
**FTI OPERATIONS, MAINTENANCE,
AND REPAIR MANUAL**

Medium Brute Puller Unit

Part #2720-007, Log #01204 Revision K
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CE

Original Instruction

ABOUT FATIGUE TECHNOLOGY INC.

Fatigue Technology Inc. (FTI) is a world-leading aerospace engineering and manufacturing company. FTI pioneered Cold Expansion (Cx™) technology (which provides solutions to fatigue problems associated with holes in metal structures) back in 1969 and has 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 Inc. Use of tooling procured from other than a licensed source may constitute patent infringement.

The detailed tooling information in this manual was compiled and written by FTI. The tooling was designed specifically for use with FTI's Cold Expansion systems. FTI cannot be held responsible for damage or injury as a result of operating this equipment if it is used for other than the process intended, with any other tooling not provided by FTI, or not used in accordance with the instructions contained in this manual. To avoid personal injury, please observe all safety precautions and instructions. FTI reserves the right to change specifications or configurations of equipment detailed in this manual as part of our ongoing technical and product improvement programs. If you have any questions about the use or serviceability of this equipment, please contact our Sales Department.

FTI's Cold Expansion 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; 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.

Fatigue Technology Inc. (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.

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

This manual can be made available in other languages. Please contact the Sales Department to request a copy.

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SECTION 1.0: INTRODUCTION

This instruction manual contains information on the operation and maintenance of the Medium Brute Puller Unit. To obtain optimum performance and many years of trouble-free service, operate the puller unit properly and carefully follow maintenance procedures. **Read this manual before operating the puller unit** and retain the manual for future reference. If requested, FTI will provide this manual in the language of the end-user.

1.1 ABOUT THE MEDIUM BRUTE PULLER UNIT

The Medium Brute hydraulic puller unit is a powerful, moderately sized, lightweight tool specifically designed for use with Fatigue Technology Inc. (FTI) patented Split Sleeve Cold Expansion™ (SsCx™) process. The Medium Brute is designed to pull a mandrel through a hole with the pre-lubricated stainless steel split sleeves used in this process. The puller is also compatible with other FTI processes including ForceMate®, FleXmate®, GromEx®, etc.

Medium Brute (MB) pullers have a maximum pull force of 24,000 pounds ($1.1 \times 10^5 \text{N}$) at 10,000 psi (689.5 bar) pump pressure. The MB is available in sizes (models) capable of cold expanding holes up to 7 inches (177.8 mm) deep, and 15/16-inch (23.8 mm) diameter in aluminum, and up to 3/4-inch (19.1 mm) diameter in steel and titanium. Larger diameters may be evaluated on a case by case basis, contact FTI Sales for application assistance.

The Medium Brute is available in various models to accommodate multiple material stack-ups, hose options, and mandrel adapters:

- MB-xx where ‘-xx’ relates to material stack (see Table 1.3-1).
- MB-xx-V where ‘-V’ represents high visibility hoses.
- MB-xx-Hxx where ‘-Hxx’ represents a unique hose length other than the standard 10 feet.
- MB-xxA comes with a MB-CA-8 mandrel adapter.
- MB-xxB comes with a MB-CA-11 mandrel adapter.
- BMB-10 is a special puller with a BB barrel and BMB-CA-13 mandrel adapter.

The Medium Brute has a fail-safe air control system that causes the puller retraction cycle to be interrupted and return the puller unit to its original position whenever the operator releases finger pressure on the trigger or in the event of an air hose failure. All puller units operate in conjunction with either of FTI’s PowerPak air-hydraulic power units, the standard FT-200D, FT-200C, or portable FT-20 (and are compatible with older units FT-200B, IW100MF, and IW10MF). The MB has proven to be very reliable and requires minimal maintenance.

Use the puller unit only with FTI tooling and accessories. Refer to the FTI Tooling Catalog for more information or contact the FTI Sales department for assistance.

1.2 GENERAL SPECIFICATIONS

Hydraulic Fluid Requirements	U.S. MIL-Spec #5606
Stackup Capacity (Grip)	Material up to 7 inches (177.8 mm)
Actuation / Operation.....	Pneumatic / Hydraulic
Compatible PowerPaks	FT-200D, FTI-200C or FT-20
Replacement Seal Kit.....	Medium Brute Seal Kit (MB-SK)
Emission sound pressure level at the work station (according to EN ISO 11201:1995) on load	83.1 dB(A)
Weighted hand-arm vibration at the handle (according to EN 28662-1:1993) on load	<2.5 m.S ²

1.3 GENERAL DESCRIPTION

- Air actuated, hydraulic puller capable of cold expanding up to 15/16-inch (23.8 mm) diameter in aluminum and mild steel, and up to 3/4-inch (19.1 mm) diameter in titanium and high-strength steel.
- Maximum pull force is 24,000 pounds (1.1×10^5 Newtons) at 10,000 psi (389.5 bar) hydraulic pressure.
- Includes a hose assembly, spanner wrench, and noscap pin wrench. Threaded adapter(s), or chuck(s) are also included depending on model (see Table 1.3.1). All models come packaged in a tool case with foam, except as noted.
- Available in various lengths depending on the model, up to 7.0 inches (177.8 mm) material stackup capacity.
- Hydraulic pressure provided by the FT-200D, FTI-200C, or FT-20 PowerPak.



Figure 1.3-1
Medium Brute Puller Unit Parts

**Table 1.3-1
Medium Brute Specifications**

Model Number	Maximum Stackup	Length	Mandrel Attachment	Weight* (Excluding Hoses)	Stroke	Case	Hose
MB-30	3.3 inch (83.8 mm)	16.7 inch (424.2 mm)	5/8-18 (Installed) or 7/8-14 (Included)	13.0 lbs (5.9 kg)	5.16 inch (131 mm)	6575-002	Standard 10 foot (3.0 m)
MB-30A	3.3 inch (83.8 mm)	16.7 inch (424.2 mm)	MB-CA-8 Chuck	13.4 lbs (6.1 kg)	5.16 inch (131 mm)	6575-002	Standard 10 foot (3.0 m)
MB-30B	3.3 inch (83.8 mm)	16.7 inch (424.2 mm)	MB-CA-11 Chuck	13.4 lbs (6.1 kg)	5.16 inch (131 mm)	6575-002	Standard 10 foot (3.0 m)
MB-30-H25	3.3 inch (83.8 mm)	16.7 inch (424.2 mm)	5/8-18 (Installed) or 7/8-14 (Included)	13.0 lbs (5.9 kg)	5.16 inch (131 mm)	6575-002	Standard 25 foot (7.6 m)
MB-30A-H25	3.3 inch (83.8 mm)	16.7 inch (424.2 mm)	MB-CA-8 Chuck	13.4 lbs (6.1 kg)	5.16 inch (131 mm)	6575-002	Standard 25 foot (7.6 m)
MB-30C	3.3 inch (83.8 mm)	16.7 inch (424.2 mm)	5/8-18 (Installed) or 7/8-14 (Included)	13.0 lbs (5.9 kg)	5.16 inch (131 mm)	N/A	Standard 10 foot (3.0 m)
MB-30-V	3.3 inch (83.8 mm)	16.7 inch (424.2 mm)	5/8-18 (Installed) or 7/8-14 (Included)	13.0 lbs (5.9 kg)	5.16 inch (131 mm)	6575-002	High-Vis 10 foot (3.0 m)
MB-70	7.0 inch (177.8 mm)	24.1 inch (612.2 mm)	5/8-18 (Installed) or 7/8-14 (Included)	16.1 lbs (7.3 kg)	8.86 inch (225 mm)	6575-003	Standard 10 foot (3.0 m)
MB-70A	7.0 inch (177.8 mm)	24.1 inch (612.2 mm)	MB-CA-8 Chuck	16.5 lbs (7.5 kg)	8.86 inch (225 mm)	6575-003	Standard 10 foot (3.0 m)
MB-70B	7.0 inch (177.8 mm)	24.1 inch (612.2 mm)	MB-CA-11 Chuck	16.5 lbs (7.5 kg)	8.86 inch (225 mm)	6575-003	Standard 10 foot (3.0 m)
MB-70-H25	7.0 inch (177.8 mm)	24.1 inch (612.2 mm)	5/8-18 (Installed) or 7/8-14 (Included)	16.1 lbs (7.3 kg)	8.86 inch (225 mm)	6575-003	Standard 25 foot (7.6 m)
MB-70A-H25	7.0 inch (177.8 mm)	24.1 inch (612.2 mm)	MB-CA-8 Chuck	16.5 lbs (7.5 kg)	8.86 inch (225 mm)	6575-003	Standard 25 foot (7.6 m)
MB-70-H20	7.0 inch (177.8 mm)	24.1 inch (612.2 mm)	5/8-18 (Installed) or 7/8-14 (Included)	16.1 lbs (7.3 kg)	8.86 inch (225 mm)	6575-003	Standard 20 foot (6.1 m)
MB-70-V	7.0 inch (177.8 mm)	24.1 inch (612.2 mm)	5/8-18 (Installed) or 7/8-14 (Included)	16.1 lbs (7.3 kg)	8.86 inch (225 mm)	6575-003	High-Vis 10 foot (3.0 m)
MB-70-H20-V	7.0 inch (177.8 mm)	24.1 inch (612.2 mm)	5/8-18 (Installed) or 7/8-14 (Included)	16.1 lbs (7.3 kg)	8.86 inch (225 mm)	6575-003	High-Vis 20 foot (6.1 m)
MB-10	1.3 inch (33.0 mm)	12.7 inch (322.6 mm)	5/8-18 (Installed) or 7/8-14 (Included)	11.4 lbs (5.2 kg)	3.16 inch (80 mm)	6575-001	Standard 10 foot (3.0 m)
MB-10A	1.3 inch (33.0 mm)	12.7 inch (322.6 mm)	MB-CA-8 Chuck	11.8 lbs (5.4 kg)	3.16 inch (80 mm)	6575-001	Standard 10 foot (3.0 m)
MB-10B	1.3 inch (33.0 mm)	12.7 inch (322.6 mm)	MB-CA-11 Chuck	11.8 lbs (5.4 kg)	3.16 inch (80 mm)	6575-001	Standard 10 foot (3.0 m)
BMB-10	1.0 inch (25.4 mm)	15.7 inch (398.8 mm)	BMB-CA-13 Chuck	19.2 lbs (8.7 kg)	3.16 inch (80 mm)	6575-002	Standard 10 foot (3.0 m)

*A user-supplied suspension system may be required at the end use site. The requirement for a suspension system is based on the end user's workplace lifting and weight standards. A risk analysis for the suspension is necessary to maintain compliance to end user's standards or directives. All risks involved with the suspension of the Medium Brute are the responsibility of the end user. User instructions and training regarding the suspension system are the responsibility of the end user.

Nosecap Selection: The Medium Brute Puller Unit is compatible with standard nose caps or extension nose caps (Refer to Section 2.3 of the FTI Tooling Catalog for more information).

Mandrel Selection: The Medium Brute Puller Unit is directly compatible with standard Type 2 or Type 5 threaded mandrels (Refer to Section 2.3 of the FTI Tooling Catalog for more information).

SECTION 2.0: SAFETY

Consult PowerPak manual for safety precautions before connecting the puller unit.

When used in accordance with these instructions, the puller unit is safe and easy to use. All general safety precautions associated with hydraulic and pneumatically operated power tools should be observed. Many of these are noted in this section. Ultimately, the operator is responsible for personal safety; however, the following general safety precautions should be observed.

⚠ CAUTION: The weight of this unit may require a suspension system per the end user's workplace lifting standards.

1. Operators must read this manual in its entirety before using the Medium Brute. Wear eye and hearing protection when operating the puller unit. Do not strike any part of the tool with a hammer or equivalent object. Keep hands and fingers clear of the nosecap, as they could be crushed between the nosecap and the workpiece. Safety labels on the tool act as a reminder to these instructions and are shown in Figure 2.0-1.

Read manual before using



Always wear eye protection



Always wear hearing protection



Do not strike



Keep fingers away from nosecap



**Figure 2.0-1
Safety Labels**

2. **⚠** This puller unit must be used with an FT-200D, FT-200C, or FT-20 PowerPak hydraulic pump. This manual does not cover the use and safety precautions of these accessories. Refer to the PowerPak operator manual for the specific pump being used.

3. ⚠️ Disconnect the air supply from the PowerPak when:
 - Maintenance is to be performed.
 - Tooling (mandrels, nosecaps, etc.) is to be installed.
 - Hydraulic hose is disconnected.
 - PowerPak is not in use.

