

VOICE CONNECTING ARRANGEMENT STP
120A INTERCONNECTING UNIT
69G APPARATUS MOUNTING
604B PANEL

1. GENERAL

1.01 This section provides identification, installation, operation, maintenance, and connection information for the 120A interconnecting unit (IU) mounted in a 69G apparatus mounting or 604B panel and used in Voice Connecting Arrangement (VCA) STP.

1.02 This section is reissued to:

- Include wiring changes made on 120A IU
- Revise figures
- Delete detailed information on 604B panel and KS-20944 protector (contained in Sections 463-300-102 and 463-300-109).

1.03 The size of the job on initial installation and the expected growth should be the determining factors in selecting the proper equipment. Use of the 69G apparatus mounting is recommended for one to three circuits and the 604B panel for expected growth of four to fourteen circuits.

1.04 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.

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

SD-69646-01, Issue 4B—120A IU

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

- To provide a method for connecting a customer-provided (CP) key telephone system to a Bell System central office (CO) exchange line or PBX line on a 2-wire basis
- To transmit network control signaling functions
- To limit excessive signal levels from the CP equipment (CPE) and to provide protection for personnel against hazardous voltages.

APPLICATION

- Voice Connecting Arrangement STP provides an automatic connection of CP key telephone system line circuits to Bell System CO exchange lines or PBX station lines.

ORDERING GUIDE

- Unit, Interconnecting, 120A (one per line, 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 69G) or an ED-91180-72 Group 21 cabinet (for 604B), or their local equivalent.

- Mounting, Apparatus, 69G (one per 120A IU, Fig. 2, requires separate fusing. See 3.02.)

or

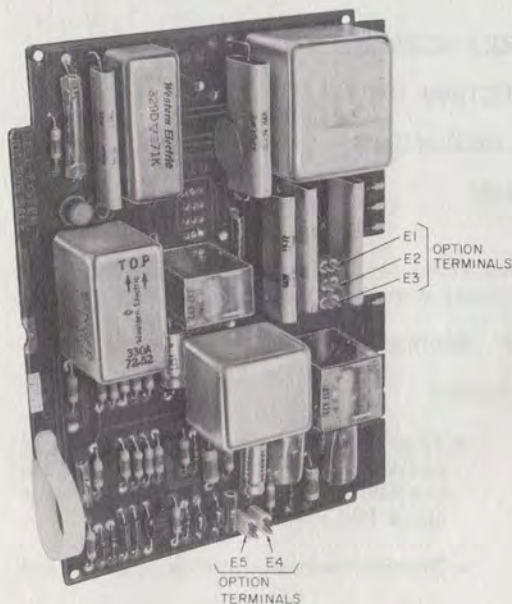


Fig. 1—120A Interconnecting Unit

- Panel, 604B (one per fourteen 120A IU, Fig. 3. Fuse panel only, no power unit.)
- Bracket, 99B (one per twelve 69Gs, Fig. 2).
- Cable, Connector, A25B (one per 69G, four per 604B, or see Table A).
- Block, Connecting, 66M1-50 (as required, Fig. 4).
- Block, Connecting, 66B4-25 (as required).

Note: Other type blocks may be used when specified locally.

- Clip, Bridging, B (as required, shipped 25 per package, Fig. 4).
- Diode, 426AG (69G mounting only, if power supply is 48 volts).
- Cable, D Inside wiring or equivalent (for cabling from 66B4-25 intermediate connecting

block to the 66M1-50 interface connecting block, 69G only).

- Unit, Power, 20C2, or 30C2 (when existing PBX power supply is insufficient).
- Unit, Telephone, Key, 201C (if required for fusing 69G. See 3.02.)
- Plug, KS-8585, L15 (if required for CP ring supply).

Replaceable Components

(a) For 604B Panel

- Fuse, 70F, 1/4 ampere (13 per panel)
- Fuse, 70A, 1-1/3 amperes (three per panel)
- Fuse, 70G, 1/2 ampere (two per panel)
- Indicator, 17C-49 (or equivalent for optional fuse alarm, if required).

(b) For Power Protection Unit (Optional)

- KS-20944, List 1 or KS-20944, List 2 Protector. Must be provided when a CP dc power supply is used. Use the List 1 protector for -24 volts or the List 2 protector for -48 volts.

TABLE A

OPTIONAL CABLE ARRANGEMENTS TO PROVIDE CONNECTIONS FOR FOUR KS-16671, L1 PLUGS ON 604B PANEL

CABLE DESIGNATION (NOTE)	MAXIMUM NO. OF CABLES REQUIRED		
	ARRANGEMENTS (SEE 3.07)		
	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.

