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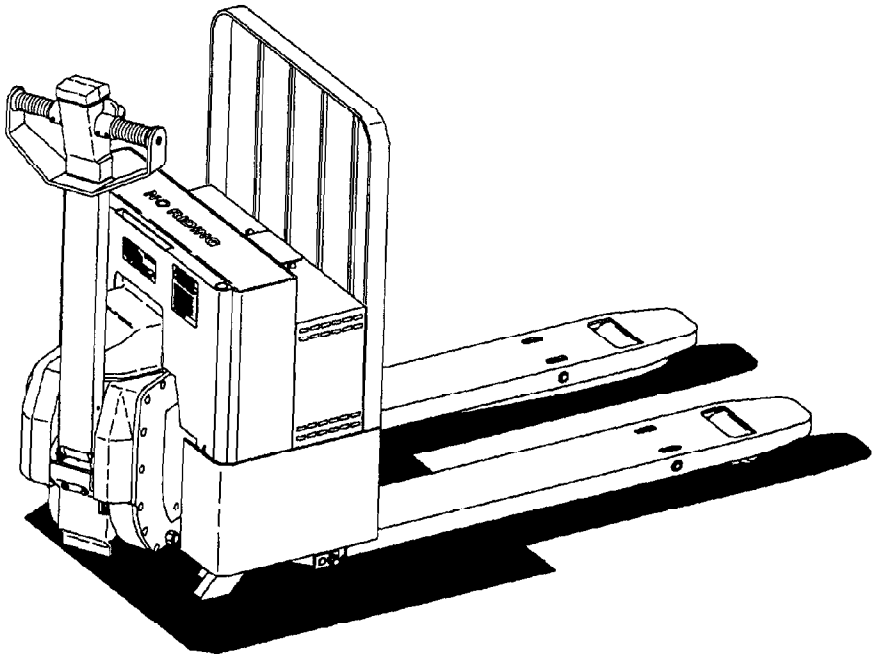
SM-560
WP-40



CLARK Technical Publications
Lexington, KY
40508

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PLANNED MAINTENANCE PROGRAM

RECCOMMENDED MAINTENANCE AND LUBRICATION SCHEDULE

PM Interval:

A = 8 - 10 hours, or daily
B = 50 - 250 hours, or every month
C = 450 - 500 hours, or every 3 months
D = 900 - 1000 hours, or every 6 months
E = 2000 hours, or every year

Notes:

*Replace As Required
#First PM only

Nominal Maintenance Interval

MAINTENANCE AND LUBRICATION	A	B	C	D	E
Check truck visually and inspect components		•			
Test drive truck -- Check functional performance		•			
Air clean truck		•			
Check torque on critical fasteners		•			
Lubricate truck (See charts)		•			
Clean/check battery terminals, electrolyte level		•			
Check battery cables/ truck receptacle		•			
Perform battery load test		•			
Check drive motor brushes*		•			
Test for grounds		•			
Clean drive unit air vent		•			
Check drive unit fluid level		•			
Drain and replace drive unit fluid		•#			•
Check brake condition and wear		•			

