VOICE CONNECTING ARRANGEMENT C2AKS

1. GENERAL

1.01 This section provides identification, installation, operation, maintenance, and connection information on the 102-type interconnecting unit (IU) when used in Voice Connecting Arrangement (VCA) C2AKS.

1.02 This section is reissued to:

- Include information on the 615A panel which replaces the 69G apparatus mounting
- Add use of 142A test set
- Include information on the KS-20944 protector
- Add information about W option on the 102B IU
- Add information on the 604C panel and 21A apparatus unit
- Add information on index clips of the 604B panel.

1.03 The 102B IU (Fig. 1) is an improved version of the 102A IU (MD) providing option terminals for matching the impedance of the customer-provided equipment (CPE) to the central office (CO) line. The 102B IU does not require pulse correction. In existing installations using pulse correction, the 103A IU (MD) pulse correctors must be removed when replacing the 102A IUs with the 102B IUs. The 102B IU also increases the range limitation to the 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 (MD), 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 job on initial installation and the expected growth should be the determining factor in selecting the proper equipment. ◗For one to three circuits using the 102-type IU use the 615A panel. For four to fourteen circuits use the 604 type. Connections are provided for the 69G apparatus mounting, but it should be used on an Additions and Maintenance (A&M) basis only.◖

1.06 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.

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

SD-1E238-01, Issue 2A—102B IU

SD-1E202-01, Issue 3A—102A IU

SD-1E258-01, Issue 1—142A Test Set

SD-1E200-01, Issue 2D—604A Panel

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 an interface between CPE and a CO, PBX, or 1A2 Key Telephone System station line terminating on a Bell System station set
- To provide network control signaling functions
- To busy out the line associated with a key telephone system station (if provided)

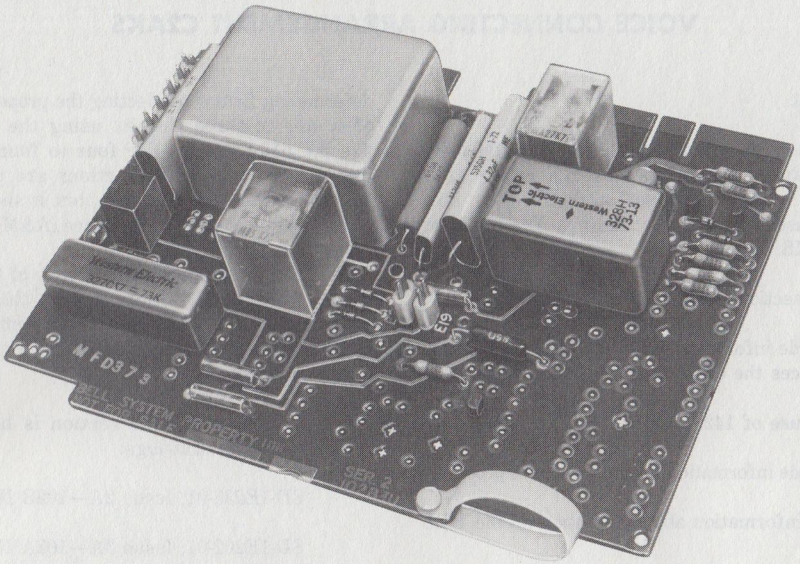


Fig. 1—102B Interconnecting Unit

- To limit excessive levels from the CPE and to provide protection for telephone company personnel against hazardous voltages.

APPLICATION

- Voice Connecting Arrangement C2AKS provides an automatic connection of customer-provided (CP) terminal equipment, typically call diversion of WATS line extension equipment, to a Bell System CO, PBX, or 1A2 Key Telephone System station line terminating on a Bell System station set.

ORDERING GUIDE

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

Note: If 102A IUs are used in positions 13 or 14 of a 604B or 604C panel, 102A IUs must also be used in positions 1, 4, 7, and 10.

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 an ED-91180-72, Group 21 cabinet for the 604-type or 615A panels.

- Panel, 604A1, (fuse panel only—no power unit)

  or

- Panel, 604A2 (19C2 power unit and fuse panel)

  or

- Panel, 604B and 604C (fuse panel only—no power unit, will mount up to fourteen 102-type IUs)

- Unit, Apparatus, 21A (used with 604C panel when −48 voltage is supplied)

- Panel, 615A (fuse panel only—no power unit; will mount up to three 102-type IUs) (Fig. 2)◀
- Bracket, 99B (one per three 615A panels)
- Cable, A25B (four per 604-type panel [see Table A] or one per 615A-type panel)
- Block, Connecting, 66M1-50 (as required, Fig. 3)
- Block, Connecting, 66B4-25 (as required)
- Clip, Bridging, B (as required, shipped 25 per package, Fig. 3)
- Block, Connecting, 66E3-25 (optional, Fig. 4)

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)
- Unit, Power, 19C2 (or equivalent for 604A1, 604B, 604C, or 615A panel locally engineered and installed when existing KTS power supply is insufficient)
- 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)

- ▶Protector, KS-20944, List 1 or List 2 (Fig. 5)—for optional power protection.

Note: Must be provided when a CP dc power supply is used. Use List 1 protector for −4 volts and List 2 for −48 volts.◀

Replaceable Components (For 604-Type Panel)

- Unit, Power, 19C2 (604A2 only)
- 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)
- Indicator, 17C-49 (for optional fuse alarm, if required, for 604B and 604C panels only).◀

▶Replaceable Components (For 615A-Type Panel)

