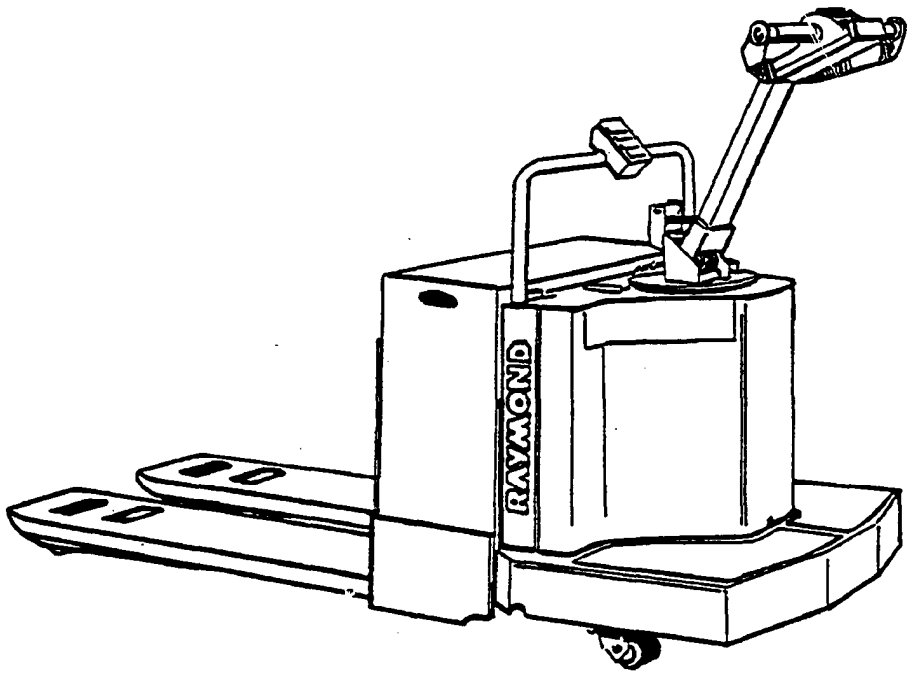
Operation & Maintenance Instructions



Model

Walkie
111TM-F60L
112TM-FRE60L
113TM-F60L
114TM/TOW-FRC60L

Serial No.

8622 and up

PDMM#

0023

Date:

11/31/91
Revised 3/15/94

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Chapter 7

Lift Cylinders

The lift cylinders are used exactly as the name implies, they lift the forks in conjunction with the battery. When the lift button is depressed, the cylinders receive oil under pressure from the hydraulic lift pump. This extends the pistons which raises the forks. When the lower button is depressed, the lowering solenoid opens the passage to allow the oil in the cylinders to return to the reservoir. The weight of the forks, battery, and load helps to force the oil out of the cylinders.

Hydraulic Reservoir

The hydraulic reservoir is located in the right side of the drive compartment and is mounted as an integral part of the hydraulic unit. Capacity of the reservoir is 1.5 quarts (1.41 liters).

Breather Cap

The breather cap, located on the side of the reservoir, allows air to enter or exit the reservoir to compensate for changes of oil level during operation of the hydraulic system. The air that enters the system is filtered to prevent any large amount of contaminants from entering the system.

Hydraulic Pump Motor

The hydraulic pump motor is a 24 Volt series wound unit utilizing Class F insulation.

Hydraulic Pump

The hydraulic pump is a positive displacement, fixed clearance, gear driven through a coupling by the series wound hydraulic pump motor. The pump has a single inlet and discharge port piped directly from the reservoir to the lift cylinders to eliminate line loss.

The internal parts of the pump are machined to a high degree of accuracy. If a pump is in need of repair which requires complete disassembly, it is recommended that the pump be sent to your local Raymond Dealer for repairs. Include your purchase order and full information about the breakdown.

Check Valve

The check valve (Figure 1.4) is used for directional control in the hydraulic system. As a directional control it has a free-flow and a no-flow direction. Flow through the seat will push the ball away and permit free flow. Spring pressure pushes the ball against the seat, and pressure build-up forces it to seal the passage so the flow is blocked.

