ELECTRO-MOTIVE DIVISION • GENERAL MOTORS CORPORATION

SERVICE DEPARTMENT

MAINTENANCE INSTRUCTION

REMOTE RESET RELAY — TYPE GJS

DESCRIPTION

The remote reset type relay, Fig. 1, is primarily used on locomotives to protect the electrical equipment from ground faults. It is a neutral direct current type of relay having one operating coil, one reset coil and contacts made of a silver alloy material requiring no cleaning or dressing, Fig. 2.

The relay is very compact in design and requires only a small mounting area for installation. All operating parts of the relay are mounted within a common base measuring 3-7/32" x 5-3/4". The base is fitted with a removable cover which, when in place, encloses all of the moving parts of the relay in a dust-proof compartment, Fig. 1. All internal electrical connections are soldered and the external connections are made to Faston terminals.

MAINTENANCE

Due to the design of this relay, it is capable of continued rugged service with a minimum of maintenance or attention. The dust free enclosure together with silver alloy contacts will tend to insure trouble-free performance and long life.

The relay is manufactured to close tolerances with precise and delicate internal adjustments. For the foregoing reasons it is suggested that maintenance be limited simply to occasional inspection as outlined below, to qualify the relay for continued service.

INSPECTION

During annual inspections of the locomotive or when relay trouble is suspected, the operation of the relay may be tested in the following manner. The relay need

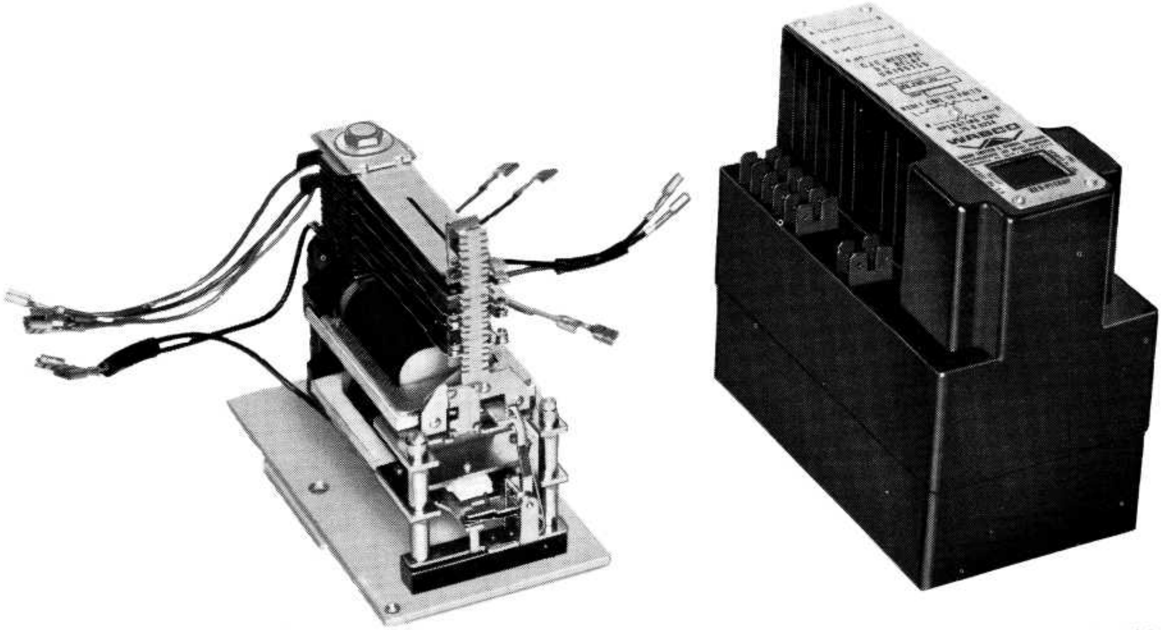

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Fig. 1 — Typical Remote Reset Relay

*NOTE: Information contained herein is applicable to equipment being produced as of the date of publication.

