ELECTRO-MOTIVE DIVISION • GENERAL MOTORS CORPORATION
SERVICE DEPARTMENT

MAINTENANCE INSTRUCTION

THROUGH CABLE RELAYS

The type 368 relays 8124362, 8172591, 8191734, and 8209167 are the balanced armature type with one set of normally open and one set of normally closed contacts.

The balanced armature of the relay, Fig. 1, is actuated by electro-magnetic attraction. Such attraction or pickup can come from either the voltage coil or from a current differential existing in the cables passing through the relay frame. The relay is named for its through cable operating principle.

The magnet portion of the relay is in the form of a "U" with the legs of different lengths. The end surfaces of both legs are machined flat. The shorter leg acts as the attracting surface for one end of the armature and as a mounting surface for two rectangular spacers which support the assembly. A coil is mounted on this leg with its terminal connections downward and is held securely in place by a coil retaining clip, the back side of which is secured to the leg of the magnet by a screw, Fig. 2. The longer leg is provided with a milled slot slightly wider than the armature face. This slot will accommodate the armature and allow for its free movement. A pole plate bridges the milled slot and acts as the attracting surface for the other end of the armature.

The bridge assembly is mounted across the open end of the "U" shaped magnet frame, Fig. 2. It consists of a sturdy brass top plate, a stationary contact assembly block, and the pole plate. An adjusting screw is provided at each end of the top plate. The screw at the coil end provides pick-up air gap adjustment. The other screw provides drop-out air gap adjustment. The stationary contact assembly bakelite block is mounted on the top plate and accommodates four stationary contact studs to which external wiring of the control circuits is directly connected. These studs are adjustable for contact wipe and opening.

The armature is supported on two adjustable bearings attached to the top plate, see Fig. 2. It has the movable interlock contacts mounted on its free end, and a threaded stud made of non-magnetic material screwed and brazed to the other end. This end of the armature is located over the unslotted or shorter leg of the magnet frame. The armature

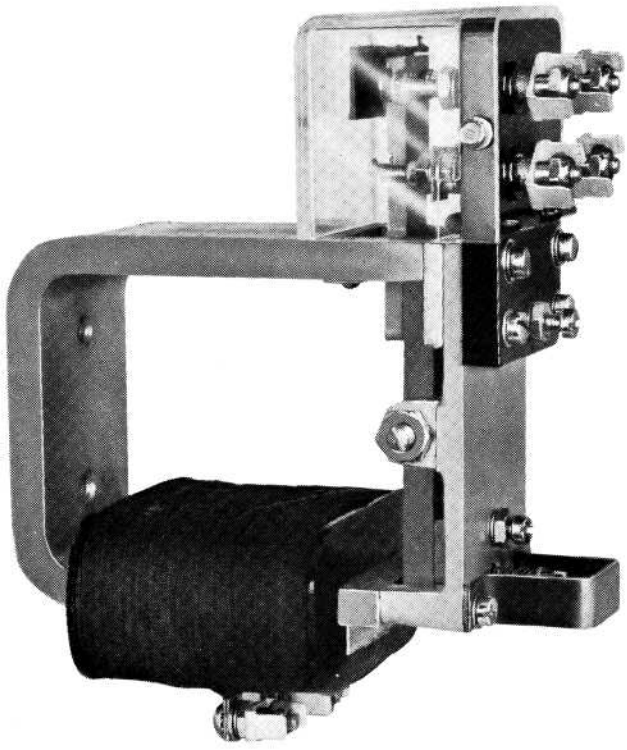

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Fig. 1 — Through Cable Relay (Cover Removed)

return spring rests against the top plate of the bridge assembly and its other end is held by means of a special, concentrically machined adjusting nut applied to the armature stud. The pickup value of the relay is set by adjusting the tension of return spring using this special nut.

The various relays of this type are different in interlock arrangement and pre-set pickup values to meet the application conditions.

OPERATION

Through cable relays are installed in the locomotive traction motor circuits and are designed to pick up on either voltage or current differentials which are produced between the motors in cases of wheel slips or creeps.

*This bulletin is revised and supersedes previous issues of this number.

