PROTECTIVE CONNECTING ARRANGEMENTS CDH AND CBF

1. GENERAL

1.01 This section provides identification, installation, operation, maintenance, and connection information for the 101-type interconnecting unit (IU) and associated 69G apparatus mounting, 604-type panel, or 615A panel when used for Protective Connecting Arrangement (PCA) CDH. It also covers the 75A control unit used for PCA CBF, the KS-20944 protector used for PCA VCP, and Uniform Service Order Codes (USOC) PFB and PFC; all of these features can be associated with PCA CDH.

1.02 This section is reissued to:

- Include information on the 101C IU which replaces the 101B (MD)
- Rate the 604B panel MD
- Replace the term Voice Connecting Arrangement (VCA) with Protective Connecting Arrangement (PCA)
- Add comcode numbers to piecepart numbers
- Add new Table A.

1.03 For detailed information on specified associated apparatus, refer to the following sections:

463-300-101—604A Panel

463-300-102—604B and 604C Panels; 21A Apparatus Unit

463-300-104—615A Panel

463-300-109—KS-20944 Protector

463-300-112—75A Control Unit

463-300-113—142A Test Set

1.04 The 101C IU (Fig. 1) is an improved version of the 101B (MD) (Fig. 2) and is the preferred unit for new installations and replacements. Existing installations with 101A (MD) and 101B (MD) IUs may be encountered in the field; do not replace these units unless they are defective. Furthermore, available stock of these MD IUs should be used if possible. Refer to Table A for a summary of the applications and limitations of the three 101-type IUs.

Note: In existing installations using pulse corrections, the 103A (MD) pulse corrector must be removed when replacing a 101A with a 101B or C.

1.05 The 604B panel (Fig. 3 and 5) is now rated MD but may be used when available; an installed 604B should be replaced with a 604C (Fig. 3 and 4) only when defective. These conditions also apply to the MD rated 604A-type panel (Fig. 6).

Caution: When 101A and 101B/C IUs are installed in the same 604B or C panel, do not use a 101A for trunk 9 (position 13) if 101B/Cs are used for trunks 1 or 3 (positions 1 or 4), and do not use a 101A for trunk 14 (position 14) if 101B/Cs are used for trunks 5 or 7 (positions 7 or 10). If these rules are violated, the AGC leads of the 101B/Cs will be shorted.

1.06 For mounting one to six 101-type IUs, use 615A panels. For over six circuits, use a 604-type panel. Consider both the size of the initial installation and the expected future growth in selecting the proper mounting equipment.

Do not use the 69G apparatus mounting for any new installations. Information is supplied in this practice only for servicing existing installations of the 69G.

1.07 The customer should contact the local Telephone Company Business Office or the

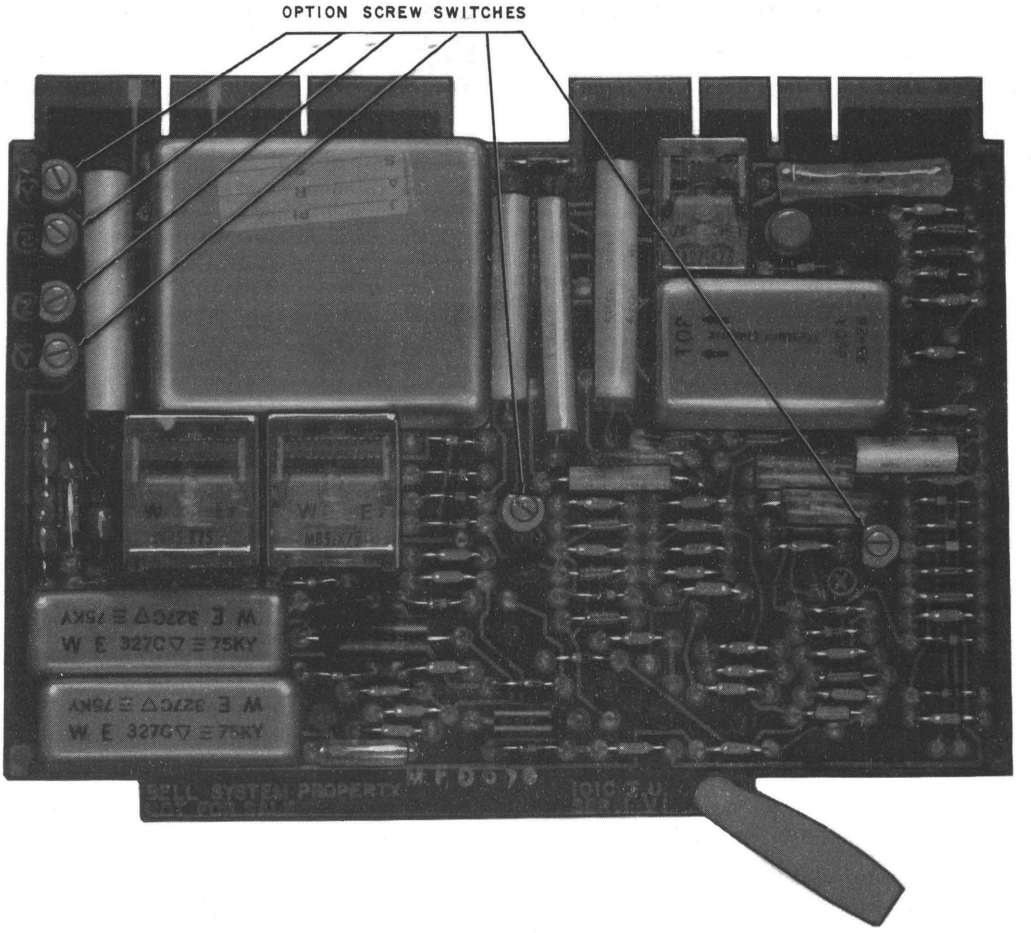


Fig. 1—►101C IU◄

Marketing Representative to obtain a copy of the Technical Reference covering this interface specification.

1.08 This issue of the section is based on the following drawings:

SD-1E201-01, Issue 5B (101A IU)

►SD-1E238-01, Issue 6B (101B IU)

SD-1E294-01, Issue 2D (101C IU)◄

SD-1E200-01, Issue 2D (604A Panel)

SD-69599-01, Issue 2A (69G Apparatus Mounting)

SD-69631-01, Issue 3D (Power Failure Transfer)

SD-1E246-01, Issue 2A (75A Control Unit)

If this section is to be used with equipment or apparatus reflecting later issue(s) of the drawing(s),

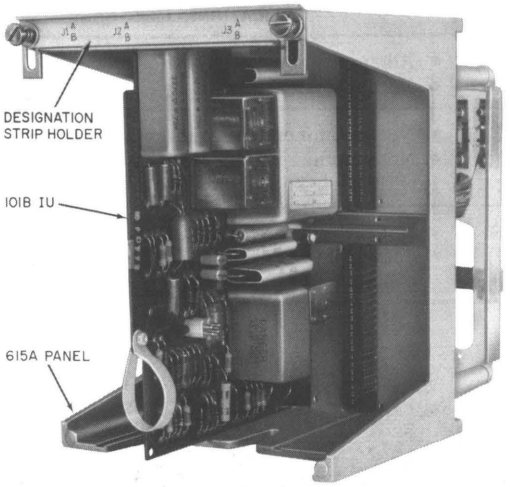
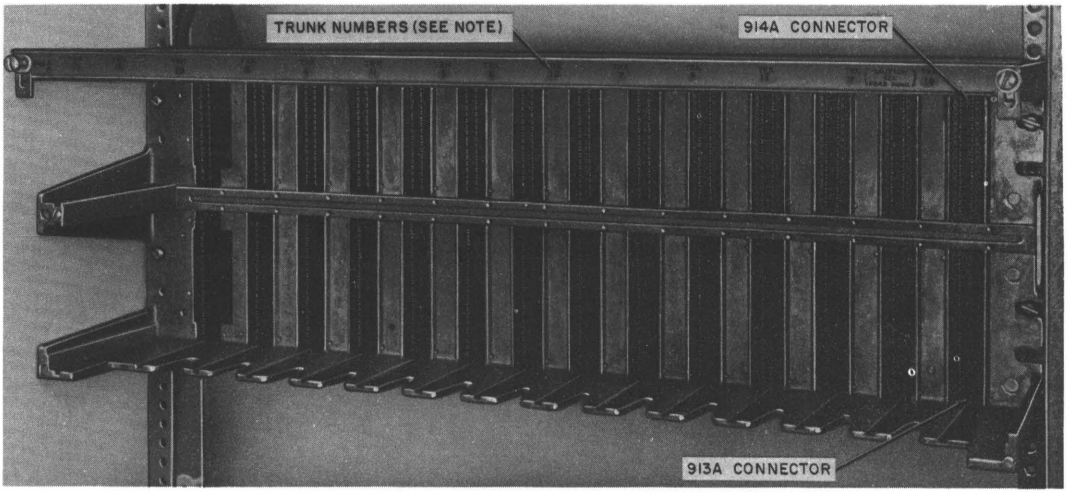


Fig. 2—101B (MD) IU Mounted in 615A Panel

TABLE A

APPLICATIONS OF 101-TYPE IUs

IU	APPLICATIONS/LIMITATIONS
101C	• All applications. • No limitations.
101B (MD)	• Not recommended for use with panel COs. • Not recommended for use with CPE equipped with electronic toll restriction circuitry.
101A (MD)	• Not recommended for use with panel COs. • Cannot be used in conjunction with 75A control units (PCA CBF).



NOTE: ON OLDER 604B PANELS, POSITION NUMBERS APPEAR INSTEAD OF TRUNK NUMBERS.

INSTALLATION SEQUENCE OF 101-TYPE INTERCONNECTING UNITS

TRUNK NO.	1	2	10	3	4	11	5	6	12	7	8	13	9	14
POSITION NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14

Fig. 3—604B (MD) or 604C Panel, Front View

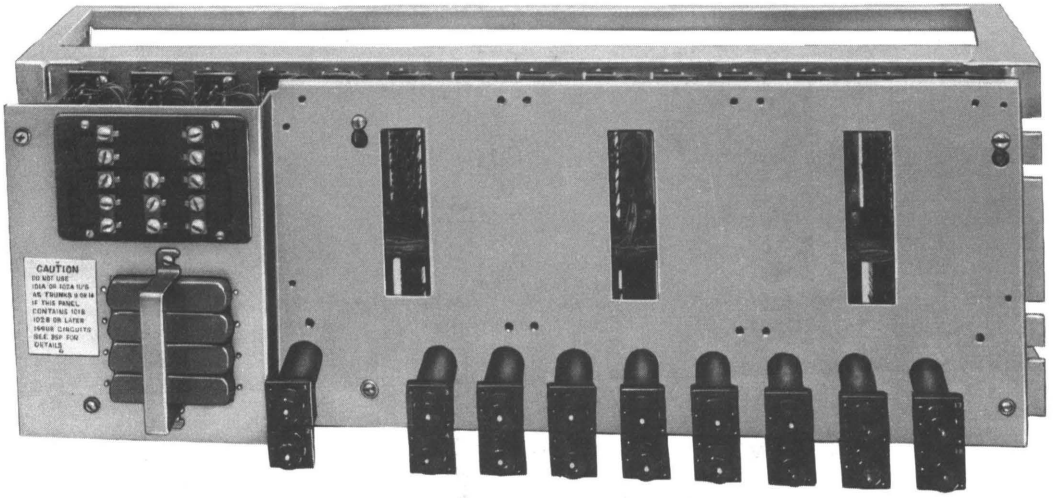


Fig. 4—604C Panel, Rear View (21A Apparatus Unit Not Installed)

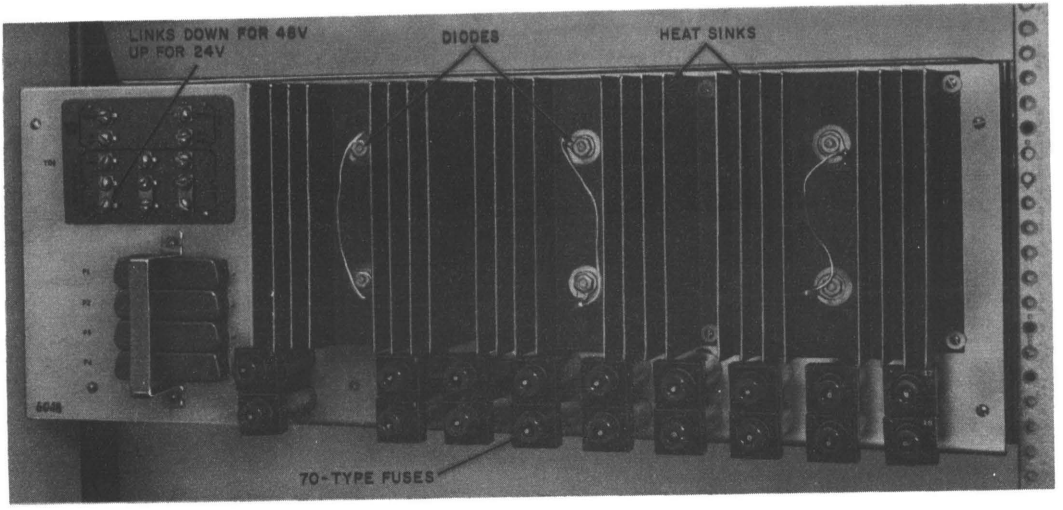


Fig. 5—604B (MD) Panel, Rear View

INSTALLATION SEQUENCE OF 101B INTERCONNECTING UNITS

TRUNK NO.	POSITION NO.
1	1
2	2
3	4
4	5
5	7
6	8
7	10
8	11
9	13
10	3
11	6
12	9
13	12
14	14

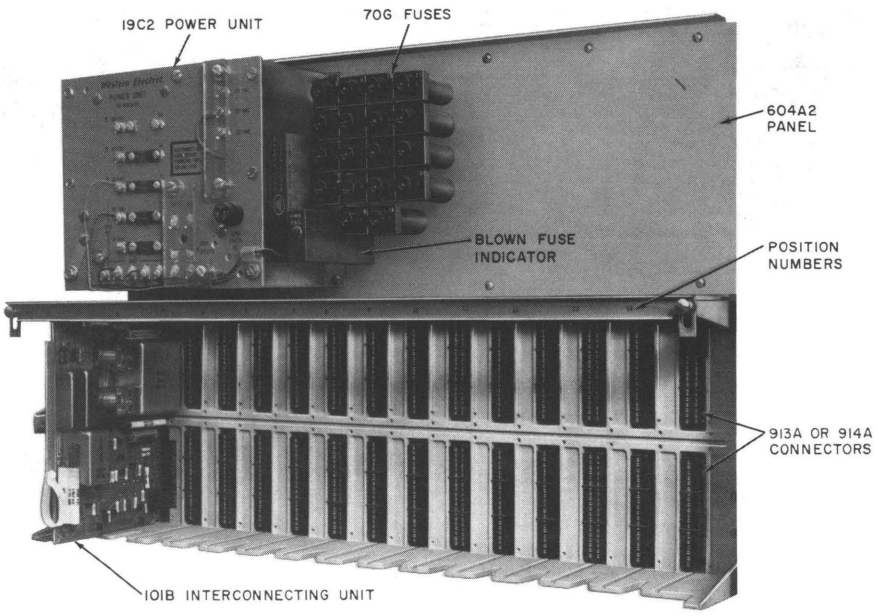


Fig. 6—101B (MD) IU Mounted in 604A2 (MD) Panel

reference should be made to the SDs and CDs to determine the extent of the changes and the manner in which the section may be affected.

