

MONOGRAM AEROSPACE FASTENERS

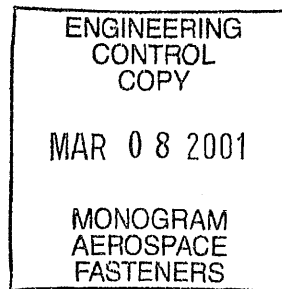
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MRL1003

INSTALLATION & INSPECTION SPECIFICATION

FOR

RADIAL-LOK™ BLIND FASTENERS



RELEASE DATE: JULY 31, 1990 ECN #6405

APPROVED BY: James Eastwood

JAMES EASTWOOD
VICE PRESIDENT ENGINEERING

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LIST OF ACTIVE SHEETS

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1.0 SCOPE:

This specification outlines the installation and inspection requirements considered necessary to insure the proper performance of Radial-Lok Blind fasteners.

The installation tooling recommendations given here-in are not applicable to Radial-Lok which have an "A" suffix (automatic installation) after the grip dash number (e.g. MRL3210-06-200A). Consult factory for details on "A" coded parts.

2.0 DESCRIPTION:

The Radial-Lok is a five-piece blind fastener consisting of a threaded nut, screw, expansion sleeve, sleeve with an acetal insert and a disposable drive-nut. It is available in a variety of head styles in sizes from 3/16" diameter through 3/8" diameter and in increments of .100" grip. Refer to the "MRL" series product drawings for available sizes and types. Grip lengths not to exceed 1.000 for -8, -9, -10, -11, and -12 diameter sizes and not to exceed .600" for -6 and -7 diameter sizes.

3.0 EQUIPMENT:

- 3.1 In order to insure the best results, only approved pneumatic tools shall be used. The current list of approved tools is noted in Tables 1 and 2, and Figures 1 and 2 for the information of the user. These tools are available from:

MONOGRAM AEROSPACE FASTENERS
3423 South Garfield Avenue
P.O. Box 6847
Los Angeles, CA 90040

- 3.2 Removal tooling, developed specifically for Radial-Lok fasteners is shown in Figure 10 and Table 7. Complete removal kits are also available. Contact Monogram Aerospace Fasteners at the above address.

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4.0 GENERAL INFORMATION:

- 4.1 These fasteners must be used within the grip range limits specified by the manufacturer in order to insure proper performance. In the event that a borderline grip condition exists, it is recommended that a min. grip condition be favored, (i.e. a .225" thick structure reading uses a - 300 grip part). This practice will help assure optimum performance in the event not all sheet gap has been removed.
- 4.2 The blind sleeve may be driven against a 7⁰ maximum sloping surface (See Figure 5 and Paragraph 6.2.).
- 4.3 It is required that only the approved tools listed in Tables 1 and 2 and shown in Figures 1 and 2 of this specification be used for the installation of these fasteners.
- 4.4 Radial-Lok shall not be used in cocked hole applications, (See Paragraph 5.1.1).
- 4.5 Radial-Lok are supplied to the user with proper lubrication to insure satisfactory driving characteristics. This lubricant shall not be removed or any additional lubricant added.
- 4.6 If a fastener has been removed, the same diameter Radial-Lok can be reinstalled provided the hole has not been damaged. In the event that the hole has been damaged, the next larger diameter Radial-Lok shall be used (NOTE: for flush head fasteners the countersink will have to be deepened).
- 4.7 If the fastener is to be coated with primer prior to installation, extreme care shall be taken to insure that no primer will get on the thread of the screw in the sleeve area, under the head of the screw or on the sleeve and nose of the nut. Wet primer applied to these areas will act as a lubricant and tend to cause over-driving of the fastener. Dried-on primer may act as a retardant. When primer is required for additional corrosion protection, it is recommended that the primer be applied to the mating hole.
- 4.8 Use of the fastener in special applications necessitating the use of sealants, paints, etc. shall be thoroughly investigated by the user prior to attempting production installations.
- 4.9 The mandatory fillet radius or chamfer is essential for Radial-Lok fasteners to properly install. See Table 3.

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5.0 DETAIL REQUIREMENTS:

5.1 HOLE & SHEET PREPARATION:

- 5.1.1 Holes shall be drilled perpendicular (within $1/2^{\circ}$) to the surface against which the manufactured head will bear. The hole shall be reasonably round and free from burrs (aluminum structure) and delamination (graphite/epoxy type structure).
- 5.1.2 The sheets to be joined shall be firmly clamped up or otherwise fixtured to prevent hole misalignment.
- 5.1.3 The recommended hole sizes, countersink diameter and **mandatory fillet radius or chamfer** for the various type Radial-Loks are shown in Table 3. The countersink diameters shown may be adjusted to suit a specific manufacturer's flushness requirements, as desired.
- 5.1.4 Holes shall be inspected using hole gages as shown in Figure 6 and limits as specified in Table 4. The "Go" gage shall pass completely through the prepared hole to insure a proper installation.

