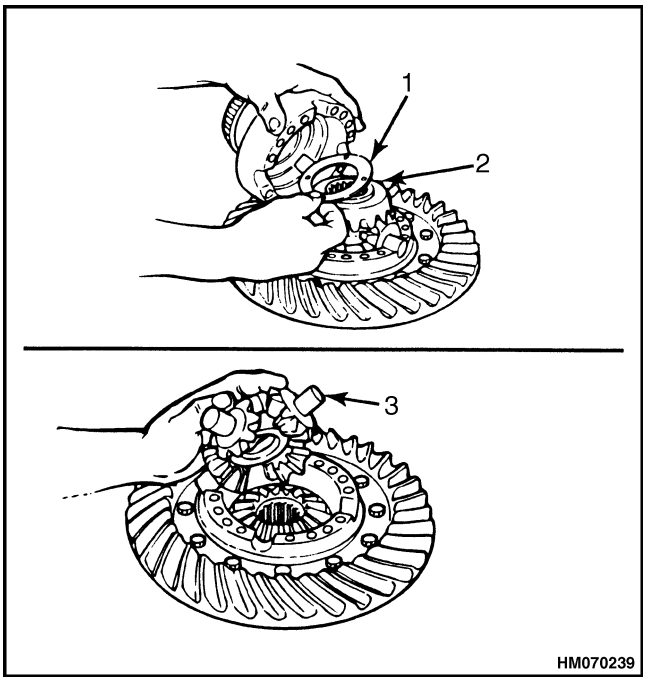
DIFFERENTIAL

H16.00-18.00XM/XMS-12 (H400-450HD/HDS) [A236]; H40.00-48.00XM-12 (H800-1050HD/HDS) [A917]; H60-80C; H110-150F; HR45-25, HR45-27, HR45-31, HR45-40S, HR45-36L, HR45-40LS, HR45-45LSX [A227, B227, C227]; HR45-EC, HR48-EC [A228]; S/H6.00-7.00XL (S/H135-155XL, S/H135-155XL$_2$) [B024, C024, F006, G006]; H8.00-12.00XL (H165-280XL) [E007]; H13.00-16.00XL (H300-360XL) [D019]; H8.00-12.00XM (H170-280HD) [F007, G007, H007]; H13.00-14.00XM (H300-330HD) [E019, F019, G019]; H16.00XM-6 (H360HD) [E019, F019, G019]; H10.00-12.00XM-12EC (H360HD-EC) [E019, F019, G019]H17.00CS-32.00C (H370CS-700C) [C008]; H14.00-20.00XM (H400-450H) [A214]; H250-300A; H13.50-16.00B (H300-350B) [B019]; H360-620B [B008]; H16.00-32.00C (H360-650C, H370-700C) [C008]; H700-800A [A117]; H36.00-44.00B (H700-920B) [B117]; H36.00-48.00C (H800-1050C) [C117]; H36.00-48.00E (H800-1050E) [D117]; H40.00-52.00XM-16CH (H1050HD-CH,-1150HD-CH) [E117, F117]; S125-150A [A024]; P40-50A [A119]; P60-80A [A018]; P125-150A [B007]; P7.00-9.00B (P150-200B) [C007]; RS45-27CH, RS45-30CH, RS45-27IH, RS46-33CH, RS46-30IH, RS46-36CH, RS46-33IH [A222]; H16.00-22.00XM-12EC (H400-500HD/HDS-EC) [B214]; RS45-27CH, RS45-31CH, RS46-36CH, RS46-40CH, RS46-41S CH, RS46-41L CH, RS46-41LS CH, RS45-24IH, RS45-28IH, RS46-33IH, RS46-37IH, RS46-38S IH, RS46-38L IH, RS46-38LS IH (HR45-27, HR45-31, HR45-36, HR45-40, HR45-41S, HR45-41L, HR45-41LS) [B222]

HYSTER

2. Remove the differential spider, four pinion gears, two side gears, and six thrust washers from inside the case halves. See Figure 14.



1. THRUST WASHER
2. SIDE GEAR
3. SPIDER, PINIONS, AND THRUST WASHERS

Figure 14. Ring Gear Disassembly

3. If the ring gear needs to be replaced, remove bolts, nuts, and washers holding the ring gear to the flange case half.

CAUTION

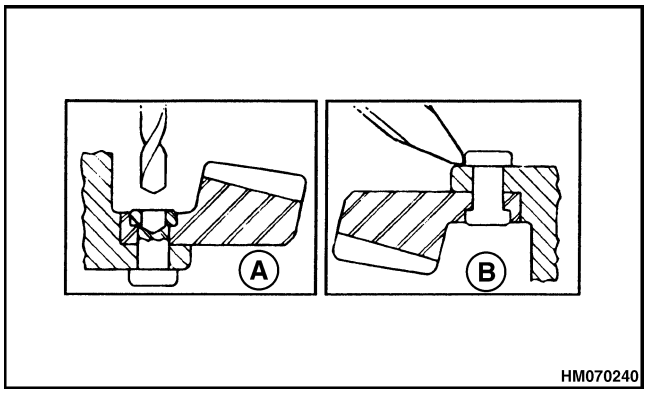
Do not remove the rivets or rivet heads with a chisel and hammer. Using a flat edge tool can cause damage to the flange case. See Figure 15.

4. If your differential model uses rivets to hold the ring gear to the flange case half, remove the rivets as follows:

a. Center punch each rivet head in the center, on the ring gear side of the assembly.

b. Drill each rivet head on the ring gear side of the assembly to a depth equal to the thickness of one rivet head. Use a drill bit that is 1/32 of an inch smaller than the body diameter of the rivets. See Figure 15.

c. Press the rivets through holes in the ring gear and flange case half. Press from the drilled rivet head.



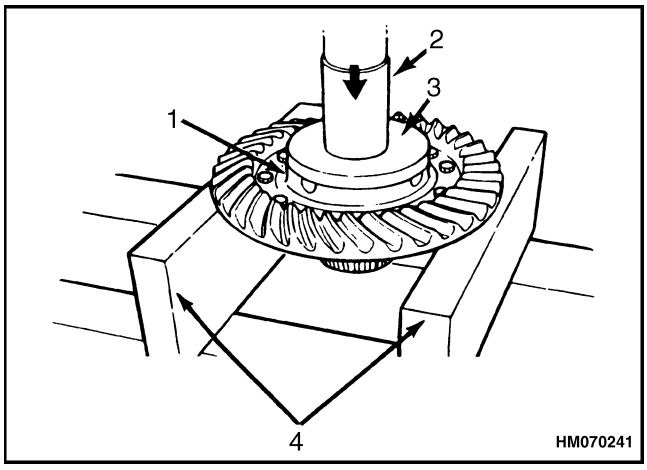
A. CORRECT DRILLING RIVETS FROM HEAD
B. WRONG CHISELING RIVETS FROM HEAD

Figure 15. Rivet Removal

WARNING

Observe all warnings and cautions provided by the press manufacturer to avoid damage to components and serious personal injury.

5. Separate the case half and ring gear using a press. Support the assembly under the ring gear with metal or wood blocks and press the case half through the gear. See Figure 16.



1. CASE HALF
2. PRESS
3. PLATE
4. SUPPORTS

Figure 16. Case Half and Ring Gear Separation

case half because of the close tolerance. Metal particles between the parts will cause gear runout that will exceed the specification of 0.2 mm (0.008 in.).

1. Heat the ring gear in 71 to 82°C (160 to 180°F) water for approximately ten minutes. Heating the gear makes it fit easier on the differential case.

WARNING

Wear protective clothing to prevent injury when handling the hot ring gear.

CAUTION

Never use a press or hammer to install the ring gear.

2. Lift the ring gear from the water using a lifting tool.

3. Install the ring gear on the flange case half immediately after the gear is heated. If the ring gear does not fit easily on the case half, heat the gear again.

4. Align fastener holes of the ring gear and flange case half. Rotate the ring gear as needed.

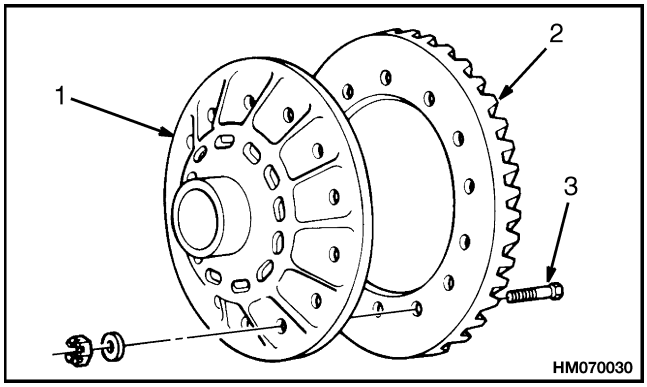
5. If special capscrews are used to fasten the ring gear to the flange case half, install the capscrews, washers, and nuts as shown in Figure 36. The capscrew heads must be against the ring gear. Use pairs of capscrews opposite each other to tighten the case and ring gear together. For capscrew torque specifications, see Specifications, Table 7.

NOTE: On S/H6.00-7.00XL (S/H135-155XL, S/H135-155XL$_2$) (B024, C024, F006, G006) lift truck models, if rivets were use to hold the ring gear and flange case half together, replace them with bolts, nuts, and washers

6. If rivets are used to fasten the ring gear to the flange case half, install the rivets cold. Do not heat the rivets. For the correct pressure to press the rivets, see Specifications, Table 4. The maximum pressure must be applied for approximately one minute at the end of the press cycle. Do not use more than the maximum pressure. Damage to the holes can occur. A correctly installed rivet will have a head at least 3.18 mm (0.125 in.) larger than the hole diameter. Install the rivets in pairs opposite each other (A-A, B-B), from the case half side of the assembly. See Figure 37.

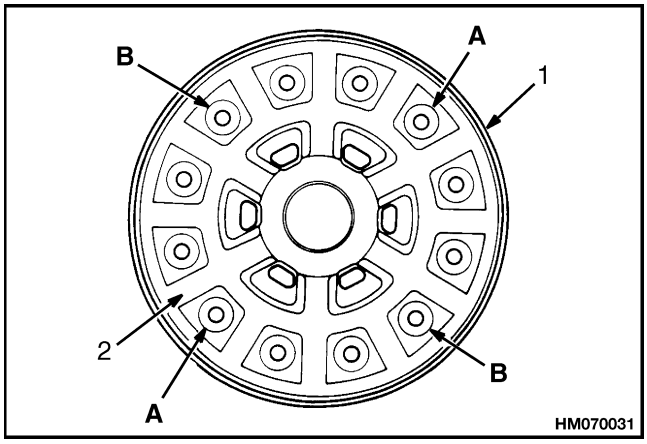
7. Use a thickness gauge that has a thickness of 0.08 mm (0.003 in.) to check for correct installation. Put the gauge between the ring gear and the case at four points that are separated by 90 degrees. The gauge cannot go in more than half the distance between the flange outer diameter and the pilot diameter for the gear. If the gauge goes more than half the distance, the ring gear must be removed and installed again. See Figure 38.

8. Install the bearing cones on both of the case halves. Use a press and a sleeve of the correct size.



1. FLANGE CASE HALF
2. RING GEAR
3. BOLT HEAD AGAINST GEAR

Figure 36. Installation With Capscrews



1. RING GEAR 2. CASE HALF

Figure 37. Installation With Rivets

3. Do the following as required:

   a. **On units with air-operated disc brakes**, install mounting brackets for slack adjusters. Install the air chamber rod pins and the cotter pin in the splined coupling.

   b. **On units with hydraulic disc brakes**, install the parts of the brake as described in the **Brake** section for your unit. Connect the drive shaft and tighten the capscrews at the yoke to 120 N•m (90 lbf ft).

   c. **On H7.00-12.50H (H150-257H) units**, assemble the axle. Install the axle in the lift truck if it was removed. Connect the drive shaft. Use a 11 mm (0.4375 in.) spacer between the speed reducer gear and the pinion nut. Use a new nut and tighten the nut to 1342 to 1790 N•m (990 to 1320 lbf ft) without lubricant.

   d. **On Straddle Trucks™**, install the bearing and seal in the bearing retainer. Install the universal joint yoke in the bearing retainer. Install the snap ring to hold the yoke. Install the stub shaft in the differential. Use a new gasket and install the yoke and bearing retainer. Install the capscrews for the bearing retainer. Install the yoke capscrew. Tighten the capscrews.

4. **For H26.00-32.00C (H550-700C) and H36.00-48.00C (H800-1050C) units with a drum brake installed on the differential**, do the following

NOTE: Special tools (a pilot shaft, a collar, and an installation nut) are required to install the yoke correctly. See Figure 54.

   a. Apply axle lubricant on the yoke seal.

   b. Check all surfaces of the yoke hub for damage. If necessary, polish the yoke hub with emery cloth or crocus cloth.

   c. Install the pilot shaft on the input shaft of the differential. See Figure 54.

CAUTION

Do not use a hammer or mallet to install the yoke onto the shaft. A hammer or mallet can damage the yoke.

   d. Slide the yoke over the pilot shaft. Align the yoke splines with the shaft splines. Slide the collar onto the pilot shaft and against the yoke. See Figure 54.

CAUTION

Do not use the yoke assembly nut for the installation procedure. Use a similar nut for the procedure described in Figure 54.

   e. Install the nut on the pilot shaft. Tighten the nut against the collar until the yoke is in the correct position on the input shaft. The nut can require torque up to 271 N•m (200 lbf ft) to install the yoke correctly.

CAUTION

Make sure the seal is not damaged as the yoke passes through the seal.

   f. Remove the nut, collar, and pilot shaft. Install the assembly nut for the yoke on the end of the input shaft. Tighten the assembly nut to 1627 N•m (1200 lbf ft).

   g. Install the brake drum and fasten with the eight capscrews.

   h. Attach the linkage to the brake adjuster arm. Connect the drive shaft from the yoke flange on the brake drum.

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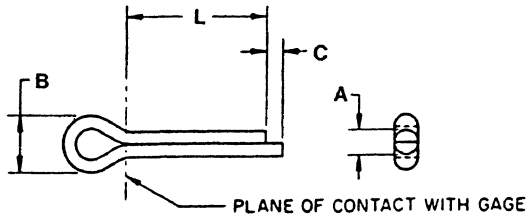
This section is for the following models:

All Models

Table 8. Cotter Pin Dimensional Data

Nominal Size A	Shank Diameter A		Head Dia. B	Length of Extended Prong C		Recommended Hole Size	
	max	min	min	max	min	min	max
1.00 mm (0.031 in.)	0.90 mm (0.035 in.)	0.70 mm (0.028 in.)	1.50 mm (0.060 in.)	1.52 mm (0.060 in.)	0.25 mm (0.01 in.)	0.91 mm (0.036 in.)	1.37 mm (0.054 in.)
1.60 mm (0.047 in.)	1.20 mm (0.048 in.)	0.90 mm (0.035 in.)	1.50 mm (0.060 in.)	2.54 mm (0.10 in.)	0.51 mm (0.02 in.)	1.50 mm (0.059 in.)	1.78 mm (0.070 in.)
2.00 mm (0.062 in.)	1.50 mm (0.060 in.)	1.30 mm (0.051 in.)	2.40 mm (0.094 in.)	2.54 mm (0.10 in.)	0.76 mm (0.03 in.)	1.90 mm (0.075 in.)	2.18 mm (0.086 in.)
2.50 mm (0.094 in.)	2.30 mm (0.091 in.)	2.10 mm (0.083 in.)	4.00 mm (0.158 in.)	2.54 mm (0.10 in.)	1.00 mm (0.04 in.)	2.41 mm (0.095 in.)	2.95 mm (0.116 in.)
3.20 mm (0.125 in.)	3.00 mm (0.120 in.)	2.70 mm (0.106 in.)	5.10 mm (0.201 in.)	3.30 mm (0.13 in.)	1.52 mm (0.06 in.)	3.12 mm (0.123 in.)	3.76 mm (0.148 in.)
4.00 mm (0.156 in.)	3.80 mm (0.150 in.)	3.50 mm (0.138 in.)	6.50 mm (0.256 in.)	4.06 mm (0.16 in.)	1.78 mm (0.07 in.)	3.94 mm (0.155 in.)	4.55 mm (0.179 in.)
5.00 mm (0.188 in.)	4.60 mm (0.181 in.)	4.40 mm (0.172 in.)	8.00 mm (0.315 in.)	4.06 mm (0.16 in.)	2.03 mm (0.08 in.)	4.93 mm (0.194 in.)	5.33 mm (0.210 in.)
6.30 mm (0.250 in.)	5.90 mm (0.232 in.)	5.60 mm (0.220 in.)	10.3 mm (0.406 in.)	4.06 mm (0.16 in.)	2.03 mm (0.08 in.)	6.22 mm (0.245 in.)	6.96 mm (0.274 in.)
8.00 mm (0.312 in.)	7.50 mm (0.295 in.)	7.00 mm (0.275 in.)	13.1 mm (0.516 in.)	4.06 mm (0.16 in.)	2.03 mm (0.08 in.)	7.85 mm (0.309 in.)	8.28 mm (0.326 in.)
9.50 mm (0.375 in.)	9.50 mm (0.374 in.)	8.40 mm (0.329 in.)	16.6 mm (0.654 in.)	6.35 mm (0.25 in.)	4.06 mm (0.16 in.)	9.45 mm (0.372 in.)	9.73 mm (0.383 in.)
13.0 mm (0.500 in.)	12.4 mm (0.488 in.)	11.9 mm (0.467 in.)	21.7 mm (0.854 in.)	6.35 mm (0.25 in.)	3.05 mm (0.12 in.)	12.62 mm (0.497 in.)	13.21 mm (0.520 in.)
16.0 mm (0.625 in.)	15.4 mm (0.606 in.)	15.0 mm (0.590 in.)	27.0 mm (1.063 in.)	8.89 mm (0.35 in.)	3.05 mm (0.12 in.)	15.80 mm (0.622 in.)	16.28 mm (0.641 in.)



EXTENDED PRONG

HM211587

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Check if the proximity switch functions properly. It should have switched **ON** 4 mm (0.157 in.) before it would touch the steel. Replace if faulty.

ADDITIONAL FUNCTIONS

Automatic Locking

The automatic locking feature is controlled by PCB3. It automatically locks the twist locks two seconds after all required input signals have been received.

On earlier series, there is a slide switch to switch the automatic locking system **ON/OFF**, and there is a small hand wheel to vary the delay between completed input signal and locking signal.

On later series, plug K1 switches the automatic locking system **ON/OFF**, and potentiometer P3 allows varying the delay of the locking signal. Do not calibrate to below 1.0 seconds.

Container Attachment Repair

REMOVE

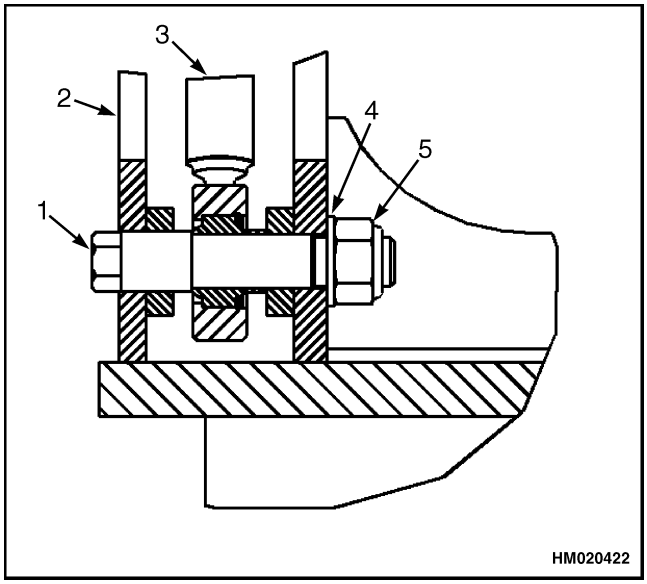
1. Fully extend the boom.
2. Place the attachment on a loaded container or use a lifting device to support attachment.
3. Apply parking brake.
4. Shut off engine.

WARNING

Do not disconnect any hydraulic lines when the engine is running or personal injury may occur.

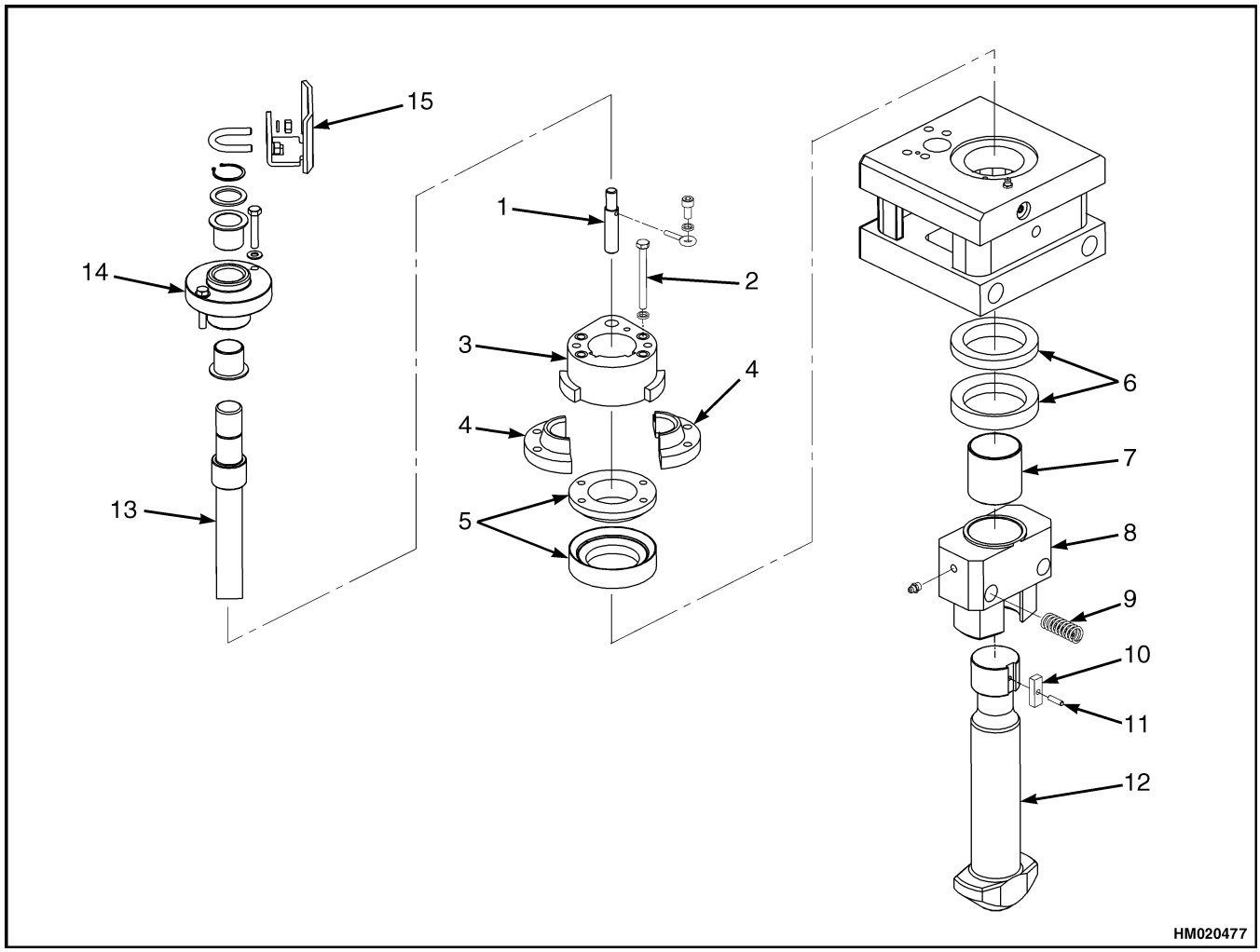
NOTE: Move all control levers back and forth a minimum of 20 times to remove all hydraulic pressure from pilot system.

5. Put identification tags on the hydraulic lines and electrical connectors.
6. Disconnect the two electrical connectors between the boom and the rotator frame.
7. Disconnect the dampening cylinder as follows:
   - **a.** Put identification tags on the hydraulic lines during removal.
   - **b.** Disconnect the hydraulic lines at the dampening cylinder. Put caps on the open lines.
   - **c.** Disconnect the dampening cylinder at the rotator frame by removing nut from the pin. See Figure 9.
   - **d.** Push the pin through the cylinder head and frame mounting brackets with a drift.
   - **e.** Remove the pin on the other dampening cylinder using the same procedure.
   - **f.** Remove the two spacers.



1. PIN
2. ROTATOR FRAME
3. DAMPENING CYLINDER
4. WASHER
5. NUT

Figure 9. Dampening Cylinder to Rotator Frame Mounting



1. PIN
2. BOLT
3. CRANK
4. COLLET
5. UPPER BEARINGS
6. LOWER BEARINGS
7. BUSHING
8. SLEEVE
9. SPRINGS
10. KEY
11. SPRING PIN
12. TWIST LOCK
13. ARM
14. BEARING HOUSING
15. INDICATOR

Figure 15. Pendular Twist Locks Assembly

CLEAN

WARNING

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

1. Clean all parts of the twist lock assembly in solvent and remove residual solvent or allow the solvent to evaporate.

INSPECT

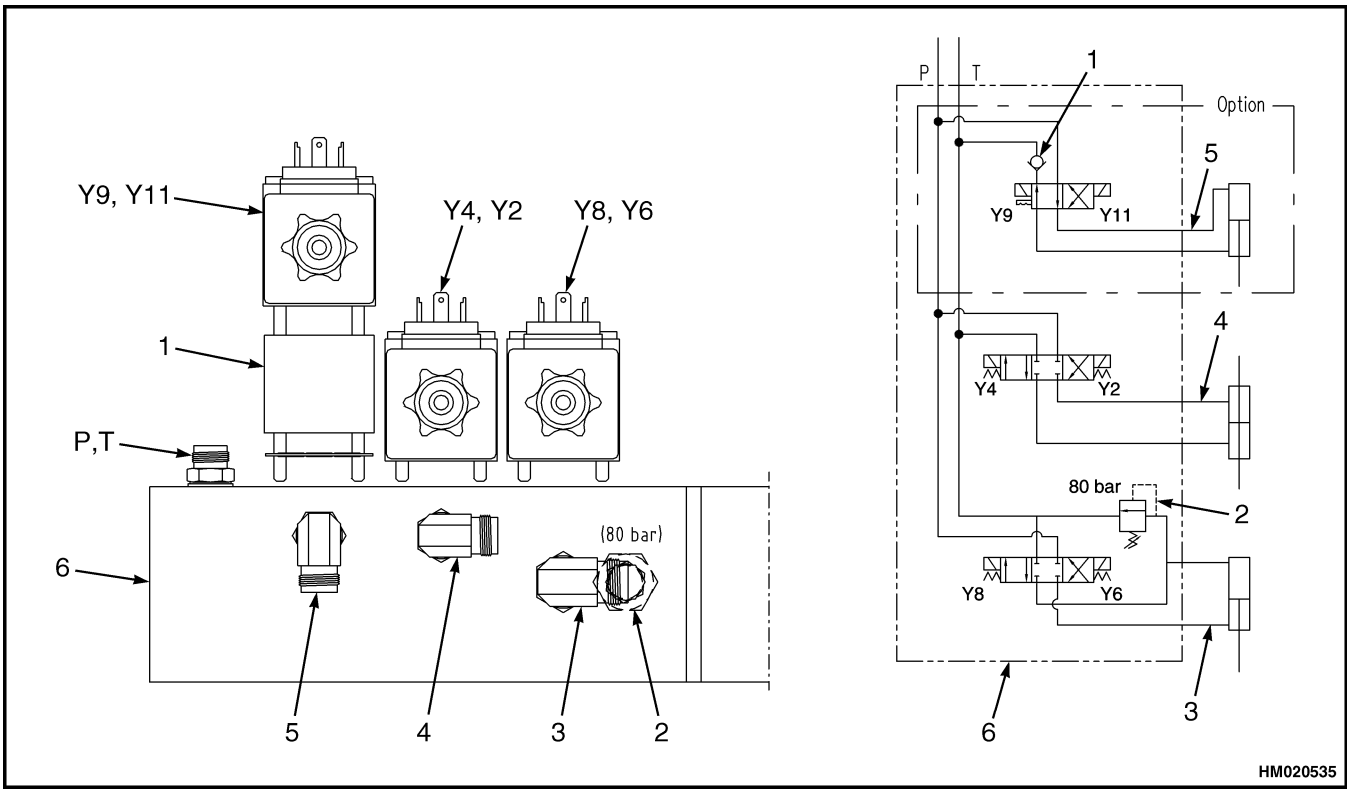
1. Inspect all parts of the twist lock assembly for damage, rust, or wear each month. When the worn area has reduced to 25 mm (1.00 in.), the twist locks must be replaced. Inspect the twist lock recesses and replace, if damaged. See Figure 17.

2. Inspect the upper and lower bearing sets for damage. Replace, if damaged.

3. Inspect the collets and the crank. Replace, if worn or damaged.

EXTENSION VALVE

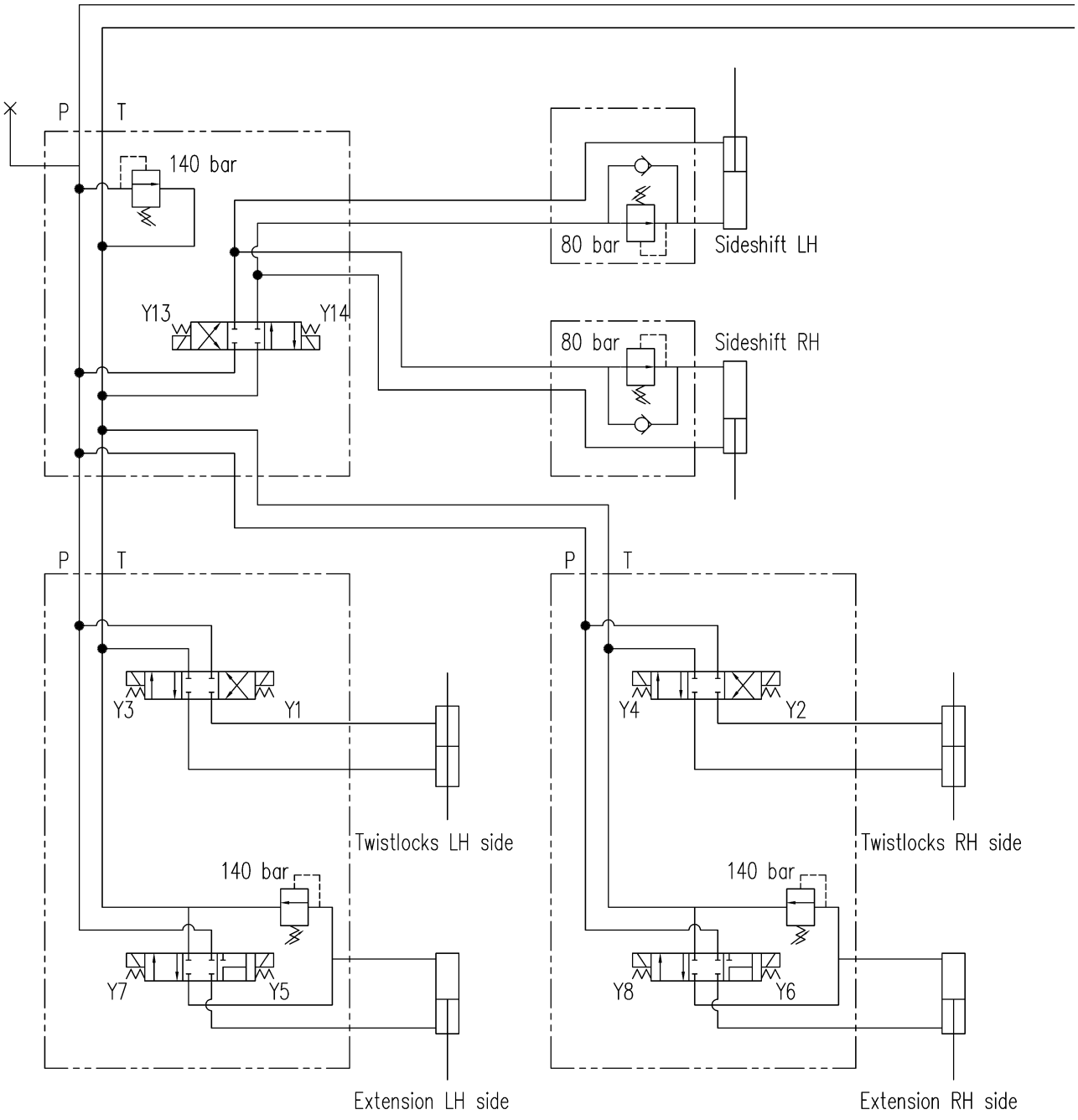
The extension valve is mounted at the shell end of the extension cylinder. See Figure 25. Fit a pressure gauge at the adapter for the pump line on the sideshift valve. Apply the extension function while the spreader is fully extended and adjust the relief valve to 80 bar.



