STEP BY STEP SYSTEM
NO. 1, 350A OR 355A
TEST TRUNK RINGING CIRCUIT
FROM LOCAL TEST DESK NO. 14
OR LOCAL TEST CABINET NO. 3
SELECTIVE SUPERIMPOSED RINGING

CHANGES

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 The rating is changed from A.T.&T.Co. Standard to Mfr. Disc. in accordance with the program to replace all test trunk ringing circuits with one new circuit.

D.2 Replacement note is added.

D.3 The connecting information is changed to include "To line insulation test control ckt."

D.4 Cross connection Figs. L, M, N and P are changed and CAD 1 is added.

4. CONNECTING CIRCUITS

When this circuit is listed on a key-sheet the connecting information thereon is to be followed.

4.1 Test trunk circuit at test desk or local test cabinet - SD-90056-01 or SD-90018-01.

4.2 Test Distributor Control Circuit - SD-31349-01.

4.3 Test trunk from selector level - SD-31245-01.

4.4 Test trunk at MDF or Protector Frame - SD-90070-01.

4.5 Test trunk at "A" switchboard - SD-90507-01.

4.6 Test trunk at plugging up circuit panel - SD-90589-01.

4.7 Test distributor circuit - SD-32007-01.

4.8 Test trunk at local test cabinet - SD-96229-01.

4.9 Line insulation test control circuit - SD-32219-01.

All other headings, no change.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT. 2353-VDM-EWO-SA

STEP BY STEP SYSTEM
NO. 1, 350A OR 355A
TEST TRUNK RINGING CIRCUIT
FROM LOCAL TEST DESK NO. 14
OR LOCAL TEST CABINET NO. 3
SELECTIVE SUPERIMPOSED RINGING

CHANGES

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Cross connection Fig. L is changed to add strap designated "T" option on terminals 15 and 16 and to remove leads designated "M" and "N" which formerly connected to the same terminals.

D.2 Cross connection Fig. M is changed to remove the loop leads "M" and "N" which formerly connected to Fig. L.

D.3 Note 102 is changed to specify a 1/2 amp HV fuse for MR SUP-. This was inadvertently not changed when the MR SUP+ fuse in the same note was changed on Issue 10-D.

D.4 Note 108 is changed to include the reference "Except where connection is to Misc. Alm. Ckt."

D.5 Note 117 is added to provide a record of the issue when the 1-1/3 amp. ringing fuse was changed.

All other headings, no change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 2353-VDM-EWO-EH

STEP-BY-STEP SYSTEM
NO. 1, 350A OR 355A
TEST TRUNK RINGING CIRCUIT
FROM LOCAL TEST DESK NO. 1A
OR LOCAL TEST CABINET NO. 3
SELECTIVE SUPERIMPOSED RINGING

CHANGES

B. CHANGES IN APPARATUS

	Superseded	Superseded by
B.1	109B retardation coil (A)	149D retardation coil (A)
	0.3 M.F. condenser (A)	1.0 M.F. condenser (A)
B.2	Added	
	400E varistor (P) 400E varistor (N)	

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

C.1 Adjustment for maximum external circuit loop of 1500 ohms is added for 114KA relay (TR).

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 "M" option is designated, rated "Mfr. Disc." and superseded by "L" option to provide for replacement of the 109B coil.

D.2 1500 ohm tripping range is added for the 114KA relay.

D.3 Note 116 is added.

2. WORKING LIMITS

2.1 Relays

(RC)	Max. Ext. Ckt Res.	Max. Res. per Cond. (TRK)	Min. Ins. Res.	Max. Earth Potential
"T" option				
Grd. Ret.	6,880 Ohms		60,000 Ohms	±15V
Met. Ret.	11,275 Ohms		60,000 Ohms	
"V" option	6,500 Ohms			
(P) and (N)	2,000 Ohms		60,000 Ohms	
(T)-(T1) and (R)-(R1)		750 Ohms	60,000 Ohms	±30V

All other headings, no change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3310-DR-RLL-T2

STEP-BY-STEP SYSTEM
NO. 1, 350A OR 355A
TEST TRUNK RINGING CIRCUIT
FROM LOCAL TEST DESK NO. 14
OR LOCAL TEST CABINET NO. 3
SELECTIVE SUPERIMPOSED RINGING

CHANGES

B. CHANGES IN APPARATUS

Superseded	Superseded By
(N) 239 relay "S" option	(N) 280J relay "R" option
(P) 239FM relay "S" option	(P) 280J relay "R" option
(RC) 239FH relay "Q" option	(RC) 280AA relay "N" option

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

C.1 Test notes 2 and 5 are removed from page 1. They read as follows:

2. A negative sign (-) preceding a current value indicates that this current shall flow in a direction opposite to the direction of the circuit operating current.

