

MONOGRAM AEROSPACE FASTENERS

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BG2003

INSTALLATION & INSPECTION SPECIFICATION

FOR

SMOOTH BORE, ONE SIDED INSTALLATION

OSI BOLT®

DATE: 07-08-1994

PREPARED BY:

REVISION:	10-01-1995	REVISION "A"
	11-08-1995	REVISION "B"
	05-06-1996	REVISION "C"
	08-09-1996	REVISION "D"
	06-10-1997	REVISION "E"
	07-15-1997	REVISION "F"
ECN#01271	01-31-2002	REVISION "G"
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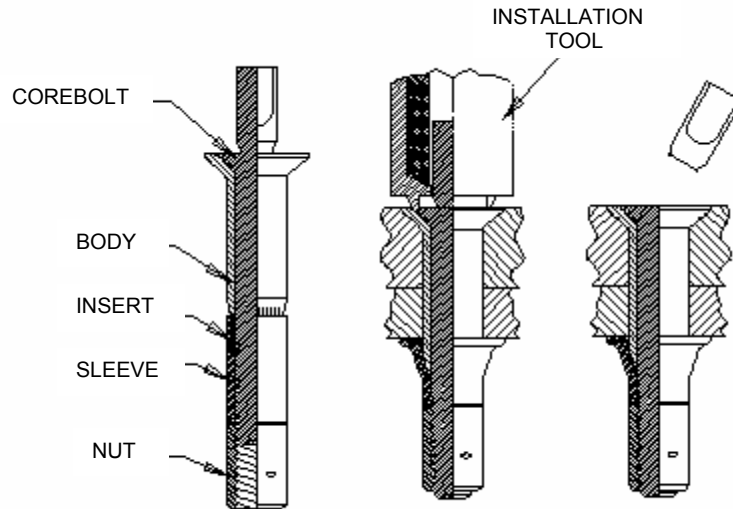
1.0 SCOPE:

This specification outlines the installation and inspection requirements considered necessary to insure the proper performance of OSI Bolt fasteners.

2.0 DESCRIPTION:

The fastener shall be of a multiple piece construction and furnished as an integral assembly. The fastener shall consist primarily of a nut, a body, a core bolt, an insert, and a forming sleeve. The dimensions and other physical characteristics shall be as specified on the applicable standard drawing. The driving of the fastener shall be accomplished by inserting the correct grip length OSI assembly into the recommended hole size provided in the structure. Using the recommended Monogram installation tool, engage the wrenching flats of the core bolt and position the nose adapter into the recess provided in the body component and apply power to the tool. For BG218() series fasteners slotted nose adapter engages body tangs. Installation is complete when the sleeve forms against the blind side of the structure and the wrenching portion of the core bolt fails in torsion.

FIGURE 1
FASTENER DESCRIPTION AND INSTALLATION



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3.0 EQUIPMENT:

- 3.1 In order to insure the best results, only approved pneumatic tools should be used. The current list of approved tools is noted in Table 1 thru Table 5 and Figure 2 thru Figure 6 for the information of the user. These tools are available from:

MONOGRAM AEROSPACE FASTENERS
3423 South Garfield Avenue
Los Angeles, CA 90040
(323)722-4760

- 3.2 Removal tooling, developed specifically for OSI-Bolt fasteners is shown in Figures 14 thru 17 and Table 12. Complete removal kits are also available. Contact Monogram Aerospace Fasteners.

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.
- 4.2 The blind sleeve may be driven against a 7° maximum sloping surface (See Figure 10 and Paragraph 6.2).
- 4.3 It is strongly urged that only the approved tools listed in Table 1 thru Table 5 as shown in Figure 2 thru Figure 6 of this specification be used for the installation of these fasteners.
- 4.4 OSI-BOLTS should not be used in cocked hole applications (See Paragraph 5.1.1).
- 4.5 OSI-BOLTS are supplied to the user with proper lubrication to ensure satisfactory driving characteristics. This lubricant should not be removed or any additional lubricant added.
- 4.6 If a fastener has been removed, the same diameter OSI-Bolt can be reinstalled provided the hole has not been damaged. In the event that the hole has been damaged, the next larger diameter OSI-Bolt should be used.
- 4.7 If the fastener is to be coated with primer prior to installation, extreme care should be taken to insure that no primer will get inside the threads of the nut, Wet primer inside the nut threads 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. The same caution should be exercised with application of a sealant.
- 4.8 Use of the fastener in special applications necessitating the use of sealants, paints, etc. should be thoroughly investigated by the user prior to attempting production installations.

5.0 DETAIL REQUIREMENTS:

5.1 HOLE & SHEET PREPARATION:

- 5.1.1** Holes shall be drilled perpendicular (within 1 1/2°) to the surface against which the manufactured head will bear. The hole shall be reasonably round and free from burrs (metal structure) and delamination (graphite/epoxy type structure).
- 5.1.2** The sheets to be joined should be firmly clamped or otherwise fixtured to prevent hole misalignment.
- 5.1.3** The recommended hole size, countersink diameter and fillet radius for the various type OSI-Bolts , are shown in Table 6 and Table 7. 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 11 and limits as specified in Table 9. 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 should be checked with a grip gage (See Figure 9 and Table 8). Refer to Standard 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 should this taper exceed 7°, in order to insure proper performance of the fastener. (Refer to Figure 10).

7.0 DRIVING PROCEDURE:

- 7.1** OSI-Bolt blind fasteners are driven with special tools and equipment designed specifically for this product. The correct tools and equipment are listed in Table 1 thru Table 5, and as shown in Figure 2 thru Figure 6 of this specification.
- 7.2** Insert the fastener in the hole. The OSI-Bolt can be inserted in a properly prepared hole without interference or with interference as per Table 6 and Table 7.
- 7.3** For interference installations fasteners should be driven into installation hole using a pneumatic hammer having a tip covered with protective cap made of a mild steel material to prevent possible damage to the fastener head which may adversely affect the installation process. Refer to Table 4 and Figure 5.

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- 7.4 The wrenching part of the adapter assembly engages the slabbed portion of the core bolt and the nose piece engages the body recesses. The driving tool must be held firmly against the head of the fastener and perpendicular to it. Cocking of the driver may induce bending and cause premature stem break-off before the fastener is completely driven.
- 7.5 The driving force is then applied by the pneumatic power tool. As power is applied, the core bolt is turned and the body is held stationary by the nose piece. The sleeve is compressed between the nut and the conical end of the body and is drawn over the tapered nose portion of the body. Finally the sleeve is expanded forming a head against the mating surface being joined. As driving is completed, the slabbed portion of the core bolt is broken off and ejected (See Figure 1). The resultant screw break - off location should be within the limits specified on the product drawing.
- 7.6 In those instances where special driving tools are adopted by the user, wrenching speed of this tooling shall not exceed 400 RPM.

8.0 REMOVAL OF OSI-BOLT

- 8.1 OSI-Bolt blind fasteners can be removed using the tooling shown in Figure 14 thru Figure 19, Figure 20 thru Figure 22 and Table 12 of this specification. Complete kits are available from Monogram Aerospace Fasteners. Contact factory for details.

9.0 INSPECTION AFTER INSTALLATION

- 9.1 The stem break-off position of the corebolt in the head of the body **is not** a positive indication of a properly installed fastener. Installed fasteners should be visually inspected for the texture of the corebolt/stem break-off display. Correctly installed fasteners having core bolt stems fractured in torsion will produce a characteristic texture - shiny and circular. Improperly installed fasteners will exhibit a dull and dark texture due to fracture caused by bending (See Figure 23). Improperly installed fasteners should be removed and replaced.

- 9.2 Back side inspection.

For proper performance of the fastener, back side footprint (J dia.) and height (K dim.) shall meet dimensional requirements as stated in Table 10. Fastener Leaf Gage (See Figure 12) can be use to verify 'J' and 'K' dimensions. When verifying 'J' diameter, for BG20()-() and BG21()-() type fasteners, leaf gage should not clear footprint diameter but for BGV2068-06- () and BGV308()- type fasteners, leaf gage must clear footprint diameter. Inspecting back side height of installed fasteners 'K' dimension, leaf gage should clear the height for all type of fasteners.

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FIGURE 2 MP550OL PNEUMATIC PISTOL

