

PROTECTIVE CONNECTING ARRANGEMENTS

STP AND C2F

1. GENERAL

1.01 This section contains identification, installation, connection, operation, and maintenance information for Protective Connecting Arrangements (PCAs) STP and C2F using the 120-type interconnecting unit (IU).

1.02 This section is reissued to:

- Rate the 120B IU MD, now replaced by the 120C (Fig. 1)
- Change Fig. 7 and 8 to include circuitry for improved lightning protection
- Add Fig. 9 (schematic of 120C)
- Show that dc power for the 120-type IU must always be talk battery
- Rate the 604B panel MD. (Information required for servicing existing installations of the 604B is retained.)

1.03 The size of the initial installation and the expected growth should be the determining factors in selecting the mounting arrangement.

- Use a 615A panel for one to three circuits. If it appears growth will not exceed six circuits, a second 615A panel can be added.
- Use a 604C panel if it appears the growth will be greater than six circuits. ♦(If the 604C is to be used with a -48V supply instead of -24V, a 21A apparatus unit must be attached and wired to it.)♦
- The 69G apparatus mounting is recommended only where mountings are already in place and an additional circuit is required, or as a direct replacement for maintenance reasons. Information on the 69G apparatus mounting

is limited to that required for additions and maintenance.

1.04 A copy of the Technical Reference covering this interface specification can be obtained from the local Telephone Company Business Office or the Marketing Representative.

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

♦CD- and SD-69646-01, Issue 10B—120A(MD), 120B(MD), and 120C IU♦

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

If this section is to be used with equipment or apparatus reflecting later issues of the drawings, reference should be made to the CDs and SDs to determine the extent of the changes and the manner in which the section may be affected.

2. IDENTIFICATION

PURPOSE

2.01 *PCA STP* provides a means for automatically connecting CP voice terminal equipment to a telephone company CO/PBX line. PCA STP provides a 2-wire interface, locally generated ringing signal, and 24-volt talking battery to the CPE. In addition, it permits CP dial pulse or tone address signaling. It is typically used for CP key telephone systems.

2.02 *PCA C2F* provides a means for automatically connecting CP voice terminal equipment to the telecommunications network. PCA C2F provides a 2-wire interface, locally generated ringing signal, and 48-volt talking battery to the CPE. In addition, it permits dial service using CP dial pulse or tone address signaling. It is typically used for connecting

NOTICE

Not for use or disclosure outside the
Bell System except under written agreement

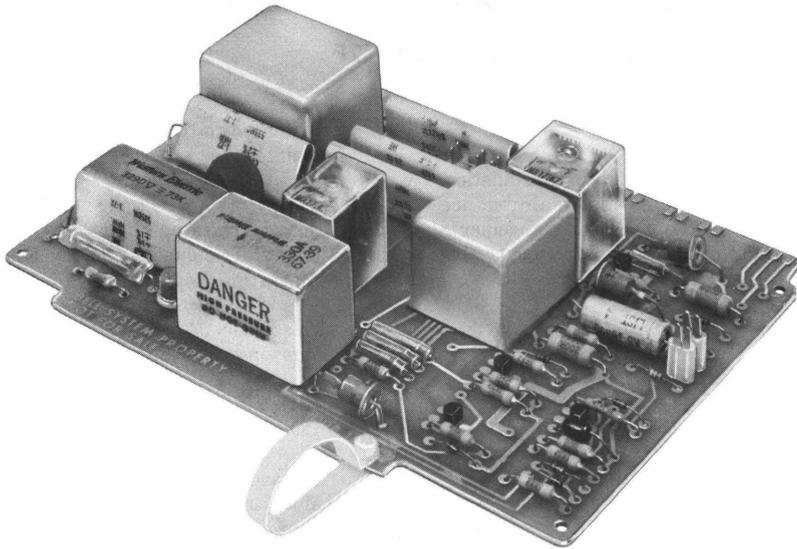


Fig. 1—120C Interconnecting Unit

a telephone company PBX to an off-premise extension using CP facilities and telephone.

ORDERING GUIDE

(a) *Basic Unit*

- Unit, Interconnecting, ♦120C♦ —one per PCA STP or C2F (Fig. 1).

Note: Any 120-type IU can be used with PCA STP, but a ♦120B(MD) or 120C♦ is always required with PCA C2F.

(b) *Associated Apparatus (Order Separately)*

Note 1: If a 23-inch rack is not available on customer premises, provide a 16C apparatus mounting (for 615A panel) or an ED-91180-72, Group 21 apparatus cabinet (for 604C panel).

Note 2: Order the following apparatus as required on the basis that PCA STP will require -24 ♦talk battery♦ volts only and PCA C2F will require -48 ♦talk battery♦ volts only.

