Government of India
Ministry of Railways
Research, Designs & Standards Organisation
Manak Nagar, Lucknow - 226 011

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SPECIAL MAINTENANCE INSTRUCTION NO. RDSO/ELRS/SMI/172
ENGINEERING PRACITCES FOR IMPROVING RELIABILITY OF RELAYS

1. OBJECT

1.1 Premature failures of different makes of relays have been reported by Railways. On review of the performance,maintenance practives being followed by sheds,manufacturing defects and design defeciencies of different makes of relays, it is necessary to introduce certain improvement measures to over come the same.

1.2 This SMI lays down guide lines for the engineering practices to be followed for improving the reliability of relays.

2. INSTRUCTIONS

2.1 ENGLISH ELECTRIC MAKE RELAYS

2.1.1 It should be ensured that the staff who are assigned for relay maintenance are adequately trained preferably at the manufactrurer's works.

2.1.2 Maintenance manuals with relevant drawings should be made available to the maintenance section and these should be easily accessible to the workers who actually work with their own hands. In addition, all descriptive material in the manual should be not translated into local languages retaining technical terms in their origional pronounciation.

2.1.3 If any repetitive defects are noticed, cyclic checks should be introduced on all relays.

2.1.4 Sometimes, relays get damaged due to wrong connections or external faults.In such cases, failure classification should be done judiciously.

2.2 ABB MAKE RELAYS

2.2.1 A close watch should be kept on the quality of economy resistors supplied with M/s.ABB relays and if any manufactruing defect is noticed, the relay should be got replaced.

2.2.2 Send each and every failure/defect report if economy resistors to M/s.ABB Vadodara under advise to RDSO. If open circuit or other types of failures occur after varranty period, it is worth to inform the manufacturer in any stage for their corrective action.

2.2.3 Soldered joints of economy resistor should be checked visually to make sure that:-

- the wire is twisted around the terminal strip and secured fully before soldering to avoid any mechanical strain on the solder itself;
- the soldered joints show proper pre-tinning and wetting of the surface;
- when new resistors are purchased by the sheds, they should be screened by operating them for 168 Hrs. at rated power dessipation. The resistance at ambient temperature should be measured before and after heat run test. The instrument used for the test should have an accuracy of at least 1.0%. Resistors which show an increase in resistnce by more than 2% should not be used.

2.2.4 The economy resistor should be dipped in a solution of 1% ammonium chloride for one hour and allow to drain in air for 23 Hrs. This should be repeated seven times. At the end of this exposure the resistor should be washed and dried. The resistor shall then be tested at rated current and power for 24 hours. There must be no failure.

2.2.5 RDSO`S SMIs No.ELRS/59, 69 and 157 should be followed strictly for relay coils.

2.2.6 Some of ABB make new PC-8 relays are found without circlips in the mounting screws. These screws get lost during transpornation, removal and fitment. it is to be ensured that appropriate size of screws with circlips are made available in the relay before fitment.

2.3 CUTLER HAMMER RELAYS

2.3.1 RDSO SMIs No. ELRS/59, 69 and 157 should be followed strictly for each and every coil supplied by the firm.

2.3.2 To prevent sticking due to residual magnetism, nylon button is provided on the electromagnet cores. in some sheds, it is observed that this button is removed or filed to compensate the reduction in the length of nylon stem on timer unit because of wear out. This practice should be avoided and required instructions be given to ensure that the nylon button is properly stuck to the core before the relay is given for fitment. Work out nylon stem should be replaced.It will be preferred that if the length of the nylon stem reduces by more than 0.5 mm, the stem should be replced. if stem requires replacement in less than three years. The matter must be taken up with the manufacturer to provide a more wear resistant material.

2.3.3 In the absence of limits for millivolt drop in the microswitch (sealed unit) from the manufacturer, condition monitoring of contacts in the sealed micro switch may be done by determining the mv drop limits as per the following procedure:

a) Pass rated current through a new micro switch and measure voltage drop across the contacts.
b) Break the rated current and reclose.
c) Repeat ‘a’ and ‘b’ ten times .
d) Repeat ‘a’ ‘b’ and ‘c’on four new microswitches.

e) Calculate the average mv drop and standered deviation from the 50 readings taken as above.

f) Take 1.5x (average mv drop+ three times standard deviation) as the upper limit for mv drop at rated current across micro switch contacts. Replace micro switches which exceed this value.

2.3.4 Some sheds have the cases of cracks at the corners of coil mounting bracket. The reason is sharp bends which are prone to fatique fractures from micro cracks produced during coil bending. It is recommended to carry out-complete check on all such components by dye penetrant method to defect any cracks at the bends. Any plate with even a small orthin crack brought out by the dye should be replaced since it will frcture sooner or later. No attempt should be made to repair any of such defective item.

2.3.5 Foundation studs used for mounting the relays are occassionally found broken. considering the weight of the relay and the vibration on locomotive it is desirable to use 50% higher size high tensile steel studs and nuts for foundation studs. The studs should have ultimate tensile strength of at least 80 kg/mm sq.

3. OERLIKON RELAYS (PROTECTIVE)

3.1 Protective relays only actuate in case of faults hence it is necessary to devise and implement special checks to ensure that these relays are operative and healthy. For this purpose, special dummy plug-in-units with leads to suitable meters should be developed by sheds so that they can be inserted in place of the relay and the current or voltages (as the case may be) measured.

3.2 The above check with dummy plug-in-units is a quick method of checking the continuity of the entire wiring up to the relay to make sure that the currents sought to be measured are really passing through the relays.

3.3 These checks need to be made only after over hauling of wiring repairs.

4. INSTRUCTION DRAWING

Nil.

5. APPLICATION

Relays on Electric Locomotives.

6. AGENCY FOR IMPLEMENTATION

All electric loco sheds and POH shops.

7. DISTRIBUTION

As per mailing list.

Encl: Mailing List

(R. N. LAL)
for Director General (Elect.)