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FTI OPERATIONS, MAINTENANCE, AND REPAIR MANUAL

Electric Little Brute Puller Unit

FTI Part #2720-138, Log #36767 Revision C

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Fatigue Technology Inc. (FTI) is a world-leading aerospace engineering and manufacturing company. FTI pioneered Cold Expansion (Cx^{TM}) 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:

- 1. Application engineering
- 2. Detailed project planning, implementation, and management
- 3. 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

DESCRIPTION

SECTION DESCRIPTION

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SECTION 1.0: INTRODUCTION

This instruction manual contains information on the operation and maintenance of the Electric Little Brute (ELB) 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 it for future reference.

1.1 ABOUT THE ELECTRIC LITTLE BRUTE PULLER UNIT

The Electric Little Brute hydraulic puller unit is a powerful, compact, lightweight tool specifically designed for use with Fatigue Technology Inc. (FTI) patented Split Sleeve Cold ExpansionTM (SsCxTM) process. The Electric Little Brute Puller Unit 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® ForceTec®, GromEx®, etc.

The puller is designed with the same attachment threads as other FTI Little Brute pullers and is directly compatible with most Little Brute tooling. For high quantity continuous use, a standard air-powered Little Brute with an FT-200D pump will provide faster cycle times.

The Electric Little Brute puller has a maximum pull force of 10,000 pounds (44,482N). The tool is capable of cold expanding holes up to 9/16 inches (14.3 mm) in diameter and 3 inches (76.2 mm) deep in aluminum, and 3/8 inches (9.53 mm) in diameter and 3 inches (76.2 mm) deep in steel and titanium. Larger diameters may be evaluated on a case by case basis, contact FTI Sales for application assistance.

The Electric Little Brute is available in various models to accommodate multiple battery, charger, and mandrel adapter options.

ELB-xx-10K-120V where '-xx' relates to material stackup (see Table 1.3-1). ELB-xx-10K-NBC where '-NBC' represents that no battery or charger is included.

The Electric Little Brute has a fail-safe control system that causes the puller retraction cycle to be interrupted whenever the operator releases finger pressure on the trigger or in the event of maximum pressure being reached. The Electric Little Brute is very reliable and requires minimal maintenance.

The ELB-xx-10K features a digital display that can be used to display live pressure, peak pressure, and cycles until recommended maintenance. It can also be used to set a pressure limit at a value below 10,000 PSI.

1.2 GENERAL DESCRIPTION

Operating Hydraulic Pressure	. 10,000 psi (68.9MPa)
Pull Force Capacity	. 10,000 pounds (44,482N)
Hydraulic Fluid Requirements	. FTI Part Number 1199-532
Operating Temperature	. 14°F to 104°F (-10°C to 40°C)
Operating Voltage	. 18 Volts
Vibration	$a_{\rm h} < 2.5 \ {\rm m/s^2}$
Noise	$L_{pA} < 70 dB(A)$
Battery Life	Approximately 200-400 Cycles (depending on hole size)
Actuation	Electric
Operation	Electric
Return	. Air
Battery	. Makita BL1860B
Battery Charger	. Makita DC18RC

1.3 GENERAL SPECIFICATIONS

Nosecap Selection: The Electric Little Brute is compatible with both standard and flush nosecaps. See FTI's comprehensive Tooling Catalog for more information.

Mandrel Selection: The Electric Little Brute is directly compatible with standard Type 1, 7/16-20 threaded mandrels. The ELB may also be adapted to tang or pintail mandrels using LB-CA and LB-PC chuck assemblies, respectively. See FTI's comprehensive Tooling Catalog for more information.

Figure 1.3-1 and Table 1.3-1 show the parts and specifications of the Electric Little Brute Puller Unit.



