SERVICE REPAIR

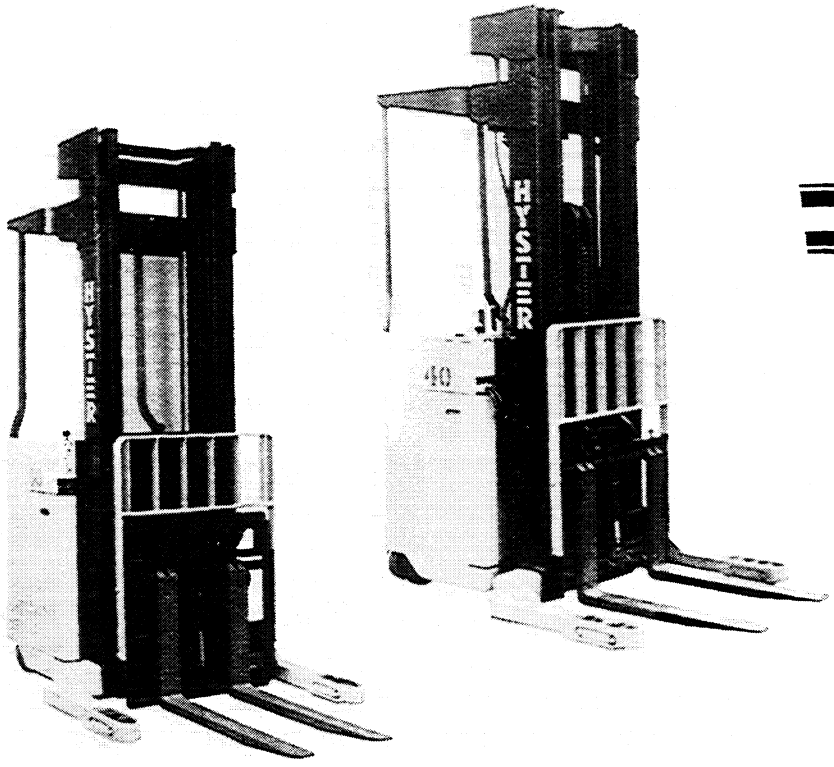
MANUAL

Hyster D138 (N40FR, N45FR, N50FA) Forklift

HYSTER

VISTA® UPRIGHT

REPAIR



HYSTER

PART NO. 897248

4000 SRM 383

SAFETY PRECAUTIONS
MAINTENANCE AND REPAIR

- When lifting parts or assemblies, make sure that all slings, chains or cables are correctly fastened and that the load being lifted is balanced. Make sure that 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 and working area clean and in order.

- 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 that all nuts, bolts, snap rings and other fastening devices are removed before using force to remove parts.

- Always fasten a DO NOT OPERATE sign to the controls of the unit when making repairs or if the unit needs repairs.

- Make sure you follow the **DANGER, WARNING** and **CAUTION** notes in the instructions.

- Gasoline, Liquid Petroleum Gas (LPG), and Diesel are flammable fuels. Make sure that you 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 has ventilation.

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This section is for the following models:
N40-50EA, N40-45ER,
R30E, R30EA, R30EA-FS

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"THE QUALITY KEEPERS"

HYSTER APPROVED PARTS

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INTRODUCTION

GENERAL

This section has the repair procedures for the Vista two-stage and three-stage uprights. A section for troubleshooting and a section for checks and adjustments is given at the end of the section. The description and operation of the uprights is given in the section VISTA UPRIGHTS, 4000 SRM 382. Repair procedures for the N40-50EA carriage and the R30E/EA/EA-FS operator platform is also in this section. Repair procedures for the N40-45ER reach carriages is in the section REACH CARRIAGES, 4500 SRM 384.

REPAIRS

NOTE: Many of the procedures for the N40-50EA and N40-45ER need the door open. To open this door, remove the capscrew at the top of the left-hand post for the overhead guard to permit the post to move with the door. Then, remove the screw that fastens the door and open the door. Make sure to install and tighten the capscrew at the top of the post after closing the door.

⚠ WARNING

Lower the lift mechanism completely. Never allow anyone under a raised carriage, operator platform or forks. Do not put any part of your body in or through the mechanism unless all parts of the upright are completely lowered and the key switch is OFF.

Before making any repairs, use blocks and chains on the upright weldments and carriage or operator platform so that they can not move. Make sure the moving parts are attached to a non-moving part.

FORKS

⚠ WARNING

Forks are heavy and can cause an injury. Do not try to remove forks without using a lifting device.

Replacement (N40-50EA) (See Figure 1)

NOTE: This replacement procedure is for the hook type forks used on the standard (not reach) N40-50EA carriage. Replacement procedures for the pin type forks on the N40-45ER reach carriages is in the section REACH CARRIAGES, 4500 SRM 384.

These forks are connected to the carriage by hooks and locking pins. The pins fit through the top fork hooks and into slots on the top crossmember of the carriage. The forks can be removed and installed by aligning them with the removal notch. The removal notch is in the bottom crossmember of the carriage.

Replacement (R30E/EA/EA-FS) (See Figure 1)

Each of these forks is connected to the operator platform by a pin near the edge of the platform. The pin fits through a tube welded to the top of the fork. The forks can be removed by raising the operator platform for access.

⚠ WARNING

Before replacing forks, use blocks and chains on the upright weldments and operator platform so that they can not move. Make sure the moving parts are attached to a non-moving part.

Use blocks and chains to prevent movement of the upright or operator platform. Support the fork, remove the snap ring on the end of the pin and remove the pin. Install the forks using the reverse procedure. Make sure the hook at the end of the fork engages the plate of the platform. Do not install any shims at this time. Make sure the operator platform is fully lowered. Adjust the lift chains of the operator platform so that the tip of the highest fork is within the specification. See the procedure LIFT

CHAIN ADJUSTMENTS at the end if this section. After the chains are adjusted, use shims on the top of the fork (lowest fork tip) at the hook so that the fork tips are aligned within 3.2 mm (1/8 in).

