CASCADE CORPORATION

TO: Pettibone

P. O. # 293770

S. O. # 184782

THIS SERVICE MANUAL IS TO BE DELIVERED TO THE PURCHASER OF THE CASCADE ATTACHMENT REFERENCED ABOVE AND NOT TO BE SHIPPED UNION ASSY

**FILING INFORMATION**
For Insertion in Manual

**Section No. 250.0 Item No. 3**

# User Manual

**Installation • Service • Parts**

# Cascade®

# VIEWMAST®
# Triple-Free Lift Masts

## MODELS M2T, M3T, M4T, M5T, M7T, M8T

**WARRANTY**

Cascade Corporation warrants all products manufactured by it for three (3) months after the date of shipment. In the case of products ordered for manufacturer's (dealer's) stock, the warranty is limited to one (1) year from date of shipment from Cascade for those products that remain in stock and are not installed on trucks, otherwise the 90-day period applies.

This warranty is limited to replacement at point of manufacture, or some other point designated by Cascade, of such parts as shall appear to Cascade upon inspection at, and f.o.b. such point, to have been defective in material or workmanship, but not including the cost of labor to replace such defective parts, and provided further that Cascade's use and/or installation instructions have been followed carefully and no parts other than those furnished by Cascade have been installed on Cascade's product. Except as shown in published catalogs or specifications, Cascade's products are not warranted to perform any particular task and Cascade assumes no responsibility for loss, damage or injury, either direct or consequential, resulting from or occasioned by possession or use of its products.



cascade®

Cascade Corporation
Portland, Oregon • Springfield, Ohio • Toronto, Canada • Amsterdam (Diemen), Holland • Paris, France • Milan, Italy • Dusseldorf, West Germany • Warwick, England Johannesburg, South Africa • Sydney, Australia



Form No. 2752E

# LUBRICATION AND PREVENTIVE MAINTENANCE INSTRUCTIONS

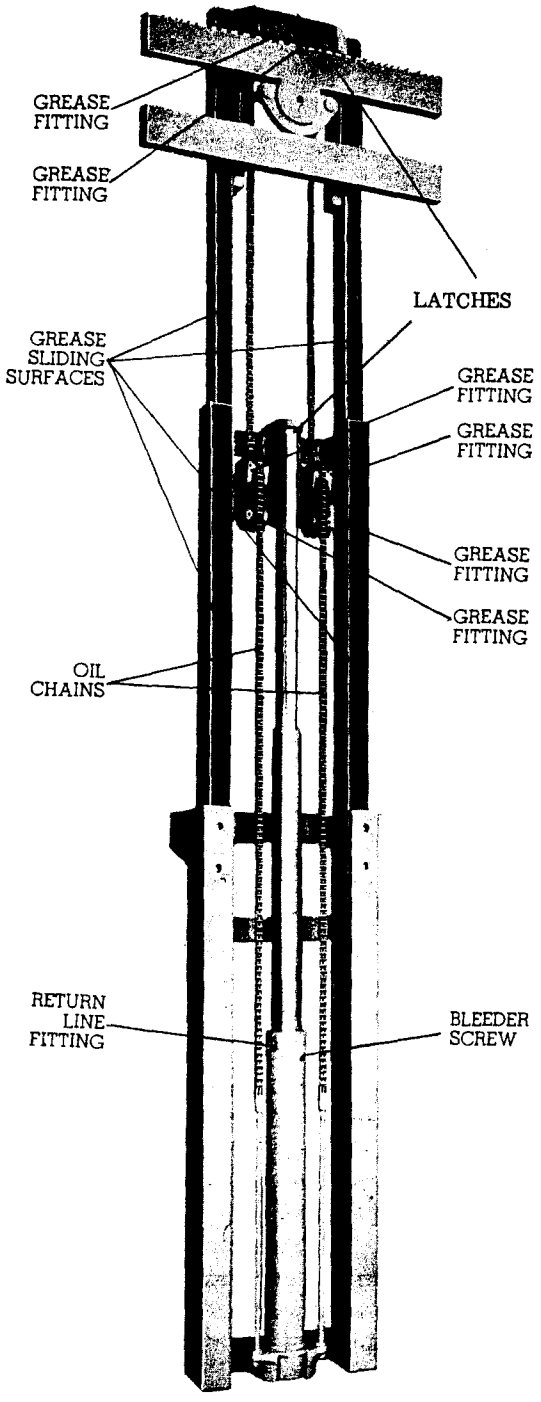



**FIG. 1**
**MAST LUBRICATION POINTS**

**LUBRICATION CHART** - All points that require lubrication are shown. Each poir shown should be lubricated at the frequency and with the type lubricant shown on this chart.

**EVERY 100 HOURS (OR FOUR WEEKS):**

1. Extend mast fully. Brush or spray sliding surfaces of mast with approved lubricant. If a spray lubricant is used, first clean sliding members, then spray all sliding surfaces including cross head wear shoes.
2. Brush chain with SAE 10 engine oil, wipe off excess oil.
3. Grease all chain sheaves (6 fittings).
4. Grease carriage (5 fittings).
5. Inspect all latches and latch actuating capscrews for wear and breakage.
6. The latch springs should also be inspected to ensure that the latches return to proper position after operating.
7. Oil mast latches.....pivot pins and mating surfaces.
8. Check carriage adjustment.
9. Check cross head adjustment.

**EVERY 500 HOURS (OR TEN WEEKS):**

1. Repeat 100-hour procedure on mast.
2. Remove chains from mast and wash thoroughly in kerosene. Wipe dry and soak in SAE 10 engine oil for 15 minutes. Wipe off excess oil and replace in mast.

**NOTE:** When mast is used in severe operations, or in highly corrosive or dusty atmospheres, maintenance should be more frequent. Above hour recommendation periods are truck meter hours.

**CAUTION:** The mast should not be raised and lowered at any time without all latches and latch points installed in their proper places.

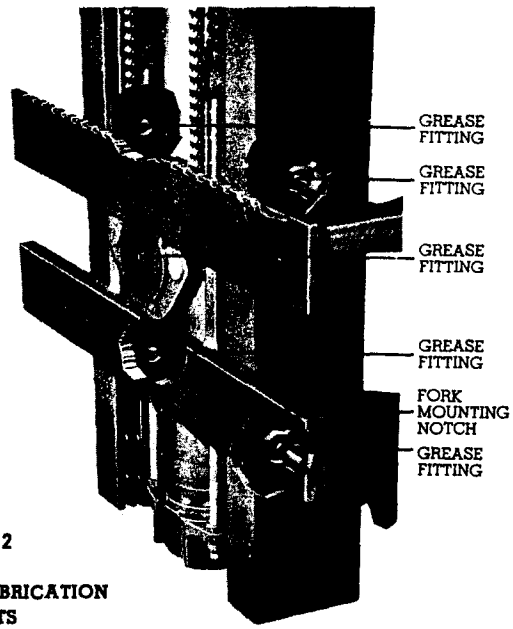



**FIG. 2**
**CARRIAGE LUBRICATION POINTS**

## SUGGESTED LUBRICANTS FOR MAST AND CARRIAGE

**CHAIN**–Any good grade SAE 10 engine oil (non-detergent type).
**CHANNEL SLIDING SURFACES**–Graphite grease or a spray-type lubricant of a type specifically for sliding channel masts.
**ALL GREASE FITTINGS**–Wheel bearing grease. In operations where mast is exposed to heat, use a high-temperature grease.
**LATCHES**–Any good grade SAE 30 Engine Oil (Non Detergent)
CONSULT CASCADE FOR RECOMMENDATIONS IN COLD STORAGE AND FREEZER OPERATIONS

# INSTALLATION INSTRUCTIONS

Each mast is assembled, cycled and adjusted by Cascade before it is shipped. If the mast is supplied complete with base mounting and tilt cylinder anchor brackets, it is ready for immediate installation on the lift truck. If, however, it is purchased without the mounting brackets, then these brackets must be welded to the mast.

The following instructions are intended to aid in the installation of this unit.

1. Weld base mounting and tilt cylinder brackets to the outer upright.

   **NOTE:** It is not necessary to disassemble the mast to weld the mounting brackets. All exposed components near the weld (chain, cylinder, etc.) should be covered to protect against weld splatter. Care should be exercised so that the brackets are properly located. Exact bracket location information will be supplied by the lift truck manufacturer. Use type E-7018 welding rod.

**WELDING BRACKETS TO OUTER CHANNEL**

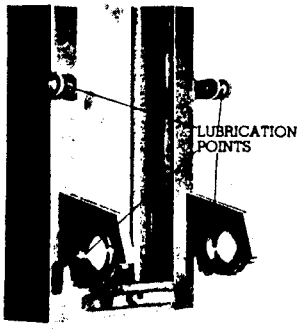



FIG. 3

2. A lowering speed control valve is provided at the base of the hoist cylinder. Remove the protective plug from the valve port and thread in the hydraulic fittings required to adapt the mast hydraulics to the truck hydraulic system. The valve port is designed for O-ring straight thread type fittings.

   **NOTE:** The adaption fitting will vary depending on the size and type of hose leading from the truck valve to the mast.

3. Mast may now be lifted into position for mounting on the lift truck.

4. After mast is lifted into position for mounting, connect the hydraulic hose leading from the truck valve to the mast lowering control valve.

5. Mast may now be mounted on the lift truck.

   **NOTE:** Lubricate all pivot points between truck and mast at points shown on Fig. 3.

6. Install the oil return line leading from the top side of the hoist cylinder to the truck sump tank. A compression type tube fitting is provided on the mast cylinder for this purpose. Position line so that it will not interfere with moving parts of the mast. For fitting location, see Fig. 1.

7. Check the hydraulic oil level in the truck tank to ensure an adequate supply to operate the mast cylinder.

8. Loosen bleeder capscrew located near the top of the cylinder outer shell (see Fig.1 ) and slowly operate lift truck control valve in the "Raise" position. Allow air to escape until a clear flow of oil is obtained. Tighten bleeder capscrew and check for leakage.

9. Operate mast in all positions, fully tilting to check for mounting interference and proper operation. (See Fig. 4)

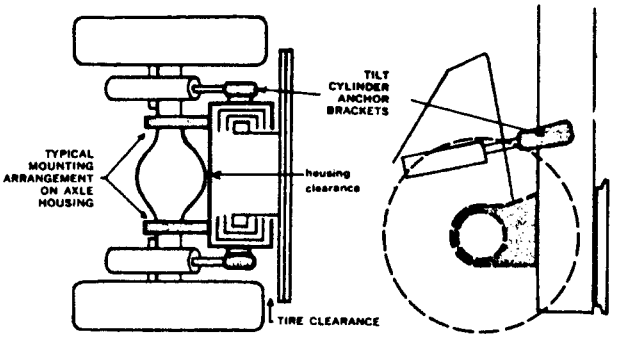



FIG. 4

10. The forks may be installed in one of two ways:

    A. Hang top hook of fork over top bar of the mast carriage directly above the cut-out in the lower bar provided for fork installation. By first releasing the spring-loaded locating pin, the fork may be slid into the desired position.

    B. Remove the two capscrews which retain the keeper at one end of the upper bar on the mast carriage. Fork can now be slid onto the mast carriage.

