

## VOICE CONNECTING ARRANGEMENT C22

### 112A INTERCONNECTING UNIT

### 607A PANEL

#### 1. GENERAL

**1.01** This section provides identification, installation, operation, maintenance, and connection information for the 112A interconnecting unit (IU) and 607A mounting panel when used to provide Voice Connecting Arrangement (VCA) C22. This arrangement is used to interface a central office (CO) arranged for direct inward dialing (DID) to a customer-provided (CP) PBX.

**1.02** This section is reissued to:

- Add information on the KS-20944 protector
- Change the 66M1-50 intermediate connecting block to 66B4-25
- Revise illustrations.

**1.03** Voice Connecting Arrangement C22 requires one 112A IU per CO trunk for connection to the CP equipment. The 607A panel will accommodate fourteen 112A IUs.

**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- and CD-1E240-01, Issue 1, 112A IU

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 one-way direct inward dialing into a CP PBX on a dial pulse basis
- To limit excessive transmission signal levels from CP equipment and to provide protection for personnel against hazardous voltages
- To provide network control signaling functions.

##### ORDERING GUIDE

- Unit, Interconnecting, 112A (one per CO trunk, Fig. 1).

##### Associated Apparatus (Order Separately)

**Note:** If a 23-inch relay rack is not provided on customer premises, provide an ED-91180-72, Group 21 equipment cabinet, or equivalent.

- 607A Panel (includes fuse panel, Fig. 2 and 3)
- Unit, Power 19C2 (24-volt, 1.5-ampere supply) or equivalent (furnished locally, if required)
- Unit, Power, KS-15620, L14 (48-volt, 2-ampere supply) or equivalent (furnished locally, if required)
- Blocks, Connecting, 66M1-50 (as required, Fig. 4)
- Blocks, Connecting, 66B4-25 (as required, see Table A)†
- Cable, A25B (three per panel)
- Clip, Bridging, B (Fig. 4)

**Note:** Other type blocks may be used when specified by local engineering.

#### Replaceable Components (for 607A Panel)

- Fuses, 24E (1/2-ampere, 10 per panel)

#### ►Overvoltage Protection Circuit (Optional)

- KS-20944, L1, Protector (Fig. 5)
- KS-20944, L2, Protector (Fig. 5)◄

### DESIGN FEATURES

#### 112A Interconnecting Unit

- Approximate dimensions: 7-1/2 inches by 5-1/2 inches (called an 8-inch board)
- Components mounted on epoxy coated 80-pin board
- Provides impedance matching cross-connections
- Provides voice frequency coupling to CP equipment
- Provides dc isolation to CP equipment
- Limits excessive signals
- Requires 0.125 ampere at 26 volts dc and 0.100 ampere at 48 volts dc.

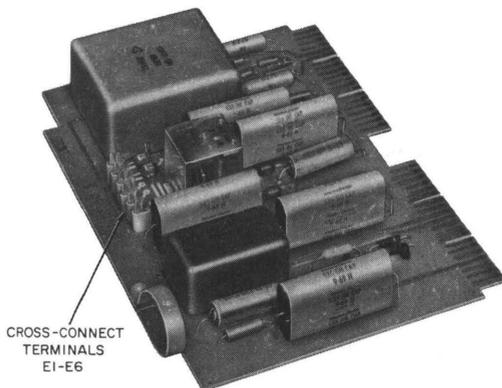


Fig. 1—112A Interconnecting Unit

#### 607A Panel

- Approximate dimensions: 8 inches high, 23 inches long, and 10 inches deep.
- Equipped with twenty-eight 40-pin 914A connectors which are factory-wired to Amphenol plugs.
- The arrangement of the 914A connectors provides two vertical connectors for each 8-inch 80-pin board.
- All 14 positions will accommodate 112A IUs.
- Is not equipped with a power supply.
- Fuse protection is provided to all IUs.