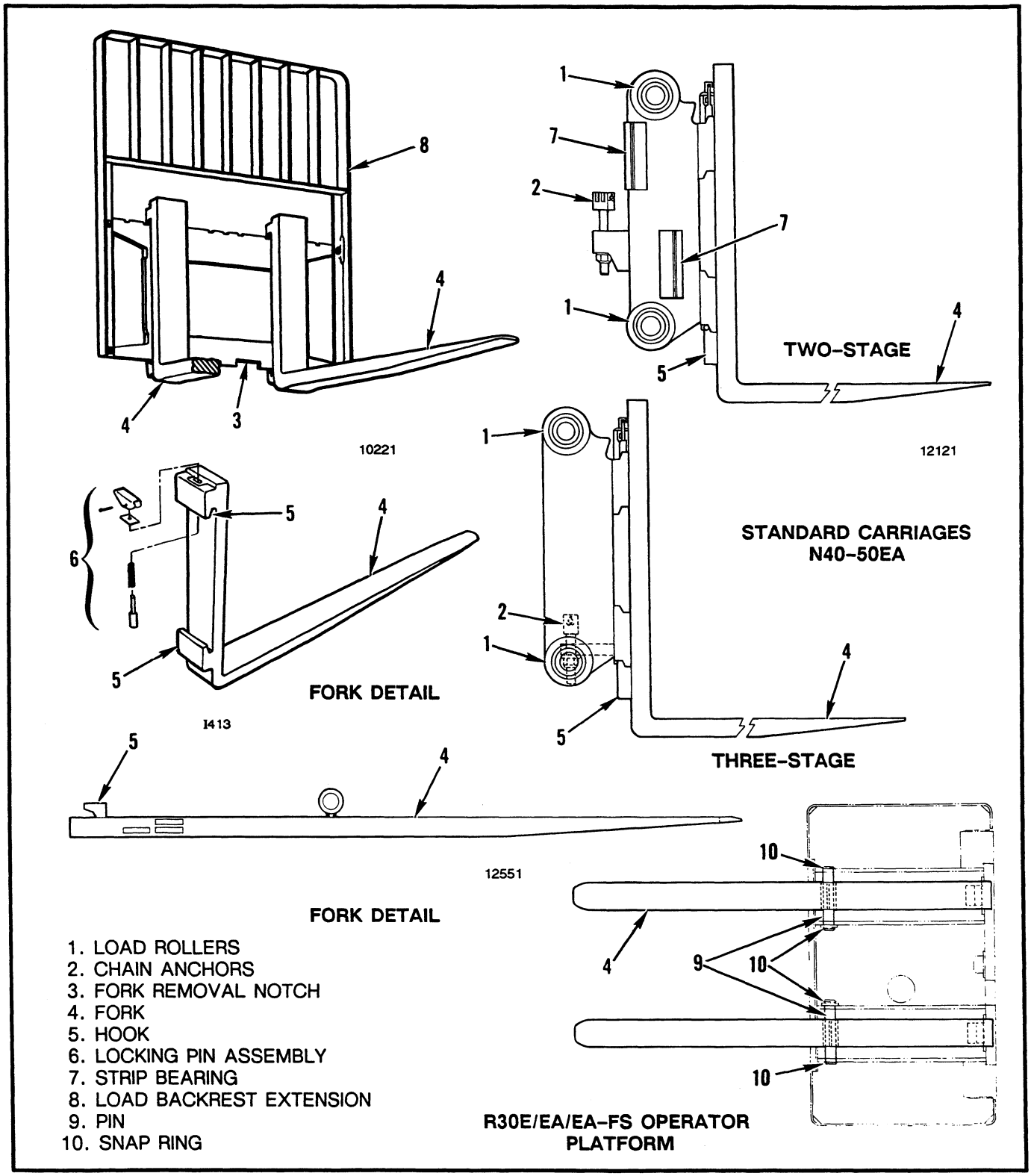


FIGURE 1. FORKS AND N40-50EA STANDARD CARRIAGE OR R30E/EA/EA-FS OPERATOR PLATFORM

CARRIAGE OR OPERATOR PLATFORM

NOTE: Removal and repair procedures for the N40-45ER reach carriages is in the section REACH CARRIAGES, 4500 SRM 384.

Removal

A. Remove the forks as described in FORKS Replacement of this section.

NOTE: On N40-50EA units remove the operator upright guard (clear plastic or wire) for access to the back of the carriage.

B. If the hydraulic system cannot be used, do Step C instead of this step. Tie a rope to the free-lift crosshead (3-stage only). Use the hydraulic system to raise the carriage or operator platform for access to the chain anchors above the top of the main lift truck frame.

C. When the hydraulic system cannot be used, connect a crane to the top of the carriage or operator platform. Make sure that the chains or slings do not damage the parts of the carriage or operator platform. Tie a rope to the free-lift crosshead (3-stage only). Carefully lift the carriage or operator platform for access to the chain anchor(s) above the top of the main lift truck frame. Make sure the lift chain(s) pass over the sheave(s) correctly.

⚠ WARNING

Before making any repairs, use blocks and chains on the upright weldments and carriage or operator platform so that they can not move. Make sure the moving parts are attached to a non-moving part.

Lift chains and cables can roll over the sheaves to fall and possibly cause an injury if the ends are not fastened. Keep control of the ends of the lift chains and cables as they are disconnected.

D. Use blocks and chains to prevent movement of the upright or operator platform. Use the battery disconnect lever to disconnect the battery. Remove the battery as described in the Operating Manual or the section PERIODIC MAINTENANCE, 8000 SRM 410.

E. Remove the pin(s) in the chain anchor of the carriage or operator platform to disconnect the lift chain(s). Removing the pin(s) will disconnect the lift chain(s) without changing the chain adjustment. Carefully move the lift chain(s) through the sheave(s) and lay the chain(s) over the top of the lift truck.

F. Use a ladder for access to the R40E/EA/EA-FS operator platform. Make a note of all the connections and disconnect the electrical cables. Carefully move each cable through the sheave and lay it over the top of the lift truck.

G. Use a crane and chains or slings to support the carriage or operator platform. Remove the blocks and chains. Use the crane to slowly lower the carriage or operator platform to the floor. Make sure the carriage or operator platform is resting on the floor and not on chains or slings.

⚠ WARNING

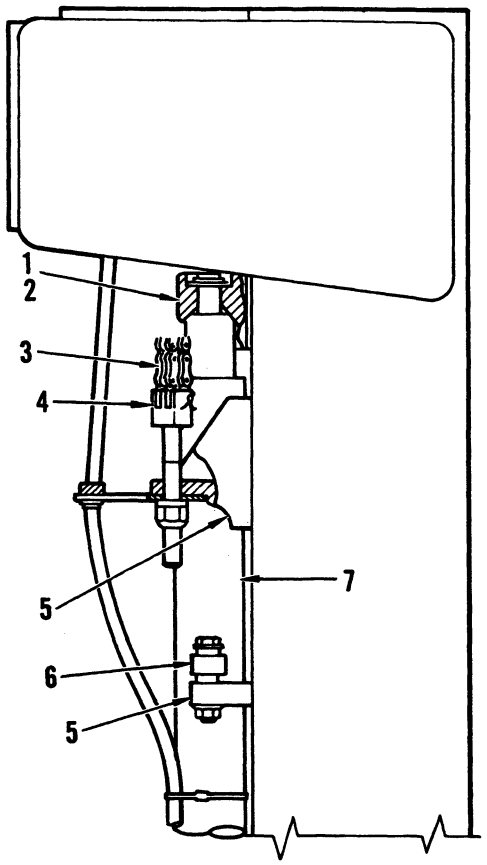
The carriage or operator platform assembly is heavy and can cause an injury if it tips or falls. Make sure the carriage or operator platform assembly has stability during and after removal.

H. Fasten the carriage or operator platform so that it can not fall. Use chains or slings to fasten a crane to the inner upright weldment. On two-stage uprights, remove the snap ring and washer at the rod of each lift cylinder. See Figure 2. The inner upright weldment must be able to move without extending the cylinder rods.

I. Use the crane to slowly raise the inner upright weldment so that the carriage rollers come out the bottom of the channels. Make sure the chains or slings do not damage the sheaves or other upright parts. Make sure there is clearance for the chains or slings as the inner upright weldment moves. Carefully move the carriage away from the lift truck. Carefully lower the inner upright weldment.

J. On N40-50EA three-stage uprights, have a helper hold the Lowering Lever in the LOWER position. On R40E/EA/EA-FS three-stage uprights, open the Manual Lowering valve. Pull on the rope to retract the free-lift cylinder rod.

