

1A PROTECTIVE RELAYING TERMINAL INSTALLATION AND CONNECTIONS

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1. GENERAL

1.01 This section provides installation, option, and connection information for the 1A protective relaying (PR) terminal. Information on the power company input and output devices is not included in this section.

1.02 Careful consideration in planning the overall installation with the customer prior to starting actual installation is of prime importance. Consideration should be given to possible future requirements, appropriateness of installation location, and convenience for maintenance in the planning stage.

1.03 The transmission facilities must be 4-wire specially conditioned private lines in accordance with Section 851-201-101. Before the PR terminal is installed, the private line(s) shall have been installed and tested in accordance with Sections 310-540-100 and -500. Bridge taps on the private line for any purpose except for use of the 1A PR terminal are prohibited. Voice communication facilities must also be available between all sites within the system before installation can be completed.

1.04 Before attempting installation of the terminal, one should be familiar with the contents of the section entitled 1A Protective Relaying Terminal—Description and Operation (024-195-100).

2. SPECIAL TOOLS AND APPARATUS

2.01 Certain interconnecting leads are subject to induced high voltage transients. All leads require the use of KS-19165-L1 wire. All wiring except ground feeder wires shall be No. 20 AWG solid; ground feeders shall be No. 16 AWG stranded. These ground feeder wires are factory-furnished with spade tips on each end.

2.02 Kulka 600 RJ or 600 RJS jumpers are furnished and shall be used for connecting adjacent terminals on terminal strips.

2.03 A screw-starting screwdriver, such as Kedman No. 1736, No. 2356, or equivalent will be helpful in mounting the apparatus.

2.04 A KS-20538 volt-ohm-millammeter (VOM) (or equivalent) is required for certain tests during installation. The section entitled KS-20538 Meter—Description and Application (100-521-101) provides operating instructions for the VOM.

3. INSTALLATION INFORMATION

MOUNTING

3.01 The 1A PR terminal may be mounted in a commercially available 19-inch standard relay rack of a height suitable to accommodate the complete terminal. The terminal may also be installed in a 19-inch cabinet. For simplifying the wiring to the station battery and circuit breakers, the power company may wish to use its own rack or cabinet. This is an acceptable arrangement. In either case the rack or cabinet arrangement must be locally engineered. Rack mounting is preferred to cabinet mounting, due to better heat dissipation. In either rack or cabinet mounting, intermediate top and bottom covers should be removed from the terminal apparatus to improve air circulation, thus providing better cooling.

TYPES OF OPTIONS

3.02 Basically, there are two types of options that apply to the PR terminal:

- Orderable options
- Field options.

As the name implies, orderable options must be ordered; they cannot be made in the field. Field options may be subdivided into three categories:

- Wiring options
- Screw switch options
- Strap options.

Field options are applied at the field site at the time of installation. The various options and units affected are listed in Table A.

PRE-INSTALLATION CHECK AND VISUAL INSPECTION

3.03 Before starting installation at a particular site, check to see that all apparatus for that site is on hand, in accordance with the apparatus checklist for the particular site to be installed (Tables B through K).

3.04 Visually inspect all apparatus for obvious physical damage. Field repairs on any damaged apparatus should not be attempted; any damaged item should be replaced before starting installation.

3.05 Incorporate appropriate screw switch options on the supervisory transmitter CP-2 (BA) and the multipoint combiner CP-7 (EA) as indicated by apparatus checklist, in accordance with Table L and Fig. 1, 2 and 3. On CP-3 (CA) verify that screw switch S1A is closed and screw switch S1B is open (Fig. 4). Incorporate trip turnoff delay strap options in receiver CP-5 (CC) in accordance with the service order, Table M, and Fig. 5. For options B, C, ZC, and ZN (2-point bidirectional and transmit or receive unidirectional), leave straps E61-E62 and E63-E64 on CP-2 (BA) in place. For options ZD, ZE, and ZF (multipoint bidirectional), remove straps (Fig. 1).

Note: The procedures covered in 3.03 through 3.05 may be accomplished at a Telco shop or

other suitable location prior to going to the installation site. This will reduce the amount of time spent on customer premises, and possibly eliminate trips back to the Telco shop.

CHECKLISTS OF PROVIDED APPARATUS

3.06 Apparatus checklists for the various sites are presented in Tables B through K. These tables correspond to the various system configurations illustrated in Section 024-195-100.

