

**SERVICE REPAIR**

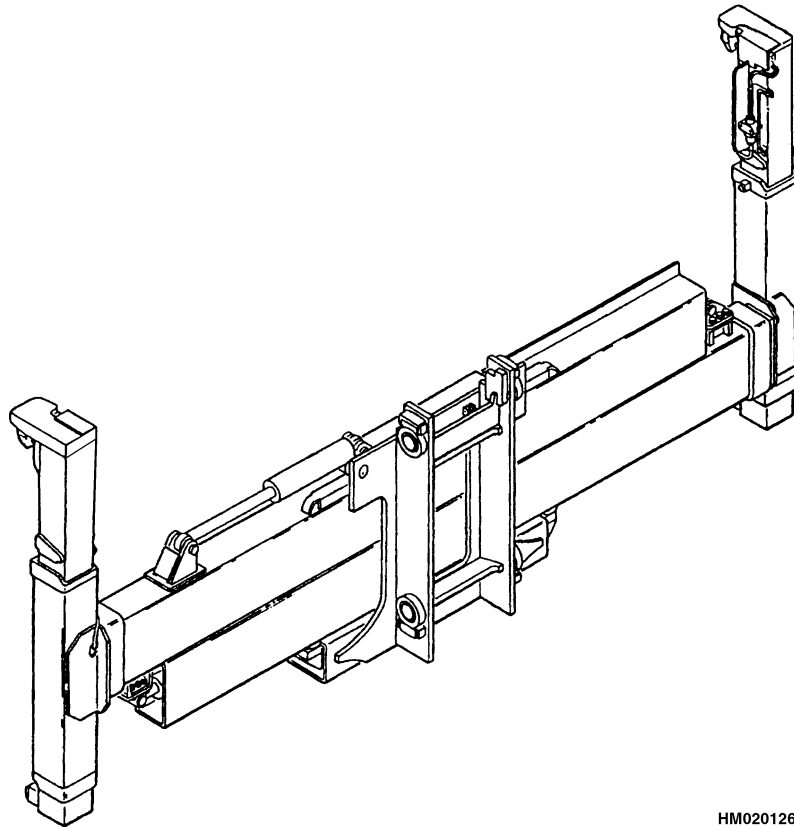
**MANUAL**

Hyster F019 (H300-350HD, H360HD-EC) Forklift

***HYSTER***

# EMPTY CONTAINER HANDLING ATTACHMENT

H10.00-12.00XM-12EC (H360HD-EC) [E019, F019]  
MODELS 553, 555, 558



HM020126

# ***HYSTER***

# SAFETY PRECAUTIONS

## MAINTENANCE AND REPAIR

- When lifting parts or assemblies, make sure all slings, chains, or cables are correctly fastened, and that the load being lifted is balanced. Make sure the crane, cables, and chains have the capacity to support the weight of the load.
- Do not lift heavy parts by hand, use a lifting mechanism.
- Wear safety glasses.
- **DISCONNECT THE BATTERY CONNECTOR** before doing any maintenance or repair on electric lift trucks.
- Disconnect the battery ground cable on internal combustion lift trucks.
- Always use correct blocks to prevent the unit from rolling or falling. See **HOW TO PUT THE LIFT TRUCK ON BLOCKS** in the **Operating Manual** or the **Periodic Maintenance** section.
- Keep the unit clean and the working area clean and orderly.
- Use the correct tools for the job.
- Keep the tools clean and in good condition.
- Always use **HYSTER APPROVED** parts when making repairs. Replacement parts must meet or exceed the specifications of the original equipment manufacturer.
- Make sure all nuts, bolts, snap rings, and other fastening devices are removed before using force to remove parts.
- Always fasten a **DO NOT OPERATE** tag to the controls of the unit when making repairs, or if the unit needs repairs.
- Be sure to follow the **WARNING** and **CAUTION** notes in the instructions.
- Gasoline, Liquid Petroleum Gas (LPG), Compressed Natural Gas (CNG), and Diesel fuel are flammable. Be sure to follow the necessary safety precautions when handling these fuels and when working on these fuel systems.
- Batteries generate flammable gas when they are being charged. Keep fire and sparks away from the area. Make sure the area is well ventilated.

**NOTE:** The following symbols and words indicate safety information in this manual:



### **WARNING**

**Indicates a condition that can cause immediate death or injury!**



### **CAUTION**

**Indicates a condition that can cause property damage!**

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manual**

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<p>This section is for the following models:</p> <p>H10.00-12.00XM-12EC (H360HD-EC) [E019, F019]</p> <p>Models 553, 555, 558</p>
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## General

This section has the description and repair procedures for telescopic empty container handling attachment and operator controls. See Figure 1. Three methods of engagement are covered in this section as follows:

- Model 553 with one pair of horizontally mounted twist locks
- Model 555 with one pair of suspended hooks
- Model 558 with one pair of vertically mounted twist locks

## Description

The extendable container attachment can be used at three widths: 6.1 m (20 ft), 12.2 m (40 ft), and when equipped with optional stops, 9.15 m (30 ft). Models 553 and 558 use twist locks and Model 555 uses hooks, which are entered into side pockets of container corner castings. See Figure 1, Figure 2, Figure 3, and Figure 4. The attachment has a center frame, two outer booms, and two floating vertical end beams. The center frame is installed on the carriage and can move from side to side with the use of a sideshift cylinder. The outer booms, supported by several glide plates for friction reduction, extend and retract from the center frame through the use of hydraulic extension cylinders. The extension cylinders on attachment are actuated by hydraulic pressure from main control valve.

A vertical tube is mounted to the end of each outer boom. A vertical end beam assembly fits into each tube and facilitates engaging and disengaging the attachment with containers. The vertical end beams can move vertically 150 mm (6 in.) to allow alignment when required. This allows the driver the possibility of raising or lowering the attachment after one twist lock or hook has been engaged with a container, so the other end can be accurately aligned before it is inserted.