1. CHECK VALVE
2. RELIEF VALVE
3. TO ROD SIDE OF EXTENSION CYLINDER
4. TO TWIST LOCK CYLINDER
5. TO STOP CYLINDER
6. VALVE ON EXTENSION CYLINDER, LEFT HAND SHOWN

Figure 25. Extension Valve

NOTES


X
P
T
140 bar
80 bar
Sideshift LH
Y13
Y14
80 bar
Sideshift RH
P
T
P
T
Y3
Y1
Y4
Y2
Twistlocks LH side
Twistlocks RH side
140 bar
140 bar
Y7
Y5
Y8
Y6
Extension LH side
Extension RH side
HM020348

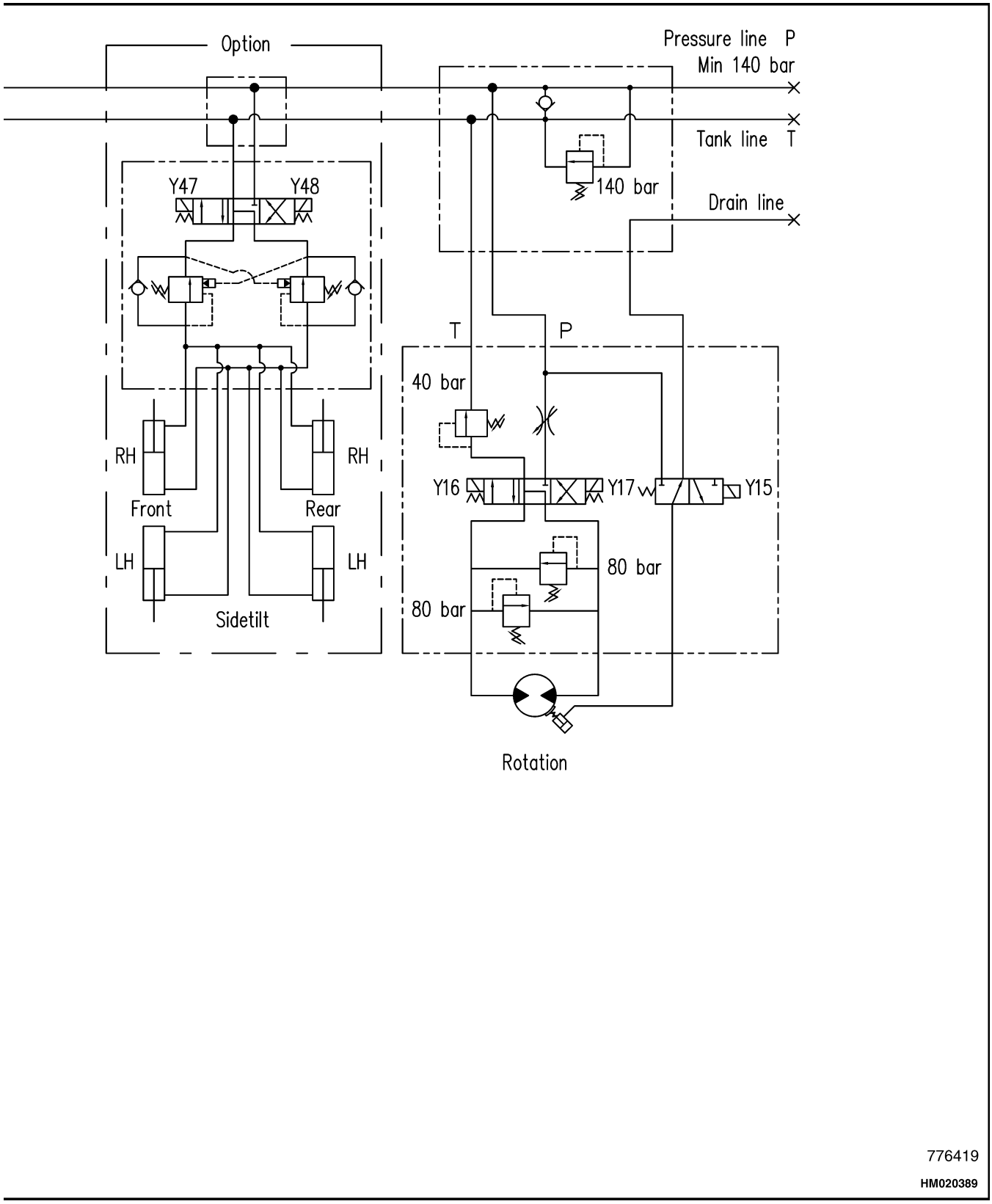
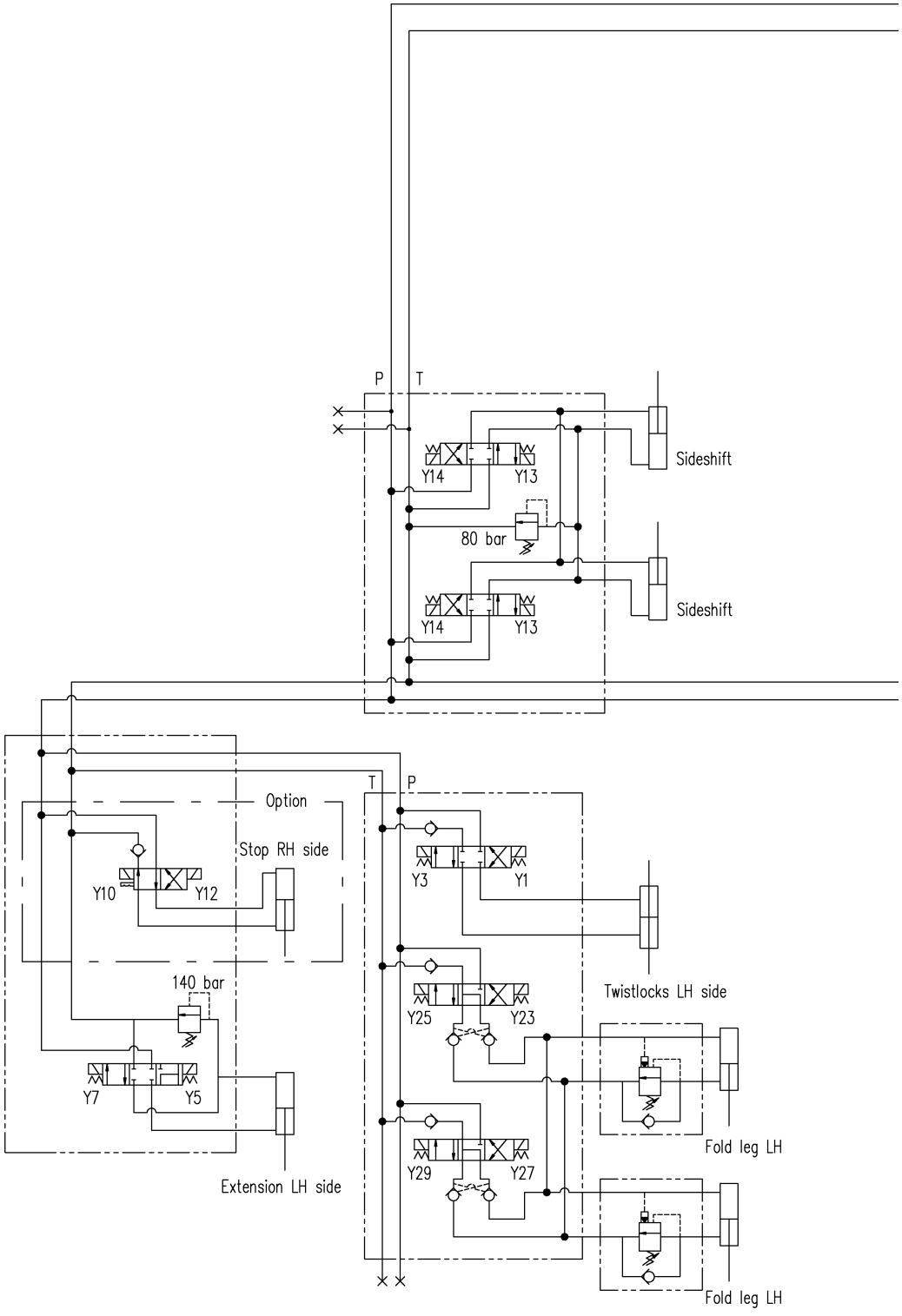


Figure 38. Elme Hydraulic Schematic 776419


P
T
Y14
Y13
Sideshift
80 bar
Y14
Y13
Sideshift
T
P
Option
Stop RH side
Y10
Y12
140 bar
Y7
Y5
Extension LH side
Y3
Y1
Twistlocks LH side
Y25
Y23
Fold leg LH
Y29
Y27
Fold leg LH
HM020561

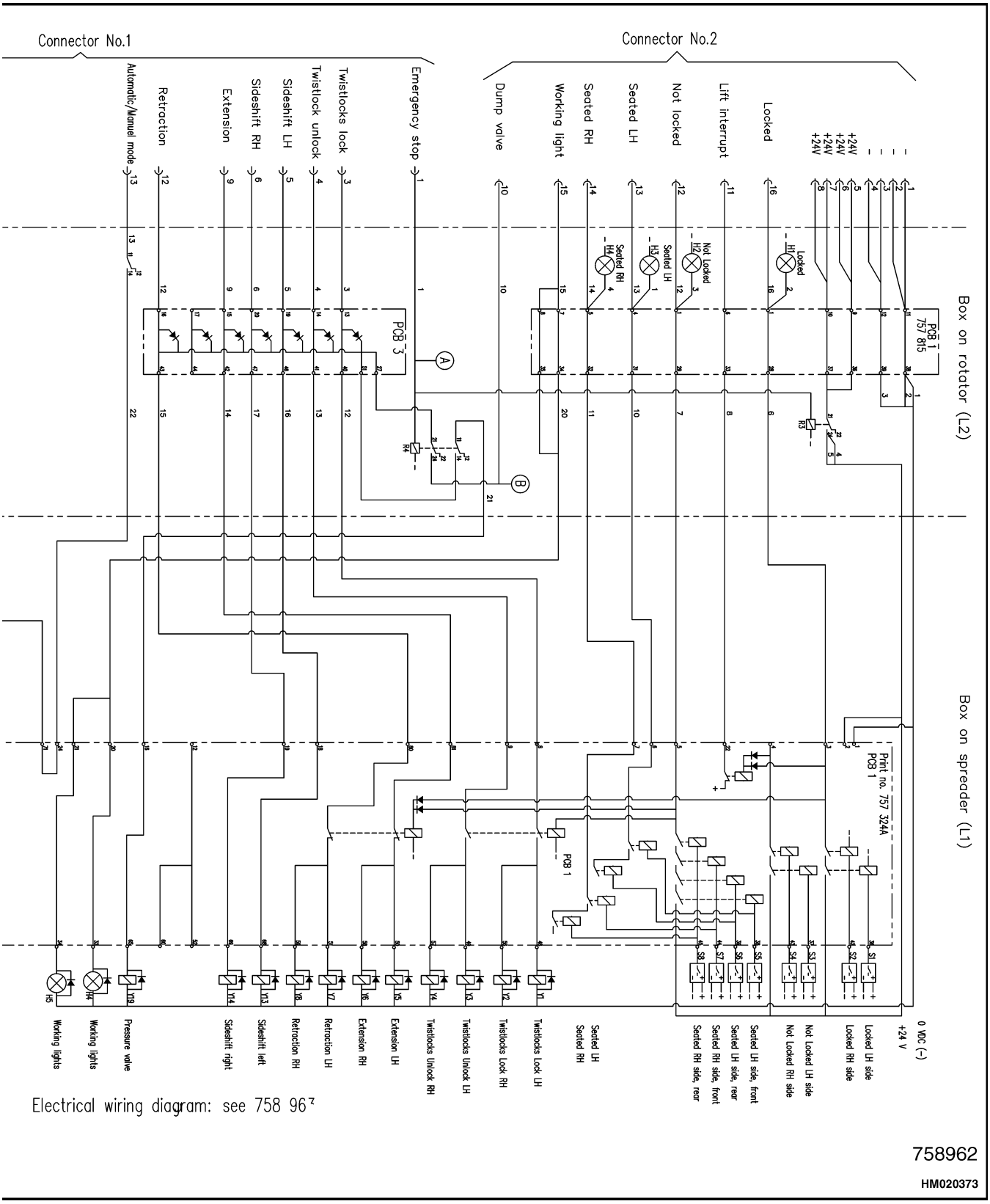
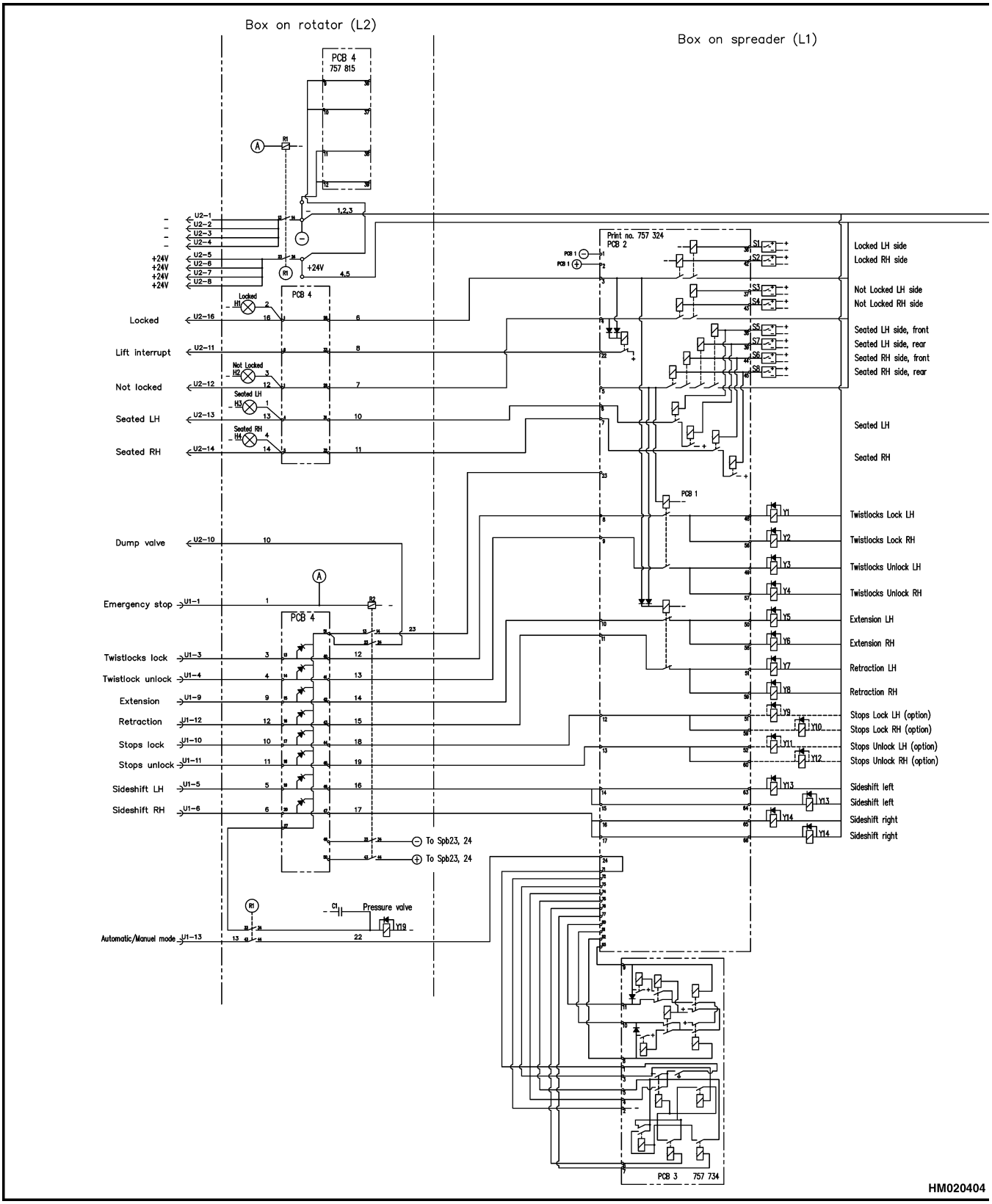


Figure 49. Elme Electrical Schematic 758962


Box on rotator (L2)
Box on spreader (L1)
PCB 4
757 815
PCB 4
PCB 4
Print no. 757 324
PCB 2
PCB 1
PCB 3 757 734
Locked
Lift interrupt
Not locked
Seated LH
Seated RH
Dump valve
Emergency stop
Twistlocks lock
Twistlock unlock
Extension
Retraction
Stops lock
Stops unlock
Sideshift LH
Sideshift RH
Automatic/Manuel mode
Pressure valve
To Spb23, 24
To Spb23, 24
+24V
Locked LH side
Locked RH side
Not Locked LH side
Not Locked RH side
Seated LH side, front
Seated LH side, rear
Seated RH side, front
Seated RH side, rear
Seated LH
Seated RH
Twistlocks Lock LH
Twistlocks Lock RH
Twistlocks Unlock LH
Twistlocks Unlock RH
Extension LH
Extension RH
Retraction LH
Retraction RH
Stops Lock LH (option)
Stops Lock RH (option)
Stops Unlock LH (option)
Stops Unlock RH (option)
Sideshift left
Sideshift left
Sideshift right
Sideshift right
HM020404

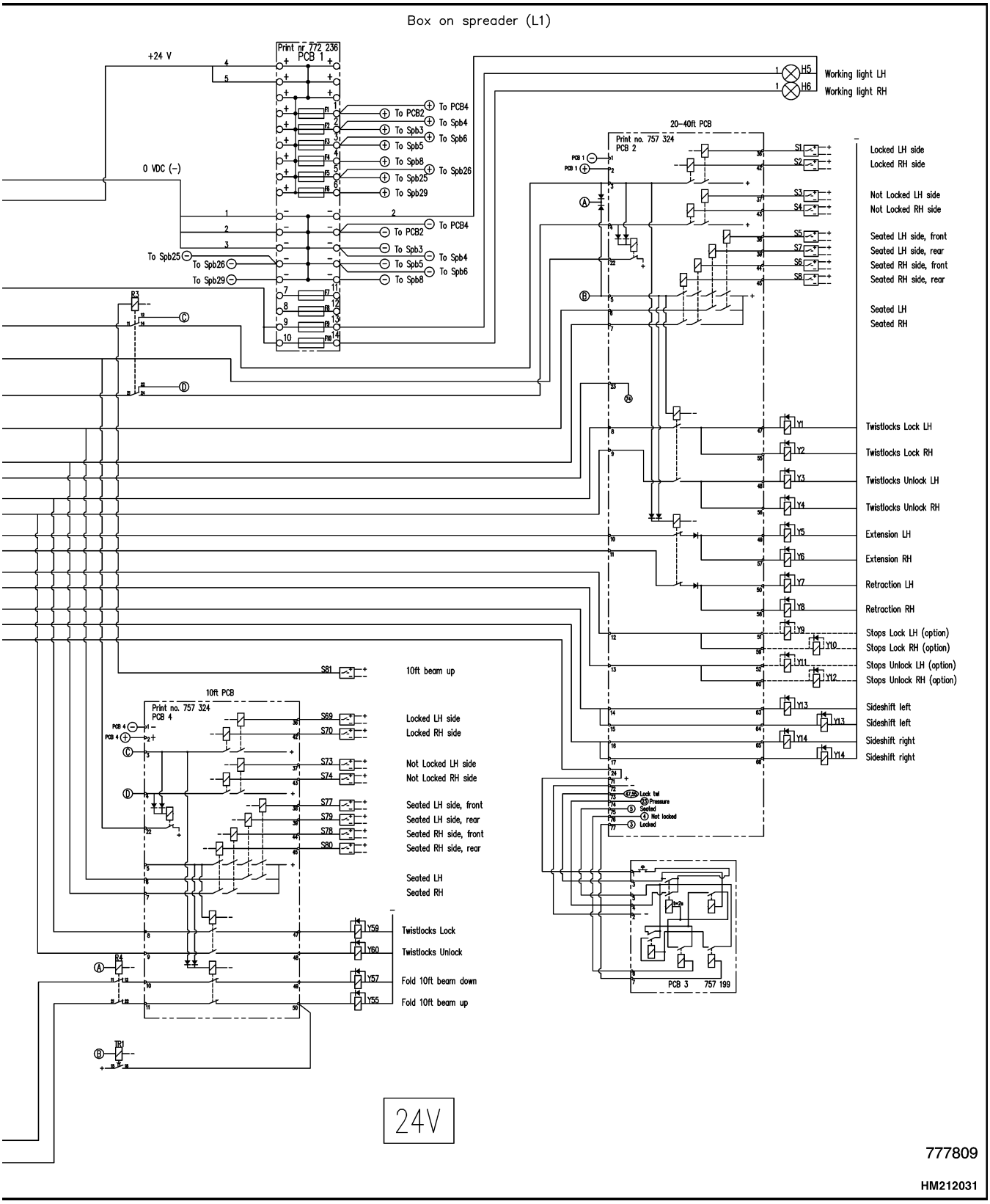
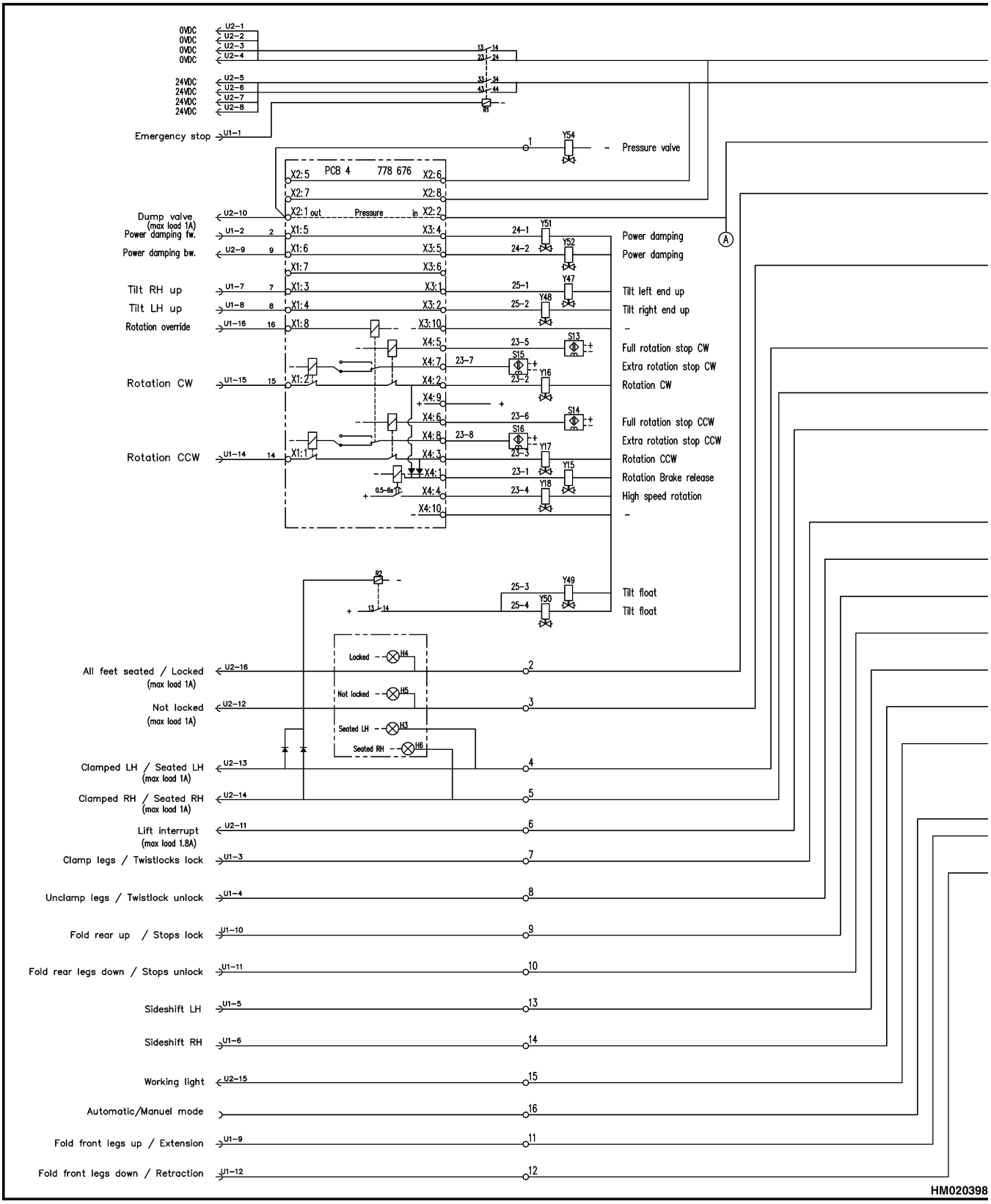


Figure 60. Elme Electrical Schematic 777809


0VDC
24VDC
Emergency stop
Pressure valve
PCB 4 778 676
Dump valve (max load 1A)
Power damping fw.
Power damping bw.
Tilt RH up
Tilt LH up
Rotation override
Rotation CW
Rotation CCW
Power damping
Tilt left end up
Tilt right end up
Full rotation stop CW
Extra rotation stop CW
Rotation CW
Full rotation stop CCW
Extra rotation stop CCW
Rotation CCW
Rotation Brake release
High speed rotation
Tilt float
All feet seated / Locked (max load 1A)
Not locked (max load 1A)
Clamped LH / Seated LH (max load 1A)
Clamped RH / Seated RH (max load 1A)
Lift interrupt (max load 1.8A)
Clamp legs / Twistlocks lock
Unclamp legs / Twistlock unlock
Fold rear up / Stops lock
Fold rear legs down / Stops unlock
Sideshift LH
Sideshift RH
Working light
Automatic/Manuel mode
Fold front legs up / Extension
Fold front legs down / Retraction
Locked
Not locked
Seated LH
Seated RH
HM020398

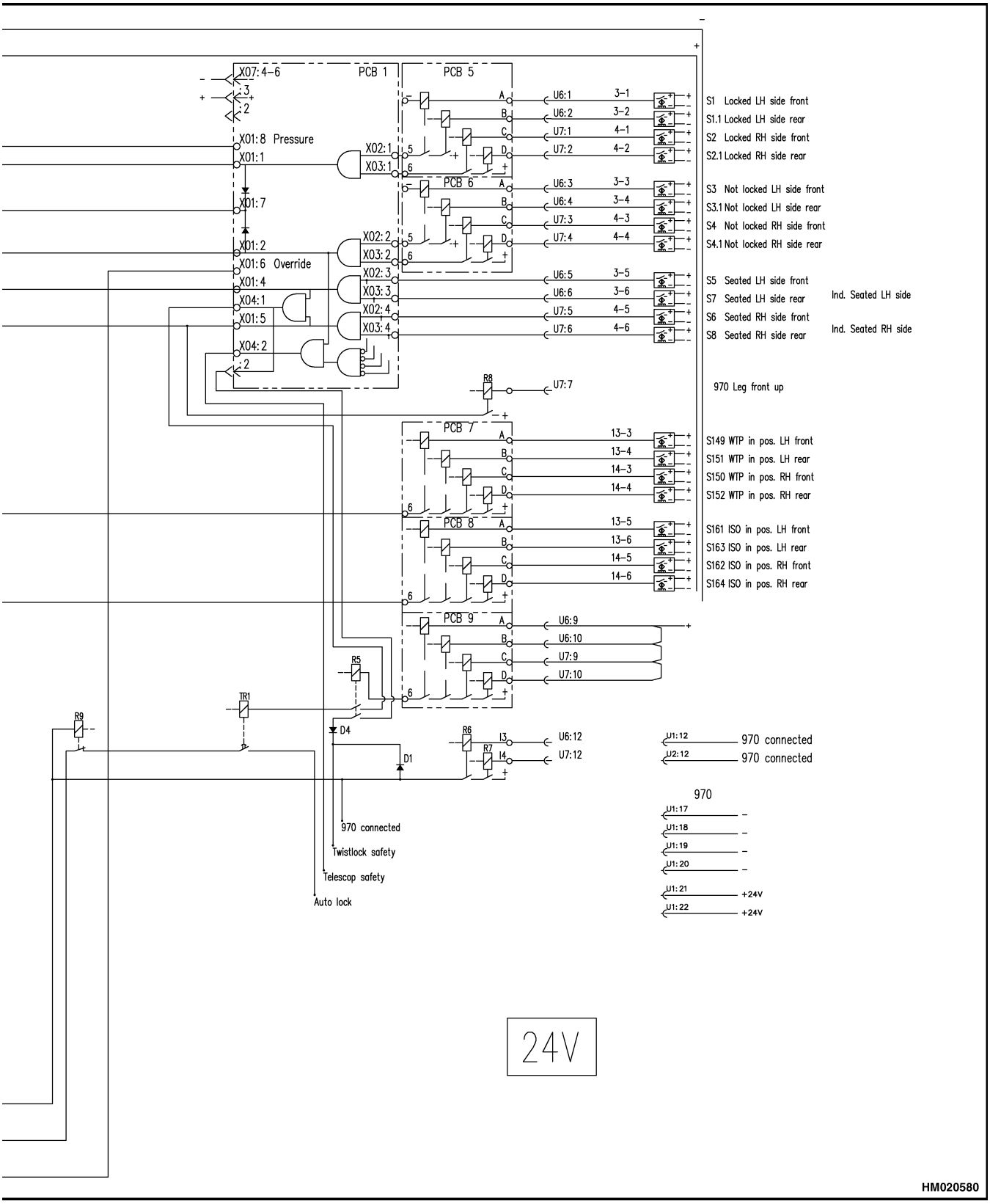
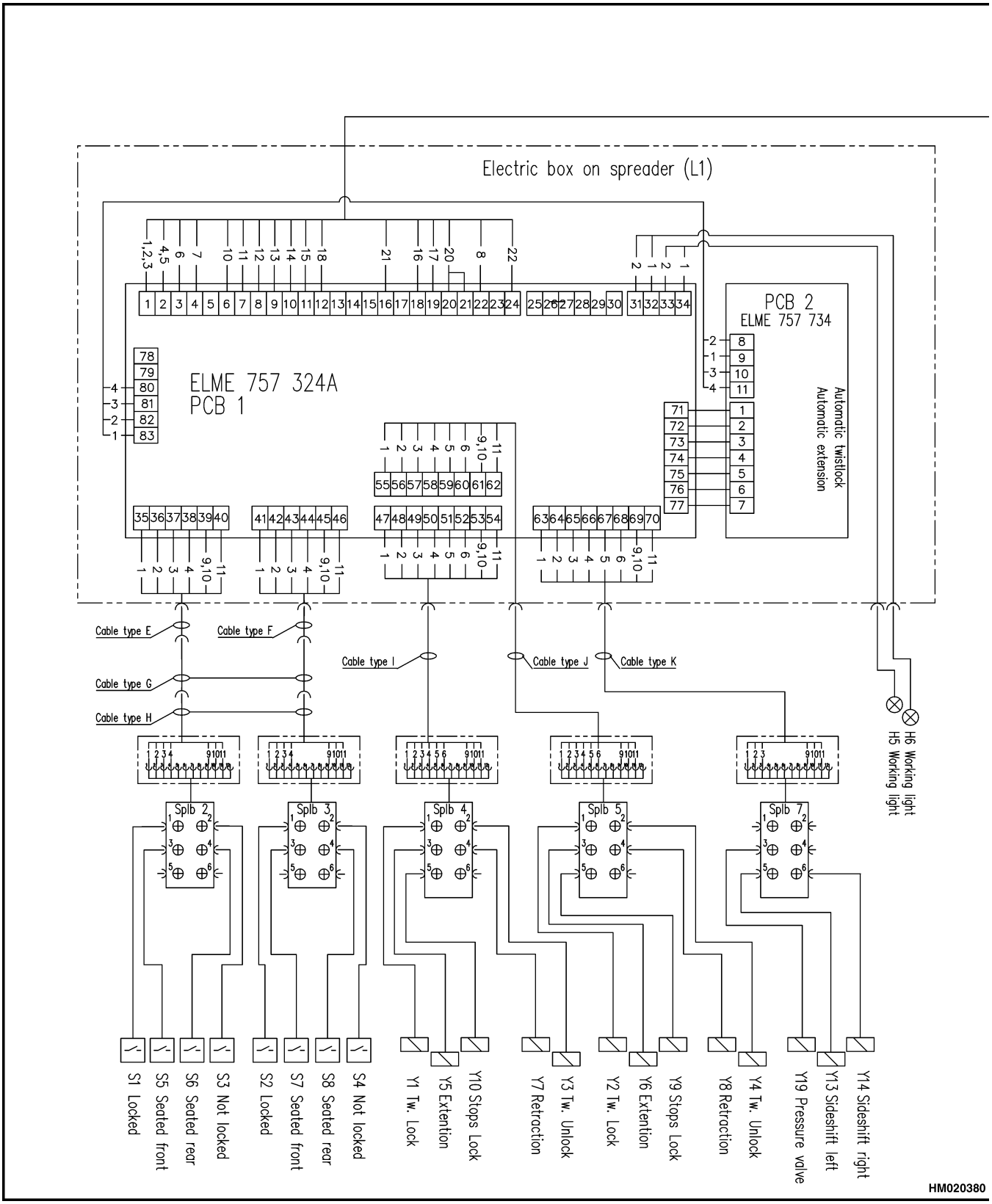
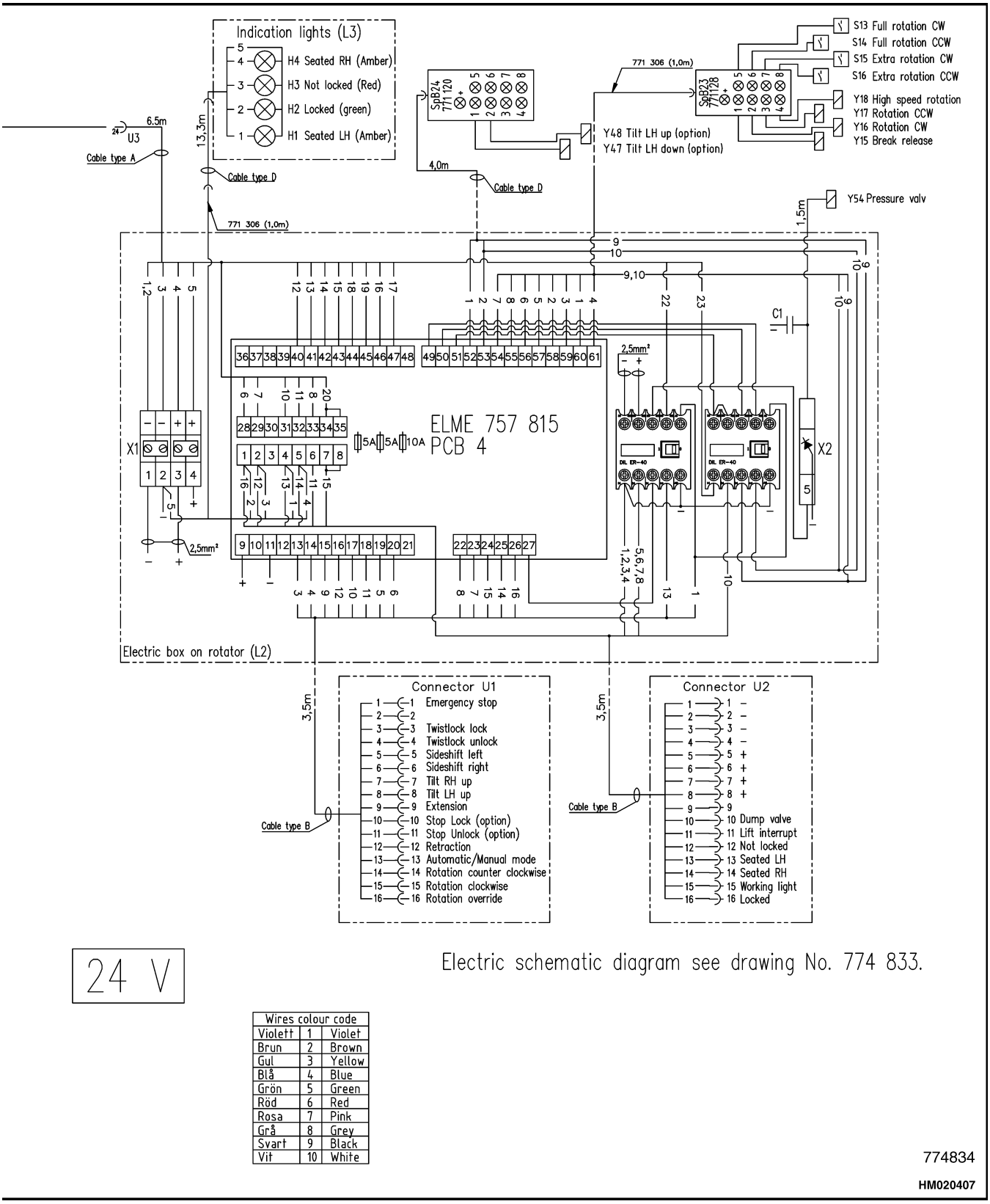