Figure 1.3-1 Electric Little Brute Puller Unit Parts

 Table 1.3-1

 Electric Little Brute Specifications

Model Number	Maximum Material Stackup (inch)	Length (inch)	Pull Force (lbs.)	Weight With Battery (lb.)	Stroke (inch)
ELB-15-10K	1.5 (38.1 mm)	9.8 (248.9 mm)	10,000	6.9 (3.13 kg)	2.5 (63.5 mm)
ELB-20-10K	2.0 (50.8 mm)	10.8 (274.3 mm)	10,000	7.1 (3.22 kg)	3.0 (76.2 mm)
ELB-30-10K	3.0 (76.2 mm)	12.8 (325.1 mm)	10,000	7.5 (3.40 kg)	4.0 (101.6 mm)

2.1 GENERAL POWER TOOL SAFETY WARNINGS

AWARNING Read all safety warnings, instructions, illustrations, and specifications provided with this power tool. Failure to follow all instructions listed below may result in electric shock, fire and/or serious injury.

Save all warnings and instructions for future reference.

The term "power tool" in the warnings refers to your mains-operated (corded) power tool or battery-operated (cordless) power tool.

1) Work area safety

- a) Keep work area clean and well lit. Cluttered or dark areas invite accidents.
- b) Do not operate power tools in explosive atmospheres, such as in the presence of flammable liquids, gases or dust. *Power tools create sparks which may ignite the dust or fumes.*
- c) Keep children and bystanders away while operating a power tool. Distractions can cause you to lose control.

2) Electrical safety

- a) Power tool plugs must match the outlet. Never modify the plug in any way. Do not use any adapter plugs with earthed (grounded) power tools. Unmodified plugs and matching outlets will reduce risk of electric shock.
- b) Avoid body contact with earthed or grounded surfaces, such as pipes, radiators, ranges and refrigerators. There is an increased risk of electric shock if your body is earthed or grounded.
- c) **Do not expose power tools to rain or wet conditions.** Water entering a power tool will increase the risk of electric shock.
- d) Do not abuse the cord. Never use the cord for carrying, pulling or unplugging the power tool. Keep cord away from heat, oil, sharp edges or moving parts. Damaged or entangled cords increase the risk of electric shock.
- e) When operating a power tool outdoors, use an extension cord suitable for outdoor use. Use of a cord suitable for outdoor use reduces the risk of electric shock.
- *f*) **If operating a power tool in a damp location is unavoidable, use a residual current device (RCD) protected supply.** Use of an RCD reduces the risk of electric shock.

3) Personal safety

- a) Stay alert, watch what you are doing and use common sense when operating a power tool. Do not use a power tool while you are tired or under the influence of drugs, alcohol or medication. A moment of inattention while operating power tools may result in serious personal injury.
- *b)* **Use personal protective equipment. Always wear eye protection.** *Protective equipment such as a dust mask, non-skid safety shoes, hard hat or hearing protection used for appropriate conditions will reduce personal injuries.*
- c) Prevent unintentional starting. Ensure the switch is in the off-position before connecting to power source and/or battery pack, picking up or carrying the tool. Carrying power tools with your finger on the switch or energizing power tools that have the switch on invites accidents.
- d) **Remove any adjusting key or wrench before turning the power tool on.** A wrench or a key left attached to a rotating part of the power tool may result in personal injury.
- e) **Do not overreach. Keep proper footing and balance at all times.** This enables better control of the power tool in unexpected situations.
- *f*) Dress properly. Do not wear loose clothing or jewelry. Keep your hair and clothing away from moving parts. Loose clothes, jewelry or long hair can be caught in moving parts.
- g) If devices are provided for the connection of dust extraction and collection facilities, ensure these are connected and properly used. Use of dust collection can reduce dust-related hazards.
- *h)* Do not let familiarity gained from frequent use of tools allow you to become complacent and ignore tool safety principles. A careless action can cause severe injury within a fraction of a second.

