PROTECTIVE CONNECTION ARRANGEMENTS CD9, CD8, CD7 AND CONNECTING ARRANGEMENT CBF

1. GENERAL

1.01 This section provides identification, installation, operation, maintenance, and connection information for the 102-type interconnecting unit (IU) and associated 604-type, ▶or 615A◀ panel when used for Protective Connecting Arrangements (PCA) CD9, CD8, or CD7. ▶It also covers the 75A control unit used for Connecting Arrangement (CA) CBF, the KS-20944 protector used for CA VCP, and Uniform Service Order Codes CA PFB and PFC.◀

1.02 This section is reissued to:

- Add 604C panel
- Add 615A panel
- Show use of the 142A test set
- Clarify use of options (Fig. 14)
- Remove information on use of 69G apparatus mounting in new installations.

1.03 For detailed maintenance and connection information of specified components, refer to:

604A Panel—463-300-101

604B and 604C Panels—463-300-102

▶615A Panel—463-300-104

142A Test Set—463-300-113◀

75A Control Unit—463-300-112

KS-20944 Protector—463-300-109.

1.04 The 102B IU is an improved version of the 102A (MD) IU for use with PCAs CD9, CD8, and CD7 and offers the following advantages:

- Line impedance matching
- Increases range limitation of supervisory and dial pulsing leads (CS and CG) from 18 ohms to 100 ohms maximum (see Note)
- Maximum allowable external loop resistance to central office (CO) of 2500 ohms
- Arranged for data application
- New transformer with higher breakdown insulation.

Note: If a problem is encountered in an existing installation with these limitations using a 102A IU, replace with a 102B. In existing installations using pulse correction, the 103A (MD) pulse corrector must be removed when replacing the 102A IU with a 102B IU.

1.05 The 604B and ▶604C◀ panels are improved versions of the 604A (MD) panel and offer the following advantages:

- Arranged for data application (with 75A control unit)
- 24V operation (604B and 604C panels)
- 48V operation (604B and 604C panels with 21A apparatus mounting)
- Require only 8 inches of the vertical mounting space
- Connections for remote fuse alarm indicator.

1.06 ▶The 615A panel provides mounting facilities for three 102-type IUs. It is designed to

be used instead of the 69G apparatus mounting in new installations.◀

Note: The 604B, ▶604C and 615A◀ panels require the use of an external power supply.

1.07 The size of the initial installation and the expected growth should be the determining factors in selecting the proper mounting equipment. For one to three IUs use the ▶615A panel.◀ If growth is expected to be 4 to 14 IUs, use the 604-type panel.

1.08 For data application (CA CBF), the 75A control unit is used with the 102B IU to provide an alternate voice/data capability. The 75A control unit can only be provided with the 604B ▶or 604C◀ panel.

1.09 These arrangements are used to provide the following services from a local or foreign exchange CO to a customer-provided (CP) communications system:

- 2-way loop-start manual service, attendant handled (CD9)
- One-way outgoing automatic service, machine handled (CD8)
- One-way outgoing manual service, attendant handled (CD7).

1.10 If the customer wants a copy of the Technical Reference which covers this interface specification, the customer should contact the local Telephone Company Business Office or the Marketing Representative.

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

SD-1E202-01, Issue 3A (102A IU)

SD-1E238-01, Issue 2A (102B IU)

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

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

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

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

(a) ***PCA CD7, CD8, and CD9***

- To provide interfaces between loop-start CO trunks and a CP PBX
- To provide voiceband transmission
- To limit excessive voice signal power levels from customer-provided equipment (CPE) and to provide protection for telephone company personnel against hazardous voltages
- To transmit network control signaling function.

(b) ***CA CBF***

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

(c) ***PFB, PFC***

- To provide telephone service during commercial power failure.

(d) ***CA VCP***

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

ORDERING GUIDE

(a) ***For PCA CD7, CD8, and CD9***

- Unit, Interconnecting, 102B (one per CO trunk, Fig. 1).

Associated Apparatus (Order Separately)

Note: If a 23-inch relay rack is not provided on customer premises, provide a 16C apparatus mounting for the ▶615A panel◀ or an ED-91180-72,

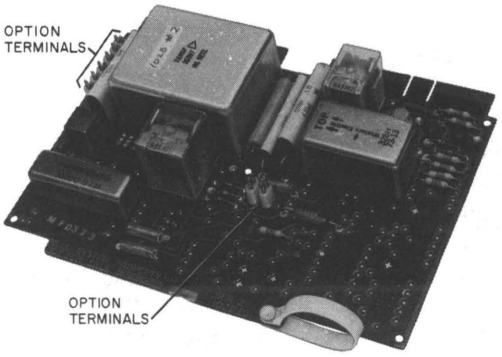


Fig. 1—102B Interconnecting Unit

Group 21 cabinet for the 604-type panel, or their local equivalent.

- Panel, 604A1 (MD) (fuse panel only, no power unit; mounts fourteen 102-type IUs)

  or

- Panel, 604A2 (MD) (includes 19C2 power unit and fuse panel; mounts fourteen 102-type IUs, Fig. 2)

  or

- Panel, 604B (fuse panel only, no power unit; mounts fourteen 102-type IUs, ▶or twelve 102B IUs and two 75A control units, Fig. 3 and 4) (24V or 48V operation)◀

  or

- Panel, 604C (fuse panel only, no power unit; mounts fourteen (102-type IUs, ▶or twelve 102B IUs and two 75A control units, Fig. 3 and 4) (24V operation)◀

  or

- Panel, 615A (fuse panel only, no power unit; mounts three 102-type IUs, Fig. 5)—supply voltage must be −24V

  or

- Unit, Apparatus, 21A—required with 604C panel when supply voltage is −48V

- Bracket, 99B ▶(one per three 615A panels)◀

- Cable, A25B (▶one per 615A panel,◀ or four per 604-type panel; see Table A)

- ▶Cable, A50B (one per 604-type panel) (Table A)

- Cable, A75B (one per 604-type panel) (Table A)◀

- Block, Connecting, 66M1-50 (as required, Fig. 6)

Note: Other type blocks should not be used as they may not be compatible for testing with the 142A test set.

- Block, Connecting 66B4-25 (as required)

- Clip, Bridging, B (25 per pkg., as required, Fig. 6)

- Cable, D Inside Wiring, or equivalent ▶(where required for the 615A panel)◀

- Unit, Power, 19C2, or equivalent (for 615A, 604A1, 604B or 604C)

- Unit, Power, 29C1, or equivalent (for 604B or 604C with 75A control units)

- Cord, Power (for 19C2 or 29C1 power unit)

  P40J326 (1-1/2 ft)

  P40J327 (2 ft)

  P40J328 (4 ft)

  P40J329 (6 ft)

  P40J099 (12 ft)

(b) ***For Power Failure Transfer (CA PFB or PFC)***

- Set, Telephone, 500C/D or 554A/B* (one per arrangement)

INSTALLATION SEQUENCE OF 102B 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

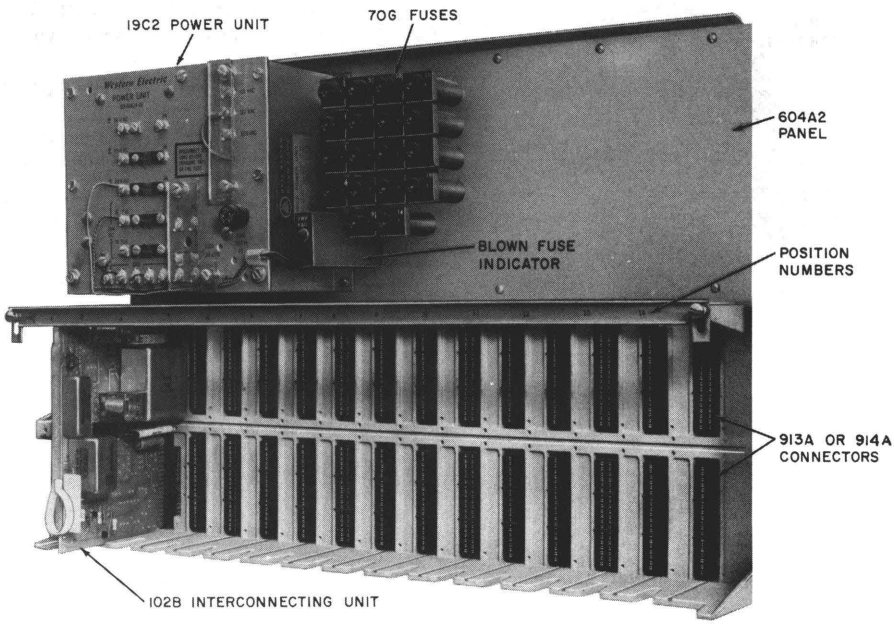


Fig. 2—102B Interconnecting Unit Mounted in 604A2 (MD) Panel

- Unit, Key Telephone, 229B (one per four arrangements if immediate restoral is used, PFB; one per arrangement if delayed restoral is used, PFC)
- Indicator, Lamp, 15-Type, or equivalent (delayed restoral only when option Z provided in 229B KTU, PFC)
- Cord, Mounting, D4BJ (for 500C/D telephone set if delayed restoral required, PFC)*

*Add color suffix.

(c) ***For Data Transmission (CA CBF)***

- Unit, Control, 75A (one per six 102B IUs in 604B or 604C panel, Fig. 7).