August, 1967

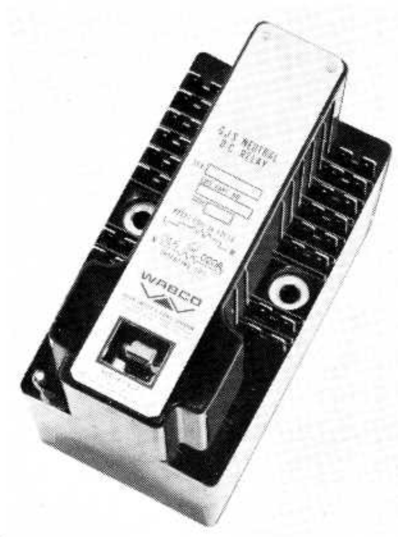

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Fig. 2 — Typical Contact Arrangement.

not be removed from its mounting on the panel.

1. Measure operating coil resistance, see Maintenance Data for coil resistance.

2. Measure reset coil resistance, see Maintenance Data for coil resistance.

3. Check pickup of the operating coil using low voltage power supply (0 — 1.0 volt) applied to terminals N-P. See Maintenance Data for coil pickup. The pickup should be sudden and without hesitation, and the relay should latch in that position until released by energizing the reset coil. To check relay action proceed as follows, using two test lights and a 74 volt DC supply:

   a. Disconnect leads on terminals of normally open contacts. Connect 74 volts DC to one terminal and a test light from the other terminal to the power supply ground. The light should be off.

   b. Disconnect leads on terminals of normally closed contacts. Connect 74 volts DC to one terminal and a test light from the other terminal to the power supply ground. The light should be on.

   c. Raise the operating coil current until the test light from the normally closed contact to ground goes out. Do not raise above this amount.

   d. The light from the normally open contact to ground should come on immediately as the light from the normally closed contact to ground goes out and the relay should latch in this position.

   e. Repeat the same procedure with the other terminals for similar response.

NOTE: Should the relay require an increase in operating coil current to light the normally open contacts test light after the normally closed contacts test light goes out, it indicates that the relay is not functioning properly. The relay should be replaced.

4. Measure the pickup of the reset coil using terminals L and M which should be 48 volts maximum, applied suddenly. No test of dropout is required.

CAUTION: Do not touch the 74 volt supply to the operating coil terminals N-P.

During annual locomotive inspection, in addition to following the above procedure, the relay should be examined for security of mounting and for tightness of the external terminal connections. Check with a compass to be sure that the "N" pole of each permanent magnet is at the bottom of the plastic housing. The "N" pole should attract "S" pole of compass.

ADJUSTMENTS

MECHANICAL

It should never be necessary to change the original air gap shim installed in the relay unless wear has occurred between the armature and its stop ledges. This armature air gap shim is made of phosphor bronze and is located between the support plate of the fixed insulating ladder, and the magnet assembly, see Fig. 3. To measure the armature air gap the armature must be at its full-stroke position. A thickness gage is inserted to a depth of about 1/8" between the center core leg and the armature. The armature air gap should be not less than .004". To replace a worn shim the label holder should be removed, and the fixed ladder pried slightly upward. The shim will fall out when the relay is tilted forward and a new one can be inserted. The proper shim should be in place when other relay adjustments are being made, otherwise the armature might not be making its full stroke.

The indicator spring is used to provide a force of 140 grams minimum and 160 grams maximum against the indicator. This force is measured at the top of the spring, where it enters the fixed ladder.

