INCOMING TRUNK TEST AND CONNECTOR FRAMES SD-25161-01

CROSS-CONNECTIONS

NO. 1 CROSSBAR OFFICES

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FIGURES

1. GENERAL

1.01 This section describes the method of making cross-connections on the incoming trunk test frame, incoming trunk test connector frame, ▶and miscellaneous relay rack.◀ Information is also included in this section regarding the functions of the various cross-connections.

1.02 This section is reissued for the following reasons:

(a) To add incoming trunk test connector frame cross-connection information for punchings CPT, RCP, and RCPT.

(b) To add incoming trunk test frame cross-connection information associated with the following features:

(1) Revertive pulsing ESS trunks.

(2) Panel call indicator pulsing trunks.

(3) Office selector tandem trunks

(4) Trunks requiring automatic number identification

(5) Traffic service position 0+ trunks.

(6) Trunks divided into eight administrative groups.

(c) To add miscellaneous relay rack equipment cross-connection information associated with 7-digit, 5-digit, and non-Standard codes.

(d) To delete reference to dial pulse incoming trunks—not required in No. 1 Crossbar.

(e) To change Table W to Table X and add new Table W for ESS revertive incoming trunks.

(f) To revise Fig. 1 and 3 and to add Fig. 4, 5, 6 and 7.

(g) To add Table of Contents.

(h) To generally update section.

1.03 Cross-connections are required on ▶three◀ frames: the incoming trunk test connector frame, the incoming trunk test frame, ▶and the miscellaneous relay rack.◀ The connector frame cross-connections supply information on the type of tests to be made. The test frame cross-connections supply the various compensating resistances for testing panel and crossbar incoming trunks and the various signals required for multifrequency and ▶panel call indicator pulsing trunks. The miscellaneous relay rack equipment cross-connections

supply information required to establish non-Standard test and busy line codes.◀

A. Incoming Trunk Test Connector Frames

1.04 Each bay of the incoming trunk test connector frame is arranged to mount five incoming trunk test connector units. Each of these units is made up of a connector (a 200-point crossbar switch), connector cut-in relays, and the associated terminal strips. By the operation of a group of cut-in relays selected by a group switch (206-type selector), a connector is associated with the test circuit. Each set of crosspoints of the connector switch gives access to a trunk location on the office link frame and has an individual D lead wired to a terminal strip located directly above the connector switch. The D punchings are cross-connected to G, VT, PT, CP, ▶CPT, RCP, RCPT,◀ or RI-RI1 punchings so that the test frame can recognize the treatment required by each crosspoint as it is closed. The A, A1 punchings are associated with like numbered RI, RI1 punchings and are cross-connected to G punchings. These cross-connections are described in 4.01 through ▶4.09.◀

1.05 The terminal strip for the D leads extends across the bay and has three rows of 100 punchings in a row, the terminal numbering appearing at the bottom of the terminal strip (Fig. 1). The lower two rows, used for the termination of the D lead, are numbered D-0 through D-199 corresponding to the individual trunk terminals of the office link frames. The RI, RI1, A, and A1 punchings are located on the row above the D punchings.

1.06 The terminal strip to which the G leads are wired is located above the terminal strip to which the D leads are wired and has ▶five◀ rows of punchings vertically and 100 punchings in a row horizontally (Fig. 1). The punching numbers appear at the bottom of the strip and the rows are designated G, VT, CP, ▶CPT, PT, RCP, and RCPT◀ reading from the bottom up. All the ▶VT, CP, CPT, PT, RCP, and RCPT◀ punchings are strapped together to facilitate cross-connection by providing a greater number of connecting points. The G punchings may be multipled in pairs for 30 of 50 G leads or left unmultipled for 100 G leads (depending on the number of G relays provided).

1.07 For circuits installed in accordance with ED-26829-01 punchings 0 on blocks (L OPR, P) (L NON OPR RI, TD) (L NON OPR) (A NON OPR, SP) (A OPR, 3D4) (TF-XB, 5D) and (TL) are associated with 0 class relay G or DM. Similarly, punchings 1 to 99 on the above blocks are associated with class relays 1 to 99 G or DM, respectively. For circuits installed in accordance with ED-25275-01 punchings 0 blocks (L OPR) (L NON OPR RI) (L NON OPR) (A NON OPR) (A OPR) (XB) (TL) and (TF) are associated with No. 0 class relay G. Similarly punchings 1 to 69 on the above blocks are associated with class relays 1 to 69, respectively.

B. Incoming Trunk Test Frame

1.08 The class relays (G for revertive pulsing and DM for multifrequency ▶or panel call indicator◀ pulsing) are operated over the terminal "D" to terminal "G" cross-connection when the connector switch crosspoints are closed. An operated G relay cuts in compensating resistances to apply test conditions to the A and L relays as described in ▶5.12 through 5.23◀ for revertive pulsing trunks. The value of the compensating resistance required for any trunk is obtained by means of cross-connections at the top of the test frame (Fig. 2 and 3) as determined from the information in Tables A through X. In computing the various conditions, the conductor insulation leakage has been neglected since it is assumed to be zero. An operated DM relay closes the path to various other relays which in turn provide the proper signals required for the multifrequency or ▶panel call indicator◀ pulse trunks.

C. ▶Miscellaneous Relay Rack Equipment

1.09 The cross-connection punchings used to establish the 7-digit, 5-digit, and non-Standard test codes are located on the miscellaneous relay rack. Also located on this frame are the auxiliary class relays ADM which select and supplement the DM class relays. The inclusion or exclusion of an ADM relay for trunk group under test is cross-connectable under control of the GA, GB, GX, and GY punchings. When an ADM relay is not used, no other cross-connection, with the exception of GA and GB, is required at the miscellaneous relay rack. If, however, the ADM relay is used, additional cross-connections, supplementing GA to GX and GB to GY, are required for the purpose of modifying the outpulsing code associated with the selected DM class relay. The various cross-connection punchings located on the miscellaneous relay rack are described in 9.01 through 9.09 and are shown in Fig. 4 and 5.◀

2. APPARATUS

2.01 Tools and materials as required for connecting and soldering cross-connections.

2.02 R-2291 short nose skinning pliers (for type K wire).

2.03 Where solderless terminals are to be connected, see Sections 069-132-811 and 069-133-801.

2.04 The following 24 gauge type K cross-connection wire, as required, for terminals ***not*** arranged for solderless wrapping.

(a) White (P46B086)

(b) Black (P365817)

(c) Red (P46B089)

(d) Brown (P46A328)

(e) Green (P46A327).

2.05 The following 24 gauge type BU wire, as required, for terminals arranged for solderless wrapping:

(a) White (P46A565)

(b) Black (P46A567)

(c) Red (P46A566)

(d) Brown (P46A563)

(e) Green (P46A562).

2.06 24 gauge bare strap wire (P46A344), as required.

2.07 22 gauge type J sleeved strap wire (P26991).

3. PREPARATION

3.01 In preparing the cross-connection assignments for the G relays, it is necessary to determine:

(a) The type of incoming trunk test line (synchronizing or nonsynchronizing). Nonsynchronizing test lines are used only in certain panel ground cutoff offices.

(b) The type of incoming trunk (see tables in Part 6).

(c) Conductor loop resistance (except where an E-type signaling circuit is employed).

(d) Incoming selector compensating resistance (except where an E-type signaling circuit is employed).

(e) ◗Trunk grouping, if provided (two or eight administrative test groups).

(f) Type of office selector tandem trunk (repeating or nonrepeating).◖

3.02 In preparing the cross-connection assignments for the DM relays, it is necessary to determine:

(a) Type of pulsing (MF or ◗PCI).◖

(b) Number of digits required.

(c) Type of start signal (delay dial or wink).

(d) Test line code.

(e) Busy line code.

(f) ◗ANI X digit or◖ 5-digit trunk office indicating digit (0 to 9).

(g) Repeated supervision (required or not required).

(h) Test line (synchronous, nonsynchronous, or rering).

(i) ◗ANI feature (required or not required).

(j) PCI loop compensation resistance.

(k) TSP 0+ trunk test feature (required or not required).

(l) Trunk grouping, if provided (two or eight administrative test groups).

3.03 In preparing the cross-connection assignments for the ADM relays, it is necessary to determine:

(a) Test line code.

(b) Busy line code.

(c) Number of digits required.

(d) 5-digit trunk office indicating digit (0 to 9).

(e) Construction of 7-digit code—3-digit prefix code and associated ABC_ relay.

4-digit Standard or non-Standard test and busy line codes and associated COD_ relays.◀

3.04 The color code of the wire required for cross-connections to the following punching is:

A. Test Frame Cross-Connections

(a) Revertive Pulsing

L OPR	Green
L NON OPR RI	Brown
L NON OPR	Black
A OPR	Red
A NON OPR	White
TL	Green
TF-XB	White
CTG RELS	White
ATY	▶White
BTY	Black
CTY	White
DTY	Black
ETY	White
FTY	Black
GTY	White
HTY	Black◀

(b) ▶PCI◀ and MF Pulsing

P	Red
SP	Brown
TD	White
TL	Red
3D4	Black
5D	Brown
DC0-9 to TU0-9	Black
DC0-9 to TH,H,T,U	Brown
ATY	White
BTY	Black
CTY	▶White
DTY	Black
ETY	White
FTY	Black
GTY	White
HTY	Black◀
PEM	Green

B. Test Connector Frame Cross-Connections

G	White
VT	Black
CP	Red
CPT	▶Red
RCP	Green
RCPT	Green
RI and RI1	White◀
PT	Brown

C. ▶Miscellaneous Relay Rack Equipment Cross-Connections

GA to GB	White

GA to GX	Black
GB to GY	Brown
OF to ABC	Red
OF to OI	Green
CD to NS	White
DC to A,B,C	Black
DC to TL(D-G)	Brown
DC to BL(D-G)	Red
BLD to SKP	Green◀

4. INCOMING TRUNK TEST CONNECTOR FRAME CROSS-CONNECTIONS

A. D Punching

4.01 All D punchings are cross-connected to a G, VT, PT, CP, ▶CPT, RCP, RCPT,◀ RI, or RI1 punching.

▶*Note:* To avoid unnecessary test frame blockage, all D punchings must be cross-connected. This is especially important when automatic start feature is in use or when testing is under control of the remote office test line (ROTL) circuit.◀

B. G Punching

4.02 The D punchings of revertive pulsing trunks are cross-connected to G punchings of class relays G which introduce the test margins required by the associated trunk. The D punchings of ▶MF or PCI◀ pulsing trunks are cross-connected to the G punching of class relays DM which introduce the proper signals required by the trunk. When two or more incoming trunks require identical cross-connections, their D leads should be cross-connected to the same G leads, as shown in Fig. 1 for terminal G1.

