STEP-BY-STEP SYSTEMS
NO. 1, 350A OR 355A
TEST DISTRIBUTOR CIRCUIT
FOR TESTING SUBSCRIBER LINES
OR FOR VERIFICATION SERVICE
ARRANGED FOR ONE-DIGIT OPERATION
ON SPECIFIED LEVELS OR
FOR 2 DIGIT OPERATION
ON ALL LEVELS

CHANGES

D. Description of Changes

D.01 The connecting information to the Mini-ROTL Circuit, SD-5P053-01, is added.

D.02 CAD Fig. 87 and 88 are added.

F. Changes in CD SECTION III

F.01 Under 4. CONNECTING CIRCUITS, add the following:

(v) Mini-RTTU Circuit - SD-5P053-01.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 55212-NAR

WE DEPT 62810-RWH-JCR-AJN

Printed in U.S.A.

STEP-BY-STEP SYSTEMS
NO. 1, 350A, OR 355A
TEST DISTRIBUTOR CIRCUIT
FOR TESTING SUBSCRIBER LINES
OR FOR VERIFICATION SERVICE
ARRANGED FOR ONE-DIGIT OPERATION
ON SPECIFIED LEVELS OR
FOR 2-DIGIT OPERATION

CHANGES

D. Description of Changes

D.01 CAD 56 is changed on a D no-record basis to agree with the manufacturing information.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 55213-DAJ

WE DEPT 45230-RWH-JTT-MHF

STEP-BY-STEP SYSTEMS NO. 1, 350A, OR 355A TEST DISTRIBUTOR CIRCUIT FOR TESTING SUBSCRIBER LINES OR FOR VERIFICATION SERVICE ARRANGED FOR ONE-DIGIT OPERATION ON SPECIFIED LEVELS OR FOR 2-DIGIT OPERATION

CHANGES

D. Description of Changes

D.01 To busy line verification limiter circuit is added to the connecting information in the upper left hand position of Fig. 1.

D.02 Options ZJ and ZK are designated and rated Standard.

D.03 Circuit Notes 102 and 104 are changed.

D.04 Figure 56 is changed and Fig. 86 is added to reflect connection to busy line verification limiter circuit.

F. Changes in CD Sections

F.01 In SECTION II, under 5. TEST CONNECTOR BUSY, change 5.01 as follows:

5.01 If the desired test connector is in use, ground will be connected to the line sleeve wiper, thereby causing E to operate through its primary winding in series with H which will hold after the release of J. The E operated opens the operating circuit for the rotary magnet to prevent the switch from responding to additional pulses if the dial is operated in error, completes the circuit for transmitting a busy tone to the originating end, and operates F, option ZK reversing battery and ground through A and G to the originating end, and connecting a ground to lead B associated with certain test distributor control circuits. This function of the F relay is used to indicate to the connecting circuits that the test connector is busy. When option N is used, F also removes compensating resistors T and R to increase the current to the trunk circuit ahead of the incoming selector in case the supervisory relays of these circuits require more current than would be furnished through resistors T and R.

F.02 In SECTION III - REFERENCE DATA, under 4. CONNECTING CIRCUITS, add the following:

(u) Busy Line Verification Limiter Circuit - SD-97761-01.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5245-DAJ

WE DEPT 45820-RWA-WEA-MAF

STEP-BY-STEP SYSTEMS
NO. 1, 350A OR 355A
TEST DISTRIBUTOR CIRCUIT
FOR TESTING SUBSCRIBER LINES
OR FOR VERIFICATION SERVICE
ARRANGED FOR ONE-DIGIT OPERATION
~~ON SPECIFIED~~ LEVELS OR
FOR 2 DIGIT OPERATION
ON ALL LEVELS

CHANGES

B. Changes in Apparatus

B.01 Added

Diode T - 533K - option Z1

D. Description of Changes

D.01 Option Z1 is added to furnish a diode to permit this circuit to function with the ANI-C or D +350 volt identification pulse.

F. Changes in CD SECTION II

F.01 In 15.01 change ANI to ANI-B.

F.02 Add 15.02 as follows:

15.02 In ANI-C or D offices specify option Z1 to prevent the ANI-C or D offices positive 350-volt identification pulse from being shorted to ground.

