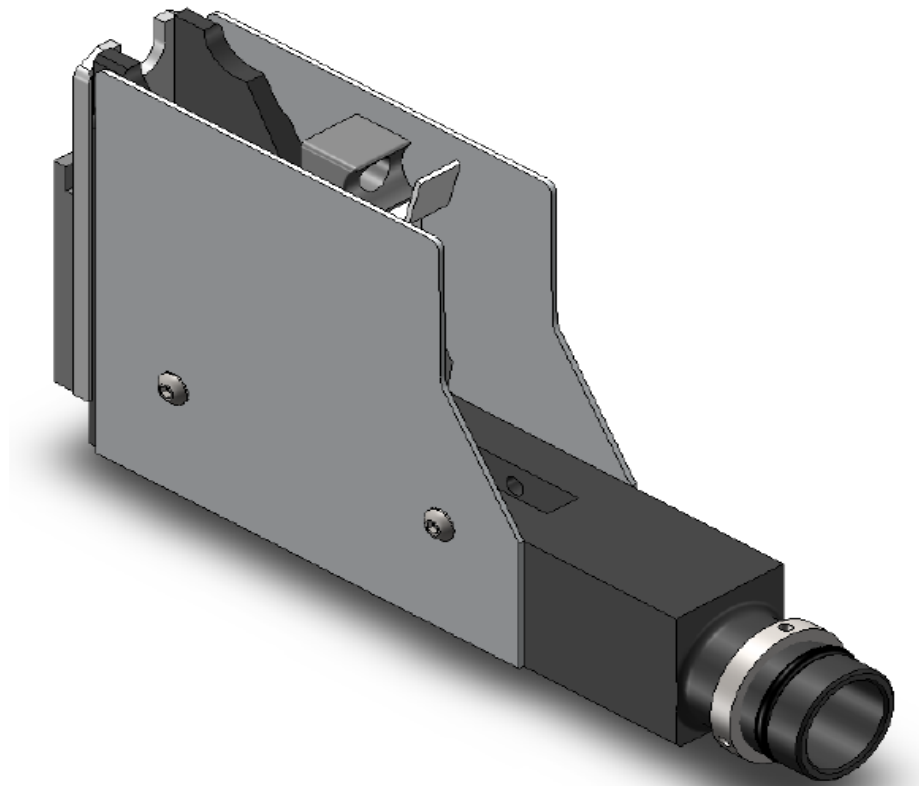

FTI OPERATIONS, MAINTENANCE, AND REPAIR MANUAL

Little Brute Offset Adapter

**Part #2720-010, Log #1203
Revision D**

November 18, 2011



Little Brute Offset Adapter with Finger Guard

**This manual should be used in conjunction with the FTI
“Little Brute Puller Unit Operations, Maintenance, and Repair Manual”**

ABOUT FATIGUE TECHNOLOGY

Fatigue Technology (FTI) is a world-leading aerospace engineering and manufacturing company. FTI pioneered cold expansion technology (which provides solutions to fatigue problems associated with holes in metal structures) back in 1969 and have advanced this science to develop innovative bushing and fastener products. These proprietary products and associated tooling may be covered by patents or agreements owned by, or exclusively licensed to Fatigue Technology. Use of tooling procured from other than a licensed source may constitute patent infringement.

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FTI's systems and processes are the subject matter of one or more of the following patents: 4,809,420, 4,885,829, 4,934,170, 5,083,363, 5,096,349, 5,103,548, 5,127,254, 5,129,253, 5,218,854, 5,245,743, 5,305,627, 5,341,559, 5,380,136, 5,405,228, 5,433,100, 5,468,104, 6,077,010, 6,183,180, 6,487,767, 6,792,657, 6,990,722, 7,024,908, 7,100,264; 1,061,276, 513,898, 692015124, 581,385, 69310828, 468,598, 69105390, 643,231, 69414946, 696,686, 785,366, 1032769, and other patents pending. These systems and processes are tooling critical and must be performed in accordance with FTI's specifications or controlling documents. To ensure proper results from FTI's cold expansion systems and to be licensed to use FTI's patented processes, it is essential that FTI's complete integrated system of tooling be purchased and utilized. The use of tooling purchased from other than a licensed supplier could jeopardize fatigue life enhancement and may constitute patent infringement.

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ABOUT FATIGUE TECHNOLOGY

Fatigue Technology (FTI) has provided innovative solutions to fatigue problems in metal structures since 1969. Complete systems of tooling are used worldwide to enhance the fatigue life of holes in airframes, turbine engines, and other critical structures.

The FTI staff of professionals provides a full range of support services including:

- Application engineering
- Detailed project planning, implementation and management
- On-site assistance, including training and tool room setup
- Complete inventory allowing FTI to respond quickly to customer' requirements

The Sales Department is always available to assist with special fatigue enhancement requirements. Please contact FTI with questions at any time.

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SECTION 1.0: INTRODUCTORY INFORMATION—LITTLE BRUTE OFFSET ADAPTER

This instruction manual contains information on the operation and maintenance of the Little Brute Offset Adapter (LBOA) designed by Fatigue Technology (FTI) for use with the patented Split Sleeve Cold Expansion™ (SsCx™) process. To obtain optimum performance and many years of trouble-free service, carefully follow maintenance procedures and operate the LBOA properly.

Read this manual before operating the LBOA, and retain the manual for future reference. If requested, FTI will provide this manual in the language of the end-user.