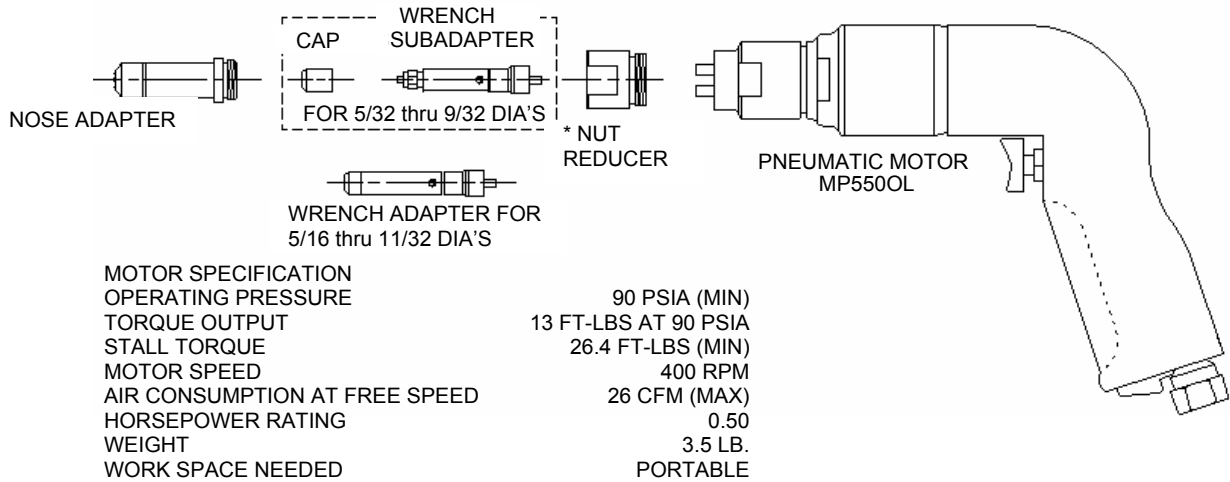


TABLE 1

BASIC DIAMETER	TYPICAL OSI-BOLT PART NUMBER	(**) CAP	WRENCH SUBADAPTER	WRENCH ADAPTER	NOSE ADAPTER	COMPLETE PNEUMATIC TOOL ASSEMBLY	
5/32	BG2031 BG2032 BG2034 BG2035 BG2041 BG2042 BG2044 BG2045 BG2081 BG2082 BG2083 BG2084 BG2085 BG2086	-05-()	MPCOL-05	MPWOL-01	--	MPFOL-05	MP550OL-05AA
3/16		-06-()	MPCOL-06		--	MPFOL-06	MP550OL-06AA
13/64		-06-()X			MPFOL-06-Y	MP550OL-06AAY	
7/32		-06-()Y	MPCOL-08		--	MPFOL-08	MP550OL-08AA
1/4		-08-()		MPFOL-08-Y	MP550OL-08AAY		
17/64		-08-()X		MPCOL-06	MPWOL-01	--	MPFOL-10
9/32		-08-()Y	MPFOL-10-X				MP550OL-10AAX
5/16		-10-()	MPFOL-10-Y				MP550OL-10AAY
21/64		-10-()X	--	--	MPOL-10		
11/32		-10-()Y					
3/16	BGV2068 BG2088 BGV3088	-06-()	MPCOL-06	MPWOL-01	--	MPFOL-06-1	MP550OL-06A1A
5/32	BG2186	-05-()	MPCOL-05	MPWOL-01	--	MPFOL-568	MP550OL-05A2A
3/16		-06-()	MPCOL-06		--		MP550OL-06A2A
1/4		-08-()	MPCOL-08		--		MP550OL-08A2A

1) *NUT REDUCER IS NOT REQUIRED FOR 5/16" THROUGH 11/32" DIAMETER SIZES.
 2) (**) CAP and WRENCH SUBADAPTER components required for 5/32 thru 9/32 diameters.

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FIGURE 3
MP2500L PNEUMATIC PISTOL

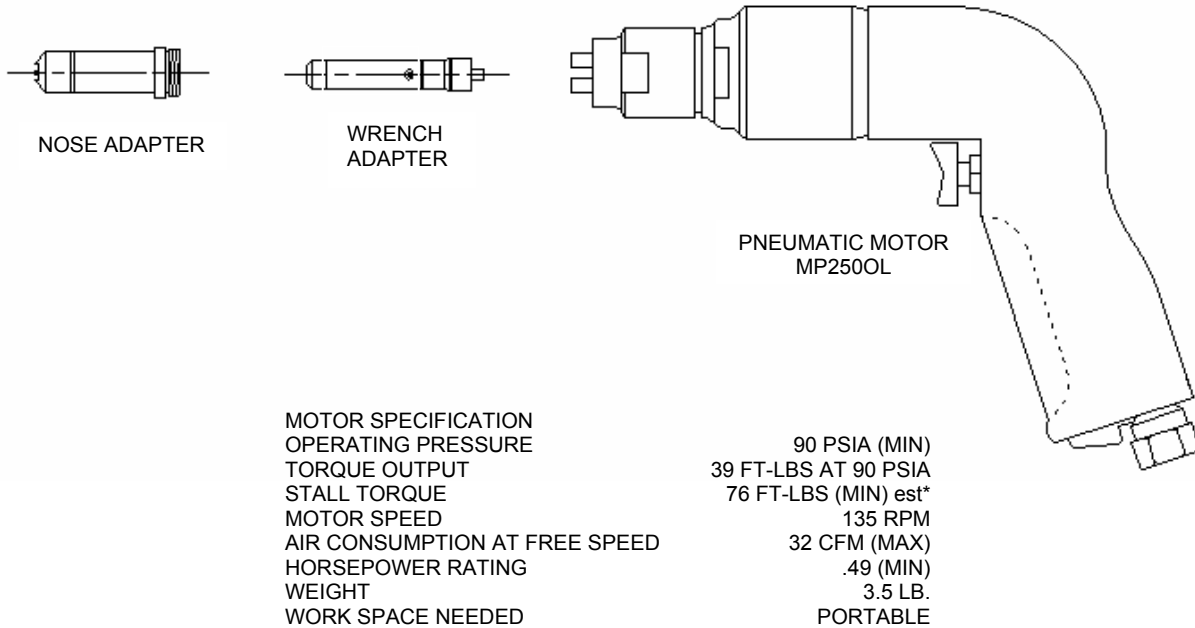


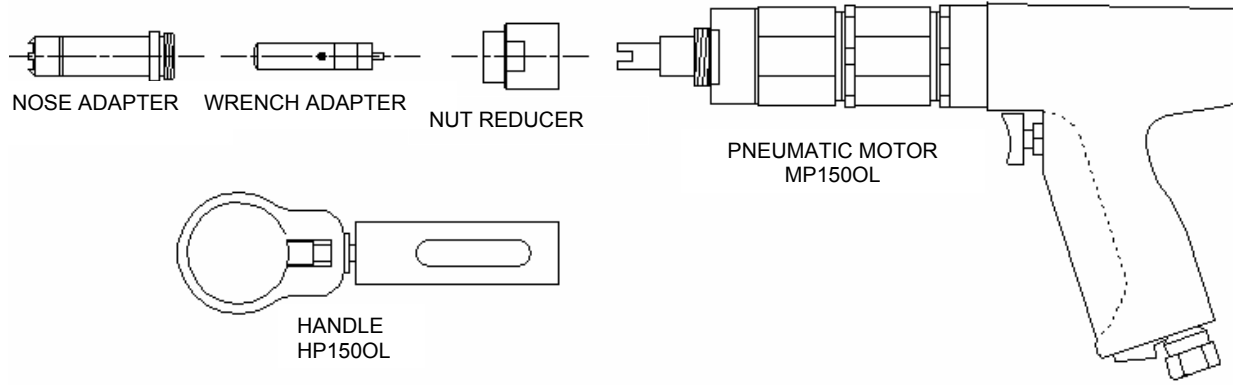
TABLE 2

BASIC DIAMETER	TYPICAL OSI-BOLT PART NUMBER			WRENCH ADAPTER	NOSE ADAPTER	COMPLETE PNEUMATIC TOOL ASSEMBLY
5/16			-10-()	MPOL-10	MPFOL-10	MP2500L-10AA
21/64	BG2031	BG2081	-10-()X		MPFOL-10X	MP2500L-10AAX
11/32	BG2032 BG2034	BG2083 BG2084	-10-()Y		MPFOL-10-Y	MP2500L-10AAY
3/8	BG2035 BG2041	BG2085 BG2086	-12-()	MPOL-12	MPFOL-12	MP2500L-12AA
25/64	BG2042 BG2044	BGV3081 BGV3082	-12-()X		MPFOL-12-XY	MP2500L-12AAX
13/32	BG2045	BGV3083 BGV3084 BGV3085 BGV3086	-12-()Y			

*Stall torque values are theoretical and not part of performance specification. Maximum allowable torque of 29 ft-lbs should not be exceeded otherwise internal gearing failures may occur.

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FIGURE 4
MP1500L PNEUMATIC PISTOL



MOTOR SPECIFICATION	
OPERATING PRESSURE	90 PSIA (MIN)
TORQUE OUTPUT	53 FT-LBS AT 90 PSIA
STALL TORQUE	105.6 FT-LBS (MIN) est*
MOTOR SPEED	130 RPM
AIR CONSUMPTION AT FREE SPEED	34 CFM (MAX)
HORSEPOWER RATING	.68 (MIN)
WEIGHT	7.5 LB.
WORK SPACE NEEDED	PORTABLE

TABLE 3

BASIC DIAMETER	TYPICAL OSI-BOLT PART NUMBER		WRENCH ADAPTER	NOSE ADAPTER	COMPLETE PNEUMATIC TOOL ASSEMBLY
7/16		BG2081	MPOL-14	MPFOL-14	MP1500L-14AA
29/64	BG2031	BG2082		MPFOL-14X	MP1500L-14AAX
15/32	BG2032	BG2083		MPFOL-14-Y	MP1500L-14AAY
	BG2034	BG2084			
	BG2035	BG2085			
	BG2041	BG2086			
	BG2042	BGV3081	MPOL-16	MPFOL-16	MP1500L-16AA
	BG2044	BGV3082			
1/2	BG2045	BGV3083			
		BGV3084			
		BGV3085			
		BGV3086			

*Stall torque values are theoretical and not part of performance specification. Maximum allowable torque of 54.5 ft-lbs should not be exceeded otherwise internal gearing failures may occur.