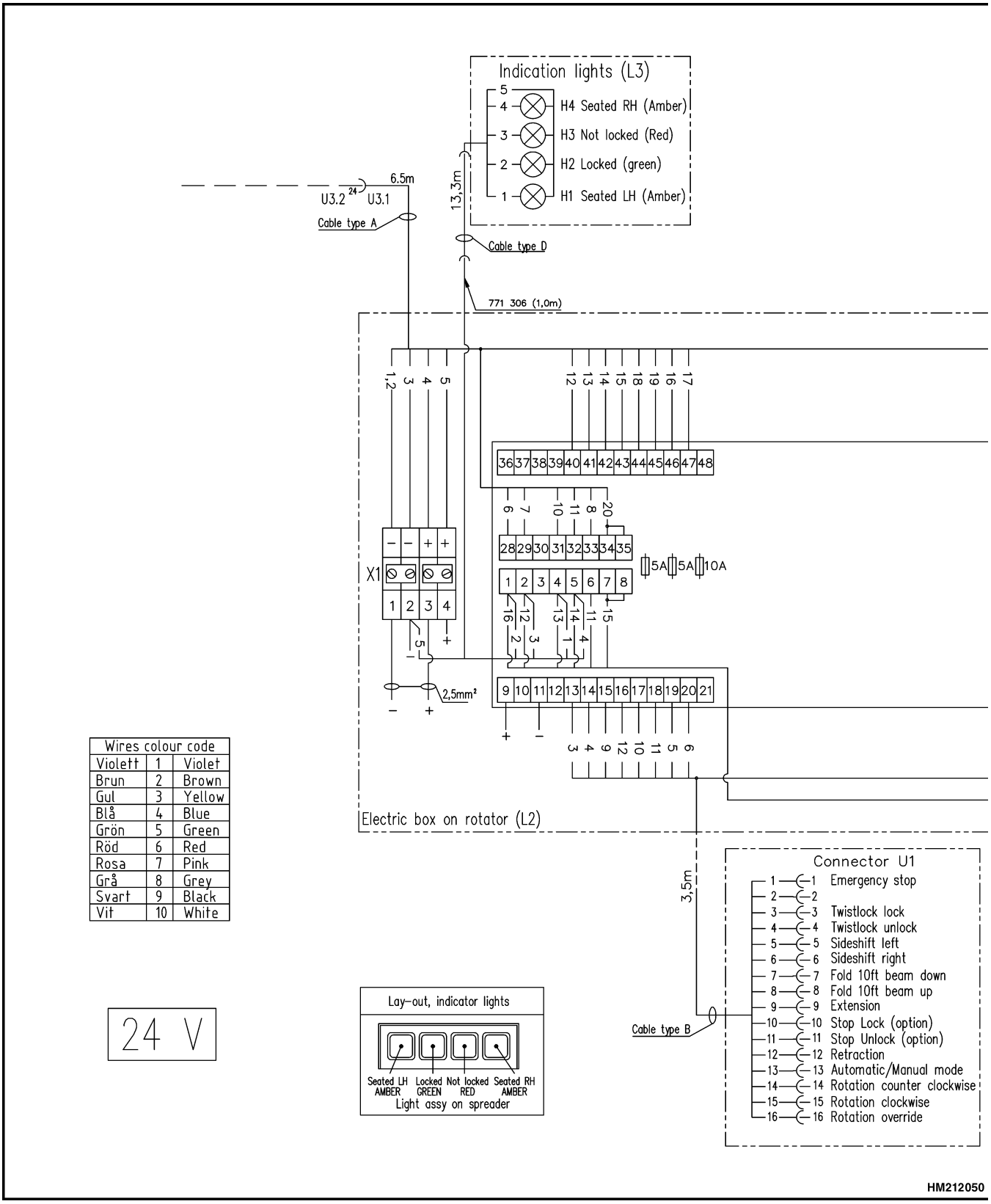
Figure 71. Elme Electrical Schematic 785099 (Sheet 1 of 2)


Electric box on spreader (L1)
ELME 757 324A
PCB 1
PCB 2
ELME 757 734
Automatic twistlock
Automatic extension
Cable type E
Cable type F
Cable type G
Cable type H
Cable type I
Cable type J
Cable type K
H6 Working light
H5 Working light
Splb 2
Splb 3
Splb 4
Splb 5
Splb 7
S1 Locked
S5 Seated front
S6 Seated rear
S3 Not locked
S2 Locked
S7 Seated front
S8 Seated rear
S4 Not locked
Y1 Tw. Lock
Y5 Extention
Y10 Stops Lock
Y7 Retraction
Y3 Tw. Unlock
Y2 Tw. Lock
Y6 Extention
Y9 Stops Lock
Y8 Retraction
Y4 Tw. Unlock
Y19 Pressure valve
Y13 Sideshift left
Y14 Sideshift right
HM020380



Wires colour code		
Violett	1	Violet
Brun	2	Brown
Gul	3	Yellow
Blå	4	Blue
Grön	5	Green
Röd	6	Red
Rosa	7	Pink
Grå	8	Grey
Svart	9	Black
Vit	10	White

Figure 81. Elme Electrical Wiring Diagram 774834



Wires colour code		
Violett	1	Violet
Brun	2	Brown
Gul	3	Yellow
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Grön	5	Green
Röd	6	Red
Rosa	7	Pink
Grå	8	Grey
Svart	9	Black
Vit	10	White

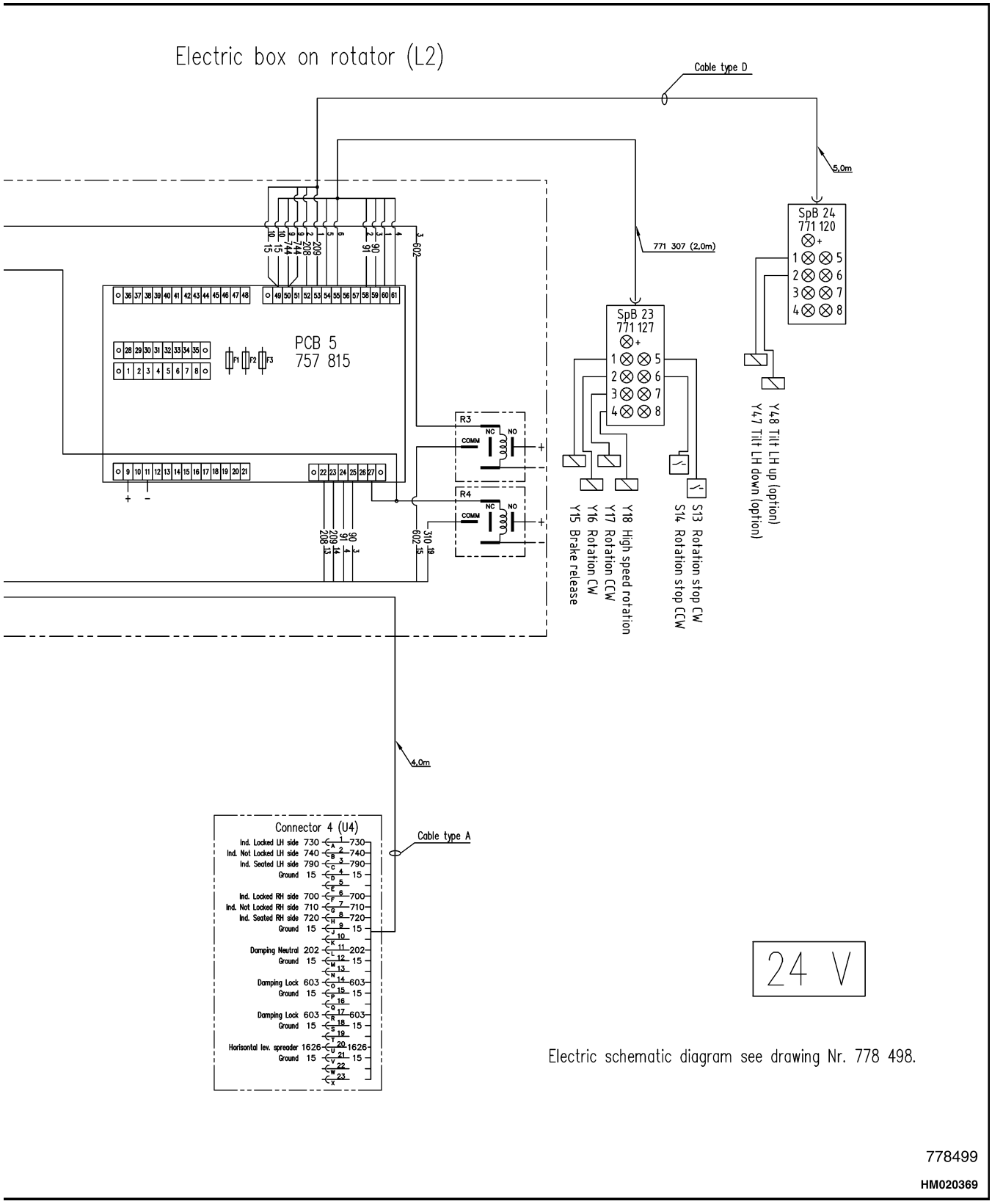
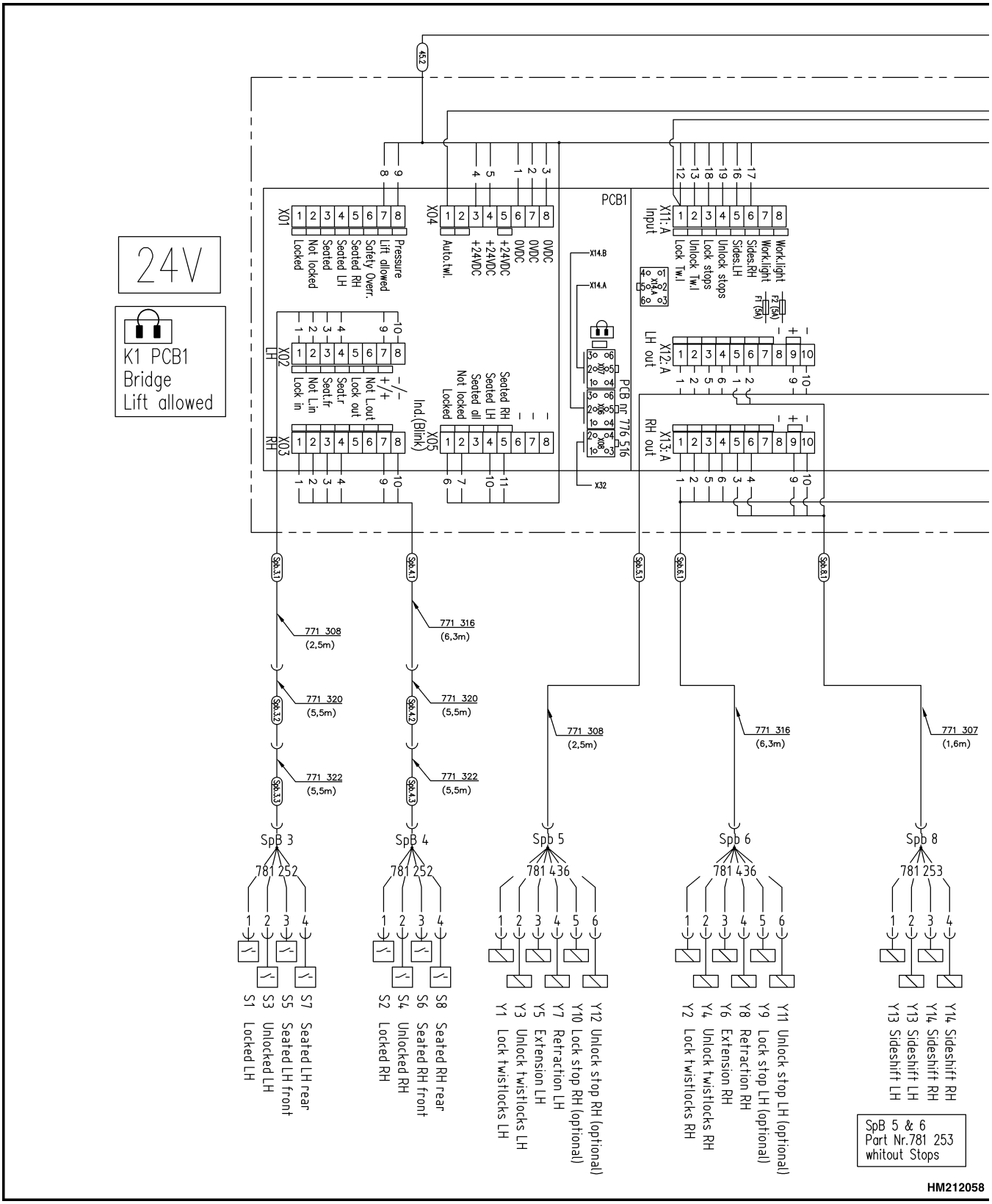


Figure 89. Elme Electrical Wiring Diagram 778499 (Sheet 2 of 2)


24V
K1 PCB1
Bridge
Lift allowed
PCB1
X01
X02 LH
X03 RH
X04
X05
X11:A Input
X12:A LH out
X13:A RH out
PCB nr 776 516
Pressure
Lift allowed
Safety Overr.
Seated RH
Seated LH
Not locked
Locked
Not Lin
Seat.fr
Seat.r
Lock out
Not Lout
Lock in
Auto.twl.
0VDC
+24VDC
Lock Twl.
Unlock Twl.
Lock stops
Unlock stops
Sides.LH
Sides.RH
Work.light
Seated all
Ind.(Blink)
771 308 (2,5m)
771 316 (6,3m)
771 320 (5,5m)
771 322 (5,5m)
771 307 (1,6m)
SpB 3
SpB 4
Spb 5
Spb 6
Spb 8
781 252
781 436
781 253
S1 Locked LH
S3 Unlocked LH
S5 Seated LH front
S7 Seated LH rear
S2 Locked RH
S4 Unlocked RH
S6 Seated RH front
S8 Seated RH rear
Y1 Lock twistlocks LH
Y3 Unlock twistlocks LH
Y5 Extension LH
Y7 Retraction LH
Y10 Lock stop RH (optional)
Y12 Unlock stop RH (optional)
Y2 Lock twistlocks RH
Y4 Unlock twistlocks RH
Y6 Extension RH
Y8 Retraction RH
Y9 Lock stop LH (optional)
Y11 Unlock stop LH (optional)
Y13 Sideshift LH
Y14 Sideshift RH
SpB 5 & 6
Part Nr.781 253
whitout Stops
HM212058

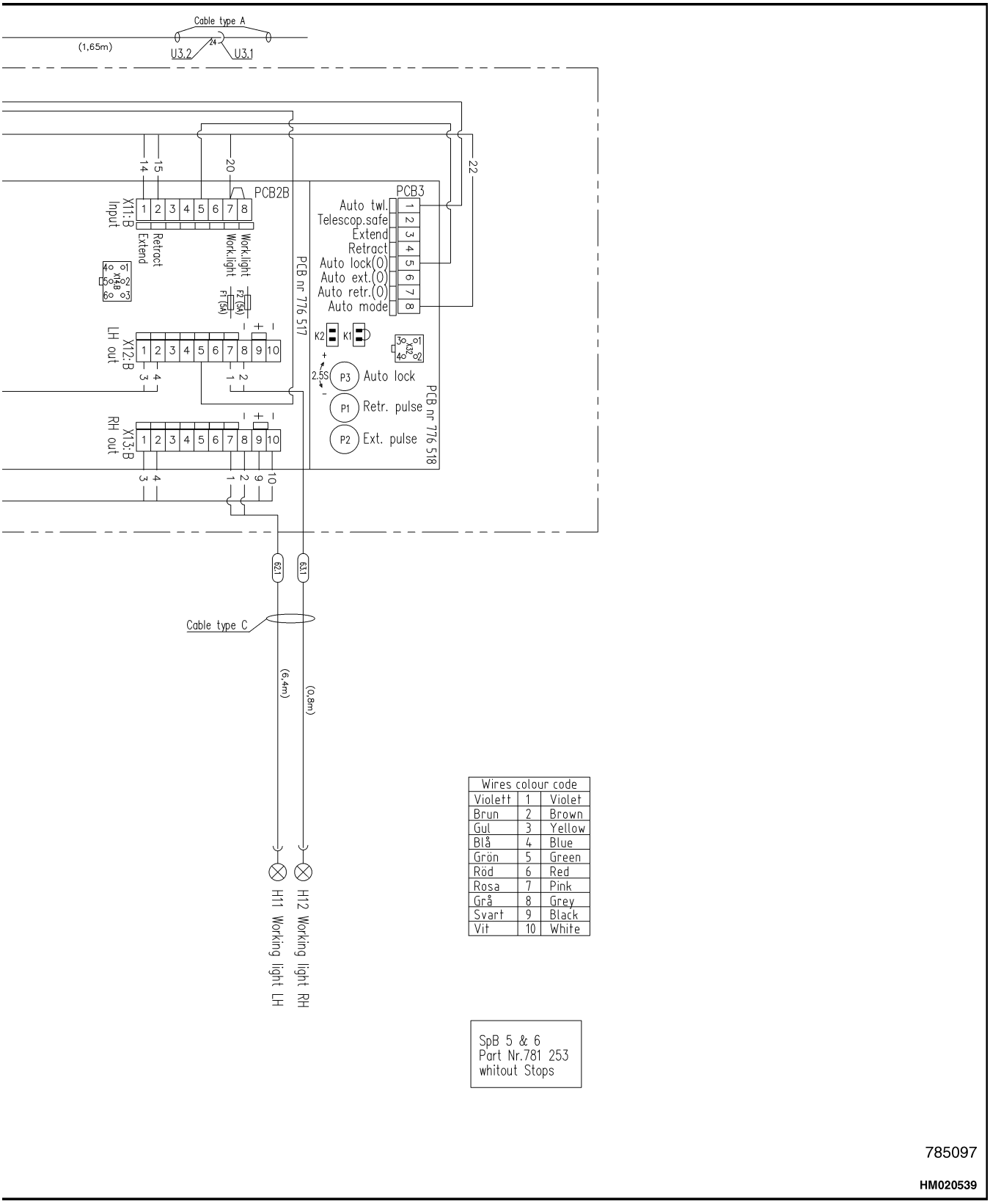
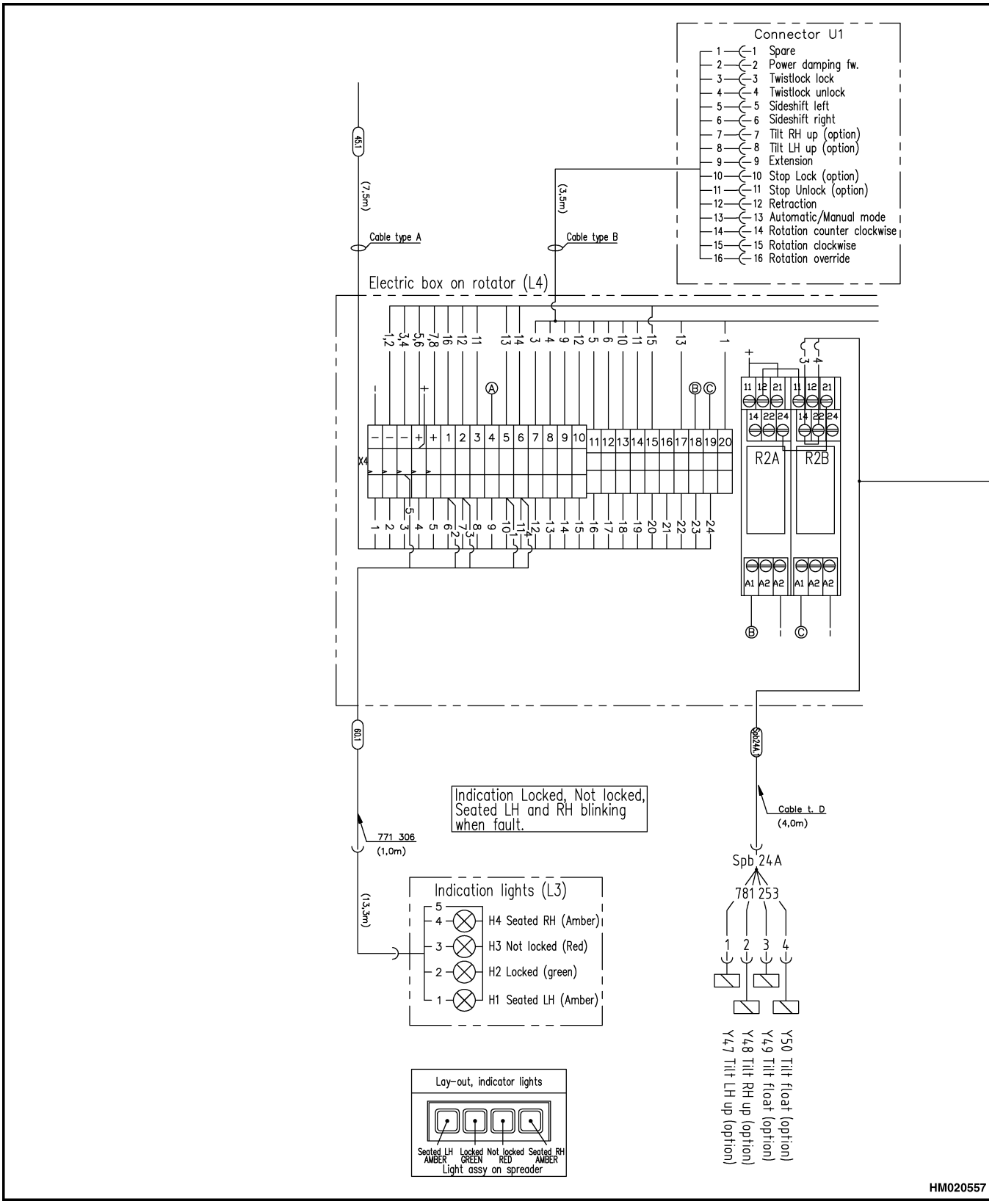


Figure 96. Elme Wiring Diagram 785097 (Sheet 1 of 2)


Connector U1
1 Spare
2 Power damping fw.
3 Twistlock lock
4 Twistlock unlock
5 Sideshift left
6 Sideshift right
7 Tilt RH up (option)
8 Tilt LH up (option)
9 Extension
10 Stop Lock (option)
11 Stop Unlock (option)
12 Retraction
13 Automatic/Manual mode
14 Rotation counter clockwise
15 Rotation clockwise
16 Rotation override
451
(7,5m)
(3,5m)
Cable type A
Cable type B
Electric box on rotator (L4)
X4
R2A
R2B
680
Spb24A
Indication Locked, Not locked, Seated LH and RH blinking when fault.
771 306
(1,0m)
(13,3m)
Cable t. D
(4,0m)
Spb 24A
781 253
Indication lights (L3)
H4 Seated RH (Amber)
H3 Not locked (Red)
H2 Locked (green)
H1 Seated LH (Amber)
Y47 Tilt LH up (option)
Y48 Tilt RH up (option)
Y49 Tilt float (option)
Y50 Tilt float (option)
Lay-out, indicator lights
Seated LH AMBER
Locked GREEN
Not locked RED
Seated RH AMBER
Light assy on spreader
HM020557

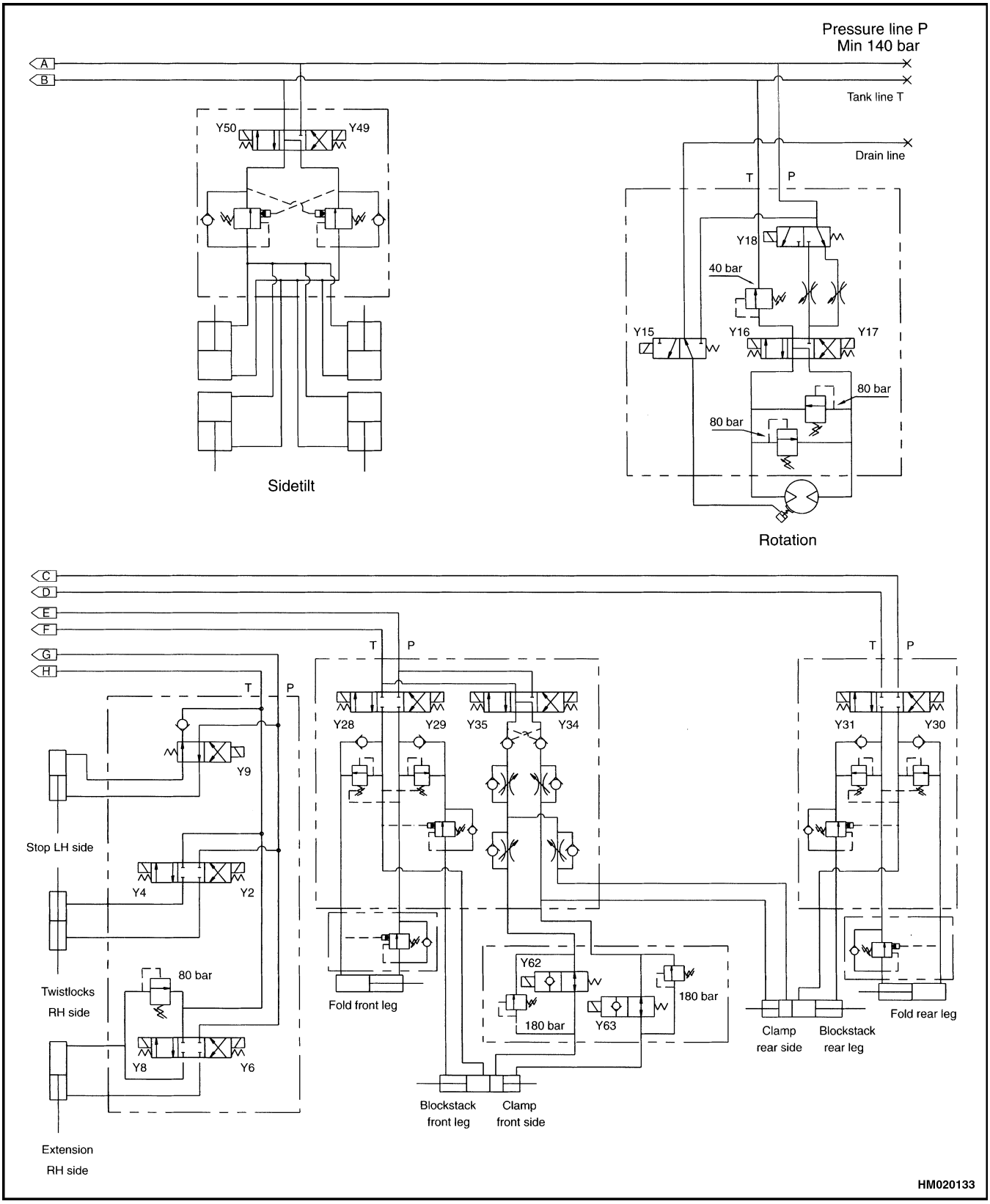


Figure 2. Intermodal Handler Hydraulic Schematic (Sheet 2 of 2)

2. Leg lowering adjustment, leg must rotate fully out before leg starts to move down. Screw in adjuster on cartridge no. 4 if necessary. If leg does not move down or moves slowly, then screw out adjuster.

3. Clamping speed adjustment; screw in adjuster on cartridge no. 6 or 19 to reduce speed on clamp and unclamp function. Screw out adjusters to increase speed.

4. Leg clamping forces adjustment. Screw in adjuster on cartridge no. 7 and 8 to increase dampening force on forward and backward movement on the legs. Screw out adjuster to decrease force.

NOTE: Do not alter adjustment on cartridge no. 17. This is set at the factory and cannot be reset in the field.

FOLDING BLOCK ADJUSTMENT

1. Leg raising adjustment; leg must be horizontal before shoulder starts to rotate in. Screw in adjuster on cartridge no. 9 if necessary. If shoulder does not rotate in or moves slowly, screw out adjuster. See Figure 10 and Figure 11.

2. Leg lowering adjustment; shoulder must rotate out before leg starts to move down. Screw in adjuster on cartridge no. 4 if necessary. If leg does not move down or moves slowly, screw out adjuster.