6.0 SELECTION OF GRIP LENGTH:

- 6.1 Prior to installation, the grip length shall be checked with a grip gage (See Figure 4). Refer to product drawings for available grip ranges.
- 6.2 In those applications where a tapered sheet condition exists on the blind side, the grip length must be determined by the depth at the centerline of the hole. In no case shall this taper exceed 7° , in order to insure proper performance of the fastener. (See Fig. 5)

7.0 DRIVING PROCEDURE:

- 7.1 Radial-Lok blind fasteners are driven with special tools and equipment designed specifically for this product. The correct tools and equipment are listed in Tables 1 and 2 and shown in Figures 1 and 2 of this specification.
- 7.2 Insert the fastener in the hole. The Radial-Lok can be inserted in a properly prepared hole without interference.
- 7.3 The wrenching part of the adapter assembly is inserted over the slabbed portion of the screw and the nose piece engages the drive nut. The driving tool must be held firmly against the head of the fastener and perpendicular to it. **Cocking of the driver may cause premature stem break-off before the fastener is completely driven.**

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- 7.4 The driving force is then applied by the pneumatic power tool or by a hand driving tool. As power is applied, the screw is turned and the nut is held stationary by the drive-nut which in turn is held stationary by the nose piece. The sleeve is compressed between the screw head and the conical end of the nut and is drawn over the tapered nose portion of the nut while simultaneously the inner nut is being drawn into the expansion sleeve. Finally the sleeve is expanded forming a head against the mating surface being joined. As driving is completed, the slabbed portion of the screw is broken off and ejected along with the drive-nut (See Figure 8). The resultant screw break - off location shall be within the limits specified on the product drawing.
- 7.5 In those instances where special driving tools are adopted by the user, wrenching speed of this tooling shall not exceed 600 RPM.

8.0 REMOVAL OF RADIAL-LOK:

- 8.1 Radial-Lok blind fasteners can be removed using the tooling shown in Figure 10 and Table 7 of this specification. Complete kits are available from Monogram Aerospace Fasteners. Contact factory for details.

9.0 SHAVING OF RADIAL-LOK SCREWS (COREBOLTS):

- 9.1 The screw protrusion may be shaved flush with the sheet surface using a standard rivet shaver equipped with a carbide cutter. The shaver must turn at a speed of approximately 10,000 RPM. The cutter and skirt diameter must be large enough to permit the screw to be approximately 3/16" from the center of the cutter. The shaver will not mill properly if the screw is centered on the cutter. A one-inch diameter cutter will be required for most fasteners.

10.0 INSPECTION AFTER INSTALLATION:

- 10.1 The stem break-off position of the screw in the head of the nut is an indication that the fastener has been properly installed (provided that the correct grip length has been used). To ensure positively that fastener is properly installed, the blind side shall be inspected for foot-print formation "J" dia. min. as per Table 3. Product drawings list the acceptable stem break-off limits, "J" dia . min., and "K" dim. max. for a properly installed fastener. Stem break-off higher than the limits shown is an indication that the fastener is too long; stem break-off falling below the limits shown is an indication that the fastener is too short; If foot-print diameter "J" dia. does not meet the minimum requirement, it is positive indication that fastener is improperly installed. In either case, the fastener shall be removed, the grip length carefully checked, and then replaced by the next longer , shorter, but correct grip fastener, as necessary. Stem break-off gages are available for inspection of the installed fasteners. Refer to Figure 9 and Table 6.

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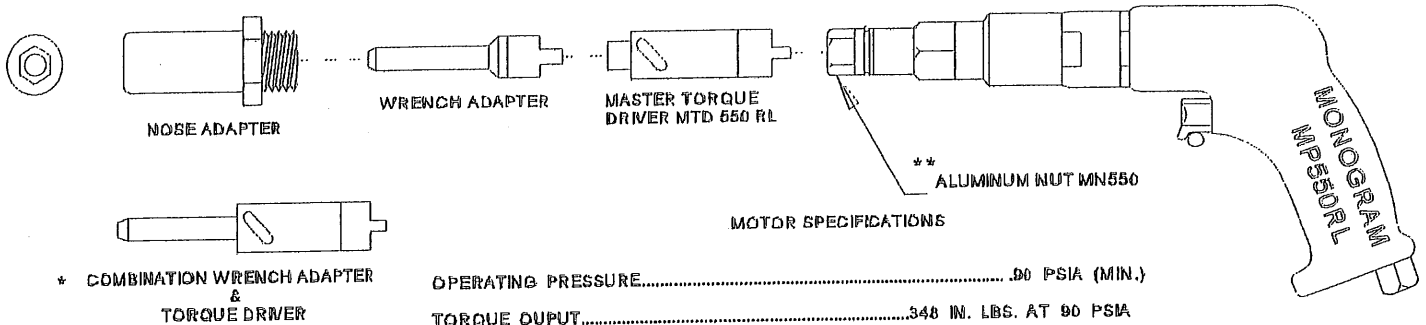
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FIGURE 1
MP 550 RL PNEUMATIC PISTOL



* COMBINATION WRENCH ADAPTER
&
TORQUE DRIVER

MOTOR SPECIFICATIONS

OPERATING PRESSURE.....90 PSIA (MIN.)
 TORQUE OUTPUT.....348 IN. LBS. AT 90 PSIA
 STALL TORQUE.....19.8 FT. LB. (MIN.)
 MOTOR SPEED.....400 RPM
 AIR CONSUMPTION AT FREE SPEED.....26 CFM (MAX.)
 HORSEPOWER RATING0.50
 WEIGHT.....3.5 LB.
 WORK SPACE NEEDED.....PORTABLE

TABLE 1

1	2		3	4	5	6
BASIC DIAMETER	TYPICAL RADIAL-LOK PART NUMBER		PNEUMATIC MOTOR	WRENCH ADAPTER (TURNS SCREW)	NOSE ADAPTER (HOLDS NUT)	COMPLETE PNEUMATIC TOOL ASSEMBLY
3/16	MRL3210 & MRL3212	-6-()	MP550RL	MPBF-6	MPPBF-8	MP550RL-6AA
7/32		-7-()		MPBF-7		MP550RL-7AA
1/4		-8-()		MPBF-8		MP550RL-8AA
9/32 & 5/16		-9-()		MPTRL-10 *	MPP-12	MP550RL-10AA
11/32		-10-()		MPTRL-12 *		MP550RL-12AA
3/8		-12-()				

* COMBINATION WRENCH ADAPTER AND MASTER TORQUE DRIVER - REQUIRES REMOVAL OF MASTER TORQUE DRIVER (MTD 550 RL) SUPPLIED WITH THE TOOL.