The Little Brute Offset Adapter:

- Is capable of cold expanding holes in restricted access areas up to 1/2-inch diameter in aluminum and mild steel and 7/16-inch diameter in titanium and high-strength steel.
- Attaches to the Little Brute (LB) series of puller units. See Little Brute Puller Manual for additional safety information.
- Adapter alone weighs approximately 6.5 pounds (2.95kg); with LB puller unit, it weighs approximately 17 pounds (7.71kg).
- Requires only 0.300" lateral clearance (see Figure 3-1).
- Has a maximum pull force of 7,000 pounds (generated by the Little Brute Puller Unit).
- Identification is provided by machined model and serial numbers.

There are two variants of the Little Brute Offset Adapter. See Figures 1-1 and 1-2:

1. Little Brute Offset Adapter with Finger Guard (shown in Figure 1-1). These are available by adding –G to the end of the LBOA-xx model number. **These units provide safety improvements that comply with the European Council's Machinery Directive 2006/42/EC.**
2. Little Brute Offset Adapter without Finger Guard (shown in Figure 1-2). These are available by the LBOA-xx model number and offer access to more restricted areas (see Figure 3-1).

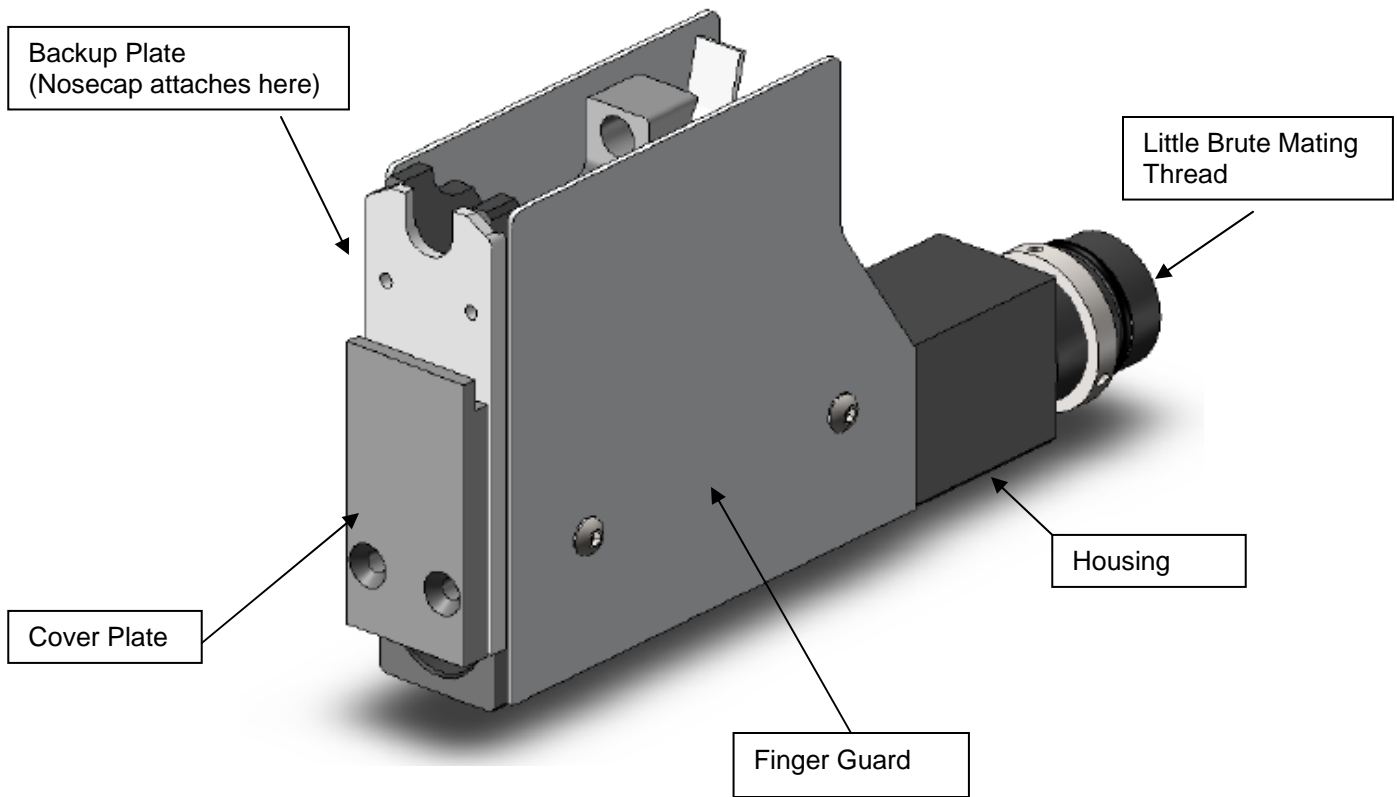


Figure 1-1
Little Brute Offset Adapter Parts, with Guard (LBOA-xx-G)