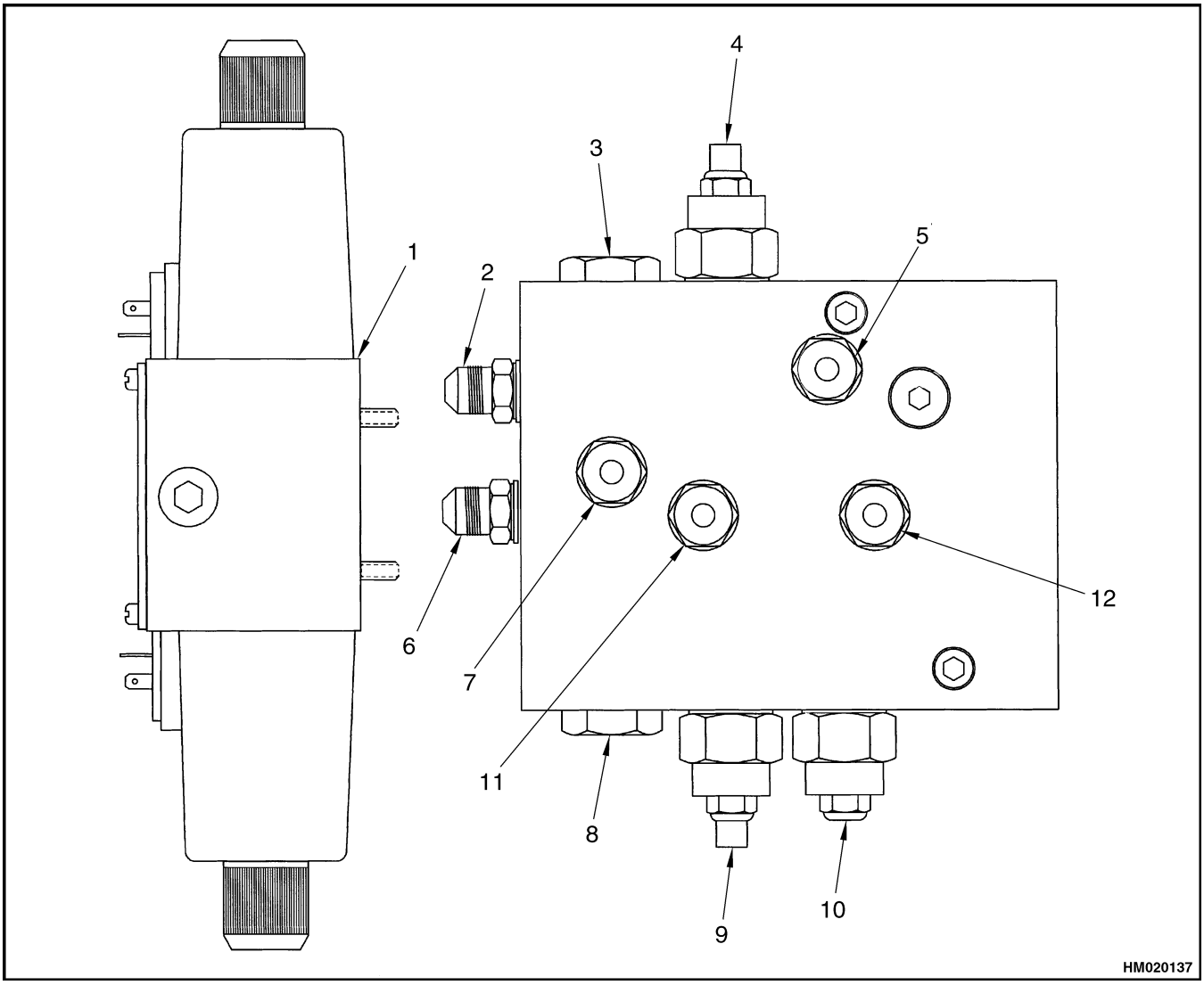


Figure 10. Intermodal Handler Folding Block

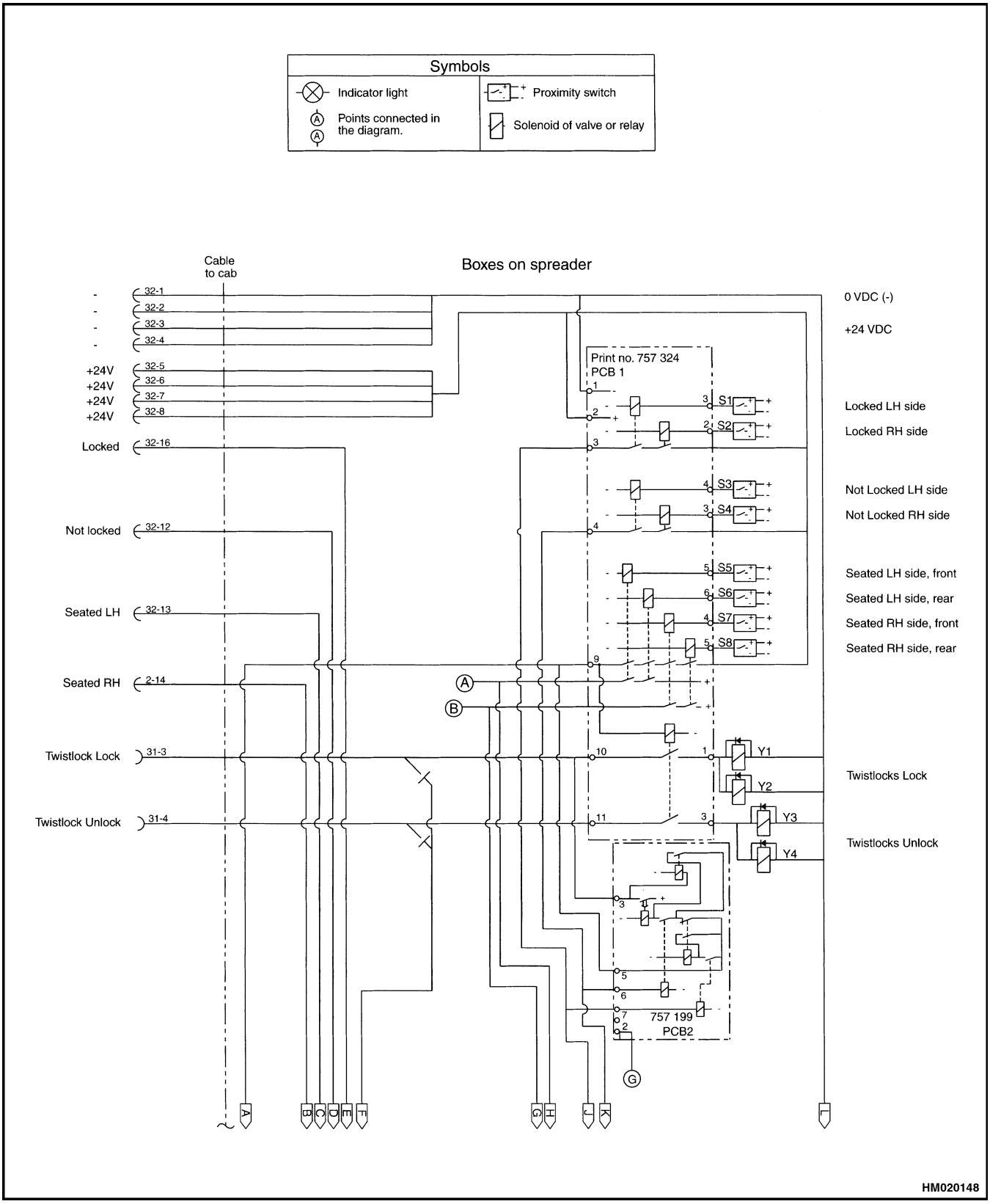


Figure 16. Intermodal Handler Electrical Schematic Diagram (Sheet 1 of 4)

NOTES

CLEAN

WARNING

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

NOTE: Bore must be clean of any particles detectable to touch.

1. Thoroughly clean metal parts in solvent and dry with compressed air.
2. Clean body bore with a clean, lint-free cloth soaked in clean solvent.

INSPECT

1. Inspect piston for cracks, burrs around O-ring grooves, or damage.
2. Using a light, examine body bore for scratches or scoring.
3. Inspect end caps for damaged threads or burrs on O-ring grooves.

REPAIR

NOTE: Minor nicks and scratches or light scoring of the body bore can be removed by using crocus cloth.

1. Dress bore until all apparent imperfections have been removed.
2. Replace Teflon wear rings, V O-rings, O-rings, and backup washers.

ASSEMBLE

NOTE: Coat all internal parts with clean hydraulic fluid before reassembly.

NOTE: Do not let V O-ring drag on threads. Piston must go into bore exactly square and very slowly. V O-ring will compress as it rides up the chamber if done slowly, but may be damaged if forced quickly. Piston should fit snug.

1. With new V O-ring and Teflon rings on piston, install piston (hollow side toward gas end) into bore of body.

NOTE: Keep force against piston while tapping V O-ring through bore chamber; otherwise, piston will bounce back and damage the O-ring.

2. Use hammer and wood block to tap piston into place until all of piston is 51 mm (2 in.) below beginning of honed bore.
3. Cover port opening to keep out dirt.

NOTE: O-ring sealing is not dependent on cap tightness. Extreme tightness is not required. Cap should be flush with end of body within 0.16 cm (0.063 in.) to 0.27 cm (0.106 in.) above or below.

4. Install new backup ring first and then new O-ring on threaded end cap or caps and install into body bore. End cap will stop against chamber leading into honed bore.

REPLACE

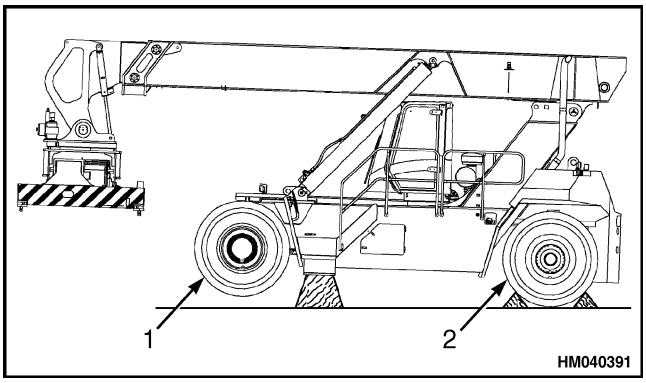
NOTE: Always check the precharge before installing a replacement accumulator on the truck.

1. Replace the accumulator on the frame brackets.
2. Tighten the bracket nuts.
3. Connect the hydraulic line.
4. Operate the system and check for leaks. Remove air from the hydraulic system. See the section **Brake System** for your lift truck.

WARNING

The tires and wheels can weigh approximately 750 kg (1653 lb). Verify the lifting device has the rated capacity to lift the tires and wheels or personal injury may occur.

12. Remove wheel and tire from lift truck.



1. DRIVE AXLE/DRIVE TIRES
2. STEER AXLE/STEER TIRES

Figure 3. Put the Lift Truck on Blocks (A222, A227, B222, and B227 Models Only)

Brake Housing

1. Apply brakes ten to twenty times until accumulated hydraulic brake pressure is released.

2. Remove end drive. See the section **Planetary Gear Axle** 1400 SRM 47 (E008 only) or **Planetary Gear Axle** 1400 SRM 1171.

3. Remove inner face seal from inside the brake housing. See Figure 4.

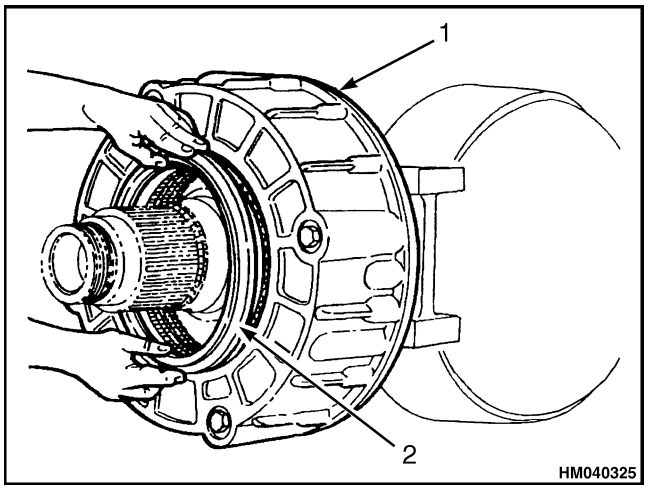
4. Remove the outer face seal from the wheel hub. See Figure 5.

5. Place a container on inner side of the brake housing.

6. Disconnect the coolant input line.

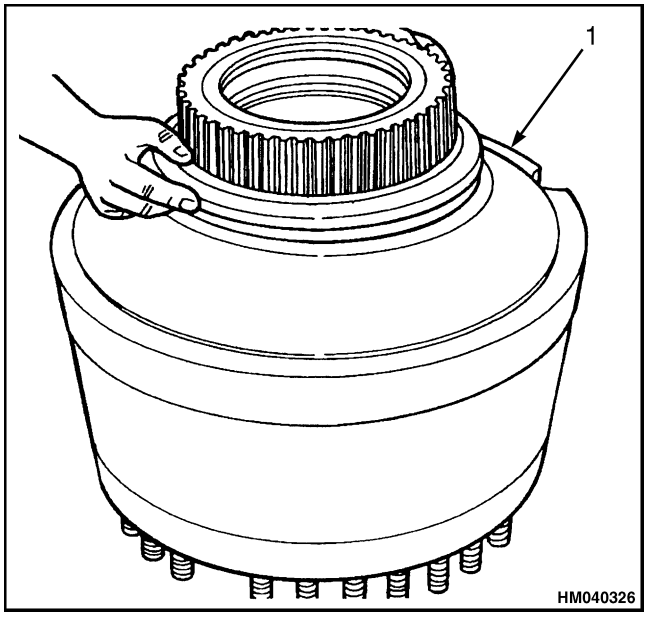
7. Place cap on line.

8. Drain coolant until no oil flows from the input port. See Figure 6.



1. BRAKE HOUSING
2. FACE SEAL

Figure 4. Brake Housing



1. WHEEL HUB

Figure 5. Wheel Hub

Spindle and Brake Cover

If necessary, install the spindle and the cover of the brake housing on the axle housing according to the following procedure:

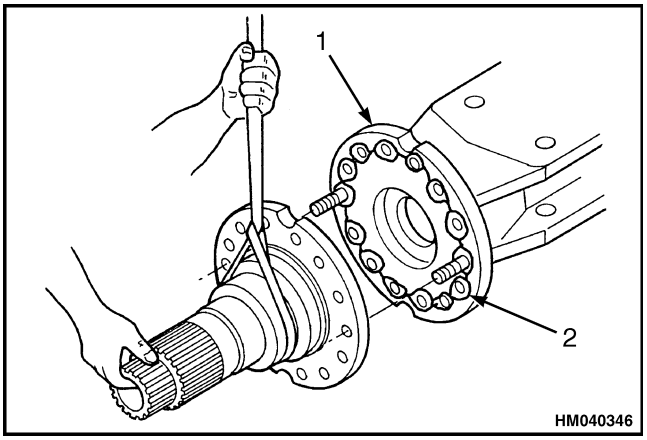
WARNING

Small amounts of acid vapor are present when applying some silicone gasket materials. To prevent possible serious personal injury, make sure there is good ventilation in the work area. If the silicone gasket material gets in your eyes, flush your eyes with water for 15 minutes. Have your eyes checked by a doctor.

NOTE: On some axle assemblies, the brake cover is mounted between the spindle and axle housing flanges. Use the following procedure to install the spindle and brake cover; but first, install the brake cover followed by the spindle.

1. Install two studs opposite each other on the axle housing flange. Verify the studs are long enough to support the spindle and brake cover.

2. Apply a bead of silicone gasket material on the mounting surface of the axle housing flange. The bead must go around each capscrew hole. See Figure 30.



1. AXLE FLANGE
2. SILICONE BEAD

Figure 30. Axle Flange

3. Use a lifting device to install the spindle on the guide studs. Make sure the spindle cannot fall before removing the lifting device. See Figure 30.

4. Apply a bead of silicone gasket material on the spindle flange where the brake cover will mount. Make sure to go around each capscrew hole. See Figure 32.

5. Use a lifting device to install the brake cover over the spindle and onto the housing. Make sure the drain hole is located at the bottom of the cover when installed. See Figure 31.

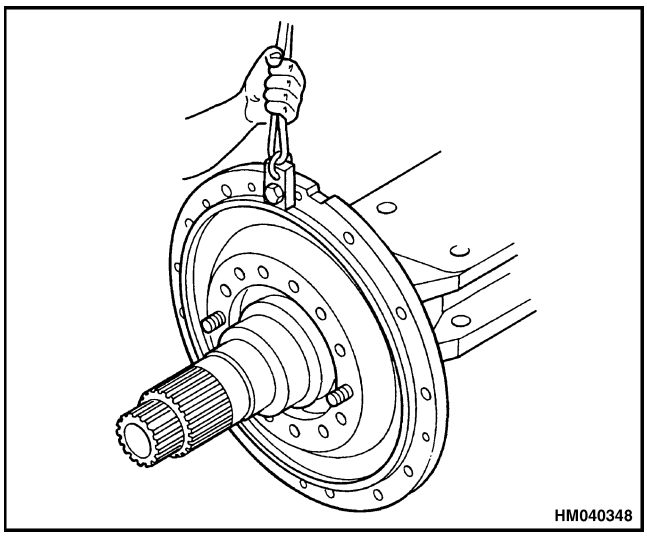
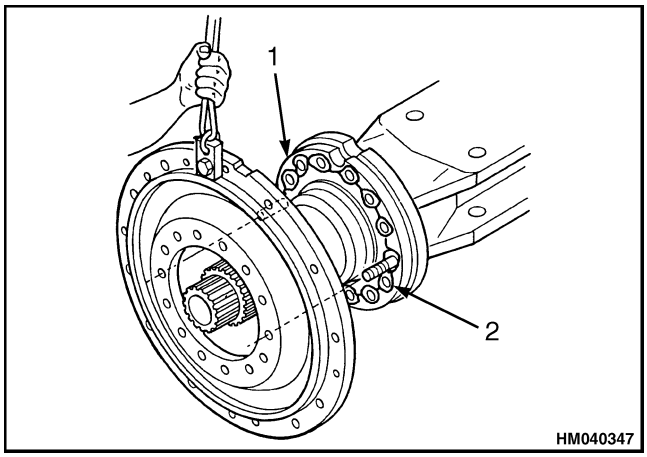


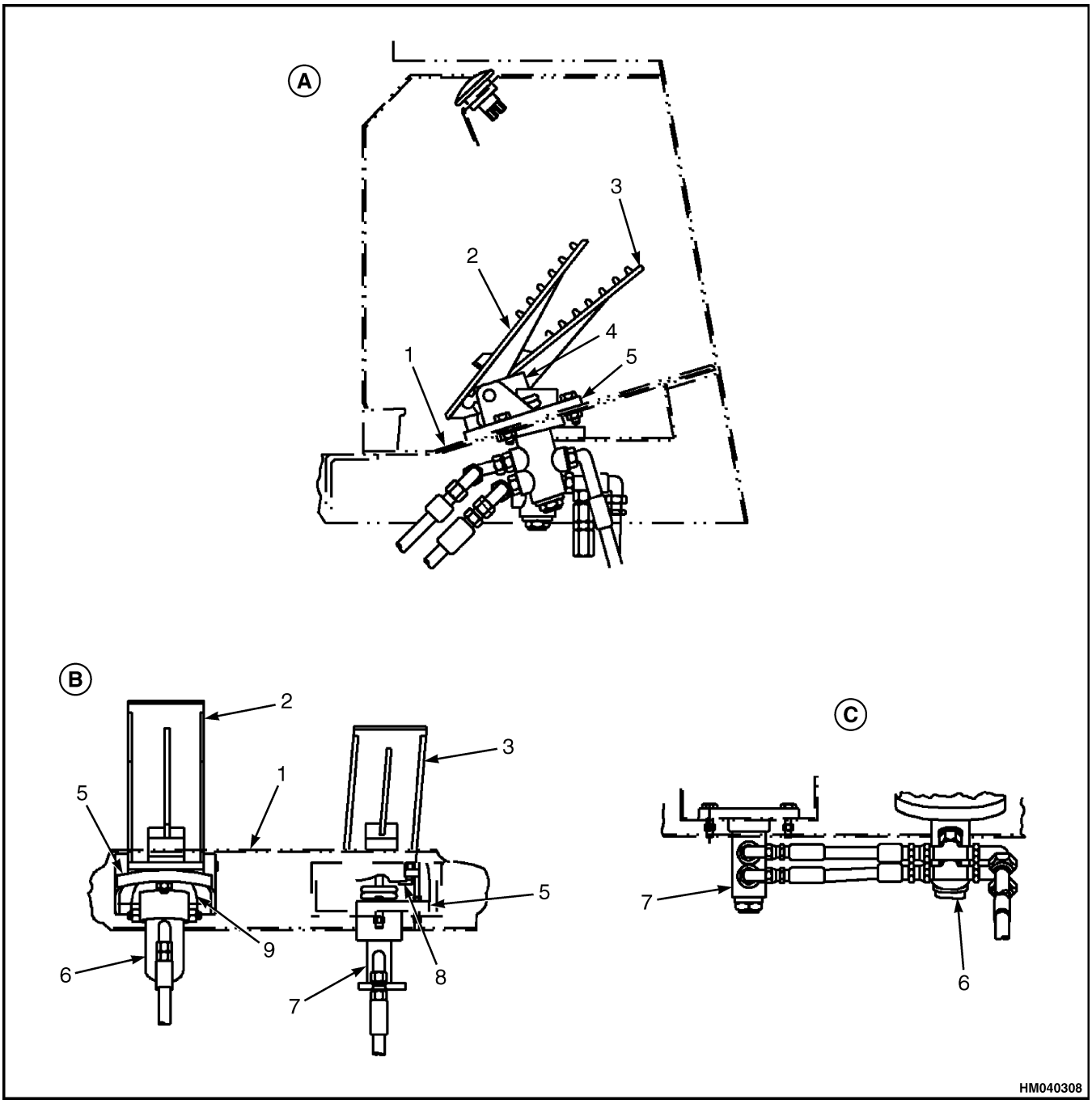
Figure 31. Spindle and Brake Cover

6. Install the capscrews and washers. See Figure 33. Remove the guide studs and install the remaining two capscrews and washers. Tighten the capscrews to the torque specified. See Specifications.



1. SPINDLE FLANGE
2. SILICONE BEAD

Figure 32. Spindle Flange



A. RIGHT SIDE VIEW
B. FRONT VIEW
C. REAR VIEW

1. MOUNT PLATE
2. BRAKE PEDAL
3. DECLUTCH/BRAKE PEDAL
4. ACTUATOR
5. PEDAL BASE
6. BRAKE VALVE
7. DECLUTCH/BRAKE VALVE
8. ACTUATOR
9. BASE OF VALVE HOUSING

Figure 45. Brake and Declutch/Brake Pedal Valve (Treadle Valve) Arrangement D117 E 01550 and After and E008 Wet Brakes

CUMMINS DIESEL/LPG ENGINE FAULT CODE GUIDE

H16.00-18.00XM/XMS-12 (H400-450HD/HDS) [A236]; H40.00-48.00XM-12 (H800-1050HD/HDS) [A917]; H16.00-22.00XM-12EC (H400-500HD/HDS-EC) [B214]; RS45-27CH, RS45-31CH, RS46-36CH, RS46-40CH, RS46-41S CH, RS46-41L CH, RS46-41LS CH, RS45-24IH, RS45-28IH, RS46-33IH, RS46-37IH, RS46-38S IH, RS46-38L IH, RS46-38LS IH (HR45-27, HR45-31, HR45-36, HR45-40, HR45-41S, HR45-41L, HR45-41LS) [B222]; HR45-27, HR45-31, HR45-40S, HR45-36L, HR45-40LS, HR45-45LSX [C227]; H40.00-52.00XM-16CH (H1050HD-CH, H1150HD-CH) [F117]; H8.00-12.00XM (H170-280HD) [G007, H007]; H13.00-14.00XM (H300-330HD) [F019, G019]; H16.00XM-6 (H360HD) [F019, G019]; H10.00-12.00XM-12EC (H360HD-EC) [F019, G019]

HYSTER

PART NO. 1564053

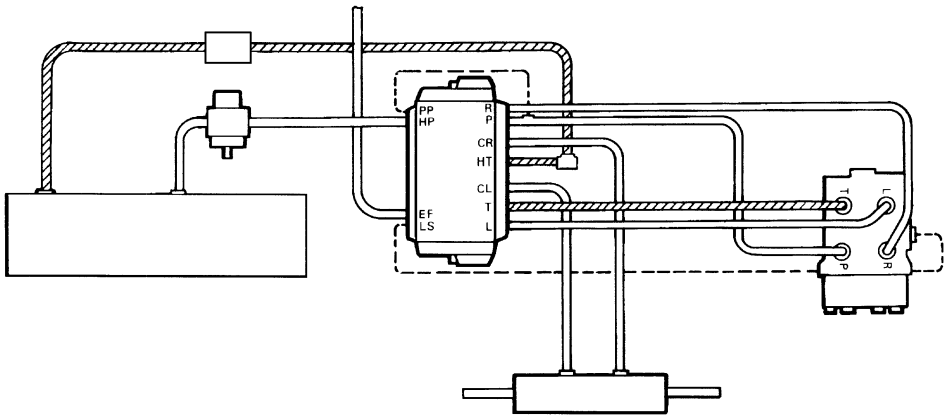
600 SRM 1101

Table 1. Error Code Descriptions (Continued)

Warning Lights			Fault Code Readout	
Diagnostic Warning Light	**Engine Stop Warning Light**	**Maintenance Warning Light**	**Fault Code**	**Description**
	ON		342	Electronic Calibration Code Incompatibility - Out of calibration
ON			343	Engine control module, internal hardware failure.
ON			346	ECM powerdown error
ON			349	Transmission Output Shaft Speed - Data valid but above normal operational range - Moderately severe level
ON			351	Injector Power Supply - Bad intelligent device or component
ON			352	Sensor supply voltage #1 circuit, shorted low.
ON			354	Intake manifold pressure sensor circuit, shorted high.
ON			355	Intake manifold pressure sensor circuit, shorted low.
	ON		361	Fuel pump control module, fuel control valve circuit, shorted high.
ON			362	Fuel pump control module, fuel control valve circuit, shorted low.
ON			363	Fuel pump control module, fuel control valve - mechanically stuck.
ON			364	Fuel pump control module, CAN communication error - abnormal update rate.
ON			365	Fuel pump control module, supply voltage circuit, shorted low.
ON			366	Fuel pump control module, supply voltage circuit - data incorrect
ON			367	Fuel pump control module, increment angle time sensor error.
ON			368	Fuel pump control module, timing error.
ON			369	Fuel pump control module, engine synchronization error.
ON			372	Fuel pump control module, idle validation error.
	ON		373	Fuel pump control module, fuel shutoff error.
ON			374	Fuel pump control module, self-test error.
ON			375	Fuel pump control module, electronic calibration code error.
ON			376	Fuel pump control module, fueling or engine speed mismatch.
ON			377	Fuel pump control module, stuck relay error.
ON			381	Intake air heater #1 (relay enable) circuit - data incorrect.
ON			382	Intake air heater #2 (relay enable) circuit - data incorrect.
ON			385	OEM sensor supply voltage circuit, shorted high.
ON			386	Sensor supply voltage #1 circuit, shorted high.
ON			387	Accelerator pedal position sensor supply voltage circuit, shorted high
ON			389	Fan clutch circuit error.
ON			391	Fuel shutoff valve supply voltage error.

STEERING SYSTEM

H40.00-48.00XM-12 (H800-1050HD/HDS) [A917]; RS45-27CH, RS45-31CH, RS46-36CH, RS46-40CH, RS46-41S CH, RS46-41L CH, RS46-41LS CH, RS45-24IH, RS45-28IH, RS46-33IH, RS46-37IH, RS46-38S IH, RS46-38L IH, RS46-38LS IH (HR45-27, HR45-31, HR45-36, HR45-40, HR45-41S, HR45-41L, HR45-41LS) [B222]H40.00-52.00XM-16CH (H1050HD-CH, 1150HD-CH) [E117, F117]



HYSTER

PART NO. 1565182

1600 SRM 1109

Legend for Figure 6

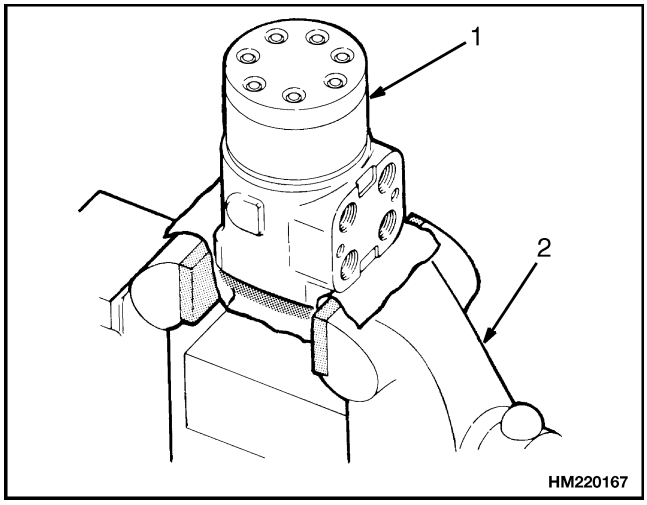
A. SHAFT INSTALLED SO THAT PIN IS ALIGNED WITH GROOVE IN ROTOR

1. SPOOL
2. SLEEVE
3. SHAFT
4. STATOR
5. ROTOR
6. PIN
7. SPRINGS
8. CONTROL SECTION
9. METERING SECTION
10. CHECK VALVE CHANGES CONTROL UNIT TO HAND OPERATED UNIT WHEN ENGINE IS OFF
11. HORN CONTACT ARRANGEMENT
12. SHAFT AND COLUMN ASSEMBLY
13. HORN CONTACT ARRANGEMENT
14. CENTERING SPRINGS RETURN VALVE TO NEUTRAL
15. SPOOL AND SLEEVE ASSEMBLY

DISASSEMBLE

Disassemble the unit as follows:

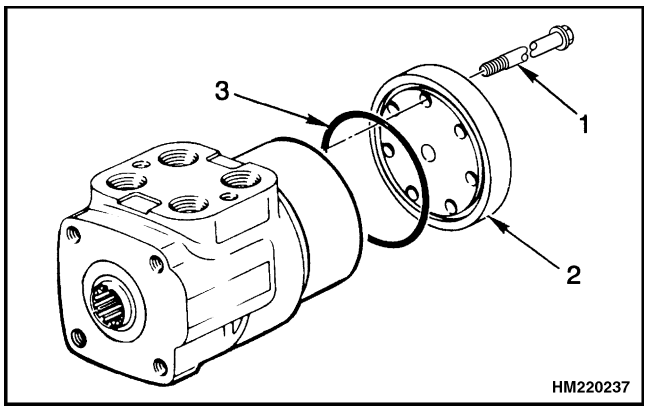
STEP 1.
Put the control unit in a vise with soft jaws. Make an identification mark on the length of the control unit. Remove the manifold block.



NOTE: Manifold removed.

1. STEERING CONTROL UNIT
2. VISE

STEP 2.
Remove the cover on the bottom of the steering control unit.



1. CAPSCREW
2. COVER
3. O-RING

Flow Amplifier Repair

GENERAL

The flow amplifier regulates and directs the flow of oil to the steering cylinder. The flow amplifier increases the output oil flow five times more than the pilot input flow from the steering control unit. The rate of oil flow to the steering cylinder is directly proportional to the rate of the pilot flow from the steering control unit.

DESCRIPTION

The following valves are part of the flow amplifier. See Figure 10.

PRIORITY VALVE. This valve selects and directs the oil flow for steering. The priority is determined in response to pressure in the load sensing line from the steering control unit. In the neutral position (no steering demand), the priority valve allows oil to flow from the pump to the main control valve.

DIRECTIONAL VALVE. This valve opens the correct cylinder supply and return passages when it senses the load sensing pressure from the steering control unit. The directional valve checks steering overrun by directing return flow from the cylinder to verify there is control under all conditions.

AMPLIFIER VALVE. This valve is moved by pilot pressure and opens to pump flow directly from the priority valve. This oil flow is then combined with the pilot flow.

CUSHION AND SUCTION VALVES. The "cushion" function of these valves makes a hydraulic cushion to reduce sharp increases of pressure in the steering cylinder. The "suction" function of these valves uses the cylinder return flow to prevent cavitation of oil inside the cylinder if steering "overrun" forces are sensed.

RELIEF VALVE. This valve senses high pressure from the load sensing line from the steering control unit. The relief valve opens and directs the oil flow to the hydraulic tank.

OPERATION

Neutral Position

In the neutral position, the oil flows from the steering pump to the priority valve and discharges through the EF port. The EF port is connected to the working pressure of the hydraulic system at the main control valve.

During Steering Function

When the steering wheel is turned, pilot pressure causes oil to flow from the steering control unit to the priority valve. The priority valve is shifted. Oil flows from the steering control unit to the flow amplifier.

The directional valve is shifted by pressure across the bore of the spool.

The pilot pressure moves the spool and causes oil to flow through the pressure control/amplifier valve to the directional valve.

The main oil flow passes from the priority valve to the pressure control/amplifier valve where the spool is in the "left turn" position. Oil now flows through holes in the valve to a chamber in one end of the spool.

The spool shifts to a position so the pressure is the same at both ends of the spool. Oil now flows through the valve to the directional valve.

The main flow and pilot flow of oil combine, increasing the flow through the directional valve to the steering cylinder. The return oil flows from the cylinder, through the directional valve to the hydraulic tank.

The flow amplifier has cushion valves to prevent pressure peaks in the steering cylinder. Suction valves are installed to prevent cavitation in the steering cylinder.

SAFETY PRECAUTIONS
MAINTENANCE AND REPAIR

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

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

WARNING

Indicates a condition that can cause immediate death or injury!

CAUTION

Indicates a condition that can cause property damage!