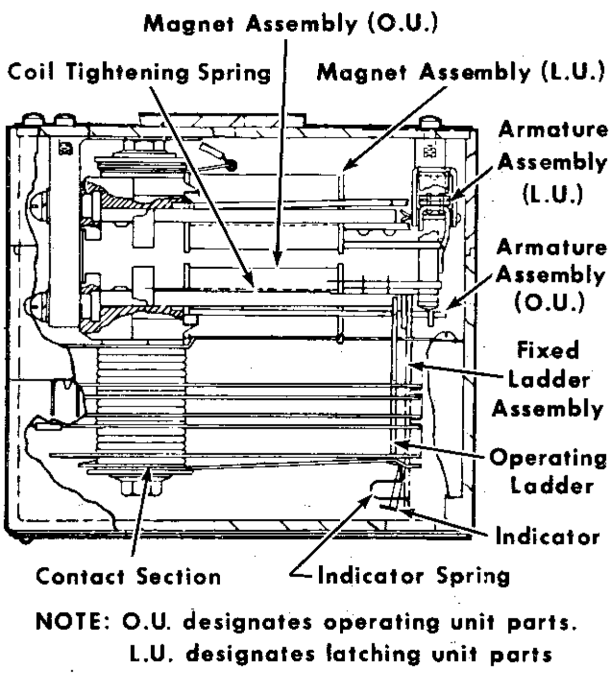


Fig. 3 — Cross-Section View

The restoring spring supplies a force which holds the armature away from the magnet core. This force is applied at the top of the contact stack, which pulls against the movable insulating ladder, and is called hold away force. The hold away force should be a minimum of 175 grams and 210 grams maximum. This hold away force is measured with a gram gauge against the top of the movable ladder at which the front contact springs just begin to move toward the fixed, or heel contact springs. This force can be adjusted by bending the restoring spring with a large bending tool.

The contact adjustments can be checked by inserting the proper thickness gauge between the armature and the upper ledges of the window in the ladder support plate, with the relay de-energized. See Maintenance Data for list of various thickness gauges needed for this check. Contact adjustments are made by bending the movable contact springs between the contact tip and the front surface of the movable insulating ladder. Contact springs that have been damaged or worn can be replaced by loosening the stack screw enough to permit one spring at a time to be worked out at the side of the stack and a new one installed. When retightening the stack screw make certain all parts are aligned with each other then tighten the screw until the conical washer spring at the top of the stack is felt to flatten against the steel pressure plate. The stack screw should be tightened to a torque of 35 inch pounds minimum to 40 inch pounds maximum.

The height of the latch is established with the relay latched and the upper armature moved between .004 and .008 inches by hand. This movement should not permit the driver to lift the front contacts at all. The latching surface must be adjusted to be parallel to the armature tab.

The unlatching unit armature hold down spring (the horizontal spring riveted to the latch) is adjusted to take 5 to 25 grams to just lift it off the lower armature tab with the relay unlatched and no energy on the unlatching unit.

With the relay latched and no energy on the operating coil and the latch is against the upper armature tab adjust the horizontal portion of the latch at the unlatching armature end so that it touches the armature hold down spring within .005 to .020 of an inch.

The vertical latch spring is adjusted with the operating portion of the relay unlatched and no energy on the reset coil. Adjust this spring so that the force needed to just move the latch away from the side of the upper armature tab is between 160 and 185 grams. This measurement can be made by placing the gram gauge in the corner of the latch.

With the relay mechanically latched, the vertical spring has driven the latch against the operating relay tab, tap the relay base against the table to see that the relay does not unlatch. The opening between the latch and upper armature tab should be .015" minimum when there is no energy on the operating unit and the unlatching armature is picked up mechanically.

ELECTRICAL CALIBRATION

In order to calibrate the relay a source of variable DC voltage is required. Connect a voltmeter directly across the relay coil. Position the relay so that the magnet core and armature are on a vertical plane.

Apply the voltage to the operating coil and bring the current up to the amount shown in the Charge Amps. column of Chart No. 1, located in Maintenance Data.

The Initial Drop Away (D.A.) value is determined by gradually reducing the current until the armature drops away and opens all the normally open contacts. This value should not be less than that shown in the "Min DA Amps." column of Chart No. 1, located in Maintenance Data.

The Initial Full Stroke value is obtained by reducing the current to zero, then opening the relay coil circuit momentarily and closing immediately, after this increase the current gradually until the armature operates to its full stroke position. This value should be within the limits of the "Min. PU Amps." and "Max. PU Amps." columns shown in Chart No. 1, located in Maintenance Data.

To perform the calibration of the reset coil properly, place the relay in the vertical position with the latch assembly at the bottom.

To determine the Drop Away or D.A. of the reset coil use the following procedure. Manually hold the armature of the operating coil in the energized position. Energize the reset coil with the amount of voltage shown in the "Charge" column of Chart No. 3 located in Maintenance Data. Slowly reduce the voltage until the latching armature drops away against its stop. This voltage should not be less than the voltage shown in the "No O.R. Load Min DA Volts" column of Chart No. 3, located in Maintenance Data. If more pressure is needed against the latch the vertical latch spring may be adjusted but not to exceed the 185 grams maximum.