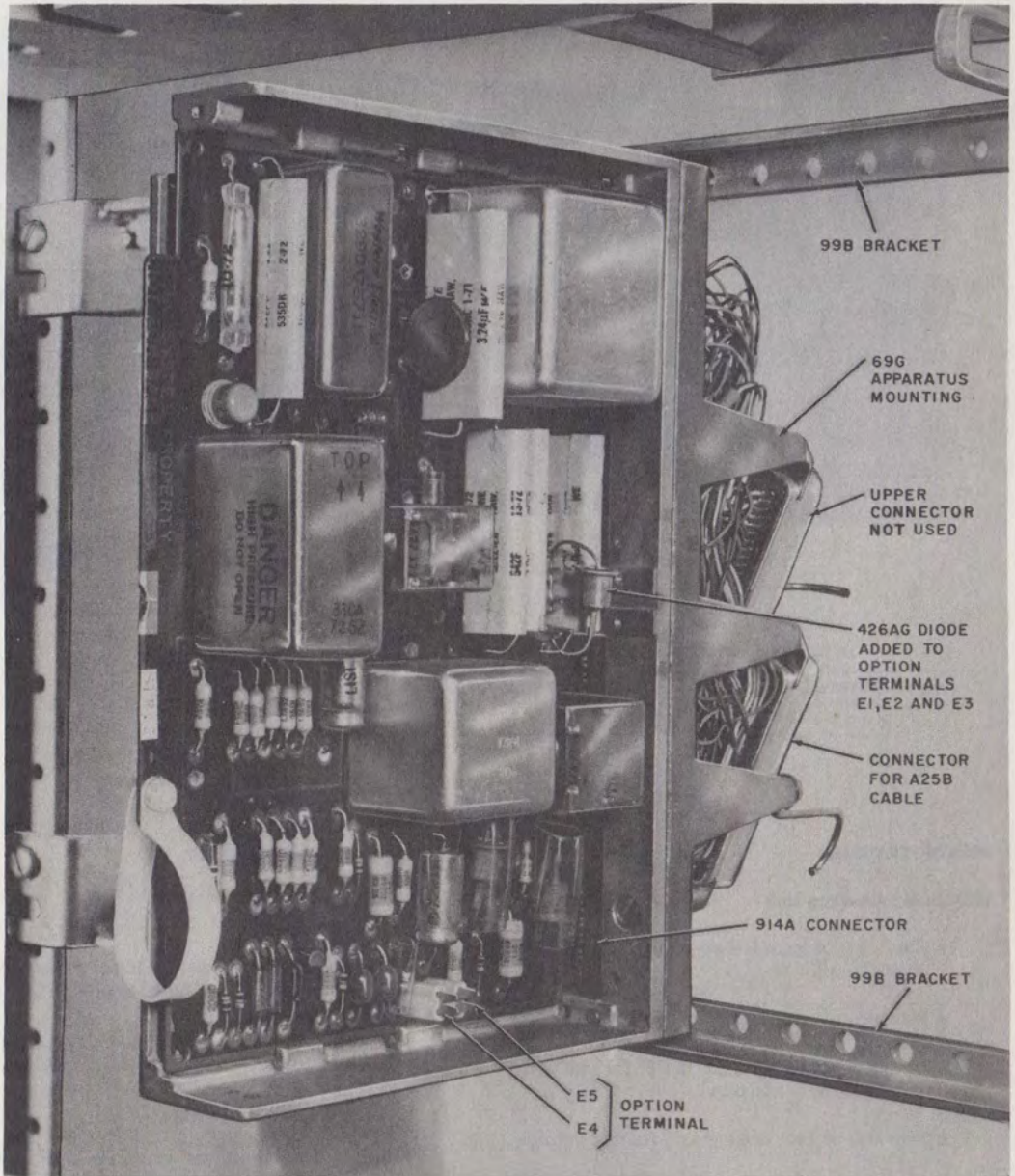
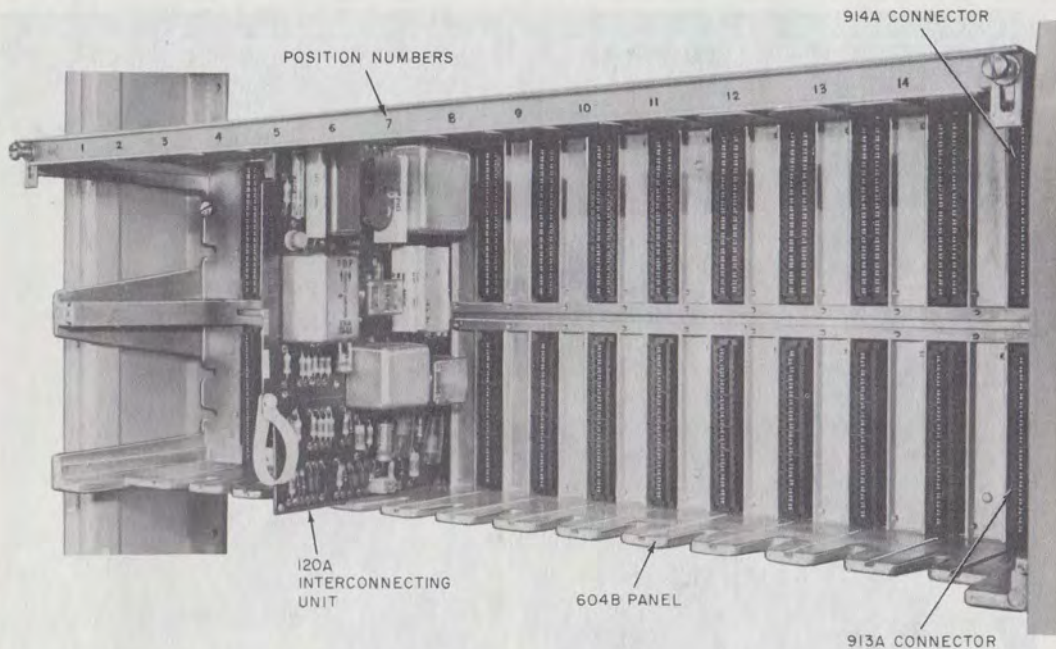


Fig. 2—120A Interconnecting Unit in 69G Apparatus Mounting



INSTALLATION SEQUENCE OF 120A INTERCONNECTING UNITS

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

Fig. 3—120A Interconnecting Unit in 604B Panel

DESIGN FEATURES**120A Interconnecting Unit**

- Components mounted on epoxy-coated 8-inch 80-pin board
- Provides voice frequency coupling to CPE
- Option terminals (Fig. 1 and 2) for use with -48 volts or -24 volts
- Provides dc talk battery and ringing voltage to CPE
- Requires 0.045 ampere at 26 volts dc, or 0.082 ampere at 50 volts dc
- Provides dc isolation to CPE

- Limits excessive signals
- Permits tone signaling from CPE

69G Apparatus Mounting

- Equipped with two 914-type 40-pin connectors factory-wired to two 50-pin KS-16671, List 1 plugs (use lower plug only)
- Designed to mount one 120A IU
- Requires separate fusing
- Mounts on a standard relay rack or in a 16C apparatus mounting using 99B brackets.

