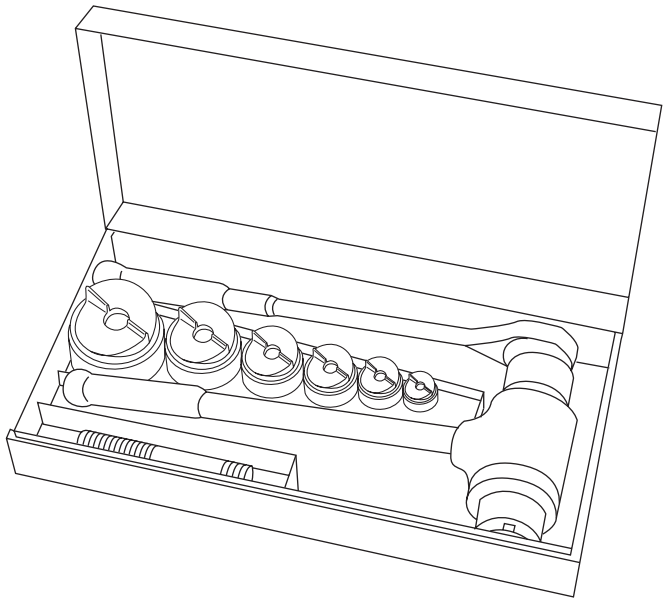
INSTRUCTION MANUAL

GREENLEE®
A Textron Company



1904, 1904Pg, 1904PgSB, and 1906SB High Capacity Ratchet Knockout Drivers

Read and **understand** all of the instructions and safety information in this manual before operating or servicing this tool.

999 9140.3

IM 1037 REV 7 12/04

Table of Contents

Description

Greenlee 1904, 1904Pg, 1904PgSB, and 1906SB High Capacity Ratchet Knockout Driver sets are intended to punch holes with Greenlee punches and dies. The recirculating ball screw mechanism reduces by half the amount of force necessary when compared to conventional ratchet drivers.

These ratchet drivers can be used with Greenlee standard or Slug-Buster® punches and dies to punch round holes, from 1/2" actual size (12.7 mm) through 3" conduit size (89.8 mm), in plastic, fiberglass, aluminum, and mild steel. Greenlee Slug-Splitter® punches and dies, available from 0.598" actual size (15.2 mm) though 2" conduit size (61.5 mm), are capable of punching through all of these materials and stainless steel.

The maximum thickness of material that the punch can penetrate depends on the size and type of the punch. Refer to the Capacity Rating chart for individual punch capacities.

Safety

Safety is essential in the use and maintenance of Greenlee tools and equipment. This manual and any markings on the tool provide information for avoiding hazards and unsafe practices related to the use of this tool. Observe all of the safety information provided.

Purpose of this Manual

This manual is intended to familiarize all personnel with the safe operation and maintenance procedures for the following Greenlee tools:

1904, 1904Pg, 1904PgSB, and 1906SB
High Capacity Ratchet Knockout Drivers

Keep this manual available to all personnel.

Replacement manuals are available upon request at no charge.

KEEP THIS MANUAL

IMPORTANT SAFETY INFORMATION

SAFETY ALERT SYMBOL

This symbol is used to call your attention to hazards or unsafe practices which could result in an injury or property damage. The signal word, defined below, indicates the severity of the hazard. The message after the signal word provides information for preventing or avoiding the hazard.

⚠DANGER

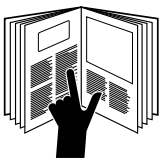
Immediate hazards which, if not avoided, WILL result in severe injury or death.

⚠WARNING

Hazards which, if not avoided, COULD result in severe injury or death.

⚠CAUTION

Hazards or unsafe practices which, if not avoided, MAY result in injury or property damage.



⚠WARNING

Read and understand all of the instructions and safety information in this manual before operating or servicing this tool.

Failure to observe this warning could result in severe injury or death.