C. VT Punching

4.03 Cross-connect the VT punching to the D punching of spare trunks located within a group of working trunks. The sleeve terminals (S1 leads) of these spare trunks are always grounded.

D. PT Punching

4.04 Cross-connect the PT punching to the D punching of trunks that are vacant and not within a group of working trunks, or trunks that ▶test frame is not arranged to test.◀

E. CP Punching

4.05 ▶When continuity and polarity test provides the only means of testing, cross-connect the CP punching to the D punching of trunks with normal polarity in their idle state (battery on tip and ground on ring). These trunk types fall into the following categories:

(a) Attendant trunks

(b) Those trunks which cannot be directed to a test line

(c) Those trunks which require the use of special test equipment not included in this test frame.

F. CPT Punching

4.06 When continuity and polarity test provides the only means of testing, cross-connect the CPT punching to the D punching of trunks with an audible tone signal and with normal polarity in their idle state (battery on tip and ground on ring). These trunk types fall into the following categories:

(a) Overflow or reorder trunks.

(b) 60 IPM tone busy.

(c) Voice announcement trunks.

G. RCP Punching

4.07 When continuity and polarity test provides the only means of testing, cross-connect the RCP punching to the D punching of trunks with normally reversed polarity in their idle state (battery on ring and ground on tip). These trunk types fall into the following categories:

(a) TX trunks

(b) Delay dial trunks that may not be directed to a test line

(c) Trunks to a local test desk

(d) Certain 911 emergency trunks.

H. RCPT Punching

4.08 When continuity and polarity test provides the only means of testing, cross-connect the RCPT punching to the D punching of trunks with an audible tone signal and with normally reversed polarity in their idle state (battery on ring and ground on tip). Permanent signal trunks fall into this category.◀

I. RI, RI1, A, and A1 Punchings

4.09 When RI and A punchings are furnished at the test connector frame, cross-connect the D punching for the crosspoint of the connector switch associated with repeating incoming selectors to an RI-0 through RI-9 or RI1-0 through RI1-9 punching, and cross-connect the corresponding A-0 through A-9 or A1-0 through A1-9 punching to the G punching of the class relay assigned for the repeating incoming trunk group. These cross-connections are shown in Fig. 1 for the D22, D23, ▶G5, and G7◀ punchings.

5. INCOMING TRUNK TEST FRAME CROSS-CONNECTIONS FOR REVERTIVE PULSING TRUNKS

A. TL and TL Punchings

5.01 When a particular class relay has access to a nonsynchronous test line, and when ▶BB7A◀ and 217H terminal strips are furnished, cross-connect TL punching of the class relay involved to the TL punching located in the same block with the TF, XB, and RI punchings. This cross-connection is shown in Fig. 3 for class relay ▶G65.◀

5.02 When 217D and 217F terminal strips are furnished, cross-connect one of the TL punchings located on the top row of terminals at the right-hand side from the front of the block designated TL to the TL punching of the class relay involved. The class relay TL punchings are located in the lower portion of terminal strip TL. This cross-connection is shown in Fig. 2 for class relay G61.

▶***Note:*** Since synchronous test lines provide a much more complete trunk test, the use of nonsynchronous test lines is not recommended when synchronous test lines are available.◀

B. TL and STL Punchings

5.03 When a particular class relay has access to a synchronous test line two digit code and when BB7A and 217H terminal strips are furnished, cross-connect TL punching of the class relay involved to the STL punching located in the same block with the TF, XB, and RI punchings. This cross-connection is shown in Fig. 3 for class relay ▶G67.◀

C. TF-XB and TF Punchings

5.04 This cross-connection is required when the trunk group associated with a particular class relay consists of 24-volt trunks. When ▶BB7A◀ and 217H terminal strips are furnished, cross-connect punching TF-XB of the class relay involved to the TF punching, as shown in Fig. 3 for relay G60.

5.05 When 217D and 217F terminal strips are furnished, cross-connect one of the TF punchings located on the top row of terminals, left-hand side facing the front of block designated TF, to the TF punching of the class relay involved. The class relay TF punchings are located in the lower portion of terminal strip TF. This cross-connection is shown in Fig. 2 for class relay G61.

D. TF-XB and XB Punchings

5.06 This cross-connection is required when the trunk group associated with a particular class relay consists of crossbar trunks ▶working over any type facilities and panel trunks working over carrier facilities.◀ When BB7A and 217H terminal strips are furnished, cross-connect punching TF-XB of the class relay involved to punching XB, as shown in Fig. 3 for class relay G61.

5.07 When 217D and 217F terminal strips are furnished, cross-connect one of the XB punchings located on the top row of terminals at the left-hand side from the front of the block designated XB to the XB punching of the class relay involved. The class relay XB punchings are located in the lower portion of terminal strip XB. This cross-connection is shown in Fig. 2 for class relay G61.

E. ▶TF-XB and ESS Punchings

5.08 This cross-connection is required when the trunk group associated with a particular class relay consists of revertive pulse trunks to a No. 1 ESS Office. When BB7A terminal strips are furnished, cross-connect punching TF-XB of the class relay to the punching ESS, as shown in Fig. 3 for class relay G62.

F. TF-XB and R1 Punchings

5.09 This cross-connection is required when the trunk group associated with a particular class relay consists of repeating incoming trunk circuits. These trunks are either to a Panel or Crossbar Office and the trunk L-relay is across the tip and ring leads. When BB7A terminal strips are furnished, cross-connect punching TF-XB of the class relay to the punching RI, as shown in Fig. 3, for class relay G65.

G. TF-XB and OST or ROS Punchings

5.10 This cross-connection is required when the trunk group associated with a particular class relay consists of office selector tandem trunks. When BB7A terminal strips are furnished, cross-connect punching TF-XB of the class relay to either punching OST for nonrepeating incoming trunks or punching RST for repeating incoming trunks. These cross-connections are shown in Fig. 3 for class relays G64 and G63.◀

5.11 The TL, ▶STL, TF, XB, ESS, RI, OST and ROS◀ punchings are left unused when the conditions specified in 5.01 ▶through 5.10◀ are not present.

H. L Relay Operate Test (Panel, Crossbar, and ▶ESS◀ Trunks) L OPR and L OPR COMP RES Punchings

5.12 The test operate current for the L relays of the trunks served by a G relay is obtained by cross-connecting the L OPR punching of the G relay involved to the L OPR COMP RES punching obtained from the proper table. The lead from the contact of the G relay is wired to the terminal strip designated L OPR located at the top of the incoming trunk test frame. The leads from the resistors are wired to the terminal strip designated L OPR COMP RES located at the top of the frame. By cross-connecting the G relay punching (L OPR) to the punchings of the L OPR COMP RES terminal strip as indicated in the table, the resistance added by the cross-connection plus the cable loop resistance will be near to, but not greater than, the maximum external circuit loop for selections shown on the incoming selector drawing. A sample cross-connection for class relay G61 is shown in Fig. 2 and 3.

5.13 When 217D and 217F terminal strips are furnished, the L OPR terminal strip is numbered from 0 through 49 or 0 through 69. The lead from the contact of the G relay is wired to the punching on this strip having the same designation number as the G relay. The punchings of the L OPR COMP RES terminal strip are numbered from 0 to 8 horizontally. Each row of punchings is multipled vertically in order to provide a greater number of connecting points.

5.14 In the case of Crossbar ▶or ESS◀ incoming trunks, the lead from the G relay punching (L OPR) is cross-connected to the 0 punching (0 resistance) on the L OPR COMP RES terminal strip where the cable resistance is more than 900 ohms. Where the cable resistance is less than 900 ohms, the resistance added by the test circuit plus the cable resistance should be near to, but not less than 900 ohms.

I. L Relay Operate Test (Trunks on Carrier Facilities) L OPR and L OPR COMP RES Punchings

5.15 Marginal test currents cannot be passed through carrier systems. To avert test frame blockage during L relay operate check of trunks working over carrier facilities, cross-connect the L OPR punching of the G relay to the L OPR COMP RES punching 0.◀

J. L Relay Nonoperate Test (Panel Incoming Selectors Only, Carrier Trunks Excluded) L NON OPR or L NON OPR RI and MISC COMP RES Punchings

5.16 The L NON OPR and L NON OPR RI terminal strips are numbered from 0 through 49, 0 through 69, or 0 through 99. The lead from the contact of the G relay is wired to the punching having the same number as the G relay. These punchings are cross-connected to punchings on the MISC COMP RES terminal strip as shown in Fig. 2 and 3 for class relays G61 and G63. The punchings of the MISC COMP RES terminal strip are numbered from 9 through 27 horizontally. ▶Terminal 28 is used to cancel L relay non-operate test. For incomings that function with final selectors that

"await sender" after units selections, the L NON OPR punching of the G class relay is cross-connected to terminal 28 in order to cancel L relay nonoperate test as shown in Fig. 3 for class relay G69.◀ Each vertical row of punchings is permanently strapped in order to provide a greater number of soldering points.

5.17 The test nonoperate current for the L relays of the trunks served by a G class relay is obtained by cross-connecting the G relay punching involved (L NON OPR or L NON OPR RI) to the MISC COMP RES punching obtained from the tables in Part 6. For incoming trunks and repeating incoming trunks which have external shunts around the L relay in the incoming advance position, or repeating incoming trunks with 280DG "L" relays, the lead from the contact of the G relay is wired to the terminal strip designated L NON OPR located at the top of the incoming trunk test frame. For other repeating incoming trunks, the lead from the contact of the G relay is wired to a terminal strip designated L NON OPR RI at the top of the incoming trunk test frame. The leads from the resistors are wired to the terminal strip designated MISC COMP RES located at the top of the frame. By cross-connecting the G relay punchings (L NON OPR or L NON OPR RI) to the punchings of the MISC COMP RES terminal strip as indicated in the table, the current through the L relay of the incoming will be near to, but not greater than, the test value shown on the incoming circuit drawing when the voltage is 50 volts.