**NOTE:** The carriages provided for all Cascade uprights are built to Industrial Truck Association (ITA) hook type mounting standards. The forks used must be of the same hook type mounting as that of the mast carriage.

## MAINTENANCE INSTRUCTIONS

### Carriage

1. To remove the carriage from the mast, lift complete mast assembly a minimum of 18 inches above the floor.

   **NOTE:** If mast is mounted on lift truck, truck should be securely blocked up before attempting carriage removal.

2. Remove the two Allen head capscrews located on the back left side of the carriage.

3. Raise the carriage to a point where the carriage anchors may be easily removed. Remove the anchors from the carriage. Anchors are retained to the truck carriage by snap rings and are accessible from the front side of the carriage.

   **NOTE:** To keep the mast chain from coming out of engagement with the upper sheaves, leave the carriage anchors connected to the chain. (See Fig. 5)

4. Carriage assembly may now be lowered out of the bottom of the mast channels.

5. All carriage parts can now be inspected for damage and wear. Replace as required.

   **NOTE:** When replacing a carriage roller, the inner bearing race must also be replaced.

### CARRIAGE INSTALLATION:

A direct reversal of the previous steps.

### MAST REMOVAL AND DISASSEMBLY:

To perform repairs which will require complete mast disassembly, the following steps should be taken:

1. Extend the mast to a point where the adjustable brass wear plugs are accessible. At this point turn all wear plugs counter-clockwise until the wearing surface of the plugs are flush with the channel members.
2. Attach a suitable sling to the upper channel crossmembers. The sling should then be connected to an overhead hoist capable of carrying the weight of the mast.

   **NOTE:** A slight pull against the weight of the mast will stabilize the unit during removal from the lift truck.
3. Remove tilt cylinder pins and mounting caps, pins, etc. as required to free the mast from the lift truck.
4. Disconnect the hydraulic line leading from the truck valve to the base of the hoist cylinder and the bleed back line leading from the top of the hoist cylinder to the truck sump tank.
5. Mast may now be lifted free of the lift truck.

   **NOTE:** Step four may have to be taken just as mast is removed, depending upon hose fitting clearance provided at the base of the mast.
6. Lay mast on suitable support with carriage facing up.
7. Carriage removal.....refer to carriage removal section.
8. Remove all four chain anchor pins. Chains may now be threaded off of the chain sheaves and removed from the mast.
9. Remove the lowering control valve from the base of the hoist cylinder.
10. Cylinder crosshead is now easily removed from the secondary plunger. It is held in position with Allen head capscrews.
11. Using a rope or similar sling, hoist cylinder may be removed by simultaneously lifting up and sliding cylinder toward the top of the mast.
12. Remove the two stop blocks provided on the back side of the lower crossmember of the intermediate channel. They are held into position by one capscrew in each block.
13. Manually unlatch the inner channel from the intermediate channel. Slide inner channel out approximately 24 inches.
14. The complete crosshead assembly may now be removed from the top of the intermediate channel.
15. The inner channel may now be completely removed from the intermediate channel.
16. Manually unlatch the intermediate channel from the outer channel. The two channel sections can now be separated.
17. For chain sheave removal on the inner channel and crosshead, see parts diagram showing location of the shaft locking set and jam screws. (See Fig. 12)
18. Thoroughly clean and inspect all components for wear or damage. Replace as required.

**MAST ASSEMBLY AND INSTALLATION:**

Mast assembly and installation is a direct reversal of the above procedure with the exceptions as noted below:

**NOTE:** See Fig. 6 (Picture showing relationship of wear plugs and wear shoes to the channels.)

**NOTE:**

A. Using wear shoe shims and adjustable wear plugs, center each channel member with respect to its mating channel.
B. Carriage adjustment - see adjustment instructions.
C. Crosshead adjustment - see adjustment instructions.
D. Wear plug adjustment - see adjustment instructions.
E. If for any reason the latch actuating capscrews are removed from the cylinder crosshead or channels, they must be returned to the exact location from which they were removed.

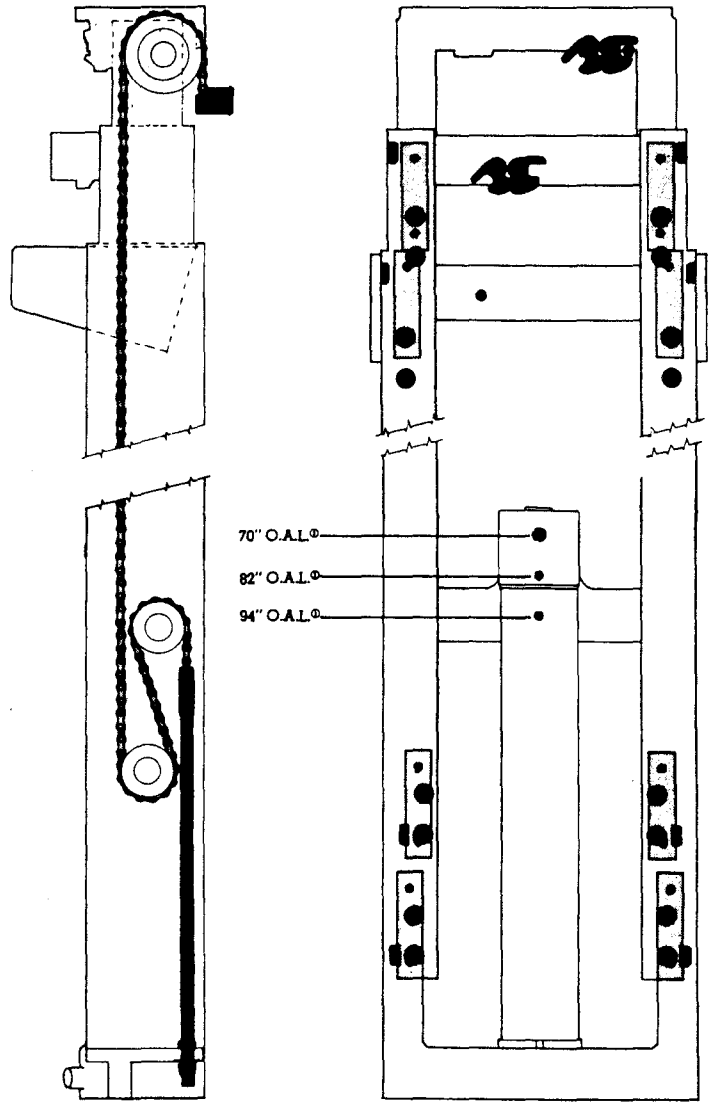


FIG. 5 — CHAIN REAVING




FIG. 6 — LATCH POSITIONS, WEAR SHOES & ADJUSTING PLUG LOCATIONS

**HOIST CYLINDER REMOVAL:**

The following instructions are intended for removing the mast cylinder without removing the mast assembly from the lift truck.

1. Raise the mast to a point where the lower bar on the carriage is above the collapsed height of the hoist cylinder.
2. Securely block inner channel, intermediate channel and carriage to prevent movement of these components when the hoist cylinder is lowered.
3. To allow the cylinder to be lowered, the cylinder crosshead first must be manually unlatched from the inner channel.
4. By operating the truck valve, lower the mast cylinder.
5. Remove the cylinder crosshead - see step 10 of Mast Removal and Disassembly.
6. Raise crosshead as high as possible and secure to channel crossmember.

7. Hydraulic line removal - see step 4 of Mast Removal and Disassembly.
8. Lowering control valve removal - see step 9 of Mast Removal and Disassembly.
9. Hoist cylinder may now be lifted up and away from the mast.

**INSTALLATION:**

Installation is a direct reversal of the previous steps.

**NOTE:** Air bleeding is required. See step 8 of Mast Installation Instructions.

**HOIST CYLINDER DISASSEMBLY:**

Care must be taken in disassembly and reassembly to prevent damage to the chromed surfaces of the primary and secondary plunger. Any nicks or scratches on these components must be made smooth by using a fine grit emery paper.

1. Lay cylinder on suitable supports to prevent rolling during disassembly. Provide a suitable container to store and protect all components from damage and contamination during repair.
2. Using a suitable spanner wrench, loosen the head locking ring at the base of the cylinder. The head can now be unthreaded and removed.
3. Using the same type of wrench as required in Step 2, unthread the retainer from the shell. This retainer is located at opposite end of the shell from the head.
4. The primary and secondary plungers may now be removed from the base end of the cylinder shell.

   **NOTE:** Reasonable care must be taken not to damage the plunger surface.
5. Lay the assembled primary and secondary plungers on a "V'd" wooden support.
6. Once again, using a spanner wrench, unthread the retainer out of the primary plunger.

   **NOTE:** To keep the primary tube from turning, a pin type spanner wrench may be inserted in four holes provided at the base end.
7. The secondary plunger is now free and should be carefully pulled out of the primary plunger.
8. Remove the piston from the base end of the secondary plunger. This is retained by a spiral snap ring.

   **NOTE:**

   A. A cavity is provided in the secondary plunger for oil leakage which has occurred during the normal life of the piston packing. This oil must be drained before reassembling the cylinder.

   B. If oil leakage becomes excessive before piston packing is replaced, a cartridge type relief valve has been provided to transfer the oil (which the cavity cannot hold) back into the base of the hoist cylinder. (See Fig. 14)

9. Remove the cartridge relief valve located in the base of the secondary plunger. This is held in position by a spiral snap ring.

   **NOTE:**

   A. It is a good policy to replace the O-ring around the O.D. of the relief valve.

   B. If the relief valve requires replacement, it must be replaced as a complete unit.

10. Pull out the self-adjusting bushing and packing assembly from the top side of the cylinder shell.
11. Inspect all parts for wear and damage.

    **NOTE:** Replace all packing, O-rings, back-up rings and wipers regardless of appearance or wear.

**ASSEMBLY:**

Assembly is a direct reversal of the previous steps with exception as noted below.

**NOTE:** Thoroughly clean all parts to be installed in the cylinder with solvent. All components should be coated with a liberal amount of petroleum jelly or hydraulic oil before being installed in the cylinder.

**CARRIAGE ADJUSTMENT**

The carriage is provided with four adjustable side thrust rollers. Minimum clearance between the carriage and the inner channel can be maintained by proper roller adjustment. For adjustment, the following steps are recommended.

1. Actuate the truck valve lever to raise the mast carriage approximately 45 inches above the floor. The roller adjustment screws should be accessible at this point.
2. Loosen all four locking screws approximately two turns.
3. Rotate clockwise all four roller adjustment screws evenly until carriage looseness has been removed.

   **NOTE:** Both steps 2 and 3 require Allen type wrenches.

   **NOTE:** Carriage must be centered within the inner channel after adjustment is completed. This can be checked by measuring the distance on each side between the outside of the carriage roller bracket and the inner edge of the inner channel.
4. Tighten all four locking screws securely.
5. Raise and lower carriage in the free lift area to ensure free movement at all points.

   **NOTE:** The mast inner channels are designed to be slightly narrower at the top than at the bottom. If the side thrust rollers have been too tightly adjusted, the carriage may bind as it reaches the top of the inner channel.
6. Pads are provided on the top of the carriage roller brackets. Shimming usually is only required at the time of the manufacture to compensate for the uneven surface on the bottom side of the inner channel crossmember.