(d) ***For Power Protection Unit (CA VCP)***

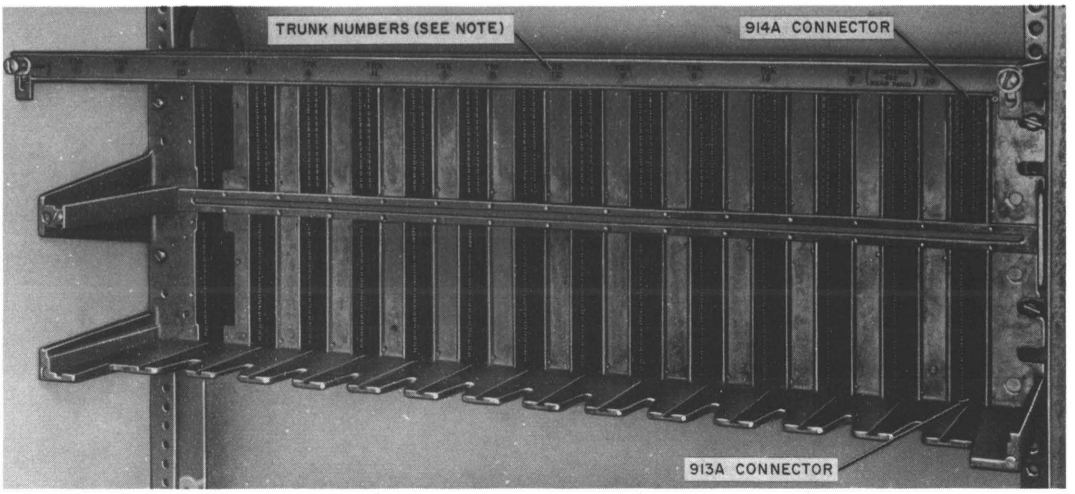
- Protector, KS-20944 (Fig. 8, select list number from Fig. 17) (must be provided when a CP dc power supply is used).

Replaceable Components

- Unit, Power, 19C2 (for 604A2 panel)
- ◗Fuse, 24E, 1/2 Ampere (eight per 615A panel)◖
- Fuse, 70G, 1/2 Ampere (18 per 604A-type panel)
- Fuse, 70F, 1/4 Ampere (13 per 604B or 604C panel)
- Fuse, 70G, 1/2 Ampere (two per 604B or 604C panel)
- Fuse, 70A, 1-1/3 Amperes (three per 604B or 604C panel)
- Unit, Apparatus, 21A.

DESIGN FEATURES

102-Type Interconnecting Unit



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

INSTALLATION SEQUENCE OF 102-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 or 604C Panel, Front View

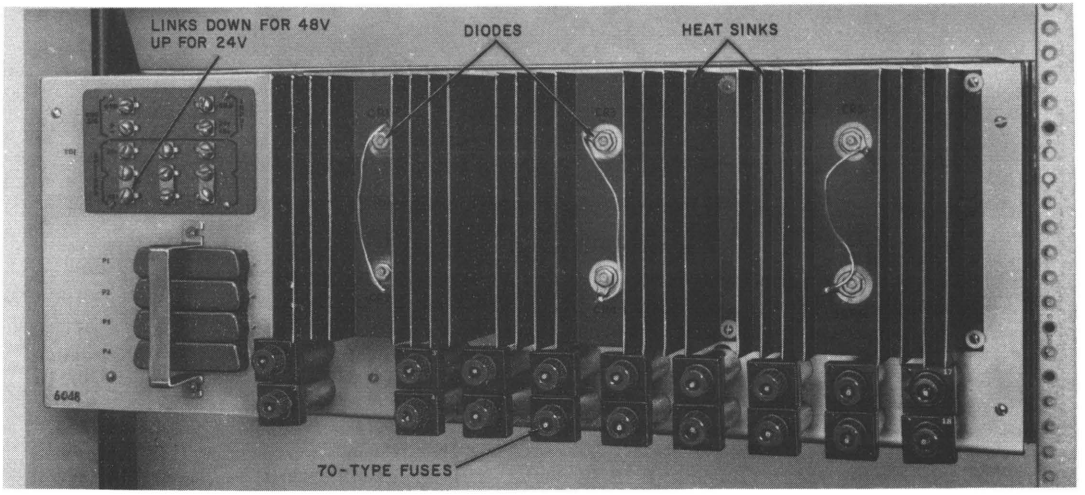


Fig. 4—604B Panel, Rear View

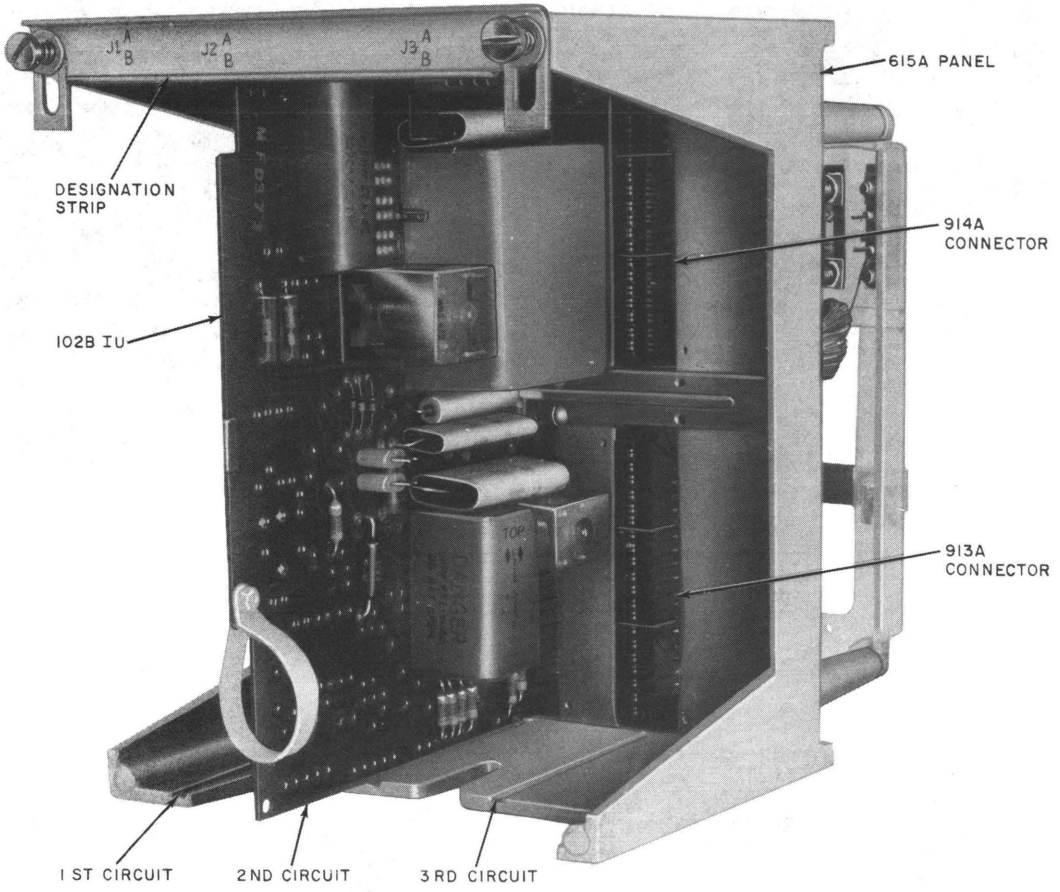


Fig. 5—102B Interconnecting Unit Mounted in 615A Panel

- Components mounted on epoxy coated 8-inch 80-pin board.
- Features loop-start operation.
- Option terminals (Fig. 1).
- Features line impedance matching (102B IU only).
- Provides dc isolation to CPE.
- 102B IU requires 0.090 ampere (maximum) at 26 volts dc; 102A IU requires 0.110 ampere maximum at 26 volts dc.
- Data transmission capability (102B only when used in 604B or 604C panel with 75A control unit).