K. A Relay Nonoperate Test (Crossbar ▶and ESS◀ Trunks and Panel Incoming Selectors with 24 Volts on A Relay) A NON OPR and MISC COMP RES Punchings

5.18 The test nonoperate current for the A relays of the trunks served by a G class relay is obtained by cross-connecting the A NON OPR punching of the G relay involved to the MISC COMP RES punching obtained from the proper table. The lead from the contact of the G relay is wired to the terminal strip designated A NON OPR located at the top of the incoming trunk test frame. By cross-connecting the G relay punching (A NON OPR) to the punchings of the MISC COMP RES terminal strip as indicated in the proper table, the current through the A relay will be near to, but not greater than, the test value shown on the incoming circuit drawing when the voltage is 25 volts for panel trunks and 50 volts for crossbar ▶and ESS◀ trunks. This cross-connection is shown in Fig. 2 and 3 for class relay G61.

5.19 The A NON OPR terminal strip is numbered from 0 through 49, 0 through 69, or 0 through 99. The lead from the contact of the G relay is wired to the punching on this strip having the same designation number as the G relay.

L. A Relay Nonoperate Test (Trunks on Carrier Facilities) A NON OPR and MISC COMP RES Punchings

5.20 Marginal test currents cannot be passed through carrier systems. To avert test frame blockage during A relay nonoperate check of trunks working over carrier facilities, cross-connect the A NON OPR punching of the G relay to the MISC COMP RES punching 27.◀

M. A Relay Operate Test (Panel, Crossbar, ▶and ESS◀ Trunks) A OPR and MISC COMP RES Punchings

5.21 The test operate current for the A relays of the group of trunks served by a G relay is obtained by cross-connecting the A OPR punching of the G relay involved to the MISC COMP RES punchings obtained from the proper table. The lead from the G relay is wired to the terminal strip designated A OPR located at the top of the incoming trunk test frame. The resistance added by the test circuit plus the cable resistance will be near to, but not greater than, the maximum external trunk supervisory loop shown on the incoming selector circuit drawing except where the incoming employs a B415 or B144 relay operating with 24 volts, in which case 500 ohms has been subtracted from the maximum external trunk supervisory loop. In the cases of Tables T and U, 1000 ohms have been subtracted from the maximum external trunk supervisory loop. This cross-connection is shown in Fig. 2 and 3 for class relay G61.

5.22 The A OPR terminal strip is numbered from 0 through 49, 0 through 69, or 0 through 99. The lead from the contact of the G relay is wired to punchings on this strip having the same designation number as the G relay.

N. ▶A Relay Operate Test (Trunks on Carrier Facilities) A OPR and MISC COMP RES Punchings

5.23 Marginal test currents cannot be passed through carrier systems. To avert test frame blockage during A relay operate check of trunks working over carrier facilities, cross-connect the A OPR punching of the G relay to MISC COMP RES punching 9.◀

O. Incoming Brush, Incoming Group, Final Brush, Final Tens, Final Units (Panel, Crossbar, ▶and ESS◀ Trunks) ▶TL-BL(0-9) and CTG(0-9) Punchings◀

5.24 By means of straps between the BL1 relay and the contacts of the counting relays, and BC1 relay and the contacts of the counting relays, the test circuit is arranged to direct the incoming trunk under test to a test line in the final multiple in panel offices, to a test line in the primary line switch multiple in Crossbar offices, ▶and to a test line in the service link network in ESS offices.◀ If a change in the location of the test line is to be made, it is necessary to make corresponding strapping changes between the BL1 relay and the counting relays or between the BC1 relay and the counting relays. The IB_1, IG_1, FB_1, FT_1, and FU_1 connections between the BL1 relay and the counting relays are used to direct the incoming trunk under test to a line normally made busy, whereas the IB, IG, FB, FT, and FU connections between the BC1 and BL1 relays and the counting relays are used to direct the incoming trunk under test to the test line.

5.25 The IB1, IG1, FB1, FT1, FU1, FT, and FU leads extend from the BL1 relay to the punchings 9, 8, 7, 6, 5, 1, and 0, respectively, on the terminal strip designated TL and BL. The IB, IG, and FB leads extend from the BC1 relay to punchings 4, 3, and 2, respectively, of the same terminal strip. The punchings in the TL and BL portion of the block are numbered from 0 through 9 horizontally. The contacts of the counting relays 0 through 9 are wired to punchings 0 through 9, respectively, in the row of terminals designated CR or CTG R located at the top of the frame.

5.26 If a change is to be made in the location of a test line which necessitates a change in the IB, IG, FB, etc, location, change the strap between the IB, IG, FB, etc, leads and the counting relays to introduce the proper counting relay. For example, if a change is made in the number of a test line requiring a change from IB_12, IG_14, FB_10 to IB_11, IG_12, FB_10, change the strap between punchings 9, 8, and 7, respectively, on the TL and BL terminal block and CR punchings 2, 4, and 0, respectively, so that the leads are run from the TL and BL punchings to CR punchings 1, 2, and 0, respectively.

Note: The following table shows telephone number and corresponding translation into IB, IG, FB, FT, and FU selections.

TRANSLATION OF TELEPHONE NUMBER INTO INCOMING BRUSH, INCOMING GROUP, FINAL BRUSH, *FINAL TENS, AND *FINAL UNITS

NUMBER	IB	IG	FB	NUMBER	IB	IG	FB
0000—0099	0	0	0	5000—5099	2	2	0
0100—0199	0	0	1	5100—5199	2	2	1
0200—0299	0	0	2	5200—5299	2	2	2
0300—0399	0	0	3	5300—5399	2	2	3
0400—0499	0	0	4	5400—5499	2	2	4
0500—0599	0	1	0	5500—5599	2	3	0
0600—0699	0	1	1	5600—5699	2	3	1
0700—0799	0	1	2	5700—5799	2	3	2
0800—0899	0	1	3	5800—5899	2	3	3
0900—0999	0	1	4	5900—5999	2	3	4
1000—1099	0	2	0	6000—6099	3	0	0
1100—1199	0	2	1	6100—6199	3	0	1
1200—1299	0	2	2	6200—6299	3	0	2
1300—1399	0	2	3	6300—6399	3	0	3
1400—1499	0	2	4	6400—6499	3	0	4
1500—1599	0	3	0	6500—6599	3	1	0
1600—1699	0	3	1	6600—6699	3	1	1
1700—1799	0	3	2	6700—6799	3	1	2
1800—1899	0	3	3	6800—6899	3	1	3
1900—1999	0	3	4	6900—6999	3	1	4
2000—2099	1	0	0	7000—7099	3	2	0
2100—2199	1	0	1	7100—7199	3	2	1
2200—2299	1	0	2	7200—7299	3	2	2
2300—2399	1	0	3	7300—7399	3	2	3
2400—2499	1	0	4	7400—7499	3	2	4
2500—2599	1	1	0	7500—7599	3	3	0
2600—2699	1	1	1	7600—7699	3	3	1
2700—2799	1	1	2	7700—7799	3	3	2
2800—2899	1	1	3	7800—7899	3	3	3
2900—2999	1	1	4	7900—7999	3	3	4
3000—3099	1	2	0	8000—8099	4	0	0
3100—3199	1	2	1	8100—8199	4	0	1
3200—3299	1	2	2	8200—8299	4	0	2
3300—3399	1	2	3	8200—8399	4	0	3
3400—3499	1	2	4	8400—8499	4	0	4
3500—3599	1	3	0	8500—8599	4	1	0
3600—3699	1	3	1	8600—8699	4	1	1
3700—3799	1	3	2	8700—8799	4	1	2
3800—3899	1	3	3	8800—8899	4	1	3
3900—3999	1	3	4	8900—8999	4	1	4
4000—4099	2	0	0	9000—9099	4	2	0
4100—4199	2	0	1	9100—9199	4	2	1
4200—4299	2	0	2	9200—9299	4	2	2
4300—4399	2	0	3	9300—9399	4	2	3
4400—4499	2	0	4	9400—9499	4	2	4
4500—4599	2	1	0	9500—9599	4	3	0
4600—4699	2	1	1	9600—9699	4	3	1
4700—4799	2	1	2	9700—9799	4	3	2
4800—4899	2	1	3	9800—9899	4	3	3
4900—4999	2	1	4	9900—9999	4	3	4

* The final tens and units correspond to the telephone number tens and units digits, respectively.

P. ▶Office Brush and Office Group (Office Selector Tandem Trunks) OBS, OGS, and CTG R Punchings

5.27 By means of straps between the STL relay and the contacts of the counting relays, the test circuit is arranged to direct the incoming trunk under test to a synchronous test line in Crossbar Tandem office. Only one test line code is available for cross-connection. If a change in the location of the test line is to be made, it is necessary to make corresponding strapping changes between the STL relay and the counting relays. Cross-connect both OBS and OGS punchings to CTG R punching 8 for code 88 as shown in Fig. 3.◀

6. TABLES

6.01 Tables A through ▶W◀ list the compensating resistance punchings required with particular conductor loop resistances for applying test values to the A and L relays which will test the trunks at their maximum range.

6.02 Table ▶X◀ lists the compensating resistance punchings required with particular conductor loop resistances for applying test values to the A and L relays which, in general, are less severe than those referred to in 6.01, but more severe than the service conditions encountered with the particular trunk loop involved. This table is intended for use where the number of G relays required by the use of Tables A through W is greater than those available and it has been determined that additional relays are not to be provided.

6.03 A code for each combination of cross-connections associated with a G relay entered on the G relay record will assist in determining if a G relay is already wired with the cross-connections required for a new assignment. A cross-connection code for each G relay may be obtained by inserting the table number in front of the alphabetical line designation of the punchings cross-connected and adding NS if the test line involved is nonsynchronous.

TABLE A

Incoming Selectors Equipped with L Relay E375 or E526

24 Volts on A Relay (Where CRT Specifies N.O. 0.0033 Amperes for A Relay when Functioning on a Supervisory Loop of 1920 Ohms)

CONDUCTOR *LOOP RES.	L OPR	L NOPR	A NOPR	A OPR
0-276	4	15	22	11
277-410	3	15	22	11
411-485	3	15	21	10
486-579	3	14	21	10
580-882	2	14	21	10
883-915	1	14	21	10
916-980	1	14	20	9
981-1185	1	13	20	9
1186-1300	0	13	20	9

*It will be satisfactory to use the above table based on a pulsing loop of 1488 ohms and a supervisory loop of 1920 ohms for those circuits for which the circuit specifies pulsing and supervisory loops of 1570 ohms and 1875 ohms, respectively.

