

MELBOURNE AND METROPOLITAN TRAMWAYS BOARD

ENGINEERING DEPARTMENT

WORKSHOPS AND RUNNINGSHEDS BRANCH

DUTIES OF ELECTRICAL MECHANICS -- RUNNINGSHEDS

ELECTRICAL EQUIPMENT, MAINTENANCE AND REPAIR.

Note: One day-in period is approximately 100 hours operation.

(a) Trolley Gear:

- Carbon inserts - At day-in inspection, or replace as required.
- Trolley pole head - Clean and lubricate at day-in, test for free movement, replace worn carbon insert holders ("shoes") when damaged or worn to gauge line.
- Trolley poles - Straighten slightly bent poles, check alignment ((day-in). Replace when required.
- Trolley base - At day-in, clean and lubricate base, examine springs, tension rods, cotter pins, connection of trolley wire to base, tension of all bolts. Every 8 days-in, lubricate hinge pin and needle bearings.
Repair or replace damaged bases and adjust trolley pole height and tension.
- Trolley ropes and Emergency ropes - Check at day-in and replace when required.
Ensure that emergency ropes are in the clips.

(b) Lightning Arrestor: - Clean and examine (8 days-in). After electrical storms, inspect, repair or replace (depending on type).

(c) Roof Troughing: - Inspect for damage caused by dewirements.

(d) Route Boxes: - Inspect earth wire for damage. Replace globes annually (before winter).

(e) Switches: - Clean, lubricate, inspect for loose connections, loosened mounting screws, defects or wear, on main knife switches, lighting, linebreaker and compressor switches.

(f) Controllers: (4 main types, 8 types in all).

At day-in, inspect, check for looseness, clean, adjust and file main finger contact tips and segments. Examine finger shunts on Clyde controllers. Clean, examine and replace cracked main barrel insulators. Replace burnt or

and reverse finger boards for burning or loose wiring connections. Check main earth wire and route box earth wire connections for continuity or burning.

Inspect, clean and adjust ratchet switches, inspect and replace, where necessitated by wear or breakage, fingers, contacts, pawls or complete ratchet switch units. On Clyde controllers remove the top cover every 8 days-in, (in addition to day-in maintenance), for special cleaning and inspection of the ratchet switch.

All springs are checked and appropriate controller parts are lubricated at day-in and reverse and main drum spindles are lubricated at every 4 days-in. Controller timing and operation is tested at day-in, motor cut-out switches are cleaned and checked for burning and controller handles and reverse keys are inspected at day-in.

Damaged, burnt or worn controllers are replaced as units where necessary. Major repairs, involving dismantling of the controller for replacement of main and reverse barrels and finger boards, are also done as required.

(g) Resistance Boxes:

Leads are inspected for breakage, looseness or burning, insulators are inspected and cleaned and grids are inspected for damage, overheating or burning at day-in. Individual components or unit changes are made as required.

(h) Linebreaker:

At day-in, inspect, clean and adjust main contact tips, interlock fingers and contact plates for wear or burning. Check all wiring for looseness or burning. Inspect operating and overload holding coils for deterioration of insulation, looseness of terminal posts or loose armature and tightness of armature plate. Check shunt and connection for breakage or burning. Check armature and rocker assembly for free movement or wear.

Check resistance tubes for tightness, deterioration and condition of pig-tail connectors. Check and clean arc chutes and insulators. Check condition of cover and clips. Individual components or complete linebreakers are replaced as required.

(i) Remote Control Units:

At day-in, inspect, clean, file main contacts, if required. Check main contact pressure spring, copper shunt; check for free operation of the armatures, inspect operating coils for deterioration and tightness, check terminal posts for tightness or burning, check mounting insulators, blow out coils and arcing throat for damage or burning. Clean and inspect arc-chutes for burning, breakage and adequate clearance for moving contacts. Clean and inspect interlock fingers and contact reels for wear or burning and correct adjustment. Check all electrical connections for looseness or burning. Check condition of cover and clips. Individual components or complete units are replaced as required.

motor where accessible. Inspect brush holders and tightness of clamping bolts, insulators, hammer tension, free movement and condition of carbon brushes. Replace brush holders and brushes as required.

Examine all accessible connections. Replace broken earth wires and accessible motor leads as required. Clean terminal blocks if necessary. See that motor case drain holes have been cleaned by Pitmen.

Check clearances between armature and field coil and interpole pole pieces, and remove any dirt or leaves from motor every 8 days-in.

(k) Air Governor:

At day-in, clean and inspect for correct operation of the contact tips. Examine insulation block for burning, examine all connections and clean arc-chute.

(l) Compressor:

At day-in, clean inside of compressor motor, examine commutator for burning or flatting, check brush holders and tightness of clamping bolts, hammer tension, free movement and condition of brushes. Check insulators and all electrical connections.

