VOICE CONNECTING ARRANGEMENT C2ACP

1. GENERAL

1.01 This section provides identification, installation, operation, maintenance and connection information on the 102-type interconnecting unit (IU), 604-type panel, or ▶615A panel◀ when used in Voice Connecting Arrangement (VCA) C2ACP.

1.02 This section is reissued to:

- Include information on the 615A panel
- Include information on the 604C panel
- Include information on the KS-20944 protector
- Add use of 142A test set
- Remove information on use of 69G apparatus mounting in new installations.

1.03 The 102B IU (Fig. 1) is an improved version of the 102A IU with option terminals for line impedance matching. No pulse correction is required. In existing installations using pulse correction, the 103A pulse correctors must be removed when replacing the 102A IUs with 102B IUs. The 102B IU also increases the range limitation to the customer-provided equipment (CPE) from 18 ohms to 100 ohms maximum on the supervision leads (CS and CG).

1.04 Refer to Sections 463-300-101 and 463-300-102 for information on the 604A, 604B, and 604C panels. ▶Refer to Section 463-300-104 for information on the 615A panel, Section 463-300-113 for information on the 142A test set, and Section 463-300-109 for information on the KS-20944 protector.◀

1.05 The size of the initial installation and the expected growth should be the determining factor in selecting the proper equipment. ▶For one to six circuits using the 102-type IU, use 615A panel. For seven to fourteen circuits use the 604-type panel. Connections are provided for the 69G apparatus mounting, but it should be used on an Additions and Maintenance (A&M) only basis.◀

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

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

SD-1E238-01, Issue 5B—102B IU

SD-1E202-01, Issue 5D—102A IU

SD-1E200-01, Issue 2D—604A Panel

SD-1E258-01, Issue 1—142A Test Set

SD-69599-01, Issue 2A—69G Apparatus Mounting.

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

VCA C2ACP

- To provide an interface between CPE and ***a loop-start*** central office (CO) line
- To provide network control signaling function
- To limit excessive signal levels from CPE and to provide protection for telephone company personnel against hazardous voltages.

CA VCP

- To provide an interface between CP power supply and VCA C2ACP
- To provide protection for personnel against hazardous voltages.

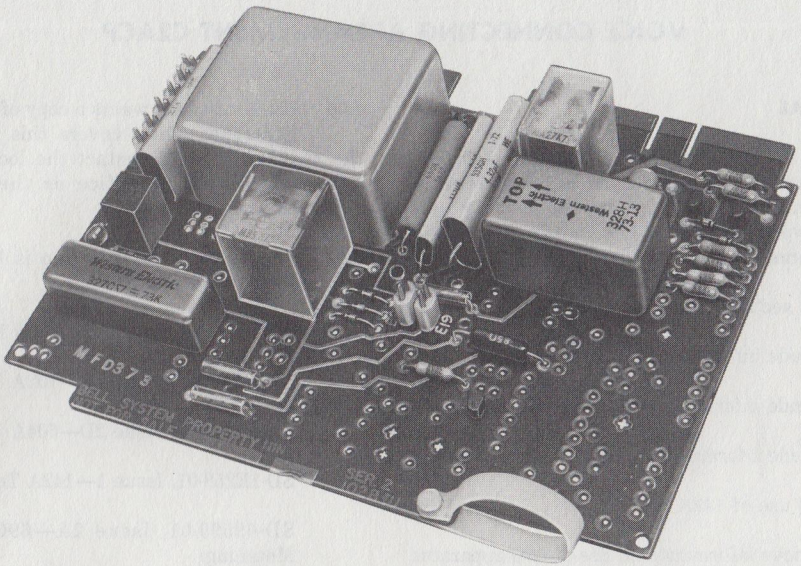


Fig. 1—102B Interconnecting Unit

APPLICATION

- Voice Connecting Arrangement C2ACP provides an automatic connection of customer-provided (CP) terminal equipment, typically key systems, to an exchange line or WATS access line.

ORDERING GUIDE

VCA C2ACP

- Unit, Interconnecting, 102A or 102B (one per CO line, Fig. 1).

Note: If 102A IUs are used in position 13 or 14 (trunk 9 or 14) of a 604B or 604C panel, 102A IUs must also be used in positions 1, 4, 7 or 10 (trunks 1, 3, 5 or 7).

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 69G or 615A panel, or an ED-91180-72, Group 21 cabinet (or equivalent) for the 604-type panel.

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

  or

- Panel, 604A2 (19C2 power unit and fuse panel, mounts fourteen 102-type IUs)

  or

- Panel, 604B or 604C (fuse panel only—no power unit; mounts fourteen 102-type IUs)—Use 604B panel if supply voltage is −48V; use 604C if supply voltage is −24V.

- Panel, 615A (fuse panel only—no power unit; will mount up to three 102-type IUs, Fig. 4)

- Unit, Apparatus, 21A (one required to convert 604C to −48V operation)

- Bracket, 99B (one per three 615A panel)

- Cable, A25B (two per 69G, ▸one per 615A-type panel or up to four per 604-type panel)◂ (See Table A.)
- Cable, A50B (one per 604-type panel) (See Table A.)
- Cable, A75B (one per 604-type panel) (See Table A.)
- Block, Connecting, 66M1-50 (as required, Fig. 2)
- Block, Connecting, 66B4-25 (as required)
- Clip, Bridging, B (as required, Fig. 2)
- Block, Connecting, 66E3-25 (optional, Fig. 3)

▸***Note:*** Other type blocks should not be used due to incompatibility with the 142A test set connections.◂

- Cable, D Inside Wiring, or equivalent (for cabling from 66B4-25 intermediate connecting block to the 66M1-50 interface connecting block and for making trunk connections to 615A panel)
- Unit, Power, 19C2, or equivalent (for 604A1, 604B, ▸604C or 615A◂ panels when existing KTS power supply is insufficient)
- Unit, Key Telephone, 201C (if required, for fusing 69G; see 3.03)
- Cord, Power (for 19C2 power unit or 604A2 panel)

  P40J326 (1-1/2 ft)

  P40J327 (2 ft)

  P40J328 (4 ft)

  P40J329 (6 ft)

  P40J099 (12 ft)

- ▸KS-20944, L1 or KS-20944, L2 Protector (for optional power protection).

Note: Must be provided when the customer supplies power. Use L1 protector for −24 volts dc; L2, −48 volts dc.◂

Replaceable Components (For 604-Type Panel)

- Fuses, 70G (1/2 ampere, 18 per 604A-type panel)
- Fuses, 70A (1-1/3 ampere, 3 per 604B and ▸604C◂ panels)
- Fuses, 70F (1/4 ampere, 13 per 604B and ▸604C◂ panels)
- Fuses, 70G (1/2 ampere, 2 per 604B and ▸604C◂ panels)
- Lamps for Indicator, 17C-49 (for optional fuse alarm if required; for 604B and ▸604C◂ panels only).

▸Replacement Component (615A Panel)

- Fuse, 24E (1/2 ampere, 8 per panel).◂

DESIGN FEATURES

102-Type Interconnecting Unit (Fig. 4)

- Components mounted on epoxy coated 8-inch 80-pin board
- Provides voice frequency coupling to CPE
- 2-way loop-start operation
- Option terminals (Fig. 1)
- Features line impedance matching options (102B only)
- Requires 0.090 ampere maximum at 26 volts dc for 102B IU
- Requires 0.110 ampere maximum at 26 volts dc for 102A IU
- Provides dc isolation to CPE
- Limits excessive signals
- Permits tone address signaling from behind CPE.