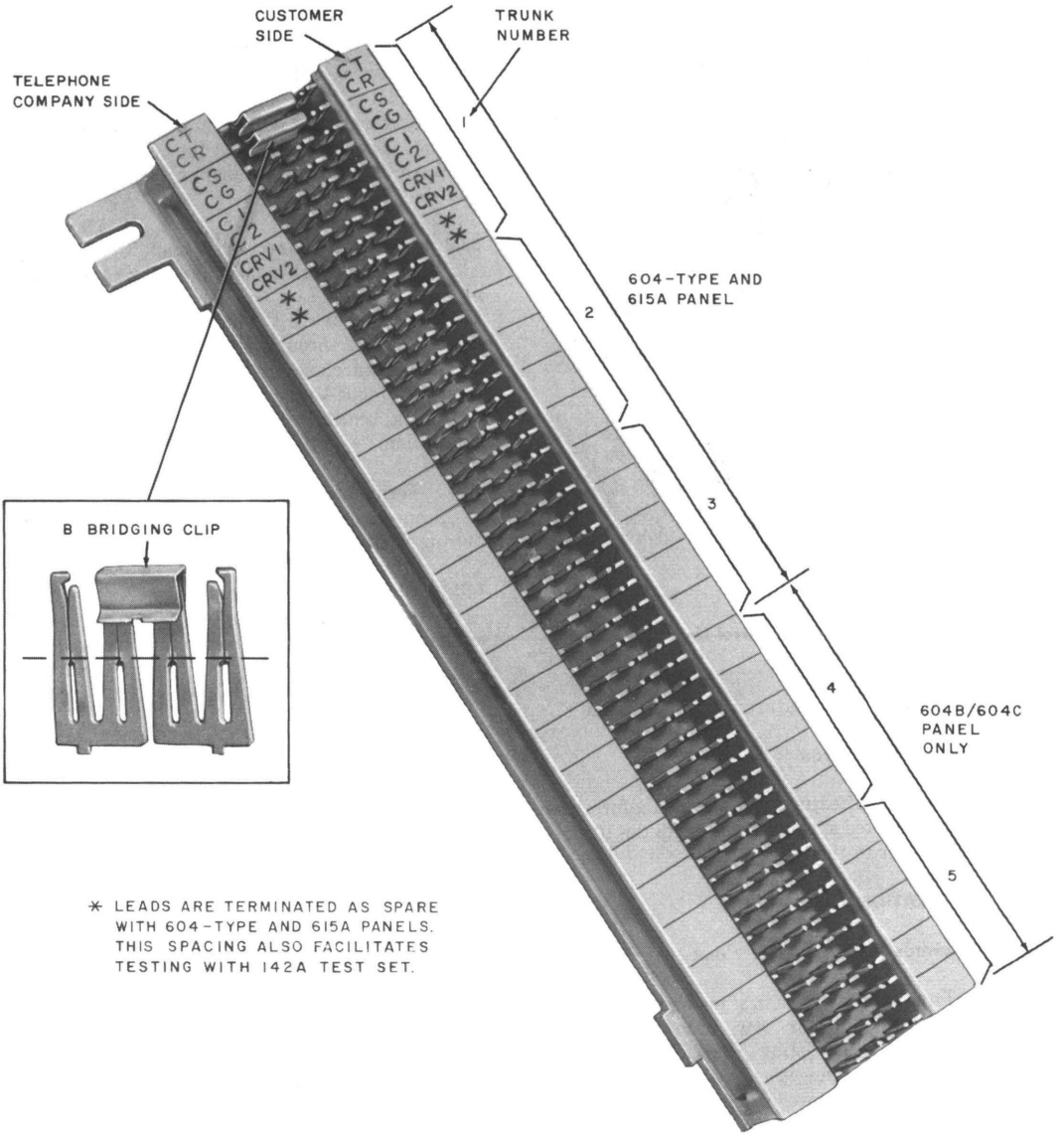


Fig. 6—66M1-50 Interface Connecting Block

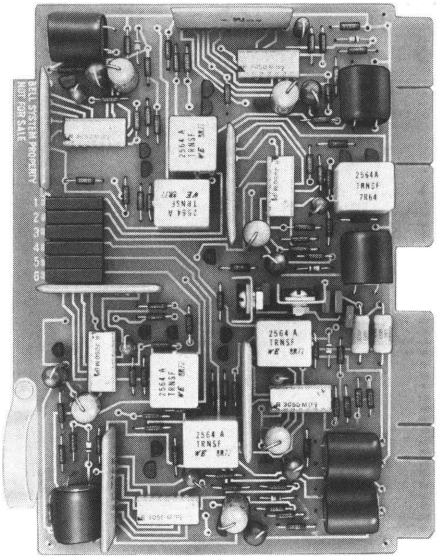


Fig. 7—75A Control Unit

- Operating temperature range 0°F to 120°F.

Associated Apparatus

- For design features and detailed information on associated apparatus used with the 102-type IU, refer to the sections shown in 1.03.

3. INSTALLATION

69G Apparatus Mounting (Fig. 9 and 10)

3.01 The 69G apparatus mounting is not recommended for new installations. To provide additions to existing installations, refer to Fig. 9 and 10 for connections required. Separate fusing and −24 volt power are provided locally.

604-Type Panel (Fig. 11, and Tables B, C, D, E, H, I, and J)

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 18 ohms loop resistance (200 ft) of the CPE for the 102A IU and within 100 ohms loop resistance for the 102B IU. This cabinet will hold two 604A-type panels, three 604B or 604C panels, or two 604B or 604C panels with power units when the drawing holder on the lower half of the cover is removed. The relay rack or equipment cabinet should be grounded separately. Mount the 66M1-50 connecting block so as to facilitate testing between the block and the 604-type panel.

3.03 Electrical connection is made to the 604-type panel through connector cables. Arrangement of the KS-16671, List 1 plugs on the panel restricts the first plug for the CO lines to an A25B connector cable. Plugs 2 through 4 for the CPE are arranged to adapt to a choice of cable sizes (see Table A). Plug No. 5 (604A-type only) is dedicated to one-way incoming trunks only and is not used in this application.

3.04 Terminate connector cable No. 1 on a 66B4-25 intermediate connecting block for connecting the CO lines.

3.05 Terminate connector cables 2, 3, and 4 at customer end on the telephone company side of the 66M1-50 interface connecting blocks located within 25 feet of panel (stencil lead designation on fanning strip, Fig. 6).

> ***Note:*** C1 and C2 leads are required for PCA CD9 only. CRV1 and CRV2 leads are used with PCA CD8 when the customer orders toll diversion service on a trunk. It is recommended that space be reserved for these leads even though they may not be required for this particular installation.

3.06 When using separate power units, the customer must provide a separately fused (15 ampere) 105- to 130-volt 60-Hz outlet for each panel within reach of the power cords (see ORDERING GUIDE for cord lengths). The outlet should not be under control of a wall switch.

3.07 Connect power, either telephone company-provided power or CP dc power supplied through the KS-20944 protector, to rear of 604A1, 604B, or 604C panel as shown in Fig. 11 and Table H. Refer to appropriate section in Division 518 for proper grounding of power plants. Proper grounding of equipment and power unit is important to prevent damage from power line surges.

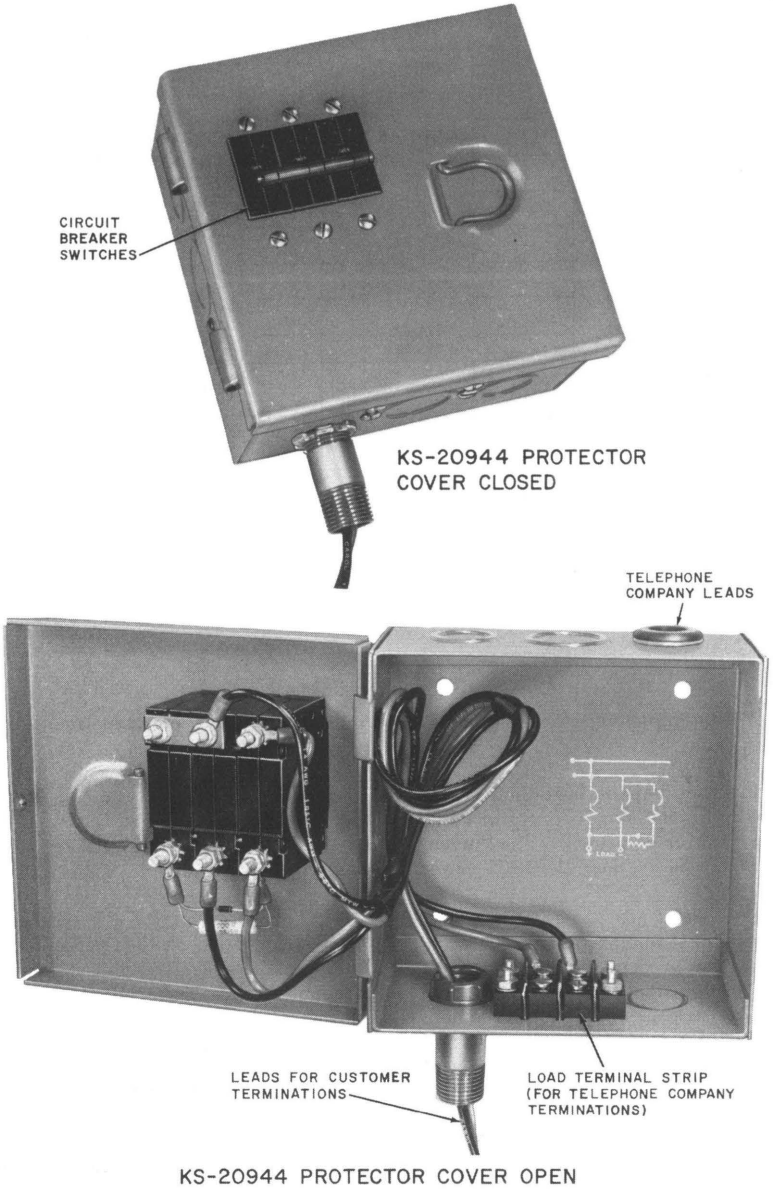


Fig. 8—KS-20944 Protector

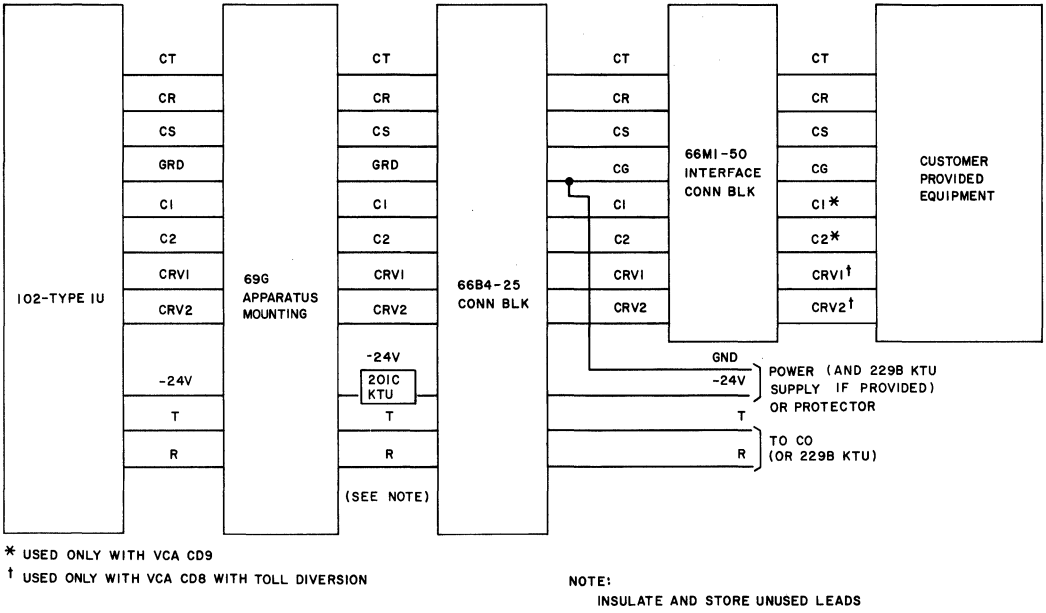


Fig. 9—Block Diagram—69G Apparatus Mounting With 102-Type Interconnecting Unit

3.08 When using the 604B or 604C panel with twelve 102B IUs and two 75A control units, use a 29C1 power unit or equivalent. The current drawn by these units will overload the 19C2 power unit.