1. LIFT CYLINDER MOUNT
2. INNER (2-STAGE) OR INTERMEDIATE (3-STAGE) UPRIGHT WELDMENT SUPPORT
3. LIFT CHAIN
4. CHAIN ANCHOR
5. OUTER UPRIGHT WELDMENT SUPPORT
6. SHELL SUPPORT
7. LIFT CYLINDER



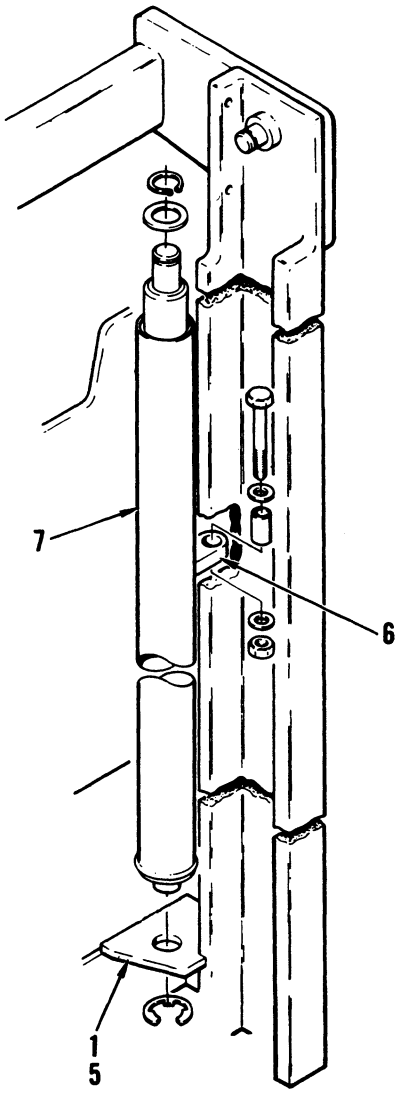


FIGURE 2. DISCONNECTING THE LIFT CYLINDERS

K. If any of the carriage or operator platform load rollers must be replaced, make a note of the shim arrangement. When the new load rollers are installed, the shim arrangement normally will be similar.

Installation

NOTE: Replace any load rollers that need replacing BEFORE starting this installation procedure. Use the same shim arrangement noted during removal.

A. Make sure the two-stage cylinder rods are not fastened to the inner upright weldment. Use a crane and chains or slings to raise the inner upright weldment as described in the Removal procedure. Raise the inner upright weldment until it is above the load rollers of the carriage or operator platform. Carefully align the carriage or operator platform load rollers and the upright channel. Slowly lower the inner upright weldment until it engages all the load rollers. On two-stage uprights, install the washers and snap rings that fasten the cylinder rods to the inner upright weldment.

B. Check the load roller clearance. See the Carriage Or Operator Platform Adjustment procedure at the end of this section.

C. Use a crane and chains or slings to raise the carriage or operator platform for access to the chain anchor(s) above the top of the main lift truck frame.

⚠ WARNING

Before installing lift chains or cables, use blocks and chains on the upright weldments and carriage or operator platform so that they can not move. Make sure the moving parts are attached to a non-moving part.

Lift chains and cables can roll over the sheaves to fall and possibly cause an injury if the ends are not fastened. Keep control of the ends of the lift chains and cables as they are connected.

D. Use blocks and chains to prevent movement of the upright or operator platform. Install the lift chain(s) using the pin(s) in the chain anchor(s). Make sure new cotter pin(s) are installed. See the Lift Chain Adjustment procedure at the end of this section to check and if necessary, adjust the lift chains. On N40-50EA units, remove the blocks and chains and carefully lower the carriage. Do **NOT** remove the blocks and chains for the R40E/EA/EA-FS operator platform. Install the N40-50EA operator upright guard (clear plastic or wire).

E. Use a ladder for access to the R40E/EA/EA-FS operator platform. Carefully move each electrical cable through the sheave and install the cable at the operator platform. Connect the wires according to the notes made during removal. Also see the section DIAGRAMS, 8000 SRM 424 for the correct connections. Remove the blocks and chains and carefully lower the operator platform.

TWO-STAGE UPRIGHT

REMOVAL

⚠ WARNING

Fully lower all the upright weldments. On N40-45ER units, make sure the forks are fully retracted. Weldments, carriages or operator platform and forks can move suddenly and cause an injury as hydraulic lines are disconnected.

NOTE: If the upright assembly will be disassembled, remove the N40-50EA carriage or the R30E/EA/EA-FS operator platform before the upright assembly is removed. See CARRIAGE OR OPERATOR PLATFORM Removal in this section. See the section REACH CARRIAGES, 4500 SRM 384 for the procedure to remove the N40-45ER reach carriage.

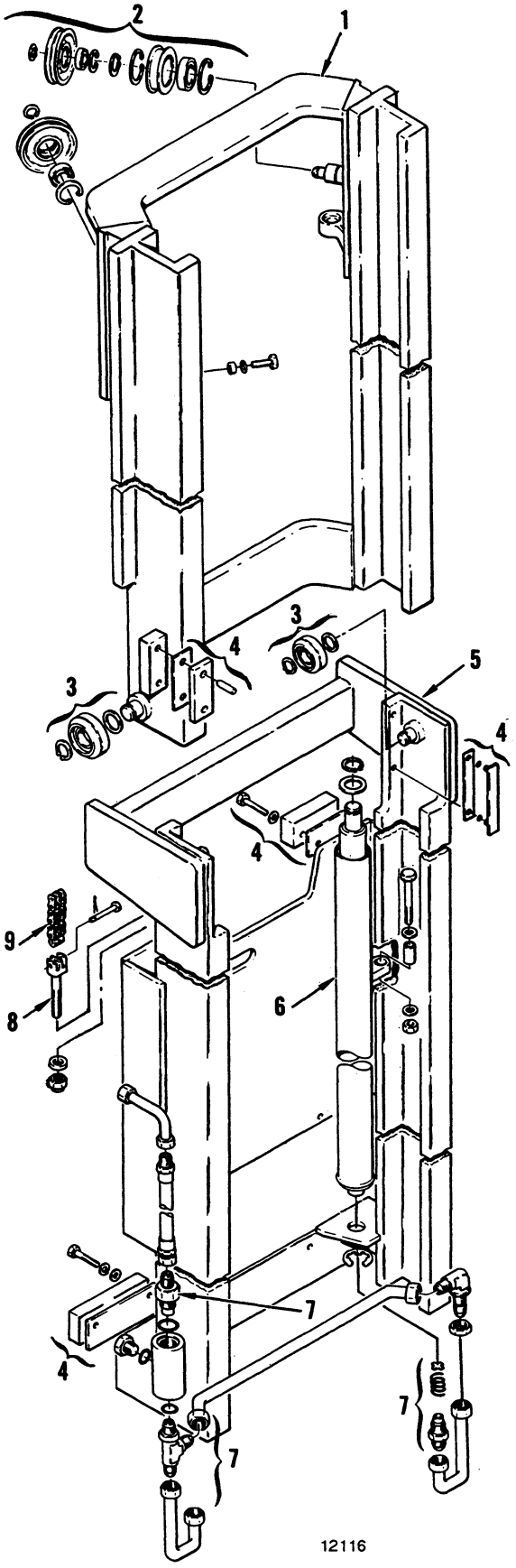
A. Disconnect and remove the battery. Refer to the correct procedure in the Operating Manual or the sections PERIODIC MAINTENANCE, 8000 SRM 373 or 8000 SRM 410.

