

MELBOURNE AND METROPOLITAN TRAMWAYS BOARDENGINEERING DEPARTMENTWORKSHOPS AND RUNNINGSHEDS BRANCHRC2 AND EE.RC1 CONTROLLER MAINTENANCE - ELECTRICAL MECHANIC'S PROCEDURE.ROSTERED DAY-IN SERVICE:

1. Before commencing any work on the controller, the trolley pole must be removed from the overhead wire and placed under the hook, danger discs attached to both trolley ropes, and both control switches placed in the off position. Before removing the steel cover rotate the main controller handle through all power notches.
2. Check the controller handle for tightness on the spindle and tighten the nut if necessary. Check the handle for material failure, especially where the handle joins the boss; if the wooden handle is damaged or does not revolve freely, the complete handle must be changed.

Check the reverse key for material failure or spreading of the jaws; if defective, replace.
3. Remove the controller cover and examine the asbestos backing on the inside of the cover and repair or replace if damaged.
4. Check all wiring cables for burning or loose connections on all finger boards and tripping switch. If the connections show signs of burning where they are attached, remove the set screw and clean the contact faces and if necessary resolder the wiring lug to the cable; renew the set screw and washers, then tighten firmly.
5. Check the tripping switch for loose set screws or bolts in moving contacts or finger base. Replace any worn segment and contact fingers and examine the fingers for fracture across the top mounting holes. If in doubt, replace the finger. Check the lift of the fingers which should not exceed $\frac{1}{8}$ ". Check tripping switch striking plate for loose rivets. If loose tighten but first renew the copper rivets. Examine trip spring guide for wear and see that all cotter pins are intact.

Check pull offspring for deformity or worn ends where it is attached; if defective, replace.

Check the ball race is free to revolve and that the grooves in the star wheel are clean. Check the stop plate and the operating arm for material failure.

To test the pull-in operation of the tripping switch, place the main controller handle in the off position, wipe the fingers and contacts clean and free of all lubricant and insert a .010" feeler (or, if not available, a tram ticket folded to four thicknesses) between the back of the tripping arm and striking plate and move the controller handle sharply to the first notch position. If the switch fails to engage, the operating arm must be removed and the contact face of the tripping arm filed. Replace the operating arm and repeat the above operation until a satisfactory operation is obtained.

To test switch for tripping open, cut 1st power notch and move the handle to the off position. The switch should

trip out smartly. Repeat the above operation on the 7th, 8th, and 14th notches. If the switch fails to trip renew the pull off spring; if it still fails to trip open, use $\frac{1}{8}$ " round file and dress the appropriate groove in the star wheel until the switch operates correctly.

6. Check the main barrel fingers for wear and looseness on the finger bases or the finger base loose on finger board. Replace the finger:
 - (a) If worn to a $\frac{1}{16}$ " thickness.
 - (b) If the copper shunt is broken between moving and fixed part of the finger.
 - (c) If the contact surface is burnt.

NOTE: When a new finger is fitted it must be checked to see that the contact face seats squarely on the segment. Adjust when necessary by twisting the finger with the finger adjusting lever.

7. Check the main barrel for burns, wear, looseness of the contact segment on the wood barrel, or the wood barrel to the shaft. Burns and blisters should be smoothed off with an 8" smooth file. If the barrel contact segment is badly worn on the leading or trailing edges, it is not possible to adjust the fingers.

8. Check all taper pins on the main and reverse barrels for looseness or material failure.

9. Main Barrel Finger Height Adjustment.

The correct lift of a finger should be $\frac{1}{8}$ " and should make a firm contact with the segment. Where two or more fingers make contact on entering a notch position, the fingers must be adjusted to make contact simultaneously. Extreme care must be taken to ensure that no finger is set too low, otherwise the finger will butt and a bent finger could result.

NOTE: After altering the lift of any controller drum finger place the controller in the 14th notch position and check that the fingers are making firm contact with the segment.

10. Check the reverse fingers and segments for burning or looseness and correct contact pressure on the segments in the forward and reverse positions. (Note: Finger contact pressure should be 4 lbs. at the point of contact). Check the motor cut switches for free operation and examine for burning on the blade contacts. Lubricate when necessary.
11. Check all pawl springs for deformity. Check the pawl roller for flats or wear on the roller pin. Replace if worn.
12. Check the set screws that retain the top cover, barrel bearings, and finger boards. If loose renew the spring locking washer (if fitted) and tighten securely.

Every 4th Rostered Day-in Service:

Oil the bottom bearing of the main barrel and top and bottom bearings of the reverse barrel, including the pivot point of the main pawl arm, the tripping switch ball race, star wheel and pivot points with a few drops of armature oil.

Do not over lubricate -- excess oil may damage electrical insulation.

In addition, the controller must be blown out with compressed air by the Tradesman's Assistant at this service.

NOTE: After the Tradesman's Assistant has cleaned and lubricated the controller, the Electrical Mechanic must inspect the controller to ensure that it has been thoroughly cleaned and lubricated and is fit for service. He then replaces the controller cover and removes the danger discs from the trolley ropes, after ascertaining that it is safe to do so.

EAST PRESTON