**CROSSHEAD ADJUSTMENT**

1. Shims have been provided under each brass wear shoe. As wear occurs, adjustment will be required.
2. The crosshead must be removed to make adjustment - see mast removal and disassembly instructions.
3. Sufficient shims should be added under each wear shoe to center the cross-head between the intermediate channels.

   **NOTE:** After adjustment, clearance between wear shoe and mast channel should not exceed 1/16 inch.

**CHAIN ADJUSTMENT**

Chain adjustment is located on the front side of the outer upright lower crossmember. When making chain adjustment, two factors should be taken into consideration.

1. Chains should be adjusted so as to be equal in length. When chains are evenly adjusted the two points at which the chains anchor to the carriage yoke will be equadistant from the bottom of the upper fork bar.
2. The second factor is the relationship of the carriage to the upright when the carriage is completely lowered. This should be as follows:

A. M2T, M3T, M4T, M5T, M7T and M8T mounted with three inch underclearance. The bottom edge of the lower bar on the mast carriage should be even with the bottom side of the mast channels.

B. M2T, M3T, M4T and M5T mounted with five inches underclearance. The carriage should be two inches below the bottom side of the mast channels.

C. M7T and M8T mounted with six inches underclearance, carriage should be three inches below bottom side of the mast channels.

**NOTE:** To obtain above dimensions, adjustment is as follows: (1) Loosen the two jam nuts on the upper side of the chain anchor rod, and (2) tighten or loosen adjustment nuts located on the end of the chain anchor rod to accomplish dimensions as listed above. After adjustment is completed, tighten the jam nuts securely.

## PLUG ADJUSTMENT

Adjustable wear surfaces have been provided to compensate for normal mast wear. Properly adjusted channel members will fit snugly but also should be free to raise and lower without binding.

If adjustment is required, it is important that all plugs be tightened evenly.

**NOTE:** After the side plugs have been adjusted, each channel assembly should be centered within its mating channel.

## LATCH ADJUSTMENT

The Cascade Viewmast has incorporated in its design two pairs of latches. The purpose of the latch is to allow the upright components to remain in proper sequence during normal operation. In the fully lowered position the intermediate upright is latched to the outer upright and the inner upright is latched to the intermediate upright. As the mast is raised the latches are actuated by socket head capscrews threaded into the back side of both the cylinder crosshead and the left hand carriage roller bracket. For latches to function properly, certain conditions must exist. Refer to operation sequence and adjustment instructions that follow:

1. At all times free latch movement is important. Binding could cause failure.
2. Stop pads are provided on the top crossmember of the outer channel and the intermediate channel to carry the weight of the channels when the mast is in the lowered position. Pads are also provided on top of the carriage roller brackets and cylinder crosshead to carry the weight of the inner channel during extension.
3. Damaged or improperly shimmed channel stop pads may cause latches to over travel. This over-travel could cause latch failure.
4. Place shims under the stop pads on the outer channel, intermediate channel, crosshead and carriage to hold latch throat horizontal when actuated.

   **NOTE:** For proper latch mating description, see Fig. 7 and 8.
5. An adjustable setscrew stop has been provided for the intermediate channel latch. Adjust the stop to bring the latch throat to a horizontal position. (Parallel with top of the intermediate channel) See Fig. 7 and 8.

## LATCH OPERATIONAL SEQUENCE

Sequence for masts with less than 100 percent freelift:

1. The carriage raises until one of the cylinder crosshead latch actuating capscrews engages the inner channel latches. The inner channel is released from the intermediate channel. The inner channel travels a short distance before the second latch capscrew on the cylinder crosshead engages the intermediate channel latches. The intermediate channel is now released from the outer channel. At this point both the inner and intermediate channels are latched to the cylinder crosshead.
2. The carriage continues to move upward at twice the speed of the channels.
3. As the carriage reaches the top of the inner channel, the carriage latch capscrew releases the inner channel from the cylinder crosshead. The inner channel at the same time becomes latched to the carriage.
4. The mast now continues its upward movement until the cylinder reaches the end of its stroke.
5. The lowering sequence is a direct reversal of the previous steps.

   **NOTE:** Refer to Fig. 7. Latch actuating capscrews will appear at points "A" and "C".

**Sequence for Masts with 100 percent freelift:**

1. The carriage raises until the cylinder crosshead latch actuating capscrew engages the intermediate channel latch. The intermediate channel is released from the outer channel and becomes latched to the crosshead. The intermediate channel travels a short distance before the carriage latch actuating capscrew engages the inner channel latch. The inner channel is now released from the intermediate channel and becomes latched to the carriage.
2. The mast continues its upward movement until the cylinder reaches the end of its stroke.
3. The lower sequence is a direct reversal of the previous steps.

   **NOTE:** Refer to Fig. 8. Latch actuating capscrew will appear at point "B" only.

   **NOTE:**

   A. Improper carriage adjustment or lack of adjustment could result in latch failure. (Refer to carriage adjustment instructions)

   B. Improper cylinder crosshead adjustment or lack of adjustment could also result in latch failure. (Refer to crosshead adjustment)

   C. Improper thrust plug adjustment or lack of adjustment could result in latch failure.

   D. The latch carrying the weight of its respective channel also could result in latch failure.

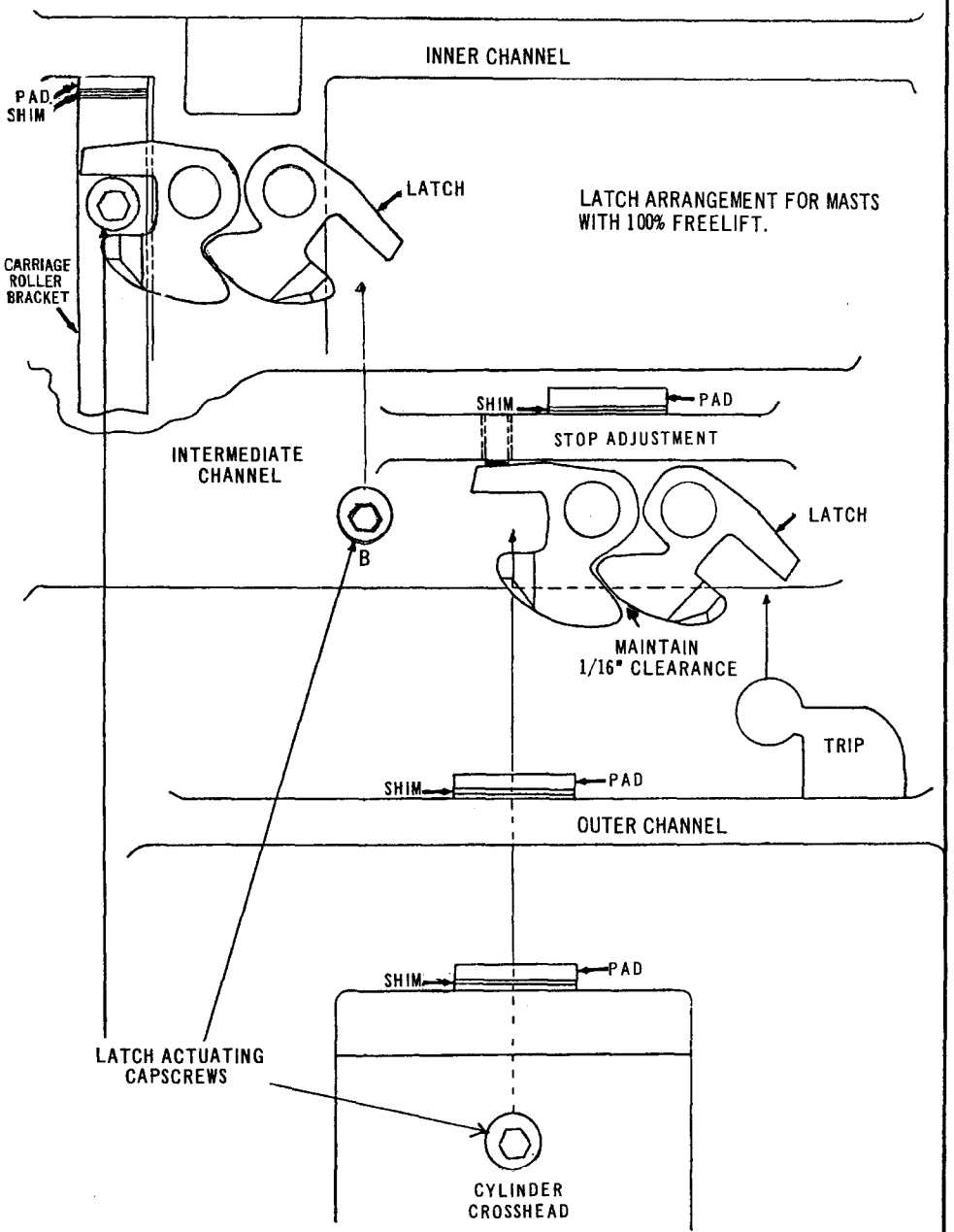



FIG. 8 (MAST AS VIEWED FROM DRIVERS SEAT)

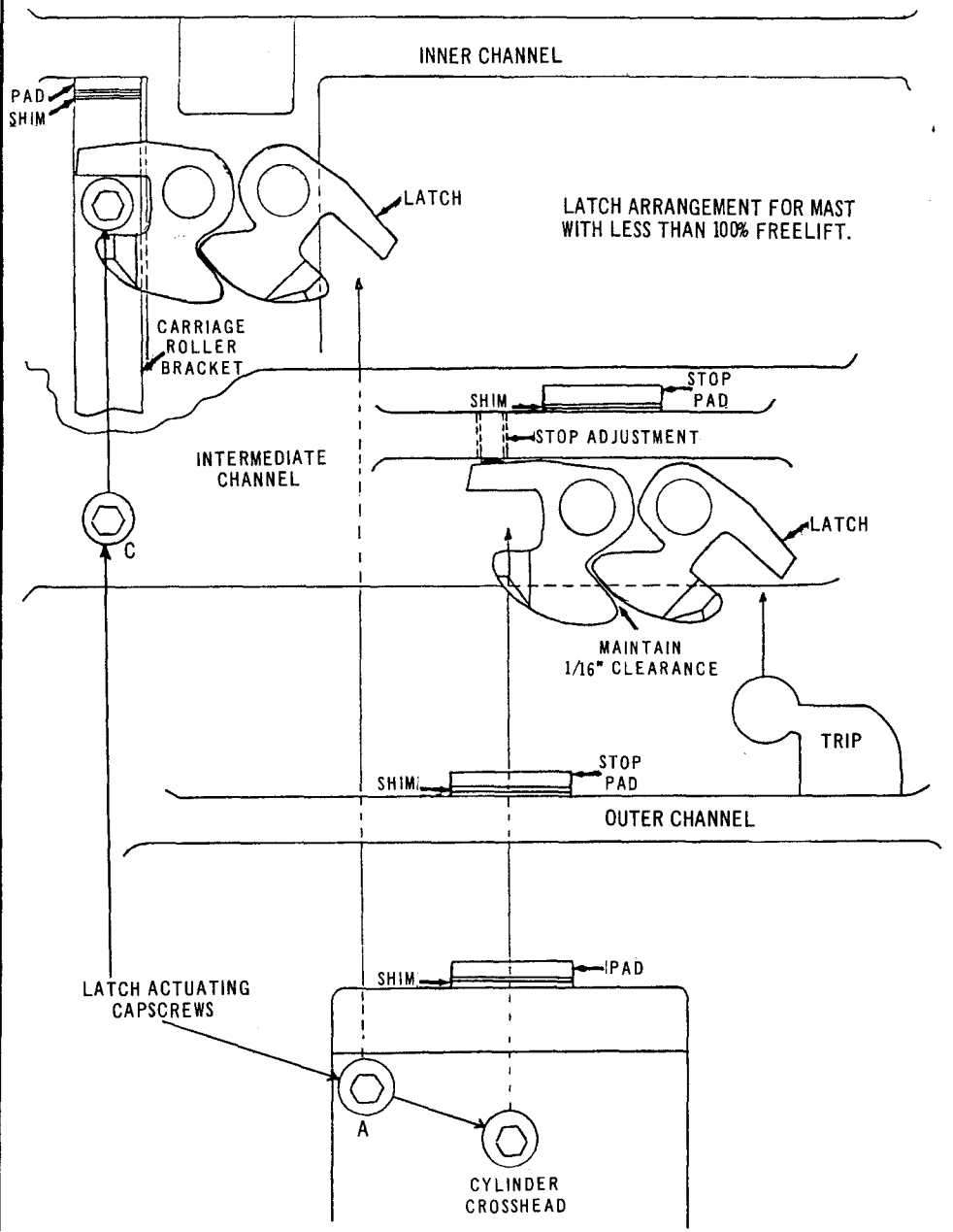



FIG. 7 (MAST AS VIEWED FROM DRIVERS SEAT)