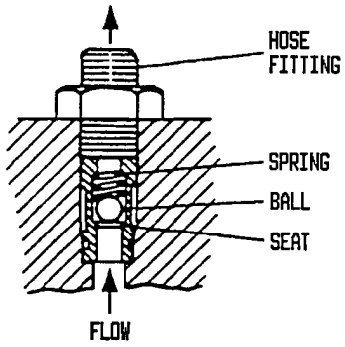

Figure 1.4 Check Valve

Operational Checks

Brake

The brake is applied only when the handle is in the positions shown in Figure 3.3. Check the brake for proper operation and make sure it is not dragging in the Brake Released position. (Refer to Step 10 of Receiving Inspection Guide on page 3.7).

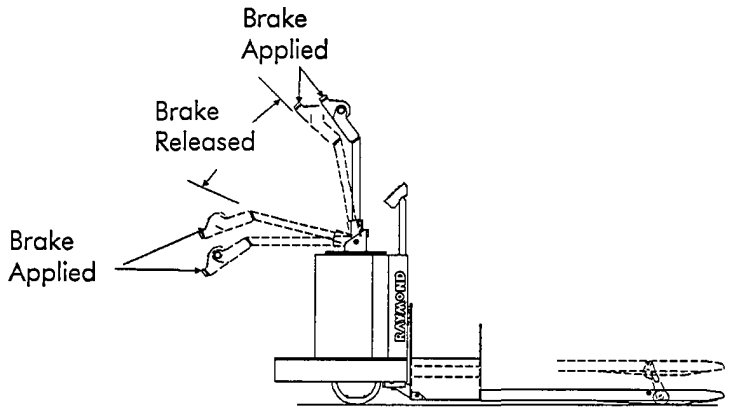

Figure 3.3

Fork/Lift Linkage

Check to make certain the forks are level and that the linkage pivot points are lubricated.

Emergency Reverse Switch

Check operation of the Emergency Reverse switch. (See Figure 3.4.)

1. Make sure that when the Emergency Reverse switch is activated:
   - the truck travels in the reverse direction
   - forward travel is locked out until reset by turning the keyswitch off or moving the control handle to the brake applied position. (See Figure 3.3.)

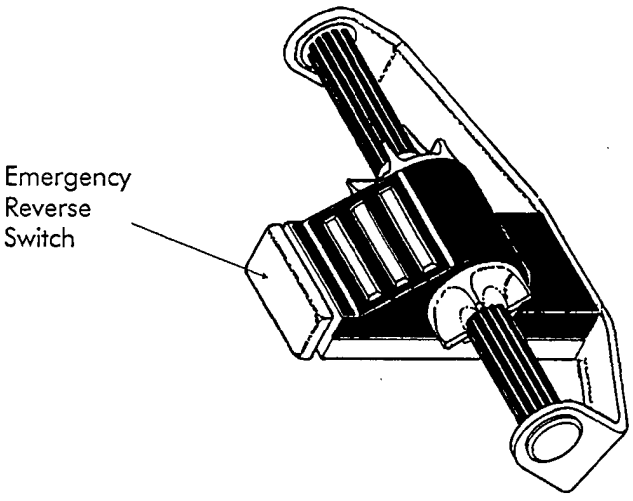

Figure 3.4

Battery Plugged IN

When a properly charged battery is connected to the vehicle, battery potential (B+) goes to: (see Figure 4.4)

1. Positive side of keyswitch.
2. Positive side of horn button.
3. Positive side of the open pump contactor tips.
4. B+ on the motor controller.
5. Through the motor controller plug diode at A2 to the positive side of the open directional contactors.

Emergency Reverse

If the truck direction of travel is quickly reversed by the emergency reverse switch, the AT control system will provide a rapid deceleration and an immediate acceleration in the reverse direction.