** LARGER MALE THREAD ON NOSE ADAPTER. REQUIRES REMOVAL OF ALUMINUM NUT (MN 500) SUPPLIED WITH THE TOOL FOR 9/32" THROUGH 3/8" DIAMETER SIZES.

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FIGURE 2
MRT550 RL PNEUMATIC RIGHT ANGLE TORQUE RESPONSIVE

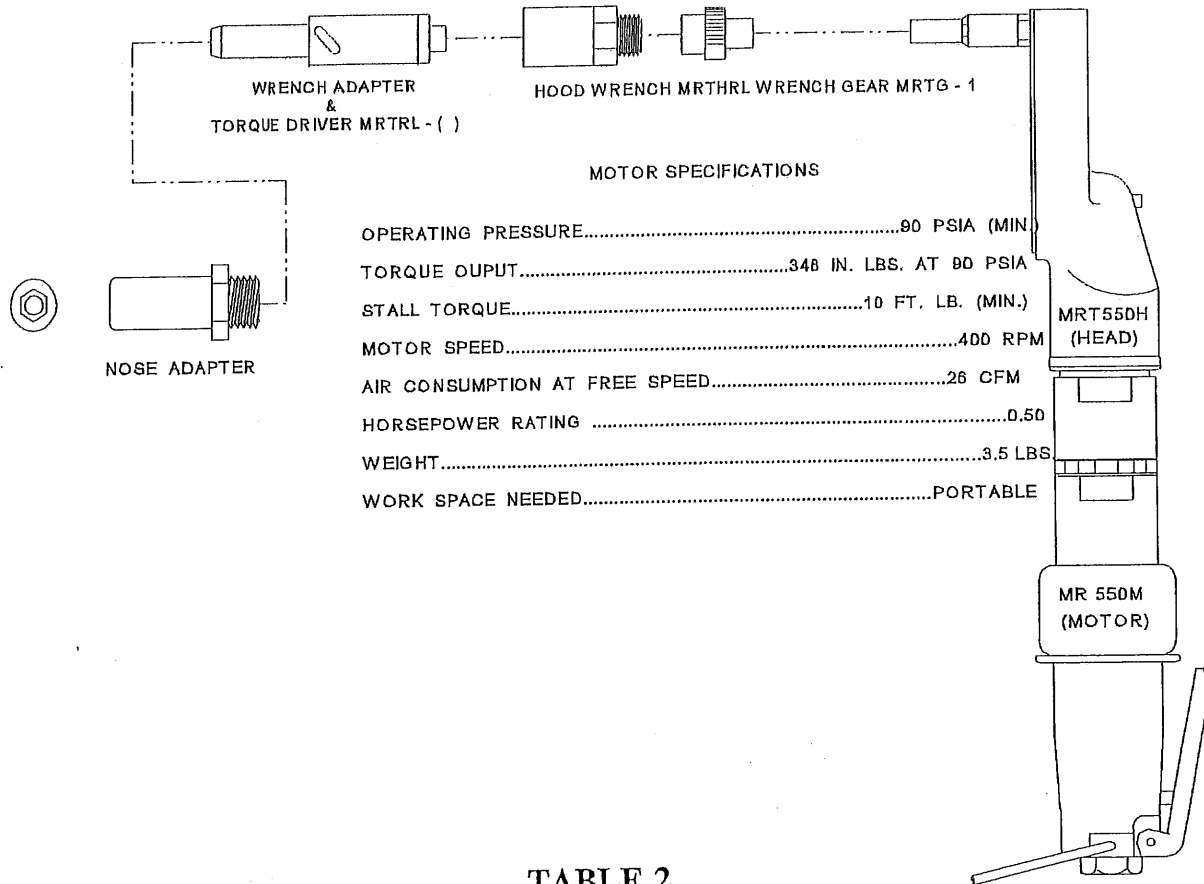


TABLE 2

1	2		3	4	5	6
BASIC DIAMETER	TYPICAL RADIAL-LOK PART NUMBER		PNEUMATIC MOTOR	WRENCH ADAPTER (TURNS SCREW)	NOSE ADAPTER (HOLDS NUT)	COMPLETE PNEUMATIC TOOL ASSEMBLY
3/16	MRL3210	-6-()	MRT550RL INCLUDES MRT550H MRTHRL & MRTG-1	MRTRL-6	MRTPRL-8	MRT550RL-6AA
7/32	&	-7-()		MRTRL-7		MRT550RL-7AA
1/4	MRL3212	-8-()		MRTRL-8		MRT550RL-8AA

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**FIGURE 3
RADIAL-LOK FASTENER
HOLE PREPARATION & INSTALLATION DIMENSIONS**