CAUTION

To avoid personal injury, use a hoist when lifting components that weigh more than 23 kg (50 lb). Verify the hoist or lift device is strong enough to support the weight of the item. Verify all chains, hooks, slings, etc. are in good condition and are of correct capacity.

6. Support the spindle with a hoist or lifting device. Remove the kingpin with a hydraulic press.

7. Remove the spindle with support from a lifting device or a hoist. Save the thrust washers and bearings.

8. Remove the kingpin bushings from the axle housing.

INSTALL

1. Install the lower cover plates for the spindle on the axle housing. See Figure 7.

WARNING

Material that is cooled to very low temperatures can cause injury on contact. Wear protective clothing including insulated gloves, safety glasses, and face shields. Handle liquid nitrogen and cooled parts carefully.

2. Cool the upper and lower bushings to −200 to −230°C (−328 to −382°F) in liquid nitrogen. Install the lower bushing in the axle housing until it contacts the lower cover.

3. Install shims with a total thickness of 1.5 mm inside the lower bushing.

4. Install the groove pins in the axle housing.

5. Install the lower and the upper thrust washers on the axle housing. Measure the distance between the thrust washers on the axle housing. See Figure 12. This is dimension A.

6. Install the pins on the spindle. Measure the distance across the spindle. See Figure 12. This is dimension B.

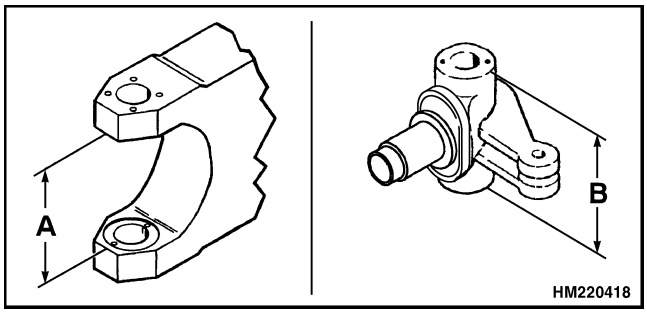


Figure 12. Dimensions A and B

7. Subtract the measurement in Step 6 from the measurement in Step 5. Select shims/thrust washer so the thickness is 0.1 mm (0.004 in.) less than the clearance.

S = A − B − 0.1 mm (S = A − B − 0.004 in.)

where S = shims/thrust washer

A = distance across the axle housing

B = distance across the spindle

8. Install the shims/thrust washer and upper thrust washer on the spindle and the upper thrust washer in the axle housing.

9. Support the spindle with a hoist or lifting device and install it in the axle housing. Lubricate the surfaces with Molykote (molybdenum disulfide grease) to ease installation.

WARNING

Material that is cooled to very low temperatures can cause injury on contact. Wear protective clothing including insulated gloves, safety glasses, and face shields. Handle liquid nitrogen and cooled parts carefully.

10. Cool the kingpin to −200 to −230°C (−328 to −382°F). The top end of the kingpin is larger than the bottom end. Install the kingpin in the axle housing from the top of the housing until it contacts the shims installed in Step 3.

11. Remove the lower cover and remove the shims.

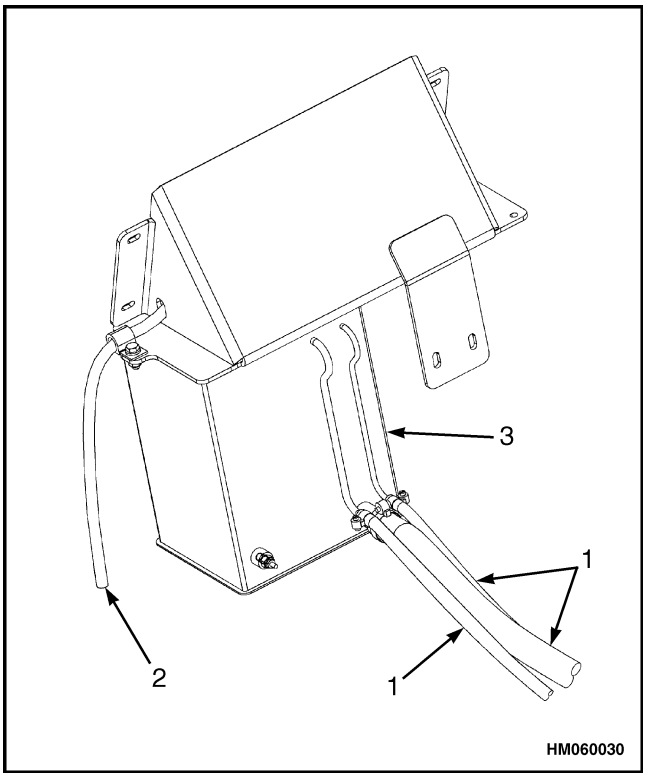
"THE
QUALITY
KEEPERS"

HYSTER
APPROVED
PARTS

5. Remove drain plug and drain radiator.

6. Disconnect charged air cooler hoses from charged air cooler core. See Figure 1 and Figure 2.

7. Disconnect engine coolant hoses from engine coolant core and expansion tank. See Figure 6 and Figure 7.



1. COOLANT HOSE
2. DRAIN HOSE
3. EXPANSION TANK

Figure 6. Engine Coolant Hoses (E117, F117)

8. Disconnect the drain hose from the frame of the cooling system.

9. Disconnect hydraulic oil lines from hydraulic oil cooler core.

10. Disconnect transmission oil lines from transmission oil cooler core.

11. Place caps on all open lines.

WARNING

Verify cables at the battery are disconnected when working near the fan. Sudden start of the fan can cause serious personal injury.

12. Remove cover to access fan bolts.

13. Remove fan.

WARNING

Verify the lifting device has the rated capacity to lift the cooling system or personal injury may occur.

14. Place a lifting device just above cooling system for support and lowering.

15. Use the lifting eyes on the cooling system and create tension with the lifting device.

16. Remove the isolator and rod between cooling system and the frame, located on the topside of the cooling system.

17. Remove capscrews and rivets between bracket, frame, bottom seal, and tanks.

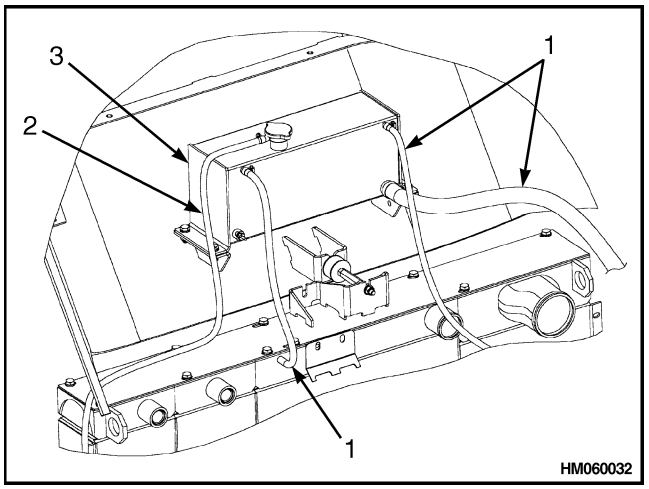
18. Remove cooling system and place carefully on ground.

INSTALL

1. Install cooling system.

2. Install capscrews and rivets between bracket, frame, bottom seal, and tanks.

3. Install the isolator and rod between cooling system and the frame, located on the topside of the cooling system.



1. COOLANT HOSE
2. DRAIN HOSE
3. EXPANSION TANK

Figure 7. Engine Coolant Hoses (B222)

General

This section has a description and the repair procedures for the planetary gear axle.

Description

The planetary gear axle has an axle housing and two final drive assemblies. See Figure 1 and Figure 2. Each final drive assembly is a planetary gear unit. The planetary gear assembly changes the final drive ratio, which increases the torque to the drive wheels. Each unit has a drive axle, sun gear, ring gear hub, and ring gear. There are also three planetary pinions, a planetary spider, and a housing. The differential is also installed in the axle housing. The service brake is also installed on the drive axle. See the section **Service Brake** for your lift truck, for repair instructions of the brakes.

Operation

The rotation of the differential causes the axle shafts and the sun gears to rotate. The sun gears then cause the planetary pinions to rotate. Rotation of the pinions causes the planetary spiders to rotate the hubs and the drive wheels. The ring gear and the ring gear hub do not rotate.

CLEAN

Ground or Polished Parts

WARNING

To prevent serious eye injury, always wear safe eye protection when performing vehicle maintenance or service.

WARNING

Solvent cleaners are flammable, poisonous, and can cause burns. Examples of solvent cleaners are carbon tetrachloride, emulsion-type cleaners, and petroleum-based cleaners. To avoid serious personal injury when using solvent cleaners, carefully follow the manufacturer's product instructions and these procedures.

- **Wear safe eye protection.**
- **Wear clothing that protects your skin.**
- **Work in a well-ventilated area.**
- **Do not use gasoline or solvents that contain gasoline. Gasoline can explode.**
- **Use hot solution tanks or alkaline solutions correctly. Follow the manufacturer's instructions carefully.**

CAUTION

- **Use only solvent cleaners to clean ground or polished metal parts. Hot solution tanks or water and alkaline solutions will damage these parts. Isopropyl alcohol, kerosene, or diesel fuel can be used for this purpose.**
- **If required, use a sharp knife to remove gasket material from parts. Be careful not to damage the ground or polished surfaces.**

1. Use a cleaning solvent, kerosene, or diesel fuel to clean ground or polished parts or surfaces. NEVER USE GASOLINE.
2. Remove gasket material from parts. Use caution not to damage ground surfaces. Apply grease to prevent corrosion.
3. DO NOT clean ground or polished parts in a hot solution tank, water, steam, or alkaline solution.

Parts With Rough Finishes

1. Use a cleaning solvent or a hot solution tank with a weak alkaline solution to clean parts with a rough finish.
2. Leave parts in the hot solution tank until they are completely cleaned and heated. When the parts are clean, remove them from the tank.
3. Wash the parts with water until alkaline solution is completely removed.

Axle Assemblies

NOTE: A complete axle assembly can be steam cleaned on the outside to remove dirt.

NOTE: Before the axle is steam cleaned, close or put a cover over all the openings in the axle assembly. Examples of openings are the breathers or vents in air chambers.

Drying Cleaned Parts

CAUTION

Dry bearings with clean paper or rags. Do not use compressed air, which can cause abrasive particles to contaminate the bearings. Damage to components and reduced lining life can result.

Immediately after cleaning, use clean paper, rags, or compressed air to dry parts.

PREVENTING CORROSION

NOTE: Parts must be clean and dry before lubricating them.

1. If assembling the parts immediately after cleaning them, lubricate the clean, dry parts with grease to prevent corrosion.
2. If storing the parts after cleaning them, apply a corrosion-preventive material to all machined surfaces. Store the parts in a special paper or other material that prevents corrosion.

PARTS INSPECTION

It is very important to inspect all parts carefully and completely before axle or carrier is assembled. Check all parts for wear and replace damaged parts. Replacement of damaged or worn parts will prevent breakdown of assembly later.

CONNECTOR

The instrument panel is connected to the system by means of one connector. The connector is located at rear of instrument panel. See Figure 2 and Table 2.

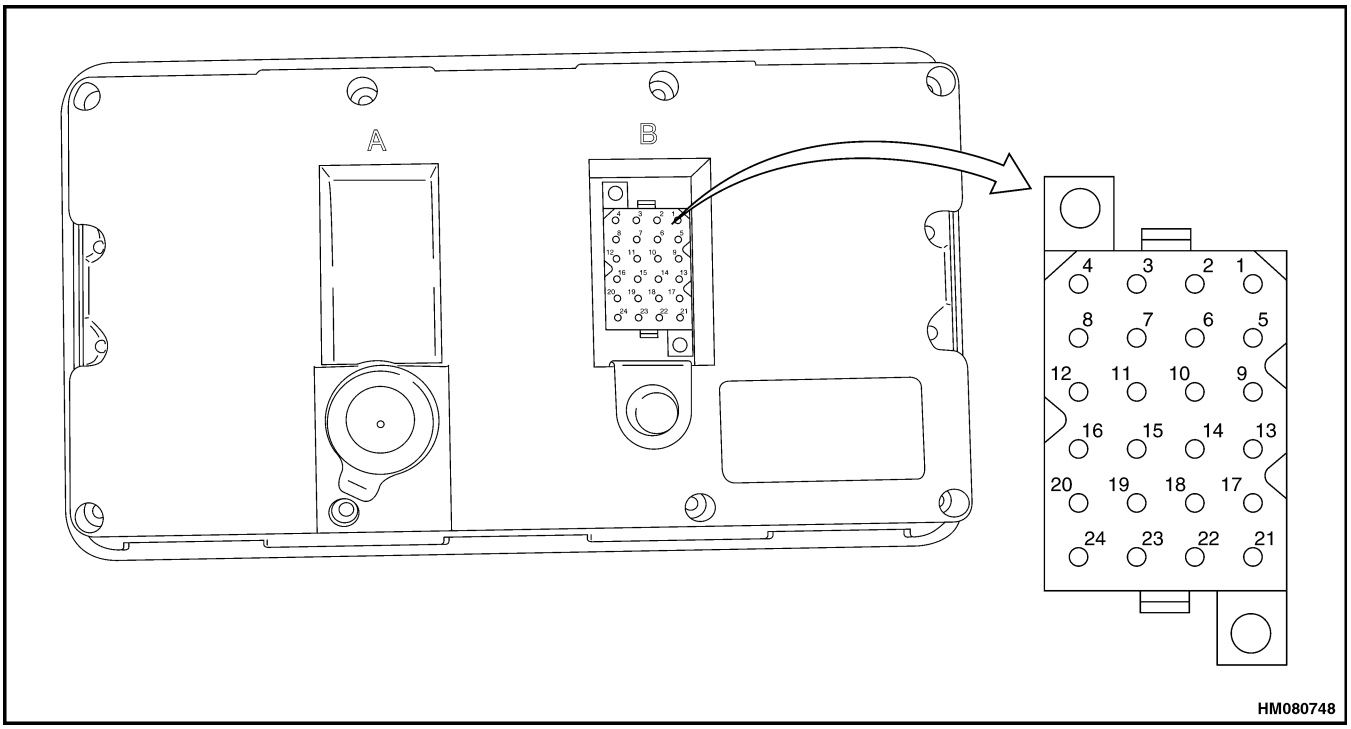


Figure 2. Connector

Table 2. Pin Description

Pin	Description	Pin	Description
1	Battery positive input	13	Brake system pressure light input
2	Seat switch input	14	Can-H
3	Not used	15	Can-L
4	Ground	16	Not used
5	Engine coolant level light input	17	Buzzer output
6	Brake system temperature light input	18	Not used
7	Park brake monitor input	19	Central light output
8	Not used	20	Hydraulic filter input
9	Engine combustion air filter light input	21	Not used
10	Not used	22	Not used
11	Neutral gear input	23	Transmission oil temperature gauge input
12	Lubrication system input	24	Fuel level gauge input

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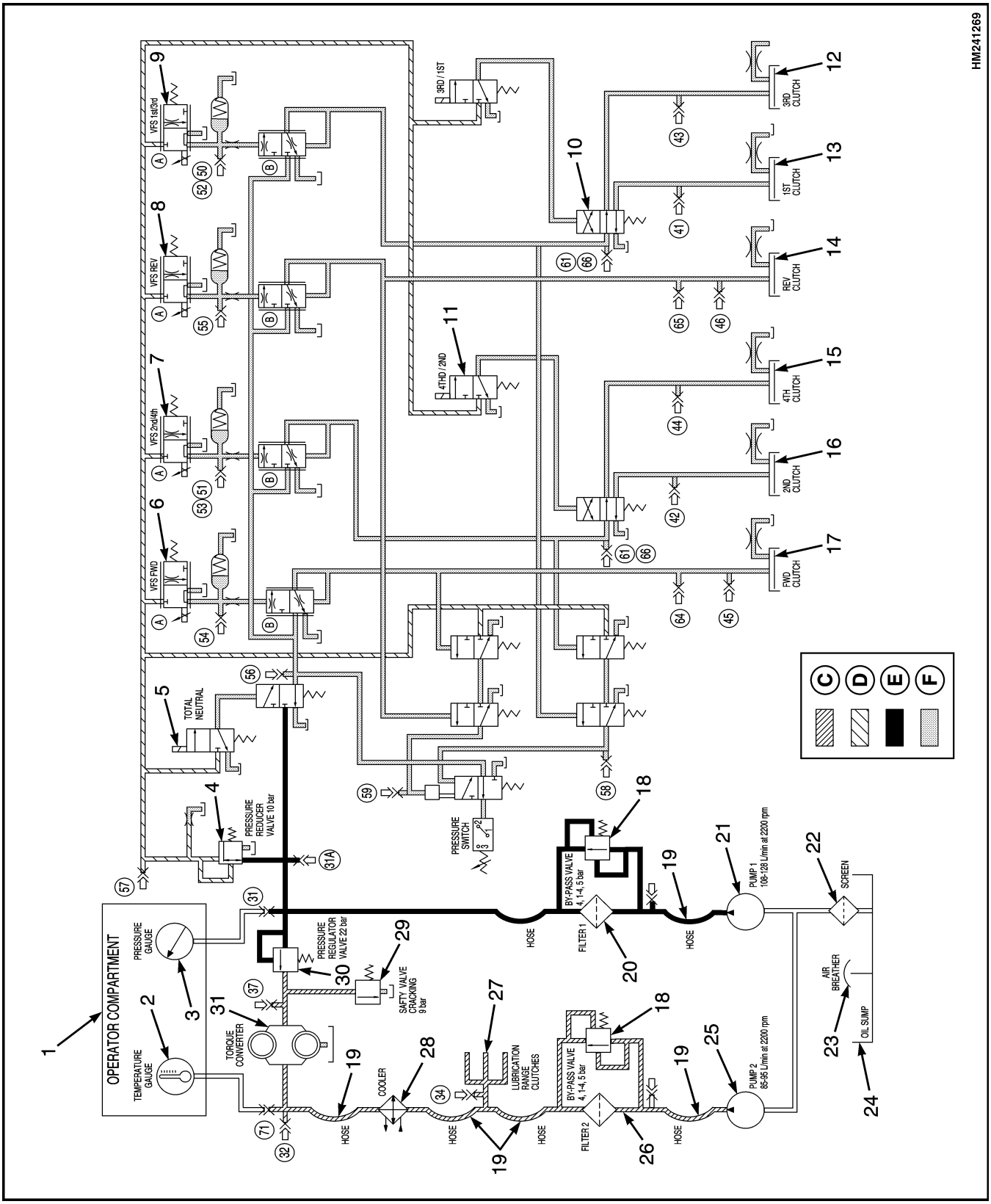


Figure 8. Neutral - 1 Selected

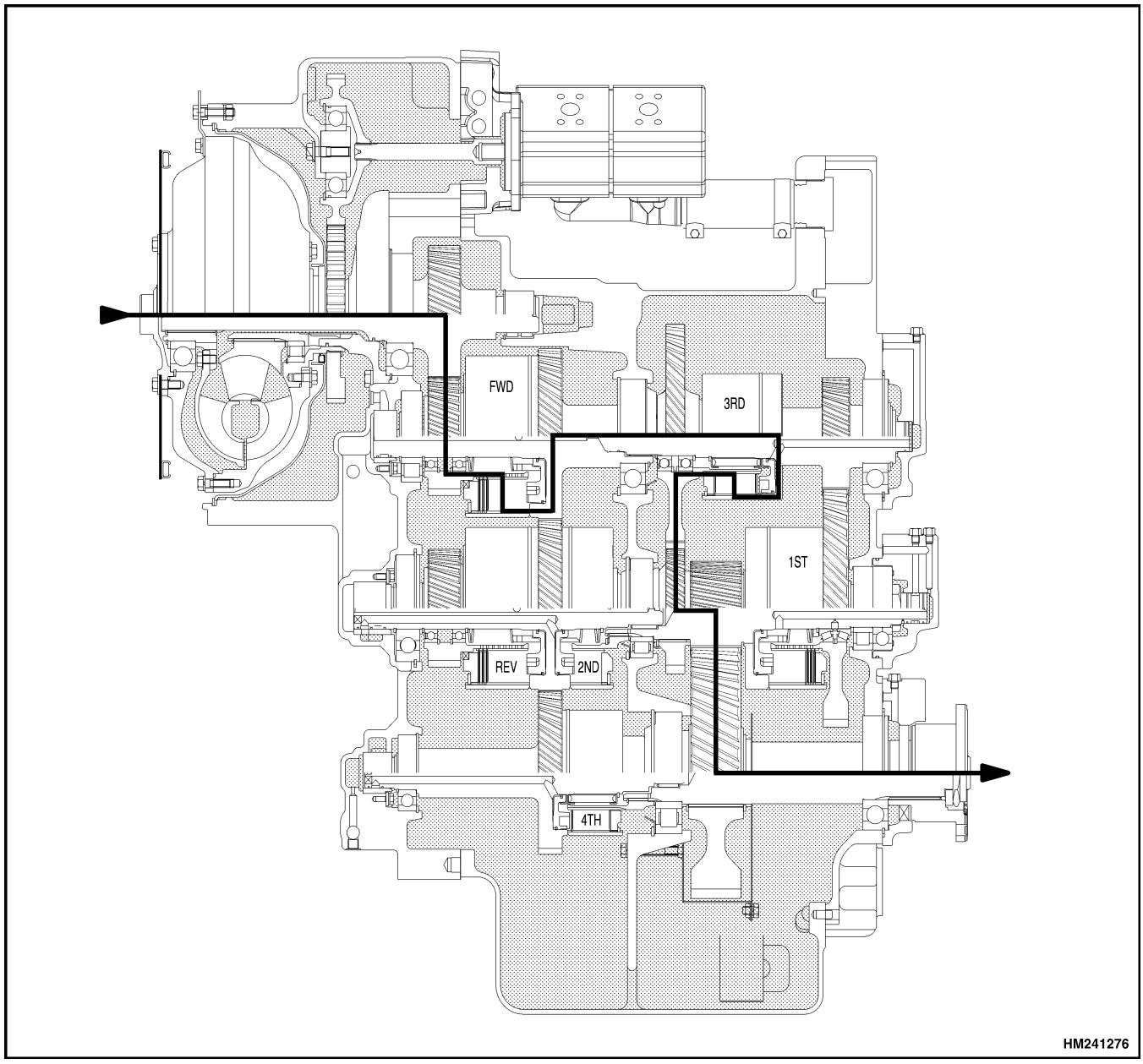


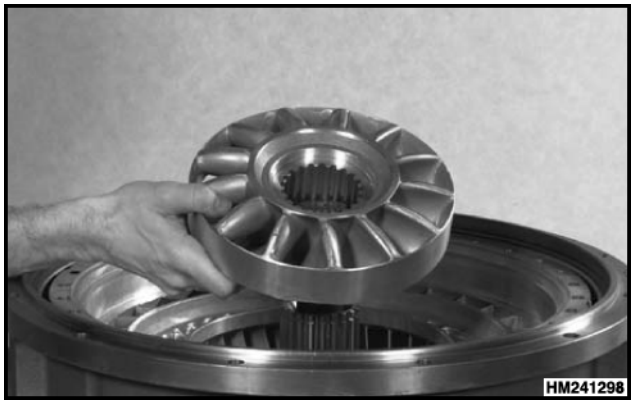
Figure 15. Forward 3rd Speed Flow

Legend for Figure 22

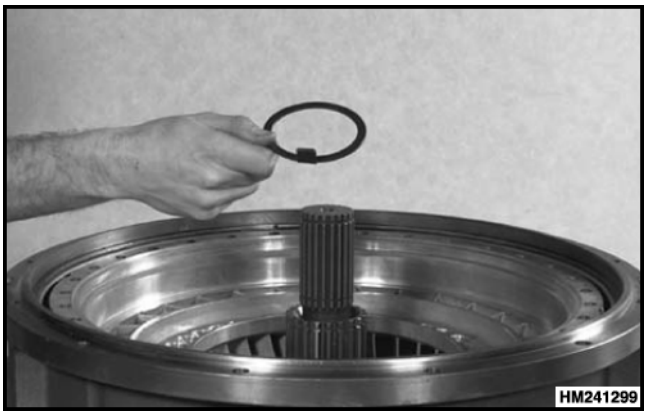
A. ELECTRONIC CONTROLLED MODULATION VALVE
B. PRESSURE INTENSIFIER
C. LUBRICATION
D. LOW PRESSURE
E. HIGH PRESSURE
F. DRAIN

1. OPERATOR COMPARTMENT
2. TEMPERATURE GAUGE
3. PRESSURE GAUGE
4. PRESSURE REDUCER VALVE
5. TOTAL NEUTRAL
6. VFS FWD
7. VFS 2ND/4TH
8. VFS REV
9. VFS 1ST/3RD
10. 3RD/1ST
11. 4TH/2ND
12. 3RD CLUTCH
13. 1ST CLUTCH
14. REV CLUTCH
15. 4TH CLUTCH
16. 2ND CLUTCH
17. FWD CLUTCH
18. BYPASS VALVE
19. HOSE
20. FILTER 1
21. PUMP 1
22. SCREEN
23. AIR BREATHER
24. OIL SUMP
25. PUMP 2
26. FILTER 2
27. LUBRICATION RANGE CLUTCHES
28. COOLER
29. SAFETY VALVE
30. PRESSURE REGULATOR VALVE
31. TORQUE CONVERTOR

STEP 9.
Remove reaction member.

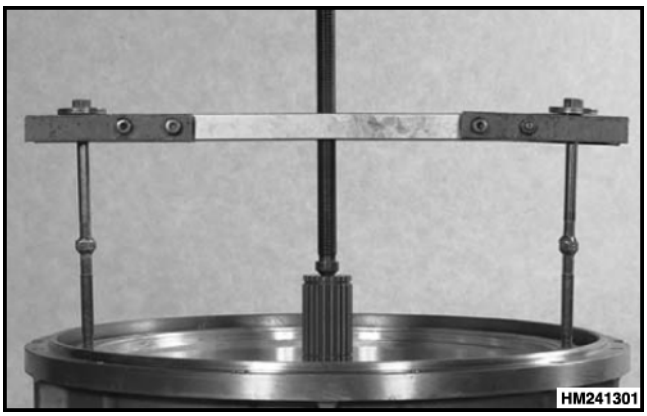


STEP 10.
Remove reaction member spacer.

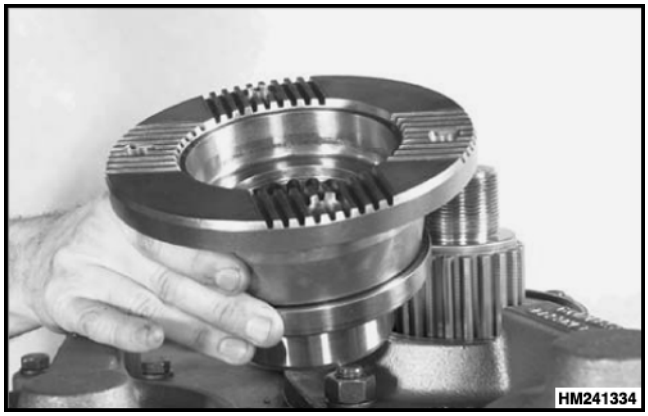


STEP 11.
Remove oil baffle retaining ring.

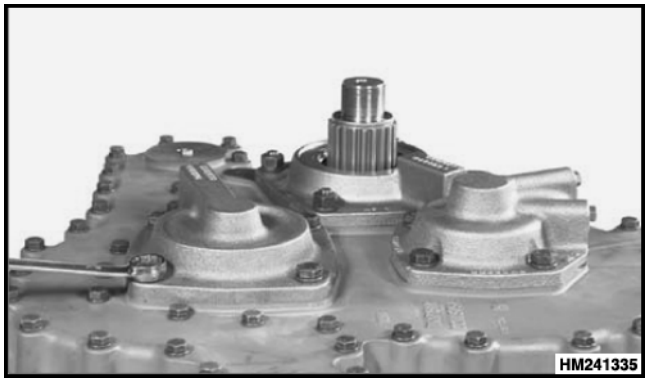
STEP 12.
An impeller removal tool, like the one shown, can be fabricated to aid in the removal of the impeller and oil baffle. Remove the impeller and oil baffle.



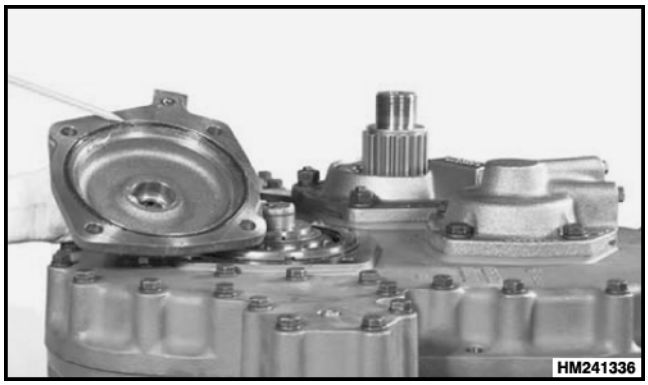
STEP 45.
Remove output flange.



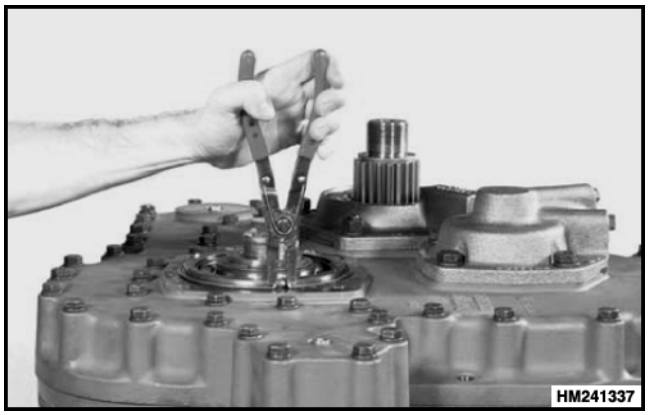
STEP 46.
Remove bolts from 3rd clutch shaft rear bearing cap.



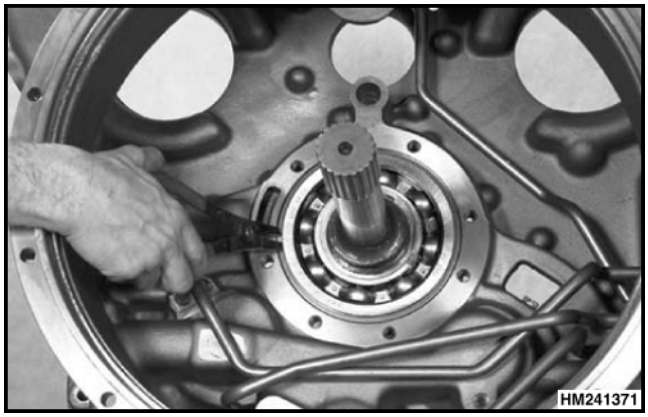
STEP 47.
Remove 3rd clutch shaft rear bearing cap and O-ring.



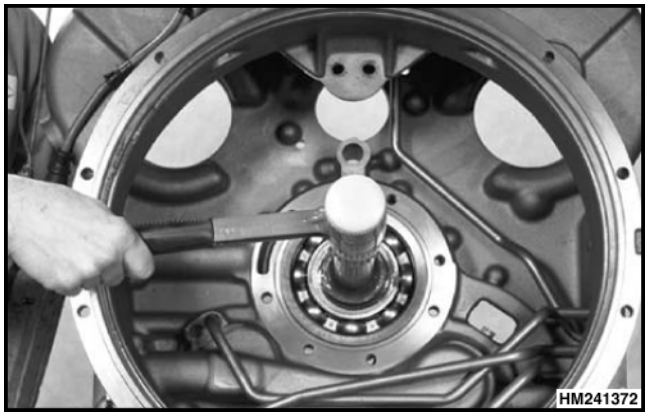
STEP 48.
Remove 3rd clutch shaft rear bearing cap locating ring.



STEP 4.
Remove turbine shaft bearing retaining ring.

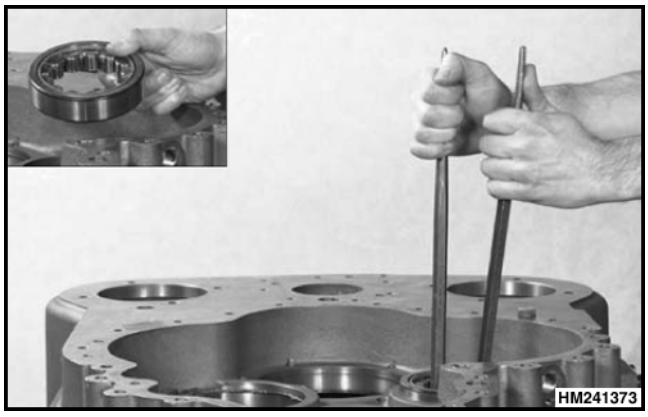


STEP 5.
Using a soft hammer, tap turbine shaft and bearing assembly from converter housing.