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**FIGURE 5
PNEUMATIC RIVET GUN
FOR INTERFERENCE INSTALLATION**

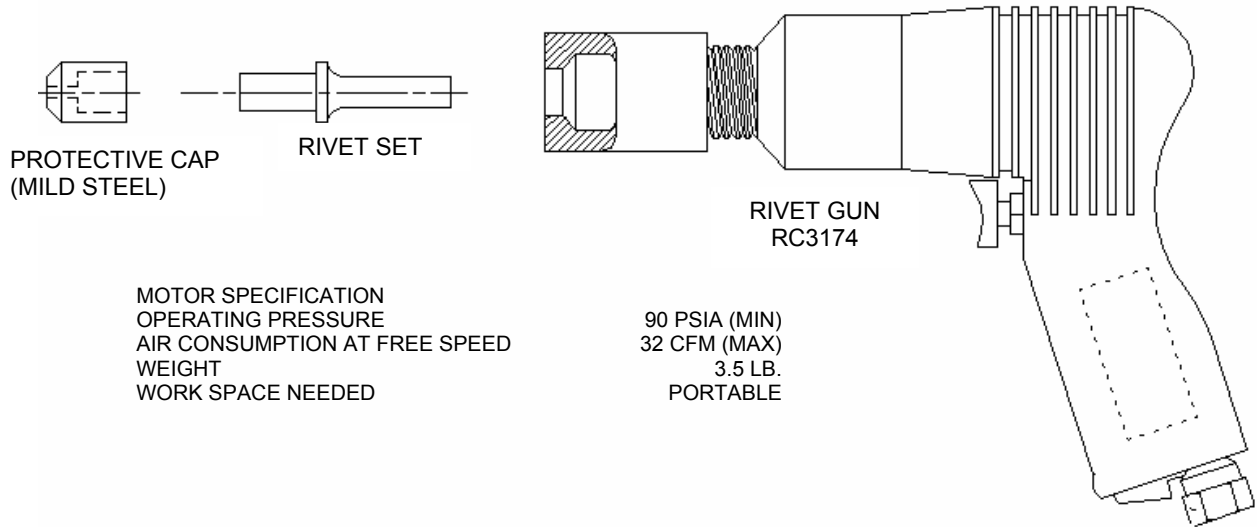
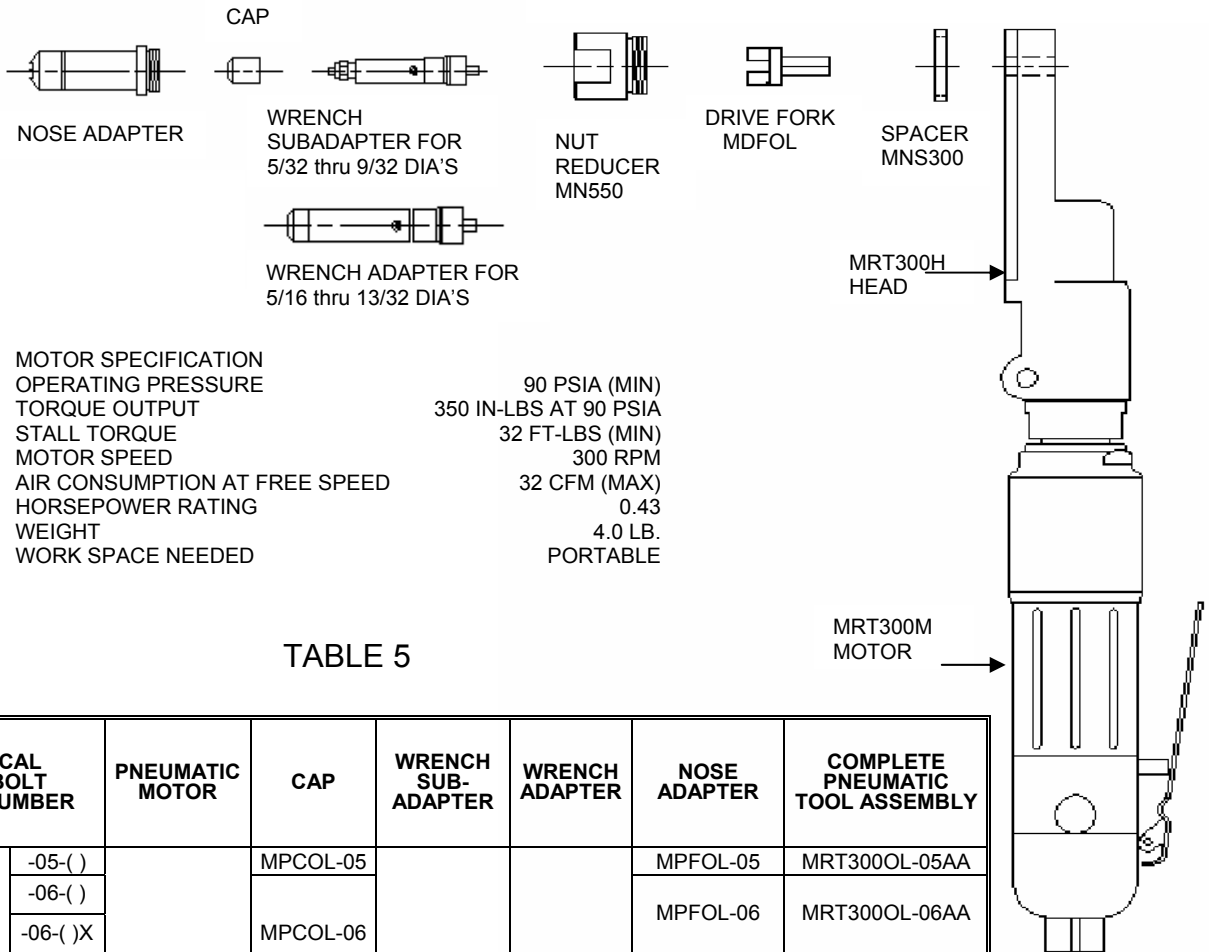


TABLE 4

BASIC DIAMETER	TYPICAL OSI-BOLT PART NUMBER		RIVET SET	PROTECTIVE CAP	SUBASSEMBLY OF RIVET SET AND PROTECTIVE CAP
5/32	BG2031		-05-()	MPCEOL-05	RM3330-05
3/16			-06-()		
13/64	BG2032		-06-()X	MPCEOL-06	RM3330-06
7/32	BG2034	BGV3081	-06-()Y		
1/4	BG2035	BGV3082	-08-()	MPCEOL-08	RM3330-08
17/64	BG2041	BGV3083	-08-()X		
9/32	BG2042	BGV3084	-08-()Y	MPCEOL-10	RM3330-10
21/64	BG2044	BGV3085	-10-()		
5/16	BG2045	BGV3086	-10-()X	MPCEOL-12	RM3330-12
11/32	BG2081	BGV3088	-10-()Y		
3/8	BG2082	BGV2068	-12-()	MPCEOL-14	RM3330-14
25/64	BG2083		-12-()X		
13/32	BG2084		-12-()Y	MPCEOL-16	RM3330-16
7/16	BG2085		-14-()		
29/64	BG2086		-14-()X		
15/32	BG2088		-14-()Y		
1/2			-16-()		

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FIGURE 6
MRT300 PNEUMATIC RIGHT ANGLE
INSTALLATION TOOL



MOTOR SPECIFICATION	
OPERATING PRESSURE	90 PSIA (MIN)
TORQUE OUTPUT	350 IN-LBS AT 90 PSIA
STALL TORQUE	32 FT-LBS (MIN)
MOTOR SPEED	300 RPM
AIR CONSUMPTION AT FREE SPEED	32 CFM (MAX)
HORSEPOWER RATING	0.43
WEIGHT	4.0 LB.
WORK SPACE NEEDED	PORTABLE

TABLE 5

BASIC DIA.	TYPICAL OSI-BOLT PART NUMBER	PNEUMATIC MOTOR	CAP	WRENCH SUB-ADAPTER	WRENCH ADAPTER	NOSE ADAPTER	COMPLETE PNEUMATIC TOOL ASSEMBLY
5/32	BG2031; BG2032	MRT300 INCLUDES: MRT300H MRT300M	MPCOL-05	MPWOL-01	--	MPFOL-05	MRT300OL-05AA
3/16			MPCOL-06			MPFOL-06	MRT300OL-06AA
13/64	MPCOL-08					MPFOL-06-Y	MRT300OL-06AAY
7/32			MPCOL-08			MPFOL-08	MRT300OL-08AA
1/4	MPCOL-08					MPFOL-08-Y	MRT300OL-08AAY
17/64			MPCOL-08			MPFOL-10	MRT300OL-10AA
9/32	MPCOL-08					MPFOL-10-X	MRT300OL-10AAX
5/16			MPCOL-08			MPFOL-10-Y	MRT300OL-10AAY
21/64	MPCOL-08					MPFOL-12	MRT300OL-12AA
11/32			MPCOL-08			MPFOL-12-X	MRT300OL-12AAX
3/8	MPCOL-08					MPFOL-12-Y	MRT300OL-12AAY
25/64			MPCOL-08			MPFOL-06-1	MRT300OL-06A1A
13/32	MPCOL-08	MPFOL-06-1		MRT300OL-06A1A			
3/16		BG2186	MPCOL-05	MPFOL-568	MRT300OL-05A2A		
5/32	MPCOL-06		MPCOL-06	MPFOL-568	MRT300OL-06A2A		
3/16		MPCOL-08	MPCOL-08	MPFOL-568	MRT300OL-08A2A		
1/4							

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FIGURE 7
BG20()(-) AND BG21()(-) OSI-BOLT FASTENERS
HOLE PREPARATION & INSTALLATION DIMENSIONS