# Maintenance Tips

| TROUBLE SPOT | PROBABLE CAUSE | CORRECTIVE ACTION |
|---|---|---|
| Latches or Latch Point Failure | 1. Side rollers on carriage loose. | 1. Adjust rollers properly for side clearance and tighten with locking screws provided. |
| | 2. Cylinder cross head wear shoes excessively loose. | 2. Adjust wear shoes properly. All side clearance should be eliminated. |
| | 3. Latches not free to turn. With mast fully lowered latch should turn freely. | 3. Eliminate tight spots. Check for any tendency for the latch to bind on the shaft. Lubricate shaft. |
| | 4. Latch points missing or worn excessively. | 4. Replace as indicated. |
| | 5. Spring return on latches broken or missing. | 5. Replace as indicated. |
| | 6. Channel members of mast binding or excessively tight in relation to each other. | 6. Eliminate any tight spots. Check side clearance adjustments for proper clearance. Mast members must move freely with no excessive looseness. |
| | 7. Chain adjustment incorrect. | 7. Adjust as indicated. Lower safety screw on the carriage should clear the cross member by approximately ½" in the lowered position. |
| Excessive side motion in carriage | 1. Side rollers out of adjustment. | 1. Adjust as needed. Set locking screw tight. |
| Excessive side motion or forward and back motion of channel members | 1. Adjusting plugs on side adjustment loose. | 1. Adjust as indicated. Eliminate excessive looseness but channel members must move freely through their length. |
| | 2. Worn wear shoes. | 2. Replace or shim as indicated. |
| Chain wear or failure | 1. Insufficient lubrication. | 1. Lubricate chains every 100 hours. |
| | 2. Over load condition. | 2. Reduce load to rated capacity of mast assembly. |
| Carriage thrust roller failure | 1. Shock loading from ramming operations. | 1. Caution operator on results of ramming. |
| | 2. Insufficient lubrication. | 2. Lubricate rollers using grease fittings provided. Lubricate every 200 hrs. |

Refer to the proper isometric drawing in this manual for assistance in assembly.

# CROSSHEAD

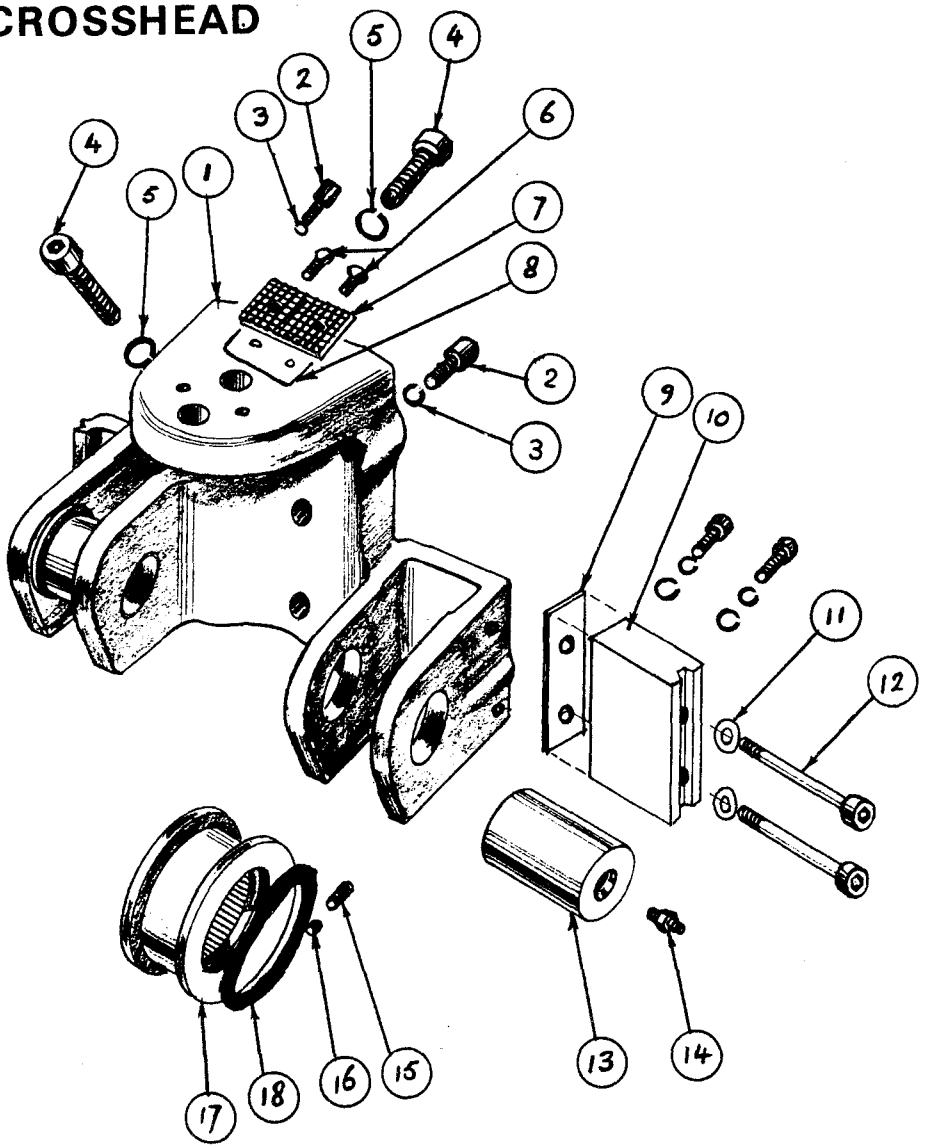



FIG. 9

## CROSSHEAD PARTS LIST

| REF. NO. | DESCRIPTION | QTY. | M2T-M3T PART NO. | QTY. | M4T-M5T PART NO. | QTY. | M7T-M8T PART NO. |
|---|---|---|---|---|---|---|---|
| 1 | Crosshead | 1 | C-616818 | 1 | C-623690 | 1 | C-616345 |
| 2 | Capscrew | 2 | C-616664 | 2 | C-615324 | 2 | C-615324 |
| 3 | Lockwasher | 2 | C-6374 | 2 | C-6447 | 2 | C-6447 |
| 4 | Capscrew | 1 | C-4305 | 2 | C-4305 | 2 | C-4306 |
| 5 | Lockwasher | 1 | C-6374 | 2 | C-6374 | 2 | C-6374 |
| 6 | Capscrew | 2 | C-4628 | 2 | C-4628 | 2 | C-4628 |
| 7 | Pad | 1 | C-615954 | 1 | C-615954 | 1 | C-615954 |
| 8 | Shim | AS REQ'D | C-616069 | AS REQ'D | C-616069 | AS REQ'D | C-616069 |
| 9 | Shim | " | C-616825 | " | C-620307 | " | C-616358 |
| 10 | Shoe | 2 | C-616824 | 2 | C-620942 | *2 | C-630247 |
| 11 | Lockwasher | | NOT USED | 4 | C-6372 | 4 | C-6374 |
| 12 | Capscrew | 4 | C-617255 | 4 | C-4270 | 4 | C-4304 |
| 13 | Shaft | 2 | C-616816 | 2 | C-613773 | 2 | C-616363 |
| 14 | Grease Fitting | 2 | C-7401 | 2 | C-7401 | 2 | C-7401 |
| 15 | Setscrew | 2 | C-4953 | 2 | C-5309 | 2 | C-5309 |
| 16 | Jam Screw | 2 | C-612404 | 2 | C-612545 | 2 | C-612545 |
| 17 | Sheave | 2 | C-619962 | 2 | C-613767 | 2 | C-616360 |
| 18 | Thrust Washer | 4 | C-616815 | | Part of Sheave Assy. | 4 | C-616351 |