Header hoses and an electrical cable connect the hydraulic and electrical circuits to the attachment.

## Operation

### GENERAL

The attachment has hydraulic and electrical circuits to control its operation. See Figure 15, Figure 16, Figure 17, Figure 18, Figure 19, and Figure 20. The operator controls these functions from the operator's compartment. Depending on the model, attachment has selector valves for operation of sideshift, extension cylinders, and twist locks. The electrical circuit incorporates sensors and switches to verify correct position of container to attachment and the twist locks.

**NOTE:** Model 555 does not have indicators to tell driver that attachment is correctly engaged or disengaged.

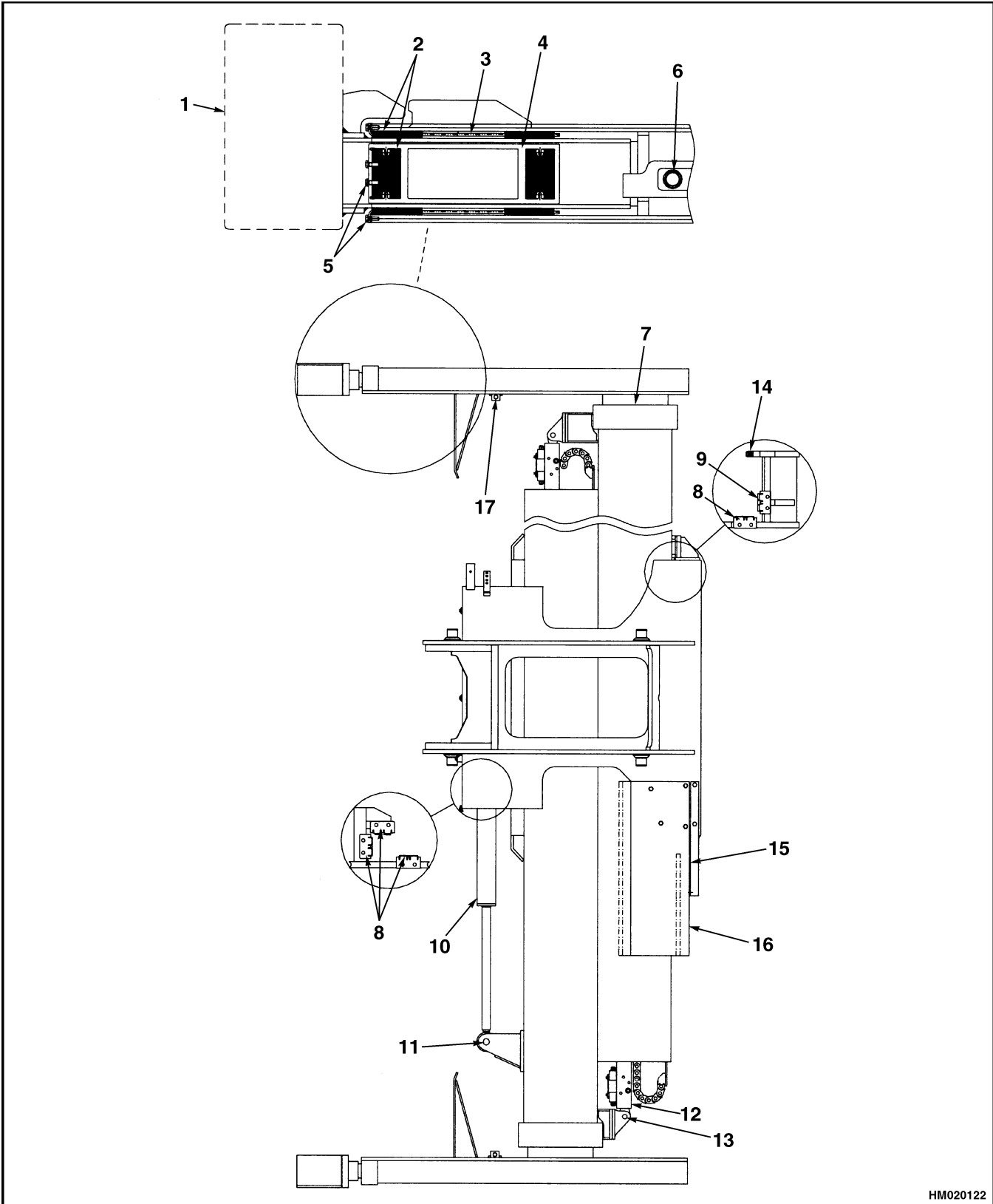
### SELECTOR VALVES

Each selector valve has two solenoids that operate the spool. The spool opens and closes a hydraulic

circuit for certain functions. Dependant upon model, selector valves are mounted on a common manifold on attachment.

### SIDESHIFT CIRCUIT

The attachment moves horizontally on the carriage. The operator energizes left or right solenoid using sideshift lever. Hydraulic oil is then supplied to appropriate cylinder end and attachment is moved. Relief valve within circuit limits maximum hydraulic pressure to 14.0 MPa (2030 psi). The sideshift cylinder is connected between the carriage and the center frame. There are four glide plates on the bottom and six glide plates on the top of the carriage to guide the movement of the attachment on the carriage. The bottom of the carriage is secured in the forward direction by two stop blocks.