4) Power tool use and care

- a) **Do not force the power tool. Use the correct power tool for your application.** The correct power tool will do the job better and safer at the rate for which it was designed.
- b) **Do not use the power tool if the switch does not turn it on and off.** Any power tool that cannot be controlled with the switch is dangerous and must be repaired.
- c) Disconnect the plug from the power source and/or remove the battery pack, if detachable, from the power tool before making any adjustments, changing accessories, or storing power tools. Such preventive safety measures reduce the risk of starting the power tool accidentally.
- d) Store idle power tools out of the reach of children and do not allow persons unfamiliar with the power tool or these instructions to operate the power tool. *Power tools are dangerous in the hands of untrained users.*
- e) Maintain power tools and accessories. Check for misalignment or binding of moving parts, breakage of parts and any other condition that may affect the power tool's operation. If damaged, have the power tool repaired before use. *Many accidents are caused by poorly maintained power tools.*
- f) **Keep cutting tools sharp and clean.** Properly maintained cutting tools with sharp cutting edges are less likely to bind and are easier to control.
- g) Use the power tool, accessories and tool bits etc. in accordance with these instructions, taking into account the working conditions and the work to be performed. Use of the power tool for operations different from those intended could result in a hazardous situation.
- h) Keep handles and grasping surfaces dry, clean and free from oil and grease. Slippery handles and grasping surfaces do not allow for safe handling and control of the tool in unexpected situations.

5) Battery tool use and care

- a) **Recharge only with the charger specified by the manufacturer**. A charger that is suitable for one type of battery pack may create a risk of fire when used with another battery pack.
- b) Use power tools only with specifically designated battery packs. Use of any other battery packs may create a risk of injury and fire.
- c) When battery pack is not in use, keep it away from other metal objects, like paper clips, coins, keys, nails, screws, or other small metal objects, that can make a connection from one terminal to another. Shorting the battery terminals together may cause burns or a fire.
- d) Under abusive conditions, liquid may be ejected from the battery; avoid contact. If contact accidentally occurs, flush with water. If liquid contacts eyes, additionally seek medical help. *Liquid ejected from the battery may cause irritation or burns.*
- e) **Do not use a battery pack or tool that is damaged or modified**. Damaged or modified batteries may exhibit unpredictable behavior resulting in fire, explosion or risk of injury.
- f) **Do not expose a battery pack or tool to fire or excessive temperature**. *Exposure to fire or temperature above 130* °C *may cause explosion.*
- g) Follow all charging instructions and do not charge the battery pack or tool outside the temperature range specified in the instructions. Charging improperly or at temperatures outside the specified range may damage the battery and increase the risk of fire.

6) Service

- a) Have your power tool serviced by a qualified repair person using only identical replacement parts. This will ensure that the safety of the power tool is maintained.
- b) **Never service damaged battery packs.** Service of battery packs should only be performed by the manufacturer or authorized service providers.

2.2 ELECTRIC LITTLE BRUTE SAFETY WARNINGS

Ultimately, operators are responsible for their own safety; however, the following general safety precautions should be observed.

1. Operators must read this manual in its entirety before using the Electric Little Brute. Wear eye protection when operating the puller unit. Hearing protection is not required for this 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.



Figure 2.0-1 Safety Labels

- 2. The puller unit is bundled with a Makita battery and charger (except for model numbers ending in -NBC). This manual does not cover the use and safety precautions of these accessories. Refer to the Makita documentation.
- 3. \triangle Disconnect the battery when:
 - Maintenance is to be performed
 - Tool is to be stored for an extended period
 - Threading on mandrels, nosecaps, or other tooling
- 4. **A** Do not use in potentially explosive atmospheres. Do not use in wet environments.
- 5. In the event of a ruptured or leaking hydraulic component, IMMEDIATELY RELEASE THE TRIGGER. Never use your hands to grasp a leaking hydraulic component 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.
- 6. A Do not operate the puller or connect the battery while any component is disassembled, missing, or loose. Injury may occur.
- 7. A Only use FTI mandrels, nosecaps, and accessories with this puller. Some attachments may be at risk of breakage if used at an inappropriate pressure setting. Be sure to follow all applicable FTI specifications, accessory manuals, and tip sheets for the products being used. If a lower pressure is needed for the application, refer to Section 3.3 for pressure setting.

SECTION 3.0: PULLER UNIT OPERATING INSTRUCTIONS

Become familiar with these instructions before operating the puller. Retain the instructions for future reference.

3.1 Puller Unit Setup Procedure and Operation

Refer to Section 6 (Illustrated Parts Breakdown) for parts identification.