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PLANNED MAINTENANCE PROGRAM

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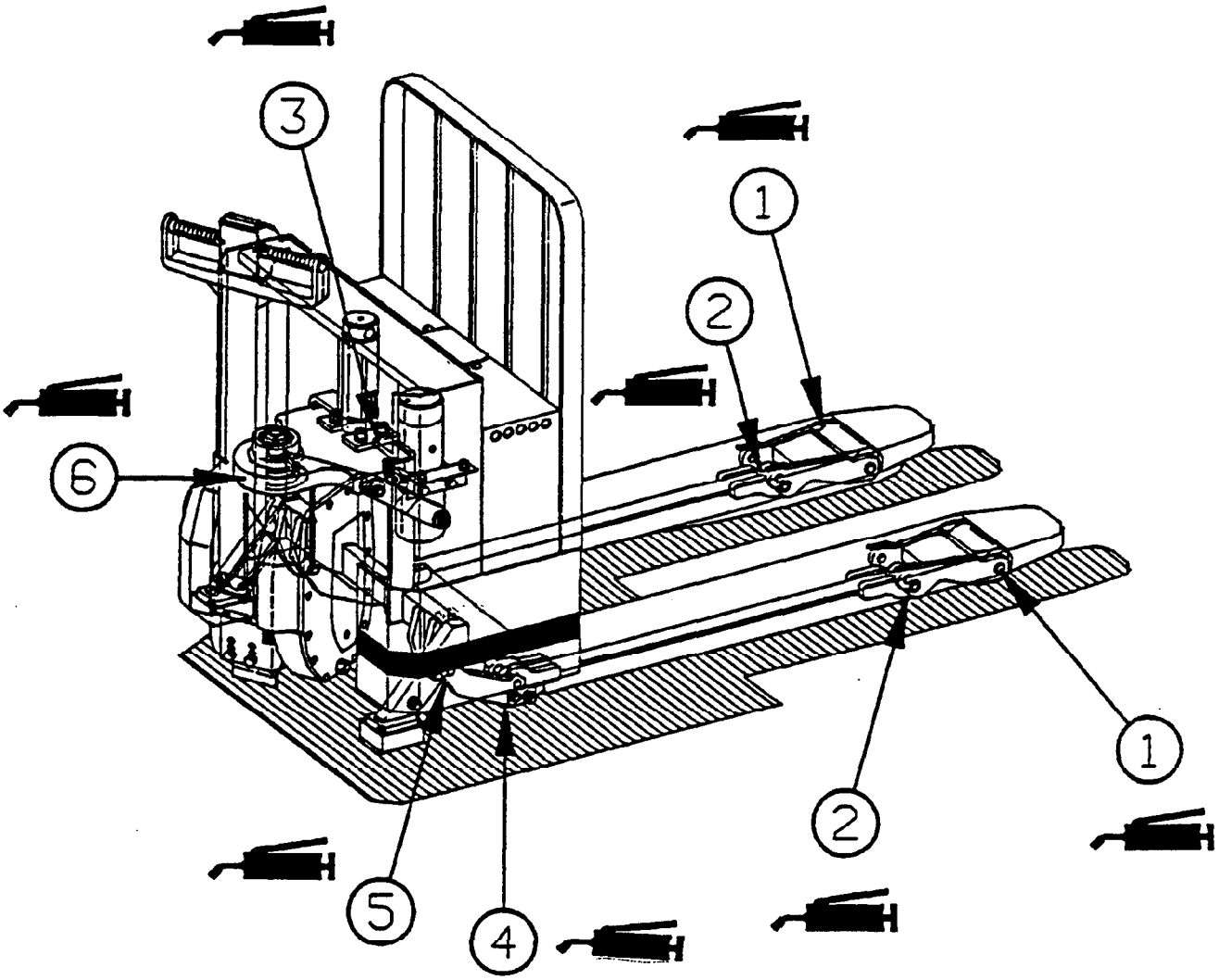
LUBRICATION CHART

GREASE POINTS



1. LOAD WHEEL AXLE (USE LUB GUN AND ADAPTOR FOR FLUSH TYPE FITTINGS)
2. PULL ROD - LOAD WHEEL END
3. LIFT CYLINDER MOUNTING PIN (COLD STORAGE TRUCKS ONLY)
4. PULL ROD - LIFT LINK END
5. LIFT LINK (COLD STORAGE TRUCKS ONLY)
6. DRIVE UNIT PIVOT BEARINGS (COLD STORAGE TRUCKS ONLY)

