BOMBARDIER
Toronto (de Havilland)
PROPRIETARY INFORMATION

PPS 2.63

PRODUCTION PROCESS STANDARD

INSTALLATION OF NUT PLATE BLIND RIVETS

Issue 10
- This standard supersedes PPS 2.63, Issue 9.
- 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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1 SCOPE

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for the installation of pull through and self plugging type nut plate blind rivets for attachment of nut plates to aircraft structures.

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 1.09 - Drilling and Reaming.

3.2 PPS 1.33 - Countersinking for Flush Head Fasteners.

3.3 PPS 2.17 - Installation of Anchor Nuts.

3.4 PPS 13.26 - General Subcontractor Provisions.

3.5 PPS 27.05 - Manual Edge Finishing Equipment.

3.6 PPS 34.02 - Application of Alkyd Zinc Chromate Primer (F1).

3.7 PPS 34.08 - Application of Epoxy-Polyamide Primer (F19 & F45).

4 MATERIALS AND EQUIPMENT

4.1 Materials

4.1.1 Nut plate blind rivets as specified by the engineering drawing. See Figure 1 for a general description of a nut plate blind rivet.

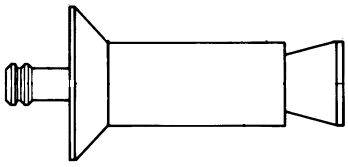
4.1.1.1 CCR264 rivets have been superseded by BACR15DR rivets which, in turn, have been superseded by MS20605 rivets. Except as noted in paragraph 4.1.1.2, install the rivets specified by Table I wherever the engineering drawing specifies the use of CCR264 or BACR15DR rivets.

4.1.1.2 For Bombardier Toronto (de Havilland) operators, install the rivets specified on the work order or assembly manual. If the rivet specified on the work order or assembly manual is not available, contact Work and Material Planning (WMP). Do not use substitute rivets (as specified herein and allowed by an Engineering approved EO or SREO) without Methods approval.

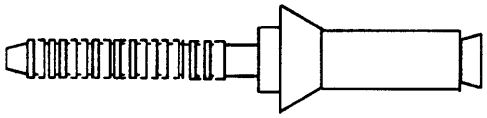
TABLE I - SREO APPROVED RIVET SUBSTITUTIONS

CCR264 RIVET (superseded)	**BACR15DR RIVET** (superseded) **REPLACEMENT FOR CCR264 RIVETS**	**MS20605 RIVET REPLACEMENT FOR BACR15DR AND CCR264 RIVETS**
CCR264SS3-* *(XF)*	BACR15DR3-* *(XPH)*	MS20605S3W* *(AXM)*
CCR264CS-* *(XZ)*	BACR15DR3A* *(XWL)*	MS20605R3W* *(AXN)*

Note 1. * denotes grip range.
Note 2. Install the superseding/replacement rivets when stock of the old rivets is depleted. **Old and new are not interchageable** (e.g., it is **not** acceptable to install a BACR15DR or a CCR264 rivet if a MS20605 rivet is specified by the engineering drawing)



PULL THROUGH TYPE
NUT PLATE BLIND RIVET
(B0207017, BACR15DR,
CCR264 & MS20605)



SELF PLUGGING TYPE
NUT PLATE BLIND RIVET
(CR2672)

FIGURE 1 - NUT PLATE BLIND RIVETS

4.2 Equipment

4.2.1 Power riveter, (e.g., TS.414.03.23 or Cherry G702). See Figure 2 for a general description of a power riveter.

4.2.2 Pulling heads for power riveter (e.g., TS.414.04.12, Cherry H702-3NPR and Cherry H890-3). See Figure 3 for a general description of a pulling head.

4.2.3 Hand riveters (e.g., TS.414.03.12, Cherry G29 or Cherry G30. See Figure 4 for a general description of a hand riveter.

4.2.4 Nosepieces (e.g., TS.414.04.12, Cherry 728A9-3 or Cherry 728-33). See Figure 5 for a general description of an installation nosepiece.