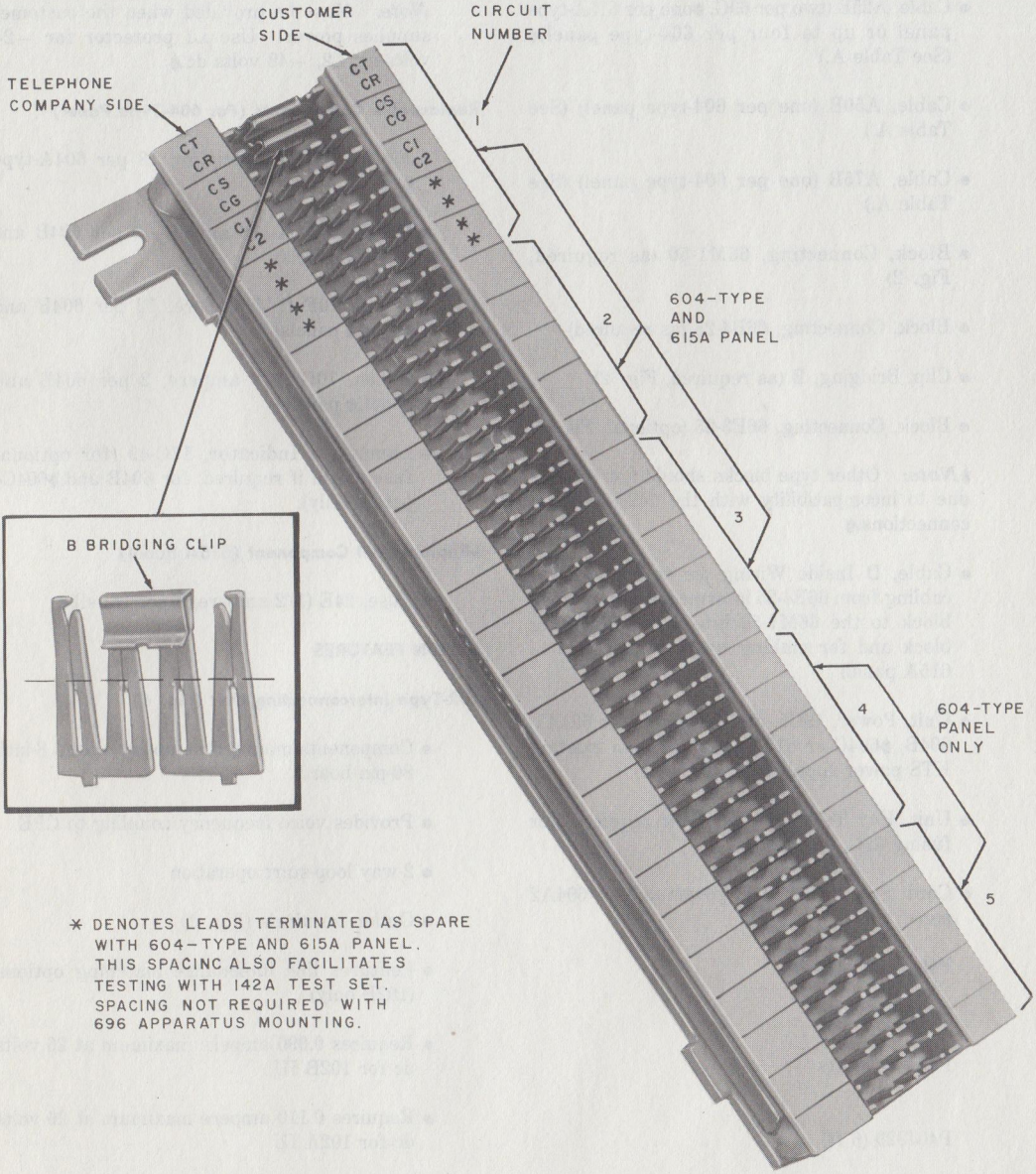


Fig. 2—66M1-50 Interface Connecting Block

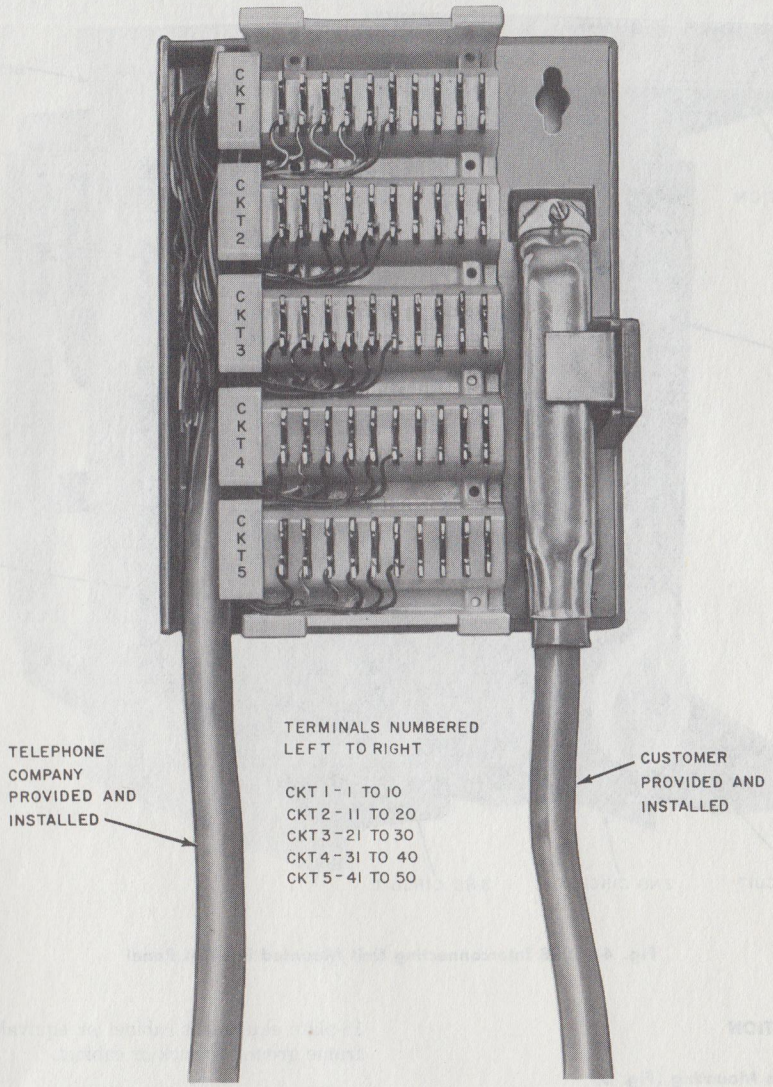


Fig. 3—66E3-25 Interface Connecting Block (Optional)

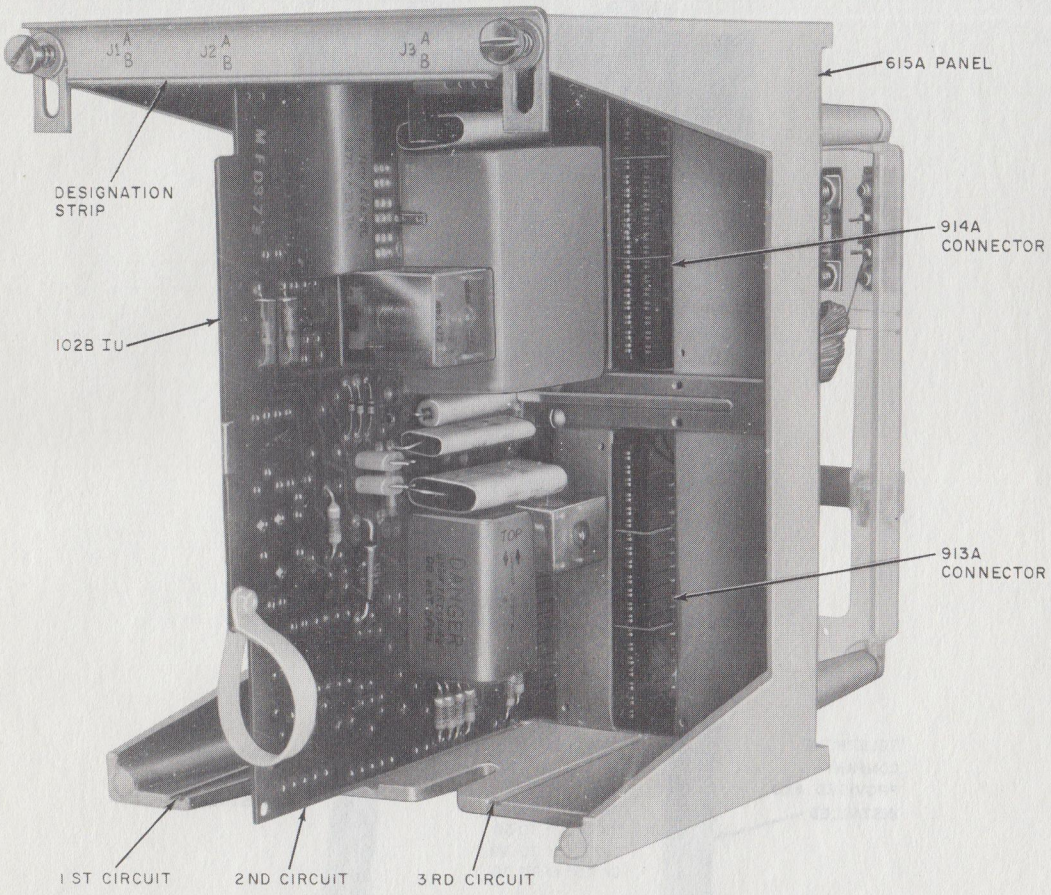


Fig. 4—102B Interconnecting Unit Mounted in 615A Panel

3. INSTALLATION

69G Apparatus Mounting (Fig. 5)

3.01 The 69G apparatus mounting should not be used for new installations of VCA C2ACP. Refer to Fig. 5 for connections used in existing installations.