2. IDENTIFICATION

PURPOSE

PCA CDH

- To provide an interface between 2-way ground start CO trunks and a customer-provided (CP) dial PBX
- To provide voiceband transmissions
- To limit excessive voice signal power levels from customer-provided equipment (CPE)
- To provide protection for telephone company personnel against hazardous voltages
- To transmit network control signaling functions.

PCA CBF

- To limit excessive data and voice signal power levels from CPE.

USOC PFB or PFC

- To provide telephone service during commercial power failure.

PCA VCP

- To provide an interface between CP power supply and PCA CDH
- To provide protection for telephone company personnel against hazardous voltages.

ORDERING GUIDE

(a) ***For PCA CDH***

- Unit, Interconnecting, 101C (one per CO trunk) (Fig. 1).

(b) ***Associated Apparatus (Order Separately)***

Note: If a 23-inch relay rack is not provided on customer premises, provide a 16C apparatus mounting, or equivalent, for the 615A panel or an ED-91180-72 Group 21 cabinet for the 604-type panel, or their local equivalent.

- Panel, 615A (includes fuse panel only, no power unit; mounts up to three 101-type IUs) (Fig. 2)
- Bracket, 99B (one per one, two, or three 615A panels when mounted in 16C or in relay rack)
- ▶Adapter, 262A (one per 19C2 power unit mounted in 16C)◀

  or

- Panel, 604C (24V operation; includes fuse panel only, no power unit; mounts up to fourteen 101-type IUs or twelve 101-type IUs and two 75A control units) (Fig. 3 and 4)
- Unit, Apparatus, 21A (converts 604C panel to 48V operation)
- Cable, A25B (one per 615A panel or one, two, or four per 604-type panel) (Table B)
- Cable, A50B (one per 604-type panel) (Table B)
- Cable, A75A (one per 604-type panel) (Table B)
- Block, Connecting, 66M1-50 (as required) (Fig. 7)

Note: Other type blocks may be used when specified by local engineering. (66M1-50 should be used for interface with CPE to facilitate testing with 142A test set.)

- Clip, Bridging, B (25 per pack, as required) (Fig. 7)
- Cable, D Inside Wiring, or equivalent (for connecting 615A panel to connecting block for CO terminations)
- Wire, D station, or equivalent (for connecting external power supplies to 604-type or 615A panels)
- Unit, Power, 19C2, or equivalent (for 615A, 604A1, 604B, or 604C panels)
- Unit, Power, 29C1, or equivalent (for 604B or 604C panels with 75A control units)
- Cord, Power (for 19C2 power unit)

  ▶824013262 (P40J326) (1-1/2 feet)

  824013270 (P40J327) (2 feet)

  824013288 (P40J328) (4 feet)

  824013296 (P40J329) (6 feet)

  824010995 (P40J099) (12 feet)◀

(c) ***For Power Failure Transfer (USOC PFB or PFC)***

- Set, Telephone, 500C/D or 554A/B (one per arrangement)
- Cord, Mounting, D4BJ (if delayed restoral is used, PFC)
- Unit, Telephone Key, 229B—one per four arrangements if immediate restoral (PFB) is used; one per arrangement if delayed restoral (PFC) is used
- Indicator, Lamp, 15-type or equivalent (one per telephone set when Z option provided, delayed restoral only, PFC)
- Key, Nonlocking, 551A (one per telephone set)
- Bracket, 77A (one per telephone set).

(d) ***For Data Transmission (PCA CBF)***

- Unit, Control, 75A (one per six 101B or C IUs in 604B or 604C panel) (Fig. 8)

(e) ***For Power Protection Unit (PCA VCP)***

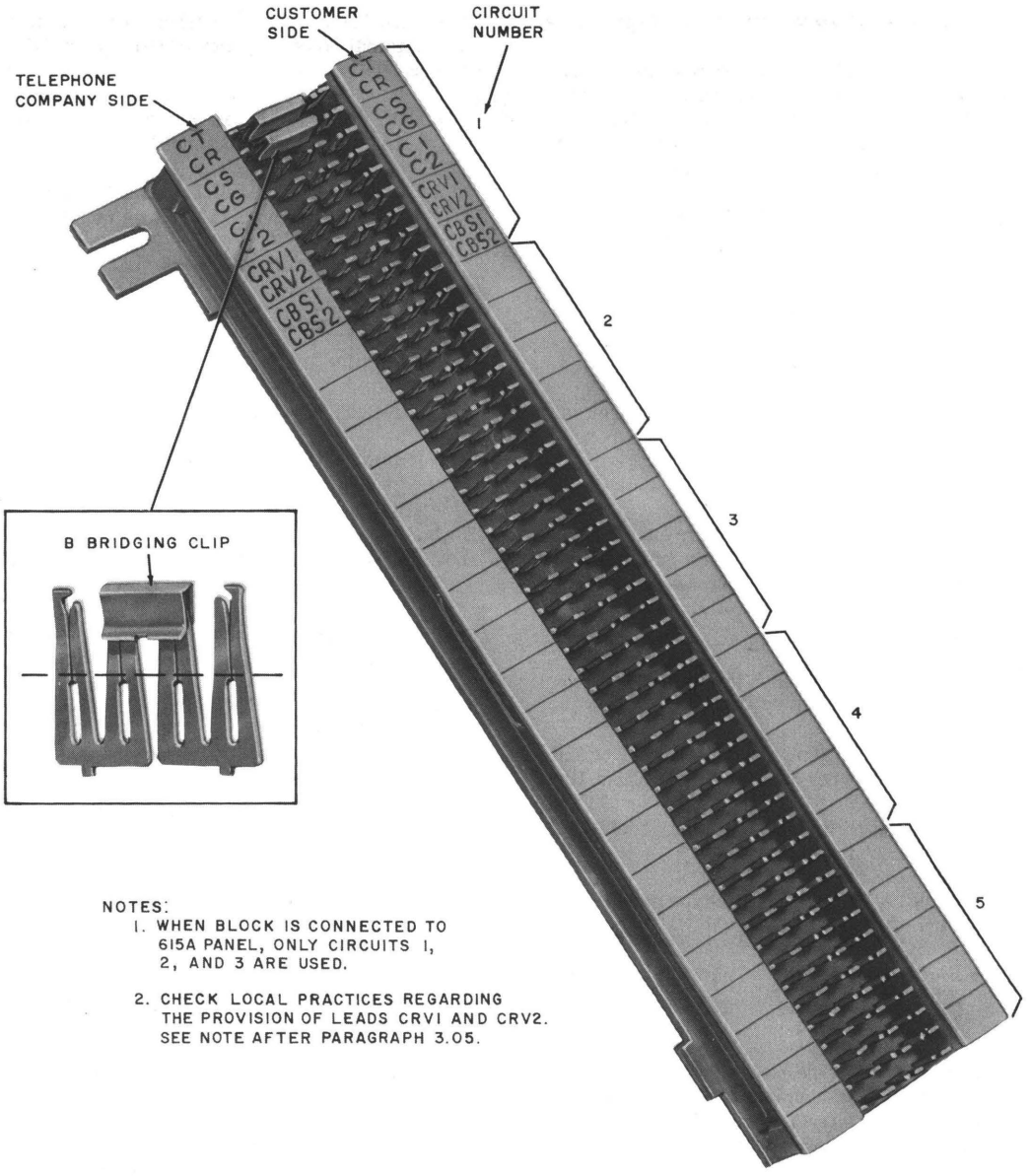


Fig. 7—66M1-50 Interface Connecting Block

- KS-20944, L1 Protector (must be provided when a CP dc power supply is used) (Fig. 9).

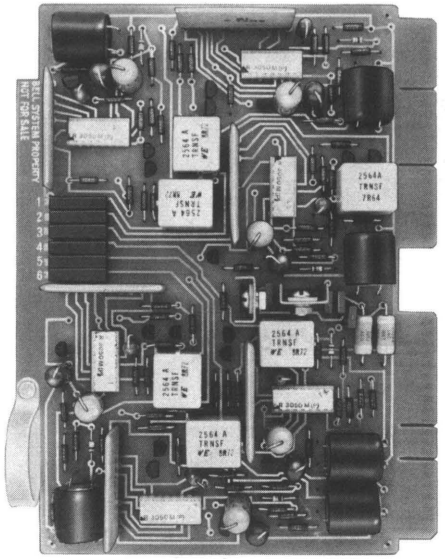


Fig. 8—75A Control Unit

(f) ***Replaceable Components (For 604-Type or 615A Panels)***

- Unit, Power, 19C2 (for 604A2 panel) (Fig. 6)
- Fuses, 70G (1/2 ampere, 18 per 604A-type panel)
- Fuses, 70F (1/4 ampere, 13 per 604B or 604C panel)
- Fuses, 70G (1/2 ampere, two per 604B or 604C panel)
- Fuses, 70A (1-1/3 ampere, three per 604B or 604C panel)
- Fuses, 24E (1/2 ampere, eight per 615A panel)
- Indicator, 17C-49 (for optional fuse alarm, if required, 604B or 604C panel only).

DESIGN FEATURES

101-Type Interconnecting Unit

- Components mounted on epoxy coated 8-inch 80-pin board
- Features ground start operation
- Approximate dimensions: 7-1/2 inches by 5-1/2 inches
- Options connected by straps on 101A and 101B; by screw switches on 101C (Fig. 1)
- Features line impedance matching (101B and C only)
- Data transmission capability (101B and C only)
- Ambient operating temperature range 0°F to 120°F
- Maximum current requirement at 26 volts dc: 0.160 ampere (101A); 0.126 ampere (101B); ◗0.143 ampere (101C).◖

3. INSTALLATION

69G Apparatus Mounting (Fig. 10 and 11)

3.01 The 69G apparatus mounting should not be used for new installations of PCA CDH. Refer to Fig. 11 for connections used in existing installations.

604-Type Panel (Fig. 12 and Tables C, D, E, F, I, K and L)

3.02 Mount the 604-type panel on a standard relay rack or in an ED-91180-72, Group 21, 18-plate equipment cabinet. Locate the panel within 200 feet (18 ohms loop resistance) of the CPE for the 101A IU or within 1000 feet (100 ohms loop resistance) for the 101B or C. Connect a separate ground wire to relay rack or cabinet. The ED-91180-72 cabinet will hold a maximum of two 604A-type panels or three 604B or C panels (power unit located externally) or two 604B or C panels

