EM MAINTENANCE INSTRUCTION

REGOHM VOLTAGE REGULATOR — 8234628

DESCRIPTION

The regohm voltage regulator 8234628, Fig. 1, is used to regulate the voltage output of locomotive auxiliary generators. It has been carefully designed and manufactured to provide efficient regulation over a long service life with a minimum of attention.

The regulator assembly consists of two main parts, namely the operator unit and the chassis, Fig. 2.

The operator consists of a can with 84 exterior contact prongs. Inside the operator, the 84 contacts are connected to 60 normally closed contact fingers, a contact bar, a normally closed interlock and three operating coils. The coils, when energized, magnetize a core which attracts a spring loaded armature which in turn opens the normally closed interlock and moves an insulated bar. This bar opens the contact fingers, one at a time, as the operating current

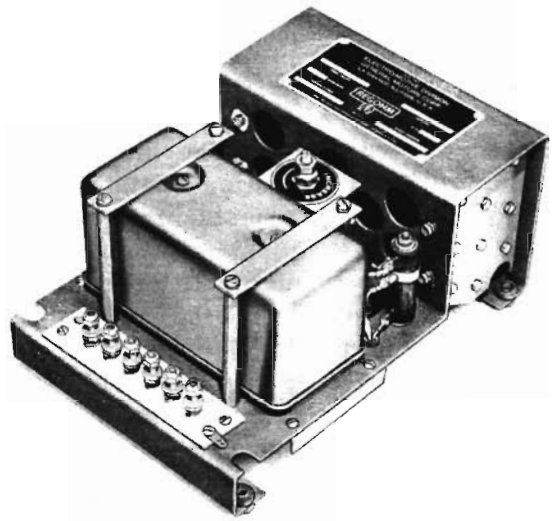
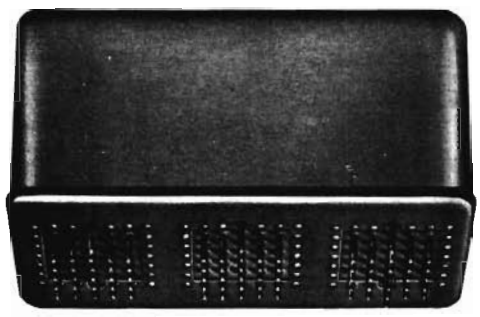


Fig. 1 - Voltage Regulator



OPERATOR UNIT

CHASSIS

Fig. 2 - Operator Unit And Regulator Chassis

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increases. The actuating bar is spring loaded and connects to an air dashpot inside the hermetically sealed operator which prevents fluttering due to fluctuation of coil current. Two temperature compensating resistors are connected in series with the operating coils to compensate for differences in coil resistance due to changes in temperature of the operating coils.

The chassis consists of a receptacle for the operator, a six point terminal board, 9 resistors with tapped insulation sections, an adjustable slide resistor, a fixed resistor, and an adjustable rheostat.

The voltage regulator is connected across the terminals of the auxiliary generator as a regulating device to maintain constant generator voltage. This is accomplished by cutting resistance in and out of the auxiliary generator shunt field to compensate for changes in speed of the auxiliary generator. If the speed of the auxiliary generator increases, the shunt field strength must be decreased to maintain a constant voltage. The voltage regulator increases the resistance of the shunt field, thereby reducing the flux or excitation. If the speed of the auxiliary generator should decrease, the shunt field strength must increase to maintain a constant voltage. The voltage regulator will now act through its dashpot controlled actuating bar to reduce resistance in order to increase current flowing in the shunt field.

OPERATION

In Fig. 3, the dotted lines enclose the voltage regulator. When current from the auxiliary generator is applied to operating coil terminals, 13/+ and 6/-, in excess of 350 milliamps, the voltage regulator armature moves and will first open the normally closed interlock. With the interlock closed, 1.6 ohms resistance is in the circuit across terminals 13/+ and 12/F. The resistance is increased to 1.7 ohms when the interlock opens. As the current is further increased, the armature continues to move controlling the insulated actuating bar which opens the normally closed fingers, one at a time, gradually increasing the resistance across the 13/+ and 12/F terminals. The resistance is 125 ohms when all fingers are open.

The voltage regulator has three operating coils. Two of these coils, which are similar, are connected in series with two temperature compensation resistors, a 100 ohm slide wire adjustable resistor, a 100 ohm fixed resistor and a 25 ohm rheostat. This series circuit is connected between regulator terminals 13/+ and 6/-.

The slide wire adjustable resistor is pre-set at the factory for correct operation of the regulator. The rheostat is used for setting the regulating voltage on different model locomotives. Changing the position of the rheostat is the only adjustment which should be made on this voltage regulator. The slide wire resistor, however, can be used to further adjust the rheostat to mid-scale if necessary.

The auxiliary coil connected across terminals P1 and P2 is not used in any application at the present time.