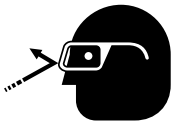
⚠WARNING

Electric shock hazard:

Do not use this tool near live circuits. This includes, but is not limited to, the following:

- Near circuit breaker panels or fuse boxes with energized circuits
- Near junction boxes with energized circuits

Failure to observe this warning could result in severe injury or death.



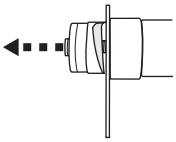
⚠WARNING

Wear eye protection.

Failure to wear eye protection could result in serious eye injury from flying debris.

⚠WARNING

Inspect the tool, punch, die, and draw stud before each use for wear or damage. Replace the punch if the cutting surfaces are not sharp. A damaged or improperly assembled tool could break and strike nearby personnel.

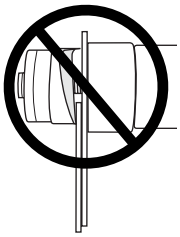


⚠WARNING

A component failure could throw broken parts.

- Do not allow anyone to stand in front of the punch unit.
- Close access doors or covers on any equipment that is in line with the punch unit.

Failure to observe this warning could result in severe injury or death.



⚠WARNING

Do not attempt to punch a hole through two or more layers of material. This will bend or break the draw stud, and could throw parts with great force.

Failure to observe this warning could result in severe injury or death.

IMPORTANT SAFETY INFORMATION

⚠WARNING

Set up the tool properly. An improper setup could cause a component to fail and strike nearby personnel with great force.

- Thread the punch completely onto the draw stud. All of the punch threads must be engaged by the draw stud threads. Incomplete assembly could cause a component failure.
- Use only Greenlee punches, dies and draw studs. Other manufacturers' components might not withstand the forces generated by this punch driver.

Failure to observe these warnings could result in severe injury or death.

⚠WARNING

Do not exceed the rated capacity of this tool. Exceeding the rated capacity could cause a component failure, which could throw broken parts with great force.

Failure to observe this warning could result in severe injury or death.

⚠CAUTION

- Do not add extensions (cheaters) to the handles. When punching at maximum capacity, this tool requires approximately 80 pounds of handle force. Using excessive force can damage the punch driver.
- Do not drive the ratchet after spindle motion stops. Driving the ratchet after the spindle motion stops can damage the punch driver.

⚠CAUTION

Use this tool for the manufacturer's intended purpose only. Any other use may result in injury or property damage.

Note: Keep all decals clean and legible, and replace when necessary.

Capacity Rating / Draw Stud Selection

CAPACITY RATING

1904 with Slug-Splitter, Slug-Buster, or standard Greenlee punches and dies

MILD STEEL								
MATERIAL THICKNESS	CONDUIT SIZE							
	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3
10 GAUGE	■	■	■	■	■	■	▒	▒
12 GAUGE	■	■	■	■	■	■	▒	▒
14 GAUGE	■	■	■	■	■	■	■	■
16 GAUGE	■	■	■	■	■	■	■	■

1904 with Slug-Splitter punches only

STAINLESS STEEL					
CONDUIT SIZE					
1/2	3/4	1	1-1/4	1-1/2	2
▒	▒	▒	▒	▒	▒
▒	▒	▒	▒	▒	▒
■	■	■	■	■	■

DRAW STUD SELECTION

Standard and Slug-Buster Greenlee punches

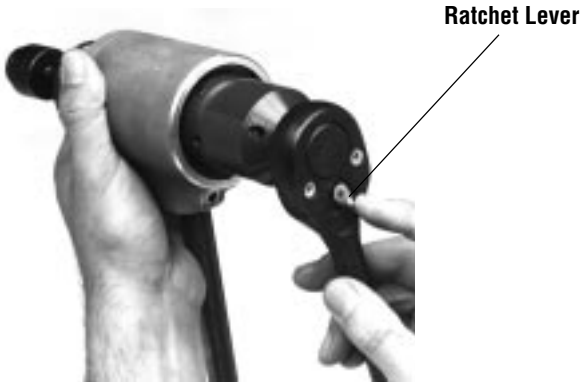
DRAW STUD NO.	CONDUIT SIZE							
	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3
12097	■							
30227								
12099		■	■	■	■	■	■	■

Slug-Splitter punches

CONDUIT SIZE					
1/2	3/4	1	1-1/4	1-1/2	2
■					
	■	■	■	■	■

Setup and Operation

Set the ratchet driver to the starting position, as follows.