#### ►KS-20944 Protector

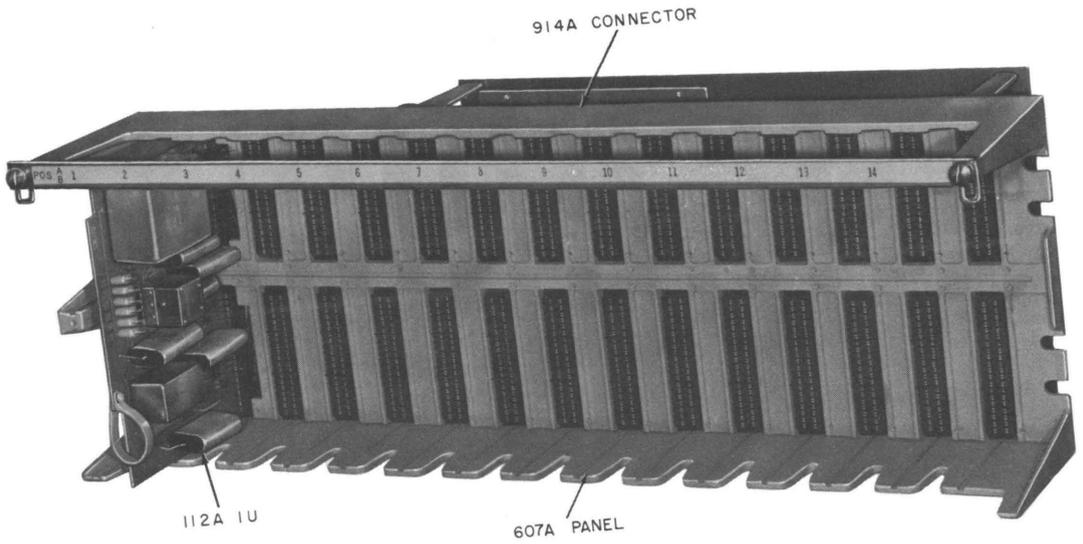
- Approximate dimensions: 6 inches high, 6 inches wide, and 3 inches deep
- Provides protection against excessive voltage and current from CP power supply
- Provides dc interface to CP equipment
- Equipped with a three-pole magnetic circuit breaker
- Provides disconnect switch for power supply voltage
- Equipped with leads for line connection and a two terminal connecting block for load connection.◄

### 3. INSTALLATION

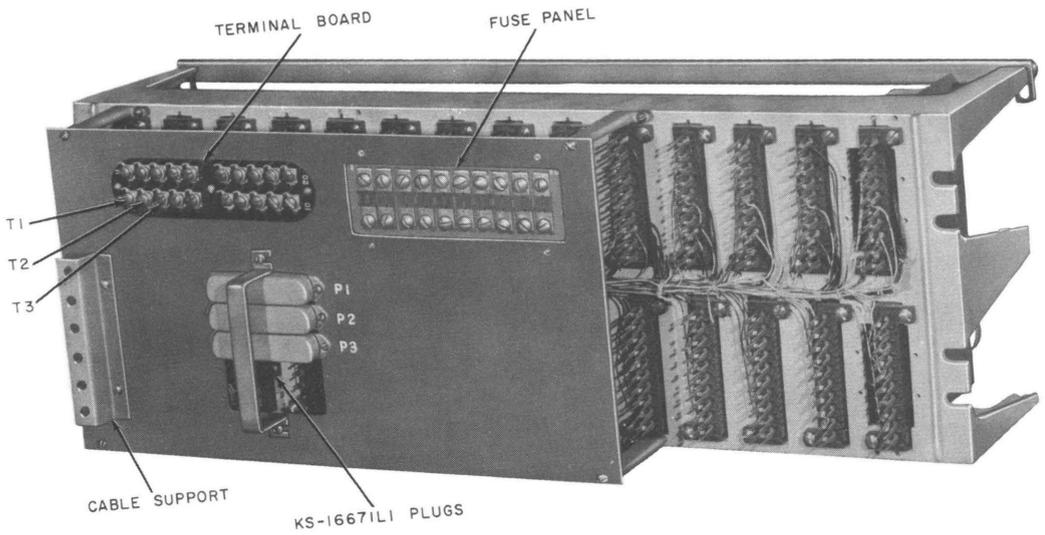
#### 607A Panel (Fig. 6 and 7, Tables A, B, C, D)

**3.01** The 607A panel will mount on a standard relay rack or in an ED-91180-72, Group 21 equipment cabinet. The cabinet will hold four 607A panels when the drawing holder on the lower half of the cover is removed. (Ground relay rack or equipment cabinet separately.)

**3.02** Electrical connection is made to the 607A panel through A25B connector cables to three Amphenol plugs (P1, P2, and P3, Fig. 3).



