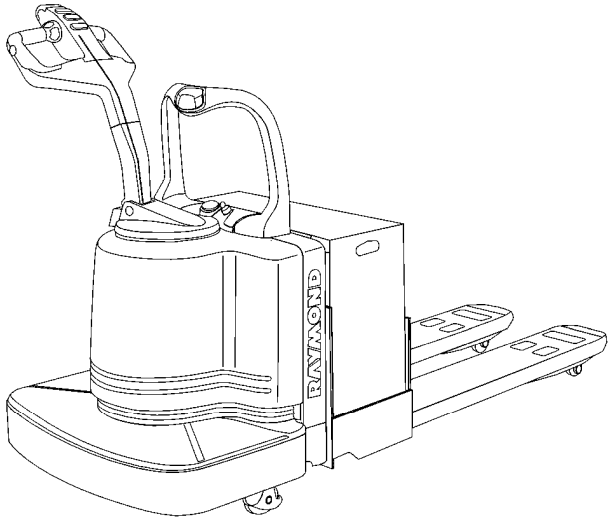
Maintenance Instructions



Models 111, 112, 113 and 114

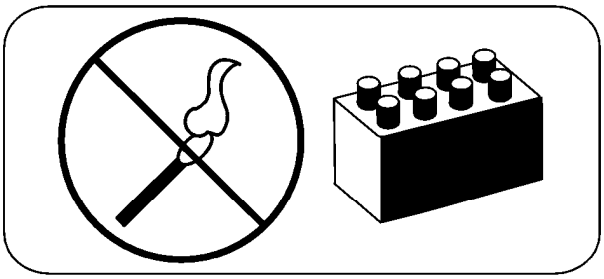
Serial No.: 97-20000 and up

PDMM-0050 **Issued: 8/5/97**

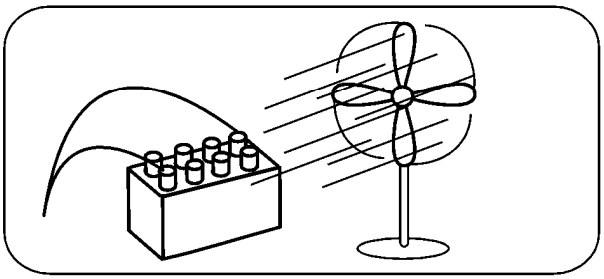
Revised 5/14/99

Battery Safety

A battery gives off explosive gases. NEVER smoke, use an open flame, or use anything that gives off sparks near a battery.

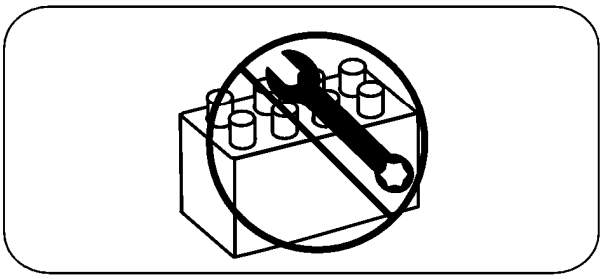


Keep the charging area well-ventilated to avoid hydrogen gas concentration.



Turn the key switch OFF *before* disconnecting the battery from the truck at the battery connector. Do not break live circuits at the battery terminals. A spark often occurs at the point where a live circuit is broken.

Do not lay tools or metal objects on top of the battery. A short circuit or explosion could result.



Welding Safety

- Check for shorts to frame as described on page 6-4. If any shorts are detected, remove them before you proceed with the welding operation.
- Clean the area to be welded.
- Protect all truck components from heat, weld spatter and debris.
- Attach the ground cable as close to the weld area as possible.
- Do not perform any welding operations near the electrical components.
- If welding must be done near the battery compartment, remove the battery from the truck.
- When you are finished welding, perform all ground tests and electrical inspections before the vehicle is operated.

Maintenance Guidelines

Following a regularly scheduled maintenance program:

- promotes maximum truck performance
- prolongs truck life
- reduces costly down time
- avoids unnecessary repairs

Scheduled maintenance includes:

- lubrication
- cleaning
- inspection
- service.

Perform all of the scheduled checks and maintenance during the suggested intervals. The intervals given in this guide are based on normal operating conditions. When operating under abnormal or severe conditions, perform these services more often as required to keep the unit in good operating condition.

See page 7-2 in the Appendix for lubrication equivalents. Refer to the manufacturer's supplements for components not listed on the following pages.

Checking for Shorts from Battery to Truck Frame

1. Turn the key switch OFF and disconnect the battery connector.
2. Use a voltmeter set on a 50 volt DC scale.
3. Attach the voltmeter leads as follows:
   - negative (-) lead to the truck frame
   - positive (+) lead to the positive battery terminal, see Figure 5-1.
4. The voltmeter should show no more than 3 volts.
5. Now attach the voltmeter leads as follows:
   - negative (-) lead to the negative battery terminal
   - positive (+) lead to the truck frame
6. The voltmeter should show no more than 3 volts.
7. If you get more than a 3 volt reading in Step 4 or 6:
   a. Remove the battery from the truck. See "Battery" on page 6-8.
   b. Thoroughly clean the battery (see page 6-10) and battery rollers (see page 6-9).
   c. Reinstall the battery.
   d. Repeat steps 2 through 6 to see if this has eliminated the problem.
   e. If excessive voltage is still found, have the battery checked for internal leakage.

Figure 5-1: Battery Shorts to Frame, testing

3. Connect the PMT to the motor controller.
4. Connect the battery and turn the key switch ON.
5. Hold the more info key, and press diagnostics key.

Clear

After you have diagnosed and corrected the problem, you should clear the diagnostic history file. This allows the motor controller to accumulate a new file of faults. By checking the new history file at a later date, you can easily determine whether the problem was completely fixed.

1. Hold the more info key, and press the program key. Release both keys after you enter the Special Program mode.
2. Scroll through the mode using the scroll display keys until "CLEAR DIAG HIST" is the top line in the display.
3. Press the more info key again. The PMT will prompt you to acknowledge or cancel.
4. Press the value up key to clear the diagnostic history. Press the value down key to cancel.