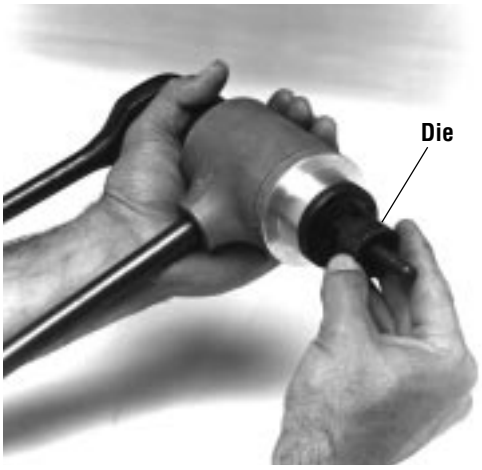


1. Move the ratchet direction lever to the right.

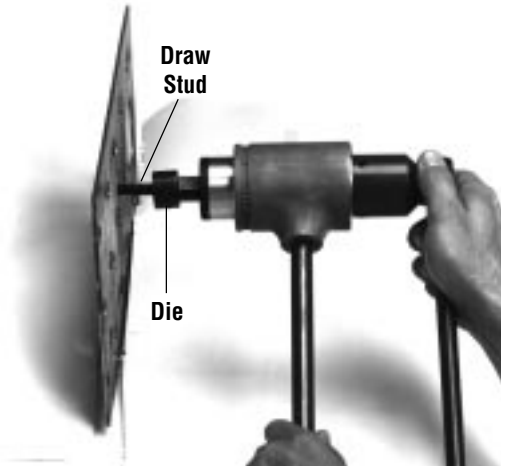
2. Rotate the ratchet as shown. When the spindle is fully extended, the view hole will be completely filled with the yellow band.

3. Select the appropriate punch and die. Use the Draw Stud Selection Table to determine the corresponding draw stud. Install the draw stud as shown.
   Note: All draw studs for the 1904 have left-hand threads.

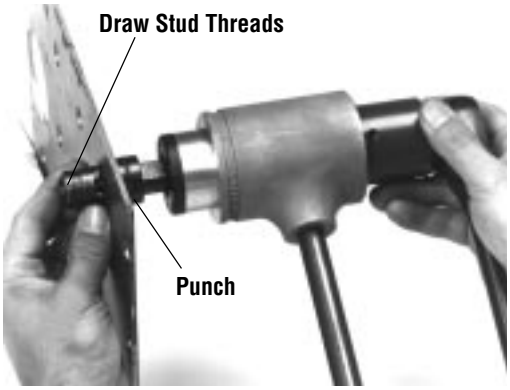
4. Snug up the draw stud with a wrench.



5. Install the die onto the stud so that the opening of the die faces outward.



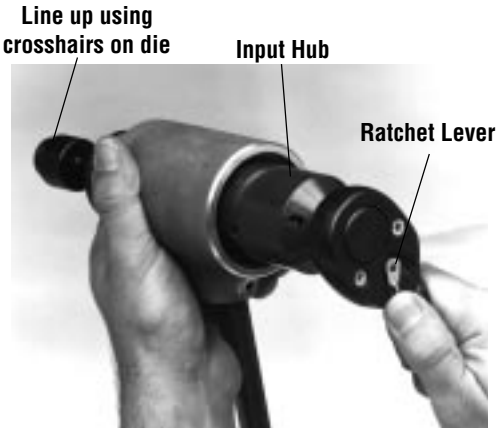
6. Insert the draw stud through the pilot hole.