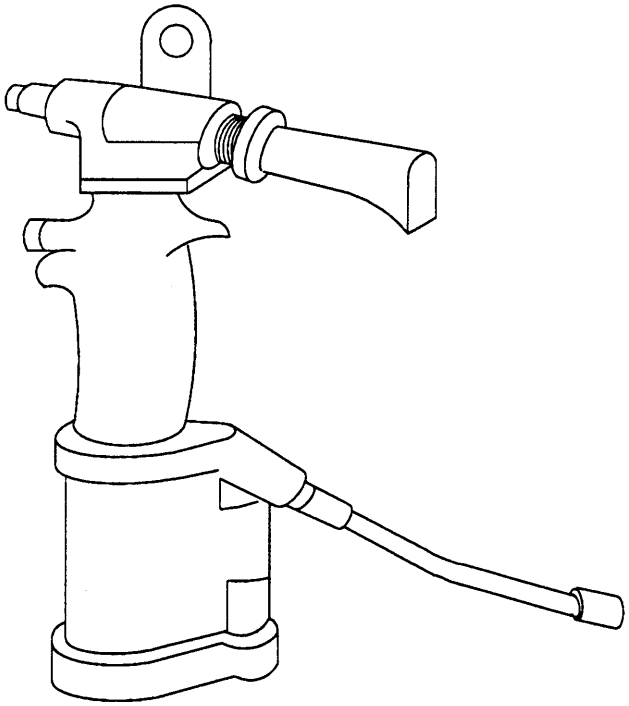


FIGURE 2 - POWER RIVETER

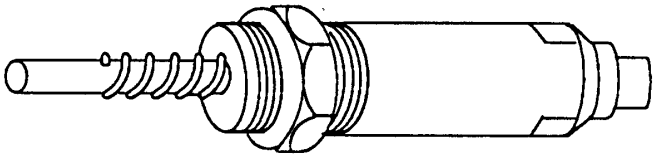


FIGURE 3 - PULLING HEAD

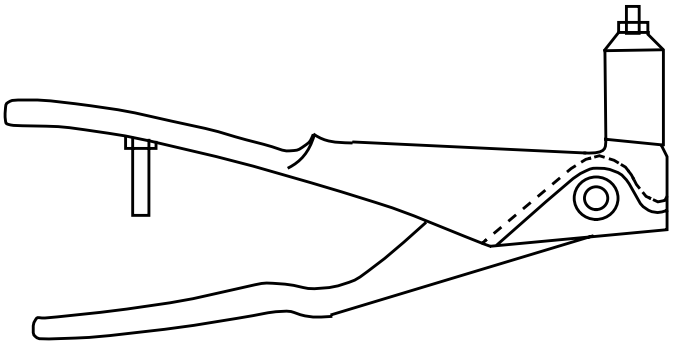


FIGURE 4 - HAND RIVETER

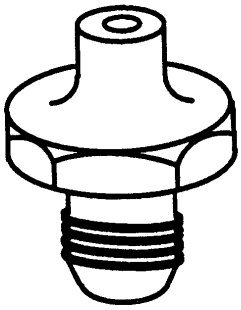


FIGURE 5 - NOSEPIECE

5 PROCEDURE

5.1 General

5.1.1 Nut plate rivets are flush head blind rivets with a pull through mandrel used for attaching nut plates (also known as anchor nuts) to the aircraft structure.

5.2 Preparation of Holes

5.2.1 Prepare holes as follows:

Step 1. Locate holes for nut plate blind rivets according to PPS 2.17.

Step 2. Drill holes to the dimension specified in Table II according to PPS 1.09.

TABLE II - HOLE PREPARATION DATA

RIVET	NOMINAL RIVET DIAMETER	RECOMMENDED DRILL SIZE	FINAL HOLE
B0207017, BACR15DR, CCR264, CCR274, CR2672 or MS20605	3/32"	#40 (0.098")	0.097" - 0.101"

Step 3. For installation of flush head nut plate blind rivets, countersink using a 100° micro stop countersink according to PPS 1.33 to the countersink diameter specified in Table III. Keep the countersink diameter as close to the minimum recommended diameter as possible.

TABLE III - COUNTERSINKING DATA (Note 1**)**

RIVET	NOMINAL RIVET DIAMETER	COUNTERSINK DIAMETER
CCR264, CCR274, CR2672, BACR15DR or MS20605	3/32"	0.175" - 0.185"
B0207017	3/32"	0.132" - 0.137"
Note 1. The countersink diameter dimensions specified in this table are for reference only; install nut plate blind rivets so that the head protrusion limits specified in paragraph 6.2 are met.		