Table B—2-Point Single Channel Symmetrical System—All Sites

Table C—3-Point Single Channel Symmetrical System—All Sites

Table D—4-Point Single Channel Symmetrical System—All Sites

Table E—5-Point Single Channel Symmetrical System—All Sites

Table F—2-Point Dual Channel Symmetrical System—All Sites

Table G—2-Point Single Channel Unidirectional System—Transmit Site

Table H—2-Point or Multipoint Single Channel Unidirectional System—Receive Site

Table I—2-Point Dual Channel Unidirectional System—Transmit Site

Table J—2-Point Dual Channel Unidirectional System—Receive Site

Table K—3-Point Single Channel Unidirectional System—One Transmitter and Two Receivers—Transmit Site

Note: Nonsymmetrical systems may be designed in a large number of configurations for specialized cases. The three examples presented herein (Tables G through K) are representative of the more common arrangements. No attempt has been made to cover all possible arrangements; systems not covered herein must be locally engineered, with sufficient detail to facilitate option installation and connections.

INSTALLATION PROCEDURES

3.07 Remove top cover of transceiver. If other transceivers are to be installed above the bottom transceiver, remove top and bottom covers of the additional transceivers. Remove bottom cover of interface mounting unit. If more than one interface mounting unit is to be installed, remove all top and bottom covers except the top of the uppermost unit. In multiple installations in *high* ambient temperature environments (above 100°F), two panel widths vertical separation (3-1/2 inches) shall be provided between units. All covers should be left on units when units are separated.

3.08 Install lower transceiver, using the mounting screws provided with the unit. If more than one transceiver is being used at the site, install other transceiver(s) above bottom transceiver.

3.09 Install interface mounting unit immediately above uppermost transceiver. If more than one interface mounting unit is being used at the site, install additional unit(s) immediately above lower interface mounting unit.

3.10 In installations where a number of transceivers and interface mounting units must be installed, two or more racks or cabinets may be desirable, so that all apparatus when mounted will be within easy reach and view of power company personnel.

3.11 Install all transceiver CPs in accordance with control panel location, using CP location strip at base of mounting unit for location of CPs. A typical arrangement is shown in Fig. 6.

3.12 Install all required interface modules in accordance with the following preferred mounting arrangement, as viewed from the front of the unit:

POSITION	MODULE
1. (Extreme Left)	Keying Input or Trip Output
2.	Trip Output or Keying Input
3.	Alarm
4.	Converter Input
5. (Extreme Right)	Fuse & Converter

When the interface mounting unit is not completely filled, the empty space should be in the center

for better heat dissipation. A typical equipped interface mounting unit is shown in Fig. 7.

4. OPTION AND WIRING CONNECTIONS**GENERAL WIRING INFORMATION**

Note: Before wiring is started, read all of GENERAL WIRING INFORMATION (4.01 through 4.06).

4.01 Before wiring of the 1A PR terminal is started, the private line(s) shall have been connected to all sites in the system and tested in accordance with Sections 310-540-100 and -500.

4.02 All interconnecting leads except ground feeder leads shall be made with No. 20 AWG solid KS-19165-L1 wire. When connecting two 20-ga wires to the same terminal, twist bare ends of wires together, then wrap ends completely around terminal in a clockwise direction.

Caution: *Do not use pliers or other tool to wrap wires around terminal, as terminal strip barriers may be damaged.*

4.03 Use factory-furnished, spade-tipped 16-ga leads for making ground feeder connections.

4.04 Connect appropriate leads in accordance with Tables N through T, using KS-19165-L1 20-ga solid wire.

Caution: *Install wires ONLY on those terminals listed in Tables N through T with no option designation, and those terminals having the same option designations as specified on the service order for the particular terminal being installed.*

4.05 Remove all fuses from the converter input and fuse and converter modules.



Before making connections, request the customer to disconnect the station battery circuit to the PR terminal.

4.06 After one end is connected, reel off sufficient wire to connect the opposite end to the designated terminal strip, to the customer interface, or to the telephone line, as shown in the wiring tables. **Allow sufficient wire for proper lead dress after wiring is completed.** After all wiring is completed, form the wires into cables with plastic spiral wrap.

WARNING: Do not make the following connections until all other installation work and tests specified in Part 5 have been completed.

- Customer keying circuit—terminals 3 and 4 of terminal strip K.
- Customer trip circuit—terminals 1 and 2 of terminal strip N.

OPTION AND WIRING TABLES

All Symmetrical Systems

- 4.07** Wire all terminal strips in accordance with Tables N, O, P, Q, R, S, and T, observing the general wiring information given in 4.01 through 4.06.
- 4.08** Verify all connections made up to this point, then proceed to the installation tests described in Part 5.