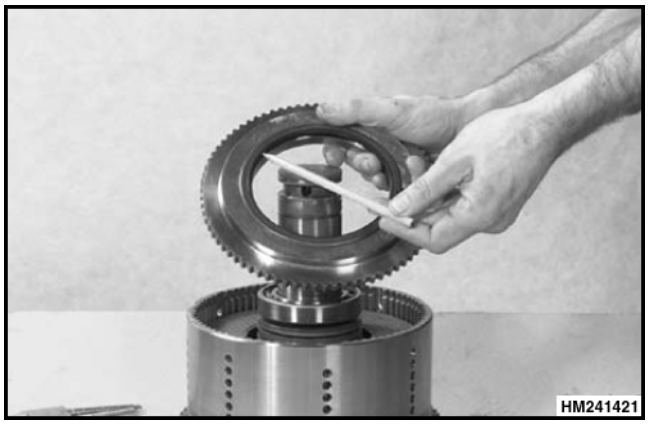


NOTE: Check the three wear sleeves in the converter housing and replace as needed.

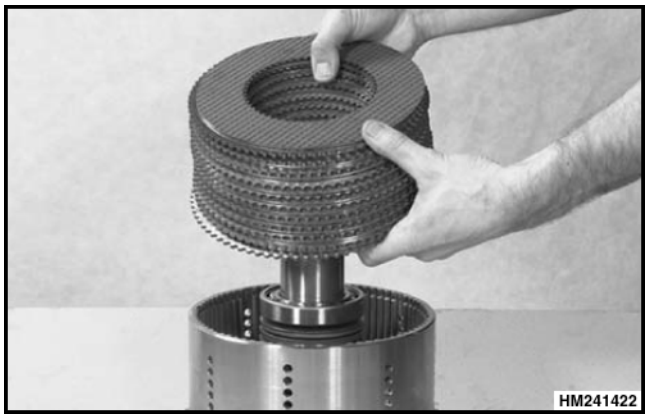
STEP 6.
Pry forward shaft bearing from housing as shown.



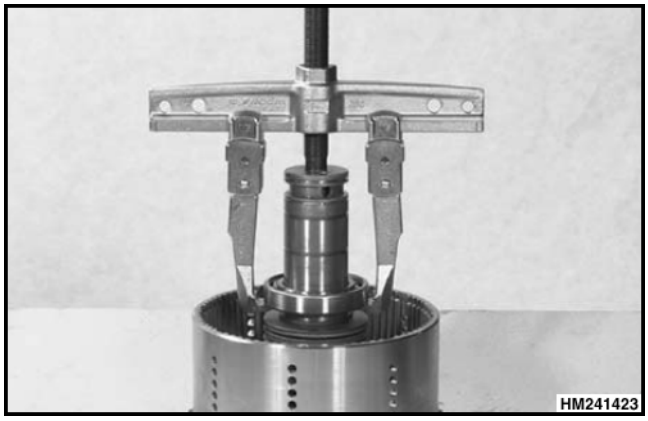
STEP 11.
Remove end plate.



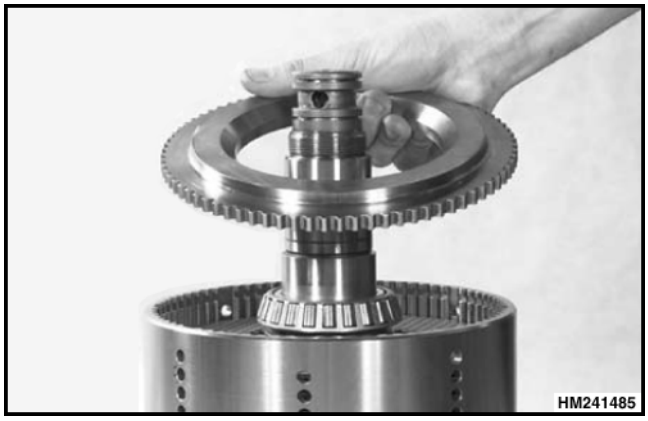
STEP 12.
Remove inner and outer clutch discs.



STEP 13.
Remove inner bearing.

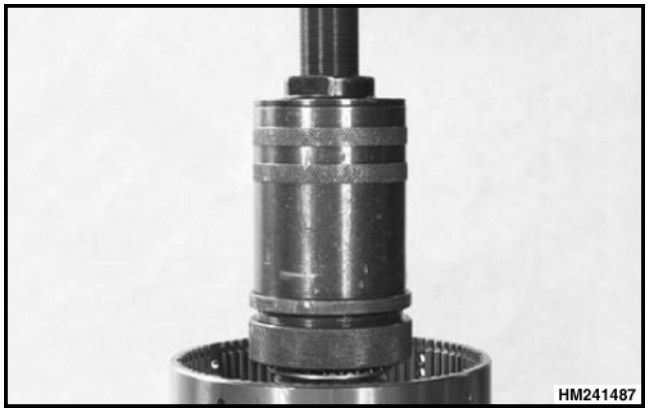


STEP 5.
Remove end plate.

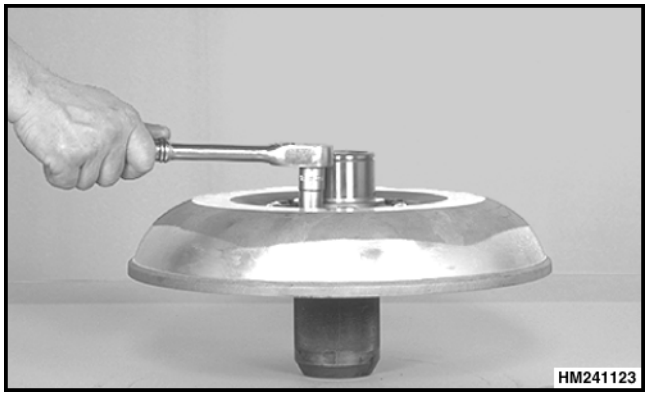


STEP 6.
Remove inner and outer clutch discs.

STEP 7.
Using a bearing puller, remove lower hub taper roller bearing from shaft.

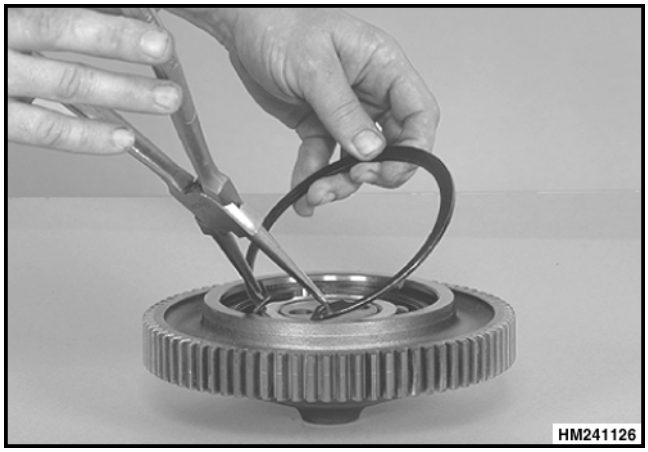


STEP 4.
Remove turbine hub bolts and lock tabs.



Pump Drive Gear, Disassemble

STEP 1.
Remove snap ring.

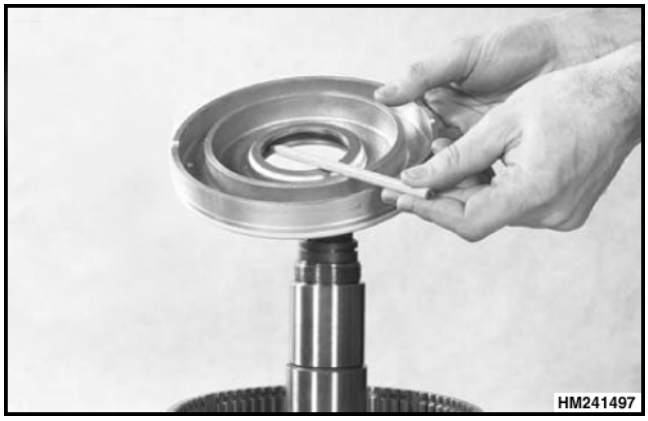


STEP 2.
Remove bearing.

First-Speed Clutch, Assemble

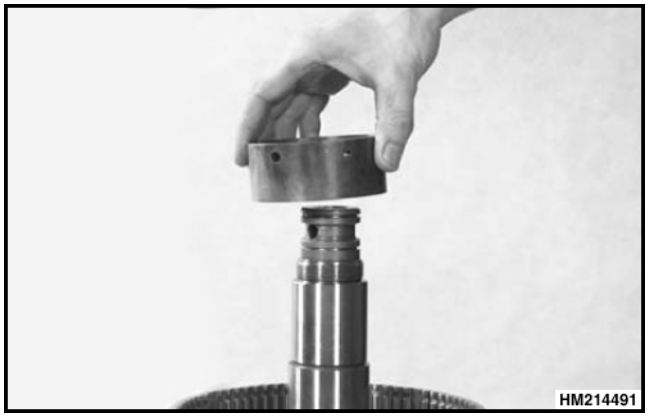
NOTE: The bleed hole in the piston must be clean and free of any foreign material.

STEP 1.
Install clutch piston inner seal.



STEP 2.
Install clutch piston outer seal and install piston into drum.

STEP 3.
Install wear sleeve.



STEP 13.
Install bearing retaining snap ring.

STEP 14.
Install piston rings.

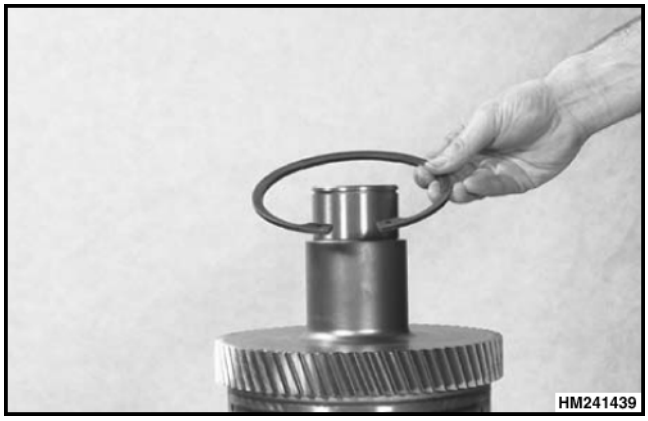
Third-Speed Clutch, Assemble

NOTE: The bleed hole in the piston must be clean and free of any foreign material.

STEP 1.
Install clutch piston inner seal.

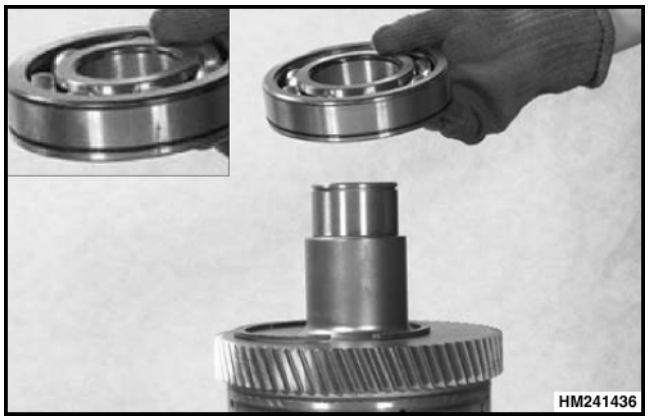
STEP 15.
Install two piston rings.

STEP 16.
Install retaining ring over shaft before installing bearing.



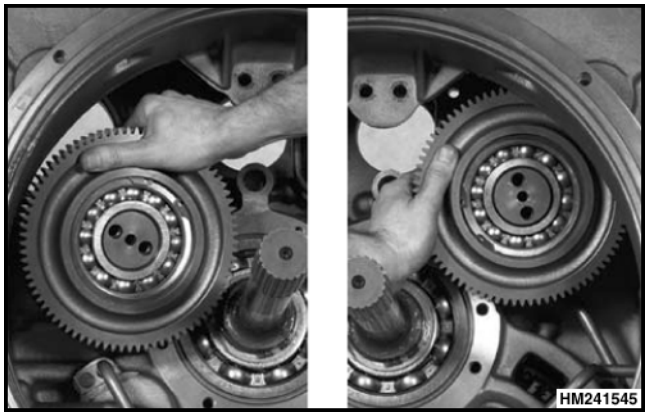
WARNING
Hot parts. Wear protective clothing and gloves to prevent burns.

STEP 17.
Heat outer bearing to 120°C (248°F) and install bearing on shaft with groove down as shown.

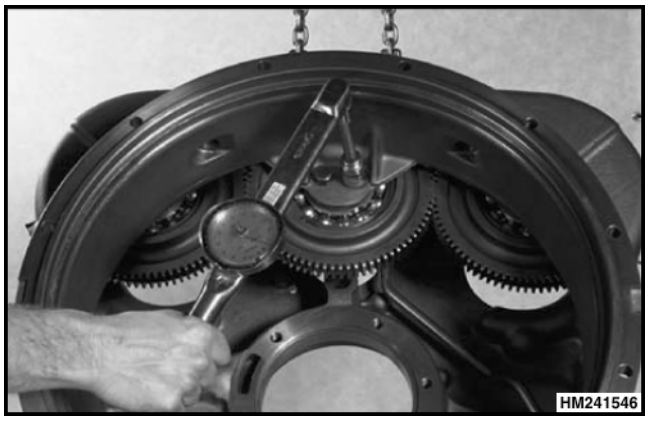


Converter Housing, Assemble

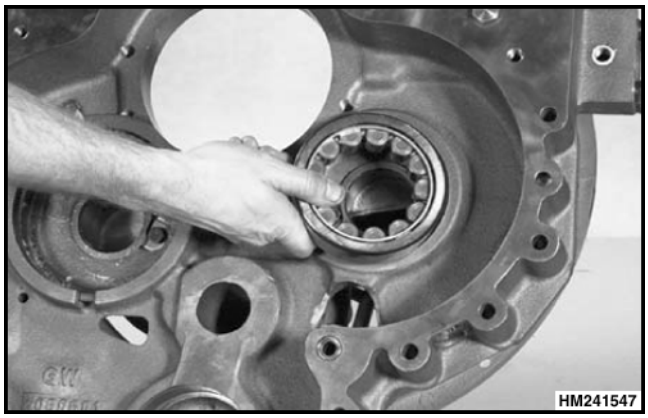
STEP 1.
Install outer pump drive gear assemblies (left and right). Place new O-rings on bolts. Install bolts and tighten to specified torque. See Torque Specifications.



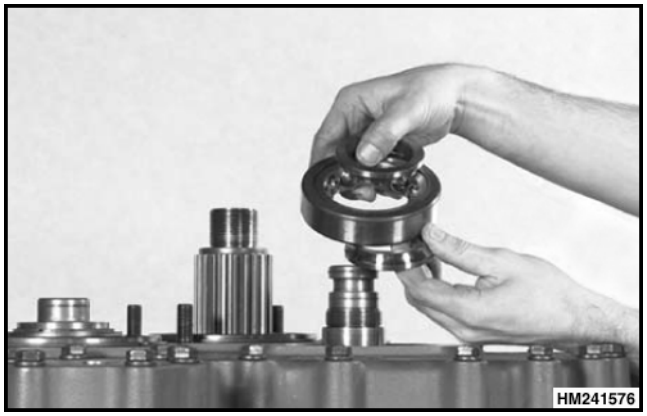
STEP 2.
Install center pump drive gear assembly. Tighten bolts to specified torque. See Torque Specifications.



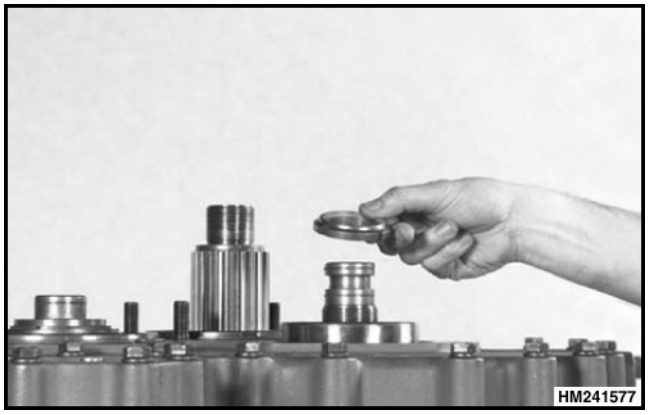
STEP 3.
Install 4th speed outer roller bearing in converter housing.



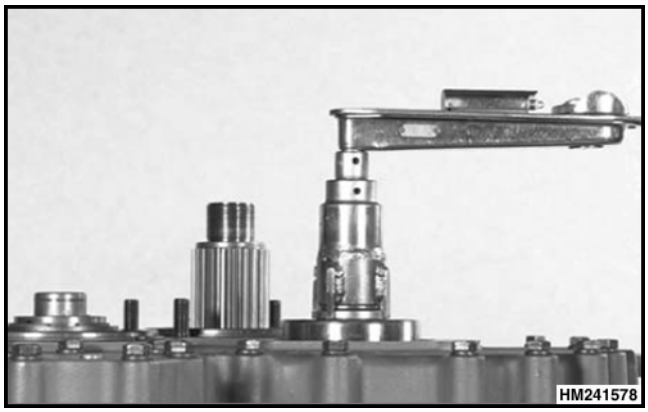
STEP 21.
Install ball bearing assembly onto 1st shaft.



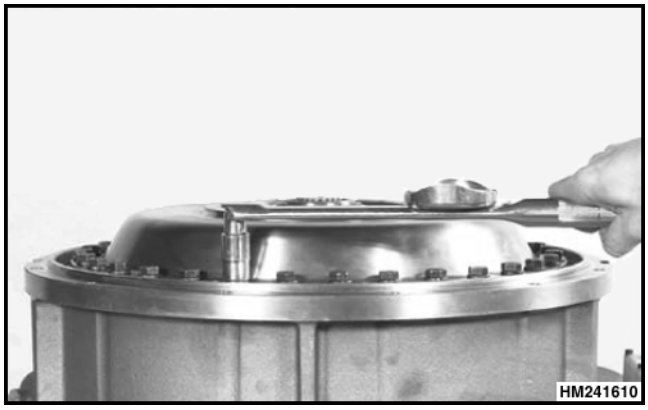
STEP 22.
Install lock nut on 1st shaft.



STEP 23.
Using a special tool, torque lock nut to 145 to 160 N•m (107 to 118 lbf ft).

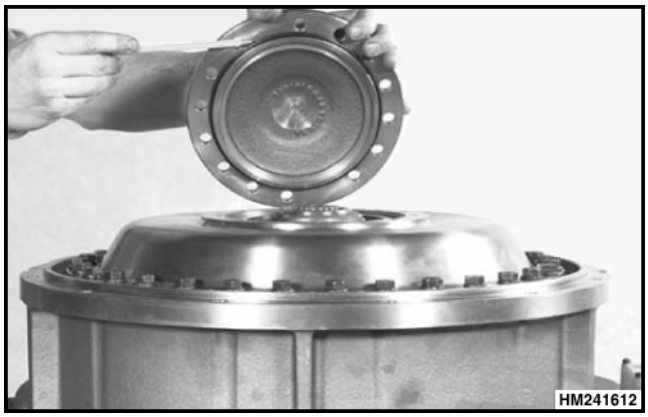


STEP 58.
Install impeller cover bolts and lockwashers. Tighten bolts to specified torque. Torque Specifications.



STEP 59.
Install turbine retaining snap ring.

STEP 60.
Install new O-ring on bearing cap and install cap.



Stall Test

The stall test checks the condition of the engine, transmission clutches, and torque convertor. If the engine is not operating correctly, the stall speed will be lower than the stall speed shown in the specification. If the torque convertor is not working correctly, the engine speed will not increase to the correct rpm. If the engine speed is greater than the stall speed shown in the specification, the transmission clutches are not holding or the wheels are turning. The transmission clutches will not hold if the clutch pressure is not great enough or the clutches are worn. The stall test is done in the highest possible gear.

NOTE: Verify the engine governor is adjusted correctly.

Verify the coolant level in the cooling system is correct. Verify the oil level in the transmission is correct.

CAUTION

Do not operate the convertor at stall condition longer than 30 seconds at one time. Shift to neutral for 15 seconds and repeat the procedure until desired temperature is reached.

Excessive temperature, 120°C (248°F) maximum, will cause damage to the transmission clutches, fluid, convertor, and seals.

Do a stall test to check the operation of the transmission clutches. The engine and hydraulic oil must be at operating temperature. Put a capacity load on the forks to prevent the wheels from turning. Connect a tachometer to the engine. Put the lift truck against an object that cannot move and apply the parking brake. Start the engine, put the transmission in **FORWARD**, and release the parking brake. Push the accelerator pedal to half throttle and operate the transmission until the oil in the transmission is at least 70°C (158°F).

After the transmission is at operating temperature, push the accelerator pedal to full throttle.

The correct stall speed for an engine with greater than 50 hours of operation is 1950 rpm.

Do not push (apply) the brake pedal. This action will release the clutches in the transmission.

Do not apply the parking brake for the stall speed test. The application of the parking brake will put the transmission into **NEUTRAL**. Use the service brakes to stop the drive wheels from turning.

CAUTION

Do not hold the throttle open for more than 15 seconds at a time. Permit the engine to operate at idle speed for 2 minutes between tests.

Release the accelerator immediately if the engine speed increases to the speed limit of the governor:

- Cummins 300 Horsepower Engine - 2130 rpm (no load)
- Cummins 330 Horsepower Engine - 2130 rpm (no load)
- Stall speed - 1950 rpm
- Convertor Torque Stall Ratio for the Cummins is 2.29.

If the stall speed is 50 to 200 rpm below the specification, the engine is not operating at full power. Check the timing of the fuel injector, air filter, fuel system, and compression.

If the engine is operating correctly and the engine speed is 250 to 500 rpm below the specification, the torque convertor is not operating correctly. The torque convertor must be replaced as a unit. If the engine governor is not adjusted correctly, the results will be wrong.

If the stall speed is greater than the specification, the engaged clutch is not holding or the convertor is damaged. Put the transmission in **REVERSE** to test the other clutch assembly. Verify the truck is placed against an object that can not move. If the engine rpm is greater than the specification in either direction, do the pressure checks to check for the possible cause.

Table 6. Common Calibration Condition Messages

Code	Cause	Action
 HM241630	The APC200 expects the shift lever to be in NEUTRAL, but finds it in another position. (FORWARD OR REVERSE)	Put the shift lever back in NEUTRAL.
 HM241631	The APC200 expects the parking brake to be **ON** while it is **OFF**.	Apply the parking brake.
 HM241632	The APC200 has detected output speed.	Verify that the parking brake is **ON** and working properly. If this is already the case, you will have to hold the lift truck at a standstill by applying the service brake. Once the lift truck has been stopped, the APC200 will ask the operator to shift to **FORWARD** before continuing the calibration.
 HM241633	Engine rpm is too low according to the limit that is necessary for calibration.	If the lift truck is equipped with throttle-by-wire, the engine rpm will be automatically adapted. In the other case, the operator has to change the throttle pedal position until the display looks as follows:  HM241635
 HM241634	Engine rpm is too high according to the limit that is necessary for calibration.	
 HM241635	After being too low or too high, the engine rpm is coming back into the correct boundaries for calibration.	
 HM241636	When the temperature becomes too low during the automatic calibration, the APC200 display indicates the actual transmission temperature.	Use the "M" button on the APC200 to go back to the heat mode and the "S" button to trigger this mode. Warm-up the transmission again until the temperature reaches 60°C (140°F). Then go back to the automatic tuning mode by the "M" button and trigger this one again to continue.

Table 9. Display Warning Codes (Continued)

DWC	Type	Explanation	Controller's Action	Driver Action	Fault Cause	Troubleshooting
See Figure 44 and Table 5 for the cross referencing of the controller wire to pin numbers.						
t5500	B	Hydraulic lever (wire on pin P1) related fault : hydraulic lever is shorted to ground.	Controller will flag the fault, and will use the lowest clipped value in its settings.	Contact maintenance for troubleshooting.	The hydraulic lever is shorted to ground, or measured input value is below the minimum value (200 mV).	Check the wiring between the controller and the hydraulic lever. Check if this device is connected.
t5501	B	Hydraulic lever (wire on pin P1) related fault : hydraulic lever is not connected.	Controller will flag the fault, and will use the lowest clipped value in its settings.	Contact maintenance for troubleshooting.	The hydraulic lever is not connected, or measured input value is above the maximum value (4800 mV).	Check the wiring between the controller and the hydraulic lever. Check if this device is connected.
t5504	B	Hydraulic lever (wire on pin P1) related fault : hydraulic lever value is below the minimum value calibrated.	Controller will flag the fault, and will use the lowest clipped value in its settings.	Contact maintenance for troubleshooting.	The hydraulic lever measured input value is below the minimum value (corresponding with 0% - 100 mV).	Check the wiring between the controller and the hydraulic lever. Check if this device is connected.
t5505	B	Hydraulic lever (wire on pin P1) related fault : hydraulic lever value is above the maximum value calibrated.	Controller will flag the fault, and will use the highest clipped value in its settings.	Contact maintenance for troubleshooting.	The hydraulic lever measured input value is above the maximum value (corresponding with 100% + 100 mV).	Check the wiring between the controller and the hydraulic lever. Check if this device is connected.

Table 9. Display Warning Codes (Continued)

DWC	Type	Explanation	Controller's Action	Driver Action	Fault Cause	Troubleshooting
See Figure 44 and Table 5 for the cross referencing of the controller wire to pin numbers.						
t7202	S	2nd VFS solenoid (wires on pin F1 and G1) related fault: the output current exceeds 1400 mA.	Controller reverts to a "limp home" mode.	Stop machine, go to neutral and select back drive. If the controller can control that drive direction, the machine will drive, but in a "limp home" mode. if not, the opposite drive direction has to be selected to move the machine and contact maintenance for troubleshooting.	The current of the 2nd VFS solenoid is exceeding 1400 mA.	Check the wiring between the controller and the 2nd VFS solenoid. Check the 2nd VFS solenoid.
t7203	S	2nd VFS solenoid (wires on pin F1 and G1) related fault: the output current is out of range, occurs when the load has the incorrect impedance.	Controller reverts to a "limp home" mode.	Stop machine, go to neutral and select back drive. If the controller can control that drive direction, the machine will drive, but in a "limp home" mode. if not, the opposite drive direction has to be selected to move the machine and contact maintenance for troubleshooting.	The current of the 2nd VFS solenoid is out of range.	Check the wiring between the controller and the 2nd VFS solenoid. Check the 2nd VFS solenoid.

Shutdown Mode

Display Warning	**t_SHT**

The ECM transmission control valve has a built-in redundant shutdown solenoid and a pressure switch that monitors the pressure controlled by that solenoid. This solenoid is controlled by the APC200 using both a high side and a low side switch.

When the controller enters shutdown mode, all four pressure modulators are put at zero and both controlling outputs of the redundant shutdown solenoid are switched off.

This mode is activated when a severe internal or external problem is detected. If it is an intermittent problem, the controller will exit the shutdown mode and enter the Limp Home mode.

However, in case the error is related to the pressure feedback signal, Shutdown mode remains selected until the controller is switched off.

When a fault related to the parameter settings located in the FLASH memory is detected, the controller reverts to Shutdown mode

Pressure Feedback Sensor

The pressure feedback signal is evaluated as an ON/OFF pressure switch, with internal resistance of 2 kOhms when open and kOhms when pressurized.

If resistance is substantially lower than 1 kOhm, a shortcut (SC) condition is assumed.

If it's higher than 2 kOhms, an open load (OL) condition is assumed.

Transmission Oil Pressure Check

PRESSURE AND TEMPERATURE SPECIFICATIONS

See Figure 45, Figure 46, Figure 47, and Figure 48 for the locations of the pressure check points.

NOTE: All pressures and flows to be measured with oil temperature of 82 to 93°C (180 to 200°F).

- Normal operating temperature 70 to 120°C (158 to 248°F) measured at temperature check port to cooler (port 71 or port 32).
- Maximum allowed transmission temperature 120°C (248°F).
- Transmission regulator pressure (neutral) - port 31. See Figure 45.
  - At 600 RPM min. 17 bar (246.5 psi) minimum.
  - At 2650 RPM: 25.5 bar (369.8 psi) maximum.
- Pump flow
  - System pump flow: 100.5 l/min. minimum [26.34 GPM] at 1973 RPM.
  - Lube pump flow: 85.1 l/min. minimum [22.48 GPM] at 1973 RPM.
- Clutch pressures
  - 1st clutch: port 41. See Figure 45.
  - 2nd clutch: port 42. See Figure 46.
  - 3rd clutch: port 43. See Figure 46.
  - Forward clutch: port 45. See Figure 45.
  - Reverse clutch: port 46. See Figure 46
- At 2200 RPM
  - 21.5 to 25.5 bar (311.8 to 369.8 psi) clutch activated.
- Filter bypass valve set at 4.1 to 4.5 bar (59.4 to 65.2 psi).
- Lube pressure (port 34b), 1.76 to 2.64 bar (25.5 to 38.2 psi) at 73 l/min. [19.2 GPM] convertor flow.
- Internal total leakage with engine at 1000 RPM
  - Fwd/Rev: 4 l/min. (1 GPM)
  - 1st: 10.5 l/min. (2.7 GPM)
  - 2nd, 3rd, 4th: 4 l/min. (1 GPM)
- Safety valve: cracking pressure 9 bar (130.5 psi).
- To cooler (convertor out) pressure (port 32). See Figure 46. Minimum 2 bar (29 psi) at 2000 RPM. Maximum 5 bar (72.5 psi) at no load governed speed.

NOTES

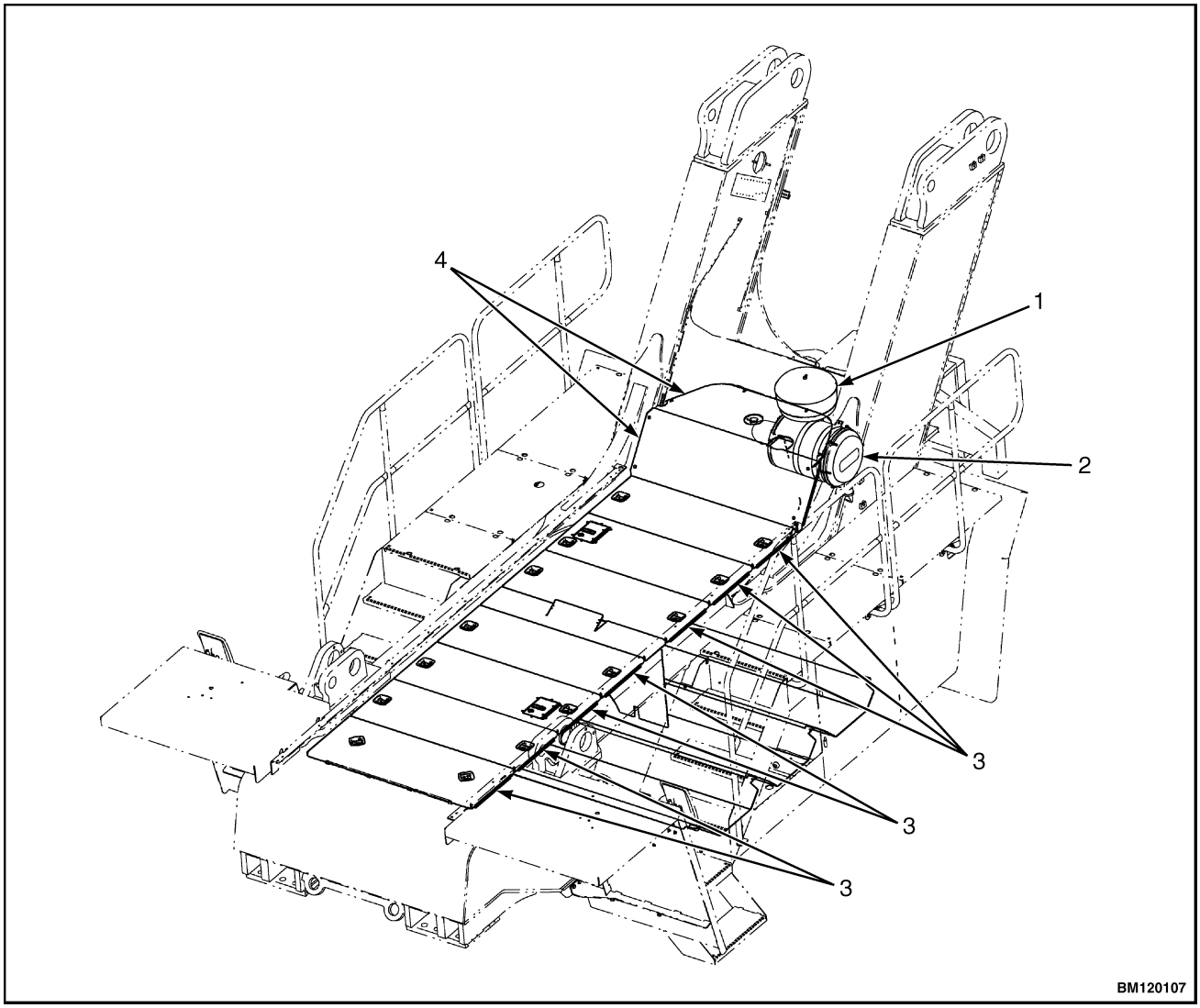


Figure 6. Covers

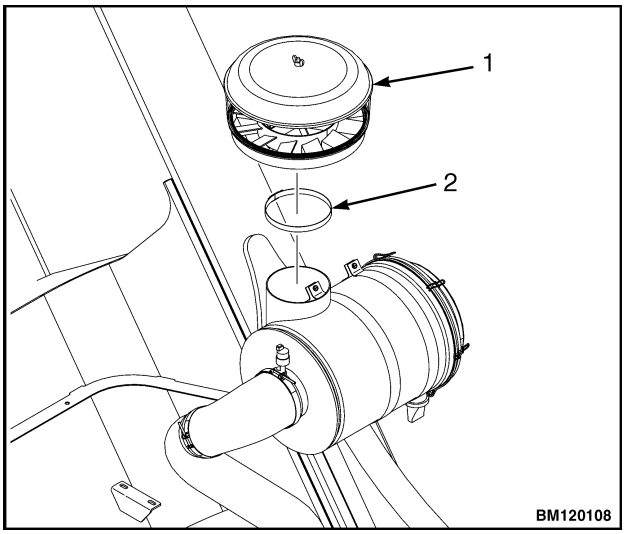


Figure 7. Precleaner

Legend for Figure 7

1. PRECLEANER
2. CLAMP

Engine Repair

REMOVE

CAUTION

Battery disconnect should only be performed at least 30 seconds after switching OFF ignition.