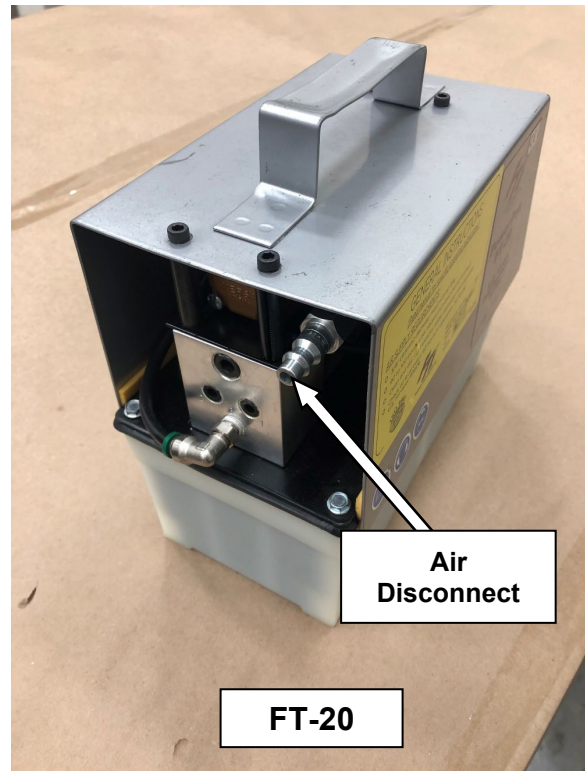
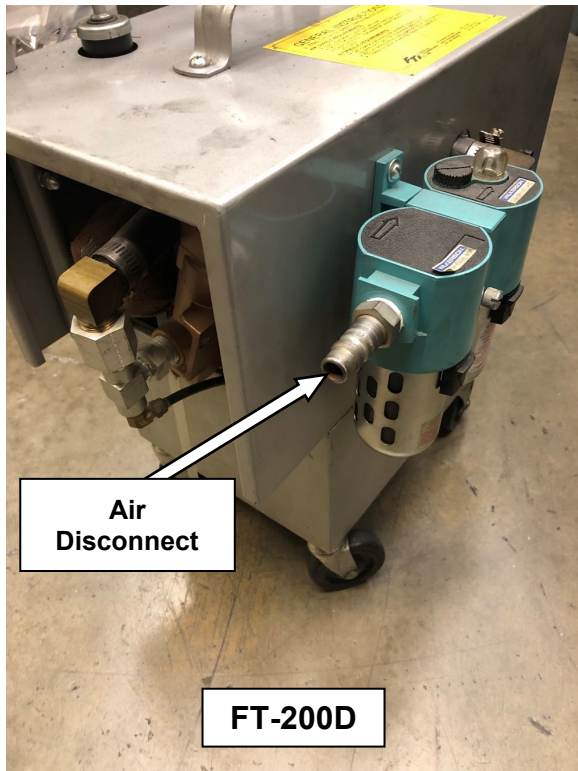


Figure 2.0-2
Location of Air Disconnect

4. ⚠️ In the event of a ruptured or leaking hydraulic hose, IMMEDIATELY RELEASE THE TRIGGER AND DISCONNECT THE AIR LINE from the PowerPak at the air coupler (see Figure 2.0-2). **Never use your hands** to grasp a leaking hose under pressure. The force of escaping hydraulic fluid could cause serious injury. If hydraulic oil should penetrate the skin, medical attention must be sought immediately.
5. ⚠️ **DO NOT** operate the puller or connect the hoses while any component is disassembled, missing, or loose. Injury may occur.
6. ⚠️ Before operating the pump, ensure all hose couplings are tightened securely by hand. Do not overtighten the connections. Couplings need only be tightened securely and leak-free. See Figure 3.1-2.
7. ⚠️ **DO NOT** use in potentially explosive atmospheres.

⚠️ IMPORTANT: FTI completed a risk assessment on this unit at our factory. Any modifications done by a third party, or the final user are excluded from that risk assessment. As a result, modifications done by a third party, or the final user nullify the CE marking.

2.1 HYDRAULIC HOSE SAFETY

1. ⚠ Inspect hydraulic hose for signs of wear (cuts, abrasions, or kinks) to the outer shell materials before each use. Pump clean oil through the entire length. Pressurize the hose and check for leaks at the crimped connectors, between the hose material and the fitting, and between the fitting and the coupler.
2. ⚠ **DO NOT** attempt to disconnect the hydraulic hose while it is under pressure, without first disconnecting air supply from pump.
3. ⚠ **DO NOT** expose hoses to potential hazards such as extreme heat or cold, sharp surfaces, or heavy impact.
4. ⚠ **DO NOT** allow hoses to kink, twist, curl, or bend so tightly that the oil flow within the hose is blocked or reduced. Inspect the hose and fittings for wear or damage before use that could cause premature failure of the hose or fittings and possibly result in injury. Damaged hoses must be replaced immediately.
5. ⚠ **DO NOT** use the hose to move attached equipment.
6. ⚠ **DO NOT** remove strain reliever from hoses. Hose strain relievers must be placed around hose fittings during use. Hoses with damaged strain relievers must be replaced immediately.



Figure 2.1-1
Strain Reliever

7. ⚠ Hose material and coupler seals must be compatible with hydraulic fluid that meets the requirements of U.S. MIL-SPEC #5606.
8. ⚠ Hoses must not come in contact with toxic materials such as creosote-impregnated objects and some paints. Keep couplers and hoses clean and free of paint. Hose deterioration due to chemical degradation may cause the hose to fail under pressure. Damaged hoses must be replaced immediately. To find specific chemical compatibility information, first look at the hose to find the manufacturer and type. The hose manufacturer will be able to provide a chemical compatibility chart, typically on their website. For example, the hose below is from Parker and is type JK; the chart can be found here: <https://www.mfcp.com/technical-info/chemical-compatibility-rubber-hose>.



Figure 2.1-2
Example Hydraulic Hose Identification

9. ⚠ Hoses can be a trip hazard. Keep hoses clear of all walkways and footpaths.
10. If hoses require replacement, contact the FTI Sales Department.

SECTION 3.0: PULLER UNIT OPERATING INSTRUCTIONS

Become familiar with these instructions before operating the puller.

3.1 PULLER UNIT SETUP PROCEDURE

Refer to Section 6.0 (Illustrated Parts Breakdown) for parts identification.

1. ⚠️ Ensure that the PowerPak is NOT connected to the air supply. If needed, disconnect the PowerPak from the air supply, following the appropriate operator manual for the pump model being used.
2. Uncoil the hose assembly of the puller unit, and inspect all threads, couplings, and hoses for damage and degradation.
3. If the chuck assembly/adaptor (see Figure 6.1-1, Item Number 17) needs to change, remove the front barrel by loosening the barrel locking (Item Number 8) with the provided spanner wrench (Item Number 30), followed by the barrel (Item Number 3). Thread on the appropriate adapter, then reattach the barrel and locking.
4. Identify the connection ports on the FTI PowerPak where the puller unit hoses will go. See Figure 3.1-1 below.

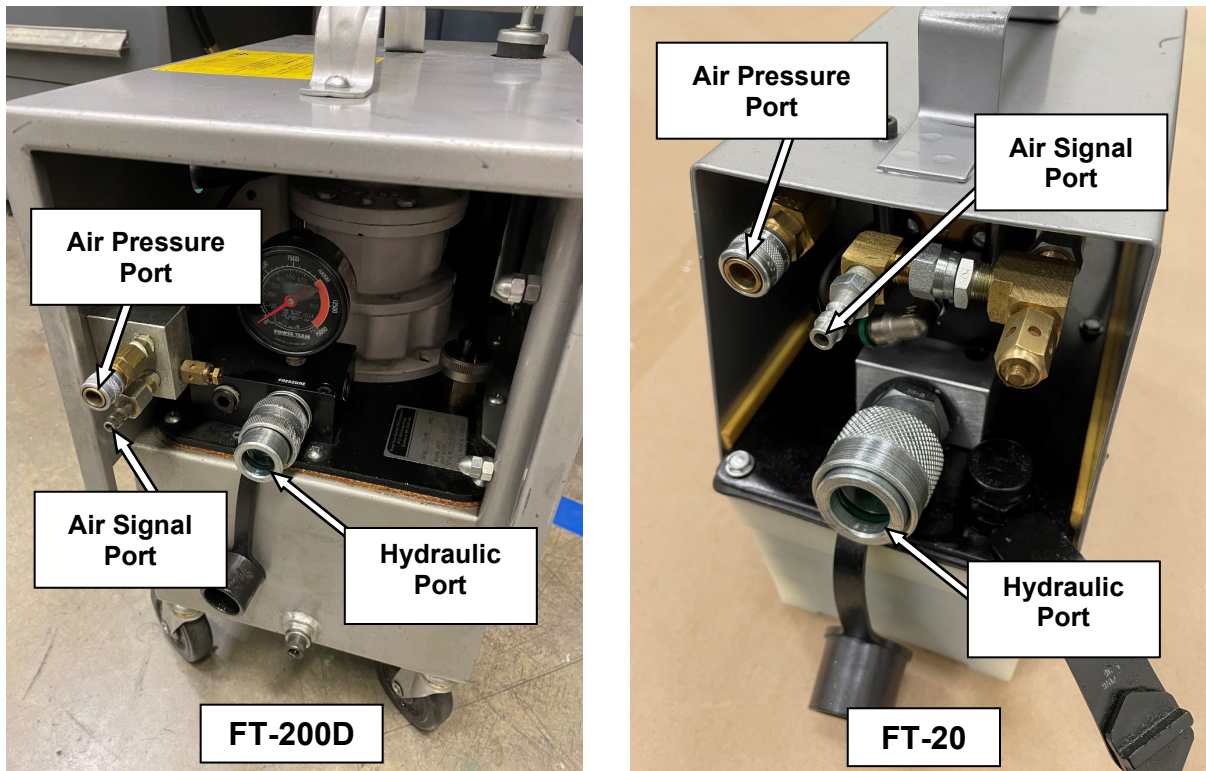


Figure 3.1-1
PowerPak Connection Ports

5. Remove protective caps from the hydraulic fittings and thread the hydraulic hose fitting from the puller unit (male) onto the hydraulic fitting of the FTI PowerPak (female). Wipe fittings clean prior to connecting. Make sure to thread couplers completely together, with no gap visible. See Figure 3.1-2 below.

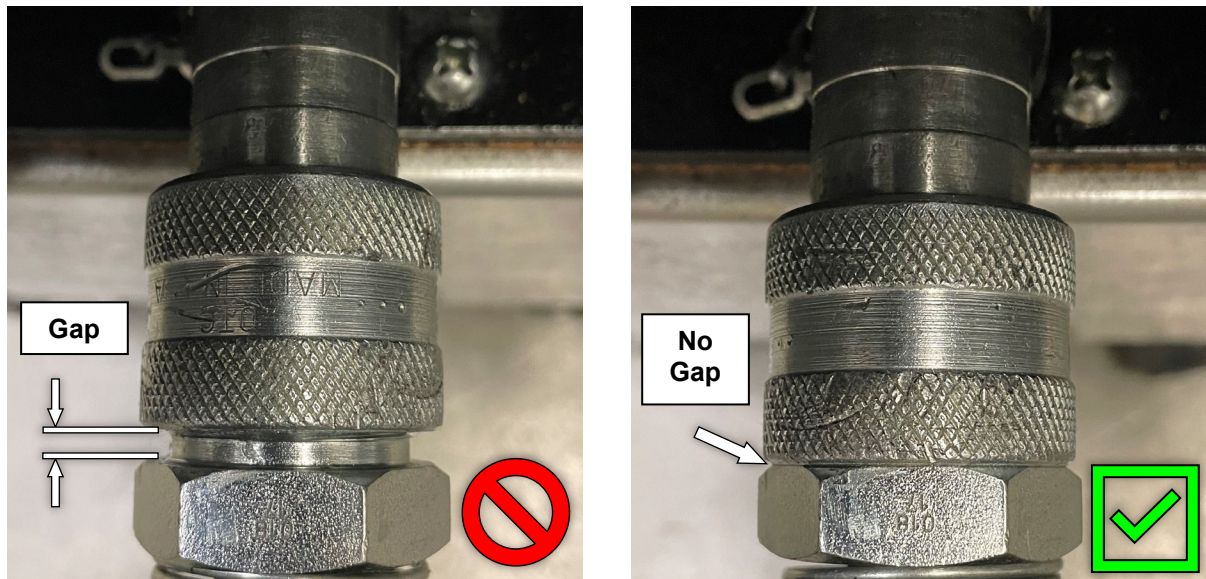


Figure 3.1-2
Hydraulic Coupler Connection

6. Connect the male/female air quick-disconnects from the puller unit to the FTI PowerPak.
7. Install the appropriate mandrel into the threaded adapter (hand tight).
8. Install the appropriate nose cap assembly over the mandrel and thread onto the barrel (hand tight).
9. Connect the PowerPak to the air supply, following the appropriate operator manual for the pump model being used.

3.2 ACTUATION OF THE PULLER

1. The puller unit can be activated only when connected to an FTI PowerPak.
2. Activate the puller unit by depressing the trigger on the handle. Hydraulic pressure is transmitted through the hose to the cylinder of the puller unit which then retracts the hydraulic piston.
3. Release the trigger once the mandrel clears the workpiece. This changes pressure at the pilot valve to stop the pull cycle and return the puller unit to its original position.
4. If the puller unit fails to operate as detailed above, refer to Section 5.0 (Troubleshooting).

SECTION 4.0: MAINTENANCE

The puller unit requires routine checking and periodic preventative maintenance to ensure safe, trouble-free operation. No special maintenance is required. The following maintenance actions are suggested.

⚠ WARNING
Disconnect the PowerPak from the air supply before performing any maintenance or repair procedures.

4.1 GENERAL CLEANING

1. Keep the outer surfaces of the puller unit free of dirt and grime. If hydraulic hoses require cleaning, refer to Section 2.1 for important safety considerations.
2. Keep all hose connections free of dirt and grime. Install protective caps whenever a hose connection is disengaged.

4.2 PREVENTATIVE MAINTENANCE

1. Whenever the puller is to be stored for longer than 2 weeks, maintain a thin coat of 10-weight oil on the outside of black oxide surfaces to prevent rusting.