TABLE B

Incoming Selectors Equipped with L Relay E375 or E526

24 Volts on A Relay (Where CRT Specifies N.O. 0.0038 Amperes After Soak for A Relay when Functioning on a Supervisory Loop of 2380 Ohms)

CONDUCTOR LOOP RES.	L OPR	L NOPR	A NOPR	A OPR
0-276	4	15	20	12
277-365	3	15	20	12
366-405	3	15	20	11
406-485	3	15	19	11
486-579	3	14	19	11
580-870	2	14	19	11
871-900	1	14	19	10
901-980	1	14	18	10
981-1185	1	13	18	10
1186-1300	0	13	18	10

TABLE C

Incoming Selectors Equipped with L Relay E526

24 Volts on A Relay (Where CRT Specifies N.O. 0.0033 Amperes for A Relay when Functioning on a Supervisory Loop of 2500 Ohms)

CONDUCTOR LOOP RES.	L OPR	L NOPR	A NOPR	A OPR
0-276	4	15	22	12
277-412	3	15	22	12
413-485	3	15	21	12
486-579	3	14	21	11
580-882	2	14	21	11
883-907	1	14	21	11
908-980	1	14	20	11
981-1185	1	13	20	10
1186-1300	0	13	20	10

TABLE D

Incoming Selectors Equipped with L Relay E526

24 Volts on A Relay (Where A Relay Functions on a Supervisory Loop of 2850 Ohms)

CONDUCTOR LOOP RES.	L OPR	L NOPR	A* NOPR	A OPR
0-276	4	15	27	12
277-485	3	15	27	11
486-579	3	14	27	11
580-791	2	14	27	11
792-882	2	14	27	10
883-980	1	14	27	10
981-1185	1	13	27	10
1186-1300	0	13	27	10

*There is no A NOPR value requirement for the 124F A relay. Resistance punching 27 is connected only to satisfy the test frame when making the rapid test to busy line as described in Section 216-277-501.

TABLE E

Incoming Selectors Equipped with L Relay E375 or E526

48 Volts on A Relay (Where A Relay Functions on a Supervisory Loop of 7540 Ohms)

CONDUCTOR LOOP RES.	L OPR	L NOPR	A OPR
0-276	4	15	23
277-470	3	15	23
471-485	3	15	22
486-579	3	14	22
580-882	2	14	22
883-980	1	14	21
981-1185	1	13	21
1186-1300	0	13	21

TABLE F

Incoming Selectors Equipped with L Relay E375 or E526

48 Volts on a A Relay (Where A Relay Functions on a Supervisory Loop of 5340 Ohms or 6350 Ohms)

CONDUCTOR LOOP RES.	L OPR	L NOPR	A OPR 6350-Ohm LOOP	A OPR 5340-Ohm LOOP
0-276	4	15	21	19
277-290	3	15	21	19
291-485	3	15	20	18
486-579	3	14	20	18
580-795	2	14	20	18
796-882	2	14	19	17
883-980	1	14	19	17
981-1185	1	13	19	17
1186-1300	0	13	19	17

TABLE G

Incoming Selectors Equipped with L Relay R638

24 Volts on A Relay (Where CRT Specifies N.O. 0.0033 Amperes for A Relay when Functioning on a Supervisory Loop of 1920 Ohms)

CONDUCTOR LOOP RES.	L OPR	L NOPR	A NOPR	A OPR
0-35	4	20	22	11
36-276	4	19	22	11
277-410	3	19	22	11
411-530	3	19	21	10
531-579	3	18	21	10
580-882	2	18	21	10
883-915	1	18	21	10
916-1025	1	18	20	9
1026-1185	1	17	20	9
1186-1300	0	17	20	9

TABLE H

Incoming Selectors Equipped with L Relay R638

24 Volts on A Relay (Where CRT Specifies N.O. 0.0038 Amperes After Soak for A Relay when Functioning on a Supervisory Loop of 2380 Ohms)

CONDUCTOR LOOP RES.	L OPR	L NOPR	A NOPR	A OPR
0-35	4	20	20	12
36-276	4	19	20	12
277-365	3	19	20	12
366-405	3	19	20	11
406-530	3	19	19	11
531-579	3	18	19	11
580-870	2	18	19	11
871-900	1	18	19	10
901-1025	1	18	18	10
1026-1185	1	17	18	10
1186-1300	0	17	18	10

TABLE I

Incoming Selectors Equipped with L Relay R638

48 Volts on A Relay (Where A Relay Functions on a Supervisory Loop of 7540 Ohms)

CONDUCTOR LOOP RES.	L OPR	L NOPR	A OPR
0-35	4	20	23
36-276	4	19	23
277-470	3	19	23
471-530	3	19	22
531-579	3	18	22
580-882	2	18	22
883-975	1	18	22
976-1025	1	18	21
1026-1185	1	17	21
1186-1300	0	17	21

TABLE J

Incoming Selectors Equipped with L Relay R638

48 Volts on A Relay (Where A Relay Functions on a Supervisory Loop of 5340 Ohms or 6350 Ohms

CONDUCTOR LOOP RES.	L OPR	L NOPR	A OPR 6350-Ohm Loop	A OPR 5340-Ohm Loop
0-35	4	20	21	19
36-276	4	19	21	19
277-290	3	19	21	19
291-530	3	19	20	18
531-579	3	18	20	18
580-795	2	18	20	18
796-882	2	18	19	17
883-1025	1	18	19	17
1026-1185	1	17	19	17
1186-1300	0	17	19	17

TABLE K

Repeater Incoming Selectors — Without Shunt at Incoming Advance (Where A Relay Functions at a Supervisory Loop of 6080 Ohms)

CONDUCTOR LOOP RES.	COMP. RES. IN INC. SEL.	L OPR	L NOPR RI	A OPR
0-20	600	5	12	21
21-55	600	5	12	20
56-70	600	4	12	20
0-20	500	5	13	21
21-96	500	5	13	20
97-160	500	5	12	20
161-375	500	4	12	20
0-20	300	5	13	21
21-286	300	5	13	20
287-370	300	5	12	20
300-525	0	5	13	20
526-571	0	5	13	19
572-685	0	5	12	19
686-988	0	4	12	19
989-1030	0	3	12	19
1031-1066	0	3	12	18
1067-1291	0	3	11	18
1292-1535	0	2	11	18
1536-1561	0	2	11	17
1562-1594	0	2	10	17
1595-1897	0	1	10	17
1898-2015	0	0	10	17

TABLE L

Repeater Incoming Selectors — Without Shunt at Incoming Advance (Where A Relay Functions on a Supervisory Loop of 7540 Ohms)

CONDUCTOR LOOP RES.	COMP. RES. IN INC. SEL.	L OPR	L NOPR RI	A OPR
0-55	600	5	12	23
56-70	600	4	12	23
0-96	500	5	13	23
97-160	500	5	12	23
161-375	500	4	12	23
0-286	300	5	13	23
287-370	300	5	12	23
300-470	0	5	13	23
471-571	0	5	13	22
572-685	0	5	12	22
686-975	0	4	12	22
976-1066	0	3	12	21
1067-1291	0	3	11	21
1292-1480	0	2	11	21
1481-1561	0	2	11	20
1562-1594	0	2	10	20
1595-1897	0	1	10	20
1898-1985	0	0	10	20
1986-2015	0	0	10	19

TABLE M

Repeater Incoming Selectors — With Shunt at Incoming Advance or 280DG Relay (Where a Relay Functions on a Supervisory Loop of 6080 Ohms)

CONDUCTOR LOOP RES.	COMP. RES. IN INC. SEL.	L OPR	L NOPR	A OPR
0-20	600	5	21	21
21-55	600	5	21	20
56-70	600	4	21	20
0-20	500	5	21	21
21-160	500	5	21	20
161-308	500	4	21	20
0-20	300	5	21	21
21-370	300	5	21	20
300-525	0	5	21	20
526-685	0	5	21	19
686-783	0	4	21	19
784-988	0	4	20	19
989-1030	0	3	20	19
1031-1278	0	3	20	18
1279-1535	0	2	19	18
1536-1594	0	2	19	17
1595-1773	0	1	19	17
1774-1897	0	1	18	17
1898-2015	0	0	18	17

TABLE N

Repeater Incoming Selectors — With Shunt at Incoming Advance or 280DG Relay (Where A Relay Functions on a Supervisory Loop of 7540 Ohms)

CONDUCTOR LOOP RES.	COMP. RES. IN INC. SEL.	L OPR	L NOPR	A OPR
0-55	600	5	21	23
56-70	600	4	21	23
0-160	500	5	21	23
161-308	500	4	21	23
0-370	300	5	21	23
300-470	0	5	21	23
471-685	0	5	21	22
686-783	0	4	21	22
784-975	0	4	20	22
976-1278	0	3	20	21
1279-1480	0	2	19	21
1481-1594	0	2	19	20
1595-1773	0	1	19	20
1774-1897	0	1	18	20
1898-1985	0	0	18	20
1986-2015	0	0	18	19

TABLE O

Battery Cutoff Incoming Selectors Using R Type L Relay

CONDUCTOR LOOP RES.	COMP. RES. IN INC. SEL.	L OPR	L NOPR	A OPR
0-104	900	2	17	21
105-252	900	1	17	20
253-415	900	1	16	20
0-104	600	3	17	21
105-124	600	3	17	20
125-252	600	2	17	20
253-427	600	2	16	20
428-609	600	1	16	20
0-104	300	4	17	21
105-136	300	4	17	20
137-252	300	3	17	20
253-439	300	3	16	20
440-609	300	2	16	20
610-745	300	2	16	19
746-1045	300	1	15	19
300-451	0	4	16	20
452-609	0	3	16	20
610-747	0	3	16	19
748-1057	0	2	15	19
1058-1114	0	1	15	19
1115-1242	0	1	15	18
1243-1360	0	1	14	18
1361-1619	0	0	14	18
1620-1640	0	0	14	17