When traveling in the forward direction, if the emergency reverse switch is activated: (See Figure 4.9)

1. The forward contactor coil is de-energized.
2. The emergency reverse switch goes into N/O position which applies B+ to PMC2-5 of the motor controller. This allows a higher plugging current limit.
3. The reverse contactor coil is energized.
4. A full reverse signal is sent to the motor controller regardless of throttle input, and remains in that condition until the belly button is released.

Once the emergency reverse switch is activated, the control module locks out the forward contactor by opening the negative circuit (internally) at P1-A. To reset the truck for normal travel, the handle must either be set to the full vertical or full horizontal position. Turning the keyswitch OFF and then ON will also reset the control module.

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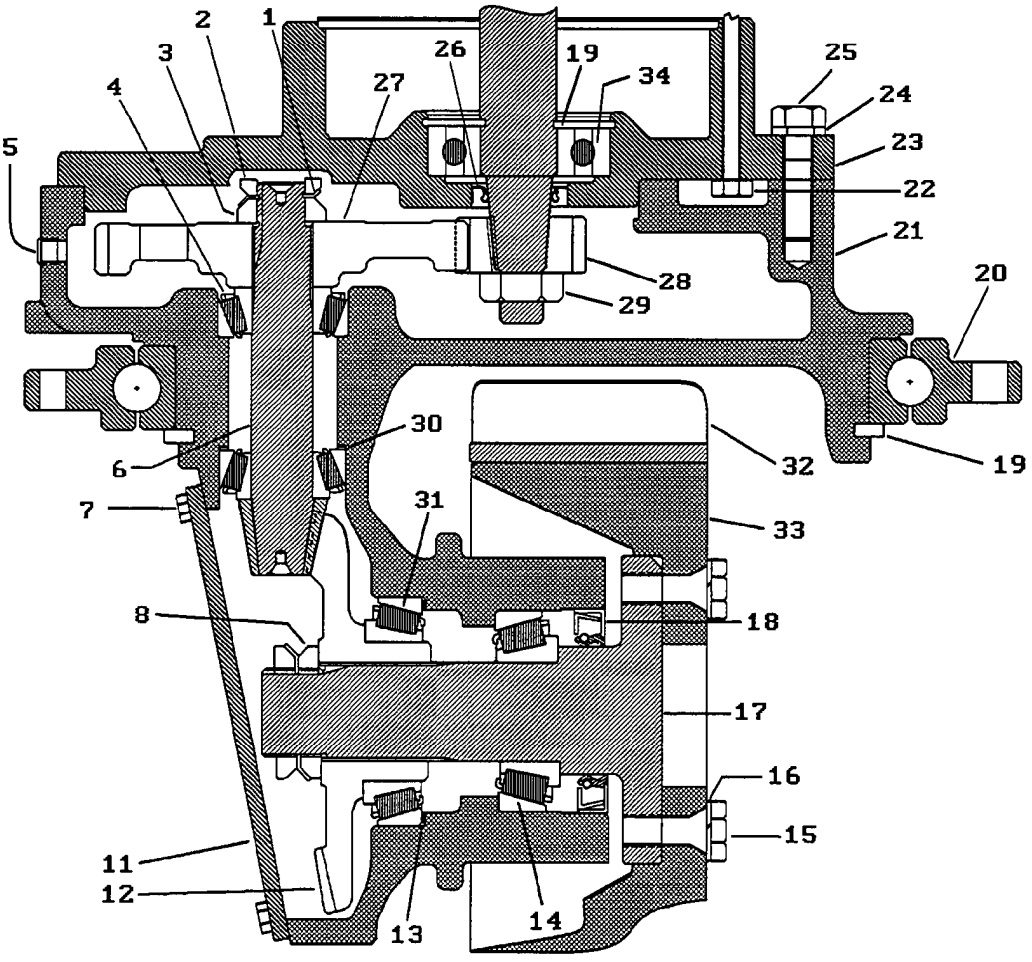