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

DESIGN FEATURES

102-Type Interconnecting Unit

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

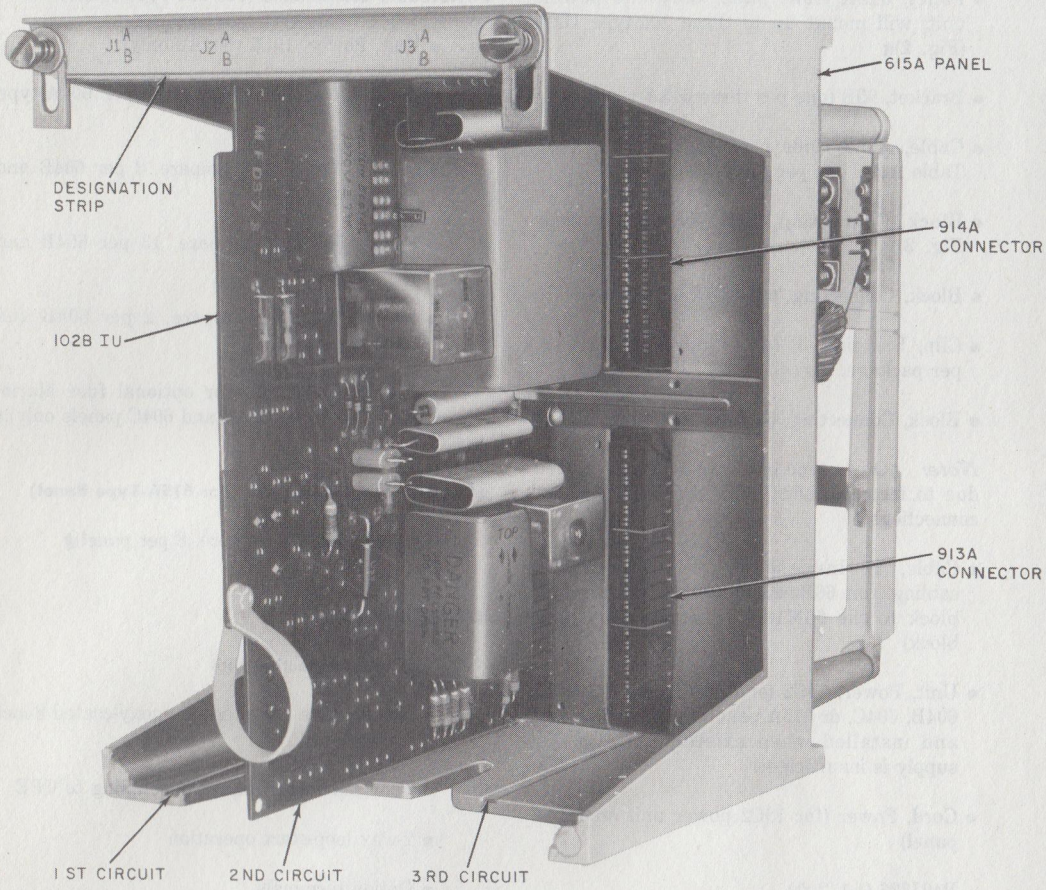


Fig. 2—102B Interconnecting Unit Mounted in 615A Panel

3. INSTALLATION

69G Apparatus Mounting (Fig. 6)

▶*Note:* The 69G apparatus mounting is not recommended for new installations. It has been replaced by the 615A panel. The following paragraphs are intended for use on an A&M ONLY basis.◀

3.01 Electrical connection is made to the 69G apparatus mounting through two A25B connector cables. Terminate the raw end of the cable to a 66B4-25 intermediate connecting block following the wiring plan shown in Fig. 6. Insulate and store all spare conductors. The CO lines and power supply leads also connect to this block.

3.02 Extend the CT, CR, CS, CG, C1, C2, and CA (if provided) leads 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. 3.

3.03 Separate fusing and −24 volt power are provided locally. ▶Connect the telephone company-provided power supply leads or CP dc