*Denotes Revision

# HOIST CYLINDER

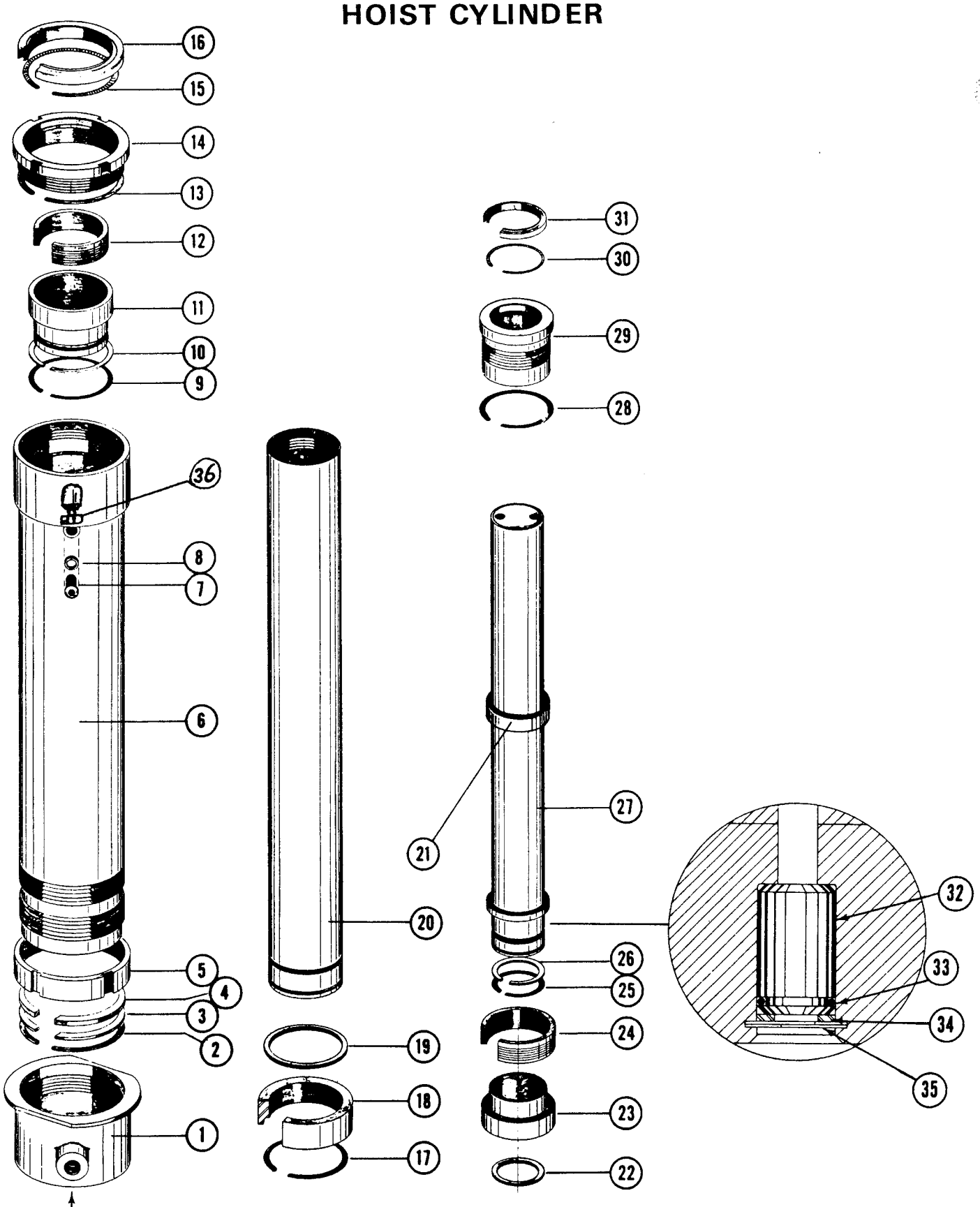



FIG. 10 — HOIST CYLINDER

## HOIST CYLINDER PARTS LIST

| | REF. NO. | DESCRIPTION | QTY. | M2T PART NO. | M3T PART NO. | M4T PART NO. | M5T PART NO. | M7T PART NO. | M8T PART NO. |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | Head | 1 | C-616912 | C-620257 | C-617256 | C-617075 | C-616403 | C-618459 |
| * | 2 | O-ring | 1 | C-2802 | C-2804 | C-2808 | C-2810 | C-2816 | C-2818 |
| * | 3 | Back-Up Ring | 1 | C-615144 | C-615146 | C-615150 | C-615152 | C-615158 | C-615160 |
| * | 4 | Ring (Nylon) | 1 | C-617115 | C-620258 | C-617258 | C-617048 | C-616496 | C-618462 |
| | 5 | Nut | 1 | C-617116 | C-620259 | C-617259 | C-617047 | C-616165 | C-618460 |
| | 6 | Shell | 1 | See separate list | | | | | |
| | 7 | Capscrew | 1 | C-4812 | C-4812 | C-4812 | C-4812 | C-4812 | C-4812 |
| * | 8 | Seal | 1 | C-601468 | C-601468 | C-601468 | C-601468 | C-601468 | C-601468 |
| * | 9 | O-ring | 1 | C-2798 | NOT USED | C-2804 | C-2806 | C-2812 | C-2814 |
| * | 10 | Back-Up Ring | 1 | C-615141 | NOT USED | C-615147 | C-615149 | C-615155 | C-615157 |
| | 11 | Bushing | 1 | C-610880 | NOT USED | C-610995 | C-611124 | C-611050 | C-618399 |
| * | 12 | Packing | 1 | C-7623 | C-7576 | C-7549 | C-7546 | C-7553 | C-7545 |
| * | 13 | O-ring | 1 | C-2801 | C-2801 | C-2807 | C-2809 | C-2815 | C-2817 |
| | 14 | Retainer | 1 | C-610879 | C-620260 | C-610996 | C-611128 | C-611051 | C-618400 |
| * | 15 | Spring | 1 | C-605660 | C-605611 | C-605663 | C-605664 | C-605667 | C-605668 |
| * | 16 | Wiper | 1 | C-605610 | C-605661 | C-605613 | C-605614 | C-605617 | C-605618 |
| | 17 | Ring | 1 | C-610877 | C-620255 | C-610993 | C-611125 | C-611047 | C-618393 |
| | 18 | Bearing | 1 | C-610878 | C-620256 | C-610994 | C-611123 | C-611049 | C-618394 |
| | 19 | Ring | 1 | C-7223 | C-7224 | C-7230 | C-7232 | C-7237 | C-7238 |
| | 20 | Intermediate Stage | 1 | See separate list. | | | | | |
| | 21 | Spacer | 1 | See separate list. | | | | | |
| | 22 | Ring | 1 | C-7346 | C-7350 | C-7360 | C-7364 | C-7372 | C-7375 |
| | 23 | Piston | 1 | C-606228 | C-620254 | C-610992 | C-605888 | C-606221 | C-605901 |
| * | 24 | Packing | 1 | C-7622 | C-7648 | C-7547 | C-7565 | C-7561 | C-7555 |
| * | 25 | O-ring | 1 | C-2722 | C-2785 | C-2789 | C-2791 | C-2795 | C-2797 |
| * | 26 | Back-Up Ring | 1 | C-615126 | C-615128 | C-615132 | C-615134 | C-615138 | C-615140 |
| | 27 | Plunger | 1 | See separate list. | | | | | |
| * | 28 | O-ring | 1 | C-2791 | C-2793 | C-2797 | C-2799 | C-2805 | C-2807 |
| | 29 | Retainer | 1 | C-606230 | C-620261 | C-610997 | C-611127 | C-606224 | C-605904 |
| * | 30 | Spring | 1 | C-606656 | C-605657 | C-605659 | C-605660 | C-605663 | C-605664 |
| * | 31 | Wiper | 1 | C-605606 | C-605607 | C-605609 | C-605610 | C-605613 | C-605614 |
| | 32 | Valve Assy. | 1 | C-626664 | C-626664 | C-626664 | C-626664 | C-626664 | C-626664 |
| | 33 | O-ring | 1 | C-624737 | C-624737 | C-624737 | C-624737 | C-624737 | C-626737 |
| | 34 | Washer | 1 | C-626665 | C-626665 | C-626665 | C-626665 | C-626665 | C-626665 |
| | 35 | Snap Ring | 1 | C-7104 | C-7104 | C-7104 | C-7104 | C-7104 | C-7104 |
| | 36 | Fitting | 1 | C-617649 | C-617649 | C-617649 | C-617649 | C-617649 | C-617649 |
| | | * Repair Kit | 1 | C-619798 | C-621936 | C-619799 | C-619800 | C-619801 | C-619802 |

## HOIST CYLINDER PARTS MODEL M2T

| LIFT HEIGHT *BOF | ITEM NO. 6 SHELL PART NO. | ITEM NO. 20 INNER STAGE PART NO. | ITEM NO. 27 PLUNGER PART NO. | ITEM NO. 21 SPACER PART NO. |
|---|---|---|---|---|
| 132 | C-617136A | C-613644 | C-627447 | C-618148 |
| 136 | C-617136A | C-613644 | C-627447 | C-618146 |
| 140 | C-617136A | C-613644 | C-627447 | C-616731 |
| 144 | C-617136A | C-613644 | C-627447 | NONE |
| 148 | C-617137A | C-613648 | C-627448 | C-618146 |
| 150 | C-617137A | C-613648 | C-627448 | C-616732 |
| 152 | C-617137A | C-613648 | C-627448 | C-616731 |
| 156 | C-617137A | C-613648 | C-627448 | NONE |
| 160 | C-617138A | C-613652 | C-627449 | C-618146 |
| 164 | C-617138A | C-613652 | C-627449 | C-616731 |
| 168 | C-617138A | C-613652 | C-627449 | NONE |
| 172 | C-617139A | C-610934 | C-627450 | C-618146 |
| 176 | C-617139A | C-610934 | C-627450 | C-616731 |
| 180 | C-617139A | C-610934 | C-627450 | NONE |
| 184 | C-617140A | C-614894 | C-627451 | C-618146 |
| 186 | C-617140A | C-614894 | C-627451 | C-616732 |

## HOIST CYLINDER PARTS MODEL M3T

| LIFT HEIGHT *BOF | ITEM NO. 6 SHELL PART NO. | ITEM NO. 20 INNER STAGE PART NO. | ITEM NO. 27 PLUNGER PART NO. | ITEM NO. 21 SPACER PART NO. |
|---|---|---|---|---|
| 132 | C-620309A | C-620311 | C-627551 | C-620267 |
| 136 | C-620309A | C-620311 | C-627551 | C-620265 |
| 140 | C-620309A | C-620311 | C-627551 | C-620263 |
| 144 | C-620309A | C-620311 | C-627551 | NONE |
| 148 | C-620316A | C-620318 | C-627552 | C-620265 |
| 150 | C-620316A | C-620318 | C-627552 | C-620264 |
| 152 | C-620316A | C-620318 | C-627552 | C-620263 |
| 156 | C-620316A | C-620318 | C-627552 | NONE |
| 160 | C-620323A | C-620325 | C-627553 | C-620265 |
| 164 | C-630323A | C-620325 | C-627553 | C-620263 |
| 168 | C-620323A | C-620325 | C-627553 | NONE |
| 172 | C-620330A | C-620332 | C-627554 | C-620265 |
| 176 | C-620330A | C-620332 | C-627554 | C-620263 |
| 180 | C-620330A | C-620332 | C-627554 | NONE |
| 184 | C-620337A | C-620339 | C-627555 | C-620265 |
| 186 | C-620337A | C-620339 | C-627555 | C-620264 |

* BOF.....Lift Heights measured to the bottom of the forks.