MAINTENANCE

No attention need be paid to the 8234628 regulator except for visual inspection. At regular maintenance inspections, check for tight terminal connections, burned resistors or wires and circuit continuity.

If trouble is suspected, the operator unit should be replaced with a new operator. The defective unit may be returned to Electro-Motive for Rebuild and Return Service. In the event that replacing the operator does not correct the difficulty, the entire regulator assembly chassis and operator should be replaced

and returned to Electro-Motive for Rebuild and Return. This highly sensitive mechanism requires special equipment and environment in order to accurately perform repairs and adjustments.

ADJUSTMENT

The only adjustment that can be made on the regulator is the value of the auxiliary generator voltage that the regulator will maintain. Two devices on the regulator can be used to make this adjustment. These are the voltage adjusting rheostat and the slide wire 100-ohm resistor, Fig. 2. Under most conditions, the range covered by the voltage adjusting rheostat will be sufficient to set the desired voltage output of the auxiliary generator. The slide wire resistor has been factory set and should need no further adjustment, however, it can be used to adjust the rheostat scale to mid-position, if need be.

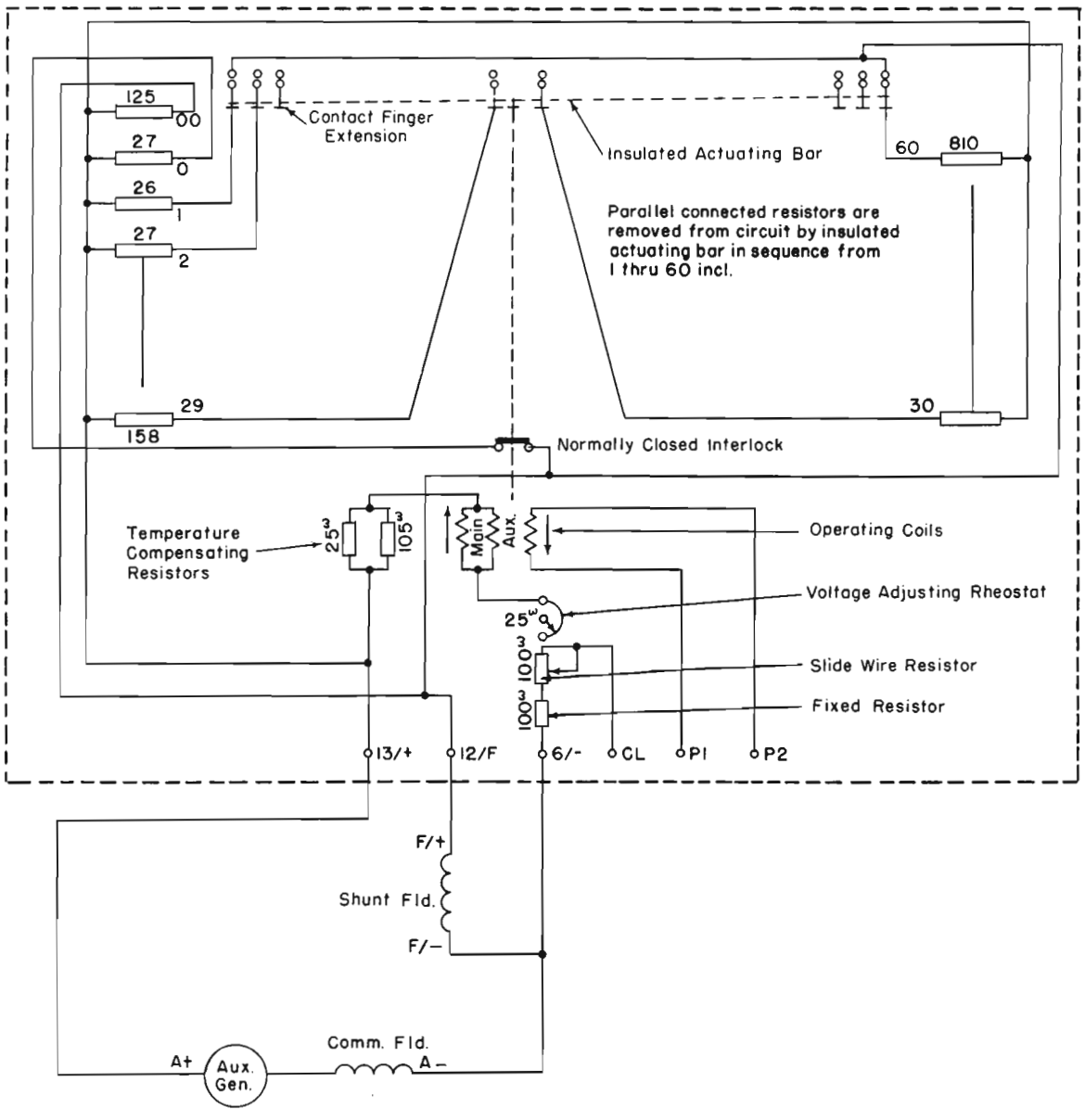

Fig. 3 - Schematic Diagram Voltage Regulator

Turning the voltage adjusting rheostat in a clockwise direction will raise the voltage and turning it counterclockwise will decrease the voltage.

