

STEERING AXLE

**GC/GLC070-120LG/MG [B818];
GC070-120LJ/MJ [C818, D818];
ERC35-55HG (ERC70-120HD/HG) [A839];
GP/GLP/GDP070-110LG/MG [B813];
GDP60-70CA (GP/GLP/GDP135-155CA)
[A878, B878];
GLP/GDP165-280DA [A876];
GLP/GDP300-360EA [A877];
GDP/GLP80-120DB
(GP/GDP/GLP170-280DB)
[B876, C876, D876];
GDP/GLP130-160EB (GP/GDP/GLP300-360EB)
[B877, C877, D877];
ERC35-55HG (ERC70-120HH) [B839/C839]**

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STEERING AXLE GDP60-70CA (GP/GLP/GDP135-155CA) (A878, B878), GLP/GDP165-280DA (A876), GDP/GLP80-120DB (GP/GDP/GLP170-280DB) (B876, C876, D876), GLP/GDP300-360EA (A877), AND GDP/GLP130-160EB (GP/GDP/GLP300-360EB) (B877, C877, D877)

Remove



WARNING

Put the lift truck on blocks. Follow the procedures for raising the lift truck described in the Operating Manual 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.

The steering axle can be removed without removing the counterweight.

1. Make sure wheels are set for straight travel. Put blocks under frame in front of steer wheels, so steering axle can be removed. Top of axle frame must have clearance under counterweight so steering axle can be removed.
2. It is not required, but it can make removal of the axle easier if the wheels are removed. Disconnect hydraulic lines at steering cylinder. Install caps on cylinder and put plugs in hydraulic lines. Caps will prevent spindles from turning when axle is removed from under the lift truck.
3. Remove two dust covers from openings of bearing caps.
4. Slide a floor jack or forks of another lift truck under steering axle. Raise lifting device until it holds weight of axle assembly. Remove four capscrews and washers that fasten two bearing caps to frame. Remove bearing caps and slowly lower axle assembly. Carefully remove axle assembly from under lift truck.

Install



WARNING

Excessive play in the pivot bushings will result in increased shock loadings to the pivot pins and increased movement of the axle, and may affect steering responsiveness. If movement in the pivot bushings is more than 4 mm (0.16 in.), or damage to the O-ring seals exists, replace the bushings, flanges, and O-rings.

1. Install O-ring, spacer, and shims on each pivot shaft. Lubricate pivot shafts with multipurpose grease and install fiber bushing. See Figure 2 and Figure 4.
2. Use a floor jack or another lift truck to put steering axle into position in frame. Make sure fiber bushings fit into mounts of frame.
3. Install bearing caps.

GDP60-70CA (GP/GLP/GDP135-155CA) (A878, B878) units. Tighten capscrews to 320 N•m (236 lbf ft).

GLP/GDP165-280DA (A876), GDP/GLP80-120DB (GP/GDP/GLP170-280DB) (B876, C876, D876), GLP/GDP300-360EA (A877), and GDP/GLP130-160EB (GP/GDP/GLP300-360EB) (B877, C877, D877) units. Tighten capscrews to 380 N•m (280 lbf ft). After installation, make sure there is zero clearance between shims and frame. Add or remove shims as necessary to get zero clearance.

4. Install dust covers in openings of bearing caps.
5. Remove plugs and caps, and connect hydraulic lines to steering cylinder. Install wheels if they were removed.
6. Operate steering system to remove air from system. Turn steering wheel several times from one wheel stop to other wheel stop. Check for hydraulic leaks.

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>

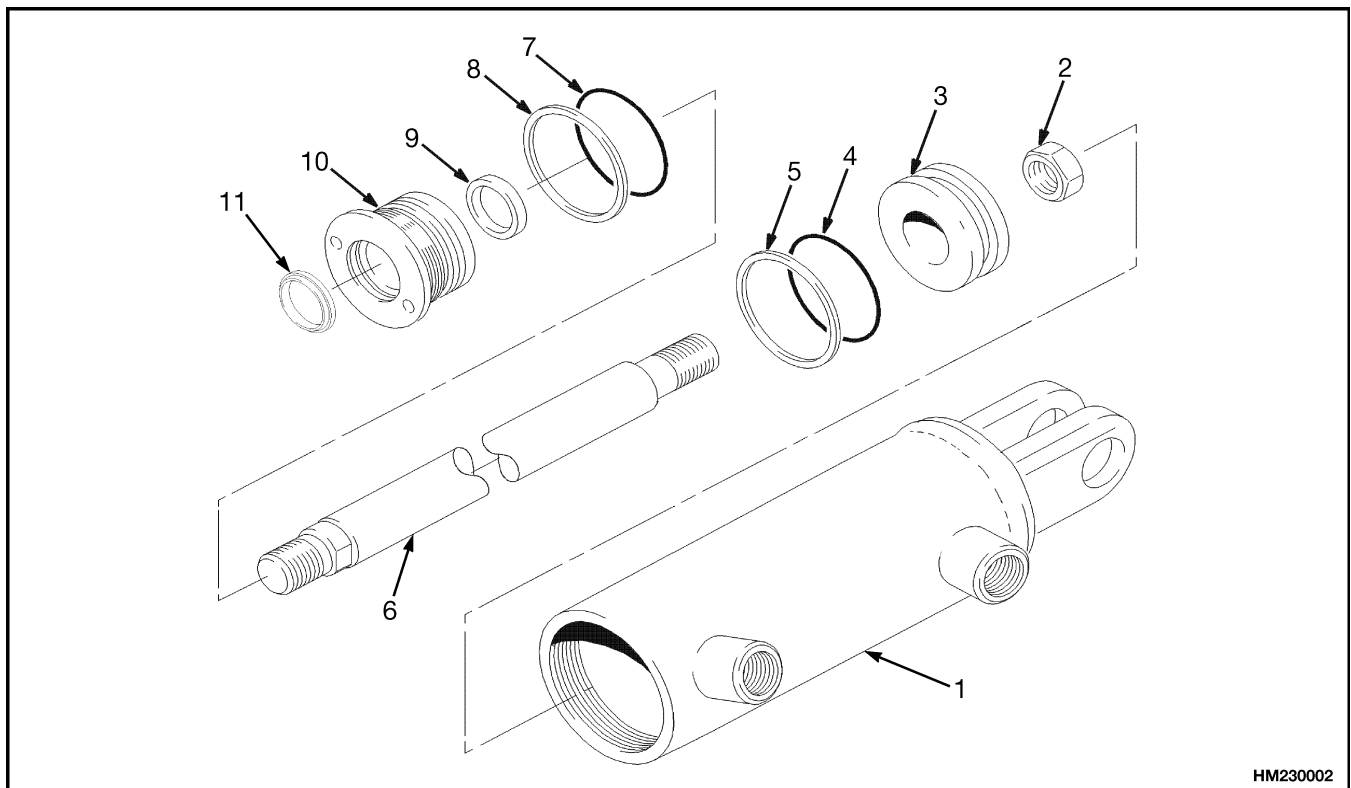
Tilt Cylinders

NOTE: The following procedure are for these models:

- GC/GLC040-065RG/TG/ZG
- GLP/GDP20-30RF/TF (GP/GLP/GDP040-060RG/TG/ZG)
- ERC20-30AGF (ERC040-065RF/ZF, RG/ZG)
- ERP20-30ALF (B216)
- ERP16-20ATF
- GDP/GLP16-20AF (GP/GLP/GDP030-040AF)
- GC/GLC030-040AF
- ERC/P16-20AAF (ERC030-040AF, AG/BG)
- ERP20-30ALF (ERP040-060DH) (D216/E216)
- ERC20-30AGF (ERC040-065GH) (A908)
- ERC/P16-20AAF (ERC030, 040AH) (B814/C814)
- ERC35-55HD/HG (ERC070-120HD/HG) (A839)
- ERC35-55HG (ERC70-120HH) (B839/C839)

NOTE: Always use new seals and O-rings. Make sure all parts are clean. Lubricate all parts with clean hydraulic oil.

1. Install the piston seal and O-ring(s) onto the piston. For lift truck models ERC35-55HD/HG (ERC070-120HD/HG) (A839) and ERC35-55HG (ERC70-120HH) (B839), install the guide ring. See Figure 2, Figure 3, and Figure 4. Install the piston onto the cylinder rod. Make sure the piston seal is not damaged. Tighten the nut on the piston rod to the value shown in Torque Specifications.
2. Install a new wiper and rod seal. Install the O-ring and backup ring onto the retainer.
3. Install the retainer assembly onto the rod.

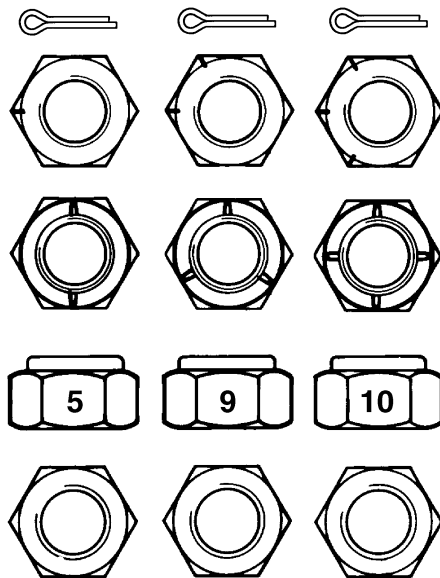


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- | | | |
|-------------------|----------------|----------------|
| 1. CYLINDER SHELL | 5. SEAL RING | 9. SEAL RING |
| 2. NUT | 6. PISTON ROD | 10. RETAINER |
| 3. PISTON | 7. O-RING | 11. WIPER RING |
| 4. O-RING | 8. BACKUP RING | |








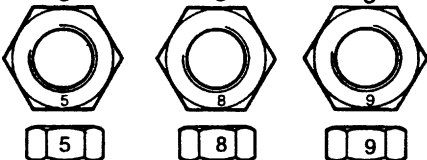
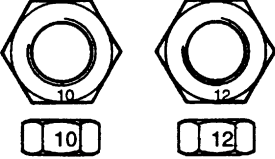
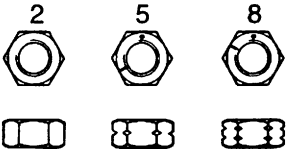

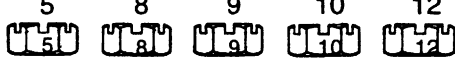
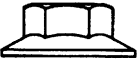
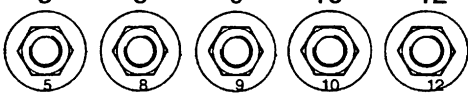
Figure 2. Tilt Cylinders for GC/GLC040-065RG/TG/ZG, GLP/GDP20-30RF/TF (GP/GLP/GDP040-060RG/TG/ZG), ERC20-30AGF (ERC040-065RF/ZF, RG/ZG) (E108), ERP20-30ALF (B216), ERP16-20ATF, GDP/GLP16-20AF (GP/GLP/GDP030-040AF), GC/GLC030-040AF, ERP20-30ALF (ERP040-060DH) (D216/E216), and ERC20-30AGF (ERC040-065GH) (A908)

METRIC AND INCH (SAE) FASTENERS



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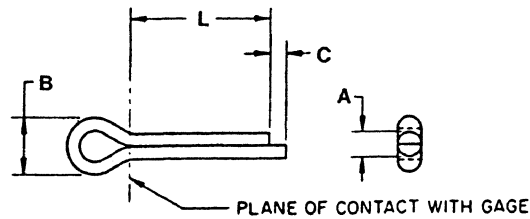
Table 2. Studs and Nuts

TYPE OF FASTENER	METRIC FASTENERS STRENGTH LEVELS: PROPERTY CLASS * MARKINGS NOT REQUIRED	INCH FASTENERS STRENGTH LEVELS: SAE GRADES * MARKINGS NOT REQUIRED
 <p>STUDS</p>	<p>4.6* 4.8* 5.8* 8.8</p>  <p>9.8 10.9 12.9</p>  <p>MARKINGS FOR SIZE M5 AND LARGER</p> <p>OR</p>  <p>OPTIONAL GEOMETRIC SYMBOLS FOR SIZES M5 THRU M11 ONLY.</p>	<p>5* 5.2*</p>  <p>8* 8.1</p> 
 <p>HEX NUTS</p>	<p>5 8 9</p>  <p>OR</p> <p>10 12</p> 	<p>OR</p> <p>2 5 8</p> 
 <p>HEX SLOTTED NUTS</p>	<p>5 8 9 10 12</p> 	<p>MARKINGS NOT REQUIRED</p>
 <p>HEX FLANGE NUTS</p>	<p>5 8 9 10 12</p> 	<p>MARKINGS NOT REQUIRED</p>

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Table 11. Cotter Pin Dimensional Data








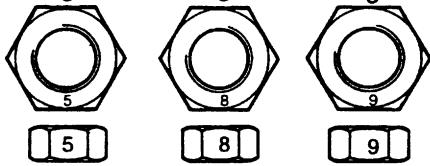
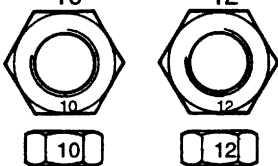
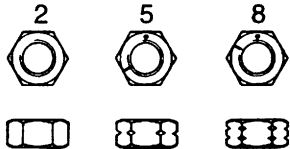

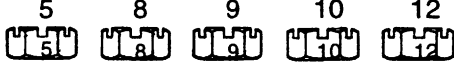
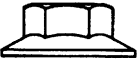
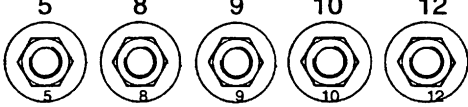
Nominal Length L	Length Range		Nominal Size - Part Numbers	
	max	min	13.0 mm (0.500 in.)	16.00 mm (0.625 in.)
19.05 mm (0.750 in.)	20.5 mm (0.807 in.)	18.3 mm (0.720 in.)		
25.4 mm (1.00 in.)	26.9 mm (1.060 in.)	23.9 mm (0.940 in.)		
31.75 mm (1.250 in.)	33.3 mm (1.310 in.)	29.2 mm (1.150 in.)		
38.1 mm (1.500 in.)	40.9 mm (1.610 in.)	36.6 mm (1.440 in.)		
44.45 mm (1.750 in.)	46.0 mm (1.810 in.)	42.9 mm (1.690 in.)	0221889	
50.8 mm (2.000 in.)	52.3 mm (2.060 in.)	49.3 mm (1.940 in.)	0221890	
57.15 mm (2.250 in.)	58.7 mm (2.310 in.)	55.1 mm (2.170 in.)	0221891	
63.5 mm (2.500 in.)	65.0 mm (2.560 in.)	62.0 mm (2.440 in.)	0221892	
69.85 mm (2.750 in.)	72.1 mm (2.840 in.)	68.3 mm (2.690 in.)	0221893	0221895
76.2 mm (3.000 in.)	81.3 mm (3.200 in.)	74.7 mm (2.940 in.)	0015291	0221896
88.9 mm (3.500 in.)	91.4 mm (3.600 in.)	87.4 mm (3.440 in.)	0015292	0221897
101.6 mm (4.000 in.)	113.3 mm (4.460 in.)	98.8 mm (3.890 in.)	0015293	0221898
127.0 mm (5.000 in.)	128.5 mm (5.060 in.)	123.7 mm (4.870 in.)	0015295	0221899
152.4 mm (6.000 in.)	153.9 mm (3.060 in.)	138.7 mm (5.460 in.)	0015297	0221900



EXTENDED PRONG

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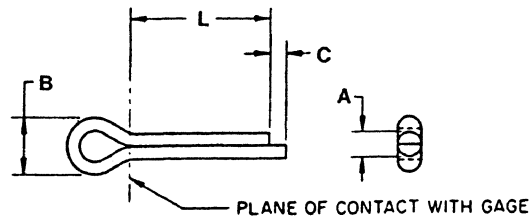
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 <p>HEX SLOTTED NUTS</p>	<p>5 8 9 10 12</p> 	<p>MARKINGS NOT REQUIRED</p>
 <p>HEX FLANGE NUTS</p>	<p>5 8 9 10 12</p> 	<p>MARKINGS NOT REQUIRED</p>

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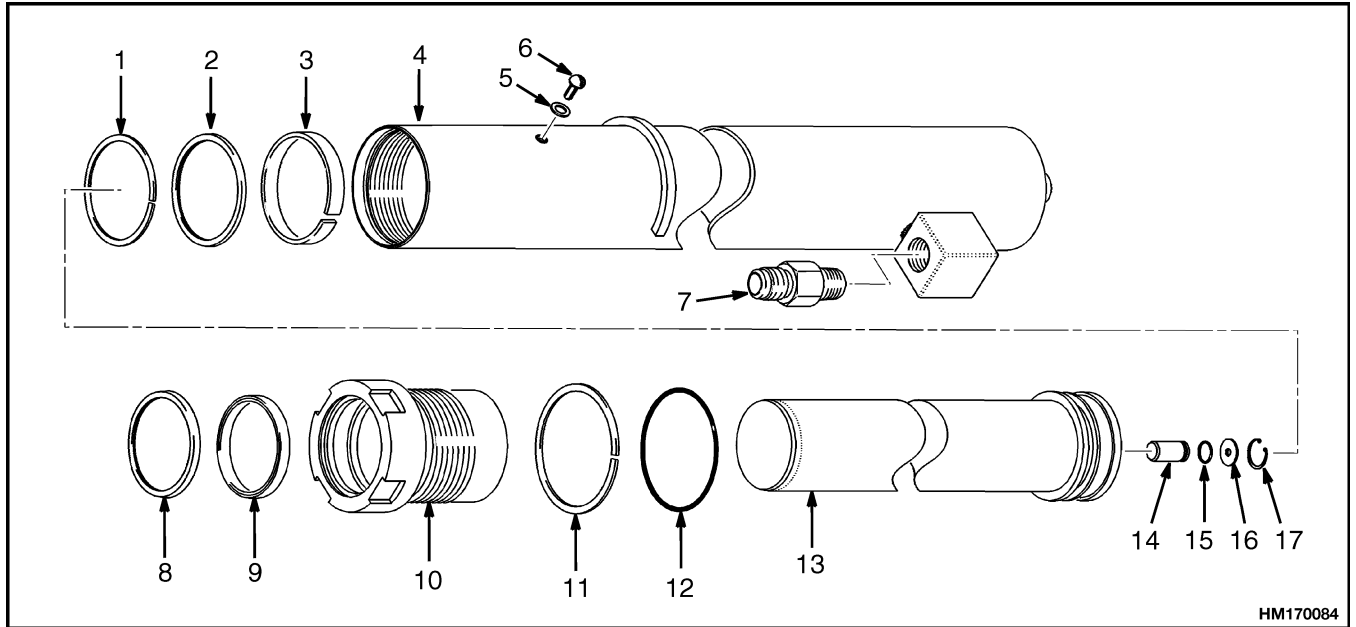
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EXTENDED PRONG

HM211587



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- | | |
|---|------------------|
| 1. BACKUP RING | 9. SEAL, ROD |
| 2. SEAL | 10. RETAINER |
| 3. WEAR RING | 11. BACKUP RING |
| 4. SHELL | 12. O-RING |
| 5. WASHER, SEAL | 13. ROD ASSEMBLY |
| 6. SCREW, BUTTON HEAD | 14. CHECK VALVE |
| 7. LOWERING CONTROL VALVE (VELOCITY FUSE) | 15. O-RING |
| 8. WIPER, ROD | 16. WASHER |
| | 17. SNAP RING |

Figure 3. Free-Lift Cylinder

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Carriage Repair

REMOVE



WARNING

Do not work under a raised carriage. Lower the carriage or use a chain or blocks to prevent the carriage and inner weldment from lowering.

NOTE: If the mast is equipped with a sideshift carriage, see the paragraphs under Sideshift Carriage Repair.

1. Put weight on the forks so carriage has stability and will not fall when it is disconnected from the mast.
2. Lower carriage and forks on blocks so lift chains become loose.



WARNING

When disconnecting the lift chains, keep control of the ends. Use wire to temporarily connect the ends of the lift chains to the mast. This procedure will prevent the lift chains from falling and causing an injury or damage.

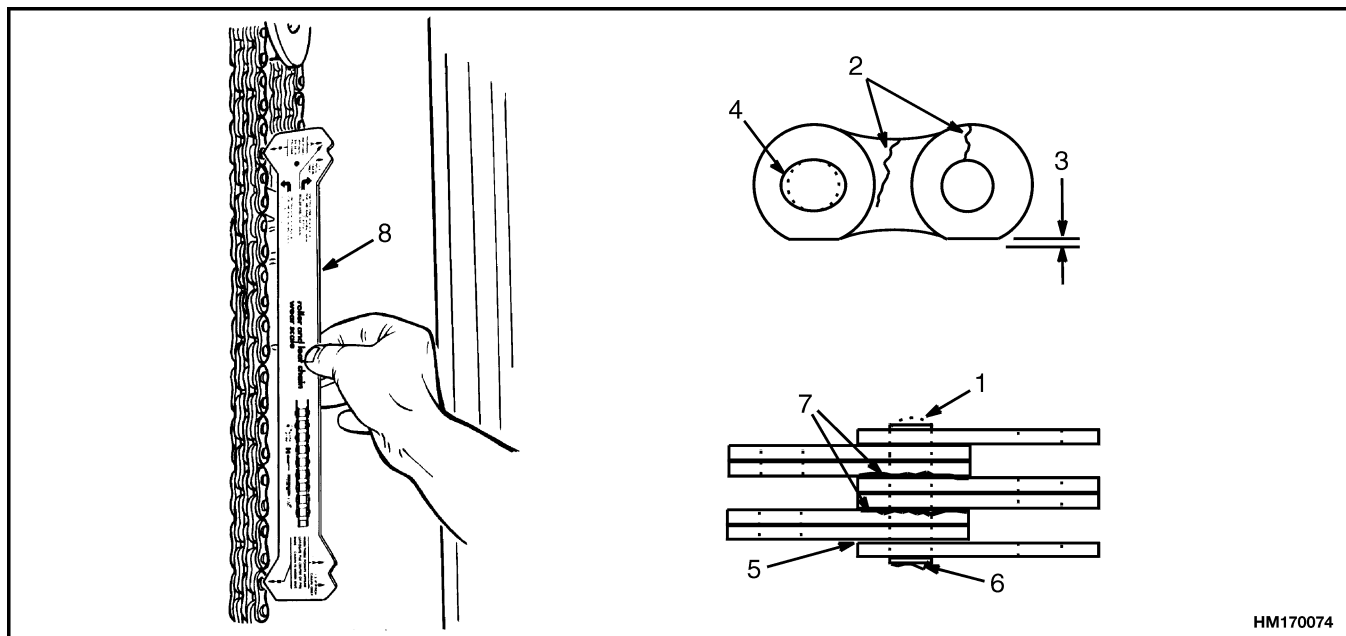
3. Remove pin from each chain anchor at the carriage. Disconnect lift chains from carriage. See Figure 9.



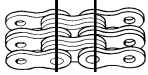
WARNING

Make sure the carriage has stability and will not fall over when the inner weldment is raised above the load rollers of the carriage.

4. Use lift cylinders to raise inner weldment until it is above the load rollers of the carriage. If the hydraulic system cannot be used, connect a lifting device to the top of the inner weldment. Carefully raise inner weldment until it is above the load rollers of the carriage.
5. Move lift truck from carriage. Connect a lifting device to the carriage. Make sure carriage is stable. Remove load backrest and forks. Put carriage on floor so that load rollers are up.
6. If any of the load rollers must be replaced, make a note of the arrangement of the shims.
7. Reverse this procedure for carriage installation.



NOTE: THE INSTRUCTIONS FOR MEASURING CHAIN WEAR ARE SHOWN ON THE CHAIN WEAR SCALE.