604B Panel

- Refer to Section 463-300-102 for detailed information on 604B panel.

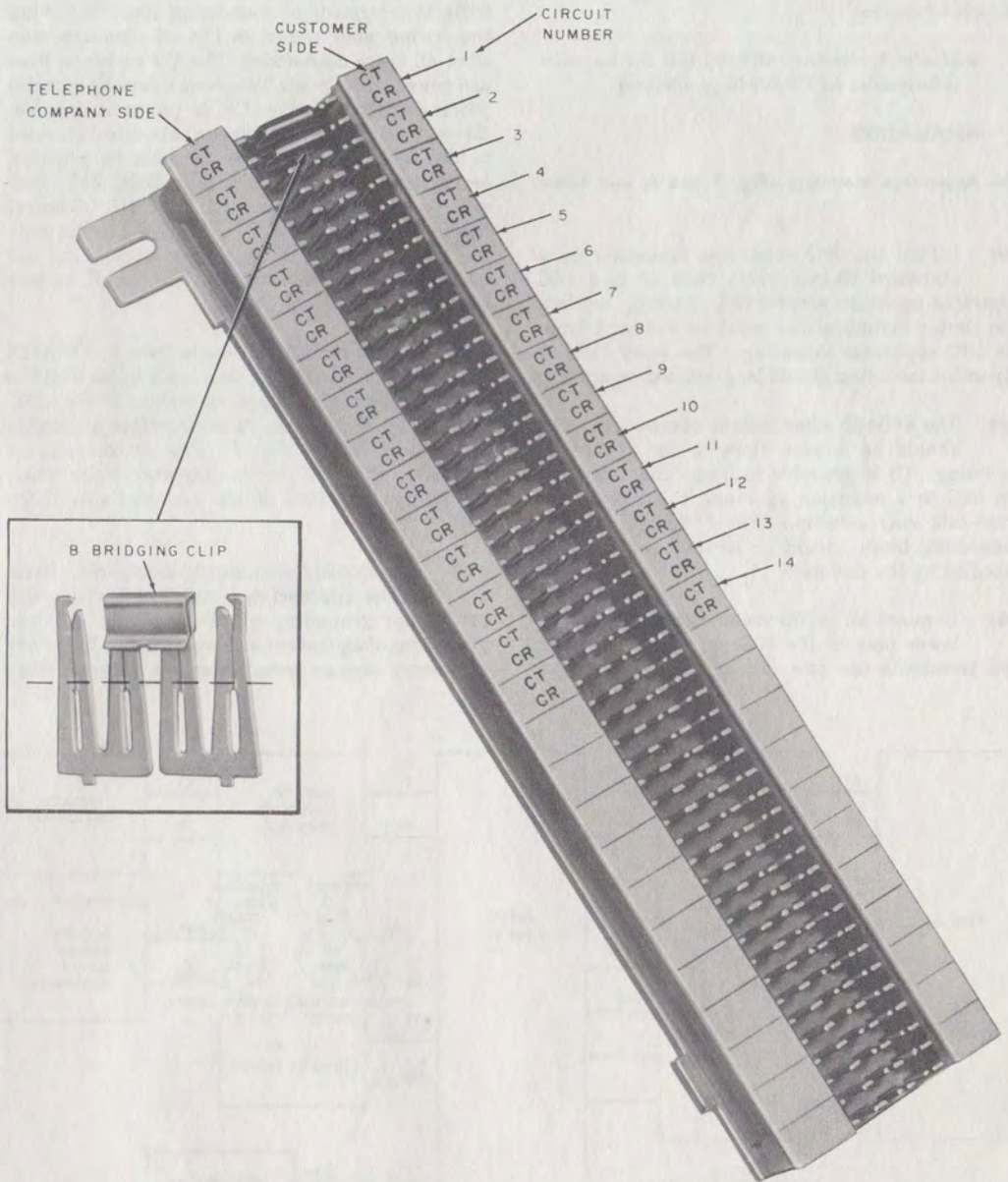


Fig. 4—66M1-50 Interface Connecting Block

KS-20944 Protector

- Refer to Section 463-300-109 for detailed information on KS-20944 protector.

3. INSTALLATION

69G Apparatus Mounting (Fig. 5 and 6, and Table E)

3.01 Install the 69G apparatus mounting on a standard 23-inch relay rack or in a 16C apparatus mounting using a 99B mounting bracket. The center mounting bar must be removed from the 16C apparatus mounting. The relay rack or apparatus mounting should be grounded separately.

3.02 The 66B4-25 intermediate connecting block should be located close to the apparatus mounting. (It is desirable to keep cable length to the 69G to a minimum as T and R are split and cross-talk may develop.) The 66M1-50 interface connecting block should be located at a location specified by the customer.

3.03 Connect an A25B connector cable to the lower plug of the 69G apparatus mounting and terminate the raw end of the cable to the

66B4-25 intermediate connecting block following the wiring plan shown in Fig. 6. Insulate and store all spare conductors. The CO exchange lines and power leads from a Telephone Company-provided power supply (or when CP dc power is supplied through the KS-20944 protector) are also connected to this block. Separate fuses must be provided locally (24E, 1/2 ampere fuse in 201C KTU fuse unit or equivalent) for each 120A IU. Connect power as shown in Table E. Typical current drain for the 120A IU is 0.045 ampere at 26 volts and 0.082 ampere at 50 volts dc. Use TALK battery output from power supply only.

3.04 Extend the CT, CR from the 66B4-25 intermediate connecting block to the 66M1-50 interface connecting block for access to the CPE. Stencil lead designations on the interface connecting block as shown in Fig. 4. The customer must terminate the CPE on the interface block using the terminal stenciled on the customer side of the block.