4.3 LUBRICATION

1. There is no internal lubrication requirement for the puller unit.

4.4 INSPECTION

1. Inspect the puller for cracks, leaks, or other damage before each use. Repair and replace immediately.
 2. Inspect safety labels (refer to Section 2.0 for required labels) before each use. If any are missing or illegible, replace immediately.
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4.5 ASSEMBLY AND DISASSEMBLY

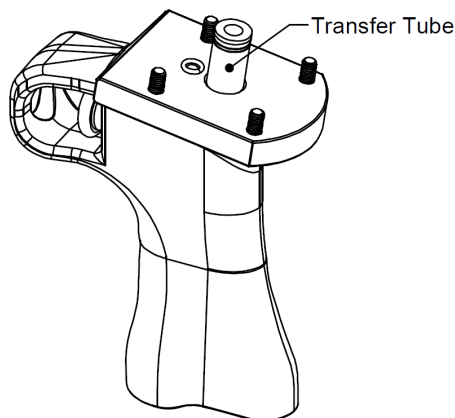
The puller unit may need to be disassembled for replacement of seals. Refer to the Illustrated Parts Breakdown, Section 6.1 for item numbers.

4.5.1 Disassembly

1. Unthread and remove any tooling accessories, such as nosecaps and mandrels.
2. Loosen all three lockrings (Item Numbers 8 and 9) using the spanner wrench (30).
3. Unthread and remove the end cap (5) using the spanner wrench (30).
4. Unscrew and remove the rear cylinder (2) and barrel (3) from the housing (1). If needed, a strap wrench can be used for additional force.
5. Loosen the locknut (10), using two 1-5/16-inch wrenches.
6. Unthread and remove the threaded adapter or chuck assembly (17) from the piston rod using a 1-5/16-inch wrench. Since it is necessary to hold the piston rod stationary, use a 3/4-inch wrench to keep the piston rod from turning.

DO NOT scratch the piston shaft during disassembly.

7. Remove the piston rod assembly (4) by pushing on the threaded end (mandrel end) of the piston rod until the threads engage the sleeve (7). Unthread the piston rod through the o-ring (13) and remove the piston rod assembly.
8. Remove the handle assembly (6) by removing the four socket-head screws, using a 5/32-inch hex driver.
9. Remove the transfer tube from the handle assembly. Remove and discard the o-rings and backup rings on both ends of the tube.



**Figure 4.5-1
Transfer Tube**

10. Remove the brass sleeve (7).
11. Discard used seals.

4.5.2 Reassembly

Important: (1) Thoroughly clean all parts prior to reassembly.
(2) Install o-rings toward hydraulic pressure, with backup rings “behind.”
Reference Figure 4.6-1.

1. Replace all o-rings and backup rings on the inside and outside of the brass sleeve (7). Drop the brass sleeve into the front of the housing (1). Turn the brass sleeve until the hole is aligned with the matching hole in the bottom of the housing.
 2. Install new 1046-045 o-rings and 1046-044 backup rings on the transfer tube (part of the handle sub-assembly). Note that the o-rings go on the ends of the tube and the backup rings will be towards the middle.
 3. Place the small 1046-012 o-ring in place on the housing before installing the handle. Install the handle assembly (6) onto the housing with four socket-head screws, using a 5/32-inch hex driver. The transfer tube will go into the hole in the brass sleeve, which was aligned in Step 1.
 4. Replace the rear cylinder (2) and tighten until snug using a strap wrench. Tighten the lockring (9) against the housing using the spanner wrench (30).
 5. Replace 1046-113 T-seal on the end of the piston assembly (4). Backup rings are included with T-seal, these are installed on both sides of the seal.
 6. Install the threaded end of the piston assembly (4) into the housing (1). Thread the piston through the housing and push to the full forward position.
 7. Replace 1046-043 U-seal on back end of threaded adapter or chuck assembly (17).
 8. Wrap Teflon tape around the threads of the piston rod, then install the threaded adapter or chuck assembly (17). Tighten the locknut (10) against the threaded adapter or chuck assembly using two 1-5/16-inch wrenches.
 9. Replace 1046-058 o-ring and install the front barrel (5). Tighten with a strap wrench, then tighten the lockring (8) against the housing using the spanner wrench (30).
 10. Install the end cap (5) and tighten using the spanner wrench (30). Next, tighten the lockring (9).
 11. The puller is now ready for use. Select the appropriate mandrel/nosecap combination and install.
-

4.6 MEDIUM BRUTE SEAL KIT (MB-SK)

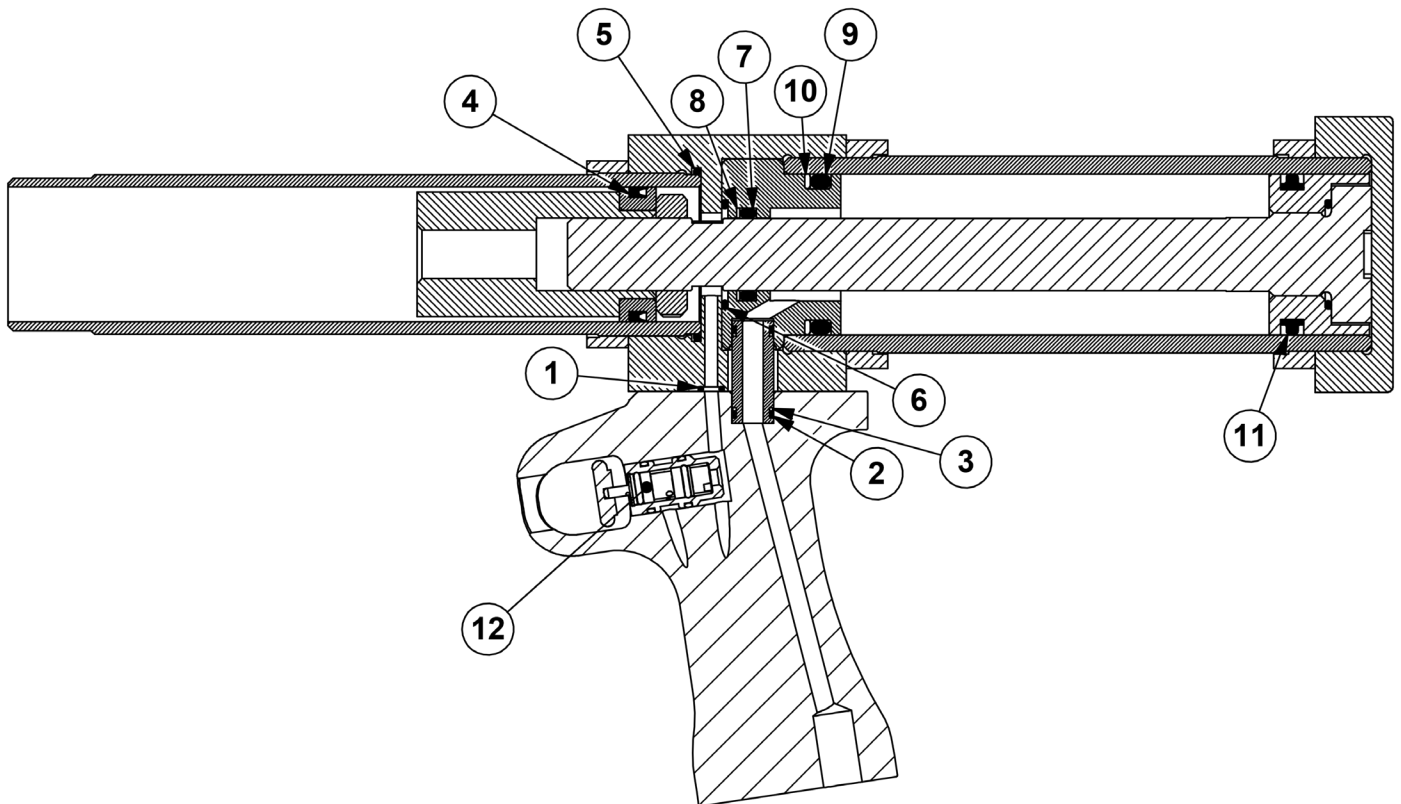
This kit is used to replace seals in MB-xx models. It is also included as part of the Medium Brute Rework Kit (see Appendix A.1). Table 4.6-1 is a parts list for the Medium Brute Seal Kit.

For the BMB-10, see Parts List (Table 6.4-1) for itemized seals.

**Table 4.6-1
Medium Brute Seal Kit (MB-SK)**

Item Number	Quantity	Part Number	Description
N/A*	1	2040-001	Seal, Trigger
1	1	1046-012	O-Ring AN6227B-3
2	2	1046-045	O-Ring AN6227B-7
3	2	1046-044	Backup Ring MS28782-7
4	1	1046-043	U Seal 568804
5	1	1046-058	O-Ring MS28775-224
6	1	1046-007	O-Ring A-122-90-BUNA
7	1	1046-002	O-Ring AN6227B-17
8	1	1046-003	Backup Ring MS2878217
9	1	1046-004	O-Ring AN6227-28
10	1	1046-005	Backup Ring MS28782-28
11	1	1046-113	T-Seal 4115B085TP023
12	1	1187-622	Valve, Cartridge Trigger

*Used with legacy triggers (See Table A.2-1, Item 6)



**Figure 4.6-1
Medium Brute Seal Locations**

SECTION 5.0: TROUBLESHOOTING

This section provides solutions to some basic trouble spots. If you cannot solve your maintenance or operational problems with the information provided in this section, contact the nearest FTI representative.

Note: Should difficulties originate in the PowerPak, consult the specific PowerPak Operations, Maintenance, and Repair Manual.

5.1 POWERPAK WILL NOT BUILD FULL HYDRAULIC PRESSURE

<u>PROBLEM</u>	<u>CAUSE</u>	<u>SOLUTION</u>
POWERPAK WILL NOT BUILD FULL HYDRAULIC PRESSURE	One or more of the key air or hydraulic lines has not been securely connected.	Check the following hose connections, See Figures 2.0-2, 3.1-1 and 3.1-2: <ol style="list-style-type: none">1. Male air-line quick-disconnect fitting from shop air system to PowerPak.2. Hydraulic quick couplings connecting the hoses to the PowerPak manifold, and the puller to the hydraulic hoses.3. Two male/female air-line quick-disconnect fittings connecting the puller to the PowerPak manifold.4. Check that the main air supply has not been interrupted.

⚠ CAUTION

Hydraulic oil under extreme pressure may cause serious injuries if not handled carefully. For technical assistance, please contact the FTI Sales Department.

5.2 PULLER RETRACTS ON TRIGGER ACTUATION, BUT WILL NOT RETURN TO START POSITION

<u>PROBLEM</u>	<u>CAUSE</u>	<u>SOLUTION</u>
PULLER RETRACTS ON TRIGGER ACTUATION, BUT WILL NOT RETURN TO START POSITION	The puller unit requires hydraulic oil to lubricate the piston and cylinder.	Disconnect the hydraulic line and install the CT-604 Pressure Relief Tool onto the end of the hose. Disconnect the air signal line (see Figure 3.1-1) but leave the air pressure line connected. Leave the pump connected to the air supply. Remove the back end cap on the Medium Brute. Use a screwdriver and the screwdriver slot in the piston to push the piston rod all the way forward. This will cause hydraulic fluid to pour out of the line, so be prepared with a suitable container. Reinstall the back end cap. Once forward, cycle the trigger several times – DO NOT bottom it out – to introduce hydraulic fluid into the cylinder (20+ short cycles).
As above, AND the hydraulic hose is difficult to bend or coil (indicating unrelieved pressure built up in the hose).	The hydraulic quick coupler line has not been completely tightened at the PowerPak manifold (there should be no space between the PowerPak coupler and the hose fitting flange). See Figure 3.1-2.	Once hydraulic pressure has been introduced to the hydraulic hose, the pressure must be relieved before the coupler can be sufficiently tightened.