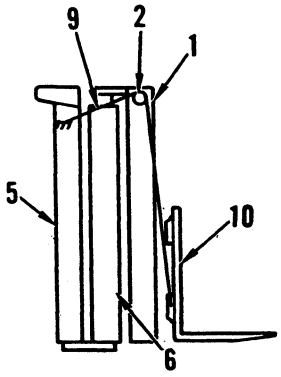
B. On N40-50EA units, remove the capscrews, nuts and washers that fasten the posts of the overhead guard to the overhead guard. Use a crane to remove the overhead guard. Remove the (clear plastic or wire) operator upright guard.

C. Install blocks under the main frame near the upright to support the main frame without changing the height. Make sure the upright, base arms and load wheels do not support any weight so the upright capscrews can be removed. Use chains to fasten the upright channels together at the top of the upright.

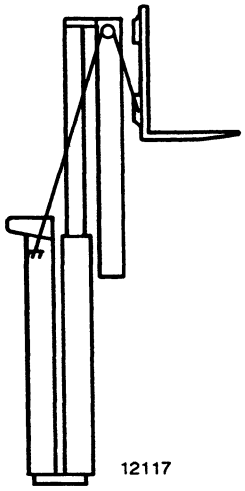
D. Open the door and remove the access cover over the electrical compartment. Remove the hydraulic tube at the cylinder port of the solenoid valve. Put caps on the port, the upright hose and both ends of the tube to prevent dirt from entering the system. Use wire to fasten the hose in a position to prevent damage during removal of the upright.

E. Disconnect the electrical cable for the reach carriage or the R30E/EA/EA-FS operator platform. Push the cable and connectors through the holes in the lift truck frame to prevent damage to the cable during removal of the upright. On N40-45ER units, remove the hydraulic tubes for the auxiliary functions. Disconnect the the upright hoses and tubes at the main control valve. Use wire to fasten the hoses and cable in a position to prevent damage.

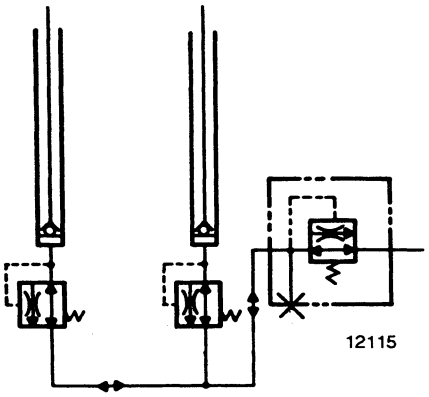




POSITION 1



POSITION 2



1. INNER UPRIGHT WELDMENT
2. CHAIN, HOSE AND CABLE SHEAVES
3. LOAD ROLLER
4. STRIP BEARING
5. OUTER UPRIGHT WELDMENT
6. LIFT CYLINDER (ONE EACH SIDE)
7. LOWERING CONTROL VALVE
8. CHAIN ANCHOR
9. LIFT CHAIN
10. CARRIAGE OR OPERATOR PLATFORM

NOTE: REACH CARRIAGE HOSES AND CABLE NOT SHOWN.

FIGURE 3. VISTA TWO-STAGE UPRIGHT ASSEMBLY

F. Use chains to connect a crane to the top of the upright. Make sure the chains will not damage the sheaves or other parts of the upright assembly. Make sure the chains and crane have the capacity to lift approximately 2000 kg (4500 lbs). Use other chains to fasten all the upright weldments together so that they cannot move. Operate the crane until it gives support to the weight of the upright. Move the crane to a position so that the upright assembly will be lifted vertically.

G. Remove the four large capscrews and washers that fasten the bottom of the upright to the lift truck frame. Hold the spacers and remove the four large capscrews and washers that fasten the top of the upright. Remove all the spacers.

⚠ WARNING

Lift chains and cables can roll over the sheaves to fall and possibly cause an injury if the ends are not fastened. Keep control of the ends of the lift chains and cables as they are disconnected.

H. Use a ladder to disconnect the lift chains at the top of the outer upright weldment. Remove the pins in the chain anchors to remove the chains without changing the adjustment. Carefully lower the lift chains. Disconnect the electrical wires from the limit switches and remove the cables.

I. Remove the cross tube (horizontal) at the battery side of the bottom of the upright.

J. Operate the crane and carefully move the upright assembly away from the lift truck. Do not damage any hydraulic lines or the electrical cable.

K. Put the upright assembly on the floor so that the back (battery side) of the upright is toward the floor.

DISASSEMBLY (See Figures 2, 3 and 4)

NOTE: This procedure does NOT include the removal of the carriage or operator platform. Remove the carriage or operator platform before starting this procedure. See the CARRIAGE OR OPERATOR PLATFORM Removal in this section to remove the standard carriage or operator platform. See the section REACH CARRIAGES, 4500 SRM 384 to remove the N40-45ER reach carriages.

A. If necessary, remove the overhead guard and the (clear plastic or wire) operator upright guard on N40-50EA or N40-45ER units.

⚠ WARNING

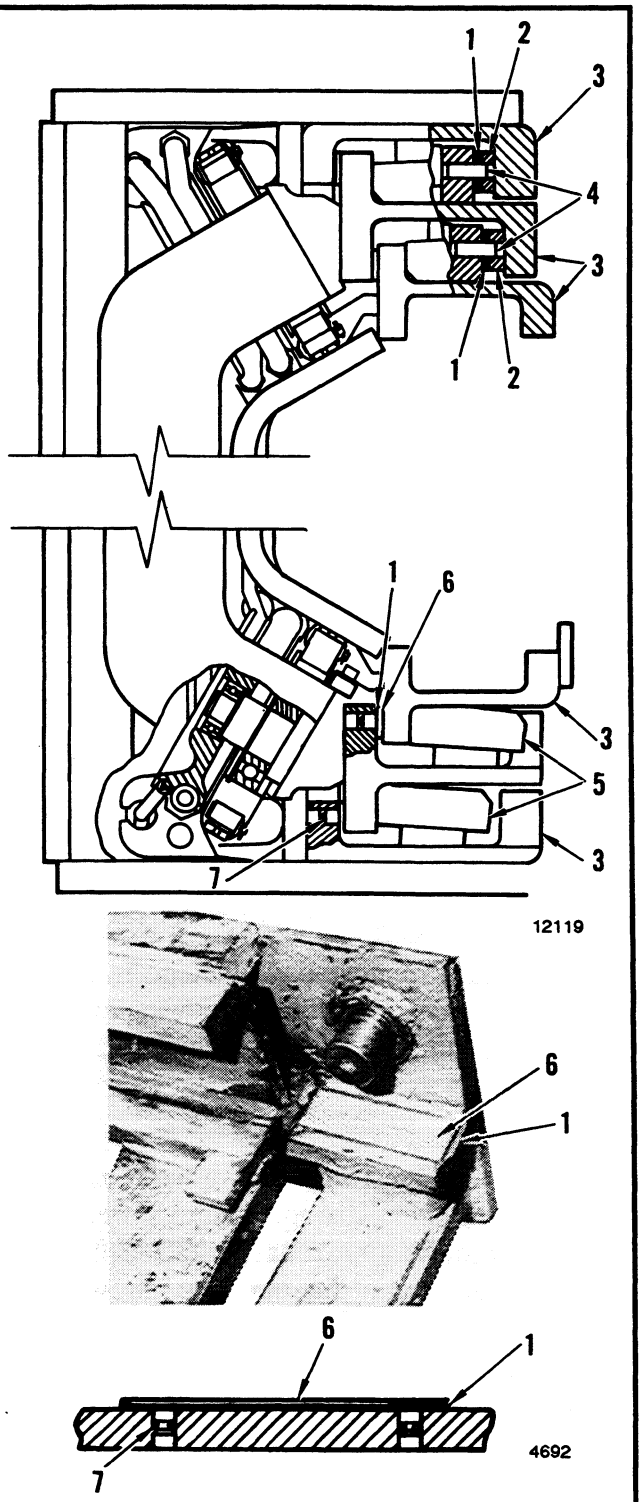
Make sure the battery side of the upright is toward the floor so that the front of the upright is up for easier disassembly. Make sure the upright weldments are fastened together so that the weldments will only slide when being moved during disassembly.