Non-Symmetrical (Unidirectional) Systems—Transmit Sites

- 4.09** Wire all terminal strips in accordance with Tables N, O, P, Q, R, and T, observing the general wiring information given in 4.01 through 4.06.
- 4.10** Verify all connections made up to this point, then proceed to the installation tests described in Part 5.

Non-Symmetrical (Unidirectional) Systems—Receive Sites

- 4.11** Wire all terminal strips in accordance with Tables N, O, P, Q, S, and T, observing the general wiring information given in 4.01 through 4.06.
- 4.12** Verify all connections made up to this point, then proceed to the installation tests described in Part 5.

5. INSTALLATION TESTS AND ADJUSTMENTS

5.01 After all wiring has been completed *at each site in the system* except that specified in the warning in 4.06, certain preliminary tests must be performed before placing the system in service.

Note: Placing the 1A PR terminal in service requires voice communication between all sites within the system, and also requires close coordination with the customer.

5.02 Verify that all fuses are removed from the converter input and fuse and converter modules. [These should have been removed previously (4.05)].

5.03 At each site in the system, set the switches to the position indicated in Table U if the switch is present. Perform the following steps at each site in the system.

5.04 Request the customer to energize the station battery circuit to the PR terminal. Insert the MAIN POWER and AUX POWER fuses in the converter input module, and the CONVERTER INPUT POS and NEG fuses and the ALM fuse in the fuse and converter module.

5.05 Using a KS-20538 VOM (or equivalent), measure the voltage between terminals 1 and 3 of terminal strip J. (Terminal 3 is ground.) The meter should indicate between +14.2 and +15.8 volts dc. Measure the voltage between terminals 2 and 3 of terminal strip J. The meter should indicate between -14.2 and -15.8 volts dc.

5.06 Remove the CONVERTER INPUT POS fuse. Insert the five 15-volt output fuses in the fuse and converter module. Replace the CONVERTER INPUT POS fuse. (This places the converter under load).

5.07 Recheck the voltages as specified in 5.05. The voltages should remain within the specified limits.

5.08 At sites having a main transmitter, connect the KS-20538 VOM to terminals 17 and 18 of TS F. Adjust potentiometer R20 on CP-1 (AA) (Fig. 1) to obtain a guard tone transmit level of -4 dBm.

5.09 At sites having a main receiver, verify by voice communication that the remote transmitter is sending guard tone at -4 dBm. Then connect the KS-20538 VOM to terminals 17 and 18 of TS C. Verify that the guard tone is being received at a level between -16 and -22 dBm.

5.10 Screw switches S1A and S1B on CP-6 (DA) provide for accomodating the supervisory receiver to deviation in the received supervisory signal level. The normal setting for these switches for a line with 16-dB loss is S1A closed and S1B open. If frequency response data for the line are available, set the switches (Fig. 12) as indicated in Table V for the loss in the 1400- to 1600-Hz range.

5.11 An alternate procedure is to measure the received supervisory signal level by connecting the KS-20538 VOM to TS C terminals 17 and 18 and removing the guard signal by operating the GUARD OFF switch on the distant transmitter control panel. Set the screw switches (Fig. 12) as indicated in Table V.

5.12 Verify that *only* the following lamps are lighted on the transceiver.

- Transmitter: +15V
- Transmitter: -15V
- Receiver: +15V
- Receiver: -15V
- Receiver: SUPV CARR PRES

5.13 Complete the installation tests as specified in Section 024-195-500.

WARNING: *Making final connections, and placing the system in service requires coordination with all sites in the system and with the customer.*

5.14 At the transmitting terminal(s) of the system being installed, operate the selector switch on the keying input module to the TEST SP position.

5.15 Connect the customer keying input circuit to terminals 3 (+) and 4 (-) of TS K. **Observe polarity as indicated.**

5.16 At the receiving terminal(s) of the system being installed, operate the selector switch on the receiver trip output module to the TEST position.

WARNING: *Before connecting the customer trip circuit, verify that it is inactivated by the customer.*

5.17 Connect the customer trip output circuit to terminals 1 (+) and 2 (-) of TS N. **Observe polarity as indicated.**

5.18 In coordination with the customer and all sites within the system, place the system in service by operating the ON LINE—TEST switch on the keying input module at the transmitting site(s) to the ON LINE position. Operate the NORMAL—TEST switch on the receiver trip output module at the receive site(s) to the NORMAL position.