3.09 ▶Position option straps on rear of 604B and 604C panels for proper supply voltage. If a 604C panel has been installed and supply voltage is −48V, a 21A apparatus unit must be added. Connect any of the R-BK leads to any of the −24V terminals. Connect any of the R leads to any of the −48V terminals.◀

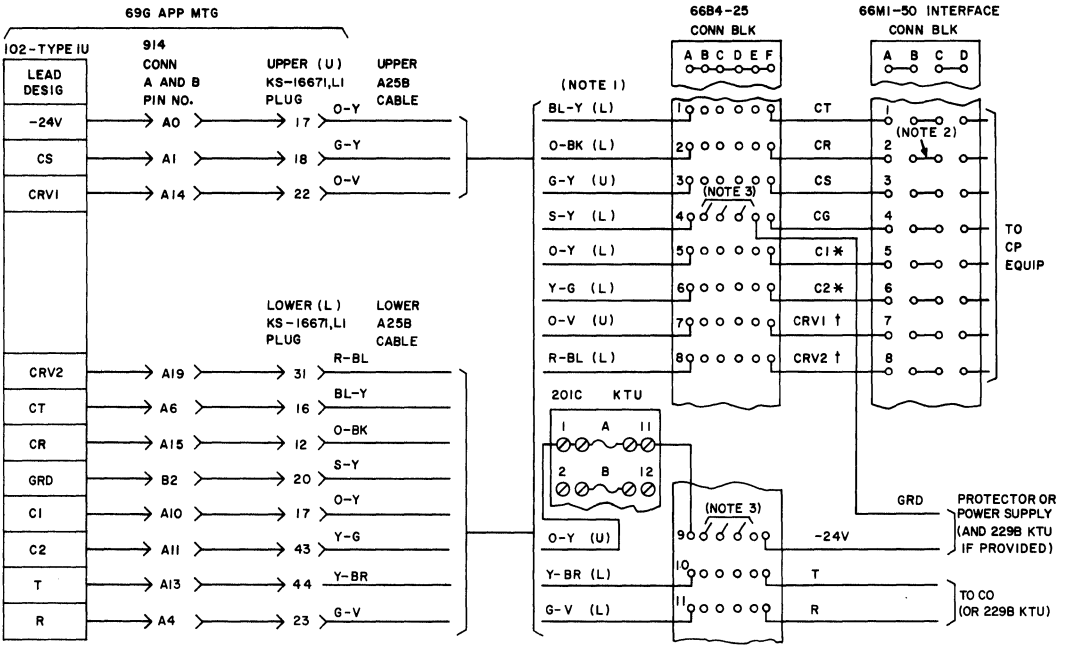
▶615A Panel (Fig. 12, and Tables F, G, H, and K)

3.10 Install the 615A panel on a 23-inch relay rack or in a 16C apparatus mounting using the 99B bracket. Remove the center mounting bar from the 16C apparatus mounting to avoid cover interference. The bracket holds up to three 615A panels. Each 615A panel holds three 102-type IUs. When less than three IUs are required, the sequence of installation of the required IUs should be the same as the designation assigned to the connectors (J1, J2, J3).

3.11 Connection of the CO lines is made to the 615A panel on a 66T1 connecting block as shown in Table F. The 24-volt power and ground terminations are also made on the 66T1 block as shown in Table H.

3.12 All other connections to the CPE are made to the 615A panel through a single A25B cable to an Amphenol plug on the panel as shown in Table G. Terminate the stub end of the A25B cable on the telephone company side of a 66M1-50 interface connecting block. Stencil lead designations on the fanning strip (Fig. 6).

3.13 Connect a frame ground wire to the 16C apparatus mounting on relay rack. Refer to the appropriate section in Division 518 for proper



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

* USED ONLY WITH VCA CD9
† USED ONLY WITH VCA CD8 FOR TOLL DENIAL WHEN SERVING CO CAN PROVIDE

Fig. 10—Connection Diagram—69G Apparatus Mounting With 102-Type Interconnecting Unit

grounding. Proper grounding of equipment and power unit is important to prevent damage from power line surges.◀

102-Type Interconnecting Unit (Fig. 1, 13, or 14)

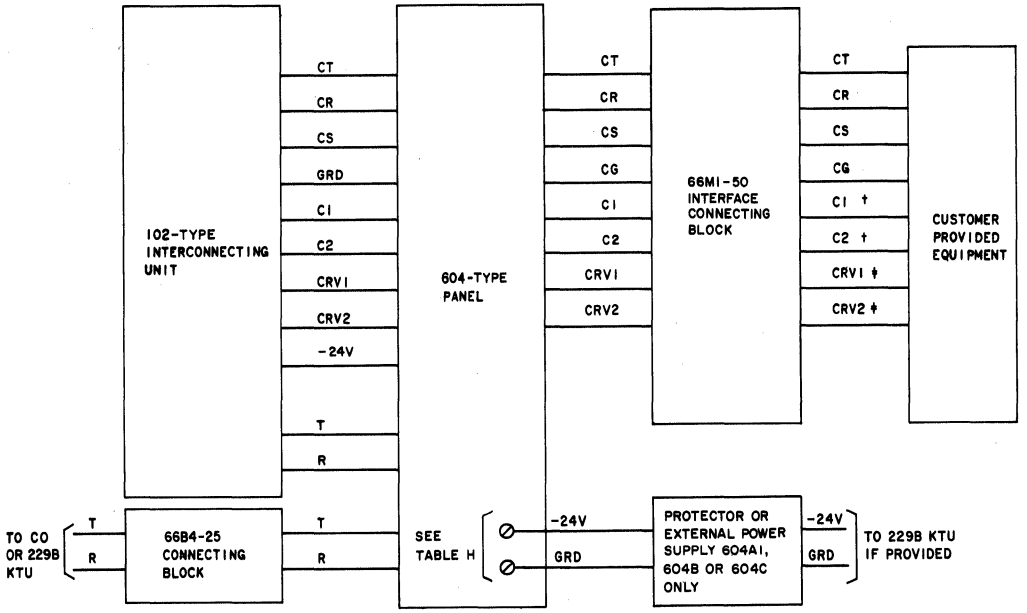
▶***Caution: Do not use 102A IU in position 13 if 102B IU is used in position 1 or 4. Do not use 102A IU in position 14 if 102B IU is used in position 7 or 10.***◀

To protect transistors and other electrical components of 102-type interconnecting units, remove fuses associated with that particular circuit before installing or replacing a unit. (See Table I, J, or K.)

3.14 Place proper option straps using 24-gauge bare wire for options W, Y, or Z from Fig. 13 or 14 for local conditions. Always use option Z for the 102A IU.

3.15 ▶For the 102B IU, provide option Y or Z as required. Option Y provides 600-ohm CPE to 600-ohm CO impedance matching. This option is factory provided on current production of 102B IUs. Option Z provides 600-ohm CPE to 900-ohm CO impedance matching. Option Z is required only when PBX-CO trunk facility is designed with terminating sets or 837-type impedance compensators that have 900-ohm input impedance.◀ ***Provide option W for CO loops greater than 800 ohms including CO resistance only.***

Note: The option designations are different for the 102A and 102B IUs.



† USED ONLY WITH VCA CD9
‡ USED ONLY WITH VCA CD8 WITH TOLL DIVERSION.

Fig. 11—Block Diagram—604-Type Panel With 102-Type Interconnecting Unit

Check that all option straps have been installed and check continuity of straps after installation.

3.16 When installing the 102-type IU, position the board in the guide grooves of the 69G apparatus mounting, 604-type or 615A panel, and slide in until the unit is properly seated in the connectors. The guide grooves prevent improper insertion of the 102-type IU.

Note: The connectors in the 604-type and 615A panels are equipped with index clips to match the code slots in the 102B IU. When using 102A IUs, it will be necessary to pull out the clips between contacts 9 and 10 in the B connectors of 604-type panels.

3.17 Make certain card retainer or designation strip holder is properly positioned to hold the 102-type IUs in place.

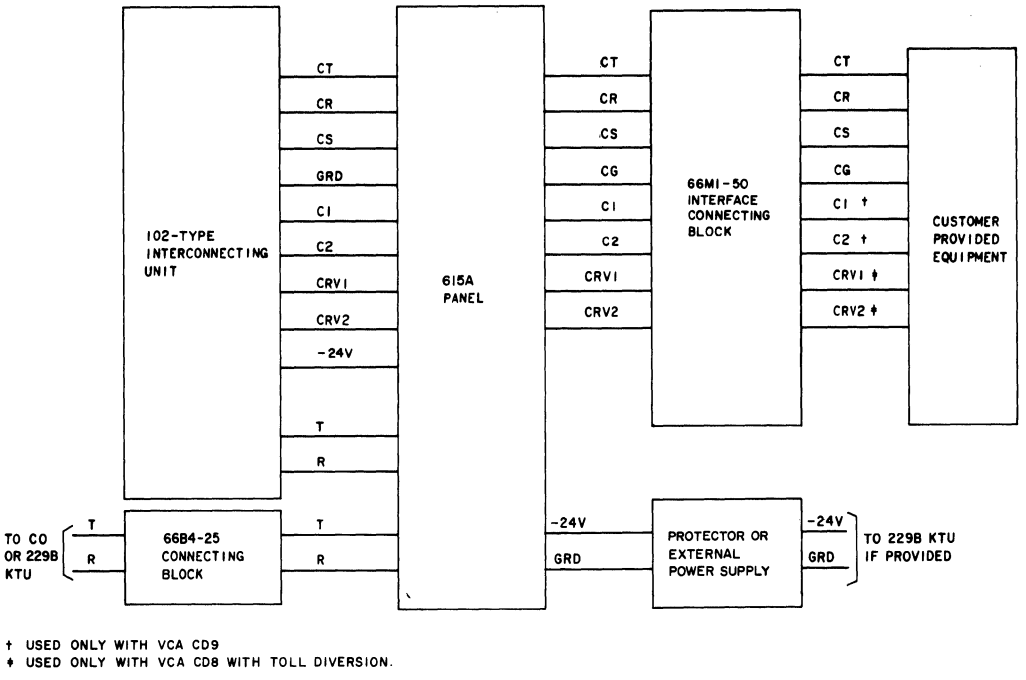
3.18 Refer to Fig. 2 or 3 for installation sequence of 102-type IUs in the 604-type panel. On earlier production of the 604B panel, the position numbers were stamped on the designation strip. On current production of the 604B and on the 604C panel, the trunk number appears on the strip.

This suggested sequence is required to correspond to the KS-16671, List 1 plug wiring arrangement.