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PLANNED MAINTENANCE PROGRAM
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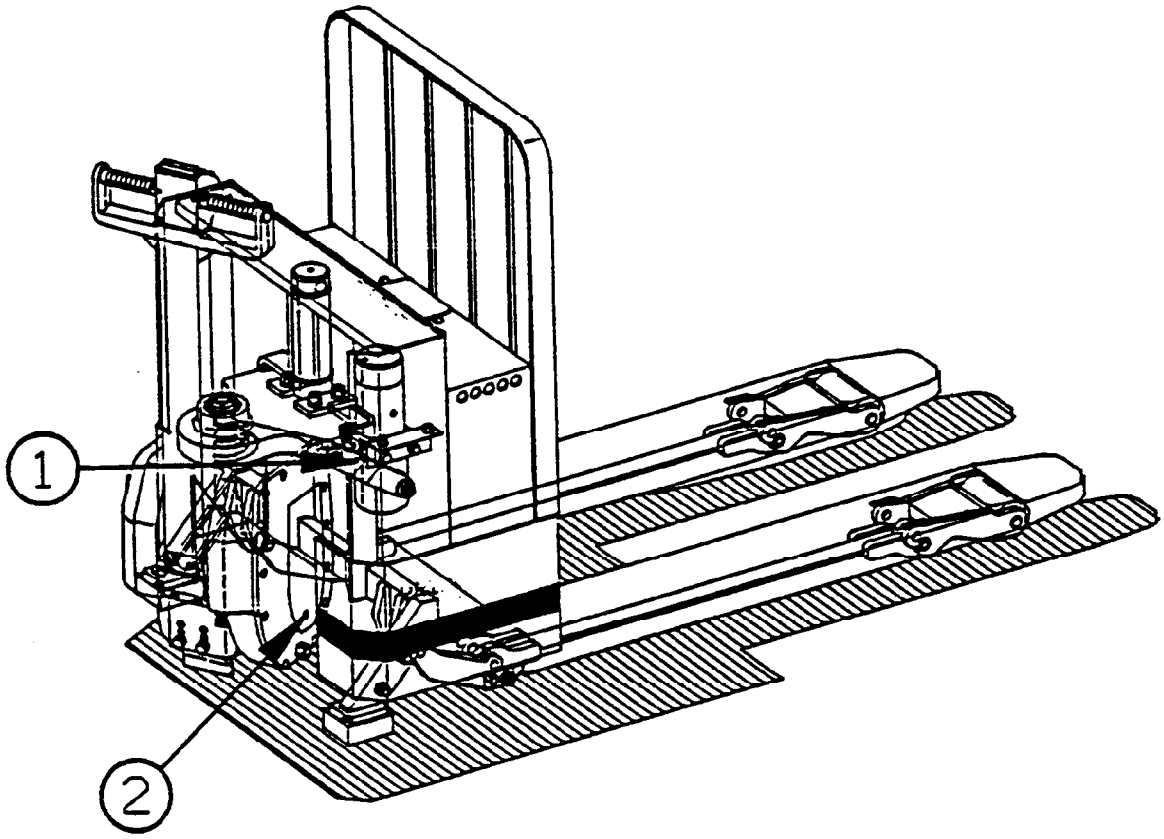
LUBRICATION CHART
FILL POINTS



1. HYDRAULIC SYSTEM RESERVOIR	
OIL CAPACITYIN RESERVOIR	1 QUART
FLUID TYPE	10W-40 MOTOR OIL
FLUID TYPE FOR COLD STORAGE	DEXTRON II ATF
2. DRIVE UNIT FLUID	
FLUID CAPACITY	.85 QUARTS
FLUID TYPE	80-90W
FLUID TYPE FOR COLD STORAGE	DEXTRON II ATF

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GROUP 12 SECTION 01
BATTERY

⚠ WARNING:

Battery Maintenance

BATTERY ACID, FUMES AND ELECTRICAL POTENTIAL CAN CAUSE INJURY OR DEATH. READ AND UNDERSTAND THESE PROCEDURES BEFORE WORKING ON BATTERIES.

1. DO NOT SMOKE OR ALLOW OPEN FLAMES OR SPARKS NEAR BATTERY CHARGING AREAS.

2. WEAR PROTECTIVE CLOTHING, GLOVES AND A FACE SHIELD WHEN WORKING ON BATTERIES.

3. KEEP ALL METAL OBJECTS AWAY FROM BATTERIES.

4. BATTERIES ARE VERY HEAVY. HANDLE THEM WITH THE CORRECT LIFTING DEVICES.

5. BATTERY CHARGING AREAS MUST CONFORM TO FEDERAL REGULATIONS.

6. DO NOT PERFORM BATTERY SERVICE UNLESS YOU ARE TRAINED AND QUALIFIED.

12-01-01 HANDLING BATTERIES

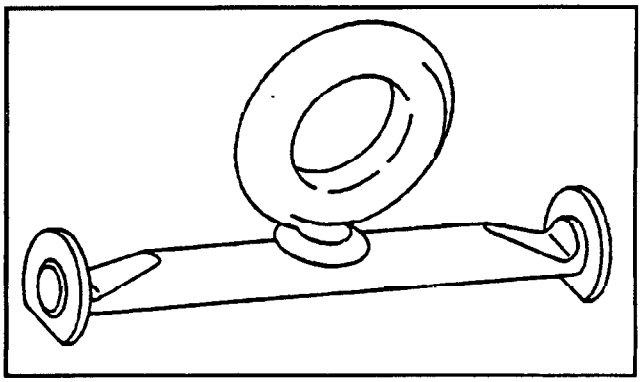
1. Change or service storage batteries only in a battery service area.

2. Make sure this area has the equipment:
   - to flush and neutralize any acid that may spill.
   - for ventilation of fumes from batteries.
   - for fire protection.