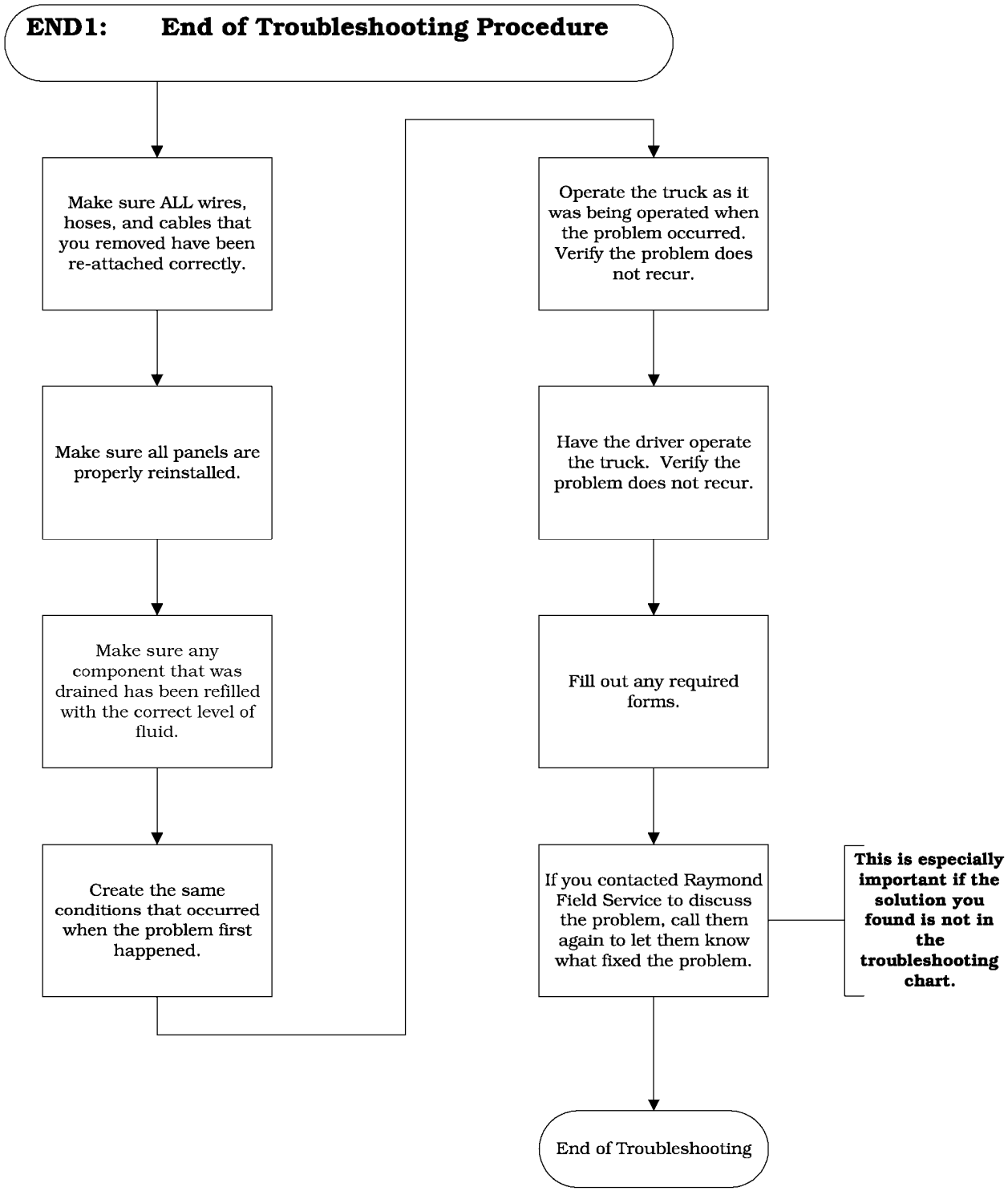
Test Mode

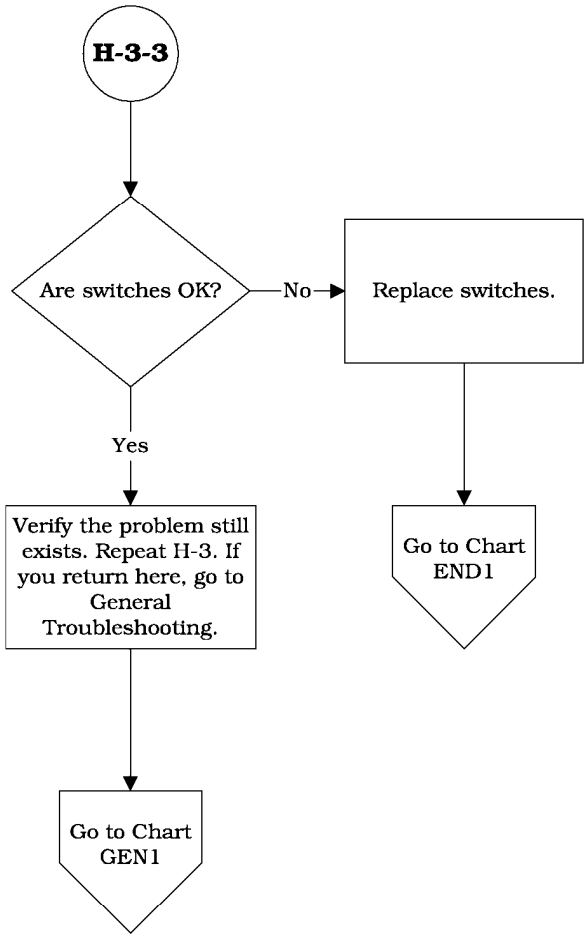
This section shows you different modes you can use on the PMT to troubleshoot this walkie truck.

