

MELBOURNE AND METROPOLITAN TRAMWAYS BOARD

ENGINEERING DEPARTMENT

WORKSHOPS AND RUNNINGSHEDS BRANCH

K35 JJ: K35 AA2 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 tags attached to both trolley ropes and both linebreaker control switches placed in the off position. Before removing the wooden 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 barrel water cap retaining screw and if loose tighten. 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 signs of burning or loose connections on all finger boards and the ratchet switch. If the connections show signs of burning where they are attached, remove the set screw and clean the contact faces and if necessary re-solder the wiring lug to the cable; renew the set screw and washers, then tighten firmly.
5. Examine the ratchet switch, check for loose screws in the switch or the insulated base, replace any worn segment and contact fingers, 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  $\frac{1}{8}$ ". Examine the ratchet switch trip pawls for wear; if worn, replace. Check pawl spring for fracture, for deformity or worn ends where it is attached to the trip pawls; if defective, replace.

Check that the grub screw holding the ratchet switch centre to the main barrel is tight; if excessively loose remove and examine and if the taper is worn, replace with a new grub screw.

To test the "pull-in" operation of the ratchet switch, place the main controller handle in the "off" position and strike the wooden handle of the controller with the palm of the hand in the direction of rotation. If the switch fails to engage, renew the "pull-in" pawl and repeat the above test; if it still fails to engage change the switch complete.

To test the switch for tripping open, cut the 1st power notch and then move controller handle to the "off" position. The switch should trip out smartly. Repeat the above operation on the 5th, 6th and 8th notch. If the switch fails to trip, renew the cut off pawl and repeat the above test; if it still fails to trip change the switch complete.

6. Open the arc shield and remove the copper deposits with the end of a flat file and replace any plates which are broken or have a crater burnt in them deeper than  $\frac{1}{8}$ ".
7. Check that the auxiliary earth contact lifts the "B" finger with the controller in the 1st notch and that the "B" finger is clear of the fibre disc in the "off" position. The height of the finger is altered by bending the mounting stop plate.
8. Check the main fingers for looseness and if any are loose renew the spring locking washer before tightening.
9. Check copper finger tips for wear by observation and feel and if any are badly ridged, replace.

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

Copper blisters must be removed from the face of the finger tip using an 8" bastard cut file.

10. Check main segments for burns, wear, and looseness on the drum, and ensure that the No.4 segments are sitting flat on the drum. Burns and blisters must be smoothed down using an 8" bastard cut file.

Renew segments when any of the following conditions of wear are found:-

- (a) the wear of the segment at the leading edge is such that the finger tip does not seat on the running face of the segment when the drum is stopped on a notch position.
- (b) wear at the leading or trailing edge of the segment is such that it does not permit simultaneous lift or fall of the finger, in particular when traversing from series to parallel notches.

Replace any segment that is scored or burnt on the running face.

Note: Any segment changed must be checked to see that the contact tip of the finger seats squarely on the segment, and the leading and trailing edges must be rounded off.

11. Controller finger height adjustment.

The correct lift of a finger should be  $\frac{1}{8}$ ", with finger contact pressure on the segment of 8 lbs. Any finger that does not meet this standard must be replaced. Where two or more fingers make contact on entering a notch position, the fingers must be adjusted to make contact simultaneously.

To meet this requirement, it may be necessary to change one or more segments. 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 finger the adjusting lock nut must be securely locked.

12. Check the reverse fingers and segments for burning or looseness and correct contact pressure on the segments in the forward and reverse position. (Note: Finger contact pressure should be 4 lbs. at the point of contact). Check the motor cut out switches for free operation and signs of burning on the blade contacts; lubricate when necessary.

13. Check all pawl springs for deformity or worn ends. Check the pawl roller for flats or wear on the roller pin. Replace if worn.

14. Check that the set screws that retain the top cover, barrel bearing and finger boards are tight. If loose, renew the spring locking washer (if fitted) and tighten securely.

15. Every 4th Rostered Day-in Service:

Oil the top and bottom bearings of the main and reverse barrels, including the point of the main pawl arm and the ratchet switch centre and pawls, with a few drops of armature oil. Do not over oil - excess oil may damage electrical insulation.

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 and replace the controller cover (taking care not to displace the motor cut outs), remove the reverse key, place it on the top of the controller and remove the danger discs from the trolley ropes after first ascertaining that it is safe to do so.

The controller must be blown out with compressed air.