3.05 An external power supply is required. Refer to the 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. When

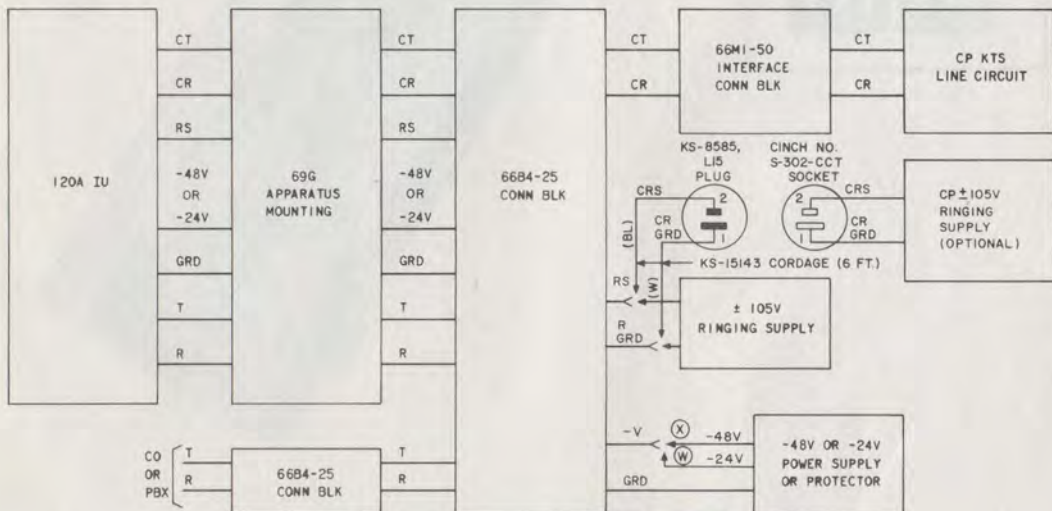


Fig. 5—Block Diagram—120A Interconnecting Unit in 69G Apparatus Mounting

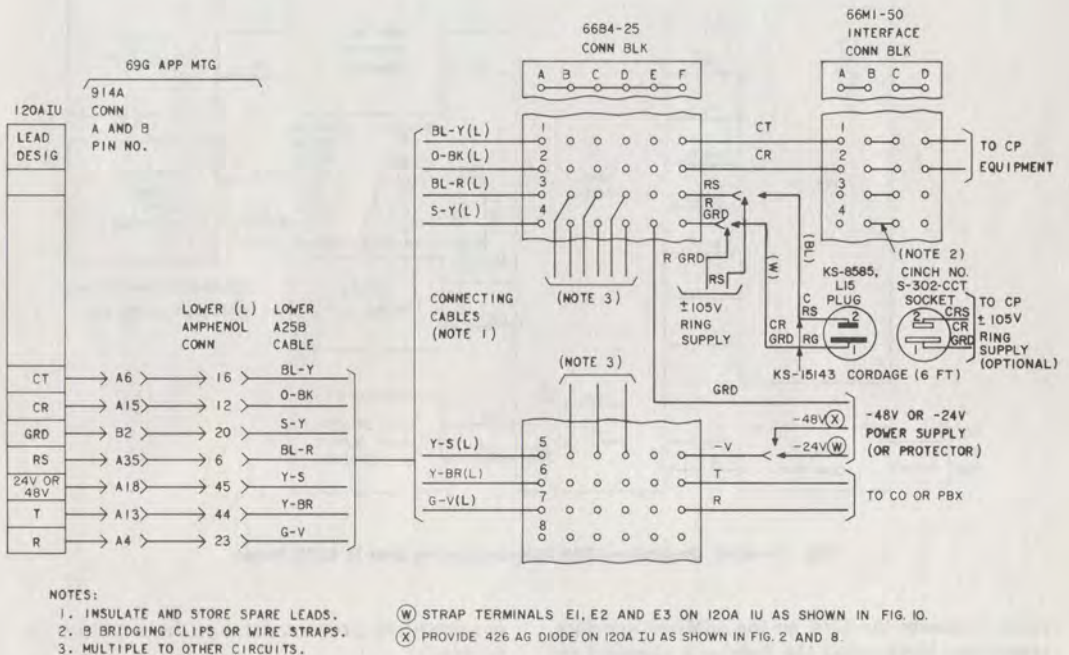


Fig. 6—Connection Diagram—120A Interconnecting Unit in 69G Apparatus Mounting

using a CP ringing supply, provide a 6-foot cord (KS-15143, 2-conductor, 18 gauge) terminated in a KS-8585, L15 plug (Cinch Mfg. Co. No. P-302-CCT plug) for connecting the CP ring supply. One side of ring supply must be grounded. Customer must furnish mating socket Cinch Mfg. Co. No. S-302-CCT. See Fig. 6.

Note: If power supply voltage is -48 volts, it will be necessary to add a separate 426AG voltage dropping diode to the 120A IU. See 3.13.

604B Panel (Fig. 7 and 8, Tables A, B, and C)

3.06 The 604B panel will mount on a standard relay rack or in an ED-91180-72, Group 21 equipment cabinet. The cabinet will hold three 604B panels or two 604B panels with power units when the drawing holder on the lower half of the cover is removed. (Ground relay rack or equipment cabinet separately.)

3.07 Electrical connection is made to the 604B panel through A25B connector cables to four KS-16671, List 1 plugs (P1, P2, P3, and P4). Arrangement of the KS-16671, List 1 plugs restricts the first plug (connections to CO lines) to an A25B connector cable. Plugs 2, 3, and 4 (connections to CPE) are arranged to adapt to a choice of cable sizes. (See Table A.)

3.08 Connect an A25B connector cable to P1 on the 604B panel and terminate the other end on the 66B4-25 connecting block to the CO trunks. See Table B for connections.