(m) Lighting:

At day-in, inspect lamp holders for looseness or burning. check flexible leads of destination boxes for deterioration and condition of destination box lamp holders, plugs and sockets. Change burnt out or discoloured lamps in tram interior, destination and route number boxes and headlights.

(n) Buzzers:

At day-in, test operation, re-adjust adjustable types, make unit change of other defective buzzers.

(o) Miscellaneous:

At day-in, check all earth connections under tram. Check wooden troughing for damage. Cleaning, referred to throughout the above, is normally shared (except at South Melbourne and North Fitzroy), by the Tradesman's Assistant, who is designated "Car Cleaner using Compressed Air", but it is the Electrical Mechanic's responsibility to see that the cleaning is satisfactorily done at day-in, and that electrical equipment is blown out using compressed air at least every 4 days-in. The assistant may remove covers, but the Electrical Mechanic must personally replace them to ensure that no displacement of equipment from its normal operating position is inadvertently caused by the unskilled man. When the R.C. unit box covers have been replaced, the Electrical Mechanic must open the main knife switch and carry out a sequence test to ensure that all remote units operate correctly, as the assistant operates the controller through all notches.

that the compressor does not start to operate, and stop, at the correct pressures. Components or complete units are changed as required.

(b) Air Compressor:

At day-in, examine for leaks at the head, for sticking valves, wear, and tightness of mounting bolts.

(c) Reservoir:

At day-in, drain off water through cock. Examine water for excess oil, which would indicate excess oil consumption by compressor. Examine cylinder for damage. Check tightness of mounting bolts.

(d) Safety Valve:

At day-in, ensure that the blow-off holes are not clogged.

(e) Motorman's Valve:

At day-in, examine for leaks. Remove the head, grease the spindle, examine the spindle and gasket for wear, replace where necessary. Clean inside of body and lightly grease the valve operating rocker. Replace head. Examine the handle for wear. Test correctness of operation to ensure that correct service pressures are indicated by the gauge and that pressure is maintained at the lower end of the range.

Every 8 days-in, remove the loading piston, clean the exhaust valve, examine the neoprene bucket, piston and loading spring. Replace worn or defective parts. Lubricate, re-assemble and adjust the valve. Test operation. Individual components or the complete units are changed as required.

(f) Double Check Valves:

Every 24 days-in, remove, clean, examine, replace seals and gaskets as necessary, check for free operation, replace and test operation.

(g) Relay Valve:

Every 8 days-in, remove, clean and examine slides, rings and seals, for wear, replace worn seals, gaskets, lubricate, assemble and replace. Test for correct operation.

(h) Barrel Unions:

At day-in, apply air brake to full emergency position and check all unions for leaks.

(i) Air Gauges:

At day-in, check to see that they show the same reading at both ends, check for loose indicating hands. Refit any loose hands or broken gauge glasses and clean dials as required. Where necessary, check air pressures indicated against master gauge.

Replace where necessary, sand boxes (assisted by Car Builder), sand box valves, hoses and retaining clips, and punch operated valves. Clear any blocked hoses. Check alignment of sand hoses.

(k) Door Engines: (For folding and sliding doors).

At day-in, oil piston sleeve and door rollers and check operation of doors. Adjust cushioning needle valve. Check correct operation of Conductor's valve and Driver's door operating valve. With sliding doors, check operation of trip valve where fitted. With folding doors, oil all pivot points. Check that door isolating cocks are free. Every 8 days-in, dismantle trip valves and door operating valves, clean, lubricate, re-assemble and test. Every 32 days-in, remove door engines, dismantle, clean, replace seals and gaskets, lubricate, re-assemble, replace and test.

(l) Windshield Wipers:

At day-in, check for correct operation, adjust where necessary, replace arms and blades where necessary, and change the unit complete, if defective.

(m) Brake Cylinders:

At day-in, check for leaks.

Every 2 days-in, oil the piston sleeve.

Every 8 days-in, turn and lubricate the piston.
Replace buckets and gaskets where necessary.

(n) Miscellaneous:

The Electrical Mechanic assists Car Builders to straighten bent stanchions, brackets, grab rails etc., ensures that motor suspension bearings are fitted correctly to housings and files dowel holes and oil ways, if necessary; assists with accident repairs, by refitting headlights which have been damaged, replaces air pipes damaged or broken by collisions: at day-in, inspects the handbrake head equipment for free and correct operation.

In addition to routine maintenance and repair, Electrical Mechanics are expected to be able to locate and rectify, where possible, any faults in electrical or air equipment which causes defective operation, or are found on routine inspection.

Testing for some electrical faults involves the use of a bank of lamps and 600 V. probe, and/or a battery operated bell set and probes.