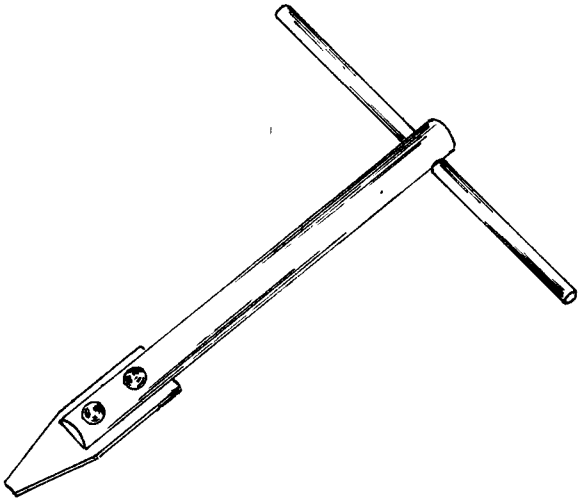


Fig. 7-A - Extracting Tool

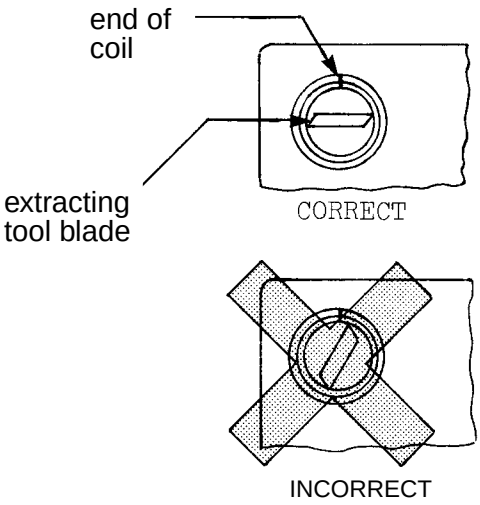


Fig. 7-B - Position in Tool in Insert

Figure 7 - Removing Installed Inserts

5.8 Use of Oversize Inserts and Twinsert Assemblies

5.8.1 If authorized by Liaison Engineering, oversize inserts may be used to repair damaged, oversize or out-of-round holes as follows.

Step 1. Select the correct size tap from Table 6 for the applicable oversize insert to be installed and re-tap the threaded hole

Step 2. Vacuum or clean out the threaded hole to remove any chips.

Step 3. Treat the hole for corrosion protection according to section 5.3.

Step 4. Install an oversize insert according to section 5.5 using the insertion tools specified in Table 5 for standard size inserts.

Step 5. Break off the tang according to section 5.6 using the tang break-off tool as specified in Table 5 for standard size inserts.

Step 6. Check the installed insert using a standard Class 3B thread gauge. If the thread is still oversize, refer to Liaison Engineering.

Table 6 - Oversize Insert and Twinsert Installation Data and Tooling

THREAD SIZE	OVERSIZE INSERTS		TWINSERTS-OUTER INSERT (NOTE 1)			
	OVERSIZE TAP	INSTALLATION TOOLS	DRILL SIZE	TWINSERT TAP	INSTALLATION TOOL	TANG BREAK-OFF TOOL
UNIFIED COARSE - UNC THREAD SERIES						
4-40 or .112-40	56187-04-2	Use standard size Heli-Coil tools for inserting oversize inserts.	#24	3887-04	2698-04	3580-06
6-32 or .138-32	56187-06-2		#12	3887-06	2698-06	3580-3
8-32 or .164-32	56187-2-2		#3	3887-2	2698-2	3580-1
10-24 or .190-24	56187-3-5		F	3887-3	2698-3	3580-4
12-24 or .216-24	56187-1-2		9/32"	3887-1	2698-01	3580-4
1/4-20 or .250-20	56187-4-2		21/64"	3987-4	2698-4	3580-5
5/16-18 or .3125-18	56187-5-2		X	3987-5	2698-5	3580-6
3/8-16 or .375-16	56187-6-2		15/32"	3987-6	2698-6	3580-7
UNIFIED FINE - UNF THREAD SERIES						
10-32 or .190-32	56193-3	Use standard size Heli-Coil tools for inserting oversize inserts.	C	3893-3	2705-3	3581-4
1/4-28 or .250-28	56193-4		5/16"	3893-4	2705-4	3581-5
5/16-24 or .3125-24	56193-5		V	3893-5	2705-5	3581-6
3/8-24 or .375-24	56193-6		7/16"	3993-6	2705-6	3581-7
7/16-20 or .4375-20	56193-7		33/64"	3993-7	2705-7	3581-8
1/2-20 or .500-20	56193-8		37/64"	3993-8	2705-8	1196-9
9/16-18 or .5625-18	N/A		41/64"	3993-9	2705-9	N/A
5/8-18 or .625-18	N/A		45/64"	3993-10	2705-10	N/A

Note 1. Use standard size Heli-Coil tools for inserting inner insert.

5.8.1.1 If authorized by Liaison Engineering, Twinserts may be used to repair damaged, oversize or out-of-round holes if an oversize insert will not rectify the discrepancy.

Step 1. Prepare the hole according to section 5.2, using the applicable Twinsert drill and tap as specified in Table 6.

Step 2. Vacuum or clean out the tapped hole to remove any chips

Step 3. Treat the hole for corrosion protection according to section 5.3.