To determine the Pick Up or P.U. of the reset coil use the following procedure. Make certain the operating coil is de-energized. Energize the reset coil with 74 volts and then slowly reduce the voltage to zero and open the circuit. After the circuit has once again been completed increase the voltage until the reset armature picks up permitting the operating relay armature to release. This Pick Up voltage should not exceed that shown in the "With O.R. Load Max. PU & FS Volts" column of Chart No. 3, located in Maintenance Data. As in the previous check if more pressure is needed against the latch the vertical latch spring may be adjusted but not to exceed the 185 grams maximum.

The overall final calibration of this relay should be made with the relay standing and the window at lower front. Connect the positive lead on the terminal marked "P".

The operating coil (N-P with positive applied to "P" terminal) should be energized at the "charge amps" that is shown in Chart No. 2 in the Maintenance Data and then reduce the current until the indicator moves a short distance. This is the Drop Away and should not be less than the amperes shown in the "Min. DA Amps" column of Chart No. 2, located in Maintenance Data. Reduce the current to zero and note that the red is still visible through the window. This indicates that the operating relay is latched mechanically in the picked up position. Energize the reset coil (L-M with positive applied to M terminal) at amount of voltage shown in "With O.R. Load Max. PU & FS Volts" column on Chart No. 3 in Maintenance Data. Check to be certain that the operating relay armature unlatches and goes to the de-energized position, that is, red is no longer visible in the window. Energize the operating coil (N-P) again to check whether the pick-up value (red visible in the window) is within the limits as shown on Chart No. 2 in Maintenance Data and that the <u>normally closed contacts remain closed until the pick-up level is reached.</u> Note that the pick-up is made in one sudden movement by observing the indicator. Energize the reset coil (L-M) again to determine if its pick-up is within the limits as shown on Chart No. 3 in Maintenance Data.

MAINTENANCE DATA

	8360045	8383122	8361776
Contacts			
Normally Open	4	2	4
Normally Closed	2	2	2
Current (Amps)	5	5	5
Operating Coil			
Resistance @ 20° C. (68° F.)	.86 ohms ± 10%	.86 ohms ± 10%	2010 ohms ± 10%
Pickup (amperes)	.750 - .825	.750 - .825	.016 - .020
Reset Coil			
Resistance @ 20° C. (68° F.)	1250 ohms ± 10%	1250 ohms ± 10%	1250 ohms ± 10%
Pickup Working Voltage	74 volts DC	74 volts DC	74 volts DC
Pickup - Maximum	48 volts DC	48 volts DC	48 volts DC

The following data is applicable to all the above relays:

	Thickness Gauge Contacts Making	Thickness Gauge Contacts Open
All normally open contacts	.042"	.038"
Normally closed contacts	.020"	.025"

Hypot Test

Operating Coil to Ground . . . . 2400 volts RMS @ 60 cycles
Operating Coil to Contacts . . . . 2400 volts RMS @ 60 cycles
Reset Coil to Ground . . . . 600 volts RMS @ 60 cycles
Reset Coil to Contacts . . . . 600 volts RMS @ 60 cycles
Contacts to Ground . . . . 600 volts RMS @ 60 cycles

CHART 1. INITIAL OPERATING UNIT VALUES

Relay Pc. No.	Coil Res. -Ohms-	Charge Amps	Min DA Amps	Full Stroke Min PU Amps	Full Stroke Max PU Amps
8383122	0.86	2.4	0.075	0.750	0.820
8360045	0.86	2.4	0.075	0.750	0.820
8361776	2010	0.05	0.0015	0.0165	0.019

August, 1967

CHART 2. OPERATING COIL N-P (Apply + to P)

RELAY COMPLETE

Relay Pc. No.	Coil Res. -Ohms-	Charge Amps	Min DA Amps	Full Stroke Min PU Amps	Full Stroke Max PU Amps
8383122	0.86	2.4	0.075	0.755	0.825
8360045	0.86	2.4	0.075	0.755	0.825
8361776	2010	0.05	0.0015	0.0165	0.020