<p style="text-align: center;">Pitch</p> 	<p style="text-align: center;">Total Length of 20 Links (Pitch) of New Chain</p>	<p style="text-align: center;">Wear Limit The Maximum Length of 20 Links</p>
<p style="text-align: center;">25.4 mm (1.00 in.) 31.8 mm (1.25 in.)</p>	<p style="text-align: center;">508.0 mm (20.0 in.) 635.0 mm (25.0 in.)</p>	<p style="text-align: center;">523.3 mm (20.6 in.) 654.1 mm (25.8 in.)</p>

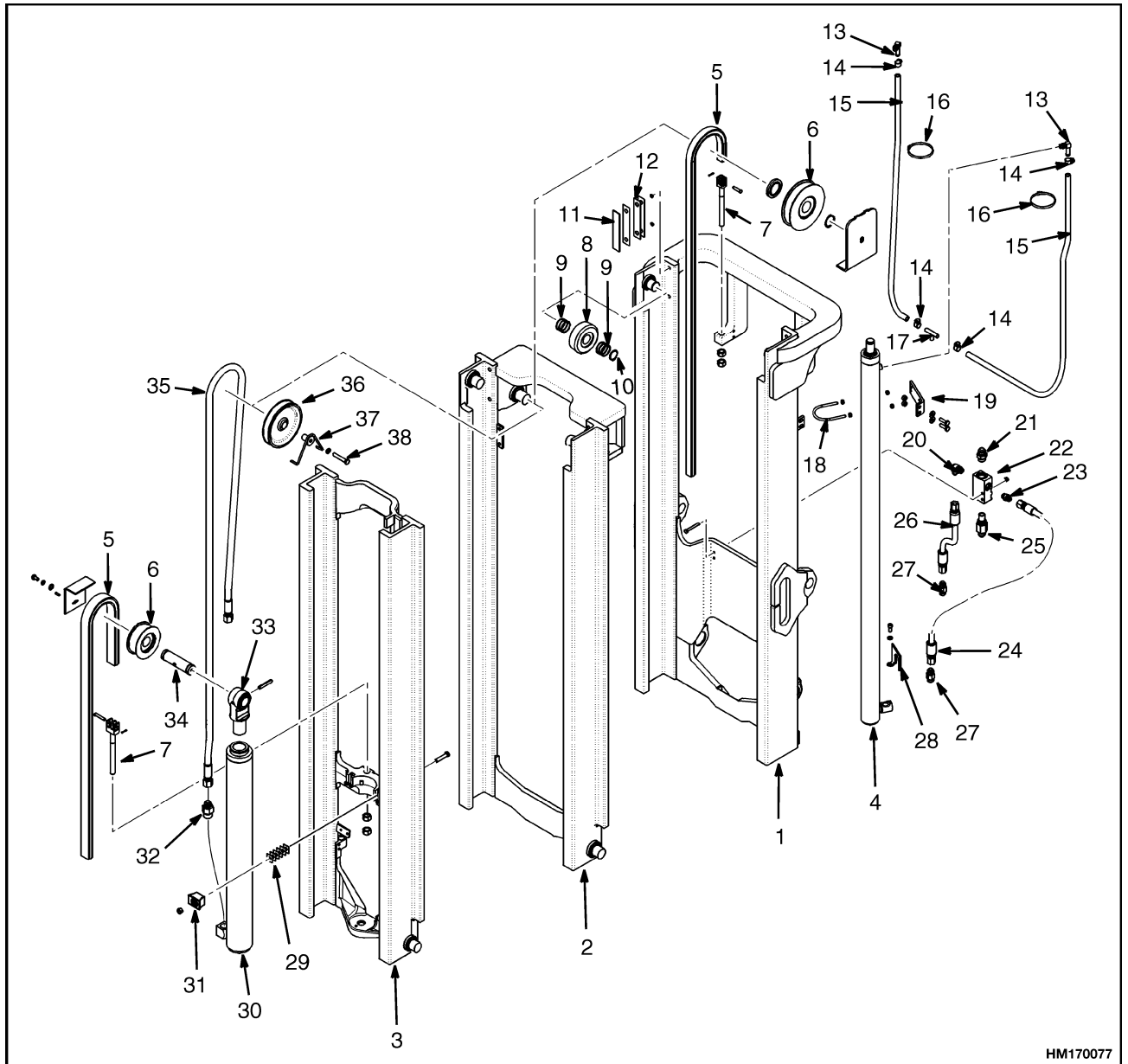
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|--|---|
| <ul style="list-style-type: none"> 1. WORN PIN 2. CRACKS 3. EDGE WEAR 4. HOLE WEAR | <ul style="list-style-type: none"> 5. LOOSE LEAVES 6. DAMAGED PIN 7. RUST 8. CHAIN WEAR SCALE |
|--|---|

Figure 15. Lift Chains Check

ASSEMBLE

NOTE: The shims for the load rollers keep the weldments parallel and provide correct clearance. During assembly, the location of the shims will be approximately the same as they were before disassembly. Check clearance and adjust shims for wear or changes because of repairs. Strip bearings are also adjusted by using shims. See Mast Adjustments in this section for the instructions to make the necessary adjustments.

1. Connect a lifting device to the center of inner weldment (see Figure 14). Put stub shafts through notches in the outer weldment. Slide inner weldment into the outer weldment so stub shafts are seen at the top and bottom of the weldments.
2. Install strip bearings and shims on the outer weldment. Apply grease to bearing surface. See Figure 16.



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- | | | |
|--------------------------|----------------------------|------------------------|
| 1. OUTER WELDMENT | 14. CLAMP | 26. HOSE |
| 2. INTERMEDIATE WELDMENT | 15. HOSE | 27. VELOCITY FUSE |
| 3. INNER WELDMENT | 16. CLAMP | 28. BRACKET |
| 4. MAIN LIFT CYLINDER | 17. FITTING | 29. SHIM |
| 5. LIFT CHAIN | 18. CLAMP | 30. FREE-LIFT CYLINDER |
| 6. CHAIN SHEAVE | 19. BRACKET | 31. CLAMP |
| 7. CHAIN ANCHOR | 20. FITTING | 32. VELOCITY FUSE |
| 8. LOAD ROLLER | 21. FITTING | 33. CROSSHEAD |
| 9. SHIMS | 22. HOUSING, VALVE | 34. PIN |
| 10. SNAP RING | 23. FITTING | 35. HOSE |
| 11. BEARING STRIP | 24. HOSE | 36. HOSE SHEAVE |
| 12. SHIM | 25. LOWERING CONTROL VALVE | 37. STUB SHAFT |
| 13. FITTING | | 38. CAPSCREW |

Figure 21. Three-Stage Mast With Full Free-Lift GLPIGDP3.5-5.5LJIMJ (GP/IGLP/IGDP070-120LJIMJ) Lift Truck Models

Legend for Figure 26

NOTE: HOSE HEADER ARRANGEMENT SHOWN FOR LIFT TRUCK MODELS ERC35-55HG (ERC70-120HH) (B839) WITH MAST HEIGHTS OF 5240 mm (17 ft) AND 5500 mm (18 ft)

- | | |
|---------------|--------------------|
| 1. SNAP RING | 10. FITTING |
| 2. WASHER | 11. O-RING |
| 3. SHEAVE | 12. MOUNTING BLOCK |
| 4. CLAMP | 13. HOSE REEL |
| 5. CAPSCREW | 14. PLATE |
| 6. HOSE | 15. FLOW VALVE |
| 7. NUT | 16. PIN |
| 8. BRACKET | 17. STRAIN RELIEF |
| 9. LOCKWASHER | 18. SPACER |

Mast Operation Check**WARNING**

Lower the lift mechanism completely. Never allow anyone under a raised carriage. Do not put any part of your body in or through the lift mechanism unless all parts of the mast are completely lowered and the engine is STOPPED.

Before making any repairs, use blocks and chains on the mast weldments and carriage so they cannot move. Make sure the moving parts are attached to a part that does not move.

Do not try to locate hydraulic leaks by putting hands on pressurized hydraulic components. Hydraulic oil can be injected into the body by pressure.

1. Check for leaks in the hydraulic system. Check condition of hydraulic hoses and tubes.

NOTE: Some parts of the mast move at different speeds during raising and lowering.

2. Slowly raise and lower the mast several times without a load. Mast components must raise and lower smoothly in correct sequence. Carriage raises first, then inner weldment and intermediate weldment (three-stage masts only).
3. Inner weldments and the carriage must lower completely.
4. Check that controls for the attachment operate the functions of the attachment. See symbols by each of the controls. Make sure all hydraulic lines are connected correctly and do not leak.

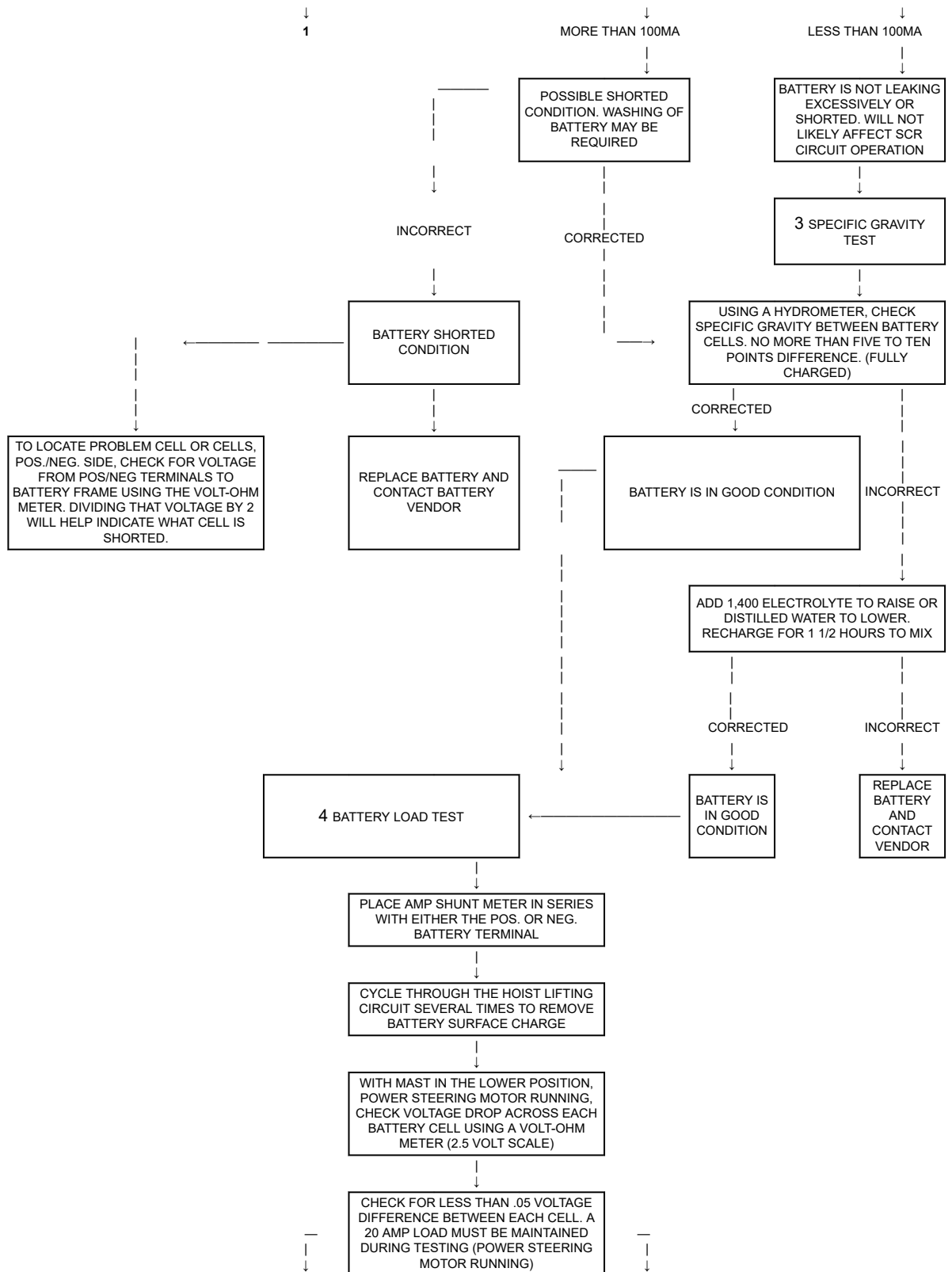
Troubleshooting

PROBLEM	POSSIBLE CAUSE	PROCEDURE OR ACTION
No movement of the lift or tilt cylinders.	Pilot line(s) to control valve are disconnected or leaking.	Tighten or connect fittings.
	No oil or not enough oil in hydraulic tank.	Fill tank. Check for leaks.
	Relief valve is not set correctly.	Adjust or install new relief valve.
	Hydraulic pump does not operate or has damage.	Repair or install new pump.
	Remote control valve does not operate.	Check and repair valve.
Slow movement of the lift or tilt cylinders.	No oil or not enough oil to the lift or tilt cylinders.	Fill tank. Check for leaks.
	Cylinders have internal or external leaks.	Repair leaks. Install new parts.
	Relief valve is not set correctly.	Adjust or install new relief valve.
	There is a restriction in a hydraulic line.	Remove restriction. Install new parts.
Rough movement of the mast assembly.	There is air in the hydraulic system.	Remove air. Check for loose connections or breaks in lines.
	Lift cylinder(s) is damaged.	Repair or install new lift cylinder.
	Mast weldments are damaged or not aligned.	Align weldments. Install new parts.
	Mast weldments are not lubricated correctly.	Lubricate correctly.
	Load rollers or bearing blocks are damaged or not adjusted correctly.	Repair or adjust the parts.
	Lift chains are damaged.	Replace lift chains.
Lift or tilt cylinders extend or retract when control valve lever (spool) is in the NEUTRAL position.	Load check valves and spools have damage.	Repair or install new load check valve and spool.
	Cylinder seals have leaks.	Install new seals.
	Hydraulic lines have leaks.	Repair leaks. Install new parts. Remove air from system.

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Table 2. BATTERY TROUBLESHOOTING GUIDE (Continued)



During the discharge of the cell, lead peroxide and sponge lead mix with sulfuric acid to make lead sulfate ($PbSO_4$) on both plates. See Figure 4. This action decreases the voltage in the cell. When the sulfuric acid is removed from the electrolyte, the specific gravity of the electrolyte decreases. See Figure 5. The potential difference of a discharged cell is approximately 1.75 volts.

When a direct current is applied to a discharged cell, the lead sulfate is changed into lead and sulfuric acid. The lead goes to the positive plate and stays as lead and to the negative plate and stays as lead peroxide. See Figure 6. The concentration of sulfuric acid in the electrolyte increases. The specific gravity of the electrolyte increases as the concentration of sulfuric acid increases. In a fully charged cell, the positive plate again contains the lead peroxide and the negative plate contains the sponge lead.

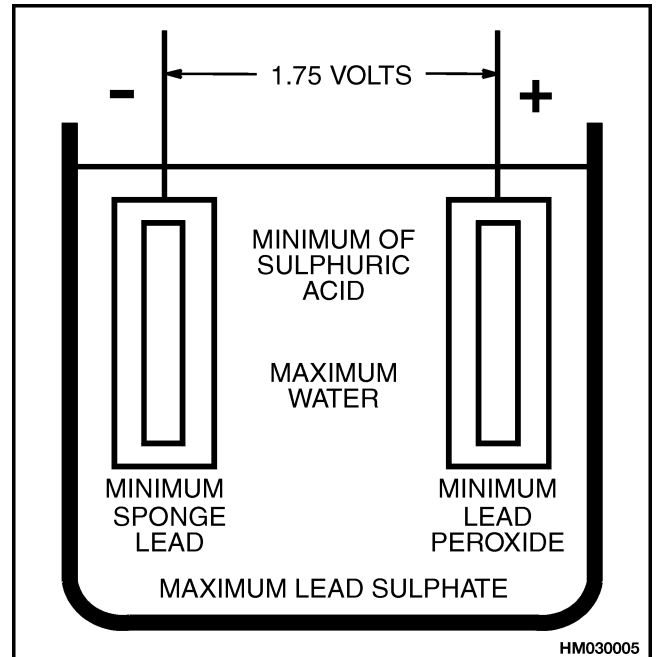


Figure 5. Discharged Cell

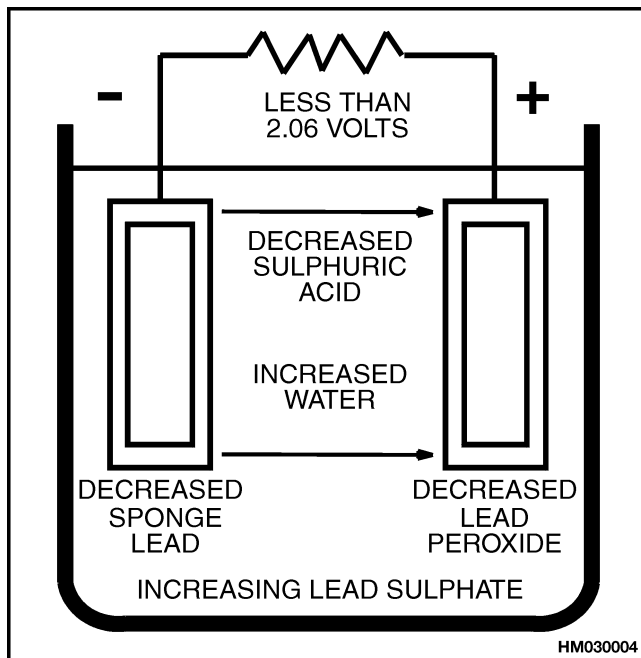


Figure 4. Discharging Cell

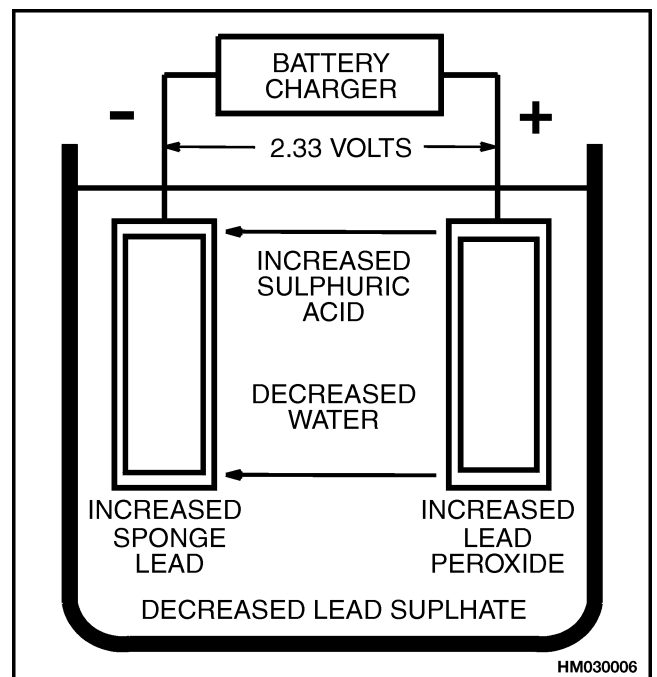


Figure 6. Charging Cell

2. **EQUALIZING CHARGE.** This charge is at a low rate and balances the charge in all the cells. The equalizing charge is usually given approximately once a month. It is a charge at a slow rate for 3 to 6 hours in addition to the regular charging cycle. Do not give an equalizing charge more than once a week. The most accurate specific gravity measurements for a charged battery will be after an equalizing charge. If the specific gravity difference is more than 0.020 between cells of the battery after an equalizing charge, there can be a damaged cell. Consult your battery dealer.

NOTE: Many customers have battery chargers that can follow a program to automatically charge a battery according to recommendations of the battery manufacturer. Use the recommendations of the battery manufacturer for charging the battery.

When performing a monthly equalization charge it is recommended to check individual cell voltages.

- 1 Complete an equalization charge.
- 2 Measure and compare the voltage for each cell.
- 3 Record any cells differing more than 0.5 volts from other cells.
- 4 Calculation the expected specific gravity (average cell voltage - 0.845 = specific gravity). For example 2.09 volts - 0.845 = 1.24.
- 5 Verify calculated specific gravity by performing a specific gravity measurement of each cell with a hydrometer.

The discharge limits and the limits for the specific gravity before the battery must be charged again are shown in Figure 17. NEVER discharge a battery below the limits shown in Figure 18. Discharging a battery beyond the design limits will decrease the service life of the battery.

NOTE: Sometimes the capacity of a battery is not enough to complete a work period. Check for the following conditions:

- The battery is too small for the job.
- The battery is not fully charged.
- The battery charger is not operating correctly.
- The battery is near the end of its service life.

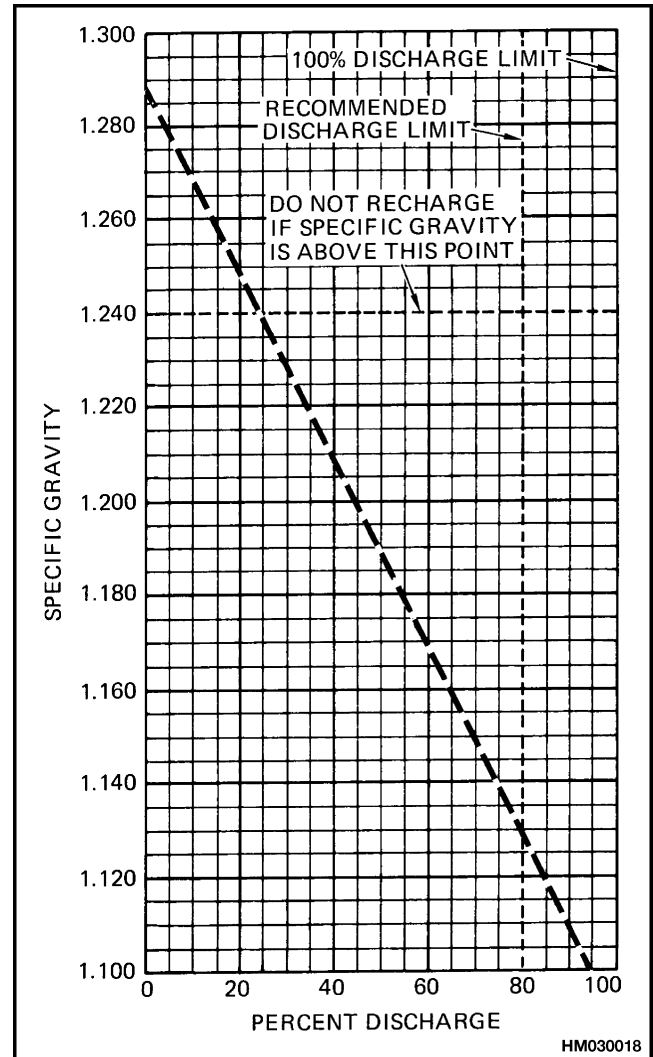


Figure 17. Specific Gravity Versus Percent Discharge

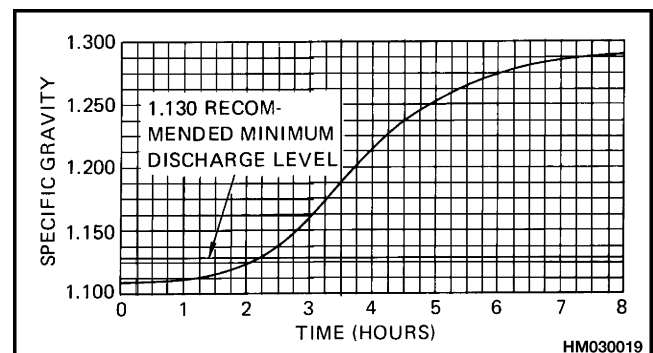
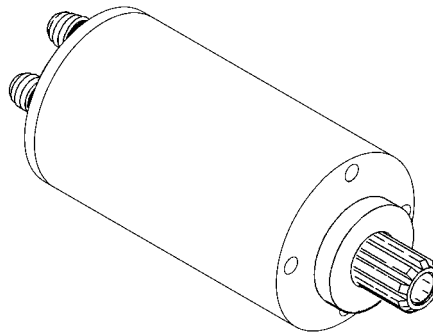


Figure 18. Specific Gravity Compared to Charging Time

STEERING HOUSING AND CONTROL UNIT

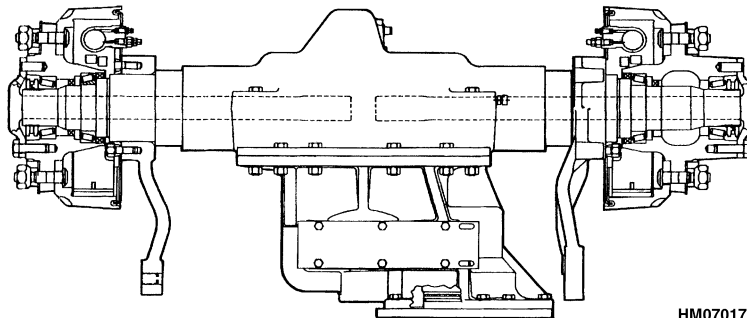
**ERC20-30AGF (ERC040-065RG/ZG) [E108];
ERC/P16-20AAF (ERC030-040AG/BG) [A814];
ERP20-30ALF [B216];
GC/GLC030-040AF [B809];
GLP/GDP16-20AF
(GP/GLP/GDP030-040AF) [B810];
GP/GLP/GDP2.00-3.00RF/TF
(GP/GLP/GDP040-060RG/TG/ZG) [A875];
GC/GLC040-065RG/TG/ZG [E187];
ERP20-30ALF (ERP040-060DH) [D216];
ERP20-32ALF (ERP040-065DH) [E216];
ERC/P16-20AAF (ERC030-040AH) [B814];
ERC20-32AGF (ERC040-065GH) [A908];
ERC35-55HG (ERC70-120HH) [B839/C839]**



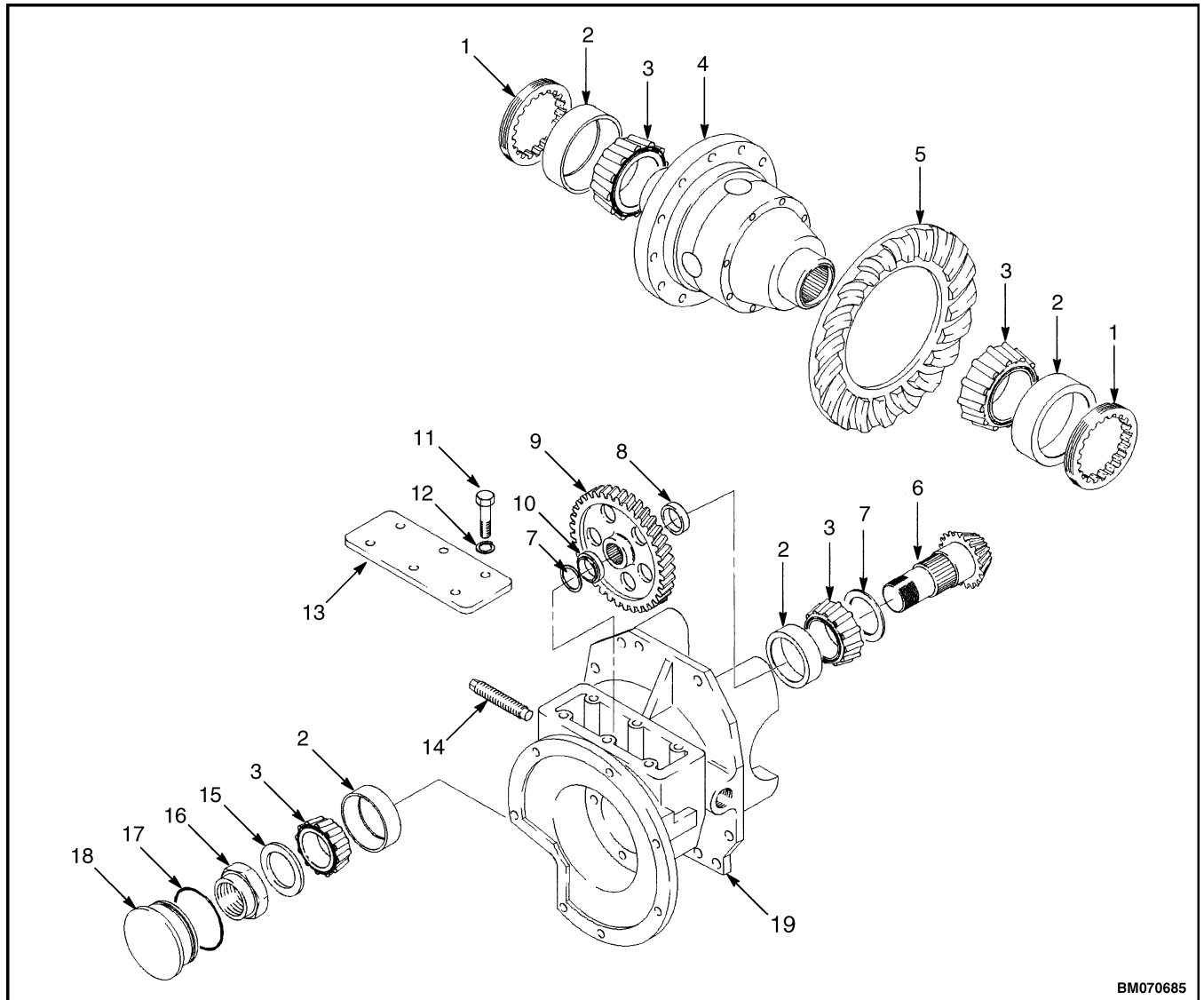
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DRIVE AXLE, SPEED REDUCER, AND DIFFERENTIAL

**ERC70-120HD, ERC70-120HG [A839];
ERC35-55HG (ERC70-120HH) [B839/C839]**



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- | | | |
|--------------------------|-----------------------|------------------------|
| 1. ADJUSTING NUT | 8. SPACER (INNER) | 15. SPECIAL WASHER |
| 2. BEARING CUP | 9. SPEED REDUCER GEAR | 16. SPECIAL LOCK NUT |
| 3. BEARING CONE | 10. SPACER (OUTER) | 17. O-RING |
| 4. DIFFERENTIAL ASSEMBLY | 11. CAPSCREW | 18. BEARING CUP |
| 5. RING GEAR | 12. WASHER | 19. SPEED REDUCER CASE |
| 6. PINION SHAFT | 13. ACCESS PLATE | |
| 7. SHIM | 14. THRUST SCREW | |

Figure 4. Speed Reducer Assembly

Differential

1. Remove ring gear from differential assembly. Remove twelve bolts and special hardened washers. **Do not use a press or a hammer to remove the ring gear.** Heat differential in hot water, 82 to 100°C (180 to 212°F), to loosen ring gear.

