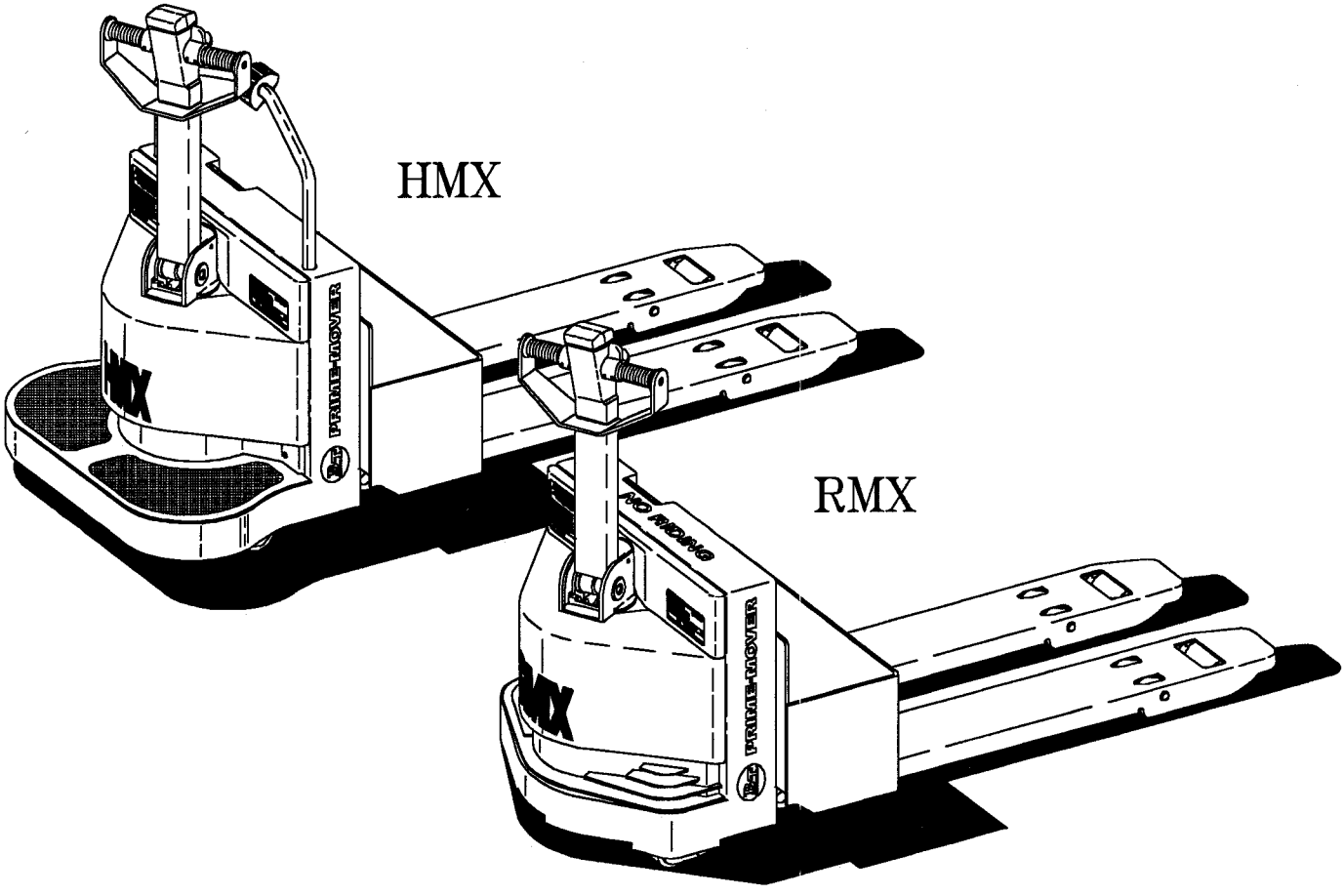
REPAIR MANUAL

Manual Part Number 302065-000
RMX/HMX ELECTRIC LOW LIFT PALLET TRUCK

Effective Serial Number 241341



BT PRIME-MOVER

ISSUED JANUARY 1995

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INTRODUCTION

Threaded fasteners like bolts, nuts, capscrews and studs are made to specifications that describe the mechanical strength and hardness of the fastener. A fastener used in a design application is selected according to its specifications. The Prime-Mover Company buys parts from many countries. There are several standards used by these countries in the manufacture of threaded fasteners. Many of these fasteners are similar, but cannot be used as direct replacement.