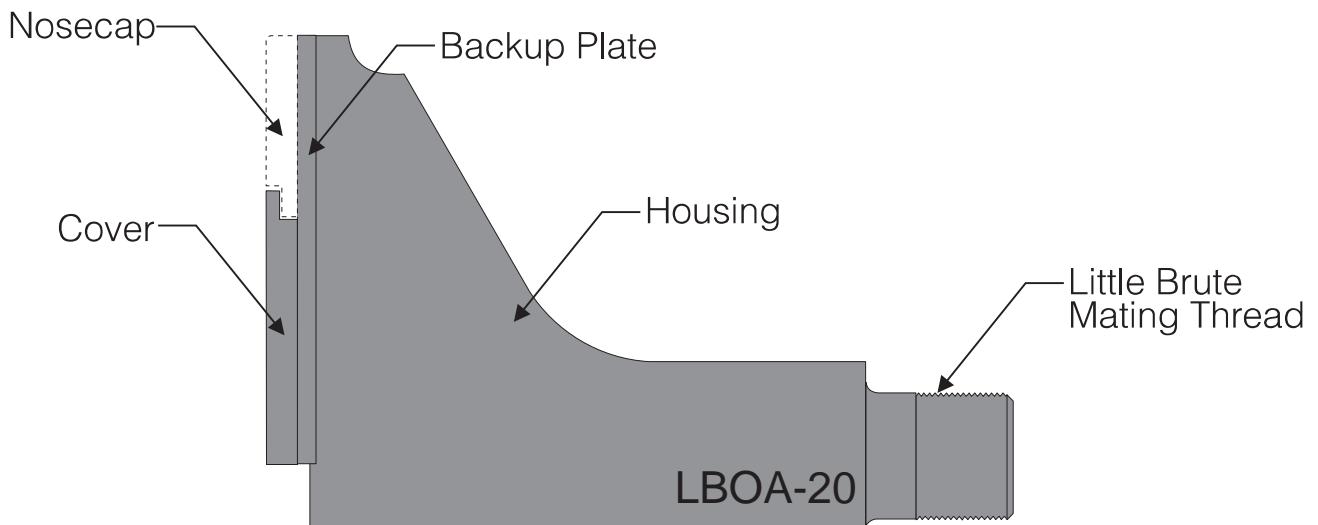


Figure 1-2
Little Brute Offset Adapter Parts, without Guard (LBOA-xx)

SECTION 2.0: SAFETY

Safe operation of the LBOA is of paramount concern. Along with standard shop safety practices (eye protection, safe handling of high-pressure equipment, etc.), the following items are peculiar to the LBOA/puller unit assembly:

1. Disconnect LB Puller Unit from PowerPak before attaching the LBOA.

2. **CAUTION:** Pinch point risk.

3. **CAUTION:** Keep fingers out of slide channel.



4. Use self-alignment nut for tooling numbered 14-0-N through 16-0-N to prevent mandrel breakage.

5. When using self-alignment nut, ensure nut retainer is in place. Bending the nut retainer may cause damage or failure.

6. Take care not to scratch puller piston rod of LB puller unit.

7. Observe all safety precautions associated with LB-20 Puller Unit and PowerPaks, as listed in their separate manuals.

SECTION 3.0: LITTLE BRUTE OFFSET ADAPTER SPECIFICATIONS

Table 3-1.1
Little Brute Offset Adapter Specifications with Guard

Model Number	Maximum Material Stackup (inch)	Adapter Width W (inch)	Combined Puller and Adapter Length (OAL) (inch)	Adapter Length L (inch)	Frontside Clearance F (inch)
LBOA-10-G	1.0	1.65	11.8	6.7	4.75
LBOA-15-G	1.5	1.65	13.3	7.7	5.25
LBOA-20-G	2.0	1.65	14.8	8.7	5.75
LBOA-25-G	2.5	1.65	16.3	9.7	6.25
LBOA-30-G	3.0	1.65	17.8	10.7	6.75
LBOA-35-G	3.5	1.65	19.3	11.7	7.25

Table 3-1.2
Little Brute Offset Adapter Specifications without Guard

Model Number	Maximum Material Stackup (inch)	Adapter Width W (inch)	Combined Puller and Adapter Length (OAL) (inch)	Adapter Length L (inch)	Frontside Clearance F (inch)
LBOA-10	1.0	1.5	11.8	6.7	4.05
LBOA-15	1.5	1.5	13.3	7.7	4.55
LBOA-20	2.0	1.5	14.8	8.7	5.05
LBOA-25	2.5	1.5	16.3	9.7	5.55
LBOA-30	3.0	1.5	17.8	10.7	6.05
LBOA-35	3.5	1.5	19.3	11.7	6.55

Note: The LBOA-20 or LBOA-20-G is standard.

Nosecap Selection: The LBOA uses special LBOA nose caps (refer to FTI Tooling Catalog, Section 2).

Mandrel Selection: The LBOA uses special LBOA mandrels (refer to FTI Tooling Catalog, Section 2).

See Figure 3-1.