WARNING

Hot parts. Wear protective clothing and gloves to prevent burns.

2. Disassemble the differential. Remove eight cap screws and washers and separate differential case. Remove cross, spider gears, and axle gears.

c. **Method 2 - Top Pins Only.** See Figure 11.

- (1) The long capscrew used to remove the bottom pins cannot be used at the top because there is a restriction at the frame sides. Use a rod threaded at both ends and the appropriate length instead of capscrew. The diameter of the threaded rod must be smaller to allow clearance to move the port-a-power at an angle in the restricted space.
 - (2) Install spacer, port-a-power with a hollow piston, and threaded rod assembly through mounting pin from frame side. Operate port-a-power in the direction away from the frame and pull the mounting pin out of (removal), or into (installation), axle mount and frame members.
4. Assemble brake assembly to mount for axle housing as described in the section **Brake System** 1800 YRM 338.
 5. Install seal in center of hub. Lubricate inner bearing with grease. Install inner seal in hub. Install brake drum on hub. Install hub and brake drum on axle. Use care not to damage seals when installing hub. Lubricate outer bearing cone with grease and install outer bearing cone.
 6. Install adjustment nut. Tighten nut to 203 N•m (150 lbf ft) while rotating wheel hub. Loosen nut until wheel hub rotates freely with no end play. The torque must be less than 27 N•m (20 lbf ft). Tighten nut to 34 N•m (25 lbf ft) and tighten to lock in place the first alignment position. Install lock nut and tighten it to 136 N•m (100 lbf ft).

7. Apply sealant Yale Part No. 520042831, to flange of axle shaft. Install axle shaft. Tighten capscrews to 225 N•m (166 lbf ft).



CAUTION

When the wheels have been installed, check all wheel nuts after 2 to 5 hours of operation. Tighten the nuts in a cross pattern to the correct torque value. When the nuts stay tight after an 8-hour check, the interval for checking the torque can be extended to 350 hours for lift truck models ERC070-120HD (A839) or 500 hours for lift truck models ERC070-120HG (A839) and ERC35-55HG (ERC70-120HH) (B839/C839)

8. Install wheels. Tighten wheel nuts to 680 N•m (502 lbf ft).
9. Install the mast assembly as described for lift truck models ERC070-120HD (A839) in section **Masts, Description and Repairs for Lift Trucks With 3,500 to 6,000 kg (7,000 to 12,000 lb) Capacities** 4000 YRM 340 or ERC070-120HG (A839) and ERC35-55HG (ERC70-120HH) (B839/C839) in section **Masts, Description and Repairs** 4000 YRM 736 for your specific lift truck.
10. Install the battery as described in the section **Periodic Maintenance** 8000 YRM 915 for lift truck models ERC070-120HG (A839) or **Periodic Maintenance** 8000 YRM 1201 for lift truck models ERC35-55HG (ERC70-120HH) (B839/C839). Fill differential housing with Ultra Gear Lubrication Gear Oil® SAE 80W (Chevron) through fill hole. Remove air from brake system as described in the section **Brake System** 1800 YRM 338.

Legend for Figure 2

NOTE: BRAKE BOOSTER AND MASTER CYLINDER FOR LIFT TRUCK MODELS GC/GLC70-120LG/MG (B818) AND GP/GLP/GDP70-120LG/MG (B813) SHOWN.

A. BRAKES NOT APPLIED

Hydraulic oil flows from the steering control unit to the inlet of the brake valve. The hydraulic oil flows freely between the plunger and the piston and returns to the hydraulic tank from the outlet.

B. BRAKES APPLIED

When the brakes are applied and the engine is not running, the plunger pushes against the piston. The piston and piston rod push against the piston in the master cylinder to actuate the brakes.

When the engine is running, there is hydraulic oil flowing through the brake valve.

The movement of the plunger makes a restriction in the flow of oil between the plunger and the piston. The hydraulic pressure behind the piston increases and pushes on the piston and piston rod to move the piston in the master cylinder. The oil pressure behind the piston decreases the effort at the brake pedal to apply the brakes.

As the piston for the master cylinder moves, brake fluid flows from the outlet to the wheel cylinders. The relief valve gives a 2300 kPa (332 psi) limit to the hydraulic pressure in the brake valve.

- | | |
|-----------------------------|--------------------------------|
| 1. BRAKE VALVE (BOOSTER) | 7. MASTER CYLINDER |
| 2. INLET | 8. PISTON (MASTER CYLINDER) |
| 3. PLUNGER | 9. OUTLET TO WHEEL CYLINDERS |
| 4. PISTON (BRAKE VALVE) | 10. INLET FROM BRAKE RESERVOIR |
| 5. PISTON ROD | 11. RELIEF VALVE |
| 6. OUTLET TO HYDRAULIC TANK | |

**CAUTION**

Do not damage the seals when you install the hub assembly.

- e. Install wheels. Tighten nuts for wheels to 610 to 680 N•m (450 to 500 lbf ft).
- f. Apply sealant (Yale Part Number 580042831) to flange of axle shaft. Install axle shaft. Tighten capscrews to 225 N•m (165 lbf ft).

**CAUTION**

When the wheels have been installed, check all wheel nuts after 2 to 5 hours of operation. Tighten

the nuts to the correct torque. When the nuts stay tight after an 8-hour check, the interval for checking can be extended to 350 hours for lift truck models ERC70-120HD (A839), GC/GLC70-120LG/MG (B818), and GP/GLP/GDP70-120LG/MG (B813) and 500 hours for lift truck models ERC70-120HG (A839) and ERC35-55HG (ERC70-120HH) (B839/C839).

12. Remove air from brake system and adjust brakes. See Brake System Air Removal and Brake Shoes Adjustment in this section.

Master Cylinder Repair

MASTER CYLINDER FOR LIFT TRUCK MODELS GC/GLC70-120LG/MG (B818) AND GP/GLP/GDP70-120LG/MG (B813)

NOTE: Replace the brake booster seal (Figure 17) when you repair or replace the master cylinder.

Remove

1. Disconnect brake line at master cylinder. Cover end of brake line. Disconnect wires at brake switch. Disconnect hose from reservoir. Put plug in end of hose. See Figure 13.
2. Remove capscrews that hold master cylinder to brake valve.

Disassemble

**WARNING**

The piston has a compressed spring behind it. Remove the piston carefully.

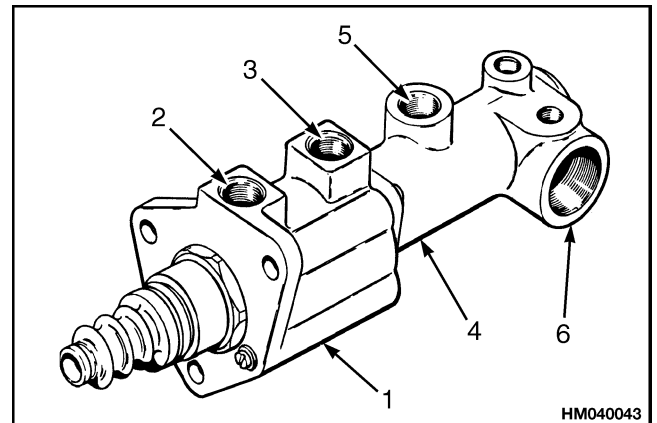
1. Remove retaining ring from end of master cylinder. Carefully remove piston and spring from bore. See Figure 14.

**CAUTION**

DO NOT use an oil solvent to clean the master cylinder, wheel cylinder, or the brake linings. Use

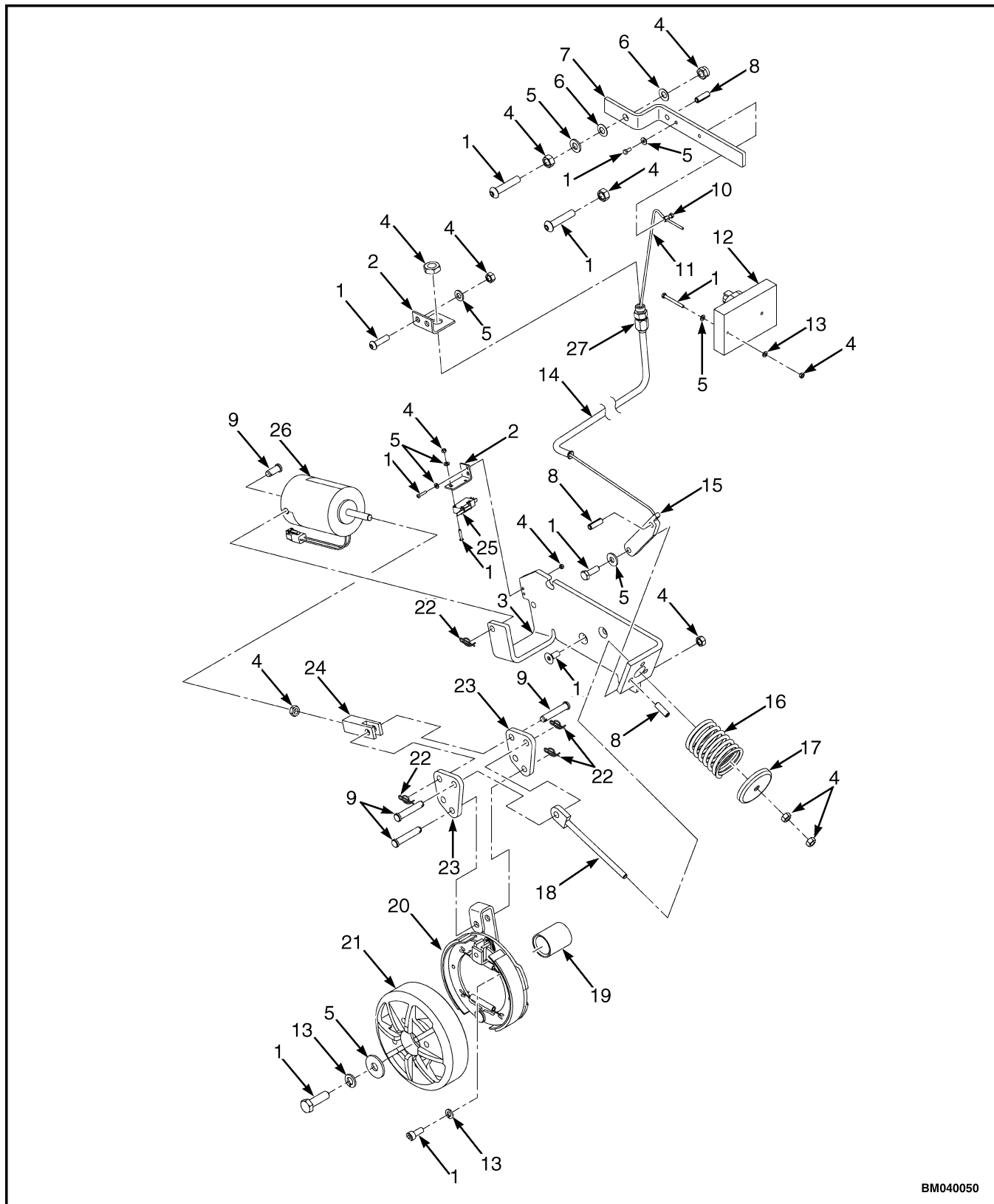
a solvent approved for cleaning of brake parts. Do not put oil or grease in the brake fluid or on the linings.

2. Remove seals from piston.



1. BRAKE BOOSTER
2. INLET FROM STEERING CONTROL UNIT
3. OUTLET TO HYDRAULIC TANK
4. MASTER CYLINDER
5. INLET FROM RESERVOIR
6. OUTLET TO WHEEL CYLINDERS

Figure 13. Brake Booster and Master Cylinder for Lift Truck Models GC/GLC70-120LG/MG (B818) and GP/GLP/GDP70-120LG/MG (B813)

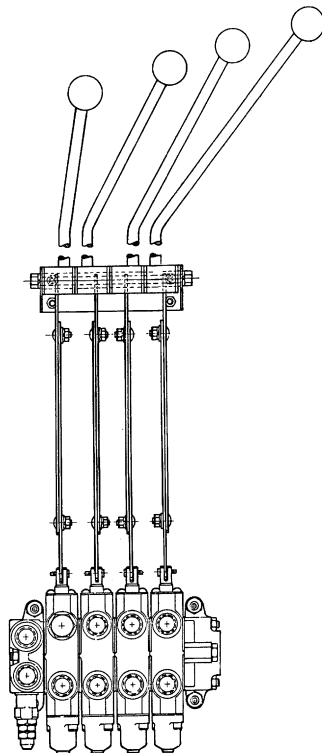


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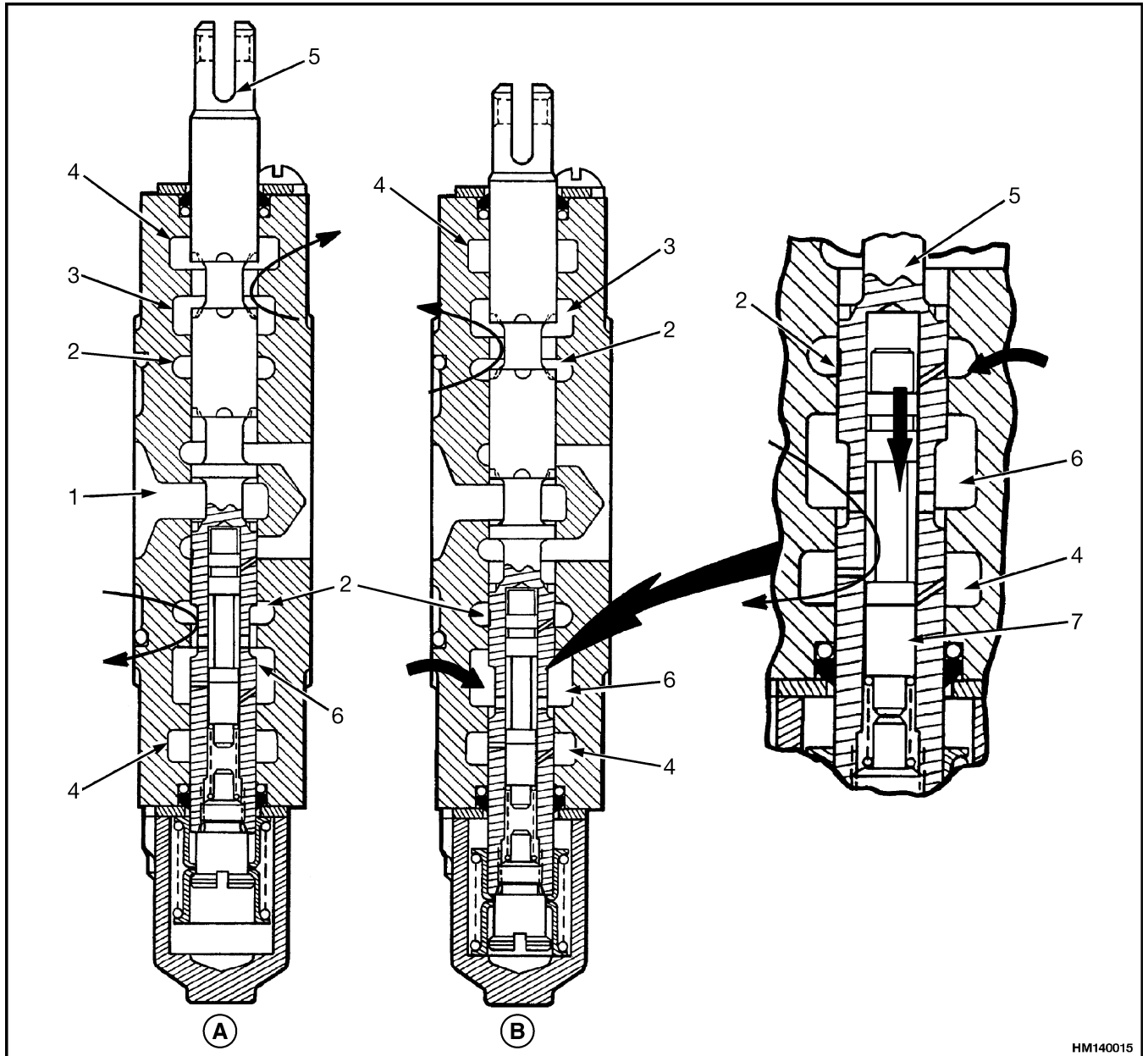
Figure 22. Seat Brake Assembly

MANUAL HYDRAULIC CONTROL VALVE

**ERC35-55HG (ERC070-120HG) [A839];
GP/GLP/GDP070-110LG/MG [B813];
GC070-120LJ/MJ [B818];
ERC35-55HG (ERC70-120HH) [B839/C839]**



HM140046



A. TILT BACKWARD

- 1. OPEN CENTER PASSAGE
- 2. SUPPLY CAVITY
- 3. TO/FROM PISTON END OF TILT CYLINDERS
- 4. DRAIN CAVITY

B. TILT FORWARD

- 5. TILT SPOOL
- 6. TO/FROM ROD END OF TILT CYLINDERS
- 7. TILT CONTROL SPOOL

Figure 6. Tilt Spool Operation

Control Lever Arrangement and Adjustment

NOTE: For electric lift trucks, see the section **Hydraulic System** 1900 YRM 286 or **Hydraulic System** 1900 YRM 559 section for the arrangement and adjustment of the control valve levers. See Figure 13.

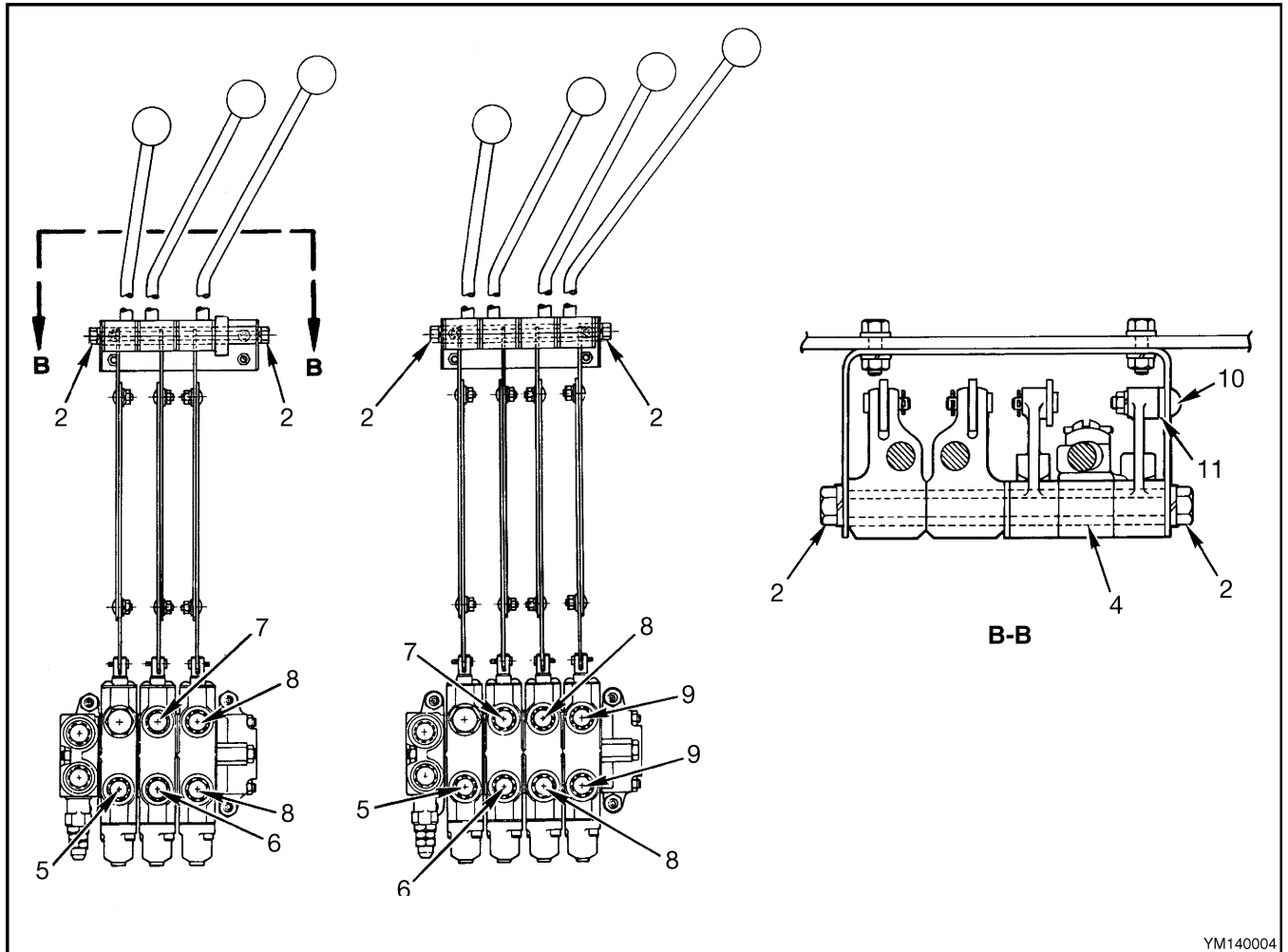


Figure 13. Control Lever Arrangement (Sheet 1 of 2)

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Operation

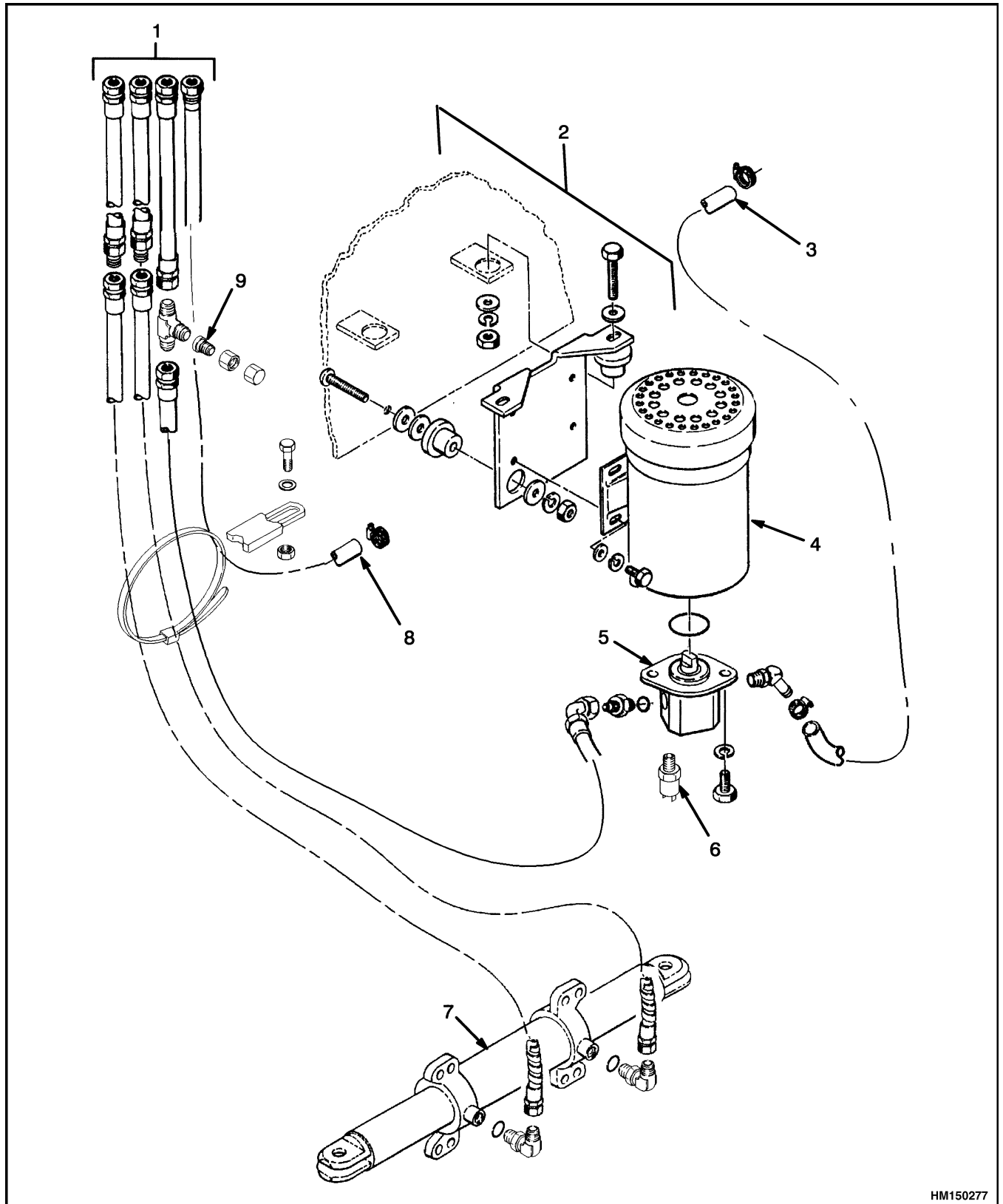
HYDRAULIC SYSTEM

The hydraulic pump causes oil to flow from the tank to the main control valve. See Figure 8, Figure 9, or Figure 10. The main control valve controls the flow of oil to the lift cylinders, tilt cylinders, traverse cylinder, rotary actuator, and auxiliary functions when applicable. A relief valve on the main control valve keeps pressure within the design limits of the hydraulic system. A test port for checking the pressure when the relief valve opens is on the main control valve.