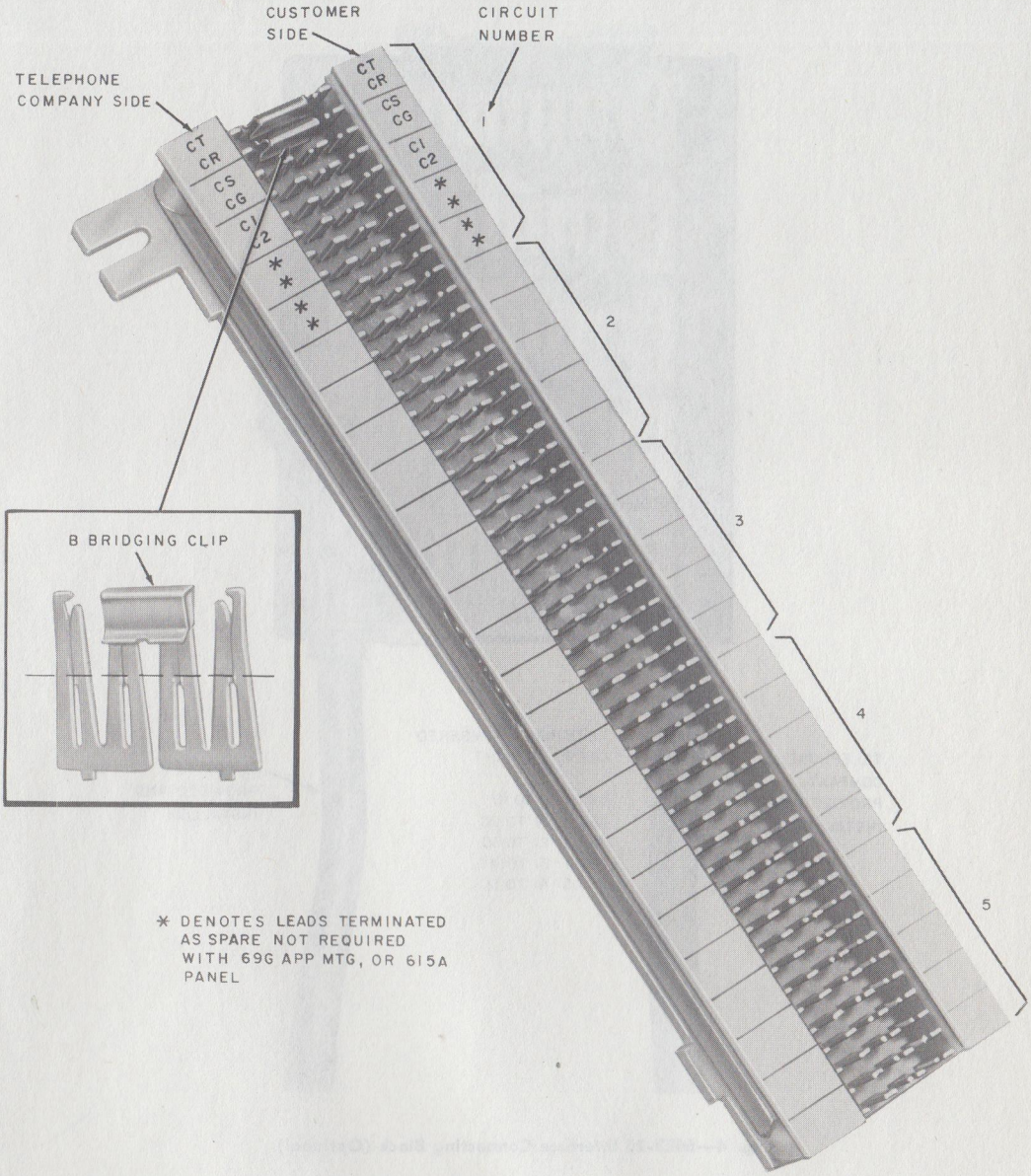


Fig. 3—66M1-50 Interface Connecting Block

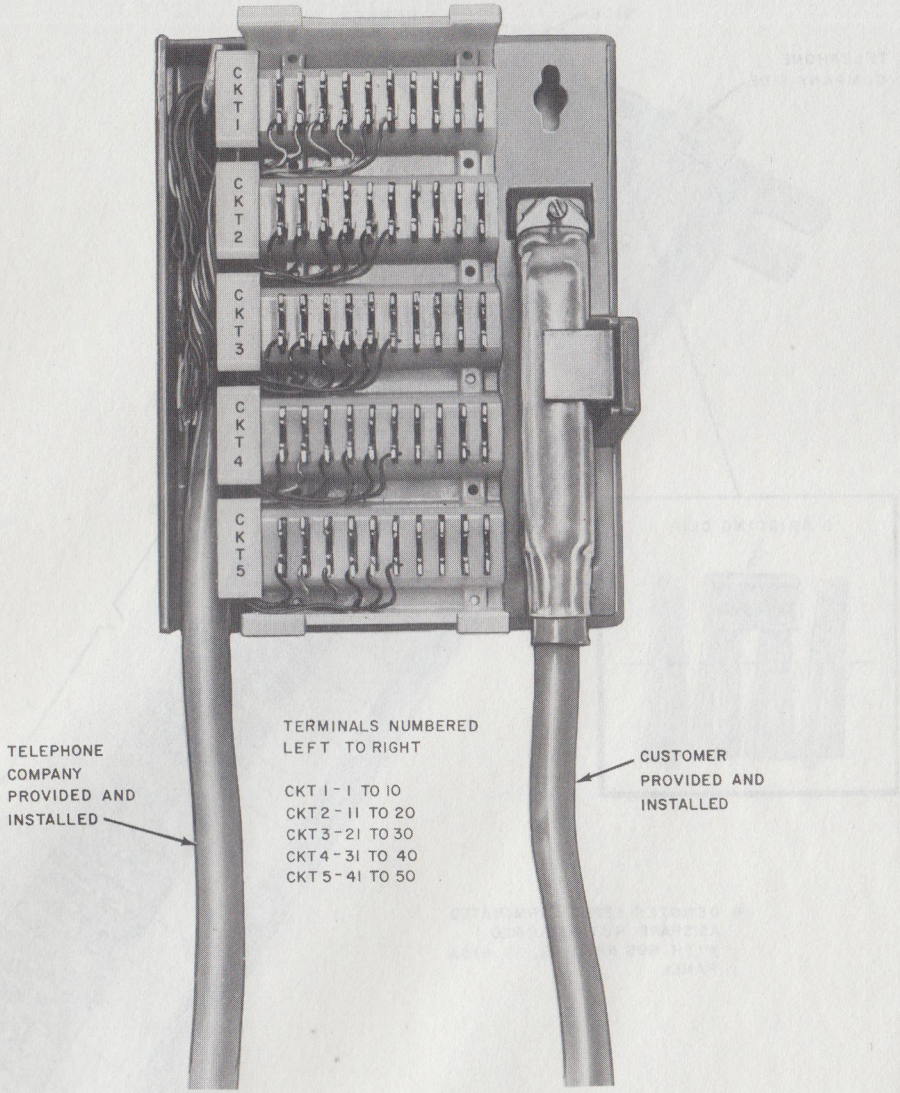


Fig. 4—66E3-25 Interface Connecting Block (Optional)

power supplied through the KS-20944, List 1 protector to the 66B4-25 connecting block as shown in Fig. 6 and Table K and multiple through separate fuses to each 102-type IU (201C KTU fuse unit with 24E, 1/2 ampere fuses or equivalent).◀

3.04 The 66B4-25 intermediate connecting block and the 66M1-50 interface connecting block should be located within 25 feet of the 69G apparatus mounting. The customer must terminate the CPE on the 66M1-50 interface connecting block using

Fig. 5—KS-20944 Protector

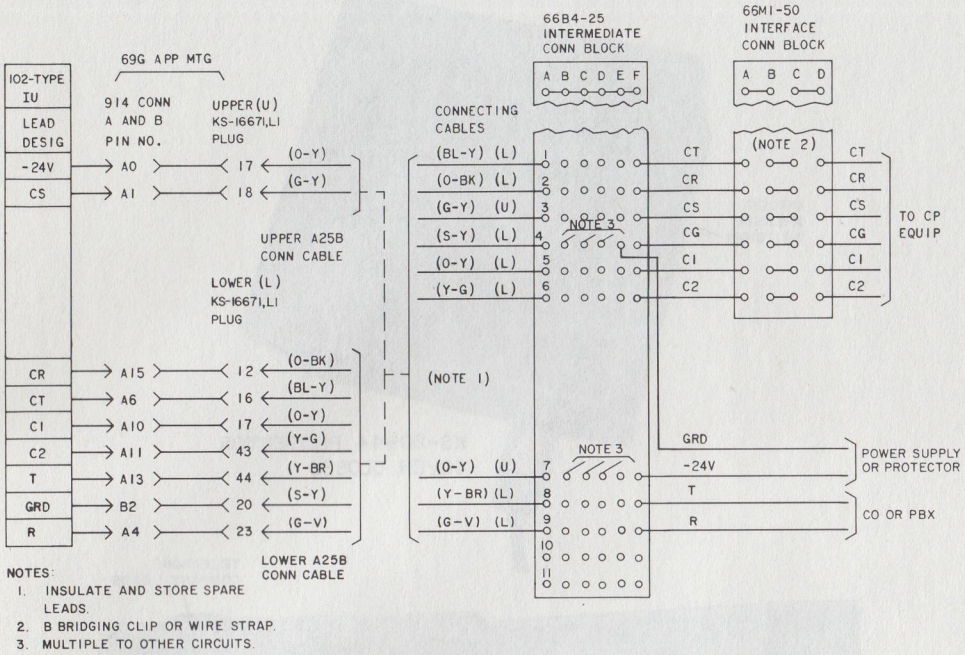


Fig. 6—Connection Diagram for 69G Apparatus Mounting

the seven terminals stenciled on the customer side of the 66M1-50 interface connecting block.