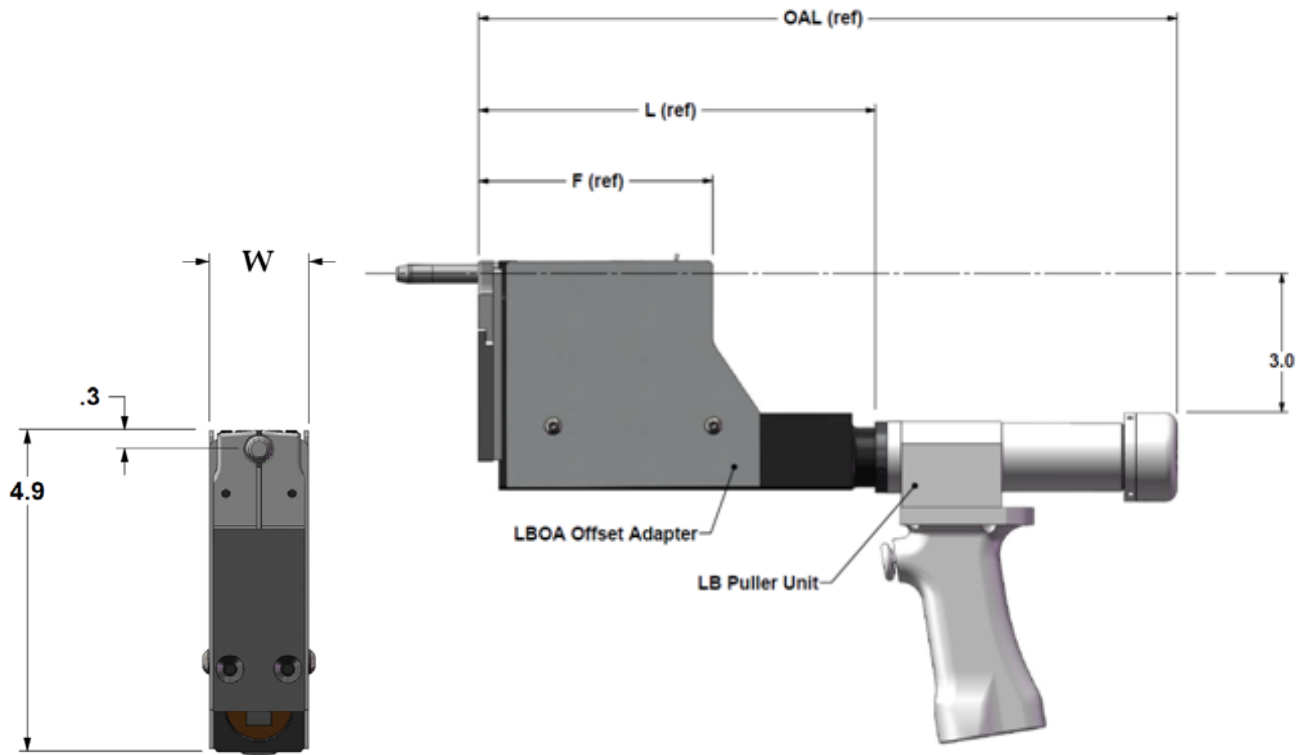


Figure 3-1
Little Brute Offset Adapter
 (Picture shown with guard)

SECTION 4.0: ASSEMBLY AND USAGE OF THE LITTLE BRUTE OFFSET ADAPTER

Follow these steps to assemble and use the LBOA:

SAFETY

Disconnect the LB Puller Unit (Figure 3-1) from the PowerPak before attaching the LBOA.

WARNING

Do not use without guard installed

1. Remove the noscap assembly from the LB Puller Unit (Figure 4-1).



Figure 4-1
Little Brute Puller Unit, Nosecap Removed

2. Unscrew and remove barrel from LB Puller Unit (Figure 4-2).



Figure 4-2
Little Brute Puller Unit, Barrel Removed

- Remove mandrel adapter from piston rod (Figure 4-3).

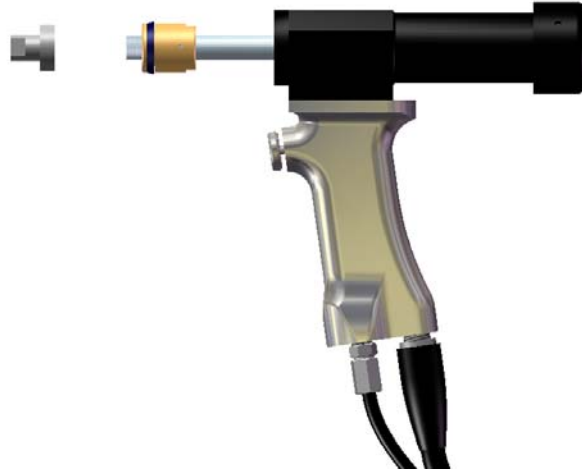


Figure 4-3
Little Brute Offset Adapter, Mandrel Adapter Removed

- Screw proper LBOA slide assembly (for tang mandrel, threaded mandrel, or broach). If the proper slide assembly is already installed, disregard Steps 5 and 6.
- Remove face plate from LBOA and insert slide assembly into housing (Figure 4-4).
- Install proper face plate, special jaw plate, or special nosecap spacer (Figure 4-4).
- If a standard face plate is used, install the proper jaw on the LBOA (Figure 4-4).