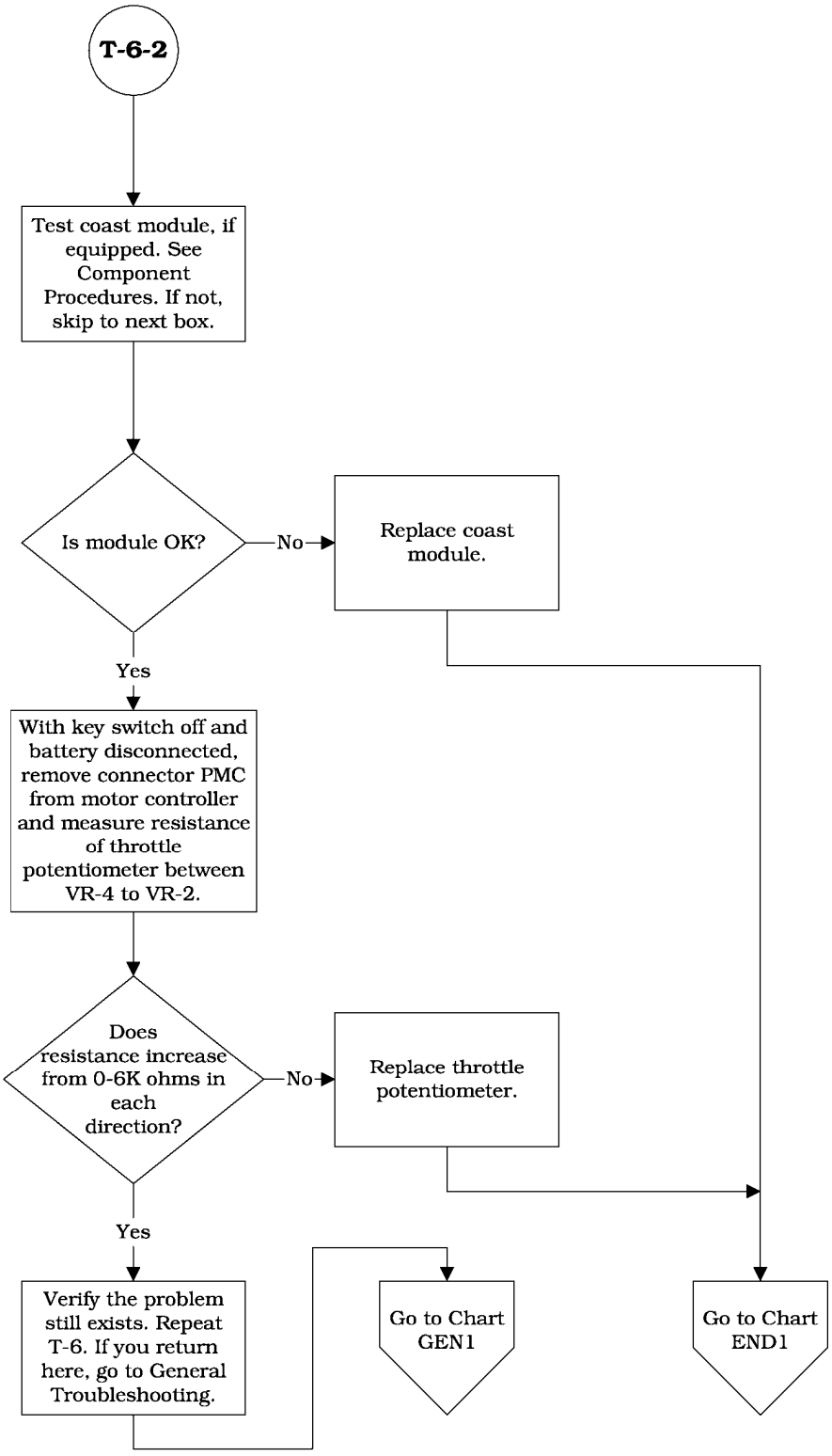
Access

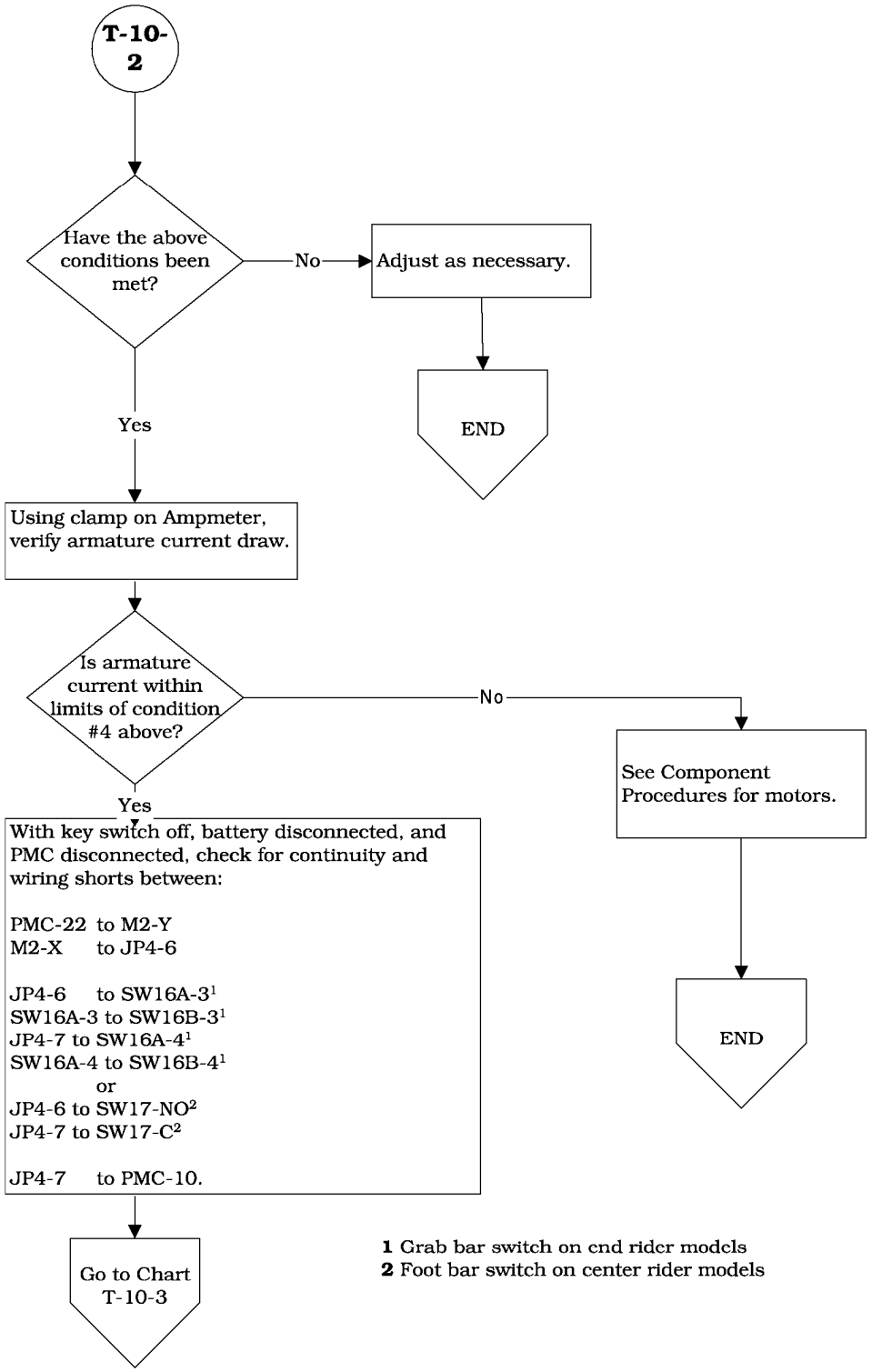
1. Turn the key switch OFF and disconnect the battery connector.
2. Remove the tractor cover.
3. Connect the PMT to the motor controller.
4. Connect the battery and turn the key switch ON.
5. Press the test key on the PMT.
6. Scroll through the line items using either scroll display key. When the item you want is the top line on the display, press the more info key for a full screen display.

END1: End of Troubleshooting Procedure

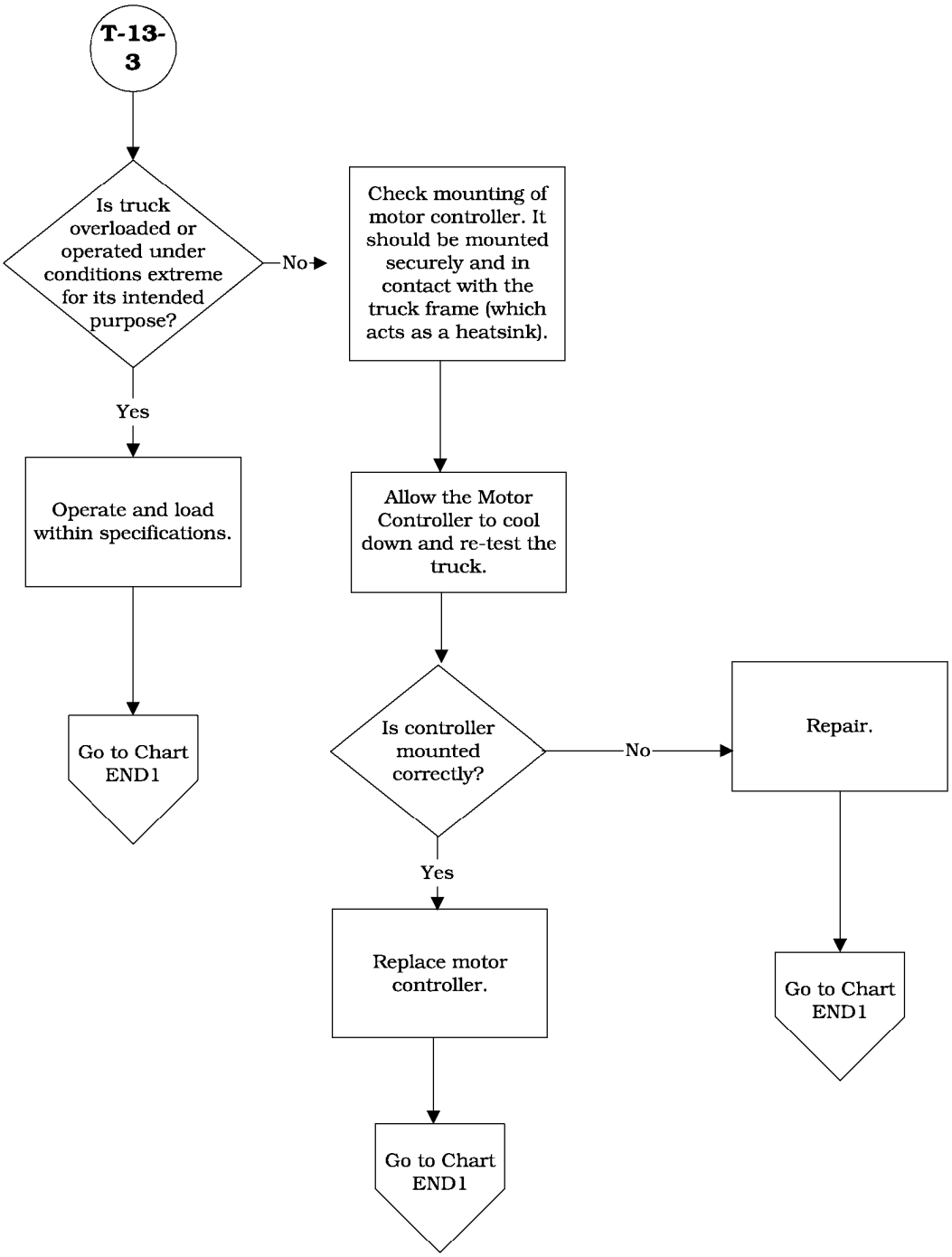



H-3-3
Are switches OK?
No
Replace switches.
Yes
Verify the problem still exists. Repeat H-3. If you return here, go to General Troubleshooting.
Go to Chart END1
Go to Chart GEN1

