CIRCUIT DESCRIPTION
AMERICAN TELEPHONE & TELEGRAPH CO.
DEPARTMENT OF DEVELOPMENT & RESEARCH.
BELL TELEPHONE LABORATORIES, INC.,
PRINTED IN U.S.A.

-PANEL SYSTEM
TEST SET CIRCUIT
TRIPPING RELAY ADJUSTING SET
FOR USE IN OFFICES USING
AC-DC RINGING

CHANGES

A. CHANGED AND ADDED FUNCTIONS

A.1 No change.

B. CHANGES IN APPARATUS

B.1 No change.

C. CHANGES IN CIRCUIT REQUIREMENTS OTHER THAN THOSE APPLYING TO ADDED OR REMOVED APPARATUS

C.1 No change.

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Prefix of drawing number changed from ES to SD and rating from Standard to Provisional Standard. The words "Machine Switching" have been removed from the first line of the title and also reference to the voltage in the last line of the title.

DEVELOPMENT

1. PURPOSE OF CIRCUIT

1.1 This circuit is used for readjusting tripping relays in offices using AC-DC ringing current.

2. WORKING LIMITS

2.1 None.

OPERATION

3. FUNCTIONS

3.1 To furnish means of connecting to relay winding terminals and sequence switch springs or to a battery supply jack to obtain battery and ground.

3.2 To furnish means of connecting to relay winding terminals and sequence switch springs for test purposes.

3.3 To furnish an audible signal during the ringing period to indicate the time to start the test.

3.4 To disconnect the audible signal and to connect the tripping relay being readjusted to the operate or non-operate resistance at a particular part of the AC-DC wave.

3.5 To disconnect the operate or non-operate resistance and reconnect the audible signal after an interval of approximately .25 to 1 second.

3.6 To reset the auxiliary tripping relays in the circuit under test.

4. CONNECTING CIRCUITS

4.1 Standard incoming selector circuits using AC-DC ringing current, 95-103 volts AC 16-19 volts DC, silent period 45-50 volts.

4.2 Ringer and dial test circuits using AC-DC ringing.

4.3 Battery and ground are supplied by connecting to battery and ground by means of a cord equipped with #360 type tools or by patching to a battery and ground supply jack in frame jack box.

DETAILED DESCRIPTION

5. APPARATUS AND FUNCTIONS

5.1 The (OPR) and (NON-OPR) is a lever type locking key used to determine the class of test.

5.2 The (RESET) and (START) is a lever type non-locking key used to set the auxiliary tripping relay in the circuit under test and to start the operation of the adjusting set.

5.3 The test cord is a special cord used to connect to the relay to be readjusted.

5.4 The battery and ground cord is used to supply the adjusting set with battery and ground.

6. CIRCUIT OPERATION

6.1 HOW THE TEST IS STARTED

6.11 Readjustment of the tripping relay in the incoming selector circuit or in the ringer and dial test circuit is accomplished in the following manner:

(a) Connect battery and ground cord to battery and ground supply.

(b) Connect the test cord to the circuit whose tripping is to be readjusted.

(c) Operate the (OPR) or (NON-OPR) key.

(d) Operate the (RESET) key.

(e) Operate the (START) key.

6.2 CONNECTING THE SET

6.21 Battery and ground are supplied by attaching the #360 type tools of the battery and ground cord "X" to battery and ground. Where a battery supply jack is available, battery and ground can be supplied by inserting the plug of the battery and ground cord "Y" into the battery supply jack located in the frame jack box.

6.22 The test cord is patched as follows:
The "RING" conductor is connected with the winding of the tripping relay; the "RESET" conductor is connected so as to operate the relay associated with the tripping relay when the (RESET) key is operated in the readjusting set.

The "GROUND" conductor, when required, is connected so as to supply a ground to lock the ringing relay combination operated.

6.3 OPERATION OF (OPR), (NON-OPR) AND (RESET) KEYS - Either the (NON-OPR) or the (OPR) key is operated, depending on which type of adjustment is to be made. The operation of either key operates the (SR) relay. The (RESET) key is then operated, operating the (PW) relay thru its primary winding and placing ground on the conductor for operating the relay associated with the tripping relay. The (PW) relay operated, locks over its secondary winding in series with the (CH) relay, which operates. When the (RESET) key is returned to normal, ground is removed from the relays in the circuit under test, leaving them in an operated position.

6.4 OPERATION OF (START) KEY

The (START) key is operated at the beginning of a ringing period as indicated by the buzzer. The (START) key operated, operates the (RL) relay. The (RL) relay is made slow operating so that it will not operate if the (CH) relay releases falsely when the (RESET) key is restored and the (START) key is momentarily operated. The (RL) relay operated, (a) locks under control of the (SR) and (CH) relays and (b) operates the (C1) relay. The (C1) relay operated (a) disconnects the buzzer, (b) connects the tripping relay through the ring of the cord through the resistances, through 2-B and 1-B contacts and primary winding of the (PW) relay, through the normally closed contacts of the (RESET) key, through resistance to ground through the (NON-OPR) or (OPR) key, and (c) opens the circuit to the (SR) relay as explained below. The (SR) relay controls the length of time that the tripping relay is connected to the (PW) relay thru the operate or non-operate resistance. It is made slow releasing so that this time will be approximately .3 to .5 seconds.

6.5 CONNECTION OF RESISTANCE AT PEAK OF AC-DC WAVE When the AC-DC ringing current flowing through the primary winding of the (PW) relay approaches the maximum point of the negative wave the (PW) relay releases differentially and connects the tripping relay through the trip or pretrip resistance to ground. The operation or non-operation of the tripping relay is checked by the setting of the relays

associated with the tripping relay in the circuit under test.

6.6 DISCONNECTION TRIP OR PRETRIP RESISTANCE When the (SR) relay has released, one of the locking circuits of the (RL) relay is opened. If the (PW) and (CH) relays have also released, opening the other locking circuit of the (RL) relay, the (RL) relay releases, in turn releasing the (C1) relay. The release of the (C1) relay (a) disconnects the trip or pretrip resistance, (b) reconnects the buzzer, (c) operates the (SR) relay. Only one trip or pretrip test should be made during a ringing period.

6.7 PREVENTION OF FALSE RETEST - If the (START) key is held operated a retest will not be made since it is necessary to operate the (RETEST) key before each test.

6.8 CLOSURE OF (START) KEY - If the (START) key is held operated for only a short period of time, the circuit operation will proceed, since the ground from the (START) key is replaced by a ground from the (RL) relay.

6.9 DISCONNECTION - At the conclusion of the readjustment the cords are disconnected.

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