3.09 Locate the 66M1-50 interface connecting block at a location specified by the customer. Connect the other connector cables to P2, P3, and P4 on the 604B panel and terminate at the customer end on the 66M1-50 interface connecting block. (Stencil lead designations on the fanning strip as shown in Fig. 4. See Table C for connections.) Insulate and store spare leads. The customer

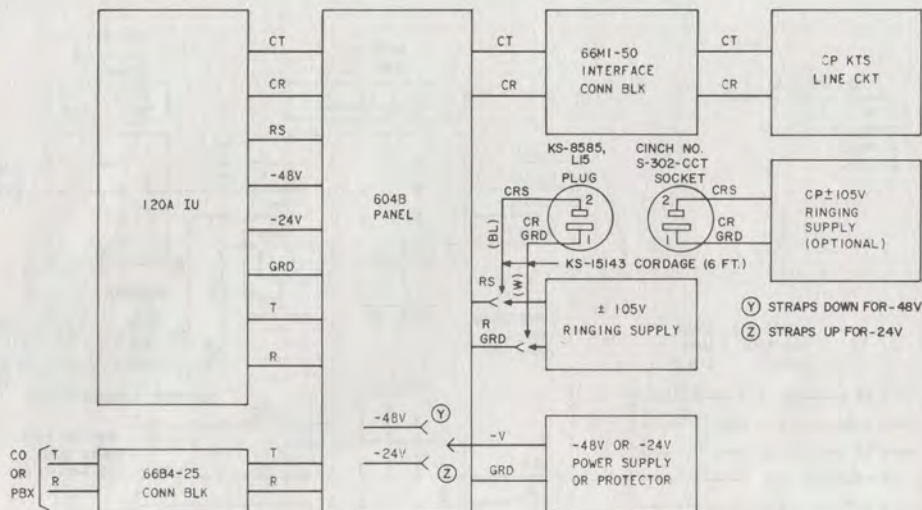


Fig. 7—Block Diagram—120A Interconnecting Unit in 604B Panel

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

3.10 Either Telephone Company or customer-provided ringing supply and dc power are connected to the terminals shown in Table E. Customer-provided dc power must be routed through the KS-20944 protector before connecting to the dc input terminals on the rear of the 604B panel. (See Fig. 9.) When using a CP ringing supply, provide a 6-foot cord (KS-15143, 2-conductor, 18-gauge) terminated in a KS-8585, L15 plug (Cinch Mfg. Co. No. P-302-CCT plug) for connecting the CP ring supply. Customer must furnish mating socket Cinch Mfg. Co. No. S-302-CCT. See Fig. 7.

3.11 When Telephone Company-provided power supplies are used, the customer must provide a 105- to 130-volt, 60-Hz outlet within reach of available power cords (locally furnished). This electrical outlet should not be under control of a wall switch.

3.12 Refer to the 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.

120A Interconnecting Unit



To protect transistors and other electrical components of interconnecting units, remove fuses before installing or replacing a unit. See Table D.

3.13 Install voltage option straps for options W, X, Y and Z (Fig. 8) as follows:

- (a) **For Use in 604B Panel:** If the dc power supply is 24 volts (option Z), strap E2 to E3 and E4 to E5. If the dc power supply is 48 volts (option Y), strap E1 to E2 (Fig. 1 and 8). Use 24 gauge bare wire and check connections for continuity after strapping.
- (b) **For Use in 69G Apparatus Mounting:** If the dc power supply is 24 volts (option W), strap E1 to E2 and E2 to E3 and E4 to E5. If the dc power supply is 48 volts (option X), connect a 426AG diode with the arrowhead pointing to E3 and the other lead run through E2 and E1 and leave E4 and E5 open. Use 24 gauge bare wire and check connections for