BELL TELEPHONE LABORATORIES, INCORPORATED

CB 5242-DAJ

WE DEPT 45820-RWH-WEA-PLS

Printed in U.S.A.

STEP-BY-STEP SYSTEMS
NO. 1, 350A OR 355A
TEST DISTRIBUTOR CIRCUIT
FOR TESTING SUBSCRIBER LINES
OR FOR VERIFICATION SERVICE
ARRANGED FOR ONE-DIGIT OPERATION
ON SPECIFIED LEVELS OR
FOR 2 DIGIT OPERATION ON
ALL LEVELS

CHANGES

D. Description of Changes

D.1 A portion of Circuit Note 102 changed to read:

When the test distributor is connected to the Line Verification Circuit (ANI-B) and/or is required to complete test calls to "AIS", App. or wiring "B" is required.

D.2 (When No. 3 Local Test Desk is used) moved from lead "B1" to after "To Fig. 6" on bracket covering leads TR, TT, R, T, B and S.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEOT 5245-LCB
WECO DEPT 5152-RWH-WEA

STEP-BY-STEP SYSTEMS NO. 1, 350A OR 355A TEST DISTRIBUTOR CIRCUIT FOR TESTING SUBSCRIBER LINES OR FOR VERIFICATION SERVICE ARRANGED FOR ONE DIGIT OPERATION ON SPECIFIED LEVELS OR FOR 2 DIGIT OPERATION ON ALL LEVELS

CHANGES

D. Description of Changes

D.1 Connecting information to a two way operator office trunk circuit SD-31747-01 (typical).

D.2 Connecting Circuit SD-31747-01 (typical) is added to the CD.

F. Changes in Body of CD

F.1 Add to Section III Reference Data

Part 4 Connecting Circuits

(S) 2 Way operator office trunk circuit SD-31747-01 (typical).

(T) Test connector circuit SD-30954-01.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5245-LCB
WECO DEPT 5152-RWH-WEA

STEP-BY-STEP SYSTEMS
NO. 1, 350A OR 355A
TEST DISTRIBUTOR CIRCUIT
FOR TESTING SUBSCRIBER LINES
OR FOR VERIFICATION SERVICE
ARRANGED FOR ONE-DIGIT OPERATION
ON SPECIFIED LEVELS OR
FOR 2-DIGIT OPERATION ON
ALL LEVELS

CHANGES

D. DESCRIPTION OF CHANGES

D.1 In Fig. 1 Option K is removed from terminal 4 of the G relay.

D.2 In Note 102, Option H is added to "LIT Control in Same Bldg."

D.3 In Fig. 1 at B1 lead, switch term. 12, connecting information is revised to read "To Fig. 6 (When No. 3 Local Test Desk is used)."

D.4 In Fig. 5 at the XTS, TR and TT leads connecting information is revised to show "XTS-To LIT Control Ckt in Distant Bldg., or Fig. 6" and "TR, TT- To LIT Control Ckt in Distant Bldg., or to Fig. 6 (When No. 14 Local Test Desk is Used)."

D.5 In Fig. 83 "OPT Rel" is changed to read "OTP Rel."

BELL TELEPHONE LABORATORIES, INC.

DEPT. 5823

WCB-DCP-MR

STEP-BY-STEP SYSTEMS NO. 1, 350A, OR 355A TEST DISTRIBUTOR CIRCUIT FOR TESTING SUBSCRIBER LINES OR FOR VERIFICATION SERVICE ARRANGED FOR ONE-DIGIT OPERATION ON SPECIFIED LEVELS OR FOR 2-DIGIT OPERATION

TABLE OF CONTENTS

SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

1.01 This circuit is used for establishing connections between the test desk, line insulation test control circuit, A switchboard or a toll position, and subscriber lines for purposes of testing and verification. By the use of one-digit operation on specified levels in a 3-4 or 4-5 digit office, it is always possible to dial the subscriber connector terminal number in order to reach the subscriber line, except when this circuit is used for line insulation testing.

SECTION II - DETAILED DESCRIPTION

Note: In following description:

Type A Operation refers to operation from test desk or for verification service.

Type B Operation refers to operation with an LIT control circuit in a distant building.

Type C Operation refers to operation with an LIT control circuit in the same building.