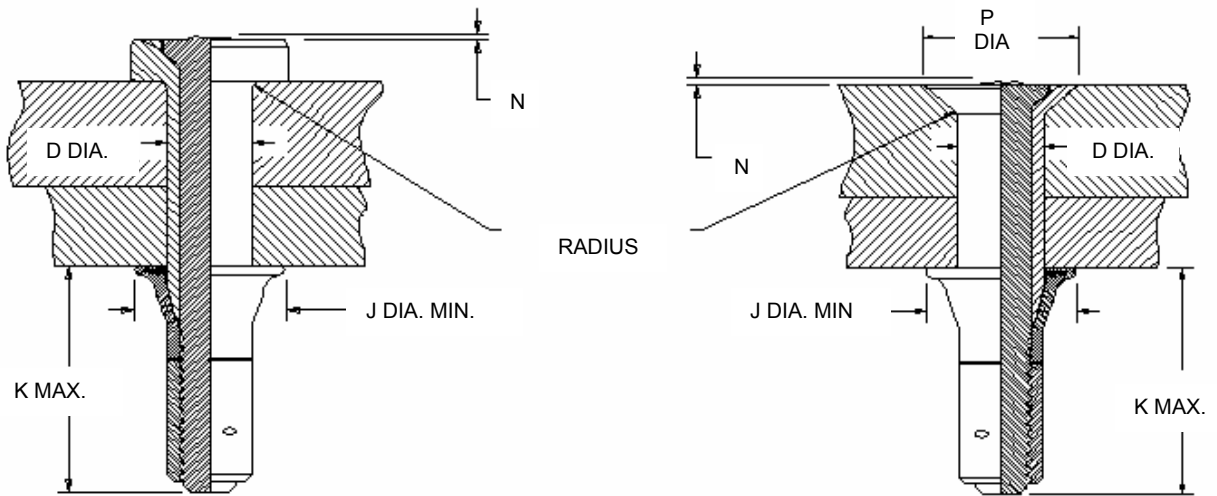


TABLE 6

RECOMMENDED HOLE SIZE "D" DIA			HOLE GAGE PART NUMBER	J DIA. MIN	K MAX	'N' SCREW BREAK-OFF LIMITS MAX.				RADIUS			
DIA. DASH NO.	CLEARANCE INSTALLATION	INTERFERENCE INSTALLATION				BG2088	BG203()(-) BG204()(-)	BG2081- BG2085-	BG2082- BG2083- BG2084- BG2086- BG2186-				
-05-()	.1670/.1650	.1630/.1615	OSIG-05	.250	.670	.025	.015			.030/.020			
-06-()	.1920/.1900	.1890/.1875	OSIG-06	.290	.750								
-06-()X	.2050/.2030	.2021/.1995	OSIG-06X	.300									
-06-()Y	.2205/.2185	.2177/.2152	OSIG-06Y	.320									
-08-()	.2520/.2500	.2490/.2470	OSIG-08	.380	.800								
-08-()X	.2680/.2660	.2646/.2621	OSIG-08X	.400									
-08-()Y	.2835/.2815	.2800/.2775	OSIG-08Y										
-10-()	.3150/.3130	.3115/.3090	OSIG-10	.475	.950		.015	.010					
-10-()X	.3305/.3285	.3271/.3246	OSIG-10X	.495									
-10-()Y	.3460/.3440	.3427/.3402	OSIG-10Y	.515									
-12-()	.3770/.3750	.3740/.3715	OSIG-12	.560	1.100		.020						
-12-()X	.3930/.3910	.3896/.3871	OSIG-12X	.580									
-12-()Y	.4090/.4070	.4052/.4027	OSIG-12Y	.600									
-14-()	.4400/.4380	.4365/.4340	OSIG-14	.660	1.250								
-14-()X	.4560/.4540	.4521/.4496	OSIG-14X	.680									
-14-()Y	.4710/.4690	.4677/.4652	OSIG-14Y	.700									
-16-()	.5020/.5000	.4990/.4965	OSIG-16	.760	1.350						.055/.045		

- NOTES:
- HOLES SHALL BE PERPENDICULAR TO SURFACE WITHIN 1°30'.
 - SHEETS SHOULD BE FIRMLY CLAMPED TOGETHER DURING DRILLING AND INSTALLATION.
 - CORE BOLT BREAK - OFF LIMITS ARE MEASURED FROM THE HEAD SURFACE OF THE FASTENER. EXCEPT FOR BG2088 WHERE BREAK-OFF IS MEASURED FROM TOP OF INSTALLATION SURFACE.
 - FOR FLUSH HEAD CSK P DIA., REFER TO STANDARD DRAWING 'A' DIAMETER THEORETICAL.

TITLE
INSTALLATION & INSPECTION SPECIFICATION
FOR SMOOTH BORE ONE SIDED INSTALLATION
(OSI BOLT®)

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FIGURE 8
BGV2068-06-() and BGV308()- OSI-BOLT FASTENER
HOLE PREPARATION & INSTALLATION DIMENSIONS

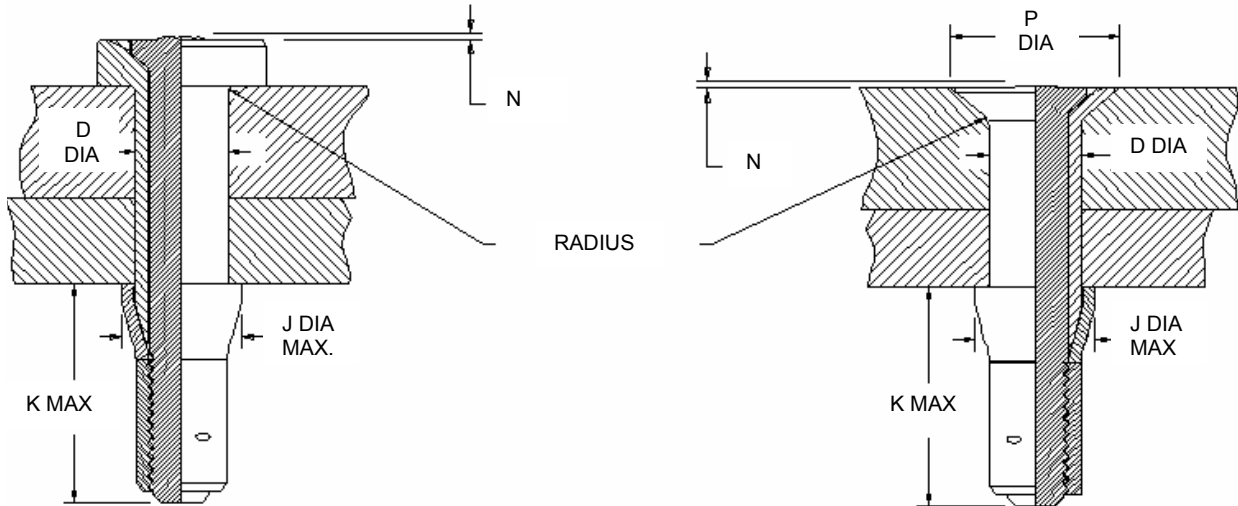


TABLE 7

DIA. DASH NO.	RECOMMENDED HOLE SIZE "D" DIA		HOLE GAGE PART NUMBER	J DIA. MAX	K MAX	'N' SCREW BREAK-OFF LIMITS MAX.			RADIUS MAX															
	CLEARANCE INSTALLATION	INTERFERENCE INSTALLATION				BGV3081 BGV3085	BGV3082 BGV3083 BGV3084 BGV3086	BGV2068 BGV3088																
-05-()	.1670/.1650	.1630/.1615	OSIG-05	.245	<i>.480</i>	.015	.010	.025	.025															
-06-()	.1920/.1900	.1890/.1875	OSIG-06	.300	.500				.015	.010	.025	.030												
-06-(X)	.2050/.2030	.2021/.1995	OSIG-06X																					
-06-(Y)	.2205/.2185	.2177/.2152	OSIG-06Y																					
-08-()	.2520/.2500	.2490/.2470	OSIG-08	.385	.600							.015	.010	.025	.030									
-08-(X)	.2680/.2660	.2646/.2621	OSIG-08X																					
-08-(Y)	.2835/.2815	.2800/.2775	OSIG-08Y																					
-10-()	.3150/.3130	.3115/.3090	OSIG-10	.430	.750										.015	.010	.025	.040						
-10-(X)	.3305/.3285	.3271/.3246	OSIG-10X																					
-10-(Y)	.3460/.3440	.3427/.3402	OSIG-10Y																					
-12-()	.3770/.3750	.3740/.3715	OSIG-12	.530	.850													.015	.010	.025	.040			
-12-(X)	.3930/.3910	.3896/.3871	OSIG-12X																					
-12-(Y)	.4090/.4070	.4052/.4027	OSIG-12Y																					
-14-()	.4400/.4380	.4365/.4340	OSIG-14	.600	.950																.015	.010	.025	.050
-16-()	.5020/.5000	.4990/4965	OSIG-16	.680	<i>1.050</i>																			

- NOTES:
- HOLES SHALL BE PERPENDICULAR TO SURFACE.
 - SHEETS SHOULD BE FIRMLY CLAMPED TOGETHER DURING DRILLING AND INSTALLATION.
 - CORE BOLT BREAK - OFF LIMITS ARE MEASURED FROM THE HEAD SURFACE OF THE FASTENER EXCEPT FOR BGV2068 AND BGV3088 WHERE BREAK-OFF IS MEASURED FROM TOP OF INSTALLATION SURFACE.
 - FOR FLUSH HEAD CSK 'P DIA.', REFER TO STANDARD DRAWING.
 - Note: Numbers in italic are projected values and are subject to adjustment.*

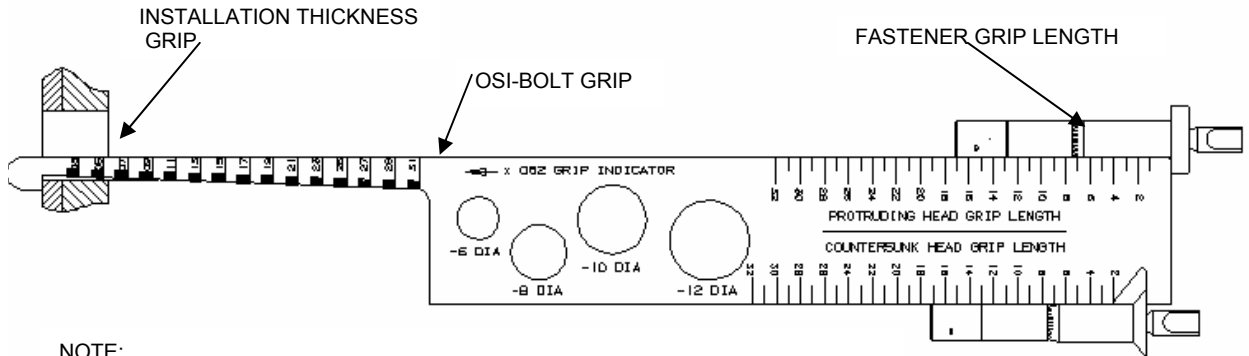
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(OSI BOLT[®])