Step 4. Deburr the hole according to PPS 27.05.

Step 5. Prime countersinks with a coat of F1 zinc chromate primer according to PPS 34.02 or F19 Type 2 epoxy-polyamide primer according to PPS 34.08.

5.2.2 On a sample basis, check at random (across the entire pattern) the number of holes specified in Table IV for conformance to the hole limit requirements, using a go/no-go gauge or other hole measuring gauge. If any oversize holes are found in the sample, check every hole in the pattern. Refer all oversize holes to Bombardier Toronto (de Havilland) MRB or Bombardier Toronto (de Havilland) delegated MRB for disposition.

5.2.2.1 While checking holes using a GO/NO-GO gauge or other hole measuring gauge, also check visually for hole ovality. For holes with a visually evident oval or out of round shape, check the hole diameter at several positions using suitable hole measurement equipment (e.g., vernier calliper, hole micrometer, etc.) to determine the minor and major diameters of the hole. The minor and major diameters of the hole must be within the minimum and maximum hole diameter tolerances, respectively. If the minor or major diameters of any oval hole in the sample are not within the minimum and maximum hole diameter tolerance, check every hole in the pattern for conformance to the hole limit requirements and visually for ovality as specified herein. Refer all non-conforming holes to Bombardier Toronto (de Havilland) MRB or Bombardier Toronto (de Havilland) delegated MRB for disposition.

TABLE IV - HOLE SIZE VERIFICATION SAMPLE REQUIREMENTS

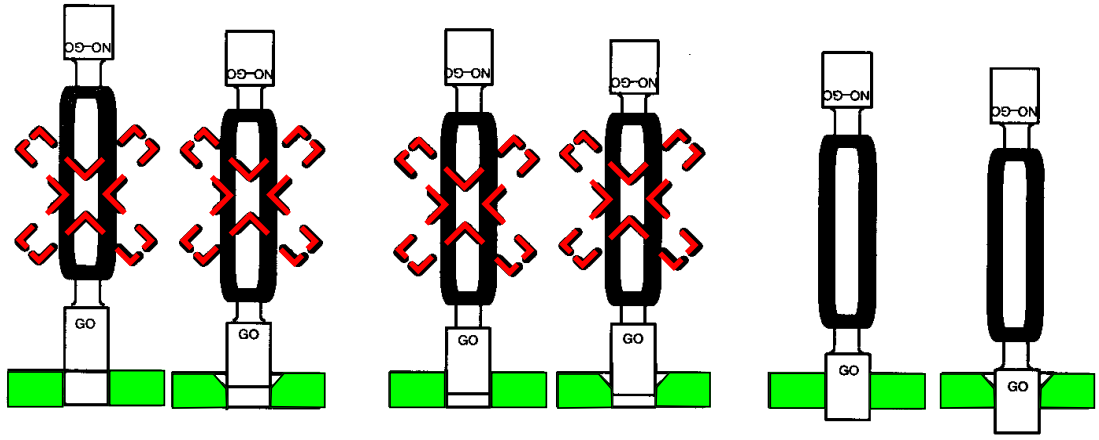
NUMBER OF HOLES IN PATTERN	REQUIRED SAMPLE SIZE
5 or less	all
6 - 50	5
51 - 90	7
91 - 150	11
151 - 280	13
281 - 500	16
more than 500	19

5.3 Use of GO/NO-GO Gauges

5.3.1 Check selected fastener holes for conformance to the requirements of Table II using the applicable go/no-go gauge as follows (see Figure 6):

Step 1. Taking care not to force or rotate the go/no-go gauge, lightly insert the go end of the gauge into the fastener hole. If the go end of the gauge goes in only partially or does not go into the hole at all, the hole is **undersize**. Open undersize holes to the final diameter specified in Table II.

Step 2. Lightly insert the no-go end of the plug gauge in the fastener hole. If the gauge goes completely into the hole, the hole is **oversize**; oversize holes are not acceptable and must be referred to Bombardier Toronto (de Havilland) MRB or Bombardier Toronto (de Havilland) delegated MRB for disposition.