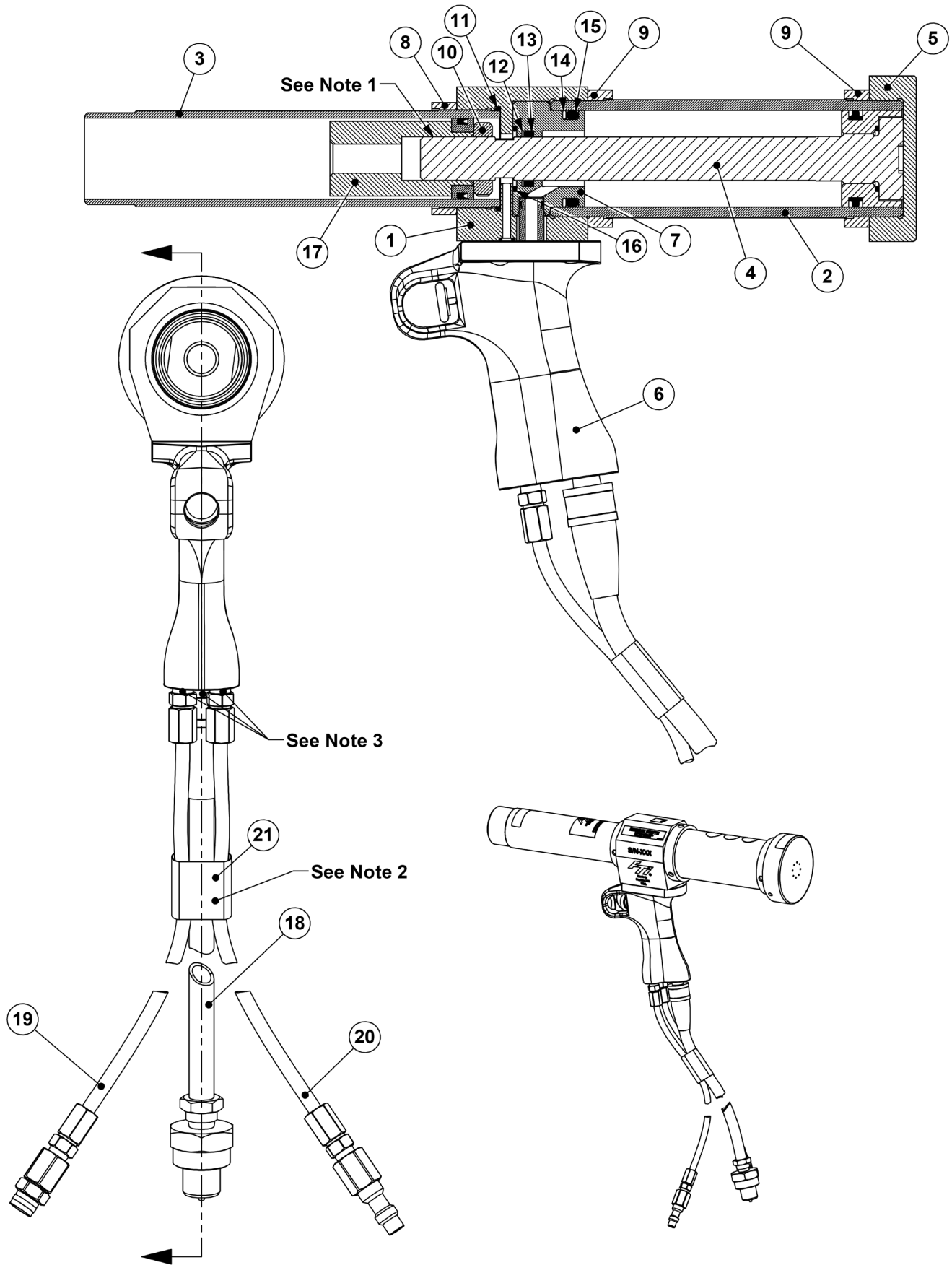
Procedure for relieving hydraulic pressure:
<ol style="list-style-type: none"> 1. Disconnect the main air supply. 2. Disconnect the hydraulic hose from the PowerPak. 3. Connect Enerpac CT-604 to free end of the hose and bleed off hydraulic oil to relieve the built-up pressure. Figure 5.2-2 shows the Enerpac CT-604 Pressure Relief Tool. 4. Once pressure is relieved, reconnect the hydraulic hose to the PowerPak. 5. Re-attach air lines to get the puller unit to return to the forward position.



**Figure 5.2-2
Enerpac CT-604 Pressure Relief Tool
(FTI Part Number 1187-770)**

5.3 MANDREL STICKS IN HOLE WHEN PULLER IS ACTIVATED

<u>PROBLEM</u>	<u>CAUSE</u>	<u>SOLUTION</u>
MANDREL STICKS IN HOLE WHEN PULLER IS ACTIVATED	Not enough pressure used to generate pull forces. If the Medium Brute is being used with the FT-20 PowerPak, proceed to solution 4.	Use the following procedure to analyze the problem: <ol style="list-style-type: none"><li data-bbox="824 352 1464 453">1. Activate the puller unit and observe the pressure reading on the PowerPak pressure gage (FT-200D or FT-200C PowerPak only).<li data-bbox="824 487 1464 588">2. The pressure gage should read 10,000 psi (689.5 bar). Note: The FT-20 PowerPak is factory set at 10,000 psi and cannot be adjusted.<li data-bbox="824 621 1464 722">3. If an increase in pressure is required, refer to the FT-200D or FT-200C operator manual for instructions to adjust the pressure limit.<li data-bbox="824 756 1464 949">4. If the mandrel remains stuck at 10,000 psi (689.5 bar), disconnect all hoses connecting the puller to the pump. Disengage the mandrel from the puller unit, then push the mandrel out using an impact hammer. Contact the FTI Sales Department for additional assistance.



**Figure 6.1-2
Medium Brute Section View**

6.2 MEDIUM BRUTE PART LISTS

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Table 6.2-12	MB-70A-H25 Parts List.....	30
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**Table 6.2-1
MB-30 Parts List**

Item Number	Quantity	Part Number	Description	Reference Information	Notes
1	1	2350-001	Housing		
2	1	2184-006	Cylinder		
3	1	2332-001	Barrel		
4	1	2405-001	Piston Assembly		1
5	1	2136-002	End Cap		
6	1	5211-002	Handle Assembly		
7	1	2349-001	Sleeve		1
8	1	2120-004	Lockring, Barrel		
9	2	2120-002	Lockring, Cylinder		
10	1	2422-001	Locknut, Adapter		
11	1	1046-058	O-Ring	MS28775-224	
12	1	1046-003	Ring, Backup	MS28782-17	
13	1	1046-002	O-Ring	MS28775-212	
14	1	1046-005	Ring, Backup	MS28782-28	
15	1	1046-004	O-Ring	MS28775-325	
16	1	1046-007	O-Ring	AS568-122 Buna, 90 Duro	
17	1	2425-001	5/8-18 Threaded Adapter Assembly		1
18	1	2107-001	Assembly, 10-foot Hydraulic Hose		2, 3
19	1	2106-002	Assembly, 10-foot Air Hose (Female)		2, 3
20	1	2106-001	Assembly, 10-foot Air Hose (Male)		2, 3
21	4	2638-001	Tube, Heat Shrink 3-inch Piece		2
22	1	1009-185	Nosecap Warning Label		
23	1	1009-184	Do Not Strike Label		
24	1	1187-105	Ear Protection Label		
25	1	1187-106	Eye Protection Label		
26	1	1187-107	Read Manual Label		
27	2	1009-187	Medium Brute Label		
28	1	1009-094	FTI Logo Label		
29	1	1166-001	CE Label		
30	1	1045-100	Spanner Wrench	34-358	4
31	1	2369-002	Pinwrench Assembly	CBC-2-PW	4
32	1	2425-002	7/8-14 Threaded Adapter Assembly		4
33	1	6575-002	Pelican Kit Case with Foam	FT-BX-21-16-10	4
34	1	2720-007	Medium Brute Operator Manual		4

Notes:

1. Apply teflon tape to threads on piston (item number 4) after installing sleeve (item number 7) and prior to installing threaded adapter (item number 17) and adapter locknut (item number 10). While installing sleeve (item number 7) onto rod of piston, rotate piston until the threads pass the o-ring (item number 13). This will prevent the o-ring from being damaged by the threads.
2. Hoses are to be fastened together using heat shrink tube, every two feet.
3. Install indicated items using teflon tape on threads.
4. Indicated items are included as part of assembly but are not installed into puller.

**Table 6.2-2
MB-30A Parts List**

Item Number	Quantity	Part Number	Description	Reference Information	Notes
1	1	2350-001	Housing		
2	1	2184-006	Cylinder		
3	1	2332-001	Barrel		
4	1	2405-001	Piston Assembly		1
5	1	2136-002	End Cap		
6	1	5211-002	Handle Assembly		
7	1	2349-001	Sleeve		1
8	1	2120-004	Lockring, Barrel		
9	2	2120-002	Lockring, Cylinder		
10	1	2422-001	Locknut, Adapter		
11	1	1046-058	O-Ring	MS28775-224	
12	1	1046-003	Ring, Backup	MS28782-17	
13	1	1046-002	O-Ring	MS28775-212	
14	1	1046-005	Ring, Backup	MS28782-28	
15	1	1046-004	O-Ring	MS28775-325	
16	1	1046-007	O-Ring	AS568-122 Buna, 90 Duro	
17	1	2491-001	Chuck Assembly	MB-CA-8	1
18	1	2107-001	Assembly, 10-foot Hydraulic Hose		2, 3
19	1	2106-002	Assembly, 10-foot Air Hose (Female)		2, 3
20	1	2106-001	Assembly, 10-foot Air Hose (Male)		2, 3
21	4	2638-001	Tube, Heat Shrink 3-inch Piece		2
22	1	1009-185	Nosecap Warning Label		
23	1	1009-184	Do Not Strike Label		
24	1	1187-105	Ear Protection Label		
25	1	1187-106	Eye Protection Label		
26	1	1187-107	Read Manual Label		
27	2	1009-187	Medium Brute Label		
28	1	1009-094	FTI Logo Label		
29	1	1166-001	CE Label		
30	1	1045-100	Spanner Wrench	34-358	4
31	1	2369-002	Pinwrench Assembly	CBC-2-PW	4
32	1	6575-002	Pelican Kit Case with Foam	FT-BX-21-16-10	4
33	1	2720-007	Medium Brute Operator Manual		4

Notes:

1. Apply teflon tape to threads on piston (item number 4) after installing sleeve (item number 7) and prior to installing threaded adapter (item number 17) and adapter locknut (item number 10). While installing sleeve (item number 7) onto rod of piston, rotate piston until the threads pass the o-ring (item number 13). This will prevent the o-ring from being damaged by the threads.
2. Hoses are to be fastened together using heat shrink tube, every two feet.
3. Install indicated items using teflon tape on threads.
4. Indicated items are included as part of assembly but are not installed into puller.

**Table 6.2-3
MB-30B Parts List**

Item Number	Quantity	Part Number	Description	Reference Information	Notes
1	1	2350-001	Housing		
2	1	2184-006	Cylinder		
3	1	2332-001	Barrel		
4	1	2405-001	Piston Assembly		1
5	1	2136-002	End Cap		
6	1	5211-002	Handle Assembly		
7	1	2349-001	Sleeve		1
8	1	2120-004	Lockring, Barrel		
9	2	2120-002	Lockring, Cylinder		
10	1	2422-001	Locknut, Adapter		
11	1	1046-058	O-Ring	MS28775-224	
12	1	1046-003	Ring, Backup	MS28782-17	
13	1	1046-002	O-Ring	MS28775-212	
14	1	1046-005	Ring, Backup	MS28782-28	
15	1	1046-004	O-Ring	MS28775-325	
16	1	1046-007	O-Ring	AS568-122 Buna, 90 Duro	
17	1	2491-002	Chuck Assembly	MB-CA-11	1
18	1	2107-001	Assembly, 10-foot Hydraulic Hose		2, 3
19	1	2106-002	Assembly, 10-foot Air Hose (Female)		2, 3
20	1	2106-001	Assembly, 10-foot Air Hose (Male)		2, 3
21	4	2638-001	Tube, Heat Shrink 3-inch Piece		2
22	1	1009-185	Nosecap Warning Label		
23	1	1009-184	Do Not Strike Label		
24	1	1187-105	Ear Protection Label		
25	1	1187-106	Eye Protection Label		
26	1	1187-107	Read Manual Label		
27	2	1009-187	Medium Brute Label		
28	1	1009-094	FTI Logo Label		
29	1	1166-001	CE Label		
30	1	1045-100	Spanner Wrench	34-358	4
31	1	2369-002	Pinwrench Assembly	CBC-2-PW	4
32	1	6575-002	Pelican Kit Case with Foam	FT-BX-21-16-10	4
33	1	2720-007	Medium Brute Operator Manual		4

Notes:

1. Apply teflon tape to threads on piston (item number 4) after installing sleeve (item number 7) and prior to installing threaded adapter (item number 17) and adapter locknut (item number 10). While installing sleeve (item number 7) onto rod of piston, rotate piston until the threads pass the o-ring (item number 13). This will prevent the o-ring from being damaged by the threads.
2. Hoses are to be fastened together using heat shrink tube, every two feet.
3. Install indicated items using teflon tape on threads.
4. Indicated items are included as part of assembly but are not installed into puller.

**Table 6.2-4
MB-30-H25 Parts List**

Item Number	Quantity	Part Number	Description	Reference Information	Notes
1	1	2350-001	Housing		
2	1	2184-006	Cylinder		
3	1	2332-001	Barrel		
4	1	2405-001	Piston Assembly		1
5	1	2136-002	End Cap		
6	1	5211-002	Handle Assembly		
7	1	2349-001	Sleeve		1
8	1	2120-004	Lockring, Barrel		
9	2	2120-002	Lockring, Cylinder		
10	1	2422-001	Locknut, Adapter		
11	1	1046-058	O-Ring	MS28775-224	
12	1	1046-003	Ring, Backup	MS28782-17	
13	1	1046-002	O-Ring	MS28775-212	
14	1	1046-005	Ring, Backup	MS28782-28	
15	1	1046-004	O-Ring	MS28775-325	
16	1	1046-007	O-Ring	AS568-122 Buna, 90 Duro	
17	1	2425-001	5/8-18 Threaded Adapter Assembly		1
18	1	2107-008	Assembly, 25-foot Hydraulic Hose		2, 3
19	1	2106-016	Assembly, 25-foot Air Hose (Female)		2, 3
20	1	2106-015	Assembly, 25-foot Air Hose (Male)		2, 3
21	12	2638-001	Tube, Heat Shrink 3-inch Piece		2
22	1	1009-185	Nosecap Warning Label		
23	1	1009-184	Do Not Strike Label		
24	1	1187-105	Ear Protection Label		
25	1	1187-106	Eye Protection Label		
26	1	1187-107	Read Manual Label		
27	2	1009-187	Medium Brute Label		
28	1	1009-094	FTI Logo Label		
29	1	1166-001	CE Label		
30	1	1045-100	Spanner Wrench	34-358	4
31	1	2369-002	Pinwrench Assembly	CBC-2-PW	4
32	1	2425-002	7/8-14 Threaded Adapter Assembly		4
33	1	6575-002	Pelican Kit Case with Foam	FT-BX-21-16-10	4
34	1	2720-007	Medium Brute Operator Manual		4

Notes:

1. Apply teflon tape to threads on piston (item number 4) after installing sleeve (item number 7) and prior to installing threaded adapter (item number 17) and adapter locknut (item number 10). While installing sleeve (item number 7) onto rod of piston, rotate piston until the threads pass the o-ring (item number 13). This will prevent the o-ring from being damaged by the threads.
2. Hoses are to be fastened together using heat shrink tube, every two feet.
3. Install indicated items using teflon tape on threads.
4. Indicated items are included as part of assembly but are not installed into puller.