5.19 Request the customer to activate the customer trip circuit.

5.20 The system is now in service. Further tests or adjustments shall not be made without the consent of the customer.

TABLE A
OPTIONS AND UNITS AFFECTED

OPTION		UNITS AFFECTED	FIELD OPTIONS		
DESIG	FEATURE PROVIDED		SCREW	WIR'G	STRAP
A	Receive Only	Supv Trmtr CP-2 (BA) Trmtr & Rcvr Backplanes Alarm Module	X	X X	X
B	Transmit Only	Supv Trmtr CP-2 (BA) Trmtr & Rcvr Backplanes	X	X	X
E	No Customer Logic	{ Rcvr Trip Output Module, List 2 (30 Amp)		X	
F	Customer Logic			X	
G	Blocking Output	{ Rcvr Trip Output Module, List 1 (2 Amp)		X	
J	Tripping Output			X	
K	AND — Dual Channel "A" Rcvr	{ Receiver Backplane		X	
M	OR — Dual Channel "A" Rcvr			X	
N	Single Channel			X	
Q ¹	"A" Rcvr — Dual Channel	Receiver Control Panel			
R	"B" Rcvr — Dual Channel	Receiver Backplane		X	
P ¹	48V Station Battery	{ Converter Input Module			
S ¹	125V Station Battery				
T	Negative Ground	{ Converter Input Module (Option S Only)		X	
V	Positive Ground			X	
Note 2	Ungrounded			X	
W ³	Dual Channel	Keying Input Module			
X ³	250V Station Battery	{ Keying Input Module Trip Output Module			
Y ³	125V Station Battery				
Z ³	48V Station Battery				

TABLE A (CONT)
 OPTIONS AND UNITS AFFECTED

OPTION		UNITS AFFECTED	FIELD OPTIONS		
DESIG	FEATURE PROVIDED		SCREW	WIR'G	STRAP
ZA	2-Point System Alarm	Alarm Module Keying Input Module Trmtr & Rcvr Backplanes		X X X	
ZB	Multipoint System Alarm	Alarm Module Keying Input Module Trmtr & Rcvr Backplanes		X X X	
ZC	2-Point Bidirectional System	Supv Transmitter CP-2 (BA) Trmtr & Rcvr Backplanes	X	X	X
ZD	3-Point Bidirectional System	Supv Transmitter CP-2 (BA) Multipoint Combiner CP-7 (EA) Trmtr & Rcvr Backplanes	X X	X	X
ZE	4-Point Bidirectional System	Supv Transmitter CP-2 (BA) Multipoint Combiner CP-7 (EA) Trmtr & Rcvr Backplanes	X X	X	X
ZF	5-Point Bidirectional System	Supv Transmitter CP-2 (BA) Multipoint Combiner CP-7 (EA) Trmtr & Rcvr Backplanes	X X	X	X
ZG ¹	All Terms w/Main Rcvr	Receiver Control Panel			
ZH ¹	All Terms w/Main Trmtr	Transmitter Control Panel			
ZI ⁴	5-ms Trip Turnoff Delay	{ Receiver CP-5 (CC)			X
ZJ ⁴	20-ms Trip Turnoff Delay				X
ZK ⁴	100-ms Trip Turnoff Delay				X
ZL ⁵	48V & 125V Aux Supply	{ Converter Input Module		X	
ZM ⁵	250V Aux Supply			X	

TABLE A (CONT)
 OPTIONS AND UNITS AFFECTED

OPTION		UNITS AFFECTED	FIELD OPTIONS		
DESIG	FEATURE PROVIDED		SCREW	WIR'G	STRAP
ZN	Multipoint Unidirectional System	Supv Trmtr CP-2 (BA) Trmtr & Rcvr Backplanes	X	X	X
ZO	Unidirectional Trmt Term.	Receiver Backplane		X	

Notes:

1. Orderable as part of J-Code list number.
2. Ungrounded operation requires absence of options T and V.
3. Specify option on order.
4. See Table M.
5. See Fig. 11 (Options ZL and ZM).