- Panel, 604C—one per fourteen IUs, -24V supply
- Unit, Apparatus, 21A—one per 604C panel to convert panel to -48V supply
- Panel, 615A—one per three IUs (-24V or -48V supply)
- Bracket, 99B—one per three 615A panels
- Cable, Connecting, A25B—one per 615A panel; one to four per 604C panel (see Fig. 3)
- Block, Connecting, 66M1-50—as required
- Block, Connecting, 66B4-25—as required

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

- Clip, Bridging, B—as required, 25 per package

- Power source(s) with talk battery and $\pm 105V$ ringing supply—locally engineered and installed when existing PBX power supply is insufficient:

STP—A 20- or 30-type power unit (-24V talk battery and ringing supply)

C2F—A KS-15620,L22 rectifier (-48V talk battery) and a 20C2 power unit (ringing only)

- Protector, KS-20944, List 1 (-24V) for STP or List 2 (-48V) for C2F—one required when CP dc power supply is used.

(c) *Replaceable Components*

For 604B (MD) and 604C Panels:

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

For 615A Panel:

- Fuse, 24E, 1/2 ampere—8 per panel.

DESIGN FEATURES

2.03 The 120-type IU provides voice frequency coupling between Bell System telecommunications network and CPE and off-hook supervision and rotary dial pulsing or tone address signaling from CPE.

Other features are listed below:

- Limits excessive signal levels on the transmission leads from the CPE.
- Provides dc talk battery to the CPE.
- Current drains are as follows:

Maximum—0.046 ampere at 20 volts dc, or
0.093 ampere at 45 volts dc

Typical—0.045 ampere at 24 volts dc, or
0.055 ampere at 48 volts dc.

- Maximum external CP conductor loop when connected to CT and CR is 200 ohms for STP or 1300 ohms for C2F.

- Maximum of two CP high impedance ringers or ringing bridges can be connected to CT and CR.

- 120B(MD) or 120C IU is immune to a maximum 60-Hz induced longitudinal voltage of 35 volts RMS. The 120A (MD) does not have this capability and should not be used for PCA C2F.

2.04 Refer to the following sections for design features and detailed information on associated apparatus:

- 463-300-102—604B and 604C Panel
- 463-300-104—615A Panel
- 463-300-109—KS-20944 Protector.

3. INSTALLATION AND CONNECTIONS

Note: All wiring should be completed and IUs installed in panels before applying power to panel to prevent damage to IU components.

69G Apparatus Mounting

3.01 The 69G apparatus mounting should only be used to add a circuit at installations where mountings are already in place. Refer to Fig. 2 for connections. For new installations, the 615A panel is recommended.

3.02 Separate fuses must be provided locally for each mounting. Use a 24E, 1/2-ampere fuse in a 201A KTU, or equivalent, and connect power as shown in Table F. Typical current drain for a 120-type IU is 0.045 ampere at 24 volts and 0.055 ampere at 48 volts dc.

604C Panel

3.03 Mount the 604C panel on a 23-inch relay rack or in an ED-91180-72, Group 21 equipment cabinet. Up to three panels may be mounted in the cabinet if the power supply is externally mounted and the drawing holder clips on the lower half of the cover are removed. The cabinet will also accommodate two panels and a 30-type power

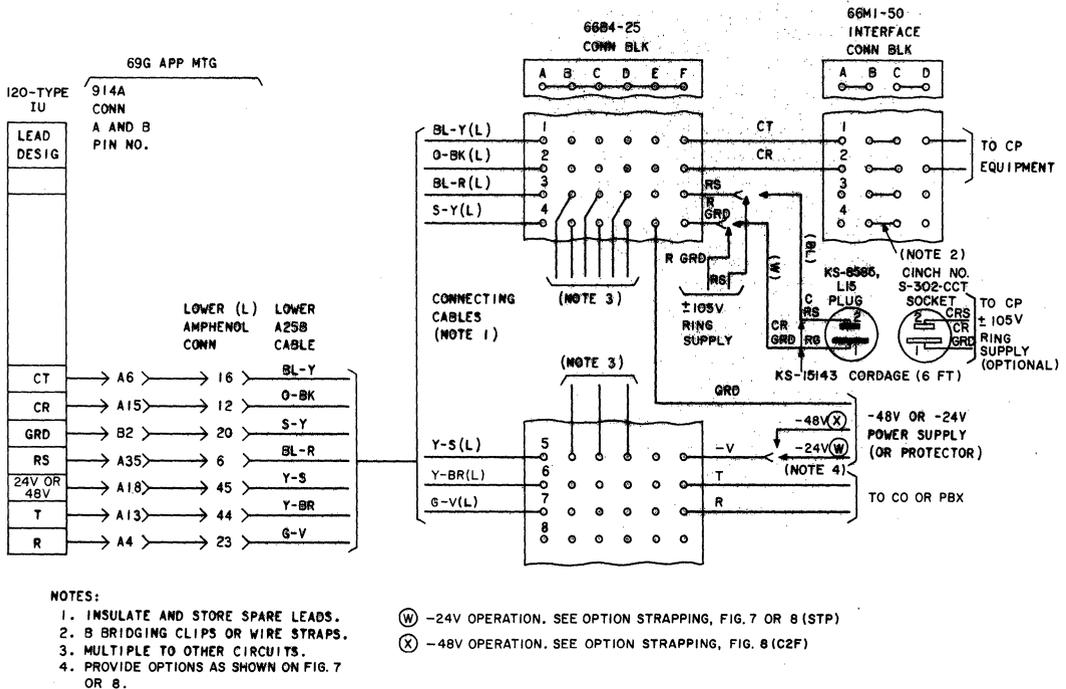


Fig. 2—Connection Diagram, 120-Type IU in 69G Apparatus Mounting

supply internally. Ground the relay rack or equipment cabinet separately.