**Table 6.2-5
MB-30A-H25 Parts List**

Item Number	Quantity	Part Number	Description	Reference Information	Notes
1	1	2350-001	Housing		
2	1	2184-006	Cylinder		
3	1	2332-001	Barrel		
4	1	2405-001	Piston Assembly		1
5	1	2136-002	End Cap		
6	1	5211-002	Handle Assembly		
7	1	2349-001	Sleeve		1
8	1	2120-004	Lockring, Barrel		
9	2	2120-002	Lockring, Cylinder		
10	1	2422-001	Locknut, Adapter		
11	1	1046-058	O-Ring	MS28775-224	
12	1	1046-003	Ring, Backup	MS28782-17	
13	1	1046-002	O-Ring	MS28775-212	
14	1	1046-005	Ring, Backup	MS28782-28	
15	1	1046-004	O-Ring	MS28775-325	
16	1	1046-007	O-Ring	AS568-122 Buna, 90 Duro	
17	1	2491-001	Chuck Assembly	MB-CA-8	1
18	1	2107-008	Assembly, 25-foot Hydraulic Hose		2, 3
19	1	2106-016	Assembly, 25-foot Air Hose (Female)		2, 3
20	1	2106-015	Assembly, 25-foot Air Hose (Male)		2, 3
21	12	2638-001	Tube, Heat Shrink 3-inch Piece		2
22	1	1009-185	Nosecap Warning Label		
23	1	1009-184	Do Not Strike Label		
24	1	1187-105	Ear Protection Label		
25	1	1187-106	Eye Protection Label		
26	1	1187-107	Read Manual Label		
27	2	1009-187	Medium Brute Label		
28	1	1009-094	FTI Logo Label		
29	1	1166-001	CE Label		
30	1	1045-100	Spanner Wrench	34-358	4
31	1	2369-002	Pinwrench Assembly	CBC-2-PW	4
32	1	6575-002	Pelican Kit Case with Foam	FT-BX-21-16-10	4
33	1	2720-007	Medium Brute Operator Manual		4

Notes:

1. Apply teflon tape to threads on piston (item number 4) after installing sleeve (item number 7) and prior to installing threaded adapter (item number 17) and adapter locknut (item number 10). While installing sleeve (item number 7) onto rod of piston, rotate piston until the threads pass the o-ring (item number 13). This will prevent the o-ring from being damaged by the threads.
2. Hoses are to be fastened together using heat shrink tube, every two feet.
3. Install indicated items using teflon tape on threads.
4. Indicated items are included as part of assembly but are not installed into puller.

**Table 6.2-6
MB-30C Parts List**

Item Number	Quantity	Part Number	Description	Reference Information	Notes
1	1	2350-001	Housing		
2	1	2184-006	Cylinder		
3	1	2332-001	Barrel		
4	1	2405-001	Piston Assembly		1
5	1	2136-002	End Cap		
6	1	5211-002	Handle Assembly		
7	1	2349-001	Sleeve		1
8	1	2120-004	Lockring, Barrel		
9	2	2120-002	Lockring, Cylinder		
10	1	2422-001	Locknut, Adapter		
11	1	1046-058	O-Ring	MS28775-224	
12	1	1046-003	Ring, Backup	MS28782-17	
13	1	1046-002	O-Ring	MS28775-212	
14	1	1046-005	Ring, Backup	MS28782-28	
15	1	1046-004	O-Ring	MS28775-325	
16	1	1046-007	O-Ring	AS568-122 Buna, 90 Duro	
17	1	2425-001	5/8-18 Threaded Adapter Assembly		1
18	1	2107-001	Assembly, 10-foot Hydraulic Hose		2, 3
19	1	2106-002	Assembly, 10-foot Air Hose (Female)		2, 3
20	1	2106-001	Assembly, 10-foot Air Hose (Male)		2, 3
21	4	2638-001	Tube, Heat Shrink 3-inch Piece		2
22	1	1009-185	Nosecap Warning Label		
23	1	1009-184	Do Not Strike Label		
24	1	1187-105	Ear Protection Label		
25	1	1187-106	Eye Protection Label		
26	1	1187-107	Read Manual Label		
27	2	1009-187	Medium Brute Label		
28	1	1009-094	FTI Logo Label		
29	1	1166-001	CE Label		
30	1	1045-100	Spanner Wrench	34-358	4
31	1	2369-002	Pinwrench Assembly	CBC-2-PW	4
32	1	2425-002	7/8-14 Threaded Adapter Assembly		4
33	1	2720-007	Medium Brute Operator Manual		4

Notes:

1. Apply teflon tape to threads on piston (item number 4) after installing sleeve (item number 7) and prior to installing threaded adapter (item number 17) and adapter locknut (item number 10). While installing sleeve (item number 7) onto rod of piston, rotate piston until the threads pass the o-ring (item number 13). This will prevent the o-ring from being damaged by the threads.
2. Hoses are to be fastened together using heat shrink tube, every two feet.
3. Install indicated items using teflon tape on threads.
4. Indicated items are included as part of assembly but are not installed into puller.

**Table 6.2-7
MB-30-V Parts List**

Item Number	Quantity	Part Number	Description	Reference Information	Notes
1	1	2350-001	Housing		
2	1	2184-006	Cylinder		
3	1	2332-001	Barrel		
4	1	2405-001	Piston Assembly		1
5	1	2136-002	End Cap		
6	1	5211-002	Handle Assembly		
7	1	2349-001	Sleeve		1
8	1	2120-004	Lockring, Barrel		
9	2	2120-002	Lockring, Cylinder		
10	1	2422-001	Locknut, Adapter		
11	1	1046-058	O-Ring	MS28775-224	
12	1	1046-003	Ring, Backup	MS28782-17	
13	1	1046-002	O-Ring	MS28775-212	
14	1	1046-005	Ring, Backup	MS28782-28	
15	1	1046-004	O-Ring	MS28775-325	
16	1	1046-007	O-Ring	AS568-122 Buna, 90 Duro	
17	1	2491-001	Chuck Assembly	MB-CA-8	1
18	1	2107-001	Assembly, 10-foot Hydraulic Hose		2, 3
19	1	2106-002	Assembly, 10-foot Air Hose (Female)		2, 3
20	1	2106-001	Assembly, 10-foot Air Hose (Male)		2, 3
21	8	2638-025	Tube, Yellow Heat Shrink 3-inch Piece		2
22	1	1009-185	Nosecap Warning Label		
23	1	1009-184	Do Not Strike Label		
24	1	1187-105	Ear Protection Label		
25	1	1187-106	Eye Protection Label		
26	1	1187-107	Read Manual Label		
27	2	1009-187	Medium Brute Label		
28	1	1009-094	FTI Logo Label		
29	1	1166-001	CE Label		
30	1	1045-100	Spanner Wrench	34-358	4
31	1	2369-002	Pinwrench Assembly	CBC-2-PW	4
32	1	6575-002	Pelican Kit Case with Foam	FT-BX-21-16-10	4
33	1	2720-007	Medium Brute Operator Manual		4

Notes:

1. Apply teflon tape to threads on piston (item number 4) after installing sleeve (item number 7) and prior to installing threaded adapter (item number 17) and adapter locknut (item number 10). While installing sleeve (item number 7) onto rod of piston, rotate piston until the threads pass the o-ring (item number 13). This will prevent the o-ring from being damaged by the threads.
2. Hoses are to be fastened together using heat shrink tube, every one foot. Do not apply any heat shrink tubing within 18 inches from either end of the hoses.
3. Install indicated items using teflon tape on threads.
4. Indicated items are included as part of assembly but are not installed into puller.

**Table 6.2-8
MB-70 Parts List**

Item Number	Quantity	Part Number	Description	Reference Information	Notes
1	1	2350-001	Housing		
2	1	2184-007	Cylinder		
3	1	2332-002	Barrel		
4	1	2405-002	Piston Assembly		1
5	1	2136-002	End Cap		
6	1	5211-002	Handle Assembly		
7	1	2349-001	Sleeve		1
8	1	2120-004	Lockring, Barrel		
9	2	2120-002	Lockring, Cylinder		
10	1	2422-001	Locknut, Adapter		
11	1	1046-058	O-Ring	MS28775-224	
12	1	1046-003	Ring, Backup	MS28782-17	
13	1	1046-002	O-Ring	MS28775-212	
14	1	1046-005	Ring, Backup	MS28782-28	
15	1	1046-004	O-Ring	MS28775-325	
16	1	1046-007	O-Ring	AS568-122 Buna, 90 Duro	
17	1	2425-001	5/8-18 Threaded Adapter Assembly		1
18	1	2107-001	Assembly, 10-foot Hydraulic Hose		2, 3
19	1	2106-002	Assembly, 10-foot Air Hose (Female)		2, 3
20	1	2106-001	Assembly, 10-foot Air Hose (Male)		2, 3
21	4	2638-001	Tube, Heat Shrink 3-inch Piece		2
22	1	1009-185	Nosecap Warning Label		
23	1	1009-184	Do Not Strike Label		
24	1	1187-105	Ear Protection Label		
25	1	1187-106	Eye Protection Label		
26	1	1187-107	Read Manual Label		
27	2	1009-187	Medium Brute Label		
28	1	1009-094	FTI Logo Label		
29	1	1166-001	CE Label		
30	1	1045-100	Spanner Wrench	34-358	4
31	1	2369-002	Pinwrench Assembly	CBC-2-PW	4
32	1	2425-002	7/8-14 Threaded Adapter Assembly		4
33	1	6575-003	Pelican Kit Case with Foam	FT-BX-28-17-10	4
34	1	2720-007	Medium Brute Operator Manual		4

Notes:

1. Apply teflon tape to threads on piston (item number 4) after installing sleeve (item number 7) and prior to installing threaded adapter (item number 17) and adapter locknut (item number 10). While installing sleeve (item number 7) onto rod of piston, rotate piston until the threads pass the o-ring (item number 13). This will prevent the o-ring from being damaged by the threads.
2. Hoses are to be fastened together using heat shrink tube, every two feet.
3. Install indicated items using teflon tape on threads.
4. Indicated items are included as part of assembly but are not installed into puller.

**Table 6.2-9
MB-70A Parts List**

Item Number	Quantity	Part Number	Description	Reference Information	Notes
1	1	2350-001	Housing		
2	1	2184-007	Cylinder		
3	1	2332-002	Barrel		
4	1	2405-002	Piston Assembly		1
5	1	2136-002	End Cap		
6	1	5211-002	Handle Assembly		
7	1	2349-001	Sleeve		1
8	1	2120-004	Lockring, Barrel		
9	2	2120-002	Lockring, Cylinder		
10	1	2422-001	Locknut, Adapter		
11	1	1046-058	O-Ring	MS28775-224	
12	1	1046-003	Ring, Backup	MS28782-17	
13	1	1046-002	O-Ring	MS28775-212	
14	1	1046-005	Ring, Backup	MS28782-28	
15	1	1046-004	O-Ring	MS28775-325	
16	1	1046-007	O-Ring	AS568-122 Buna, 90 Duro	
17	1	2491-001	Chuck Assembly	MB-CA-8	1
18	1	2107-001	Assembly, 10-foot Hydraulic Hose		2, 3
19	1	2106-002	Assembly, 10-foot Air Hose (Female)		2, 3
20	1	2106-001	Assembly, 10-foot Air Hose (Male)		2, 3
21	4	2638-001	Tube, Heat Shrink 3-inch Piece		2
22	1	1009-185	Nosecap Warning Label		
23	1	1009-184	Do Not Strike Label		
24	1	1187-105	Ear Protection Label		
25	1	1187-106	Eye Protection Label		
26	1	1187-107	Read Manual Label		
27	2	1009-187	Medium Brute Label		
28	1	1009-094	FTI Logo Label		
29	1	1166-001	CE Label		
30	1	1045-100	Spanner Wrench	34-358	4
31	1	2369-002	Pinwrench Assembly	CBC-2-PW	4
32	1	6575-003	Pelican Kit Case with Foam	FT-BX-28-17-10	4
33	1	2720-007	Medium Brute Operator Manual		4

Notes:

1. Apply teflon tape to threads on piston (item number 4) after installing sleeve (item number 7) and prior to installing threaded adapter (item number 17) and adapter locknut (item number 10). While installing sleeve (item number 7) onto rod of piston, rotate piston until the threads pass the o-ring (item number 13). This will prevent the o-ring from being damaged by the threads.
2. Hoses are to be fastened together using heat shrink tube, every two feet.
3. Install indicated items using teflon tape on threads.
4. Indicated items are included as part of assembly but are not installed into puller.