3.19 Perform tests shown in Part 5 after installation.

Power Failure Transfer (Fig. 15 or 16)

3.20 When power failure transfer with delayed restoral is required, the 229B KTU must be mounted externally and wired to the 69G apparatus mounting, 604-type or 615A panel, and selected telephone set as shown in Fig. 15 and Table L. Replace the D3BN mounting cord with a D4BJ



† USED ONLY WITH VCA CD9
♦ USED ONLY WITH VCA CD8 WITH TOLL DIVERSION.

Fig. 12—♦Block Diagram—615A Panel With 102-Type Interconnecting Unit♦

mounting cord. If Z option (indicator lamp) is required, install per local practices.

3.21 When power failure transfer with immediate restoral is required, the 229B KTU must be mounted externally and wired to the 604-type or 615A panel and selected telephone set as shown in Fig. 16. No telephone set modification is required.

75A Control Unit

3.22 The 75A control unit is plugged into position 13 of the 604B or 604C panel to furnish ALC to IUs in position 1 through 6 or plugged into position 14 to furnish ALC for positions 7 through 12. Since the 604B and 604C panels are 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.

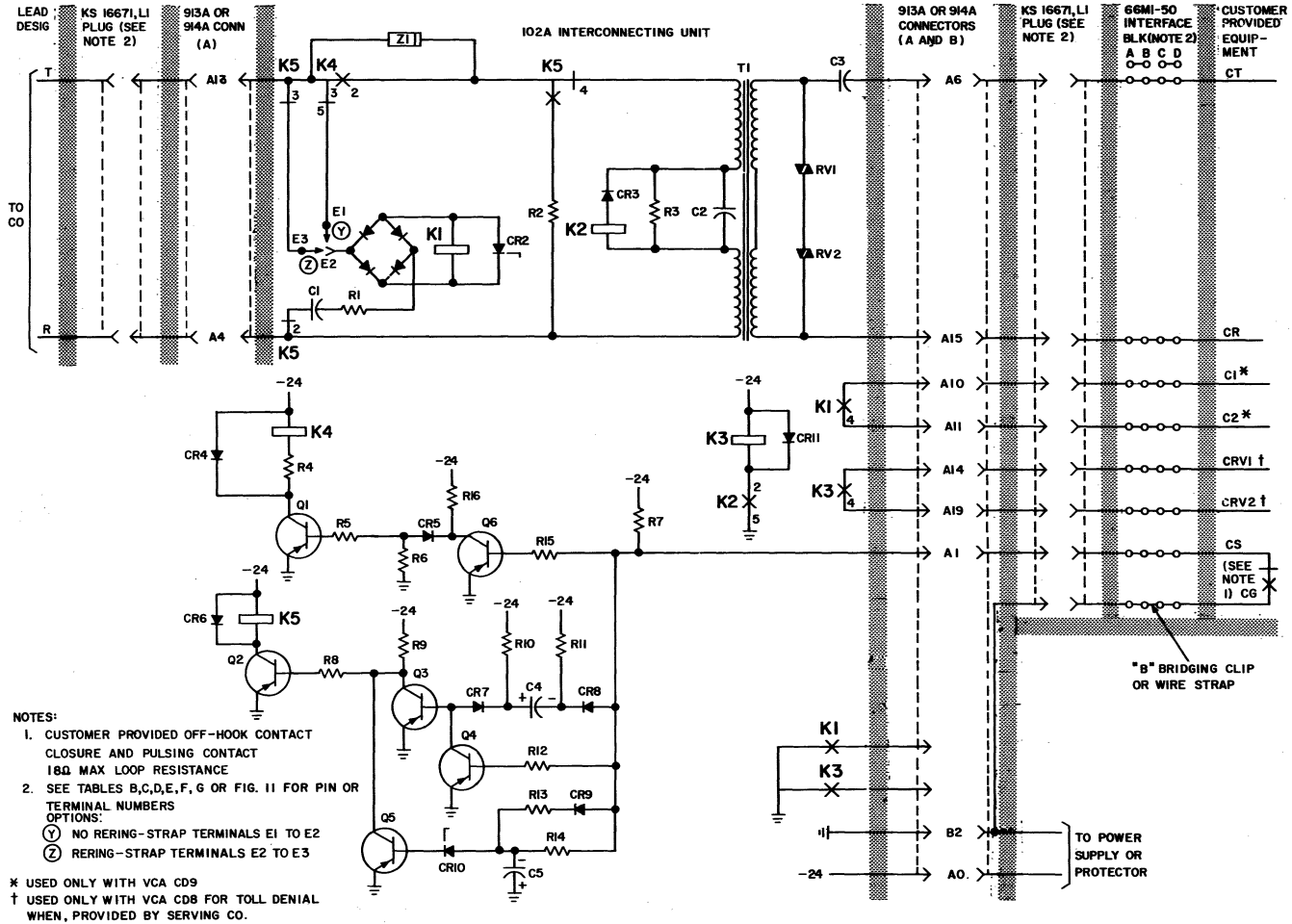
3.23 After installation, adjust the limiting level threshold by setting the six-level control potentiometers as shown in 5.04 of Section 463-300-112.

KS-20944 Protector (Fig. 17)

3.24 When voltage protection is required, the KS-20944 protector must be mounted externally and wired to the power supply terminals of the 69G apparatus mounting (Fig. 10), 604-type panel (Fig. 11), or 615A panel (Fig. 12). Refer to Section 463-300-109 for connections to multiple installations.

3.25 Connect as shown in Fig. 17 following local wiring instructions. The customer must connect his power supply to the red (GRD) and black (-V) 14-gauge (or 10-gauge) wires extending from the unit.

Warning: Voltage will be present on the number 1 (upper) terminals of circuit breakers when customer power is connected.



NOTES:

1. CUSTOMER PROVIDED OFF-HOOK CONTACT CLOSURE AND PULSING CONTACT 18Ω MAX LOOP RESISTANCE
2. SEE TABLES B,C,D,E,F,G OR FIG. 11 FOR PIN OR TERMINAL NUMBERS

OPTIONS:

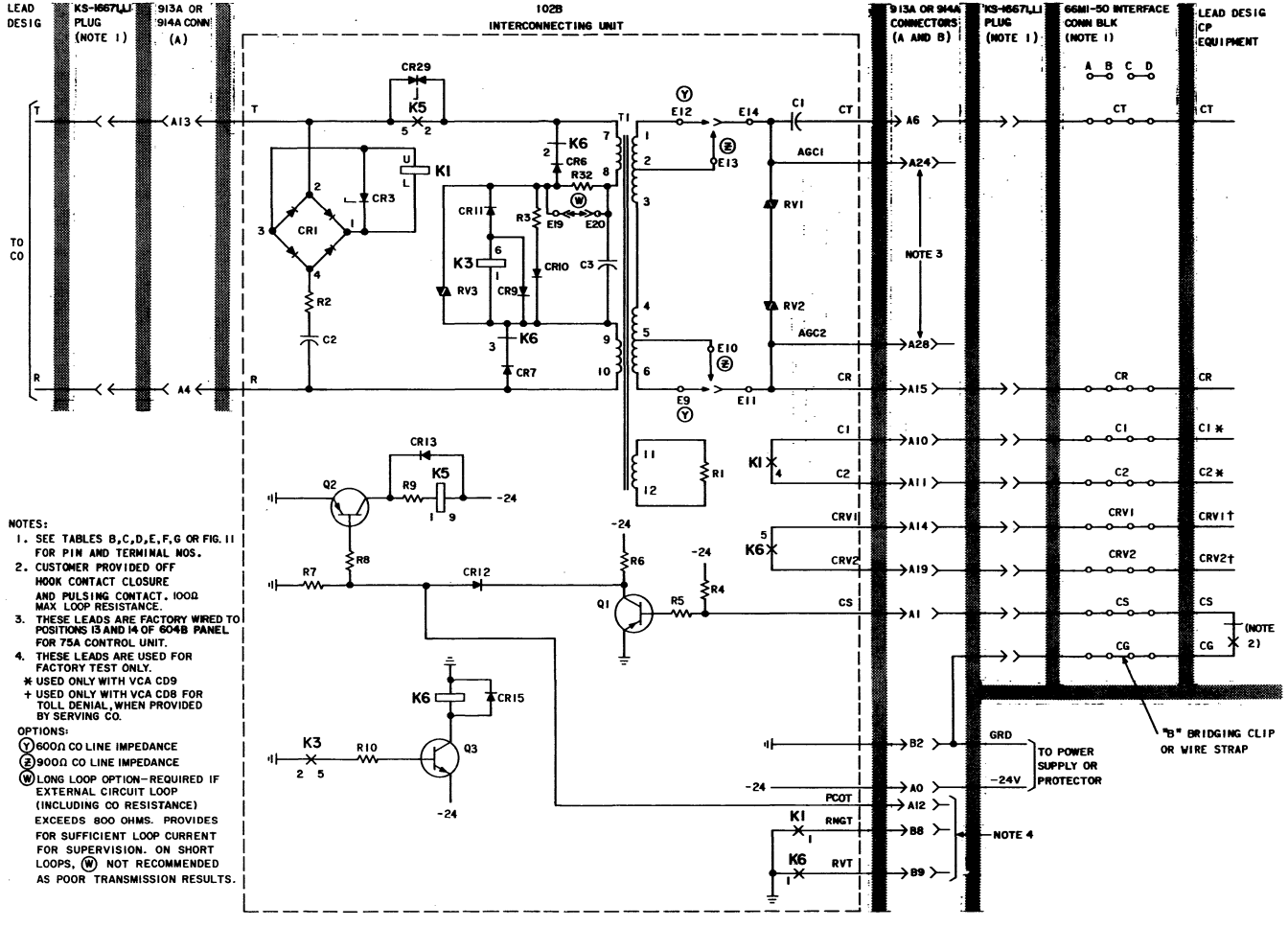
Ⓨ NO RERING-STRAP TERMINALS E1 TO E2

Ⓩ RERING-STRAP TERMINALS E2 TO E3

* USED ONLY WITH VCA CD9

† USED ONLY WITH VCA CD8 FOR TOLL DENIAL WHEN, PROVIDED BY SERVING CO.