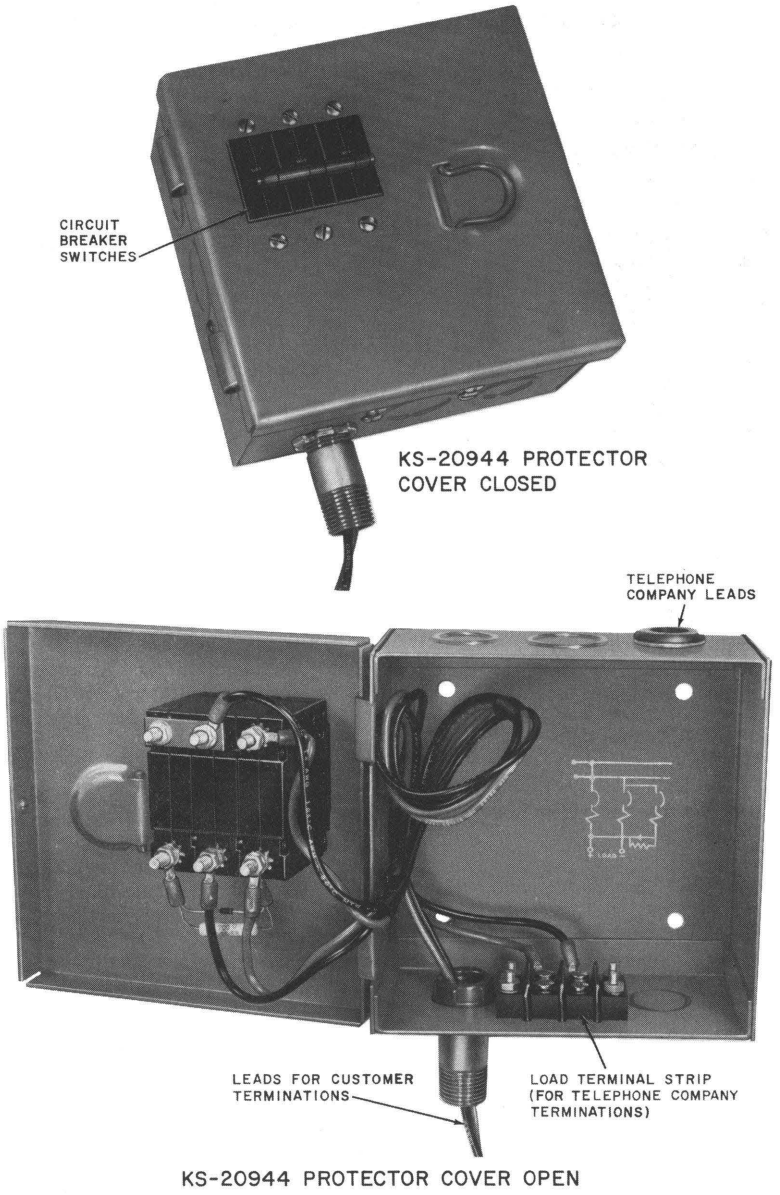


Fig. 9—KS-20944 Protector

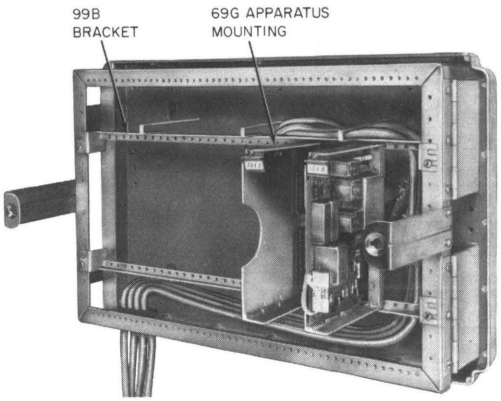


Fig. 10—69G Apparatus Mounting With 101B IU Mounted in 16C Apparatus Mounting

and a power unit when the drawing holder on the lower half of its cover is removed. Mount the 66M1-50 interface connecting block within 25 feet of the panel and in a position which will facilitate testing between the block and the panel.

3.03 Make electrical connection to the 604-type panel with connector cables. Arrangement of the plugs on the panel restricts plug P1 (CO lines) to an A25B connector cable. Plugs 2 through 4 (CPE connections) are arranged to accept a choice of cable sizes (see Table B). For example, in the first arrangement an A25B can be used for plug 1, single A75A for plugs 2 through 4, or a separate A25B can be used for each plug. Plug 5 (604A panel only) is not used with PCA CDH.

3.04 Terminate the stub end of the connector cable from P1 on one side of a 66B4-25 connecting block for CO lines (Table C).

3.05 Terminate the stub end of the connector cable(s) from P2, P3, and P4 on the telephone company side of the 66M1-50 interface connecting block (Tables D, E, and F). Stencil lead designations on fanning strips and use B bridging clips to connect columns B and C together on the connecting block (Fig. 7).

Note: ◗Check local practices regarding the provision of leads CRV1 and CRV2. In some companies, these leads are not terminated on the interface connecting block unless the customer has ordered toll call indication.◖

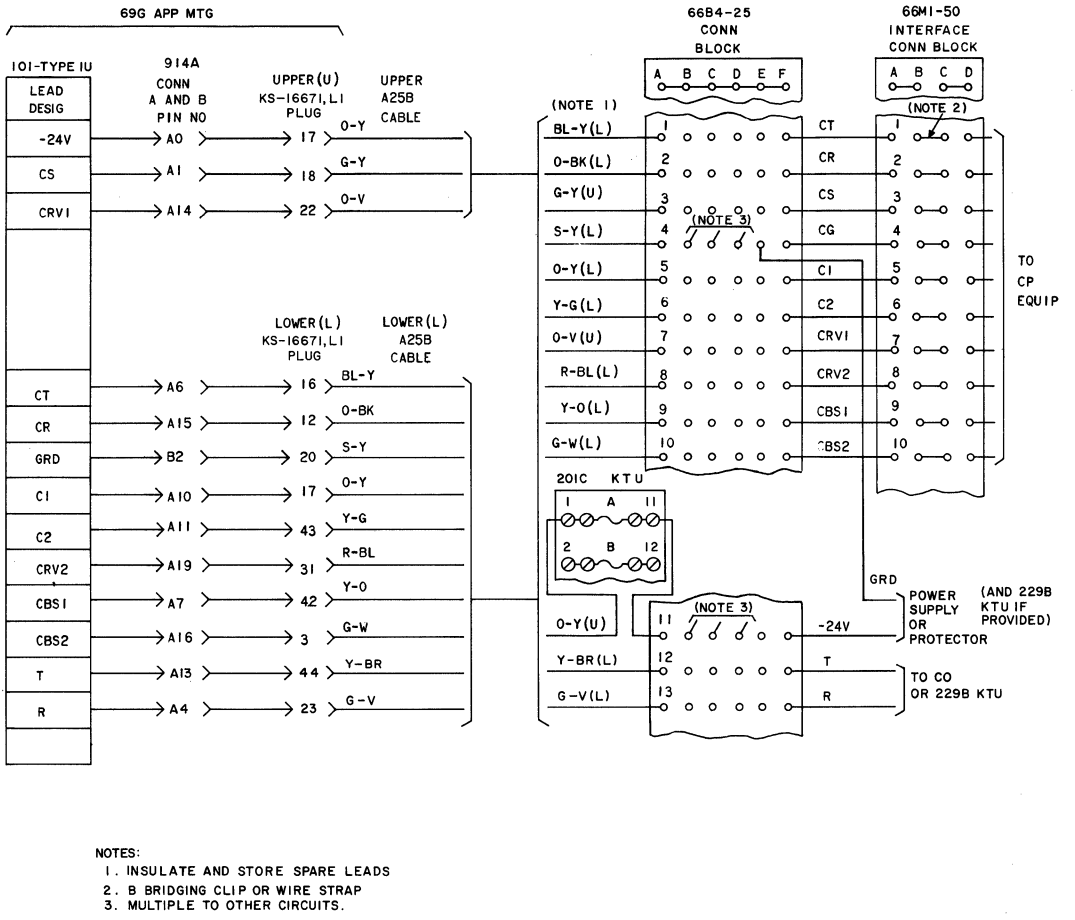
3.06 The 604A1, 604B, and 604C panels operate on externally supplied −24 volts. The 604B can be adapted to −48 volt operation by putting the option straps in the down position (Fig. 5). The 604C can be adapted to −48 volt operation by adding a 21A apparatus unit and putting the option straps in the down position. Attach the 21A to the rear of the 604C using the four 8-32 by 3/16-inch screws supplied with the apparatus unit as a loose item. Electrical connection to the 604C is made by attaching each red wire to a 48-volt terminal and each red-black wire to a 24-volt option terminal.

3.07 When a telephone company power unit is used, the customer must provide a separately fused 105- to 130-volt, 60-Hz outlet within reach of available power cords (see ORDERING GUIDE for cord lengths) and not under control of a wall switch. Mount the power unit in the same rack or cabinet with the 604-type panel it supplies, if possible, or in a nearby location (see ORDERING GUIDE for recommended units). When using the 604B or C panel with twelve 101B or C IUs and two 75A control units, use a 29C1 power unit or equivalent. The extra current drain by the 75A units (0.720 ampere maximum) will overload a 19C2 power unit. If CP power is used, it must be supplied through a KS-20944 protector (see 3.24).

3.08 Connect external power to terminals on rear of 604-type panel as shown in Table I. Refer to the appropriate section in Division 518 for proper grounding of power plants, which is important to prevent damage from power line surges.

615A Panel (Fig. 12 and Tables G, H, I, and M)

3.09 Mount the 615A panel on a standard relay rack or on a 16C apparatus mounting using a 99B bracket. Remove the center mounting bar from the 16C to allow the 615A to fit on the 99B bracket. The bracket holds up to three 615A panels or two 615A panels and a 19C2 power unit mounted with a 262A adapter; up to three 101-type IUs can be installed in each panel. Locate the panel within 200 feet (18 ohms loop resistance) of the CPE for the 101A IU or within 1000 feet (100 ohms loop resistance) for the 101B or C. Connect



NOTES:
1. INSULATE AND STORE SPARE LEADS
2. B BRIDGING CLIP OR WIRE STRAP
3. MULTIPLE TO OTHER CIRCUITS.

Fig. 11—Connection Diagram—69G Apparatus Mounting With 101-Type IU

a separate ground wire to relay rack or apparatus mounting.

3.10 Use D station wire or D inside wiring cable to run T and R leads from the 66T1 block on the 615A panel to one side of a 66B4-25 connecting block where CO lines are terminated (Table G).

3.11 Use an A25B connecting cable to connect the 615A panel to a 66M1-50 interface connecting block located within 25 feet of the panel. Connect the plug end of the cable to P1 on the 615A panel and terminate the stub end on the telephone company side of the connecting block (Table H). Stencil lead designations on fanning strips and use B bridging clips to connect columns B and C together on the connecting block (Fig. 7; see ***Note*** after 3.05).

3.12 When used with PCA CDH, the 615A panel operates on −24 volts supplied from associated equipment, a separate telephone company power unit, or from the customer's power supply. When

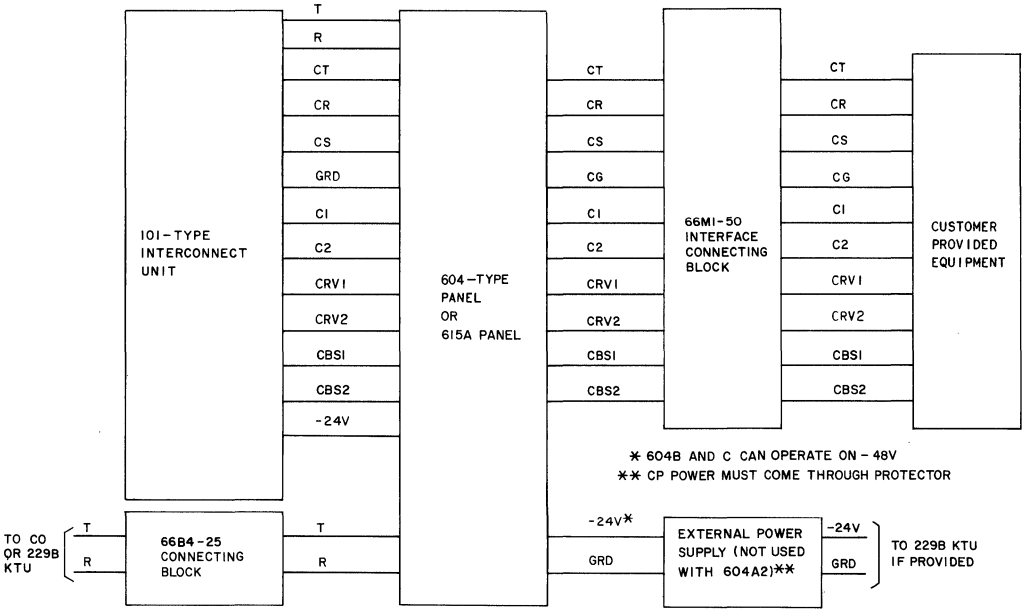


Fig. 12—Block Diagram—PCA CDH Using 604-Type or 615A Panel

a telephone company power unit such as the recommended 19C2 is used, the customer must provide a 105- to 130-volt, 60-Hz outlet within reach of available power cords (see ORDERING GUIDE for cord lengths) and not under the control of a wall switch. Mount the power unit in the same rack or apparatus mounting with the 615A panel it supplies, if possible, or in a nearby location. If CP power is used, it must be supplied through a KS-20944 protector (see 3.24).

3.13 Use 20-gauge wire to connect external power to the 66T1 connecting block on rear of 615A panel as shown in Table I. Refer to appropriate section in Division 518 for proper grounding of power plants, which is important to prevent damage from power line surges.

101-Type Interconnecting Unit (Fig. 1, 13, 14, and 15)

3.14 ***Options—101A IU:*** Install proper option straps with 24-gauge bare wire (see Fig. 13):

- Option W: Required when CO is step-by-step.
- Option Y: Always required.
- Option Z: Install when CO loop resistance (including resistance of CO) is greater than 500 ohms.

Be sure all option straps have been installed and check continuity of option straps after they are in place.

3.15 ***Options—101B or C IU:*** Install proper option straps with 24-gauge bare wire or by screwing down screw switches on 101C (see Fig. 14 or 15):

- Option W: Install when CO loop resistance (including resistance of CO) is greater than 800 ohms.
- Option X: Required when CO is step-by-step.
- Option Y: Normally required; factory installed. Provides impedance ratio of 600

ohms to 600 ohms between CPE and CO lines.

- Option Z: Provides impedance ratio of 600 ohms to 900 ohms between CPE and CO lines, respectively. Required only when PBX-CO trunk facility is designed with terminating sets or 837-type impedance compensators that have 900 ohms input impedance.

The sequence of installing 101-type IUs in the panels is important. Refer to the tables in Fig. 3 and 6 for the correct sequence for 604A and 604B or C panels. Note that the trunk number does not necessarily correspond to the position number in the panel. For example, the IU for trunk 3 must be installed in position 4. (The designation strip holders on the 604C panel and on some newer 604B panels show the trunk number associated with each position. The 604A and older 604Bs have only the position number.) In the 615A panel, install the IUs for trunks 1, 2, and 3 in J1, J2, and J3, respectively (see Fig. 2).

