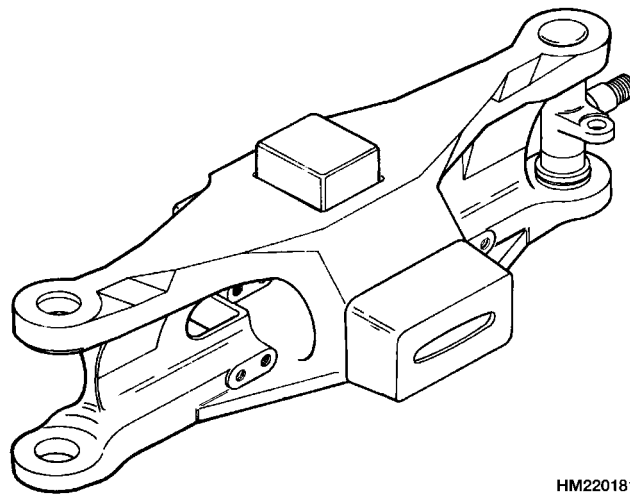


STEERING AXLE

GC/GLC/GDC135-155CA [A879, B879]



HM220181

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 **YALE 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!

TABLE OF CONTENTS

General.....	1
Description	1
Steering Axle Assembly Repair.....	2
Remove	2
Install.....	2
Wheels and Hubs Repair.....	3
Remove and Disassemble	3
Clean.....	3
Assemble and Install	3
Spindles, Bearings, and Tie Rods Repair.....	3
Remove	3
Clean.....	4
Assemble and Install	4
Steering Cylinder Repair	5
Remove and Disassemble	5
Clean and Inspect	5
Assemble and Install	6
Troubleshooting	6

This section is for the following models:
GC/GLC/GDC135-155CA [A879, B879]

Yale[®]