Some auxiliary functions require less pressure than the lift function. A secondary relief valve on the main control valve provides lower pressure for auxiliary functions.

The steering pump causes oil to flow from the tank to the steering control unit. The steering control unit is a metering pump actuated by the steering wheel. When the steering wheel is turned, oil flows to actuate the steering cylinder. Oil returns from the steering control unit to the main control valve. A relief valve in the pump keeps pressure within the design limits of the steering system.

The oil returns from the main control valve and flows through a filter in the hydraulic tank. The filter removes small particles from the oil. The filter has a bypass valve so that the oil can flow through the system if the filter becomes too dirty.



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Figure 13. Steering Pump and Hydraulic Circuit for ERP20-30ALF (B216) Lift Truck Models

Chemical Solution Method

If the tank cannot be cleaned with steam, use the following procedure:

NOTE: Remove battery before cleaning the tank for lift truck models ERC35-55HG (ERC70-120HH) (B839/C839).

1. Mix a solution of water and trisodium phosphate or a cleaning compound with an alkali base. Follow instructions given by 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.

2. Fill tank with cleaning solution. Use compressed air to mix solution in tank.
3. Drain tank. Flush inside of tank with hot (boiling) water. Make sure all cleaning compound is removed.
4. Make an inspection of the inside of the tank. If the tank is not clean, repeat Step 1 through Step 3. Make another inspection of the tank. When making inspections, use a light that is approved for locations with flammable vapors.
5. Check tank for flammable vapors as described in the previous section Step 7. If the amount of flammable vapors is not below the lower flammable limit, repeat cleaning procedures.

ADDITIONAL METHODS FOR TANK REPAIR

If nitrogen gas or carbon dioxide gas is available, prepare tank for welding using these gases. See the manual Safe Practices for Welding and Cutting Containers that Have Held Combustibles by the American Welding Society, F4.1 - 1999. If these gases are not available, another method using water can be used as follows:

1. Fill tank with water to just below the point where the work will be done. Make sure the space above the level of the water has a vent.
2. Use acceptable welding practices to repair the tank. See the American National Standard "Safety in Welding and Cutting," AWS Z 49.1 - 1999.

TANK, INSTALL [ERC/P16-20AAF (ERC030-040AF, AG/BG) (A814); ERC/P16-20AAF (ERC030-040AH) (B814/C814); ERC20-32AGF (ERC040-065GH) (A908); AND ERC20-30AGF (ERC040-065RF/ZF, RG/ZG) (E108)]

NOTE: Make sure to install tank so fill neck is centered in opening in step of frame. Make sure to install all plugs, hoses, and clamps to prevent leaks when oil is added to the tank.

1. Install repaired or replacement hydraulic tank in truck frame. See Figure 16 and Figure 17. Make sure tank is correctly aligned for connection of the hoses. Make sure pads are installed between tank and truck frame.
2. Install bracket assembly to hold tank in position. Do not tighten screws.
3. Remove plugs and install all hoses at the same locations as during removal. Do NOT remove drain plug. Align tank so fill tube and fill cap will be in the center of the access hole. Install fill tube and fill cap. Tighten screws that fasten mount bracket assembly.



CAUTION

Do NOT fill the tank above the FULL mark on the dipstick. If the tank is too full, oil will come out the breather during operation.

4. Make sure all hoses and plugs are installed and tight. Fill the tank using the oil specified in one of the following **Service Manual** sections:
Periodic Maintenance 8000 YRM 552 for the ERC/P16-20AAF (ERC030-040AF, AG/BG) (A814) and ERC20-30AGF (ERC040-065RF/ZF, RG/ZG) (E108) trucks and **Periodic Maintenance** 8000 YRM 1060 for models ERC/P16-20AAF (ERC030-040AH) (B814/C814) and ERC20-32AGF (ERC040-065GH) (A908).

Loosen clamp at inlet hose of hydraulic pump to let air out until hose fills with oil. Tighten hose clamp as soon as oil leaks out of hose. Do the same procedure for steering pump.

5. Remove traction motor as described in one of the following the frame **YRM** for your lift truck.

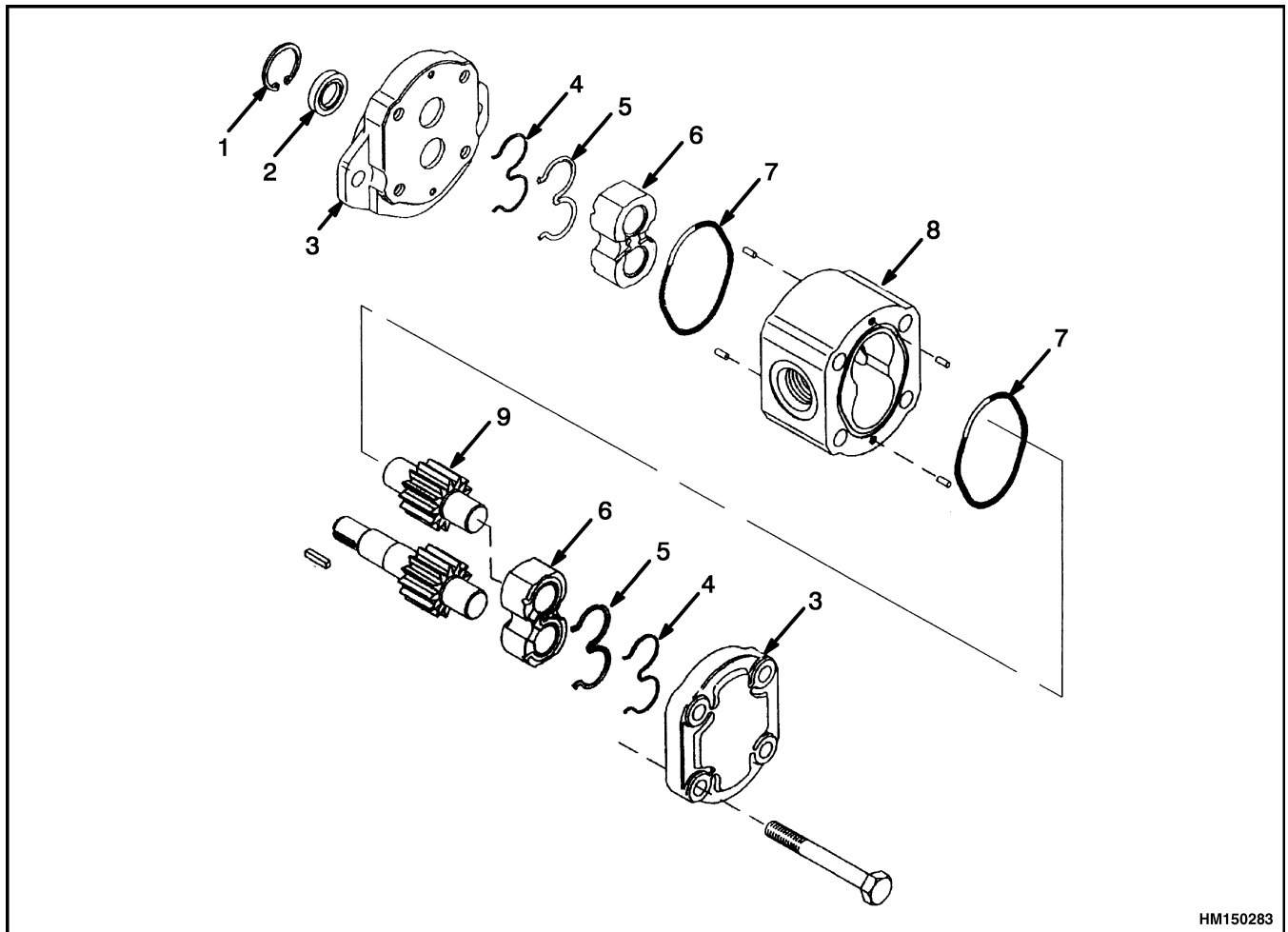
Make sure you make careful notes of the location and orientation of the parts and seals during disassembly. Some of the parts are similar but are not exactly the same. It can be difficult to make an identification if the parts are mixed.

NOTE: Place an alignment mark on each section of the pump body to aid in reassembly.

1. Remove pump coupling from shaft by loosening setscrews. Do not lose keys between coupling and each shaft. See Figure 30.
2. Remove four capscrews that hold pump together.

NOTE: Make note of seal arrangement.

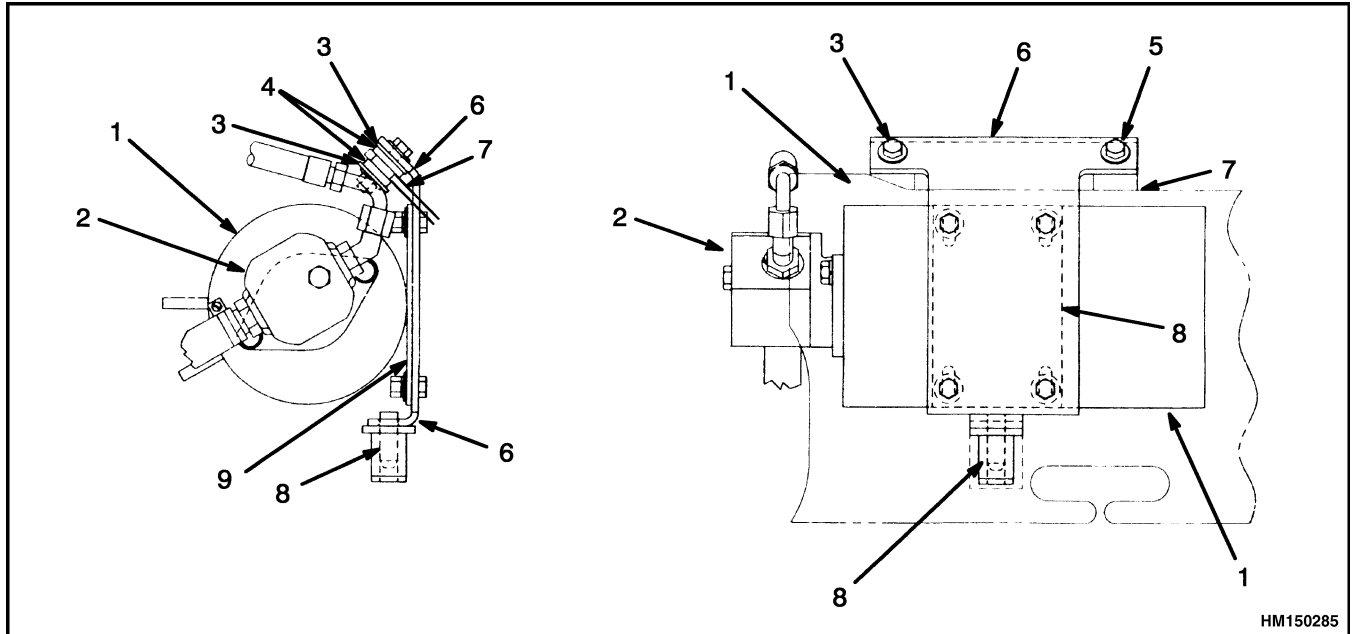
3. Carefully remove end housing.
4. Push shaft through oil seal in flange end housing as flange end housing is removed from pump.
5. Remove snap ring and oil seal from flange end housing. Discard oil seals.
6. Carefully remove outer and inner seals from bushings. Discard seals.
7. Remove and discard seals from pump body.



HM150283

- | | |
|-----------------------|------------------------|
| 1. SNAP RING | 6. BUSHINGS |
| 2. OIL SEAL | 7. SEAL |
| 3. END HOUSING | 8. PUMP BODY |
| 4. OUTER BUSHING SEAL | 9. GEAR SET |
| 5. INNER BUSHING SEAL | 10. FLANGE END HOUSING |

Figure 29. Hydraulic Gear Pump Assembly for ERC/P16-20AAF (ERC030-040AF, AG/BG) (A814); ERC20-30AGF (ERC040-065RF/ZF, RG/ZG) (E108); ERC20-32AGF (ERC040-065GH) (A908); and ERC/P16-20AAF (ERC030-040AH) (B814/C814) Lift Truck Models



HM150285

- | | |
|------------------------------|------------------|
| 1. MOTOR | 6. MOUNT BRACKET |
| 2. HYDRAULIC PUMP - STEERING | 7. FRAME BRACKET |
| 3. WASHER (4) | 8. MOUNT PIN |
| 4. RUBBER BUSHINGS (4) | 9. MOTOR BASE |
| 5. CAPSCREW AND NUT (2) | |

Figure 34. Steering Pump and Motor for ERCIP16-20AAF (ERC030-040AF, AGIBG) (A814) and ERCIP16-20AAF (ERC030-040AH) (B814)

- | | |
|---|--|
| <p>6. Make a note of the positions of the rubber bushings at the mount brackets and remove capscrows that fasten brackets. See Figure 35.</p> <p>7. Carefully lift steering pump and motor assembly up out of frame. Do not damage pressure switch on bottom of pump.</p> | <p>NOTE: Do not remove mount brackets from motor base unless motor will be replaced. These brackets must be correctly aligned on motor base.</p> <p>8. Make a note of the position of the inlet and outlet ports of the pump for correct alignment to the motor during assembly. Remove two capscrows that fasten pump to motor and carefully remove pump. Remove O-ring at pump shaft.</p> |
|---|--|

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Legend for Figure 39

- | | |
|----------------------------------|---------------------------------|
| 1. ON-DEMAND STEERING COMPONENTS | 17. COTTER PIN |
| 2. UPPER COVER | 18. PIN |
| 3. BRACKET | 19. STEERING CONTROL UNIT |
| 4. PIVOT SHAFT | 20. PLUG |
| 5. PLATE | 21. HORN BUTTON |
| 6. LOCKWASHER | 22. STEERING WHEEL |
| 7. CAPSCREW | 23. STEERING COLUMN |
| 8. LOCK NUT | 24. RETURN SPRING |
| 9. SCREW | 25. STEERING SENSOR (ON-DEMAND) |
| 10. STATIC GROUND PATCH | 26. LARGE HEX NUT |
| 11. LOWER COVER | 27. INPUT |
| 12. COLUMN TILT LEVER | 28. RIGHT TURN |
| 13. PUSH ROD | 29. LEFT TURN |
| 14. LATCH | 30. RETURN |
| 15. SPRING | 31. PLASTIC RIVET |
| 16. WASHER | |

Steering Cylinder Repair

NOTE: The correct procedure for the removal and repair of the steering cylinder is in the following sections:

Steering Axle 1600 YRM 619 for the ERC/P16-20AAF (ERC030-040AF, AG/BG) (A814) and ERC/P16-20AAF (ERC030-040AH) (B814/C814) trucks

Steering Axle 1600 YRM 258 for the ERC20-30AGF (ERC040-065RF/ZF, RG/ZG) (E108) and ERC20-32AGF (ERC040-065GH) (A908) trucks.

Steering Axle 1600 YRM 316 for the ERP20-30ALF (B216), ERP20-30ALF (ERP040-060DH) (D216) and ERP20-32ALF (ERP040-065DH) (E216) trucks.

Steering Axle 1600 YRM 326 for the ERC35-55HG (ERC70-120HH) (B839/C839) trucks.

Main Control Valve Check and Adjust

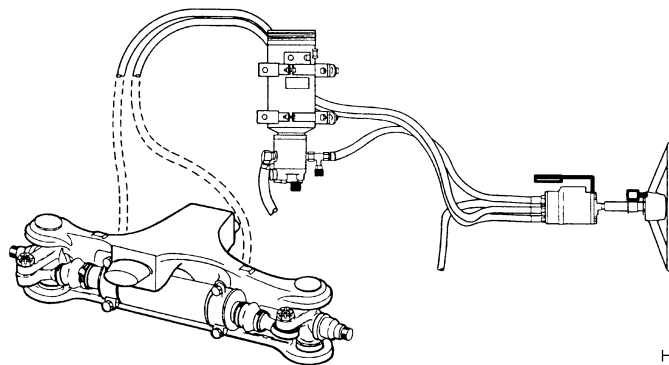
NOTE: The adjustments of the relief valves of the main control valve can be found in one of the following **Service Manual** sections:

- **Manual hydraulic Control Valve** 2000 YRM 562 for lift truck models ERC/P16-20AAF (ERC030-040AF, AG/BG) (A814), ERC/P16-20AAF (ERC030-040AH) (B814/C814), ERP20-30ALF (B216), ERP20-30ALF (ERP040-060DH) (D216), and ERC20-30AGF (ERC040-065RF/ZF, RG/ZG) (E108), and for lift truck models ERC20-32AGF (ERC040-065GH) (A908) and ERP20-32ALF (ERP040-065DH) (E216) with a manual hydraulic main control valve.

- **Manual hydraulic Control Valve** 2000 YRM 77 for lift truck models ERC35-55HG (ERC70-120HH) (B839/C839). The adjustment procedure for the switches of the linkage are also in the above sections.
- **Electro-hydraulic Control Valve** 2000 YRM 1224 for lift truck models ERP20-32ALF (ERP040-065DH) (E216) ERC20-32AGF (ERC040-065GH) (A908), ERC/P16-20AAF (ERC030-040AH) (C814), and ERC35-55HG (ERC70-120HH) (C839) with a electronic main hydraulic control valve.

STEERING SYSTEM FOR AC ELECTRIC LIFT TRUCKS

**ERC20-32AGF (ERC040-065GH) [A908];
ERC/P16-20AAF (ERC030, 040AH) [B814/C814];
ERP20-30ALF (ERP040-060DH) [D216];
ERP20-32ALF (ERP040-065DH) [E216];
ERC35-55HG (ERC70-120HH) [B839/C839]**



HM220411

- Connect the wire at the horn button and install the horn button.
6. Identify the corresponding contact and electrical wire to each directional switch. Install the directional switch to the housing of the steering column. Install screws and shift lever assembly to steering column. See Figure 4.
 7. If removed, install the wires on the key switch that were identified during removal. Install the key switch.
 8. Identify each horn wire to the horn switch. Install each horn wire to the horn switch. Using two plastic rivets install the horn switch into the steering shaft.
 9. If removed, connect the wire connectors on the direction switch that were identified during removal. Install the direction switch in the housing and install the large nut, dust cover, and handle. See Figure 4.
 10. Install column tilt lever.
 11. Connect the wire connectors at the bottom of the steering column. Install the upper and lower access covers on the steering column. See Figure 3.
 12. Lower the steering column to the **DOWN** position. Remove **DO NOT CONNECT BATTERY** tag from truck battery connector. Connect the battery and operate the steering system to check for correct operation and leaks.

Power Steering Motor and Pump

DESCRIPTION

NOTE: See also the section **Hydraulic System** 1900 YRM 559 for additional information for the power steering pump. The steering motor and pump assembly are mounted behind the battery compartment on ERP20-30ALF (ERP040-060DH) (D216) and ERP20-32ALF (ERP040-065DH) (E216). Under the floor boards on ERC20-32AGF (ERC040-065GH) (A908) and ERC35-55HG (ERC70-120HH) (B839/C839) lift truck models, and under the battery tray on ERC/P16-20AAF (ERC030-040AH) (B814/C814). See Figure 6.

The power steering motor and pump operate as described in Description in the front of this manual. See Figure 7.

REMOVE



WARNING

Make sure the blocks or stands have enough capacity to hold the lift truck. Use additional blocks next to the tires as necessary to prevent movement of the lift truck.

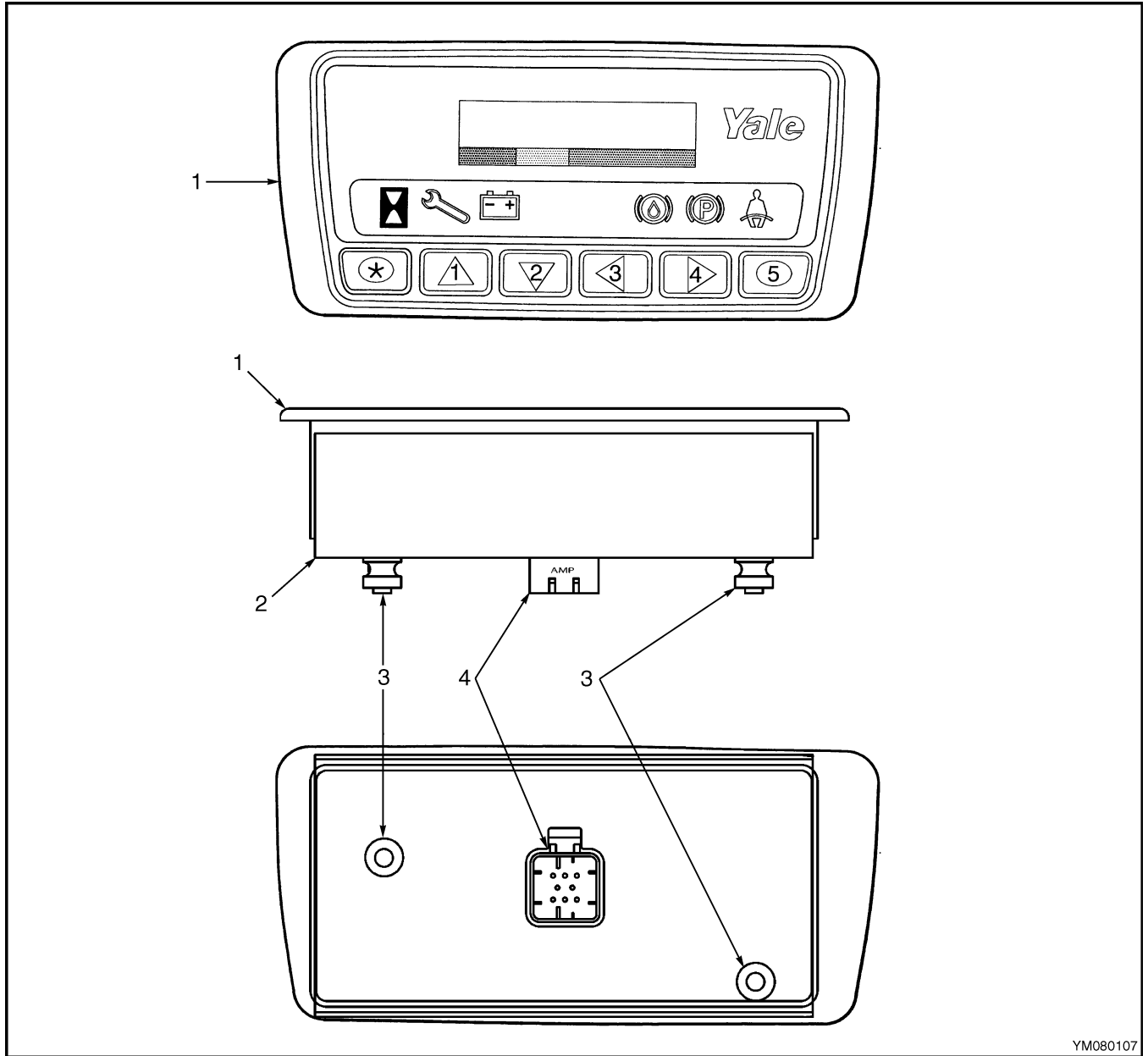
NOTE: To remove the steering motor and pump from the ERC20-32AGF (ERC040-065GH) (A908), and ERC35-55HG (ERC70-120HH) (B839/C839) the floor boards must be removed, and on the ERC/P16-20AAF (ERC030-040AH) (B814/C814) the battery and battery tray must be removed See Figure 6.

NOTE: Put the lift truck on blocks as described in the **Operating Manual** or in the section **Periodic Maintenance** 8000 YRM 1226 for lift truck models ERP20-32ALF (ERP040-065DH) (E216), **Periodic Maintenance** 8000 YRM 1060 for lift truck models ERC20-32AGF (ERC040-065GH) (A908), ERC/P16-20AAF (ERC030-040AH) (B814/C814), and ERP20-30ALF (ERP040-060DH) (D216) or section **Periodic Maintenance** 8000 YRM 1201 for lift truck models ERC35-55HG (ERC70-120HH) (B839/C839). To remove the steering motor and pump from the ERP20-30ALF (ERP040-060DH) (D216), ERP20-32ALF (ERP040-065DH) (E216) the left steer wheel and fender shield must be removed. See Figure 6.

1. Turn the key to the **OFF** position, unplug battery, and discharge capacitors by honking horn. Remove the left steer wheel.

NOTE: Step 2, Step 3, Step 4, Step 5, and Step 6 are used on ERP20-30ALF (ERP040-060DH) (D216), ERP20-32ALF (ERP040-065DH) (E216) lift trucks.

2. Remove the left side steer tire and wheel. See the section **Steering Axle** 1600 YRM 316 for the procedures.
3. Remove the fender shield that is located above the steer wheel on the left side.