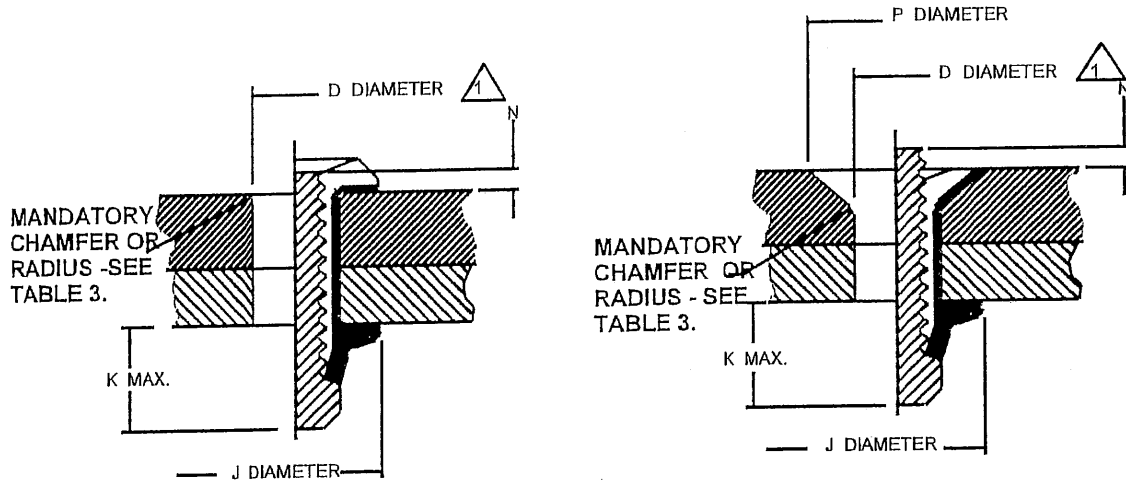


TABLE 3

DIA. DASH NO.	D DIA. RECOMMENDED HOLE SIZE	HOLE GAGE PART NUMBER	FLUSH HEAD CSK P DIA.	J DIA. MIN.	K MAX.	N SCREW BREAK-OFF LIMITS	MANDATORY CHAMFER OR RADIUS -MINIMUM REQD.	
							PROTRUDING	FLUSH HEAD
-6	.199 - .202	MRLG - 6	.378 - .385	.290	.500	PER PRODUCT DRAWING	.050	.040
-7	.228 - .231	MRLG - 7	.409 - .416	.330	.500		.050	.040
-8	.260 - .263	MRLG - 8	.499 - .507	.390	.500		.055	.040
-9	.290 - .293	MRLG - 9	.530 - .538	.430	.500		.055	.040
-10	.312 - .315	MRLG - 10	.626 - .635	.460	.550		.060	.050
-11	.344 - .347	MRLG - 11	.657 - .666	.490	.625		.060	.050
-12	.375 - .378	MRLG - 12	.752 - .762	.560	.625		.060	.050

- NOTES:
- HOLES SHALL BE PERPENDICULAR TO SURFACE.
 - SHEETS SHALL BE FIRMLY CLAMPED TOGETHER DURING DRILLING AND INSTALLATION.
 - SCREW BREAK - OFF LIMITS ARE MEASURED FROM SKIN SURFACE ON PROTRUDING HEAD FASTENERS ONLY. FLUSH STYLE FASTENERS SCREW BREAK-OFF LIMITS ARE MEASURED FROM THE HEAD OF THE FASTENER. BREAK-OFF LIMITS PER APPLICABLE STANDARDS PAGE.