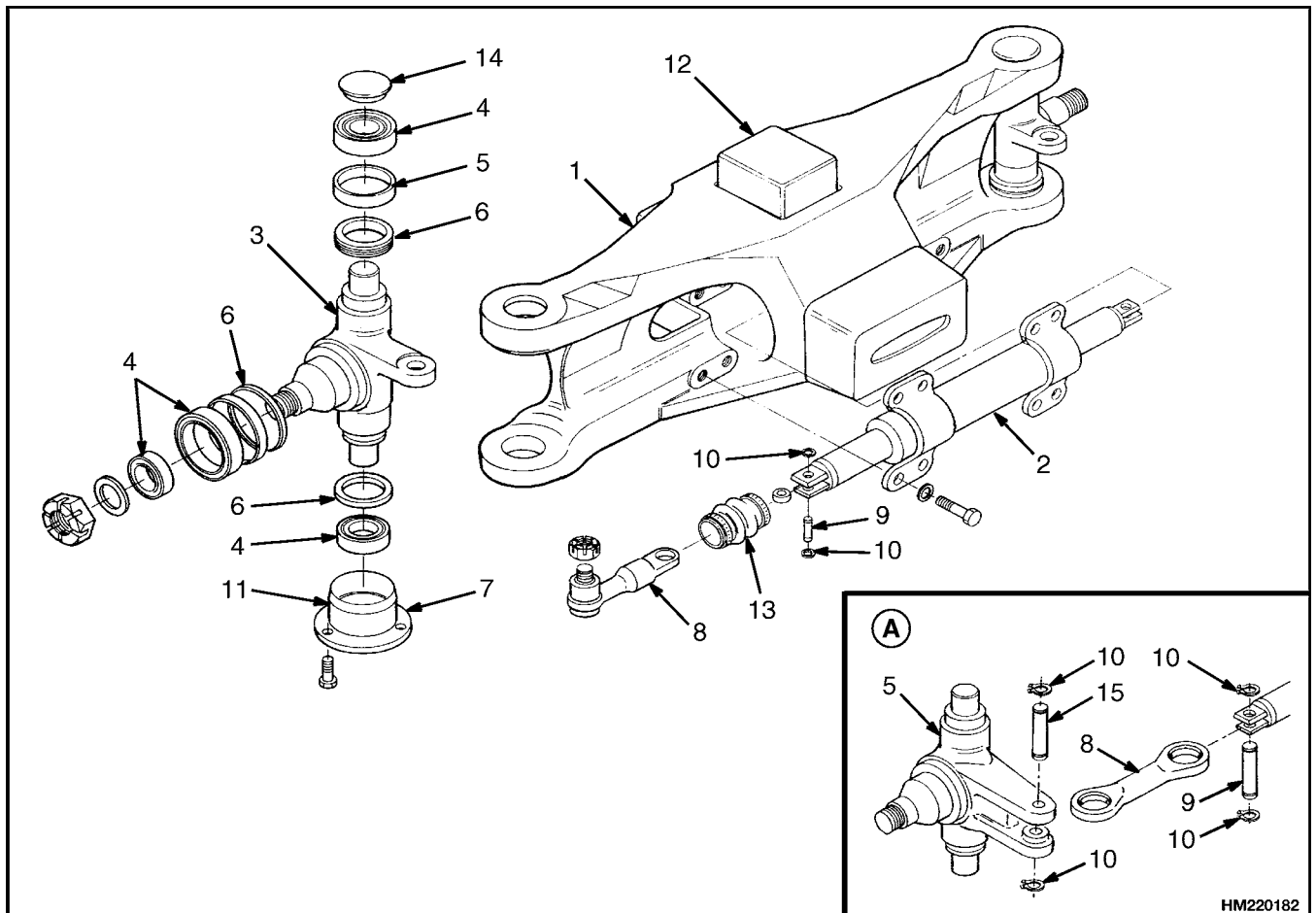
General

This section has the description and repair procedures for the steering axle. For information on the steering control unit, see the section **Steering Control Unit** 1600 YRM 54.

Description

The steering axle assembly includes an axle frame, steering cylinder, tie rods, and two spindle and hub assemblies. See Figure 1. The steering axle is articulated and is connected to the frame with center pivot mounts. The large rubber pivot mounts permit the

steering axle to move in the lift truck frame when the lift truck travels over rough surfaces. The GLC70CA (GC/GLC/GDC155CA) also has a large rubber block at the top center of the steering axle to cushion vertical shocks.



A. LATER MODELS

- | | |
|------------------------------------|------------------|
| 1. AXLE FRAME | 9. PIN |
| 2. STEERING CYLINDER | 10. SNAP RING |
| 3. SPINDLE | 11. BEARING CAP |
| 4. BEARING ASSEMBLY (CUP AND CONE) | 12. RUBBER MOUNT |
| 5. WEAR SLEEVE | 13. DUST COVER |
| 6. SEAL | 14. GREASE CAP |
| 7. SHIMS | 15. PIN |
| 8. TIE ROD | |

Figure 1. Steering Axle

The end caps of the steering cylinder are also the mounts for the cylinder and are held to the axle by capscrews. The ends of the piston rod extend from both ends of the cylinder. A single piston and the seal are at the center of the piston rod. Oil pressure on one side of the piston moves the piston in the bore. The piston pushes an equal amount of oil from the opposite side of the cylinder. The oil returns to the steering control unit.

When the piston in the steering cylinder reaches the end of the stroke, a relief valve controls the oil pressure. The relief valve for the steering system is in the manifold block that is installed on the steering control unit.

Each spindle turns on two tapered roller bearings in the axle frame. The preload on the bearings is controlled by shims at the lower bearing cap. The tie rods that connect the spindle arms to the cylinder do not have an adjustment.

The wheel hubs rotate on two tapered roller bearings and are held on the spindles by a castle nut. The bearing preload of the wheel hubs is adjusted by the castle nut. The grease seals protect the bearings from dirt and water. Wear sleeves prevent the seals from causing wear on the hub.

Steering Axle Assembly Repair

REMOVE



WARNING

Put the lift truck on blocks. Follow the procedures for raising the lift truck that are in the Operating Manual or the Periodic Maintenance 8000 YRM 393 for this lift truck. The surface must be solid, even, and level. Make sure the blocks are solid, one-piece units. Make sure the lifting devices used during repairs can lift the weight of the parts as given in the procedures.