Service persons must use replacement fasteners that have the same specifications. Fasteners made to each specification have identification marks for that specification. This specification is commonly called "Grade" for SAE standards and "property" for metric standards. This section describes the identification of some common fasteners.

The metric system used by BT Prime-Mover is described as SI (International System of Units, also called SI in all languages). The SI system of measurement is described in ISO Standard 1000, 1973.

NOMENCLATURE, THREADS

The thread design is specified by a series of numbers and letters for inch and metric fasteners. (See Figure 1). The diameter of the shank of the fastener is shown first in the series [M12=12mm, M20=20mm (1/2=1/2 inch, 3/4=3/4 inch)].

The number of threads per inch is normally not shown for inch nomenclature and only the UNC (Unified National Coarse) or UNF (Unified National Fine) is shown. This number of threads per inch is not shown because a UNC or UNF fastener has a standard number of threads per inch for a specific diameter.

The length of a shank is often indicated as part of the description of a fastener. This length is shown in inches for inch fasteners and in millimeters for metric fasteners.
A capscrew will have the following description:

INCH	METRIC
1/2 x 13 UNC x 1-1/2 A B C D	M12 x 1.75 x 50 A B C
A = SHANK DIAMETER B = NUMBER OF THREADS PER UNIT OF LENGTH C = TYPE OF THREAD D = SHANK LENGTH	A = THREAD SIZE B = PITCH C = LENGTH

0.4 Maintenance and Adjustments

0.4.1 Maintenance

Planned Maintenance is a critical part of safe pallet truck operation. By following a regular schedule of planned maintenance procedures the correct and safe functioning of the pallet truck can be better assured. A good planned maintenance program will alert you to the need for adjustments and minor repairs and will greatly reduce the potential for unexpected failures.

An effective planned maintenance program will include a daily inspection to be made by the operator prior to each operating shift. This should include a visual inspection for damage, leaks, and fluid levels as well as testing for the correct operation of safety devices.

In addition to the operator's daily inspection a regular scheduled planned maintenance service should be performed by a qualified BT Prime-Mover technician. This service should include a thorough visual inspection, lubrication of service points, operational checks and minor adjustments.

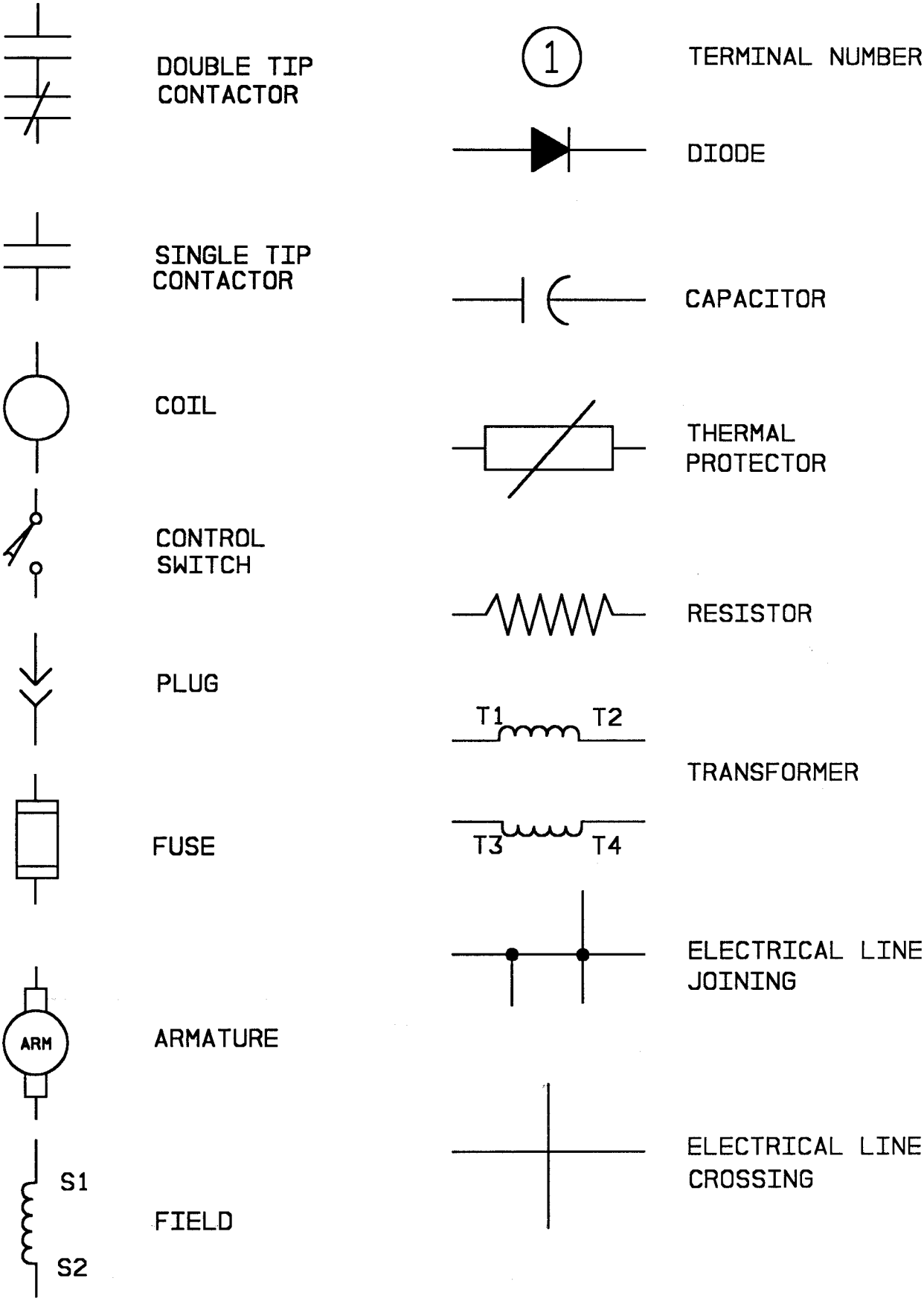
The basic planned maintenance visit should be made every 200 operating hours or once every three months. Heavy truck usage is estimated at 200 hours per month, more detailed service should be performed once a year. A comprehensive schedule of planned maintenance operations and detailed planned maintenance procedures are in the sections that follow.