3.04 All connections, except power supply, are made to the panels through the four plugs on the rear of the panel. The wiring arrangement requires that an A25B connector cable be used in P1 (top plug). Any of the cable combinations shown on Fig. 3 can be used to connect P2, P3, and P4.

3.05 Wire the panel as follows:

- (a) Connect the connector end of an A25B connector cable to P1. Route to terminating point for incoming CO/PBX lines and terminate T and R leads per Table A.
- (b) Plug desired connector cables to P2, P3, and P4, and terminate raw ends on 66M1-50 interface block (Fig. 5). Only the CT and CR

leads are terminated as shown in Table B unless the optional fuse alarm is also provided. Insulate and store all spare leads.

Note: Each circuit should be tagged or otherwise identified at the interface block for subsequent trouble testing and reporting.

- (c) All power supply leads are connected to the terminal board on the rear of the panel per Table G. Position the power option straps for the proper voltage being supplied. Refer to 4.06 for information on power options.

615A Panel

3.06 Mount the 615A panel on a 23-inch relay rack or in a 16C apparatus mounting. When a 16C mounting is used, a 99B bracket is required and the center mounting bar must be removed before the panel can be mounted.

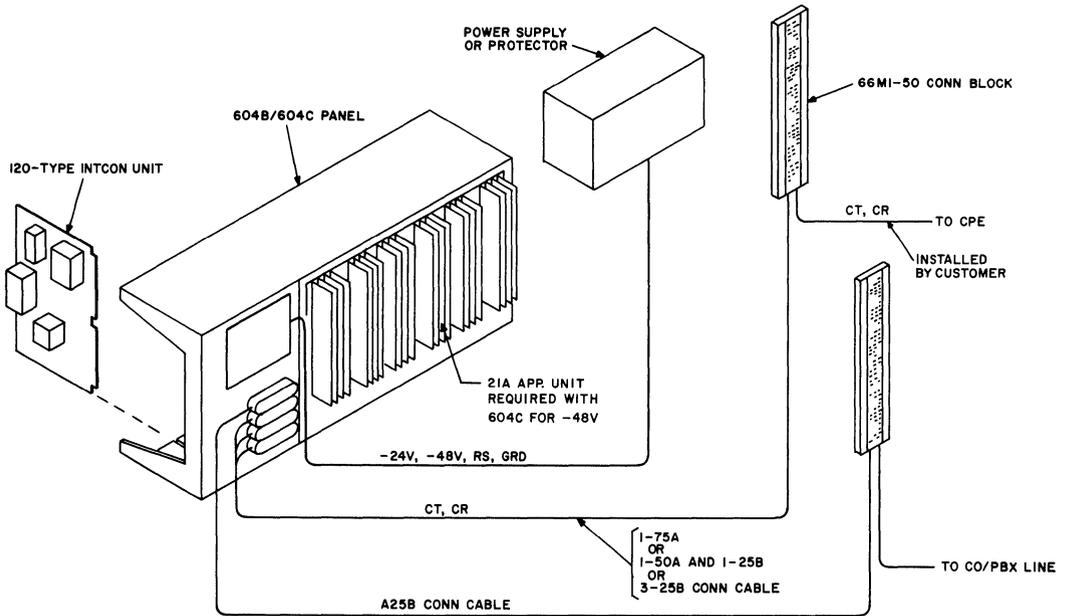


Fig. 3—Block Diagram, PCA STP or C2F Using 604-Type Panel

3.07 Leads CT and CR are multiplied, both in plug P1 and in the 66T1 connecting block, so connections can be made by either of the following methods (Fig. 4):

- (a) Connect the connector end of an A25B connector cable to P1 and terminate the raw end on the 66M1-50 interface block (Fig. 5). Only leads CT and CR need be terminated (Table D). Insulate and store all spare leads.

or

- (b) Terminate one end of a 6-pair IW cable on the 66T1 connecting block on rear of panel, terminating only CT and CR (Table D). Insulate and store all spare leads. The other end of the cable is terminated on the interface block.

Note: Each circuit should be tagged or otherwise identified at the interface block for subsequent trouble testing and reporting.

3.08 The T and R leads of the CO/PBX lines are supplied to the panel through a separate IW cable or jumpers between the incoming termination point and the 66T1 connecting block. Connect as shown in Table C.

3.09 All power supply leads are brought to the 66T1 block and terminated per Table G. Provision is made for either -24V or -48V operation of the 615A panel. With either type operation, $\pm 105V$ must be supplied on the RS lead. Refer to 4.06 for information on power options.