Step 4. Install the outer insert according to section 5.5 using the Twinsert installation tool specified in Table 6.

Step 5. Break off the tang according to section 5.6, using the tang break-off tool specified in Table 6.

Step 6. Install the inner insert according to section 5.5, using the insertion tools specified in Table 5 for standard size inserts. Ensure that the ends of the inner and outer inserts are flush (see Figure 9).

Step 7. Break off the tang according to section 5.6, using the tang break-off tool specified in Table 5 for standard size inserts.

Step 8. Check the installed Twinsert assembly using a standard Class 2B thread gauge. Refer Twinsert assemblies which are gauged over or undersize to Liaison Engineering for disposition.

6 Requirements

6.1 For standard and oversize inserts, ensure that the top coil of the installed insert is 1 to 1 1/2 pitches below the surface of the tapped hole (see Figure 8). For Twinsert assemblies, ensure that the top coil of the outer insert is 1/4 to 1/2 of a pitch below the surface of the tapped hole (see Figure 9).

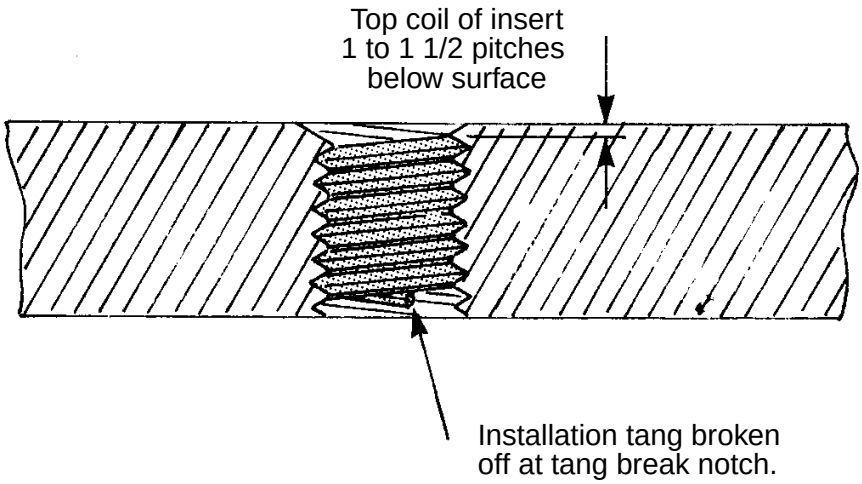


Figure 8 - Standard and Oversize Insert Installation Requirements

6.2 Ensure that the installation tang has been cleanly broken off at the tang break notch. For Twinsert assemblies, the installation tangs of both inner and outer inserts must be cleanly broken off at the tang break notch.

6.3 Inserts failing to meet the depth of coil requirements or having deformed or damaged coils must be removed according to section 5.7 and replaced. Provided there is no damage to the structure, Liaison Engineering approval is not required to replace coils.

6.4 For Twinsert assemblies, ensure that the end coil of the inner insert is flush with the end coil of the outer insert (see Figure 9).

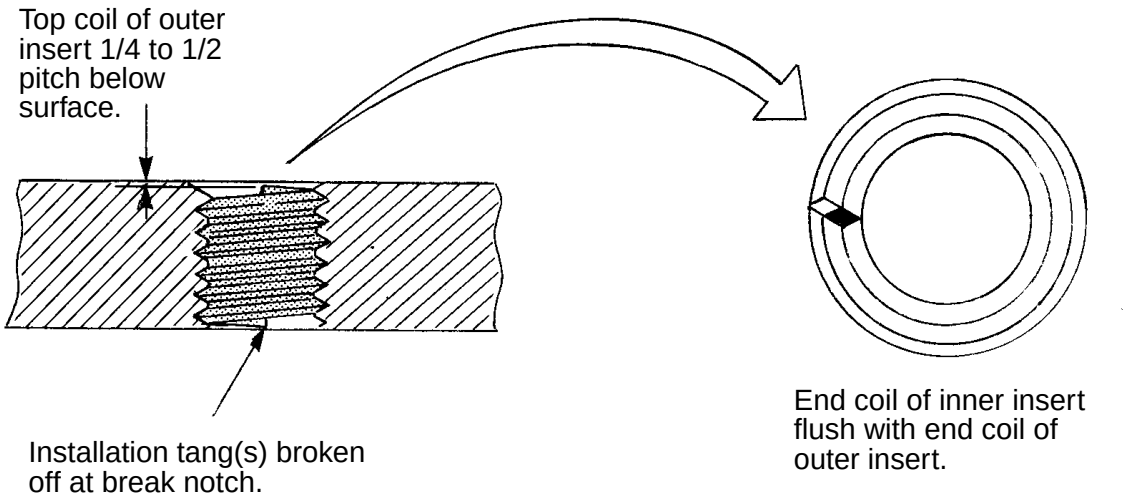


Figure 9 - Twinsert Assembly Installation Requirements

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 their appropriate local government regulations.

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

7.3 Disconnect air lines from pneumatic power insertion tools when changing or adjusting front end assemblies.

8 Personnel Requirements

8.1 Personnel responsible for installation of Heli-Coil screw thread inserts 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 It is recommended that Heli-Coil tools be issued in complete sets, contained in specially designated boxes and that set be regularly checked for damaged and missing parts.