3.16 ***Refer to CAUTION preceding 1.06 before installing 101A and 101B or C IUs in the same 604B or 604C panel.*** When installing the 101-type IU, raise the designation strip holder on the panel, position the board in the guide grooves of the 604-type or 615A panel, and slide the 101-type IU in until it is properly seated and electrically connected to the 913A or 914A connectors. The guide grooves prevent improper insertion of the 101-type IUs.

Note: The connectors in the 604B and C panels are equipped with index clips to match the code slots in the 101B and C IUs. When using 101A IUs, pull out the clips between contacts 9 and 10 in the B connectors.

3.17 Make certain designation strip holder is properly positioned to hold the IUs in place.

3.18 Perform tests shown in Part 5 after installation.

Power Failure Transfer (Fig. 16 and 17)

3.19 When power failure transfer with delayed restoral is required, the 229B KTU must be mounted externally and wired to the 615A or 604-type panel and selected telephone set as shown in Fig. 16 and Table J. Replace the D3BN mounting cord with a D4BJ mounting cord. If Z option (indicator lamp) is required, install per local practices.

3.20 When power failure transfer with immediate restoral is required, the 229B KTU must be mounted externally and wired to the 615A or 604-type panel and selected telephone set as shown in Fig. 17. No telephone set modification is required.

3.21 The 77A bracket is equipped with two screws and nuts for mounting the 551A nonlocking key. The bracket is equipped with friction pads and is arranged to mount over the lip on the base of the telephone set. The bracket is held in place by the housing. Connect the 551A ground start switch to C and G of network in telephone set.

75A Control Unit

3.22 The 75A control unit is plugged into position 13 of the 604B or C panel to furnish ALC to IUs in positions 1 through 6 or plugged into position 14 for positions 7 through 12. Since the 604B or C panel is prewired for the 75A, all connections are made when it is plugged into the panel.

The electrical design of the 75A control unit protects it from voltage surges, and it may be installed or removed without disturbing service to the associated IUs.

3.23 After installation adjust the limiting level threshold by setting the six level control potentiometers as shown in Section 463-300-112.

KS-20944 Protector (Fig. 18)

3.24 When voltage protection is required, the KS-20944 protector must be mounted externally and wired to the power supply terminals of the 615A or 604-type panel (Fig. 12). Refer to Section 463-300-109 for connections to multiple installations.

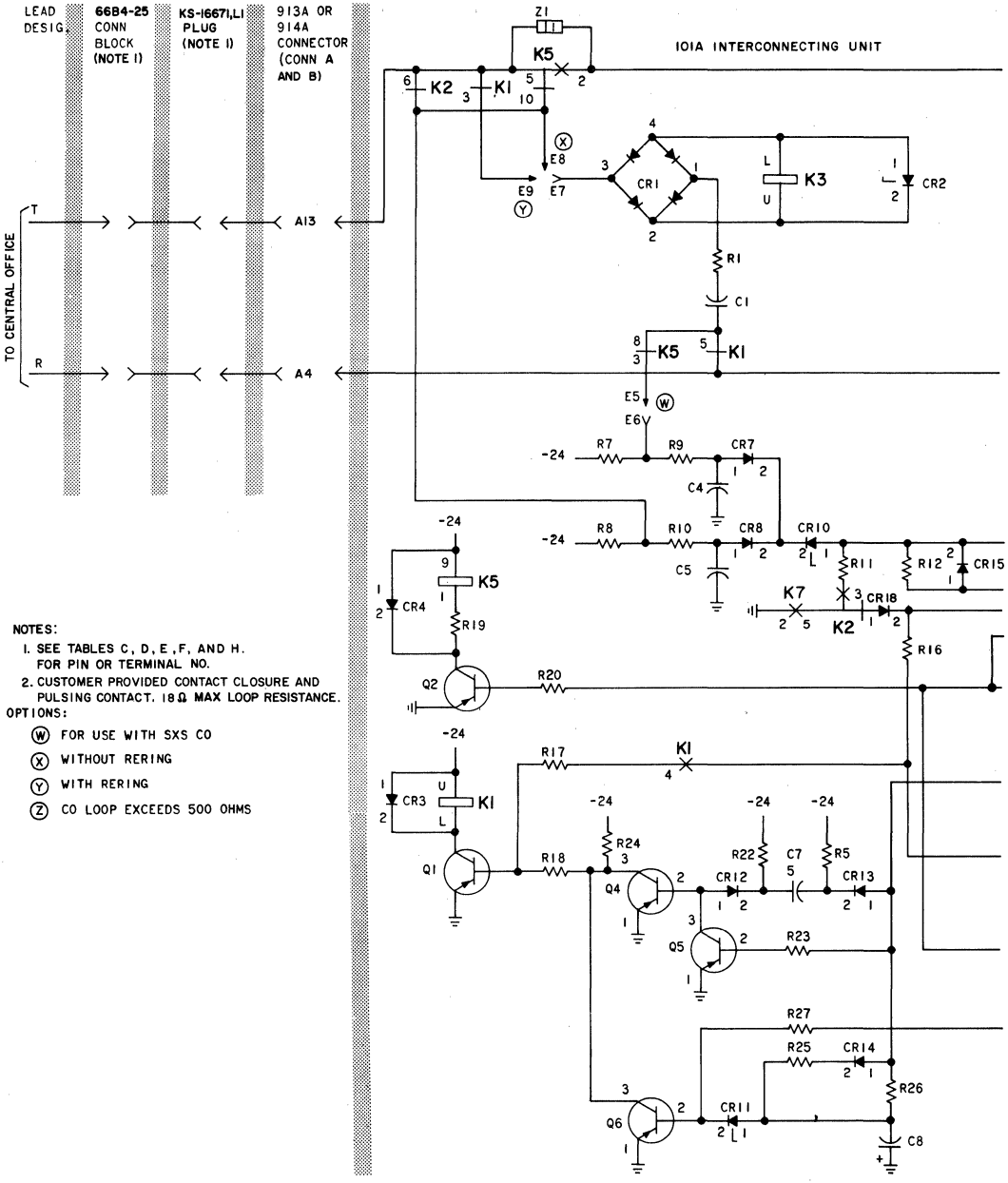


Fig. 13—Schematic—101A (MD) IU (Sheet 1)

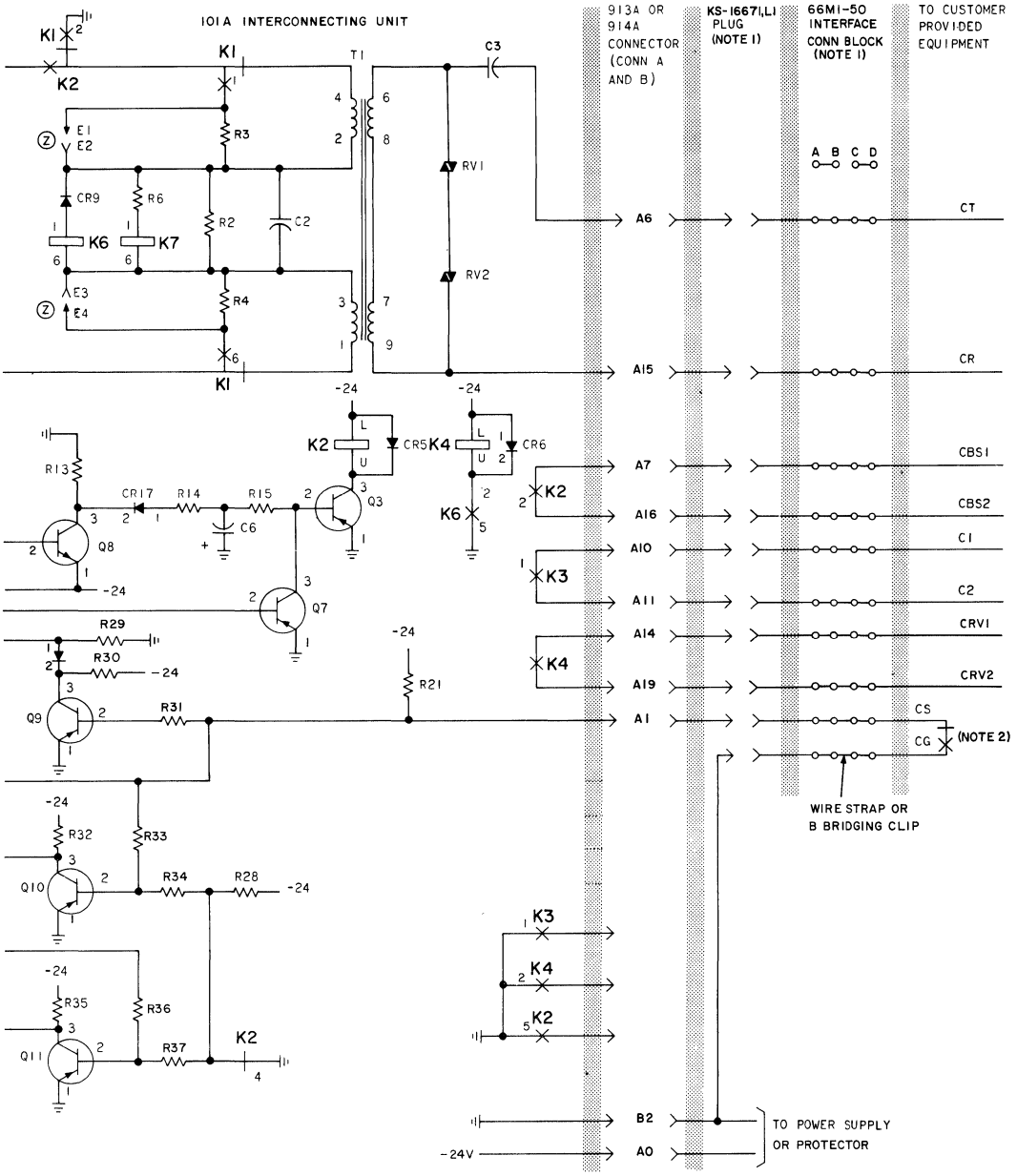
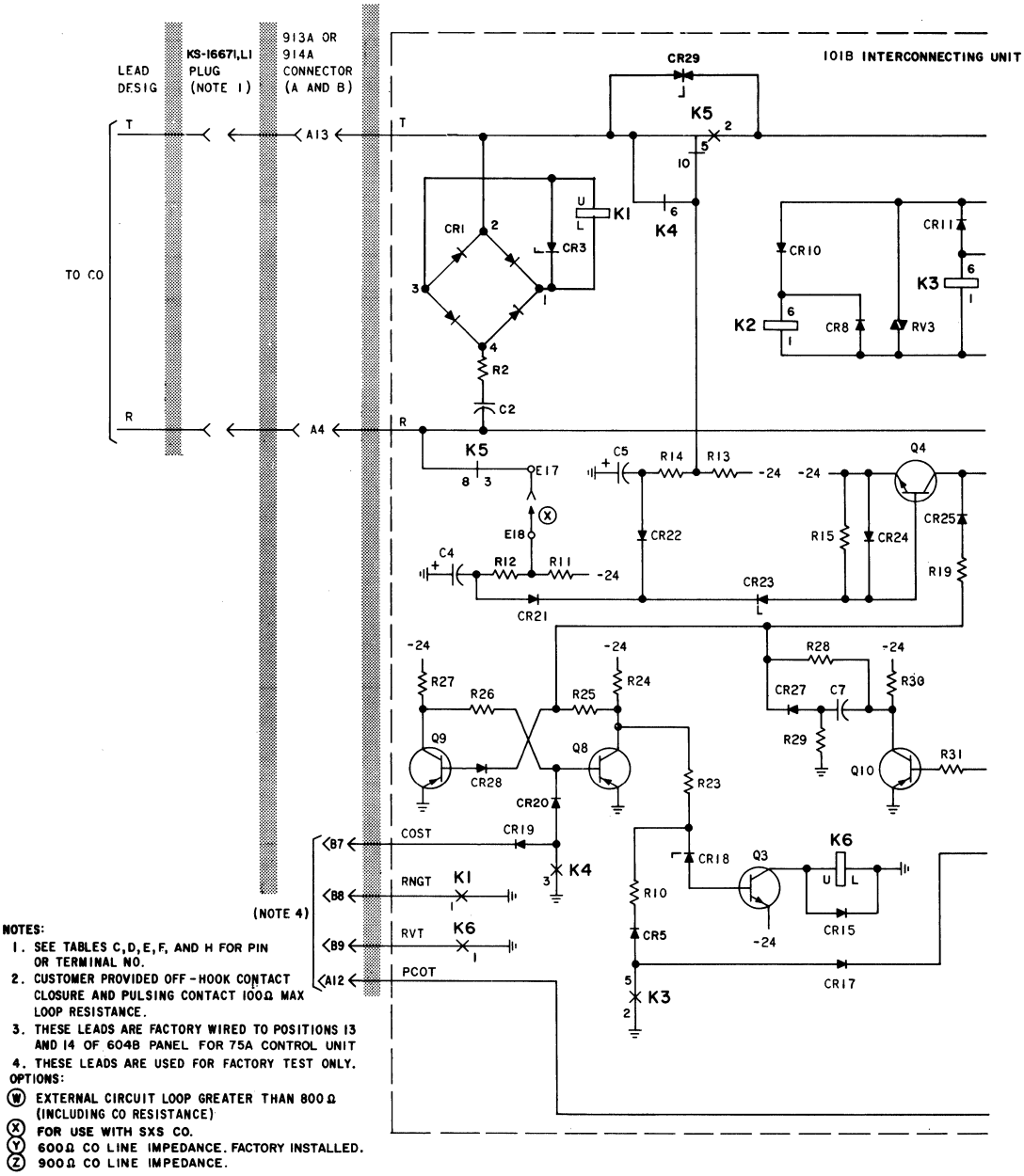


Fig. 13—Schematic—101A (MD) IU (Sheet 2)



NOTES:

1. SEE TABLES C, D, E, F, AND H FOR PIN OR TERMINAL NO.
2. CUSTOMER PROVIDED OFF-HOOK CONTACT CLOSURE AND PULSING CONTACT 100Ω MAX LOOP RESISTANCE.
3. THESE LEADS ARE FACTORY WIRED TO POSITIONS 13 AND 14 OF 604B PANEL FOR 75A CONTROL UNIT
4. THESE LEADS ARE USED FOR FACTORY TEST ONLY.