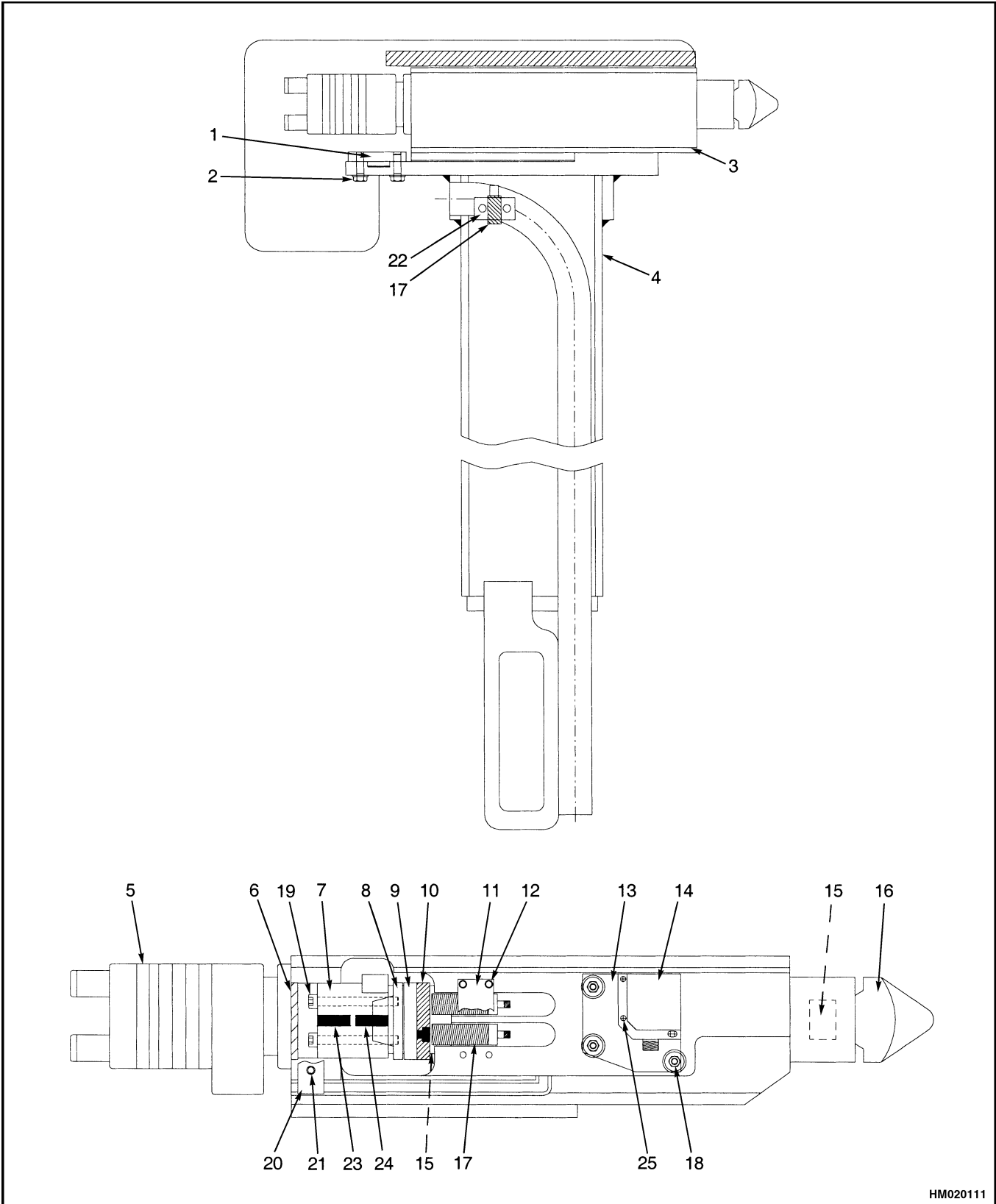
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*Figure 1. Empty Container Attachment*



*Legend for Figure 1*

- |   |  |
|---|--|
| 1. END BEAM ASSEMBLY                          | 11. PIN, BOLT, NUT                           |
| 2. WEAR PADS                                  | 12. EXTENSION CYLINDER ASSEMBLY              |
| 3. BRACKET                                    | 13. BRACKET, BOLT, NUT, WASHER, PIN, WASHER, |
| 4. BRACKET                                    | COTTER PIN, PIN, SNAP RING                   |
| 5. BOLT, WASHER                               | 14. STOP BLOCK, BOLT, WASHER                 |
| 6. PIN, BOLT, NUT                             | 15. BRACKET                                  |
| 7. WEAR PADS                                  | 16. COVER                                    |
| 8. WEAR PADS, BRACKET, BOLT, WASHER           | 17. PIN, BOLT, NUT                           |
| 9. WEAR PADS, BRACKET, BOLT, WASHER           |  |
| 10. SIDESHIFT ASSEMBLY, SOCKET HEAD<br>SCREWS |  |