1. LOCK WASHER
2. LOCKNUT
3. NUT
4. BEARING CUP/CONE
5. PIPE PLUG
6. PINION SHAFT
7. HEX HD. BOLT
8. NUT
9. N/A
10. N/A
11. COVER PLATE
12. SPIRAL GEAR
13. SHIM PACK
14. BEARING CUP/CONE
15. HEX HD. BOLT
16. LOCKWASHER
17. WHEEL DRIVE SHAFT
18. SEAL
19. SNAP RING
20. STEERING RING ASSY.
21. MAIN CASE
22. HEX HD. BOLT
23. TOP COVER/MOTOR MTG. PLATE
24. LOCK WASHER
25. HEX HD. BOLT
26. SEAL
27. HELICAL GEAR
28. HELICAL PINION
29. LOCKNUT
30. SHIM PACK
31. BEARING CUP/CONE
32. DRIVE WHEEL
33. WHEEL HUB
34. BEARING

Figure 5.4 Drive Assembly (Cutaway View)

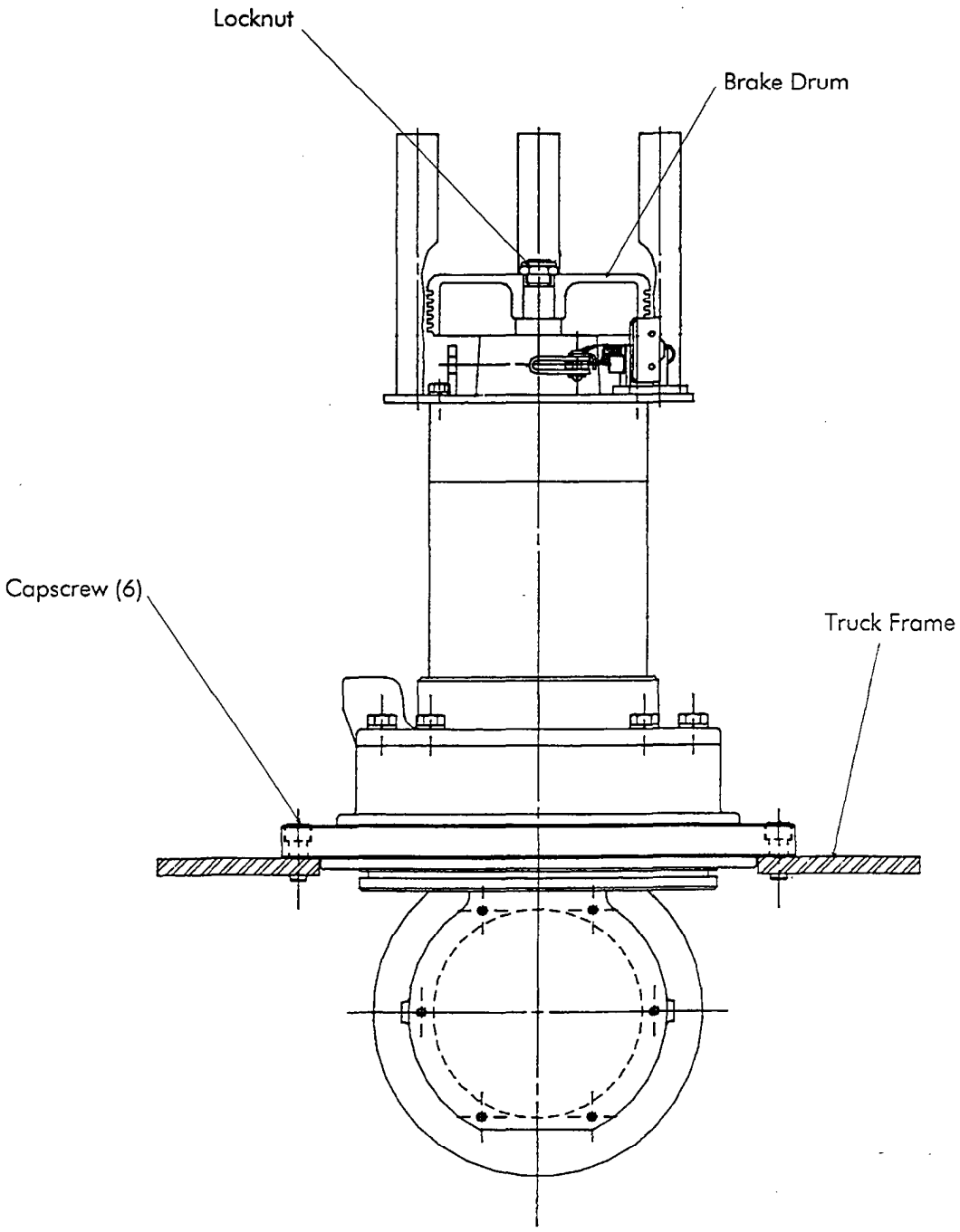


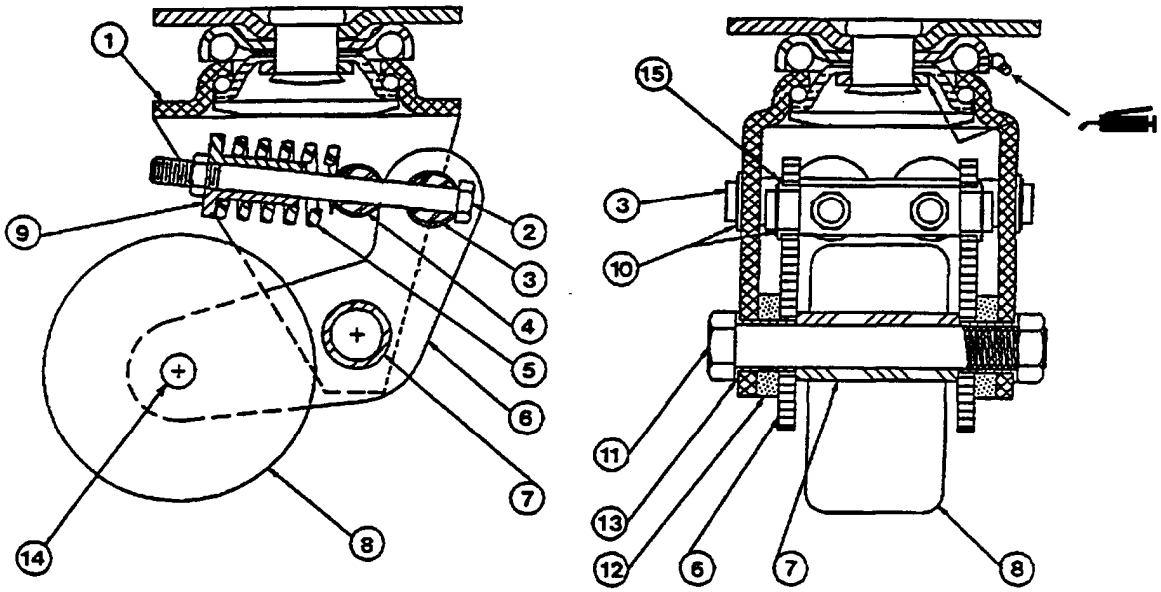
Figure 5.9 Drive Unit Assembly Removal/Installation

Casters

Casters are used on Models 112TM-FRE60L, 113TM-FRC60L, and 114TM-TOW. (See Figure 5.20)

Daily Inspection

Inspect the condition of the casters. Remove steel chips and other foreign material to prevent damage to the casters. Replace the casters if they are badly worn or have an excessive amount of breaks.



1. Yoke Assembly
2. Hex Bolt C/W Nut
3. Pin
4. Pin
5. Spring
6. Arm
7. Spacer
8. Wheel
9. Spacer
10. Retaining Ring
11. Hex Bolt C/W Nut
12. Oilite Washer
13. Oilite Bushing
14. Wheel Axle
15. Oilite Bushing

Figure 5.20 Casters 112TM-FRE60L, 113TM-FRC60L and 114TM-TOW

Hydraulic Reservoir
(Cont'd)

Inspection Every 1,000 Hours

After each operating interval of 1,000 hours, the oil in the reservoir should be drained. This is very important because of the accumulation of condensation and contamination. Heating the oil during operation and cooling the oil when the truck is not in use contributes to condensation which is damaging to the system. Contaminants such as dirt, rust, scale, and products of oil deterioration are also damaging to the system.