**Table 6.2-10
MB-70B Parts List**

Item Number	Quantity	Part Number	Description	Reference Information	Notes
1	1	2350-001	Housing		
2	1	2184-007	Cylinder		
3	1	2332-002	Barrel		
4	1	2405-002	Piston Assembly		1
5	1	2136-002	End Cap		
6	1	5211-002	Handle Assembly		
7	1	2349-001	Sleeve		1
8	1	2120-004	Lockring, Barrel		
9	2	2120-002	Lockring, Cylinder		
10	1	2422-001	Locknut, Adapter		
11	1	1046-058	O-Ring	MS28775-224	
12	1	1046-003	Ring, Backup	MS28782-17	
13	1	1046-002	O-Ring	MS28775-212	
14	1	1046-005	Ring, Backup	MS28782-28	
15	1	1046-004	O-Ring	MS28775-325	
16	1	1046-007	O-Ring	AS568-122 Buna, 90 Duro	
17	1	2491-002	Chuck Assembly	MB-CA-11	1
18	1	2107-001	Assembly, 10-foot Hydraulic Hose		2, 3
19	1	2106-002	Assembly, 10-foot Air Hose (Female)		2, 3
20	1	2106-001	Assembly, 10-foot Air Hose (Male)		2, 3
21	4	2638-001	Tube, Heat Shrink 3-inch Piece		2
22	1	1009-185	Nosecap Warning Label		
23	1	1009-184	Do Not Strike Label		
24	1	1187-105	Ear Protection Label		
25	1	1187-106	Eye Protection Label		
26	1	1187-107	Read Manual Label		
27	2	1009-187	Medium Brute Label		
28	1	1009-094	FTI Logo Label		
29	1	1166-001	CE Label		
30	1	1045-100	Spanner Wrench	34-358	4
31	1	2369-002	Pinwrench Assembly	CBC-2-PW	4
32	1	6575-003	Pelican Kit Case with Foam	FT-BX-28-17-10	4
33	1	2720-007	Medium Brute Operator Manual		4

Notes:

1. Apply teflon tape to threads on piston (item number 4) after installing sleeve (item number 7) and prior to installing threaded adapter (item number 17) and adapter locknut (item number 10). While installing sleeve (item number 7) onto rod of piston, rotate piston until the threads pass the o-ring (item number 13). This will prevent the o-ring from being damaged by the threads.
2. Hoses are to be fastened together using heat shrink tube, every two feet.
3. Install indicated items using teflon tape on threads.
4. Indicated items are included as part of assembly but are not installed into puller.

**Table 6.2-11
MB-70-H25 Parts List**

Item Number	Quantity	Part Number	Description	Reference Information	Notes
1	1	2350-001	Housing		
2	1	2184-007	Cylinder		
3	1	2332-002	Barrel		
4	1	2405-002	Piston Assembly		1
5	1	2136-002	End Cap		
6	1	5211-002	Handle Assembly		
7	1	2349-001	Sleeve		1
8	1	2120-004	Lockring, Barrel		
9	2	2120-002	Lockring, Cylinder		
10	1	2422-001	Locknut, Adapter		
11	1	1046-058	O-Ring	MS28775-224	
12	1	1046-003	Ring, Backup	MS28782-17	
13	1	1046-002	O-Ring	MS28775-212	
14	1	1046-005	Ring, Backup	MS28782-28	
15	1	1046-004	O-Ring	MS28775-325	
16	1	1046-007	O-Ring	AS568-122 Buna, 90 Duro	
17	1	2425-001	5/8-18 Threaded Adapter Assembly		1
18	1	2107-008	Assembly, 25-foot Hydraulic Hose		2, 3
19	1	2106-016	Assembly, 25-foot Air Hose (Female)		2, 3
20	1	2106-015	Assembly, 25-foot Air Hose (Male)		2, 3
21	12	2638-001	Tube, Heat Shrink 3-inch Piece		2
22	1	1009-185	Nosecap Warning Label		
23	1	1009-184	Do Not Strike Label		
24	1	1187-105	Ear Protection Label		
25	1	1187-106	Eye Protection Label		
26	1	1187-107	Read Manual Label		
27	2	1009-187	Medium Brute Label		
28	1	1009-094	FTI Logo Label		
29	1	1166-001	CE Label		
30	1	1045-100	Spanner Wrench	34-358	4
31	1	2369-002	Pinwrench Assembly	CBC-2-PW	4
32	1	2425-002	7/8-14 Threaded Adapter Assembly		4
33	1	6575-003	Pelican Kit Case with Foam	FT-BX-28-17-10	4
34	1	2720-007	Medium Brute Operator Manual		4

Notes:

1. Apply teflon tape to threads on piston (item number 4) after installing sleeve (item number 7) and prior to installing threaded adapter (item number 17) and adapter locknut (item number 10). While installing sleeve (item number 7) onto rod of piston, rotate piston until the threads pass the o-ring (item number 13). This will prevent the o-ring from being damaged by the threads.
2. Hoses are to be fastened together using heat shrink tube, every two feet.
3. Install indicated items using teflon tape on threads.
4. Indicated items are included as part of assembly but are not installed into puller.

**Table 6.2-12
MB-70A-H25 Parts List**

Item Number	Quantity	Part Number	Description	Reference Information	Notes
1	1	2350-001	Housing		
2	1	2184-007	Cylinder		
3	1	2332-002	Barrel		
4	1	2405-002	Piston Assembly		1
5	1	2136-002	End Cap		
6	1	5211-002	Handle Assembly		
7	1	2349-001	Sleeve		1
8	1	2120-004	Lockring, Barrel		
9	2	2120-002	Lockring, Cylinder		
10	1	2422-001	Locknut, Adapter		
11	1	1046-058	O-Ring	MS28775-224	
12	1	1046-003	Ring, Backup	MS28782-17	
13	1	1046-002	O-Ring	MS28775-212	
14	1	1046-005	Ring, Backup	MS28782-28	
15	1	1046-004	O-Ring	MS28775-325	
16	1	1046-007	O-Ring	AS568-122 Buna, 90 Duro	
17	1	2491-001	Chuck Assembly	MB-CA-8	1
18	1	2107-008	Assembly, 25-foot Hydraulic Hose		2, 3
19	1	2106-016	Assembly, 25-foot Air Hose (Female)		2, 3
20	1	2106-015	Assembly, 25-foot Air Hose (Male)		2, 3
21	12	2638-001	Tube, Heat Shrink 3-inch Piece		2
22	1	1009-185	Nosecap Warning Label		
23	1	1009-184	Do Not Strike Label		
24	1	1187-105	Ear Protection Label		
25	1	1187-106	Eye Protection Label		
26	1	1187-107	Read Manual Label		
27	2	1009-187	Medium Brute Label		
28	1	1009-094	FTI Logo Label		
29	1	1166-001	CE Label		
30	1	1045-100	Spanner Wrench	34-358	4
31	1	2369-002	Pinwrench Assembly	CBC-2-PW	4
32	1	6575-003	Pelican Kit Case with Foam	FT-BX-28-17-10	4
33	1	2720-007	Medium Brute Operator Manual		4

Notes:

1. Apply teflon tape to threads on piston (item number 4) after installing sleeve (item number 7) and prior to installing threaded adapter (item number 17) and adapter locknut (item number 10). While installing sleeve (item number 7) onto rod of piston, rotate piston until the threads pass the o-ring (item number 13). This will prevent the o-ring from being damaged by the threads.
2. Hoses are to be fastened together using heat shrink tube, every two feet.
3. Install indicated items using teflon tape on threads.
4. Indicated items are included as part of assembly but are not installed into puller.

**Table 6.2-13
MB-70-H20 Parts List**

Item Number	Quantity	Part Number	Description	Reference Information	Notes
1	1	2350-001	Housing		
2	1	2184-007	Cylinder		
3	1	2332-002	Barrel		
4	1	2405-002	Piston Assembly		1
5	1	2136-002	End Cap		
6	1	5211-002	Handle Assembly		
7	1	2349-001	Sleeve		1
8	1	2120-004	Lockring, Barrel		
9	2	2120-002	Lockring, Cylinder		
10	1	2422-001	Locknut, Adapter		
11	1	1046-058	O-Ring	MS28775-224	
12	1	1046-003	Ring, Backup	MS28782-17	
13	1	1046-002	O-Ring	MS28775-212	
14	1	1046-005	Ring, Backup	MS28782-28	
15	1	1046-004	O-Ring	MS28775-325	
16	1	1046-007	O-Ring	AS568-122 Buna, 90 Duro	
17	1	2425-001	5/8-18 Threaded Adapter Assembly		1
18	1	2107-002	Assembly, 20-foot Hydraulic Hose		2, 3
19	1	2106-004	Assembly, 20-foot Air Hose (Female)		2, 3
20	1	2106-003	Assembly, 20-foot Air Hose (Male)		2, 3
21	9	2638-001	Tube, Heat Shrink 3-inch Piece		2
22	1	1009-185	Nosecap Warning Label		
23	1	1009-184	Do Not Strike Label		
24	1	1187-105	Ear Protection Label		
25	1	1187-106	Eye Protection Label		
26	1	1187-107	Read Manual Label		
27	2	1009-187	Medium Brute Label		
28	1	1009-094	FTI Logo Label		
29	1	1166-001	CE Label		
30	1	1045-100	Spanner Wrench	34-358	4
31	1	2369-002	Pinwrench Assembly	CBC-2-PW	4
32	1	2425-002	7/8-14 Threaded Adapter Assembly		4
33	1	6575-003	Pelican Kit Case with Foam	FT-BX-28-17-10	4
34	1	2720-007	Medium Brute Operator Manual		4

Notes:

1. Apply teflon tape to threads on piston (item number 4) after installing sleeve (item number 7) and prior to installing threaded adapter (item number 17) and adapter locknut (item number 10). While installing sleeve (item number 7) onto rod of piston, rotate piston until the threads pass the o-ring (item number 13). This will prevent the o-ring from being damaged by the threads.
2. Hoses are to be fastened together using heat shrink tube, every two feet.
3. Install indicated items using teflon tape on threads.
4. Indicated items are included as part of assembly but are not installed into puller.

**Table 6.2-14
MB-70-V Parts List**

Item Number	Quantity	Part Number	Description	Reference Information	Notes
1	1	2350-001	Housing		
2	1	2184-007	Cylinder		
3	1	2332-002	Barrel		
4	1	2405-002	Piston Assembly		1
5	1	2136-002	End Cap		
6	1	5211-002	Handle Assembly		
7	1	2349-001	Sleeve		1
8	1	2120-004	Lockring, Barrel		
9	2	2120-002	Lockring, Cylinder		
10	1	2422-001	Locknut, Adapter		
11	1	1046-058	O-Ring	MS28775-224	
12	1	1046-003	Ring, Backup	MS28782-17	
13	1	1046-002	O-Ring	MS28775-212	
14	1	1046-005	Ring, Backup	MS28782-28	
15	1	1046-004	O-Ring	MS28775-325	
16	1	1046-007	O-Ring	AS568-122 Buna, 90 Duro	
17	1	2425-001	5/8-18 Threaded Adapter Assembly		1
18	1	2107-001	Assembly, 10-foot Hydraulic Hose		2, 3
19	1	2106-002	Assembly, 10-foot Air Hose (Female)		2, 3
20	1	2106-001	Assembly, 10-foot Air Hose (Male)		2, 3
21	8	2638-025	Tube, Yellow Heat Shrink 3-inch Piece		2
22	1	1009-185	Nosecap Warning Label		
23	1	1009-184	Do Not Strike Label		
24	1	1187-105	Ear Protection Label		
25	1	1187-106	Eye Protection Label		
26	1	1187-107	Read Manual Label		
27	2	1009-187	Medium Brute Label		
28	1	1009-094	FTI Logo Label		
29	1	1166-001	CE Label		
30	1	1045-100	Spanner Wrench	34-358	4
31	1	2369-002	Pinwrench Assembly	CBC-2-PW	4
32	1	2425-002	7/8-14 Threaded Adapter Assembly		4
33	1	6575-003	Pelican Kit Case with Foam	FT-BX-28-17-10	4
34	1	2720-007	Medium Brute Operator Manual		4

Notes:

1. Apply teflon tape to threads on piston (item number 4) after installing sleeve (item number 7) and prior to installing threaded adapter (item number 17) and adapter locknut (item number 10). While installing sleeve (item number 7) onto rod of piston, rotate piston until the threads pass the o-ring (item number 13). This will prevent the o-ring from being damaged by the threads.
2. Hoses are to be fastened together using heat shrink tube, every one foot. Do not apply any heat shrink tubing within 18 inches from either end of the hoses.
3. Install indicated items using teflon tape on threads.
4. Indicated items are included as part of assembly but are not installed into puller.

**Table 6.2-15
MB-70-H20-V Parts List**

Item Number	Quantity	Part Number	Description	Reference Information	Notes
1	1	2350-001	Housing		
2	1	2184-007	Cylinder		
3	1	2332-002	Barrel		
4	1	2405-002	Piston Assembly		1
5	1	2136-002	End Cap		
6	1	5211-002	Handle Assembly		
7	1	2349-001	Sleeve		1
8	1	2120-004	Lockring, Barrel		
9	2	2120-002	Lockring, Cylinder		
10	1	2422-001	Locknut, Adapter		
11	1	1046-058	O-Ring	MS28775-224	
12	1	1046-003	Ring, Backup	MS28782-17	
13	1	1046-002	O-Ring	MS28775-212	
14	1	1046-005	Ring, Backup	MS28782-28	
15	1	1046-004	O-Ring	MS28775-325	
16	1	1046-007	O-Ring	AS568-122 Buna, 90 Duro	
17	1	2425-001	5/8-18 Threaded Adapter Assembly		1
18	1	2107-002	Assembly, 20-foot Hydraulic Hose		2, 3
19	1	2106-004	Assembly, 20-foot Air Hose (Female)		2, 3
20	1	2106-003	Assembly, 20-foot Air Hose (Male)		2, 3
21	18	2638-025	Tube, Yellow Heat Shrink 3-inch Piece		2
22	1	1009-185	Nosecap Warning Label		
23	1	1009-184	Do Not Strike Label		
24	1	1187-105	Ear Protection Label		
25	1	1187-106	Eye Protection Label		
26	1	1187-107	Read Manual Label		
27	2	1009-187	Medium Brute Label		
28	1	1009-094	FTI Logo Label		
29	1	1166-001	CE Label		
30	1	1045-100	Spanner Wrench	34-358	4
31	1	2369-002	Pinwrench Assembly	CBC-2-PW	4
32	1	2425-002	7/8-14 Threaded Adapter Assembly		4
33	1	6575-003	Pelican Kit Case with Foam	FT-BX-28-17-10	4
34	1	2720-007	Medium Brute Operator Manual		4

Notes:

1. Apply teflon tape to threads on piston (item number 4) after installing sleeve (item number 7) and prior to installing threaded adapter (item number 17) and adapter locknut (item number 10). While installing sleeve (item number 7) onto rod of piston, rotate piston until the threads pass the o-ring (item number 13). This will prevent the o-ring from being damaged by the threads.
2. Hoses are to be fastened together using heat shrink tube, every one foot. Do not apply any heat shrink tubing within 18 inches from either end of the hoses.
3. Install indicated items using teflon tape on threads.
4. Indicated items are included as part of assembly but are not installed into puller.