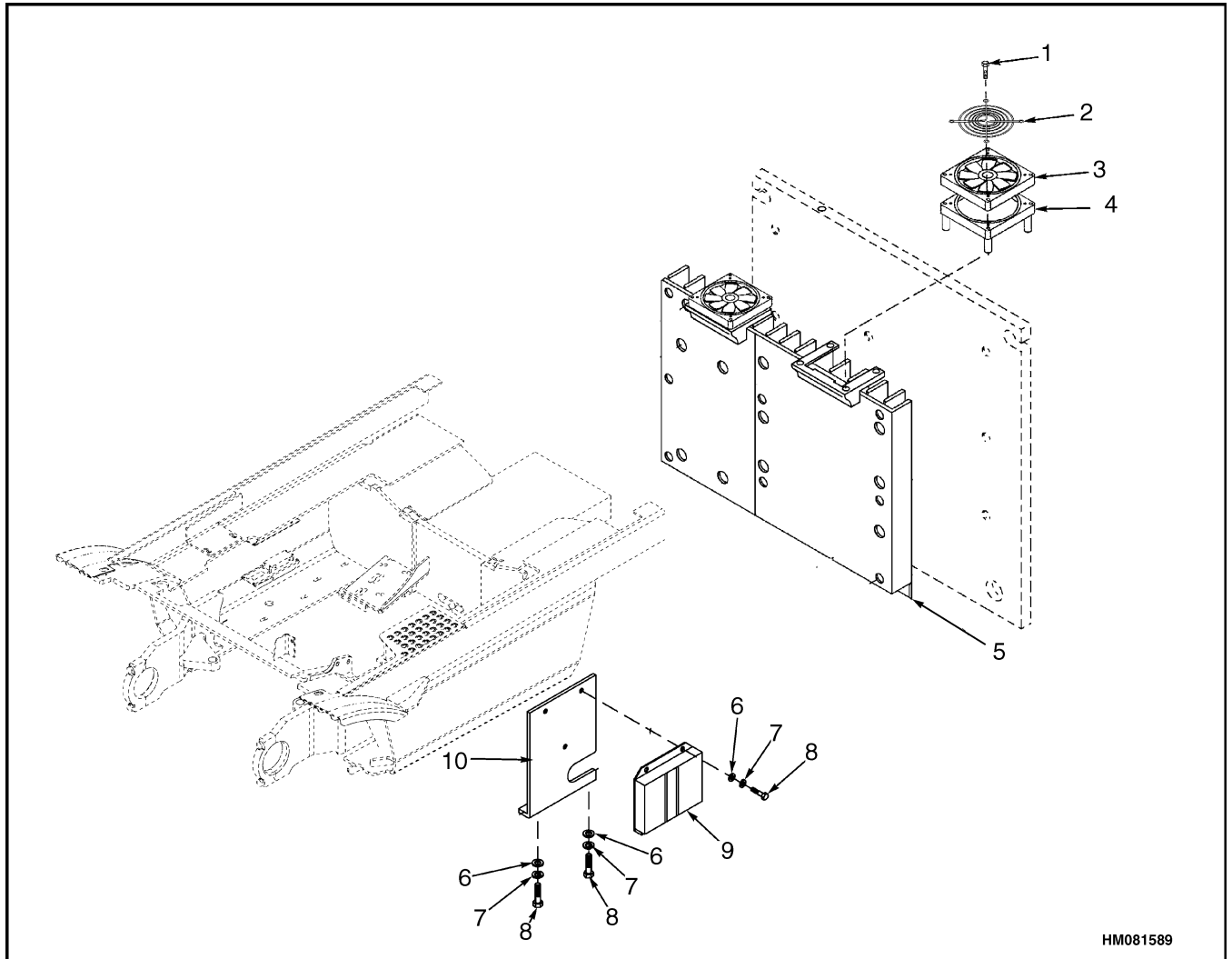


YM080107

- 1. DISPLAY PANEL
- 2. MOUNT BRACKET

- 3. MOUNT NUT
- 4. 8-PIN CONNECTOR

Figure 2. Mounting of Display Panel



HM081589

- | | |
|--------------|----------------------|
| 1. SCREW | 6. WASHER |
| 2. GUARD | 7. LOCKWASHER |
| 3. FAN | 8. CAPSCREW |
| 4. SPACER | 9. MASTER CONTROLLER |
| 5. HEAT SINK | 10. BRACKET |

Figure 10. AC Master Controller for ERCIP16-20AAF (ERC030-040AH) (B814/C814) and ERC20-32AGF (ERC040-065GH) (A908)

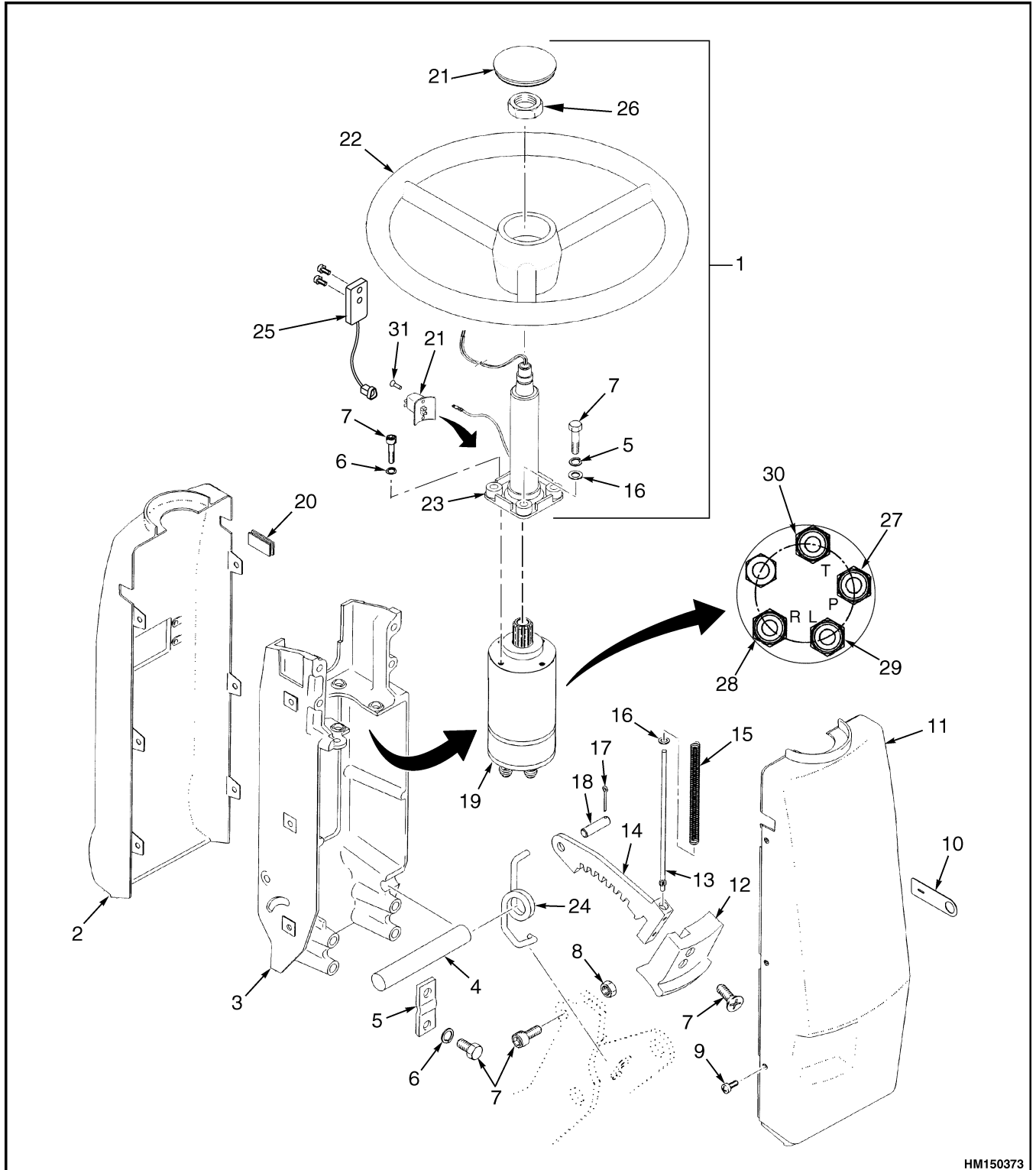


Figure 21. Steering Column Assembly

Wire Harness Repair

Del-City Crimp-Solder-Shrink Splice

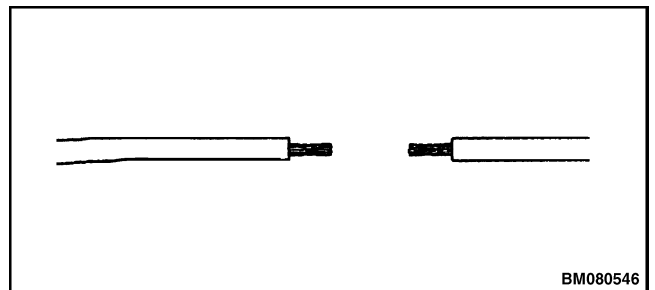
Refer to Table 1 for the correct splice part number for the wire gauge being repaired.

Table 1. Wire Splice Size

Part Number	Wire Gauge Range
150121847	10 to 12 AWG (5.0 to 3.0 mm ²)
150121848	14 to 16 AWG (2.0 to 1.0 mm ²)
150121849	18 to 20 AWG (0.8 to 0.5 mm ²)

STEP 1.

Strip approximately 9.525 mm (0.375 in.) from both wire ends.



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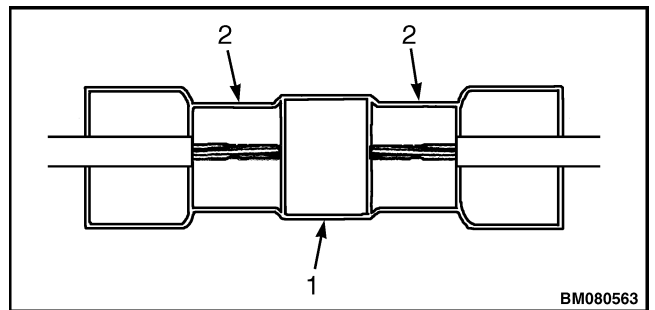


CAUTION

Do not crimp solder sleeve in the center of the connector. This will make the connector unserviceable.

STEP 2.

Insert one wire into the connector. Make sure wire is properly seated and crimp the connector using an insulated connector crimping tool nest that matches the color or gauge of the connector.



BM080563

1. SOLDER SLEEVE

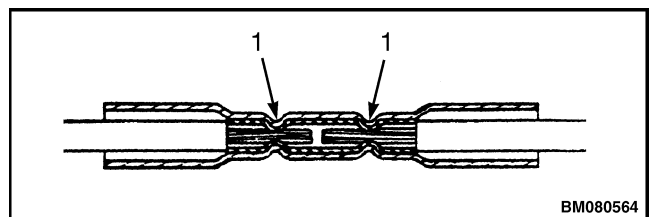


CAUTION

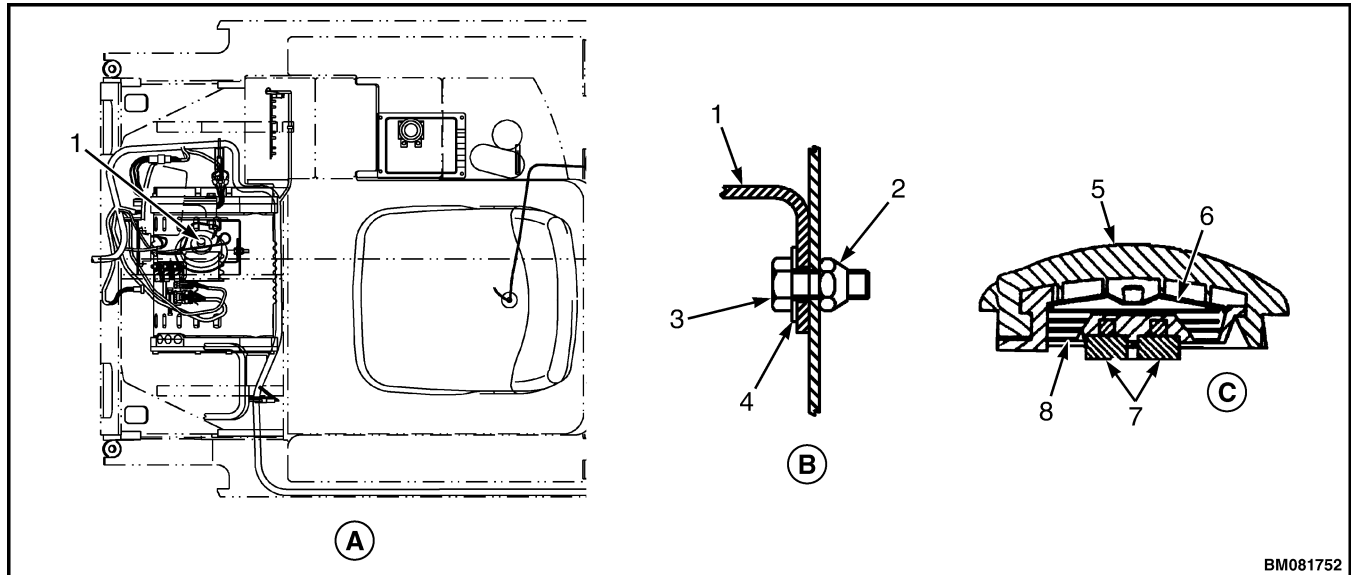
Do not crimp solder sleeve in the center of the connector. This will make the connector unserviceable.

STEP 3.

Insert the second wire into the opposite end of the connector. Make sure wire is properly seated and crimp the connector using an insulated connector crimping tool nest that matches the color or gauge of the connector.



BM080564



BM081752

A. HORN PLACEMENT
B. HORN MOUNTING

1. HORN
2. NUT
3. CAPSCREW
4. WASHER

C. HORN BUTTON

5. COVER
6. CONTACT PLATE
7. CONTACT SET AND SETSCREW
8. SPRING

Figure 34. Horn and Horn Button for Lift Trucks ERP20-30ALF (ERP040-060DH) (D216), ERP20-32ALF (ERP040-065DH) (E216)

**Horn Replacement for Lift Trucks
 ERC35-55HG (ERC70-120HH) (B839/C839)**

The horn is attached to the left-hand frame rail. Replace the horn as follows:

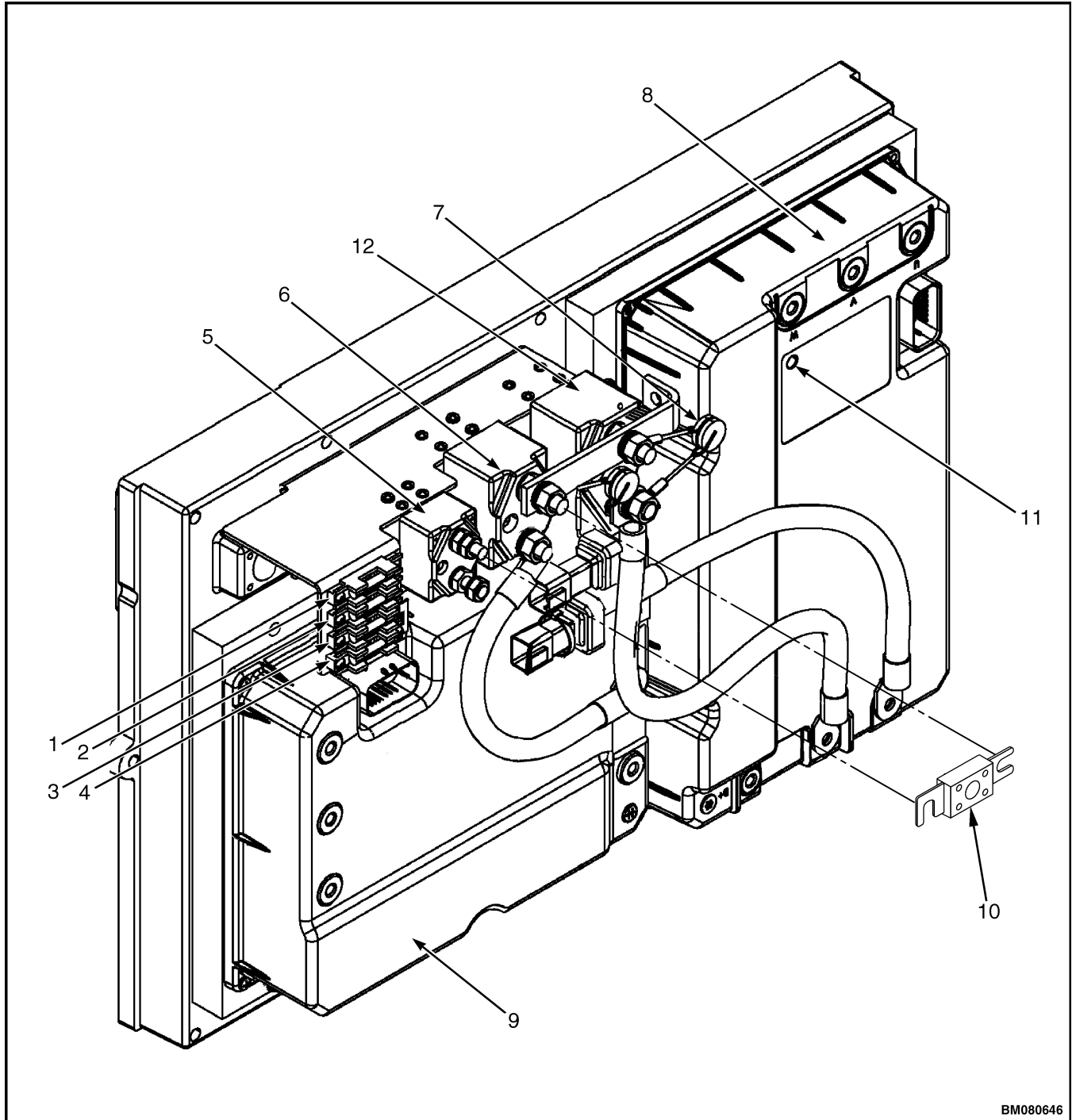
1. Disconnect the battery and discharge the capacitors by holding the horn button down until the horn stops making a sound. Attach a tag to truck battery connector stating **DO NOT CONNECT BATTERY**. Remove the key.
2. Remove the battery from the lift truck. See
3. Disconnect the wires fastened to the horn terminals. **DO NOT** lose the screws.

NOTE: Perform Step 4 for 36/48V lift truck.

4. Hold the horn and remove mounting hardware that fastens the horn to the dc converter bracket. **DO NOT** lose the parts. Remove the horn.

NOTE: Perform Step 5 for 80V lift truck.

5. Hold the horn and remove the nut, cap screw, and washer that fasten the horn to the dc converter bracket. **DO NOT** lose the parts. Remove the horn.
6. Install the washer and cap screw nut onto the dc converter bracket as shown in Figure 35.
7. Align the horn in the same position as the old horn. Install the nut and tighten the cap screw and nut.
8. Install the wires on the horn terminals. Install the battery.
9. Remove the **DO NOT CONNECT BATTERY** tag from truck battery connector and reconnect the battery.



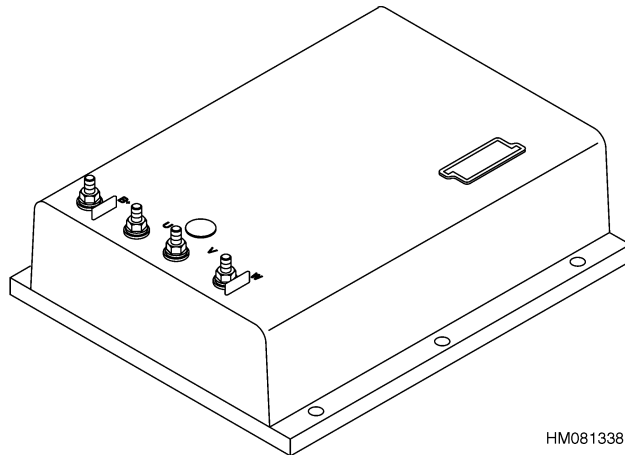
BM080646

Figure 43. AC Traction and Pump Motor Controllers for ERC35-55HG (ERC70-120HH) (B839/C839) Lift Trucks Only

AC MOTOR CONTROLLERS/DISPLAY PANEL

DESCRIPTION, CHECKS, ADJUSTMENTS, AND TROUBLESHOOTING

**ERC20-32AGF (ERC040-065GH) [A908];
ERC/P16-20AAF (ERC030, 040AH) [B814/C814];
ERP20-30ALF (ERP040-060DH) [D216];
ERP20-32ALF (ERP040-065DH) [E216];
ERC35-55HG (ERC70-120HH) [B839/C839]**



HM081338

NOTE: The deceleration rate is less when the pedal is not fully depressed.

Function Number 7 AUTO DECELERATION

(Range 0-100)

Function 7 determines the maximum deceleration rate when the accelerator pedal is released. The strength of auto deceleration is a percentage of the regen braking strength determined by **Function 6**.

A **Function 7** setting of **zero** will turn off auto deceleration completely, and a setting of **100** will give auto deceleration the same strength as regen braking.

Function Number 8 BDI ADJUSTMENT

(Range 0-100)

Function 8 allows for adjustment to improve the accuracy of the **Battery Discharge Indicator** in the dash display. Increasing the setting will cause the gage to show **empty** at a higher specific gravity or battery voltage.

A setting of 30 is the recommended starting point for flooded cell batteries, and a setting of 50 for maintenance-free batteries. Further adjustments may be used to fine-tune the BDI accuracy.

Function Number 9 LIFT INTERRUPT

(Enable or Disable)

Function 9 enables or **disables** the lift interrupt feature. The lift interrupt feature stops hoist operation when the BDI reads **empty** to protect the battery from excessive discharge and possible damage.

NOTE: Trucks are shipped from the factory with this feature **enabled**.

Function Number 10 POWER STEERING TIME DELAY

(Range 0-100)

Function 10 sets the time delay for the power steering contactor to open after the seat switch opens. The setting range is 1.5 to 65 seconds. Opening the key switch will open the power steering contactor with no delay.

Function Number 11 SERVICE REMINDER

(Set Next Hourmeter)

Function 11 can be used by the service technician to show a **Status Code 99** when the truck is due for service.

To use this feature, set this function to the hourmeter reading that the service is to occur. When that hourmeter is reached, the dash display will display **Status Code 99** for 10 seconds each time the key is turned **ON**. After 20 hours of operation, the truck will slow to half speed and the code will display continuously until the service is performed. After servicing the truck, **Function 11** should be set to the next service hourmeter reading to regain full performance.

NOTE: A setting of **zero** will disable this feature.

Function Number 12 CUSTOM

(Range 0-100)

Function 12 is not used **except for special functions** required for special applications. Normally, this function is set to **zero**.

A setting value of 1 will change auto deceleration to work even with a partial release of the accelerator pedal. Normally, auto deceleration only works when the accelerator pedal is **fully** released.

A setting value of 2 will cause the maximum lift speed and pump motor acceleration rate to change with the performance mode selected. Normally, only traction speeds and acceleration rates change with the performance mode selected.

A setting value of 3 will combine the changes described for setting values of 1 and 2.

A setting value of 4 directs the master controller to output forward and reverse signals that are compatible with wire guided trucks.

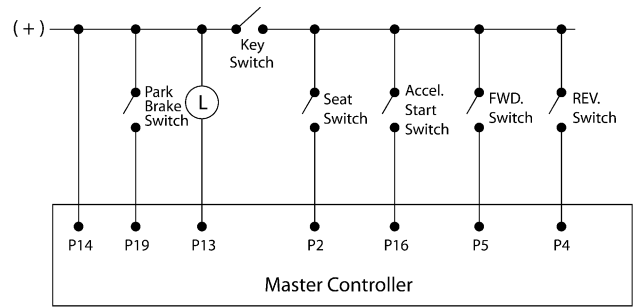
Function Number 13 PUMP SPEED 1

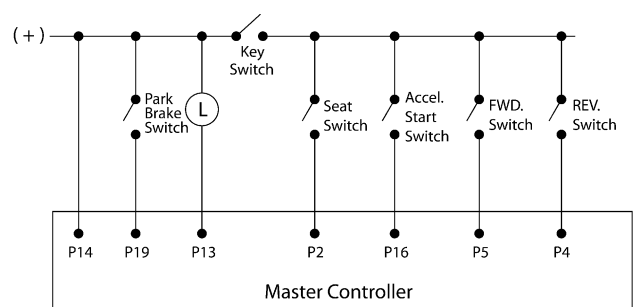
NOTE: This function does not apply for lift trucks that are equipped with the e-hydraulics option.

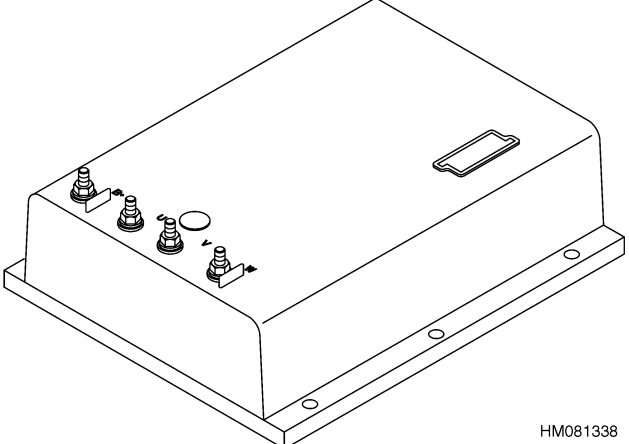
(Range 0-100)

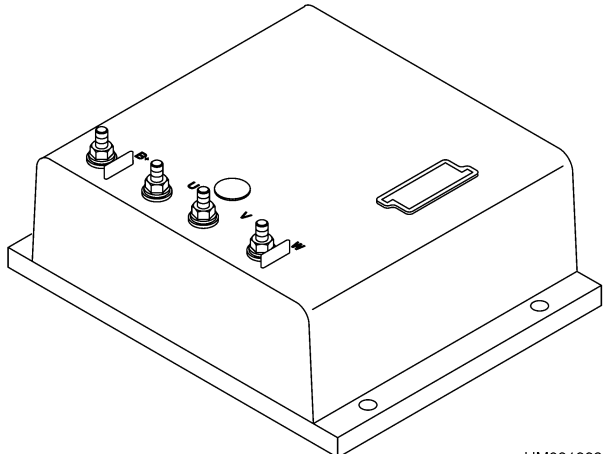
Function 13 determines the hydraulic pump motor **low speed**. **Low speed** is used for **tilt** and some auxiliary operations (sideshift).