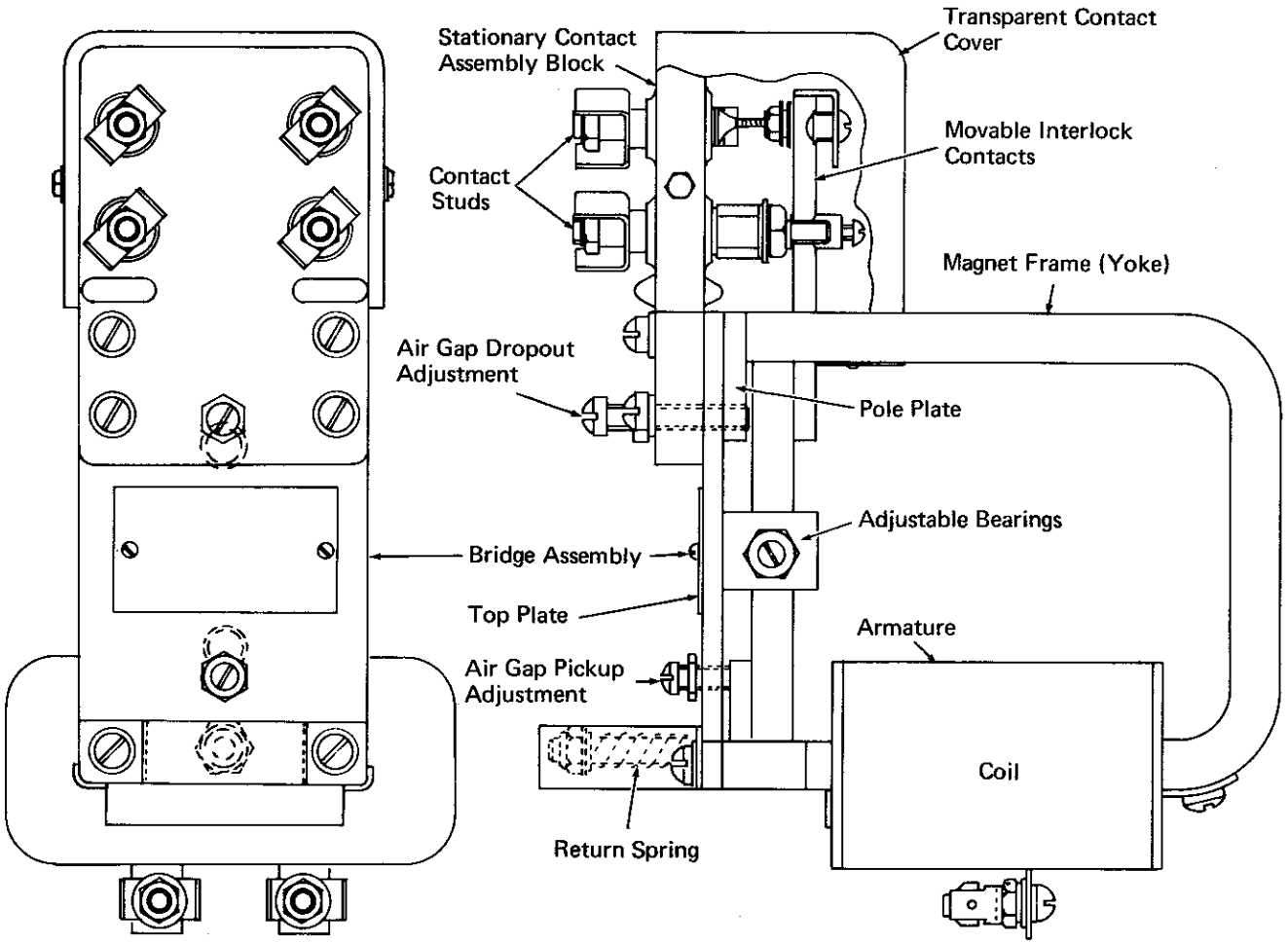

Fig. 2 – Through Cable Relay Details

In certain applications the relay is operated by either voltage impressed on the voltage coil or a current through the cables. Voltage applied to the voltage coil or increased current through the cables in the magnet frame sets up a magnetic field in the magnet frame of the relay. Therefore, an increase in voltage or current results in a corresponding increase in strength of the magnetic field. When the voltage or current reaches a predetermined value, the magnetic field will be of sufficient strength to overcome the action of the return spring and cause the armature to rotate and close against the magnet frame. Rotation of the armature causes the contacts to close. With the closing of the armature, the normally open N.O. contacts close and the normally closed N.C. contacts open.