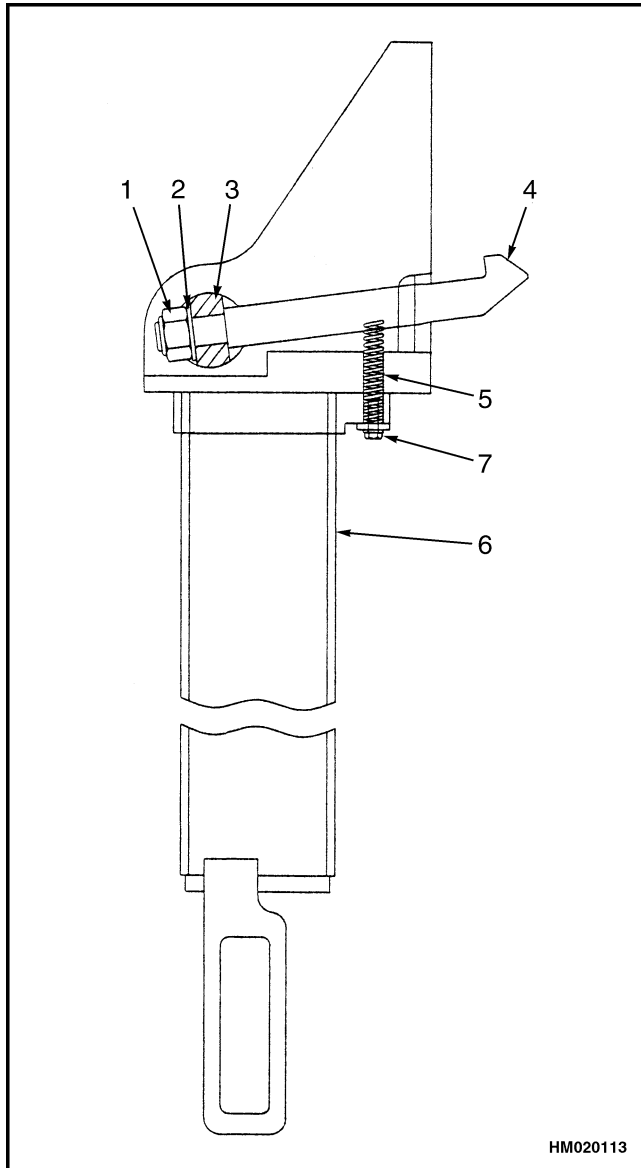


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**Figure 2. End Beam Assembly (Model 553)**

*Legend for Figure 2*

- |                               |                         |
|-------------------------------|-------------------------|
| 1. PLATE                      | 14. SENSOR              |
| 2. BOLT, LOCKWASHER           | 15. BUSHING             |
| 3. HOUSING                    | 16. TWIST LOCK          |
| 4. END BEAM                   | 17. SENSOR              |
| 5. HYDRAULIC MOTOR            | 18. SHOCK ABSORBER, NUT |
| 6. RING                       | 19. SOCKET HEAD SCREW   |
| 7. SLEEVE                     | 20. HOSE CLAMP          |
| 8. COLLET                     | 21. BOLT, WASHER        |
| 9. RING                       | 22. BRACKET             |
| 10. RINGS, SOCKET HEAD SCREWS | 23. KEY                 |
| 11. BRACKET                   | 24. KEY                 |
| 12. SOCKET HEAD SCREW         | 25. SOCKET HEAD SCREW   |
| 13. PLATE                     |                         |



- |               |                |
|---------------|----------------|
| 1. NUT        | 5. SPRING      |
| 2. WASHER     | 6. END BEAM    |
| 3. STUB SHAFT | 7. PLATE, BOLT |
| 4. HOOK       |                |

**Figure 3. End Beam Assembly (Model 555)**

### EXTEND AND RETRACT CIRCUIT

The attachments are designed to lift either 20- or 40-ft containers. The optional 30-ft stop kit allows lifting 30-ft containers. The 30-ft position is obtained by energizing the 30-ft stop while extending or retracting the beams.

When the operator selects the extend or retract function with the control lever, the appropriate solenoid is energized and oil from the main control valve is supplied to the extension cylinders via the control valves. A relief valve within the circuit limits hydraulic pressure to a maximum 14.0 MPa (2030 psi) to protect the extension cylinders from damage.

### TWIST LOCK CIRCUIT AND CONTROL

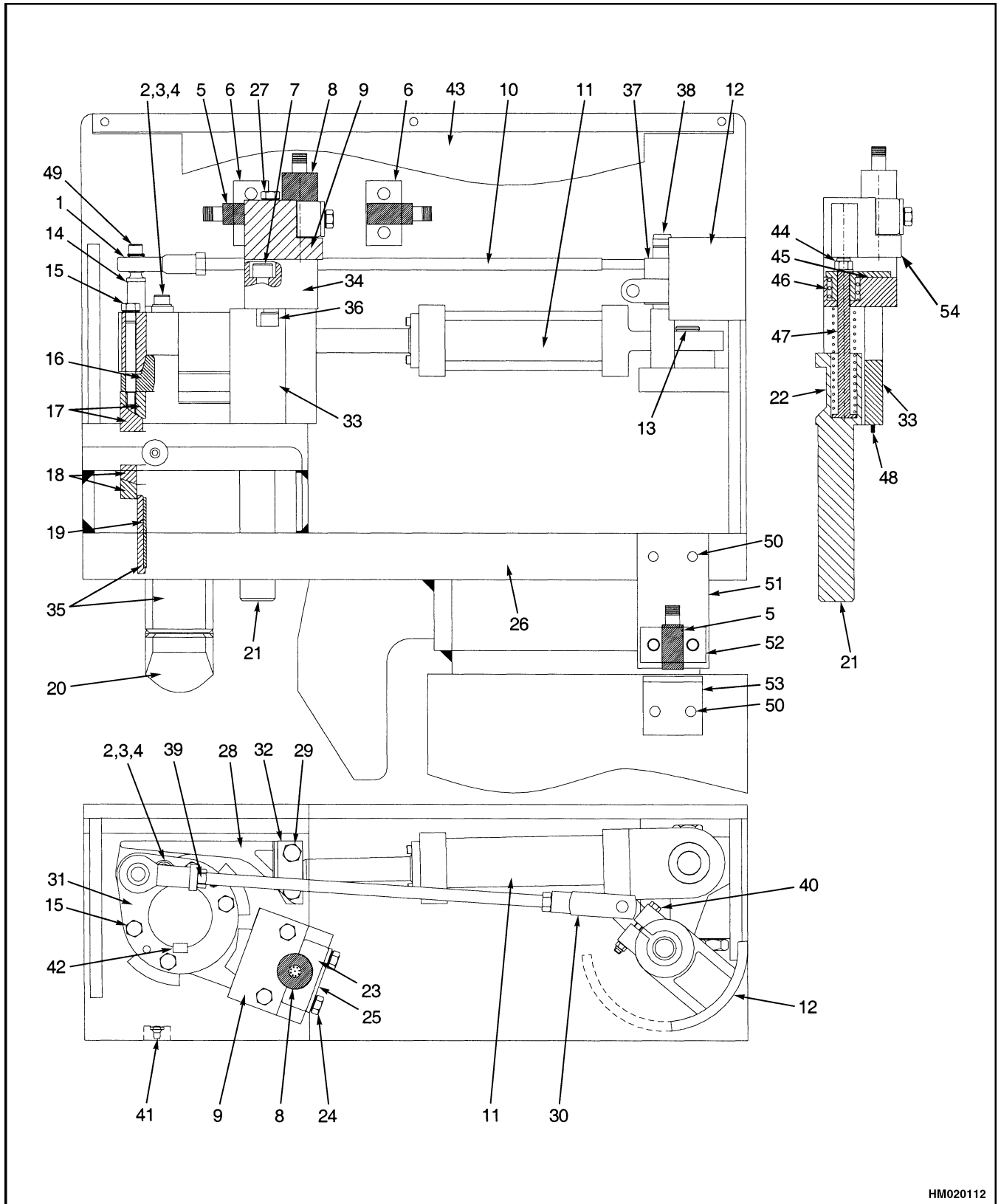
For model 553, locking of the twist locks is done manually only. For model 558, locking of the twist locks can be either manually or automatically. Unlocking is always done manually. Locking or unlocking is controlled by energizing the relevant solenoids and spools. Relief valves within the circuit limit the maximum hydraulic pressure to 8 MPa (1160 psi).