**Fig. 2—607A Panel With 112A Interconnecting Unit**



**Fig. 3—607A Panel-Rear View**

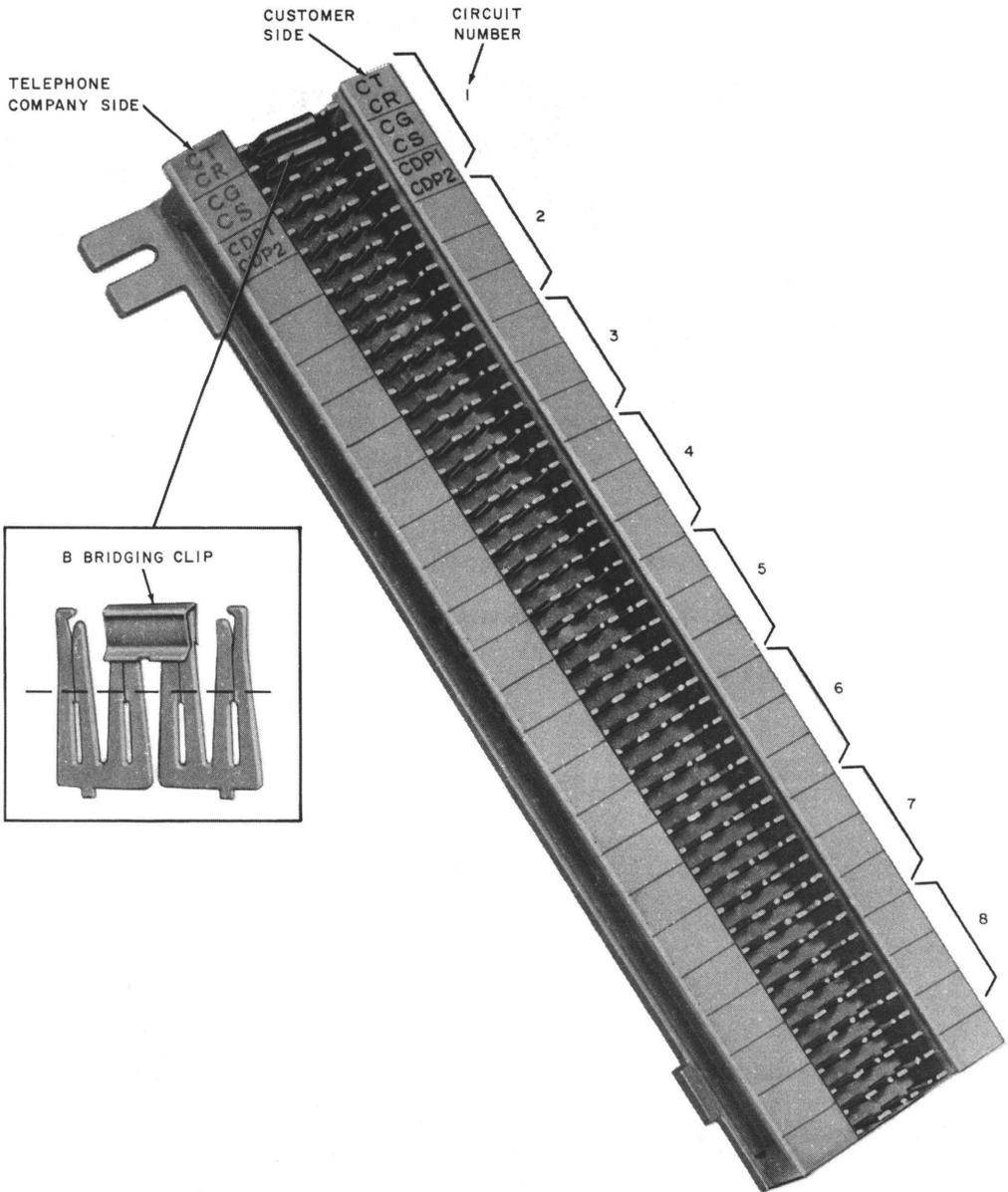


Fig. 4—66M1-50 Interface Connecting Block

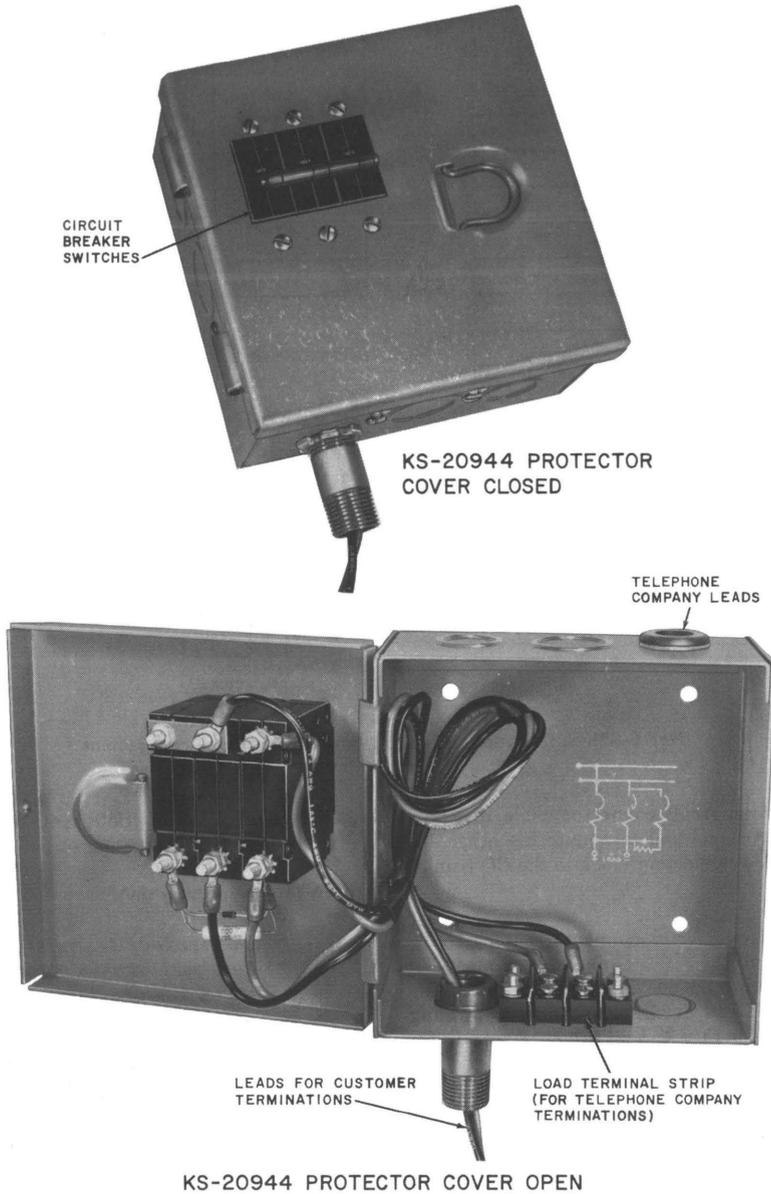


Fig. 5—KS-20944 Protector

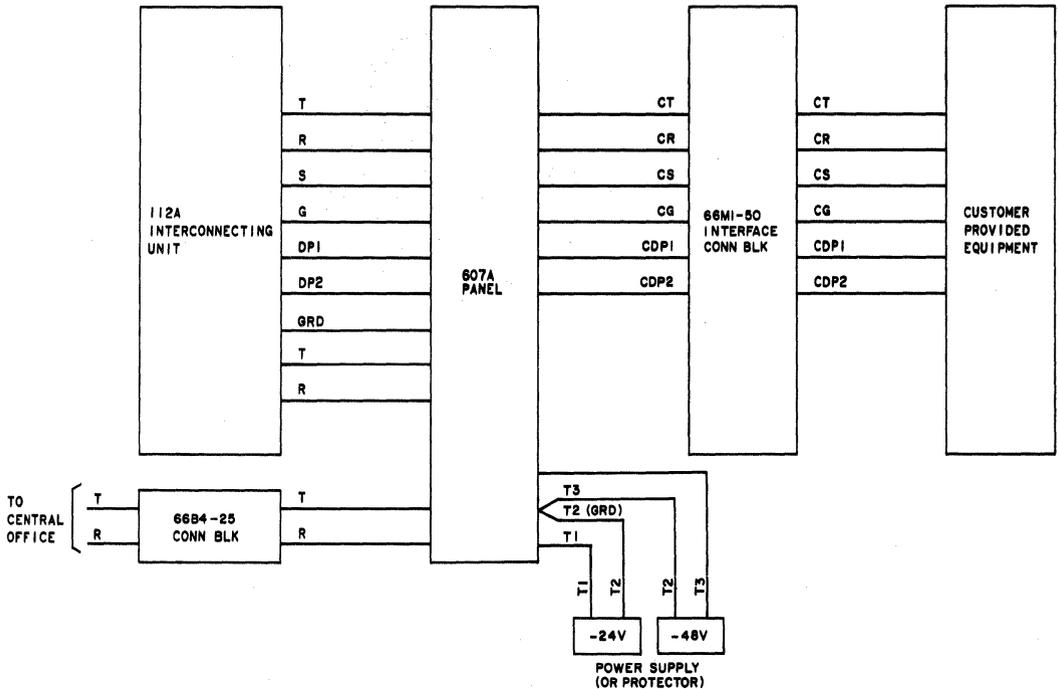


Fig. 6—Block Diagram of Typical Voice Connecting Arrangement

**3.03** Connect an A25B connector cable to P1 on the 607A panel and terminate the other end on the 66B4-25 connecting block to the CO trunks. (See Table A.)

**3.04** Connect two A25B connector cables to P2 and P3 on the 607A 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 Tables B and C for connections.)