TABLE P

Battery Cutoff Incoming Selectors Using N3 L and N6 L Relays

CONDUCTOR LOOP RES.	COMP. RES. IN INC. SEL.	L OPR	L NOPR	A OPR
0-47	900	5	18	21
48-104	900	5	17	21
105-266	900	5	17	20
267-300	900	4	17	20
0-47	600	6	18	21
48-104	600	6	17	21
105-177	600	6	17	20
178-542	600	5	17	20
543-581	600	5	16	20
582-600	600	4	16	20
0-47	300	7	18	21
48-104	300	7	17	21
105-247	300	7	17	20
248-542	300	6	17	20
543-629	300	6	16	20
630-651	300	6	16	19
652-900	300	5	16	19
300-542	0	6	17	20
543-609	0	6	16	20
610-799	0	6	16	19
800-1037	0	5	16	19
1038-1114	0	5	15	19
1115-1203	0	5	15	18
1204-1506	0	4	15	18
1507-1532	0	3	15	18
1533-1619	0	3	14	18
1620-1809	0	3	14	17
1810-2027	0	2	14	17
2028-2112	0	2	13	17
2113-2415	0	1	13	16
2416-2522	0	0	13	16
2523-2629	0	0	12	16
2630-2700	0	0	12	15

TABLE Q

Battery Cutoff Incoming Selectors Using N5 L Relay

CONDUCTOR LOOP RES.	COMP. RES. IN INC. SEL.	L OPR	L NOPR	A OPR
0-104	900	6	18	21
105-300	900	6	18	20
0-104	600	7	19	21
105-200	600	7	19	20
201-255	600	7	19	20
256-600	600	6	18	20
0-60	300	8	20	21
61-104	300	7	19	21
105-500	300	7	19	20
501-555	300	7	19	20
556-629	300	7	18	20
630-900	300	6	18	19
300-360	0	8	20	20
361-609	0	7	19	20
610-800	0	7	19	19
801-855	0	7	19	19
856-1114	0	6	18	19
1115-1200	0	6	18	18
1201-1350	0	6	18	18
1351-1550	0	5	17	18
1551-1619	0	5	17	18
1620-1845	0	4	17	17
1846-2112	0	3	16	17
2113-2200	0	3	16	16
2201-2340	0	3	16	16
2341-2500	0	2	15	16
2501-2629	0	2	15	16
2630-2700	0	1	15	15
2701-2800	0	1	15	15
2801-2835	0	1	15	15
2836-3200	0	0	14	14

TABLE R

Crossbar Incoming Trunks Using B Type A Relay

CONDUCTOR LOOP RES	L OPR	A NOPR	A OPR
0-195	3	27	22
196-305	3	27	21
306-602	2	27	21
603-700	1	27	21
701-899	1	27	20
900-1205	0	27	20
1206-1245	0	27	19
1246-1710	0	26	19
1711-1740	0	26	18
1741-2215	0	25	18
2216-2235	0	25	17
2236-2610	0	24	17

TABLE S

Crossbar Incoming Trunks Using S Type A Relay

CONDUCTOR LOOP RES	L OPR	A NOPR	A OPR
0-123	3	21	23
124-305	3	20	23
306-430	2	20	23
431-602	2	20	22
603-618	1	20	22
619-899	1	19	22
900-935	0	19	22
936-1113	0	19	21
1114-1440	0	18	21
1441-1608	0	18	20
1609-1945	0	17	20
1946-2103	0	17	19
2104-2450	0	16	19
2451-2598	0	16	18
2599-2900	0	15	18

TABLE T

Crossbar Incoming Trunks Using UA Type A Relay

CONDUCTOR LOOP RES	L OPR	A NOPR	A OPR
0-150	3	12	19
151-305	3	12	18
306-655	2	11	18
656-753	1	11	17
754-899	1	10	17
900-1160	0	10	17
1161-1248	0	10	16
1249-1665	0	9	16
1666-2170	0	9	15
2171-2675	0	9	14
2676-2900	0	9	13

TABLE U

Crossbar Incoming Trunks Using AJ8 A Relay

CONDUCTOR LOOP RES	L OPR	*A NOPR	A OPR
0-150	3	21	19
151-305	3	21	18
306-655	2	21	18
656-899	1	21	17
900-1160	0	21	17
1161-1665	0	21	16
1660-2170	0	21	15
2171-2675	0	21	14
2676-2900	0	21	13

*There is no A NOPR value requirement for the AJ8 A relay. Resistance punching 21 is connected only to satisfy the test frame when making the rapid test to busy line as described in Section 216-277-501.

TABLE V

Crossbar Incoming Trunk Using AJ29 A Relay

CONDUCTOR LOOP RES.	L OPR	*A NOPR	A OPR
0-150	3	21	19
151-305	3	21	18
306-655	2	21	18
656-899	1	21	17
900-1160	0	21	17
1161-1665	0	21	16
1666-2170	0	21	15
2171-2675	0	21	14
2676-2900	0	21	13
2901-3200	0	21	13

*There is no A NOPR value requirement for the AJ29 A relay. Resistance punching 21 is connected only to satisfy the test frame when making the rapid test to busy line as described in Section 216-277-501.

TABLE W

ESS REVERTIVE INCOMING TRUNKS

CONDUCTOR LOOP RES	L OPR	A NOPR	A OPR
0-299	3	21	14
300-499	2	21	14
500-599	2	21	13
600-899	1	21	13
900-999	0	21	13
1000-1499	0	21	12
1500-1999	0	21	11
2000-2499	0	21	10
2500-3000	0	21	9

*There is no A NOPR value requirement for the AJ8 A relay. Resistance punching 21 is connected only to satisfy the test frame when making the rapid test to busy line as described in Section 216-277-501.

TABLE X

CROSS-CONNECTIONS (SEE 6.02) USING BROAD TEST REQUIREMENTS

TYPE OF CIRCUIT	TRUNK RESIST. LOOP & COMP.	L OPR	L NOPR	A NOPR	A OPR
Panel — 24 Volts	0-579	3	20	22	10
on A Relay	580-882	2	18	21	10
	883-1185	1	17	21	9
	1186-1300	0	17	20	9
Panel — 48 Volts	0-579	3	20	—	18
Nonrepeating	580-882	2	18	—	17
Ground Cutoff	883-1185	1	18	—	17
	1186-1300	0	17	—	17
Panel — Repeating —	0-685	5	21	—	19
With Shunt or	686-1291	3	21	—	18
280DG Relay	1292-1897	1	19	—	17
	1898-2015	0	18	—	17
Panel — Repeating —	0-685	5	13*	—	19
Without Shunt	686-1291	3	12*	—	18
	1292-1897	1	11*	—	17
	1898-2015	0	10*	—	17
Panel — Battery	0-618	4	17	—	22
Cutoff Using	619-921	3	16	—	21
R Type L Relay	922-1224	2	15	—	20
	1225-1527	1	15	—	20
	1528-1640	0	14	—	20

TABLE X (Cont)

CROSS-CONNECTIONS (SEE 6.01) USING BROAD TEST REQUIREMENTS

TYPE OF CIRCUIT	TRUNK RESIST. LOOP & COMP.	L OPR	L NOPR	A NOPR	A OPR
Panel — Battery	0-618	4	17	—	22
Cutoff Using	619-921	3	16	—	21
N3 L Relay	922-1224	2	15	—	20
	1225-2582	1	15	—	20
	2583-2700	0	12	—	18
Crossbar Using	0-900	3	—	27	20
B Type A Relay	901-2610	0	—	27	17
Crossbar Using	0-900	3	—	21	22
S Type A Relay	901-2900	0	—	19	18
Crossbar Using	0-900	3	—	12	17
UA Type A Relay	901-2900	0	—	10	13
Crossbar Using	0-900	3	—	21**	17
AJ Type A Relay	901-2170	0	—	21**	15
	2171-2900	0	—	21**	13
	2901-3200	0	—	21**	13
Panel — Battery	0-609	7	20	—	22
Cutoff Using	610-1350	6	19	—	20
N5 L Relay	1351-1845	4	17	—	20
	1846-2629	2	16	—	18
	2630-3200	0	15	—	15
ESS Office	0-1000	3	—	21	13
	1001-2000	0	—	21	11
	2001-3000	0	—	21	9

*Use L NONOPR RI punchings.

**There is no A NOPR value requirement for the AJ8, AJ29 relay. Resistance punching 21 is connected only to satisfy the test circuit when making the rapid test to busy line as described in Section 216-277-501.

Note 1: Cross connect the TF punching when testing panel incoming selectors with 24 volts on the A relay.

Note 2: Cross connect the TL punching when testing to a nonsynchronizing test line.

Note 3: Cross connect the XB punching when testing crossbar incomings.

7. INCOMING TRUNK TEST FRAME CROSS-CONNECTIONS MF ▶OR PCI PULSING TRUNKS◀

A. P and MF or ▶CI Punchings◀

7.01 This cross-connection determines whether PCI or MF will be outpulsed. For MF outpulsing, cross-connect the pulsing punching P of the class relay involved to the MF punching as shown in Fig. 3 for class relay DM99. For ▶PCI◀ outpulsing, cross-connect the P punching to the CI punching as shown in Fig. 3 for class relay DM98.

B. ▶SP and CRA, CRB, or CRC Punchings

7.02 This cross-connection is required to provide additional resistance into the loop of PCI pulsing trunks so that a minimum of 900-ohms resistance may be maintained at all times. For the various values of compensation resistance to be added, cross-connect the SP punching as indicated below.◀

TRUNK LOOP RESISTANCE	CROSS-CONNECT SP PUNCHING OF CLASS RELAYS INVOLVED TO PUNCHING	CROSS-CONNECTION SHOWN IN FIG. 3 FOR CLASS RELAY
900 or more	none	—
600 to 900	CRA	DM 95
300 to 600	CRB	DM 96
0 to 300	CRC	DM 97

C. SP and DPL or WK Punchings

7.03 This cross-connection determines whether the test circuit will make a delay dial or wink start signal check on MF pulsing trunks associated with a particular class relay. For the two types of start pulse signal checks, cross connect the SP punchings as indicated below:

START PULSE SIGNAL CHECK	CROSS-CONNECT SP PUNCHING OF CLASS RELAYS INVOLVED TO PUNCHING	CROSS-CONNECTION SHOWN IN FIG. 3 FOR CLASS RELAY
Delay Dial	DPL	DM99
Wink	WK	DM98

D. ▶TD and ANI Punchings

7.04 This cross-connection is required when the trunks associated with a particular class relay require the automatic number identification (ANI) feature as provided by APP Fig. 66. Cross-connect punching TD of the class relay involved to punching ANI as shown in Fig. 3 for class relay DM98.◀

Number of Digits Dialed

E. 3-Digit Trunk Group with Rering Signal 3D4 and 3DR Punchings

7.05 This cross-connection is required when the trunks associated with a particular class relay require three digits with a rering signal. Cross-connect the 3D4 punching of the class relay involved to the 3DR punching as shown in Fig. 3 for class relay DM99.