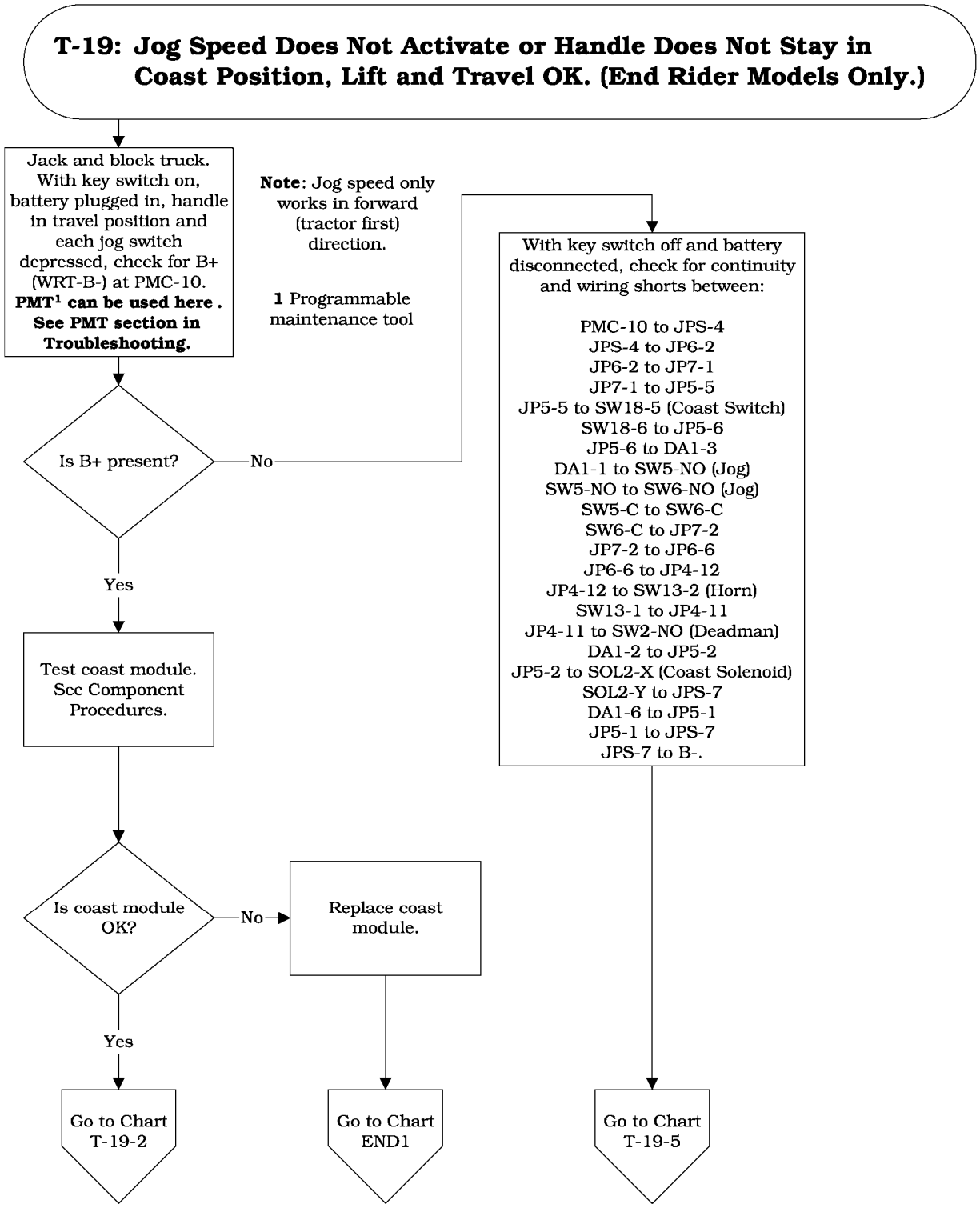

T-6-2
Test coast module, if equipped. See Component Procedures. If not, skip to next box.
Is module OK?
No
Replace coast module.
Yes
With key switch off and battery disconnected, remove connector PMC from motor controller and measure resistance of throttle potentiometer between VR-4 to VR-2.
Does resistance increase from 0-6K ohms in each direction?
No
Replace throttle potentiometer.
Yes
Verify the problem still exists. Repeat T-6. If you return here, go to General Troubleshooting.
Go to Chart GEN1
Go to Chart END1



1 Grab bar switch on end rider models
2 Foot bar switch on center rider models


T-13-3
Is truck overloaded or operated under conditions extreme for its intended purpose?
No
Yes
Check mounting of motor controller. It should be mounted securely and in contact with the truck frame (which acts as a heatsink).
Operate and load within specifications.
Allow the Motor Controller to cool down and re-test the truck.
Go to Chart END1
Is controller mounted correctly?
No
Repair.
Yes
Replace motor controller.
Go to Chart END1
Go to Chart END1

T-19: Jog Speed Does Not Activate.



Alphabetical List of Component Procedures

A

B

C

D

E

F

G

H

the soda solution. Wait until all foaming stops, indicating that the battery exterior is neutralized.

e. Rinse the battery with clean water.

f. Dry the battery completely before re-installing it.

g. Apply a thin coat of petroleum jelly to the battery posts and cable terminals.

Charging

To charge a battery, direct current is passed through the battery cells in the direction opposite to that of discharge. Charging time is 5% to 20% longer than discharge time.

The most important element in battery service and prolonging battery life is proper charging. Make sure you follow the proper method for each application, following the battery and battery charger manufacturers' instructions.

⚠ CAUTION

The vent holes in the filler plugs must be open to allow hydrogen gas to escape from the cells. When you charge the battery, make sure the polarity connections are correct. The positive lead of the charger must be connected to the positive terminal, and the negative lead must be connected to the negative terminal.

1. Familiarize yourself with the following:
   - charging rate, starting rate, and finish rate
   - time available for charge
   - overheating, excessive gassing, or overcharging
   - variations between cell voltage

Fuses

Test/Inspection

Examine the fuse for signs of overheating, discoloration, cracking, or other physical damage. Replace the fuse if you find damage.

To test a fuse, remove it or isolate it from the electrical circuit. Do this by removing the fuse from the truck or by removing all the connections from one side of the fuse.

Use an ohmmeter set to Rx1 scale and measure the resistance across the fuse. The resistance should be less than 1 ohm.