## HOIST CYLINDER PARTS MODEL M4T

| LIFT HEIGHT *BOF | ITEM NO. 6 SHELL PART NO. | ITEM NO. 20 INNER STAGE PART NO. | ITEM NO. 27 PLUNGER PART NO. | ITEM NO. 21 SPACER PART NO. |
|---|---|---|---|---|
| 132 | C-617279A | C-611955 | C-627537 | C-618152 |
| 136 | C-617279A | C-611955 | C-627537 | C-618150 |
| 140 | C-617279A | C-611955 | C-627537 | C-615264 |
| 144 | C-617279A | C-611955 | C-627537 | C-611446 |
| 148 | C-617280A | C-611961 | C-627538 | C-618150 |
| 152 | C-617280A | C-611961 | C-627538 | C-615264 |
| 156 | C-617280A | C-611961 | C-627538 | NONE |
| 160 | C-617281A | C-611967 | C-627539 | C-618150 |
| 164 | C-617281A | C-611967 | C-627539 | C-615264 |
| 166 | C-617281A | C-611967 | C-627539 | C-611443 |
| 168 | C-617281A | C-611967 | C-627539 | NONE |
| 172 | C-617282A | C-611974 | C-627540 | C-618150 |
| 176 | C-617282A | C-611974 | C-627540 | C-615264 |
| 180 | C-617282A | C-611974 | C-627540 | NONE |
| 184 | C-617283A | C-614968 | C-627541 | C-618150 |
| 188 | C-617283A | C-614968 | C-627541 | C-615264 |
| 192 | C-617283A | C-614968 | C-627541 | NONE |
| 196 | C-617284A | C-614969 | C-627542 | C-618150 |
| 200 | C-617284A | C-614969 | C-627542 | C-615264 |
| 202 | C-617284A | C-614969 | C-627542 | C-611443 |
| 204 | C-617284A | C-614969 | C-627542 | NONE |
| 208 | C-617285A | C-614901 | C-627543 | C-618150 |
| 212 | C-617285A | C-614901 | C-627543 | C-615264 |
| 216 | C-617285A | C-614901 | C-627543 | NONE |

## HOIST CYLINDER PARTS MODEL M5T

| LIFT HEIGHT *BOF | ITEM NO. 6 SHELL PART NO. | ITEM NO. 20 INNER STAGE PART NO. | ITEM NO. 27 PLUNGER PART NO. | ITEM NO. 21 SPACER PART NO. |
|---|---|---|---|---|
| 132 | C-617068A | C-614925 | C-627390 | C-623470 |
| 136 | C-617068A | C-614925 | C-627390 | C-624186 |
| 140 | C-617068A | C-614925 | C-627390 | C-621961 |
| 144 | C-617068A | C-614925 | C-627390 | C-611446 |
| 148 | C-617069A | C-614926 | C-627391 | C-624186 |
| 152 | C-617069A | C-614926 | C-627391 | C-621961 |
| 156 | C-617069A | C-614926 | C-627391 | NONE |
| 160 | C-617070A | C-614927 | C-627392 | C-624186 |
| 164 | C-617070A | C-614927 | C-627392 | C-621961 |
| 166 | C-617070A | C-614927 | C-627392 | C-613698 |
| 168 | C-617070A | C-614927 | C-627392 | NONE |
| 172 | C-617071A | C-614928 | C-627393 | C-624186 |
| 176 | C-617071A | C-614928 | C-627393 | C-621961 |
| 180 | C-617071A | C-614928 | C-627393 | NONE |
| 184 | C-617072A | C-614929 | C-627394 | C-624186 |
| 188 | C-617072A | C-614929 | C-627394 | C-621961 |
| 192 | C-617072A | C-614929 | C-627394 | NONE |
| 196 | C-617073A | C-614930 | C-627395 | C-624186 |
| 200 | C-617073A | C-614930 | C-627395 | C-621961 |
| 202 | C-617073A | C-614930 | C-627395 | C-613698 |
| 204 | C-617073A | C-614930 | C-627395 | NONE |
| 208 | C-617074A | C-614931 | C-627396 | C-624186 |
| 212 | C-617074A | C-614931 | C-627396 | C-621961 |
| 216 | C-617074A | C-614931 | C-627396 | NONE |

*BOF.....Lift heights measured to the bottom of the forks.

## HOIST CYLINDER PARTS MODEL M7T

| LIFT HEIGHT *BOF | ITEM NO. 6 SHELL PART NO. | ITEM NO. 20 INNER STAGE PART NO. | ITEM NO. 27 PLUNGER PART NO. | ITEM NO. 21 SPACER PART NO. |
|---|---|---|---|---|
| 132 | C-616523A | C-615359 | C-627516 | C-618500 |
| 136 | C-616523A | C-615359 | C-627516 | C-618458 |
| 140 | C-616524A | C-615360 | C-627517 | C-618502 |
| 142 | C-616524A | C-615360 | C-627517 | C-618501 |
| 144 | C-616524A | C-615360 | C-627517 | C-618500 |
| 148 | C-616524A | C-615360 | C-627517 | C-618458 |
| 152 | C-616524A | C-615360 | C-627517 | C-606223 |
| 156 | C-616525A | C-615361 | C-627518 | C-618500 |
| 160 | C-616525A | C-615361 | C-627518 | C-618458 |
| 164 | C-616525A | C-615361 | C-627518 | C-606223 |
| 168 | C-616525A | C-615361 | C-627518 | NONE |
| 172 | C-616526A | C-615362 | C-627519 | C-618458 |
| 176 | C-616526A | C-615362 | C-627519 | C-606223 |
| 178 | C-616526A | C-615362 | C-627519 | C-610495 |
| 180 | C-616526A | C-615362 | C-627519 | NONE |
| 184 | C-616527A | C-615363 | C-627520 | C-618458 |
| 188 | C-616527A | C-615363 | C-627520 | C-606223 |
| 192 | C-616527A | C-615363 | C-627520 | NONE |
| 196 | C-616528A | C-615364 | C-627521 | C-618458 |
| 200 | C-616528A | C-615364 | C-627521 | C-606223 |
| 204 | C-616528A | C-615364 | C-627521 | NONE |
| 208 | C-616529A | C-615365 | C-627522 | C-619458 |
| 212 | C-616529A | C-615365 | C-627522 | C-606223 |
| 216 | C-616529A | C-615365 | C-627522 | NONE |

## HOIST CYLINDER PARTS MODEL M8T

| LIFT HEIGHT *BOF | ITEM NO. 6 SHELL PART NO. | ITEM NO. 20 INNER STAGE PART NO. | ITEM NO. 27 PLUNGER PART NO. | ITEM NO. 21 SPACER PART NO. |
|---|---|---|---|---|
| 132 | C-618412A | C-618426 | C-627560 | C-618495 |
| 136 | C-618412A | C-618426 | C-627560 | C-618493 |
| 140 | C-618413A | C-618427 | C-627561 | C-618497 |
| 142 | C-618413A | C-618427 | C-627561 | C-618496 |
| 144 | C-618413A | C-618427 | C-627561 | C-618495 |
| 148 | C-618413A | C-618427 | C-627561 | C-618493 |
| 152 | C-618413A | C-618427 | C-627561 | C-618491 |
| 156 | C-618414A | C-618428 | C-627562 | C-618495 |
| 160 | C-618414A | C-618428 | C-627562 | C-618493 |
| 164 | C-618414A | C-618428 | C-627562 | C-618491 |
| 168 | C-618414A | C-618428 | C-627562 | NONE |
| 172 | C-618415A | C-618429 | C-627563 | C-618493 |
| 176 | C-618415A | C-618429 | C-627563 | C-618491 |
| 178 | C-618415A | C-618429 | C-627563 | C-618490 |
| 180 | C-618415A | C-618429 | C-627563 | NONE |
| 184 | C-618416A | C-618430 | C-627564 | C-618493 |
| 188 | C-618416A | C-618430 | C-627564 | C-618491 |
| 192 | C-618416A | C-618430 | C-627564 | NONE |
| 196 | C-618417A | C-618431 | C-627565 | C-618493 |
| 200 | C-618417A | C-618431 | C-627565 | C-618491 |
| 204 | C-618417A | C-618431 | C-627565 | NONE |
| 208 | C-618418A | C-618432 | C-627566 | C-618493 |
| 212 | C-618418A | C-618432 | C-627566 | C-618491 |
| 216 | C-618418A | C-618432 | C-627566 | NONE |

*BOF.....Lift heights measured to the bottom of the forks.

# CARRIAGE

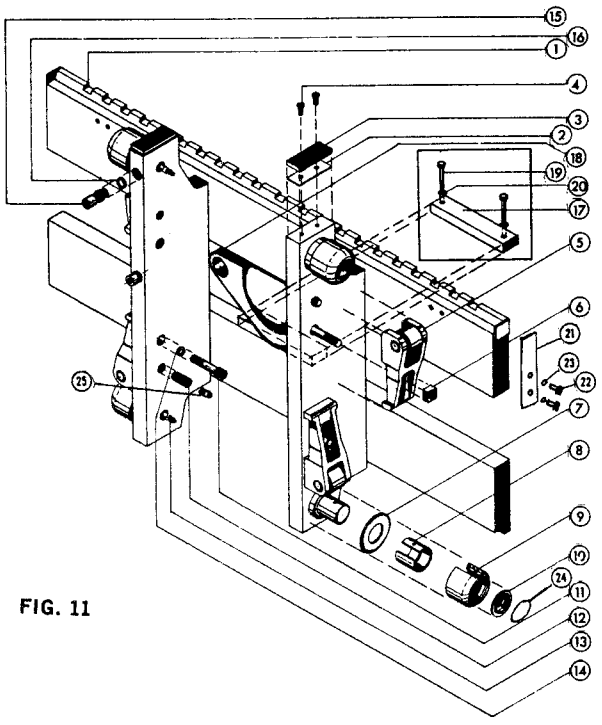


FIG. 11

| REF. NO. | DESCRIPTION | QUAN. | M2T-M3T PART NO. | QUAN. | M4T-M5T PART NO. | QUAN. | M7T-M8T PART NO. |
|---|---|---|---|---|---|---|---|
| | | | **Carriage for Masts Mounted with 3" of Underclearance** | | | | |
| | Carriage Assy. | 1 | 32" C-616936 | 1 | 37" C-614880 | 1 | 42" C-619293 |
| | Carriage Assy. | 1 | 36" C-620117 | 1 | 45" C-614996 | 1 | 48" C-616376 |
| | Carriage Assy. | | | | | 1 | 60" C-616390 |
| 1 | Carriage | 1 | 32" C-616937 | 1 | 37" C-614881 | 1 | 42" C-619294 |
| 1 | Carriage | 1 | 36" C-616938 | 1 | 45" C-614997 | 1 | 48" C-616377 |
| 1 | Carriage | | | | | 1 | 60" C-616391 |
| | | | **Carriage for Masts Mounted with 5" of Underclearance** | | | | |
| | Carriage Assy. | 1 | 32" C-620936 | 1 | 37" C-617793 | | |
| | Carriage Assy. | 1 | 36" C-621282 | 1 | 45" C-617794 | | |
| 1 | Carriage | 1 | 32" C-620937 | 1 | 37" C-617795 | | |
| 1 | Carriage | 1 | 36" C-620962 | 1 | 45" C-617796 | | |
| | | | **Carriage for Masts Mounted with 6" of Underclearance** | | | | |
| | Carriage Assy. | | | | | 1 | 42" C-620608 |
| | Carriage Assy. | | | | | 1 | 48" C-620610 |
| | Carriage Assy. | | | | | 1 | 60" C-620612 |
| 1 | Carriage | | | | | 1 | 42" C-620609 |
| 1 | Carriage | | | | | 1 | 48" C-620611 |
| 1 | Carriage | | | | | 1 | 60" C-620613 |
| 2 | Shim | As Req'd | C-616835 | As Req'd | C-616069 | As Req'd | C-616069 |
| 3 | Pad | 2 | C-616834 | 2 | C-615954 | 2 | C-615954 |
| 4 | Capscrew | 4 | C-4629 | 4 | C-4628 | 4 | C-4628 |
| 5 | Roller Assy. | 4 | C-613774 | 4 | C-613774 | 4 | C-613774 |
| 6 | Nut | 4 | C-621951 | 4 | C-621951 | 4 | C-621951 |
| 7 | Washer | 4 | C-613764 | 4 | C-613764 | | NOT USED |
| 8 | Sleeve | 4 | C-613766 | 4 | C-613766 | | NOT USED |
| 9 | Roller | 4 | C-613763 | 4 | C-613763 | 4 | C-616371 |
| 10 | Plug | 4 | C-613765 | 4 | C-613765 | | NOT USED |
| 11 | Capscrew | 4 | C-4507 | 4 | C-4509 | 4 | C-4510 |
| 12 | Setscrew | 4 | C-616168 | 4 | C-5257 | 4 | C-5258 |
| 13 | Fitting | 4 | C-7401 | 4 | C-7401 | | NOT USED |
| 14 | Lockwasher | | NOT USED | 4 | C-6374 | 4 | C-6374 |
| 15 | Capscrew | 2 | C-615324 | 2 | C-615324 | 2 | C-615324 |
| 16 | Lockwasher | 2 | C-6447 | 2 | C-6447 | 2 | C-6447 |
| 17 | Bar | 1 | C-616833 | | NOT USED | 1 | C-616374 |
| 18 | Yoke | 1 | C-616832 | | PART OF CARRIAGE | 1 | C-616375 |
| 19 | Capscrew | 2 | C-3257 | | NOT USED | 2 | C-3356 |
| 20 | Lockwasher | 2 | C-6288 | | NOT USED | 2 | C-6288 |
| 21 | Keeper | 2 | C-624394 | 2 | C-624394 | 2 | C-606988 |
| 22 | Capscrew | 4 | C-4880 | 4 | C-4880 | 4 | C-4880 |
| 23 | Lockwasher | 4 | C-6290 | 4 | C-6290 | 4 | C-6290 |
| 24 | Snap Ring | | NOT USED | | NOT USED | 4 | C-3140 |
| 25 | Jam Setscrew | 4 | C-628020 | 4 | C-628020 | 4 | C-628020 |
| 26 | Roller | 4 | C-613778 | 4 | C-613778 | 4 | C-613778 |
| 27 | Bushing | 1 | C-613777 | 1 | C-613777 | 1 | C-613777 |
| 28 | Roll Pin | 1 | C-7892 | 1 | C-7892 | 1 | C-7892 |
| 29 | Pin | 1 | C-613779 | 1 | C-613779 | 1 | C-613779 |
| 30 | Thrust Washer | 2 | C-613776 | 1 | C-613776 | 2 | C-613776 |
| 31 | Bracket | 1 | C-613775 | 1 | C-613775 | 1 | C-613775 |