TABLE B

**CHECKLIST OF PROVIDED APPARATUS FOR EACH SITE AND OPTIONS REQUIRED
2-POINT SINGLE CHANNEL SYMMETRICAL SYSTEM**

QUAN	APPARATUS		OPTIONS			NOTES
			ORDERED	FIELD		
	CODE	NAME		SCREW	TS WIRG	
1	J1G030B,L1	Transceiver Mtg Unit				
1	J1G030A,L1 L3	Trmtr Control Panel Rcvr Control Panel				
1	J1G030C,L1	Trmtr Backplane			ZC	
1	J1G030C,L1 L2	Rcvr Backplane			N & ZC	
1	J1G030AA,L1	Main Trmtr CP-1 (AA)				
1	BA,L1	Supv Trmtr CP-2 (BA)		ZC		1
1	J1G030CA,L1	Main Rcvr CP-3 (CA)				
1	CB,L1	Main Rcvr CP-4 (CB)				
1	CC,L1	Main Rcvr CP-5 (CC)				2
1	DA,L1	Supv Rcvr CP-6 (DA)				
1	J1G030G,L1	Interface Mtg Framework				
1	J1G030GB,L1	Alarm Module			ZA	
1	J1G030GC,L1	Conv Input Module				
1	GE,L1	Fuse & Conv Module				
		} 48V Sta Bat.			ZL or ZM	3
		OR				
1	J1G030GC,L2	Conv Input Module				
1	GE,L2	Fuse & Conv Module				
		} 125V Sta Bat.			ZL or ZM & T or V	4
1	J1G030GA,L1	Keying Input Module		X or Y or Z		
1	J1G030GD,L1	Trip Output Module (2 Amp)		X or Y or Z		J or G
		OR				
1	J1G030GD,L2	Trip Output Module (30 Amp)		X or Y or Z		E or F

- Notes:**
1. Strap option required on CP-2 (BA).
 2. Trip turnoff delay strap option required on CP-5 (CC).
 3. Options T and V do not apply to 48V station battery.
 4. Positive ground, negative ground, or ungrounded station battery

TABLE C

CHECKLIST OF PROVIDED APPARATUS FOR EACH SITE AND OPTIONS REQUIRED
3-POINT SINGLE CHANNEL SYMMETRICAL SYSTEM

QUAN	APPARATUS		OPTIONS			NOTES
			ORDERED	FIELD		
	CODE	NAME		SCREW	TS WIR'G	
2	J1G030B,L1	Transceiver Mtg Unit				
1	J1G030A,L1	Trmtr Control Panel				
2	L3	Rcvr Control Panel				
1	L6	Dummy Control Panel				
1	J1G030C,L1	Trmtr Backplane			ZD	
2	L2	Rcvr Backplane			N & ZD	
1	J1G030AA,L1	Main Trmtr CP-1 (AA)				
1	BA,L1	Supv Trmtr CP-2 (BA)		ZD		1
1	EA,L1	Multipoint Combiner CP-7 (EA)		ZD		
2	J1G030CA,L1	Main Rcvr CP-3 (CA)				
2	CB,L1	Main Rcvr CP-4 (CB)				
2	CC,L1	Main Rcvr CP-5 (CC)				2
2	DA,L1	Supv Rcvr CP-6 (DA)				
2	J1G030G,L1	Interface Mtg Framework				
1	J1G030GB,L1	Alarm Module			ZB	
2	J1G030GC,L1	Conv Input Module			ZL or ZM	3
2	GE,L1	Fuse & Conv Module				
		OR				
2	J1G030GC,L2	Conv Input Module			ZL or ZM	4
2	GE,L2	Fuse & Conv Module			& T or V	
		OR				
1	J1G030GA,L1	Keying Input Module		X or Y or Z		
2	J1G030GD,L1	Trip Output Module (2 Amp)		X or Y or Z	J or G	
		OR				
2	J1G030GD,L2	Trip Output Module (30 Amp)		X or Y or Z	E or F	

- Notes: 1. Strap option required on CP-2 (BA).
 2. Trip turnoff delay strap option required on CP-5 (CC).
 3. Options T and V do not apply to 48V station battery.
 4. Positive ground, negative ground, or ungrounded station battery.

TABLE D

**CHECKLIST OF PROVIDED APPARATUS FOR EACH SITE AND OPTIONS REQUIRED
4-POINT SINGLE CHANNEL SYMMETRICAL SYSTEM**

QUAN	APPARATUS		OPTIONS			
			ORDERED	FIELD		NOTES
	CODE	NAME		SCREW	TS WIR'G	
2	J1G030B,L1	Transceiver Mtg Unit				
1	J1G030A,L1	Trmtr Control Panel				
3	L3	Rcvr Control Panel				
1	J1G030C,L1	Trmtr Backplane			ZE	
3	L2	Rcvr Backplane			N, ZE	
1	J1G030AA,L1	Main Trmtr CP-1 (AA)				
1	BA,L1	Supv Trmtr CP-2 (BA)		ZE		1
1	EA,L1	Multipoint Combiner CP-7 (EA)		ZE		
3	J1G030CA,L1	Main Rcvr CP-3 (CA)				
3	CB,L1	Main Rcvr CP-4 (CB)				
3	CC,L1	Main Rcvr CP-5 (CC)				2
3	DA,L1	Supv Rcvr CP-6 (DA)				
2	J1G030G,L1	Interface Mtg Framework				
1	J1G030GB,L1	Alarm Module			ZB	
2	J1G030GC,L1	Conv Input Module				
2	GE,L1	Fuse & Conv Module				3
		OR				
2	J1G030GC,L2	Conv Input Module				
2	GE,L2	Fuse & Conv Module				4
		OR				
1	J1G030GA,L1	Keying Input Module	X or Y or Z			
3	J1G030GD,L1	Trip Output Module (2 Amp)	X or Y or Z		J or G	
		OR				
3	J1G030GD,L2	Trip Output Module (30 Amp)	X or Y or Z		E or F	