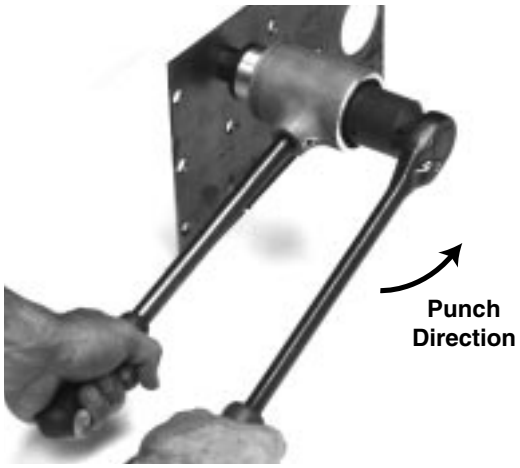
7. Thread the punch onto the stud so that the cutting surfaces of the punch are toward the material.

   Note: This end of the stud and the punch have right-hand threads.

   Note: Do not unthread the stud.



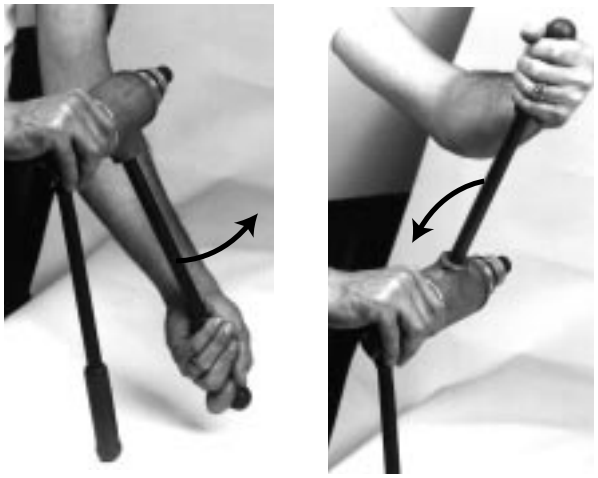
8. Push the ratchet direction lever to the left.



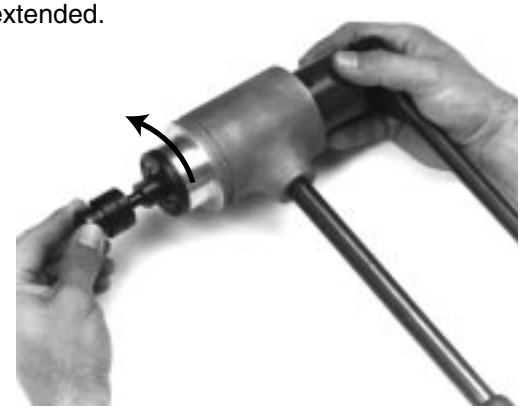
9. Turn the ratcheting handle counterclockwise. Continue to ratchet until the punch is completely through the material.

   Do not drive the ratchet after spindle motion stops. Driving the ratchet after the spindle motion stops can damage the punch driver. If the spindle is at the end of its stroke and the punch is not completely through, unthread the punch and check the setup. The spindle must be in the starting position and the stud must be threaded completely into the spindle.