Remove the engine as follows:

1. Place truck on solid, level surface.
2. Lower the boom completely.
3. Shut down the engine.
4. Apply parking brake.

CAUTION

Remove the ground cable first.

5. Disconnect the cables at the battery.

WARNING

Verify the lifting device has the rated capacity of 2500 kg (5512 lb).

6. Attach a lifting device and sling to the hood panels.

NOTE: Do not remove the hood panel located above the air cleaner.

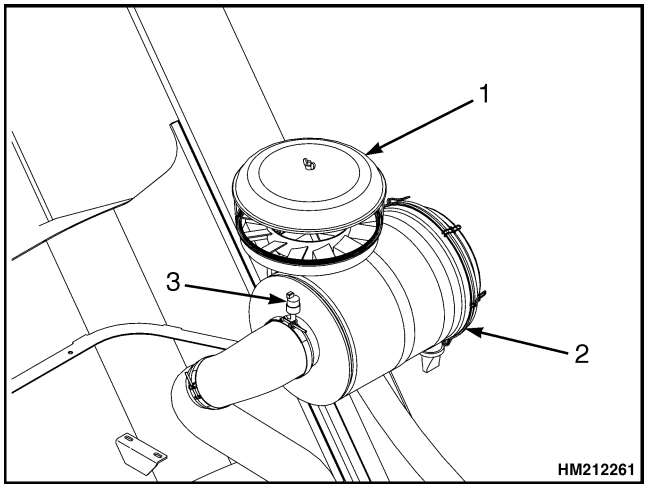
7. Remove the hood panels.
8. Remove the precleaner and pipe from the air cleaner. See Figure 13.
9. Remove the hood panel located above the air cleaner.
10. Remove the rubber elbow between the engine and air cleaner.
11. Remove the air cleaner.
12. Drain the coolant from the cooling system.

NOTE: Do not disconnect the cooling lines from the radiator.

13. Disconnect the cooling lines from the engine.
14. Remove the capscrews to the fan through the inspection cover.
15. Remove the fan.
16. Close shutoff valves on the bottom of the hydraulic tank.

NOTE: Use a pan to catch the oil in the hydraulic lines.

17. Disconnect the hydraulic lines at the pumps.
18. Put tags on the lines for identification.
19. Put caps on open lines and fittings.
20. Disconnect the flexible tube, attached to the engine, from the exhaust pipe. See Figure 12
21. Disconnect fuel lines at the fuel filter and engine.
22. Disconnect electric wires and wiring harnesses from the engine.
23. Disconnect the starter cable from the starter.
24. Disconnect the electrical wires from the transmission.
25. Disconnect the cooling lines from the transmission.
26. Remove the U-joint from the transmission.
27. Disconnect hydraulic lines from the transmission to the hydraulic filter.



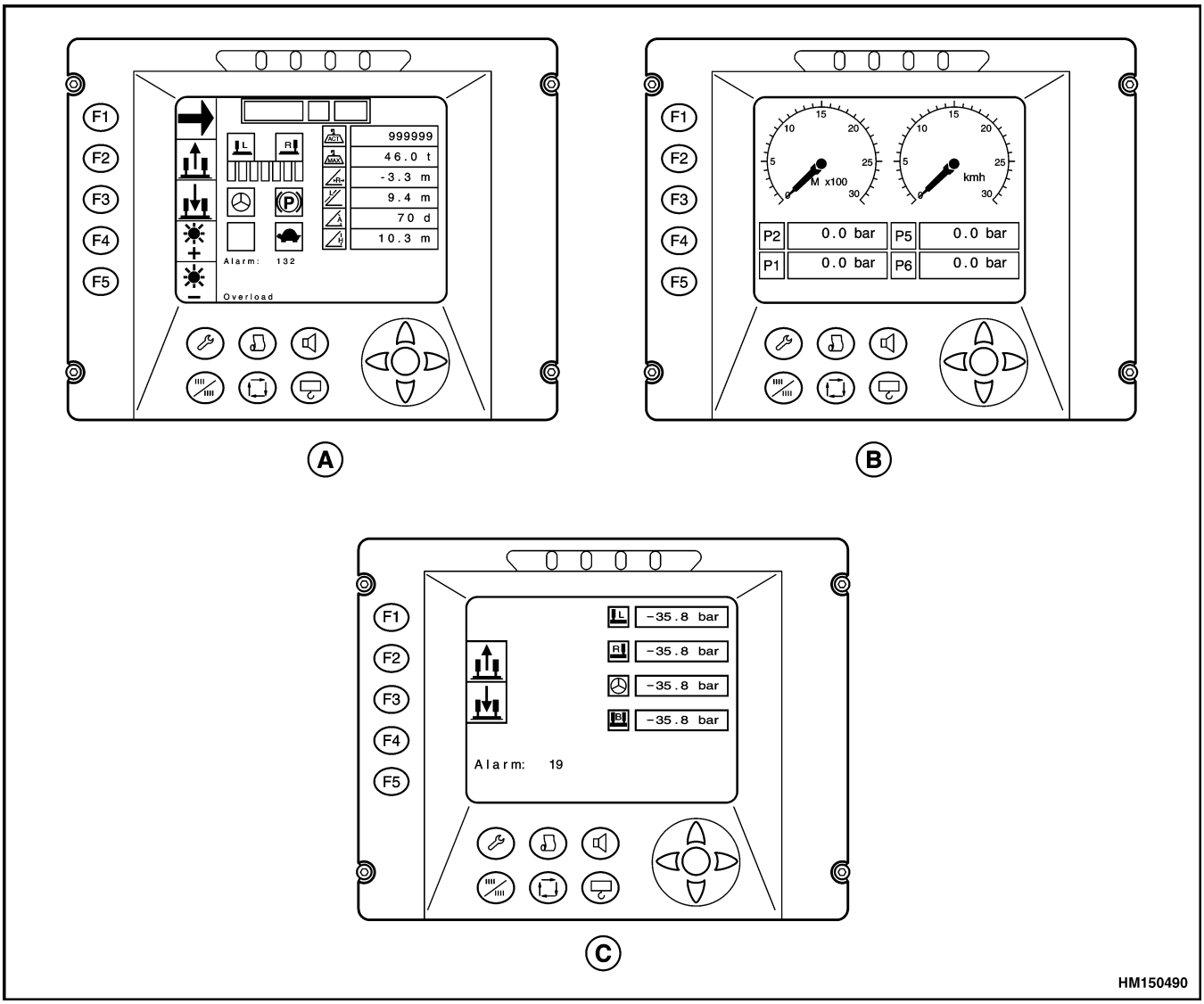
1. PRECLEANER
2. AIR CLEANER
3. ELECTRONIC RESTRICTION INDICATOR

Figure 13. Engine Air Cleaner

TABLE OF CONTENTS

This section is for the following models:

RS45-27CH, RS45-31CH, RS46-36CH, RS46-40CH, RS46-41S CH, RS46-41L CH, RS46-41LS CH, RS45-24IH, RS45-28IH, RS46-33IH, RS46-37IH, RS46-38S IH,RS46-38L IH, RS46-38LS IH (HR45-27, HR45-31, HR45-36, HR45-40, HR45-41S, HR45-41L, HR45-41LS) [B222]



A. LMI PAGE VIEW **B.** ENGINE PAGE VIEW **C.** STABILIZER PAGE VIEW

Figure 9. VIEW Display Unit for Trucks With Stabilizer

CABLE REEL (BOOM LENGTH AND ANGLE TRANSDUCER)

WARNING

The replacement of the length transducer and angle transducer must be done by qualified personnel only.

The cable reel (see Figure 10) is assembled at the back side of the outer boom. The internal length transducer consists of a spring loaded cable reel on which the length detection cable is wound. The other side of the cable is connected to the inner boom. During extending the boom a potentiometer length sensing device is measuring the boom length. The internal angle transducer is measuring the absolute angle of the boom through an accelerometer angle sensing device. These signals are essential in computing the boom geometry.

Setting Password

NOTE: The password will be supplied through Contact Managemment.

Refer to Table 5 for instructions on setting the password.

Table 5. Setting Password

Procedure	Display
Switch the lift truck **ON** and wait a few seconds until the display shows the software name.	RSMCD_3 17/11/05 HYSTER
Press the "ENTER" button. The "set password" should appear as shown. If a different page is shown, it means that the "ENTER" button was pressed too early or too late. Switch the lift truck **OFF** and start again.	* Code: 4477
Press the "ESC" button several times to move the asterisk on the display further to the right. With the "+" button, increase the number until the proper value is displayed. If necessary, use "−" button to decrease it. Press "ENTER" to confirm.	* Code: 4485
The system will show the name of the lift truck/configuration and the configuration (tires/stabilizers).	SPREADER TIRE
Press the "+" button to enter in the calibration menu. Always use "+" button to move inside the calibration menu. Proceed to Table 6.	

Language Selection and Unit of Measurement

Refer to Table 6 for instructions on setting the language and unit of measurement.

Table 6. Language Selection and Unit of Measurement

Procedure	Display
Now it is necessary to set the language. Go to menu 32 CONFIGURATION, using the "+" button.	CONFIGURATION Language 0
Press the "ESC" button several times to move the asterisk on the display further to the right. With the "+" button, increase the number until the proper value is displayed. If necessary, use "−" button to decrease it. Press "ENTER" button to change the value.	* Language 1 0 = Italian 1 = English 3 = German
Now select the unit of measurement.	CONFIGURATION Eng. Unit 0
Press the "ESC" button several times to move the asterisk on the display further to the right. With the "+" button, increase the number until the proper value is displayed. If necessary, use "−" button to decrease it. Press "ENTER" button to change the value.	* Eng. Unit 1 0 = Metric 1 = Imperial
Proceed to Table 7.	

SAFETY PRECAUTIONS
MAINTENANCE AND REPAIR

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

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

WARNING

Indicates a condition that can cause immediate death or injury!

CAUTION

Indicates a condition that can cause property damage!

PUMP OUTPUT CHECK

Two methods are given for checking the volume of flow from the hydraulic pump. The first method uses a flow meter, a pressure gauge, and a needle valve. The second method uses a needle valve, a pressure gauge, a container, and a timer.

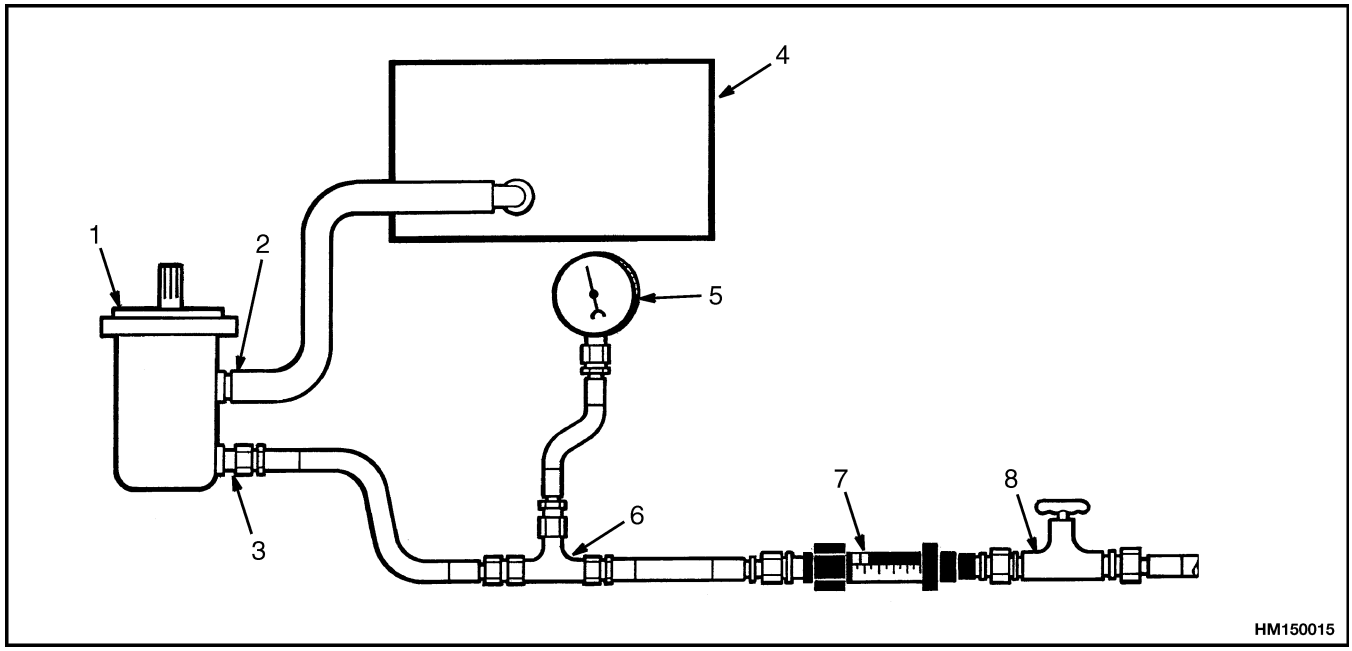
First Method

1. If the flow meter is available, install flow meter between needle valve and outlet port of pump. See Figure 5. Pressure gauge must be between needle valve and pump. Make a separate check for each system. When hydraulic oil is at operating temperature, run engine at 2100 rpm with no load on hydraulic system. Note reading of flow meter. Compare output rate of pump with specification found in the Specifications section.

WARNING

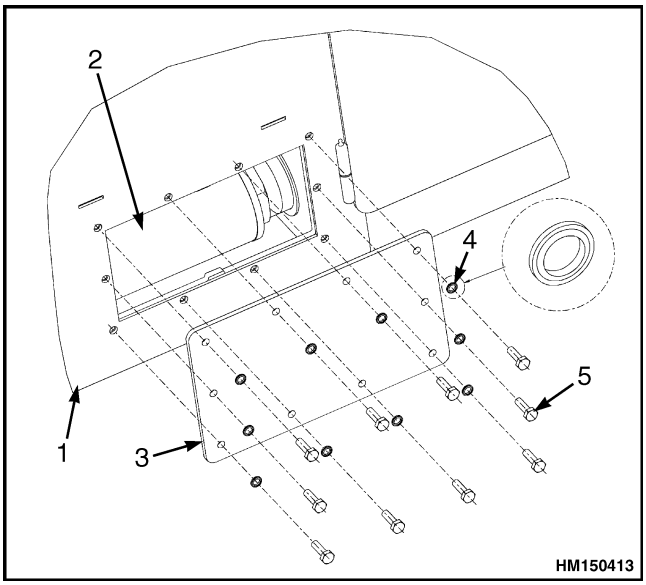
Hydraulic oil can be hot. Do not touch oil during tests.

2. Run engine at high limit. Slowly close needle valve until gauge indicates a pressure just below specification for relief valve setting. Pump output at high pressure must be within 25% of output with no load. If output at high pressure is less than 75% of low pressure output, pump has a problem.



1. HYDRAULIC PUMP
2. INLET PORT
3. OUTLET PORT
4. HYDRAULIC TANK
5. PRESSURE GAUGE
6. TEE FITTING
7. FLOW METER
8. NEEDLE VALVE

Figure 5. Check Output of Hydraulic Pump With Flow Meter



1. HYDRAULIC TANK
2. SUCTION FILTER
3. INSPECTION COVER
4. SEAL RING, 10 EACH
5. BOLT, 10 EACH

Figure 10. Suction Filters

6. Remove seal rings.

7. Remove inspection cover.

8. Remove suction filters by turning each filter counterclockwise.

9. Install new suction filters by turning each filter clockwise.

NOTE: Only use seal rings specified by your local Hyster dealer. Using seal rings other than specified can lead to hydraulic oil leakage.

10. Install inspection cover using seal rings and bolts.

11. Torque bolts to 51 N•m (38 lbf ft).

12. Fill hydraulic tank with hydraulic oil, as specified in the section **Periodic Maintenance** 8000 SRM 1263.

13. Open shutoff valves.

CAUTION

Never start the engine with closed shutoff valves. Open the shutoff valves before starting the engine to prevent damage to hydraulic components.

14. Start engine and check system operation.

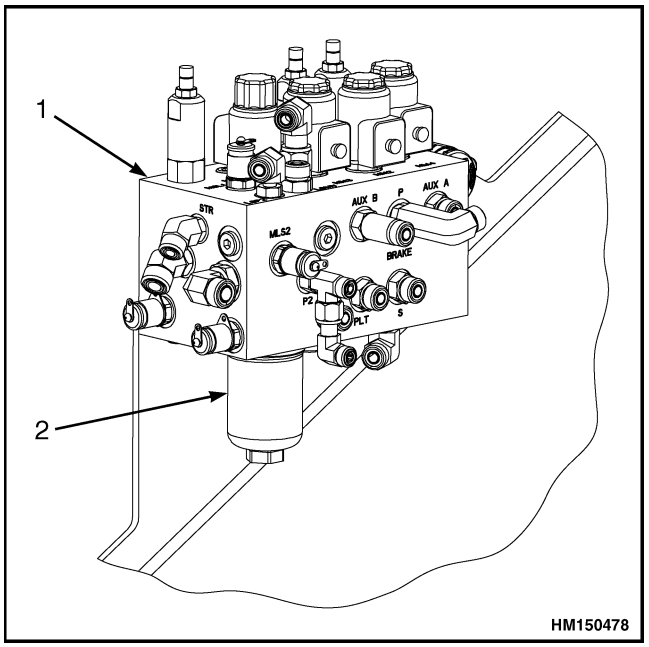
High Pressure Filter

1. Lower boom completely.

2. Shut down the engine and apply the parking brake.

3. Apply brakes minimum 10 times to relieve hydraulic pressure.

4. Loosen the bowl by using a wrench to turn the bowl counterclockwise. See Figure 11.



1. MAIN MANIFOLD
2. BOWL

Figure 11. High Pressure Filter

5. Remove filter cartridge.

6. Insert new filter cartridge.

7. Install the bowl by turning the bowl clockwise.

8. Torque the bowl to 20 N•m (14.7 lbf ft).

9. Start engine and check system operation.

Brake Filter

1. Lower boom completely and close shutoff valves on the bottom of the hydraulic tank.

2. Shut down the engine and apply the parking brake.

Legend for Figure 2

NOTE: THE FOLLOWING TABLE INDICATES HYDRAULIC CONNECTIONS TO/FROM THE MANIFOLD. LETTERING IN PARENTHESIS INDICATES LOCATION AND IS STAMPED ON MANIFOLD.

Hydraulic Line Connections			
Location	**Connection**	**Location**	**Connection**
ACC	To/From Accumulator	P1	From Main Control Valve
Aux A	To Main Control Valve (A3)	P Brake	Park Brake Pressure Supply To Brake Manifold
Aux B	From Main Control Valve (B3)	S Brake	Service Brake Pressure Supply To Cab Manifold
P2	From Main Control Valve (Derrick, XA1, XA2)	T1	Drain Line To Hydraulic Tank
PLT	Pilot Supply To Cab Manifold (Derrick, Extend/Retract)	T2	From Cab Manifold (T)
STR	LS Line From/To Flow Amplifier	T3	From Derrick Load Holding Valve (Drain "D")
LS1	LS Line To Pump 1	LS2	LS Line To Pump 2
LSMV	LS Line From/To Main Control Valve	PD	From Main Control Valve (Aux "XA3")

NOTE: ITEMS ARE VALVES, MEASUREMENT PORTS, AND PRESSURE SWITCHES. NUMBERS IN PARENTHESIS INDICATE LOCATION AND ARE STAMPED ON MANIFOLD.

Item	Description	Stamping on Manifold
1	High Pressure Filter	N/A
2	Insert Valve	N/A
3	Shuttle Valve	N/A
4	Shuttle Valve	N/A
DR1	Electrical Selector Valve (ACC)	DR1
DR2	Electrical Selector Valve (Pilot)	DR2
DR3	Electrical Selector Valve (PD)	DR3
5	Insert Valve	N/A
6	Insert Valve	N/A
MACC	Pressure Display For Accumulator Pressure	M ACC
MP1	Check Port MP1 For Pressure Pump 1 Or Pump 2 When Not Fully Stroked	M P1
MPLT	Check Port MPLT For Pilot Pressure	M PLT

Torque Values

Valve/Cartridge Torque Specifications		
Cartridge Size	**210 bar (3046 psi)**	**345 bar (5004 psi)**
#04	7 N•m (5 lbf ft)	9 N•m (7 lbf ft)
#06	14 N•m (10 lbf ft)	16 N•m (12 lbf ft)
#07	20 N•m (15 lbf ft)	31 N•m (23 lbf ft)
#08	20 N•m (15 lbf ft)	31 N•m (23 lbf ft)
#09	20 N•m (15 lbf ft)	31 N•m (23 lbf ft)
#10	22 N•m (16 lbf ft)	65 N•m (48 lbf ft)
#12	28 N•m (21 lbf ft)	76 N•m (56 lbf ft)
#16	54 N•m (40 lbf ft)	99 N•m (73 lbf ft)
#20	113 N•m (83 lbf ft)	133 N•m (98 lbf ft)

Nonadjustable Adapter Assembly Torques		
Size	**Port Thread**	**Assembly Torque**
#04	7/16" - 20UNF-2A	20 to 22 N•m (15 to 16 lbf ft)
#06	9/16" - 18UNF-2A	45 to 50 N•m (33 to 37 lbf ft)
#08	3/4" - 16UNF-2A	80 to 88 N•m (59 to 65 lbf ft)
#12	1 1/16" - 12UNF-2A	185 to 204 N•m (136 to 150 lbf ft)
#16	1 5/16" - 12UNF-2A	270 to 297 N•m (199 to 219 lbf ft)
#20	1 5/8" - 12UNF-2A	340 to 374 N•m (251 to 276 lbf ft)

Adjustable Adapter Assembly Torques		
Size	**Port Thread**	**Assembly Torque**
#04	7/16" - 20UNF-2A	20 to 22 N•m (15 to 16 lbf ft)
#06	9/16" - 18UNF-2A	45 to 50 N•m (33 to 37 lbf ft)
#08	3/4" - 16UNF-2A	80 to 88 N•m (59 to 65 lbf ft)
#12	1 1/16" - 12UNF-2A	185 to 204 N•m (136 to 150 lbf ft)
#16	1 5/16" - 12UNF-2A	270 to 297 N•m (199 to 219 lbf ft)
#20	1 5/8" - 12UNF-2A	340 to 374 N•m (251 to 276 lbf ft)

Swivel Fitting Assembly Torques		
Size	**Port Thread**	**Assembly Torque**
#6	11/16" - 18UNF-2A	24 to 27 N•m (18 to 20 lbf ft)
#8	13/16" - 16UNF-2A	43 to 47 N•m (32 to 35 lbf ft)
#12	1 3/16" - 16UNF-2A	90 to 95 N•m (66 to 70 lbf ft)

SAFETY PRECAUTIONS
MAINTENANCE AND REPAIR

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

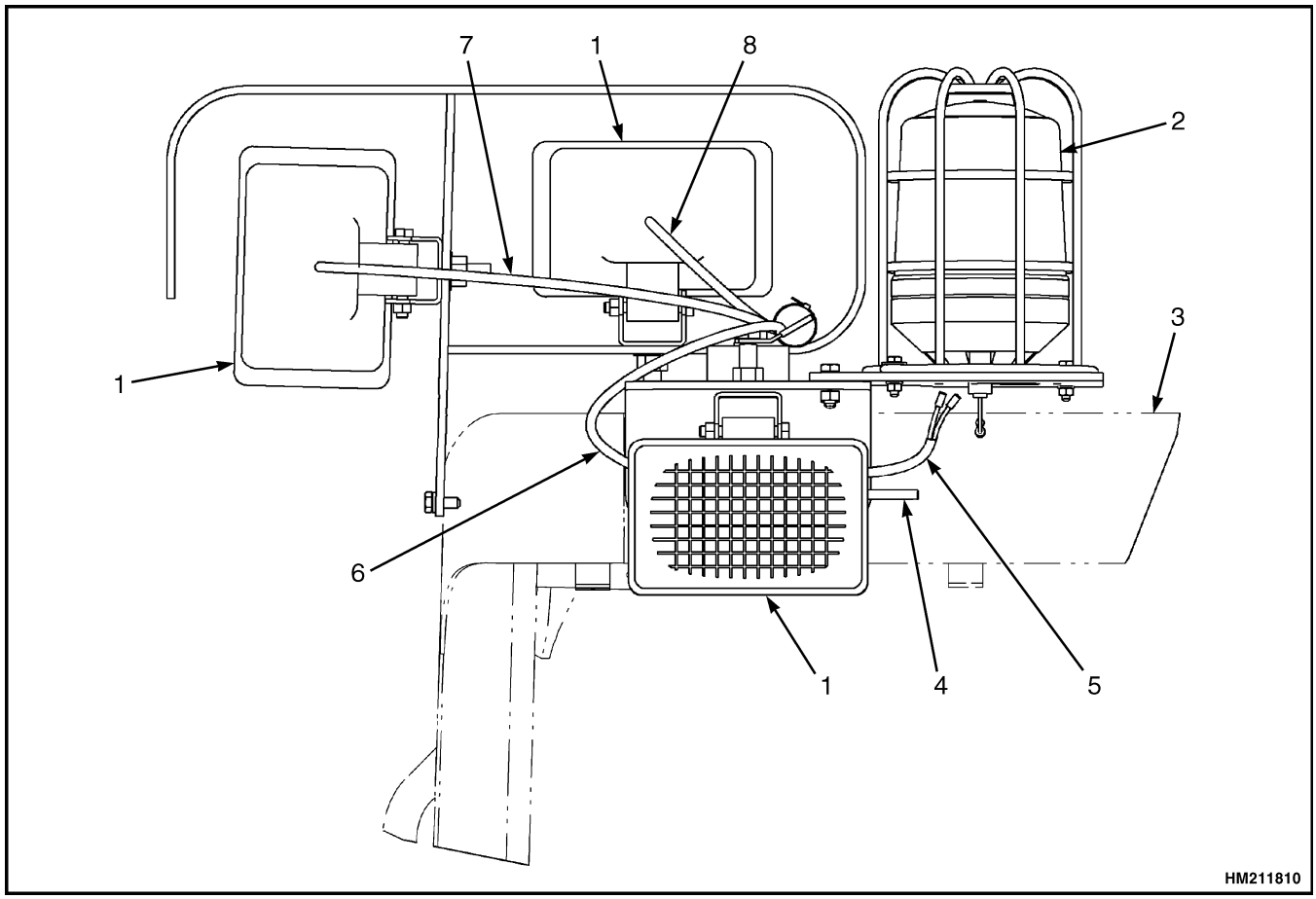
NOTE: The following symbols and words indicate safety information in this manual:

WARNING

Indicates a condition that can cause immediate death or injury!

CAUTION

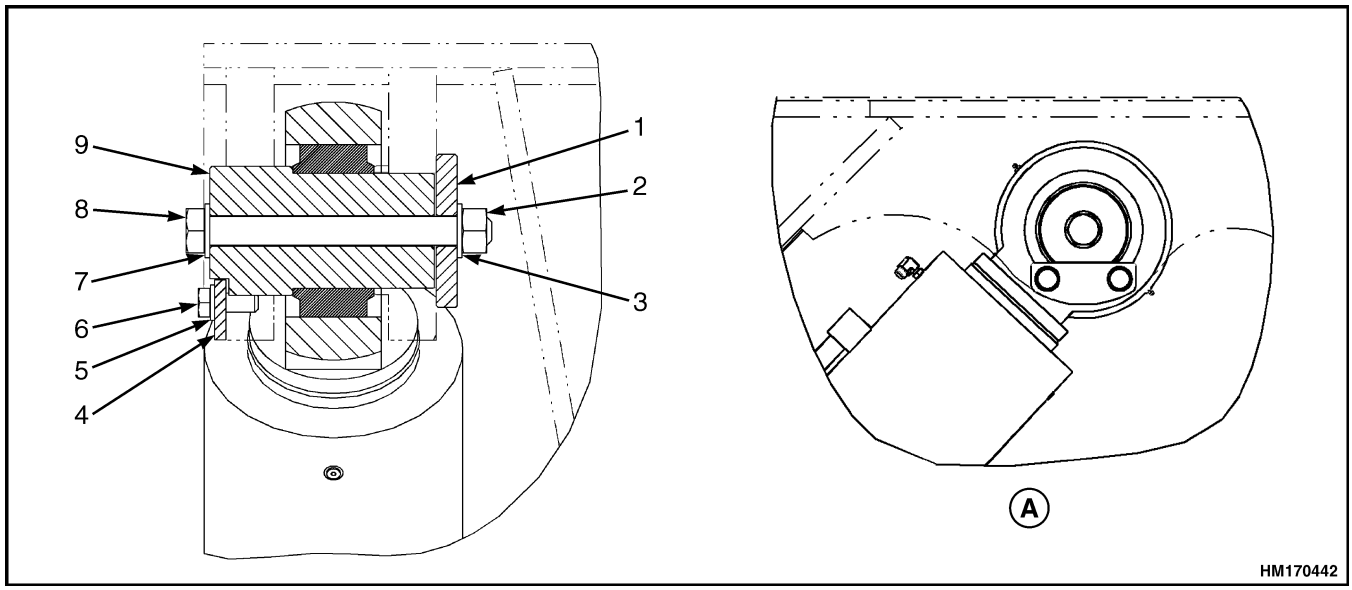
Indicates a condition that can cause property damage!



Item No.	Connector	Description
1	N/A	Working Light (Halogen or HID)
2	N/A	Rotating Flashing Light
3	N/A	Cab
4	C10 (black 8 way dt socket housing – DEUTSCH)	Mate to connector on cab assembly.
5	C30 (4 mm socket terminal and 4 mm male bullet terminal – SUMITOMO)	Beacon/Strobe
6	C20 (black 2 way dt socket housing – DEUTSCH)	Rear Drive Light
7	C50 (black 2 way dt socket housing – DEUTSCH)	Outer Front Flood Light
8	C40 (black 2 way dt socket housing – DEUTSCH)	Inner Front Flood Light

Figure 6. Light Assemblies

NOTES



A. SIDE VIEW SHOWN

1. RING
2. NUT
3. WASHER
4. PLATE
5. WASHER
6. CAPSCREW
7. WASHER
8. CAPSCREW
9. PIN CYLINDER

Figure 4. Lift Cylinders to Boom Mounting

WARNING

Verify that the lifting device has the rated capacity to lift the pin or personal injury may occur.

d. Use a press to push the pivot pin towards the outside of the boom.

e. Remove the pivot pin.

f. Follow Step a through Step e to remove the pivot pin of the other derricking cylinder.

g. Start the engine.

h. Fully retract the derricking cylinders.

i. Shut down the engine.

12. Disconnect the boom from the frame as follows:

a. Disconnect the two hydraulic lines and three electrical connectors between the boom and frame. Put caps on open lines.

b. Remove nut, two washers, and capscrew from the pivot pin. See Figure 5.

c. Remove the cap, positioned at the center of the frame.

d. Remove the three capscrews and replace with longer capscrews for removing the cap, located at the outside. Tighten capscrews alternating each screw to remove cap from the pivot pin

e. Remove the cap.

WARNING

Verify that the lifting device has the rated capacity to lift the pin or personal injury may occur.

f. Remove pivot pin.

g. Remove the pivot pin from the other side of the boom using the same procedure.

4. Assemble the cylinder onto the cylinder shell with 20 capscrews and tightly fasten the capscrews.
5. Assemble the piston head on the piston hose by turning the piston head clockwise.
6. Tighten the piston head using the screws.
7. Install the load holding valve with four capscrews.
8. Attach the two hoses to the boom extension cylinder fittings.
9. Route the three hoses as shown in Figure 11.