604-Type Panel (Fig. 7, 8 and Tables B, C, D, E and G)

3.05 The 604-type panel will mount on a standard 23-inch relay rack or in an ED-91180-72, Group 21, 18-plate equipment cabinet which should be installed in a location specified by the customer. Connect a frame ground to rack or cabinet.

The 18-plate cabinet will hold two 604A-type (MD), three 604B or 604C (with external power unit) panels, or two 604B or 604C panels with power unit, when the drawing holder on the lower half of the equipment cover is removed.

3.06 Telephone circuit 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 (to CO lines) to an A25B connector cable. Plugs two through four (to 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.

3.07 Terminate the raw end of connector cable No. 1 on a 66B4-25 connecting block for the CO lines. Terminate the raw ends of connector cables 2, 3 and 4 on 66M1-50 interface connecting blocks at the customer end following the wiring plan shown in Fig. 7 and Tables B, C, D, and E. Insulate and store all spare conductors. Stencil lead designations on the interface connecting block as shown in Fig. 3.

3.08 The customer must provide a 105- to 130-volt 60-Hz outlet within reach of available power cords (see Ordering Guide for cord lengths). It is

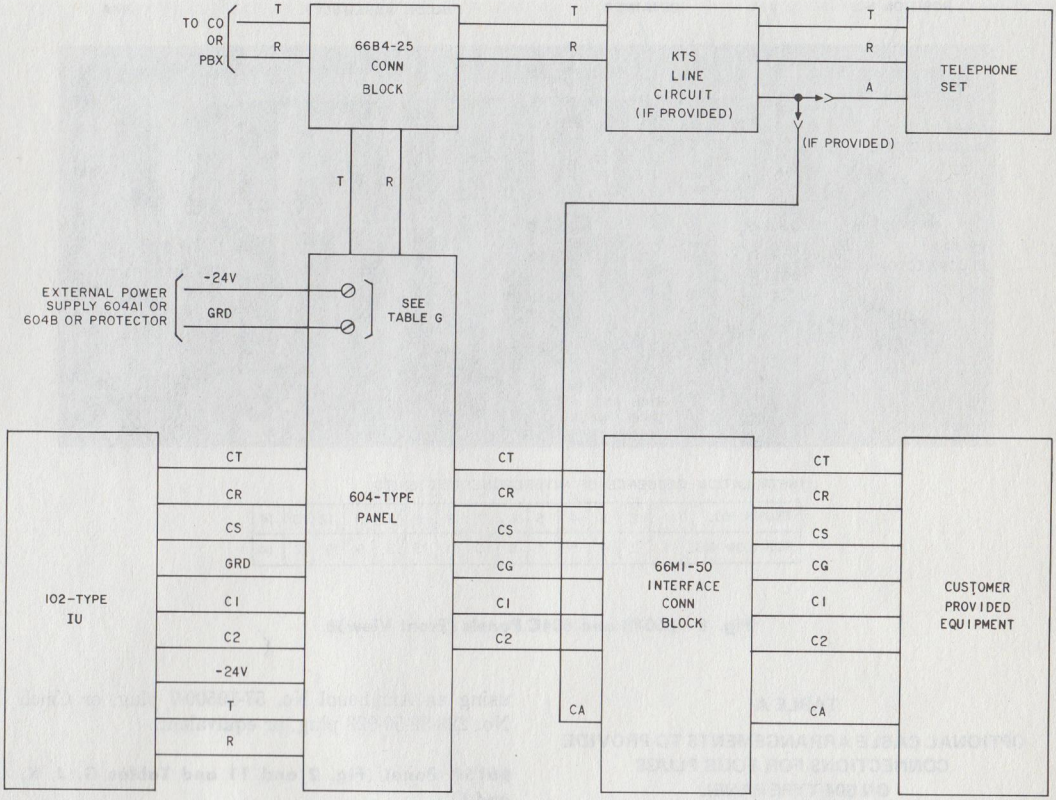


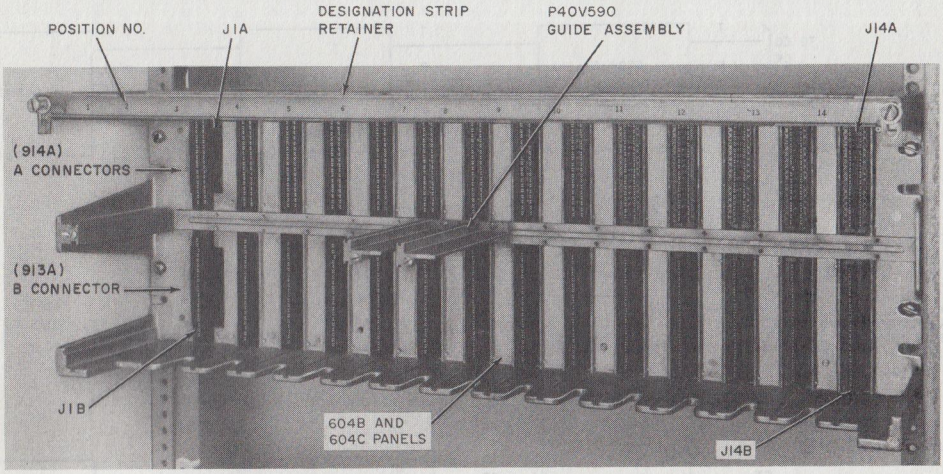
Fig. 7—Block Diagram—102-Type Interconnecting Unit With 604-Type Panel

recommended that this outlet be separately fused and not under the control of a wall switch.

3.09 If an external telephone company-provided power supply is used (604A1, 604B, or 604C only), or CP dc power is supplied through the KS-20944 protector, connect to fuse panel on rear of 604A1, 604B, or 604C as shown in Fig. 7 and Table G (use 16-gauge, or equivalent, twisted pair). Refer to the appropriate section in Division 167 for proper grounding of power plants. Connect power supply (using 16 gauge or equivalent twisted pair) as shown in Fig. 7 and Table G. Proper grounding of equipment and power unit is important to prevent damage from power line surges.

3.10 The 66M1-50 interface connecting block should be located within 25 feet of the panel. The customer must terminate the CPE on the interface connecting block using the seven terminals stenciled on the customer side.

3.11 As a customer option, the 66E3-25 interface connecting block may be used and located not further than 200 feet from the panel. When using the 66E3-25 optional interface connecting block, refer to Fig. 4 and Table F for terminal and pin numbers. The 66E3-25 block provides an Amphenol connector for up to five circuits. The customer must terminate the CPE to the connector



INSTALLATION SEQUENCE OF 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. 8—604B and 604C Panels (Front View)

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 3.06)		
	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.

using an Amphenol No. 57-10500-7 plug, or Cinch No. 223-32-50-023 plug, or equivalent.