10. Remove the driver assembly from the punched hole.



11. For rapid return, hold the assembly as shown. Rotate the handle as shown until the spindle is fully extended.



12. Remove the punch, die, and draw stud.

Standard Accessories

Part Number	Nominal Size	Metric Size	Type	1904	1906SB	1904Pg	1904PgSB
Draw studs							
501 2097.2	3/8" x 2-15/16"			1	1		
503 0227.2	7/16" x 3-5/8"			1			
501 2099.9	3/4" x 4-3/4"			1	1		
Punches							
502 1316.4	Pg-9	15.2 mm	standard			1	
503 1969.8	Pg-9	15.2 mm	Slug-Buster				1
501 7700.1	Pg-11	18.6 mm	standard			1	
503 1970.1	Pg-11	18.6 mm	Slug-Buster				1
501 7697.8	Pg-13	20.4 mm	standard			1	
503 1971.0	Pg-13	20.4 mm	Slug-Buster				1
500 4006.5	1/2" conduit	22.5 mm	standard			1	
503 1756.3	1/2" conduit	22.5 mm	Slug-Buster		1		1
503 1973.6	Pg-21	28.3 mm	Slug-Buster				1
503 6882.6	Pg-21	28.3 mm	standard			1	
503 1757.1	3/4" conduit	28.3 mm	Slug-Buster		1		
503 6282.8	1-7/32"	30.5 mm	standard			1	
503 6284.4	1-7/32"	30.5 mm	Slug-Buster				1
503 1758.0	1" conduit		Slug-Buster		1		
501 8331.1	Pg-29	37.0 mm	standard			1	
503 1975.2	Pg-29	37.0 mm	Slug-Buster				1
503 1759.8	1-1/4" conduit	43.2 mm	Slug-Buster		1		
501 7687.0	Pg-36	47.0 mm	standard			1	
503 1976.0	Pg-36	47.0 mm	Slug-Buster				1
503 1760.1	1-1/2" conduit	49.6 mm	Slug-Buster		1		
501 7690.0	Pg-48	60.0 mm	standard			1	
503 1978.7	Pg-48	60.0 mm	Slug-Buster				1
503 1761.0	2" conduit	61.5 mm	Slug-Buster		1		
Dies							
503 2002.5	Pg-9	15.2 mm				1	1
503 2003.3	Pg-11	18.6 mm				1	1
503 2004.1	Pg-13	20.4 mm				1	1
501 4722.6	1/2" conduit	22.5 mm			1	1	1
503 2006.8	Pg-21	28.3 mm				1	1
500 6972.1	3/4" conduit	28.3 mm			1		
503 6279.8	1-7/32"	30.5 mm				1	1
500 4011.1	1" conduit	34.6 mm			1		
503 2008.4	Pg-29	37.0 mm				1	1
500 4013.8	1-1/4" conduit	43.2 mm			1		
503 2009.2	Pg-36	47.0 mm				1	1
500 4061.8	1-1/2" conduit	49.6 mm			1		
503 2011.4	Pg-48	60.0 mm				1	1
500 4063.4	2" conduit	61.5 mm			1		

Maintenance

Disassembly (photos 1-3)

1. Mount unit to be repaired in sturdy vise as shown. Remove ratchet wrench (1) from hub by depressing locking detent with an appropriate tool.

2. To remove retaining ring (3), use small screwdriver to remove tab end of ring from groove and “spiral” ring out of groove as shown in photo.

3. After retaining ring is removed, lift spindle hub unit (5) out of sleeve casting (20).

Disassembly of Spindle Hub Unit (photos 4-10)

4. Mount unit securely in vise as shown. Care must be taken to not damage ball return tube of the ball nut when gripping with vise. Then remove 3 set screws (6) from unit and discard screws (new screws must be used during reassembly).

5. Remove hub (7) with ratchet (1) or any suitable 1/2" drive ratchet or breaker bar. The hub was tightened to a torque of 90 ft-lb to 100 ft-lb at the factory. Therefore, a considerable amount of force will be necessary to loosen.

6. Unscrew hub and remove from ball nut.

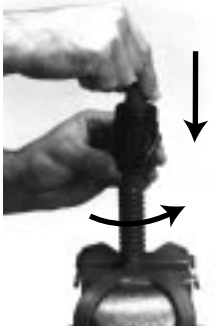
7. To complete disassembly, remove above unit from vise and regrip on “flats” of spindle (13). Use “soft” jaws to prevent damage from hard vise jaws. Loosen flat head screw (8) with Allen wrench and remove top washer (9).