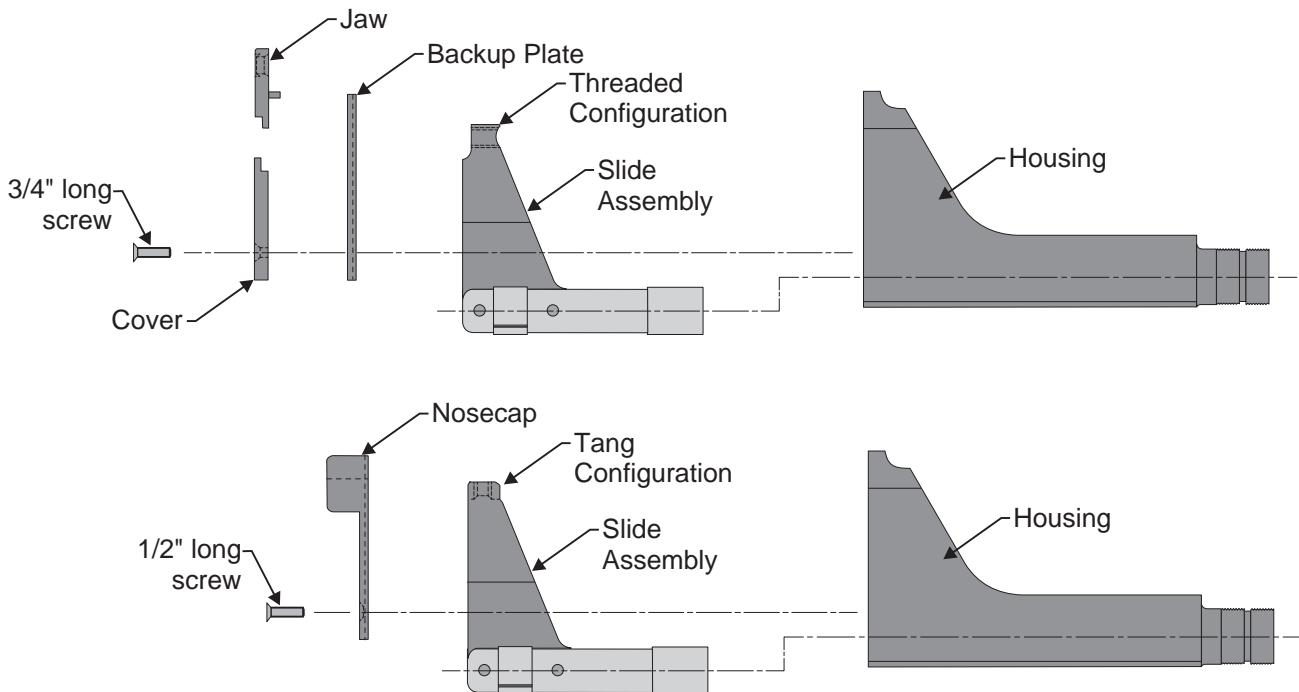


Figure 4-4
Little Brute Offset Adapter, Jaw Installation
(Guard not shown in Figure 4-4 for clarity)

8. Screw LBOA onto Little Brute Puller Unit (Figure 4-5). Connect piston first then connect housing. Tighten locking.

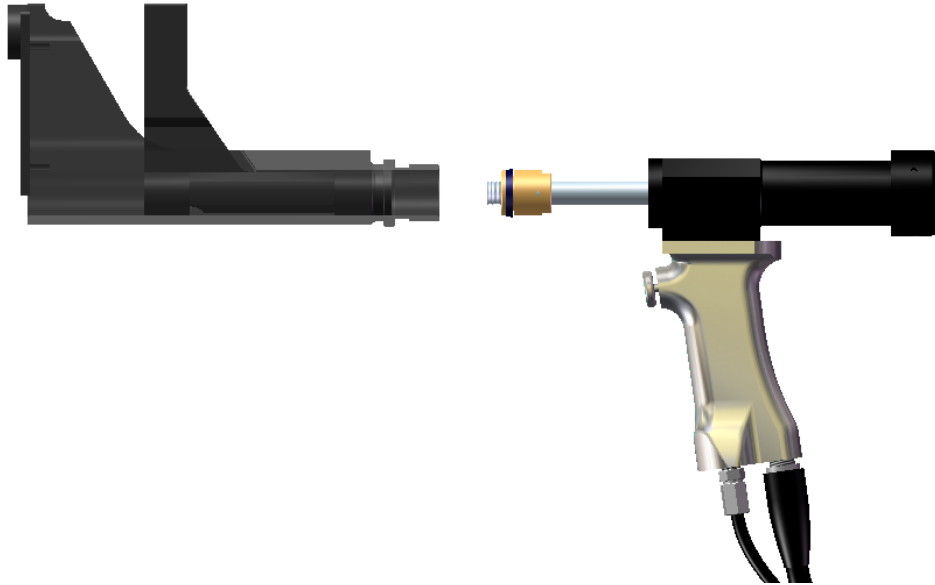


Figure 4-5
Little Brute Offset Adapter Connection to Little Brute Puller Unit
(Guard not shown in Figure 4-5 for clarity)

9. Ream starting hole to proper diameter.
10. Verify starting hole diameter (SHD) using the stepped go/no-go end of a combination gage (Figure 4-6).



Figure 4-6
Starting Hole Gage

Note: For threaded slide assembly, refer to Steps 12 to 16; for a tang assembly, refer to Steps 17 to 21.

11. Select the proper mandrel and check major diameter for wear by inserting mandrel into mandrel gage. If the mandrel can be passed through the gage, it is excessively worn and must be discarded (Figure 4-7).