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FIGURE 9
GRIP DETERMINATION

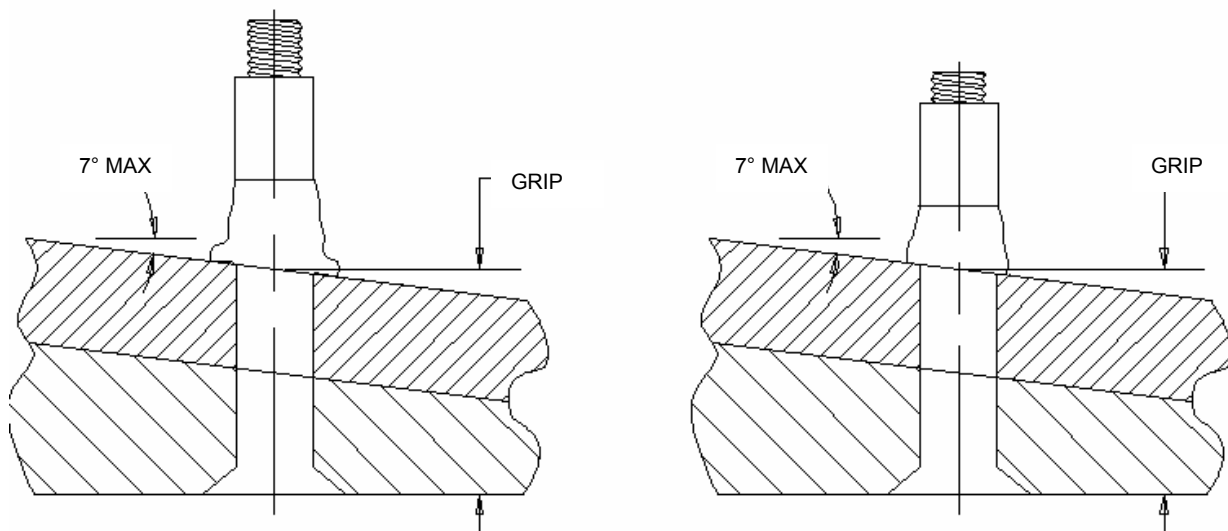


NOTE:
IN FIGURE 9, INSTALLATION THICKNESS AND FASTENER LENGTH ARE -06

TABLE 8

PART DESCRIPTION	PART NUMBER
OSI-BOLT GRIP GAGE	OLS-1
GRIP SCALE SLIDE (NOT SHOWN HERE)	GSS-1
OSI-BOLT GRIP GAGE AND GRIP SCALE SLIDE ASSEMBLY	OLS-1A

FIGURE 10
SLOPE GRIP DETERMINATION



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**FIGURE 11
HOLE SIZE 'GO'/'NO-GO' GAGE
FOR INTERFERENCE INSTALLATIONS**

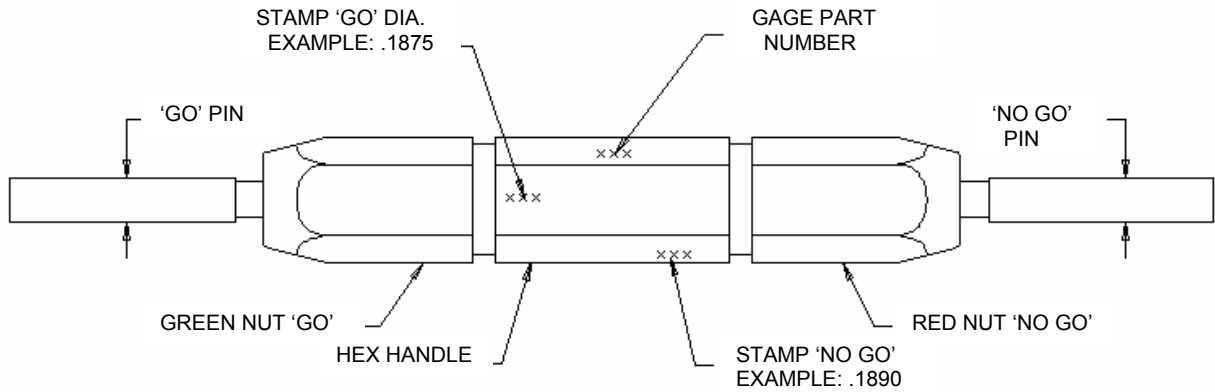


TABLE 9

FOR INTERFERENCE INSTALLATION HOLE GAGE PART NUMBER	"GO" DIAMETER	"NO-GO" DIAMETER
OSIG-05	.1615	.1630
OSIG-06	.1875	.1890
OSIG-06X	.1995	.2021
OSIG-06Y	.2152	.2177
OSIG-08	.2470	.2490
OSIG-08X	.2621	.2646
OSIG-08Y	.2775	.2800
OSIG-10	.3090	.3115
OSIG-10X	.3246	.3271
OSIG-10Y	.3402	.3427
OSIG-12	.3715	.3740
OSIG-12X	.3871	.3896
OSIG-12Y	.4027	.4052
OSIG-14	.4340	.4365
OSIG-14X	.4496	.4521
OSIG-14Y	.4652	.4677
OSIG-16	.4965	.4990

MONOGRAM AEROSPACE FASTENERS

FIGURE 12
OSI-BOLT FASTENER LEAF GAGE

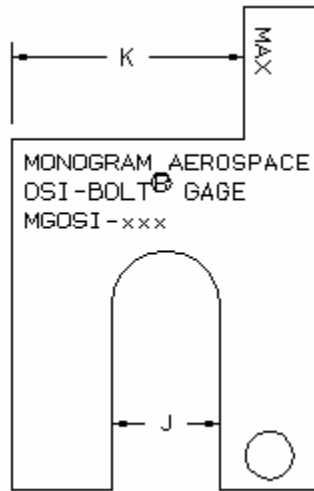


TABLE 10

Note: Numbers in italic are projected values and are subject to adjustment

FASTENER SIZE	LEAF GAGE PART NO.		GAGE DIMENSIONS $\pm .002$			
	FOR		K MAX		J MIN	J MAX
	BG20()- BG21()-	BGV2068-06-() BGV308()-()	BG20()- BG21()-	BGV2068-06-() BGV308()-()	BG20()- BG21()-	BGV2068-06-() BGV308()-()
-05- ()	MGOSI-05	MGVOSI-05	.670	<i>.480</i>	.250	<i>.245</i>
-06- ()	MGOSI-06	MGVOSI-06	.750	.500	.290	.300
-06- ()X	MGOSI-06X				.300	
-06- ()Y	MGOSI-06Y				.320	
-08- ()	MGOSI-08	MGVOSI-08	.800	<i>.600</i>	.380	.385
-08- ()X	MGOSI-08XY				.400	
-08- ()Y					MGVOSI-08Y	
-10- ()	MGOSI-10	MGVOSI-10XY	.950	<i>.750</i>	.475	<i>.430</i>
-10- ()X	MGOSI-10X				.495	
-10- ()Y	MGOSI-10Y				.515	
-12- ()	MGOSI-12	MGVOSI-12XY	1.100	<i>.850</i>	.560	<i>.530</i>
-12- ()X	MGOSI-12X				.580	
-12- ()Y	MGOSI-12Y				.600	
-14 ()	MGOSI-14	MGVOSI-14	1.250	<i>.950</i>	.660	<i>.600</i>
-14- ()X	MGOSI-14X	-		-	.680	-
-14- ()Y	MGOSI-14Y	-		-	.700	-
-16- ()	MGOSI-16	MGVOSI-16	1.350	<i>1.050</i>	.760	<i>.680</i>

TITLE
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FOR SMOOTH BORE ONE SIDED INSTALLATION
(OSI BOLT[®])

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MONOGRAM AEROSPACE FASTENERS

