EMD MAINTENANCE INSTRUCTION

NO (AC) VOLTAGE RELAY NVR - 8089615 AND 8174103

DESCRIPTION

Many locomotives are equipped with alternators to supply electrical power to drive such auxiliaries as traction motor blowers and engine cooling water fans. In the event that the alternator should fail, it is apparent that serious damage might occur due to these fans and blowers becoming inoperative. To prevent such occurrences, the No (AC) Voltage Relay, illustrated in Fig. 1, is used. It functions as a safety device and will initiate protective action at the instant of AC electrical power failure.

The NVR consists of two normally closed and one normally open contact assemblies, a hinge type armature, magnet core, operating coil and mounting base. The contacts are actuated by movement of the bakelite actuating bar attached to the hinge type armature. The armature in turn is actuated by the operating coil.

Relay 8174103 has replaced previously used relay 8089615. They are interchangeable as a complete assembly. Although similar in design and appearance, the new relay features improved contacts, a different operating coil and added counterweights.

OPERATION

The operating coil of the NVR relay is connected across one phase of the alternator. The coil is energized by alternator output and the normally open contacts are closed completing circuits for normal locomotive operation.

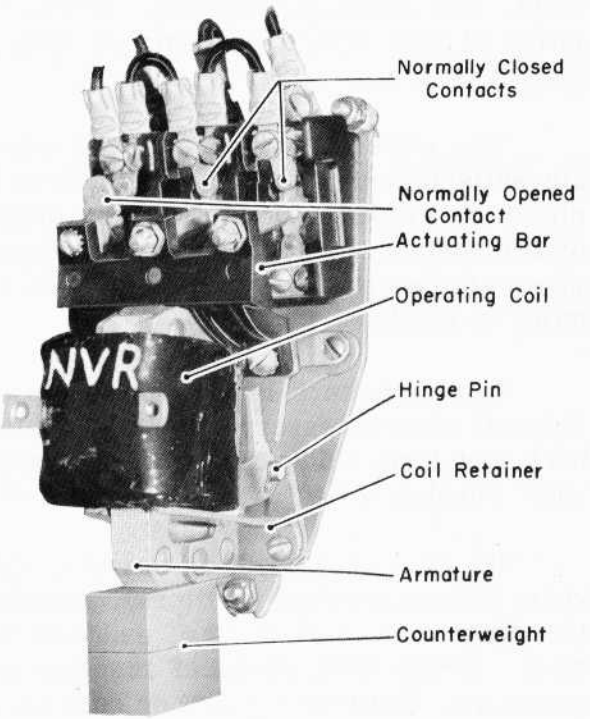

Fig. 1 - No Voltage (AC) Relay

If the alternator should fail, the NVR relay operating coil would be de-energized and the contacts would return to their normal positions. The circuits affected by these contacts may be determined by consulting the specific locomotive wiring diagram. Generally, the ER relay would be de-energized bringing the engine down to idle (engine will stop in run 5 or 6) and the alternator failure light would come on and the alarm bells would ring.

The alternator failure alarm light can be extinguished and the alarm bells silenced by placing the isolation switch in the START position. The cause of alternator failure would have to be corrected, however, before normal locomotive operation can be restored.

* THIS BULLETIN SUPERSEDES ALL ISSUES OF M.I. 2030.

MAINTENANCE

Inspect and clean the relay at intervals as specified in the Scheduled Maintenance Program 1704.

Inspect the relay for binding, discoloration of the coil, condition of contacts, and loose connections. Accumulation of dust should be removed with a soft brush.

The silver alloy contacts will operate satisfactorily even though blackened, pitted or eroded. Do not clean, dress or file contact surface. Replace contacts when any portion of the alloy is worn away to the base metal.

Give armature hinge pin a drop of light oil when necessary. Work armature back and forth a few times by hand, then wipe surplus oil off with a clean cloth.

If, after a period of service, the relay becomes noisy (chatters), remove the hinge pin, coil holder, and coil so as to expose both faces of the magnet armature. Remove any dirt or rust from the face of the armature and give it a thorough film of oil. Reassemble, making sure the retaining pins are replaced and that the armature is free and does not bind on the side of the coil.

When replacing contacts, it is very essential that new ones be lined up so they make good contact across the face when closed.