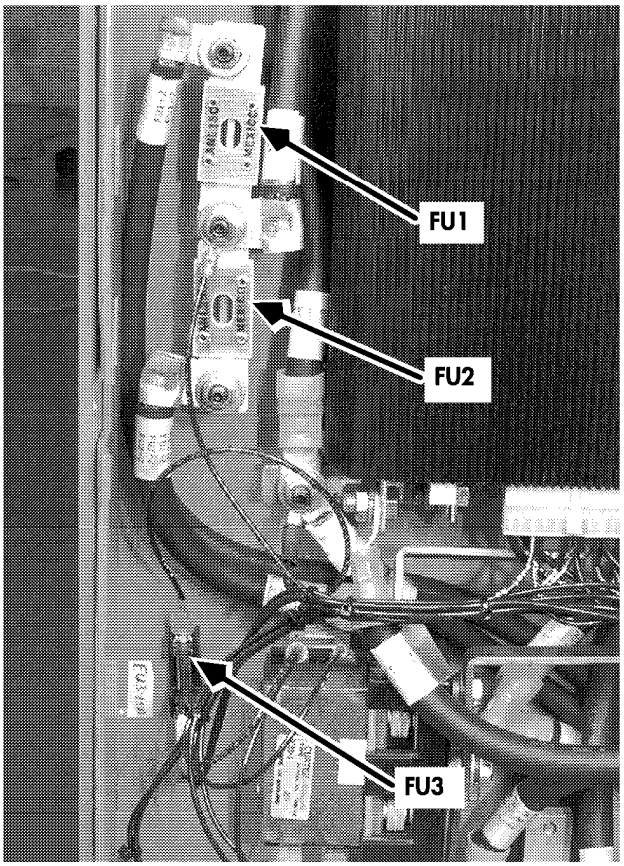


Figure 6-6: Fuse Location

Auto Coast Solenoid

Model 112 Only

Removal

1. Turn the key switch OFF, and disconnect the battery connector.

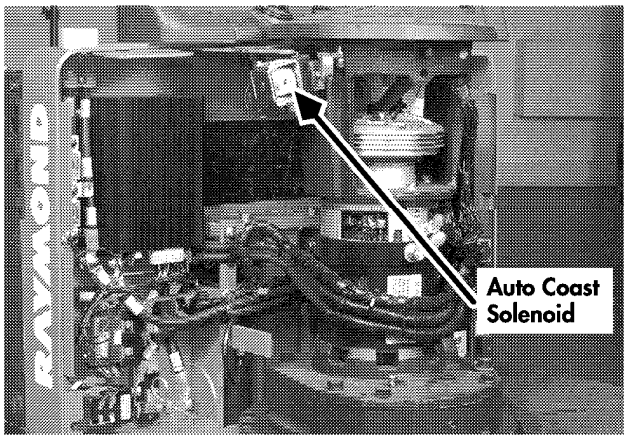


Figure 6-17: Auto Coast Solenoid Location

NOTE: Prior to removing the screws in step 2, two small ball bearings (Figure 6-19) will fall from the coast solenoid rod as you remove it from the canister. Place your hand under the canister as you remove the rod.

2. Remove the two socket head cap screws holding the solenoid mechanism to the handle mounting. See Figure 6-18.

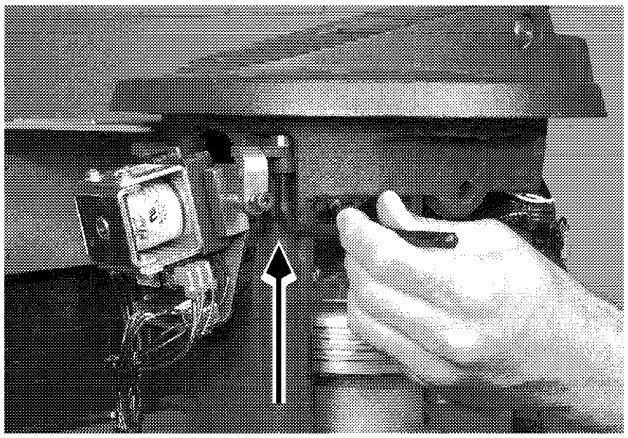


Figure 6-18: Socket Head Cap Screws

3. Remove the solenoid mechanism. See Figure 6-19.

NOTE: Do not lose either ball bearing when you remove the mechanism from the tractor.

4. Remove all wires. Note and mark location to aid during installation.
5. Remove the two screws securing the solenoid to the mechanism and remove the solenoid.

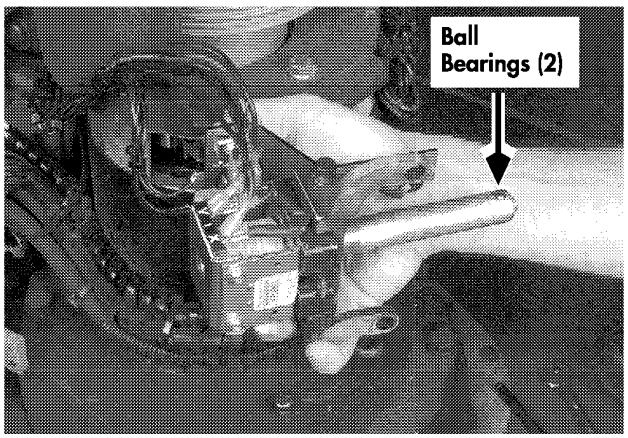


Figure 6-19: Removed Solenoid Mechanism

⚠ CAUTION

Before removing the nut in the next step, make sure you are not under the handle. When the nut is removed, the handle will fall down.

8. Remove the tie straps holding the motor cables to the weldment. Remove the nut holding the bottom of the handle return spring seat weldment. Remove the bolt.
9. Remove the remaining four (4) socket head cap screws holding the handle assembly to the tractor frame.
10. Carefully remove the handle.

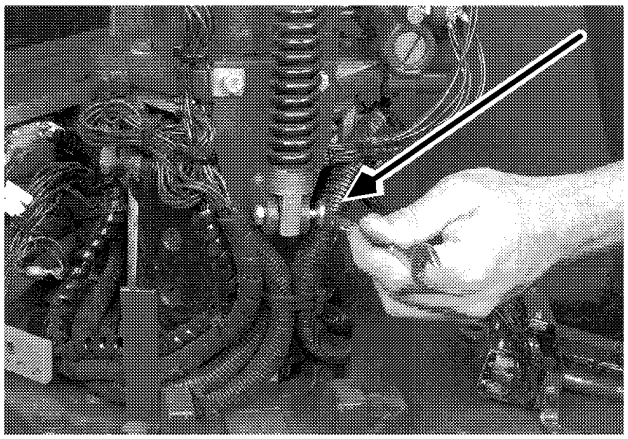


Figure 6-28: Detaching Handle Return Spring

Installation

1. Secure the handle to the tractor frame using the four (4) socket head cap screws you removed earlier. Do not tighten until the last screw is in place (after installing auto coast solenoid mechanism).
2. Thread the handle harnesses through the handle base and leave disconnected for now.
3. Put the washer on the spring rod, followed by the spring on the push rod on models 111 and 112.
4. Install the mounting bolt. Install locking nut on bolt and secure.
5. Install the auto coast solenoid mechanism. See "Auto Coast Solenoid" on page 6-32.
6. Raise handle and adjust the handle return spring on models 111 and 112. See "Return Spring Adjustment 111 and 112" on page 6-43.
7. Connect the handle harness connectors.
8. Install the handle cover.
9. Install the cable tie straps on the handle harness and drive motor cables, in their original locations.
10. Connect the battery connector and turn on the key switch.
11. Test operate the truck.

10. Reattach the switch cover assembly to the control handle with 4 screws previously removed.
11. Reconnect the battery connector.
12. Test the truck's operation.
13. Turn the key switch OFF and disconnect the battery connector.
14. Install the tractor cover.
15. Reconnect the battery connector.

Assembly Installation

1. Secure the contactor assembly to the frame with the two screws.
2. Install the cap screw securing the bus bar to the motor controller.
3. Install the bolts and cables to the bus bars on M1-2 and M1-2.
4. Install the bus bar connected to the field weakening contactor.
5. Connect the wires to the X and Y terminals on the contactor coils.
6. Install the tractor cover.
7. Connect the battery connector and turn the key switch ON.
8. Test operation of the truck.

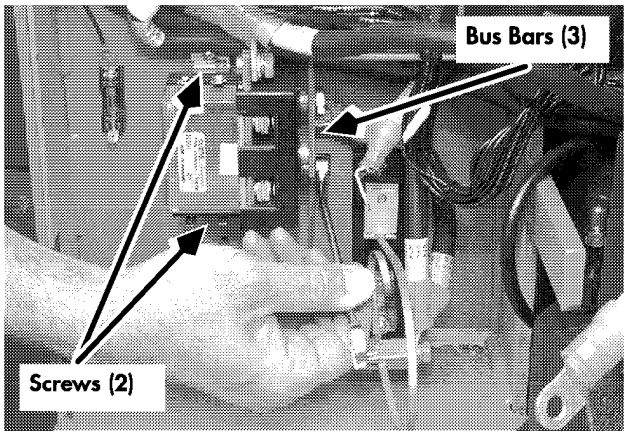


Figure 6-60: Installing the FWD/REV Contactor

Commutator

Inspection

The commutator should be inspected for surface condition and high mica.

The commutator must be smooth and clean to provide maximum brush wear. When commutators are not properly maintained, carbon dust can collect in the grooves between the segments. This can lead to a short circuit in the armature.

Good commutation will be indicated by a dark brown polished commutator and an evenly polished brush wearing surface.

If the commutator appears rough, pitted, or has signs of burning or heavy arcing between the commutator bars, the motor should be removed for servicing.