When voltage or current returns to normal the strength of the magnetic field in the magnet frame decreases and the return spring overcomes the attraction of the magnetic field, thus allowing the return spring to rotate the armature and restore the relay contacts to their normal position.

In another type of application the voltage impressed on the relay coil calibrates the relay and determines the value of current flow in the cable that will pick up the relay.

MAINTENANCE

Inspect relay for loose parts or loose electrical connections contact burning, and charring of coil insulation. Clean the relay at intervals as specified in the Scheduled Maintenance Program for cleaning and inspection of electrical equipment.

AIR GAP ADJUSTMENTS

The following air gap settings should be made with the relay at the work bench. Measurements are to be made with a feeler gauge between the armature and the coil side of the magnet frame, Fig. 2.

Open Air Gap

Set the armature open air gap to specification (see Maintenance Data) by adjusting the pickup air gap screw located near the armature return spring. Be sure to tighten the locknut after each setting.

Closed Air Gap

Set the closed air gap to .005" minimum – .015" maximum by adjusting the dropout air gap screw

located near the contact terminals. The closed air gap is made by holding the armature firmly in the closed (picked-up) position. Be sure to tighten the locknut after each adjustment.

CONTACT ADJUSTMENT

Adjust the inside (closest to armature pivot point), outside (farthest from armature pivot point), and normally closed (N.C.) contacts to open or close at the proper armature air gap (see Maintenance Data). Use the correct thickness feeler gauge and insert in the same manner as for setting armature air gap. Adjust contact position by turning contact stud. Be sure to tighten locknut after each adjustment. Latest design relays have an improved normally closed contact arrangement, see Fig. 3.

ARMATURE BEARING PIN

Proper bearing pin adjustment is obtained by turning one pivot screw in until it is bottomed finger tight in the armature and then backing out from 1/8 to 1/6 turn before securing locknut. The armature must be very closely centered. The side gaps from the armature to the frame must be equal.

ELECTRICAL SETTING OF RELAY COIL

After making checks and adjustments to the relay at a work bench, mount the relay on its bracket in the locomotive unit and test electrically. Before installing the relay check the machined surfaces of the magnet frame and bridge assemblies to see that they are free of all burns and dirt.

Check the mounting surfaces for correct alignment and see that there is no distortion as the sections are tightened together. The armature should have free movement before and after the sections are tightened together.

SETTING RELAY PICKUP

The pickup value of the relay is set by means of the return spring adjustment feature, Fig. 2. Compressing the spring increases the setting of the relay.

Set the pickup current to the proper value corresponding to the relay application. (See Maintenance Data.) Make several trials of current value reducing to dropout after each trial. Open the circuit momentarily, and then close it and gradually increase the current until the relay closes to determine the pickup value. Readjust if necessary.

NOTE: All settings are to be made by gradually approaching the operating point. No hesitancy of action is to be permitted. Action must follow through with the same current once started. The return spring should be replaced if the action of the relay is sluggish.

After setting the pickup value of the relay, reverse the current flow in the opposite direction to the current flow on the initial setting. The reverse current pickup should be within the maximum values given in Maintenance Data.

SETTING RELAY DROPOUT

Gradually increase the current until the armature picks up, then decrease the current gradually until the armature drops out. The current value should correspond to those given in Maintenance Data. If the dropout value does not fall within limits, change the closed air gap. Minimum air gap is .005", see "Air Gap Adjustment."