OPTIONS:

(W) EXTERNAL CIRCUIT LOOP GREATER THAN 800Ω (INCLUDING CO RESISTANCE)
(X) FOR USE WITH SXS CO.
(Y) 600Ω CO LINE IMPEDANCE. FACTORY INSTALLED.
(Z) 900Ω CO LINE IMPEDANCE.

Fig. 14—Schematic—101B (MD) IU (Sheet 1)

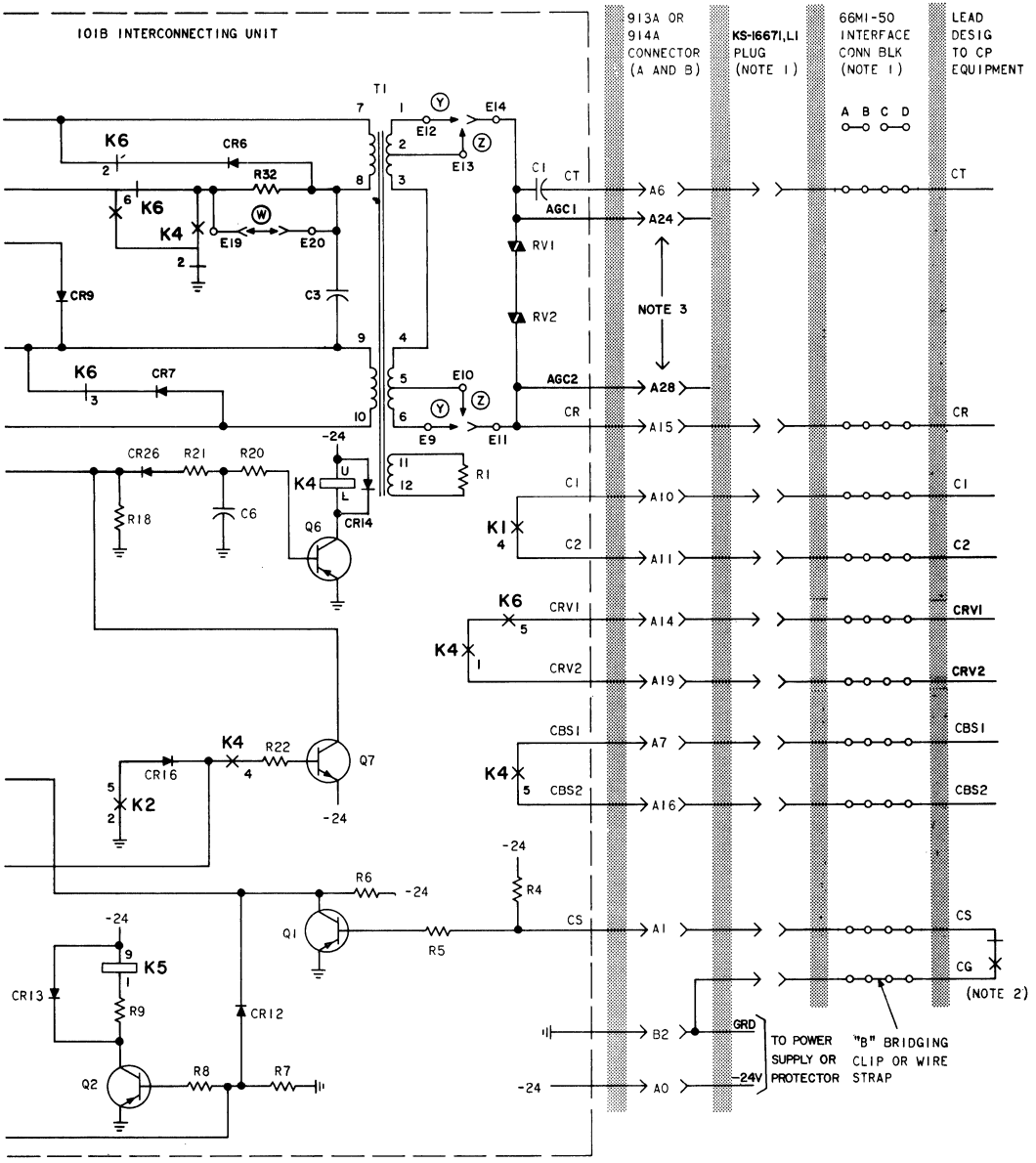


Fig. 14—Schematic—101B (MD) IU (Sheet 2)

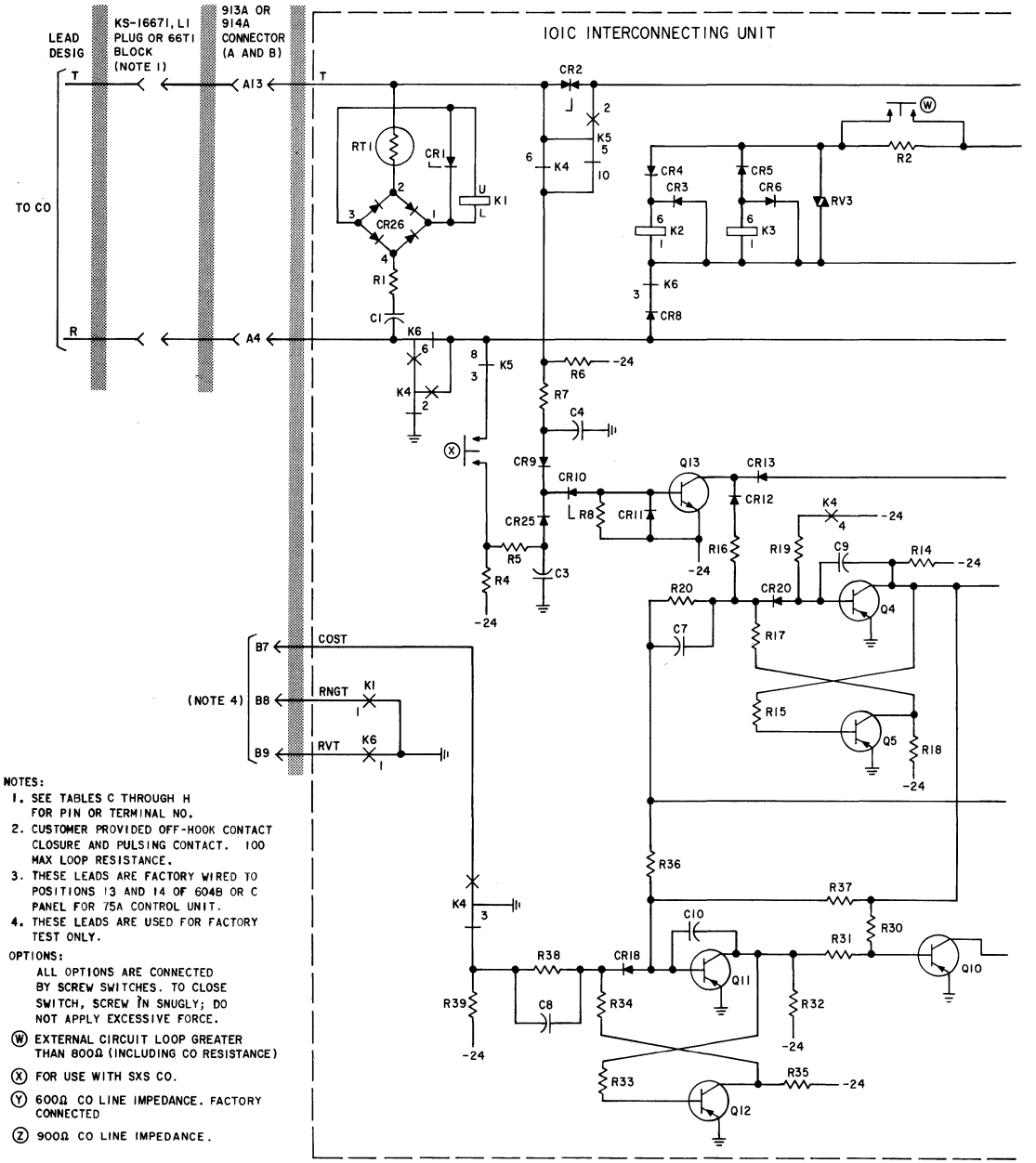


Fig. 15—Schematic—101C IU (Sheet 1)

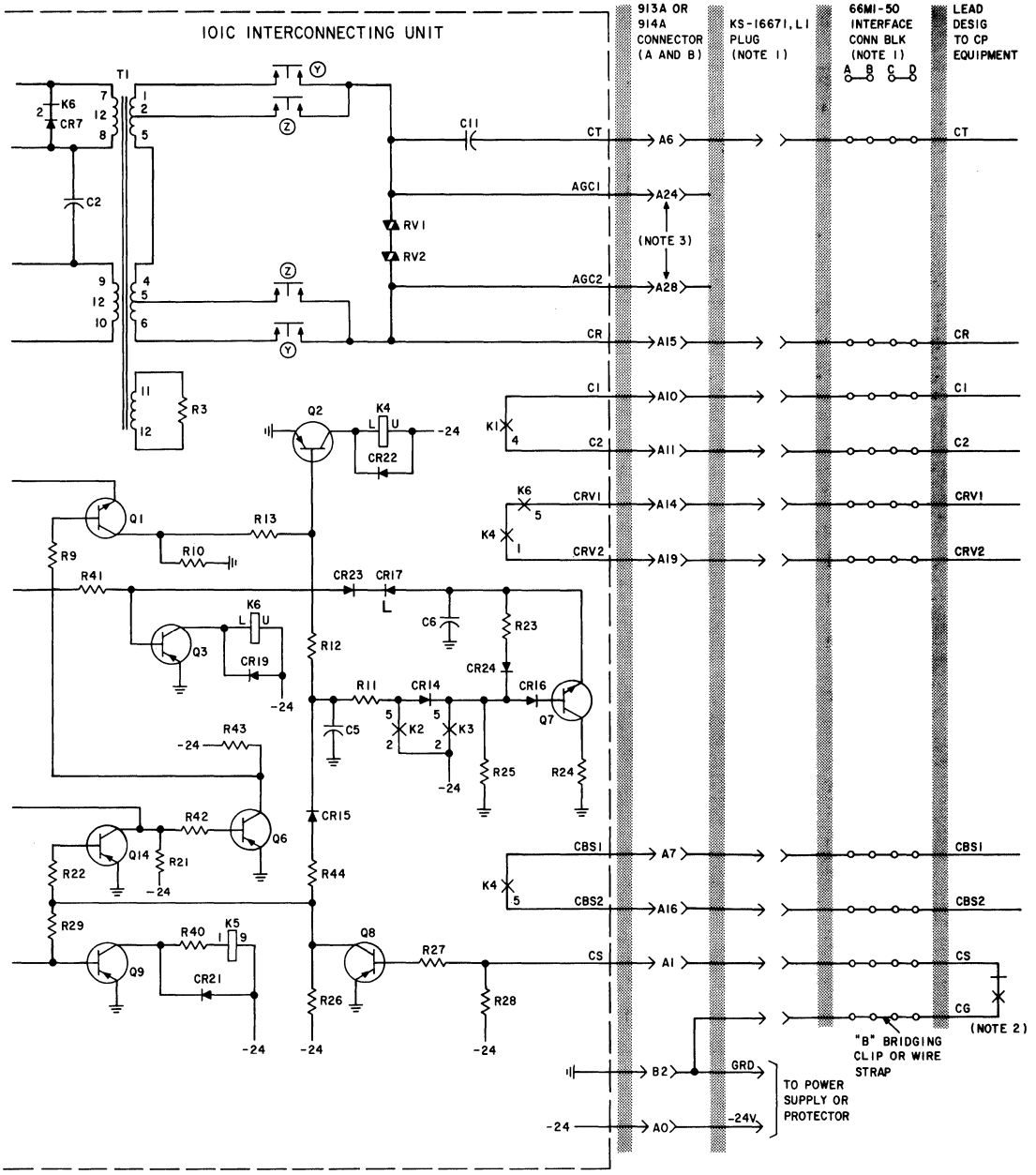


Fig. 15—Schematic—101C IU (Sheet 2)

Warning: Voltage will be present on upper terminals of circuit breakers as soon as customer power is connected.

3.25 Set circuit breaker switch lever to OFF and connect as shown in Fig. 18 following local wiring instructions. The customer must connect his power supply to the red (GRD) and black (−V) wires extending from the unit.

Check for correct polarity and ground before closing circuit breaker.

4. OPERATION

A. 101B or C Interconnecting Unit (Fig. 14 or 15)

Incoming Call

4.01 When the CO seizes this circuit, ground is placed on the tip (or ground on the ring if a SXS toll call) which activates the ground detector circuit, causing K4 relay to operate. Operation of K4 relay provides a contact closure on the CBS1 and CBS2 leads to the CPE indicating a seizure (busy condition) on this trunk.

4.02 Ringing current is supplied by the CO over the tip and ring to operate the ring relay K1. The K1 relay operates and releases to provide a closure on the C1 and C2 leads to the CPE which follows the ringing cycle. K4 remains operated during ringing.