1. SEIZURE

1.01 When this circuit is seized, the A and G relays operate over the loop in the connecting circuit. A operated operates B which, in turn, prepares the circuit for operating the vertical magnet and connects ground to lead S to the test distributor control circuit or to the local selector. G operated also provides ground for holding B. B operated also connects ground to the MS lead to start the ringing machine in the 355A office.

2. VERTICAL STEPPING

2.01 Relay A responds to dial impulses. G may or may not follow pulsing. When A releases on the first pulse, C and vertical magnet operate in series. B and C are slow in releasing and therefore do not release during the dialing of a digit. However, C releases at the end of the digit. C operated connects the G resistor in shunt with the G relay in order to reduce the impedance of the circuit through which A is pulsing. When Fig. 2 is used, C also operates K which looks to B and the rotary interrupter spring. The vertical magnet raises the shaft and the wipers of the switch to the desired level in response to the digit dialed. C being operated, the circuit is opened to J and the rotary magnet and the circuit for the vertical magnet and C is maintained after the VON springs function. The release of C at the end of the digit transfers the pulsing circuit from itself and the vertical magnet to the rotary magnet and J. C released also removes the G resistor shunt from the G relay.

3. ROTARY STEPPING (2-DIGIT OPERATION)

3.01 The next digit dialed operates J and the rotary magnet causing the switch to rotate to the desired terminal. J is slow to release and remains operated during the dialing of the digit. J operated operates H (types A and B operation only) and connects the G resistor in shunt with the G relay as described above. H operated opens the leads to the test wipers and prepares the circuit for operating D or E. J releases at the end of the digit removing the G resistor shunt from the G relay.

4. AUTOMATIC CUT IN (ONE-DIGIT OPERATION) - FIG. 2 AND W, M, AND H OPTIONS

4.01 If the switch is dialed to a level where the circuit from K to the rotary magnet is closed through the normal post spring, the release of C operates the rotary magnet one step in multiple with J, in turn, operating H which functions as described in 3.01. The rotary magnet operating releases K and, in turn, D and the magnet.

5. TEST CONNECTOR BUSY

TYPES A AND B OPERATION

5.01 If the desired test connector is in use, ground will be connected to the line sleeve wiper, thereby causing E to operate through its primary winding in series with H which will hold after the release of J. E operated opens the operating circuit for the rotary magnet to prevent the switch from responding to additional pulses if the dial is operated in error, completes the circuit for transmitting a busy tone to the originating end, and operates F reversing battery and ground through A and G to the originating end, and connecting a ground to lead B associated with certain test distributor control circuits. This function of the F relay is used to indicate to the connecting circuits that the test connector is busy. When N option is used, F also removes compensating resistors T and R to increase the current to the trunk circuit ahead of the incoming selector in case the supervisory relays of these circuits require more current than would be furnished through resistors T and R.

TYPE C OPERATION

5.02 When this circuit is controlled by a line insulation test control circuit in the same building, the line sleeve from the test connector is transferred to the LIT control circuit. A busy test connector indicated by ground on the line sleeve is detected by that circuit.

6. TEST CONNECTOR IDLE

TYPES A AND B OPERATION

6.01 If the test connector is not in use, J releasing opens the operating circuit for H and closes the circuit for operating D which operates through the contacts of H before the latter has released and locks through its own contacts to ground from B. D closes the wiper circuits and the pulsing loop to the test connector and removes the short circuit from resistor D in series with the rotary magnet.

6.02 With type B operation, the LIT control circuit in the distant building

operates K, Fig. 4 or 5, over the XTS lead after it has determined that the test connector is idle. K locks operated through a front contact of the B relay, (a) transfers the XTS lead from its winding to the test sleeve lead to the test connector, (b) prepares a path to operate OTP, Fig. 6, and (c) opens the operate path to the J relay. With Fig. 5 and F option, K also connects the TT and TR leads from the LIT control circuit to contacts 2 and 4 of H. These functions of the K transfer the supervision and control of subscriber line circuits from the test distributor to the LIT control circuit.

6.03 Under type B operation, a means is provided that permits the test distributor to skip certain working terminals. For this feature, Fig. F, G or H and option A are required in addition to Fig. 5 and options F and J.