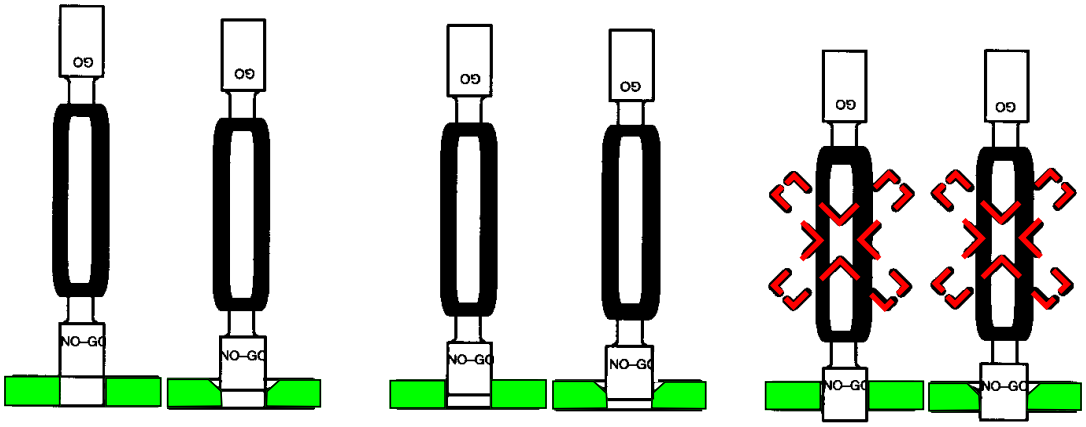


Does not go in.
UNDERSIZE HOLE

Goes only partially in.
UNDERSIZE HOLE

Goes in completely.
ACCEPTABLE

USE OF GO END



Does not go in.
ACCEPTABLE

Goes only partially in.
ACCEPTABLE

Goes in completely.
OVERSIZE HOLE

USE OF NO-GO END

FIGURE 6 - USE OF GO/NO-GO GAUGES

5.4 Selection of Rivet Length

5.4.1 If the engineering drawing does not specify which rivet grip length to use, refer to Table V.

TABLE V - NUT PLATE BLIND RIVET GRIP RANGES

GRIP RANGE	MATERIAL THICKNESS	GRIP RANGE	MATERIAL THICKNESS
-1	0.046" - 0.062"	-5	0.251" - 0.312"
-2	0.063" - 0.125"	-6	0.313" - 0.375"
-3	0.126" - 0.187"	-7	0.376" - 0.437"
-4	0.188" - 0.250"	-8	0.438" - 0.500"

5.5 Preparation of Installation Tools

5.5.1 Prepare power and hand riveters as follows:

Step 1. If using a power riveter, fit the tool with the pulling head specified by Table VI. The hand riveters are permanently fitted with the correct pulling head.

Step 2. Thread the nosepiece specified by Table VI onto the pulling head.

Step 3. Before connecting the power riveter (see paragraph 4.2.1) ensure that the air line connectors are free of foreign particles.

TABLE VI - INSTALLATION EQUIPMENT SELECTION

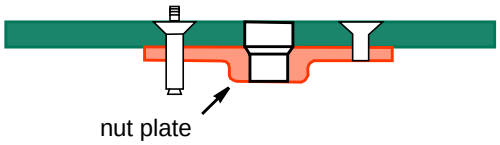
RIVET	POWER RIVETER	PULLING HEAD	HAND RIVETER	NOSEPIECE
B0207017, BACR15DR, CCR264, CCR274 or MS20605	TS.414.03.23 (Cherry G702)	TS.414.04.12 (Cherry H702-3NPR)	G29	TS.414.04.12 (Cherry 728A9-3
CR2672		Cherry H890-3	G30	Cherry 728-33

5.6 Riveting Operation

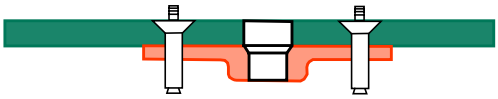
5.6.1 Use of G29 Hand Riveter

5.6.1.1 When using a hand riveter, install rivets as follows:

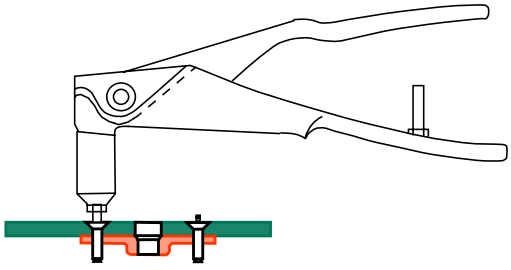
Step 1. Insert a nut plate blind rivet into one of the prepared holes as shown:



Step 2. Insert another rivet into the other hole to ensure the correct alignment of the nut plate as shown:



Step 3. Open the handles of the tool and place the nose piece of the tool over the rivet stem as shown:



Step 4. Ensure that the nut plate is firmly seated against the sheet.

Step 5. Hold the tool perpendicular to the surface of the work, apply sufficient pressure to the head of the rivet to ensure it is fully seated and squeeze the handle of the tool fully closed so as to pull the stem out of the rivet. The handle may have to be squeezed several times before the stem is pulled out of the rivet.

Step 6. Squeeze the handle several more times while holding the tool upside down to allow the stem to fall out.

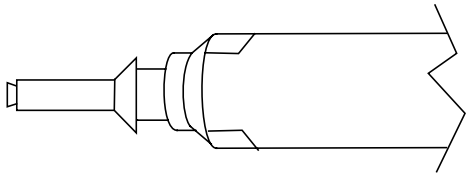
Step 7. Repeat Step 3 through Step 6 for the second rivet.

Step 8. Shave or file the flash (if any) or stem of self plugging rivets flush with the fastener head if required for safety or aerodynamic reasons. Take care to avoid marking the fastener head.

5.6.2 Use of Power Riveter

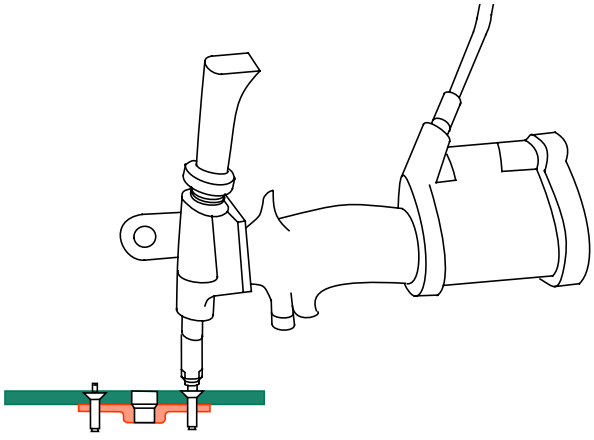
5.6.2.1 When using a power riveter, install rivets as follows.

Step 1. Push the stem of one rivet into the nosepiece of the tool until the rivet head butts against the tip of the nosepiece as shown:



Step 2. Insert the rivet shank into the prepared hole.

Step 3. Insert another rivet into the other hole to ensure the correct alignment of the nut plate as shown:



Step 4. Ensure that the nut plate is firmly seated against the sheet.

Step 5. Hold the gun perpendicular to the surface of the work, apply sufficient pressure to the head of the rivet to ensure it is fully seated and pull the trigger of the gun so as to pull the stem out of the rivet. The rivet stem will be ejected when the next rivet is inserted into the nosepiece.

Step 6. Push the stem of the second rivet into the nosepiece of the tool until the rivet head butts against the tip of the nosepiece.

Step 7. Insert the rivet shank into the prepared hole.

Step 8. Hold the gun perpendicular to the surface of the work, apply sufficient pressure to the head of the rivet to ensure it is fully seated and pull the trigger of the gun so as to pull the stem out of the rivet.

Step 9. Shave or file the flash (if any) or stem of self plugging rivets flush with the fastener head if required for safety or aerodynamic reasons. However, do not mark the fastener head.

5.7 Removal of Installed Rivets

5.7.1 If necessary, remove installed rivets as follows (see Figure 7).

Step 1. Drill completely through the head of the installed rivet using a 3/32” or 1/8” diameter drill, as applicable, so as to break off the rivet head as shown:

Step 2. Drive out the rivet shank using a suitable drift punch.If necessary to prevent damage, on thin gauge material support the structure from the reverse side with a suitable support block while driving out the rivet shank.