4.03 ▶The customer's equipment should recognize an incoming call only when both closures, CBS1-CBS2 and C1-C2, are present. This will prevent false incoming call indications caused by transients momentarily operating K1. However, in the event of a trouble condition within the CO, where battery is reversed on T and R from a non-SXS CO (option X not provided) and ringing is applied, only the C1-C2 closure occurs. Under this condition, the incoming call cannot be recognized or answered, as described in 4.04, because relay K4 is not operated.◀

4.04 When the customer goes off-hook to answer the call, the CPE provides a contact closure across the CS and CG leads causing the K5 relay to operate. The K5 relay operated closes the loop to the CO, removes the ground detector circuit, trips the CO ringing which releases K1, and cuts through the transmission path to the CT and CR leads. The CO detects the loop closure and returns talk battery which operates the K2 relay. K2 relay operated holds K4 relay operated.

Outgoing Call

4.05 ***101B Only:*** When the customer seizes this circuit outgoing (goes off-hook to dial), a contact closure in the CPE across the CS and CG leads operates the K5 and K6 relays. The K6 relay operated grounds the ring side of the CO trunk to seize the CO, and the K2 relay operates from this ground to CO battery. The CO equipment returns ground on the tip to release the K6 relay and to operate K4 relay, removing the ground detector. The K4 relay operated provides a contact closure on the CBS1 and CBS2 leads to the CPE, indicating seizure. When K6 relay releases, the ground is removed from the ring lead, the loop is closed to the CO, and the CO detects the loop closure. Dial tone is returned to the customer.

4.06 ▶***101C Only:*** When the customer goes off-hook to dial, a contact closure in the CPE across the CS and CG leads operates the K6 relay. K6 grounds the ring side of the CO trunk to seize the CO which returns ground on the tip side. This tip ground is sensed by the ground detector, causing K6 to release and K5 to operate, closing the loop to the CO. K2 operates on loop current, causing K4 to operate and the ground detector to be removed from the line. Dial tone is now returned to the customer.◀

4.07 When the customer dials, using dial pulse dialing, a normally closed dial pulsing contact between the CS and CG leads opens and closes. K5 relay releases and operates in unison with the dialing contacts. The K5 relay repeats the dial pulses to the CO by opening and closing the loop to the CO. Operation of K5 relay after each digit and after completion of dialing restores the transmission path to the CPE. With tone address signaling, the signals are passed directly over the CT and CR leads to the CO tip and ring and the CO receiver.

Toll Call Indication

4.08 If a battery reversal is returned from the CO on tip and ring to indicate that the outgoing call is a toll call, K3 relay will operate.

The K3 relay operated causes K6 relay to operate. K6 relay operated provides a contact closure on the CRV1 and CRV2 leads to the CPE to indicate the CO has reversed battery. When normal CO battery polarity is restored, the K3 and K6 relays release.

Disconnect

4.09 If the CPE disconnects first, the K5 relay releases and opens the loop to the CO, connecting the ground detector to the tip side of the line. With normal battery supervision, K5 relay released causes K2 relay to release. If reverse battery supervision is provided, K3 relay releases causing K6 relay to release and open the closure between leads CRV1 and CRV2. K2 or K3 relays releasing causes K4 relay to release in 500 ms, opening the contact closure on the CBS1 and CBS2 leads to the CPE and indicating disconnect. The CO trunk returns to idle condition when the open loop is detected.

4.10 If the CO end disconnects first and reverse battery supervision is applied, the loop is opened, causing K3 relay to release. K3 relay released causes K6 relay to release, opening the closure between leads CRV1 and CRV2. If the CO disconnects with normal battery supervision, K2 relay releases. K2 or K3 relay releasing causes K4 relay to release in 500 ms, opening the contact closure on the CBS1 and CBS2 leads to the CPE and indicating disconnect. When the CPE disconnects, K5 relay releases, opening the loop to the CO. The IU returns to idle condition.

Note: 101A IU (Fig. 13) operates similarly to the 101B and C using different relays.

B. Power Failure Transfer (Delayed Restoral, Fig. 16)

4.11 Under normal conditions, CO tip and ring are connected through the operated contacts of the 229B KTU to the IU associated with the CPE. The 229B KTU is held operated through its own contact to local power supply. The telephone company-provided power failure station is inoperative at this time. Should local power fail, the 229B KTU releases. CO tip and ring are transferred to the Bell System station; this transfer is indicated by a lamp (if provided) powered independently. After power is restored, the 229B KTU will be reoperated by ground obtained through the line switch of the station only after the first time it goes on-hook, returning the circuit to normal. Calls in progress when local power is restored will not be interrupted.

4.12 Option Z (Fig. 16) provides visual indication only when the CO line is connected to the power failure telephone set, and an off-hook condition exists when local power resumes. The transfer indicator lamp is lighted through a contact of the 229B KTU. The lamp lights only when the 229B KTU is released by loss of power. It becomes inoperative with the operation of the 229B KTU.

4.13 Ground start operation is required, and when an off-hook condition exists at the power failure telephone set, depression of the start key applies ground to the ring side of the line to operate CO equipment which returns dial tone. The start key should be released when dial tone is returned. The call should then proceed in a normal manner.

C. Power Failure Transfer (Immediate Restoral, Fig. 17)

4.14 Under normal conditions, CO tip and ring are connected through the operated contacts of the 229B KTU and the IU associated with the CPE. The 229B KTU is held operated through battery and ground connected directly to the TR relay winding. The telephone company-provided power failure station is inoperative at this time. Should local power fail, the 229B KTU releases; CO tip and ring are transferred to the station. When power is restored, the 229B KTU will reoperate immediately returning the circuit to normal. Calls in progress when local power is restored will be interrupted. No visual indication is provided.

4.15 Ground start is required and when an off-hook condition exists at the power failure telephone set, depression of the start key applies ground to the ring side of the line to operate CO equipment which returns dial tone. The start key should be released when dial tone is returned. A start key must be provided at each telephone set associated with a CO line. The call then should proceed in a normal manner.

D. 75A Control Unit

4.16 The 75A control unit consists of six identical ALC circuits, each connected to the

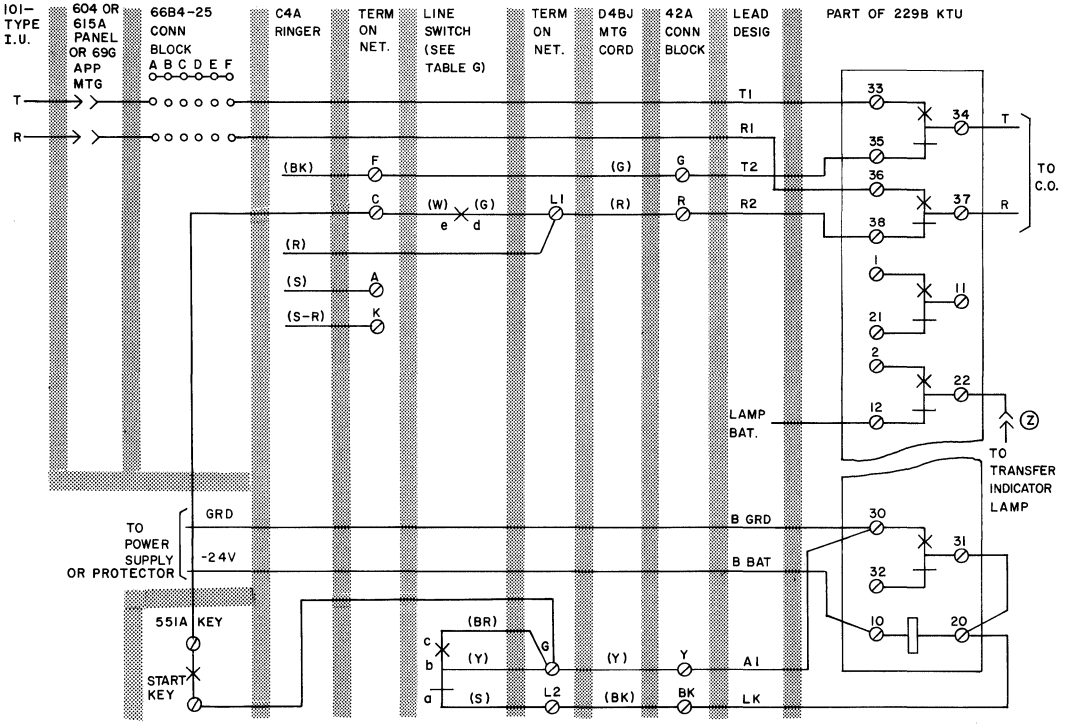


Fig. 16—Power Failure Transfer Circuit (Delayed Restoral)

transmission circuit (tip and ring) of an IU to protect Bell System equipment against excessive signal power. This protection is required when using voice-type IUs for data transmission. (See Section 463-300-112 for complete operational description.)

4.17 The ALC circuit monitors the CP data/voice voltages applied to tip and ring of the IU. If the power exceeds a preset level, the ALC circuit will present a resistance shunt across the input to the IU to linearly attenuate the signal to the preset value.

4.18 The level adjusting potentiometers R1 through R6 are set to limit the customer signals at a level determined by the amount of trunk loss and impedance.

E. KS-20944 Protector (Fig. 18)

4.19 When the CPE dc power supply is used to operate the Bell System equipment, overvoltage protection is required. The KS-20944 power protector is used to protect the Bell System personnel from hazardous voltages but may not protect the equipment from component failure. Separate fuses are required for the 101-type IUs. The breakers of the KS-20944 protector provide a switch to disconnect dc power when working on interconnecting circuits. (See Section 463-300-109 for complete operational description.)

4.20 The KS-20944 protector consists of a dc voltage-operated circuit breaker in series with a parallel resistor diode combination connected across the line and two dc current-operated circuit breakers connected in each side of the line. The contacts on each breaker are connected in series

with the coil of that breaker and all three breakers are mechanically interlocked, externally by a tie bar and internally by a tripper bar. When any breaker is operated, all breakers will be opened. The circuit breakers are of the trip free type, so that the contacts cannot be closed by holding the lever to the ON position if the fault is still on the line.

4.21 The KS-20944, List 1 protector is designed to trip in 25 milliseconds (maximum) on dc overvoltage, current overload, reversed polarity, or ac greater than 18 volts, and on incorrect power supply ground.

5. MAINTENANCE

5.01 When trouble is reported, check for blown fuses and loose or broken connections, and check the CO pair. ▶If it is reported that calls from a non-SXS CO into the customer's equipment are not being answered, check for battery reversal on T and R leads. (Refer to 4.03 for explanation.)◀ If the fault is not found, perform a test of the 101-type IU.

A. Using 1013A Hand Test Set and 81A Test Set

5.02 Prepare the circuit under test as follows:

(a) Open the 10 leads to the circuit under test by removing the B bridging clips (or wire straps) at the 66M1-50 interface connecting block.

(b) Supply talk battery by connecting a 500-ohm resistor from the −24 volt supply to terminal CR and ground to terminal CT (make all connections on the telephone company side of the 66M1-50 interface connecting block). A 2A KTU or 31A KTU may be used for battery feed instead of the 500-ohm resistor; refer to Section 518-112-421 for KTU connections.

(c) Connect a 1013A (or equivalent) hand test set across terminals CT and CR. Prepare a strap to be used to connect terminal CS to CG as required.

(d) Connect an 81A or KS-16990, List 1 test set across terminals C1 and C2 to indicate continuity (ringing); connect another 81A or equivalent test set across terminals CBS1 and CBS2 to indicate continuity (CO supervision).

5.03 Perform the following tests:

(a) ***Incoming Call:*** Have the test desk call the number associated with the 101-type IU under test. The 81A (or equivalent) test set connected to terminals CBS1 and CBS2 will buzz steadily. The 81A (or equivalent) test set across terminals C1 and C2 will follow ringing. Answer the call by strapping terminal CS to CG and K5 relay should operate to establish a talk path. Have test desk disconnect; the 81A (or equivalent) test set across terminals CBS1 and CBS2 will indicate disconnect (open) within 0.5 second. Remove strap from terminals CS and CG and 81A (or equivalent) test set from terminals C1 and C2.

(b) ***Outgoing Call (Rotary Dial):*** Connect another 81A (or equivalent) test set across terminals CRV1 and CRV2. Connect the blue and green (or blue) leads of a 9C dial across terminals CS and CG for dialing. Dial tone will now be heard on the hand test set connected to terminals CT and CR, and the 81A test set connected to terminals CBS1 and CBS2 will buzz steadily until disconnect. Dial the test desk number using the 9C dial. If the office is arranged for toll diversion, have the test desk reverse battery and verify that the test set connected across terminals CRV1 and CRV2 indicates continuity for the duration of reversal. Disconnect by removing the 9C dial from terminals CS and CG; the 81A test set across terminals CBS1 and CBS2 will go silent indicating disconnect and the transmission path will open.

Note: If the IU is a 101B, a ground hum may be heard in the hand test set during trunk seizure. This is a normal condition caused by the ground start placed on the ring passing through the coupling transformer.