604-Type Panel (Fig. 6)

3.02 The 604-type panel will mount on a standard relay rack, or in an ED-91180-72, Group 21, 18-plate equipment cabinet or equivalent. Connect frame ground to rack or cabinet.

The 18-plate equipment cabinet will house two 604A-type, three 604B and ◗604C◖ with external power unit, two 604B and ◗604C◖ panels with power unit when the drawing holder on the lower half of the equipment cabinet cover is removed.

3.03 Telephone circuit connection is made to the 604-type panel through connector cables.

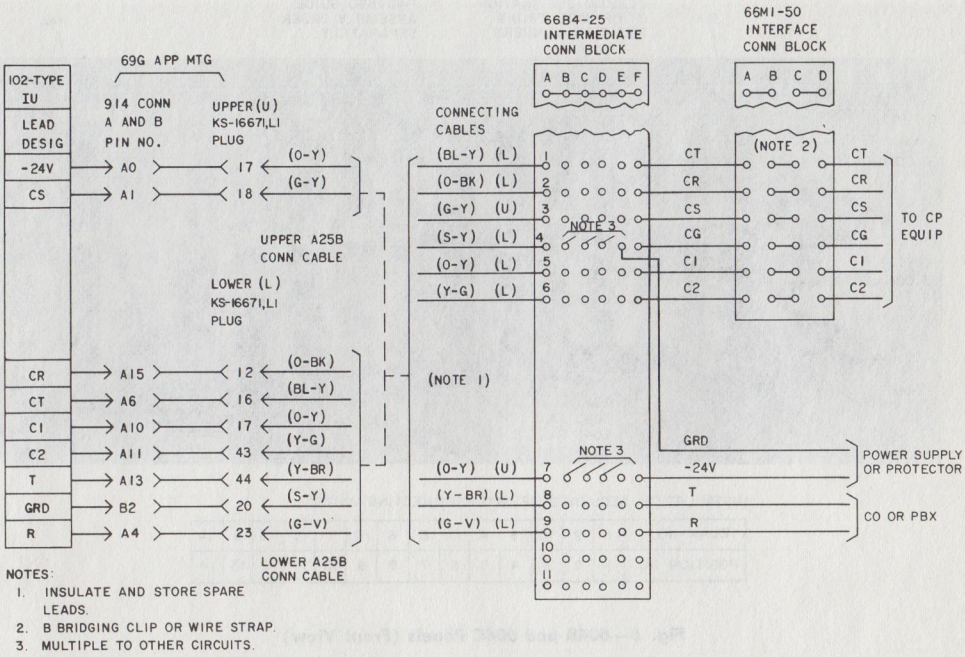
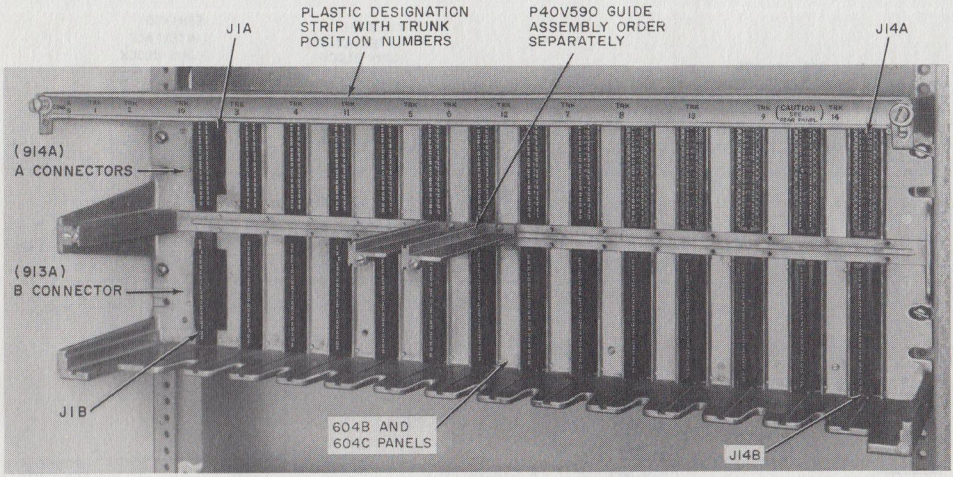


Fig. 5—Connection Diagram for 69G Apparatus Mounting



INSTALLATION SEQUENCE OF 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. 6—604B and 604C Panels (Front View)

Arrangement of the KS-16671, L1 plugs on the panel restricts the first plug (for CO lines) to an A25B connector cable. Plugs 2 through 4 (for CPE) are arranged to adapt to a choice of cable sizes (see Table A). Plug 5 (604A-type only) is dedicated to one-way incoming trunks only and is not used in this application.

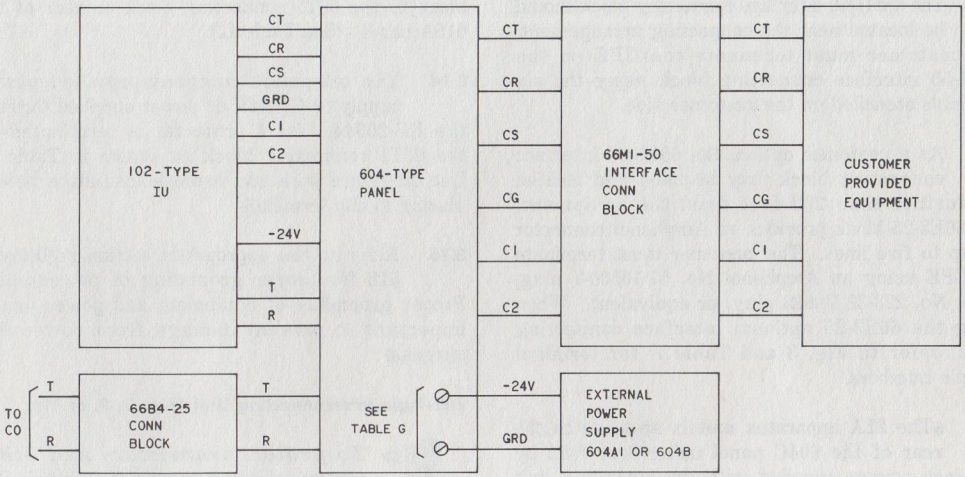


Fig. 7—Block Diagram—102-Type Interconnecting Unit With 604-Type Panel

3.04 Terminate the raw end of connector cable 1 on a 66B4-25 connecting block for the CO lines (Table B). Terminate the raw end of connector cables 2, 3, and 4 on the 66M1-50 interface connecting block following the wiring plan shown in Tables C, D, and E. Stencil lead designations on the 66M1-50 interface connecting block as shown in Fig. 2).

3.05 The customer must provide a 105- to 130-volt, separately fused, 60-Hz outlet within reach of available power cords (see Ordering Guide for cord lengths). This outlet should ***not*** be under the control of a wall switch.

3.06 If an external telephone company-provided power supply is used (604A1, 604B or ▶604C only),◀ or CP dc power supplied through the KS-20944 protector, connect to fuse panel on rear of 604A1, 604B, and 604C as shown in Fig. 7 and Table G (use 16-gauge or equivalent twisted pair). ▶The 604A, 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. The 604C can be adapted to −48 volt operation by adding a 21A apparatus unit and putting the option straps in the down position.◀ Refer to the appropriate section in Division 167 for proper grounding of power plants. Proper grounding of equipment and power unit is important to prevent damage from power line surges.

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)		
	ARGT 1	ARGT 2	ARGT 3
A25B	4	2	1
A50B		1	
A75A			1

Note: Arrangement of interconnecting units and local requirements will determine the size and maximum length of cable required.

3.07 The 66M1-50 interface connecting block should be located near the connecting arrangement. The customer must terminate the CPE on the 66M1-50 interface connecting block using the six terminals stenciled on the customer side.

3.08 As a customer option, the 66E3-25 interface connecting block may be used and located not further than 200 feet from the equipment. The 66E3-25 block provides an Amphenol connector for up to five lines. The customer must terminate the CPE using an Amphenol No. 57-10500-7 plug, Cinch No. 223-32-50-023 plug, or equivalent. When using the 66E3-25 optional interface connecting block, refer to Fig. 3 and Table F for terminal and pin numbers.