Drain and clean the reservoir as follows:

1. Completely retract the lift cylinders.
2. Disconnect the battery and remove and tag all wires and cables connected to the pump motor.
3. Remove and tag the hydraulic lines from the hydraulic unit. Plug all openings.
4. Remove the bolts which connect the hydraulic unit to the mounting bracket (frame).
5. Remove the hydraulic unit from the truck.
6. Remove the four bolts which connect the hydraulic reservoir to the adapter housing.
7. Remove the reservoir and properly dispose of old hydraulic oil.

⚠ CAUTION DO NOT OPERATE THE HYDRAULIC PUMP TO DRAIN THE HYDRAULIC SYSTEM.

8. After the oil has drained, flush the inside of the reservoir with a suitable cleaning solvent and clean the screen in the tank filler opening.
9. Dry the inside of the tank with clean, dry, compressed air.
10. While the reservoir is off, clean the inlet suction screen with clean, dry compressed air from the pump side.
11. Carefully install the reservoir on the adapter housing. Make sure that the adapter O-ring is properly in place.

Drive Motor General Data

- LUBRICATION. None required. Sealed ball bearings are used at both ends of motor. (Refer to Figure 5.31)
- ARMATURE TEST. These armatures have standard winding connections and can be tested on a growler using a metal strip or hacksaw blade to locate shorted windings.
- COMMUTATOR. Minimum diameter *(2.875")* or *(2.75")* . Replace armature when commutator has worn to this dimension.
- BRUSH REPLACEMENT. Replace brushes when they have worn to the minimum length specified in the table below.
- SPRING TENSION. Adjust spring tension per table below for new brushes.

MOTOR	BRUSH LENGTH (Min.)	SPRING TENSION
Drive Motor	.562" (14.27mm)	30 to 36 oz. (842 to 1016.4 grams)
Lift Motor	.500" (12.70mm)	32 to 40 oz. (908.8 to 1136 grams)

Drive Motor Inspection

Refer to Motor Adjustment and Inspection on page 5.45.

Drive Motor Removal

1. Disconnect the battery and electrical leads from the drive motor
2. Disconnect the brake linkage and cam lever from the top cover motor mounting plate.
3. Remove the brake assembly from the top of the drive motor.
4. Remove the hex head bolts securing the mounting plate to the main case of the transmission.
5. Lift out the drive motor and mounting plate.

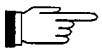
Hydraulic Pump Motor General Data

- LUBRICATION. No lubrication is required. Sealed ball bearings are used at both ends of the motor. (See Figure 5.32)
- ARMATURE TEST. These armatures have standard wiring connections and can be tested on a growler using a metal strip or hacksaw blade to locate shorted windings.
- COMMUTATOR. Minimum diameter is approximately *1.500" (38.10mm)*. Replace the armature when commutator has worn to this dimension.
- BRUSH REPLACEMENT. Replace brushes when they have worn to the minimum length specified in the table above.
- SPRING TENSION. Adjust spring tension per table above for new brushes. Measure with a spring scale hooked under the brush spring at the brush. Pull the scale on a line opposite the line of force exerted by the brush spring and take the reading just as the spring leaves the brush.

Replacement Of Contactor Tips, Insulation And/or Core And Rod Assembly (Cont'd)

Remove the base buss bar assembly from multideck units so that clamping pressure is applied directly to the plate and tie rod assembly. Apply pressure until the core bottoms out and there is no further movement.

7. Press the end frame and core assembly (1) into position and tighten the four frame side screws (9) that secure the frame and core assembly (1) to the sideplate (2, 3).



Replacement of these components is very similar for all contactors. Refer to Figure 5.36 for typical contactor exploded view and follow the general disassembly and reassembly procedure.

Leave all shims in place when replacing contact tips as they are necessary for proper contact gap and overtravel.