Before trying to remove, install, or charge a storage battery, the truck must be in a battery service area with the brake applied so that the truck cannot move.

3. Make sure the area has material handling equipment made for the purpose of removing and installing batteries, such as an overhead hoist. Make sure the overhead hoist has safety hooks.

4. When a battery is to be removed, make sure that the battery removal hook, Clark part number 1822063, is used.



5. When a power chain hoist is used, make sure the hoist has a chain container to hold the amount of chain used.

6. When a hand hoist is used, a battery without a cover must have a non-conductive material put over it to prevent the chain from making contact on the cell connections or terminals.

7. Keep all tools and other objects made of metal away from the terminals.

8. Because of hydrogen gas from batteries that are being charged, no smoking will be permitted in the battery area. Do not check electrolyte level with an open flame. No open flames, sparks, or electric arcs will be permitted in the battery charging area.

9. When batteries are being charged, the vent caps must be kept in position to prevent electrolyte spray. The vent holes in the caps must be open.

10. Electrical installations must follow the National Electrical Code (ANSI B56.2, 1974), NFPA 505-78, Part "C" and any local ordinances.

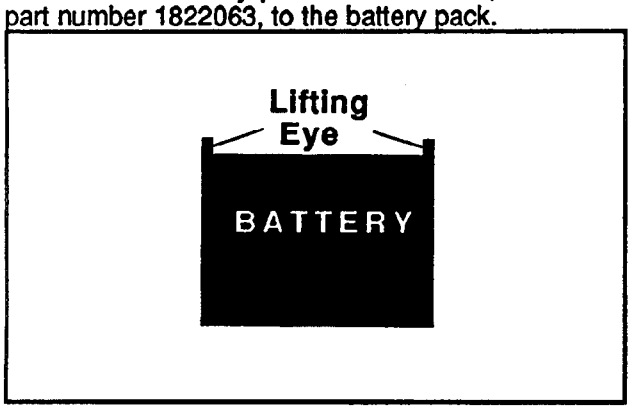
12-01-02 BATTERY REMOVAL

⚠ WARNING:
BEFORE YOU DO SERVICE WORK OR REMOVE OR INSTALL A TRUCK BATTERY OR BATTERY PAC, READ THE FOLLOWING INSTRUCTIONS CAREFULLY. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN SERIOUS PERSONAL INJURY.

1. Check the service and charging area for proper fire protection. Make sure there are no flames or heat in the area. Do not smoke. Make sure all necessary equipment is in the area, in good repair, and operating correctly. If service is to be done on the batteries, make sure there is equipment to flush and neutralize any acid that may spill, ventilation to carry fumes from the batteries, and equipment to handle electrolyte.

2. Put the truck in the battery area, turn the key switch to the "off" position, and disconnect the battery receptacle.

3. Attach the battery pack removal hook, Clark part number 1822063, to the battery pack.



4. Remove the battery pack from the truck.

12-01-03 BATTERY CLEANING

1. Clean the batteries only when they are removed from the truck.

2. The vent caps must be in position during cleaning.

3. Wash the batteries with low pressure cold water.

The batteries can also be washed with a solution of sodium bicarbonate (put a box of sodium bicarbonate in a pail of cold water and mix). Rinse with clean cold water.

12-01-04 BATTERY CHARGING PROCEDURE

⚠ WARNING:
BATTERY CHARGING

TO AVOID PERSONAL INJURY BATTERIES MUST BE CHARGED IN AN APPROVED CHARGING AREA AND CHARGED ACCORDING TO APPROVED PROCEDURES.

IMPORTANT

DO NOT OPERATE THE CHARGER UNLESS IT IS FIRST CONNECTED TO THE BATTERIES.

1. Replace any missing vent caps and tighten. Check vent caps for proper operation (the vent hole is clean and open).

2. Open the battery charger cover. Disconnect the battery pack from the truck receptacle and turn the charger timer to the "off" position.

3. Connect the A.C. cord to a 115V. A.C. outlet (or a 220V A.C. outlet, according to the type of charger).

4. Connect the Battery receptacle to the charger.

5. Turn the timer to the "on" position. The pilot light and the ammeter show the charger is "on" and charging. When the charger is turned to the "on" position, the charger will run for up to 12 hours maximum, or as set. See page 4 for charge rates.