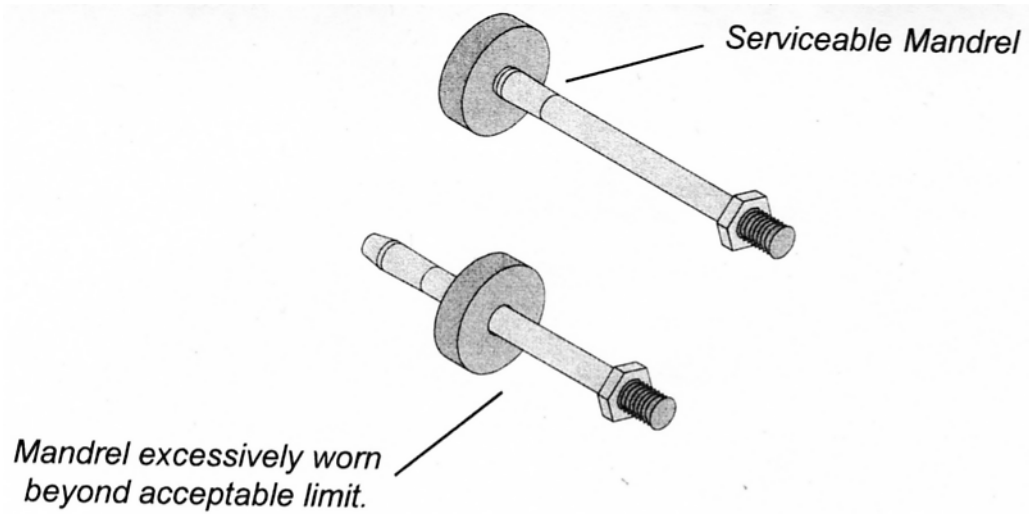


Figure 4-7
Mandrel Check Gage

SECTION 5.0: PROCEDURE FOR THREADED MANDREL SLIDE ASSEMBLY

The LBOA will allow for the use of threaded (7/16 inch -20) mandrels or tang-style mandrels (Section 6.0). The following instructions identify how to install threaded mandrels:

1. Pull the LBOA slide assembly back, thread in the mandrel and return the slide assembly to its forward position.
2. Thread LB piston rod into LBOA slide assembly then thread LBOA housing into LB housing (Figure 5.1). Ensure the o-ring on LBOA housing is seated at the LB housing.

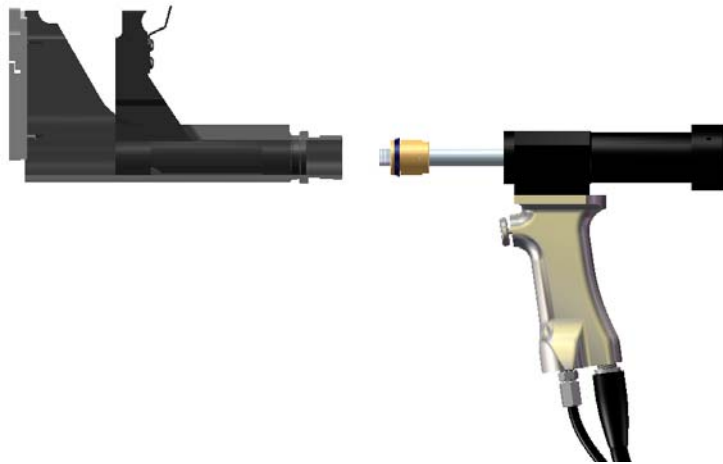


Figure 5-1
Little Brute Piston Rod and Slide Assembly, Threaded Mandrel
(Guard not shown in Figure 5-1 for clarity)

3. Select and install sleeve on mandrel with flare toward nosecap. Insert mandrel and sleeve into hole as shown in Figure 5-2.

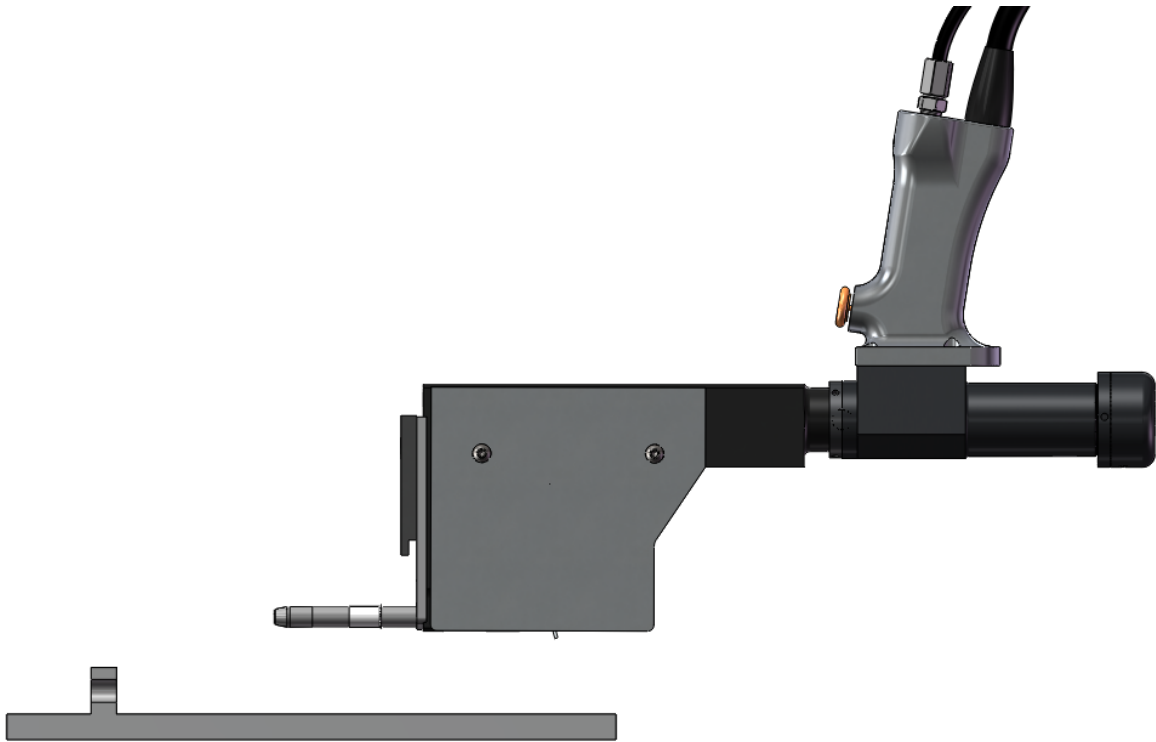


Figure 5-2
Sleeve Installation, Threaded Mandrel
(Picture shown with guard)

4. Move LB/LBOA combination into position, holding nosecap or nosecap spacer flush against workpiece. Press trigger to retract mandrel and cold expand the hole.
5. Verify that the hole has been properly cold expanded. Refer to Figure 5-3.