F. 3-Digit Test Line Arranged for Rering Signal H, T, and U to DC0-9 Punchings

7.06 Cross-connect the 3DRR H, T, and U punchings to the DC0 to DC9 punchings in accordance with the 3-digit rering test line code. For example, if the test line code is 222, cross-connect H to DC2, T to DC2, and U to DC2 as shown in Fig. 3.

D. ▶TD and ANI Punchings◀

7.04 This cross-connection is required when the trunks associated with a particular class relay require the automatic number identification (ANI) feature as provided by APP Fig. 66. Cross-connect punching TD of the class relay involved to punching ANI as shown in Fig. 3 for class relay DM98.◀

Number of Digits Dialed

E. 3-Digit Trunk Group with Rering Signal 3D4 and 3DR Punchings

7.05 This cross-connection is required when the trunks associated with a particular class relay require three digits with a rering signal. Cross-connect the 3D4 punching of the class relay involved to the 3DR punching as shown in Fig. 3 for class relay DM99.

F. 3-Digit Test Line Arranged for Rering Signal H, T, and U to DC0-9 Punchings

7.06 Cross-connect the 3DRR H, T, and U punchings to the DC0 to DC9 punchings in accordance with the 3-digit rering test line code. For example, if the test line code is 222, cross-connect H to DC2, T to DC2, and U to DC2 as shown in Fig. 3.

G. 3-Digit Trunk Group Without Rering Signal 3D4 and 3DA or 3DB Punchings

7.07 This cross-connection is required when the trunks associated with a particular class relay require three digits and are not arranged for a rering signal. ▶This cross-connection may also be used for 0+ trunks to Crossbar Tandem TSP office instead of the normal 7-digit cross-connection required for ANI trunks.◀ Cross-connect the 3D4 punching to the 3DA punching for the first test line code as shown in Fig. 3 for class relay DM98. If another group of 3-digit nonrering trunks associated with another DM relay have access to a test line with a code different from that of the first test line, cross-connect the 3D4 punching of the second DM relay to punching 3DB as shown in Fig. 3 for class relay DM97.

H. 3-Digit Test Lines Not Arranged for a Rering Signal (3 DIG NON RR A and B) H, T, and U to DC0-9 Punchings

7.08 Cross-connect the (3 DIG NON RR A) H, T, and U punchings to the DC0 through DC9 punchings in accordance with the first 3-digit nonrering test line code. For example, if the first test line code is 543, cross-connect punchings H to DC5, T to DC4, and U to DC3 as shown in Fig. 3 for 3 DIG NON RR A. Similarly, cross-connect the (3 DIG NON RR B) H, T, and U punchings to the DC0 to DC9 punchings in accordance with the second 3-digit nonrering test line code if required. The cross-connections for a second test line code 333 are shown in Fig. 3 for 3 DIG NON RR B.

I. 4-Digit Trunk Group 3D4 and 4DA, 4DB, and 4DC Punchings

7.09 This cross-connection is required when the trunk group associated with a particular class relay is arranged for four digits. Cross-connect the 3D4 punching to the 4DA punching for the first combination of test line and busy line codes as shown in Fig. 3 for class relay DM96. If other groups of 4-digit trunks, each associated with a different DM relay, have access to test lines and busy lines having numbers different from those of the first test line and busy line combination, cross-connect the 3D4 punching of the second DM relay to the 4DB punching as shown in Fig. 3 for class relay DM95. Cross-connect the 3D4 punching of the third DM relay to the 4DC punching as shown in Fig. 3 for class relay DM94.

J. 4-Digit Test Lines and Busy Lines (4-5 DIG TL A,B,C and BL A,B,C) TH, H, T, and U to DC0-9 Punchings

7.10 Cross-connect the TH, H, T, and U punchings under 4-5 DIG TL-A to the DC0 through DC9 punchings in accordance with the test line code required. For example, if the first test line code is 9972, cross-connect punchings TH and H to DC9, T to DC7, and U to DC2 as shown in Fig. 3. Also, cross-connect the TH, H, T, and U punchings under 4-5 DIG BL-A to the DC0 through DC9 punchings. For example, if the busy line code is 9970, cross-connect punchings TH and H to DC9, T to DC7, and U to DC0 as shown in Fig. 3.

K. 5-Digit Trunk Group 5D and 5D CONT(0-9) Punchings

7.11 This cross-connection is required when the trunk group associated with a particular class relay is arranged for five digits, four line-number digits (TH, H, T, and U digits) and one office indicating digit (▶OI◀ digit). This test circuit is arranged to provide for 0 through 9 different ▶OI digit selections.◀ Cross-connect the 5D punching of the associated class relay to the 5D CONT-0 punching for the first 5-digit ▶OI0 relay,◀ to the 5D CONT-1 punching for the second, or to 5D CONT-9 for the tenth 5-digit ▶OI9◀ relay. The cross-connection for a 5-digit trunk group is shown in Fig. 3 for class relay DM97.

Note 1: The OI0 or OI1 relay is required for selecting the ANI X digit when testing trunk groups with automatic number identification feature.

Note 2: The use of an auxiliary class relay ADM renders punchings 5D and 5D CONT ineffective and transfers control for selection of the OI relays to punchings OF and OI (see 9.04).

L. 5-Digit Test Lines and Busy Lines TU(0-9) and DC(0-9) Punchings

7.12 An operated OI(0-9) relay cuts in the path to a like numbered TU(0-9) punching which provides the necessary cross-connection to determine the terminating unit to be selected. Depending on the digit selection desired, cross-connect punching TU0 for the first, TU1 for the second, or TU9 for the tenth 5-digit trunk group to punching DC(0-9). The cross-connection for punching TU2 to punching DC6 is shown in Fig. 3. In addition to the preceding cross-connections, other cross-connections should be established as described for 4-digit test and busy lines (see 7.09 and 7.10).

M. Synchronous or Nonsynchronous Test Line TL and NS Punchings

7.13 When a particular class relay is to be associated with a nonsynchronous test line, cross-connect punching TL of the class relay involved to punching NS as shown in Fig. 3 for class relay DM88. No cross-connection is required when test line is of the synchronous type.◀

N. CP1 and PEM Punchings

7.14 Cross-connect the CP1 punching to the PEM punching when trunks using repeated or converted supervision are to be tested for continuity reversal. The CP1 punching number corresponds to the number of the associated DM relay. The PEM punchings are common. ▶This cross-connection is shown in Fig. 6 and 7 for class relay DM 89.◀

8. ▶INCOMING TRUNK TEST FRAME CROSS-CONNECTIONS COMMON TO ALL TRUNKS

A. Two Administrative Trunk Groups TG and ATY or BTY Punchings

8.01 These cross-connections are required when trunks to be tested are divided into two groups for administrative purposes. For test purposes, group A may be isolated from group B by cross-connecting the TG punching of G or DM class relay for trunks in group A to an ATY punching. Similarly, the TG punching of each G or DM class relay for trunks in group B should be cross-connected to a BTY punching. Trunks so connected may be tested as a unit or as group A alone or group B alone. An example of these cross-connections is shown in Fig. 6 for class relays DM91 and G16.

B. Eight Administrative Trunk Groups TG and ATY, BTY, CTY, DTY, ETY, FTY, GTY or HTY Punchings

8.02 These cross-connections are required when trunks to be tested are divided into eight groups for administrative purposes. Groups A through H may be isolated from each other for test purposes by cross-connecting the TG punching of G or DM class relay for trunks in groups A through H to corresponding ATY through HTY punchings. Trunks so connected may be tested as a unit, individually by group or in combinations of up to four groups. An example of these cross-connections is shown in Fig. 7 for class relays DM91, DM82, DM73, G64, G55, G46, G37 and G28.

9. MISCELLANEOUS RELAY RACK EQUIPMENT CROSS-CONNECTIONS

A. Auxiliary Class Relays GA, GB, GX and GB Punchings

9.01 When a 7-digit, 5-digit, or non-standard code is required, an auxiliary class ADM relay is

used to select a DM class relay and modify the outpulsed code associated with that DM relay. The operation of the ADM relay requires a cross-connection between punching GA, which is hard wired to a like-numbered G punching located on the ITTC frame, and punching GX, which is connected to the winding of the selected ADM relay. This cross-connection (GA to GX) is shown in Fig. 4 for auxiliary class relays ADM97 and 98. To select a DM class relay, cross-connect punching GY to punching GB as shown in Fig. 4 for auxiliary class relays ADM97 and 98.

9.02 If auxiliary class information is not required, then punching GA is cross-connected to punching GB, thereby bypassing the ADM relay. This cross-connection (GA to GB) is shown in Fig. 4 for class relay G60.

B. 7-Digit Trunk Group OF and ABC Punchings

9.03 This cross-connection is required when the trunk group associated with a particular auxiliary class relay is arranged for seven digits. Cross-connect punching OF of the auxiliary class relay involved to punching ABC as shown in Fig. 4 for auxiliary class relay ADM98. The seven-digit number is composed of three prefix code digits (see 9.09) and either four Standard line-number digits (see 7.09 and 7.10) or four non-Standard line-number digits (see 9.05 and 9.06).

C. 5-Digit Trunk Group OF and OI Punchings

9.04 This cross-connection is required when the trunk group associated with a particular auxiliary class relay is arranged for five digits. Cross-connect punching OF of the auxiliary class relay involved to punching OI(0-9) as shown in Fig. 4 for auxiliary class relay ADM97. The five-digit number is composed of one office indicating digit (see 7.11 and 7.12) and either four Standard line-number digits (see 7.09 and 7.10) or four non-Standard line-number digits (see 9.05 and 9.06).

D. Non-Standard Codes CD and NS Punchings

9.05 This cross-connection is required when the trunk group associated with a particular auxiliary class relay is arranged for a non-Standard test or busy line-number. Cross-connect punching CD of the auxiliary class relay involved to punching NS as shown in Fig. 4 for auxiliary class relays ADM97 and 98. Punching NS selects a COD _ relay which furnishes cut-in contacts for the four non-Standard line-number punchings TL(D-G) or BL(D-G).