- Notes:**
1. Strap option required on CP-2 (BA).
 2. Trip turnoff delay strap option required on CP-5 (CC).
 3. Options T and V do not apply to 48V station battery.
 4. Positive ground, negative ground, or ungrounded station battery.

TABLE E

CHECKLIST OF PROVIDED APPARATUS FOR EACH SITE AND OPTIONS REQUIRED
5-POINT SINGLE CHANNEL SYMMETRICAL SYSTEM

QUAN	APPARATUS		OPTIONS			NOTES
			FIELD			
	CODE	NAME	ORDERED	SCREW	TS WIR'G	
3	J1G030B,L1	Transceiver Mtg Unit				
1	J1G030A,L1	Trmtr Control Panel				
4	L3	Rcvr Control Panel				
1	L6	Dummy Control Panel				
1	J1G030C,L1	Trmtr Backplane			ZF	
4	L2	Rcvr Backplane			N, ZF	
1	J1G030AA,L1	Main Trmtr CP-1 (AA)				
1	BA,L1	Supv Trmtr CP-2 (BA)		ZF		1
1	EA,L1	Multipoint Combiner CP-7 (EA)		ZF		
4	J1G030CA,L1	Main Rcvr CP-3 (CA)				
4	CB,L1	Main Rcvr CP-4 (CB)				
4	CC,L1	Main Rcvr CP-5 (CC)				2
4	DA,L1	Supv Rcvr CP-6 (DA)				
3	J1G030G,L1	Interface Mtg Framework				
1	J1G030GB,L1	Alarm Module			ZB	
3	J1G030GC,L1	Conv Input Module	}	48V Sta Bat.	ZL or ZM	3
3	GE,L1	Fuse & Conv Module				
		OR				
3	J1G030GC,L2	Conv Input Module	}	125V Sta Bat.	ZL or ZM & T or V	4
3	GE,L2	Fuse & Conv Module				
1	J1G030GA,L1	Keying Input Module		X or Y or Z		
4	J1G030GD,L1	Trip Output Module (2 Amp)		X or Y or Z	J or G	
		OR				
4	J1G030GD,L2	Trip Output Module (30 Amp)		X or Y or Z	E or F	

- Notes: 1. Strap option required on CP-2 (BA).
 2. Trip turnoff delay strap option required on CP-5 (CC).
 3. Options T and V do not apply to 48V station battery.
 4. Positive ground, negative ground, or ungrounded station battery.

TABLE F

**CHECKLIST OF PROVIDED APPARATUS FOR EACH SITE AND OPTIONS REQUIRED
2-POINT DUAL CHANNEL SYMMETRICAL SYSTEM**

QUAN	APPARATUS		OPTIONS			NOTES
			FIELD			
	CODE	NAME	ORDERED	SCREW	TS WIR'G	
2	J1G030B,L1	Transceiver Mtg Unit				
2	J1G030A,L1	Trmtr Control Panel				
1	L3	Rcvr Control Panel - Chan B				
1	L4	Rcvr Control Panel - Chan A				
2	J1G030C,L1	Trmtr Backplane			ZC	
2	L2	Rcvr Backplane			K or M & ZC, R	
2	J1G030AA,L1	Main Trmtr CP-1 (AA)				
2	BA,L1	Supv Trmtr CP-2 (BA)		ZC		1
2	J1G030CA,L1	Main Rcvr CP-3 (CA)				
2	CB,L1	Main Rcvr CP-4 (CB)				
2	CC,L1	Main Rcvr CP-5 (CC)				2
2	DA,L1	Supv Rcvr CP-6 (DA)				
2	J1G030G,L1	Interface Mtg Framework				
2	J1G030GB,L1	Alarm Module			ZA	
2	J1G030GC,L1	Conv Input Module	} 48V Sta Bat.		ZL or ZM	3
2	GE,L1	Fuse & Conv Module				
		OR				
2	J1C030GC,L2	Conv Input Module	} 125V Sta Bat.		ZL or ZM	4
2	GE,L2	Fuse & Conv Module				
1	J1G030GA,L1	Keying Input Module		W & X or Y or Z		
1	J1G030GD,L1	Trip Output Module (2 Amp)		X or Y or Z	J or G	
		OR				
1	J1G030GD,L2	Trip Output Module (30 Amp)		X or Y or Z	E or F	

- Notes:**
1. Strap option required on CP-2 (BA).
 2. Trip turnoff delay strap option required on CP-5 (CC).
 3. Options T and V do not apply to 48V station battery.
 4. Positive ground, negative ground, or ungrounded station battery.