120-Type Interconnecting Unit

3.10 Before installing a 120-type IU in a panel or apparatus mounting, install the proper straps as shown on Fig. 7, 8, or 9. Use bare wire for strapping and check continuity after placing.

3.11 The IUs should be installed in the panels in the proper sequence. For the 615A panel, this sequence is from left to right. For the 604B

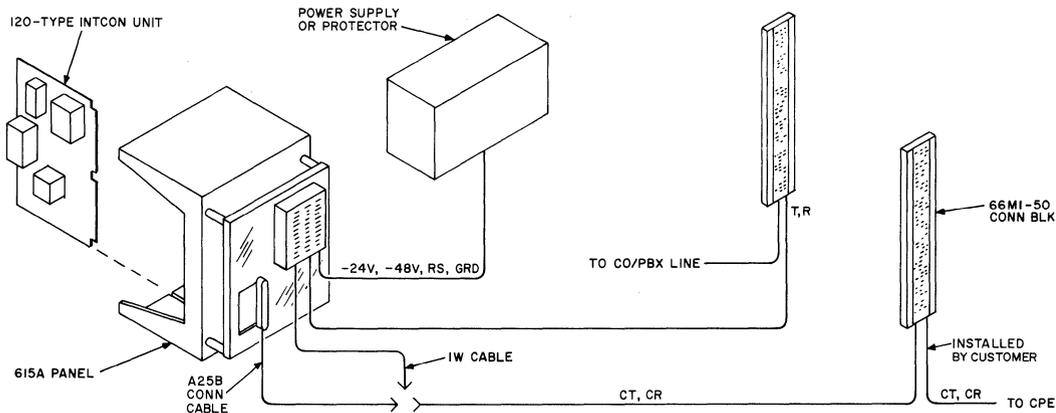


Fig. 4—Block Diagram, PCA STP or C2F Using 615A Panel

(MD) and 604C panels, install trunks in the order shown in Table A.

Note: On earlier production of the 604B panels, the **position** number was stamped on the designation strip locking bar. On current production of the 604B and the 604C panels, the **trunk** number is stamped on the bar.

3.12 When installing the 120-type IU, position the IU in the guide grooves of the panel and slide the unit in until it is properly seated in the mating connectors. When units are installed, lower the designation strip locking bar to hold the IUs in place.

3.13 When installation work is complete, perform the tests outlined in Part 5.

KS-20944 Protector

3.14 When CP equipment provides the dc power for the 120-type IU, the KS-20944 protector must be mounted externally and wired to the power supply terminals of the 604C or 615A panel.

3.15 Connect as shown in Fig. 6 following local wiring instructions. The customer must connect his power supply to the red (+) and black (-) 14-gauge leads 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)

3.16 Install a 17C lamp indicator at a location agreeable with the customer and connect to leads specified in Table B. Install an M1 lamp (48V) under the red lens and an A3 lamp (24V) under the green lens.