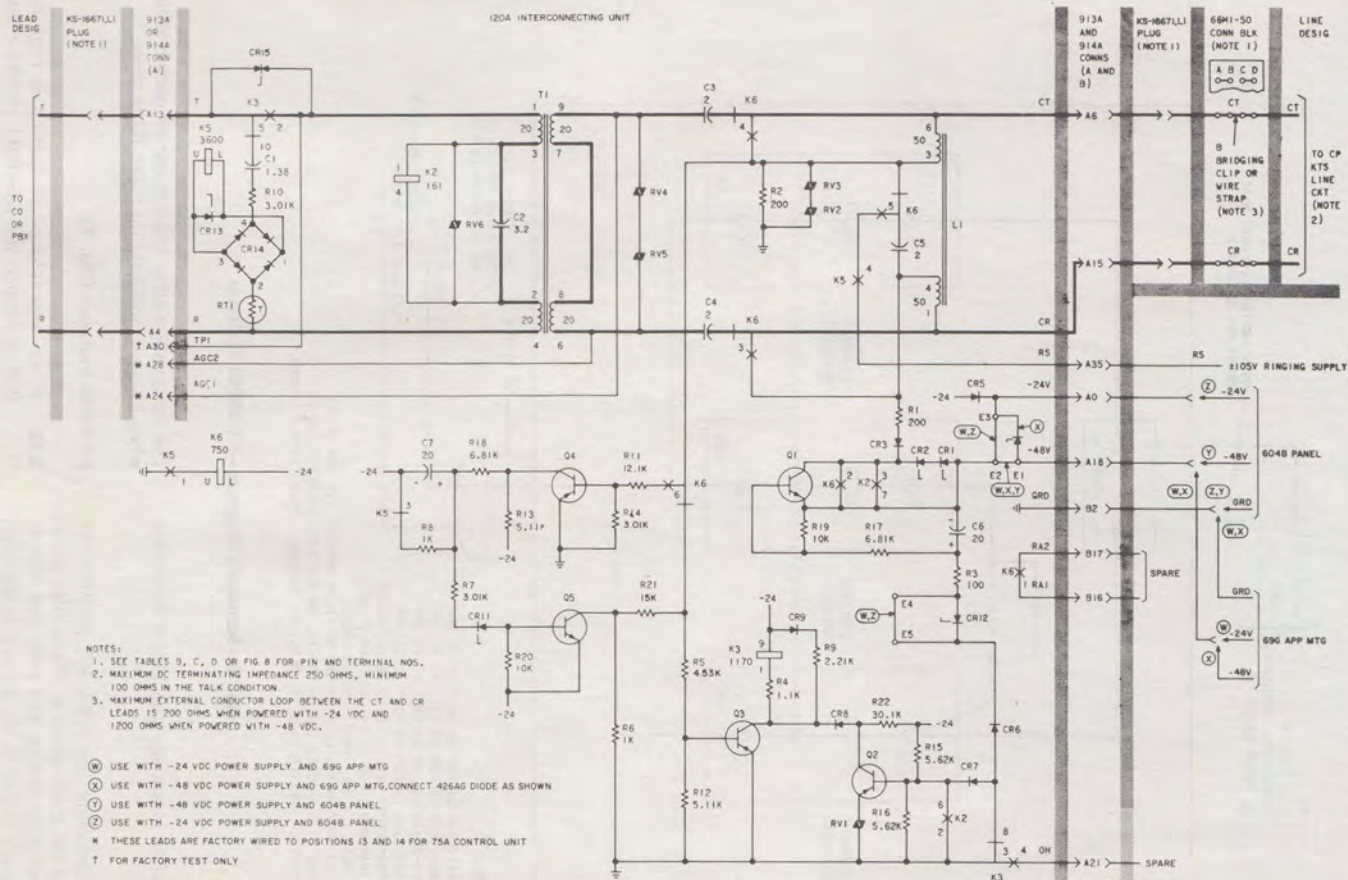


Fig. 8—Schematic Diagram—120A Interconnecting Unit

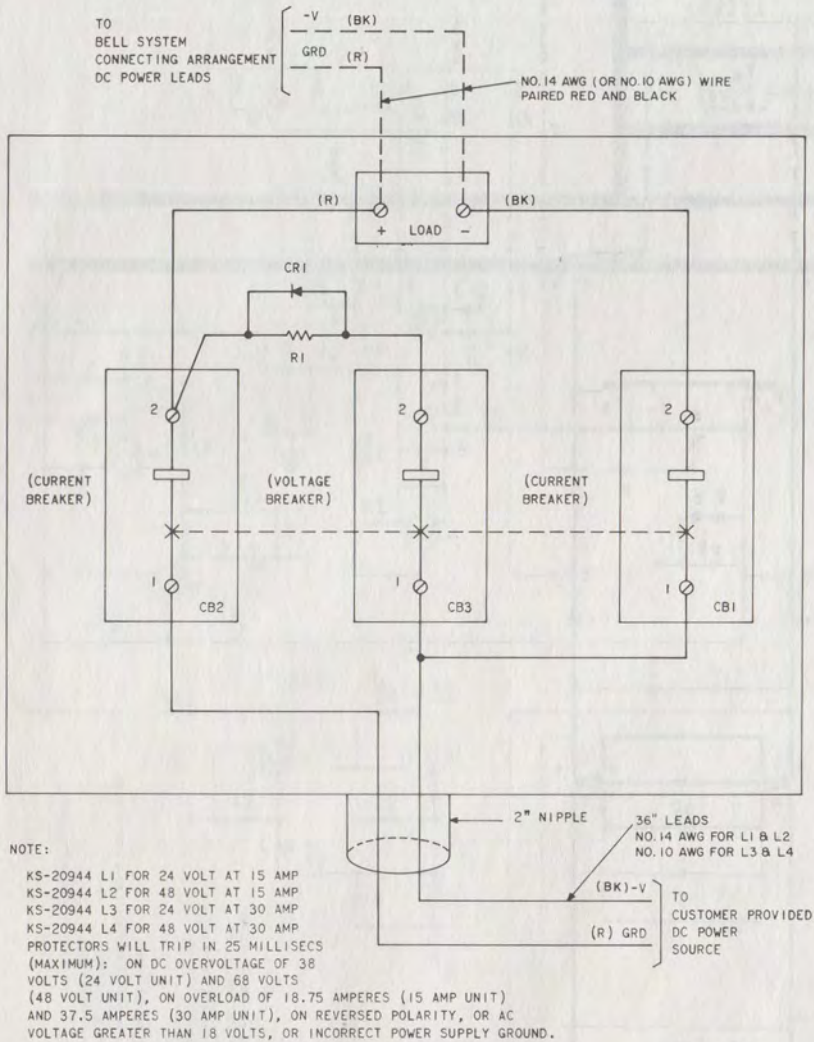


Fig. 9—Schematic Diagram—KS-20944 Protector

continuity after strapping (see Fig. 8 for option connections).

3.14 When installing the 120A IU, position the board in the guide grooves of the 604B panel or 69G apparatus mounting and slide the unit in until it is properly seated in the mating connectors.

The designation strip locking bar or card retainer, when lowered, will hold the 120A IU in place.

KS-20944 Protector (Fig. 9)

3.15 When overvoltage protection is required, (CP dc supply) the KS-20944 protector must

be mounted externally and wired to the power supply terminals of the 604B panel.

3.16 Connect as shown in Fig. 9 following wiring instructions in Section 463-300-109. The customer must connect his power supply to the red (+) and the black (-) 14-gauge lead (or 10 gauge) extending from the unit.

Warning: Voltage will be present on terminal 1 of circuit breakers.



Check for correct polarity and ground before closing switch.

Fuse Alarm Indicator (Optional)

3.17 A No. 17C indicator may be provided at the attendant station, if desired, and connected to leads shown in Table B. Install a M1 lamp (48V) under the red lens and an A3 lamp (24V) under the green lens.

4. OPERATION (Fig. 8)

INCOMING CALL

4.01 On an incoming call, ringing voltage from the CO (or PBX) is applied to the T and R leads and causes the ring relay K5 in the ring detector circuit to operate. K5 relay operated causes the ring slave relay K6 to operate. The K5 and K6 relays operate and release in unison with the ringing voltage. K6 relay operated disconnects transformer T1 from CT and CR, shorts the windings of battery feed inductor L1, connects the local ringing voltage lead RS to the CR lead to the CPE and connects the ring trip circuit of Q4 and Q5 to the dropping resistor R2. The ac voltage of the ringing signal across R2 causes Q4 to turn on and off at a 20-Hz rate. This causes the timing capacitor C7 to charge and discharge to keep Q5 turned off to prevent false ringing trip. The ringing interval to the CPE is under control of the K5 and K6 relays.