8, 9, 10. A suitable arbor is needed to perform this operation. Arbor must have a diameter of approximately 0.840/0.800 inches. Hold arbor flush to end of spindle. With other hand, screw ball nut toward and onto arbor as shown. Once ball nut is completely on arbor, ball nut and arbor can be moved away from spindle (arbor retains ball bearings in ball nut.)

IMPORTANT: If arbor is not the proper size, or is removed from ball nut while apart, balls will fall free from the race. Should this happen, refer to Assembly of Ball Nut at the end of the Maintenance section.

Maintenance (cont'd)

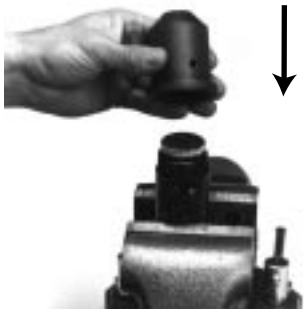
Assembly of Spindle Hub Unit (photos 11-17)



11, 12. Place ball nut with arbor to end of spindle as shown.

13. Carefully rotate ball nut down the arbor and onto the spindle.
Note: Spindle has left-hand lead.

14. Replace top washer (9) and replace flat head cap screw (8). With a torque wrench and Allen socket, torque screw to 35 ft-lb to 45 ft-lb.



15. Reassemble hub (7) to ball nut. (Note how unit is held in vise.)

16. Torque hub to ball nut to 90 ft-lb to 100 ft-lb. (Use 1/2" drive torque wrench of appropriate torque capacity.)

17. Replace three set screws (6) and torque to 70 ft-lb to 80 ft-lb. (Use Allen socket and torque wrench of appropriate capacity.)
Note: All tightening torques must be met to ensure satisfactory operation.

Assembly of Ball Nut Unit into Sleeve (photos 18, 19)

18, 19. Refer to these photos and reassemble in the reverse order. Inspect and reinstall thrust bearings. Install spindle hub unit, wave washer (4), and retaining ring (3). Be sure to seat the retaining ring completely in the groove.

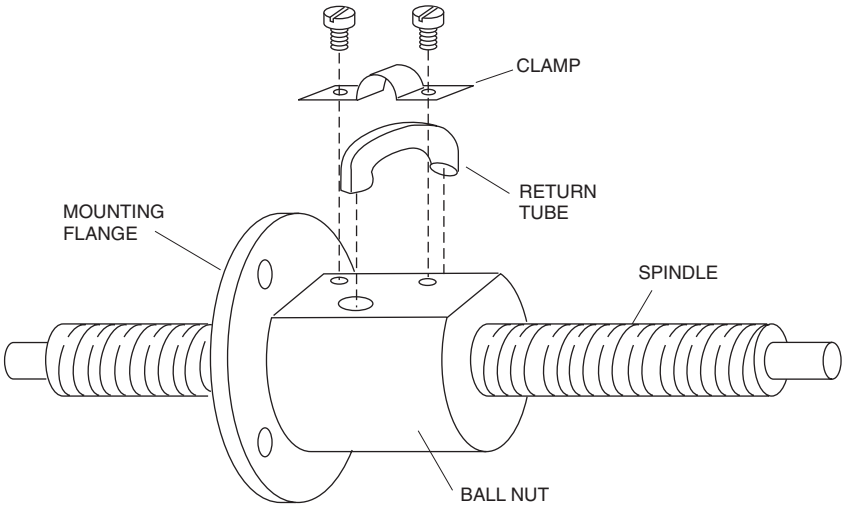
Thrust Bearings

If thrust bearing set (14, 15 & 16) show any significant damage, replace as a complete set. Lubricate with Molycote-G.