#### Model 553 - Horizontally Mounted

The horizontally-mounted twist lock circuit uses a twist lock motor and three sensors. See Figure 2. The three sensors register if the twist lock is locked, twist lock is unlocked, and container is seated.

To pick up a container, twist locks must be in unlocked position. The horizontal twist locks enter side pockets of container corner castings. When completely entered, the seated sensor registers and switches related amber light ON. When both seated sensors register and both amber lights are ON, twist lock circuit will allow twist lock motor to be operated. For model 553, locking and unlocking of twist locks is done manually only. Opening twist locks is also a manual operation.

To protect against possibility of twist locks opening unintentionally, twist locks have a flat surface, which touches vertical area of the corner casting when container is being carried. The weight of container locks the flat surface of twist lock against vertical area of corner casting and prevents twist lock from turning. It therefore is important to make sure that the attachment is completely seated before locking or unlocking twist locks.



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Figure 4. End Beam Assembly (Model 558)

*Legend for Figure 4*

- |  |  |
|--|--|
| 1. ROD END                                   | 28. TIE ROD END                                |
| 2. RING PIN                                  | 29. BOLT, LOCKWASHER, NUT                      |
| 3. SOCKET HEAD SCREW                         | 30. ROD END                                    |
| 4. LOCKWASHER                                | 31. CRANK                                      |
| 5. SENSOR                                    | 32. FLAG                                       |
| 6. SENSOR BRACKET, SPACER, SOCKET HEAD SCREW | 33. SEATED TOWER                               |
| 7. SOCKET HEAD SCREW                         | 34. BRACKET                                    |
| 8. SENSOR                                    | 35. SLEEVE                                     |
| 9. BRACKET                                   | 36. SOCKET HEAD SCREW                          |
| 10. ROD                                      | 37. ARM  |
| 11. CYLINDER ASSEMBLY                        | 38. NUT, WASHER, BUSHING, NYLON WASHER, WASHER |
| 12. INDICATOR                                | 39. NUT  |
| 13. SNAP RING                                | 40. BOLT, NUT                                  |
| 14. PIN                                      | 41. GREASE NIPPLE                              |
| 15. BOLT, LOCKWASHER                         | 42. KEY  |
| 16. COLLET                                   | 43. COVER                                      |
| 17. UPPER BEARING                            | 44. NUT  |
| 18. LOWER BEARING                            | 45. INDICATOR                                  |
| 19. BUSHING                                  | 46. SPRING                                     |
| 20. TWIST LOCK                               | 47. ROD  |
| 21. SEATED PIN                               | 48. ROLL PIN                                   |
| 22. SPRING                                   | 49. SOCKET HEAD SCREW, WASHER                  |
| 23. BRACKET                                  | 50. BOLT, LOCKWASHER                           |
| 24. BOLT, LOCKWASHER                         | 51. BRACKET                                    |
| 25. TOP PLATE                                | 52. SENSOR BRACKET, SOCKET HEAD SCREW          |
| 26. HEAD                                     | 53. INDICATOR                                  |
| 27. BOLT                                     |  |

**Model 558 - Vertically Mounted**

The vertically-mounted twist lock circuit uses a twist lock cylinder and three sensors. See Figure 4. The three sensors register the following: twist lock is locked, twist lock is unlocked, and container is seated.

To pick up a container, twist locks must be in unlocked position. Vertical twist locks enter top pockets of container corner castings. When completely entered, the seated sensor registers and switches related amber light ON. When both seated sensors register and both amber lights are ON, twist lock circuit will allow twist lock cylinders to be operated. Twist locks may be operated manually by driver, or may operate automatically after a 2-second time delay. Opening the twist locks is always a manual operation.

To protect against the possibility of twist locks opening unintentionally, seated pins have a cam in place which prevents twist lock crank from turning if seated pin is not seated.