4.02 If the CP station goes off-hook to answer the call during the ringing interval, a dc voltage drop appears across R2 because of the talk battery furnished on the CT and CR leads. The dc voltage across R2 causes Q4 to turn on and charge timing capacitor C7 to the breakdown voltage of the zener diode CR12 causing Q5 to turn on.

Q5 turned on causes Q3 to turn on and operates the dial pulse relay K3. K3 relay operated connects transformer T1 to the T and R leads providing a dc termination to trip ringing on the CO (or PBX) line. K3 relay operated disconnects the ring detector circuit and the K5 and K6 relays release. K6 relay released disconnects the local ringing voltage from the CR lead and connects resistor R5 to resistor R2 to hold Q3 on and K3 relay operated. K6 relay released also cuts through the transmission path to the CPE. The line relay K2 is held operated by the CO (or PBX) battery. K2 relay operated closes a contact shunting Q1 to provide local talk battery to the CT and CR leads. A momentary open on the T and R leads will be passed on to the CT and CR leads, and Q2 will be turned on to hold K3 relay operated while K2 relay is released.

4.03 If the CP station goes off-hook to answer the call during the silent interval of the ringing cycle, a dc voltage across R2 causes Q3 to turn on and operate relay K3. K3 relay operated connects transformer T1 to the T and R leads, provides a dc termination to trip ringing on the CO (or PBX) line and cuts through the transmission path to the CT and CR leads to the CPE.

OUTGOING CALL

4.04 When the CP station goes off-hook closing the loop to the CT and CR leads, transistor Q1 turns on and dc voltage across R2 causes Q3 to turn on and operate K3 relay. K3 relay operated removes ground from timing capacitor C6 and cuts through the transmission path to the CT and CR leads. The line relay K2 operates from CO (or PBX) battery and shunts transistor Q1. Capacitor C6 discharges turning Q1 off, and local talk battery is supplied to the CP equipment under control of K2 relay. After dial tone is received, the CP station dials the desired number. The dial pulses turn Q3 on and off causing K3 relay to operate and release at the dial pulse rate. K3 relay repeats the dial pulses on the T lead to the CO (or PBX) and remains operated after dialing. When tone address signaling is used, the signals are transmitted through transformer T1 to the CO (or PBX) line and K3 relay remains operated.

DISCONNECT

4.05 When the CP station goes on-hook and opens the loop on the CT and CR leads, the dc voltage across R2 drops to zero turning Q3 off

and releases the K3 relay. K3 relay released disconnects the T1 transformer from the tip and ring, opens the transmission path, and connects the ring detector across the line to restore the circuit to normal.

POWER OPTIONS

120A Interconnecting Unit

4.06 The 120A IU is designed to provide either -24 volts or -48 volts as talk battery to the CPE. Maximum external conductor loop on the CT and CR leads to the CPE is 200 ohms for -24 volts and 1200 ohms for -48 volts talk battery. Talk battery is fed through R1 (200 ohms) and inductor L1 to the CR lead and ground through R2 (200 ohms) and L1 to the CT lead to the CPE. The 120A IU uses -24 volts talk battery for its logic circuitry.

4.07 When used with a 69G apparatus mounting, the supply voltage is connected to the 66B4-25 connecting block. If supply voltage is -24 volts, option W must be used on the 120A IU (Fig. 8). If supply voltage is -48 volts, option X must be used and a 426AG diode added to the 120A IU.

4.08 When used with a 604B panel, the -24 volt or -48 volt supply voltage is connected to the proper terminal on the rear of the panel and the panel option straps properly positioned for the voltage in use. In addition, option Y or Z must be added to the 120A IU (Fig. 8).

4.09 The ringing voltage, provided by a grounded ringing supply, is superimposed on the dc supply voltage used for talk battery to the CT and CR leads to the CPE. The ringing voltage is applied through a 2MF capacitor and 200 ohms to the CT and CR leads. The ringing supply may be 105 volts \pm 15 volts, 20 Hz or 30 Hz.

604B Panel

4.10 The 604B panel is designed to be powered by either a -48 volt (option Y) or -24 volt (option Z) power supply. When a -48 volt power supply is used, the -48 volts is dropped by diodes to -24 volts battery for operation of the 120A IU, and the -48 volts is used for talk battery to CPE only. Option straps are provided to switch the voltage dropping diodes in or out of the circuit. With a -48 volt power source, the straps swing

down connecting the diodes into the circuit. With a -24 volt power source, the straps swing up removing the diodes from the circuit. Use talk battery output from power supply only.

KS-20944 Protector (Fig. 9)

4.11 The KS-20944 protector is used to protect the Bell System personnel from hazardous voltages when CP power is used but will not protect equipment from component failures (separate fuses are required for the 120A IUs). The KS-20944 circuit breaker provides a switch to disconnect dc power when working on interconnecting circuits.

4.12 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 their toggles are mechanically coupled together. When any breaker is operated, all breakers will trip. The circuit breakers must be manually reset after tripping. If the fault is still on the line, the breakers cannot be reset.

4.13 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 amperes dc (List 1) or 36 amperes (List 2)
- Reversed polarity (or ac) greater than 18 volts
- Incorrect ground.

The diode and resistor combination is selected to adjust the tripping voltage of the voltage-operated circuit breaker. Refer to Section 463-300-109 for additional information on operation of the KS-20944 protector.

Fuse Alarm Indicator Circuit

4.14 Leads have been provided on plug P3 to provide voltage for operating an optional attendant alarm indicator. The red lamp will light when a 48-volt fuse blows, and the green lamp

will light when a 24-volt fuse blows. The attendant may be instructed to call a repairman.