TABLE G

CHECKLIST OF PROVIDED APPARATUS FOR TRANSMIT SITE AND OPTIONS REQUIRED
2-POINT SINGLE CHANNEL UNIDIRECTIONAL SYSTEM

QUAN	APPARATUS		OPTIONS			NOTES
			FIELD			
	CODE	NAME	ORDERED	SCREW	TS WIR'G	
1	J1G030B,L1	Transceiver Mtg Unit				
1	J1G030A,L1	Trmtr Control Panel				
1	L5	Rcvr Control Panel				
1	J1G030C,L1	Trmtr Backplane			B, ZA	
1	L2	Rcvr Backplane			B, ZA, ZO	
1	J1G030AA,L1	Main Trmtr CP-1 (AA)		B		1
1	BA,L1	Supv Trmtr CP-2 (BA)				
1	DA,L1	Supv Rcvr CP-6 (DA)				
1	J1G030G,L1	Interface Mtg Framework				
1	J1G030GB,L1	Alarm Module			ZA	
1	J1G030GC,L1	Conv Input Module			ZL or ZM	2
1	GE,L1	Fuse & Conv Module				
		OR				
1	J1G030GC,L2	Conv Input Module			ZL or ZM	3
1	GE,L1	Fuse & Conv Module			& T or V	
1	J1G030GA,L1	Keying Input Module	X or Y or Z		ZA	

- Notes: 1. Strap option required on CP-2 (BA).
 2. Options T and V do not apply to 48V station battery.
 3. Positive ground, negative ground, or ungrounded station battery.

TABLE H

**CHECKLIST OF PROVIDED APPARATUS FOR RECEIVE SITE AND OPTIONS REQUIRED
2-POINT OR MULTIPOINT SINGLE CHANNEL UNIDIRECTIONAL SYSTEM**

QUAN	APPARATUS		OPTIONS			NOTES
			FIELD			
	CODE	NAME	ORDERED	SCREW	TS WIR'G	
1	J1G030B,L1	Transceiver Mtg Unit				
1	J1G030A,L2	Trmtr Control Panel				
1	L3	Rcvr Control Panel				
1	J1G030C,L1	Trmtr Backplane			A	
1	L2	Rcvr Backplane			A, N	
1	J1G030BA,L1	Supv Trmtr CP-2 (BA)		A		1
1	CA,L1	Main Rcvr CP-3 (CA)				
1	CB,L1	Main Rcvr CP-4 (CB)				
1	CC,L1	Main Rcvr CP-5 (CC)				2
1	DA,L1	Supv Rcvr CP-6 (DA)				
1	J1G030G,L1	Interface Mtg Framework				
1	J1G030CB,L1	Alarm Module			A	
1	J1G030GC,L1	Conv Input Module	}	48V Sta Bat.	ZL or ZM	3
1	GE,L1	Fuse & Conv Module				
		OR				
1	J1G030GC,L2	Conv Input Module	}	125V Sta Bat.	ZL or ZM & T or V	4
1	GE,L2	Fuse & Conv Module				
1	J1G030GD,L1	Trip Output Module (2 Amp)		X or Y or Z	J or G	
		OR				
1	J1G030GD,L2	Trip Output Module (30 Amp)		X or Y or Z	E or F	

- Notes:*
1. Strap option required on CP-2 (BA).
 2. Trip turnoff delay strap option required in CP-5 (CC).
 3. Options T and V do not apply to 48V station battery.
 4. Positive ground, negative ground, or ungrounded station battery.

