

TRIP RELAY ADJUSTING SETS

1. GENERAL

1.01 This section describes the portable adjusting sets used for readjusting trip relays in offices employing A.C.-D.C., A.C. and superimposed ringing systems. Ringing current is used in adjusting the trip relays.

1.02 This section has been reissued to include the RESET TR key.

2. THEORY OF OPERATION

2.01 Trip relays or relays of similar design, if adjusted to meet a direct current value, will be found to have widely varying operating characteristics under ringing current conditions. A direct current test is, therefore, not a true indication of the performance of the relay on ringing current.

2.02 Since the trip relays must be adjusted so that they will not trip prematurely on ringing current through the line loop and subscriber set, it would seem that they should be tested by simulating the service conditions with resistance, inductance and capacity. However, this method has not been found entirely satisfactory due to the commercial variations in the inductance and capacity of apparatus available for this purpose.

2.03 These conditions and the fact that resistances can easily be held to close limits, led to the adoption of the non-inductive resistance test on ringing current as a means of checking trip relays. However, non-inductive resistance tests will produce inconsistent results if the relay is tested without consideration being given to the point of the wave at which the test current is applied. For example, it was found that on a.c. ringing current approximately one and one-half times as much current is required to operate the relays when the circuit is closed at the peak of the a.c. wave than when the circuit is closed at the zero point of the wave.

2.04 A reliable method of applying uniform checks to trip relays is to apply the test at a particular part of the wave. With this method the testing circuit is always closed at or near the peak of the wave. It would be equally satisfactory to make the test at the zero point or at other points on the wave, providing it was applied uniformly at the same point. However, since the rate of change in an alternating current is least at the peak, it is most satisfactory to use that point so that variations in the time of application of the test resistance with respect to the a.c. wave will have a minimum effect on the

uniformity of the test. This method is used when checking relays in offices having A.C.-D.C. or A.C. ringing systems.

2.05 When a d.c. component is added to a ringing current, it stabilizes the operating characteristics of the trip relay. When this component is sufficiently high, it eliminates the necessity of the particular part of the wave test and since the standard four-party full selective ringing currents have high d.c. components, the particular part of the wave test feature is not required in offices having superimposed ringing.

Note: In order to use a single type of trip relay adjusting test set in panel offices, the set used is arranged for the particular part of the wave test, even though this feature is not needed in offices having superimposed ringing.

3. DESCRIPTION OF APPARATUS

3.01 The various adjusting sets are similar in design. The apparatus of each is mounted in a box of such size and shape that it may be conveniently used on the steps of a rolling ladder. Two cleats are provided on the bottom of sets in wooden cases to prevent the box from falling off the ladder steps.

3.02 The equipment of an adjusting set consists of an arrangement of resistances, relays, keys, a buzzer circuit, and two cords. One of these cords supplies battery and ground to the set and the other cord is used for connecting the adjusting circuit to the circuit under test. In addition, the adjusting set for manual offices employing a.c. ringing current is equipped with a millimeter and a rheostat for regulating the current flow through the second relay of the pair which is used for connecting the ringing current to the adjusting resistance at a particular part of the a.c. wave.

3.03 The cords which are fastened to the cord fasteners inside the box, extend through the cord holes in the front face. These cords are designated by means of number plates appearing above the cord holes and the designation of the conductors of each cord appear on the cord fastener mounting.

4. FUNCTIONS OF KEYS

4.01 The OPR key (locking) when operated connects the proper resistance in the circuit for the operate current flow adjustment to be made on the trip relay. Likewise, the operation of the NON-OPR key (locking) connects the proper resistance for the non-operate adjustment.

4.02 The RESET key (non-locking) prepares the circuit for the start of the test. After a test has been made, the operation of this key also resets the trip relay combination.

4.03 The START key (non-locking) when operated connects the ringing circuit to the test resistances in the adjusting circuit.

4.04 The TT key (locking), provided in the earlier sets, is used in some No. 11 manual offices to change the value of the resistance in series with the RESET lead, when adjusting the relay operated over this lead.

4.05 The RESET TR key (locking) is provided in sets used in certain No. 11 manual offices which are equipped with call indicator trunks of the type normally used in No. 1 manual offices. This key is used to transfer the reset lead from battery to ground at the RESET key, as required.

5. CIRCUIT DESCRIPTIONS

5.01 Detailed descriptions of the circuit operation of trip relay adjusting sets will be found in the associated circuit descriptions furnished with the drawings covering these sets.