**LIFTING HOOKS****Model 555**

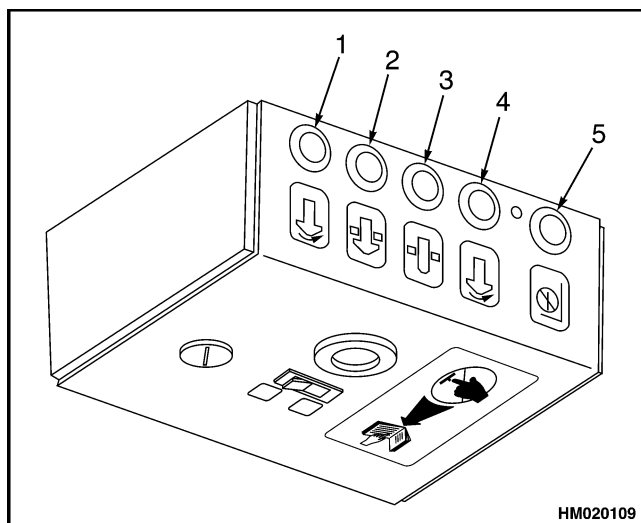
Model 555 does not have sensors or indicator lights to register position of hooks in relation to container. On this type of attachment, all safety monitoring must be done by driver. A good condition of hooks is essential. Check condition of hooks on a daily basis.

To pick up a container, approach container with mast tilted slightly forward. Enter one hook and then maneuver other hook up and down until hook can be entered into side pocket of container.

## INDICATOR LIGHTS AND LEDS

There are four indicator lights on left side of attachment and five LEDs in operator's cab. See Figure 5 and Figure 6. Indication is as follows:

- Left Amber Light and LED indicate attachment is seated on left side and ready to have twist locks activated.
- Green Light and LED indicate that both twist locks are in locked position and ready to lift the container.
- Red Light and LED indicate that both twist locks are in unlocked position. It is now possible to move the twist locks into or out of the corner pockets.
- Right Amber Light and LED indicate attachment is seated on right side and ready to have twist locks activated.
- Blue LED (cab only) indicates that overlowering interrupt function or lift interrupt is activated.



- |                   |                    |
|-------------------|--------------------|
| 1. LEFT AMBER LED | 4. RIGHT AMBER LED |
| 2. GREEN LED      | 5. BLUE LED        |
| 3. RED LED        |                    |

*Figure 5. Indicator LEDs*

### LIFT INTERRUPT AND OVERRIDE



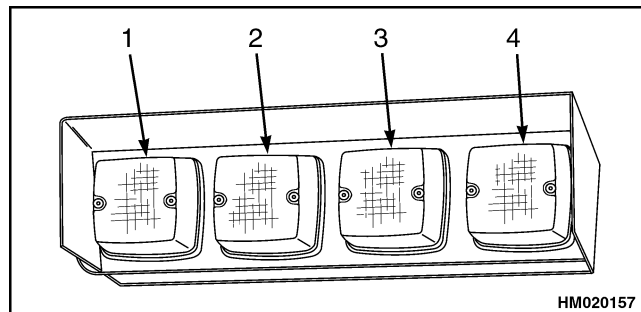
#### WARNING

Only use override feature for the positioning of twist locks to enable proper locking. Do not use

override feature for general lifting and transport of container.

When attachment is seated and any of the twist locks are between unlocked and locked position, the blue LED inside operator's cab will illuminate and lift interrupt system will not allow lifting of mast.

To override lift interrupt feature, turn override key switch clockwise and push override button while using lift lever.



- |                     |                      |
|---------------------|----------------------|
| 1. LEFT AMBER LIGHT | 3. RED LIGHT         |
| 2. GREEN LIGHT      | 4. RIGHT AMBER LIGHT |

*Figure 6. Indicator Lights*

### OVERLOWERING INTERRUPT AND OVERRIDE



#### WARNING

When lifting after using the override feature, verify that chains, hoses, and cables are not obstructed in any way.

An overlowering interrupt feature is incorporated on models 553 and 558. The overlowering interrupt function prevents further lowering of attachment when both end beams have been raised in relation to outer booms. This prevents slacking of chains, hoses, and wires over the mast. It also reduces shock on attachment. The blue LED in operator's cab will illuminate when lowering interrupt is activated.

To override overlowering interrupt feature, turn override key switch clockwise and push override button while using lowering lever.

## Carriage and Attachment Repair

### REMOVE



#### WARNING

When working on or near mast, see **Safety Procedures When Working Near Mast in Mast 4000 SRM 445**.

**Do not work under a raised carriage. Lower carriage or use a chain to prevent carriage and inner mast from lowering. Attach all moving parts of mast to parts that DO NOT move with a chain and make secure.**

1. Put mast in a vertical position. Lower carriage onto blocks so lift chains and hoses are not under tension. Shut off engine.



#### WARNING

**Do not disconnect any hydraulic lines when engine is running.**

2. Disconnect hydraulic lines to attachment and put caps on open lines. Disconnect electrical connector at attachment. Remove clamps as necessary to remove harness from carriage.



#### WARNING

**Keep control of lift chains when disconnecting them from carriage. Use wire to temporarily connect ends of lift chains to mast. This procedure will prevent lift chains from falling and causing an injury or damage.**

3. Remove pin from each chain anchor at carriage. Disconnect lift chains from carriage. Attach a rope to ends of each lift chain to control their movement.
4. Connect a lifting device to attachment main frame using lifting straps. Verify frame will have stability once disconnected. Lifting device with lifting straps must hold 10,000 kg (22,046 lb).



#### WARNING

**When carriage is not connected to mast, it can fall and cause an injury. Make sure carriage has stability and will not fall over when inner mast is raised above carriage.**

5. Use lift cylinders to raise inner mast until it is above load rollers of carriage. If hydraulic system cannot be used, connect a lifting device to top of inner mast. Carefully raise inner mast until it is above load rollers of carriage.
6. Carefully move lift truck away from attachment. Put attachment on blocks on a flat surface so that carriage is up.
7. If any of the load rollers need to be replaced, make a note of location of shims.