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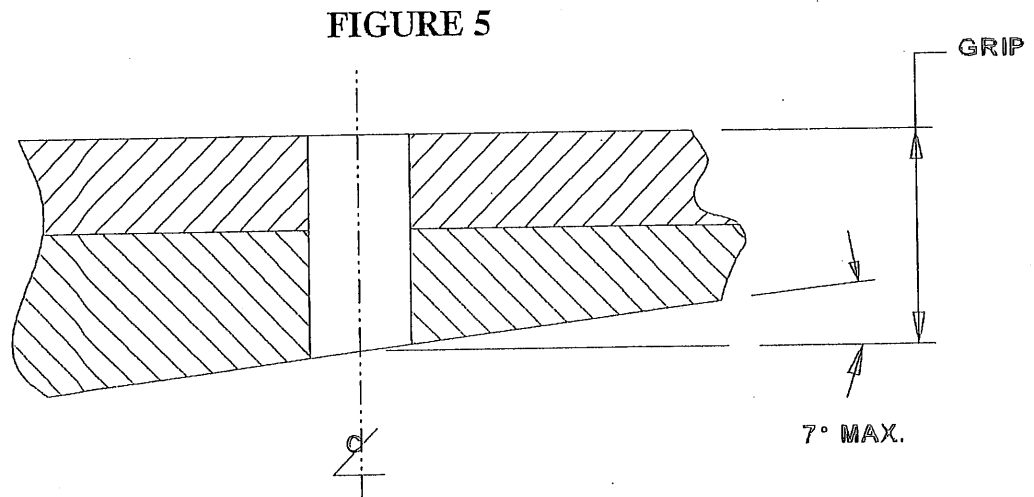
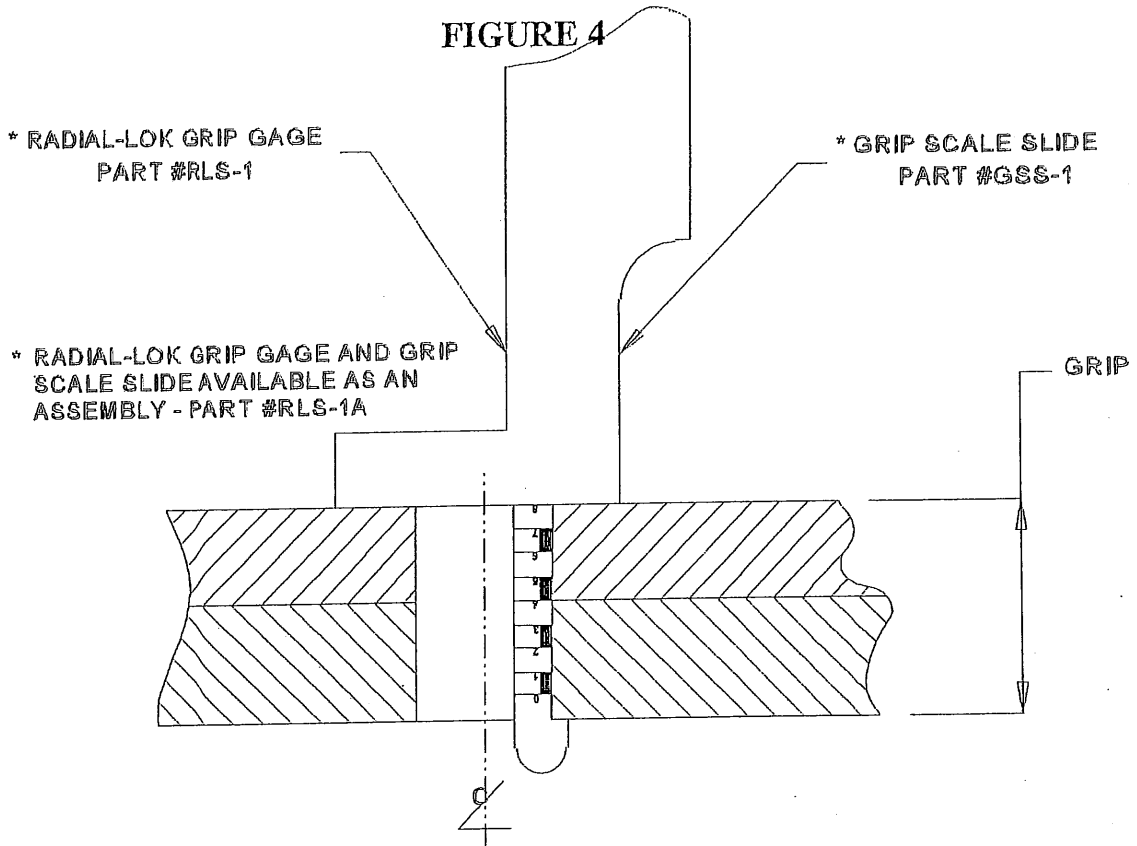
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FIGURE 6

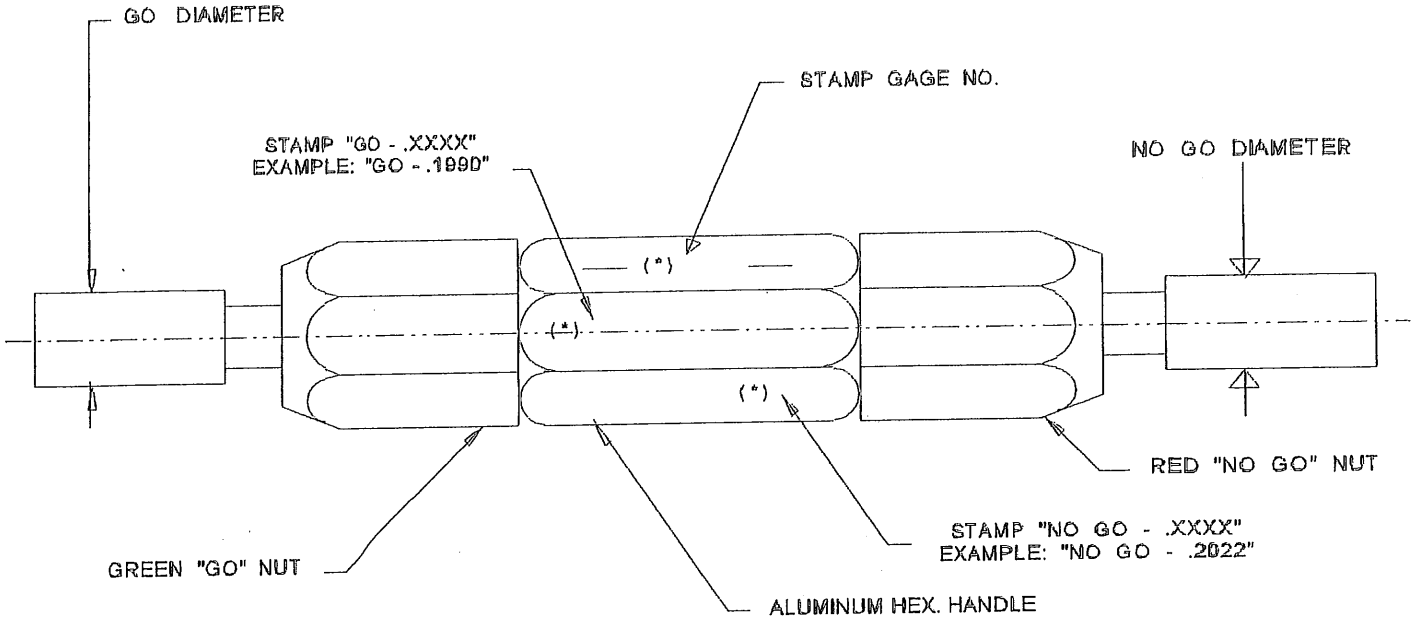


TABLE 4

GAGE NUMBER	"GO" DIAMETER	"NO GO" DIAMETER
MRLG - 6	.1990	.2022
MRLG - 7	.2280	.2312
MRLG - 8	.2600	.2632
MRLG - 9	.2900	.2932
MRLG - 10	.3120	.3152
MRLG - 11	.3440	.3472
MRLG - 12	.3750	.3782