**Table 6.2-16
MB-10 Parts List**

Item Number	Quantity	Part Number	Description	Reference Information	Notes
1	1	2350-001	Housing		
2	1	2184-009	Cylinder		
3	1	2332-004	Barrel		
4	1	2405-004	Piston Assembly		1
5	1	2136-002	End Cap		
6	1	5211-002	Handle Assembly		
7	1	2349-001	Sleeve		1
8	1	2120-004	Lockring, Barrel		
9	2	2120-002	Lockring, Cylinder		
10	1	2422-001	Locknut, Adapter		
11	1	1046-058	O-Ring	MS28775-224	
12	1	1046-003	Ring, Backup	MS28782-17	
13	1	1046-002	O-Ring	MS28775-212	
14	1	1046-005	Ring, Backup	MS28782-28	
15	1	1046-004	O-Ring	MS28775-325	
16	1	1046-007	O-Ring	AS568-122 Buna, 90 Duro	
17	1	2425-001	5/8-18 Threaded Adapter Assembly		1
18	1	2107-001	Assembly, 10-foot Hydraulic Hose		2, 3
19	1	2106-002	Assembly, 10-foot Air Hose (Female)		2, 3
20	1	2106-001	Assembly, 10-foot Air Hose (Male)		2, 3
21	4	2638-001	Tube, Heat Shrink 3-inch Piece		2
22	1	1009-185	Nosecap Warning Label		
23	1	1009-184	Do Not Strike Label		
24	1	1187-105	Ear Protection Label		
25	1	1187-106	Eye Protection Label		
26	1	1187-107	Read Manual Label		
27	2	1009-187	Medium Brute Label		
28	1	1009-094	FTI Logo Label		
29	1	1166-001	CE Label		
30	1	1045-100	Spanner Wrench	34-358	4
31	1	2369-002	Pinwrench Assembly	CBC-2-PW	4
32	1	2425-002	7/8-14 Threaded Adapter Assembly		4
33	1	6575-001	Pelican Kit Case with Foam	FT-BX-20-15-9	4
34	1	2720-007	Medium Brute Operator Manual		4

Notes:

1. Apply teflon tape to threads on piston (item number 4) after installing sleeve (item number 7) and prior to installing threaded adapter (item number 17) and adapter locknut (item number 10). While installing sleeve (item number 7) onto rod of piston, rotate piston until the threads pass the o-ring (item number 13). This will prevent the o-ring from being damaged by the threads.
2. Hoses are to be fastened together using heat shrink tube, every two feet.
3. Install indicated items using teflon tape on threads.
4. Indicated items are included as part of assembly but are not installed into puller.

**Table 6.2-17
MB-10A Parts List**

Item Number	Quantity	Part Number	Description	Reference Information	Notes
1	1	2350-001	Housing		
2	1	2184-009	Cylinder		
3	1	2332-004	Barrel		
4	1	2405-004	Piston Assembly		1
5	1	2136-002	End Cap		
6	1	5211-002	Handle Assembly		
7	1	2349-001	Sleeve		1
8	1	2120-004	Lockring, Barrel		
9	2	2120-002	Lockring, Cylinder		
10	1	2422-001	Locknut, Adapter		
11	1	1046-058	O-Ring	MS28775-224	
12	1	1046-003	Ring, Backup	MS28782-17	
13	1	1046-002	O-Ring	MS28775-212	
14	1	1046-005	Ring, Backup	MS28782-28	
15	1	1046-004	O-Ring	MS28775-325	
16	1	1046-007	O-Ring	AS568-122 Buna, 90 Duro	
17	1	2491-001	Chuck Assembly	MB-CA-8	1
18	1	2107-001	Assembly, 10-foot Hydraulic Hose		2, 3
19	1	2106-002	Assembly, 10-foot Air Hose (Female)		2, 3
20	1	2106-001	Assembly, 10-foot Air Hose (Male)		2, 3
21	4	2638-001	Tube, Heat Shrink 3-inch Piece		2
22	1	1009-185	Nosecap Warning Label		
23	1	1009-184	Do Not Strike Label		
24	1	1187-105	Ear Protection Label		
25	1	1187-106	Eye Protection Label		
26	1	1187-107	Read Manual Label		
27	2	1009-187	Medium Brute Label		
28	1	1009-094	FTI Logo Label		
29	1	1166-001	CE Label		
30	1	1045-100	Spanner Wrench	34-358	4
31	1	2369-002	Pinwrench Assembly	CBC-2-PW	4
32	1	6575-001	Pelican Kit Case with Foam	FT-BX-20-15-9	4
33	1	2720-007	Medium Brute Operator Manual		4

Notes:

1. Apply teflon tape to threads on piston (item number 4) after installing sleeve (item number 7) and prior to installing threaded adapter (item number 17) and adapter locknut (item number 10). While installing sleeve (item number 7) onto rod of piston, rotate piston until the threads pass the o-ring (item number 13). This will prevent the o-ring from being damaged by the threads.
2. Hoses are to be fastened together using heat shrink tube, every two feet.
3. Install indicated items using teflon tape on threads.
4. Indicated items are included as part of assembly but are not installed into puller.

**Table 6.2-18
MB-10B Parts List**

Item Number	Quantity	Part Number	Description	Reference Information	Notes
1	1	2350-001	Housing		
2	1	2184-009	Cylinder		
3	1	2332-004	Barrel		
4	1	2405-004	Piston Assembly		1
5	1	2136-002	End Cap		
6	1	5211-002	Handle Assembly		
7	1	2349-001	Sleeve		1
8	1	2120-004	Lockring, Barrel		
9	2	2120-002	Lockring, Cylinder		
10	1	2422-001	Locknut, Adapter		
11	1	1046-058	O-Ring	MS28775-224	
12	1	1046-003	Ring, Backup	MS28782-17	
13	1	1046-002	O-Ring	MS28775-212	
14	1	1046-005	Ring, Backup	MS28782-28	
15	1	1046-004	O-Ring	MS28775-325	
16	1	1046-007	O-Ring	AS568-122 Buna, 90 Duro	
17	1	2491-002	Chuck Assembly	MB-CA-11	1
18	1	2107-001	Assembly, 10-foot Hydraulic Hose		2, 3
19	1	2106-002	Assembly, 10-foot Air Hose (Female)		2, 3
20	1	2106-001	Assembly, 10-foot Air Hose (Male)		2, 3
21	4	2638-001	Tube, Heat Shrink 3-inch Piece		2
22	1	1009-185	Nosecap Warning Label		
23	1	1009-184	Do Not Strike Label		
24	1	1187-105	Ear Protection Label		
25	1	1187-106	Eye Protection Label		
26	1	1187-107	Read Manual Label		
27	2	1009-187	Medium Brute Label		
28	1	1009-094	FTI Logo Label		
29	1	1166-001	CE Label		
30	1	1045-100	Spanner Wrench	34-358	4
31	1	2369-002	Pinwrench Assembly	CBC-2-PW	4
32	1	6575-001	Pelican Kit Case with Foam	FT-BX-20-15-9	4
33	1	2720-007	Medium Brute Operator Manual		4

Notes:

1. Apply teflon tape to threads on piston (item number 4) after installing sleeve (item number 7) and prior to installing threaded adapter (item number 17) and adapter locknut (item number 10). While installing sleeve (item number 7) onto rod of piston, rotate piston until the threads pass the o-ring (item number 13). This will prevent the o-ring from being damaged by the threads.
2. Hoses are to be fastened together using heat shrink tube, every two feet.
3. Install indicated items using teflon tape on threads.
4. Indicated items are included as part of assembly but are not installed into puller.

6.3 *BMB-10 ASSEMBLY DIAGRAM*

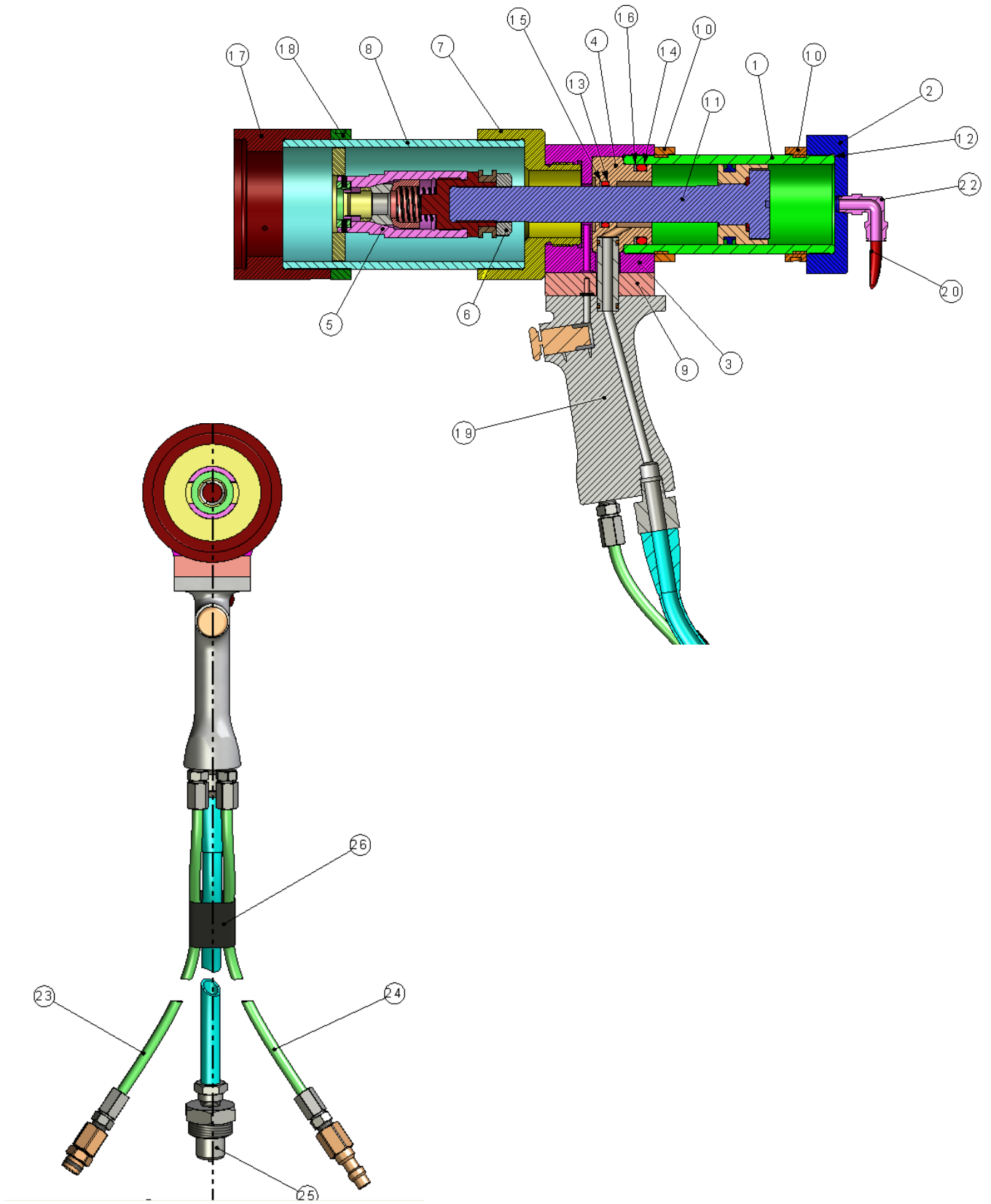


Figure 6.3-1
BMB-10 Assembly Diagram

6.4 BMB-10 PARTS LIST

**Table 6.4-1
BMB-10 Parts List**

Item Number	Description	Part Number	Reference Information
1	Cylinder	2184-009	
2	End Cap	2136-004	
3	Housing	2350-001	
4	Sleeve	2349-001	
5	Tang Mandrel Adapter	2491-004	BMB-CA-13
6	Locknut Adapter	2422-001	
7	Barrel Adapter	3941-001	
8	Barrel	3939-001	
9	Air Return Plate	2836-003	
10	Cylinder Lockring	2120-002	2 each
11	Piston Assembly	2405-004	
12	O-Ring	1046-046	
13	O-Ring	1046-002	AN6227-17
14	O-Ring	1046-004	AN6227-28
15	Backup Ring	1046-003	MS28782-17
16	Backup Ring	1046-005	MS28782-28
17	Cap	3003-003	
18	Barrel Lockring	2120-005	
19	Handle Assembly	5211-006	
20	Air Hose Tubing	2638-022	
21	Air Hose Fitting	1047-056	
22	Air Hose Elbow	1047-057	
23	Air Hose Assembly (Female)	2106-002	
24	Air Hose Assembly (Male)	2106-001	
25	Hydraulic Hose Assembly	2107-001	
26	Heat Shrink Tube (3-inch long)	2638-001	4 each
27	BMB Puller Label	1009-278	
28	FTI Label	1009-094	
29	“Do Not Strike” Label	1009-184	
30	Warning Label	1009-185	
31	Eye Protection Label	1187-106	
32	Ear Protection Label	1187-105	
33	Read Manual Label	1187-107	
34	CE Label	1166-001	
35	Spanner Wrench (not shown)	1045-100	Part not installed into Puller
36	Spanner Wrench (not shown)	1045-015	Part not installed into Puller
37	Case with Foam (not shown)	6575-002	
38	Manual (not shown)	2720-007	

APPENDIX A: LEGACY UNITS

Various design changes and improvements have been made to the Medium Brute series. These older units can be upgraded or refurbished to the new configuration if desired.