1	Control handle head assy. (See Fig.# 1.2)
2	Plug, RMX
2	Control, coast HMX
3	Baffle
4	Screw, socket head
5	E clip
6	Pin, coast control
7	Pin, handle pivot
8	Screw, flat head socket
9	Washer, finishing
10	Cap, tapered
11	Screw, socket head
12	Pin, groove
13	Pivot, handle
14	Cap, straight
15	Pin, brake pivot
16	Screw, set
17	Seal, small
18	Bearing, small
19	Frame, carrier (See Fig.# 4.1)
20	Seal, large
21	Bearing
22	Transmission assembly (See Fig.# 1.3)
23	Guide, wire
24	Spring
25	Bearing
26	Stem, handle
27	Screw, flat head socket
28	Washer, finishing

1	Key
2	Drum, brake
3	Nut
4	Yoke assembly
5	Screw, socket head
6	Anchor, spring
7	Screw, cap
8	Bearing, handle
9	Bushing
10	Screw, socket head (Torque 14 ft./lbs.)
11	Case, gear
12	Pin, dowel
13	Gear, HMX pinion
13	Gear, RMX pinion
14	Nut, flanged (Torque 50 ft./lbs.)
15	Cover, gear case
16	Plug, pipe
17	Washer, sealing
18	Gear, HMX idler
18	Gear, RMX idler
19	Bearing, ball
20	Gear, drive
21	Bearing
22	Ring
23	Seal
24	Wheel, Flat rubber drive
24	Wheel, Urethane drive
24	Wheel, Non-marking XLC drive
24	Wheel, Traction-lug drive
24	Wheel, Grip rubber shell drive
24	Wheel, Siped rubber
25	Tire, Flat rubber
25	Tire, Urethane
25	Tire, Non-marking XLC drive
25	Tire, Traction-lug drive
25	Tire, Grip rubber shell drive
25	Tire, Siped rubber
26	Wheel, drive
27	Nut, flanged (Torque 250 ft./lbs.)
28	Motor, drive (See Fig.# 2.18-2.19)
29	Brake assembly
30	Cam
31	Plate
32	Lever
33	Clip
34	Spring
35	Shoe
36	Retainer
37	Linkage, brake
38	Rod, push
39	Spring