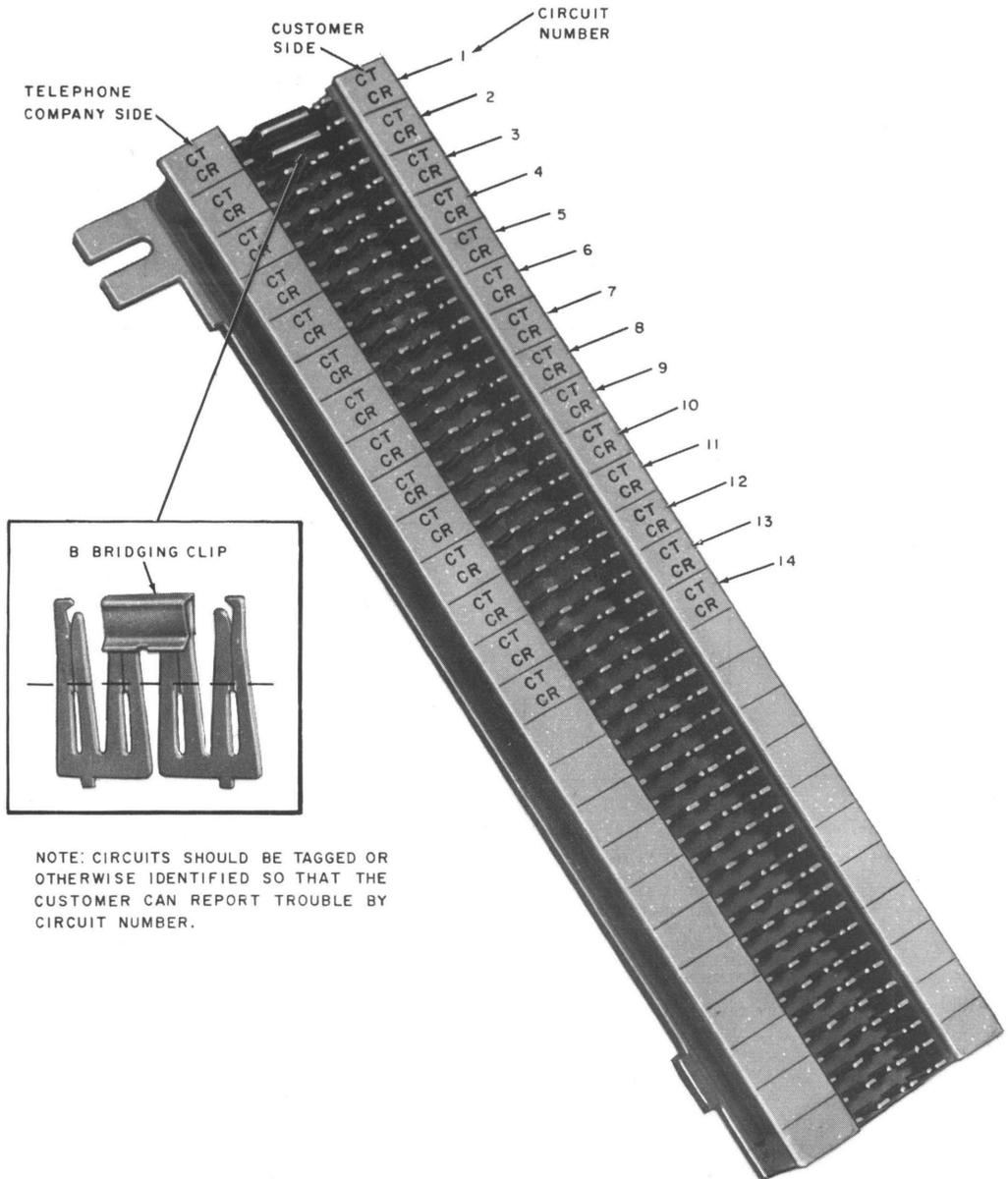
4. OPERATION

PCA STP (120A, B, OR C IU)

Incoming Call

4.01 Ringing from the CO or PBX line on the T and R leads will operate the R relay which in turn operates the R1 relay. Operation of these relays connects local ringing from the RS lead to the CR lead and short-circuits the windings of talk battery inductor L1. Relays R and R1 follow the CO/PBX ringing cycle.

4.02 When the CP station goes off-hook, relay DP operates, which connects transformer T1 to the T and R leads to trip ringing on the CO/PBX line and operates the L relay from battery and ground. If the CP station went off-hook



NOTE: CIRCUITS SHOULD BE TAGGED OR OTHERWISE IDENTIFIED SO THAT THE CUSTOMER CAN REPORT TROUBLE BY CIRCUIT NUMBER.

Fig. 5—66M1-50 Interface Connecting Block

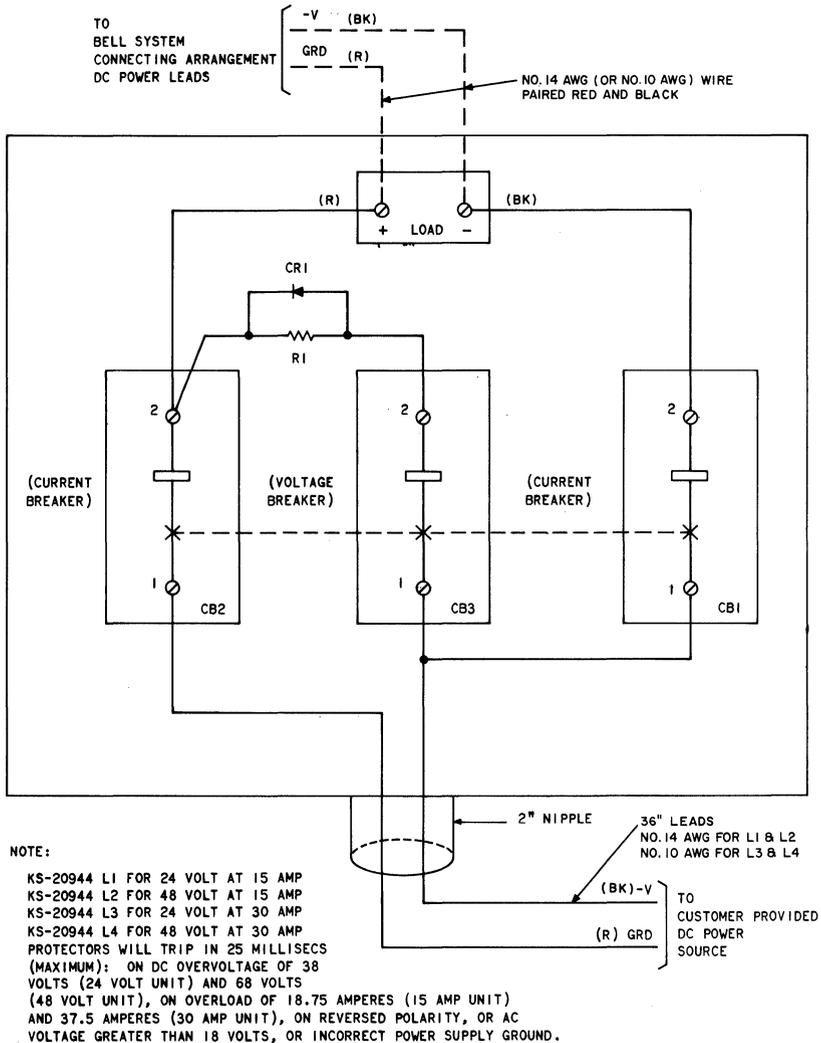


Fig. 6—Schematic Diagram—KS-20944 Protector

during a ringing interval, operation of relay DP removes the ringing detector from the line, releasing the R and R1 relays. This in turn removes the local ringing supplied on the RS lead and removes the shunt from the L1 windings, establishing a transmission path between the CPE and the line through T1. The local dc talk path, furnished on