The steering axle can be removed without removing the counterweight. See Figure 1.

1. Make sure the wheels are set for straight travel. Put blocks under the frame in front of the steer wheels and under the counterweight so that the steering axle can be removed. The top of the axle frame must have clearance under the counterweight so that the steering axle can be removed.
2. Disconnect the hydraulic lines at the steering cylinder. Install caps on the cylinder and put plugs in the hydraulic lines. The caps prevent the spindles from turning when the axle is removed from under the lift truck.
3. Slide a floor jack or the forks of another lift truck under the steering axle. Make sure the lifting device has a capacity of 475 kg (1045 lb). Raise the lifting device until it holds the weight of the axle assembly. Remove the four capscrews and washers that fasten the two brackets under the rubber mounts. Remove the brackets and slowly lower the axle assembly onto the tires. Carefully roll the axle assembly from under the lift truck.

INSTALL

NOTE: The GLC70CA (GC/GLC/GDC155CA) has an additional rubber mount on the top of the steering axle between the axle and lift truck frame. See Figure 1.

1. Apply a lubricant that is approved for use with rubber (tire lubricant) to the rubber mounts and the lift truck frame at the mount positions. Do **NOT** use a petroleum base oil. The lubricant is used where the rubber mounts fit onto the steering axle and into the lift truck frame brackets.
2. Install the rubber mount on the axle with the heavier section of mount at the top and the **PART NUMBER** facing away from the axle frame. Install the rubber block in the center pocket at the top of the axle on GLC70CA (GC/GLC/GDC155CA) units.
3. Use a floor jack or another lift truck to put the steering axle into the position in the frame. Make sure the rubber mounts fit inside the frame brackets for the mounts. If necessary, lower the weight of the lift truck onto the axle to make sure the rubber mounts fit completely in the frame brackets.
4. Install the bottom plates for the rubber mounts. Tighten the four capscrews for the brackets to 250 to 275 N•m (185 to 203 lbf ft).
5. Remove the plugs and caps and connect the hydraulic lines to the steering cylinder.
6. Operate the steering system to remove the air from the system. Turn the steering wheel several times from one stop to the other stop. Check for hydraulic leaks.

Wheels and Hubs Repair

REMOVE AND DISASSEMBLE

NOTE: The wheels and hubs can be removed without removing the steering axle.

1. Put the axle or lift truck on blocks so that the wheels are just raised from the floor. See Figure 1. See the **Operating Manual** or the **Periodic Maintenance 8000 YRM 393** to put the rear of the lift truck on blocks. Remove the grease cap at the center of the wheel. Remove the cotter pin and the castle nut. Remove the bearing cone. Slide the hub from the spindle. Remove the inner bearing cone and the seal from the spindle.
2. If the wheel bearings must be replaced, use a brass drift to remove the bearing cup and the wear sleeve.
3. Repeat the procedure for the other wheel.

CLEAN



WARNING

Cleaning solvents can be flammable and toxic, and can cause skin irritation. When using cleaning solvents, always follow the recommendations of the manufacturer.

Clean all parts with solvent. Make sure the bearings are clean.

ASSEMBLE AND INSTALL

1. If the wheel bearings must be replaced, use a press and the correct tool to install the new bearing cups in the hub. See Figure 1. Install a new wear sleeve in the wheel hub. Install the grease seal on the spindle. Fill the bearing cones and lubricate seal surfaces with grease. Make sure the bearings are filled with grease. Install the bearing cone on the spindle.



CAUTION

Do not damage the seals during installation.

2. Carefully slide the wheel and hub onto the spindle. Install the outer bearing cone.
3. Install the washer and castle nut. Tighten the castle nut to 200 N•m (150 lbf ft) while rotating the wheel and hub. Loosen the nut to less than 27 N•m (20 lbf ft). Tighten the nut to 34 N•m (25 lbf ft). Tighten the castle nut until the cotter pin can be installed. Install the cotter pin. Bend one end of the cotter pin over the spindle and cut it flush with the end of the spindle. Bend the other end of the cotter pin and cut it. Install the grease cap at the center of the wheel.
4. Repeat the procedure for the other wheel.