1	Panel assembly (See Fig.# 2.4)
2	Screw, socket flat head
3	Nut
4	Screw, lock
5	Pump/motor assembly, lift (See Fig.# 3.4)
6	Harness
7	Switch, emergency disconnect
8	Switch, key
9	Lockwasher
10	Motor, drive (See Fig.# 2.14)
11	Connector assembly
*	Connector, RED housing
*	Connector, tip
*	Bushing
*	Cable, 25.75" NEGATIVE
*	Cable, 51.00" POSITIVE
12	Screw, locking
13	Nut
14	Switch, interlock
15	Screw, round head
16	Nut, twin
17	Cable assembly
18	Cable assembly
19	Nut, clip
20	Clamp
21	Sleeve (3 foot)
22	Cable assembly
23	Cable assembly
24	Breacker, circuit
25	Cable assembly
26	Plug, hole
27	Cable assembly
28	Screw, form fit
29	Screw, flat head
30	Clamp
31	Extension, terminal

HMX 24 VOLT ELECTRICAL SCHEMATIC SYMBOLS



HMX65/80 ONLY

When the reverse switch is closed to make the truck travel in the fork direction positive battery voltage is made available via wire #3 to the reverse contactor coil. Wire #3 also supplies battery positive voltage to the PMC controller to signal it that a direction has been selected.

Battery negative for this coil is supplied via wire #21 through the PMC controller only after the controller has satisfied its safety circuits. When the controller has satisfied its safety circuits. The reverse contactor coil is energized and the reverse contactor will close. At this time the Curtis PMC controller will start "pulsing" power to the drive motor at a rate based on the accelerator potentiometer position. The PMC power circuit and the accelerator potentiometer circuit are described later.

- **Forward travel (control handle direction) switch is closed.**

RMX50 ONLY

When the forward switch is closed to make the truck travel in the control handle direction, positive battery voltage is made available via wire #2, a set of normally closed contacts on relay #2, and wire #32 to the coil of relay #3. The other side of the coil is connected directly to battery negative so relay #3 actuates and closes the contacts between terminals #5 and #3. Wire #14 connected to terminal #3 then supplies battery positive voltage to the forward contactor coil. Wire #13, battery negative, is connected to the other side of the forward contactor coil. Therefore, the forward contactor coil is energized and the forward contactor will close.

At this time the Curtis PMC controller will start "pulsing" power to the drive motor at a rate based on the accelerator potentiometer position. The PMC power circuit and the accelerator potentiometer circuit are described later.

Example: Equipment and battery are sized for the type of work they are used for. On occasion, equipment designated for heavy work might be used for light tasks. Lighter work means low-current drain which, in turn, means the recommended 80% depth of discharge lockout point will be at a higher voltage level. In these cases, to properly align the low-current work profile and the required higher lift lockout point, the DISCHARGE pot can be adjusted to the "O" (1.78 VPC) or the "P" (1.82 VPC) settings.

It is important to note that adjustments of the DISCHARGE pot can be made at any time during a work cycle prior to lift lockout. however, DISCHARGE pot adjustments made late in a work cycle have little or no effect in delaying lift lockout in that particular work cycle. Once lift lockout does occur, the gauge must be reset before DISCHARGE pot adjustments can have an effect.

TABLE OF POT SETTINGS AND ASSOCIATED VOLTAGES PER CELL

DISCHARGE		RESET	
P	1.82 VPC*	E	2.18 VPC
O	1.78	D	2.15
N factory set	1.73	C	2.12
M	1.68	B factory set	2.09
L	1.63	A	2.06
K	1.57	BEYOND A	2.00
BEYOND K	1.56		

*The DISCHARGE voltage of the unit is not an instantaneous voltage, nor a measure of the open circuit voltage at the time of lift lockout.

NOTE: FOR RMX65/80 FOLLOW STEPS E AND F. FOR RMX50 FOLLOW STEPS G THROUGH L. FOR HMX65/80 FOLLOW STEPS M THROUGH 0.

E. Positive side of forward contactor coil, wire #32.

Repair open wire #32 between relay #2 and forward contactor coil.

F. Negative side of forward contactor coil, wire #13.

Special Instructions:

If battery voltage is found here then repair open wire #13 to battery negative.

If no battery voltage is found here then replace forward contactor coil.

See also troubleshooting chart 2.5.8.

G. FOR RMX50 ONLY - Wire #32 on terminal #7 on relay #3.

Repair open wire #32 between relay #2 and relay #3.

H. Wire #13 on terminal #8 on relay #3.

SPECIAL INSTRUCTIONS:

If no voltage is measured here check for operation of relay #3 when forward direction is chosen. If relay #3 does not operate replace relay #3.

If voltage is measured here repair open wire #13 between relay #3 and battery negative.