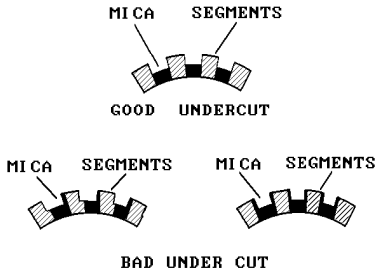


Figure 6-77: Mica Undercutting

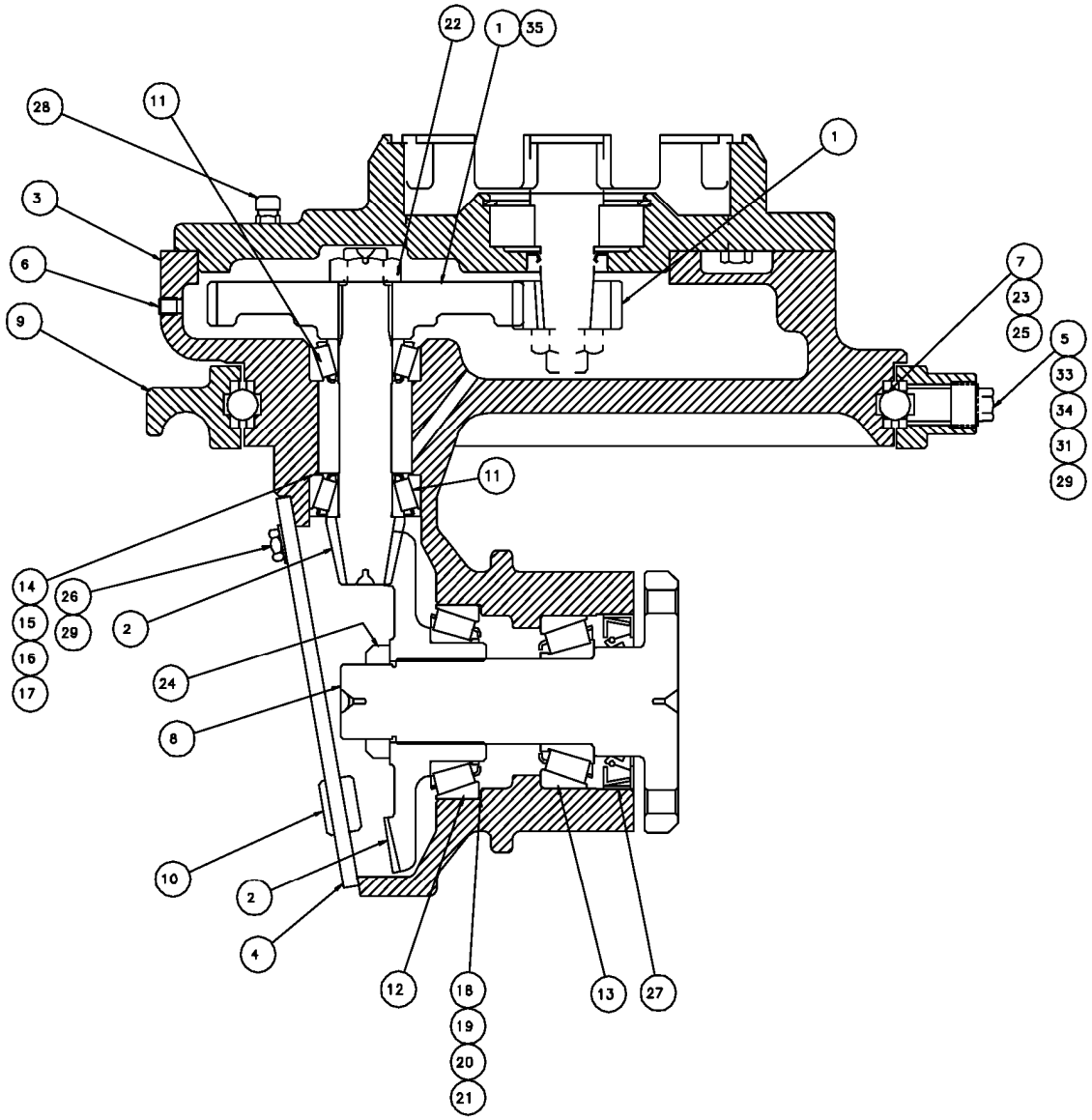
High Mica

Most armatures have the mica undercut. If the armature on your motor does not, do not attempt to cut it. The decision to undercut or not is determined by the type and grade of brush used in that particular motor. The mica should be undercut to a depth equal to the width of the mica (usually 1/32 inch, but may vary in some motors). See Figure 6-77.

Servicing

If the commutator requires service, you will need to remove the armature from the motor.

DO NOT use a stone to even out high and low spots on the commutator. Use only a suitable abrasive rubber polisher.



LEGEND:

1. Helical Gear	10. Pipe Plug	19. Shim 3.5 OD	28. Vent Plug
2. Spiral Gear and Pinion Shaft	11. Bearing Cup/Cone	20. Shim 3.5 OD	29. Hex Head Cap Screw
3. Main Case	12. Bearing Cup/Cone	21. Shim 3.5 OD	30. N/A
4. Cover Plate	13. Bearing Cup/Cone	22. Lock Nut	31. Flat Washer
5. Bearing Filler Plug	14. Shim 2.0 OD	23. Ring Set-Kit	32. N/A
6. Hex Plug	15. Shim 2.0 OD	24. Lock Nut	33. Grease Fitting
7. Ball (34)	16. Shim 2.0 OD	25. Ball (35)	34. Spirol Pin
8. Drive Wheel Shaft	17. Shim 2.0 OD	26. Lock Washer (6)	35. Helical Gear and Pinion Set
9. Ring	18. Shim 3.5 OD	27. Seal-Oil	

Figure 6-88: Drive Unit, Cross-Sectional View

5. Center the hub assembly on top of the ram and make sure they mate squarely.
6. Apply a soap solution to the inside of the tire rim.
7. Position the new tire with its chamfered insert facing the hub. Align the new tire and the hub so they are concentric.
8. Begin pressing the new tire onto the hub and the old tire off of the wheel. Run the press slowly for the first few inches of travel because this is the critical stage of the operation. If the tire begins to cock, stop the press immediately and realign the tire. A sharp jar with a soft-headed mallet will usually realign the tire on the hub.

NOTE: If the new tire does not press on with a minimum of 5 tons (68,947 kPa) pressure, replace the hub.

9. Release the press. Remove the wheel, tire assembly and the old tire from the press table. Wipe off any grease. Inspect the wheel and tire assembly.
10. Install the wheel and tire assembly on the drive axle of the truck. Torque the mounting hub bolts to 100 ft. lbs. (140 Nm).

Fork Height Adjustment 6000 Lb. Models

To adjust the lowered fork height for new load wheels, refer to Figure 6-99.

1. Raise the forks a few inches from the floor and block them in place.
2. Loosen the nut [3] on the eccentric pin [1]. Rotate the hex head of the eccentric pin until the top of the trail-fork touches the bottom side of the fork surface at 'A'.
3. Tighten the nut for the eccentric pin.
4. Remove the blocks and lower the forks completely. Check the fork height at 'B'. The lowered fork height should be 3-1/4" (83 mm).

To adjust the lowered fork height for worn load wheels:

1. Lower the forks completely. Measure the distance from the floor to the top of the fork at 'B'. The lowered fork height should be 3-1/4" (83 mm).
2. If the fork height is incorrect, jack the forks up a few inches from the floor and block them in place.
3. Loosen the nut [3] on the eccentric pin [1]. Rotate the hex head of the eccentric pin slightly to change the position of the load wheel.
4. Tighten the nut to lock the eccentric pin in place.