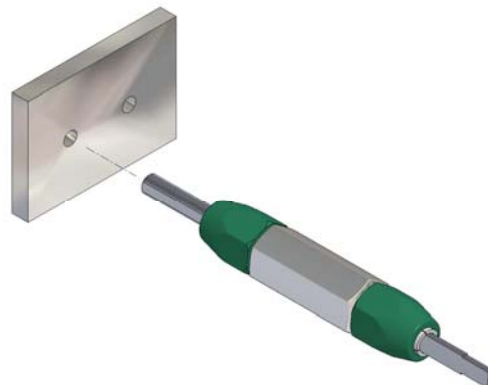


Figure 5-3
Verification Gage

SECTION 6.0: PROCEDURE FOR TANG MANDREL SLIDE ASSEMBLY

The LBOA will allow for the use of tang-style mandrels or threaded (7/16-inch -20) mandrels (Section 5.0). The following instructions identify how to install tang-style mandrels.

1. Thread LB piston rod into LBOA slide assembly then thread LBOA housing into LB housing (Figure 6-1).

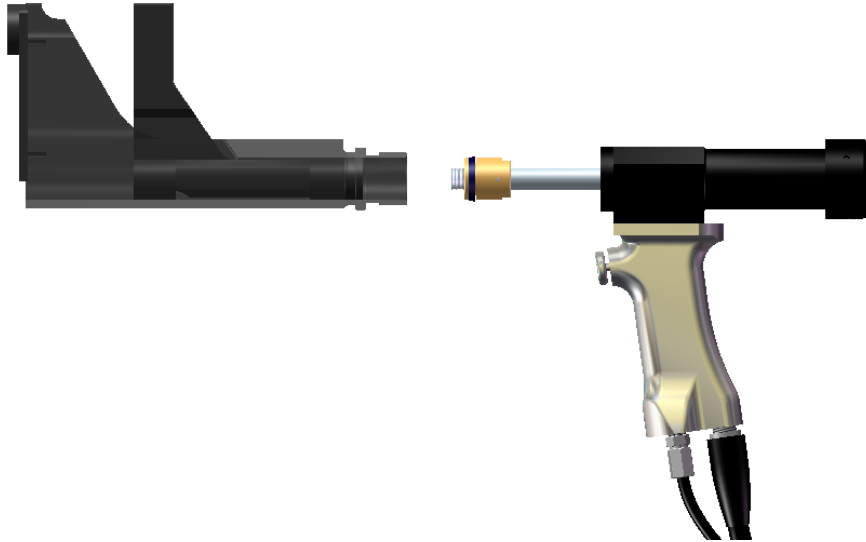


Figure 6-1
Little Brute Piston Rod and Slide Assembly, Tang Mandrel
(Guard not shown in Figure 6-1 for clarity)

2. Select and install sleeve on mandrel with flare away from noscap. Insert mandrel and sleeve into hole as shown in Figure 6-2.