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FIGURE 7
RADIAL-LOK FASTENER BLIND SIDE PROTRUSION

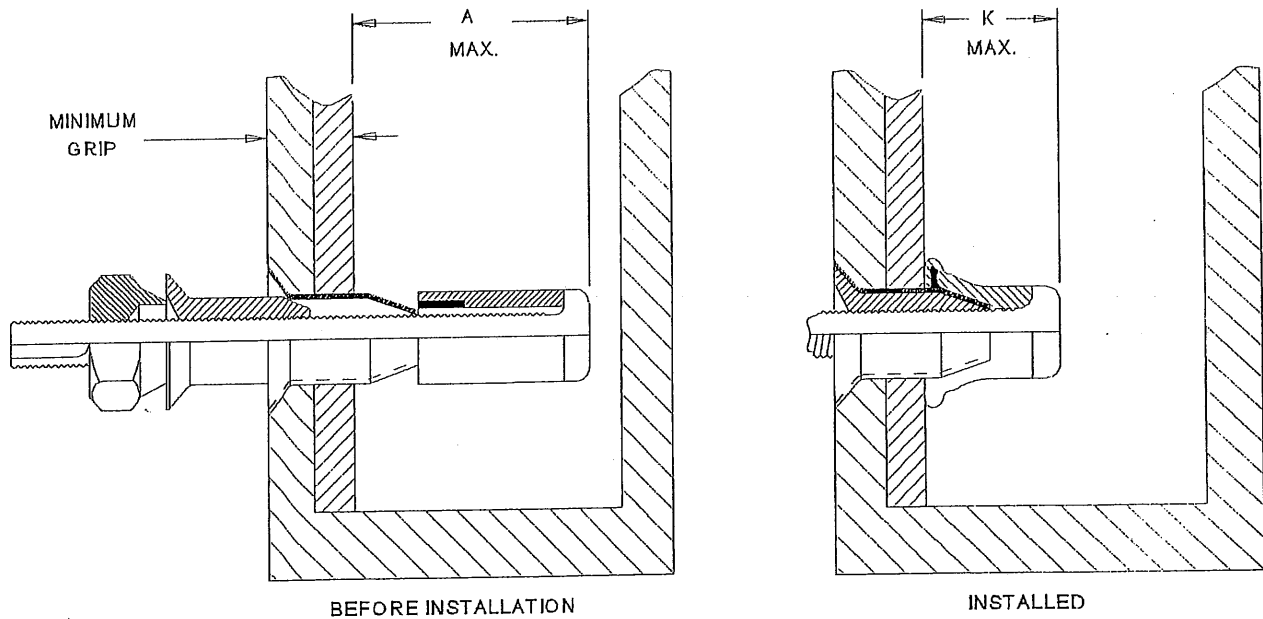


TABLE 5

NOMINAL SIZE DIAMETER	"A" MAXIMUM BLIND SIDE PROTRUSION BEFORE INSTALLATION	"K" MAXIMUM BLIND SIDE PROTRUSION AFTER INSTALLATION
3/16	.845	.500
7/32	.845	.500
1/4	.845	.500
9/32	.945	.500
5/16	.945	.550
11/32	.945	.625
3/8	1.075	.625

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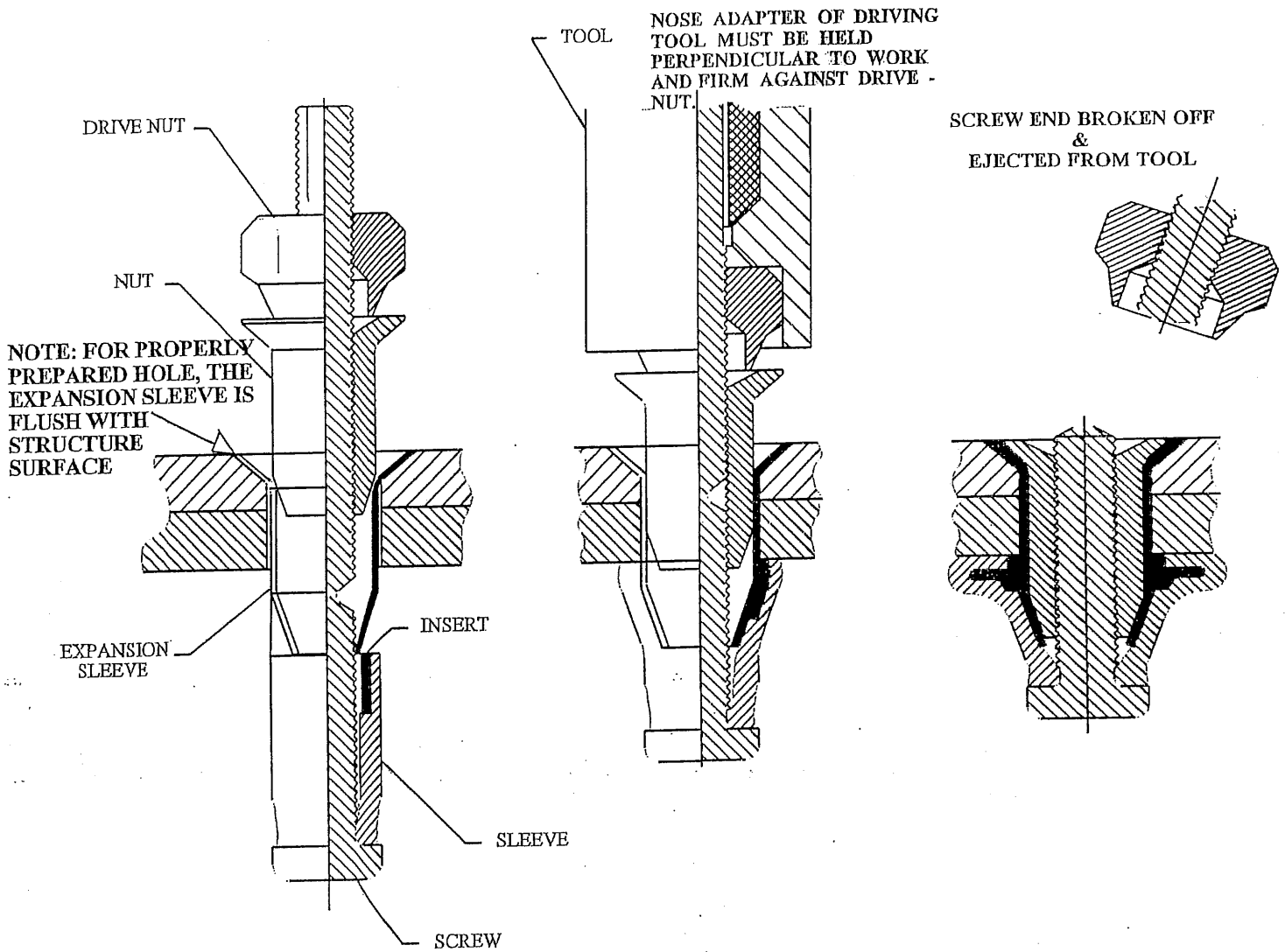
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FIGURE 8 DESCRIPTION OF INSTALLATION