3.09 ▶The 21A apparatus unit is attached to the rear of the 604C panel using four 8-32 by 3/16-inch screws supplied with the apparatus unit as a loose item. Electrical connection to the 604C panel is made by attaching any of the red lead wires to the 48-volt option terminals and any of the red-black lead wires to the 24-volt option terminals, one lead per terminal (total 6 leads).◀

▶615A Panel (Fig. 8)

3.10 The 615A panel is mounted on a standard relay rack or 16C apparatus mounting (or equivalent) using the 99B bracket. The 99B bracket will hold three 615A panels. Remove the center mounting bar from the 16C apparatus mounting to avoid cover interference.

3.11 An A25B (or equivalent) connector cable is used to connect the 615A panel to the 66M1-50 interface connecting block. The A25B connector cable plugs into plug P1 on the rear of the 615A panel. The raw end of the A25B connector cable is terminated on the telephone company side of the 66M1-50 interface connecting block according to standard even-count color code (Table J). Lead designations are stenciled on the 66M1-50 interface connecting block as required.

3.12 The customer must terminate the CPE on the 66M1-50 interface connecting block using the terminals on the customer side.

3.13 D inside wiring cable is used to extend the T and R leads from the CO or PBX connecting block to the 66T1 connecting block on rear of the 615A panel. (See Table L.)

3.14 The telephone company-provided power supply or CP 24V dc power supplied through the KS-20944, List 1 protector is terminated on the 66T1 connecting block as shown in Table G. Use 20-gauge wire and remove insulation before placing in clip terminals.

3.15 Refer to the appropriate section in Division 518 for proper grounding of power units. Proper grounding of equipment and power unit is important to prevent damage from power line surges.◀

102-Type Interconnecting Unit (Fig. 1, 9, or 10)

To protect transistors and other electrical components of 102-type IUs, remove fuse associated with that particular circuit before installing or replacing a unit. (See Tables H and I for 604-type panels ▶and Table K for 615A panel.)◀

3.16 Select proper option straps for options W, Y, and Z from Fig. 9 or 10 for local conditions. Always use option Z for the 102A IU and use bare wire for strapping. Option Z is required only when PBX-CO trunk facility is designed with terminating sets or 837-type impedance compensators that have 900 ohms input impedance. Use option W for 102B IUs when the external circuit resistance (including CO resistance) is greater then 800 ohms in the talking state.

Be sure all option straps have been installed and check for continuity after strapping.

3.17 Loosen screw securing retaining clip (69G) or designation strip holder (604-type ▶or 615A)◀ to apparatus mounting or panel and raise clip or holder to provide access.

3.18 Position the board in the guide grooves and slide the unit in until it is properly seated in the connector. ▶The 604B and 604C panels have a P13B354 clip between contacts 9 and 10 in the lower position connector that must be removed when using the 102A IU. The 604-type panels are electrically equivalent for this VCA and are

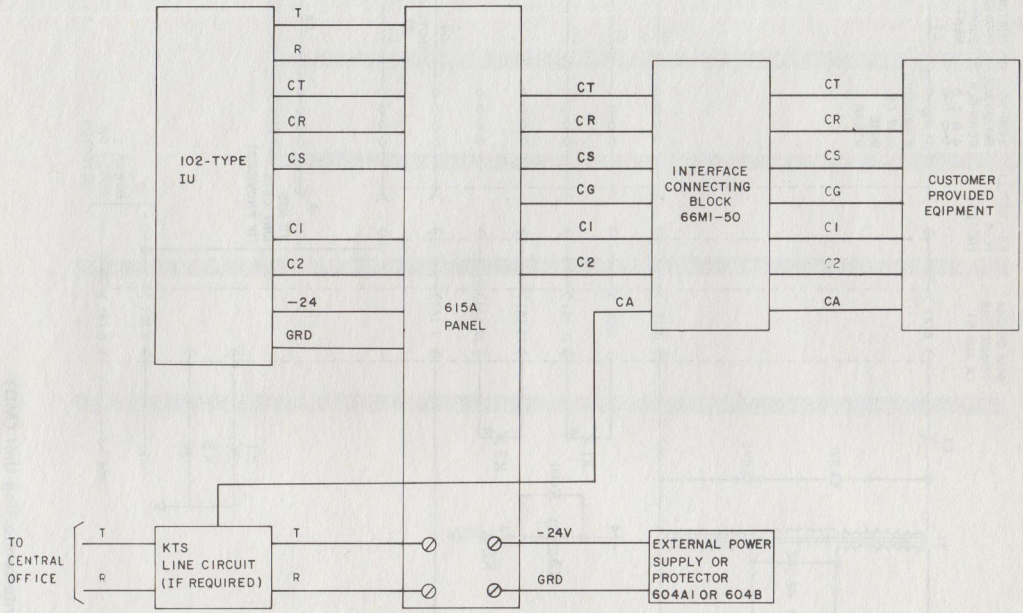


Fig. 8—Block Diagram—102-Type Interconnecting Unit With 615A-Type Panel

interchangeable if this clip is removed. The 102B IUs have a slot for this clip.◀

3.19 Position retaining clip or designation strip holder to hold 102-type IU securely.

3.20 Stencil circuit designation information as required on retaining clip or designation strip. ▶On 604C and current production of the 604B panels the designation strip is marked to show trunk numbering. Earlier production of the 604B showed position numbers.◀

3.21 For the 604-type panel, refer to Fig. 6 for installation sequence of 102-type IUs. This suggested sequence is established to correspond to the plug arrangement.

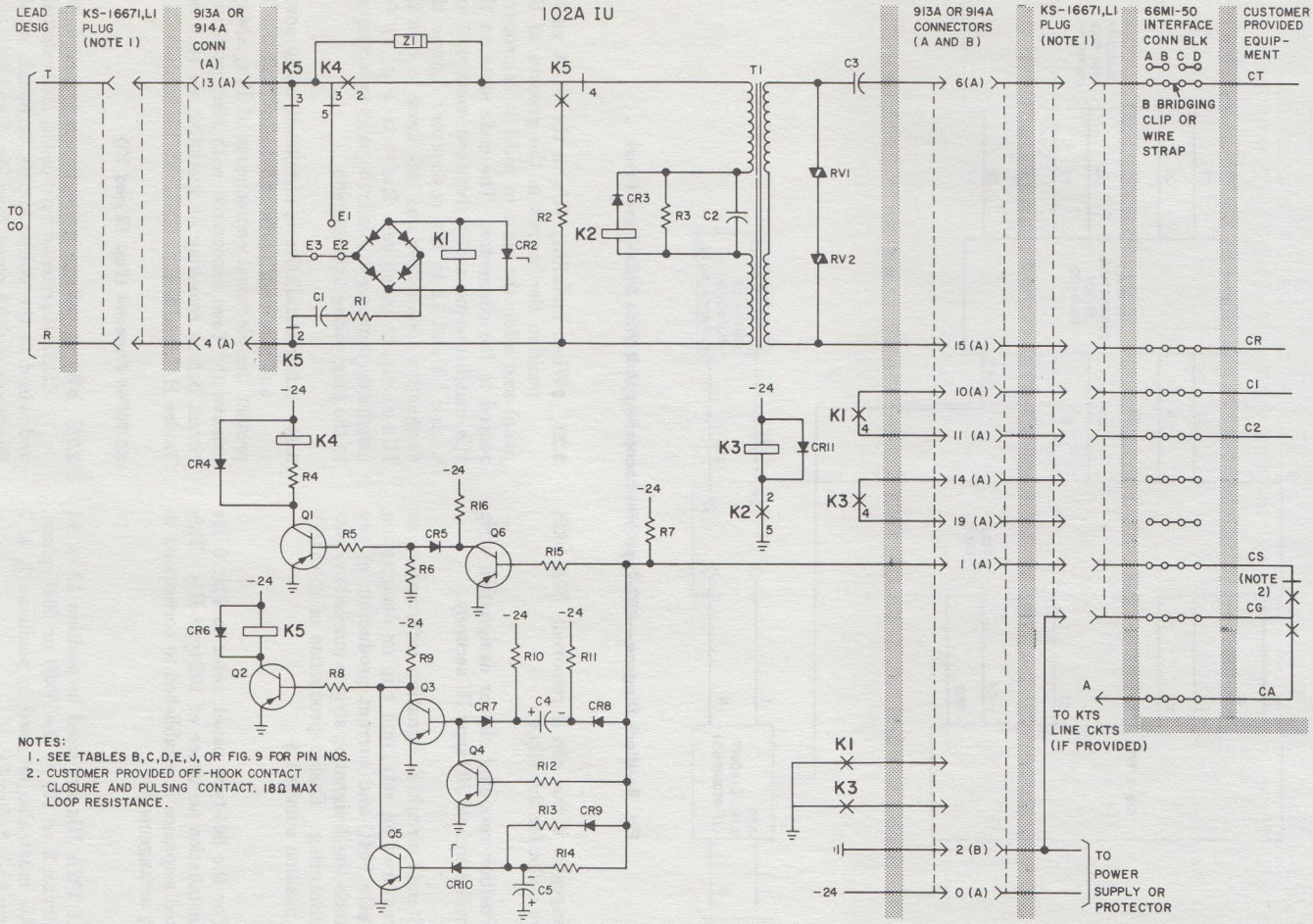
3.22 If 102A IUs are used in position 13 or 14 (trunk 9 or 10) of the 604B or 604C panel, 102A IUs must also be used in positions 1, 4, 7 or 10 (trunks 1, 3, 5 or 7).