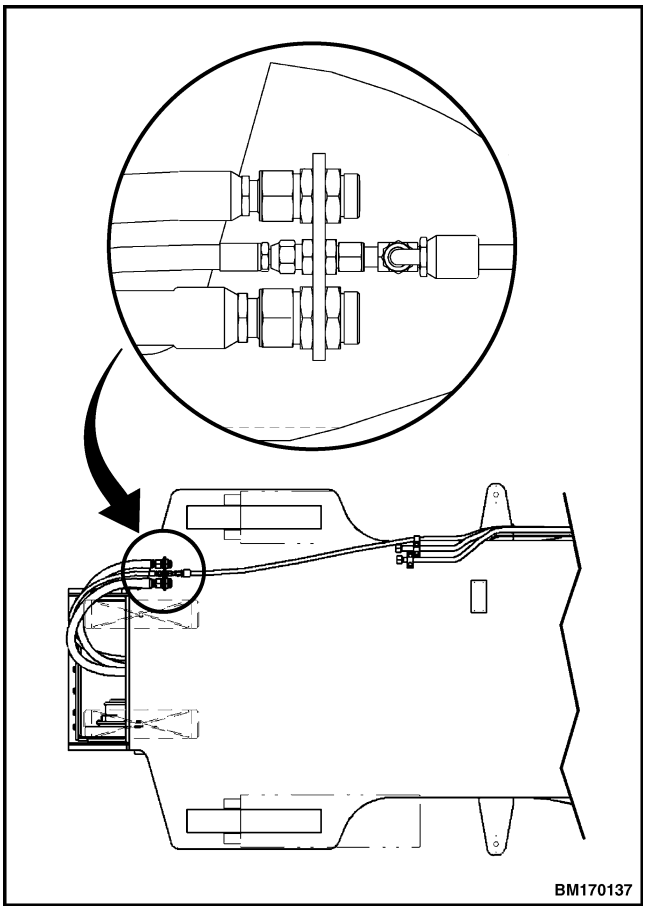


Figure 11. Boom Extension Hose Routing

INSTALL

1. Connect a lifting device to the boom extension cylinder.
2. Install the boom extension cylinder in the inner boom section (through the rear of the outer boom section) so the pin tube on the cylinder rod is aligned with the holes for the mount pin.
3. Install the pin through the holes into the pin tube at the cylinder rod side.
4. Install the two covers.
5. Apply Loctite® 270 to the six capscrews and install capscrews.
6. Align the pin tube on the cylinder shell with the holes at the rear of the outer boom section.
7. Install the pin so the slot for the keeper is at the top side.
8. Install the keeper, two capscrews, and washers. Tighten the capscrews to 265 N•m (195 lbf ft).
9. Attach the hoses to the boom extension cylinder.
10. Start the engine and operate the boom functions. Verify that the boom extension cylinder functions correctly.

WARNING

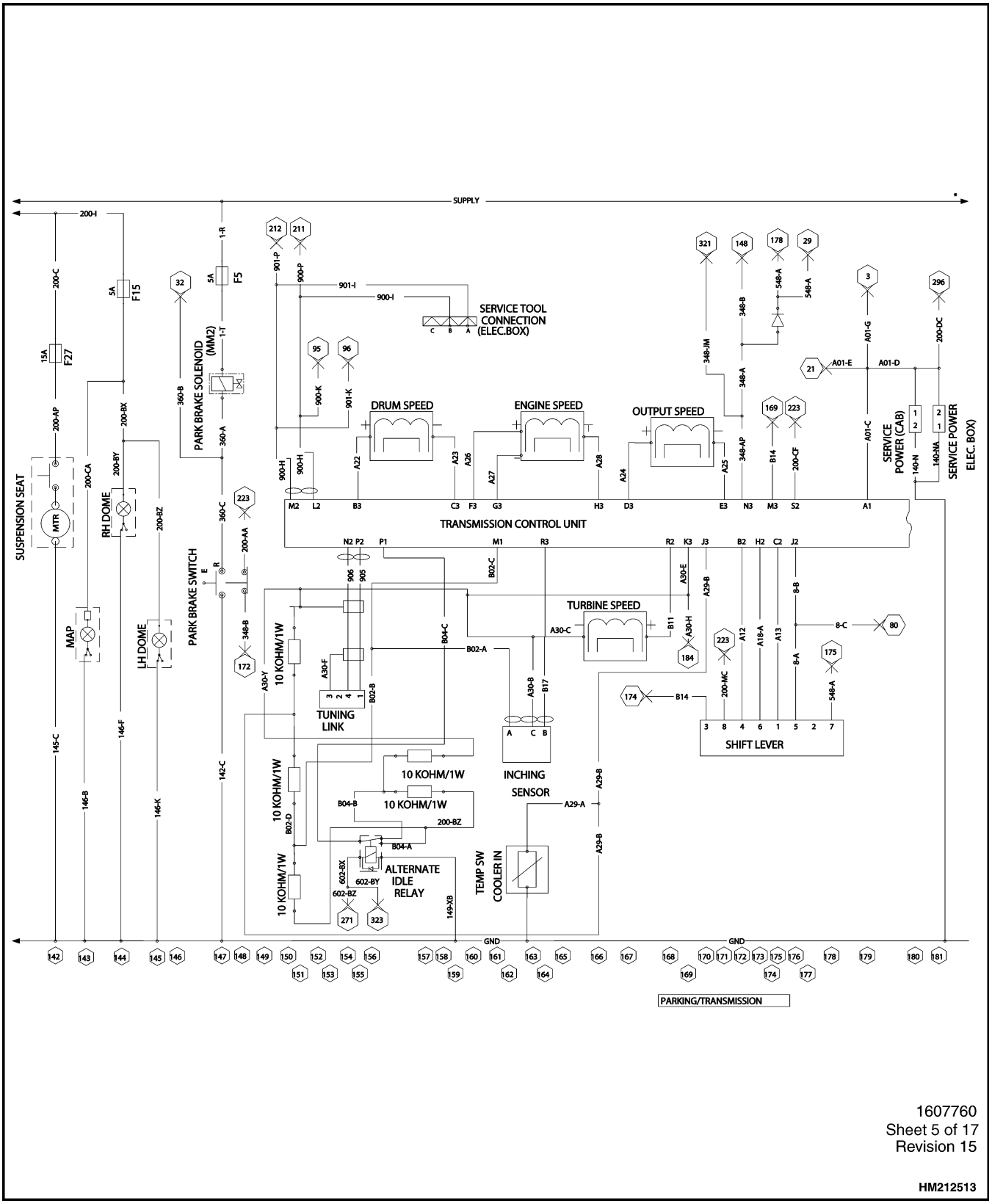
Do not try to locate hydraulic leaks by placing hands on pressurized hydraulic components. Hydraulic oil can be injected into the body by pressure.

11. Check for leaks.

TABLE OF CONTENTS

This section is for the following models:

RS45-27CH, RS45-31CH, RS46-36CH, RS46-40CH, RS46-41S CH, RS46-41L CH, RS46-41LS CH, RS45-24IH, RS45-28IH, RS46-33IH, RS46-37IH, RS46-38S IH, RS46-38L IH, RS46-38LS IH (HR45-27, HR45-31, HR45-36, HR45-40, HR45-41S, HR45-41L, HR45-41LS) [B222]



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HM210009

Figure 1. Electrical Schematic (Sheet 10 of 16)

902-A	CAN Low[CANopen] CAB Diag. Plug Splice to CAN Low[CANopen] Midac Splice
902-A	CAN Low[CANopen] CAB Diag. Plug Splice to CAN Low LMI Display Splice
902-B	CAN Low[CANopen] CAB Diag. Plug Splice to CAN Low[CANopen] Midac Splice
902-C	CAN Low[CANopen] CAB Diag. Plug Plug Splice to LMI Diagnostic Plug[CAB]
902-D	CAN Low LMI Display Splice to LMI Display
902-E	CAN Low LMI Display Splice to Terminating Resistor[120ohm]
902-F	LH5 RHCAN Low[CANopen] LMI Diag. Plug Splice to LMI Diagnostic Plug[electric box]
902-G	CAN Low[CANopen] Midac Splice to MIDAC256 pin 7B
902-K	CAN Low[CANopen] Midac Splice to CAN Low [CANopen] LMI Diag. Plug Splice
902-L	CAN Low[CANopen] LMI Diag. Plug Splice to ACT pin 4
902-T	CAN Low Midac256 pin 5A to Midac256 diagnostic connector
903-A	CAN High[CANopen] CAB Diag. Plug Splice to CAN Low[CANopen] Midac Splice
903-A	CAN High[CANopen] CAB Diag. Plug Splice to CAN High LMI Display Splice
903-B	CAN High[CANopen] CAB Diag. Plug Splice to CAN High[CANopen] Midac Splice
903-C	CAN High[CANopen] CAB Diag. Plug Splice to LMI Diagnostic Plug[CAB]
903-D	CAN High LMI Display Splice to LMI Display
903-E	CAN High LMI Display Splice to Terminating Resistor[120ohm]
903-F	CAN High[CANopen] LMI Diag. Plug Splice to LMI Diagnostic Plug[electric box]
903-G	CAN High[CANopen] Midac Splice to MIDAC256 pin 6B
903-K	CAN High[CANopen] Midac Splice to CAN High[CANopen] LMI Diag. Plug Splice
903-L	CAN High[CANopen] LMI Diag.Plug Splice to ACT pin 3
903-T	CAN High Midac256 pin 5B to Midac256 diagnostic connector
913-A	Flasher Unit to Flasher Splice
913-B	Flasher Splice to Hazard Switch
913-C	Flasher Splice to Indicator Switch
914-A	Boom Lights Relay to Boom Lights Splice
914-B	Inner Boom Light Splice to Inner Boom Light Splice
914-C	Inner Boom Light Splice to Inner Boom Light Splice
914-D	Outer Boom Light Splice to Outer Boom Light Splice
914-D	Inner Boom Lights Splice to Inner Boom Light LHS
914-E	Outer Boom Light Splice to Outer Boom Light Splice
914-E	Inner Boom Lights Splice to Inner Boom Light RHS
914-F	Outer Boom Lights Splice to Outer Boom Light LHS
914-G	Outer Boom Lights Splice to Outer Boom Light RHS
914-J	Boom Lights Connector to Outer Boom Lights Splice
914-K	Boom Lights Connector to Inner Boom Lights Splice
915-A	Strobe Light switch to Strobe Light Splice
915-B	Strobe Light Splice to Strobe Light
915-C	Strobe Light Splice to Strobe Light
917-A	Midac256 pin 8C to Boom Extend Cut-off Relay
917-H	Aux. Relay to AUX A Solenoid[70l/min]
917-I	Aux. Relay to AUX B Solenoid[110l/min]
917-P	Twist Module pin 7 to Switched Supply] Splice[TWIST module]
918-A	Reverse Relay to Reverse Splice
918-B	Reverse Splice to Strope Light Switch
918-C	Reverse Splice to Reverse Light Fuse[F30]
918-D	Buzzer Override Diode Splice to Buzzer Override Splice
918-E	Sliding Cab Buzzer Diode to Buzzer Override Splice
918-F	Buzzer Override Splice to Buzzer Override Relay
918-G	Red light Splice[Midac] to Buzzer Override Splice
927-A	Front Washer Pump Splice to Front Wiper Timer
927-B	Front Wiper/Washer Switch to Front Washer Pump Splice
927-C	Front Washer Pump Splice to Front Washer Pump
928-A	Instrument Cluster to Audible Warning Splice
928-B	Audible Warning Splice to Audible Warning
928-C	Audible Warning Splice to Audible Warning Diode
928-D	Audible Warning Splice to Buzzer Override Relay
937-A	Attach Lights Switch to Spreader U2-15[Work Lights]
937-AB/ SHD5	MIDAC256 pin 4A to MIDAC256 Analog Ground Splice
937-AE	Pressure Trans 5 to MDAC256 Analog Ground Splice
937-AF	Pressure Trans 6 to MDAC256 Analog Ground Splice
937-AG	Pressure Trans 1 to MDAC256 Analog Ground Splice
937-AH	Pressure Trans 2 to MDAC256 Analog Ground Splice
937-AM	Shield RS232 Com Midac to Midac Diagnostic Plug pin 5
937-EA	MIDAC256 2A to Pressure Trans 1
939-EB	MIDAC256 3A to Pressure Trans 6
939-ED	MIDAC256 3B to Pressure Trans 5
939-EE	MIDAC256 1C to CM1[Derrick Down Cut-of]
939-EE	Boom Down Relay to Switch CM1
939-EF	MIDAC256 2C to Boom positon switch
939-FA	MIDAC256 2B to Pressure Trans 2
939-FB	MIDAC256 4C to Sliding CAB cut-of Relay
939-TA	MIDAC256 1C to CM1[Derrick Down Cut-of]
939-TA	Midac256 pin 1C to Boom Down Relay
940-A	Stair Light Splice to Stair Light switch
940-B	Stair Light to Stair Light Splice
940-B/C	Stair Light to Stair Light Splice
940-C	Stair Light to Stair Light Splice
A01-B	XMSN Controller/Service Power Splice Frame to XMSN Controller/Service Power Splice CAB
A01-C	XMSN Controller/Service Power Splice Controllers to XMSN Controller pin A1
A01-D	XMSN Controller/Service Power Splice Controllers to Service power
A01-D	XMSN Controller/Service Power Splice CAB to Service power
A01-E	XMSN Controller/Service Power Splice Frame to XMSN Controller/Service Power Splice Contr.
A01-E	XMSN Controller/Service Power Splice CAB to Calilbration Switch
A01-F	Battery Splice to Fuse XMSN Controller /Service Power[7.5A]
A01-G	Fuse XMSN Controller/Service Power[7.5A] to XMSN Controller/Service Power Splice Frame
A02	Transmission valve pin 3 [forward] to XMSN ctrl pin B1 [large connector]
A03	Transmission valve pin 4 [forward] to XMSN ctrl pin C1 [large connector]
A04	Transmission valve pin 1[2nd gear] to XMSN ctrl pin D1[large connector]
A05	Transmission valve pin 2 [2nd gear] to XMSN ctrl pin E1 [large connector]
A06	Transmission valve pin 7 [reverse] to XMSN ctrl pin F1 [large connector]
A06	Transmission valve pin 7 to XMSN ctrl J2
A06	Valve pin 7 to XMSN ctrl J2
A07	Transmission valve pin 8 [reverse] to XMSN ctrl pin G1 [large connector]
A08	Transmission valve pin 5 [1st/3rd gear] to XMSN ctrl pin H1 [large connector]

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Item	Specification
M PLT - Pilot Circuit at 2100 rpm	4.5 to 5.0 MPa (653 to 725 psi)
M SB1 - Service Brake Pressure at 2100 rpm	17.0 to 17.5 MPa (2466 to 2538 psi)
M SB4- Service Brake Pressure at 2100 rpm	15.66 to 16.68 MPa (2271 to 2419 psi)
M STEER - Service Circuit at 2100 rpm	21.0 to 22.5 MPa (3046 to 3263 psi)
Main Return Line Filter	
Bypass Pressure	250 to 350 kPa (36 to 51 psi)
Transmission Filter	
Bypass Pressure	170 to 200 kPa (25 to 29 psi)
Brake Filter	
Bypass Pressure	35 kPa (5 psi)

Torque Specifications

MAIN CONTROL VALVE

Main Control Valve Fastening Bolts 225 N•m (166 lbf ft)

Plate Socket Bolt 70 N•m (52 lbf ft)

A-Side

Locking Screw
120 N•m (89 lbf ft)

Top-Side

Locking Screw
300 N•m (221 lbf ft)

B-Side

Combined Relief Anti-cavitation Valve
150 N•m (111 lbf ft)

Flow Limiter Valve
25 N•m (19 lbf ft)

Locking Screw
150 N•m (111 lbf ft)

Anti-cavitation Valve
150 N•m (111 lbf ft)

Pressure Relief Valve
25 N•m (19 lbf ft)

Seat Valve from Pressure Relief Valve
15 N•m (11 lbf ft)

A and B Side

Socket Bolt for Spool Cover
10.4 N•m (8 lbf ft)

ELECTRICAL SYSTEM

Alternator

Shaft Nut
95-108 N•m (70-80 lbf ft)

Mount Bolt
81-95 N•m (60-70 lbf ft)

Battery (B+) Terminal
9.0-13.6 N•m (80-120 lbf in)

Indicator (I) Terminal
1.7-2.8 N•m (15-25 lbf in)

Ground (B-) Terminal
5.6-6.8 N•m (50-60 lbf in)

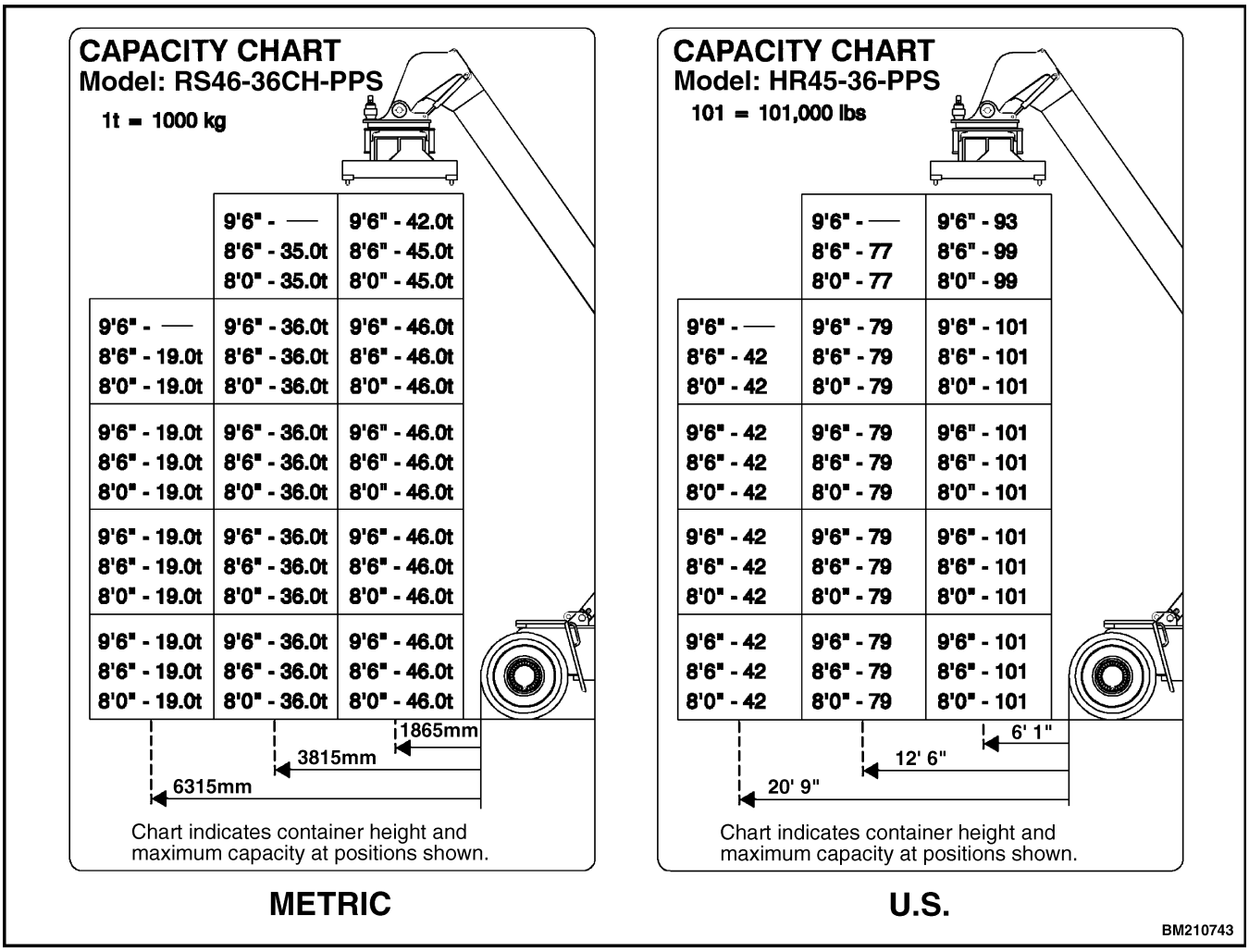


Figure 10. Lifting Capacities

HYSTER TECHNICAL PUBLICATIONS

8000 SRM 1262 10/07 (7/07)(5/06) Printed in U.S.A.

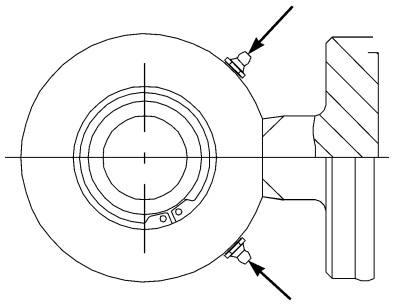
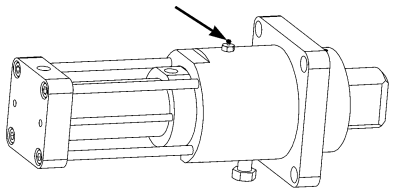
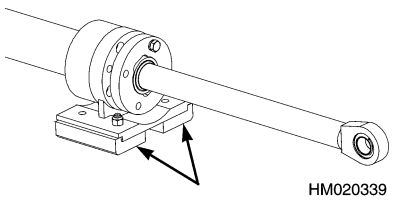
Table 1. Daily Inspections — Condition Check

Item No.	Item	Procedure
	Safety Labels	Check for presence and readability. See **Parts Manual**.
33	Boom, Rotator, and Spreader	Check condition.
21	Air Pre-Cleaner Dust Bowl	Check dust level in bowl. Empty bowl when dust is present.
	Tires and Tire Pressure	Check condition and pressure. See Nameplate. Check for missing wheel nuts.
26	Drive Belt	Check condition.
	Engine Air Intake and Charge Air Piping	Check for wear points, damage to piping, leaks, loose clamps, or loose connections.
	Fuel, Oil, and Coolant Leaks	Check for leaks.
22, 3	Radiator Sections for Engine Coolant, Charge Air Cooler, Transmission and Hydraulic Oil	Check fins and clean if necessary. Check hoses and tube connections for leakage.
	Coolant Hoses	Inspect for cracks, cuts, and collapsing.
	Engine Compartment	Remove combustible materials.
	Safety Belt, Seat Rails, and Steering Column	Check condition and operation.
See Figure 2 for Item Nos.		

Table 2. Daily Inspections — Fluid Level Check

Item No.	Item	Specification	Procedure
19	Hydraulic System Oil	John Deere JDM-J20C	**CAUTION** **Additives in the hydraulic system oil may damage the hydraulic system. Before using additives, contact your local HYSTER dealer.** Check level indicator with boom fully lowered and retracted. Add oil if needed. Fill hydraulic oil through hydraulic return filter.
	Windshield Washer Fluid		Check level and add fluid as necessary.
16, 27	Engine Oil Level	SAE 15W-40, −18°C (0°F) and up. API CH-4/SJ	Maintain level at Full mark on dipstick when cold.
See Figure 2 for Item Nos.			

Table 11. Lubricate (Continued)

Item No.	Item	Interval	Quantity	Procedure
5	Joint Balls  HM020336	500 hr/3 mo	**NOTE:** There are two grease nipples available. Only one grease nipple is necessary to grease 5 grease points	Lube with multipurpose grease with 2-4% molybdenum disulfide additive.
6	Stop Cylinders  HM020337	500 hr/3 mo	**NOTE:** One grease nipple on each stop cylinder. 2 grease points.	Lube with multipurpose grease with 2-4% molybdenum disulfide additive.
7	Extension Cylinder Support Wear Pads and Tracks  HM020339	500 hr/3 mo	**NOTE:** Two tracks in each extension beam. 4 grease points.	Lube with multipurpose grease with 2-4% molybdenum disulfide additive.
See Figure 3 and Figure 4 for Item Nos.				

Attachments

Check that the controls for the attachment operate the functions of the attachment correctly as described in the **Operating Manual**. See the symbols by each of the controls. Make sure all of the hydraulic lines are connected correctly and do not leak.

Boom and Spreader Operation

WARNING

Lower and retract the boom 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.

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

Do the following checks and inspections:

- Check for leaks in the hydraulic system. Check the condition of the hydraulic hoses and tubes.
- Slowly raise and lower the boom several times without a load. Extend and retract the boom at least once. The boom must raise and lower smoothly.
- Check that the controls for the boom and spreader operate the functions correctly. See the symbols by each of the controls.

Transmission

Inspect for leaks and the condition of the hoses. Make sure the transmission is shifting smoothly. If a problem is present, report this problem immediately. **DO NOT** operate the lift truck until the problem is corrected.

Transmission Oil

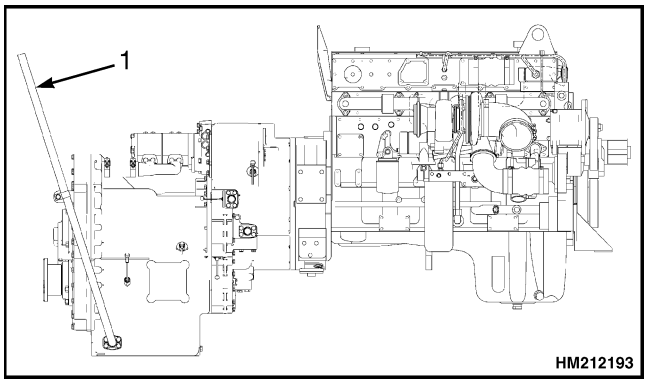
CAUTION

DO NOT operate the engine when the gauge needle is in the red area.

NOTE: Check with transmission hot.

There is an oil temperature warning light, oil temperature gauge, and an oil pressure gauge for the transmission. The red light is **ON** when the key switch is in the **START** position and must go **OFF** when the engine is running. During normal operation, the needle of the temperature gauge will be in the green area, the needle of the pressure gauge will be approximately in the middle of the scale.

Apply the parking brake. Check the oil level in the transmission when the engine is running at idle speed and the shift lever is in the **NEUTRAL** position. The dipstick and fill tube is on the right-hand side of the engine near the fuel filter. Use the correct oil as shown in the Maintenance Schedule. Keep the oil level at the "FULL" mark on the dipstick. See Figure 17.



1. TRANSMISSION DIPSTICK AND FILL TUBE

Figure 17. Transmission Dipstick

Maintenance Procedures Every 3000 Hours or 18 Months

NOTE: Do these procedures in addition to the 2000-hour checks.

HYDRAULIC RETURN LINE OIL FILTER

Check hydraulic oil pressure at check port MRF (full throttle, maximum lowering speed at minimum oil temperature) 60°C (140°F). If measured value is higher than 250 kPa (36 psi), change filters.

HYDRAULIC SYSTEM OIL AND HYDRAULIC SUCTION OIL FILTERS

WARNING

At operating temperature, the hydraulic oil is HOT. Do not permit the oil to contact the skin and cause a burn.

Disposal of lubricants and fluids must meet local environmental regulations.

CAUTION

Do not permit dirt to enter the hydraulic system when the oil is checked or the filters are changed or lift truck damage may occur.

CAUTION

Never start the engine with closed shutoff valves. Open the shutoff valves before starting the engine to prevent damage to hydraulic components.

CAUTION

Additives in the hydraulic system oil may damage the hydraulic system. Before using additives, contact your local HYSTER dealer.

1. Put the lift truck on a level surface and completely lower and retract the boom.
2. Shut down the engine and apply the parking brake.
3. Put a container with a capacity of approximately 605 liter (160 gal) under the hydraulic tank.
4. Remove the drain plug to drain the oil.
5. When the hydraulic oil is drained, install the drain plug.
6. Remove the bolts and seal rings that hold the inspection cover.
7. Remove the suction filters by turning counterclockwise.
8. Install new suction filters by turning clockwise.
9. Install the inspection cover using the bolts and new seal rings.
10. Torque inspection cover bolts to 51 N•m (38 lbf ft).
11. Fill the hydraulic tank with the correct oil specified in the Maintenance Schedule.
12. Operate the system and check for leaks.

Maintenance Procedures Every 5000 Hours

NOTE: Do these procedures in addition to the 3000-hour or 18-month checks.

TWIST LOCKS

Replace the twist locks. See the section **Extendable Container Attachment (Elme)** 5000 SRM 776 and **Intermodal Container Attachment** 5000 SRM 777.

Maintenance Procedures Every 5000 Hours or 3 Years

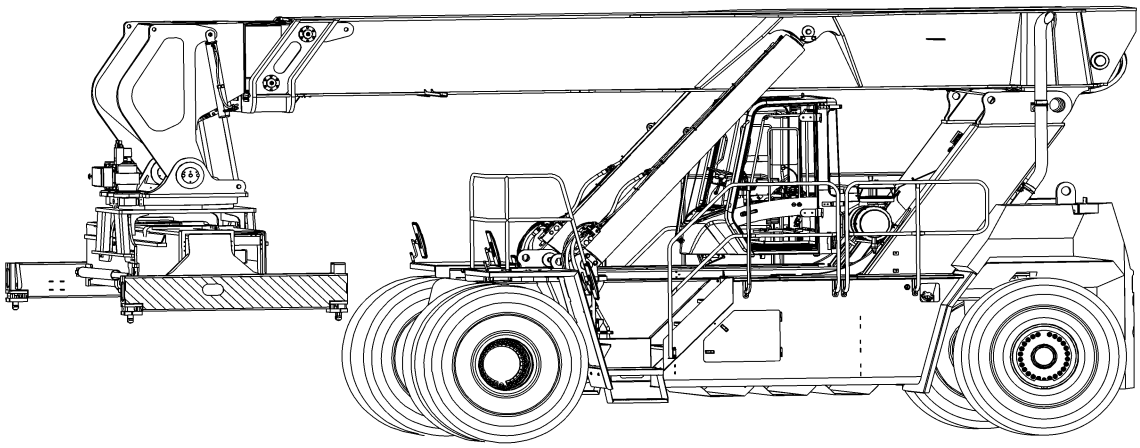
NOTE: Do these procedures in addition to the 3000-hour checks.

AIR CONDITIONING

Contact certified AC trained technician for extracting refrigerant and refilling with new lubricant and refrigerant.

ASSEMBLY GUIDE

RS45-27CH, RS45-31CH, RS46-36CH, RS46-40CH, RS46-41S CH, RS46-41L CH, RS46-41LS CH, RS45-24IH, RS45-28IH, RS46-33IH, RS46-37IH, RS46-38S IH, RS46-38L IH, RS46-38LS IH (HR45-27, HR45-31, HR45-36, HR45-40, HR45-41S, HR45-41L, HR45-41LS) [B222]



HYSTER

PART NO. 1638197

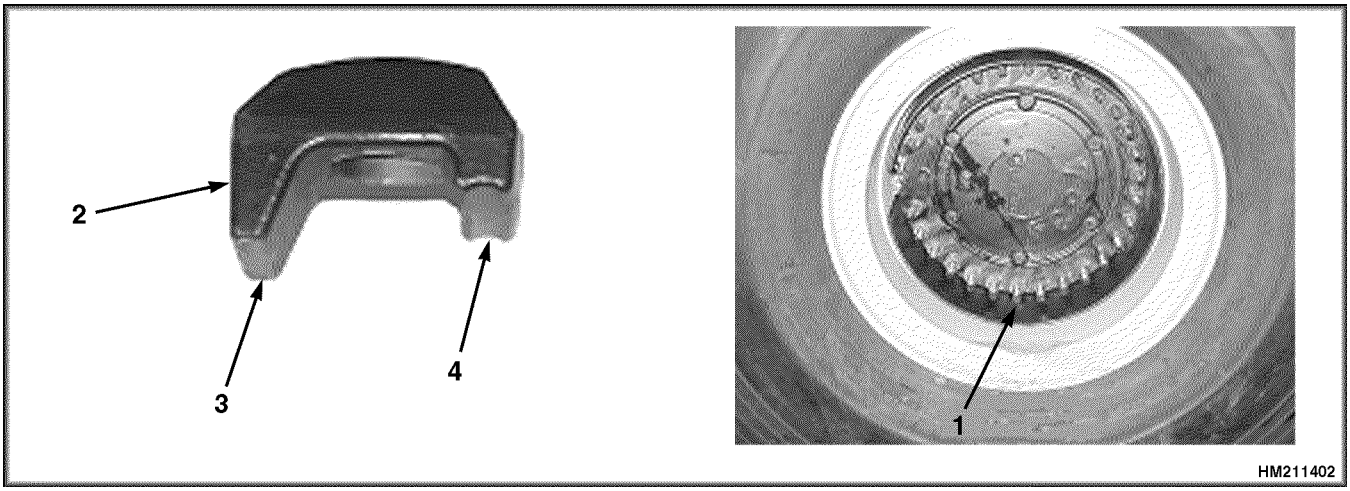
8000 SRM 1265

CAUTION

Verify all the contact areas between the rim, the axle, and the spacers are clean and have a minimum paint thickness.

STEP 11.

Install the wedgeband on the hub (see picture). Clamp the wedgeband on the hub with the rim clamps including spacers and wheel nuts. Fasten the wheel nuts. Be sure the rim clamps are well positioned on the wedgeband, because the wedgeband locks up the rim on the hub.



1. WEDGEBAND
2. RIM CLAMP
3. HUB SIDE
4. WEDGEBAND SIDE