Disassembly/ Reassembly

1. Remove any external buss bars (36, 37, 38) if present.
2. Remove nut (33) and its associated hardware.
3. Lift off, as applicable, in the following order, the:

   - non-metallic washer (32)
   - bushing (31)
   - insulation (21), if present
   - buss bars (35), if present
   - contact spring (30) and movable contact bar (29)
   - bushing (28)
   - non-metallic spacer (34), if present
   - washer (27), if present
   - bushing (28), if present
   - second set of comparable components, if present.

4. Remove screws (24) and (26) and their associated hardware, if present.
5. Remove the buss bar assembly (or stationary buss bar(s) (22), if present).
6. Remove, as applicable, consulting diagram for order the:

   - insulation (21)
   - screw (20)
   - insulators (19), (18)
   - detent (17) The core and rod assembly is now accessible for inspection or replacement.

7. Reverse the order to reassemble. Refer to Contactor Table on page 5.59 for individual contact gap setting.

Wiring Inspection Procedure

Visually inspect all wiring in all compartments for:

- Broken wiring and shorted conditions, especially close to metal edges or surfaces.
- Loose connections
- Loose or broken terminals
- Damaged terminal blocks or strips

1. Check that fuses are not blown, terminals and connections are properly connected, contactors actuate normally, and contact tips are not worn.
2. If the problem has not been found, use the following procedure:
   a. Check that fuses are good.
   b. Check parts for proper installation and correct electrical polarity.
   c. Check all wiring for proper connections.
   d. Check insulation resistance, It should be more than 1megohm (measure on a x 100 ohm range). Check only with a volt-ohmmeter. Place negative lead:
      - (-) of the meter to the chassis and the positive lead.
      - (+) to the live parts and vice versa.

Refer to Chapter 7 Appendix for schematics of the truck being serviced.

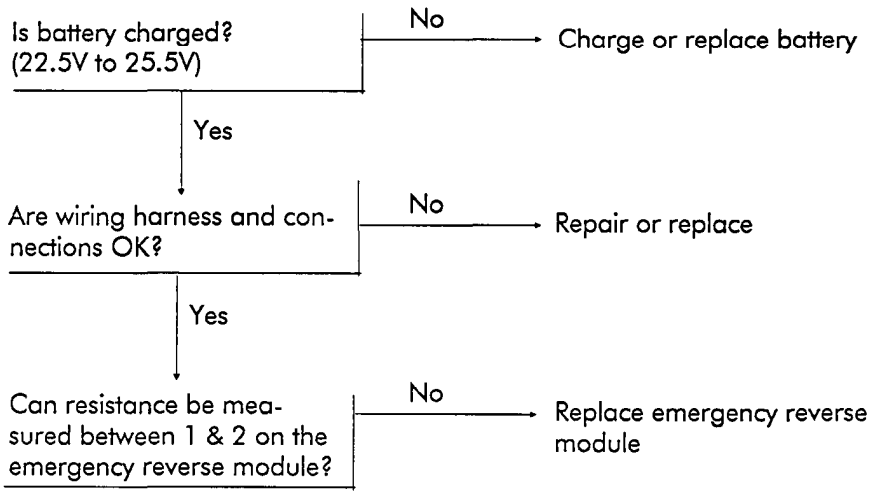
3. Use the Troubleshooting Flow Charts by:
   - Consulting the list of problems.
   - Following any applicable charts from beginning to isolation of problem.

4. Identify the cause of the problem by:
   - Checking for careless or improper operating procedures and if found, bringing the problem to the service manager's attention to avoid repetition of the cause.