5. *Indicates that there is more than one relay with the same designation.

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Circuit note 110 is rated "mfr. disc." and notes 114 and 115 are added.

D.2 The use of the 239FM and the 239FH relays is rated "mfr.disc." and they are superseded by 280 type relays to provide polarized relays with improved adjustment stability.

D.3 The options used table is added.

D.4 The 231FL relay is designated "Q" option and 231FM is designated "P" option.

D.5 Cross connection figure M is revised.

All other headings, no change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3330-MHK-AJB-WV

STEP BY STEP SYSTEM
NO. 1, 350A OR 355A
TEST TRUNK RINGING CIRCUIT
FROM LOCAL TEST DESK NO. 14
OR LOCAL TEST CABINET NO. 3
SELECTIVE SUPERIMPOSED RINGING

CHANGES

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

C.1 The adjustment values for the 114KA relays (TR), page 2, formerly read:

TEST AMP.	READJ. AMP.
.032	.0305
.026	.0275

All other headings, No change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3340

EAK)
FJS) WW

STEP BY STEP SYSTEM
NO. 1, 350A OR 355A
TEST TRUNK RINGING CIRCUIT
FROM LOCAL TEST DESK NO. 14
OR LOCAL TEST CABINET NO. 3
SELECTIVE SUPERIMPOSED RINGING

CHANGES

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

C.1 Prior to Issue 8-D the title of the circuit requirements was: "Test Trk. Ring. Ckt. From Local Test Desk No. 14 (Test Trk. Ring.)".

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Figures L, M, N and P have been added to the cross-connections and Fig. K is rated "Mfr. Disc."

D.2 Prior to Issue 8-D the information at the ringing leads was: "To Machine Ringing".

D.3 The cross-connections have been removed from Sheet -01 and shown on added Sheet -012.

D.4 In the information at the "TEST T", "TEST R" and "S" leads connection to "Plugging-up circuit panel" is changed to "Plugging-up frame".

All other headings under "Changes", no change.

1. PURPOSE OF CIRCUIT

1.1 This circuit is used to relay ringing from the test desk or test cabinet to a subscriber line. It is used in offices having selective superimposed ringing.

2. WORKING LIMITS

2.1 (RC) relay ("T" wiring)

2.11 With ground return, maximum external circuit resistance = 6880 ohms.

2.12 With metallic return, maximum external circuit resistance = 11275 ohms.

2.2 (RC) relay ("V" wiring) - maximum external circuit resistance = 6500 ohms.

2.3 (P) and (N) relays - maximum external circuit resistance = 2000 ohms.

2.4 (T) and (T1) relay combination and (R) and (R1) relay combination - maximum resistance per trunk conductor = 440 ohms.

2.5 Minimum test trunk insulation resistance = 60,000 ohms between conductors or either side to ground.

2.6 Maximum earth potential (difference between ground potential in this office and ground potential at the local test desk).

2.61 For (RC) relay with ground return = ± 15 volts.

2.62 For (T) and (T1) relay combination and for (R) and (R1) relay combination = ± 30 volts.

2.7 Maximum external circuit loop for tripping.

Covered on tripping range table.

3. FUNCTIONS

3.1 To recognize ringing signal from the test desk or test cabinet.

3.2 To select proper side of line over which to relay ringing.

3.3 To select proper polarity of ringing.

3.4 To connect ringing to the outgoing side of this circuit when the above selections have been made.

3.5 To trip local ringing when the receiver is removed from a switchhook on the line.

3.6 To provide a closure in order to trip distant ringing when the receiver is removed from a switchhook cn the line.

3.7 To restore to normal when ringing at the test desk has been tripped or when the ringing key or master ringing key at the test desk or test cabinet is restored.

4. CONNECTING CIRCUITS

4.1 Test trunk circuit at test desk or local test cabinet.

4.2 Test Distributor Control Circuit.

4.3 Test trunk from selector level.

4.4 Test trunk at MDF or Protector Frame.

4.5 Test trunk at "A" switchboard.

4.6 Test trunk at plugging up frame.

4.7 Test distributor circuit.

4.8 Test distributor test trunk at local test cabinet.

4.9 Miscellaneous Alarm Circuit.

DESCRIPTION OF OPERATION

5. START RINGING ("T" Wiring)

When a ringing key in the secondary test circuit at the test desk is operated, after a testing path has been established to a subscriber line in the local office in which this circuit is located, battery on the sleeve lead incoming to this circuit is changed from negatively poled to positively poled battery. This causes the (RC) relay to operate in turn operating the (RC1) relay.