To set the voltage regulator while mounted in place on the product, the following sequence must be followed:

1. Have the locomotive unit operating so that the device will be warm and stable.

2. Operate the throttle from Idle to No. 8 and back to Idle to remove hysteresis characteristics.

3. Connect a voltmeter across the auxiliary generator terminals. Pull auxiliary generator switch or fuse out, move throttle to #4 position (500 RPM) and adjust the voltage regulator so that the auxiliary generator output is 74 $\pm$ 1/2 volts as read on the voltmeter.

4. Move throttle to #8 position and check auxiliary generator output. Also check output with throttle in Idle.

5. Auxiliary generator output must be 72-76 volts in all throttle positions. If readings at #8 throttle or Idle are outside the 72-76 volt range, adjust to bring within the tolerance. After making any adjustment, recheck to make sure that auxiliary generator output is within 72-76 volts at all throttle positions.

6. Close the auxiliary generator switch or replace fuse.

7. With throttle in Idle, and with an approximate 130-ampere load, the auxiliary generator voltage should still read between 72-76 volts.

The following equipment is required to set voltage regulator on a work bench:

1. Direct current power source, 0-100 volts, 2 amperes.

2. Two voltmeters, 0-100 volts DC with 1 volt graduations and an accuracy of $\pm$ 0.5%.

3. Ammeter, 0 to 1 ampere with .01 ampere graduations and an accuracy of $\pm$ 0.5%.

4. 1-1000 mfd - 125 volt condenser.

Connect the devices up to the voltage regulator in accord with Fig. 4. The condenser is to prevent hunting action by the regulator. Check operation by measuring current through operating coil and regulated voltage (V2) across terminals 13/+ and 6/- as follows:

1. Apply 100 volts (V1) across terminals 12/F and 6/-.

2. Adjust rheostat until voltage (V2) across 13/+ and 6/- is 74 volts. Rheostat should be approximately at mid-position. Current through the operating coil should be .350 $\pm$ .020 amperes. To simulate actual locomotive operation, tap the screw on top of the operator can lightly with a screwdriver while making this adjustment.

3. Decrease input voltage (V1) to 75. Note the voltage (V2) across 13/+ and 6/-. Gradually increase voltage (V1) to 100 volts noting voltage (V2) across 13/+ and 6/-. This voltage (V2) should be within a 3 volt band for full range operation between 75 and 100 volts.

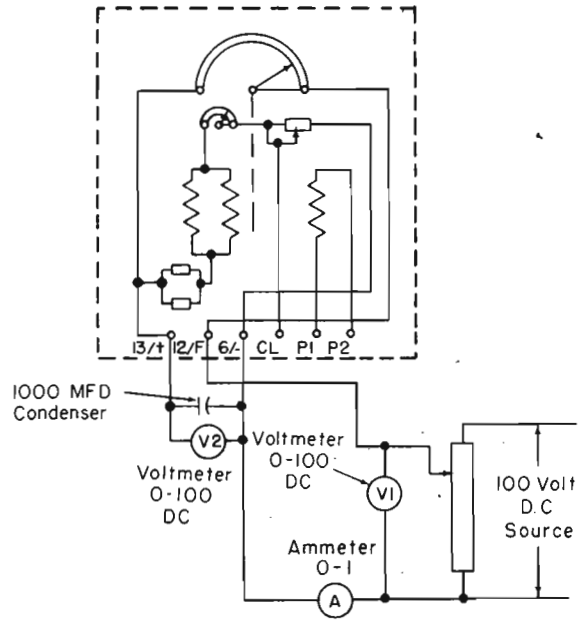

Fig. 4 - Schematic Diagram Regulator Adjustment

MAINTENANCE DATA

Contact Rating
- Resistor Contacts (60) - 12 Watts
- Interlock Contact (1) - 12 Watts

Coil Rating
- Main (2) - 51.6 ± 10% Ohms @ 20° C. (Coils Connected In Parallel)
- Auxiliary - 6.4 ± 10% Ohms @ 20° C.

Operating Range - .350 ± .020 Amperes (Temperature Compensated Within 1%)

Effective Regulating Resistance
- Coil De-energized - 1.6 Ohms ± 10%
- Coil Energized - 125 Ohms ± 10% (Max.)

Hi-Pot Data (1 Minute Duration)
- Coils To Chassis - 600 VRMS @ 60 Cycles (Terminals 13/+, 12/F or 6/-)

Resistors To Chassis - 600 VRMS @ 60 Cycles
800 VRMS @ 50 Cycles