3.23 ▶When installing IUs in the 615A panel, position the boards in the grooves of the panel and slide the unit in until it is properly seated in the connector. The code slots on the IUs match the index clips between contacts 5 and 6, and 12 and 13 in the connector. Lower the designation strip holder and lock down to hold the IUs securely in place. Refer to Fig. 11 for installation sequence of IUs in the panel to correspond to the plug wiring arrangement.

3.24 After installation is completed, apply power and perform tests shown in Part 5. To protect the electrical components of IUs, always remove the fuse associated with that particular circuit before removing or installing an IU. See Tables H, I, and K.◀

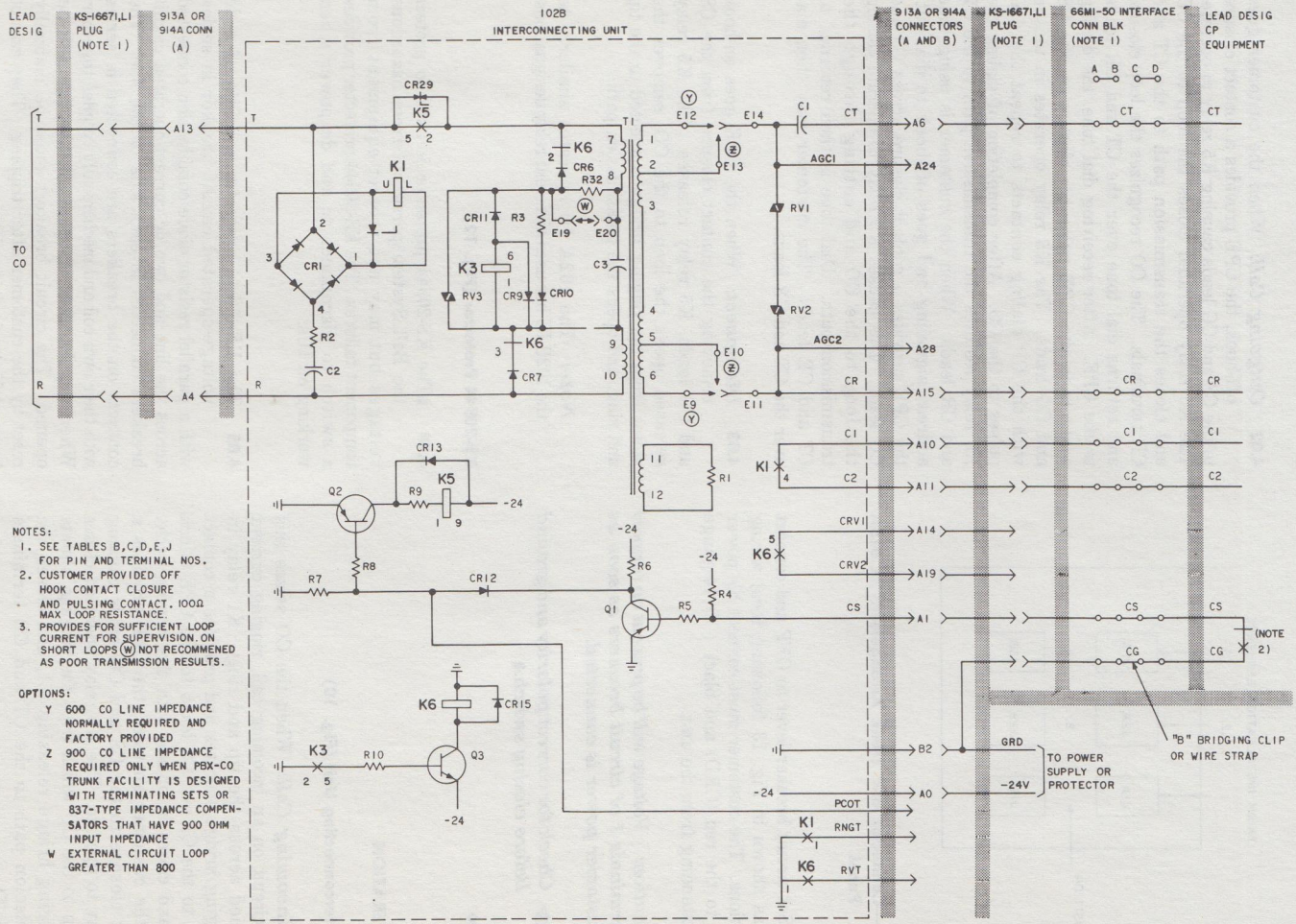
KS-20944 Protector (Fig. 12 and 13)

3.25 ▶When voltage protection is required, the KS-20944 protector must be mounted externally and wired to the power supply terminals of the 604-type and 615A panel. (See Fig. 7 and 8.)



NOTES:
1. SEE TABLES B,C,D,E,J, OR FIG. 9 FOR PIN NOS.
2. CUSTOMER PROVIDED OFF-HOOK CONTACT CLOSURE AND PULSING CONTACT. 18Ω MAX LOOP RESISTANCE.

Fig. 9—Schematic Diagram—102A Interconnecting Unit (MD)



NOTES:

1. SEE TABLES B,C,D,E,J FOR PIN AND TERMINAL NOS.
2. CUSTOMER PROVIDED OFF HOOK CONTACT CLOSURE AND PULSING CONTACT. 100Ω MAX LOOP RESISTANCE.
3. PROVIDES FOR SUFFICIENT LOOP CURRENT FOR SUPERVISION. ON SHORT LOOPS (W) NOT RECOMMENED AS POOR TRANSMISSION RESULTS.

OPTIONS:

Y 600 CO LINE IMPEDANCE NORMALLY REQUIRED AND FACTORY PROVIDED

Z 900 CO LINE IMPEDANCE REQUIRED ONLY WHEN PBX-CO TRUNK FACILITY IS DESIGNED WITH TERMINATING SETS OR 837-TYPE IMPEDANCE COMPENSATORS THAT HAVE 900 OHM INPUT IMPEDANCE

W EXTERNAL CIRCUIT LOOP GREATER THAN 800

Fig. 10—Schematic Diagram—102B Interconnecting Unit

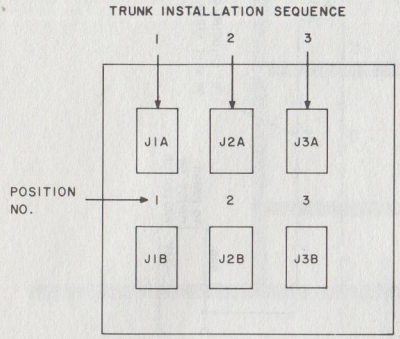


Fig. 11—Connector and Trunk Arrangement in 615A Panel

3.26 Set circuit breaker lever to OFF and connect as shown in Fig. 13 following local wiring instructions. The customer must connect his power supply to the red (GRD) and black (-V) 14-gauge leads extending from the unit.

Caution: Voltage will be present on (upper) terminals 1 of circuit breakers as soon as customer power is connected.

Check for correct polarity and ground before closing switch.

4. OPERATION

102B Interconnecting Unit (Fig. 10)

4.01 ***Incoming Call:*** 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 to 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 the CS and CG leads causing K5 relay to operate. The K5 relay operated closes the loop to the CO which trips the ringing, shunts the ringing bridge releasing K1, and closes the transmission path to the CT and CR terminals through T1.

4.02 ***Outgoing Call:*** When the customer goes off-hook, the CPE provides a contact closure to the CS and CG leads causing K5 relay to operate. The K5 relay operated closes the loop to the CO and closes the transmission path to the CT and CR terminals. The CO recognizes the loop closure and returns dial tone over the CT and CR leads to the CPE. After receiving dial tone, the dialing contacts in the CPE pulse the closure on the CS and CG leads. The K5 relay operates in unison with the CP dialing contacts to repeat the dial pulses to the CO. After completion of dialing the K5 relay restores the transmission path to the CT and CR leads. When the customer is using tone address signaling and goes off-hook to dial out, the CPE provides a contact closure across CS and CG leads. This causes K5 relay to operate closing the loop to the CO and cutting through the transmission path. Dial tone is then returned to CT and CR leads. The customer may then dial over the CT and CR leads.