- 1. Inspect all threads and fittings for signs of wear or damage and replace them if necessary.
- 2. Ensure that the piston is in the fully forward position. If not, hold the return button down until the piston stops moving.
- 3. Install the appropriate mandrel in the threaded adapter. The piston is locked while in the fully forward position, so no tool is needed to keep it from rotating. Install the proper chuck assembly in place of the threaded adapter if a tang or pintail mandrel is to be used.
- 4. Install the appropriate nosecap assembly over the mandrel and thread it into place.
- 5. Ensure that the battery is fully charged. If needed, charge the battery with the battery charger. This manual does not cover the use and safety precautions of these accessories. Refer to the Makita documentation.
- 6. Check that the electrical contacts on the battery and tool are clean. Slide the battery onto the puller until it clicks into place.

3.2 Display and Menus

1. Turn on the puller unit by quickly depressing the trigger on the handle and immediately releasing it. Do not hold the trigger at this point unless you want the puller to retract (see section 3.4). Once the puller is turned on, you will see the main screen below.



Figure 3.2-1 Main Menu

2. Pressing the right menu button will take you to the following screen showing the cumulative statistics of the tool.



Statistics Screen

3. The next menu screen shows the number of cycles remaining before preventative maintenance is recommended.



Figure 3.2-3 Maintenance Screen

4. The next menu screen shows the trigger click setting. The default behavior activates the puller with a single pull of the trigger. If desired, the user can set the tool to require double-clicking instead to prevent accidental activation.



Figure 3.2-4 Trigger Setting Screen

5. To change to double-click trigger behavior, press and hold both menu buttons for 3 seconds. The screen will change to highlight the current setting.



Figure 3.2-5 Trigger Setting Selection Screen

6. Next, click the right menu button to select the double-click user profile. Confirm the selection by pressing and releasing the trigger.





Figure 3.2-6 Double Click Trigger Setting

7. The next screen shows the currently installed firmware and the pump identification number.





3.3 Setting the Pressure Limit

1. By default, the puller will operate up to the maximum limit of 10,000 PSI. However, for some applications a lower limit is desired. The tool immediately stops when the pressure limit is reached. To change the pressure limit setting, press and hold both menu buttons for 3 seconds while on the main menu screen.



2. The current pressure limit is now shown. To change the value, press and hold both menu buttons for 3 seconds.



Figure 3.3-2 Pressure Limit Current Setting

3. Use the left and right buttons to select the desired limit. Press and release the trigger to confirm the new value.





Figure 3.3-3 Pressure Limit New Setting

3.4 Activation of Puller Unit

- 1. Activate the puller unit by depressing the trigger on the handle. Hydraulic pressure is pumped to the cylinder of the puller, which then retracts the hydraulic piston that performs the cold expansion procedure.
- 2. During a cycle, the display will show pressure in real time as well as the peak pressure for that cycle. The peak pressure will reset on the next trigger pull.



Figure 3.4-1 Display During a Cycle

3. There are two LED lights on the tool. The white work light on the front of the tool will activate when the trigger is pulled and will remain lit for 10 seconds after the trigger is released. The red status light on the left side of the tool has several functions, refer to Table 3.4-1.

Table 3.4-1Red Status LED Signals

Light Status	Signal	Indicates
Flashing light for 2 seconds	•	Battery is inserted in tool
Constant light for 20 seconds		Battery charge level low
Tool will stop, and flashing light for 20		Motor current exceeds limit
seconds when trigger is released		Circuit has become too hot

- 4. Releasing the trigger stops the pull cycle. Release the trigger once the mandrel has pulled completely through the workpiece.
- 5. Once the cycle is complete, hold down the return button. Air pressure returns the puller to the original position.
- 6. Using the tool continuously is not recommended as is may overheat. After performing 30 to 40 cycles, allow the puller to cool for 15 minutes.
- 7. When not in use, return the piston to the fully forward position.
- 8. If the puller fails to operate as detailed above, refer to Section 5 (Troubleshooting).

SECTION 4.0: PULLER UNIT MAINTENANCE

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

4.1 General Cleaning

- 1. Keep the outer surfaces of the puller unit free of dirt and grime. Do not use aggressive chemical cleaners on the housing as they may not be compatible with the plastic.
- 2. Keep the electrical contacts for the battery free of dirt and grime.
- 3. When not in use, return the piston to the fully forward position.