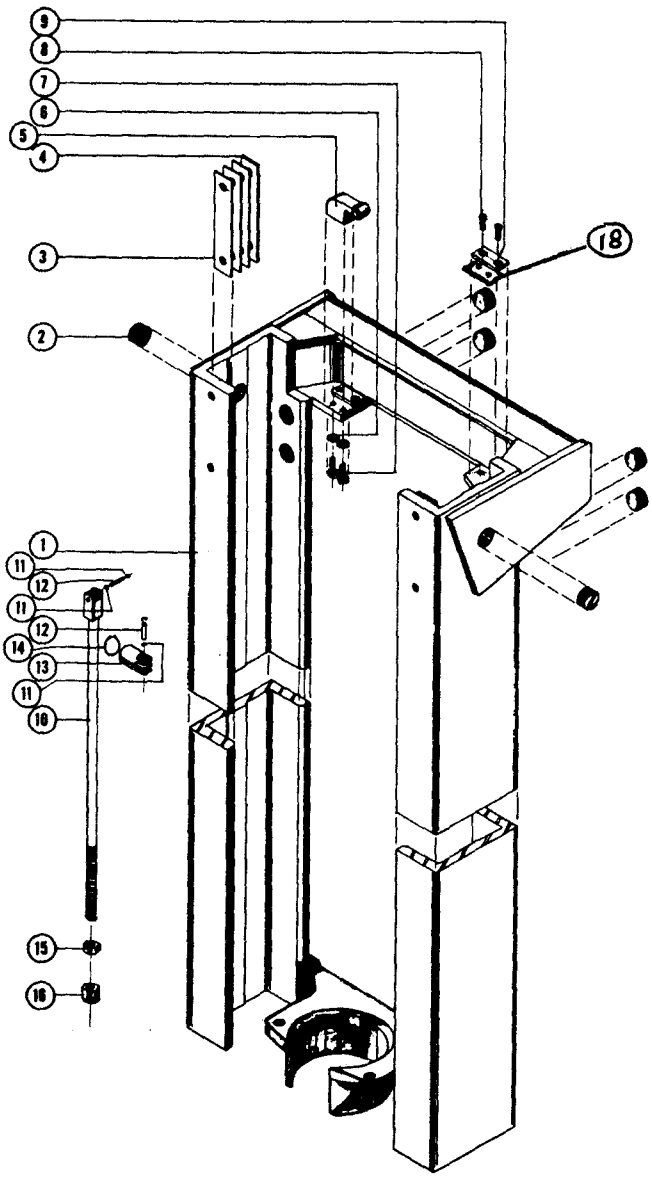



FIG. 12 — OUTER CHANNEL ASSEMBLY

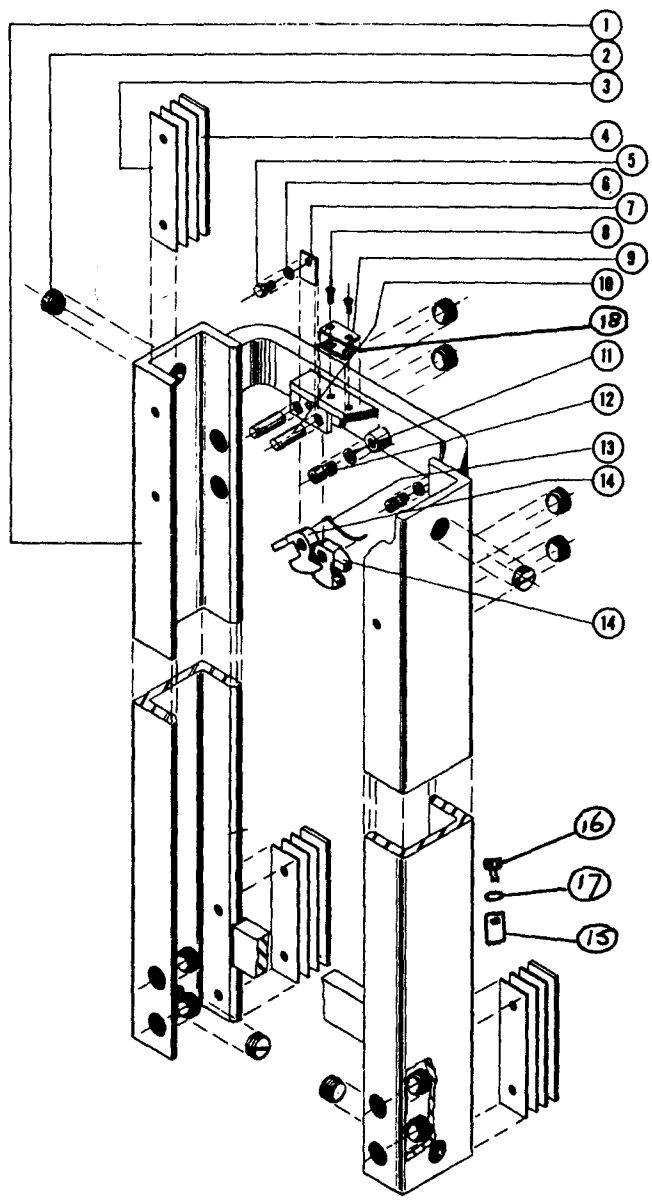



FIG. 13 — INTERMEDIATE CHANNEL ASSEMBLY

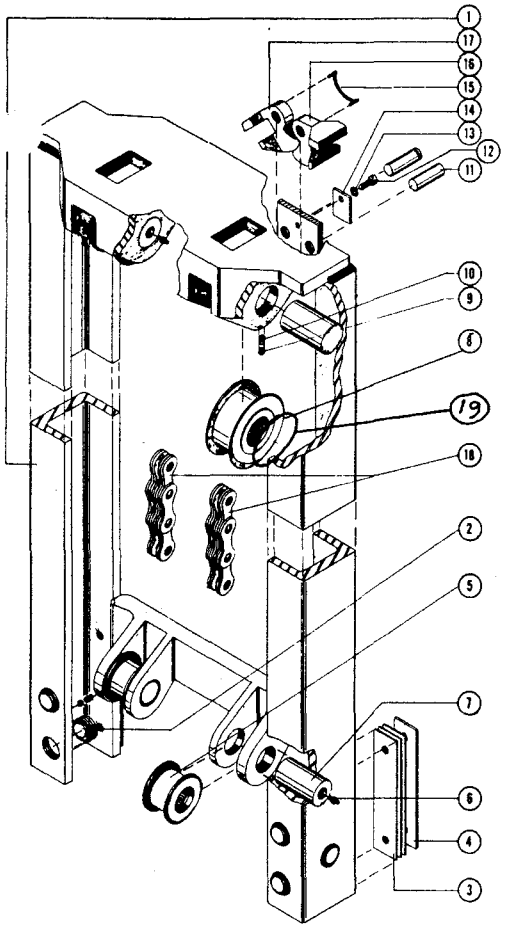



FIG. 14—INNER CHANNEL ASSEMBLY

## OUTER CHANNEL

| | REF. NO. | DESCRIPTION | QTY. | PART NO. M2T - M3T | QTY. | PART NO. M4T - M5T | QTY. | PART NO. M7T - M8T |
|---|---|---|---|---|---|---|---|---|
| * | 1 | Channel 70" OAL | 1 | C-616860 | 1 | C-614845 | 1 | C-616249 |
| * | 1 | Channel 76" OAL | 1 | C-619090 | 1 | C-617767 | 1 | C-618918 |
| * | 1 | Channel 82" OAL | 1 | C-616861 | 1 | C-614846 | 1 | C-616250 |
| * | 1 | Channel 88" OAL | | | 1 | C-618602 | 1 | C-618919 |
| * | 1 | Channel 94" OAL | | | 1 | C-614847 | 1 | C-616251 |
| | 2 | Plug | 8 | C-626164 | 8 | C-626164 | 8 | C-626164 |
| | 3 | Shim | AS REQ'D | C-613797 | AS REQ'D | C-613797 | AS REQ'D | C-616344 |
| | 4 | Bearing | 2 | C-613792 | 2 | C-613792 | | C-616343 |
| | 5 | Trip | 1 | C-614833 | 1 | C-614833 | | C-614833 |
| | 6 | Lockwasher | 2 | C-6288 | 2 | C-6288 | | C-6288 |
| | 7 | Capscrew | 2 | C-3253 | 2 | C-615953 | | C-8606 |
| | 8 | Capscrew | 2 | C-4628 | 2 | C-4628 | | C-4628 |
| | 9 | Pad | 1 | C-615954 | 1 | C-615954 | | C-615954 |
| | 10 | Anchor | 2 | C-619966 | 2 | C-620975 | | C-616348 |
| | 11 | Cotter Pin | * 8 | C-629440 | * 8 | C-629440 | 8 | C-6508 |
| | 12 | Pin | * 4 | C-629441 | * 4 | C-629439 | 4 | C-616346 |
| | 13 | Anchor | 2 | C-619965 | 2 | C-620973 | | C-616347 |
| | 14 | Ring | | NONE | 2 | C-3139 | | C-3148 |
| | 15 | Nut | 2 | C-5720 | 2 | C-5721 | | C-5722 |
| | 16 | Nut | 2 | C-5880 | 2 | C-5881 | | C-5882 |
| | 17 | Shim | AS REQ'D | C-616069 | AS REQ'D | C-616069 | AS REQ'D | C-616069 |