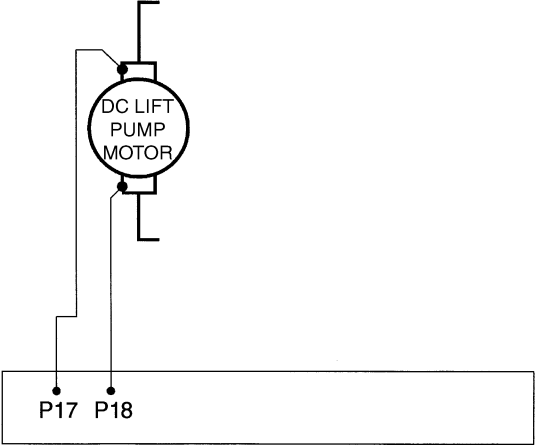
AC Motor Controllers Status Code Charts

Status Code	Description	Memory Recall	Circuit
1	No seat switch input.	No	Traction
<p style="text-align: center;">Symptom</p> <p style="text-align: center;">Lift truck does not move. Hydraulic functions are disabled.</p> <p style="text-align: center;">Possible Causes and Test Procedures</p> <ul style="list-style-type: none"> • Seat switch malfunction. Check to see that the seat switch operates properly. Replace a failed switch. • Check wiring to the seat switch and from the seat switch to the master controller 		 <p style="text-align: right; font-size: small;">HM080916</p>	

Status Code	Description	Memory Recall	Circuit
2	The forward switch is closed before the key or seat switch closes.	No	Traction
<p style="text-align: center;">Symptom</p> <p style="text-align: center;">Lift truck does not operate.</p> <p style="text-align: center;">Possible Causes and Test Procedures</p> <ul style="list-style-type: none"> • A directional switch is closed when the key switch is turned to the ON position. This violates the Static Return to Off (SRO) Startup Procedure, move the directional lever to the neutral position, and then select a direction. • A directional switch is failed closed or out of adjustment. 		 <p style="text-align: right; font-size: small;">HM080916</p>	

Status Code	Description	Memory Recall	Circuit
41	Traction motor controller overheated.	Yes	Traction
<p style="text-align: center;">Symptom</p> <p>Truck acceleration is reduced or truck may stop completely.</p> <p style="text-align: center;">Possible Causes and Test Procedures</p> <ul style="list-style-type: none"> • Excessive pushing or stalling of traction motor. • Check operation of cooling fans. See Fan Test. • Check for proper application of thermal grease between motor controller and heat sink. 		 <p style="text-align: right; font-size: small;">HM081338</p>	

Status Code	Description	Memory Recall	Circuit
42	Pump motor controller overheated.	Yes	Traction
<p style="text-align: center;">Symptom</p> <p>Truck acceleration and travel speed is reduced and pump motor may stop completely.</p> <p style="text-align: center;">Possible Causes and Test Procedures</p> <ul style="list-style-type: none"> • Excessive operation or stalling of the pump motor. • Check operation of the cooling fans. See Fan Test. • Check for proper application of thermal grease between motor controller and heat sink. 		 <p style="text-align: right; font-size: small;">HM081339</p>	

Status Code	Description	Memory Recall	Circuit
95	DC lift pump motor brushes are worn.	Yes	Pump
<p>Symptom Status code warning only.</p> <p>Possible Causes and Test Procedures</p> <ul style="list-style-type: none"> • Pump motor brushes are worn too short. • Motor brush wear sensor wires to motor controller may have a short to battery positive. 		 <p style="text-align: right;">HM081426</p>	

Status Code	Description	Memory Recall	Circuit
99	Maintenance Alert and Speed Limit.	No	Traction
<p style="text-align: center;">Symptom</p> <p>Status code is displayed and, after 20 hours, truck speed is reduced to 50% of normal top speed.</p> <p style="text-align: center;">Possible Causes and Test Procedures</p> <ul style="list-style-type: none"> • Maintenance reminder indicating it is time to service truck. It was set by a technician through the dash display or with a PC. • The technician must perform desired maintenance and reset reminder to next hourmeter reading that maintenance should occur. 			

FUSES

The fuses are found on the contactor panels. See Figure 8, Figure 9, Figure 10, Figure 11, and Figure 12. The condition of the fuses can normally be checked by looking at them. Some fuses do not change in appearance and must be checked with an ohmmeter.

FAN TEST

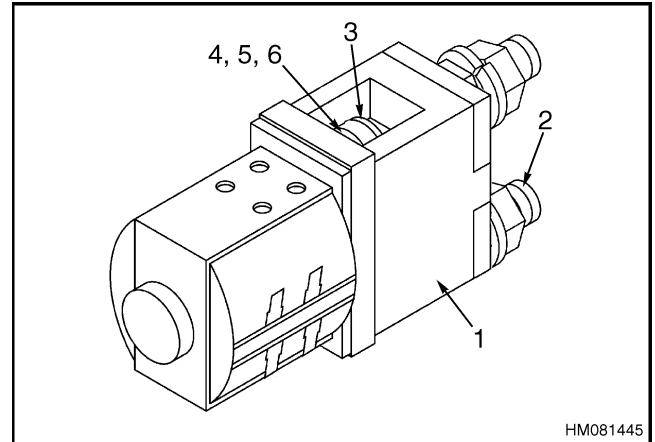
To determine if the fans are operating correctly, go to the Access to Service Functions section of this YRM. Using the procedures in that section, go to Diagnostics Menu and select No Run Diagnostics. From there, go to Fan On, which is the last menu item. As soon as Fan On is selected, the fans should start running.

On 36/48 volt trucks, the fans operate at battery voltage. If battery voltage is present at the fan terminal strip and the fan(s) doesn't run, replace the fan(s). If battery voltage is not present at the fan terminal strip, look for problems in the positive circuit from the key switch or the negative circuit to pin 15 on the master controller.

On 72/80 volt trucks, the fans operate with a fan power supply. If the power supply voltage (48 volts) is present and the fan(s) doesn't run, then replace the fan(s). If there is battery voltage to the fan power supply and there is no output voltage, then replace the fan power supply. If battery voltage is not present at the power supply, look for problems in the positive circuit from the key switch or the negative circuit to pin 15 on the master controller.

CONTACTORS

There can be three contactors on these lift trucks. All lift trucks have a power steering contactor and a line contactor. See Figure 13 and Figure 14. Lift truck models ERC35-55HG (ERC70-120HH) (B839/C839) have a separate line contactor for the pump motor controller. Lift trucks that do not have a pump motor controller also have a contactor to energize the lift pump motor. See Figure 13.



- | | |
|--------------------|---------------------|
| 1. CONTACTOR | 4. MOVABLE CONTACTS |
| 2. POWER TERMINALS | 5. SPRING |
| 3. FIXED CONTACTS | 6. PLUNGER |

Figure 13. Pump Motor Contactor

Repair

Tag, identify, and disconnect the wires and cables from the contactor assembly. Remove the mounting screws and remove the contactor assembly. See Figure 14.

Contactor Contacts. The contacts in a contactor are made of special silver alloy. The contacts will look black and rough from normal operation. This condition does not cause problems with the operation of the lift truck. Cleaning is not necessary. **DO NOT USE A FILE ON THE CONTACTS. DO NOT LUBRICATE THE CONTACTS.**

CAUTION

ALWAYS replace all of the contacts in a contactor at the same time. Replace the contacts when the thickness of any area of a contact is less than 30 percent of the thickness of a new contact or if there is any transfer of contact material.

Coil. Check the coil with an ohmmeter for an open circuit or a short circuit. Coil resistance is very low. Approximate coil resistance, at room temperature, can be determined by looking at **Status Codes 63, 64, 65, and 69**. Replace the coil if it is damaged. Make sure the coil wires are connected again to the correct terminals.

NO OF FUNCTIONS

Setting 3 or 4: For hydraulic valves with a single auxiliary function, the number of auxiliary functions is set to 3. For hydraulic valves with double auxiliary functions, the number of auxiliary functions is set to 4.

CLAMP INSTALLED?

Setting Yes or No: If a clamp attachment is installed, then the setting is yes. If the number of functions is 3, then the clamp is assumed to be aux 1 position. If the number of functions is 4, then the clamp is assumed to be aux 2.

HI FLOW AUX INSTLD?

Setting Yes or No: If the E-hydraulic valve has the optional High Flow Auxiliary block installed, then set this to Yes. If it is a standard flow auxiliary block, then the setting is No. See Figure 25 and Figure 26.

- E-HYD CALIBRATION

CALIBRATE LIFT

CALIBRATE TILT FW

CALIBRATE TILE BK

CALIBRATE AUX1 DIR A

CALIBRATE AUX1 DIR B

CALIBRATE AUX2 DIR A

CALIBRATE AUX2 DIR B

Calibration procedure is as follows:

1. The operator must be on the seat, and the armrest down and latched in order to calibrate the valve.
2. Press the ▲ or ▼ keys to select the function for which calibration is desired. Press the ► key to start calibration of that function.
3. The master controller will run the pump at a slow speed and will command cracking current to that function. Use the ▲ or ▼ keys to increase or decrease the cracking current until there is creep in the function. A number from 0 to 15 will be displayed on the Dash Display which corresponds to a cracking current off set value. objective is to find the value of cracking current that produces the slowest creep speed. Press the ★ key to save.
4. Once the calibration is saved, the pump will stop and the Dash Display will return to the calibration menu. Repeat the above procedure to calibrate the next function.
5. No calibration is required for the lowering function.

- PASSWORD MENU

ENTER PASSWORD

TRUCK INSPECTION

ADD PASSWORD

DELETE PASSWORD

EDIT PASSWORD

- NO RUN DIAGNOSTICS
 - DIRECTION SWITCH
 - ACCELERATOR LOCK
 - THROTTLE POT VOLT
 - SEAT SWITCH
 - PARK BRAKE
 - PUMP SWITCH #1
 - PUMP SWITCH #2
 - PUMP SWITCH #3
 - DC PUMP BRUSH #1
 - DC PUMP BRUSH #2
 - DC PUMP MOTOR
 - FAN ON

- RUN DIAGNOSTICS
 - TRACTION MOTOR SPEED
 - TRACTION MOTOR AMPS
 - TRACTION MOTOR TEMP
 - TRACTION CNTRL TEMP
 - AC PUMP MOTOR SPEED
 - AC PUMP MOTOR AMPS
 - AC PUMP MOTOR TEMP
 - AC PUMP CNTRL TEMP

- E-HYD DIAGNOSTICS

LIFT/LOWER INPUT

The four inputs are displayed on a scale from 0 to 255. The value ranges from 0 when the lever is moved to the full back position to 255 when the lever is moved to the full forward position. The value 128 must be displayed when the lever is in the neutral position.

TILT INPUT

AUX1 INPUT

AUX2 INPUT

CLAMP INTERLOCK

When the clamp interlock switch on the mini-lever module is pressed, 1 will be displayed on the Dash Display.

DUAL FUNCTION SW

If the truck is equipped with a third auxiliary function then the dual function switch will indicate whether it is pressed (1) or released (0).

LIFT COIL CURRENT

The coil currents, as measured by the Valve Driver, is displayed in mA/10. The maximum value 255 corresponds with 2550 mA (or 2.55 amps).

TILT COIL CURRENT

AUX1 COIL CURRENT

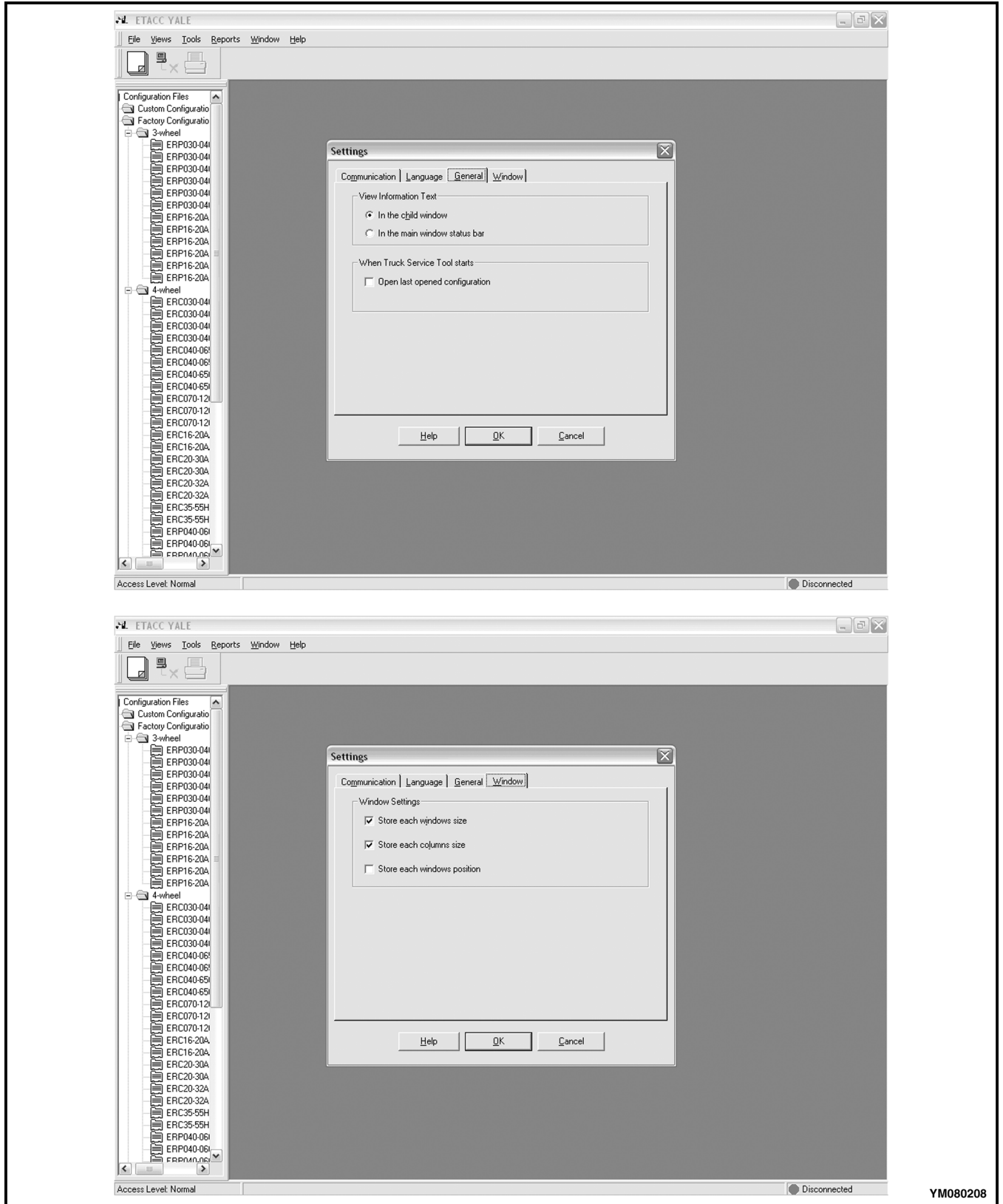
AUX2 COIL CURRENT

- VIEW HOURMETER

TRACTION HOURMETER

PUMP HOURMETER

SECURE HOURMETER



YM080208

Figure 3. Settings Menu (Sheet 2 of 2)

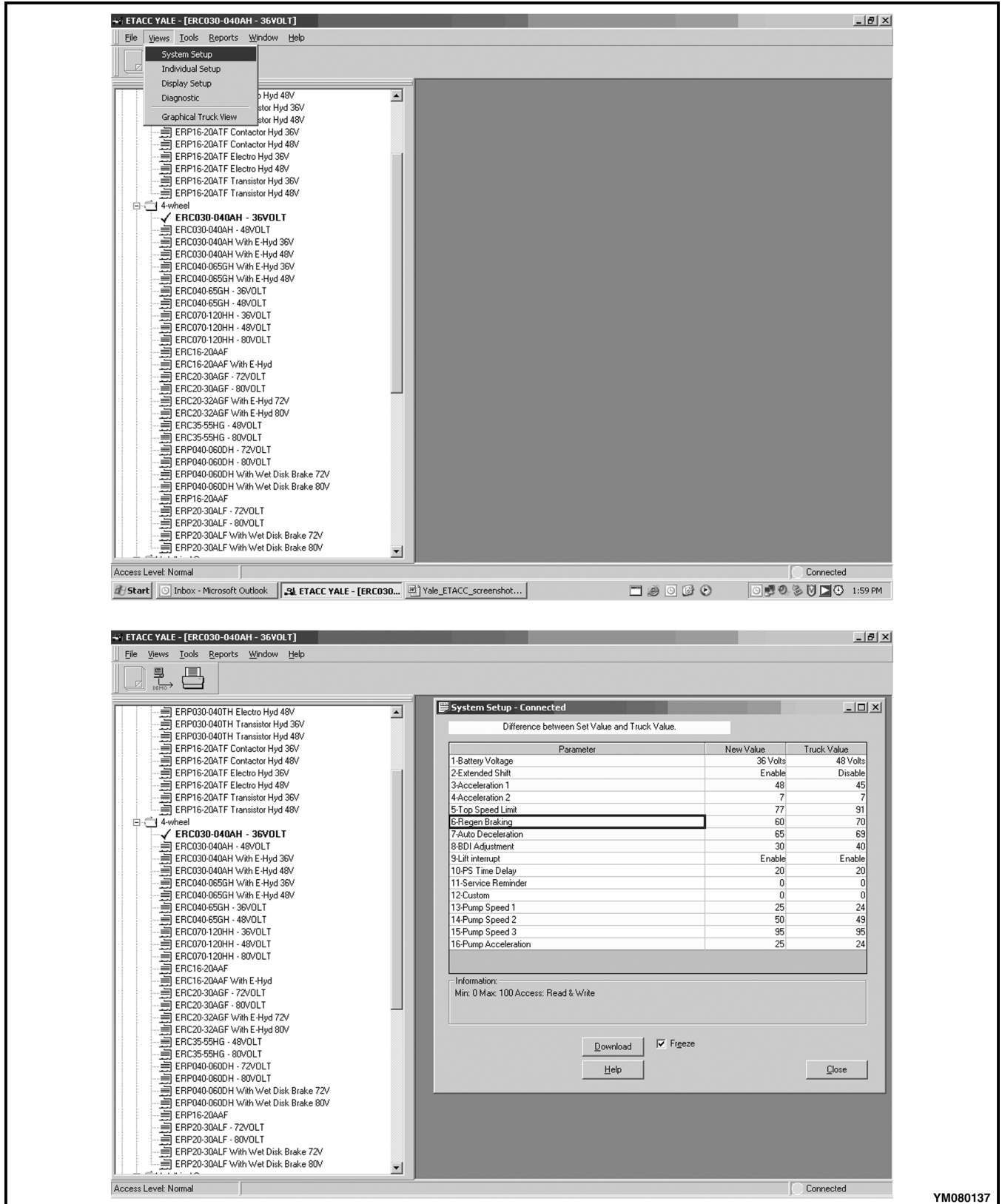


Figure 14. Views Menu System Setup, ERC20-32AGF (ERC040-065GH) (A908), ERC/P16-20AAF (ERC030-040AH) (B814/C814), ERP20-30ALF (ERP040-060DH) (D216/E216), and ERC35-55HG (ERC070-120HH) (B839/C839)

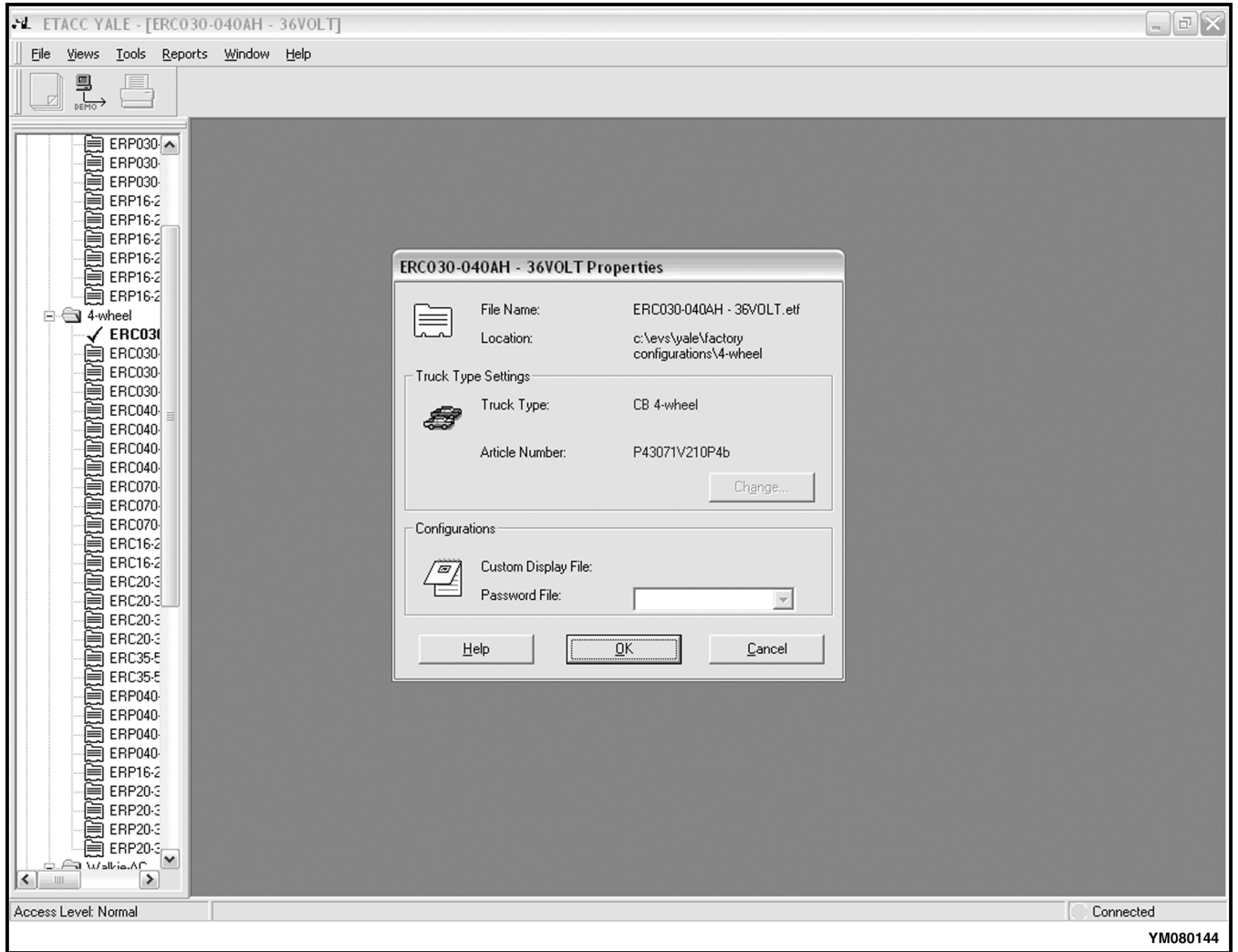
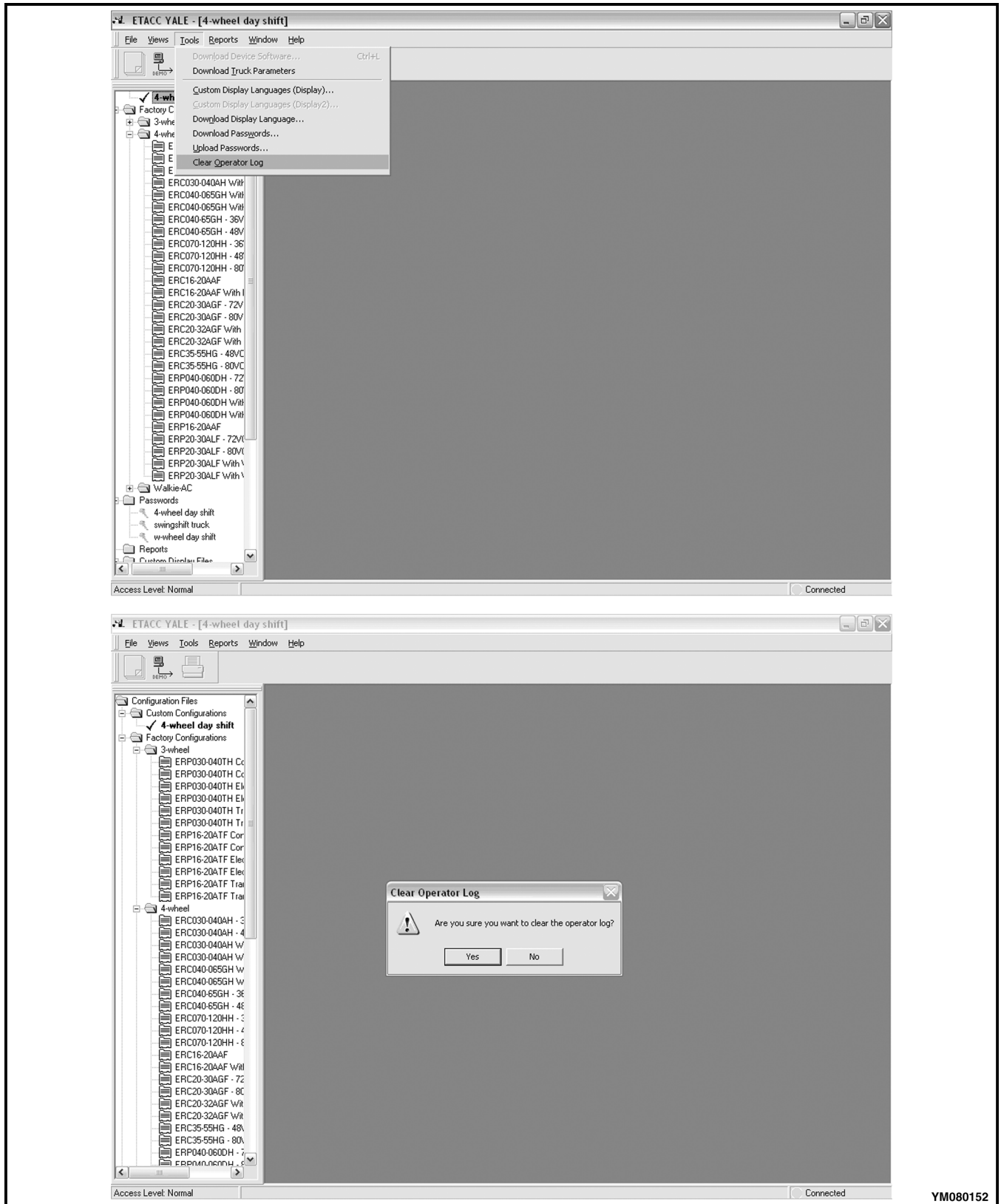
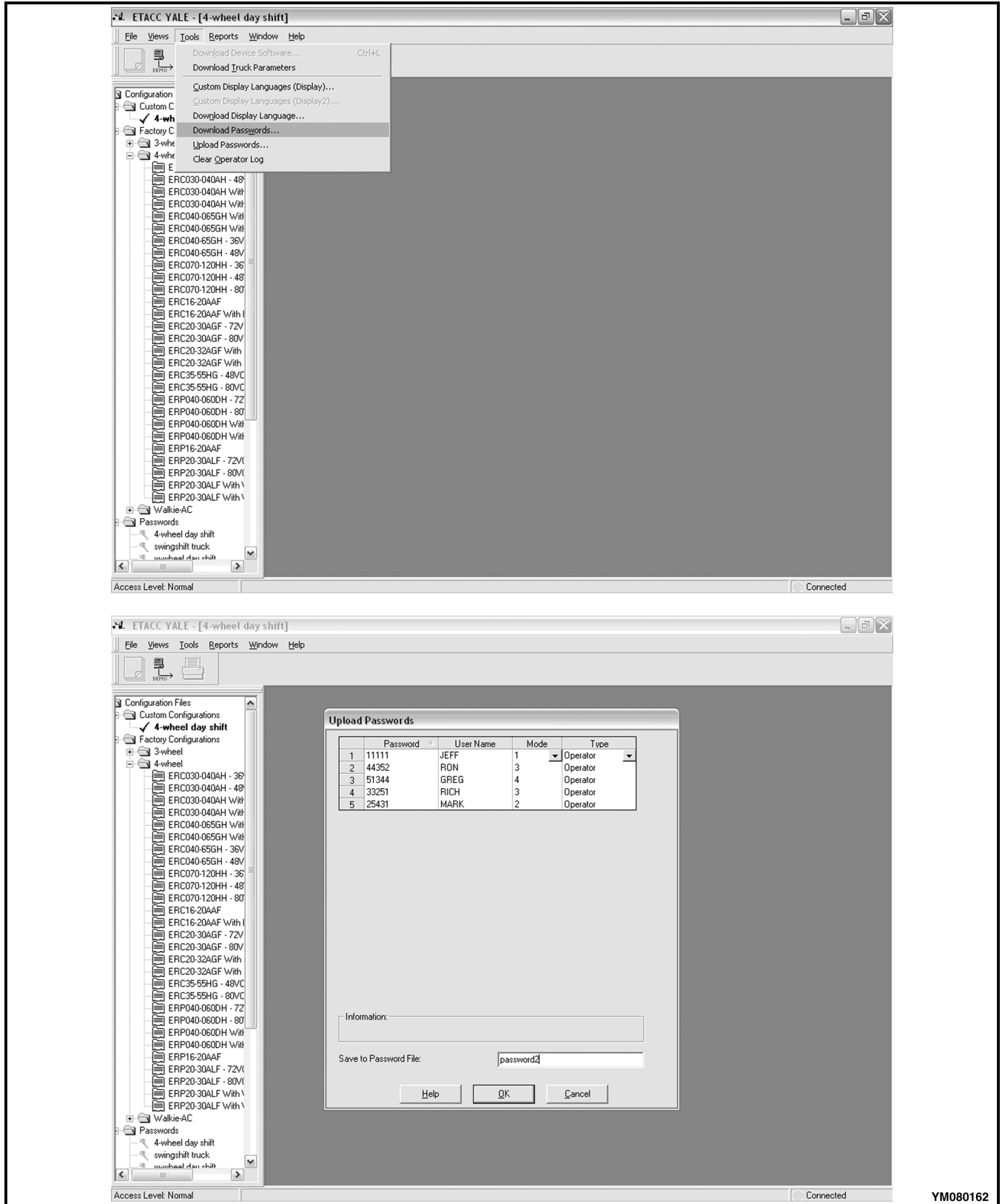