4.2 **Preventative Maintenance**

- 1. An oil change and preventative maintenance is recommended every 10,000 cycles. The display shows the remaining cycles until the next service (see Figure 3.2-3).
- 2. Preventative maintenance must be performed at FTI or an authorized repair center. Contact FTI Sales if maintenance is needed.
- 3. 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 2.2 for required labels) before each use. If any are missing or illegible, replace immediately.

4.5 Air Tank

- 1. Check the air pressure monthly and fill with 70-100 PSI clean, dry air when needed. The fill valve is a Schrader type fitting, commonly found on tires.
- 2. The piston must be in the fully forward position while filling with air or checking the pressure.
- 3. A hand or powered pump may be used. If a powered pump is desired, the Makita DMP180ZX is a great option because it shares the same battery as the puller unit. Alternatively, the puller can be connected to a 70-100 PSI air supply for a few seconds.
- 4. If the air tank or fill valve is to be removed for maintenance, the tank must be safely depressurized first. Ensure the piston is in the forward position. Remove the valve cap, flip it over, and press the top nub into the valve. Continue to press for a few seconds until no more air can be heard hissing out.



Figure 4.5-1 Depressurizing Air Tank

4.6 Repair

- 1. There are no user-replaceable hydraulic or electronic parts on the Electric Little Brute. Contact FTI Sales if repairs are needed.
- 2. User-replaceable parts are identified in Section 6.1. Contact FTI Sales for assistance if needed.

SECTION 5.0: TROUBLESHOOTING

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

CAUTION: Always disconnect the battery before performing any repair or maintenance.

	PROBLEM	CAUSE	SOLUTION
1.	Puller functions but does not reach the end of travel.	(a) Air in the hydraulic system or low oil level.(b) Cold oil.	(a) Contact FTI Sales to return puller for repair.(b) Press trigger and return button simultaneously to warm the oil. Try operating normally once the tool is warm.
2.	Motor does not run when the trigger is depressed.	(a) Dead battery.	 (a) Check charge level by pressing the button on the back of the battery. Charge if necessary following manufacturer instructions.
		(b) Dirty electrical contacts.	(b) Clean contacts on the top of the battery and bottom of the tool.
		(c) Broken or damaged internal components.	(c) Contact FTI Sales to return puller for repair.
3.	Puller leaks fluid from the rear endcap.	(a) Damaged piston seal.	(a) Contact FTI Sales to return puller for repair.
4.	Puller leaks fluid from the front barrel.	(a) Damaged rod seal.	(a) Contact FTI Sales to return puller for repair.
5.	Puller leaks fluid from the housing.	(a) Damaged pump.	(a) Contact FTI Sales to return puller for repair.
6. Piston	Piston does not return to the front when the return button is	(a) Low air pressure.	(a) Repressurize air tank to 70-100 PSI
	held down.	(b) Air leak.	(b) Inspect air tank valve and o- ring. Replace if necessary.

▲ CAUTION: Hydraulic oil under extreme pressure may cause serious injuries if not handled carefully. For technical assistance, please contact FTI's Sales Department.

6.1 Electric Little Brute Parts List

Item Number	Quantity	FTI Part Number	Description
1	1	60130-001	Housing
2	1	1199-570	Pump Assembly
3	1	60127-002	Cylinder
4	1	60125-002 ¹	Air Tank
5	1	60129-001	End Stop
6	1	60063-003 ¹	Barrel
7	1	60128-002	Piston Rod
8	5	60126-001	Lock Pin
9	1	1199-555 ¹	Air Fill Valve, Schrader
10	1	2340-001 ¹	Adapter
11	1	1199-477	Piston Seal
12	1	1199-476	Rod Seal
13	1	1046-122 ¹	O-Ring
14	1	1046-080	O-Ring
15	1	1046-166	Backup Ring
16	1	60186-001	Return Button Assembly
17	1	1009-320 ¹	FTI Label, Left
18	1	1009-321 ¹	FTI Label, Right
19	1	1009-185 ¹	Nosecap Warning Label
20	1	1009-184 ¹	Do Not Strike Label
21	2	1009-322 ¹	ELB Label

Table 6.1-1 ELB-15-10K Parts List

¹ Indicated parts are user replaceable. See Section 4.6.