B. If necessary, remove the lift chains by removing the pin in the chain anchor. Removing the pin will allow chain removal without changing the adjustment.

C. Remove the snap rings and washers from the top of each lift cylinder. Use a pry bar to move the inner upright weldment approximately 152 - 305 mm (6 - 12 in) out the top of the outer upright weldment. Remove the chain and hose sheaves.

D. Install a sling near the center of each channel of the inner upright weldment so that it will be balanced. The slings must pass through the loop at the end of the sling so that the sling tightens and does not slip on the channel as the weldment is lifted. Fasten a crane to the slings.

E. Use the crane to move the inner upright weldment out of the outer upright weldment. Move the upright weldment until the bottom rollers of the inner upright weldment touch the top rollers of the



1. SHIMS
2. LOWER STRIP BEARING
3. UPRIGHT WELDMENTS
4. PIN
5. LOAD ROLLER
6. UPPER STRIP BEARING
7. O-RING

FIGURE 4. LOAD ROLLER AND STRIP BEARING ARRANGEMENT

outer upright weldment. Use the crane to raise the top of the inner upright weldment so that it is at an angle of approximately 30°. Lift the weldment straight up to remove the inner from the outer upright weldment. Put the weldment flat on the floor so that it cannot fall.

F. Clean the area at the hydraulic fittings for the lift cylinders. Disconnect the fittings. Put caps on the open fittings and cylinder port to prevent dirt from entering the system. Remove the snap rings at the bottom of each cylinder.

G. Install a sling near the center of the lift cylinder in the same manner used for the upright weldment removal. Remove the capscrew, washer and spacer that fastens the cylinder to the outer upright channel. See Figure 2. Use the crane to move the cylinder out of the base hole and remove the cylinder from the upright. Repeat the procedure to remove the other cylinder.

H. Remove the snap rings from the lower and upper load rollers. Make a note of the shim arrangement as each load roller is removed. The shim arrangement will be approximately the same when the upright is assembled.

I. Remove the strip bearings from the outer upright weldment. See Figure 4. Make a note of the shim arrangement during removal of the strip bearings for correct installation during assembly.

J. Disassemble the sheaves and rollers as necessary for repair and cleaning.

CLEANING AND INSPECTION

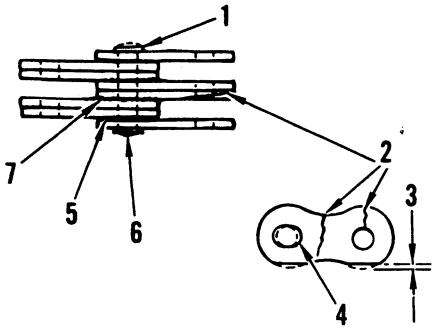
NOTE: These cleaning and inspection procedures apply to both the two-stage and three-stage uprights.

⚠ CAUTION

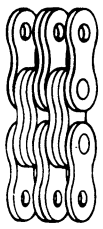
Do NOT use steam to clean the lift chains, sheaves or load rollers. The sheaves and roller bearings are sealed and permanently lubricated. Do not use compressed air on the bearings. The air can force the lubricant out of the bearings. Follow the manufactures instructions when using solvent.

NOTE: The instructions for measuring chain wear are shown on the Chain Wear Scale.

1. WORN PIN
2. CRACKS
3. EDGE WEAR
4. HOLE WEAR
5. LOOSE LEAVES
6. DAMAGED PIN
7. RUST
8. CHAIN WEAR SCALE



pitch		Total length of 20 links (pitch) of new chain		WEAR LIMIT MAXIMUM LENGTH OF 20 LINKS	
inch	(mm)	inch	(mm)	inch	(mm)
0.50	(12.7)	10.0	(254)	10.3	(261.6)
0.625	(15.9)	12.5	(317.5)	12.88	(327.0)
0.75	(19.1)	15.0	(381)	15.45	(392.4)
1.00	(25.4)	20.0	(508)	20.6	(523.25)
1.25	(31.8)	25.0	(635)	25.75	(654.1)
1.75	(44.5)	35.0	(889)	36.05	(915.7)
2.00	(50.8)	40.0	(1016)	41.2	(1046.5)



NEW CHAIN

9448

FIGURE 5. CHAIN PARTS AND WEAR

A. Wash the lift chains with solvent. Use compressed air to dry the chains. Inspect the chains for wear and damage.

B. Inspect the lift chains for cracks or broken links and pins. Check for corrosion or worn holes in the links. When the pins or the holes wear, the chain becomes longer. The chain links that run over the chain sheaves have the most wear. If a chain is 3% longer than a new chain, the chain must be replaced. If a chain scale is available, check the lift chains as shown in Figure 5. If a chain scale is not available, measure 20 links of chain. Compare the measurements with the lengths given in the table of Figure 5. Replace the chains if the increase in length is 3% or greater.

⚠ WARNING

Never replace just the worn section of a chain. Replace the complete chain. Never replace just one chain of a chain pair. Replace both chains.

C. For chains that can be used again, put the chains in SAE 30 oil for 12 hours.

D. Inspect the chain anchors and pins. Replace chain anchors that have broken fingers, or holes worn so that they are not round. Replace chain anchor pins that are worn or have cracks.

⚠ WARNING

Commercial cleaning solvents can be flammable and toxic, and cause severe skin irritation. When using commercial cleaning solvents, always comply with the solvent manufacturer's recommended safety precautions.

E. Clean the upright weldments with steam or solvent.

F. Inspect the sliding and rolling surfaces. Inspect the welds around the stub shafts.

⚠ WARNING

Do NOT weld on uprights. Get information from your Hyster lift truck dealer before welding on uprights.

LIFT CYLINDERS

NOTE: The lift cylinders are removed during disassembly of the upright. To repair the cylinders, see the LIFT CYLINDERS section, 4000 SRM 135 for the correct service procedures.

ASSEMBLY

NOTE: The shims for the load rollers keep the channels of the upright weldments parallel and give correct clearance. During assembly, the arrangement of the shims will be the same or approximately the same as they were before disassembly. Check the clearance and adjust for wear or changes from the repairs. The strip bearings at the top of the outer upright weldment and the bottom of the inner upright weldment are also adjusted using shims. See the Checks And Adjustments in this section for the instructions to make the necessary adjustments.