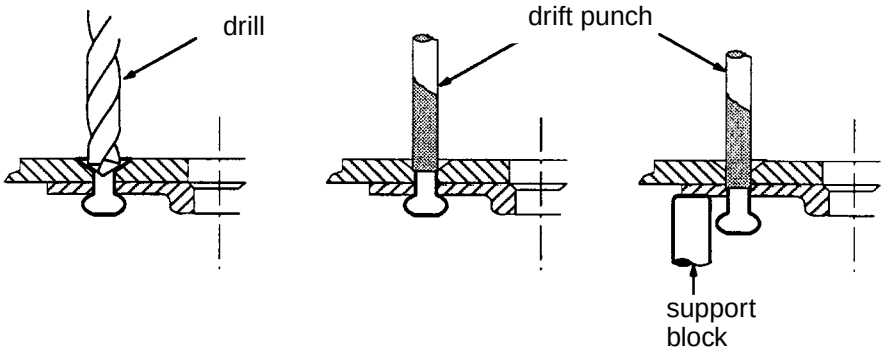


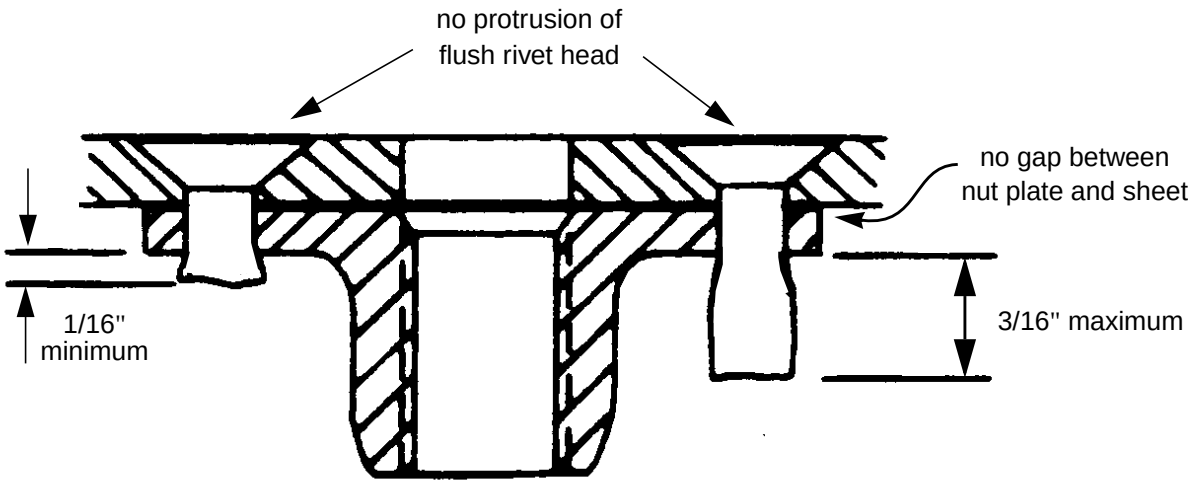
FIGURE 7 - REMOVAL OF INSTALLED RIVETS

6 REQUIREMENTS

6.1 Replace loose, cracked or badly damaged rivets. Slight marking of the rivet head caused by the nosepiece is acceptable.

6.2 Ensure that installed nut plates and nut plate rivets meet the following requirements:

- Ensure that the installed nut plate is firmly seated against the sheet without any gap.
- Ensure that flush rivet heads are flush (no protrusion allowed) to 0.010" below flush with the surface of the sheet.
- For installed rivets, the length of the rivet bulb should be 1/16" - 3/16" as shown below.



7 SAFETY PRECAUTIONS

7.1 The procedure and materials specified herein present no specific safety hazard when used according to accepted plant safety regulations.

8 PERSONNEL REQUIREMENTS

8.1 Personnel responsible for installation of nut plate blind rivets must have a good working knowledge of the procedure and requirements as specified herein and shall have exhibited their familiarity to their supervisor.

9 RECOMMENDED MAINTENANCE OF EQUIPMENT

9.1 Rivet installation tools should be kept clean and moving parts oiled or greased regularly. It is recommended to inject a few drops of light machine oil into the air inlet of air tools daily.

9.2 Damaged or badly worn tools should be repaired or replaced.

9.3 Do not rework or alter installation tools without proper authorization.