(c) ***Outgoing Call (Tone Address Signaling):*** Connect another 81A (or equivalent) test set across terminals CRV1 and CRV2. Connect the mounting cord leads of a 2500D (or equivalent) station set using 161A adapters across terminals CT (green and yellow) and CR (red) for dialing. Connect a strap from terminal CS to CG. Dial tone will now be heard on the 2500D (or equivalent) station set, and the 81A test set connected to terminals CBS1 and CBS2 will buzz steadily until disconnect. Dial the test desk number; if the office is arranged for toll diversion, have the

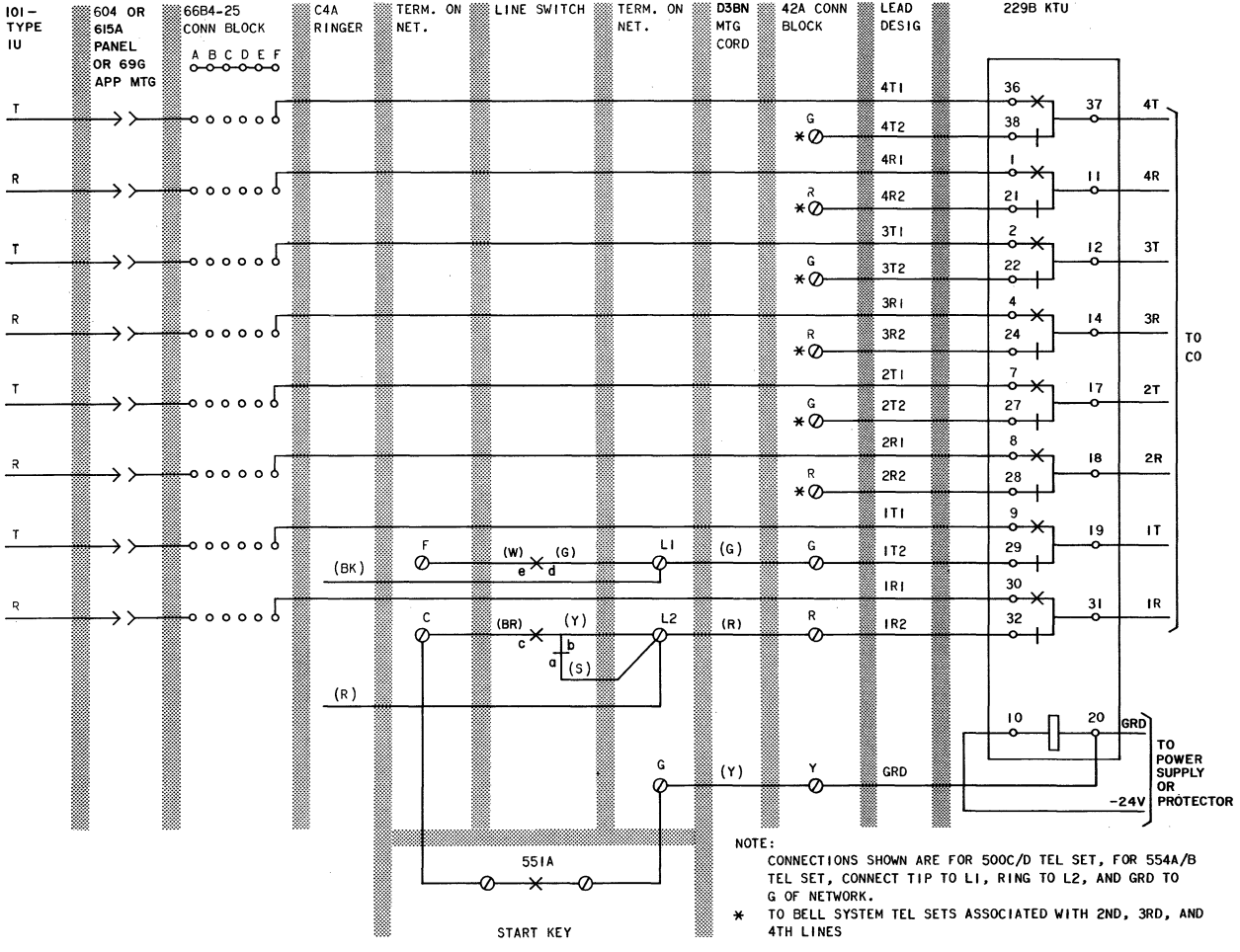


Fig. 17—Power Failure Transfer Circuit (Immediate Restoral)

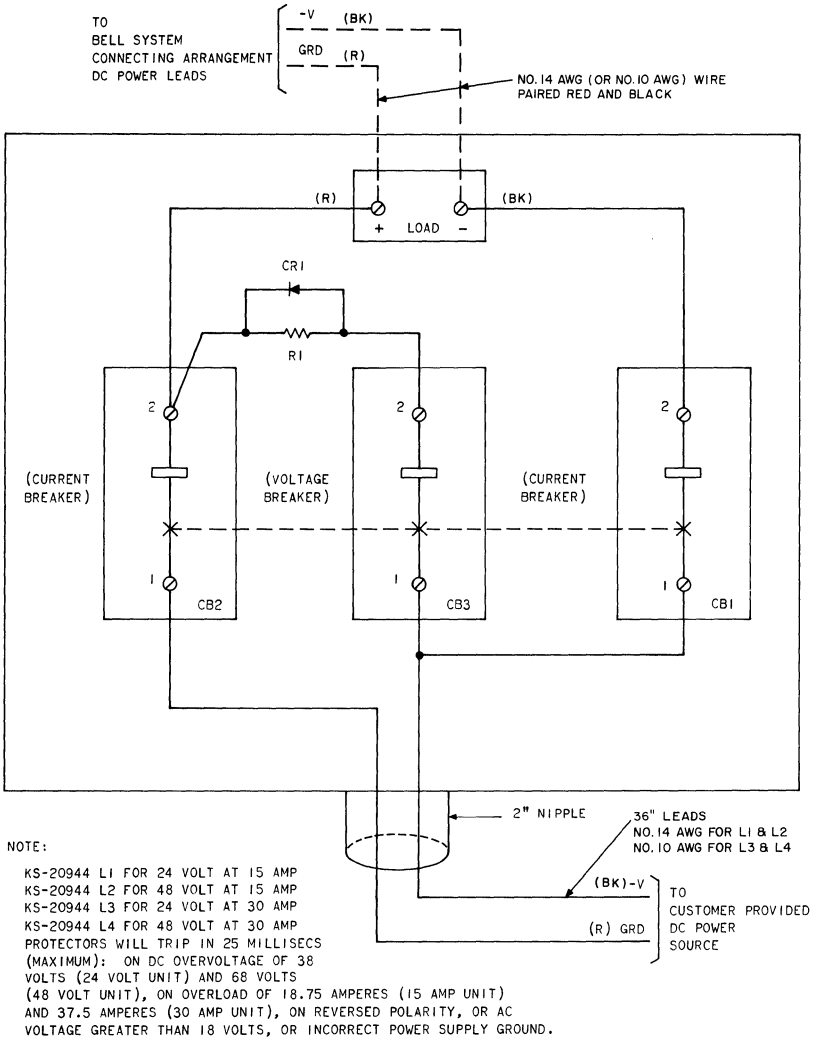


Fig. 18—Schematic—KS-20944 Protector

test desk reverse battery and verify that the 81A (or equivalent) test set connected across terminals CRV1 and CRV2 will indicate continuity for the duration of the reversal. Disconnect by removing the strap from terminals CS and CG; the 81A test set across terminals CBS1 and CBS2 will go silent indicating disconnect and the transmission path will open.

B. Using 142A Test Set (Fig. 19)

5.04 Prepare the circuit under test as follows:

(a) Disconnect the CPE by removing the B bridging clips or wire straps at the interface block.

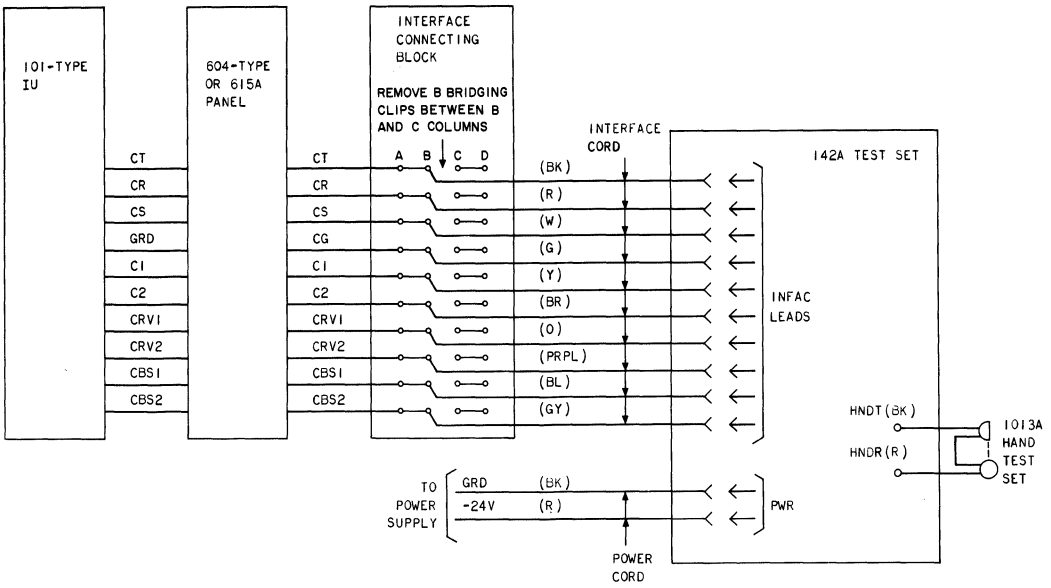


Fig. 19—Connections for Testing 101-Type IU With 142A Test Set

(b) ⏵Select the proper interface cord from the three available 10-conductor cords and connect to the proper terminals on the telephone company side of the block.⏴

(c) Connect the leads from the 2-conductor power cord to −24 volts and ground. This voltage should be obtained from the same source used to power the IU under test. The PWR lamp on the test set should light.

(d) Connect a 1013A hand test set to the HNDR and HNDT terminals of the test set with the MON-TALK switch in the MON position.

(e) Set the CS-CG loop switch in the 18-ohm position for a 101A IU or in the 100-ohm position for a 101B or C IU.

Note: ⏵This is a slide switch on current production; earlier models used a rotary switch.⏴

5.05 After circuit preparation, proceed as follows:

(a) Operate switch on 1013A hand test set to the TALK position. The S relay in the 142A test set will operate, lighting the CS lamp and providing ground on the CS lead through the selected resistance on the CS-CG loop switch. Ground on the CS lead causes the IU to seize the CO trunk as indicated by the CBS- lamp lighting and dial tone being heard in the hand test set. If the IU is a 101B used on a ground start trunk, a ground hum may be heard in the hand test set during trunk seizure. This is a normal condition caused by the ground start placed on the ring passing through the coupling transformer.

Note: If the IU fails to seize the CO trunk, move the CS-CG loop switch to a lower value. If the IU now operates properly, it is considered marginal. Circuits which operate only in the O position should be replaced.

(b) Dial the local test desk using the 1013A hand test set. The S relay and the CS

lamp should follow the dial pulses. Request the test desk to call back on the trunk under test.

(c) Operate the hand test set to the MON position. The CS lamp should be extinguished indicating the S relay in the 142A test set has released removing the ground from the CS lead. The CBS- lamp should also be extinguished in approximately 1/2 second indicating the IU has released the CO trunk and the CO has disconnected.

(d) When the trunk is seized on the return call from the test desk, the CBS- lamp lights. When ringing is applied to the trunk, the C- lamp lights, following the ringing cycle.

(e) Reoperate the hand test set switch to TALK. The C- lamp should extinguish and the CS lamp lights indicating ringing has been tripped and the call answered. The trunk should now be cut through the IU and transmission quality judged using the hand test set.

(f) Instruct the test desk to reverse line polarity. The CRV- lamp should light and remain lit for the duration of the reversal.

(g) Have the test desk release the trunk and return hand test set switch to MON. The CBS- and CS lamps should be extinguished and the IU should be in the idle condition.

5.06 When all testing is complete, remove power and interface cords. Connect CPE by restoring B bridging clips or wire straps at interface connecting block.

5.07 When trouble is suspected in the 101-type IU, exchange it with another unit known to be functioning properly. Tag and place the defective IU in blister pack and return it for repair.

Do not attempt any tests or repairs to the customer-provided equipment.

5.08 When trouble is suspected in the CPE, notify the Repair Service Bureau so that proper maintenance of service charge billing can be initiated as outlined in BSP 660-101-312 entitled Maintenance of Service Charge on Services With Customer-Provided Equipment (CPE).

6. CONNECTIONS

6.01 For connection information using the 69G apparatus mounting, refer to Fig. 11 and Table I.

6.02 For connection information using the 604A-type panel, refer to Fig. 6 and Tables B, C, D, E, F, and I.

6.03 For connection information using the 604B and 604C panels, refer to Fig. 3, 4, 5, and 12 and Tables B, C, D, E, F, and I.

6.04 For connection information using the 615A panel, refer to Fig. 2 and 12 and Tables G, H, and I.

6.05 For connection information using the power failure transfer circuit with delayed restoral, refer to Fig. 16 and Table J. For delayed restoral replace the D3BN mounting cord of 500C/D telephone set with a D4BJ cord.

6.06 For connection information using the power failure transfer circuit with immediate restoral, refer to Fig. 17 and make modifications and connections to telephone set as shown.

6.07 All necessary connections for data transmission are provided by the internal wiring of the 604B or 604C panel when a 75A control unit is plugged into position 13 or 14.

6.08 For connection information using the KS-20944 protector, refer to Fig. 18. For connections to multiple installations, refer to Section 463-300-109.

TABLE B

OPTIONAL CABLE ARRANGEMENTS TO PROVIDE CONNECTIONS FOR FOUR PLUGS ON 604-TYPE PANEL

CABLE DESIGNATION (NOTE)	MAXIMUM NO. OF CABLES REQUIRED		
	ARRANGEMENTS (SEE 3.03)		
	Arrangement 1	Arrangement 2	Arrangement 3
A25B	1	4	2
A50B			1
A75A	1		

Note: Arrangement of interconnecting units and local requirements will determine the size and maximum length of cable required. (Plug No. 5 of 604A (MD) panel not used in this application.)