CHART 3. RESET COIL L-M (Apply + to M)

RELAY COMPLETE

Relay Pc. No.	Coil Res. -Ohms-	Charge Volts	(Optional) No. O.R. Load Min DA Volts	(Optional) No. O.R. Load Min PU & FS Volts	With O.R. Load Max PU & FS Volts
8383122	1250	74	2.0	18.0	48.0
8360045	1250	74	2.0	18.0	48.0
8361776	1250	74	2.0	18.0	48.0

Notes: 1. Charts 2 and 3 reflect the final calibration values for the complete relay
2. O.R. - Operating Relay
3. DA - Drop Away
4. PU - Pickup
5. FS - Full Stroke

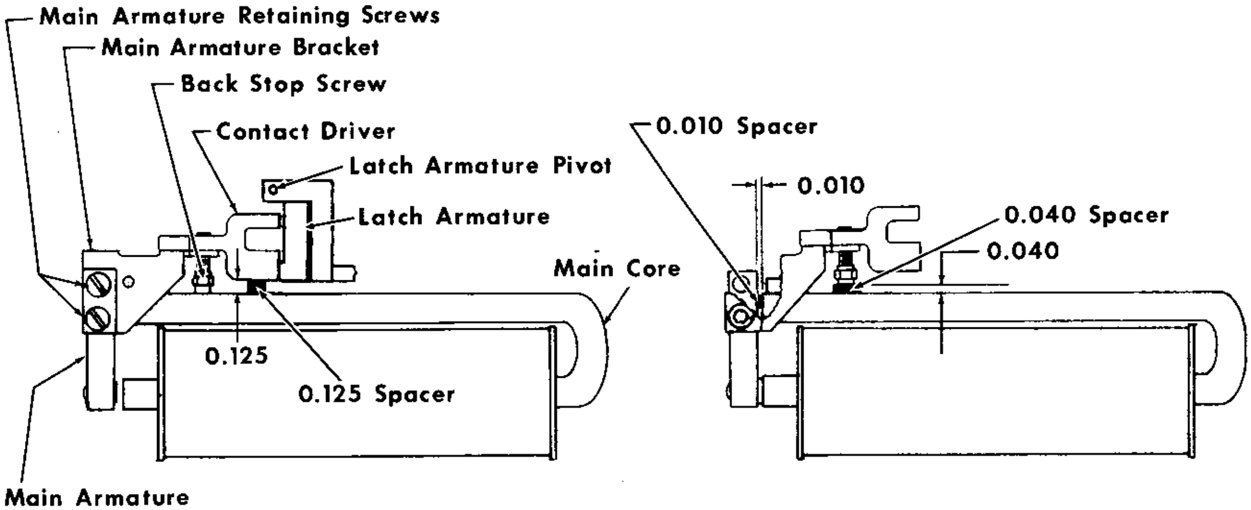
Relay, 8213294, has been replaced by relay, 8383122. Since there is still a wide use of relay, 8213294, a relay recalibration kit, 8383161, is being offered to bring and retain this relay within the specified operating limits. The procedure for installation of this kit follows.

The relay recalibration kit 8383161 consists of a pivot pin (.06 dia. x 1/2" long) and two hex socket head screws (6-32 x 7/8").

This relay can be brought within specified operating limits by installing this kit in the following manner, see illustration.

1. Remove the latch armature pivot and replace it with a new pivot. The new pivot can be identified by the round head on one end.

3. Place a .125" spacer under the contact driver and with relay in the unlatched state, adjust the back stop screw to just touch the main core.



Relay Recalibration Kit Installation

4. Apply a small amount of retaining compound 8383673 on each side of the main armature. Replace the main armature in the main armature bracket using new socket head main armature retaining screws. Do not tighten screws at this point. Care should be taken to insure that the retaining compound does not get on any part of the relay other than between the main armature and the main armature bracket.

5. Place a .040" spacer between the main core and the back stop screw.

6. Place a .010" spacer between the main core and the main armature adjacent to the main armature pivot.

7. Hold the main armature against the main core and tighten the main armature retaining screws.

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