A. Assemble the load rollers, sheaves and strip bearings on the upright weldments and carriage or operator platform as necessary. Make sure to keep the same shim arrangement noted during disassembly. Apply a thin layer of multi-purpose grease to the strip bearings and the bearing and roller surfaces of the channels.

B. Make sure the cylinders are assembled and install a sling near the center of the cylinder as during removal. Use a crane to move the cylinder into position in the outer upright weldment. Install the snap ring on the bottom of the cylinder. Install the capscrew, washer and spacer to fasten the cylinder shell to the channel. Repeat the procedure to install the other cylinder.

C. Use the crane to move the inner upright weldment into position over the outer upright weldment. Fasten the slings to the centers of the channels to balance the weldment as during removal. Make sure the inner upright weldment is at approximately a 30° angle with the bottom load rollers in the notch near the top load rollers of the outer upright channels. Slowly lower the inner upright weldment and insert it into the outer upright weldment.

D. Check the clearance of the load rollers and the strip bearings. Make the necessary adjustments as described in Checks And Adjustments.

E. With the inner upright weldment approximately 152 - 305 mm (6 - 12 in) out of the outer upright weldment, install the chain and hose sheaves. Move the inner upright weldment into the outer upright weldment so that the tops of the cylinder rods are through the holes in the inner upright channels. Install the washers and snap rings to fasten the cylinder rods to the channels.

INSTALLATION

NOTE: To make alignment of the upright, spacers and lift truck frame during installation, make two to four alignment studs. Cut the heads off extra mount capscrews and grind the end into a dull point.

A. Install the alignment studs in the bottom mount holes. Install the bottom spacers on the studs.

B. Use chains to fasten the upright weldments together so that they cannot move. Connect a crane to the top of the upright assembly. Make sure the crane and chains have the capacity to lift the upright assembly. Make sure the chains will not damage the sheaves or other parts of the upright assembly.

⚠ WARNING

Upright assemblies are heavy and can cause an injury when moving. NEVER put any part of your body between the upright and a solid object when the upright is being moved.

C. Raise the upright assembly to a vertical position. Install the cross tube (horizontal) at the battery side of the bottom of the upright. Carefully move the upright assembly into approximately the correct position near the alignment studs. Install the electrical cables and hydraulic lines through the upright and frame holes as the upright moves into the correct position. The upright and spacers are in correct alignment when the studs can be removed without using a tool. Hold the top spacers and install the mount capscrews, washers and the spacers. The longer capscrews are installed at the bottom of the upright. Replace all the alignment studs with capscrews. Tighten all eight capscrews to 380 N.m (280 lbf ft) torque.

D. Install and connect all the hydraulic lines and lowering control valves. On N40-45ER or R30E/EA/EA-FS units, connect the electrical cable for the carriage or operator platform.

E. If the carriage or operator platform was not installed with the uprights, install the carriage or op-

erator platform as described in Carriage Or Operator Platform Installation in this section. Make sure to install the electrical cables and hydraulic lines. Apply grease to the channels of the inner upright weldment for the carriage or operator platform load rollers.

F. Check the clearance of the load rollers as described in Checks And Adjustments.

G. If necessary, install the lifting chains. Use new cotter pins at the chain anchor pins. If necessary, adjust the length of the lift chains as described in Checks And Adjustments.

H. On N40-50EA or N40-45ER units, install the overhead guard and the (clear plastic or wire) operator upright guard. Tighten the capscrews for the overhead guard to 380 N.m (280 lbf ft) torque. Install the capscrews, washers and nuts that fasten the legs to the overhead guard.

THREE-STAGE UPRIGHT

REMOVAL

NOTE: If the upright assembly will be disassembled, remove the N40-50EA carriage or the R30E/EA/EA-FS operator platform before the upright assembly is removed. See CARRIAGE OR OPERATOR PLATFORM Removal in this section. See the section REACH CARRIAGES, 4500 SRM 384 for the procedure to remove the N40-45ER reach carriage.

⚠ WARNING

Fully lower all the upright weldments. On N40-45ER units, make sure the forks are fully retracted. Weldments, carriages or operator platform and forks can move suddenly and cause an injury as hydraulic lines are disconnected.

The removal procedure of the three-stage upright is similar to the removal procedure for the two-stage upright. See TWO-STAGE UPRIGHT Removal in this section for the correct procedure.

DISASSEMBLY (See Figures 3, 4 and 6)

NOTE: This procedure does NOT include the removal of the carriage or operator platform. Remove the carriage or operator platform before starting this procedure. See the CARRIAGE OR OPERATOR PLATFORM Removal in this section to remove the standard carriage or operator platform. See the section REACH CARRIAGES, 4500 SRM 384 to remove the N40-45ER reach carriages.

A. If necessary, remove the overhead guard and the (clear plastic or wire) operator upright guard on N40-50EA or N40-45ER units.