615A Panel (Fig. 2 and 11 and Tables G, J, K, and L)

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

3.13 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 or optional 66E3-25 block (see 3.11) according to standard even

count color code. Lead designations are stenciled on the 66M1-50 interface connecting block as required.

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

3.15 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 as shown in Table L.

3.16 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 L. Use 20-gauge wire and remove insulation before placing in clip terminals.

3.17 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. 9 and 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 Tables H and I for 604-type panels.)

3.18 Select proper option straps for options Y, Z and W from Fig. 9 or 10 for local conditions. Always use option Z for the 102A IU. Use bare wire for strapping. Use option W for 102B when the external circuit resistance (including CO resistance) is greater than 800 ohms in the talking state.

Check option strap for continuity after strapping.

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

3.20 Position the board in the guide grooves, and slide the unit into the panel until it is properly seated in the connector. ▶The 604B and 604C panels have a P13B354 index clip between contacts 9 and 10 in the lower position connector that must be removed when using the 102A IU. The 604A, 604B, and 604C panels are electrically equivalent for this VCA and are interchangeable if this clip is removed. The 102B IUs have a slot for this clip. For the 615A panel the code slots on the IUs match the index clips between contacts 5, 6, 12, and 13 in the connector.◀

3.21 Position the retaining clip or designation strip holder to hold 102-type IUs securely.

3.22 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.◀

3.23 Install 102-type IUs in 604-type panels following the suggested sequence. This sequence is established to correspond to the plug arrangements. ▶The installation sequence for the 615A panel is the same as the connector (J1A, J2A, J3A) from left to right. See Fig. 12.◀

3.24 ▶If 102A IUs are used in positions 13 or 14 of the 604B or 604C panel, 102A IUs must also be used in positions 1, 4, 7, and 10.◀

3.25 When installing IUs in the 615A panel, position the boards in the grooves of the panel and slide the unit 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 to hold the IUs securely in place. Refer to Fig. 12 for installation sequence of IUs in the panel to correspond to the plug wiring arrangement.

▶KS-20944 Protector (Fig. 13)◀

3.26 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 panels.

3.27 Connect as shown in Fig. 13 following local wiring instructions. The customer must

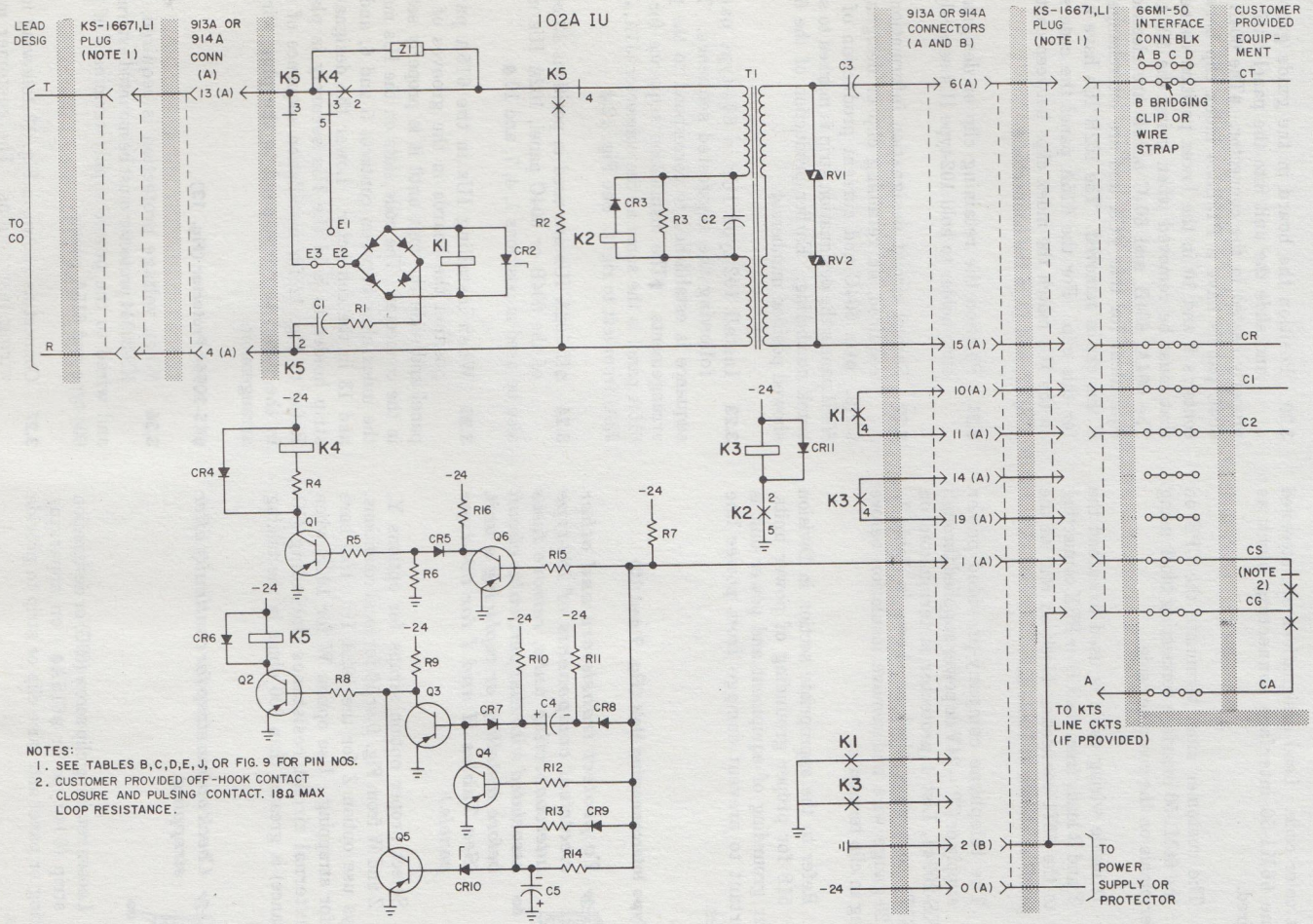


Fig. 9—Schematic Diagram—102A Interconnecting Unit (MD)