6.04 If it is required to skip up to three working terminals, each appearing on separate test distributor levels, Fig. H is provided. When the test distributor reaches a level containing such a terminal a set of normal post springs is operated. When relay K operates, ground is connected via the operated normal post springs and the PUL lead to the test tip bank terminal. If the test distributor wipers are standing on the terminal so marked ground will be extended via the test tip conductor to the LIT control circuit which will cause the test distributor to advance to the next terminal. If it is required to skip two or three working terminals appearing on the same test distributor level, Fig. F is provided. Relay PUL operates when both relay K is operated, and the test distributor is standing on the level containing these terminals. PUL operated connects ground via the PUL leads to the test tip bank terminals and, when the test tip wiper reaches a terminal so marked, the ground is extended to the LIT control circuit which causes the test distributor to advance to the next terminal.

6.05 If it is required to skip three working terminals, two of which appear on the same level, and the third appears on a separate level, Fig. G is provided. The test tips of the two terminals appearing on the same level are marked by ground when relay K, the right front normal post springs, and relay PU are operated. The test tip of the individual terminal is marked by ground when relay K and the right-rear normal post springs are operated.

TYPE C OPERATION

6.06 When this circuit is controlled by an LIT control circuit in the same building, the LIT control circuit has direct control of the test connector. D relay never operates under this condition and the control circuit closes the loop to the test connector to cause its seizure.

7. PULSING THE TEST CONNECTOR

TYPES A AND B OPERATION

7.01 After the connection is extended to the test connector, the next series of dial pulses, pulses A which repeats the pulses to the test connector, and operates OTP, Fig. 6. OTP locks operated to ground on the XTS lead or ground from the sleeve of busy subscriber lines and opens the test tip and ring. This reduces clicks on busy subscriber terminals caused by discharging the capacitance of the testing cable pairs as the test connector is being stepped to adjacent terminals. OTP is released when the test connector is connected to an idle line, and ground is removed from the XTS lead by the distant LIT control circuit. For type A operation only, J and H operate during the pulsing period and release at the end of the pulse train. As described above, J connects the G resistor in shunt with the G relay; G may or may not follow the pulses. Resistor D in series with the rotary magnet prevents operation thereof and acts as a shunt on J to assist in holding this relay operated during the pulsing.

TYPE C OPERATION

7.02 Dial pulses generated by the LIT control circuit are used to vertically and rotary step the test connector and are transmitted over the loop directly connecting these two circuits.

8. CONNECTION TO CALLED LINE

TYPE A OPERATION

8.01 If the line called at the test connector is in use, ground from the busy line finder circuit is extended back over the TEST sleeve wiper through the contacts of the operated H relay and released J relay operating F when Fig. D is used, or operating Z and, in turn, F when Fig. E is used. F locks itself to the same ground through its make contacts and the contacts of H when the latter releases. When Fig. E is used, Z operated also short-circuits contacts 4 and 5 and removes ground from 2 of A. This prevents reoperation of J or stepping of the test connector in case A releases momentarily due to the operation of F before the release of C relay of a battery ground pulsing trunk or repeater preceding this circuit. Z releases after H at the end of the final digit. F operated performs the same functions as described in 5.01. The called line may be held by the test circuit until it is idle, at which time the replacement of the receiver on the switch hook removes the ground from the TEST sleeve wiper, and F releases.

This in turn retires the busy condition in the connecting circuit, and places a ground from the contact of G to the TEST sleeve wiper to operate the line cut-off relay in the No. 1 or 350A office, or to fully operate the combined line and cut-off relay in the No. 355A office, also busying the line. If the called line is not busy when seized, ground from G will immediately operate the cut-off or combined line and cut-off relay and busy the line. The called line is now ready for testing.

TYPE B OPERATION

8.02 When the LIT control circuit has finished pulsing the test connector, it connects ground to the LR lead to reoperate A but leaves the LT lead open so that G will not reoperate and ground the test sleeve lead. If the line is busy, ground will be connected to this test sleeve lead at the connector bank terminal to hold the OTP relay operated. This ground is detected by the LIT control circuit on the XTS lead. If the line is idle, the OTP is released and the LIT control circuit recloses the loop to operate G as well as A. G operated operates Z, Fig. 4 or 5. Z connects ground from a front contact of A to the test sleeve to operate the cut-off relay in the line circuit and busy the line.