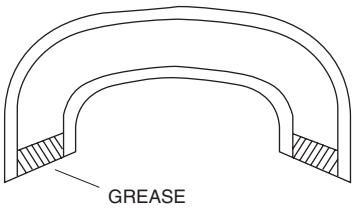
Balls

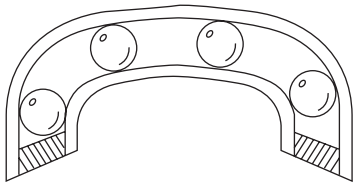
If any balls need replacement, a complete set should be ordered to ensure proper consistency of size.

Assembly of Ball Nut Unit

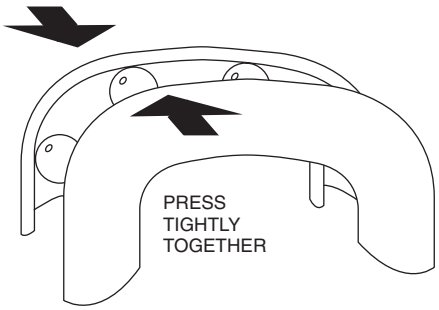


1. Remove the return tube clamp and the return tube from the ball nut.
2. Place the nut approximately midway on the spindle (13) and align the ball grooves in the nut with those on the screw.
3. Place a short length of rod or dowel into one return tube hole to prevent loss of balls.
4. Place balls successively into the other return tube hole, rotating the screw so that the balls are fed along the thread and through the nut, until the ball circuit is completely full.
5. Remove dowel or rod, being careful to not rotate the nut. The balls must not be in the return tube holes—balls must only be in the mesh between the ball nut and screw.
6. On both ends of the return tube, place a small amount of light grease.