E. Non-Standard 4-Digit Test Lines and Busy Lines TL(D-G) or BL(D-G) and DC(0-9) Punchings

9.06 Cross-connect the TLD, TLE, TLF, and TLG punchings associated with a particular COD _ relay to the DC0 through DC9 punchings in accordance with the test line-number required. For example, if the test line-number is 2211, cross-connect punchings TLD to DC2, TLE to DC2, TLF to DC1, and TLG to DC1, as shown in Fig. 5, for the COD1 relay. Also, cross-connect the BLD, BLE, BLF, and BLG punchings associated with a particular COD _ relay to the DC0 through DC9 punchings in accordance with the busy line-number required. For example, if busy line-number is 4433, cross-connect punchings BLD to DC4, BLE to DC4, BLF to DC3, and BLG to DC3, as shown in Fig. 5, for the COD18 relay.

F. Non-Standard 3-Digit Test Line Codes with Rering BLD to SKP and TL(E-G) to DC(0-9) Punchings

9.07 These cross-connections are required when the trunks are associated with a non-Standard 3-digit test line code arranged with rering signal feature. Cross-connect punchings BLD to SKP, TLE to DC4, TLF to DC3, and TLG to DC3 as shown in Fig. 5 for the COD 15 relay.

Note: A cross-connection between punchings 3D4 and 3DR is also required (see 7.05).

G. Non-Standard 3-Digit Test Line Codes Without Rering BLD to SKP and TL(E-G) to DC(0-9) Punchings

9.08 These cross-connections are required when the trunks are associated with a non-Standard 3-digit test line code arranged without rering signal feature. Cross-connect punchings BLD to SKP, TLE to DC2, TLF to DC2, and TLG to DC2 as shown in Fig. 5 for the COD 7 relay.

Note: A cross-connection between punchings 3D4 and 3DA is also required (see 7.07).

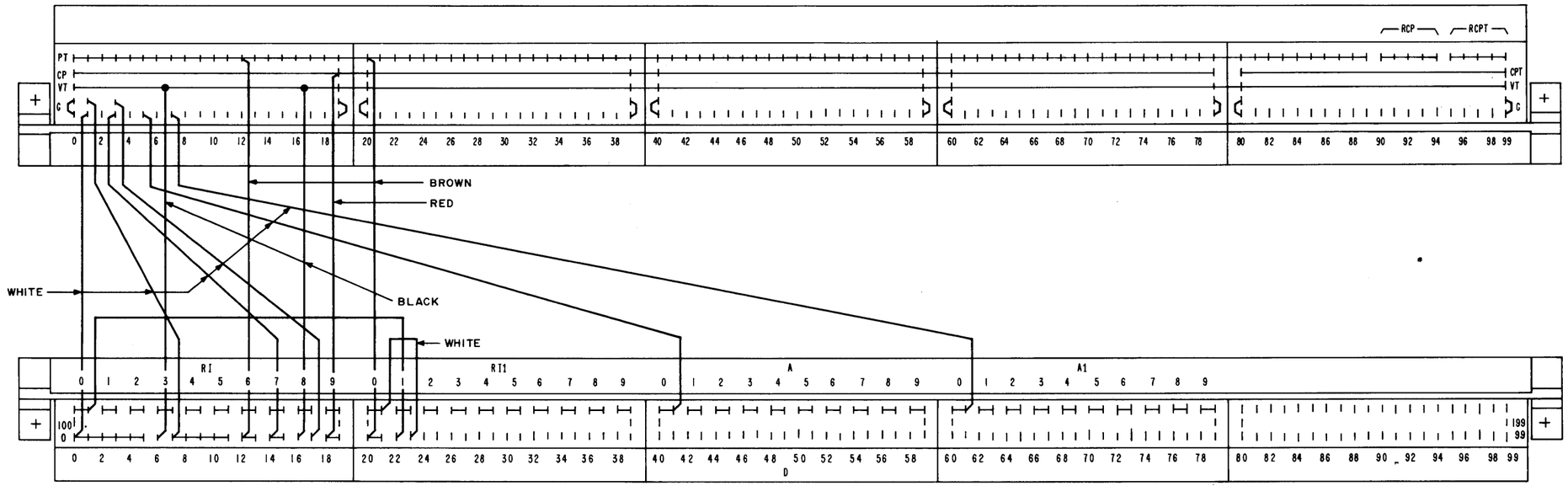
H. 3-Digit Prefix Code A, B, C, and DC(0-9) Punchings

9.09 A 3-digit prefix code may be added to a Standard or non-Standard 4-digit line-number

to form a 7-digit test or busy line-number. To form a 3-digit prefix code, cross-connect the A, B, and C punchings associated with a particular ABC _ relay to the DC0 through DC9 punchings in accordance with prefix code required. For example, if the code is 998, cross-connect punchings A to DC9, B to DC9, and C to DC8 as shown in Fig. 5 for the ABC9 relay.

10. REPORTS

10.01 The required record of the changes in cross-connections should be entered on the proper form.



D, RI, RI1, A, A1, G, VT, CP, CPT, PT, RCP, AND RCPT PUNCHINGS

Fig. 1—Typical Cross-Connections at Test Connector Frame

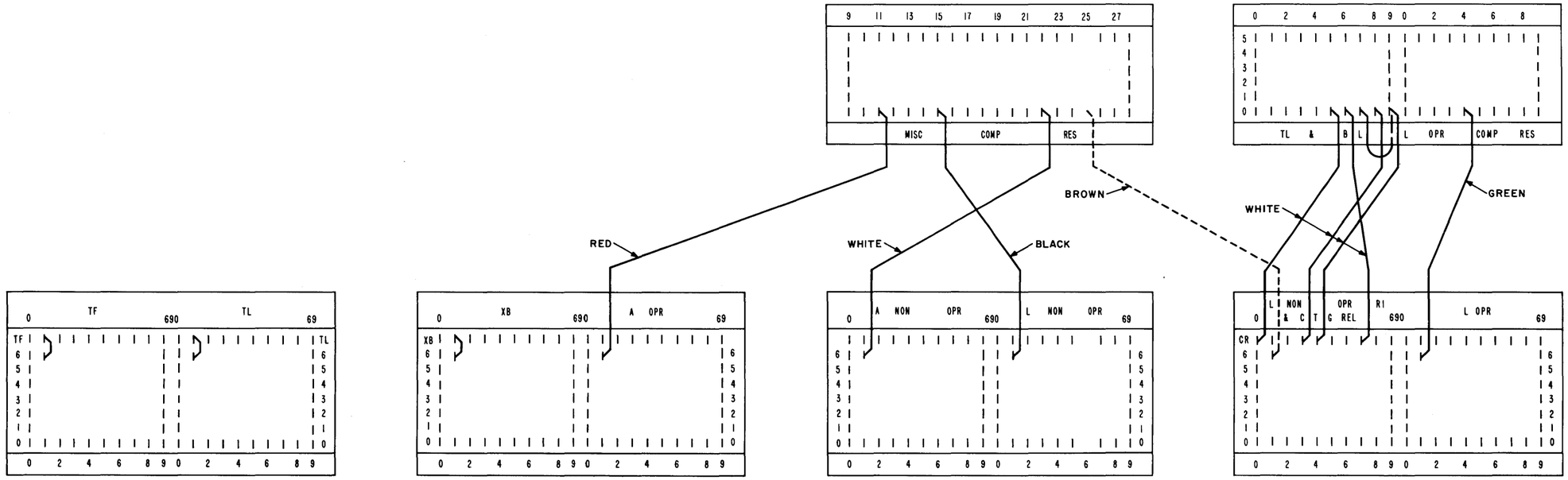


Fig. 2—Typical Cross-Connection at Incoming Trunk Test Frame—RP Only

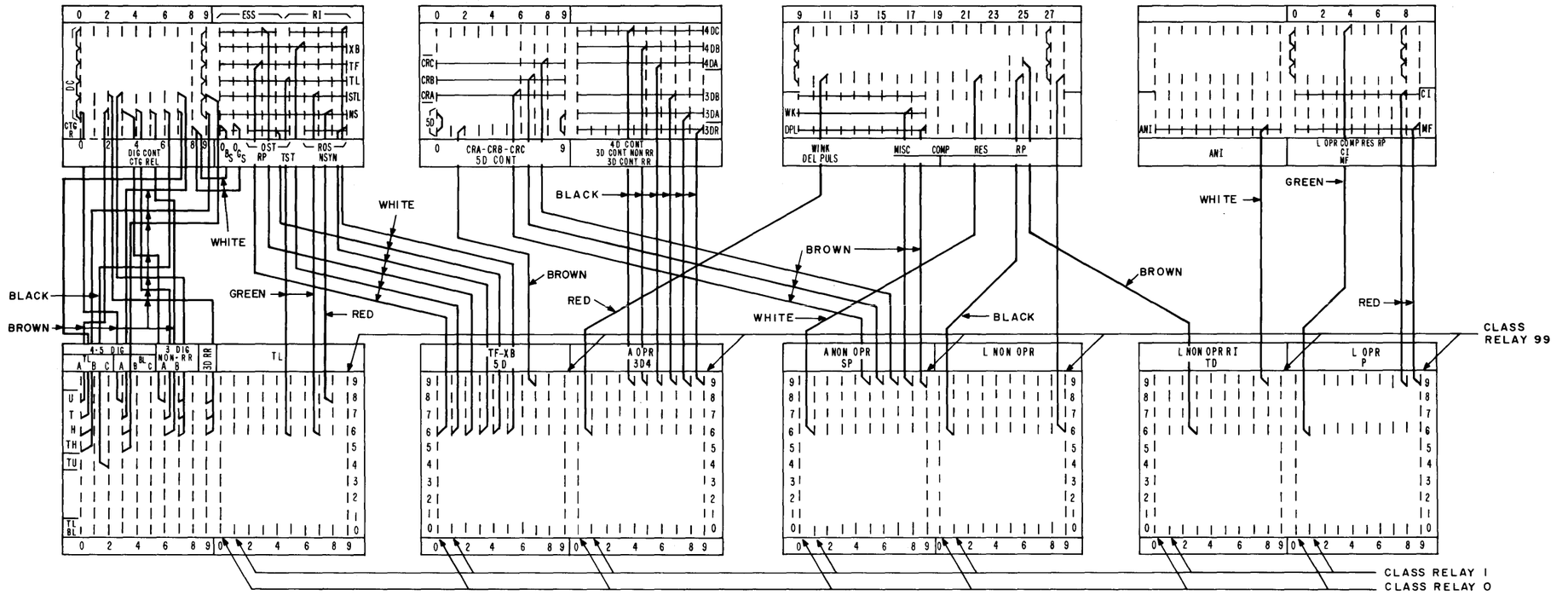


Fig. 3—Typical Cross-Connections at Incoming Trunk Test Frame for RP, DP, and MF Pulsing and Straightforward