FIGURE 13
OSI-BOLT FASTENER BLIND SIDE PROTRUSION

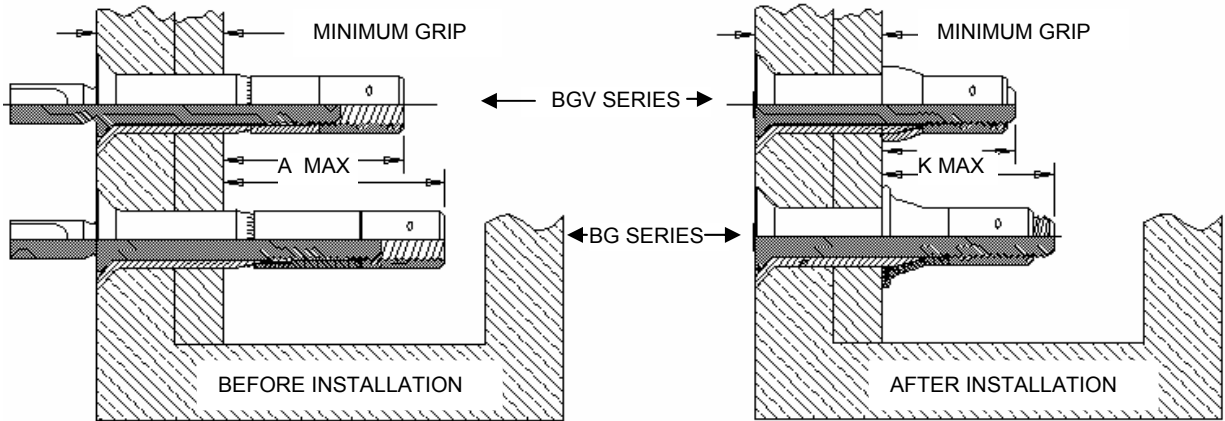


TABLE 11

BASIC DIAMETER	TYPICAL OSI-BOLT PART NO.				
	BG2031;BG2032; BG2034;BG2035 BG2041;BG2042; BG2044;BG2045	BG2081;BG2082 BG2083;BG2084; BG2085;BG2086; BG2186;BG2088	BG2031;BG2032;BG2034; BG2035;BG2041;BG2042;BG2044; BG2045;BG2081;BG2082;BG2083; BG2084;BG2085;BG2086; BG2186;BG2088	BGV2068-06; BGV3081;BGV3082 BGV3083;BGV3084; BGV3085;BGV3086; BGV3088	
	"A" MAX		"K" MAX	"A" MAX	"K" MAX
-05-()	.795		.670	.580	.480
-06-()	.920	.870	.750	.580	.500
-06-()X				.645	
-06-()Y	.980	.930			
-08-()	1.060	1.050	.800	.880	.600
-08-()X				.930	
-08-()Y	<i>1.120</i>	<i>1.100</i>			
-10-()	1.180	1.100	.950	.980	.750
-10-()X	1.210	1.130		1.030	
-10-()Y	<i>1.250</i>	<i>1.170</i>			
-12-()	1.330	1.270	1.100	1.080	.850
-12-()X	1.380	1.320		1.130	
-12-()Y	<i>1.410</i>	<i>1.350</i>			
-14-()	1.480	1.480	1.250	1.230	.950
-14-()X	<i>1.530</i>	<i>1.530</i>		-	-
-14-()Y	<i>1.580</i>	<i>1.580</i>		-	-
-16-()	<i>1.620</i>	<i>1.620</i>	1.350	1.370	1.050

Note: Numbers in italic are projected values and are subject to adjustment.

MONOGRAM AEROSPACE FASTENERS

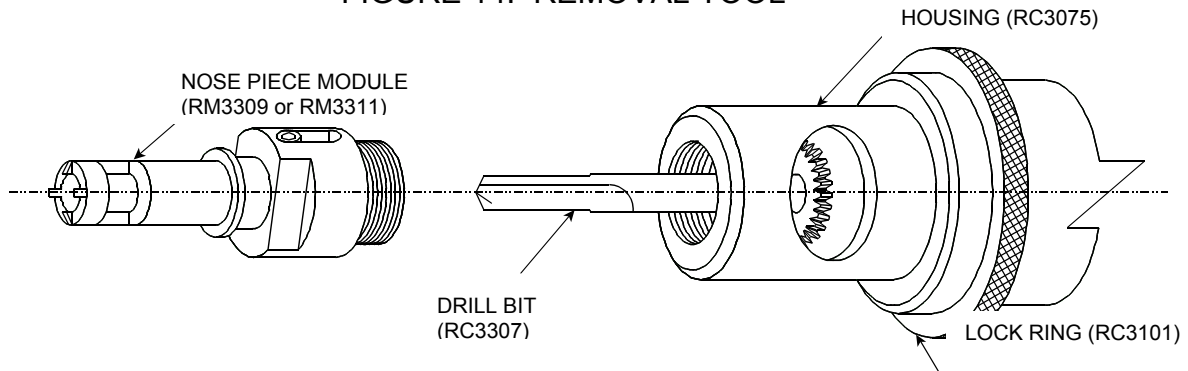
TABLE 12
OSI-BOLT® REMOVAL COMPONENT PART NUMBERS

Basic Dia.	Dia. Dash No.	Flush Head Nose Piece Module Part No.	Protruding Head Nose Piece Module Part No.	Carbide Star Drill for Corebolt Removal	Depth Gage for Flush Head OSI	Depth Gage for Protruding Head OSI	Rivet Set for OSI Corebolt Removal	Piloted End Mill For Head to Shank Removal of the OSI Body	Piloted Rivet Set for OSI Body Removal	
5/32	-05	RM3309-05	RM3311-05	RC3307-05	RM3313-01	RM3313-00	RC3331-05	RC3329-05	RC3328-05	
3/16	-06	RM3309-06	RM3311-06	RC3307-06		RM3313-01	RC3331-06	RC3329-06	RC3328-06	
13/64	-06X							RC3329-06Y	RC3328-06Y	
7/32	-06Y									
1/4	-08	RM3309-08	RM3311-08	RC3307-08		RM3313-02	RC3331-08	RC3329-08	RC3328-08	
17/64	-08X							RC3329-08X	RC3328-08X	
9/32	-08Y				RC3329-08Y			RC3328-08Y		
5/16	-10	RM3309-10	RM3311-10	RC3307-10	RM3313-02		RC3331-10	RC3329-10	RC3328-10	
21/64	-10X							RC3329-10X	RC3328-10X	
11/32	-10Y							RC3329-10Y	RC3328-10Y	
3/8	-12	RM3309-12	RM3311-12	RC3307-12		RM3313-03	RC3331-12	RC3329-12	RC3328-12	
25/64	-12X							RC3329-12X	RC3328-12X	
13/32	-12Y							RC3329-12Y	RC3328-12Y	
7/16	-14	RM3309-14	RM3311-14	RC3307-14	RM3313-03		RC3331-14	RC3329-14	RC3328-14	
29/64	-14X							RC3329-14X	RC3328-14X	
15/32	-14Y							RC3329-14Y	RC3328-14Y	
1/2	-16	RM3309-16	RM3311-16	RC3307-16		RM3313-04	RM3313-05	RC3331-16	RC3329-16	RC3328-16

Setting up the OSI removal tool

1. Insert appropriate diameter carbide star drill (RC3307) into air motor chuck until it bottoms out, then tighten chuck firmly (See Figure 14).
2. Slide appropriate nose piece module over the drill bit and screw it onto the housing until the module bottoms out on the face of the housing (RC3075), then tighten (See Figure 14).

FIGURE 14: REMOVAL TOOL



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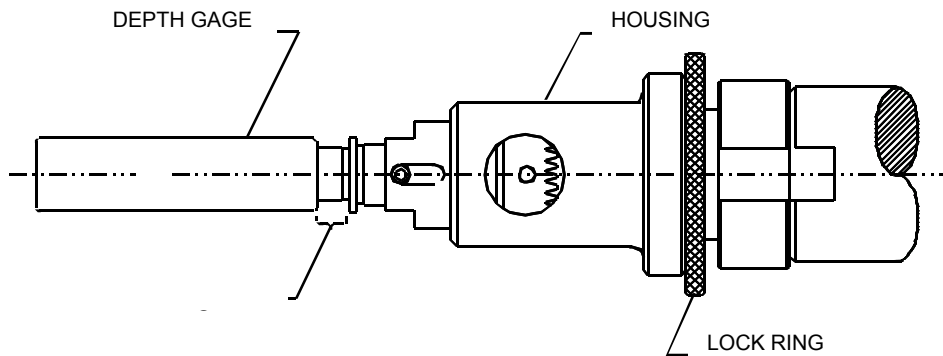
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REVISION: "K"

Setting Cutting Depth for Corebolt Removal

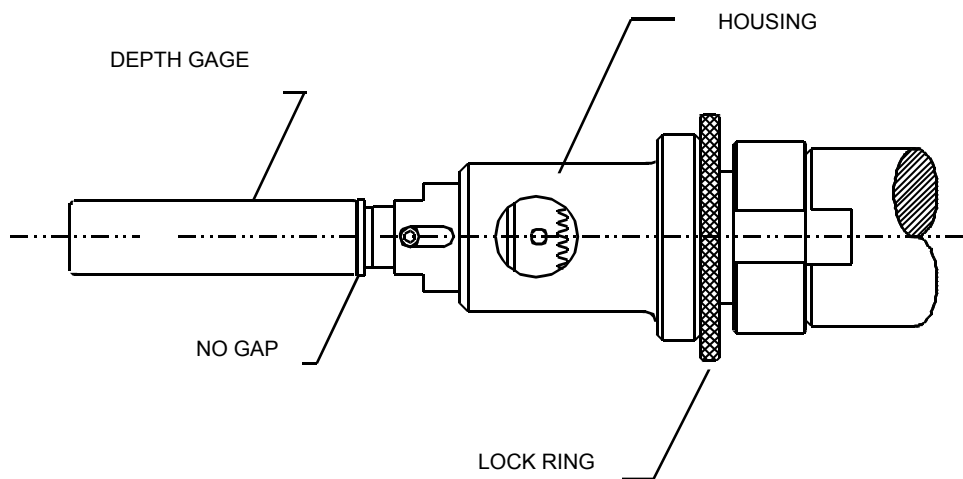
Step 1. Slide depth gage over nose adapter module. Using your forefinger to apply slight downward pressure on the top of the depth gage, adjust cutting depth by rotating the housing (RC3075) until a gap is created between the base of the depth gage and the flange of the nose module. The gap is caused by the tip of the drill bit contacting the depth gage and pushing it upward. This procedure is to ensure that contact between the two components is made prior to facilitating step two of the depth control setup (See Figure 15).