5. MAINTENANCE (Fig. 8)

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

5.02 Open the two leads to circuit under test by removing B bridging clips or wire straps at the 66M1-50 connecting block. To verify in which direction the trouble exists, perform the following tests:

(a) **Transmission Path:** Connect a 1013A (or equivalent) hand test set to the CT and CR leads on the Telephone Company side of the 66M1-50 connecting block (avoid shorting CT and CR). Operate the TALK-MON switch of the test set to the TALK position. This will cause the 120A IU to operate cutting through the transmission path, and dial tone will be heard on the hand test set.

(b) **Outgoing Call (Rotary Dial):** After receiving dial tone, dial the local test desk number using the 1013A hand test set and arrange to have a call returned to the number associated with the 120A IU under test. Operate the TALK-MON switch of the test set to the MON position and wait for the return call.

(c) **Incoming Call (Rotary Dial):** When the local test desk calls back, ringing will be heard on the hand test set. Answer the call by operating the TALK-MON switch to the TALK position and verify that ringing has been tripped and transmission is satisfactory. Disconnect by removing the hand test set from the CT and CR terminals.

(d) **Outgoing Call (Tone Address Signaling):** Connect the mounting cord of a 2500D (or equivalent) telephone set using 161A adapters as follows:

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

Go off-hook. This will cause the 120A IU to operate cutting through the transmission path and dial tone

should be heard on the 2500D station set. Dial the test desk number using the 2500D and arrange to have a call returned to the number associated with the 120A IU under test. Go on-hook and wait for the return call.

(e) **Incoming Call (Tone Address Signaling):**

When the local test desk calls back, ringing will be heard on the station set. Answer the call and verify that ringing has been tripped and transmission is satisfactory. Disconnect by going on-hook and remove the station set from the CT and CR terminals.

5.03 When trouble is suspected in the 120A IU, exchange it with another unit known to be functioning properly.



Never replace an interconnecting unit without first removing the fuse or power for that particular circuit. See Table D.

5.04 If tests are satisfactory, remove all test connections and restore circuit to normal by replacing B bridging clips on the 66M1-50 interface connecting block. Follow local reporting procedures for trouble in CPE.



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

5.05 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 Services with Customer-Provided Equipment (CPE).

6. CONNECTIONS

6.01 For connection information using the 69G apparatus mounting, refer to Fig. 4, 5, and 6, and Table E.

6.02 For connection information using the 604B panel, refer to Fig. 4, 7, and 8, and Tables A, B, C, D, and E.

6.03 Connect power as shown in Table E.

TABLE B
CONNECTIONS FOR PLUG 1-604B PANEL

TRUNK NO.	LEAD DESIG*	CONN PIN NO.	A25B CONN CABLE COLOR	66B4-25 CONN BLK ROW NO.	POS. IN 604B 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.

TABLE C
 CONNECTIONS FOR PLUGS 2, 3, AND 4— 604B PANEL

TRUNK NO.	LEAD* DESIG	CONN PIN NO.	CONN CABLE COLOR	66M1-50† CONN BLK ROW NO.	POS IN 604B PANEL
CONNECTIONS FOR PLUG 2					
1	CT	26	W-BL	1	J1A
	CR	1	BL-W	2	
2	CT	31	R-BL	3	J2A
	CR	6	BL-R	4	
3	CT	36	BK-BL	5	J4A
	CR	11	BL-BK	6	
4	CT	41	Y-BL	7	J5A
	CR	16	BL-Y	8	
5	CT	46	V-BL	9	J7A
	CR	21	BL-V	10	
CONNECTIONS FOR PLUG 3					
6	CT	26	W-BL	11	J8A
	CR	1	BL-W	12	
7	CT	31	R-BL	13	J10A
	CR	6	BL-R	14	
8	CT	36	BK-BL	15	J11A
	CR	11	BL-BK	16	
9	CT	41	Y-BL	17	J13A
	CR	16	BL-Y	18	
24V	FAL1	49	V-BR	‡	F2(FA)
24V	G1	24	BR-V	‡	GRD
48V	FAL2	50	V-S	‡	F16(FA)
48V	G2	25	S-V	‡	GRD
CONNECTIONS FOR PLUG 4					
10	CT	26	W-BL	19	J3A
	CR	1	BL-W	20	
11	CT	31	R-BL	21	J6A
	CR	6	BL-R	22	
12	CT	36	BK-BL	23	J9A
	CR	11	BL-BK	24	
13	CT	41	Y-BL	25	J12A
	CR	16	BL-Y	26	
14	CT	46	V-BL	27	J14A
	CR	21	BL-V	28	

* Stencil lead designations on fanning strip.

† Insulate and store spare leads.

‡ Optional attendant alarm No. 17 Indicator.

TABLE D
604B PANEL FUSE ASSIGNMENT

VOLTAGE	FUSE NO.	PANEL POSITION
±105V	F1†	J1A thru J14A
TALK BATTERY -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
	TALK BATTERY -48V*	F16‡
F17‡		J6A thru J10A
F18‡		J11A thru J14A

*-48V used for talk battery to CP equipment only

† 70F fuses 1/4 Ampere

‡ 70A fuses 1-1/3 Ampere

§ 70G fuses 1/2 Ampere

TABLE E
POWER CONNECTIONS

INPUT VOLTAGE	69G APP MTG (NOTE 1)	604B PANEL (NOTE 2)
-24V	5	INPUT -24V
-48V	5	INPUT -48V
GRD	4	INPUT GRD
±105V	3	RNG SIG ±
±GRD	4	RNG SIG GRD

Notes:

1. Terminals on 66B4-25 connecting block. If -48V is supplied, add 426AG diode as shown in Fig. 10.
2. Terminals on rear of panel stamped as shown. Position option straps for -24V or -48V.