**3.05** Connect power supply to terminals on rear of 607A panel as shown in Table D and Fig. 3.

**3.06** When separate 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.

**3.07** Refer to appropriate section in Division 167 for proper grounding of power plants.

#### 112A Interconnecting Unit



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

**3.08** If the incoming CO trunk is 600 ohms, strap E1 to E2 and E4 to E5. If the incoming CO trunk is 900 ohms, strap E1 to E3 and E4 to E6 (Fig. 1 and 7). Check connections for continuity after strapping to make sure terminals cut through insulation.

**3.09** When installing the 112A IU, position the board in the guide grooves of the 607A panel and slide the unit in until it is properly seated in the mating 914A connectors. The designation strip

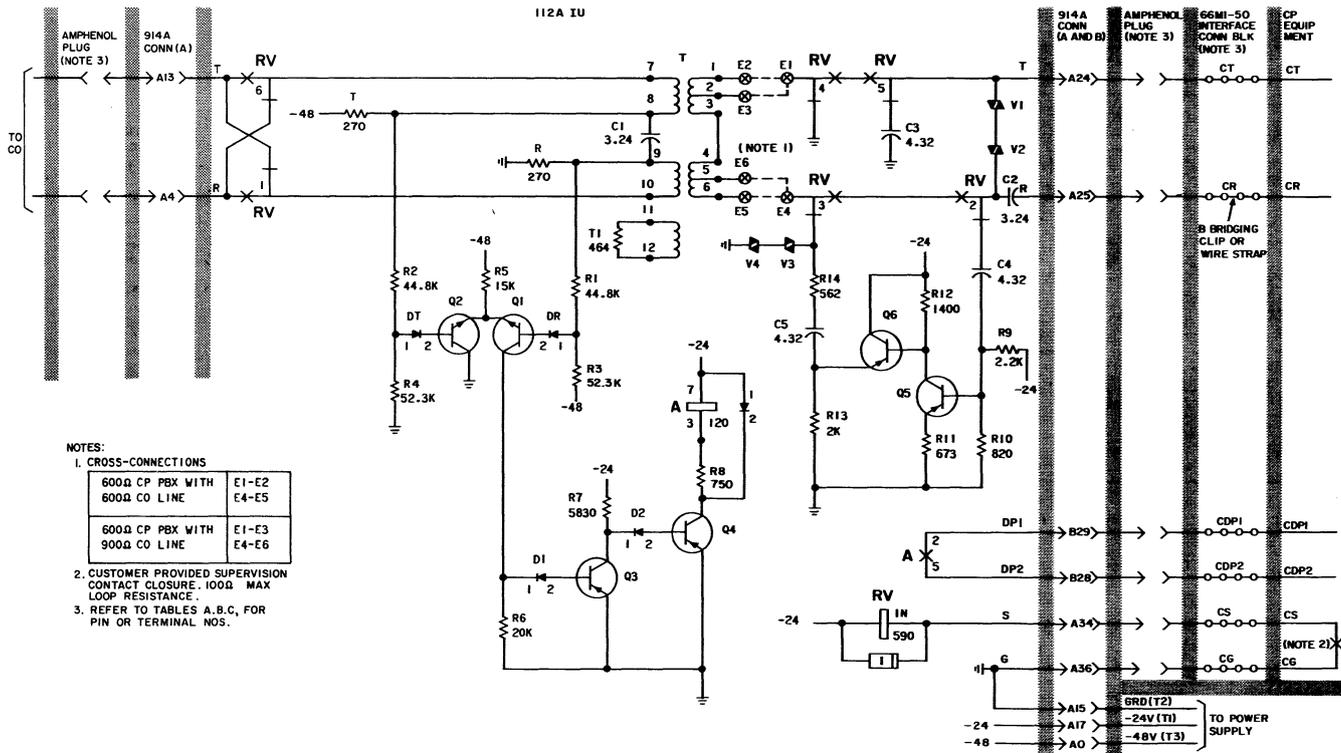


Fig. 7—Schematic of 112A Interconnecting Unit

locking bar, when lowered, will hold the IU in place.

◆KS-20944 Protector (Fig. 8)

3.10 When overvoltage protection is required, the KS-20944 protector must be mounted externally and wired to the power supply terminals of the 607A panel (Fig. 3).

3.11 Connect as shown in Fig. 8 following local wiring instructions. The customer must connect his power supply to the red (+) and black (-) 16-gauge leads extending from the unit.