Table 6.1-2 ELB-20-10K Parts List

Item Number	Quantity	FTI Part Number	Description
1	1	60130-001	Housing
2	1	1199-570	Pump Assembly
3	1	60127-003	Cylinder
4	1	60125-003 ¹	Air Tank
5	1	60129-001	End Stop
6	1	60063-004 ¹	Barrel
7	1	60128-003	Piston Rod
8	5	60126-001	Lock Pin
9	1	1199-555 ¹	Air Fill Valve, Schrader
10	1	2340-001 ¹	Adapter
11	1	1199-477	Piston Seal
12	1	1199-476	Rod Seal
13	1	1046-122 ¹	O-Ring
14	1	1046-080	O-Ring
15	1	1046-166	Backup Ring
16	1	60186-001	Return Button Assembly
17	1	1009-320 ¹	FTI Label, Left
18	1	1009-321 ¹	FTI Label, Right
19	1	1009-185 ¹	Nosecap Warning Label
20	1	1009-1841	Do Not Strike Label
21	2	1009-3221	ELB Label

¹ Indicated parts are user replaceable. See Section 4.6.

Table 6.1-3 ELB-30-10K Parts List

Item Number	Quantity	FTI Part Number	Description
1	1	60130-001	Housing
2	1	1199-570	Pump Assembly
3	1	60127-001	Cylinder
4	1	60125-001 ¹	Air Tank
5	1	60129-001	End Stop
6	1	60063-002 ¹	Barrel
7	1	60128-001	Piston Rod
8	5	60126-001	Lock Pin
9	1	1199-555 ¹	Air Fill Valve, Schrader
10	1	2340-001 ¹	Adapter
11	1	1199-477	Piston Seal
12	1	1199-476	Rod Seal
13	1	1046-122 ¹	O-Ring
14	1	1046-080	O-Ring
15	1	1046-166	Backup Ring
16	1	60186-001	Return Button Assembly
17	1	1009-320 ¹	FTI Label, Left
18	1	1009-321 ¹	FTI Label, Right
19	1	1009-185 ¹	Nosecap Warning Label
20	1	1009-1841	Do Not Strike Label
21	2	1009-322 ¹	ELB Label

¹ Indicated parts are user replaceable. See Section 4.6.

 Table 6.1-4

 Additional Parts List for ELB-xx-10K-120V and ELB-xx-10K-NBC

Item Number	Quantity	FTI Part Number	Description
1	1	1199-581 ²	Makita DC18RC Charger
2	1	1199-579 ²	Makita BL1860B Battery
3	1	1187-929	Pelican Case
4	1	1363-002	Case Foam Set
5	1	1199-580	Hex T-Handle, 5/16"
6	1	1045-018	Spanner Wrench
7	1	1199-554	Adjustable Pin Spanner Wrench
8	1	1009-323	FTI Logo Case Label
9	2	1199-511 ²	Lithium Battery Warning Label
10	2	1199-582 ²	Class 9 Hazard Label
11	1	1199-501 ²	120V Input Warning Label (For Charger)
12	12 in.	1199-525	1" Wide Black Velcro, Adhesive Backed
13	1	1199-526	9" x 12" Ziploc Bag

² Item not included in ELB-xx-10K-NBC

6.2 Electric Little Brute Assembly Diagram



Figure 6.2-1 Electric Little Brute Assembly

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(D)

Section 1 – Produc	ct & Company Identification
Product Name:	GREENLEE Hydraulic Oil
Product Model No:	4016GB and 4017GB
Product Catalog No:	90510593 (Gallon); 90508608 (Quart)
Recommended Use:	For use with Greenlee hydraulic equipment
Restrictions on Use:	Industrial use only
Company Information:	
North America GREENLEE TOOLS, INC. 4455 Boeing Drive Rockford, Illinois 61109-2932 1-815-387-9547 (8:00 am – 5:00 pm EST, M-F) Emergency Telephone call 9-1-1 or local emergency number www.Greenlee.com	Canada Emerson Electric Canada Limited 66 Leek Crescent , Richmond Hill, Ontario L4B 1H1 905-762-1010
Revision: Issue Date:	A November 6, 2020