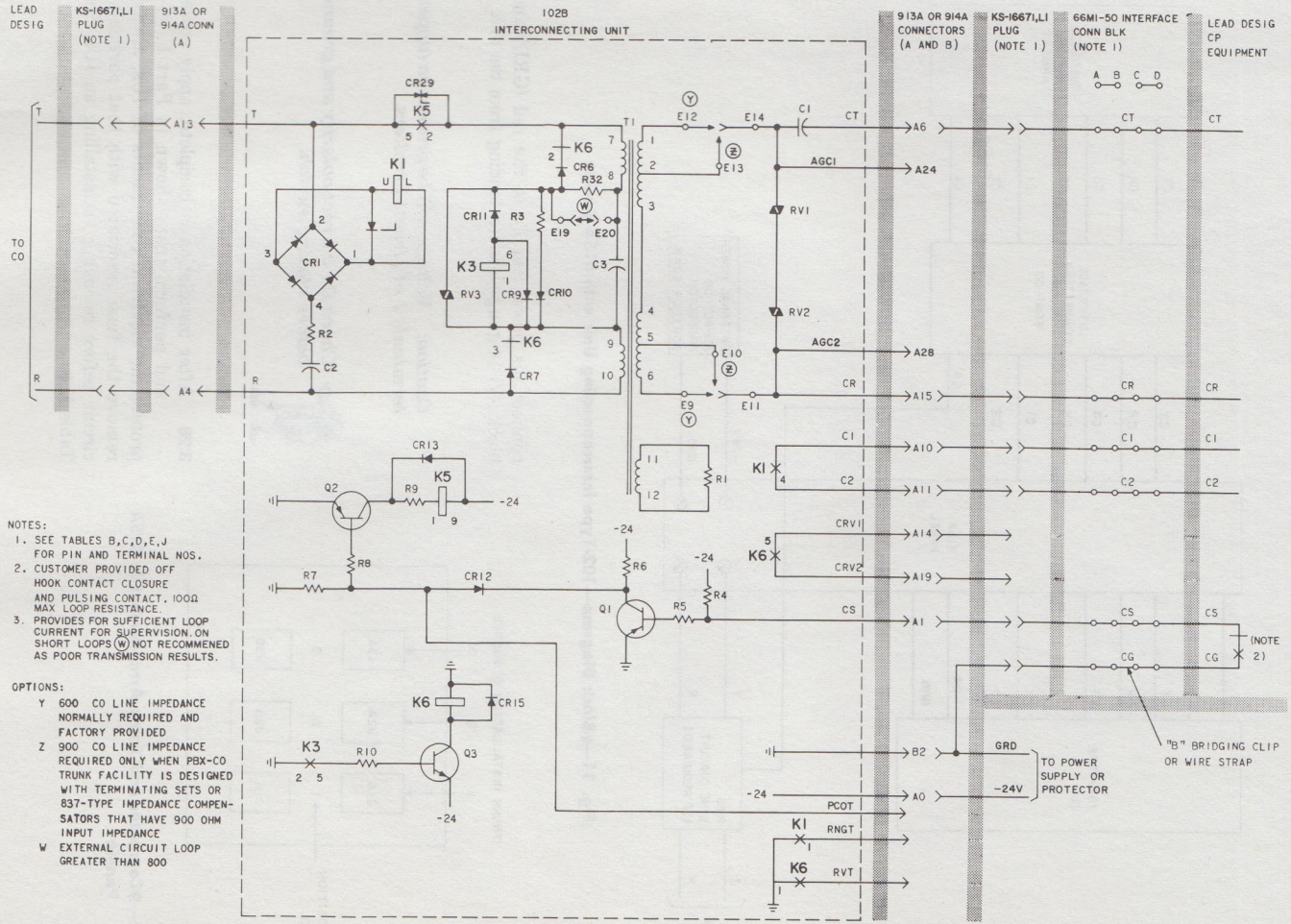


Fig. 10—Schematic Diagram—102B Interconnecting Unit

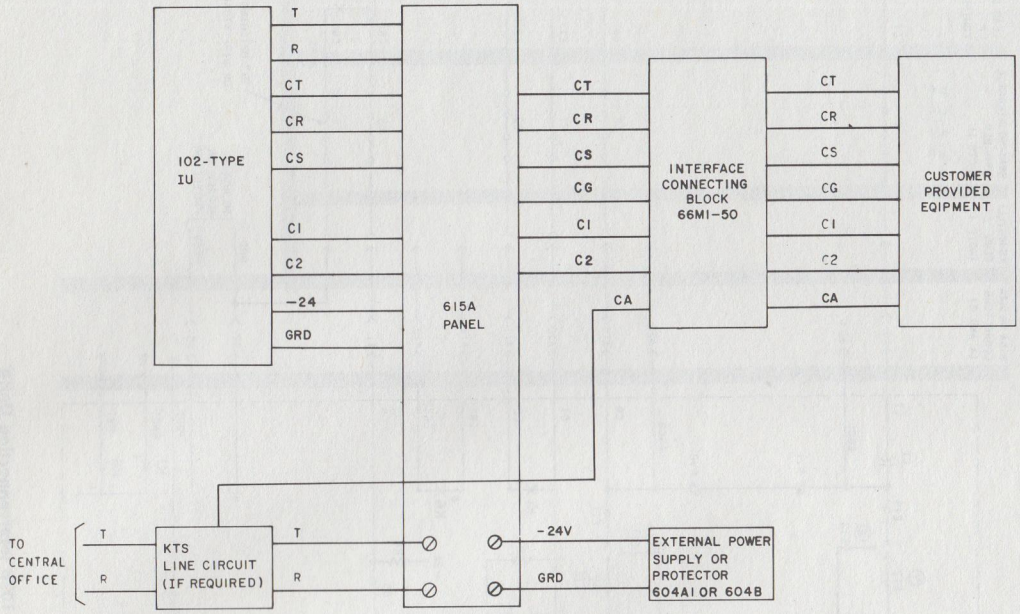


Fig. 11—Block Diagram—102-Type Interconnecting Unit with 615A Panel

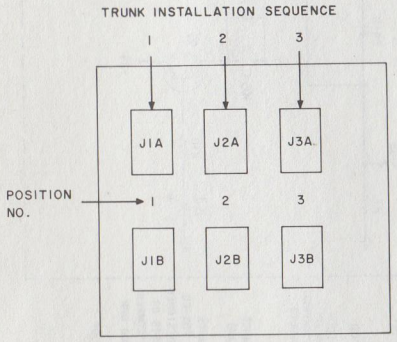


Fig. 12—Connector and Trunk Arrangement in 615A Panel

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.

Check for correct polarity and ground before closing switch.

