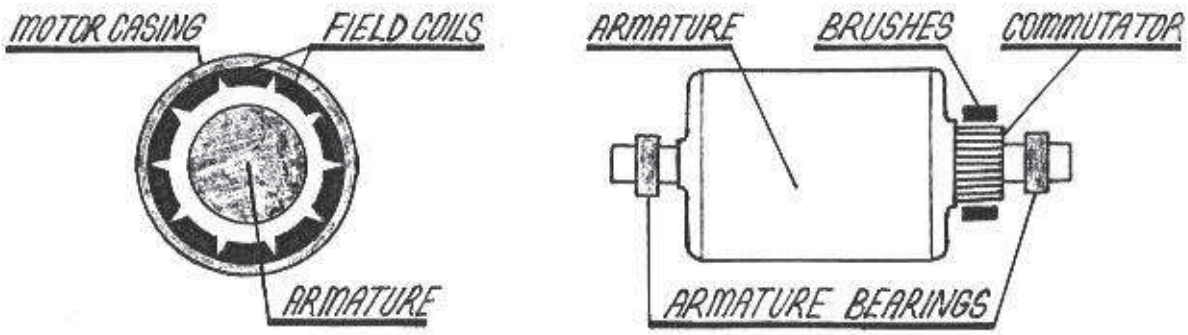
GOOD HOUSEKEEPING OF TRACTION MOTORS

Presenter: Richard Gilbert
Session Chair: Ray Blackmore

Session Secretary: Craig Tooke

The paper I am presenting is on behalf of Colin Britt of the firm AC - DC Electric Motor Repairs of Edwardstown, South Australia. That firm specialises in rewinding all makes of electric motors. I am pleased to present this paper because I feel the housekeeping of traction motors is something that is not high up on the priority of most museums. Too often the policy is one of a corrective solution and not one of a preventative solution.

We need to develop a better understanding of traction motors and their maintenance requirements. Generally our motors are very old, but they are the heart of the tram and without due regard to their well being the museum can be up for a big repair bill. Colin Britt is a great advocate of good housekeeping of traction motors in the form of preventative maintenance and should a motor require repair he aims to do the job properly as he does not intend the motor to be back with him again.



Simplified Diagram of a Motor

The motor has 4 main parts: Armature, Commutator, Field Coils, Brushes. The principle of the motor is to cause a strong magnetic field from the field coils to react with a strong magnetic field of the armature to cause the armature to spin freely to drive the tram. We use electricity under a lot of pressure to achieve this. Once we open the controller, electricity has to go somewhere. If the motor has a fault the electricity will take the most convenient path and there is a risk of damage to the equipment.

It's a case of some simple housekeeping rules or maintenance schedules.

Have the commutator clean. Modern tools for the job make these tasks more easily accomplished. An abrasive stick can be used to remove carbon build-up from the commutator. This stick is held over the commutator whilst the motor is slowly turned. The brushes should be checked to see they have sufficient length and are fitting the full face over the commutator.

Armature bearings should be in good order. An armature having ability to move about within the motor could strike the field coils and cause a major fault.

There should be a regular inspection schedule drawn up as part of the routine tram maintenance schedule. Colin Britt is keen to advise museums to contact him on these matters.

What causes an electrical fault? A flashover on the commutator is generally caused by carbon build up on the commutator. The electricity takes the shortest path and jumps across the commutator from one brush to the other.

Faulty armature coils. This can be due to a breakdown of the insulation through age or moisture collecting in the armature. Moisture can be a concern in museum operation because trams are not working hard and are not used day after day continuously.

We have all stood beside a tram, or train, that has been working hard all day and can feel the dry heat and electrical smell radiating from the motors. Our museum operation rarely achieves this.

Faulty Field Coils. Like an armature can break down due to age or moisture, the armature striking the field coil will cause a fault. This happens when the armature bearings are worn allowing the armature to move about.

When the Ballarat Tramway Preservation Society sent the traction motor from No.40 for repairs we were enlightened by Colin Britt to just how poor the condition of the motor was. The insulation of the wires entering and within the motor casing was well broken down, as was that on the field coils.

The point of concern is that the motor at the other end of 40 looks the same as do many of ours, and they are still working - but, for how long?

This is not a statement meant to frighten people, but a visit or telephone call to Colin to discuss issues would be enlightening. Our Society has been most impressed with his work, personal interest and understanding of the requirements of the museum and the vintage electrical equipment we use. His firm winds the motors for 'Trans Adelaide' (the MTT) and Australian National Railways.

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Questions/Comments

1. D.Lange - What happens to the commutator stick material as it is ground away on application to the commutator?
   Answer: C.Tooke - The material, which is a fine particle and is non-conductive, tends to fall out via the motor ventilation. A small amount remains inside the motor case, however, it is not harmful.
2. T.Burling - How often is it necessary to bed in motor brushes?
   Answer: R.Gilbert - I believe it is generally only necessary when the brushes are new.
3. M.Sanders - We experienced a motor problem with Brisbane Drop Centre (234) and repairs were carried out by the EMD Co of Dunedin.
4. R.Gilbert - Another possible poor practice is to regularly practice 4th emergency by pulling the reverse key back when the tram is in motion. The B.T.P.S. train drivers in the technique but not whilst the tram is in motion.
5. J.Pennack - Lower supply voltages at museums are also a good practice for museum operation and had proved successful at the AETM.
6. J.Phillips - The V/Line locomotive simulators which we will be inspecting as part of the post conference activities is capable of illustrating emergency brake stops by pulling the controller key back.
7. J.Nyman - Asked what delegates thought of GEC Alsthom as a repairer of traction motors?
   Answer: In general, museums had not had any work done by this company so were therefore unable to comment.

Conclusion

J. Shanks (THS) on behalf of the group moved a vote of thanks to R. Gilbert for the presentation, R. Blackmore for chairing the session and C. Tooke for recording the details.