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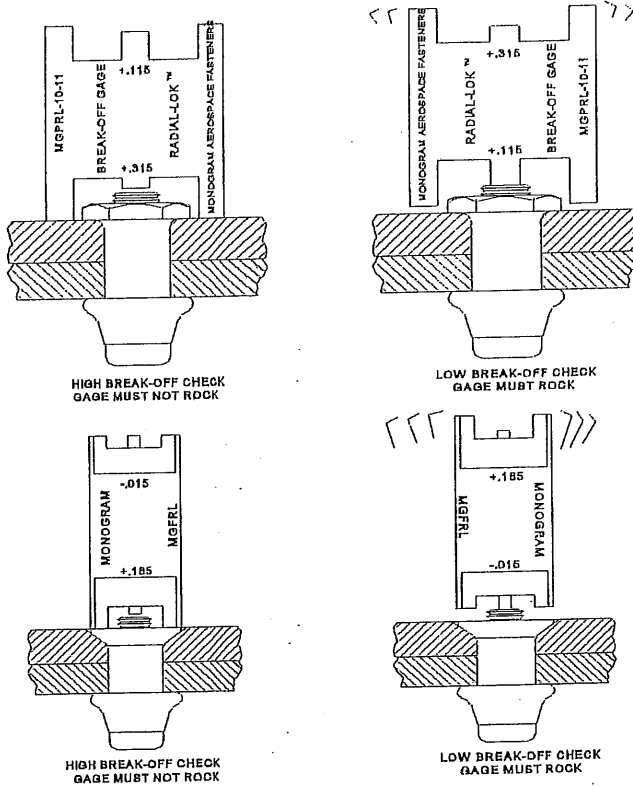
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FIGURE 9



MONOGRAM GAGES: TO CHECK BREAK-OFF ON PROTRUDING HEAD RADIAL-LOKS, PLACE LEAF GAGE ON THE INSTALLED FASTENER AS SHOWN. WHEN CHECKING HIGH BREAK-OFF, THE GAGE PRONGS MUST STRADDLE BOTH SIDES OF THE SCREW. IF THE GAGE ROCKS, THE BREAK-OFF IS TOO HIGH.

WHEN CHECKING LOW BREAK-OFF, REPEAT THE PROCEDURE USING LOW BREAK-OFF END OF THE GAGE AS SHOWN. IF GAGE DOES NOT ROCK, THE BREAK-OFF IS TOO LOW.

MONOGRAM BARREL GAGES: TO CHECK BREAK-OFF ON FLUSH HEAD RADIAL-LOKS, PLACE GAGE ON THE INSTALLED FASTENER AS SHOWN. WHEN CHECKING HIGH BREAK-OFF, THE GAGE PRONGS MUST STRADDLE BOTH SIDES OF THE SCREW. IF THE GAGE ROCKS, THE BREAK-OFF IS TOO HIGH.

WHEN CHECKING LOW BREAK-OFF, REPEAT THE PROCEDURE USING LOW BREAK-OFF END OF GAGE AS SHOWN. IF GAGE DOES NOT ROCK, THE BREAK-OFF IS TOO LOW.