FIGURE 15: SETTING CUTTING DEPTH STEP 1



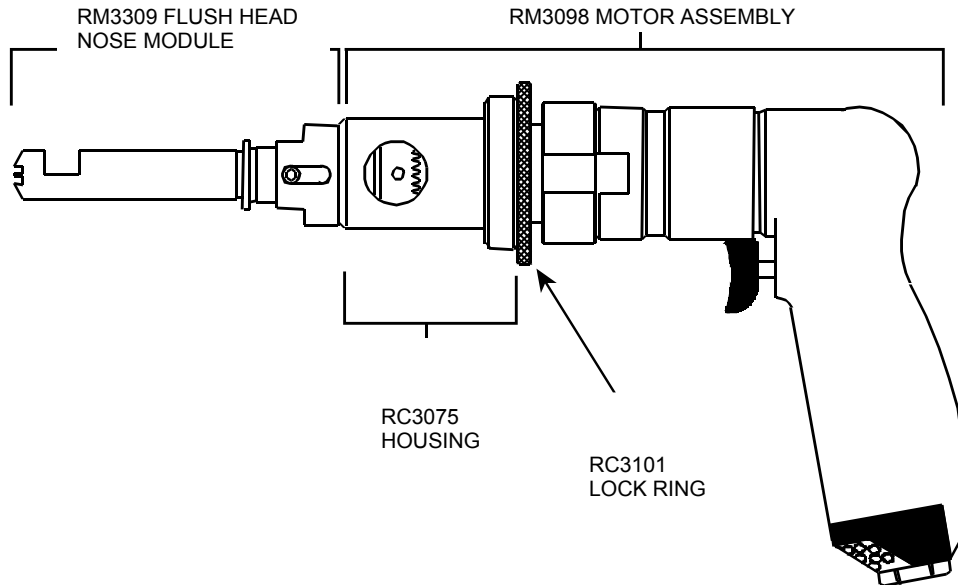
Step 2. After creating a gap and while continuing to apply slight forefinger pressure on the top of the depth gage, rotate the housing in the opposite direction until base of depth gage barely makes contact with the nose piece flange. Tighten knurled lock ring (RC3101) against the base of the housing to secure it and prevent further rotation. This process ensures that the housing will not rotate out of adjustment during the drilling process (Figure 16).

FIGURE 16: SETTING CUTTING DEPTH STEP 2



Once the depth adjustment procedure is completed your motor assembly should look like Figure 17.

FIGURE 17: COMPLETED MOTOR ASSEMBLY



The Drilling Process

The prongs at the tip of the nose piece module must first engage the recesses of the OSI fastener. User should be careful to maintain motor assembly perpendicularity to the work surface. This helps prevent “drifting” and aids in maintaining centerline cutting. Note that user must bring motor to full rpm before making drill bit contact with the fastener or the carbide bit may chip and be rendered useless.

After reaching full rpm, it is recommended that the user “peck” away at the fastener corebolt as opposed to applying full drilling force immediately. Applying full force right away generally results in drifting off centerline of the fastener. The pecking technique is useful for creating a “cone” cavity, which acts as a guide when full force is eventually applied. Drilling should continue until the spring loaded gap, as depicted in Figure 18, is closed or until the head of the corebolt is removed. Once achieved discontinue drilling to avoid difficulty in removing the fastener head from the drill. The fixed travel of the nose piece, in conjunction with the depth setting procedure, controls your cutting depth and should drill to the depth of the corebolt head (See Figure 19).

FIGURE 18: DRILLING PROCESS

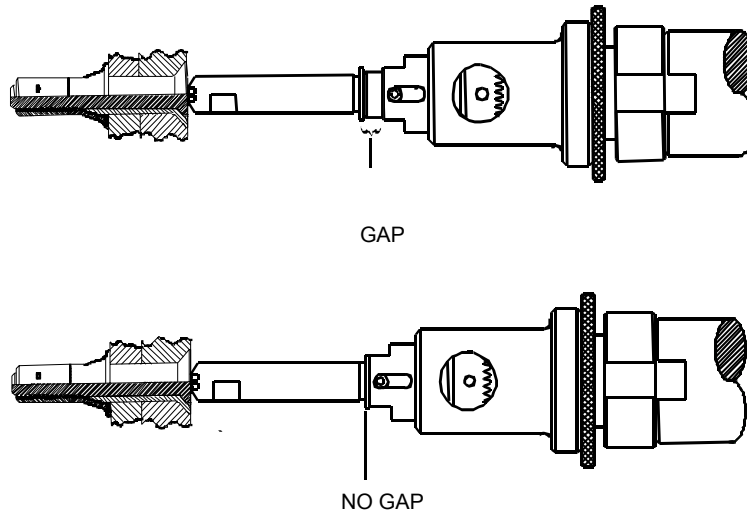
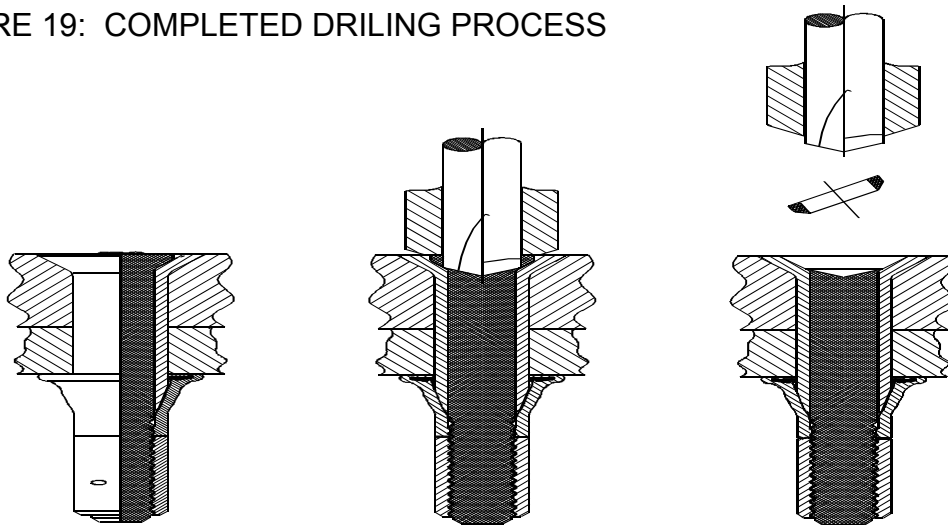


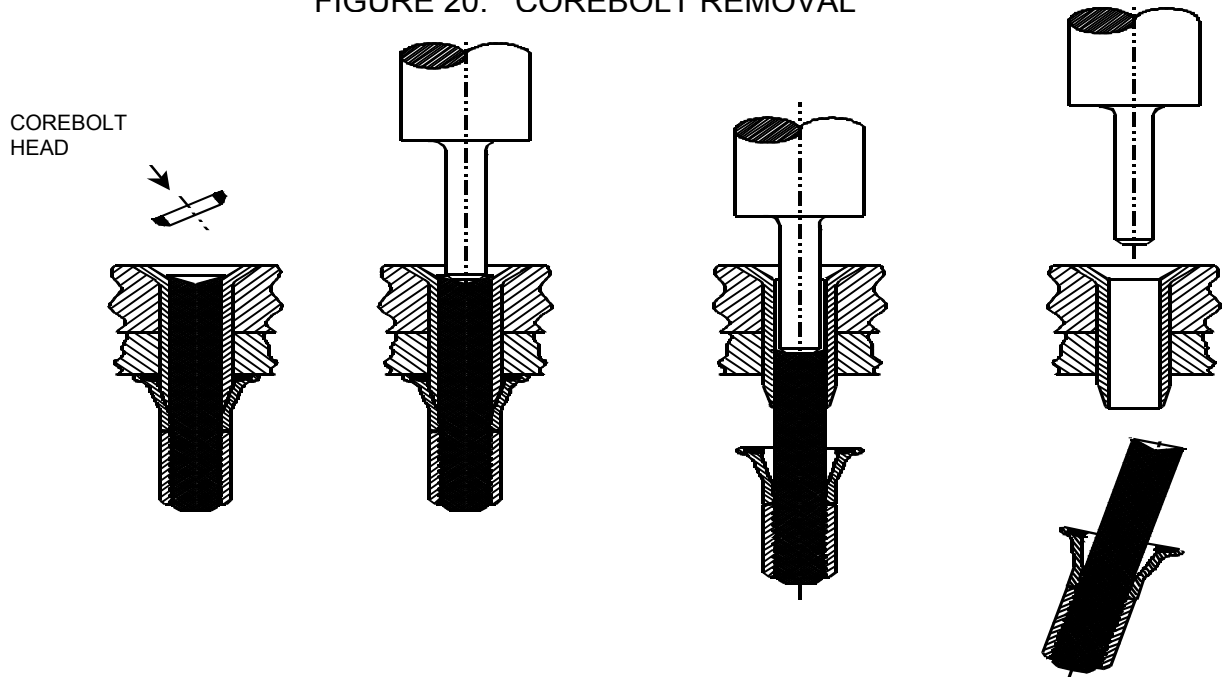
FIGURE 19: COMPLETED DRILING PROCESS



Corebolt Removal

Once the corebolt head becomes detached (as depicted below), use the proper diameter rivet set (RC3331 series) in conjunction with a standard utility hammer to push the remaining shank out the back side of the structure (See Figure 20).