I. Wire #7 on terminal #5 on relay #3.

Repair open wire #7 between brake interlock switch and relay #3.

J. Wire #14 on terminal #3 on relay #3.

Replace relay #3.

K. Positive side of forward contactor coil, wire #14.

Repair open wire #14 between relay #3 and forward contactor coil.

(b) For trucks WITH Lift Interrupt System.

Test for battery voltage at terminal 6 on back of BDI gauge, wire #43.

If battery voltage is NOT measured here then repair open wire #43 between lift contactor coil and BDI gauge.

If battery voltage IS measured here then continue to test (c).

(c). Test for battery voltage at negative terminal on back of BDI gauge, wire #13.

If battery voltage IS measured here repair open wire #13 between BDI gauge and battery negative. Also verify that battery voltage is sufficient for Lift Interrupt System to allow lift function to operate.

If battery voltage is NOT measured here replace BDI gauge which contains the Lift Interrupt System.

(d) ALL testing to resume with test G.

G. Positive side of 110 amp circuit breaker.

Repair open power cable between battery positive terminal and 110 amp circuit breaker.

H. Negative side of 110 amp circuit breaker.

Replace 110 amp circuit breaker.

I. Positive side of lift contactor tips.

Repair open power cable between 110 amp circuit breaker and lift contactor.

J. Negative side of lift contactor tips.

Replace lift contactor.

K. A1 terminal on lift motor.

Repair open power cable between lift contactor and lift motor.

Raw Copper Surface	Embedded copper Bad service condition Wrong brush grade	See "Copper in Brush Face" 43-45-47-49 59-61

INDICATIONS	IMMEDIATE CAUSE	PRIMARY FAULTS
Rapid Commutator Wear with Blackened Surface	Burning Severe Sparking	2-3-11-14 See "Sparking"
Rapid Commutator Wear with Bright Surface Copper Dragging	Foreign material in brush face Wrong brush grade Brush vibration	43-45-47-49 61 39-52-58-59

INDICATIONS APPEARING AS HEATING

INDICATIONS	IMMEDIATE CAUSES	PRIMARY FAULTS
Heating in Windings	Severe load condition Unbalanced magnetic field Unbalanced armature currents Poorly equalized parallel operation Lack of ventilation	38-41-42-53 18-19-20-21-27-28-29 8-19-22-25-27-28-29-37 7-13-23-34
Heating at Commutator	Severe load condition Severe sparking High friction Poor commutator surface Depreciation High contact resistance	38-41-42 7-8-9-12-20-33-45-57 10-11-36-43-45-49-58-59 See specific surface fault in evidence 6-24 56
Heating at Brushes	Severe load condition Faulty machine adjustment Severe sparking Raw streaks on commutator surface Embedded copper Wrong brush grade	38-41-42 7-10-11-12-26 See "Sparking" See "Streaking or Threading of Surface" See "Copper in Brush Face" 57-58-59-61-62

1	Hydraulic pump and motor assembly (See Fig.# 3.4)
2	Hose assembly
3	Adapter
4	O ring
5	O ring
6	Cylinder assembly
7	Body, cylinder
8	Ring, retainer
9	Rod, cylinder
10	Seal, rod
11	Wiper, rod Kit, seal (CONTAINS ITEMS MARKED WITH "K")
12	Screw, socket flat head
13	Hose assembly
14	Switch, pressure
15	Clamp
16	Screw, taplite
17	Washer, flat
18	Bolt, shoulder

5. Remove wiper seal and seal from inside diameter of barrel assembly.

6. It is not necessary to inspect wiper seal, seal or lock ring. These parts should be replaced as new items and are included in the seal repair kit available for this cylinder.

INSPECTION

1. Thoroughly clean all parts and remove all nicks and burrs with emery cloth.

2. Inspect inside surface of barrel assembly for excessive wear or scoring.

3. Inspect outside surface of rod for nicks, scratches or scoring.

ASSEMBLY

1. All parts should be cleaned and dried thoroughly. Metal parts should be lightly oiled prior to reassembly.

2. Install new seal in inside diameter of barrel. Install new wiper seal with lips facing inward to bottom of barrel.

3. Install new lock ring in deep groove of rod end.

4. Oil outside of piston rod and carefully insert rod in barrel assembly.

5. Push rod in barrel assembly until snap ring area of rod can be seen through port.

6. By using screwdriver through port, move snap ring to lock position.

7. Extend rod to full out position to make sure snap ring is locked in place.