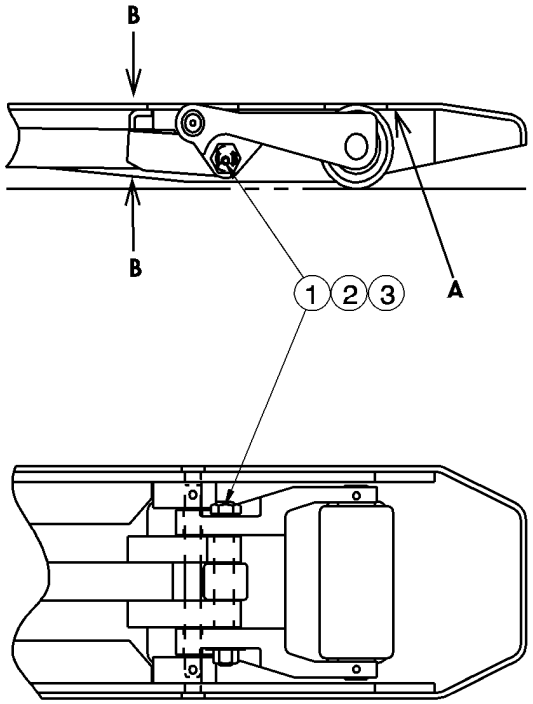


Figure 6-118: Fork Height Adjustment, 6000 lb.

13. Lift the fork section to maximum height and block the fork section under the battery compartment. The tractor section will remain on the floor.

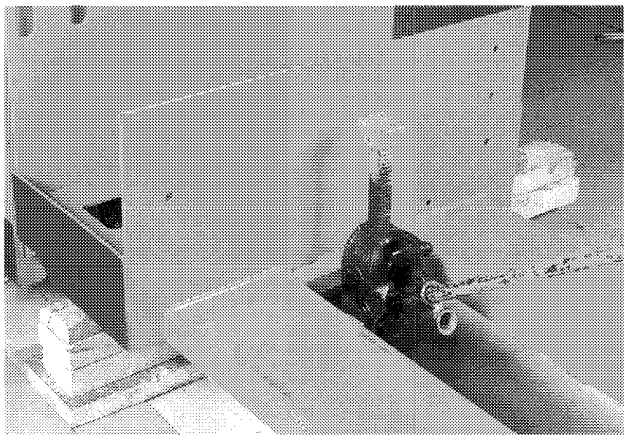


Figure 6-128:Blocking Fork Section For Ram Removal

14. Remove the two (2) hex head cap screws securing the retaining plate at the top end of the cylinder and remove the plate. See Figure 6-129.

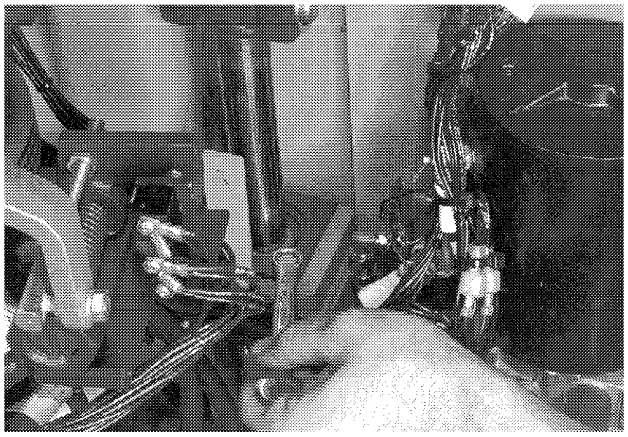


Figure 6-129:Removing the Retaining Plate

15. Remove the two (2) hex head cap screws securing the piston clevis to the fork frame. See Figure 6-130.
16. Push the piston completely into the cylinder.
17. Support the tractor with a jack.

⚠ CAUTION

In the next step, the tractor and frame will separate at top. Use the jack to stabilize the truck. See Figure 6-131.

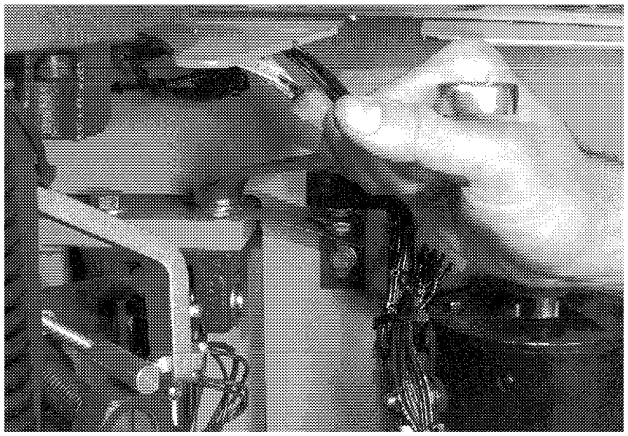


Figure 6-130:Removing Piston Clevis From Fork Frame

Filter Screen and Suction Tube

1. Remove the reservoir. See "Hydraulic Reservoir" on page 6-123.
2. With pump assembly inverted, push the spring clip toward the pump housing. See Figure 6-152.
3. Grasp the suction tube with the filter screen and pull out of pump housing. See Figure 6-152.
4. Clean the filter screen at the bottom of the suction tube with suitable solvent. See Figure 6-153.
5. From the pump side, blow dry with clean, dry compressed air.

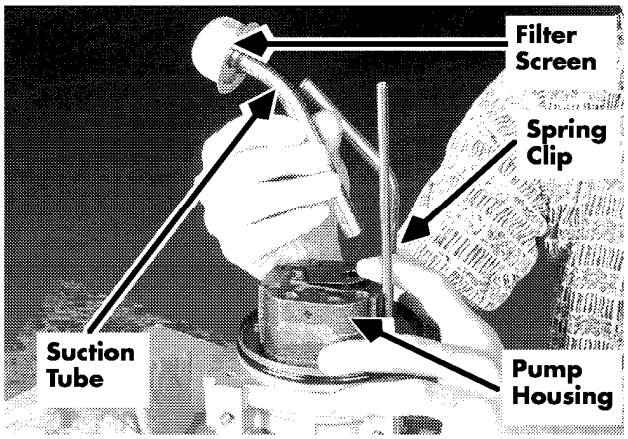


Figure 6-152:Pump Housing Components

Installation

1. Inspect the filter screen and tube for defects and replace if necessary.
2. Lubricate the pump end of the suction tube with hydraulic fluid.
3. Push the spring clip toward the pump housing and insert the suction tube through the spring clip and into the pump housing until it stops. See Figure 6-152.
4. If necessary, rotate the suction tube so that the filter screen is toward center line of the pump.
5. Install the hydraulic reservoir. See "Hydraulic Reservoir" on page 6-123.

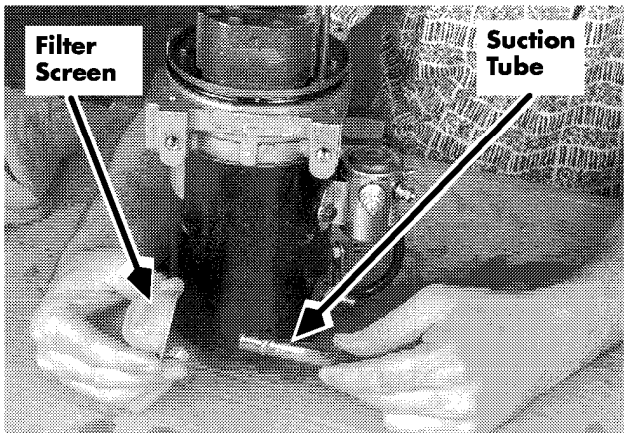


Figure 6-153:Cleaning Filter Screen

Approved Raymond Lubricants			
Where Used	**Type**	**Approved Manufacturer**	**Raymond Part Number**
Bearings, etc.	Grease	Chevron Avi-Motive Grease Citgo HEP2 (above 30° F only) Exxon RONEX MP or UNIREX N2 Gulf Gulfcrown Grease No. 2 Mobil Grease 77 Phillips Philube 1B and RB Grease Shell Alvania Grease EP2 Sohio Bearing Guard "LT" Texaco Regal AFB 2 Grease MIL-G-18709A	990-620/01 (10 cartridges per case) 990-620/02 (5 gal./ 18.9 liters)