4.03 ***Disconnect:*** When the CPE goes on-hook removing the contact closure from the CS and CG leads, K5 relay releases. The K5 relay released opens the loop to the CO, removes the shunt from the ringing bridge connected to the tip and ring, and opens the transmission path.

Note: The 102A IU operates similarly to the 102B IU but uses different relay designations.

KS-20944 Protector (Fig. 12)

4.04 The KS-20944 protector is used to protect the Bell System personnel from hazardous voltages but may not protect equipment from component failures. The KS-20944 protector provides a switch to disconnect ac and dc power when working on IUs.

4.05 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 the breakers are connected in series with their own coil and mechanically coupled together. When any breaker is operated, the line will be opened. The circuit breakers must be manually reset by the customer after tripping. They cannot be reset if the fault persists.

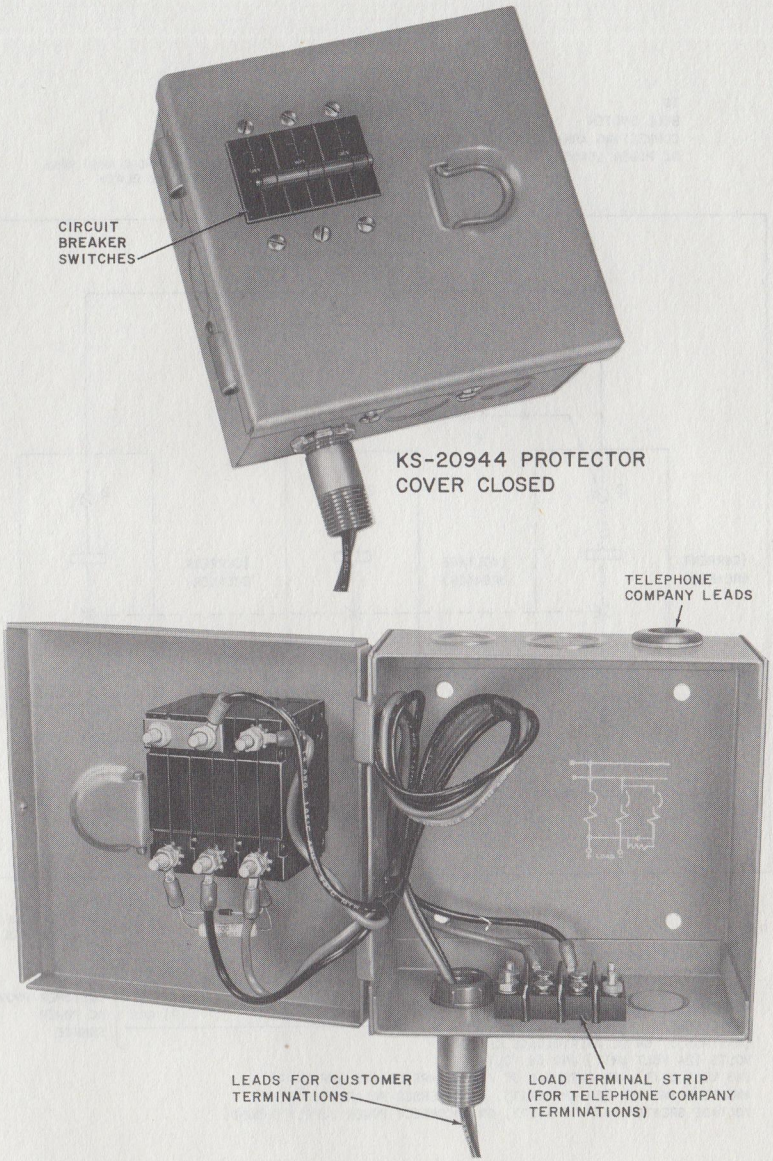
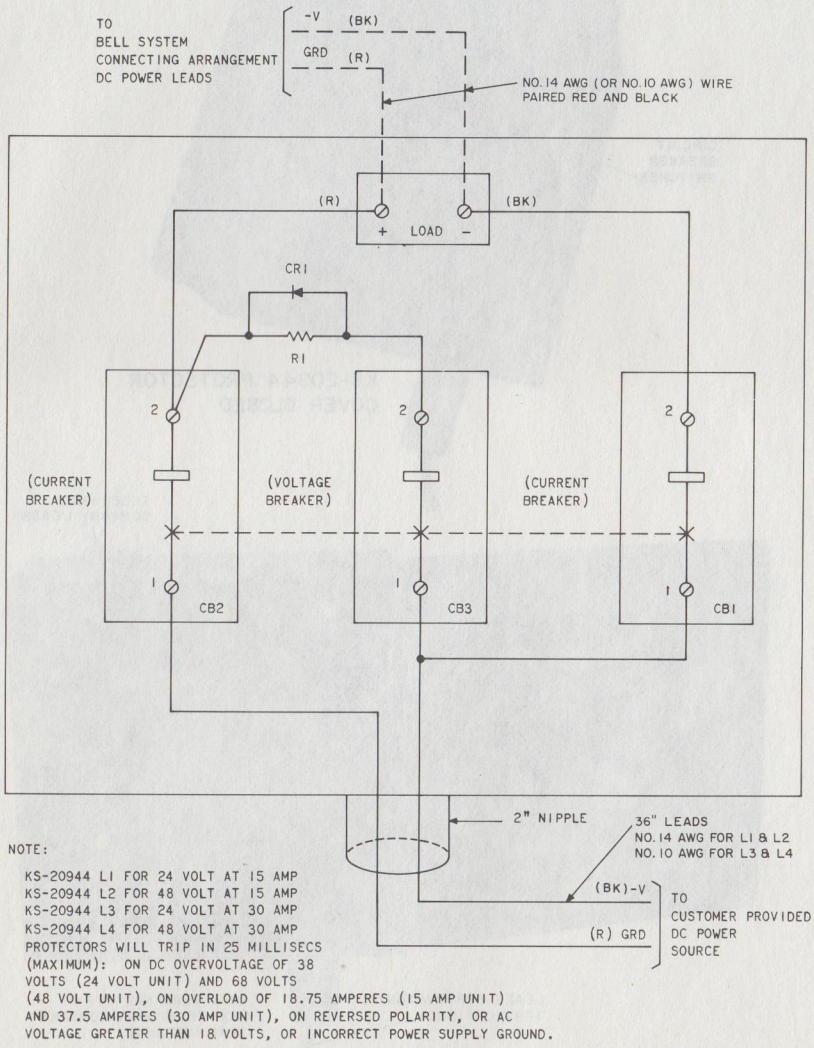


Fig. 12—KS-20944 Protector



NOTE:

KS-20944 L1 FOR 24 VOLT AT 15 AMP
KS-20944 L2 FOR 48 VOLT AT 15 AMP
KS-20944 L3 FOR 24 VOLT AT 30 AMP
KS-20944 L4 FOR 48 VOLT AT 30 AMP
PROTECTORS WILL TRIP IN 25 MILLISECS (MAXIMUM): ON DC OVERVOLTAGE OF 38 VOLTS (24 VOLT UNIT) AND 68 VOLTS (48 VOLT UNIT), ON OVERLOAD OF 18.75 AMPERES (15 AMP UNIT) AND 37.5 AMPERES (30 AMP UNIT), ON REVERSED POLARITY, OR AC VOLTAGE GREATER THAN 18 VOLTS, OR INCORRECT POWER SUPPLY GROUND.

Fig. 13—Schematic—KS-20944 Protector

4.06 The KS-20944, List 1 and List 2 protectors are designed to trip in 25 milliseconds (maximum) on:

- 38 volts dc (List 1) or 68 volts dc (List 2)
- 18.75 amps dc (List 1) or 36 amps (List 2)
- Reversed polarity or ac greater than 18 volts
- Incorrect power supply ground.◀

5. MAINTENANCE

5.01 When trouble is reported, check the CO pair and check for blown fuses and loose or broken connections.

▶Circuit Test Using 142A Test Set

5.02 The 142A test set (see Fig. 14 and 15) should be set up as follows with the IU:

Caution: Before removing or installing IUs in the mounting, remove the associated fuse to prevent damage to electrical components.

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

(2) Connect the leads from the 10-conductor interface cord, as required, to the proper terminals on the telephone company side of the block.

(3) Connect the leads from the 2-conductor power cord to −24 volts (red lead) and ground (black lead). This should be obtained from the same source used to power the IU under test. The PWR lamp should light at this time.

(4) 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.

(5) Set the CS-CG LOOP switch in the 18-ohm position for a 102A IU or in the 100-ohm position for the 102B IU.

5.03 After circuit preparation, proceed as follows:

(1) Operate switch on 1013A hand test set to the TALK position. The CS lamp on the 142A test set should light and the dial tone should be heard in the test set.