TYPE C OPERATION

8.03 A busy line is indicated to the LIT control circuit by ground on the TS lead (K option). If the line is idle, the LIT control circuit places ground on this lead to operate the cut-off relay in the line circuit and busy the line.

9. ROUTINE TEST OF LINE CIRCUITS (OTHER THAN 8- OR 10-PARTY TERMINAL PER LINE CIRCUITS)

9.01 When it is desired to test all lines in one connector level successively, the lowest number line may be dialed, and when tests are completed and the next line is desired, it is secured by dialing the digit 1. This sequence may be repeated until all 10 lines have been tested. This procedure cannot be used with 8- or 10-party terminal-per-line test connectors.

10. DISCONNECTION OF TEST CONNECTOR

TYPES A AND B OPERATION

10.01 If it is desired to release only the test connector, a key (type A operation) or a relay (type B operation) in the associated test circuit is operated. This places battery on the tip and opens the ring causing A to release and opening the loop to the test connector and returning the latter to normal. For type A operation only, A released also operates J which, in turn, operates H. J operated connects the G resistor in shunt with the G relay, but this performs no useful function at this time and G remains operated. H operated opens the test leads while the connector wipers, in releasing, pass over lines which may be in use. G operated with the connector release key operated at the test desk holds B operated, and thereby, prevents the test distributor from releasing. When the connection is again desired to the line, it is only necessary to dial the last two digits of the number.

TYPE C OPERATION

10.02 To release only the test connector, the LIT control circuit opens the loop to it, while holding closed the loop to this circuit.

11. ADVANCE TO ADJACENT TERMINAL

TYPE C OPERATION

11.01 When controlled by an LIT control circuit, the test distributor may be advanced to an adjacent terminal on the same level. To do this, the control circuit transmits a single dial pulse over the loop to the A and G relays. This pulse releases both A and G. G released performs no function at this time. A released operates J and the rotary magnet in parallel from ground through its back contact. At the end of the pulse, A and G reoperate.

12. DISCONNECTION OF TEST DISTRIBUTOR

12.01 Upon disconnection, both A and G release causing B to release and open the loop to the test connector circuit. Opening the loop causes the test connector to release and the release of B releases D, if operated, and operates the release magnet. The release magnet operating, returns the shaft to normal and restores the VON springs.

13. LINE RELAY TEST

13.01 If it is desired to test the line relay, a key in the associated test circuit is operated which releases G, but holds operated A. G normal releases the cut-off or combined line and cut-off relay which, in turn, connects the line relay or the line windings of the combined line and cut-off relay to the test T and R leads making this relay available for test from the associated test circuit.

14. VERIFICATION SERVICE

14.01 When the circuit is used for verification service, it is connected to the A board or toll position by a trunk or from the A board through a local selector. The circuit functions the same as in the above description for testing service from

the local test desk, except that only a talking connection is established to the called line.

15. LINE VERIFICATION ANI OFFICES

15.01 In ANI offices, B option is specified to permit identification tone to be passed over the test tones sleeve to the sleeve of the line circuit through the test connector. The induction coil permits tone to be passed over the sleeve while retaining a low-resistance dc ground path.

16. PULSING AND CONTACT PROTECTION NETWORKS

16.01 1-uf capacitor C and the associated 200-ohm resistor, or network C is used to prevent excessive sparking at the contacts of the A relay which operate the vertical and rotary magnets of this switch. The B capacitor and B resistor provide a pulsing network to assist in pulsing the test connector. Resistor A together with capacitor B and resistor B protect the contacts of relay A which pulse the test connector.

17. TEST JACK

17.01 This circuit is provided with a test jack to facilitate maintenance conditions and to provide access to the leads of this circuit.

18. MISCELLANEOUS

18.01 With options M and H type A operation is possible.

18.02 With K option, types A and C operation are possible.

18.03 With J option, types A and B operation are possible.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 Maximum conductor loop for pulsing, 2000 ohms.

1.02 Maximum external circuit loop for supervision, 2750 ohms.

1.03 When this circuit is used with the test desk the maximum earth potential is as follows: For 1100 ohms maximum conductor loop, ±20 volts; 1500 ohms maximum conductor loop, +15 volts -20 volts; maximum conductor loop 2000 ohms, +9 volts -20 volts.