Spindles, Bearings, and Tie Rods Repair

REMOVE



CAUTION

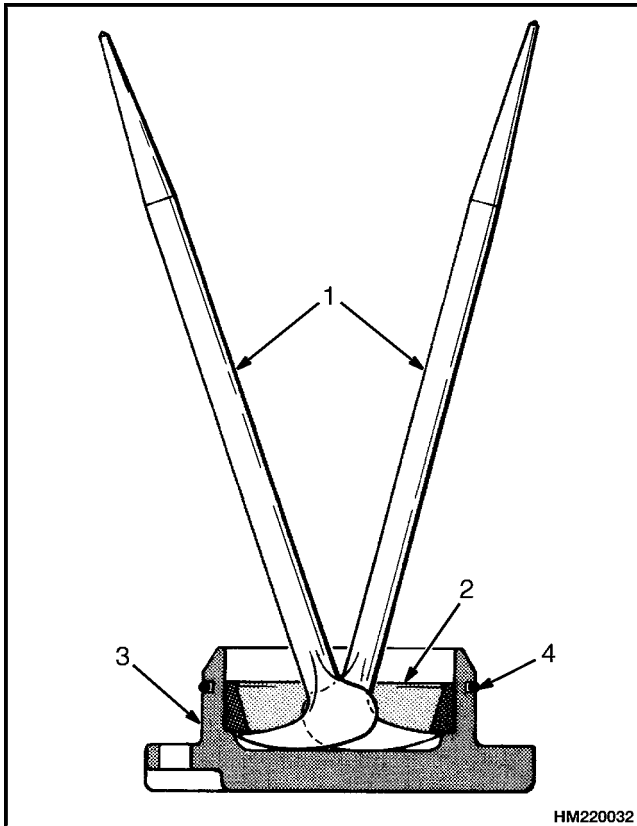
Do not hit the threads or the nut of the tie rod.

1. **Early Production Models.** If the tie rod must be replaced, remove the cotter pin and castle nut. To loosen the stud, hold a large hammer behind the spindle arm of the spindle. Hit the side of the spindle arm with another large hammer. The shock of the hammer from hitting the spindle arm will normally loosen the tapered stud. If the stud does not loosen, use a tie rod end puller to remove the stud.

Later Production Models. Remove the snap ring from the retainer pin in each tie rod shown in Figure 1. Remove the pin.

NOTE: The spindle and tie rod can be removed as a unit. Disconnect the tie rod at the retaining pin inside the dust cover. (Use a hammer and a drift to push the pins) for the tie rods upward.

2. Remove the grease cap at the top of the spindle. Remove the capscrews from the bearing cap. Remove the bearing cap and shims. If necessary, remove the bearing cup from the bearing cap as shown in Figure 2.
3. Tilt the spindle and lift the spindle from the axle. If the bearing must be replaced, remove the bearing and seals from the spindle. If the wear sleeve and the bearing cup must be replaced, remove them from the axle frame.
4. Repeat the procedure for the other spindle and tie rod.



- | | |
|----------------|----------------|
| 1. PRY BAR | 3. BEARING CAP |
| 2. BEARING CUP | 4. O-RING |

Figure 2. Bearing Cup Removal

CLEAN

WARNING

Cleaning solvents can be flammable and toxic, and can cause skin irritation. When using cleaning solvents, always follow the recommendations of the manufacturer.

Clean all parts except the ends of the tie rods in solvent. Make sure the bearings are clean.

ASSEMBLE AND INSTALL

1. Install new seals on the spindle. Lubricate the seals with grease. See Figure 1.

2. Fill the bearings with wheel bearing grease. Make sure the bearings are filled with grease. If necessary, press the new bearing cups into the steering axle frame and bearing cap. Install the wear sleeve in the steering axle frame. Install the seals and bearing cones on the spindle.
3. Install the spindle in the steering axle. Install the bearing cap without the O-ring shown in Figure 2. Tighten the capscrews evenly until all the clearance is removed from the spindle so that it cannot move vertically. Measure the clearance between the bearing cap and the axle to find the correct shim thickness for preload. Remove the bearing cap. Install shims to decrease the clearance to 0.00 to 0.13 mm (0.000 to 0.005 in.). This clearance is necessary to give a bearing preload when the cap is tightened. Install the O-ring on the bearing cap. Install the bearing cap and capscrews. Tighten the capscrews evenly to 52 N•m (38 lbf ft).