3.28 After installation is complete, 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 Table K.

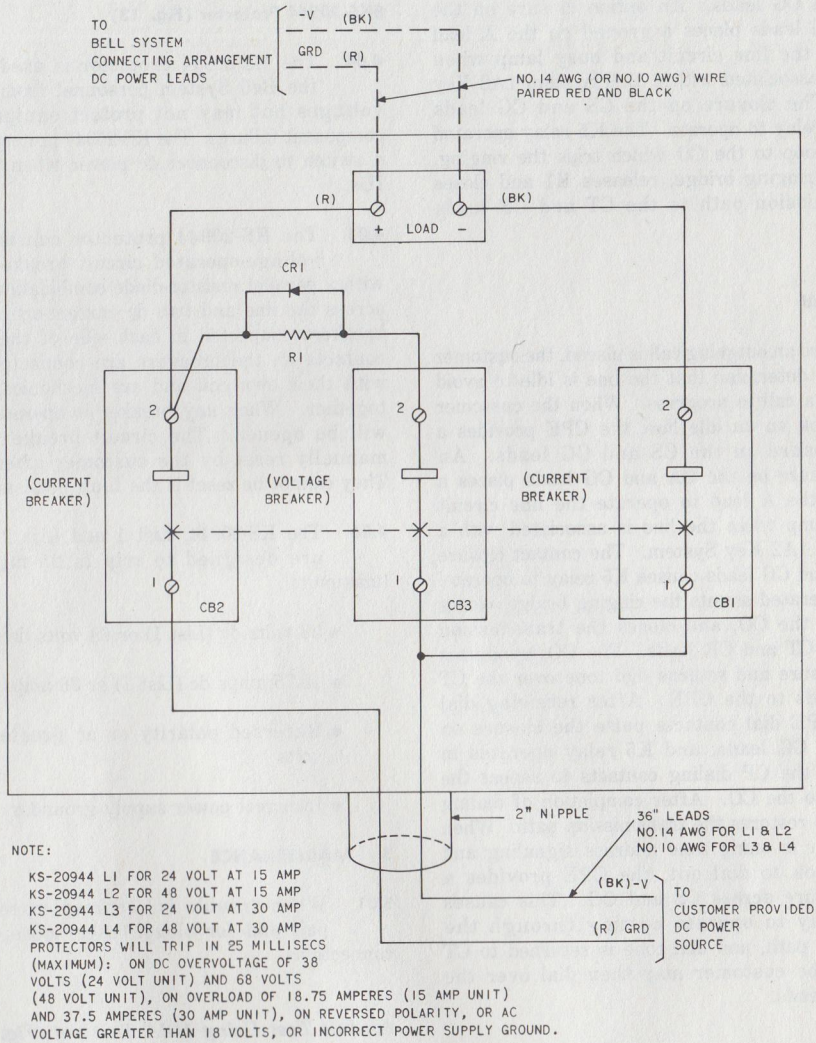


Fig. 13—Schematic—KS-20944 Protector

4. OPERATION

102B INTERCONNECTING UNIT (Fig. 10)

Incoming Call

4.01 When the CO seizes this circuit on an incoming call, ringing current is applied across the tip and ring. The K1 relay in the ringing bridge operates and provides a contact closure on the C1 and C2 leads to the CPE which open and close in unison with the ringing cycle. When the customer answers, the CPE provides a contact closure on

the CS and CG leads. An option closure on the CA and CG leads places a ground on the A lead to operate the line circuit and busy lamp when the line is associated with a Bell System 1A2 Key System. The closure on the CS and CG leads causes K5 relay to operate. The K5 relay operated closes the loop to the CO which trips the ringing, shunts the ringing bridge, releases K1 and closes the transmission path to the CT and CR leads through T1.

Outgoing Call

4.02 Before an outgoing call is placed, the customer must determine that the line is idle to avoid bridging to a call in progress. When the customer goes off-hook on an idle line, the CPE provides a contact closure on the CS and CG leads. An optional closure on the CA and CG leads places a ground on the A lead to operate the line circuit and busy lamp when the line is associated with a Bell System 1A2 Key System. The contact closure on the CS and CG leads causes K5 relay to operate. K5 relay operated shunts the ringing bridge, closes the loop to the CO, and closes the transmission path to the CT and CR leads. The CO recognizes the loop closure and returns dial tone over the CT and CR leads to the CPE. After receiving dial tone, the CPE dial contacts pulse the closure on the CS and CG leads, and 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. 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. This causes the K5 relay to operate cutting through the transmission path, and dial tone is returned to CT and CR. 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 and CA and CG leads, the K5 relay releases, and the line circuit and busy lamp are released. K5 relay released opens the loop to the CO, removes shunt from the ringing bridge and opens the transmission path.

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

KS-20944 Protector (Fig. 13)

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 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 are 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.

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

- 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 for blown fuses, loose or broken connections.

Circuit Test Using 142A Test Set (Fig. 14)