Fig. 13—Schematic—102A (MD) Interconnecting Unit



NOTES:

1. SEE TABLES B,C,D,E,F,G OR FIG. 11 FOR PIN AND TERMINAL NOS.
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.

* USED ONLY WITH VCA CD9

\+ USED ONLY WITH VCA CD8 FOR TOLL DENIAL, WHEN PROVIDED BY SERVING CO.

OPTIONS:

(Y) 600Ω CO LINE IMPEDANCE

(Z) 900Ω CO LINE IMPEDANCE

(W) LONG LOOP OPTION—REQUIRED IF EXTERNAL CIRCUIT LOOP (INCLUDING CO RESISTANCE) EXCEEDS 800 OHMS. PROVIDES FOR SUFFICIENT LOOP CURRENT FOR SUPERVISION. ON SHORT LOOPS, (W) NOT RECOMMENDED AS POOR TRANSMISSION RESULTS.

Fig. 14—Schematic—102B Interconnecting Unit

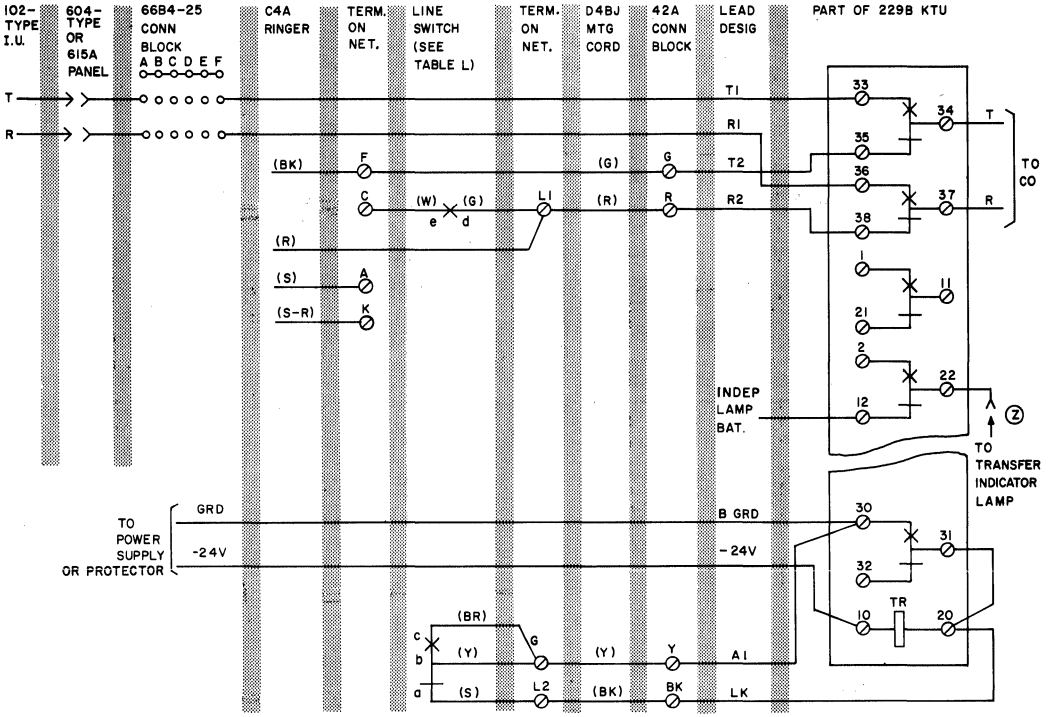


Fig. 15—Power Failure Transfer Circuit (Delayed Restoral)

Check for correct polarity and ground before closing circuit breaker.

4. OPERATION

A. 102A Interconnecting Unit (Fig. 13)

4.01 ***Incoming Call (CD9 only):*** When the CO seizes this circuit on an incoming call, ringing current is applied across the tip and ring. K1 relay in the ringing bridge operates and provides a contact closure on the C1 and C2 leads to the CPE which opens and closes in unison with the ringing cycle. When the customer answers, the CPE provides a contact closure to ground the CS lead operating K4 relay. Operated K4 relay trips the CO ringing and establishes a talking path.

4.02 ***Outgoing Call (CD7, CD8 and CD9):*** When the CPE provides a contact closure to leads CS and CG, K4 relay operates. Operated K4 relay closes the loop toward the CO (and removes the ringing bridge in 2-way loop manual service). The CO recognizes the loop closure and returns dial tone to the CPE. When the customer dials, ground on the CS lead is interrupted. The first time the dial contacts break, K5 relay operates and opens the talking path. K4 relay repeats the dial pulses to the CO. K5 relay releases after each digit and, after completion of dialing, restores the talking path.

4.03 ***Toll Denial:*** If a battery reversal is returned from the CO on the tip and ring, K2 relay will operate, operating K3 relay. Operated K3 relay provides a contact closure on leads CRV1

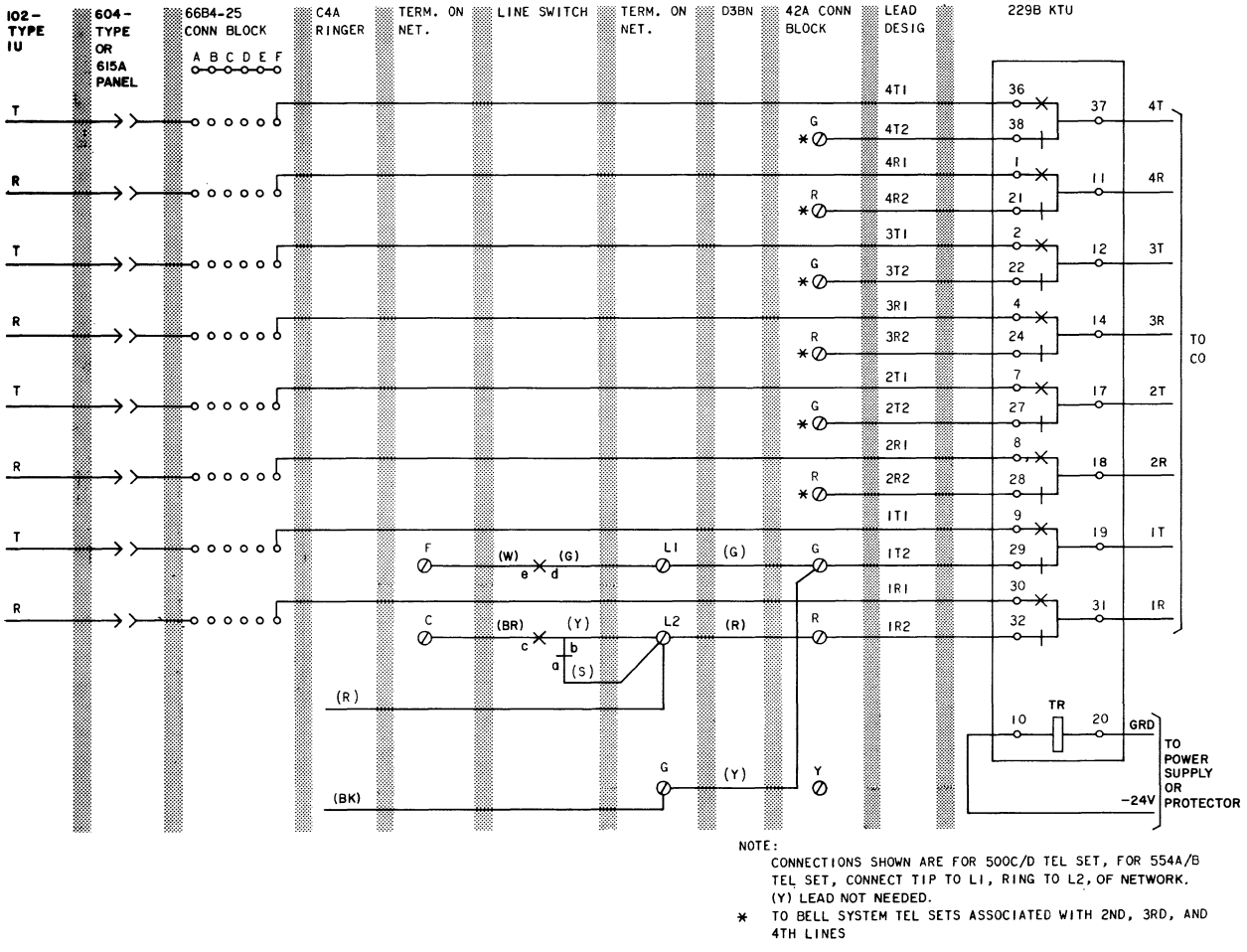


Fig. 16—Power Failure Transfer Circuit (Immediate Restoral)