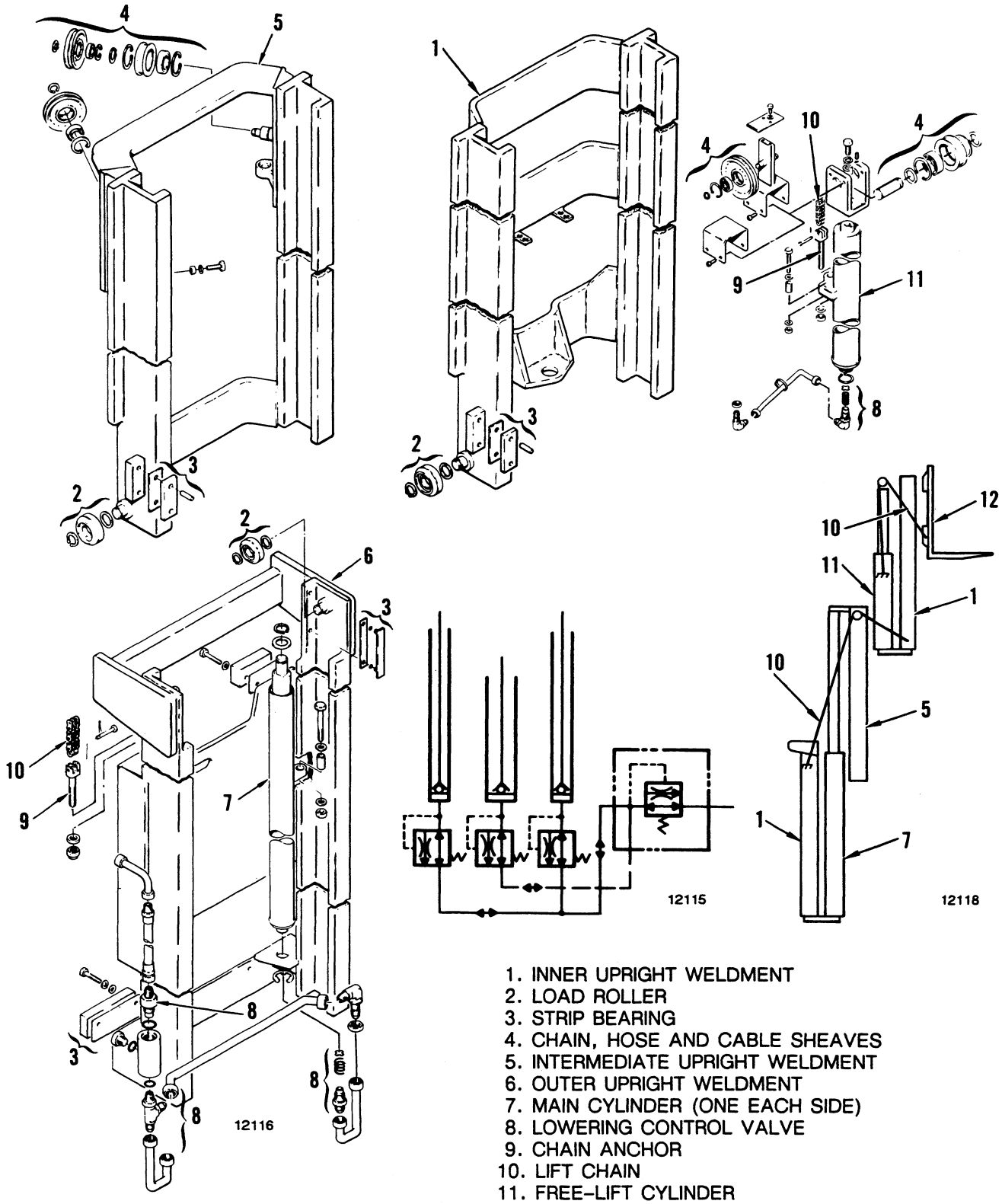
⚠ WARNING

Make sure the battery side of the upright is toward the floor so that the front of the upright is up for easier disassembly. Make sure the upright weldments are fastened together so that the weldments will only slide when being moved during disassembly.

B. If necessary, remove the lift chains by removing the pin in the chain anchor. Removing the pin will allow chain removal without changing the adjustment.

C. Install a sling near the center of the free-lift cylinder. The sling must pass through the loop at the end of the sling so that the sling tightens and does not slip on the cylinder as it is lifted.

D. Remove the capscrews, spacers, washers and nuts that fasten the shell of the free-lift cylinder to the inner upright weldment. Remove the hydraulic fitting at the bottom of the cylinder. Install plugs to keep dirt out of the cylinder and hydraulic lines. Remove the snap ring that fastens the bottom of the cylinder to the upright weldment. Use a crane to remove the cylinder.



1. INNER UPRIGHT WELDMENT
2. LOAD ROLLER
3. STRIP BEARING
4. CHAIN, HOSE AND CABLE SHEAVES
5. INTERMEDIATE UPRIGHT WELDMENT
6. OUTER UPRIGHT WELDMENT
7. MAIN CYLINDER (ONE EACH SIDE)
8. LOWERING CONTROL VALVE
9. CHAIN ANCHOR
10. LIFT CHAIN
11. FREE-LIFT CYLINDER
12. CARRIAGE OR OPERATOR PLATFORM

NOTE: REACH CARRIAGE HOSES AND CABLE NOT SHOWN.

FIGURE 6. VISTA THREE-STAGE UPRIGHT ASSEMBLY

E. Use a pry bar to move the inner upright weldment approximately 1/2 to 3/4 out of the intermediate upright weldment. Remove the snap rings and washers from the top of each main-lift cylinder. Move the intermediate upright weldment approximately 152 - 305 mm (6 - 12 in) out the top of the outer upright weldment. Remove the chain and remove the hose sheaves at the top of the intermediate upright weldment.

F. Install a sling near the center of each channel of the inner upright weldment so that it will be balanced. The slings must pass through the loop at the end of the sling so that the sling tightens and does not slip on the channel as the weldment is lifted. Fasten a crane to the slings.

G. Use the crane to move the inner upright weldment out of the outer upright weldment. Move the upright weldment until the bottom rollers of the inner upright weldment touch the top rollers of the outer upright weldment. Use the crane to raise the top of the inner upright weldment so that it is at an angle of approximately 30°. Lift the weldment straight up to remove the inner from the outer upright weldment. Put the weldment flat on the floor so that it cannot fall.

H. Use the procedure of steps F and G to remove the intermediate upright weldment from the outer upright weldment.

I. Clean the area at the hydraulic fittings for the main-lift cylinders. Disconnect the fittings. Put caps on the open fittings and cylinder port to prevent dirt from entering the system. Remove the snap rings at the bottom of each cylinder.

J. Install a sling near the center of one main-lift cylinder in the same manner used for the upright weldment removal. Remove the capscrew, washer and spacer that fastens the cylinder to the outer upright channel. See Figure 2. Use the crane to move the cylinder out of the base hole and remove the cylinder from the upright. Repeat the procedure to remove the other main-lift cylinder.

K. Remove the snap rings from all load rollers. Make a note of the shim arrangement as each load roller is removed. Remove the snap rings from all the sheaves. Make a note of the shim arrangement as each sheave is removed. All shim arrangements will be approximately the same when the upright is assembled.

L. Remove the strip bearings from the outer upright weldment. See Figure 4. Make a note of the shim arrangement during removal of the strip bearings for correct installation during assembly.

M. Disassemble the sheaves and rollers as necessary for repair and cleaning.

CLEANING AND INSPECTION

The procedures for cleaning and inspecting the three-stage uprights are the same as the procedures for the two-stage uprights. See Cleaning and Inspection for the Two-Stage Uprights for the correct procedures.

LIFT CYLINDERS

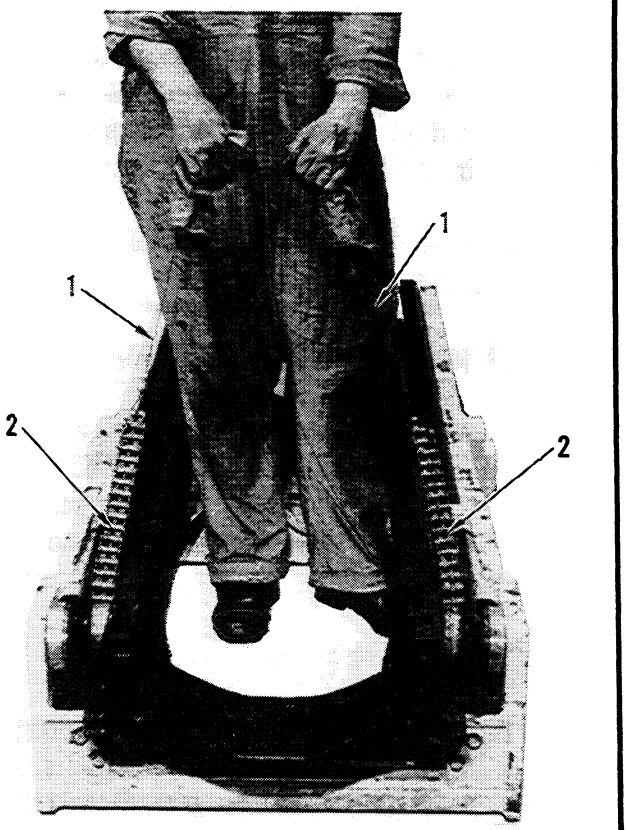
NOTE: The lift cylinders are removed during disassembly of the upright. To repair the cylinders, see the LIFT CYLINDERS section, 4000 SRM 135 for the correct service procedures.