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

(3) 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.

(4) When ringing is applied to the trunk, the C- lamp lights and follows the ringing cycle.

(5) 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.

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

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

Circuit Testing Without 142A Test Set

5.05 Prepare the circuit under test as follows:

(a) Open the six leads to CPE by removing the B bridging clips (or wire straps) or connector at the 66B4-25 interface block.

(b) Supply talk battery by connecting a 500-ohm resistor from the −24 volt supply to

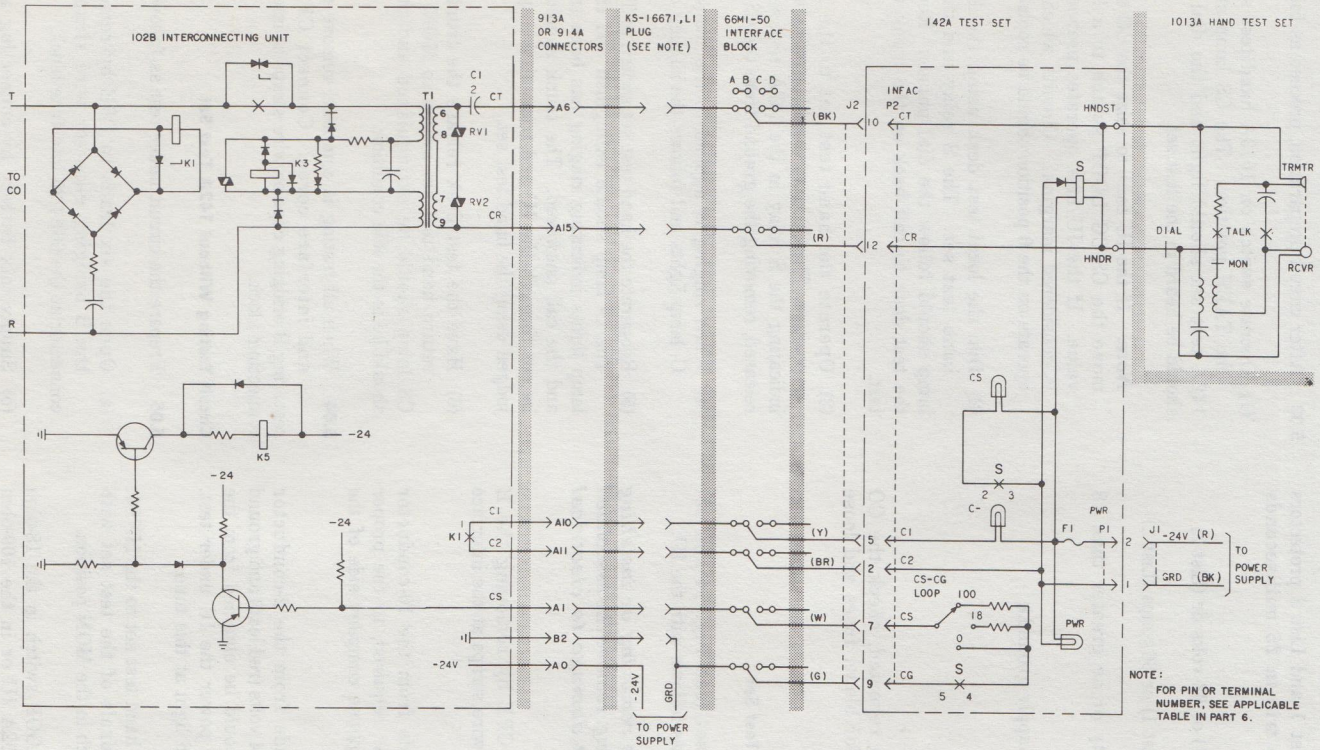


Fig. 14—Testing 102B Interconnecting Unit With 142A Test Set

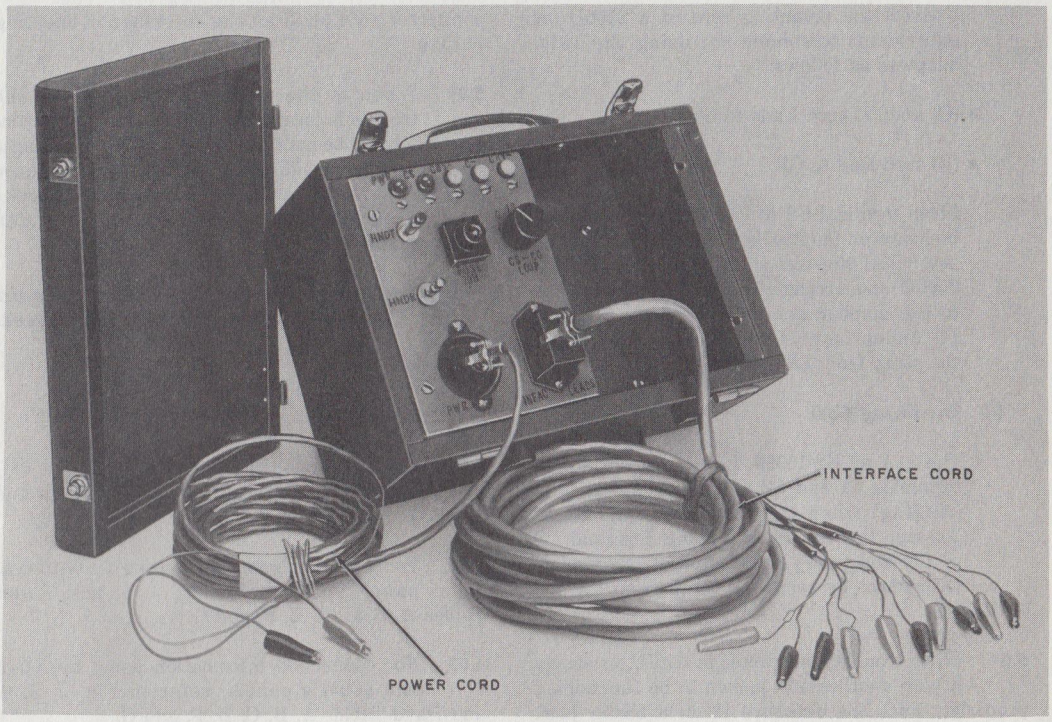


Fig. 15—142A Test Set

terminal CR and connect ground to terminal CT. A 2A KTU or 31A KTU may be used for battery feed instead of the resistor. Refer to Section 518-112-421 for KTU connections. (Make all test connections on the telephone company side of the interface block.)

(c) Connect a 1013A hand test set (or equivalent) across terminals CR and CT.

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

5.06 Perform the following tests.

(a) ***Transmission Path***

Operate the switch of the hand test set to MON. Temporarily strap terminal CS to CG causing K5 relay to operate cutting through the transmission path. Dial tone will be heard on the hand test set across CT and CR. Remove strap from terminals CS and CG and operate the switch on the hand test set to TALK.

(b) ***Outgoing Call (Rotary Dial)***

Connect the blue leads (or blue and green) of a 9C dial across terminals CS and CG for dialing. Dial tone will be heard on the hand test set connected to CT and CR. Dial the test desk using the 9C dial and talk over the hand test set and arrange to have a call returned to the number associated with the 102-type IU under test. Disconnect by removing 9C dial from terminals CS and CG.

(c) ***Outgoing Call (Tone Address Signaling)***

Connect the mounting cord of a 2500D (or equivalent) telephone set using the 161A adapters as follows:

- (G) and (Y) cord leads to CT
- (R) cord lead to CR.

Strap terminal CS to CG; dial tone will now be heard on the 2500D (or equivalent) station set. Dial the test desk number using the 2500D and arrange to have a call returned to the number associated with the 102-type IU under test. Disconnect by removing the strap from CS and CG.

(d) ***Incoming Call***

The 81A or KS-16990, List 1 test set across terminals C1 and C2 will indicate continuity (ringing) when the test desk calls back. Answer the call by strapping terminal CS to CG and verify satisfactory transmission. Disconnect by removing strap from CS and CG.

5.07 When trouble is suspected in the IU, exchange it with another unit known to be functioning properly. Pack the defective IU in a blister pack and return it for repair.

Never replace a 102-type IU in the 604-type or 615A panel or 69G apparatus mounting without first removing the fuse for that particular circuit. (See Tables H and K.)

5.08 If tests are satisfactory, remove all test connections to restore circuit to normal and replace B bridging clips (66M1-50) or Amphenol connector (66E3-25) at the interface connecting block.

5.09 When in the repairman's judgment the trouble is located in 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 Services with Customer-Provided Equipment (CPE).