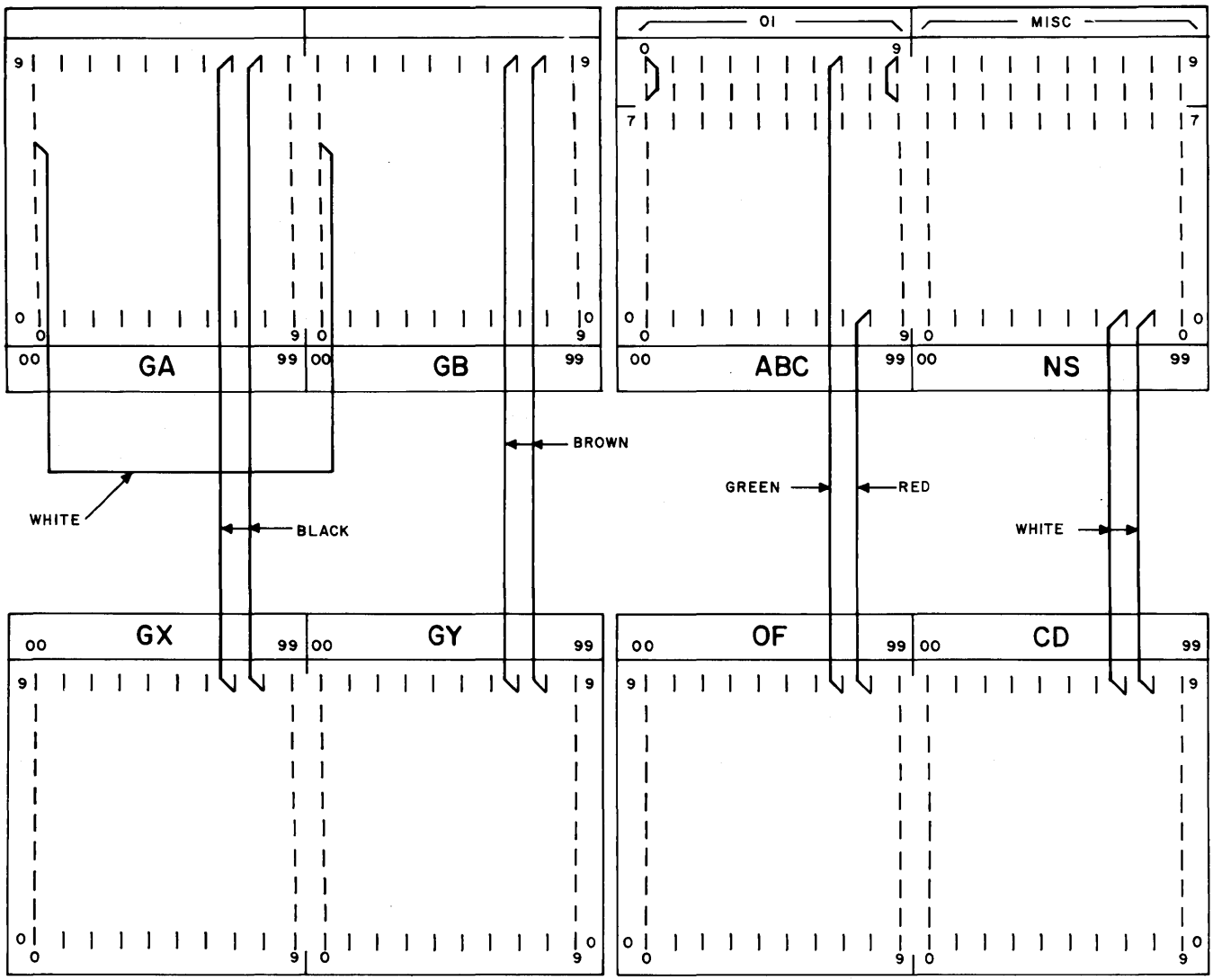


Fig. 4—Typical Cross-Connections at Miscellaneous Relay Rack

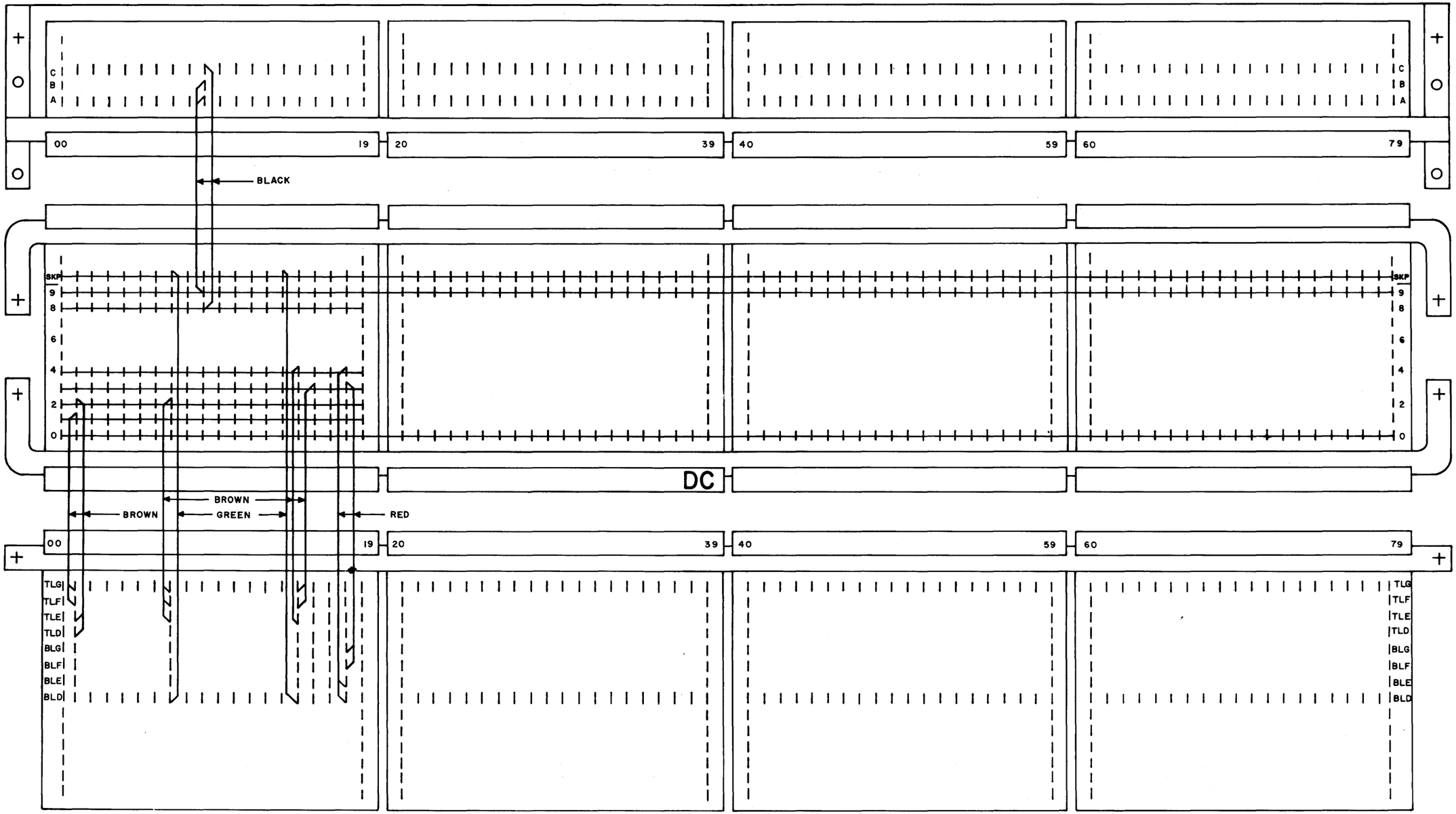


Fig. 5—Typical Cross-Connections at Miscellaneous Reay Rack

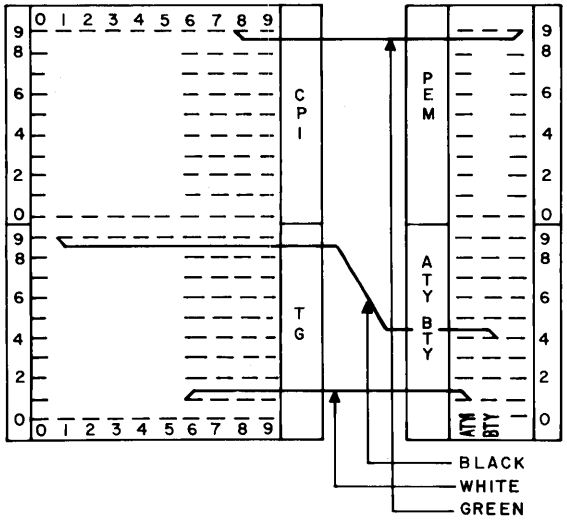


Fig. 6—Typical Cross-Connections at Incoming Trunk Test Frame for Trunks Divided into Two Administrative Test Groups

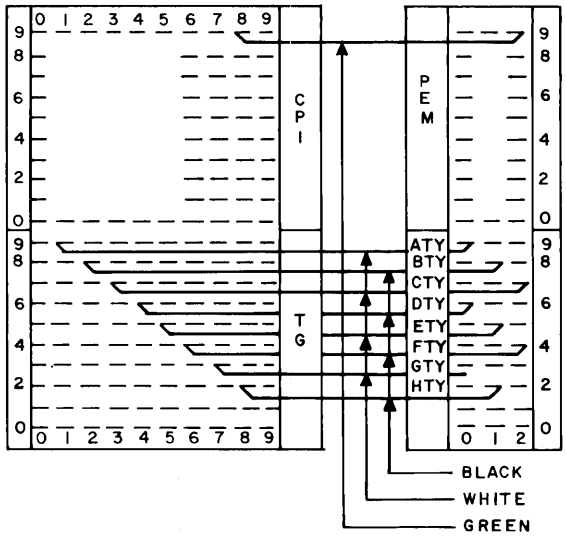


Fig. 7—Typical Cross-Connections at Incoming Trunk Test Frame for Trunks Divided into Eight Administrative Test Groups