The same operation will take place if the master ringing key at the test desk or test cabinet is operated.

6. START RINGING ("V" Wiring and Apparatus)

When this circuit is connected to a test distributor test trunk at local test cabinet, "V" wiring and apparatus will be provided. The current over the "LT" and "LR" leads is normally in the direction not to operate (RC) relay. However when the master ringing key at the local test cabinet is operated, after a testing path has been established between the local test cabinet and a subscriber line in the local office in which this circuit is located, positive coin battery is connected to "LT" lead and ground is connected to "LR" lead at the local test cabinet. This causes (RC) relay to operate and the relays on the "LINE T" and "LINE R" leads in the test distributor circuit to remain operated. The (RC) relay operated, operates the (RC1) relay. In case the test connector or called line is busy, the battery and ground connected to "LINE R" and "LINE T" leads are reversed and ground is connected to "B" lead by the test distributor. The reversal of current over the "LINE T" and "LINE R" leads would operate (RC) relay in turn operating (RC1) relay. However, ground over (B) lead operates (B) relay, opening the circuits of the (RC) and (RC1) relays. (RC) relay is normally shunted by the (G) 20 ohm resistance, and "LT" lead remains closed thru this resistance when (B) relay is operated. This shunting resistance also improves the dialing and tone circuits over the "LT" lead.

7. SELECTION

The (RC1) relay operated, connects the windings of the (T) and (R) relays to the incoming tip and ring conductors respectively. If ringing current is being applied to the tip conductor and ringing ground to the ring conductor at the test desk or test cabinet, the (T) relay will operate. If ringing current is being applied to the ring and ringing ground to the tip, the (R) relay will operate. For the purpose of this description assume that ringing is being applied to the tip. The (T) relay operated, closes a circuit to operate the (T1) relay which locks under control of the (RC1) relay and operates the (T2) relay. The purpose of the second of the two J type relays is to present a ring up relay combination which will not operate falsely on condenser charging or discharging current set up by the talking battery at the test desk or test cabinet or by differences in ground potential or by residual charges due to ringing voltages. In case ringing current had been received on the ring instead of the tip, (R), (R1) and (R2) relays would have operated in a manner similar to (T), (T1) and (T2). The (T2) or (R2) relay operated, connects the (P) and (N) relays together with an impedance network consisting of the (A) retard coil, (A) condenser, and (C) resistance in series across the tip and ring and closes the outgoing tip and ring conductors through to the tripping relay (TR) and ringing ground respectively. The (T2) relay also removes the ringup relays (T) and (R) and associated condensers from tip and ring in order to prevent false kickups of (P) and (N) relays thru the ringup condensers. Ringing current is not yet closed to the tripping relay however. If positive superimposed ringing current is being sent out at the test desk or test cabinet the (P) relay will operate but the (N) relay will not operate. The (P) relay operated, operates the (P1) relay. The (P1) relay operated, locks under control of the (RC1) relay and connects positive superimposed ringing current through the tripping relay and out over the line. If negative superimposed current is being sent out at the test desk or test cabinet the (N) relay will operate in turn operating the (N1) relay which functions in a manner similar to the (P1) relay except that it connects negative superimposed current to the line.

8. TRIPPING

When the receiver at a station on the line is removed from the switchhook the (TR) relay operates. The (TR) relay operated, removes the short circuit from the (TR1) relay which now operates. The (TR1) relay operated, closes a bridge across the incoming tip and ring leads. This causes the ringing at the test desk to be tripped or signals the test cabinet. This bridge is of 200 ohms resistance when the trunk is less than 200 ohms so as to prevent excessive current flow when ringing is tripped. The (TR1) relay

operated, also releases the (T2) relay which disconnects ringing from the outgoing side of the line.

9. RETURN TO NORMAL

When ringing at the desk has been tripped or when the ringing key or master ringing key at the test desk or test cabinet is restored, the (RC) relay releases, releasing the (RC1) relay. The (RC1) relay released, closes the tip and ring leads from the test desk or test cabinet to the station and releases all operated relays in this circuit.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 832

EBH)
FJH) GK