Product Name : GREENLEE Hydraulic Oils

Section 2 – Hazards Identification					
		1		1	
EWIERGENCTOVER			HMIS		
GHS Classification			HEALTH	1	
			FLAMMABILTY	1	
Physical Hazards		Not Classified	PHYSICAL HAZARD	0	1
Health and Environm Hazards	nental	See below	PERSONAL PROTECTION	See Se	ection 8
Signal Word		WARNING	•	•	
Precautionary Statements Wash thoroughly after handling. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice or attention.					
Section 3	Section 3 – Composition / Information On Ingredients				
Component Petroleum oil		CAS Number 64742-65-0	Percenta >90	ge	
Component Petroleum oil	Sectio	CAS Number 64742-65-0	Percenta >90 id Measures	ge	
Component Petroleum oil Skin Contact	Section First cloth cloth occu	CAS Number 64742-65-0 on 4 – First Ai aid not normally ing. Wash area o ing before reuse irs and persists.	Percenta >90 id Measures required. Remove cont of contact with soap and . Get medical attention	ge taminated d water. V if irritation	d Vash n
Component Petroleum oil Skin Contact Eye Contact	Section First cloth cloth occu Rem mate eyeb irrita	CAS Number 64742-65-0 on 4 – First Ai aid not normally ing. Wash area of ing before reuse irs and persists. nove contact lens erial are gone. Ey ball to ensure tho tion persists.	Percenta >90 id Measures required. Remove cont of contact with soap and of contact with soap and	ge taminated d water. V if irritation til all trac vay from ical atten	d Wash n es of the tion if
Component Petroleum oil Skin Contact Eye Contact Inhalation	Section First cloth cloth occu Rem mate eyeb irrita Rem med	CAS Number 64742-65-0 on 4 – First Ai aid not normally ing. Wash area of ing before reuse irs and persists. Hove contact lens erial are gone. Ey ball to ensure tho tion persists.	Percenta >90 id Measures required. Remove cont of contact with soap and of contact with soap and	ge taminated d water. V if irritation til all trac vay from ical atten osure. Ge	d Wash n es of the tion if
Component Petroleum oil Skin Contact Eye Contact Inhalation Ingestion	Section First cloth cloth occu Rem mate eyeb irrita Rem med Do n	CAS Number 64742-65-0 on 4 – First Ai aid not normally ing. Wash area of ing before reuse irs and persists. Hove contact lens erial are gone. Ey ball to ensure tho tion persists.	Percenta >90 id Measures required. Remove cont of contact with soap and of contact with soap and	ge taminated d water. V if irritation til all trac vay from ical atten osure. Ge f aspiratio	d Wash n es of the tion if et

Product Name : GF	REENLEE Hydraulic Oils
	lungs. If spontaneous vomiting occurs, monitor for breathing difficulty. Get medical attention.
	Section 5 – Fire Fighting Measures

Section 6 – Accidental Release Measures

Refer to Section 8: Exposure Control and Personal Protection

Emergency Action	Isolate release area and keep unnecessary people away. Exercise caution regarding personnel safety and exposure.
Spill/Leak Procedure	Floor and surfaces may be slippery. Dike with sand or other noncombustible material. Flush area with water provided runoff does not enter drain or sewer; use absorbent material and dispose of properly.
Notification	Any spill or release to navigable water that causes a visible sheen upon the water must be reported immediately to the National Response Center (800/424-8802), as required by U.S. federal law.

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Product Name : GREENLEE Hydraulic Oils

Section 7 – Handling And Storage

Refer to Section 8: Exposure Control and Personal Protection

Handling	Wear proper protective equipment. Avoid contact with skin, eyes and clothing. Avoid breathing vapors or mists. Do not ingest. For industrial use only. Use good hygiene practices when handling product, including changing and laundering work clothes after use. Get medical attention if you are exposed and feel unwell. The shipping and storage container is not designed to be pressurized. Do not use pressure to empty the container as it may rupture with explosive force. Containers should be completely drained, properly closed, and promptly returned to a drum reconditioner or disposed of properly. Empty containers may contain residue or vapors. Do not cut, grind, drill, weld or reuse containers.
Storage	Store product in closed containers in a well-ventilated area

storage	Store product in closed containers in a well-ventilated area
	away from heat, sources of ignition and incompatibles. Do
	not store in unlabeled containers. Empty containers may
	contain residue or vapors.