**NOTE:** For further details on repairs and adjustments of carriage, see **Mast 4000 SRM 445**.

## Attachment Without Carriage Repair

**NOTE:** Most repairs for attachment can be done while attachment is installed on lift truck. If attachment must be removed, this can be done by either removing carriage and attachment or just attachment.

### REMOVE

1. Retract attachment to 6.1 m (20 ft) width. Put mast in vertical position. Shut down engine.
2. Remove sideshift cylinder. See **Sideshift Cylinders Repair, Remove**.
3. Disconnect hydraulic lines to attachment and put caps on open lines. Disconnect electrical connector at attachment. Remove clamps as necessary to remove harness from carriage.
4. Remove covers for lower sideshift wear pads.
5. Connect a lifting device to attachment main frame using lifting straps. Verify frame will have stability once disconnected. The lifting device with lifting straps must hold 10,000 kg (22,046 lb).
6. Remove bolts from two lower front stop blocks.



- Remove top two wear blocks to allow easier removal of attachment. Slide lower frame of attachment forward so frame rotates slightly. This

will allow top bar of attachment frame to be released from the carriage. For further disassembly, attachment should be put in a flat position.

## Sideshift Cylinders Repair

### REMOVE

- Disconnect hydraulic lines at cylinder. Put caps on open lines and cylinder.
- Remove cylinder. To remove lock nut from cylinder rod end, use a wrench on flats so rod end will not turn in cylinder.

### DISASSEMBLE

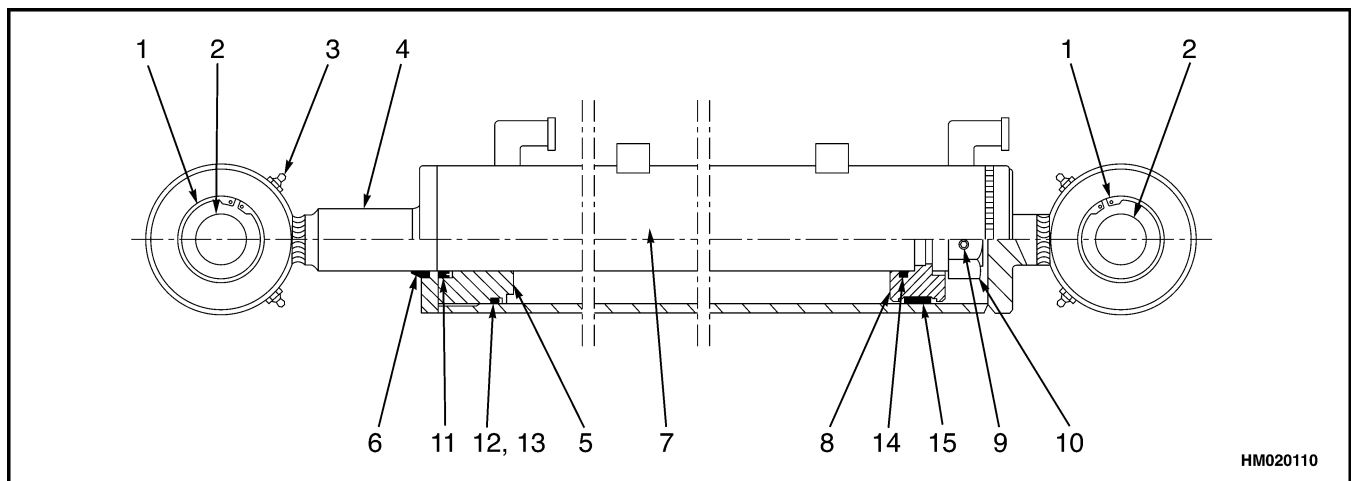
- Remove gland nut. See Figure 7.
- Pull rod assembly and retainer from cylinder shell. Remove gland nut from rod.

- Remove nut and piston from rod.

- Remove and discard all wipers, seals, backup rings, and O-rings from gland nut.

### ASSEMBLE

- Install new wipers, seals, and backup ring on piston. See Figure 7.
- Install gland nut piston onto rod and tighten nut to 800 N•m (590 lbf ft).
- Install rod and piston in shell.



- |                      |                 |
|----------------------|-----------------|
| 1. SNAP RING         | 9. SETSCREW     |
| 2. SPHERICAL BEARING | 10. NUT         |
| 3. GREASE NIPPLE     | 11. SEAL ROD    |
| 4. PISTON ROD        | 12. O-RING      |
| 5. GLAND NUT         | 13. BACKUP RING |
| 6. WIPER RING        | 14. O-RING      |
| 7. SHELL             | 15. SEAL PISTON |
| 8. PISTON            |                 |

*Figure 7. Sideshift Cylinder*

## Extension Cylinders Repair

### REMOVE

1. Retract attachment to 20-ft position. Shut down engine. See Figure 1 and Figure 8.
2. Disconnect hydraulic lines at chain end (42) and put caps on open lines. Disconnect electrical plugs at chain end.
3. Remove bracket (25) holding chain and hose clamp closest to chain.
4. Start engine. Extend extension beam approximately 1200 mm (4 ft) allowing removal of pin at rod end of extension cylinder.
5. Remove snap ring and pin from rod end of extension cylinder.
6. Retract attachment to 20-ft position. Shut down engine.
7. Using a crane or lift truck, pull extension beam out approximately 1200 mm (4 ft). Carefully guide hose/cable chain into center frame.
8. Remove two bolts holding interface box and reposition box to prevent damage.
9. Support extension cylinder using a crane or lifting device capable of supporting 250 kg (551 lb).
10. Remove six bolts at gland (10) holding extension cylinder.
11. Remove extension cylinder from attachment horizontally until cylinder is completely clear of main frame of attachment. Carefully guide chain to prevent damage.