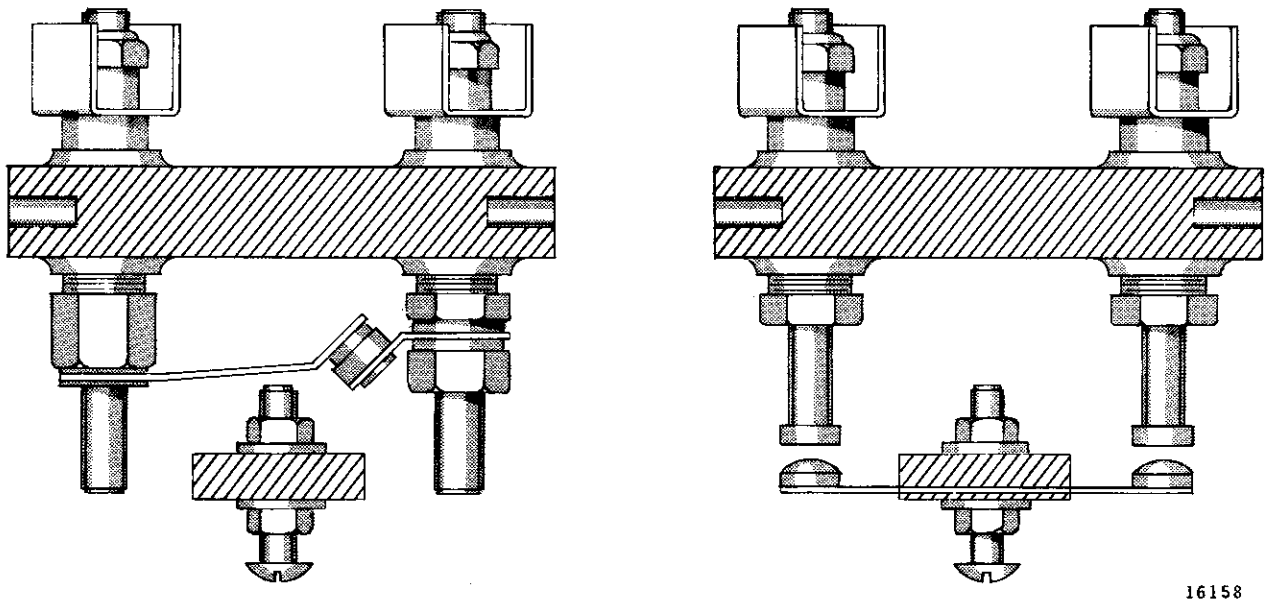

Fig. 3 — Interlock Cross-Section

MAINTENANCE DATA

Relay Number	Pickup	Dropout	Magnet Coil Resistance	Magnet Air Gap Open	Magnet Air Gap Closed	Inside Contact Should Make At Magnet Air Gap Of	Outside Should Make At Magnet Air Gap Of	Contact Pressure
8124362	17-19 MA after 11 MA Dropout	10-12 MA after 18 MA Pickup	542 Ohms ±10% @ 20°C.	.073" to .077"	.005" to .015"	.041" to .045"	.027" to .031"	25-35 Grams (1.06 oz.)
8172591	17-19 MA w/Calibrating Coil 140-16- Amps. w/thru Cable	9-12 MA w/Calibrating Coil 55% of Pickup Min. w/thru Cable	542 Ohms ±10% @ 20°C.	.073" to .075"	.005" to .015"	.030" to .034"	.041" to .045"	35-37 Grams for N.O. 25-27 Grams for N.C.
8191734	13.5-15.5 MA w/Calibrating Coil 115-130 Amps. w/thru Cable	8-10 MA w/Calibrating Coil 55% of Pickup Min. w/thru Cable	542 Ohms ±10% @ 20°C.	.063" to .065"	.005" to .015"	.028" to .035"	.023" to .027"	35-37 Grams for N.O. 25-27 Grams for N.C.
8209167	25-26 MA w/Calibrating Coil 200-220 Amps. w/thru Cable	16.5-17.5 w/Calibrating Coil 66% of Pickup Min. w/thru Cable	542 Ohms ±10% @ 20°C.	.073" to .075"	.005" to .015"	.037" to .045"	.028" to .035"	35-37 Grams for N.O. 25-27 Grams for N.C.

Hy-Pot Data (All Four Relays)

Coil to Ground — 1 Minute . . . . . 2400 Volts RMS @ 60 Cycles

Coil to Contacts — 1 Minute . . . . . 2400 Volts RMS @ 60 Cycles

Contacts to Ground — 1 Minute . . . . . 600 Volts RMS @ 60 Cycles

Contacts to Contacts — 1 Minute . . . . . 600 Volts RMS @ 60 Cycles

General (All Relays)

Contact Rating . . . . . 2.5 Amperes @ 74 Volts DC

Contact Wear . . . . . .020" Maximum

Contact Wipe . . . . . 1/32" Min. After Adjustment

Litho in U.S.A.