A.1 TRIGGER REWORK (FTI-CT-RK AND MB-CT-RK)

FTI has redesigned the puller unit trigger assembly, built with serial number 810 or higher, to a cartridge trigger assembly. The new design reduces the occurrence of trigger air leaks, performs more reliably (better pump actuation), and is easier to maintain.

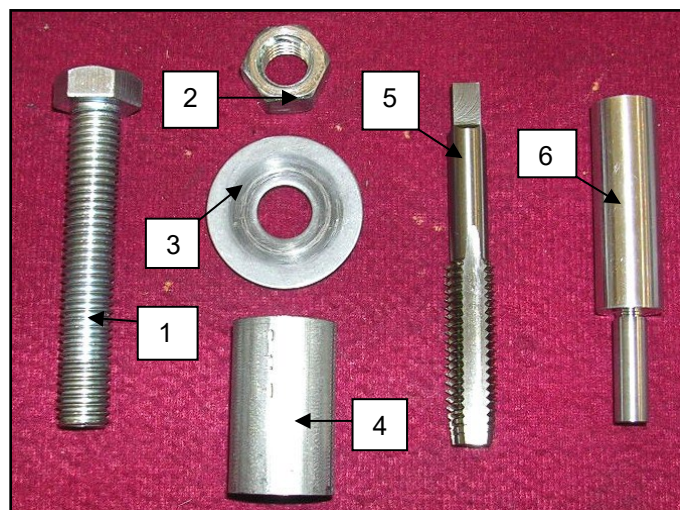
The legacy trigger design detailed in Section A.2 can be easily replaced with this improved trigger assembly detailed in Section A.1. Two part numbers are needed for replacement:

- Either the Cartridge Trigger Assembly Kit (FTI-CT-RK) or the Medium Brute Rework Kit (MB-CT-RK) – (see kit differences in Table A.1-2 and A.1-3), and
- Puller Trigger Rework Tool Kit (FTI-CT-RKT) – (see kit in Table A.1-1).

One FTI-CT-RK or MB-CT-RK kit is required for each puller unit converted. Only one tool kit (FTI-CT-RKT) is required regardless of the number of pullers converted. The FTI-CT-RKT kit includes the tools (punch, tap, etc.) required and detailed instructions on how to perform the modification.

Table A.1-1
FTI-CT-RKT Trigger Assembly Replacement Tool Kit

Item Number	Quantity	Part Number	Description
1	1	1199-029	Hex Head Cap Screw, fully threaded, 3 inches long, 1/2-13UNC
2	1	1045-464	Hex nut, 1/2-13UNC
3	1	1187-633	Flat washer, 9/16 inch ID, 1 3/16 inches OD
4	1	1199-028	Metal Tubing, 1.5 inches long, 7/8 inch ID
5	1	1187-634	Hand tap, 1/2 x 13UNC, HSS, Class H2, Plug
6	1	3471-001	Hand punch, piloted, .35 inch pilot dia.
7	1	2720-072	Puller Trigger Replacement Instructions (DM #160918) – not shown



FTI-CT-RK Trigger Rework Kit

Item Number	Quantity	Part Number	Description
1	1	1187-622	Cartridge Valve
2	1	1187-623	Push Button, Brass
3	1	1187-624	Retaining Ring, Internal
4	1	3196-001	Sleeve, Puller Handle Trigger

Table A.1-3
MB-CT-RK Medium Brute Rework Kit

Item Number	Quantity	Part Number	Description
Not Pictured	1	1029-005	Screw, SHG (10-32 UNFX 3/4)
Not Pictured	1	2039-002	MB-H-D16 Hydraulic Adapter
See Section 4.6	1	8000-485	Medium Brute Seal Kit (MB-SK)
1	1	1187-622	Cartridge Valve
2	1	1187-623	Push Button, Brass
3	1	1187-624	Retaining Ring, Internal
4	1	3196-001	Sleeve, Puller Handle Trigger

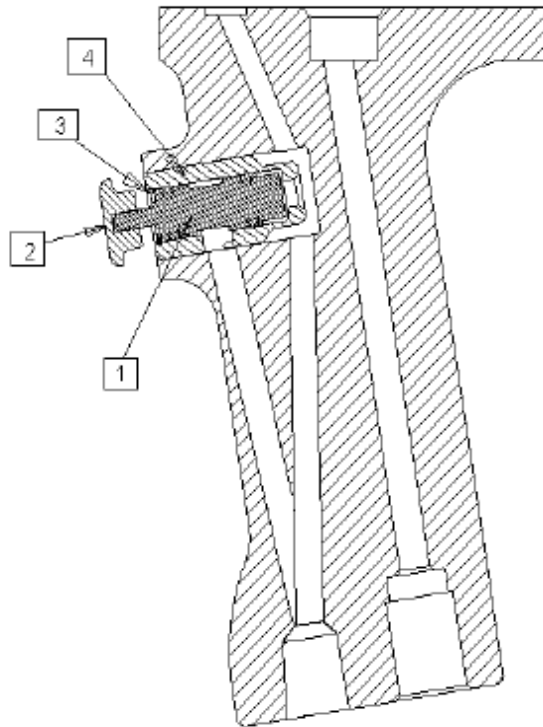


Figure A.1-2
Diagram of Cartridge Trigger Assembly

A.2 LEGACY TRIGGER ASSEMBLY

The legacy trigger design (serial numbers smaller than 810) detailed here can be easily replaced with the improved trigger assembly detailed in Section A.1. Table A.2-1 is a parts list for the old-style trigger assembly.

Table A.2-1
Parts List for Legacy Trigger Assembly

Item Number	Quantity	Part Number	Description
1	1	2042-001	Trigger, LB Handle
2	1	1005-003	Spring, LB Handle
3	1	2043-001	Retainer, LB Handle
4	1	1045-025	Ball, .250 Diameter Steel
5	1	1045-026	Spring Pin, 1/8 x 3/4
6	1	2040-001	Seal, LB Handle
7	1	2044-001	Sleeve, LB Handle

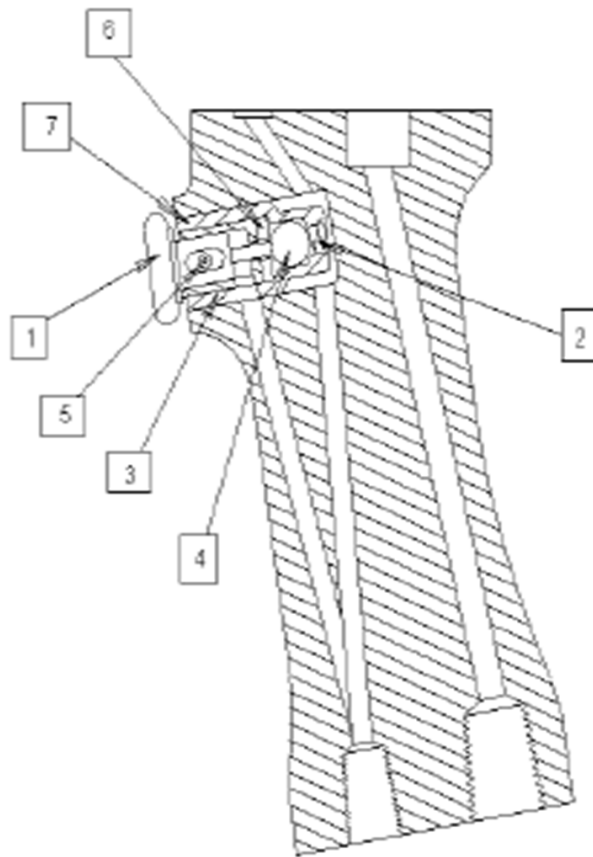
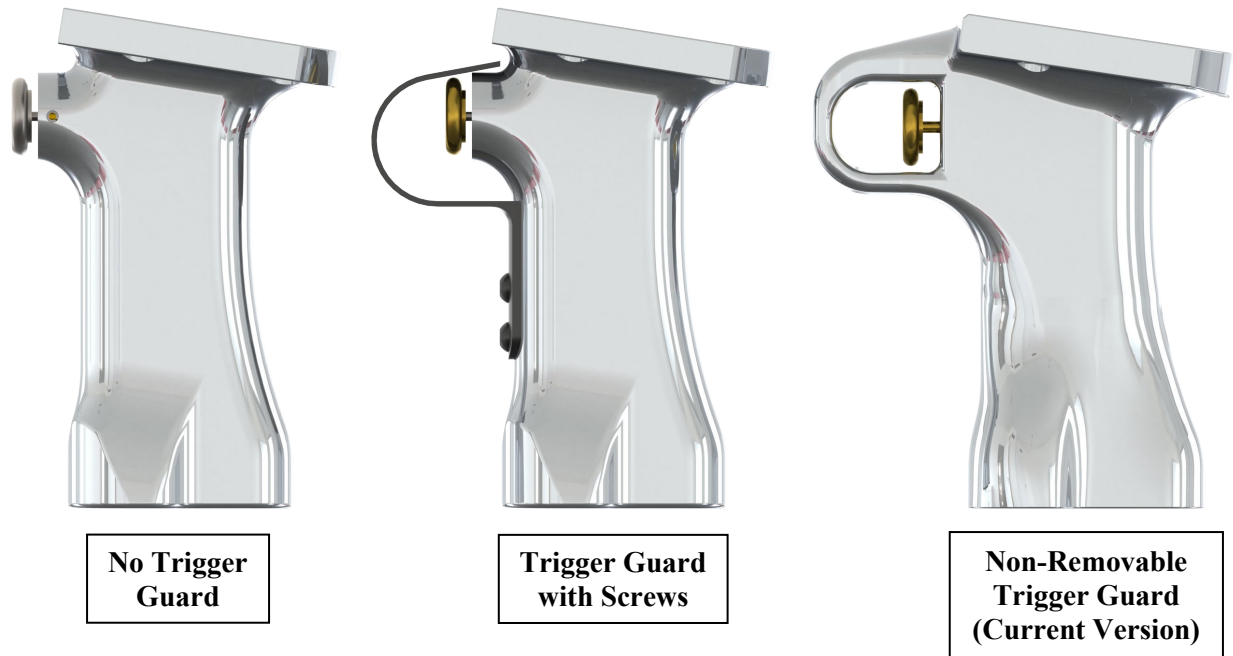


Figure A.2-1
Diagram of Legacy Trigger Assembly

A.3 HANDLE REVISIONS

There have been two major variations of the handle design before the current model. See Figure A.3-1.



**Figure A.3-1
Handle Revisions**

The trigger guard is an important safety feature that was added to minimize the chances of accidental activation. A sheet metal guard attached with screws was originally available as an option but was made a standard feature in 2013.

In 2019 this design was replaced by an integrated trigger guard that is non-removable. This prevents the operator from removing the guard and causing an unsafe condition. The design also improves operator comfort since the protruding screw heads are removed.

If desired, the older model handles can be replaced by purchasing the new version. The sub-assembly (5211-002) also includes an installed trigger, so the rework options described in Appendix A.1 are not necessary.

APPENDIX B: E.C. DECLARATION OF CONFORMITY

FATIGUE TECHNOLOGY
401 Andover Park East
Seattle, Washington 98188-7605
USA



E.C. DECLARATION OF CONFORMITY

Manufacturer: Fatigue Technology
401 Andover Park East
Seattle, WA 98188-7605

Telephone: (206) 246-2010
Fax: (206) 244-9886

The undersigned declares that the machinery described:

Type: MB-xx, where "xx" denotes stack-up capability.

MB-xyy, where "y" denotes configuration.

MB-xx-z, where "z" denotes hose type.

BMB-xx, where "xx" denotes stack-up capability.

For a full list of applicable model numbers, see Table 1.3-1 in the operator manual.

Conforms to the following Directive(s), Regulation(s), and/or Normative Document(s):

2006/42/EC	EU Machinery Directive
ISO 11148-1	Hand-Held Non-Electric Power Tools – Safety Requirements – Part 1
ISO 12100-1	Safety of machinery - General Principles for design - Risk assessment and risk reduction
ISO 4413	Hydraulic fluid power – General rules and safety requirements for systems and their components
ISO 4414	Pneumatic fluid power – General rules and safety requirements for systems and their components
ISO 7010	Graphical symbols — Safety colours and safety signs — Registered safety signs

Responsible Person in E.C.:

Permaswage SAS
Boitelle, Sevara
5 Rue des Dames
78344 Les Clayes Sous Bois
France
Telephone: 33 (0)6-76-61-83-90

Signature:  _____

Date: 12.12.2023 _____

DM# 954838

