

## TYPE HZM RELAY

With 0.2 - 2.0 Ohm First Impedance Element

## Supplementary Instructions

These instructions are supplementary to I.L. 41-412.1 and cover a special HZM relay having a 0.2 - 2.0 ohm first impedance element with the center of the impedance circle fixed at the origin. This relay differs from the standard type HZM in the following respects.

First Impedance Element Characteristics

Current coil taps	2 - 3 - 4 - 6 - 9 - 13
Core screw markings	0.8 - 1.0 - 1.2 - 1.4
Bridging contact gap	.015 inch on each side
Bridging contact follow	.010 inch
Current coil gap	.020 inch from beam to stop pin
Middle iron gap	.009 inch
Rear voltage iron gap	.025 inch

The capacitor in the a-c potential circuit is 0.225 mfd. for the first element, and 0.45 mfd. for the second and third impedance elements.

External Connections

Since the characteristic of the first element is an impedance circle with its center at the origin, the external HZM auxiliary unit is not connected to this element. With reference to I.L. 41-412.1, Figure 9, terminals 7, 10 and 13 of the auxiliary unit are not used. Instead, connect terminal 12 of phase A, B and C HZM relay to phase A, B and C voltage source respectively.

Settings

The first impedance element should be set for 80 to 90 percent of the protected section in accordance with the standard formula:

$$TS = 10 \frac{Z_o R_c}{R_v}$$

The terminology is the same as explained in I.L. 41-412.1. For dependable operation, the relay voltage for a fault at the balance point under the condition of minimum generation should be at least 5 volts.

### Adjustment

The gap settings should be approximately as listed on page 1. Then the beam may be balanced as follows. Connect the relay with polarities as shown in the test diagram, Figure 10, except connect relay terminal 12 directly to the left hand potential lead coming from the phase shifter instead of as shown. With any tap and scale setting, check the impedance measured by the relay with 35 volts potential restraint. Apply 5 volts restraint and adjust the balance weight on the beam until the beam just trips with  $1/7$  of the current required to trip with 35 volts restraint.

The stationary contacts should be adjusted to give .015 inch clearance between them and the silver bridge on the beam when the beam is in the reset position. The bridge should be made to touch both contacts simultaneously, and deflect the contact springs at least .010 inch before the beam strikes the bronze stop on the core screw.

A good method of adjusting the contacts consists in first adjusting one of the contacts to the correct gap and then applying just sufficient current to trip the beam against a restraint of about 5 volts. While the beam is in this position, that is, lightly pressing on the one contact, the other contact should be slowly adjusted upward by means of the set screw until it just touches the silver bridge without lifting it off the other contact. The trip circuit should be energized so that the lighting of a lamp or the tripping of an auxiliary relay will show when both contacts are made.

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