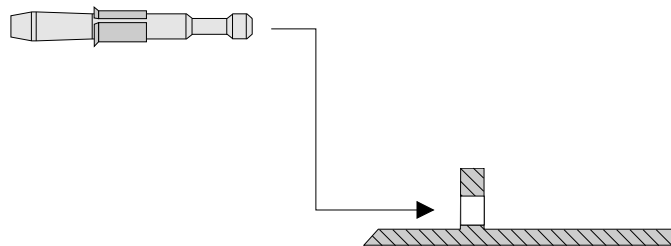


Figure 6-2
Sleeve Installation, Tang Mandrel

3. Position LB/LBOA combination and hook LBOA slide assembly onto mandrel tang (Figure 6-3).

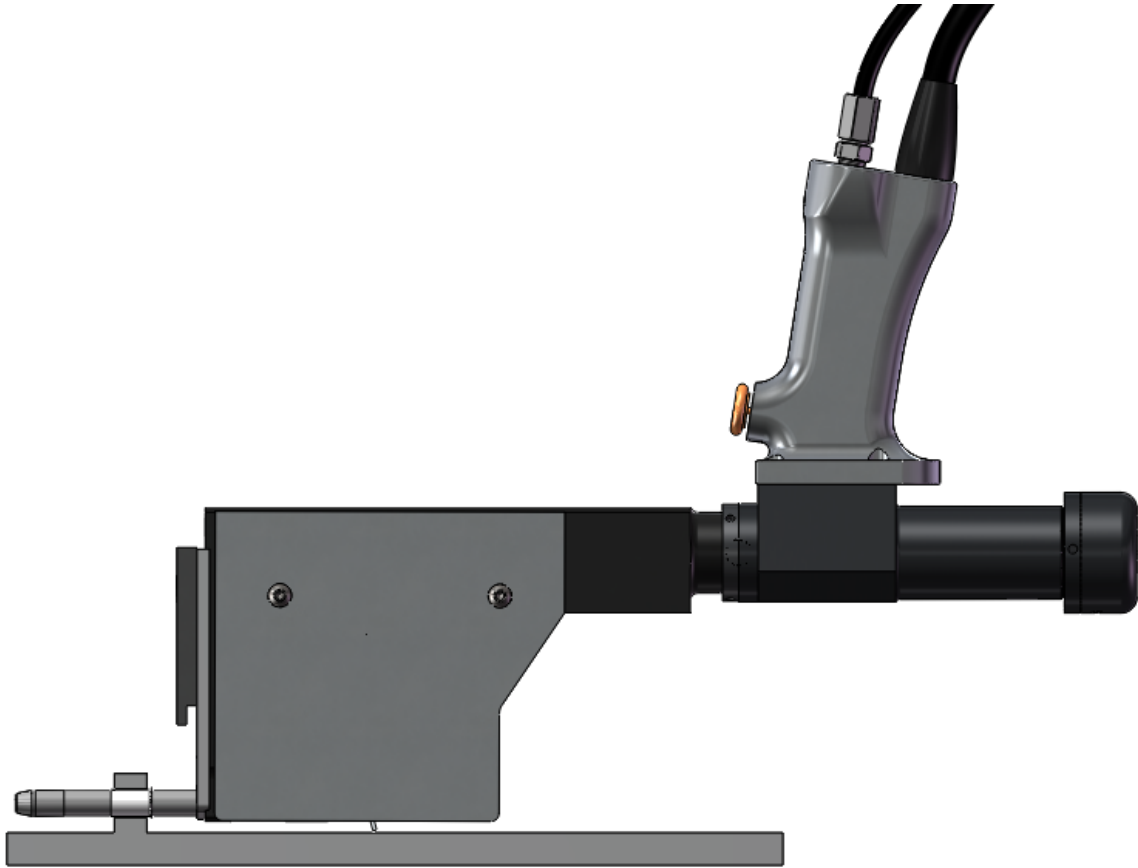


Figure 6-3
Slide Assembly, Tang Mandrel
(Picture shown with guard)

4. Keep nosecap spacer flush against workpiece and press LB trigger to retract mandrel and cold expand the hole.
5. Verify that the hole has been properly cold expanded (Figure 6-4).



Figure 6-4
Verification Gage

APPENDIX A: CONVERTING THE LITTLE BRUTE OFFSET ADAPTER INTO A BROACH PULLER

1. Disconnect air lines from PowerPak.
2. Disconnect LBOA from Little Brute Puller Unit.
3. Remove finger guards on side of unit
4. Remove cover plate of LBOA with Allen head wrench.
5. Remove LBOA jaw.
6. Remove backup plate.
7. Remove slide assembly. This assembly should slide straight out of the housing.
8. Install tang slide assembly into housing.
9. Place nosecap against slide assembly and fasten with 1/2-inch long Allen head screw.
10. Reinstall LBOA onto LB puller per Section 4.0. (Reference A300-53-244)

Table A1
Parts Needed for Conversion

Quantity	Part Number	Description
1	LBOA-XX	Offset Adapter
1	LBOA-XX-T6	Tang Slide Assembly, Offset Adapter Kit

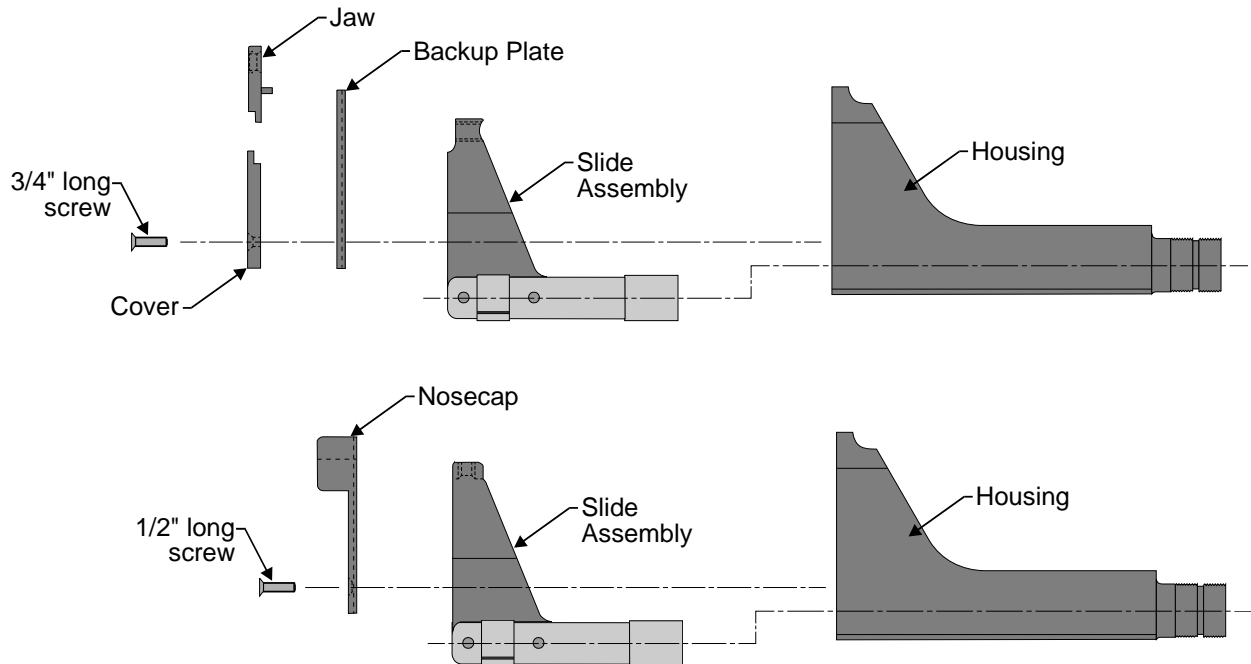


Figure A1
Parts Needed for Conversion to Broach Puller
(Guard not shown in Figure A1 for clarity)