TABLE 6

FASTENER SIZE	MONOGRAM PART NUMBER		SCREW BREAK-OFF LIMITS
	FLUSH HEAD BARREL GAGE MGFRLL(-)	PROTRUDING HEAD LEAF GAGE MGPRLL(-)	
-6 (3/16)	-6	6	PER PRODUCT DRAWING
-7 (7/32)	-7	7	
-8 (1/4)	-8	8	
-9 (9/32)	-9	9	
-10 (5/16)	-10	10	
-11 (11/32)	-11	11	
-12 (3/8)	-12	12	

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TABLE 7 REMOVAL DATA

NOMINAL FASTENER DIAMETER	NOSE PIECE MODULE PART NUMBER	CARBIDE STAR DRILL PART NUMBER	DRILL SIZE +.0000 DIA. -.0000	DEPTH 1 GAGE
-6 (.1975)	RM3081-6	RC3050-6	.1890	RC3031-6
-7 (.2265)	RM3081-7	RC3050-7	.2180	RC3031-7
-8 (.2585)	RM3081-8	RC3050-8	.2500	RC3031-8
-9 (.2885)	RM3081-9	RC3050-9	.2810	RC3031-9
-10 (.3105)	RM3153-10	RC3050-10	.3020	RC3156-10
-11 (.3425)	RM3153-11	RC3050-11	.3320	RC3156-11
-12 (.3735)	RM3153-12	RC3050-12	.3590	RC3156-12

NOTES: 1. USED ON COMPOSI-LOK AND RADIAL-LOK FASTENERS

2. THIS KIT IS USED TO REMOVED ALLOY STEEL, TITANIUM AND A-286 VISU-LOKS OR A-286 AND TITANIUM COMPOSI-LOK AND RADIAL-LOK FASTENERS. TO REMOVE H-11 AND SIMILAR MATERIAL, CONTACT FACTORY FOR DETAILS.
3. SCREW PROTRUSION Shall BE MILLED FLUSH PRIOR TO REMOVAL.
4. A COMPLETE TOOL CONSISTS OF THE AIR MOTOR MIDDLE (#RM3098), A NOSE PIECE MODULE (SEE CHART), AND A CARBIDE STAR DRILL (RM3050-()).

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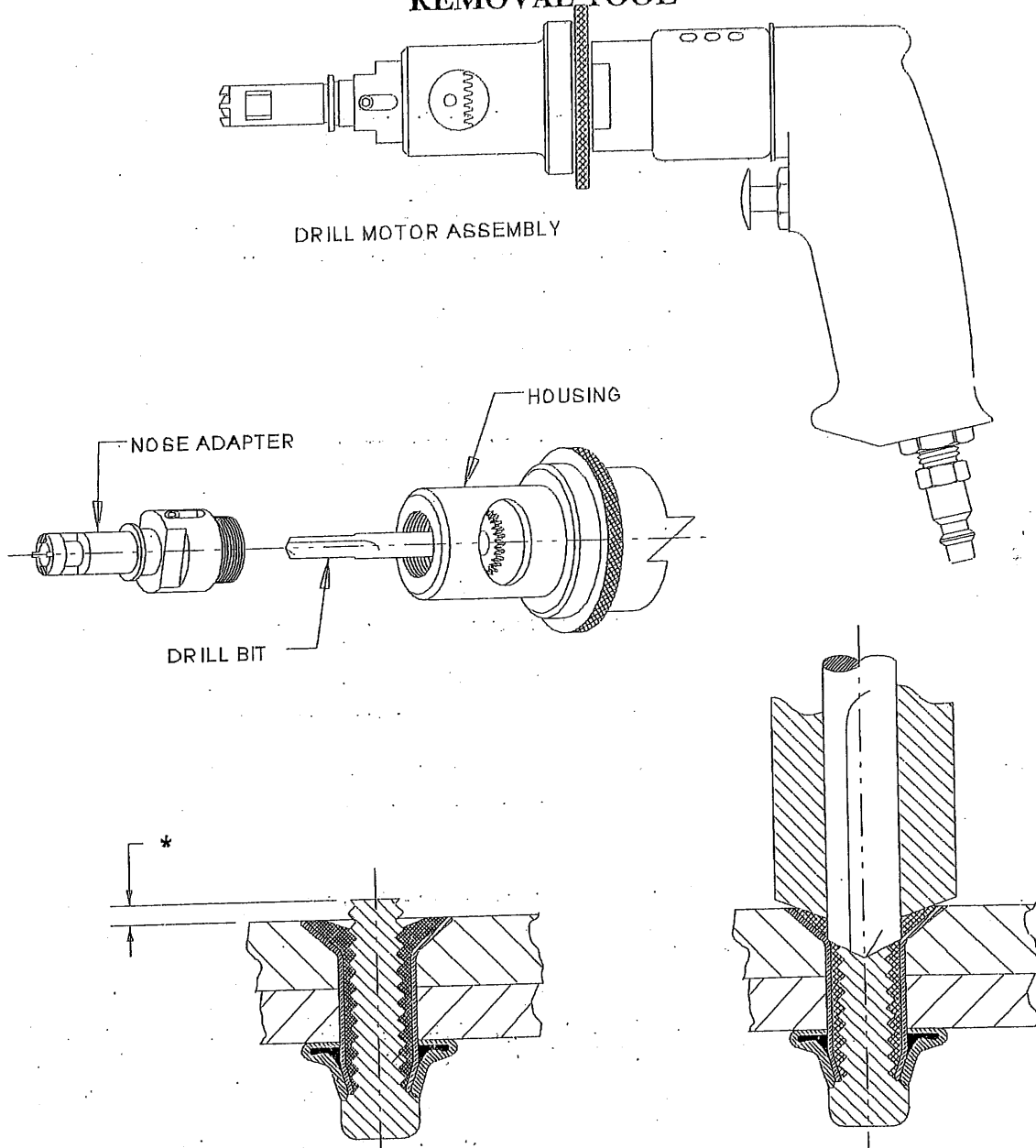
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FIGURE 10 REMOVAL TOOL



* SCREW PROTRUSION SHALL BE SHAVED FLUSH PRIOR TO DRILLING.

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