5.02 The 142A test set 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.

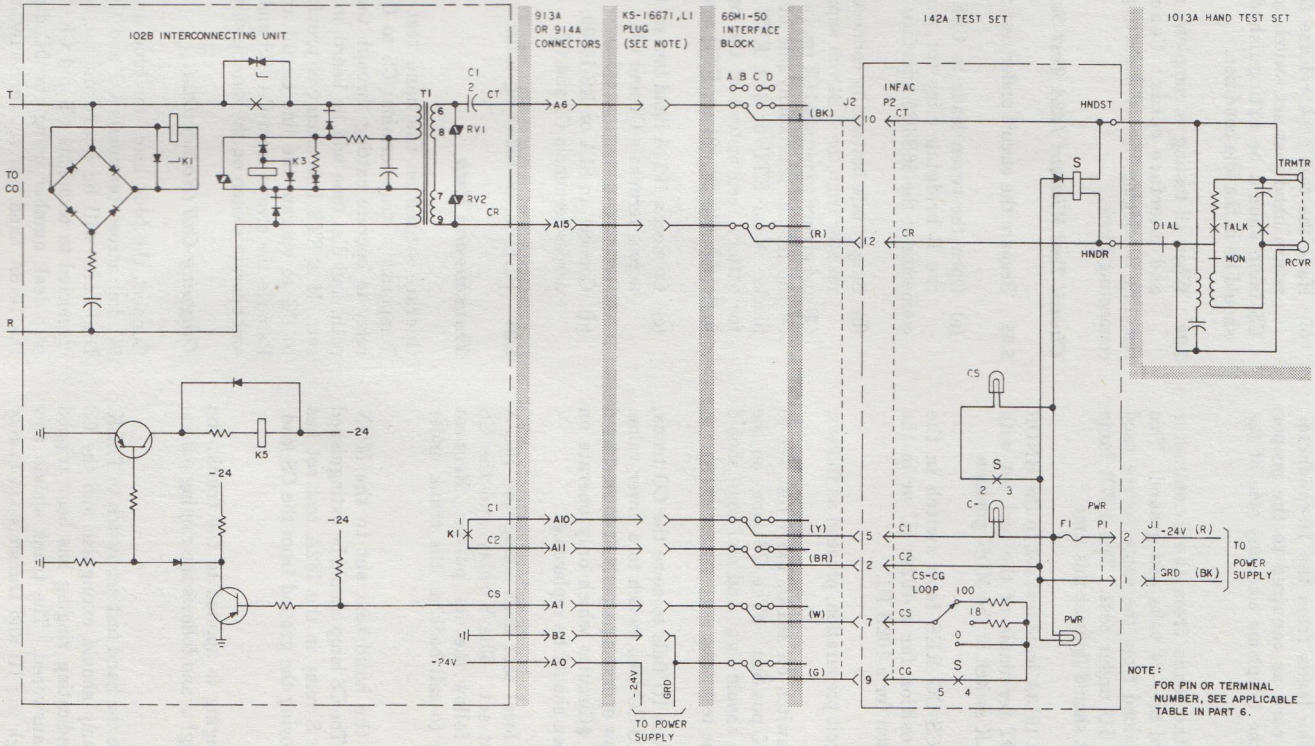


Fig. 14—Testing 102B Interconnecting Unit With 142A Test Set

(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 and ground. This should be obtained from the same source used to power the IU under test. The PWR lamp on the test set 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 RES loop switch in the 18-ohm position for a 102A IU or in the 100-ohm position for a 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 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 pulses.

(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 Test Without 142A Test Set

5.05 Prepare the circuit under test as follows:

(a) Open the seven leads to CPE by removing the B bridging clips (or wire straps) or connector at the 66B3-25 interface block.

(b) Supply talk battery by connecting a 500-ohm resistor from the −24 volt supply to terminal CR and ground to terminal CT (make all connections on the telephone company side of the interface block. 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.

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

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

5.06 Perform the following tests:

Transmission Path

Operate switch on the hand test set to MON. Temporarily strap terminal CS to CG causing K5 relay to operate cutting through the transmission path, and dial tone will be heard on the hand test set. If a KTS line circuit is provided, strap CA to CG to operate the line circuit and busy lamp. Remove the straps from CA, CS and CG terminals and operate switch on the hand test set to TALK.

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 terminals CT and CR. Dial the local test desk number using the 9C dial. Talk over the 1013A hand test set connected to CT and CR; arrange to have a call returned to the number

associated with the 102-type IU under test. Remove the 9C dial tone from terminals CS and CG.

Outgoing Call (Tone Address Signaling)

Connect the mounting cord leads of a 2500D (or equivalent) station set using 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 terminals CS and CG.

Incoming Call

The 81A test set or KS-16990, List 1 test set across terminals C1 and C2 will indicate continuity (ringing) when the local test desk calls back. Answer the call by strapping terminal CS to CG and verify satisfactory transmission. Disconnect by removing the strap from terminals 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 interconnecting unit without first removing the fuse or power for that particular circuit. (See Tables H, I, 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 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).

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. 6 and Table G.

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

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

6.04 For connection information using the optional 66E3-25 connecting block, refer to Fig. 4 and Table F.

6.05 The A and CA leads used to indicate a busy line condition are not required when a KTS line circuit is not provided.

6.06 For connection information using the 615A panel refer to Fig. 2, 11, and 12, and Tables G, J, and L.

6.07 ▶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	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	
	SPARE	29	W-BR	7	
	SPARE	4	BR-W	8	
	CA	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	
	CA	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	
	CA	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	
	CA	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	
	CA	50	V-S	49†	
	SPARE	25	S-V	50	

* Stencil lead designations on fanning strip.

† Terminal CA connects to A lead on KTS line circuit. Omit A and CA leads when KTS line circuit not provided.

◗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	
	SPARE	29	W-BR	7	
	SPARE	4	BR-W	8	
	CA	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	
	CA	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	
	CA	40	BK-S	29†	
	SPARE	15	S-BK	30	

TABLE D (Cont)

TRUNK NO.	LEAD DESIG*	CONN PIN NO.	CONN CABLE COLOR	66M1-50 INTERFACE CONN BLK 2 ROW NO.	POS. IN 604-TYPE PANEL
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	
	CA	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	
−48V	FAL2 ‡	50	V-S	49	F16(FA)
GRD	G2 ‡	25	S-V	50	

* Stencil lead designations on fanning strip.
† Terminal CA connects to A lead on KTS line circuit. Omit A and CA leads when KTS line circuit is not provided.
‡ Optional attendant alarm indicator on 604B panel only.

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	
	SPARE	29	W-BR	7	
	SPARE	4	BR-W	8	
	CA	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	
	CA	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	
	CA	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	
	CA	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	
	CA	50	V-S	49†	
	SPARE	25	S-V	50	

* Stencil lead designations on fanning strip.

† Terminal CA connects to A lead of KTS line circuit. Omit A and CA leads when KTS line circuit is not provided.

TABLE F

CONNECTIONS FOR 66E3-25 INTERFACE 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
	CA	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
	CA	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
	CA	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
	CA	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
	CA	49*	50
	SPARE	50	25

* A lead of KTS line circuit connects to CA terminal. Omit if KTS line circuit is not provided.

◆TABLE G◆

POWER CONNECTIONS

INPUT VOLTAGE	69G APP MTG (NOTE 1)	604A1 PANEL (NOTE 2)	604B PANEL (NOTE 3)	615A PANEL (NOTE 4)
—24V	8	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. 7.
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.

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 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	
CA	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	
CA	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	
CA	40	BK-S		A7	
SPARE	15	S-BK		A16	

TABLE J (Cont)

LEAD DESIG.	PLUG P1 PIN NO.	LEAD COLOR	615A PANEL		
			JACK	PIN	66T1 BLK
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	Y-BL		B10	
SPARE	21	BL-Y		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 FUSE PANEL ASSIGNMENT

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

* 24E fuse ½ ampere.

† Spare — not used in VCA C2AKS.

◗TABLE L◖

TRUNK CONNECTIONS – 615A PANEL

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