IMPORTANT- WEEKLY CHECK

AFTER CHARGING, CHECK THE HEIGHT OF ELECTROLYTE IN EACH CELL. ADD DISTILLED WATER IF NECESSARY. THEN, AFTER BATTERIES HAVE BEEN CHARGED, CONNECT THE BATTERIES TO THE CHARGER AND SET THE TIMER TO 4 ON THE DIAL. THIS ADDED CHARGING WILL EQUALIZE THE CELLS AND HELP KEEP THE BATTERIES IN GOOD CONDITION. WEEKLY CHECKS ARE TO BE MADE ONLY BY TRAINED AND AUTHORIZED BATTERY MAINTENANCE PERSONNEL.

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BATTERY CHARGING RATE CHART

BATTERY VOLTAGE	CHARGING RATE - AMPERS AND TIME			
OPEN CIRCUIT VOLTAGE	5 AMP	10 AMP	20 AMP	30 AMP
BELOW 11.80 VOLTS	10 HOURS	5.5 HOURS	2.5 HOURS	1.7 HOURS
11.80 TO 11.90 VOLTS	9 HOURS	4.5 HOURS	2.3 HOURS	1.5 HOURS
11.90 TO 12.05 VOLTS	7.5 HOURS	3.7 HOURS	2 HOURS	1.3 HOURS
12.05 TO 12.20 VOLTS	6 HOURS	3 HOURS	1.5 HOURS	1 HOUR
12.20 TO 12.35 VOLTS	4 HOURS	2 HOURS	1 HOURS	30 MINUTES
ABOVE 12.35 VOLTS	3 HOURS	- - - -	- - - -	- - - -

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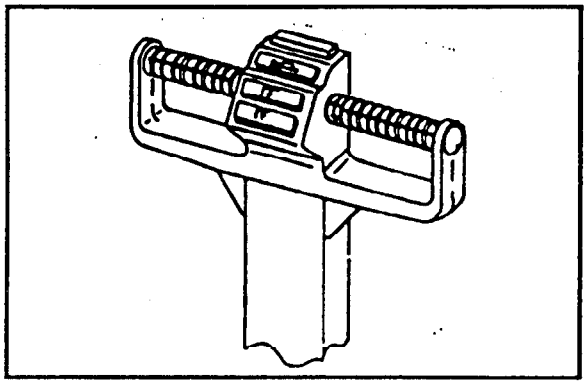
GROUP 13 SECTION 01 DIRECTION / ACCELERATOR CONTROL

CONTENTS NO.

13-01-01 CONTROL DESCRIPTION

The accelerator / directional control is one unit located inside the control handle. This switch is actuated when either of the control handles are rotated forward or backward. Further rotation of the lever increases the speed of the truck.



13-01-02 CONTROL MAINTENANCE

1.Check for smooth operation of the rotation of the switch actuating handle and its return to neutral position.

2.With an ohm meter, check for proper opening and closing of the electrical circuits through the switch.

13-01-03 CONTROL REMOVAL

1.Tunrn the key switch to OFF.

2. Disconnect the battery receptacle.

3.Remove the four (4) control handle head unit mounting screws.

4. Disconnect the wiring harness connector.

5.Remove the two (2) screws attaching the master switch to the handle assembly. Lift out the switch.

6.Disconnect the wiring attached to the control switch.

REFER TO PARTS MANUAL WP-2 (GROUP 13) FOR ILLUSTRATION.

13-01-04 CONTROL REPAIR

NOTE: This switch has no serviceable components and must be replaced as a unit.

REFER TO PARTS MANUAL WP-2 (GROUP 13) FOR ILLUSTRATION.

NOTE: When repairs are complete, check for proper operation and continuity, and reinstall in the control handle.

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GROUP 16 SECTION 01 ELECTRIC MOTOR GENERAL MAINTENANCE

ELECTRIC MOTOR MAINTENANCE GENERAL PROCEDURES

A planned maintenance program of regular, routine inspections is important for long life and trouble-free operation of electric motors. Make and keep records of your inspections. Use these records to help establish correct P. M. intervals and to indicate maintenance required to prevent major problems from occurring during operation.

INSPECTION PROCEDURES

To perform these service procedures, it is recommended that you first:

Park truck safely.

Fully lower forks.

Turn key switch "OFF".

Disconnect battery from truck receptacle.

MOTOR CLEANLINESS

Electric motors should be kept clean at all times, to prevent shorting, minimize wear, and for best cooling.

Wipe off all dust, dirt, oil, water, etc., from outer surface of motor.

Remove any debris from cooling air vents and around motor frame to prevent overheating.