1.04 K relay:

Earth Potential Difference	Max Ext Fig. 4	Ckt Res Fig. 5
0 volt	1900 ohms	2800 ohms
-10 volts	1300 ohms	1650 ohms
-20 volts	700 ohms	500 ohms

2. FUNCTIONAL DESIGNATIONS

None.

3. FUNCTIONS

3.01 When used by test desk or for verification service:

(a) To connect to any desired test connector circuit.

(b) To cut in on the first terminal of specified levels when Fig. 2 is used.

(c) To repeat pulses from the originating end to the test connector with which it connects.

(d) To give a busy tone and a reversal to the originating end if the test connector is busy.

(e) To give a reversal only, and cut through, if the called line is busy.

(f) To hold switches used in establishing the connection in their operated positions.

(g) When used with the test desk to establish a through circuit for testing through the test connector to the called line with all central office equipment removed.

(h) To return to normal.

(i) To connect from an A operator through a local selector for verification service.

(j) When used as in (i) with certain trunks, normally connecting to a connector and requiring low resistance (200 ohms) battery and ground for proper supervision to cut out compensating resistors when a reversal is given.

(k) To function with battery ground pulsing trunks or repeaters when Fig. E is used.

(ℓ) To connect to a local test cabinet No. 3, test distributor control circuit, test trunk ringing circuit, or test distributor control and test trunk ringing circuit.

3.02 When used for line insulation testing:

(a) To connect to any desired test connector circuit.

(b) To provide direct connections through test connector circuits to the tip, ring, and sleeve of subscriber line circuits.

(c) To repeat pulses from a control circuit in a distant building to the test connector with which it connects.

(d) To give a reversal to a control circuit in a distant building if the test connector is busy.

(e) To hold switches used in establishing the connection when the control circuit is in a distant building.

(f) To provide a direct connection from a control circuit in the same building to the control leads (line tip, line ring, and line sleeve) of a test connector.

(g) To advance to an adjacent terminal on the same level without first being released when control circuit is in the same building.

(h) To skip certain working terminals when LIT control circuit is in a distant building.

(i) To open the test tip and ring leads while an LIT control circuit in a distant building is stepping the test connector.

4. CONNECTING CIRCUITS

4.01 When this circuit is listed on a key-sheet, the connecting information thereon is to be followed. The following circuits are typical:

(a) Outgoing Trunk From Toll Switchboard No. 3 or Switchboard No. 11 Toll Positions - SD-55346-01.

(b) Outgoing Trunk From D.S.A. Switchboard - SD-31654-01.

(c) Local Selector - SD-30200-01.

(d) Test Distributor Control Circuit - SD-31401-01.

(e) Test Circuit - Local Test Cabinet No. 3 - SD-96181-01.

(f) Test Line Circuit at Local Test Desk - ES-254582 - SD-31400-01.

(g) Test Distribution Selector Circuit - ES-30241-01.

(h) Miscellaneous Bank Multiple Circuit - SD-32129-01.

(i) Selector Bank Multiple Circuit - SD-32123-01.

(j) Test Trunk Ringing Circuit - SD-31237-01.

(k) Miscellaneous Alarm Circuit - SD-32048-01.

(ℓ) Power Ringing Circuit - SD-80780-01.

(m) Miscellaneous Tone Circuit - SD-31521-01.

(n) Line Insulation Test Control Circuit - SD-32219-01.

(o) AMA Sender, Identifier, and Transverter Test Circuit - SD-32208-01.

(p) AMA Line Verification Circuit - SD-32231-01.

(q) Line Load Arranged for Remote Control and Supervision of Line Load - SD-32108-01.

(r) ANI Line Verification Circuit - SD-32246-01.

SECTION IV - REASONS FOR REISSUE

D. Description of Changes

D.1 Option ZG is rated Mfr Disc. and is replaced by option ZH to bring the operating path of OTP in Fig. 6 through a make contact of K relay in Fig. 5 instead of directly to the winding of Z relay. The removal of option ZG eliminates the false operation of Z on type A operation.

D.2 Reference to option ZG is removed from Note 102 and reference to ZH is added.

D.3 Reference to option ZH is added to Note 103 and Options Used Table.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5641-MKD-RMW