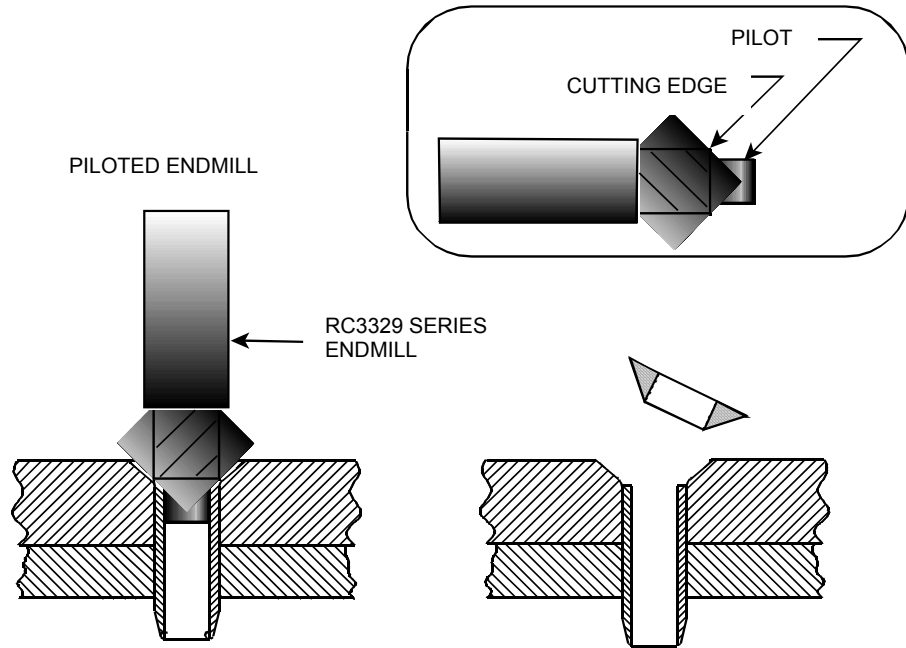
FIGURE 20: COREBOLT REMOVAL

**Removing the Remaining Body Component**
End Mill Cutting Method

The piloted end mill (RC3329 series) is to be utilized with any drill motor that does not exceed 200 rpm, which is the optimum speed for cutting efficiency and end mill life. The shanks of all Monogram supplied piloted end mills are ground to 1/4", allowing the user to employ a drill motor with any quarter-inch or larger Jacobs-style chuck.

User should maintain drill motor perpendicularity to the work surface when cutting with the end mill. The depth of the cut is estimated; user should attempt to cut only to where the head of the body attaches to the shank. User should not bear into the fastener with full force. Moderate tool end pressure is adequate and more efficient in terms of end mill life. However, over cutting is not a problem due to the end mill pilot which ensures centerline cutting provided reasonable perpendicularity is maintained. Although dry cutting is sufficient, Boe-lube may augment cutting efficiency and extend the life of the cutting piece. In most cases the head will remain attached to the shank after the milling process. A very thin wall at this juncture is easily fractured when employing the piloted rivet set sequence shown in the next removal segment (See Figure 22). However, depending on motor perpendicularity, the head may become detached during the milling action (See Figure 21).

FIGURE 21: REMOVING THE REMAINING BODY COMPONENT



Removing The Remaining Shank Portion Of The OSI body (Figure 22)

User must select the appropriate size piloted rivet set (RC3328 series). This configuration varies from the standard rivet set in that a pilot on the end of the tool is employed to ensure that it remains confined within the OSI body during the separation process. Thus, the pilot helps the rivet set react against the OSI body in lieu of the structure. User can employ any of Monogram’s rivet sets with most standard pneumatic utility hammers, or they may utilize a Monogram supplied unit (RC3173). User should adjust the power output of the utility hammer to a low setting and “creep” up in power as needed to remove the remaining body segment. It is recommended that moderate end pressure first be applied to the tool; however, end pressure can be increased or decreased as needed.

FIGURE 22: REMOVING THE REMAINING SHANK

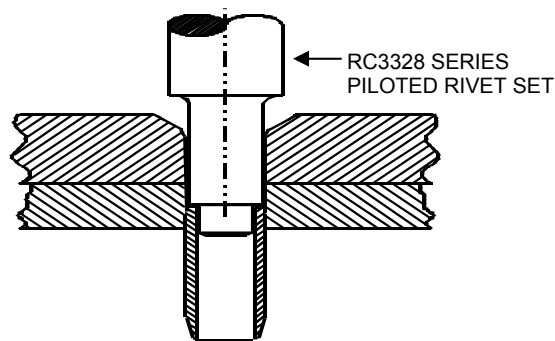
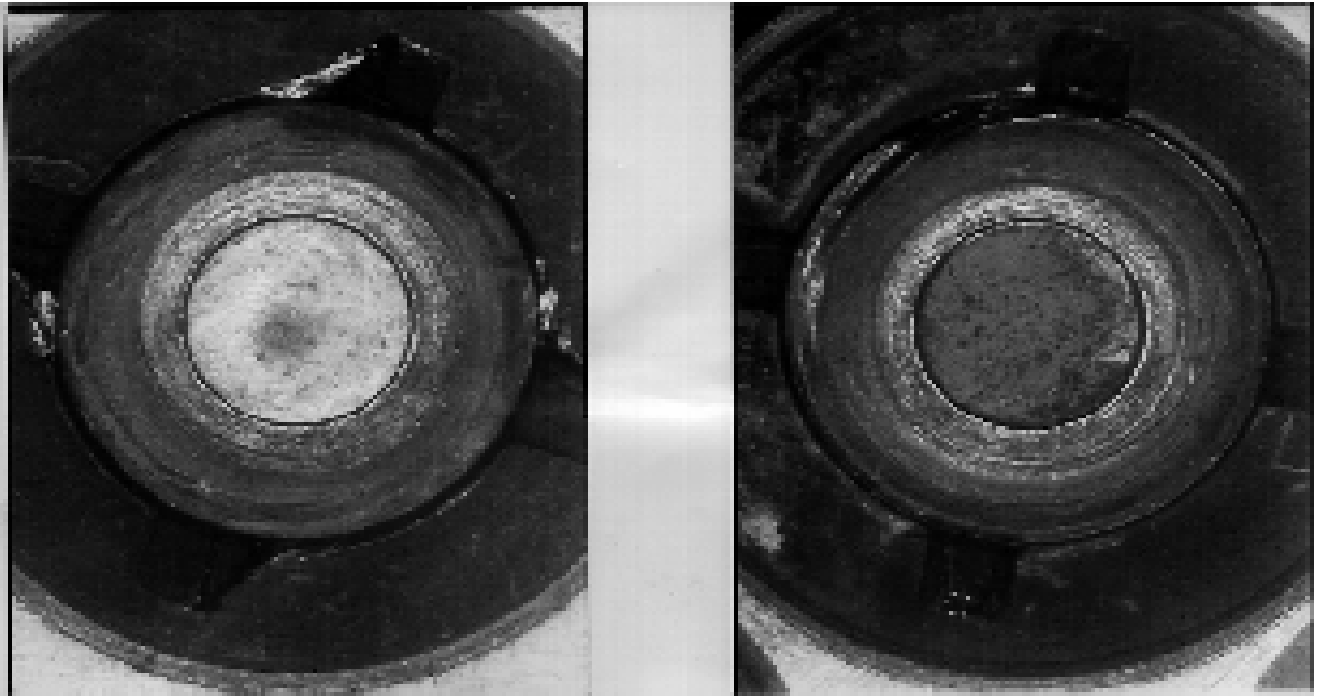


FIGURE 23
COMPARISON BETWEEN PROPERLY AND IMPROPERLY INSTALLED
FASTENERS

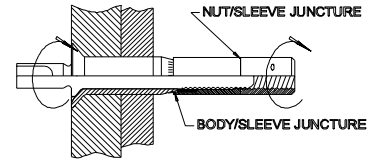


PROPERLY INSTALLED FASTENER
COREBOLT FRACTURED IN TORSION
(SHINY SURFACE WITH TORSIONAL
SWIRL)

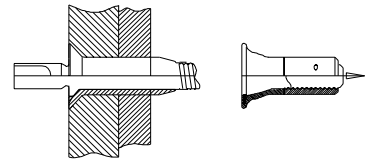
IMPROPERLY INSTALLED FASTENER
COREBOLT FRACTURED IN BENDING
(DARK GRAINY SURFACE WITHOUT
TORSIONAL SWIRL)

**FIGURE 24
OSI-BOLT INSTALLATION TROUBLESHOOTING GUIDE**

1. "SPINNER" @ NUT/SLEEVE OR @ SLEEVE/BODY JUNCTURES, ALSO WHEN BODY RECESS "CAM-OUT"
NOT INSTALLABLE -- REPLACE FASTENER

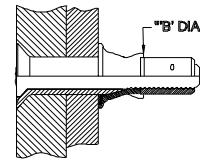


2. "SHOOTA" -- COREBOLT SEVERED DURING INSTALLATION.
NOT ACCEPTABLE -- REPLACE FASTENER

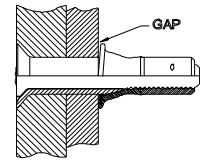


3. "TUCK-OUT" -- SLEEVE EXTRUSION OVER THE NUT.

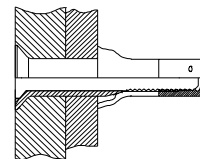
1 *NOT ACCEPTABLE -- REPLACE FASTENER IF 'B' DIAMETER EXCEEDS NUT O.D. BY MORE THAN .050 INCH.



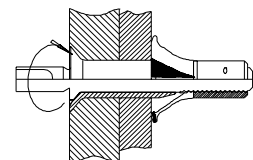
4. "OFF-SHEET" -- PARTIAL FOOTPRINT CONTACT.
ACCEPTABLE -- IF FULL CONTACT EXCEEDS 90% OF THE BEARING AREA



5. INCOMPLETE FOOTPRINT FORMATION.
NOT ACCEPTABLE -- REPLACE FASTENER



6. SPLIT SLEEVE.
NOT ACCEPTABLE -- REPLACE FASTENER



1 "B" DIAMETER MEASURED AT THE CENTER OF THE CRIMPING BAND (APPROXIMATELY 1/32 INCH FROM THE BASE OF THE NUT) SHALL NOT EXCEED THE NUT OUTSIDE DIAMETER (O.D.) MEASURED AT THE BASE OF THE NUT, BY MORE THAN .050 INCH. APPLIES TO -10 AND SMALLER DIAMETERS.