Air clean (blow out) open motors using clean, dry (moisture-free) compressed air at [207 kPa] 30 psi. maximum air pressure. Air clean all inner areas around commutator and brushes, including cooling air vents and fan.

The presence of any oil on or near motor could indicate either bad bearings or leaking hydraulic system. Determine cause and repair problem before extensive motor damage occurs.

MOTOR INSULATION

If a change (reduction) in truck (motor) performance has been noted, it may be due to breakdown in motor insulation causing internal grounding or a short circuit.

Failures of motor insulation are due to: (1) contamination, (2) mechanical factors, and (3) high temperatures.

Contamination includes dirt, moisture, oily vapors, metal chips, carbon dust from brushes, etc. Mechanical factors include shock, vibration, overspeed, etc.

Operation at prolonged or excessively high temperature will cause insulation to become brittle and crack leading to premature failure. The insulation condition can be judged both visually and by test measurement. Regular, periodic measurements of insulation resistance can give a useful indication of the rate of insulation deterioration.

A sudden drop or consistent trend toward low values of insulation resistance give evidence that insulation is deteriorating and that failure may be imminent.

TEST FOR MOTOR INSULATION RESISTANCE TO GROUND

(USING A 500 VOLT MEGGER)

1.Turn the keyswitch to OFF and disconnect the battery from the truck receptacle.

2. Disconnect the power cables from all motor terminals.

3. Connect one lead of a 500 volt megger to any motor terminal. Connect the other lead to the motor frame. Apply voltage.

NOTE: Test all motor terminals individually.

4. The resistance should measure at least 1,000,000 ohms (1 megohm). If reading is less than this, the motor should be air-cleaned or dried to attempt to increase the insulation resistance.

5. If the reading is less than 1 megohm after cleaning, the motor should be removed from the truck for inspection and repair.

TEST FOR MOTOR INSULATION RESISTANCE TO GROUND
(USING A VOLT-OHMMETER VOM)

Use a Simpson 260-6p or equivalent VOM, calibrated on the Rx10,000 scale.

1. Turn the keyswitch to OFF and disconnect battery from truck receptacle.

2. Disconnect power cables from all motor terminals.

3. Connect the positive lead of the VOM to all terminal studs of test motor. Connect VOM negative lead to motor frame.

NOTE: Test all terminals individually.

VOM must show 1,000,000 ohms (1 megohm) resistance or higher for a good motor insulation.

5. If less than 1 megohm is measured, air clean motor and repeat test of motor resistance. If air cleaning does not make an improvement, motor will have to be removed and disassembled for closer inspection and repair if needed.

BRUSH AND COMMUTATOR INSPECTION

1. Remove brush cover(s) and remove brushes from brush holders. Clean brushes and holders. Check brush holders for damage.

2. Inspect condition of brushes. Remove each brush from brush holder and inspect brushes and commutator for worn condition and uneven wear.

3. Clean commutator surface. Wipe commutator with a dry, lint-free cloth.

DO NOT USE LUBRICANT OR SOLVENT ON COMMUTATOR.

4. Check appearance of commutator surface where brushes ride. Inspect commutator bars for burned, damaged or raised areas. The best signs of good commutation are a dark brown highly-polished commutator and uniform glossy brush-wearing surfaces.

5. Measure and make a record of brush length at each inspection. The record will verify amount of brush wear and indicate if there is enough brush length remaining until next scheduled inspection.

6. Brushes must be replaced when worn to approximately half of original length.

IMPORTANT
NEW BRUSHES MUST BE OF SAME SIZE AND GRADE (MATERIAL SPECIFICATION) AS ORIGINAL BRUSHES.

Observe how brushes are assembled in brush holders, and position of brush lead (brush shunt). New brushes must be installed in same manner.

7. Check brush shunt for good contact with brush holder. Be sure shunt is not damaged or burned since this may cause brush spring to carry current and lose tension.

8. If brushes do not need to be replaced, and commutator is in good condition, install brushes and brush springs into brush holders.

IMPORTANT
ALWAYS REPLACE BOTH BRUSHES AND SPRINGS. DO NOT REUSE OLD SPRINGS.

Be sure brush spring is correctly placed on brush holder and that brush is free to slide in brush box.

9. Clean and check brush box and connector screws. Tighten if loose. Be sure brush box shunt connection is tight. Install brush cover on motor case.

10. Check and tighten all motor bolts. Check lower nut on each terminal post. It should be installed finger-tight, then tightened another 1/4 turn with a wrench.