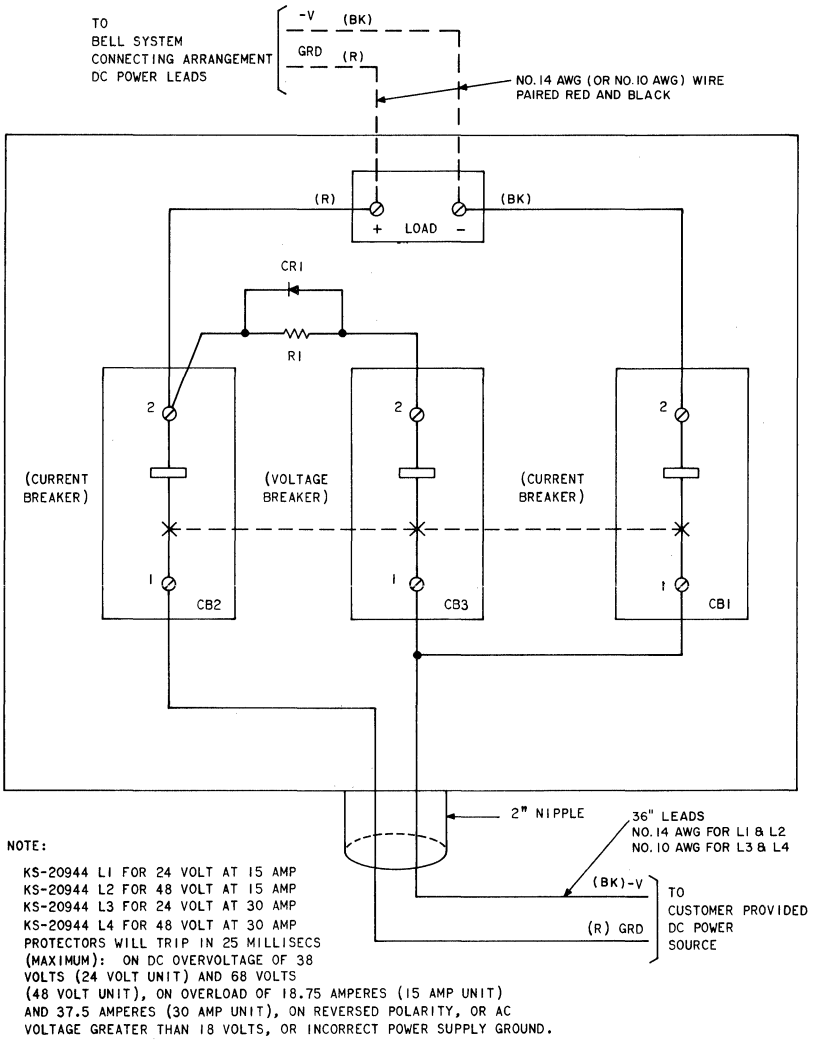


Fig. 17—Schematic—KS-20944 Protector

and CRV2 (normally used for toll diverting, if provided in the CO and ordered by the customer).

4.04 ***Disconnect:*** When the CPE goes on-hook, ground is removed from the CS lead releasing K4 relay. When K4 relay releases, it opens the loop toward the CO (and reconnects the ringing bridge across the tip and ring in the 2-way loop manual service).

B. 102B Interconnecting Unit (Fig. 14)

4.05 ***Incoming Call (CD9 only):*** When the CO seizes this circuit on an incoming call, ringing

current is applied across the tip and ring. K1 relay in the ringing bridge operates and provides a contact closure on the C1 and C2 leads to the CPE which closes during ringing and opens during silent period in unison with the ringing cycle. When the customer goes off-hook to answer the call, the CPE provides a contact closure across CS and CG leads to ground the CS lead operating K5 relay. K5 relay operated closes the loop to the CO to trip the CO ringing and cut through the transmission path to the CT and CR leads.

4.06 ***Outgoing Call (CD7, CD8, and CD9):*** When this circuit is seized for an outgoing call, the CPE provides a contact closure across leads CS and CG causing K5 relay to operate. K5 relay operated closes the loop toward the CO and cuts through the transmission path. The CO recognizes the loop closure and returns dial tone to the CPE. When the customer rotary dials, the CS and CG leads are opened and closed to release and operate the K5 relay which repeats the dial pulses to the CO. When the customer uses ***tone address signaling,*** the CPE provides a contact closure across CS and CG. K5 relay operates and dial tone is returned to CT and CR, and the customer may dial over the CT and CR leads.

4.07 ***Toll Denial:*** If a battery reversal is returned from the CO on the tip and ring to indicate that the outgoing call is a toll call, K3 relay will operate, operating K6 relay. K6 relay operated provides a contact closure on leads CRV1 and CRV2 to indicate that the CO has reversed battery. When normal battery supervision is restored, the K3 and K6 relays release.

4.08 ***Disconnect:*** When the CPE goes on-hook, leads CS and CG are opened removing ground from the CS lead releasing K5 relay. When K5 relay releases, it opens the loop toward the CO and opens the transmission path. In approximately 500 milliseconds after the closure is removed from the CS and CG leads, the circuit can be reseized. The exact reseizure time depends on the CO.

C. Power Failure Transfer (Delayed Restoral, Fig. 15)

4.09 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, and CO tip and ring are transferred to the station. This transfer is indicated by a lamp (if desired) 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 station is on-hook or the first time it goes on-hook, returning the circuit to normal. Calls in progress when local power is restored will not be interrupted as there is no operate path for the 229B KTU when the station is off-hook.

4.10 Z option provides a visual indication only when the CO line is connected to the power failure telephone set and an off-hook condition exists when local power is restored. The power failure indicator lamp is lighted through the break contact of the power failure transfer (TR) relay. The lamp functions only when the TR relay is released and power is restored. It becomes inoperative with the operation of the TR relay.

D. Power Failure Transfer (Immediate Restoral, Fig. 16)

4.11 Under normal conditions, CO tip and ring are connected through the operated contacts of the 229B KTU to the 102-type IU associated with the CPE. The 229B KTU is held operated through battery and ground connected directly to the winding of the TR relay. The telephone company-provided power failure station is inoperative at this time. Should local power fail, the 229B KTU releases, and CO tip and ring are transferred to the station. Calls in progress will be interrupted, but new calls can be placed or answered in the normal manner. When power is restored, the 229B KTU will reoperate, returning the circuit to normal immediately. Calls in progress will be interrupted when power is restored. No visual indication is provided.

E. 75A Control Unit

4.12 The 75A control unit consists of six identical ALC circuits, each connected to the transmission circuitry of an IU to protect telephone company equipment against excessive signal power. This protection is required when using voice-type IUs for data transmission. (See Section 463-300-112 for a complete description.)

4.13 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.

4.14 The level adjusting potentiometers R1 through R6 are set as described in Section 463-300-312 to limit the customer signals at a level determined by the amount of trunk loss and impedance.

F. KS-20944 Protector (Fig. 17)

4.15 When the CPE dc power supply is used to operate the telephone company equipment, power protection is required. The KS-20944 protector is used to protect the telephone company personnel from hazardous voltages but may not protect equipment from component failures. Separate fuses are required for the 102-type IUs. The breakers of the KS-20944 protector provide a switch to disconnect CP dc power when working on interconnecting circuits. (See Section 463-300-109 for a complete description.)

4.16 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 open. The circuit breakers must be manually reset by the customer after tripping. The 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.

4.17 The KS-20944 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, loose or broken connections and check the CO lines. Perform a test of the 102-type IU.

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

5.02 Prepare the circuit under test as follows:

(a) Open the eight leads to the circuit under test by removing 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 connect a ground strap from CG to terminal CT. (Make all connections on the telephone company side of the 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 connections to KTUs.

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

(d) Connect an 81A or KS-16990, List 1 test set across terminals C1 and C2 to indicate continuity (ringing).

5.03 Perform the following tests:

(a) ***Incoming Call (CD9 only):*** Have the test desk call the number associated with the 102-type IU under test. When ringing is indicated by the test set across terminals C1 and C2, answer the call by strapping terminals CS and CG together. K5 relay should operate cutting through the transmission path. Verify transmission and remove the strap from terminals CS and CG and disconnect the test set from terminals C1 and C2.

(b) ***Outgoing Call—Rotary Dial (CD9, CD8, CD7):*** Connect the blue and green (or blue) leads of a 9C or 9CA dial across terminals CS and CG for dialing. Dial tone will be heard on the hand test set connected to terminals CT and CR. Connect the 81A or KS-16990, List 1 test set across terminals CRV1 and CRV2 (if used) to indicate continuity (battery reversal). Dial the test desk number using the 9C or 9CA dial connected across terminals CS and CG. If the office is arranged for toll diversion, have the test desk reverse battery. The test set connected across terminals CRV1 and CRV2 will show continuity for the duration of the reversal.

Disconnect by removing the 9C or 9CA dial from terminals CS and CG. The transmission path to leads CT and CR will open.

(c) ***Outgoing Call—Tone Address Signaling (if office is arranged for TOUCH-TONE® dialing) (CD9, CD8, CD7):*** Connect the 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 terminals CS to CG. Dial tone will now be heard on the 2500D (or equivalent) station set. Dial the test desk number using the 2500D; if the office is arranged for toll diversion, have the test desk reverse battery and verify that the 81A (or equivalent) test set connected across terminals CRV1 and CRV2 will show continuity for the duration of the reversal. Disconnect by removing the strap from terminals CS and CG. The transmission path to CT and CR will open.

B. ▶Using the 142A Test Set (Fig. 18)

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.

(b) Connect the test set interface cord to the terminals on the telephone company side of the block. The cord required is determined by the type of block provided to terminate the interface.

(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 HNDST terminals on the test set. Set the MON-TALK switch on the hand test set to MON position.

(e) On the 142A test set, set the CS-CG LOOP switch to the 100-ohm position.

5.05 Perform the following tests:

PCA CD7, CD8, or CD9

(1) 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 a ground path on the CG lead through the 100-ohm resistor on the CS-CG LOOP switch. Ground on the CS lead causes relay K5 in the IU to operate and seize the CO trunk as indicated by dial tone being heard in the hand test set.

Note: If the IU fails to seize the CO trunk, move the CS-CG LOOP switch to the 18 position. If the IU now operates properly, it is considered marginal. The IU circuits that operate only on the 0 position should be replaced.

(2) Dial the local test desk using the 1013A hand test set. The S relay and the CS lamp of the test set should follow the dial pulses. When the test desk answers, the trunk should be cut through and satisfactory transmission may be judged using the hand test set.

CD7 Only

(3) Have the test desk release the trunk under test.