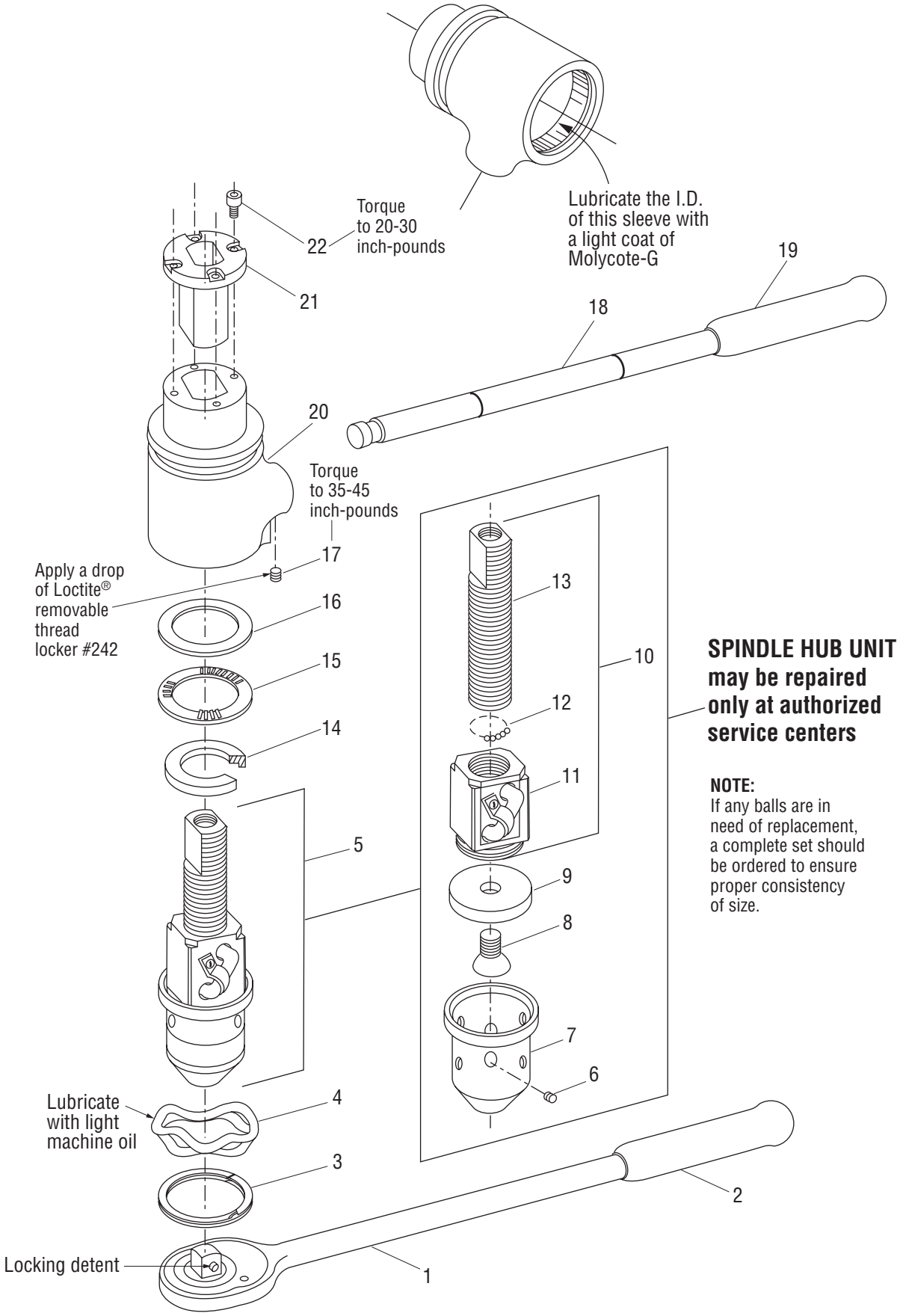


7. Load this half tube half full of balls.
8. Place the second half of the return tube over the balls and hold the two halves tightly together.



9. Place the return tube ends into the return tube holes in the nut (the grease in the tube will prevent the balls from dropping out).
10. Place the tube clamp over the tube (taking care to keep the two halves together) and secure with the clamp screws.

Exploded View



Parts List

Key	Catalog No.	Description	Qty.
1	502 0495.5	Wrench, ratchet	1
2	502 4575.9	Grip	1
3	905 3497.2	Ring, retaining, 2.25 spiral internal	1
4	905 3248.1	Washer, wave, 1.90 x 2.15 x .480 spring	1
5	503 3554.5	Hub unit, spindle	1
6	905 5361.6	Screw, set, 1/4 - 28 x .125 socket	3
7	503 0223.0	Hub, input	1
8	905 3247.3	Screw, machine, 7/16 - 14 x .750 flat head	1
9	503 0224.8	Washer, flat, .468 x 1.37 x .250	1
10	503 3548.0	Ball/Nut unit, square	1
11	503 0221.3	Ball/Nut, square	1
12	503 0400.3	Ball, .156 diameter	84 (± 4)
13	503 3547.2	Spindle, .970 x 4.60	1
14	503 0249.3	Washer, thrust, 1.12 x 2.09 x .250 (stepped)	1
15	905 3251.1	Bearing, thrust, 1.50 x 2.17 x .078	1
16	905 3250.3	Washer, thrust, 1.508 x 2.16 x .125	1
17	905 3600.2	Screw, set, 1/4 - 20 x .437 flat point socket	1
18	503 0225.6	Handle unit	1
19	502 3258.4	Grip	1
20	503 3553.7	Sleeve, ratchet driver	1
21	503 3549.9	Insert, alignment	1
22	905 1762.8	Screw, cap, #6 - 32 x .375 socket head	4
	503 2483.7	Decal - Caution (not shown)	1
	503 2600.7	Decal - Max. Capacity (not shown)	1

USA	800-435-0786	Fax:	800-451-2632
	815-397-7070	Fax:	815-397-1865
Canada	800-435-0786	Fax:	800-524-2853
International	+1-815-397-7070	Fax:	+1-815-397-9247

4455 Boeing Drive • Rockford, IL 61109-2988 • USA • 815-397-7070

An ISO 9001 Company • Greenlee Textron Inc. is a subsidiary of Textron Inc.

www.greenlee.com Printed in USA