ASSEMBLY (See Figures 3, 4, 6 and 7)

NOTE: The shims for the load rollers keep the channels of the upright weldments parallel and give correct clearance. During assembly, the arrangement of the shims will be the same or approximately the same as they were before disassembly. Check the clearance and adjust for wear or changes from the repairs. The strip bearings at the top of the outer upright weldment and the bottom of the inner upright weldment are also adjusted using shims. See the Checks And Adjustments in this section for the instructions to make the necessary adjustments.

A. Assemble the load rollers, sheaves and strip bearings on the upright weldments and carriage or operator platform as necessary. Assemble the

sheaves on the free-lift cylinder. Make sure to keep the same shim arrangement noted during disassembly. Apply a thin layer of multi-purpose grease to the strip bearings and the bearing and roller surfaces of the channels.



1. WIRE
2. OUTER LIFT CHAINS

FIGURE 7. INSTALLING THE OUTER LIFT CHAINS

B. Make sure the cylinders are assembled and install a sling near the center of one main-lift cylinder as during removal. Use a crane to move the cylinder into position in the outer upright weldment. Install the snap ring on the bottom of the cylinder. Install the capscrew, washer and spacer to fasten the cylinder shell to the channel. Repeat the procedure to install the other main-lift cylinder.

C. Use the crane to move the intermediate upright weldment into position over the outer upright weldment. Fasten the slings to the centers of the channels to balance the weldment as during removal. Make sure the intermediate upright weldment is at approximately a 30° angle with the bottom load rollers in the notch near the top load rollers of the outer upright channels. Slowly lower the intermediate upright weldment and insert it into the outer upright weldment.

D. Check the clearance of the load rollers and the strip bearings. Make the necessary adjustments as described in Checks And Adjustments.

E. With the intermediate upright weldment approximately 152 - 305 mm (6 - 12 in) out of the outer upright weldment, install the chain and hose sheaves. Move the intermediate upright weldment into the outer upright weldment so that the tops of the main-lift cylinder rods are through the holes in the intermediate upright channels. Install the washers and snap rings to fasten the cylinder rods to the channels.

F. Use the procedure of step C to install the inner upright weldment. Check the clearance of the load rollers and the strip bearings. Make the necessary adjustments as described in Checks And Adjustments.

G. Install the outer lift chains between the top of the outer upright weldment and the inner upright weldment as follows:

1. Slide the inner upright weldment for access to the chain anchors.

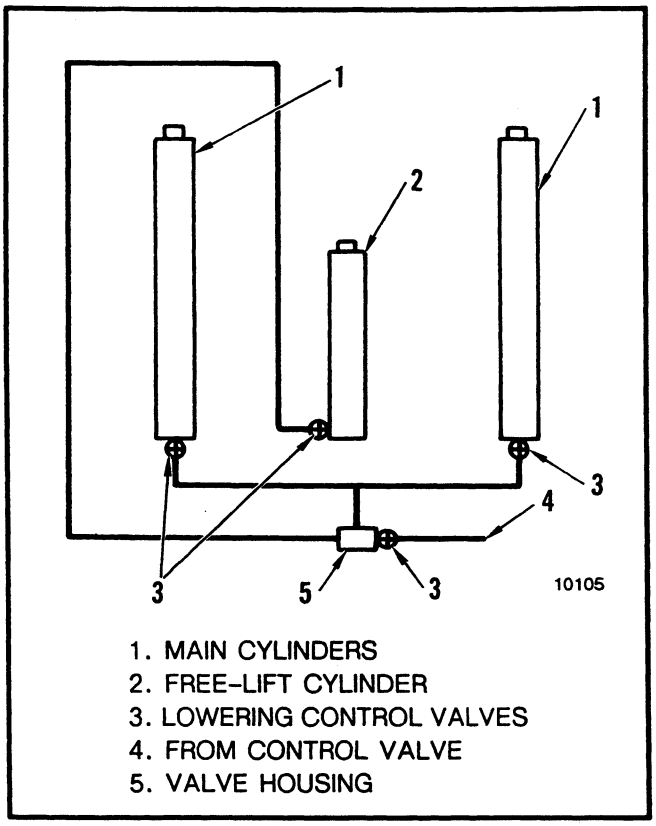
2. Connect a piece of wire approximately 1 meter (3 feet) long to the end of each lift chain. Use the wire to pull each lift chain into position between the channels of the inner and intermediate upright weldments. Connect the ends of the chains to the chain anchors at the bottom of the inner upright weldment. Use new cotter pins during installation of the chains.

3. Use the wires to pull the chains up between the chain sheaves and the top load rollers on the intermediate upright weldment. Look between the inner and intermediate upright weldments to see the positions of the lift chains. If necessary, use a thin screwdriver to move each lift chain to the inside edge of the inner upright weldment. Remove the wires.

4. Install the chain, hose and cable sheaves as removed during disassembly. Lubricate the

bearings with multi-purpose grease during installation.

5. Connect each end of a wire approximately 2 metre (6 feet) long to the end of each lift chain as shown in Figure 7.



1. MAIN CYLINDERS
2. FREE-LIFT CYLINDER
3. LOWERING CONTROL VALVES
4. FROM CONTROL VALVE
5. VALVE HOUSING

FIGURE 8. HYDRAULIC DIAGRAM - VISTA THREE-STAGE UPRIGHT

6. Pull on the wires to pull the inner upright weldment into the intermediate upright weldment. Remove the wires from the chains. Connect each chain to the anchors on the outer upright weldment. Use new cotter pins during installation of the chains. If necessary, adjust the length of the lift chains as described in Checks And Adjustments.

H. Install a sling near the center of the free-lift cylinder as during removal. Use a crane to move the cylinder into position in the inner upright weldment. Install the capscrews, spacers, washers and nuts that fasten the shell of the free-lift cylinder to the inner upright weldment. Install the snap ring that fastens the bottom of the cylinder to the upright weldment. If necessary install the crosshead assembly to the free-lift cylinder. Adjust the cylinder so that the cylinder shell is parallel to the sides of the inner upright weldment $\pm$ 3.0 mm ($\pm$ 0.12 in). Install the hydraulic lines to the free-lift cylinder. See Figure 8.

INSTALLATION

NOTE: To make alignment of the upright, spacers and lift truck frame during installation, make two to four alignment studs. Cut the heads off extra mount capscrews and grind the end into a dull point.

A. Install the alignment studs in the bottom mount holes. Install the bottom spacers on the studs.

B. Use chains to fasten the upright weldments together so that they cannot move. Connect a crane to the top of the upright assembly. Make sure the crane and chains have the capacity to lift the upright assembly. Make sure the chains will not damage the sheaves or other parts of the upright assembly.

⚠ WARNING

Upright assemblies are heavy and can cause an injury when moving. NEVER put any part of your body between the upright and a solid object when the upright is being moved.

C. Raise the upright assembly to a vertical position. Install the cross tube (horizontal) at the battery side of the bottom of the upright. Carefully move the upright assembly into approximately the correct position near the alignment studs. Install the electrical cables and hydraulic lines through the upright and frame holes as the upright moves into the correct position. The upright and spacers are in correct alignment when the studs can be removed without using a tool. Hold the top spacers and install the mount capscrews, washers and the spacers. The longer capscrews are installed at the bottom of the upright. Replace all the alignment studs with capscrews. Tighten all eight capscrews to 380 N.m (280 lbf ft) torque.

D. Install and connect all the hydraulic lines and lowering control valves. On N40-45ER or R30E/EA/EA-FS units, connect the electrical cable for the carriage or operator platform.