NOTE: The spindle bearings must have zero clearance. Install shims so that the clearance decreases to 0.00 to 0.13 mm (0.000 to 0.005 in.). This clearance is necessary for the bearing preload.

4. Install the tie rod to the spindle arm or steering cylinder. Install the dust cover over the tie rod. If removed, tighten the castle nut. Tighten the castle nut to 160 N•m (118 lbf ft) so that the cotter pin can be installed.
5. Install the grease cap on the top of the steering axle. Use a sealant between the grease cap and the steering axle.
6. Repeat the procedure for the other spindle and tie rod.
7. (Tie rods with grease fittings) Lubricate the spindles at the grease fitting in each bearing cap. Use the grease specified in the Periodic Maintenance Schedule of the **Operating Manual** or the **Periodic Maintenance** 8000 YRM 393.

Steering Cylinder Repair

REMOVE AND DISASSEMBLE

NOTE: The end caps of the steering cylinder are held in the shell by the cylinder mount capscrews. See Figure 3. To prevent oil leaks at the end caps, hold the caps on the shell during removal.

1. Disconnect the hydraulic lines at the steering cylinder. Install end caps in the fittings on the cylinder and put fittings on the hydraulic lines.
2. Loosen the clamps on both dust covers on the ends of the steering cylinder rod. Slide the dust covers from the cylinder rod.
3. Remove the snap ring from the retainer pin in each end of the rod shown in Figure 1. Remove the pin.
4. Remove the capscrews and washers that fasten the steering cylinder to the axle frame. Hold the end caps on the shell and remove the steering cylinder.
5. Hold the end of the steering cylinder over a drain pan. Remove the cap for the hydraulic fitting from each end cap. Push the rod toward the end of the shell that is over the drain pan. Oil drains from the cylinder. Repeat the procedure for the other end.
6. Carefully slide one end cap from the shell. Carefully pull the rod from the shell. Keep the rod in the

center of the shell during removal. Remove the end cap from the rod. Remove the other end cap from the shell. Remove all seals, wipers, and O-rings.

CLEAN AND INSPECT

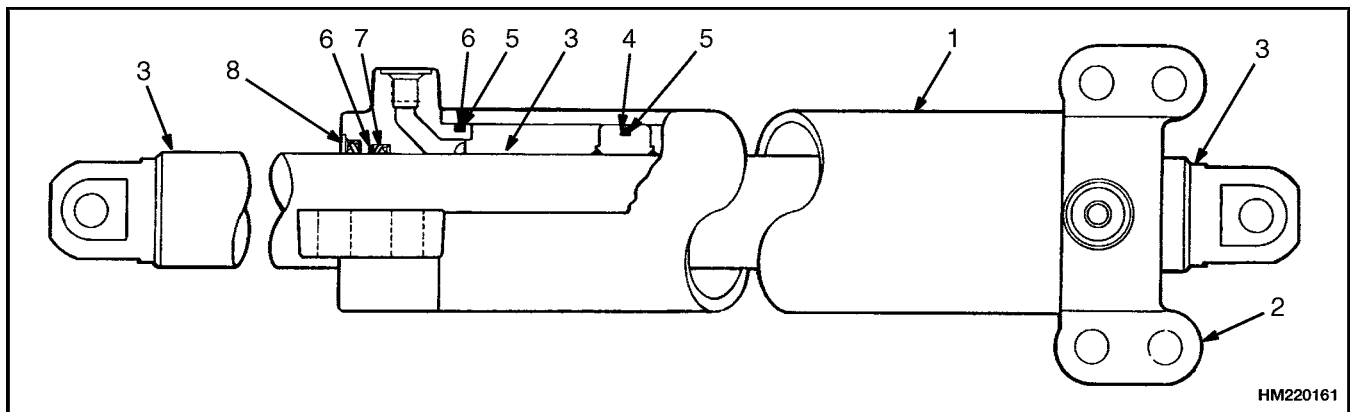
WARNING

Cleaning solvents can be flammable and toxic, and can cause skin irritation. When using cleaning solvents, always follow the recommendations of the manufacturer.