REMOVAL OF MAGNET COIL

To replace the magnet coil, follow the outlined procedure:

1. Remove the coil retainer.
2. Remove the bakelite actuating bar.
3. Tilt back the movable armature assembly and lift out the coil.
4. To reassemble relay, apply a new coil and reverse above procedure.

REMOVAL OF CONTACTS

1. To remove the normally open movable contact, rotate it sideways until it drops out of contact support.
2. To remove the normally closed movable contacts, remove the normally closed stationary contacts and lift the contacts out.

TESTING NVR 8174103 WHILE MOUNTED IN LOCOMOTIVE

Since alternator frequency varies with engine speed, it is important to note the following speed-frequency relationship that will be used for checking NVR pickup and dropout.

The engines in all models of EMD locomotives idle at 275 RPM. This results in an alternator frequency of 36.6 cycles.

The full speed of engines on Models F2, F3, F7, FP7, BL2, GP7, SD7, E8 and E9 locomotives is 800 RPM. This results in an alternator frequency of 106.7 cycles.

On Models F9, FP9, GP9 and SD9 locomotives the full engine speed is 835 RPM which corresponds to an alternator frequency of 111.3 cycles.

TEST PROCEDURE

1. Connect a suitable AC voltmeter, accurate to within 1%, across the NVR coil terminals.
2. Run engine at idle speed, 275 RPM for 36.6 cycles.
3. Actuate auxiliary generator voltage regulator by hand to reduce voltage and cause reverse current relay (RCR) and the battery charging contactor (BC) to drop out.

NOTE: For units equipped with Regohm type voltage regulators, the voltage is lowered by loosening the locknut on the voltage adjusting rheostat shaft and turning shaft

counterclockwise. See Maintenance Instruction 4510.

On units having Allis-Chalmers type voltage regulators, the auxiliary generator voltage is lowered by means of moving the regulator actuating shaft assembly. See Maintenance Instruction 570.

4. Continue to reduce the auxiliary generator voltage to the dropout point of the NVR relay which is about 20 volts AC minimum. The NVR dropout will cause the alternator failure alarm light and bell to function if the isolation switch is in RUN position.

5. Raise auxiliary generator voltage and note voltage required to pick up the NVR relay. This pickup should be at about 42 volts AC maximum.

6. Run engine up to full speed and similarly check NVR dropout which should be as follows:

   800 RPM - 106.7 cycles - NVR dropout 50 volts AC minimum

   835 RPM - 111.3 cycles - NVR dropout 52 volts AC minimum

7. Return engine to idle and restore voltage regulators to normal operating settings.

CAUTION: Use care when operating voltage regulators by hand so as not to damage the delicate mechanisms.

BENCH TESTING OF NVR 8174103

The following procedure is suggested for bench testing of the NVR relay.

1. Mount relay in a normal operating, vertical position.

2. Connect an AC voltmeter, accurate to 1%, and having a 0-125 volt scale with one volt graduations, across the NVR coil terminals.

3. Connect an AC voltage source of 0-125 volts, 60 cycles to the NVR coil terminals.

4. Measure pickup and dropout of relay which should be as follows:

   Pickup - 70 volts maximum @ 60 cycles

   Dropout - 35 volts minimum @ 60 cycles

NOTE: Slight chatter at pickup and dropout limits is permissible but the action must be complete at limits designated.

MAINTENANCE DATA

RELAY 8089615 (COIL TB-80-8)

Resistance at 20°C.	32.2 ± 10% ohms
Pickup at 36.6 cycles	55 volts max.
Dropout at 36.6 cycles	45 volts min.

RELAY 8174103 (COIL TB-80-17)

Resistance at 20°C.	36.8 ± 10% ohms
Pickup at 36.6 cycles	42 volts max.
Dropout at 36.6 cycles	20 volts min.
Dropout at 106.7 cycles	50 volts min.
Dropout at 111.3 cycles	52 volts min.

RELAYS 8089615 AND 8174103

Contacts (contact air gap measured at lower contact)

Normally open contact	1/4"
Normally closed contact (when open)	1/8"
Normally open contact pressure (when closed)	2 oz.
Normally closed contact pressure (when closed)	1 oz.

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