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

6. CONNECTIONS

6.01 For connection information using the 69G apparatus mounting, refer to Fig. 5 and Table G.

6.02 For connection information using the 604A-type panel, refer to Fig. 2, 3, 6, and 7 and Tables A, B, C, D, E, F, and G.

6.03 For connection information using the 604B and 604C panels, refer to Fig. 2, 3, 6, and 7 and Tables A, B, C, D, F, and G.

6.04 For connection information using the optional 66E3-25 connecting block, refer to Fig. 3 and Table F.

6.05 For connection information using the 615A panel, refer to Fig. 2, 3, 4, 8, 11 and Tables F, G, J and L.

6.06 For connection information using the KS-20944 Protector, refer to Fig. 13.

TABLE B

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	1A
	R	1	BL-W	2	
2	T	27	W-O	3	2A
	R	2	O-W	4	
3	T	28	W-G	5	4A
	R	3	G-W	6	
4	T	29	W-BR	7	5A
	R	4	BR-W	8	
5	T	30	W-S	9	7A
	R	5	S-W	10	
6	T	31	R-BL	11	8A
	R	6	BL-R	12	
7	T	32	R-O	13	10A
	R	7	O-R	14	
8	T	33	R-G	15	11A
	R	8	G-R	16	
9	T	34	R-BR	17	13A
	R	9	BR-R	18	
10	T	35	R-S	19	3A
	R	10	S-R	20	
11	T	36	BK-BL	21	6A
	R	11	BL-BK	22	
12	T	37	BK-O	23	9A
	R	12	O-BK	24	
13	T	38	BK-G	25	12A
	R	13	G-BK	26	
14	T	39	BK-BR	27	14A
	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.

† Insulate and store spare leads.

TABLE C

CONNECTIONS FOR PLUG NO. 2—604-TYPE PANEL

TRUNK NO.	LEAD DESIG*	CONN PIN NO.	CONN CABLE COLOR	66MI-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	
	SPARE	29	W-BR	7	
	SPARE	4	BR-W	8	
	SPARE	30	W-S	9	
	SPARE	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	
	SPARE	34	R-BR	17	
	SPARE	9	BR-R	18	
	SPARE	35	R-S	19	
	SPARE	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	
	SPARE	39	BK-BR	27	
	SPARE	14	BR-BK	28	
	SPARE	40	BK-S	29	
	SPARE	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	
	SPARE	44	Y-BR	37	
	SPARE	19	BR-Y	38	
	SPARE	45	Y-S	39	
	SPARE	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	
	SPARE	49	V-BR	47	
	SPARE	24	BR-V	48	
	SPARE	50	V-S	49	
	SPARE	25	S-V	50	

* Stencil lead designations on fanning strip.

TABLE D

CONNECTIONS FOR PLUG NO. 3—604-TYPE PANEL

TRUNK NO.	LEAD DESIG*	CONN PIN NO.	CONN CABLE COLOR	66MI-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	
	SPARE	29	W-BR	7	
	SPARE	4	BR-W	8	
	SPARE	30	W-S	9	
	SPARE	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	
	SPARE	34	R-BR	17	
	SPARE	9	BR-R	18	
	SPARE	35	R-S	19	
	SPARE	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	
	SPARE	39	BK-BR	27	
	SPARE	14	BR-BK	28	
	SPARE	40	BK-S	29	
	SPARE	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	
	SPARE	44	Y-BR	37	
	SPARE	19	BR-Y	38	
	SPARE	45	Y-S	39	
	SPARE	20	S-Y	40	
	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 and 604C panels only.

‡ TS1 was in early 604B panels. Now incorporated in cable form with metal clamp.

TABLE E

CONNECTIONS FOR PLUG NO. 4—604-TYPE PANEL

TRUNK NO.	LEAD DESIG*	CONN PIN NO.	CONN CABLE COLOR	66MI-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	
	SPARE	29	W-BR	7	
	SPARE	4	BR-W	8	
	SPARE	30	W-S	9	
	SPARE	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	
	SPARE	34	R-BR	17	
	SPARE	9	BR-R	18	
	SPARE	35	R-S	19	
	SPARE	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	
	SPARE	39	BK-BR	27	
	SPARE	14	BR-BK	28	
	SPARE	40	BK-S	29	
	SPARE	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	
	SPARE	44	Y-BR	37	
	SPARE	19	BR-Y	38	
	SPARE	45	Y-S	39	
	SPARE	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	
	SPARE	49	V-BR	47	
	SPARE	24	BR-V	48	
	SPARE	50	V-S	49	
	SPARE	25	S-V	50	

* Stencil lead designations on fanning strip.

TABLE F

CONNECTIONS FOR 66E3-25 CONNECTING BLOCK

CIRCUIT NO.	LEAD DESIG.	66E3-25 TERM NO.	66E3-25 PIN NO.
1	CT	1	26
	CR	2	1
	CS	3	27
	CG	4	2
	C1	5	28
	C2	6	3
	SPARE	7	29
	SPARE	8	4
	SPARE	9	30
	SPARE	10	5
2	CT	11	31
	CR	12	6
	CS	13	32
	CG	14	7
	C1	15	33
	C2	16	8
	SPARE	17	34
	SPARE	18	9
	SPARE	19	35
	SPARE	20	10
3	CT	21	36
	CR	22	11
	CS	23	37
	CG	24	12
	C1	25	38
	C2	26	13
	SPARE	27	39
	SPARE	28	14
	SPARE	29	40
	SPARE	30	15
4	CT	31	41
	CR	32	16
	CS	33	42
	CG	34	17
	C1	35	43
	C2	36	18
	SPARE	37	44
	SPARE	38	19
	SPARE	39	45
	SPARE	40	20
5	CT	41	46
	CR	42	21
	CS	43	47
	CG	44	22
	C1	45	48
	C2	46	23
	SPARE	47	49
	SPARE	48	24
	SPARE	49	50
	SPARE	50	25

▮TABLE G◖

POWER CONNECTIONS

INPUT* VOLTAGE	69G APP MTG (NOTE 1)	604A1 PANEL (NOTE 2)	604B PANEL (NOTE 3)	615A PANEL (NOTE 4)
−24V	7	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. 5.
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.

* 48 volts not used with 102 IUs.

TABLE H

604A-TYPE PANEL FUSE ASSIGNMENT

VOLTAGE	FUSE NO.*	PANEL POSITION
−24V	F1	J1A
	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 not used in this application.

TABLE I

604B/C PANEL FUSE ASSIGNMENT

VOLTAGE	FUSE NO.	PANEL POSITION
±105V (Note)	F1*	J1A thru J14A
−24V	F2*	J1A
	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
−48V (Note)	F16‡	J1A thru J5A
	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 J◀

CONNECTIONS FOR PLUG P1 – 615A PANEL

LEAD DESIG	PLUG P1 PIN NO.	LEAD COLOR	615A PANEL		
			JACK	PIN	66T1 BLK
CT	26	W-BL	J1A	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	
SPARE	29	W-BR		A14	
SPARE	4	BR-W		A19	
SPARE	30	W-S		A7	
SPARE	5	S-W		A16	
CT	31	R-BL	J2A	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	
SPARE	34	R-BR		A14	
SPARE	9	BR-R		A19	
SPARE	35	R-S		A7	
SPARE	10	S-R		A16	
CT	36	BK-BL	J3A	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	
SPARE	39	BK-BR		A14	
SPARE	14	BR-BK		A19	
SPARE	40	BK-S		A7	
SPARE	15	S-BK		A16	
SPARE	41	Y-BL	J1B	B6	D12
SPARE	16	BL-Y		B15	
SPARE	42	Y-O		B1	
SPARE	17	O-Y		—	
SPARE	43	Y-G		B10	
SPARE	18	G-Y		B11	
SPARE	44	Y-BR	J2B	B6	D13
SPARE	19	BR-Y		B15	
SPARE	45	Y-S		B1	
SPARE	20	S-Y		—	
SPARE	46	V-BL		B10	
SPARE	21	BL-V		B11	
SPARE	47	V-O	J3B	B6	D14
SPARE	22	O-V		B15	
SPARE	48	V-G		B1	
SPARE	23	G-V		—	
SPARE	49	V-BR		B10	
SPARE	24	BR-V		B11	
SPARE	50	V-S			
SPARE	25	S-V			

TABLE K

615A PANEL FUSE ASSIGNMENT

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

* 24E Fuse, 1/2 ampere.

† Unused in this application.

TABLE L

CO OR PBX TRUNK CONNECTIONS – 615A PANEL

LEAD DESIGNATION		66T1 CONNECTING BLOCK TERMINAL
TRK 1	T	1A
	R	2A
TRK 2	T	3A
	R	4A
TRK 3	T	5A
	R	6A