the CT and CR leads, is under control of the L relay so that any momentary open on the T and R leads will be passed on to CT and CR via the L relay contact. If the CPE goes off-hook during a silent-ringing interval, the DP relay operates to provide the dc termination to trip ringing and establishes the transmission path.

Outgoing Call

4.03 When the CP station goes off-hook, the DP relay operates which closes the transmission path to the CO/PBX line through the T1 transformer. Relay L operates from CO/PBX battery and ground. A make contact on the L relay controls the local battery and ground supply (24V) on the CT and CR leads. If the CPE rotary pulses, the DP relay follows the pulses which are transmitted to the line. At the end of pulsing, relay DP remains operated. Thermistor RT1 prevents false operation of the ring detector from dial pulse transients on the line when the DP relay releases during dialing. If the CPE uses tone address signaling, the signals are transmitted through T1 to the T and R, and relay DP remains operated. Once established, the call is under control of the CPE via the CT and CR leads.

Release

4.04 When the CPE goes on-hook, relay DP releases which disconnects T1 and connects the ring detector. The CO/PBX line releases and the circuit is now restored to normal.

PCA C2F (120B OR C IU)

4.05 Circuit operation of PCA C2F is the same as STP except ringing and battery and ground (48V) on the T and R leads are supplied by a telephone company PBX, and an off-premises station is connected to the CT and CR leads through CP facilities.

POWER OPTIONS

4.06 The 120-type IU is designed to operate on either -24 or -48V talk battery dc supply. For STP the supply must be -24V and is used for both circuit operation and talk battery. For C2F the supply must be -48V (120B or C IU only). A diode on the 120B or C IU is used to reduce the voltage to -24V for circuit operation in the 615A panel and 69G apparatus mounting while the -48V is used for talk battery.

4.07 Provide power wiring and options depending on supply voltage and mounting as follows:

(a) 69G Apparatus Mounting

- (1) If supply voltage is -24V, add option W to 120A, B, or C IU (STP only).
- (2) If supply voltage is -48V, add option X to 120B or C IU (C2F only).
- (3) Connect supply voltage to 66B4-25 connecting block (Fig. 2).

(b) 604B (MD) Panel

- (1) If supply voltage is -24V, place option straps on rear of panel in upper positions and add option Z to 120A, B, or C IU (STP only).
- (2) If supply voltage is -48V, place option straps in lower positions and add option Y to 120B or C IU (C2F only).
- (3) Connect supply voltage to proper terminals on rear of panel.

(c) 604C Panel, -24V Supply (STP only)

- (1) Place option straps in upper positions and add option Z to 120A, B, or C IU.
- (2) Connect supply voltage to -24V terminals on rear of panel.

(d) 604C Panel, -48V Supply (C2F only)

- (1) Add 21A apparatus unit to 604C panel.
- (2) Connect the R-BK leads to the -24 terminals in any order and the R leads to the -48V terminals in any order.
- (3) Position option straps in lower positions and add option Y to 120B or C IU.
- (4) Connect supply voltage to -48V terminals on rear of panel.

(e) 615A Panel

- (1) If supply voltage is -24V, add option Q to 120A, B, or C IU (STP only).
- (2) If supply voltage is -48V, add option R to 120B or C IU (C2F only).

(3) Connect supply voltage to terminals of connecting block on rear of panel per Table G.

4.08 Refer to Fig. 7, 8, or 9 for placement of options on the 120-type IU. **Options should be added before plugging IU into mounting and before connecting power.** Use bare wire for strapping and check continuity after placing.

KS-20944 PROTECTOR

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

4.10 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.

4.11 The KS-20944, List 1 (use for STP) and List 2 (use for C2F) 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 2)
- Reversed dc voltage or ac voltage 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.

CP RINGING SUPPLY

4.12 If the customer supplies the $\pm 105V$ ringing voltage, furnish a 6-foot length of KS-15143 cordage terminated in a KS-8585, List 15 plug. The other end of the cordage is terminated per Table G. If terminated on a clip-type terminal, the connection must be soldered. The customer must furnish a Cinch No. S-302-CCT socket and extend the wiring to his ringing voltage power supply.

FUSE ALARM INDICATOR CIRCUIT

4.13 Leads have been provided on plug P3 of the 604C panel 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 Repair Service.