Figure 7-1: Lubrication Equivalency Chart

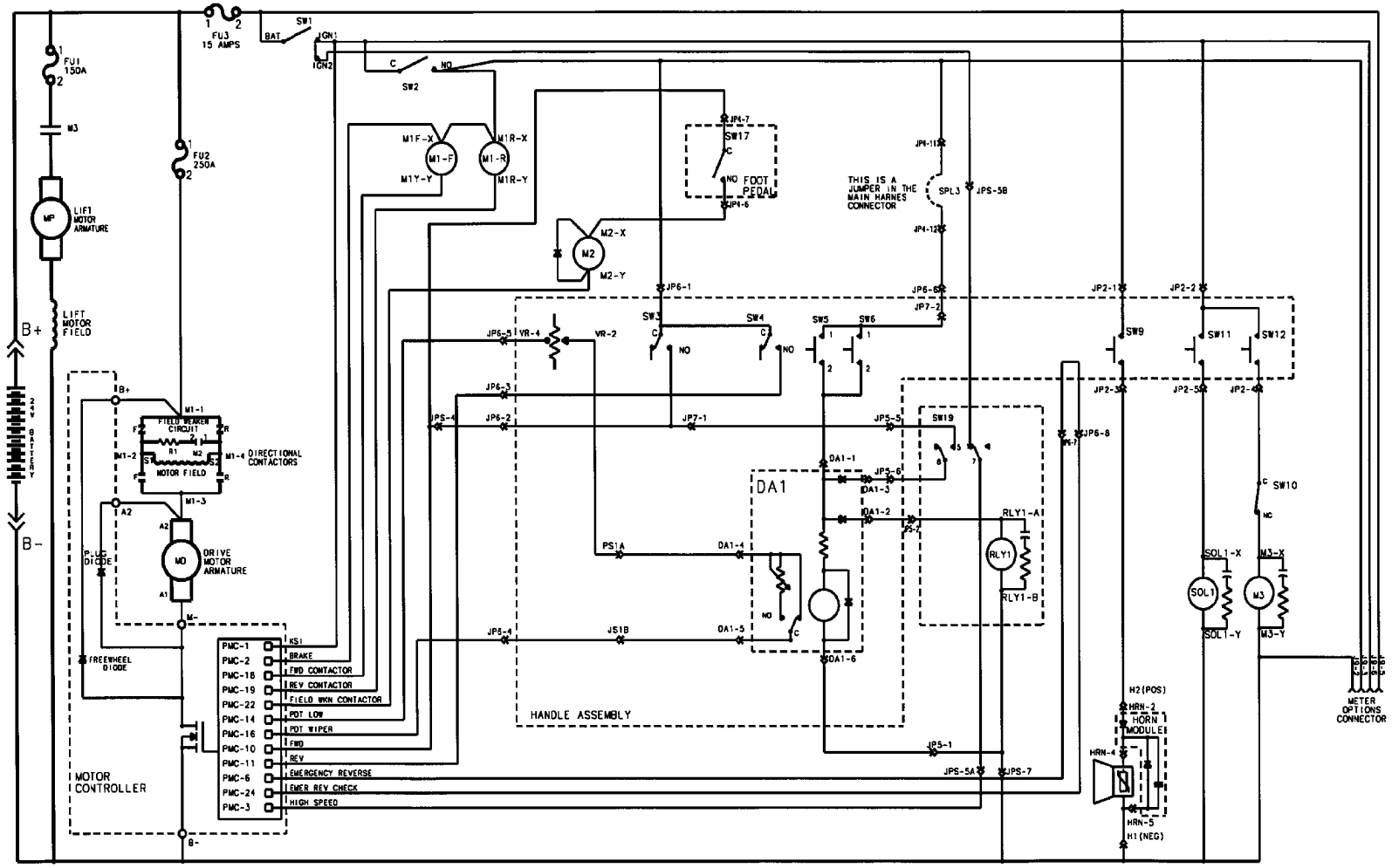


Figure 7-9: Model 114 Without Jog (Sheet 4 of 8)

RAYMOND PRODUCT IMPROVEMENT NOTICE

The Raymond Corporation
Corporate Headquarters
P O Box 130
Greene, New York 13778-0130

RPIN No. PLT-01-R006
August 23, 2001

Models 111, 112, 113, 114, 019
S/N 112-97-18628 and Up

SUBJECT: Noticeable Play in Drive Unit

Note: This Bulletin is for Information Purposes Only!

DESCRIPTION: The fit of radial rings in the drive unit transmission is such that some play is to be expected. However, as the rings wear, the play may increase. If the play is allowed to become extreme, it will become quite noticeable in the drive unit.

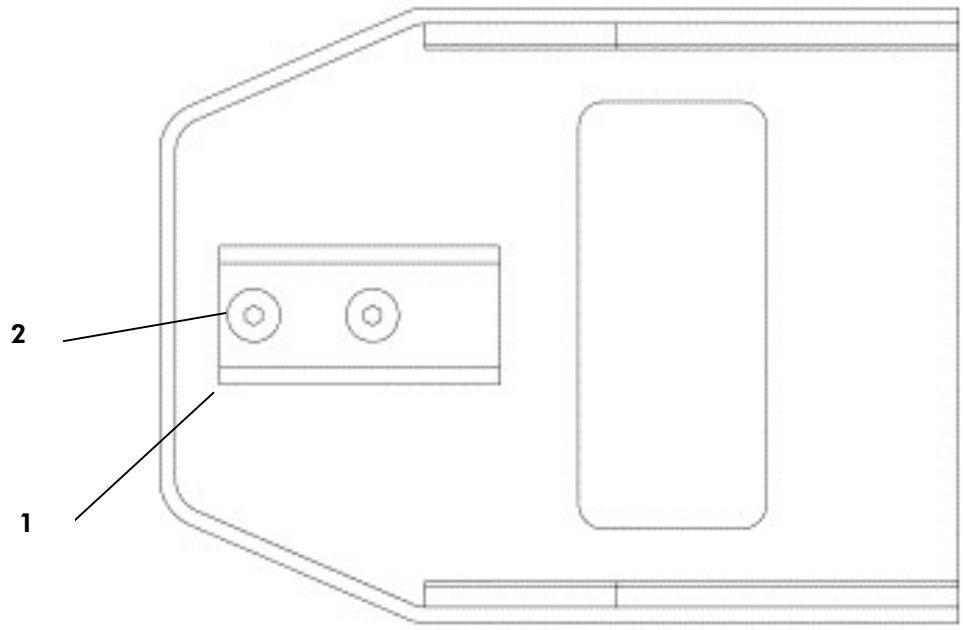
RESOLUTION: If worn rings are suspected as the cause of play in the drive unit, perform the following steps to determine if the rings should be replaced.

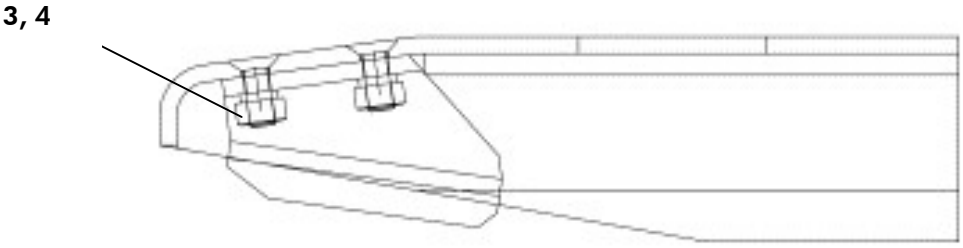
PROCEDURES: A magnetic base dial indicator is required to perform the following,
Refer to photos on page 2:

1. Jack the tractor of the truck up just enough to allow the drive tire to clear the floor.

WARNING! Use extreme care whenever the truck is jacked for any reason. Keep hands and feet clear from beneath the vehicle while jacking.

FOTP-0005/djm/5-12-00/A





Note:
Torque to 20-25 ft. lb.

Installation Entry Slider Kit (P/N 850-900-068)

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