Figure 23. Lift Truck Properties



YM080152

Figure 31. Tools Menu, Clear Operator's Log



YM080162

Figure 40. Tools Menu, Upload Passwords

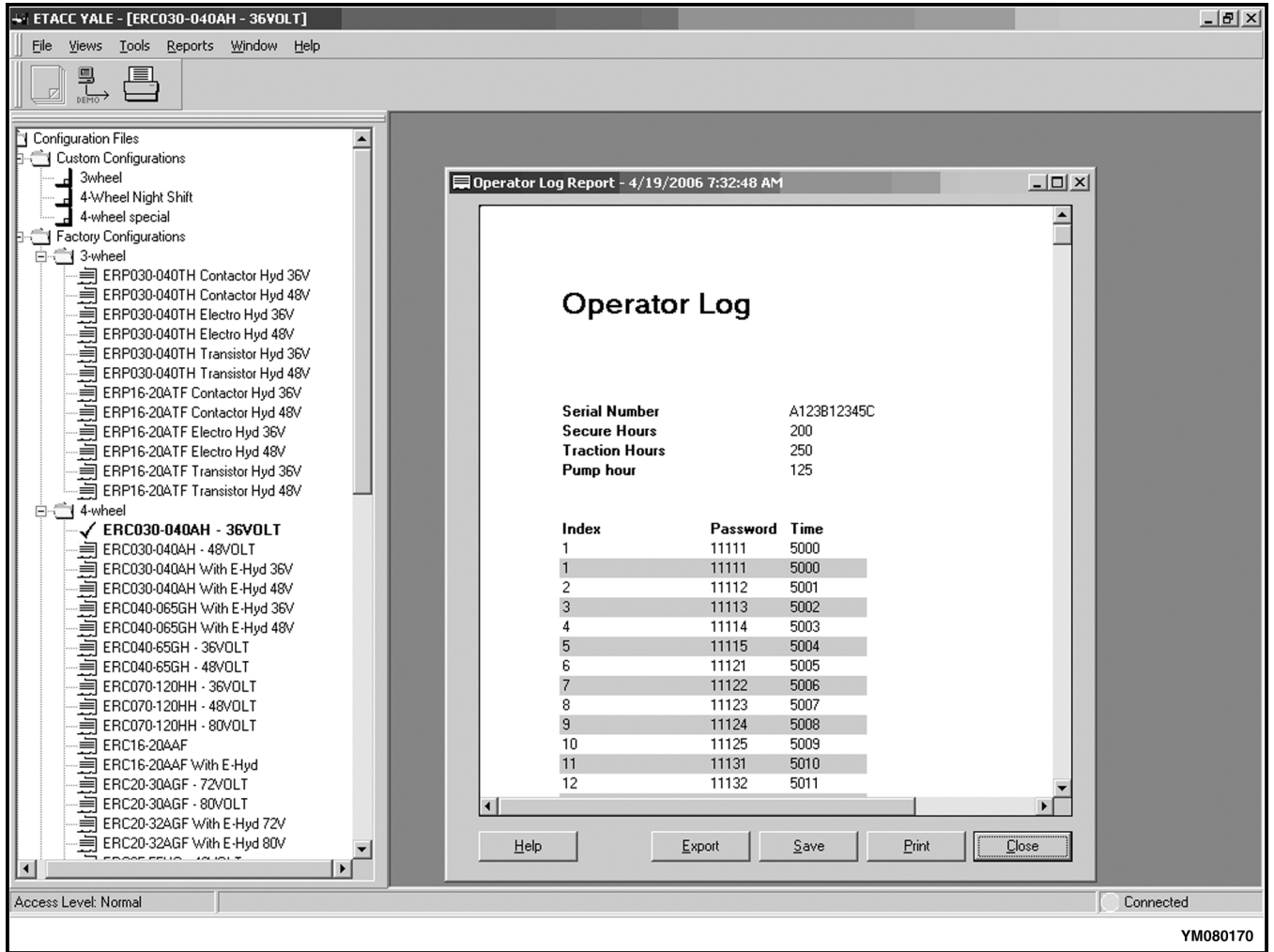


Figure 49. Operator Log Report

Troubleshooting

This section discusses the use of the diagnostic tables.

DIAGNOSTICS

Click **Diagnostic** on the **Views** menu. See Figure 58.

NOTE: The computer **MUST** be connected to the lift truck and communication between the computer and the lift truck **MUST** be established for diagnostics to be functional. If the computer is **NOT** communicating with the lift truck, the **Truck Value** column will display **Failed** for each item in the **Parameter** column. See Figure 59.

NOTE: If the computer and the lift truck are communicating with each other, the status of each item in the **Truck Value** column will have an **actual value** for **Throttle Pot Volts**, **Traction/Pump Motor Amps**, **Traction/Pump Motor Temp**, and **RPM**. All other items will be indicated by either a **0** value or a **1** value in each row. A **Diagnostic Connected** dialog box pops up with the following information on the lift truck. See Figure 60.

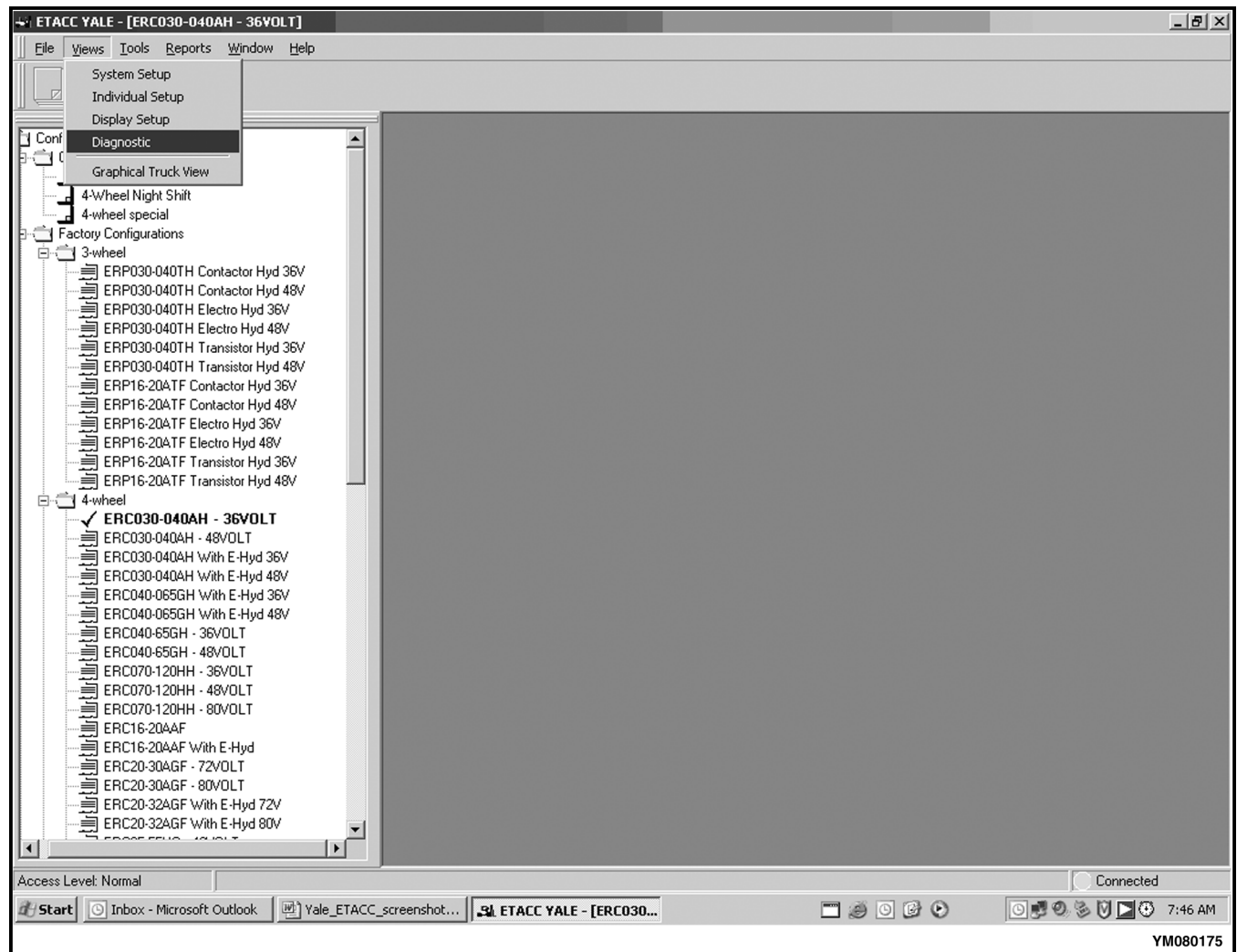
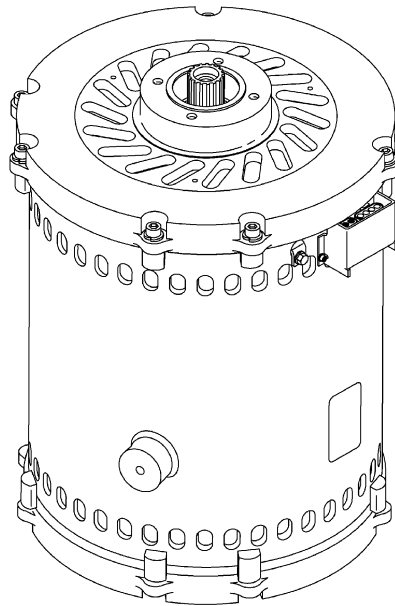
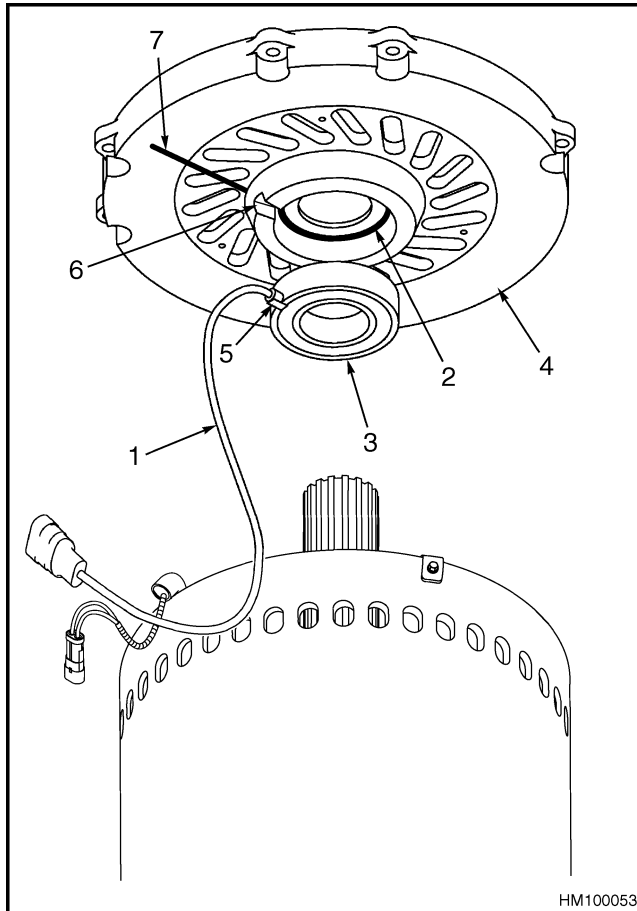


Figure 58. Tools Menu, Diagnostics

AC MOTOR REPAIR

ERC20-32AGF (ERC040-065GH) [A908];
ERC/P16-20AAF (ERC030-040AH) [B814/C814];
ERC35-55HG (ERC70-120HH) [B839/C839]





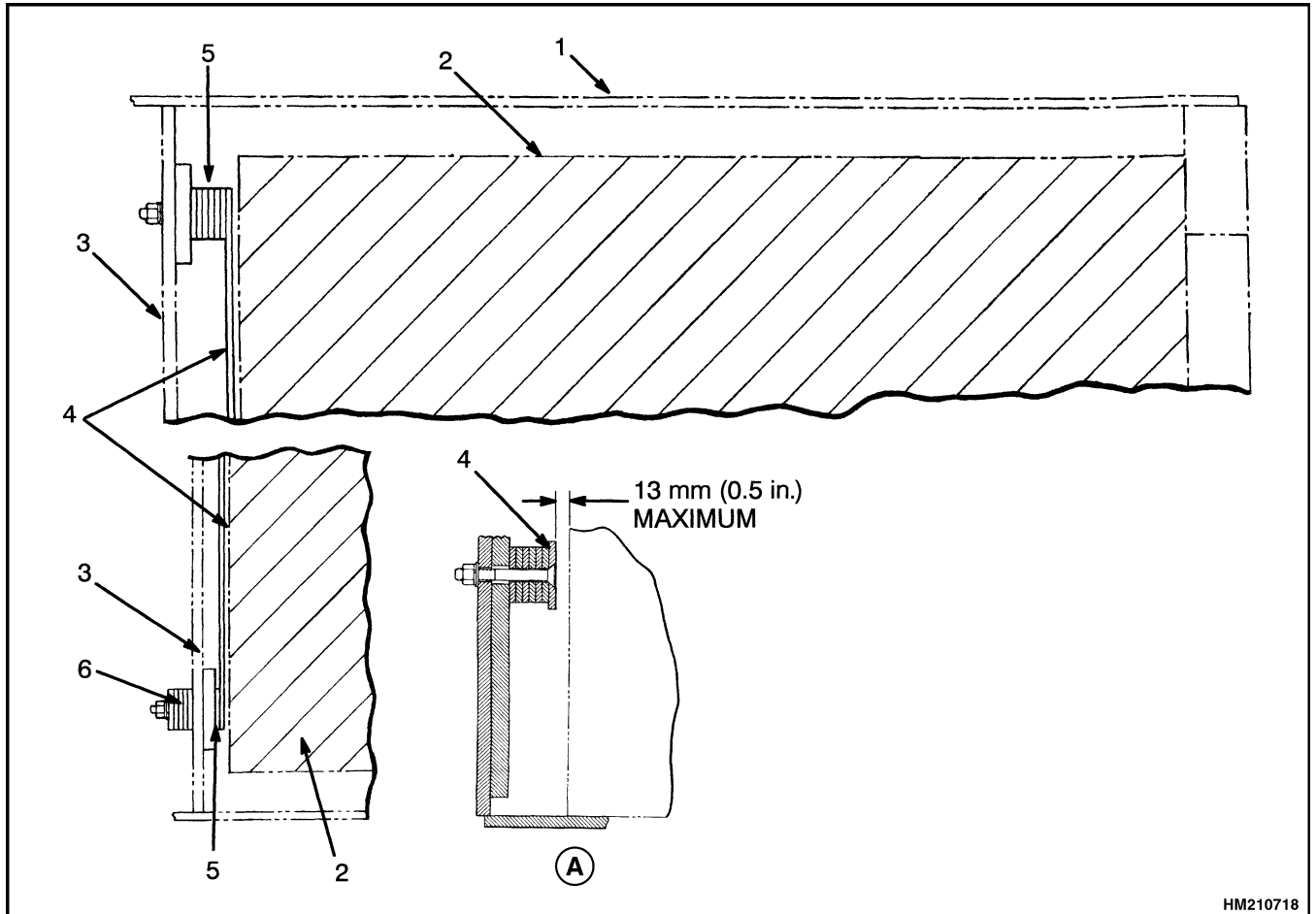
Legend for Figure 13

- | | |
|--------------------|-------------------------|
| 1. ENCODER WIRE | 5. ENCODER BEARING TANG |
| 2. SPRING WASHER | 6. ENCODER TANG SLOT |
| 3. ENCODER BEARING | 7. ENCODER WIRE SLOT |
| 4. END BELL | |

Figure 13. Alignment of Encoder Wire and Encoder Bearing Tang in End Bell Slot

Troubleshooting

PROBLEM	POSSIBLE CAUSE	PROCEDURE OR ACTION
Truck moves slow or in a jerky motion.	Encoder broken.	Replace encoder bearing.
	Encoder wire broken.	Check and repair encoder wire or replace encoder bearing.
Temperature sensor wire fails.		Measure resistance with ohmmeter. Resistance should be 530 ohms at 25 °C (77 °F). Repair temperature sensor wire. The temperature sensor wire can be repaired, but the temperature sensor cannot be repaired.



HM210718

A. FRONT SPACER

- | | |
|------------------------|--|
| 1. BATTERY COMPARTMENT | 5. SHIM |
| 2. BATTERY | 6. STORE ADDITIONAL SHIMS IN FRONT OF BULKHEAD |
| 3. BULKHEAD | |
| 4. SPACER BAR | |

Figure 2. Battery Spacer and Shims

Overhead Guard Replacement

REMOVE



WARNING

Do not operate the lift truck without the overhead guard correctly fastened to the lift truck.



WARNING

DO NOT weld mounts for lights or accessories to legs of the overhead guard. Changes that are made by welding, or by drilling holes that are too big or in the wrong location, can reduce the strength of the overhead guard.

See your dealer for Yale lift trucks **BEFORE** performing any changes to the overhead guard.

No welding or drilling on legs of overhead guard is permitted as per previous **WARNING**.

1. Remove battery as described in the section **Periodic Maintenance** 8000 YRM 1201. See the section Battery Specifications for information on battery weights and sizes.

Steam Method

Use the following procedure to clean the tank with steam:

1. Remove all parts from tank. Install drain plug.
2. Fill tank 1/4 full with a solution of water and sodium bicarbonate or sodium carbonate. Mix 0.5 kg (1 lb) per 4 liter (1 gal) of water.



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.

3. Mix solution in tank using air pressure. Make sure all surfaces on inside of tank are flushed with solution. Drain tank.
4. Put steam into tank until tank does not have odors and metal is hot. Steam vapors must come from all openings.
5. Flush inside of tank with boiling water. Make sure all loose material is removed from inside of tank.
6. Make inspection of inside of tank. If it is not clean, repeat Step 4 and Step 5 and make another inspection. When making inspections, use a light that is approved for locations with flammable vapors.
7. Put plugs in all openings in tank. Wait 15 minutes, then remove inlet and outlet plugs. Test a sample of the vapor with a special indicator for gas vapors. If the amount of flammable vapors is above the lower flammable limit, repeat the cleaning procedures.

Chemical Solution Method

If the tank cannot be cleaned with steam, use the following procedure:

1. Mix a solution of water and trisodium phosphate or a cleaning compound with an alkali base. Follow the instructions given by 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.

2. Fill tank with cleaning solution. Use compressed air to mix solution in tank.
3. Drain tank. Flush inside of tank with hot (boiling) water. Make sure all cleaning compound is removed.
4. Make an inspection of inside of tank. If tank is not clean, repeat Step 1 through Step 3. Make another inspection of tank. When making inspections, use a light that is approved for locations with flammable vapors.
5. Check tank for flammable vapors using a special indicator for gas vapors. If the amount of flammable vapors is above the lower flammable limit, repeat the cleaning procedures.

ADDITIONAL PREPARATIONS FOR REPAIR

If nitrogen gas or carbon dioxide gas is available, prepare the tank for welding using these gases. See the manual *Safe Practices For Welding and Cutting Containers That Have Held Combustibles* by the American Welding Society, F4.1 - 1999. If these gases are not available, another method using water can be used as follows:

1. Fill tank with water to just below the point where the work will be done. Make sure the space above the level of the water has a vent.
2. Use acceptable welding practices to repair tank. See the American National Standard "Safety in Welding and Cutting," AWS Z 49.1 - 1999.

TABLE OF CONTENTS (Continued)

This section is for the following models:

ERC35-55HG (ERC70-120HH) [B839/C839]

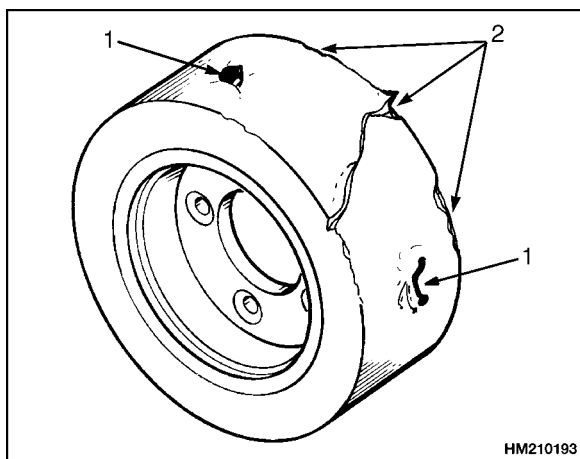
HOW TO MAKE CHECKS WITH KEY SWITCH OFF

Tires and Wheels

CAUTION

Check all drive wheel nuts after 2 to 5 hours of operation: when new lift trucks begin operation and on all lift trucks when the drive wheels have been removed and installed. Tighten nuts in a cross pattern to correct torque value shown in Maintenance Schedule. When nuts stay tight for eight hours, interval for checking torque can be extended to 500 hours.

Inspect tires for wire, rocks, glass, pieces of metal, holes, cuts, and other damage. Remove any object that will cause damage. See Figure 5. Check for loose or missing hardware. Remove any wire strapping or other material wrapped around axle. Make sure that drive wheel nuts are tight. Tighten drive wheel nuts in a cross pattern to correct torque value shown in Maintenance Schedule.



1. CHECK FOR DAMAGE AND REMOVE NAILS, GLASS, METAL, AND OTHER OBJECTS
2. MAKE EDGES SMOOTH

Figure 5. Tires Check

Forks

NOTE: Forks must be removed and installed by trained personnel.

The identification of a fork describes how the fork is connected to the carriage. These lift trucks have hook forks.