TABLE C

CONNECTIONS FOR PLUG NO. 1—604-TYPE PANEL

TRUNK NO.	LEAD DESIG*	A25B CONN PIN NO.	A25B CONN CABLE COLOR	66B4-25 CONN BLK ROW NO.	POS. IN 604-TYPE PANEL
1	T	26	W-BL	1	1
	R	1	BL-W	2	
2	T	27	W-O	3	2
	R	2	O-W	4	
3	T	28	W-G	5	4
	R	3	G-W	6	
4	T	29	W-BR	7	5
	R	4	BR-W	8	
5	T	30	W-S	9	7
	R	5	S-W	10	
6	T	31	R-BL	11	8
	R	6	BL-R	12	
7	T	32	R-O	13	10
	R	7	O-R	14	
8	T	33	R-G	15	11
	R	8	G-R	16	
9†	T	34	R-BR	17	13
	R	9	BR-R	18	
10	T	35	R-S	19	3
	R	10	S-R	20	
11	T	36	BK-BL	21	6
	R	11	BL-BK	22	
12	T	37	BK-O	23	9
	R	12	O-BK	24	
13	T	38	BK-G	25	12
	R	13	G-BK	26	
14†	T	39	BK-BR	27	14
	R	14	BR-BK	28	
SPARE	SPARE	40	BK-S	29	
		15	S-BK	30	
		41	Y-BL	31	
		16	BL-Y	32	
		42	Y-O	33	
		17	O-Y	34	
		43	Y-G	35	
		18	G-Y	36	
		44	Y-BR	37	
		19	BR-Y	38	
		45	Y-S	39	
		20	S-Y	40	
		46	V-BL	41	
		21	BL-V	42	
		47	V-O	43	
		22	O-V	44	
		48	V-G	45	
		23	G-V	46	
		49	V-BR	47	
		24	BR-V	48	
		50	V-S	49	
		25	S-V	50	

* Stencil lead designations on fanning strip.

† Cannot be used if 75A control unit is used in position 13 or 14 of 604B panel.

TABLE D

CONNECTIONS FOR PLUG NO. 2—604-TYPE PANEL

TRUNK NO.	LEAD DESIG*	CONN PIN NO.	CONN CABLE COLOR	66M1-50 INTERFACE CONN BLK 1 ROW NO.	POS. IN 604-TYPE PANEL
1	CT	26	W-BL	1	1
	CR	1	BL-W	2	
	CS	27	W-O	3	
	CG	2	O-W	4	
	C1	28	W-G	5	
	C2	3	G-W	6	
	CRV1	29	W-BR	7	
	CRV2	4	BR-W	8	
	CBS1	30	W-S	9	
	CBS2	5	S-W	10	
2	CT	31	R-BL	11	2
	CR	6	BL-R	12	
	CS	32	R-O	13	
	CG	7	O-R	14	
	C1	33	R-G	15	
	C2	8	G-R	16	
	CRV1	34	R-BR	17	
	CRV2	9	BR-R	18	
	CBS1	35	R-S	19	
	CBS2	10	S-R	20	
3	CT	36	BK-BL	21	4
	CR	11	BL-BK	22	
	CS	37	BK-O	23	
	CG	12	O-BK	24	
	C1	38	BK-G	25	
	C2	13	G-BK	26	
	CRV1	39	BK-BR	27	
	CRV2	14	BR-BK	28	
	CBS1	40	BK-S	29	
	CBS2	15	S-BK	30	
4	CT	41	Y-BL	31	5
	CR	16	BL-Y	32	
	CS	42	Y-O	33	
	CG	17	O-Y	34	
	C1	43	Y-G	35	
	C2	18	G-Y	36	
	CRV1	44	Y-BR	37	
	CRV2	19	BR-Y	38	
	CBS1	45	Y-S	39	
	CBS2	20	S-Y	40	
5	CT	46	V-BL	41	7
	CR	21	BL-V	42	
	CS	47	V-O	43	
	CG	22	O-V	44	
	C1	48	V-G	45	
	C2	23	G-V	46	
	CRV1	49	V-BR	47	
	CRV2	24	BR-V	48	
	CBS1	50	V-S	49	
	CBS2	25	S-V	50	

* Stencil lead designations on fanning strip.

TABLE E

CONNECTIONS FOR PLUG NO. 3 — 604-TYPE PANEL

TRUNK NO.	LEAD DESIG*	CONN PIN NO.	CONN CABLE COLOR	66M1-50 INTERFACE CONN BLK 2 ROW NO.	POS. IN 604-TYPE PANEL
6	CT	26	W-BL	1	8
	CR	1	BL-W	2	
	CS	27	W-O	3	
	CG	2	O-W	4	
	C1	28	W-G	5	
	C2	3	G-W	6	
	CRV1	29	W-BR	7	
	CRV2	4	BR-W	8	
	CBS1	30	W-S	9	
	CBS2	5	S-W	10	
7	CT	31	R-BL	11	10
	CR	6	BL-R	12	
	CS	32	R-O	13	
	CG	7	O-R	14	
	C1	33	R-G	15	
	C2	8	G-R	16	
	CRV1	34	R-BR	17	
	CRV2	9	BR-R	18	
	CBS1	35	R-S	19	
	CBS2	10	S-R	20	
8	CT	36	BK-BL	21	11
	CR	11	BL-BK	22	
	CS	37	BK-0	23	
	CG	12	O-BK	24	
	C1	38	BK-G	25	
	C2	13	G-BK	26	
	CRV1	39	BK-BR	27	
	CRV2	14	BR-BK	28	
	CBS1	40	BK-S	29	
	CBS2	15	S-BK	30	
9‡	CT	41	Y-BL	31	13
	CR	16	BL-Y	32	
	CS	42	Y-O	33	
	CG	17	O-Y	34	
	C1	43	Y-G	35	
	C2	18	G-Y	36	
	CRV1	44	Y-BR	37	
	CRV2	19	BR-Y	38	
	CBS1	45	Y-S	39	
	CBS2	20	S-Y	40	
SPARE	SPARE	46	V-BL	41	
		21	BL-V	42	
		47	V-O	43	
		22	O-V	44	
		48	V-G	45	
		23	G-V	46	
−24V	FAL1†	49	V-BR	47	F2(FA)
GRD	G1†	24	BR-V	48	TS1(15)
−48V	FAL2†	50	V-S	49	F16(FA)
GRD	G2†	25	S-V	50	TS1(16)

* Stencil lead designations on fanning strip.

† Optional attendant alarm indicator on 604B or C panel only.

‡ Cannot be used if 75A control unit is used in position 13 of 604B or C panel.

TABLE F

CONNECTIONS FOR PLUG NO. 4—604-TYPE PANEL

TRUNK NO.	LEAD DESIG*	CONN PIN NO.	CONN CABLE COLOR	66M1-50 INTERFACE CONN BLK 3 ROW NO.	POS. IN 604-TYPE PANEL
10	CT	26	W-BL	1	3
	CR	1	BL-W	2	
	CS	27	W-O	3	
	CG	2	O-W	4	
	C1	28	W-G	5	
	C2	3	G-W	6	
	CRV1	29	W-BR	7	
	CRV2	4	BR-W	8	
	CBS1	30	W-S	9	
	CBS2	5	S-W	10	
11	CT	31	R-BL	11	6
	CR	6	BL-R	12	
	CS	32	R-O	13	
	CG	7	O-R	14	
	C1	33	R-G	15	
	C2	8	G-R	16	
	CRV1	34	R-BR	17	
	CRV2	9	BR-R	18	
	CBS1	35	R-S	19	
	CBS2	10	S-R	20	
12	CT	36	BK-BL	21	9
	CR	11	BL-BK	22	
	CS	37	BK-O	23	
	CG	12	O-BK	24	
	C1	38	BK-G	25	
	C2	13	G-BK	26	
	CRV1	39	BK-BR	27	
	CRV2	14	BR-BK	28	
	CBS1	40	BK-S	29	
	CBS2	15	S-BK	30	
13	CT	41	Y-BL	31	12
	CR	16	BL-Y	32	
	CS	42	Y-O	33	
	CG	17	O-Y	34	
	C1	43	Y-G	35	
	C2	18	G-Y	36	
	CRV1	44	Y-BR	37	
	CRV2	19	BR-Y	38	
	CBS1	45	Y-S	39	
	CBS2	20	S-Y	40	
14†	CT	46	V-BL	41	14
	CR	21	BL-V	42	
	CS	47	V-O	43	
	CG	22	O-V	44	
	C1	48	V-G	45	
	C2	23	G-V	46	
	CRV1	49	V-BR	47	
	CRV2	24	BR-V	48	
	CBS1	50	V-S	49	
	CBS2	25	S-V	50	

* Stencil lead designations on fanning strip.

† Cannot be used if 75A control unit is used in position 14 of 604B or C panel.

TABLE G

CONNECTIONS FOR CENTRAL OFFICE TRUNKS AT 615A PANEL

TRUNK NO.	LEAD DESIG	TERMINAL ON 66T1 CONN BLOCK	66B4-25 CONN BLOCK ROW NO.
1	T R	1A 2A	1 2
2	T R	3A 4A	3 4
3	T R	5A 6A	5 6

TABLE H

CONNECTIONS FROM PLUG P1 ON 615A PANEL TO INTERFACE CONNECTING BLOCK

TRUNK NO.	LEAD DESIG	P1 PIN NO.	A25B CONN CABLE	66M1-50 CONN BLOCK (TELCO SIDE) ROW NO.
1	CT	26	W-BL	1
	CR	1	BL-W	2
	CS	27	W-O	3
	CG	2	O-W	4
	C1	28	W-G	5
	C2	3	G-W	6
	CRV1	29	W-BR	7
	CRV2	4	BR-W	8
	CBS1	30	W-S	9
	CBS2	5	S-W	10
2	CT	31	R-BL	11
	CR	6	BL-R	12
	CS	32	R-O	13
	CG	7	O-R	14
	C1	33	R-G	15
	C2	8	G-R	16
	CRV1	34	R-BR	17
	CRV2	9	BR-R	18
	CBS1	35	R-S	19
	CBS2	10	S-R	20
3	CT	36	BK-BL	21
	CR	11	BL-BK	22
	CS	37	BK-O	23
	CG	12	B-BK	24
	C1	38	BK-G	25
	C2	13	G-BK	26
	CRV1	39	BK-BR	27
	CRV2	14	BR-BK	28
	CBS1	40	BK-S	29
	CBS2	15	S-BK	30

TABLE I

POWER CONNECTIONS

INPUT VOLTAGE	69G APP MTG (NOTE 1)	604B OR C PANEL (NOTE 2)	604A1 PANEL (NOTE 3)	615A PANEL (NOTE 4)
−24V	11	Input −24V	14	2D
−48V	—	Input −48V	—	—
GRD	4	Input GRD	13	4D

Notes:

1. Terminals on 66B4-25 connecting block. Connect as shown in Fig. 11.
2. Terminals on rear of panel stamped as shown. Position option straps for −24V or −48V.
3. Terminals on terminal strip TSA on rear of 604A1 panel.
4. Terminals on 66T1 connecting block.

TABLE J

MODIFICATION OF 500C/D OR 554A/B
TELEPHONE SETS FOR POWER FAILURE TRANSFER
WITH DELAYED RESTORAL ONLY

LEAD AND CONTACT DESIG		LEAD COLOR	TERM. ON NET. (Note)	
			REMOVE FROM	CONNECT TO
D4BJ Mtg Cord	Tip	(G)	L1	F
	Ring	(R)	L2	L1
	LK	(BK)		L2
	A1	(Y)		G
C4A Ringer		(R)	L2	L1
		(BK)	G or L1	F
Line Switch	a	(S)		L2
	b	(Y)	L2	G
	c	(BR)	C	G
	d	(G)		L1
	e	(W)	F	C

Note: Connect 551A ground start key between C and G of network.

TABLE K

604A-TYPE PANEL FUSE ASSIGNMENT

FUSE NO.*	PANEL POSITION	VOLTAGE
F1	J1A	−24V
F2	J2A	
F3	J3A	
F4	J4A	
F5	J5A	
F6	J6A	
F7	J7A	
F8	J8A	
F9	J9A	
F10	J10A	
F11	J11A	
F12	J12A	
F13	J13A	
F14	J14A	
F15	J10B†	
F16	J11B†	
F17	J13B†	
F18	J14B†	

* Fuses are 70G 1/2-ampere.
† Plug No. 5 dedicated to one-way incoming trunks.

TABLE L

604B AND 604C PANEL FUSE ASSIGNMENT

FUSE NO.	PANEL POSITION	VOLTAGE
F1*	J1A thru J14A	Ringing Voltage (Note)
F2*	J1A	−24V
F3*	J2A	
F4*	J3A	
F5*	J4A	
F6*	J5A	
F7*	J6A	
F8*	J7A	
F9*	J8A	
F10*	J9A	
F11*	J10A	
F12*	J11A	
F13*	J12A	
F14†	J13A	
F15†	J14A	
F16†	J1A thru J5A	−48V (Note)
F17‡	J6A thru J10A	
F18‡	J11A thru J14A	

Note: Ringing voltage fuse and −48V fuses not used in this application.

* 70F fuse 1/4 ampere.
† 70G fuse 1/2 ampere.
‡ 70A fuse 1-1/3 ampere.

TABLE M

615A PANEL FUSE ASSIGNMENTS

VOLTAGE	FUSE NO.†	CONNECTOR
−24V	F1	J1A, B
	F2	J2A, B
	F3	J3A, B
−48V*	F4	J1A
	F5	J2A
	F6	J3A
±105V*	F7	J1A, J2A, J3A
	F8	SPARE

* Not used with PCA CDH.

† All fuses 24E, 1/2-ampere.