**Check for correct polarity and ground before closing switch. ⚡**

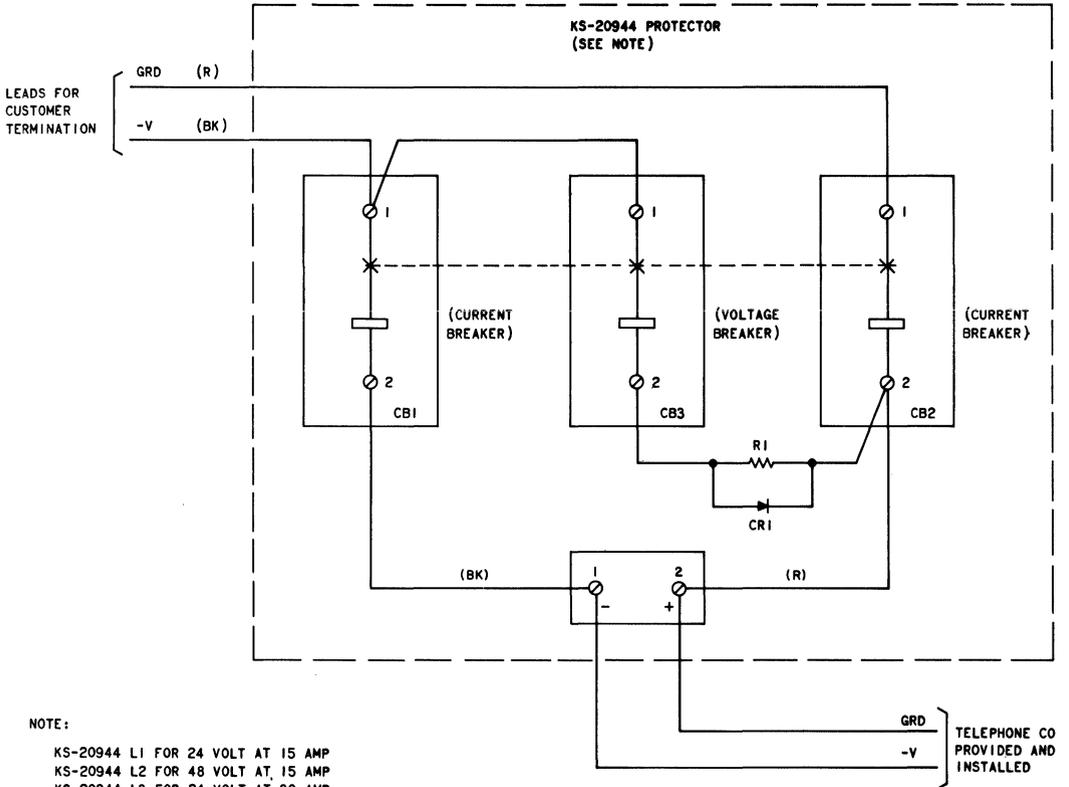


Fig. 8—◆Schematic of KS-20944 Protector◆

## 4. OPERATION

### A. 112A Interconnecting Unit (Fig. 7)

#### Incoming Call

**4.01** When the CO seizes this circuit by a loop closure, voltage level changes at resistors R and T in the 112A IU are detected by transistors Q1 and Q2 resulting in the operation of supervisory A relay. The A relay operated provides a contact closure between leads CDP1 and CDP2 indicating seizure to the CP PBX.

**4.02** The dc pulses are received from the CO over tip and ring leads. The maximum external loop resistance to the CO should not exceed 2500 ohms.

**4.03** The pulses are repeated to the CP PBX by the A relay over leads CDP1 and CDP2. This is a fast mercury relay and will not distort the pulses. Current in leads CDP1 and CDP2 should not exceed 0.5 ampere maximum.

**4.04** Only one-way voice transmission (toward the CO) is provided until an answer signal is received from the CP PBX. When the CP PBX station answers, a CP contact between leads CS and CG closes and operates RV relay. RV relay operated sends answer supervision by causing a local battery-ground reversal on leads T and R toward the CO, removes the amplifier and establishes 2-way transmission between the CO and CP PBX. The maximum allowable external loop resistance between leads CS and CG is 100 ohms.

**4.05** The CO indicates disconnection by causing the A relay to release which opens the contact closure between leads CDP1 and CDP2. The CP PBX indicates disconnection by opening the contact closure between leads CS and CG.

**4.06** The CS, CG loop should be open when the unit is idle. To prevent incoming calls on this unit, the associated trunk at the CO should be made busy.

**4.07** Some step-by-step COs will not wait for a signal to start outpulsing; in this case, the CP PBX must be prepared to receive dial pulses within 65 milliseconds after seizure. A by-link path may be required in the CP PBX.