Section 8 – Exposure Controls / Personal Protection ACGIH TLV OSHA PEL Component Petroleum oil 5 mg/m^3 5 mg/m^3 Engineering Controls Use appropriate ventilation to maintain airborne concentration limits below recommended exposure limits. Eye and Face Protection Wear safety glasses; use face shield if splashing is possible. Skin Protection Oil resistant gloves should be used to avoid repeated contact. **Respiratory Protection** Not normally needed. A NIOSH or MSHA approved respirator should be used in areas with high vapor concentrations or oil misting.

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Section 9 – Physical And Chemical Properties			
	-		1
Appearance/Physical State	Amber liquid	Flash Point	>300 °F
Specific Gravity (Water=1)	See Data Sheet	Upper/Lower Flammability Limits (Vol. %)	Not Determined
рН	Not Applicable	Auto-ignition Temperature	Not Determined
Solubility in Water	Negligible	Decomposition Temperature	Not Determined
Odor	Petroleum	Vapor Pressure	Not Determined
Odor Threshold	Not Determined	Vapor Density (Air- =1)	>1
Melting/Freezing Point	Not Determined	Partition Coefficient (n-octanol/water)	Not Determined
Boiling Range	Not Determined	Viscosity	See Data Sheet
Initial Boiling Point	Not Determined	Critical Temperature	Not Determined
Note: Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications.			

Section 10 – Stability And Reactivity

Reactivity Chemical Stability Stability/Incompatibility Conditions to Avoid Hazardous Reactions/De	Does not react under normal conditions of use. Stable under normal conditions of use. Avoid contact with strong oxidizers. Open flame or sources of ignition. composition Products Does not decompose under normal conditions; combustion may produce CO, CO2, volatile hydrocarbons and other possibly toxic gases.
Section Likely Routes of	on 11 – Toxicological Information

Likely Routes of Exposure	Inhalation, skin, eyes
Acute Effects	Product not tested. Based on components the effects of skin contact, inhalation and ingestion are expected to be mild. Some temporary eye irritation may occur. Refer to
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	Sections 2 and 4 for recommended actions.
Chronic Effects	Any acute symptoms may be aggravated. Refer to Sections
	2 and 4 for recommended actions.
Symptoms	Prolonged or repeated exposure may cause redness,
	drying, or cracking of the skin, eye irritation, gastrointestinal
	and respiratory discomfort. Refer to Sections 2 and 4 for
	recommended actions.
Carcinogenicity	No components of this product are found to be carcinogens by NTP, IARC or OSHA.

Section 12 – Ecological Information

Ecotoxicity Persistence and Biodegradability Bioaccumulative Potential Mobility in Soil Not Determined Not Determined Not Determined Not Determined

Section 13 – Disposal Consideration

Dispose of this product in compliance with all applicable federal, state and local regulations.

Section 14 – Transportation Information

DOT UN Proper Shipping Name/Number Not Regulated Not Regulated

Section 15 – Regulatory Information

Chemical Inventory Lists

SARA (311/312) Reportable Hazard Categories SARA 313 Ingredients All ingredients are listed on TSCA and DSL None None

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Section 16 – Other Information

Prepared by:..... GREENLEE TOOLS, INC.

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Issue Date: November 6, 2020

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	FATIGUE TECHNOLOGY 401 Andover Park East Seattle, Washington 98188-7605 USA
E.C. AND UK	CA 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	he machinery described:
Type: ELB-xx-10K, when	e "xx" denotes stack-up capability.
Conforms to the following Dire	ective(s), Regulation(s), and/or Normative Document(s):
2006/42/EC	EU Machinery Directive
UK S.I. 2008/1597	The Supply of Machinery (Safety) Regulations 2008
ISO 62841-1	Electric Motor Operated Hand-Held Tools
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	Responsible Person in UK.: Fatigue Technology Huxley, Keith PO Box 253 Deeside, CH5 9FQ UK
Telephone: 33 (0)6-76-61-83-90	0 Telephone: 44 7399 618699
Signature:	Signature: A Aple
Date:	CE UK