CD8 Only

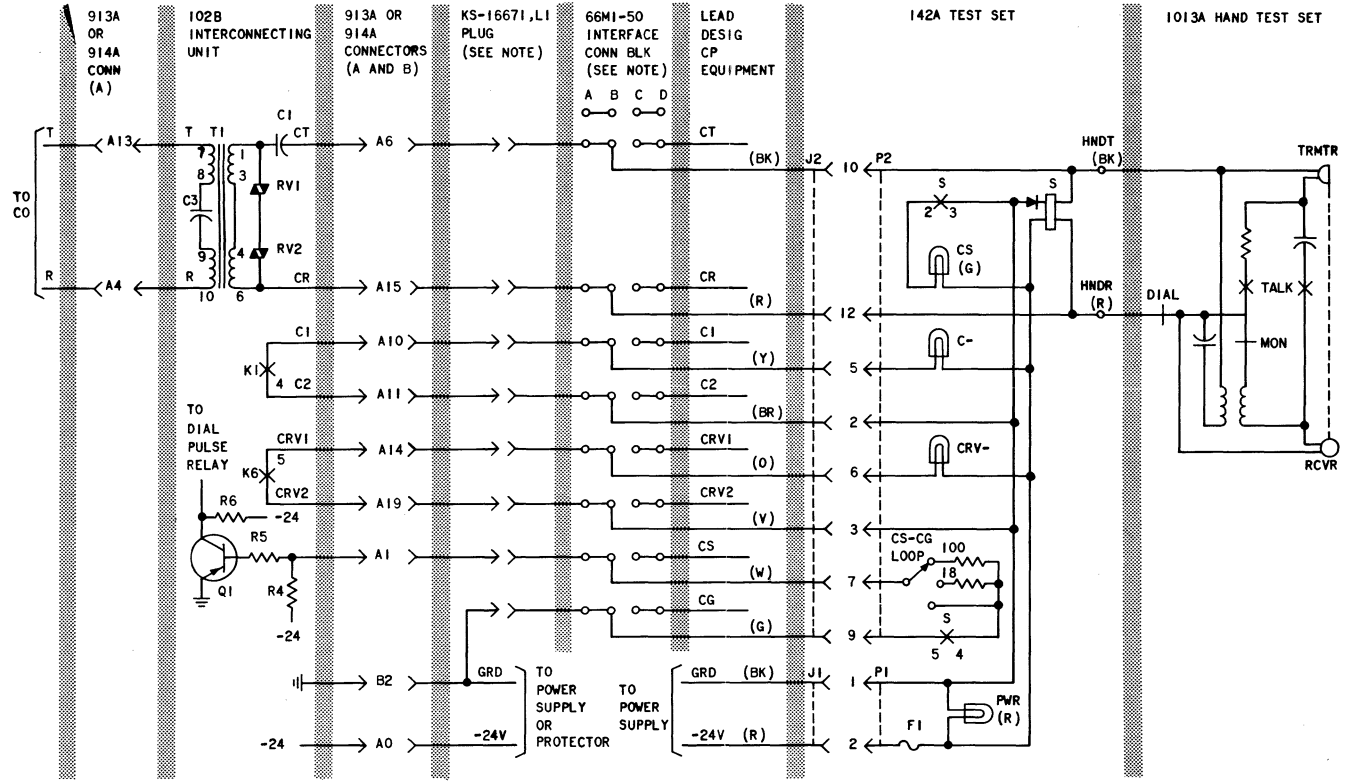
(4) If toll denial is provided, have the test desk reverse line polarity. The CRV- lamp should light and remain lighted for the duration of the reversal.

(5) Have the test desk release the trunk under test.

CD9 Only

(6) Request the test desk to call back on the trunk under test.

(7) Operate the hand test set switch to MON position. The CS lamp should be extinguished indicating the S relay in the 142A test set has released. The S relay in the IU should also release causing the IU to release the CO trunk.



NOTE:
FOR PIN OR TERMINAL NUMBER,
SEE APPLICABLE TABLE IN PART 6.

Fig. 18—Testing 102B Interconnecting Unit With 142A Test Set

(8) When the trunk is seized on the return call from the test desk and ringing is applied to the trunk, the C- lamp lights and follows the ringing cycle.

(9) Operate the hand test set switch to TALK. The C- lamp should extinguish and the CS lamp light indicating ringing has been tripped and the call answered. The trunk should now be cut through the IU and satisfactory transmission may be judged by using the hand test set.

(10) Have the test desk release the trunk.

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

Never replace an interconnecting unit without first removing the fuse for that particular circuit. See the applicable table in Part 6.

5.07 When trouble is suspected in the 102-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 in the repairman's judgment the trouble is located in the CPE, the Repair Service Bureau should be notified so that proper maintenance of service charge billing can be initiated as outlined in BSP 660-101-312 entitled Maintenance of Service Charge on Service With Customer-Provided Equipment (CPE).

6. CONNECTIONS

6.01 For connection information using the 69G apparatus mounting, refer to Fig. 9 and 10.

6.02 For connection information using the 604A-type panel, refer to Fig. 2, 6, and 11, and Tables A, B, C, D, E, and H.

6.03 For connection information using the 604B or 604C panel, refer to Fig. 3, 4, 6, and 11, and Tables A, B, C, D, E, and H.

6.04 ▶For connection information using the 615A panel, refer to Fig. 5, 6, and 12, and Tables F, G, and H.◀

6.05 For connection information using the power failure transfer circuit with delayed restoral, refer to Fig. 15 and Table L. Replace the D3BN mounting cord of the 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. 16.

6.07 All necessary connections are provided by the internal wiring of the 604B and 604C panels 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. 17. For connections to multiple installations, refer to Section 463-300-109.

TABLE A

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 on 604A-type panel not used in this application.

TABLE B

CONNECTIONS FOR PLUG NO. 1 – 604-TYPE PANEL

TRUNK NO.	LEAD DESIG*	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 position is occupied by 75A control unit.

TABLE C

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	
		30	W-S	9	
		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	
		35	R-S	19	
		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	
		40	BK-S	29	
		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	
		45	Y-S	39	
		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	
		50	V-S	49	
		25	S-V	50	

* Stencil lead designations on fanning strip.

† Used only with VCA CD9.

‡ Used only with VCA CD8 for toll denial when provided by serving CO.

§ Associated with 75A control unit in position 13.

¶ Associated with 75A control unit in position 14.

TABLE D

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	
		30	W-S	9	
		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	
		35	R-S	19	
		10	S-R	20	
8	CT	36	BK-BL	21	11**
	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	
		40	BK-S	29	
		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	
		45	Y-S	39	
		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.
† Used only with VCA CD9.
‡ Used only with VCA CD8 for toll denial when provided by serving CO.
§ Optional attendant alarm indicator on 604B panel only.
¶ Cannot be used if position is occupied by 75A control unit.
** Associated with 75A control unit in position 14.

TABLE E

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	
		30	W-S	9	
		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	
		35	R-S	19	
		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	
		40	BK-S	29	
		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	
		45	Y-S	39	
		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	
		50	V-S	49	
		25	S-V	50	

* Stencil lead designations on fanning strip.
† Used only with VCA CD9.
‡ Used only with VCA CD8 for toll denial when provided by serving CO.
§ Cannot be used if position is occupied by 75A control unit.
¶ Associated with 75A in position 13.
** Associated with 75A in position 14.

TABLE F

CONNECTIONS FOR CO TRUNKS – 615A PANEL

TRUNK NUMBER	LEAD DESIG	66T1 CONN. BLOCK	TO 913 OR 914	
			CONN.	PIN
1	T	A1	J1A	13
	R	A2	J1A	4
2	T	A3	J2A	13
	R	A4	J2A	4
3	T	A5	J3A	13
	R	A6	J3A	4

TABLE G

CONNECTIONS FOR PLUG P1 – 615A PANEL

LEAD DESIG	PLUG P1 PIN NO.	LEAD COLOR		615A PANEL	
			JACK	PIN	66T1 BLK
CT	26	W-BL	J1	A6	C12
CR	1	BL-W		A15	
CS	27	W-O		A1	
CG	2	O-W			
C1	28	W-G		A10	
C2	3	G-W		A11	
CRV1	29	W-BR		A14	
CRV2	4	BR-W		A19	
SPARE	30	W-S		A7	
SPARE	5	S-W		A16	
CT	31	R-BL	J2	A6	C13
CR	6	BL-R		A15	
CS	32	R-O		A1	
CG	7	O-R			
C1	33	R-G		A10	
C2	8	G-R		A11	
CRV1	34	R-BR		A14	
CRV2	9	BR-R		A19	
SPARE	35	R-S		A7	
SPARE	10	S-R		A16	
CT	36	BK-BL	J3	A6	C14
CR	11	BL-BK		A15	
CS	37	BK-O		A1	
CG	12	O-BK			
C1	38	BK-G		A10	
C2	13	G-BK		A11	
CRV1	39	BK-BR		A14	
CRV2	14	BR-BK		A19	
SPARE	40	BK-S		A7	
SPARE	15	S-BK		A16	

TABLE H

POWER CONNECTIONS

INPUT VOLTAGE	69G APP MTG (NOTE 1)	604A1 PANEL (NOTE 2)	604B OR 604C PANEL (NOTE 3)	615A PANEL (NOTE 4)
−24V	9	T14	Input −24V	D2
−48V	—	—	Input −48V	—
GRD	4	T13	Input −GRD	D4

Notes:

1. Terminals on 66B4-25 connecting block, connect as shown in Fig. 10.
2. Terminals on terminal strip TSA on rear of 604A1 Panel.
3. Terminals on rear of 604B Panel are stamped as shown. Position option straps for −24V or −48V.
4. Terminals on 66T1 connecting block. Use 20-gauge wire; strip leads before putting into 66-type terminals. Power may be distributed to subsequent panels by multipling succeeding panels from terminal C2 and C4 (multiple a maximum of three panels).

TABLE I

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.

TABLE J

604B AND 604C PANELS—FUSE ASSIGNMENT

FUSE NO.	PANEL POSITION	VOLTAGE
F1*	J1A thru J14A	±105V (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: ±105V and −48V not used in this application.

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

TABLE K

615A PANEL—FUSE ASSIGNMENT

VOLTAGE	FUSE NO. *	PANEL POSITION
−24V	F1	J1A
	F2	J2A
	F3	J3A
−48V	F4†	J1B
	F5†	J2B
	F6†	J3B
±105V	F7†	J1A, J2A, J3A
SPARE	F8	

* 24E fuse 1/2 ampere.

† Not used in this application.

TABLE L

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

LEAD AND CONTACT DESIG		LEAD COLOR	TERM. ON NET. (Note)	
			REMOVE FROM	CONNECT TO
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 (Note)	a	(S)		L2
	b	(Y)	L2	G
	c	(BR)	C	G
	d	(G)		L1
	e	(W)	F	C

Note: 500C/D and 554A/B telephone sets having 425B networks cannot be used to control power failure transfer relay as some line switch leads are soldered on the network.