**4.08** With "wink start" signaling, the CP PBX should provide a momentary closure on leads CS, CG as an indication that it is ready to receive dial pulses. This closure should last 200 milliseconds nominal (140 milliseconds minimum).

**4.09** With delay dial signaling, the CP PBX must provide a contact closure on leads CS, CG immediately upon seizure and must open when ready to receive dial pulses.

**4.10** Under wink start and delay dial signaling, the CDP1 and CDP2 leads may open momentarily. If this occurs, the open is not expected to exceed 5 milliseconds and shall be ignored by the CP PBX.

**4.11** Call progress tones (audible ringing, busy and reorder) and recorder announcements are applied to leads CT and CR for transmission to the CO.

**4.12** The 112A IU is provided with option strapping to properly match the PBX impedance (600 ohms) to the CO line impedance.

### B. KS-20944 Protector (Fig. 8)

**4.13** 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 voltage when working on interconnecting circuits.

**4.14** 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 both breakers are connected in series with their own coil and mechanically coupled together. When either breaker is operated, the line will be opened. The circuit breakers must be manually reset after tripping.

**4.15** The KS-20944, List 1 and List 2 protectors are designed to trip in 25 milliseconds (maximum) on 38 volts dc (List 1) and 68 volts dc (List 2), on 18 amperes dc (List 1), and 18 amperes dc (List 2), on reversed polarity (or ac) greater than 18 volts, and on incorrect ground. The diode and resistor combination are selected to adjust the tripping voltage of the voltage-operated circuit breaker.⚡

**5. MAINTENANCE (Fig. 7)**

**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 all six leads on 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) Connect a 1013A (or equivalent) test set to the CT and CR leads on the Telephone Company side of the 66M1-50 connecting block. Set the TALK-MON switch of the test set to the TALK position. To furnish talk battery, connect a 5000-ohm resistor from CT to ground and -24 volt to CR. Connect an 81A or KS-16990, List 1 test set to the CDP1 and CDP2 terminals (set test set to continuity position). Connect a short strap to the CS terminal (to be connected to CG later).

(b) Request the test desk to dial the CO line connected to the interconnecting circuit under test. When the CO seizes the trunk, the 81A or KS-16990, List 1 test set will follow dial pulses (81A may not follow dial pulses if batteries are weak) remaining on steadily after dialing. Hold the transmitter of the 1013A test set near the buzzer long enough for the test desk to hear it; this tests operation of the one-way amplifier.

(c) Connect terminal CS to terminal CG to answer the call. The one-way amplifier is removed and talk path cut through.

**5.03** When trouble is suspected in the 112A IU, exchange it with another unit known to be functioning satisfactorily.



**Never replace an IU in the 607A panel without first removing the fuse for this particular unit.**

**5.04** If the above tests are satisfactory, remove all test connections to restore circuit to normal and replace the B bridging clips (or wire straps) at the 66M1-50 interface connecting block.



**Do not attempt any tests or repairs to the CP equipment.**

**6. CONNECTIONS**

**6.01** For connection information, refer to Tables A, B, C, and D and Fig. 4, 6, and 7.

**6.02** Connect the 24-volt power supply to terminals T1 (-24 volts) and T2 (GRD) and the 48-volt power supply to terminals T2 (GRD) and T3 (-48 volts) on the 607A fuse panel. (See Table D.)

**6.03** If overvoltage circuit protection is used with a CP power source, connect the KS-20944, List 1 protector to terminals T1 (-24 volts) and T2 (GRD) and the KS-20944, List 2 protector to terminals T2 (GRD) and T3 (-48 volts) on the 607A fuse panel. (See Table D.)

**TABLE A**  
**CONNECTIONS FOR AMPHENOL CONNECTOR NO. 1**

TRUNK NO.	LEAD DESIG*	AMPHENOL CONN PIN NO.	A25B CONN CABLE COLOR	6684-25 CONN BLK TERM.	POS. IN 607A PANEL
1	T	26	W-BL	1	J1A
	R	1	BL-W	2	
2	T	27	W-O	3	J2A
	R	2	O-W	4	
3	T	28	W-G	5	J3A
	R	3	G-W	6	
4	T	29	W-BR	7	J4A
	R	4	BR-W	8	
5	T	30	W-S	9	J5A
	R	5	S-W	10	
6	T	31	R-BL	11	J6A
	R	6	BL-R	12	
7	T	32	R-O	13	J7A
	R	7	O-R	14	
8	T	33	R-G	15	J8A
	R	8	G-R	16	
9	T	34	R-BR	17	J9A
	R	9	BR-R	18	
10	T	35	R-S	19	J10A
	R	10	S-R	20	
11	T	36	BK-BL	21	J11A
	R	11	BL-BK	22	
12	T	37	BK-O	23	J12A
	R	12	O-BK	24	
13	T	38	BK-G	25	J13A
	R	13	G-BK	26	
14	T	39	BK-BR	27	J14A
	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 B