## INTERMEDIATE CHANNEL

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| * | 1 | Channel 70" OAL | 1 | C-616866 | 1 | C-620888 | * 1 | C-630253 |
| * | 1 | Channel 76" OAL | 1 | C-619093 | 1 | C-620889 | * 1 | C-630254 |
| * | 1 | Channel 82" OAL | 1 | C-616867 | 1 | C-620917 | * 1 | C-630255 |
| * | 1 | Channel 88" OAL | | | 1 | C-620918 | * 1 | C-630256 |
| * | 1 | Channel 94" OAL | | | 1 | C-620919 | * 1 | C-630257 |
| | 2 | Plug | 12 | C-628711 | 12 | C-626164 | 12 | C-626164 |
| | 3 | Shim | AS REQ'D | C-613797 | AS REQ'D | C-613797 | AS REQ'D | C-616344 |
| | 4 | Bearing | 4 | C-616959 | 4 | C-613792 | 4 | C-616343 |
| | 5 | Capscrew | 1 | C-3249 | 1 | C-3249 | 1 | C-3249 |
| | 6 | Lockwasher | 1 | C-6288 | 1 | C-6288 | 1 | C-6288 |
| | 7 | Keeper | 1 | C-613782 | 1 | C-613782 | 1 | C-613782 |
| | 8 | Capscrew | 2 | C-4628 | 2 | C-4628 | 2 | C-4628 |
| | 9 | Pad | 1 | C-615954 | 1 | C-615954 | 1 | C-615954 |
| | 10 | Pin | 2 | C-613783 | 2 | C-613783 | 2 | C-616342 |
| | 11 | Lockwasher | 1 | C-6374 | 1 | C-6447 | 1 | C-6447 |
| | 12 | Capscrew | 1 | C-616664 | 1 | C-615324 | 1 | C-615324 |
| | 13 | Spring | 1 | C-613780 | 1 | C-613780 | 1 | C-613780 |
| | 14 | Latch | 2 | C-616962 | 2 | C-616962 | 2 | C-616962 |
| | 15 | Stop Block | 2 | C-629821 | 2 | C-629813 | 2 | C-629813 |
| | 16 | Capscrew | 2 | C-3707 | 2 | C-3709 | 2 | C-3710 |
| | 17 | Lockwasher | 2 | C-6292 | 2 | C-6292 | 2 | C-6292 |
| | 18 | Shim | AS REQ'D | C-616069 | AS REQ'D | C-616069 | AS REQ'D | C-616069 |

## INNER CHANNEL

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| * | 1 | Channel 70" OAL | 1 | C-616872 | 1 | C-614863 | 1 | C-616267 |
| * | 1 | Channel 76" OAL | 1 | C-619096 | 1 | C-617773 | 1 | C-618930 |
| * | 1 | Channel 82" OAL | 1 | C-616873 | 1 | C-614864 | 1 | C-616268 |
| * | 1 | Channel 88" OAL | | | 1 | C-618608 | 1 | C-618931 |
| * | 1 | Channel 94" OAL | | | 1 | C-614865 | 1 | C-616269 |
| | 2 | Plug | 6 | C-626164 | 6 | C-626164 | 6 | C-626164 |
| | 3 | Shim | AS REQ'D | C-613797 | AS REQ'D | C-613797 | AS REQ'D | C-616344 |
| | 4 | Bearing | 2 | C-613792 | 2 | C-613792 | 2 | C-616343 |
| | 5 | Sheave | 2 | C-619962 | 2 | C-613767 | 2 | C-616360 |
| | 6 | Fitting | 4 | C-7401 | 4 | C-7401 | 4 | C-7401 |
| | 7 | Pin | 4 | C-616816 | 4 | C-613773 | 4 | C-616363 |
| | 8 | Sheave | 2 | C-619968 | 2 | C-613771 | 2 | C-616352 |
| | 9 | Jam Screw | 4 | C-612404 | 4 | C-612545 | 4 | C-612545 |
| | 10 | Setscrew | 4 | C-4953 | 4 | C-5309 | 4 | C-5309 |
| | 11 | Pin | 2 | C-616878 | 2 | C-613783 | 2 | C-616342 |
| | 12 | Capscrew | 1 | C-3249 | 1 | C-3249 | 1 | C-3249 |
| | 13 | Lockwasher | 1 | C-6288 | 1 | C-6288 | 1 | C-6288 |
| | 14 | Keeper | 1 | C-616808 | 1 | C-613782 | 1 | C-613782 |
| | 15 | Spring | 1 | C-616809 | 1 | C-613780 | 1 | C-613780 |
| | 16 | Latch | 1 | C-616964 | 1 | C-616968 | 1 | C-616960 |
| | 17 | Latch | 1 | C-616966 | 1 | C-616962 | 1 | C-616962 |
| | 18 | Chain | See separate list, Page 8 | | | | | |
| | 19 | Thrust Washer | 8 | C-616815 | 8 | Part of Sheave Assy. | 8 | C-616351 |

* **NOTE:** O.A.L. (Overall Lowered Height) is measured from the floor level to the top of the outer channel. Listed heights are for masts mounted with 3 inches of underclearance. Add 2 inches to listed heights for masts mounted with 5 inches of underclearance and add 3 inches to listed heights for masts mounted with 6 inches of underclearance.

# CHAIN PART NUMBERS

## FOR MASTS WITH 3" UNDERCLEARANCE

### M2T, M3T

| O.A.L. | Lift Height | Part No. | Length |
|---|---|---|---|
| 70" | 130"-144" | C-619954 | 156⅞" |
| 70" | 146"-150" | C-619955 | 163⅛" |
| 76" | 146"-156" | C-619956 | 175⅝" |
| 76" | 158"-168" | C-619957 | 181⅞" |
| 82" | 164"-168" | C-619958 | 193⅛" |
| 82" | 170"-180" | C-619959 | 199⅜" |
| 82" | 182"-186" | C-619960 | 205⅝" |

### M4T, M5T

| O.A.L. | Lift Height | Part No. | Length |
|---|---|---|---|
| 70" | 132"-144" | C-620963 | 164⅜" |
| 70" | 146"-148" | C-620964 | 170⅝" |
| 76" | 146"-156" | C-620965 | 183⅛" |
| 76" | 158"-166" | C-620966 | 189⅜" |
| 82" | 164"-168" | C-620967 | 200⅝" |
| 82" | 170"-180" | C-620968 | 206⅞" |
| 82" | 182"-184" | C-620969 | 213⅛" |
| 88" | 182"-192" | C-620970 | 224⅜" |
| 88" | 194"-202" | C-620971 | 230⅝" |
| 94" | 200"-204" | C-620972 | 243⅛" |
| 94" | 206"-216" | C-620982 | 249⅜" |

### M7T, M8T

| O.A.L. | Lift Height | Part No. | Length |
|---|---|---|---|
| 71" | 132"-136" | C-616303 | 163" |
| 71" | 138"-142" | C-616304 | 169" |
| 77" | 138"-154" | C-618936 | 181" |
| 77" | 156"-160" | C-618937 | 187" |
| 83" | 156"-168" | C-616305 | 199" |
| 83" | 170"-178" | C-616306 | 205" |
| 89" | 174"-180" | C-618938 | 217" |
| 89" | 182"-192" | C-618939 | 223" |
| 89" | 194"-196" | C-618940 | 229" |
| 95" | 192" | C-616307 | 235" |
| 95" | 194"-204" | C-616308 | 241" |
| 95" | 206"-216" | C-616309 | 247" |

## FOR MASTS WITH 5" UNDERCLEARANCE

### M2T, M3T

| O.A.L. | Lift Height | Part No. | Length |
|---|---|---|---|
| 72" | 130"-144" | C-621117 | 159⅜" |
| 72" | 146"-150" | C-621118 | 165⅝" |
| 78" | 146"-156" | C-621119 | 178⅛" |
| 78" | 158"-168" | C-621120 | 184⅜" |
| 84" | 164"-168" | C-621121 | 195⅝" |
| 84" | 170"-180" | C-621122 | 201⅞" |
| 84" | 182"-186" | C-621123 | 208⅛" |

### M4T, M5T

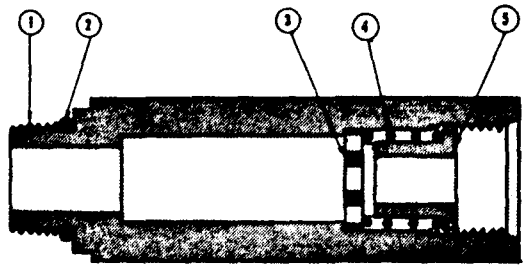
| O.A.L. | Lift Height | Part No. | Length |
|---|---|---|---|
| 72" | 132"-144" | C-621103 | 166⅞" |
| 72" | 146"-148" | C-621104 | 173⅛" |
| 78" | 146"-156" | C-621105 | 185⅝" |
| 78" | 158"-166" | C-621106 | 191⅞" |
| 84" | 164"-168" | C-621107 | 203⅛" |
| 84" | 170"-180" | C-621108 | 209⅜" |
| 84" | 182"-184" | C-621109 | 215⅝" |
| 90" | 182"-192" | C-621110 | 226⅞" |
| 90" | 194"-202" | C-621111 | 233⅛" |
| 96" | 200"-204" | C-621112 | 245⅝" |
| 96" | 206"-216" | C-621113 | 251⅞" |

## FOR MASTS WITH 6" UNDERCLEARANCE

### M7T, M8T

| O.A.L. | Lift Height | Part No. | Length |
|---|---|---|---|
| 74" | 132"-136" | C-620950 | 167" |
| 74" | 138"-142" | C-620951 | 173" |
| 80" | 138"-154" | C-620952 | 185" |
| 80" | 156"-160" | C-620953 | 191" |
| 86" | 156"-168" | C-620954 | 203" |
| 86" | 170"-178" | C-620955 | 209" |
| 92" | 174"-180" | C-620956 | 221" |
| 92" | 182"-192" | C-620957 | 227" |
| 92" | 194"-196" | C-620958 | 233" |
| 98" | 192" | C-620959 | 239" |
| 98" | 194"-204" | C-620960 | 245" |
| 98" | 206"-216" | C-620961 | 251" |

O.A.L – Overall Lowered Height of Mast measured from floor level to top of outer channel.




LOWERING CONTROL VALVE

| REF. NO. | DESCRIPTION | QTY. | M2T-M3T PART NO. | QTY. | M4T-M5T PART NO. | QTY. | M7T-M8T PART NO. |
|---|---|---|---|---|---|---|---|
| | Valve Assembly | 1 | C-616827 | 1 | C-613793 | 1 | C-622427 |
| 1 | Body | 1 | C-613794 | 1 | C-613794 | 1 | C-62242 |
| 2 | O-ring | 1 | C-2842 | 1 | C-2842 | 1 | C-2843 |
| 3 | Washer | 1 | C-616920 | 1 | C-608805 | 1 | C-608805 |
| 4 | Spring | 1 | C-605893 | 1 | C-605893 | 1 | C-613521 |
| 5 | Spacer | 1 | C-605892 | 1 | C-605892 | 1 | C-605892 |

LITHO IN U.S.A.