### DISASSEMBLE

1. Remove four bolts (16) that hold ring (6).
2. Slide ring away from cylinder head.
3. Pull piston rod (3) out of cylinder.
4. Piston (13) will touch spacer (11), which will push out gland (10), O-ring (23), bushing (9), and seal ring (22). It will also push out wiper ring (4), guide ring (8), and washer (5).
5. Remove setscrew (15). Remove nut and piston from rod.

6. Inspect components and replace if necessary.

### CLEAN AND INSPECT



#### WARNING

**Cleaning solvents can be flammable and toxic and can cause skin irritation. When using cleaning solvents, always follow the solvent manufacturer's recommended safety precautions.**

Clean parts of the cylinder with solvent. Inspect shell, rod, and piston for wear or damage. Inspect bearing blocks for wear or damage. Install new parts as necessary.

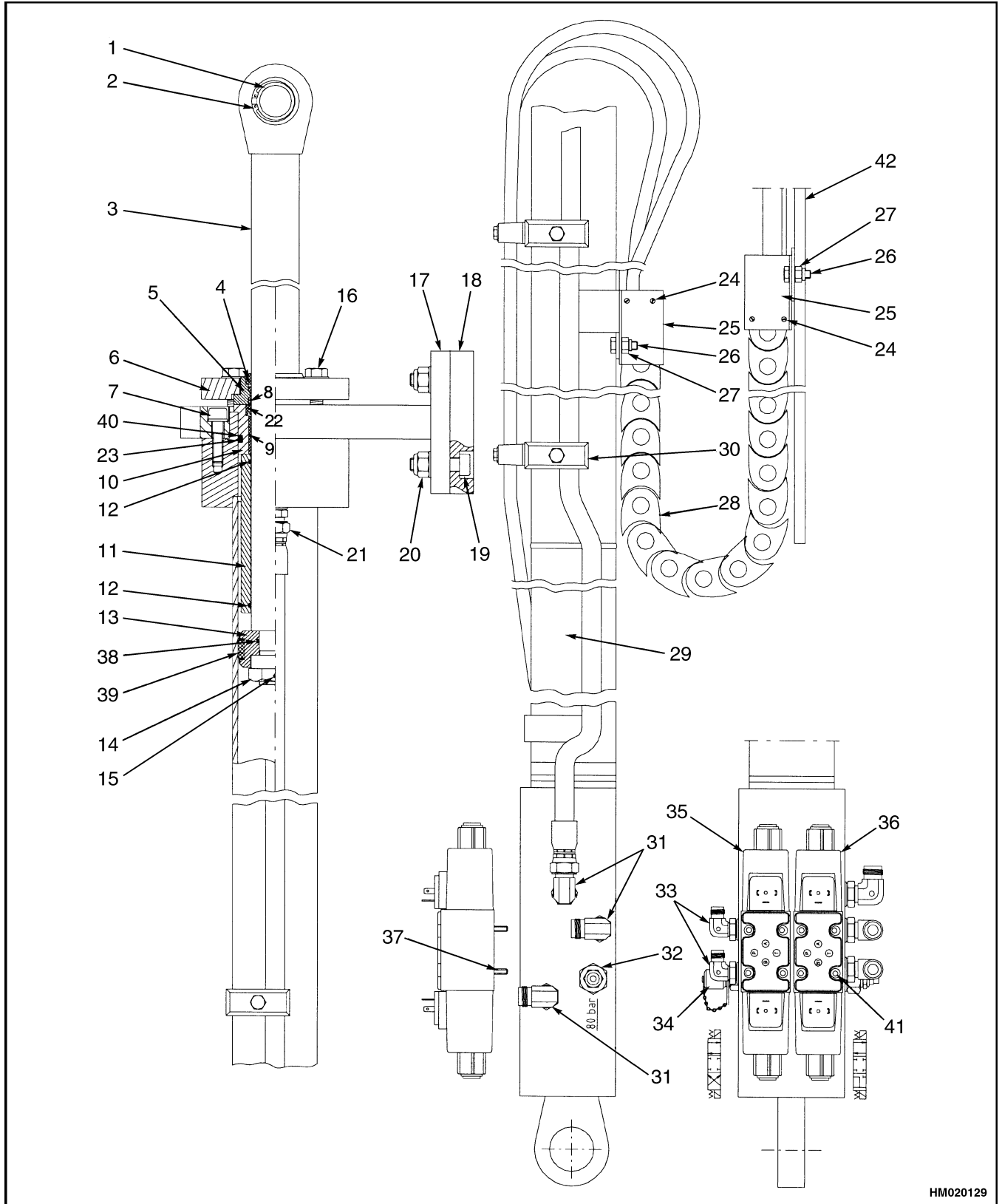
**NOTE:** The pressure reducer (32) has been sealed and is supplied with a pressure setting of 80 bar (1160 psi). See Figure 8. Do not adjust this pressure setting.

### ASSEMBLE

Follow steps under Disassemble in reverse order.

### INSTALL

1. Clean tracks and lubricate in those positions where nylon pads (18) for extension cylinder will come in contact with center beam. See Figure 8.
2. Use a crane or other lifting device capable of supporting 250 kg (551 lb) and install extension cylinder until bracket holding extension cylinder is aligned. Carefully guide hose/cable chain into center frame.
3. Install six bolts holding bracket.
4. Mount interface box using two bolts.
5. Connect electrical connectors at rear of extension cylinder. Connect hydraulic lines to extension cylinder.
6. Start engine. Extend attachment and align piston rod (3) end with extension beam, allowing installation of pin and snap ring. Install pin and snap ring.
7. Retract attachment to 20-ft position. Carefully guide hose/cable chain.



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Figure 8. Extension Cylinder