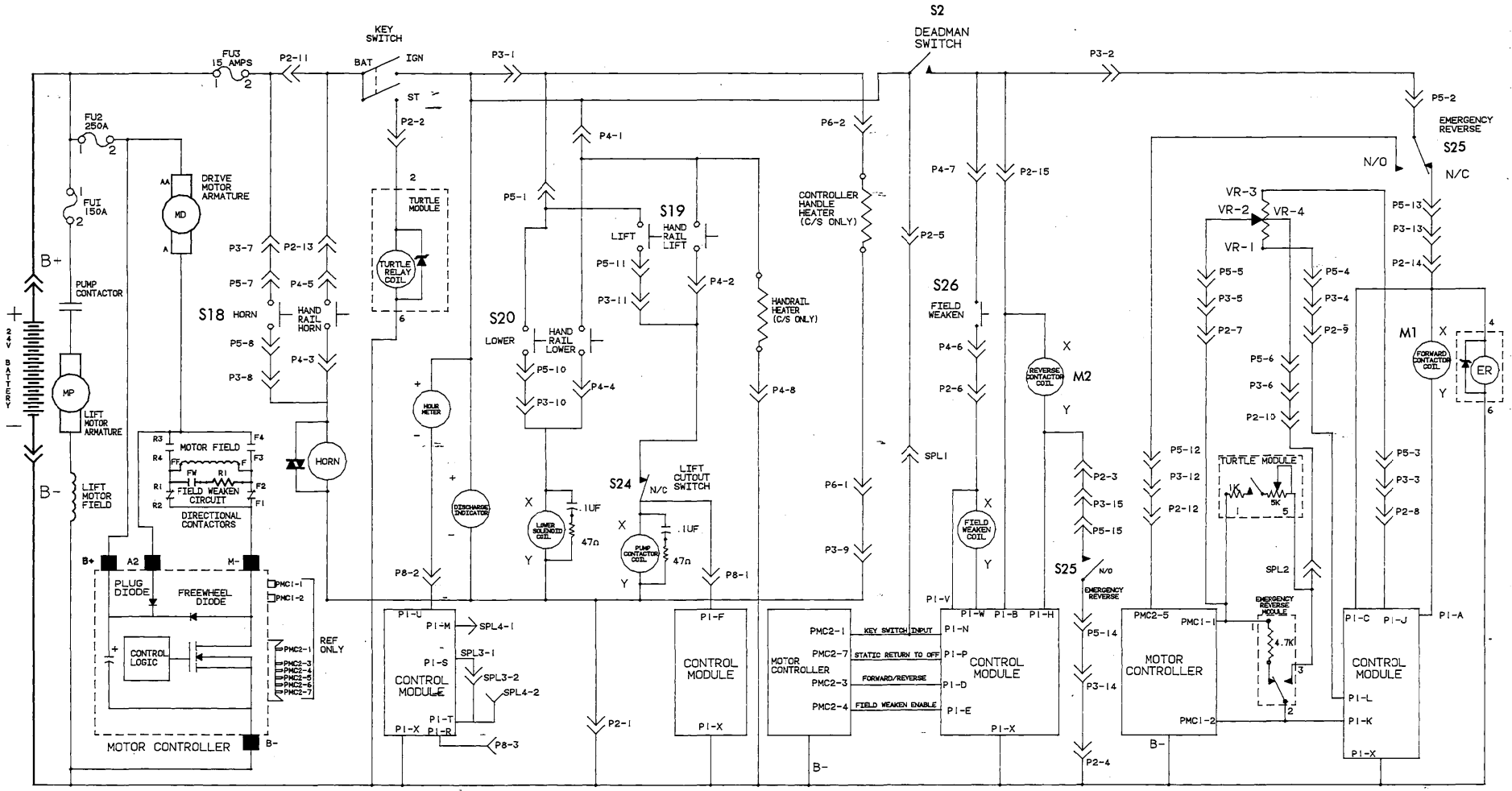
5. Correct the problem by:
   - Repairing or replacing defective components and following instructions in the Maintenance Chapter 5 of this manual.

Truck Operates Normally, But:

- Emergency reverse engages, but truck does not travel-(reverse).



ELECTRICAL SCHEMATIC



NOTES:

1. All boxes labeled Turtle Module are physically contained in a single module and are split out on this diagram for functional clarity only.
2. All boxes labeled Motor Controller are physically contained in a single module and are split out on this diagram for functional clarity only.
3. All boxes labeled Control Module are physically contained in a single module and are split out on this diagram for functional clarity only.

Figure 7.7 Electrical Schematic for Model 112TM-FRE60L