## CONNECTIONS FOR AMPHENOL CONNECTOR NO. 2

CIRCUIT NO.	LEAD DESIG*	AMPHENOL CONN PIN NO.	CONN CABLE COLOR	66M1-50 CONN BLK	POS. IN 607A PANEL
1	CT	26	W-BL	1	J1
	CR	1	BL-W	2	
	CG	27	W-O	3	
	CS	2	O-W	4	
	CDP1	28	W-G	5	
	CDP2	3	G-W	6	
2	CT	29	W-BR	7	J2
	CR	4	BR-W	8	
	CG	30	W-S	9	
	CS	5	S-W	10	
	CDP1	31	R-BL	11	
	CDP2	6	BL-R	12	
3	CT	32	R-O	13	J3
	CR	7	O-R	14	
	CG	33	R-G	15	
	CS	8	G-R	16	
	CDP1	34	R-BR	17	
	CDP2	9	BR-R	18	
4	CT	35	R-S	19	J4
	CR	10	S-R	20	
	CG	36	BK-BL	21	
	CS	11	BL-BK	22	
	CDP1	37	BK-O	23	
	CDP2	12	O-BK	24	
5	CT	38	BK-G	25	J5
	CR	13	G-BK	26	
	CG	39	BK-BR	27	
	CS	14	BR-BK	28	
	CDP1	40	BK-S	29	
	CDP2	15	S-BK	30	
6	CT	41	Y-BL	31	J6
	CR	16	BL-Y	32	
	CG	42	Y-O	33	
	CS	17	O-Y	34	
	CDP1	43	Y-G	35	
	CDP2	18	G-Y	36	
7	CT	44	Y-BR	37	J7
	CR	19	BR-Y	38	
	CG	45	Y-S	39	
	CS	20	S-Y	40	
	CDP1	46	V-BL	41	
	CDP2	21	BL-V	42	
8	CT	47	V-O	43	J8
	CR	22	O-V	44	
	CG	48	V-G	45	
	CS	23	G-V	46	
	CDP1	49	V-BR	47	
	CDP2	24	BR-V	48	
	SPARE	50	V-S	49	
	SPARE	25	S-V	50	

\* Stencil lead designations on fanning strip.

**TABLE C**  
**CONNECTIONS FOR AMPHENOL CONNECTOR NO. 3**

CIRCUIT NO.	LEAD DESIG*	AMPHENOL CONN PIN NO.	CONN CABLE COLOR	66M1-50 CONN BLK	POS. IN 607A PANEL
9	CT	26	W-BL	1	J9
	CR	1	BL-W	2	
	CG	27	W-O	3	
	CS	2	O-W	4	
	CDP1	28	W-G	5	
	CDP2	3	G-W	6	
10	CT	29	W-BR	7	J10
	CR	4	BR-W	8	
	CG	30	W-S	9	
	CS	5	S-W	10	
	CDP1	31	R-BL	11	
	CDP2	6	BL-R	12	
11	CT	32	R-O	13	J11
	CR	7	O-R	14	
	CG	33	R-G	15	
	CS	8	G-R	16	
	CDP1	34	R-BR	17	
	CDP2	9	BR-R	18	
12	CT	35	R-S	19	J12
	CR	10	S-R	20	
	CG	36	BK-BL	21	
	CS	11	BL-BK	22	
	CDP1	37	BK-O	23	
	CDP2	12	O-BK	24	
13	CT	38	BK-G	25	J13
	CR	13	G-BK	26	
	CG	39	BK-BR	27	
	CS	14	BR-BK	28	
	CDP1	40	BK-S	29	
	CDP2	15	S-BK	30	
14	CT	41	Y-BL	31	J14
	CR	16	BL-Y	32	
	CG	42	Y-O	33	
	CS	17	O-Y	34	
	CDP1	43	Y-G	35	
	SDP2	18	G-Y	36	
SPARE		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 D**  
**CONNECTIONS FOR POWER SUPPLY**

TERMINAL	VOLTAGE	FUSE*	PANEL POSITION
T1	-24 Volts	F1	1-2-3
		F2	4-5-6
		F3	7-8-9
		F4	10-11-12
		F5	13-14
T2	GRD		Multipled
T3	-48 Volts	F6	1-2-3
		F7	4-5-6
		F8	7-8-9
		F9	10-11-12
		F10	13-14

\* Type 24E (1/2-amp)