WARNING

Compressed air can move particles so that they cause injury to the user or to other personnel. Make sure that the path of the compressed air is away from all personnel. Wear protective goggles or a face shield to prevent injury to the eyes.

1. Clean all parts in solvent. Use compressed air to dry the parts.
2. Inspect the piston rod for grooves or damage. Remove small scratches with fine (400 grit) emery cloth. Inspect the cylinder bore for damage. Inspect the mounts for cracks.



- | | |
|----------------|----------------|
| 1. SHELL | 5. O-RING |
| 2. END CAP | 6. BACKUP RING |
| 3. PISTON ROD | 7. ROD SEAL |
| 4. PISTON SEAL | 8. WIPER SEAL |

Figure 3. Steering Cylinder

ASSEMBLE AND INSTALL

1. Put the O-rings, seals, and wipers in warm hydraulic oil. Install the O-rings, seals, and wipers in the correct positions shown in Figure 3.

 **CAUTION**

Do not damage the following items during installation: O-rings, seals, or wipers.

2. Lubricate the O-rings, seals, and wipers with O-ring lubricant and carefully install one end cap on the rod.
3. Carefully slide the rod into the shell. Keep the rod in the center of the shell during installation. Carefully slide the end cap into the shell. Carefully install the other end cap on the rod and shell. Put caps on the hydraulic fittings of the end caps.

4. Hold the end caps and install the steering cylinder on the axle frame using the capscrews and washers. Make sure the end caps are fully engaged with the shell. Tighten the capscrews to 225 N•m (166 lbf ft).
5. Align the tie rods at each end of the rod. See Figure 1. Install the pins and snap rings. Slide the dust covers over the rod so that the edge of each dust cover is against the shoulder of the rod. Tighten the clamps at the edge of the dust cover.
6. Remove the plugs and caps and connect the hydraulic lines to the steering cylinder. Start the engine and operate the steering system to remove the air from the cylinder and the system. Turn the steering wheel several times from one stop to the other. Check for leaks.

NOTE: The tie rods do not have an adjustment.

Troubleshooting

PROBLEM	POSSIBLE CAUSE	PROCEDURE OR ACTION
The steering wheels do not move when the steering wheel is turned.	The oil level is low or there is no oil in the tank.	Fill tank. Check for leaks.
	The steering control unit is damaged.	Repair or install new control unit.
	No oil flow from the steering control unit to the steering cylinder.	Repair or install new components. Check for leaks.
Slow or difficult steering.	Relief valve for the steering system needs adjustment.	Adjust or install new relief valve.
	Low oil pressure from the hydraulic pump.	Check for restrictions. See the Troubleshooting Chart in the Hydraulic System 1900 YRM 453.
	Seal in the steering cylinder has a leak.	Install new seal.
	Steering control unit is worn or has damage.	Repair or install new control unit.

PROBLEM	POSSIBLE CAUSE	PROCEDURE OR ACTION
Steering wheel turns the tires in the wrong direction.	The hydraulic lines are not connected correctly at the steering cylinder or at the steering control unit.	Connect lines properly. Remove air from system.
Steering function continues after the steering wheel stops.	The steering control unit was assembled wrong or has damage.	Repair or install new control unit.
There is air in the steering system.	<p>The oil level in the tank is low.</p> <p>Air was not removed after repair to the hydraulic or steering system.</p> <p>The hydraulic pump has an air leak at the inlet.</p>	<p>Add hydraulic oil as necessary. Check for leaks.</p> <p>Remove air from system.</p> <p>Repair system. Remove air from system.</p>



Yale Materials Handling Corp.
1400 Sullivan Dr., Greenville, NC 27834-2011

Thanks for your reading.

Please click here to download complete manual instantly.

And can also choose other manuals.

Feel free --->write to me with any questions.

Our service email:

manuals007@hotmail.com