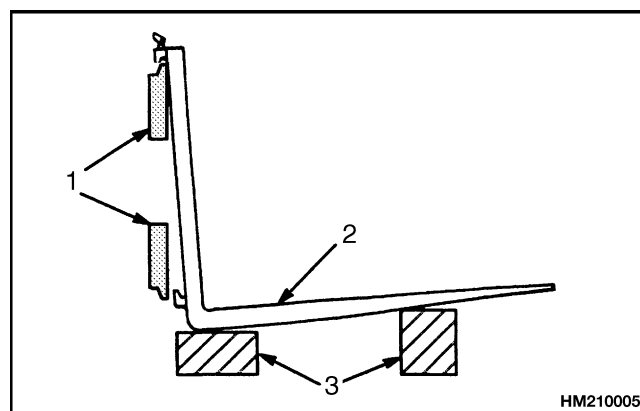
Remove

WARNING

Do not try to move a fork without a lifting device. Each hook fork for these lift trucks can weigh 35 to 180 kg (80 to 395 lb).

NOTE: Forks are to be replaced only in pairs and not individually.

A fork can be removed from the carriage for replacement of the fork or other maintenance. Slide a hook fork to the fork removal notch on the carriage. See Figure 6 and Figure 7. Lower the fork onto blocks so that the bottom hook of the fork moves through the fork removal notch. See Figure 7. Lower the carriage further so that the top hook of the fork is disengaged from the top carriage bar. Move the carriage away from the fork, or use a lifting device to move the fork away from the carriage.



1. CARRIAGE BARS
2. HOOK FORK
3. BLOCKS

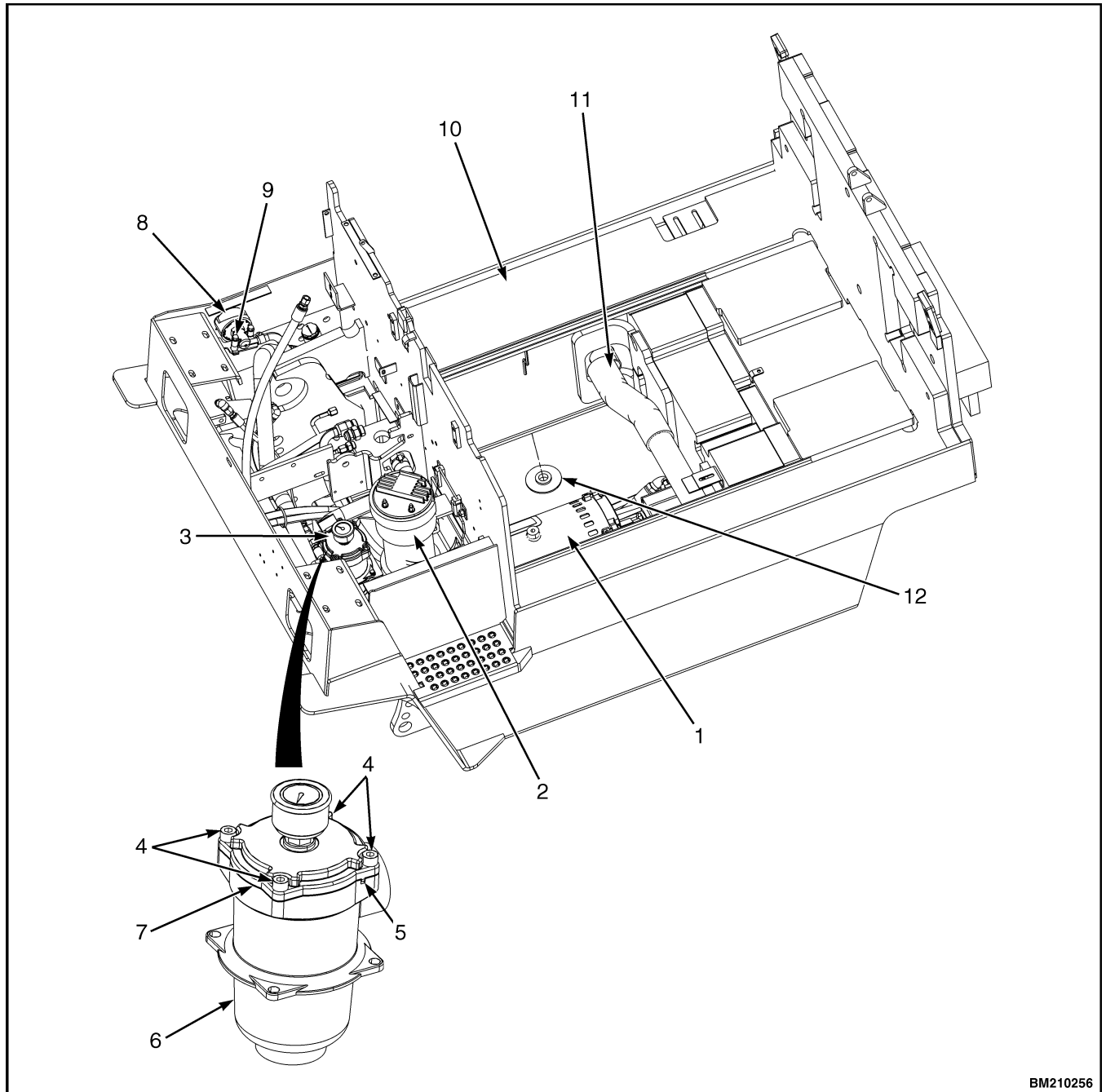
Figure 6. Hook Fork Removal

Inspect

WARNING

Do not try to correct fork tip alignment by bending the forks or adding shims. Replace bent forks. Never repair damaged forks by heating or welding. Forks are made of special steel using special procedures. Replace damaged forks. Forks are to be replaced only in sets and not individually.

1. Inspect the forks for cracks and wear. Check that the fork tips are aligned to within 13 mm (0.5 in.) of each other (see Figure 7). Check that the bottom of the fork is not worn (Item 4 in Figure 7).



BM210256

NOTE: FLOOR PLATE NOT SHOWN FOR CLARITY.

- | | |
|-----------------------------|---------------------------------|
| 1. HYDRAULIC PUMP AND MOTOR | 7. FILTER COVER |
| 2. STEERING PUMP AND MOTOR | 8. HYDRAULIC BREATHER |
| 3. HYDRAULIC FILTER | 9. BREATHER ADAPTER |
| 4. SOCKET HEAD SCREWS | 10. HYDRAULIC TANK |
| 5. ALIGNMENT PIN AND NOTCH | 11. HYDRAULIC TANK SUCTION HOSE |
| 6. FILTER HOUSING | 12. HYDRAULIC TANK DRAIN PLUG |

Figure 15. Hydraulic Filter Removal and Hydraulic Oil Change, Lift Truck Models ERC35-55HG (ERC70-120HH) (C839)

Legend for Figure 25

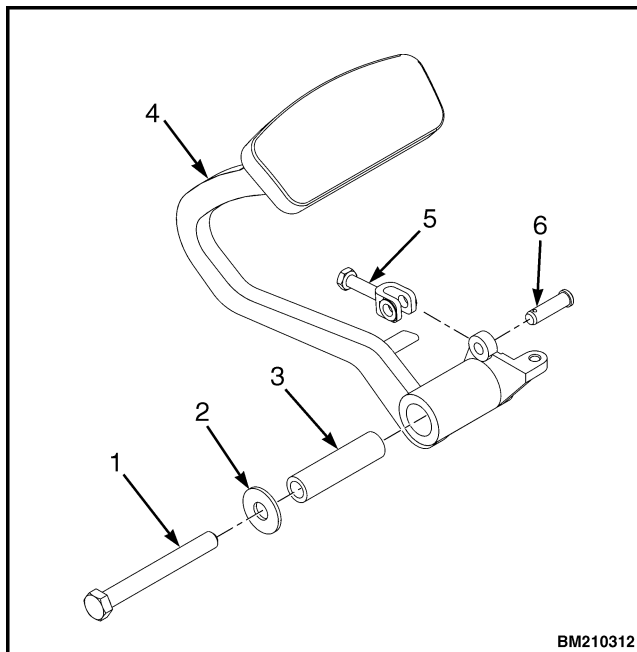
1. PIVOT
2. APPLIED POSITION
3. RELEASED POSITION
4. PARKING BRAKE SLIDE

BRAKE LINKAGE SHAFTS

NOTE: Lubricate the brake linkage shafts at 1000 hours if lift truck is used in a clean, dry warehouse environment. If lift truck is used in a more severe environment, lubricate at 500 hours.

NOTE: Under dusty or dirty conditions, clean and lubricate the brake linkage shafts more frequently.

Lubricate rod end and pedal assembly with multipurpose grease as specified in the Maintenance Schedule. See Figure 26.



1. CAPSCREW
2. WASHER
3. PIVOT TUBE
4. PEDAL ASSEMBLY
5. ROD END
6. ROD END PIN

Figure 26. Brake Linkage Shafts

Lubricate the pivot tube in the pedal assembly using the following procedure:

1. Remove floor plate.
2. Remove capscrew, washer, and tube from pedal assembly. Apply multipurpose grease, as specified in the Maintenance Schedule, on the outside of the tube.
3. Install tube, washer, and capscrew into pedal assembly. Tighten capscrew to 165 N•m (122 lbf ft).
4. Install floor plate.

STEERING SPINDLES AND TIE ROD ENDS

Use multipurpose grease, as specified in the Maintenance Schedule, to lubricate the tie rod ends on the steering axle and the steering spindles. For the tie rod ends, there are two fittings, one on each end of the steering axle. For the steering spindles, there are four lube fittings, one on the top and bottom on each end of the steering axle.

SEAT RAILS

NOTE: Lubricate the seat rails at 1000 hours if lift truck is used in a clean, dry warehouse environment. If lift truck is used in a more severe environment, lubricate at 500 hours.

Lubricate the seat rails with multipurpose grease, as specified in the Maintenance Schedule.

SEAT PLATE HINGES

NOTE: Lubricate the seat plate hinges at 1000 hours if lift truck is used in a clean, dry warehouse environment. If lift truck is used in a more severe environment, lubricate at 500 hours.

NOTE: Under dusty or dirty conditions, clean and lubricate the seat plate hinges more frequently.

Lubricate the seat plate hinges with silicone lubricant-spray as specified in the Maintenance Schedule.

Battery Maintenance

HOW TO CHARGE BATTERY

WARNING

If the lift truck was operated with a low battery, inspect all contactors for welded contacts **BEFORE** connecting a charged battery. The lift truck cannot be controlled if contacts are welded. This condition can cause personal injury when battery is connected.

WARNING

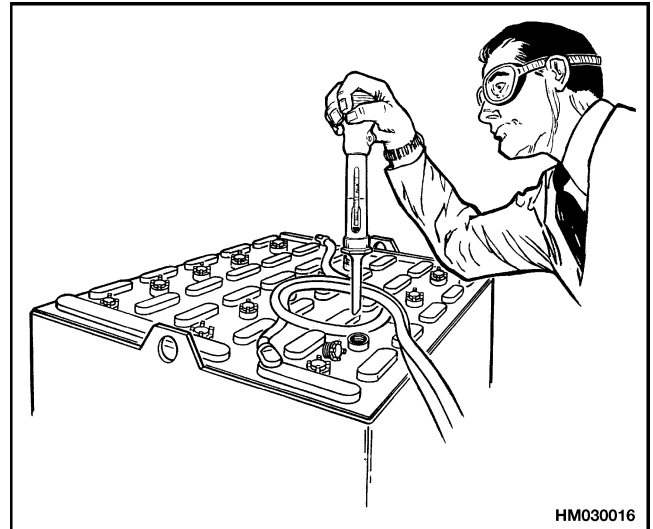
The acid in the electrolyte can cause injury. Use water to flush area and make acid neutral with a water and soda solution. Acid in eyes must be flushed with water. Batteries generate explosive fumes when they are being charged. Keep fire, sparks, and burning material away from battery charger area. Avoid sparks from battery connections. Charge batteries only in the special area for charging batteries. When battery is being charged, keep vent caps clear. Battery charger area must have ventilation so that explosive fumes are removed. Open battery cover on a covered battery. Disconnect battery when doing cleaning and maintenance.

CAUTION

Never connect battery charger plug to plug of lift truck. You can damage electronic controller. Make sure battery charger voltage is correct voltage for battery.

NOTE: Many users have battery chargers that can follow a program to automatically charge a battery according to recommendations of the battery manufacturer. Use recommendations of battery manufacturer for charging battery.

Correct use of the hydrometer (Figure 33) and proper operation of the battery charger is important. Follow instructions of charger manufacturer. Never let battery discharge below minimum value given by battery manufacturer. A fully charged battery will have a specific gravity of 1.265 to 1.310 at 25°C (77°F). Never charge a battery at a rate that will raise electrolyte temperature above 49°C (120°F). Never let battery stay discharged for long periods.



HM030016

Specific Gravity Reading	Electrolyte Temp.	Correction Points	Correct Value
1.210	31°C (87°F)	+0.003	1.213
1.210	27°C (80°F)	+0.001	1.211
1.210	25°C (77°F)	0.000	1.210
1.210	18°C (64°F)	-0.004	1.206

+0.001 or -0.001 for each 2°C from the 25°C base value.

Figure 33. Check Specific Gravity

1. **NORMAL CHARGE:** This charge is the charge that is normally given to a battery that is discharged from normal service. Many users give this charge at a regular interval based on usage. This practice will keep the battery fully charged if the battery is not discharged below the limit. Always use a hydrometer (Figure 33) to check battery if interval charge cycle is used. Frequent charging of a battery that has 2/3 of a full charge or more can decrease battery life.

2. **EQUALIZING CHARGE:** This charge is at a low rate and balances the charge in all of the cells. The equalizing charge is normally given approximately once a month. It is a charge at a slow rate for three to six hours in addition to the regular charging cycle.

DO NOT give an equalizing charge more than once a week. The most accurate specific gravity measurements for a charged battery will be after an equalizing charge. If the specific gravity difference is more than 0.020 between cells of the battery after an equalizing

Overhead Guard Changes



WARNING

DO NOT weld mounts for lights or accessories to the legs of the overhead guard. The strength of the overhead guard can be reduced by welding or heating.

DO NOT operate lift truck without overhead guard correctly fastened to the lift truck.

Observe previous **WARNING** before doing any changes to overhead guard.

Wheels and Tires

GENERAL



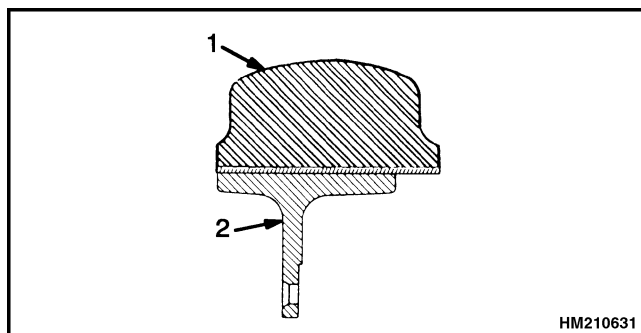
WARNING

The type of tires are shown on the lift truck Nameplate. Make sure Nameplate is correct for type of tires that are installed on lift truck.

Wheels must be changed and tires repaired by trained personnel only.

Always wear safety glasses.

These lift trucks use solid rubber tires. See Figure 40. Solid rubber tires made from softer or harder material can be installed as optional equipment. Tread on solid rubber tires can be either smooth or it can have lugs. Electric compound tires are recommended. **DO NOT** mix types of tires or tread on lift truck. Make sure the type of tires that are installed on lift truck are same as shown on lift truck Nameplate.



1. SOLID RUBBER TIRE (PRESS-ON)
2. WHEEL

Figure 40. Wheel and Tire

REMOVE WHEELS FROM LIFT TRUCK



WARNING

Wheels must be changed and tires repaired by trained personnel only.

Always wear safety glasses.

1. Raise lift truck as described in How to Put Lift Trucks on Blocks in this manual.
2. Remove wheel nuts and remove wheel from lift truck. Lift truck wheels are heavy.

REMOVE TIRE FROM WHEEL AND INSTALL TIRE ON WHEEL

Remove

The correct tools, equipment, and a press ring must be used for each size of wheel. Use a press to push wheel from the tire assembly. The capacity of the press must be approximately 36,000 to 181,600 kg (80,000 to 400,000 lb).

Install

NOTE: Make sure tires are installed on wheels according to dimensions shown in Figure 41. Tires must be installed the same for both wheels (drive or steer). Also check Nameplate of lift truck for correct tread width.

The correct tools, equipment, and a press ring must be used for each size of wheel. Use a press to push the wheel into the tire assembly. The capacity of the press must be approximately 36,000 to 181,600 kg (80,000 to 400,000 lb).

Steering System

SPECIFICATIONS

Item	36 Volt	48/80 Volts
Steering Oil Temperature	49 to 60°C (120 to 140°F)	49 to 60°C (120 to 140°F)
Inside Tire Angle	79°	79°
Number of Turns on Steer Wheel	4.5	4.5
Steering Relief Pressure	10,342 ±345 kPa (1500 ±50 psi)	10,342 ±345 kPa (1500 ±50 psi)
Steering Relief Current	18.4 ±5.0 Amps	18.3 ±5.0 Amps (48 Volt) 11.5 ±5.0 Amps (80 Volt)
Open Center Pressure Maximum	345 kPa (50 psi) Max.	345 kPa (50 psi) Max.
Open Center Current Maximum	3.0 Amps Max.	3.0 Amps Max. (48 Volt) 2.0 Amps Max. (80 Volt)
Steering Time (Unloaded Static)	3.6 Seconds	2.9 Seconds (48 Volt) 3.0 Seconds (80 Volt)
Hand Pump Displacement (Nominal)	100 CC/Rev.	100 CC/Rev.

TURNING RADIUS

Model	Turning Radius
ERC35HG (ERC70HH)	2098 mm (82.6 in.)
ERC40HG (ERC80HH)	2148 mm (84.6 in.)
ERC45HG (ERC100HH) Short Wheel Base	2225 mm (87.6 in.)
ERC45HG (ERC100HH) Long Wheel Base	2314 mm (91.1 in.)
ERC55HG (ERC120HH)	2405 mm (94.7 in.)
Minimum Turing Radius Average Values ±50 mm (±2 in.) (WITH LOAD)	

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This section is for the following models:

ERC35-55HG (ERC70-120HH) [B839/C839]

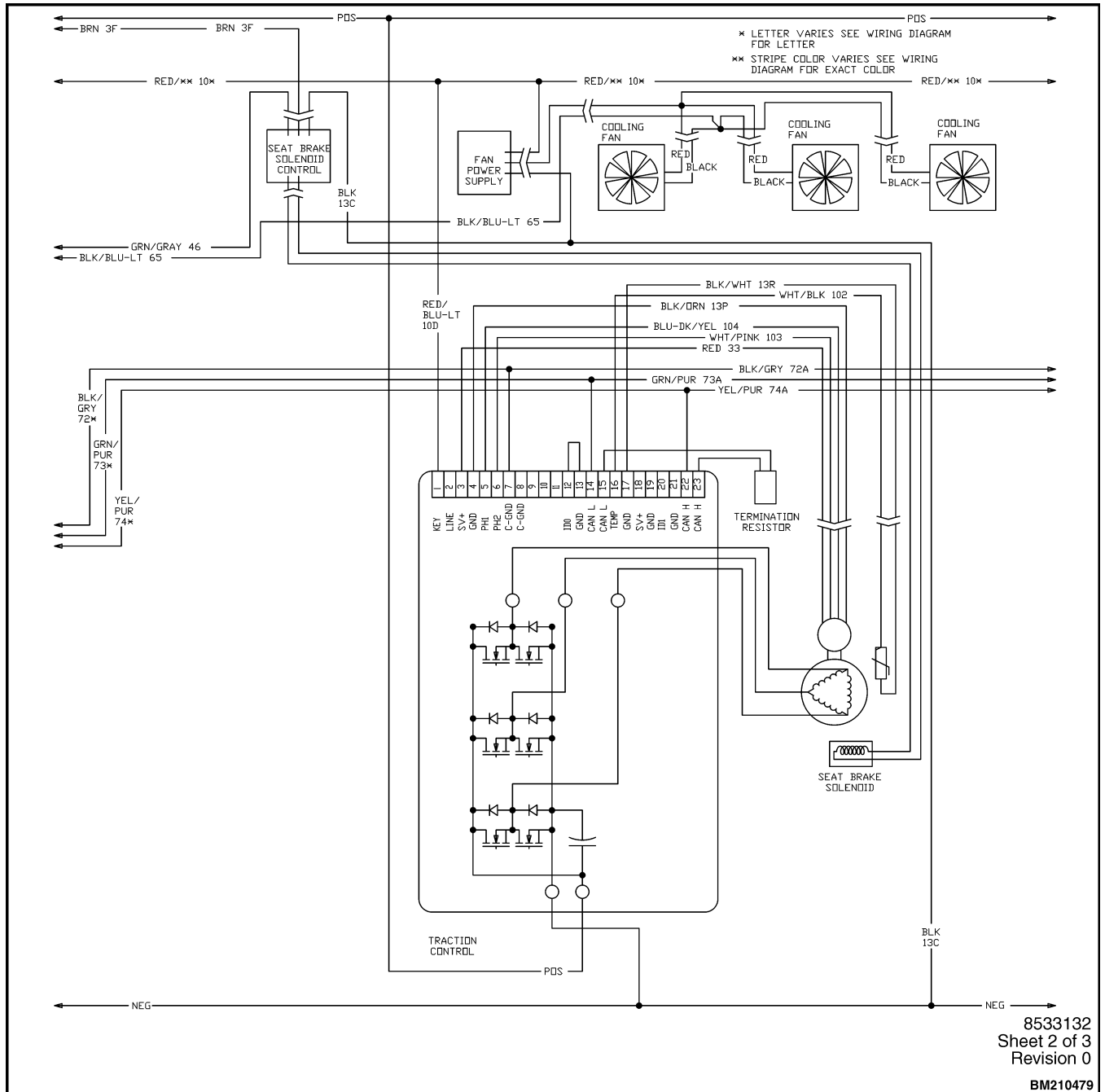
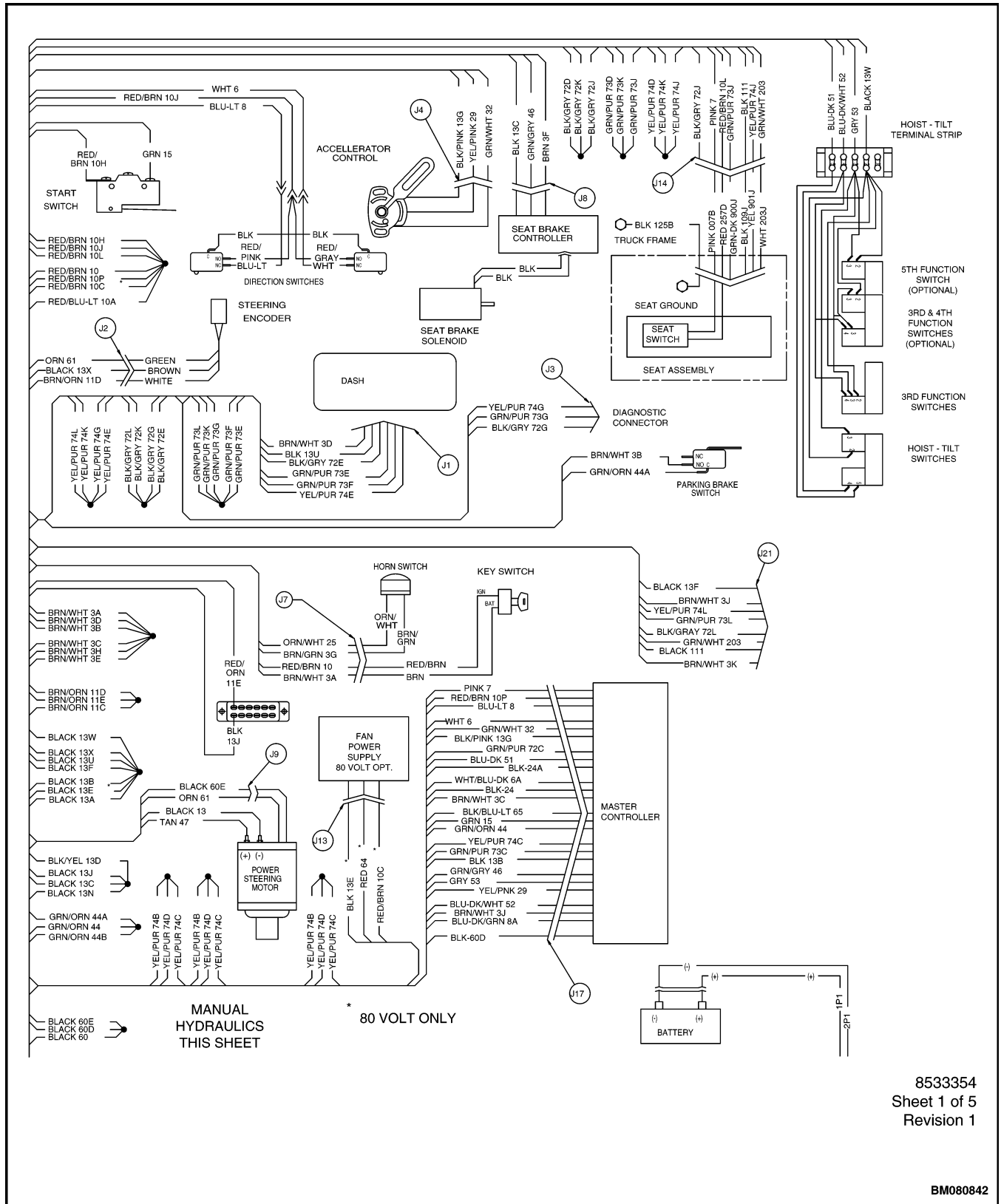


Figure 2. Schematic Wiring Diagram ERC35-55HG (ERC70-120HH) (B839), 80 Volts (Sheet 2 of 3)



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 Sheet 1 of 5
 Revision 1

BM080842

Figure 5. Wiring Diagram ERC35-55HG (ERC70-120HH) (C839), 36/48 and 80 Volts (Sheet 1 of 5)

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