5. MAINTENANCE

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 CT and CR 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 lead 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 120-type 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 120-type IU under test. Operate the TALK-MON switch of the test set to the MON position and wait for the return call.

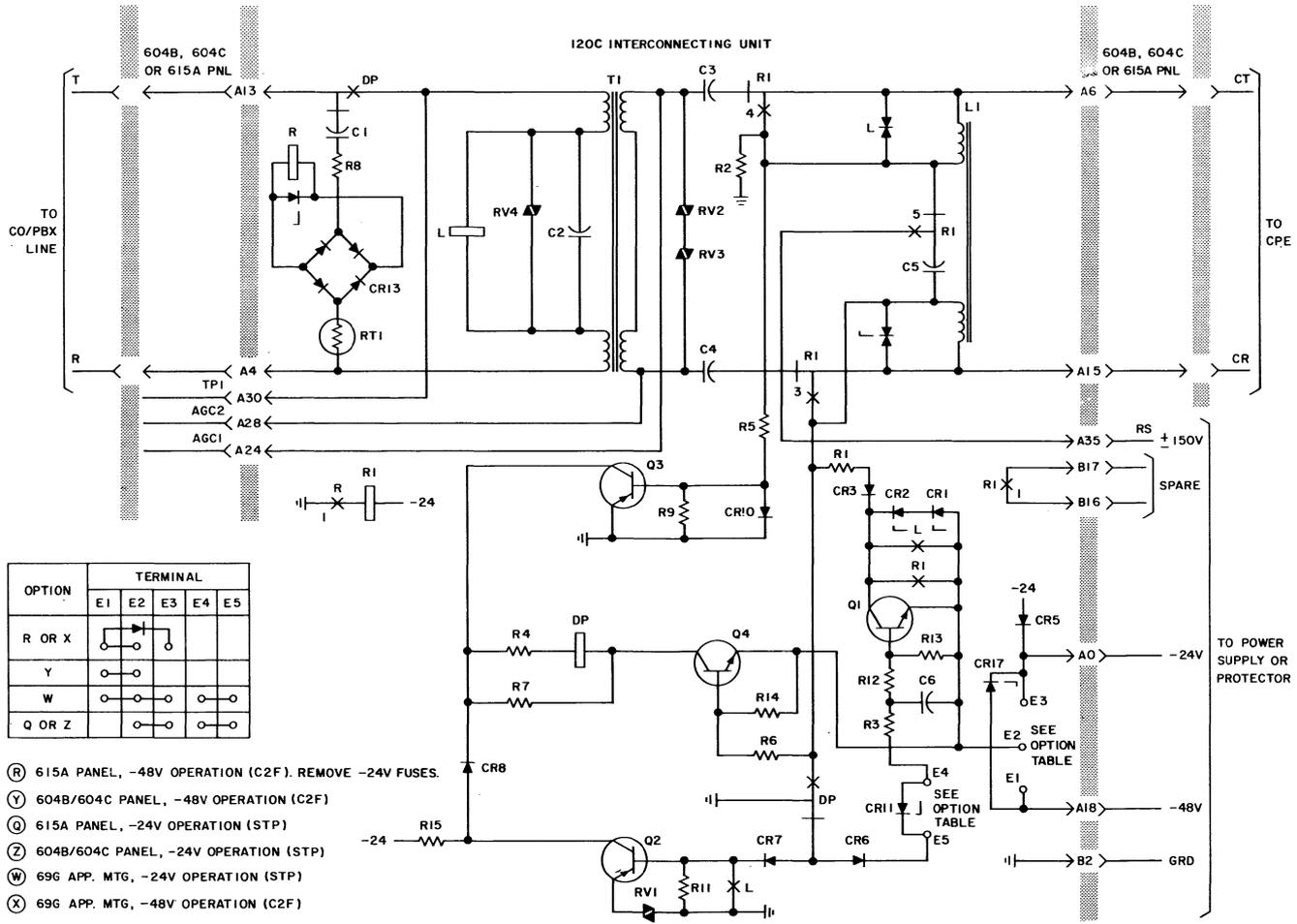


Fig. 9—Schematic Diagram—120C IU

(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 120-type 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 120-type 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 120-type IU, exchange it with another unit known to be functioning properly.

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 judgment of repair personnel 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 Section 660-101-312 entitled Maintenance of Service Charge on Services with Customer-Provided Equipment (CPE).

TABLE A
CONNECTIONS FOR PLUG 1-604B OR 604C PANEL

TRUNK NO.	POS. IN 604B/C PANEL	LEAD DESIG*	CONN PIN NO.	A25B CONN CABLE COLOR	66B4-25 CONN BLK ROW NO.
1	1	T R	26	W-BL	1
			1	BL-W	2
2	2	T R	27	W-O	3
			2	O-W	4
3	4	T R	28	W-G	5
			3	G-W	6
4	5	T R	29	W-BR	7
			4	BR-W	8
5	7	T R	30	W-S	9
			5	S-W	10
6	8	T R	31	R-BL	11
			6	BL-R	12
7	10	T R	32	R-O	13
			7	O-R	14
8	11	T R	33	R-G	15
			8	G-R	16
9	13	T R	34	R-BR	17
			9	BR-R	18
10	3	T R	35	R-S	19
			10	S-R	20
11	6	T R	36	BK-BL	21
			11	BL-BK	22
12	9	T R	37	BK-O	23
			12	O-BK	24
13	12	T R	38	BK-G	25
			13	G-BK	26
14	14	T R	39	BK-BR	27
			14	BR-BK	28
		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 PLUGS 2, 3, AND 4—604B OR 604C PANEL

TRUNK NO.	POS. IN 604B/C PANEL	LEAD* DESIG	CONN PIN NO.	CONN CABLE COLOR	66M1-50† CONN BLK ROW NO.
CONNECTIONS FOR PLUG 2					
1	J1	CT	26	W-BL	1
		CR	1	BL-W	2
2	J2	CT	31	R-BL	3
		CR	6	BL-R	4
3	J4	CT	36	BK-BL	5
		CR	11	BL-BK	6
4	J5	CT	41	Y-BL	7
		CR	16	BL-Y	8
5	J7	CT	46	V-BL	9
		CR	21	BL-V	10
CONNECTIONS FOR PLUG 3					
6	J8	CT	26	W-BL	11
		CR	1	BL-W	12
7	J10	CT	31	R-BL	13
		CR	6	BL-R	14
8	J11	CT	36	BK-BL	15
		CR	11	BL-BK	16
9	J13	CT	41	Y-BL	17
		CR	16	BL-Y	18
24V	F2(FA)	FAL1	49	V-BR	‡
24V	GRD	G1	24	BR-V	‡
48V	F16(FA)	FAL2	50	V-S	‡
48V	GRD	G2	25	S-V	‡
CONNECTIONS FOR PLUG 4					
10	J3	CT	26	W-BL	19
		CR	1	BL-W	20
11	J6	CT	31	R-BL	21
		CR	6	BL-R	22
12	J9	CT	36	BK-BL	23
		CR	11	BL-BK	24
13	J12	CT	41	Y-BL	25
		CR	16	BL-Y	26
14	J14	CT	46	V-BL	27
		CR	21	BL-V	28

* Stencil lead designations on fanning strip.

† Insulate and store spare leads.

‡ Optional attendant alarm No. 17 Indicator.

TABLE C
LINE CONNECTIONS TO 615A PANEL

LEAD DESIGNATION		COLOR	615A PANEL	
			66T1 CONN. BLOCK	POSITION
Trunk 1	T	W-BL	1A	J1A/J1B
	R	BL-W	2A	
Trunk 2	T	W-O	3A	J2A/J2B
	R	O-W	4A	
Trunk 3	T	W-G	5A	J3A/J3B
	R	G-W	6A	

TABLE D
LEADS TO CPE—615A PANEL

LEAD DESIGNATION		A25B CONN. CABLE	6 PAIR IW CABLE	615A PANEL	
				66T1 CONN. BLOCK	POSITION
Trunk 1	CT	W-BL	W-BL	1B	J1A/J1B
	CR	BL-W	BL-W	2B	
Trunk 2	CT	R-BL	W-O	3B	J2A/J2B
	CR	BL-R	O-W	4B	
Trunk 3	CT	BK-BL	W-G	5B	J3A/J3B
	CR	BL-BK	G-W	6B	

Note: Connections to the CPE can be made either through an A25B connector cable in P1 or by terminating a 6-pair IW cable on the 66T1 connecting block. See Fig. 4.

TABLE E

604B OR 604C PANEL FUSE ASSIGNMENT

VOLTAGE	FUSE NO.	PANEL POSITION
±105V	F1†	J1A thru J14A
Talk Battery -24V (STP Only)	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* (C2F Only)	F16‡	J1A thru J5A
	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 F

615A PANEL FUSE ASSIGNMENT

VOLTAGE	FUSE NO.*	PANEL POSITION
Talk Bat. -24V (STP Only)	F1	J1A
	F2	J2A
	F3	J3A
Talk Bat. -48V (C2F Only)	F4	J1A
	F5	J2A
	F6	J3A
±105V	F7	J1A, J2A, J3A
Spare	F8	

* 24E fuse, 1/2 ampere

♦TABLE G♦

POWER CONNECTIONS

INPUT VOLTAGE	69G APP MTG (NOTE 1)	604B PANEL (NOTE 2)	615A PANEL (NOTE 3)
-24V Talk Bat.	5	Input -24V	D2
-48V Talk Bat.*	5	Input -48V	D10 (Note 4)
GRD	4	Input GRD	D4 (24V) D12 (48V)
±105V	3	RING SIG ±	D6
±GRD	4	RNG SIG GRD	D8

Note 1: Terminals on 66B4-25 connecting block.

Note 2: Terminals on rear of panel stamped as shown.
Position option straps for -24V or -48V.

Note 3: Terminals on 66T1 connecting block.

Note 4: Remove 24V fuses on 615A panel when powering 120B IU from -48V.

* KS-15620, L22 rectifier is suitable for talk battery supply.