TABLE I

CHECKLIST OF PROVIDED APPARATUS FOR TRANSMIT SITE AND OPTIONS REQUIRED
2-POINT DUAL CHANNEL UNIDIRECTIONAL SYSTEM

QUAN	APPARATUS		OPTIONS			NOTES
			FIELD			
	CODE	NAME	ORDERED	SCREW	TS WIR'G	
2	J1G030B,L1	Transceiver Mtg Unit				
2	J1G030A,L1	Trmtr Control Panel				
2	L5	Rcvr Control Panel				
2	J1G030C,L1	Trmtr Backplane			B, ZA	
2	L2	Rcvr Backplane			B, ZA, ZO	
2	J1G030AA,L1	Main Trmtr CP-1 (AA)		B		1
2	BA,L1	Supv Trmtr CP-2 (BA)				
2	DA,L1	Supv Rcvr CP-6 (DA)				
2	J1G030G,L1	Interface Mtg Framework				
2	J1G030GB,L1	Alarm Module			ZA	
2	J1G030GC,L1	Conv Input Module	}	48V Sta Bat.	ZL or ZM	2
2	GE,L1	Fuse & Conv Module				
		OR				
2	J1G030GC,L2	Conv Input Module	}	125V Sta Bat.	ZL or ZM & T or V	3
2	GE,L2	Fuse & Conv Module				
1	J1G030GA,L1	Keying Input Module		W & X or Y or Z	ZA	

- Notes: 1. Strap option required on CP-2 (BA).
2. Options T and V do not apply to 48V station battery.
3. Positive ground, negative ground, or ungrounded station battery.

TABLE J

**CHECKLIST OF PROVIDED APPARATUS FOR RECEIVE SITE AND OPTIONS REQUIRED
2-POINT DUAL CHANNEL UNIDIRECTIONAL SYSTEM**

QUAN	APPARATUS		OPTIONS			NOTES
			FIELD			
	CODE	NAME	ORDERED	SCREW	TS WIR'G	
2	J1G030B,L1	Transceiver Mtg Unit				
2	J1G030A,L2	Trmtr Control Panel				
2	L3	Rcvr Control Panel				
2	J1G030C,L1	Trmtr Backplane			A	
2	L2	Rcvr Backplane			A, K or M, & R	
2	J1G030BA,L1	Supv Trmtr CP-2 (BA)		A, ZC		1
2	CA,L1	Main Rcvr CP-3 (CA)				
2	CB,L1	Main Rcvr CP-4 (CB)				
2	CC,L1	Main Rcvr CP-5 (CC)				2
2	DA,L1	Supv Rcvr CP-6 (DA)				
2	J1G030G,L1	Interface Mtg Framework				
2	J1G030GB,L1	Alarm Module			A	
2	J1G030GC,L1	Conv Input Module	}	48V	ZL or ZM	3
2	GE,L1	Fuse & Conv Module				
		OR				
2	J1G030GC,L2	Conv Input Module	}	125V	ZL or ZM & T or V	4
2	GE,L2	Fuse & Conv Module				
1	J1G030GD,L1	Trip Output Module (2 Amp)	X or Y or Z		J or G	
		OR				
1	J1G030GD,L2	Trip Output Module (30 Amp)	X or Y or Z		E or F	

- Notes:*
1. Strap option required on CP-2 (BA).
 2. Trip turnoff delay strap option required in CP-5 (CC).
 3. Options T and V do not apply to 48V station battery.
 4. Positive ground, negative ground, or ungrounded station battery.

TABLE K

**CHECKLIST OF PROVIDED APPARATUS FOR TRANSMIT SITE AND OPTIONS REQUIRED
3-POINT SINGLE CHANNEL UNIDIRECTIONAL SYSTEM
ONE TRANSMITTER WITH TWO RECEIVERS**

QUAN	APPARATUS		OPTIONS			NOTES
			FIELD			
	CODE	NAME	ORDERED	SCREW	TS WIR'G	
2	J1G030B,L1	Transceiver Mtg Unit				
1	J1G030A,L1	Trmtr Control Panel				
2	L5	Rcvr Control Panel				
1	L6	Dummy Control Panel				
1	J1G030C,L1	Trmtr Backplane			ZB, ZN	
2	L2	Rcvr Backplane			ZB, ZN, ZO	
1	J1G030AA,L1	Main Trmtr CP-1 (AA)				
1	BA,L1	Supv Trmtr CP-2 (BA)		ZN		1
2	DA,L1	Supv Rcvr CP-6 (DA)				
2	J1G030G,L1	Interface Mtg Framework				
1	J1G030GB,L1	Alarm Module			ZB	
1	J1G030GC,L1	Conv Input Module			ZL or ZM	2
1	GE,L1	Fuse & Conv Module				
		OR				
1	J1G030GC,L2	Conv Input Module			ZL or ZM	3
1	GE,L2	Fuse & Conv Module			& T or V	
1	J1G030GA,L1	Keying Input Module	X or Y or Z		ZB	

- Notes: 1. Strap option required on CP-2 (BA).
 2. Options T and V do not apply to 48V station battery.
 3. Positive ground, negative ground, or ungrounded station battery.

TABLE L
SCREW SWITCH OPTIONS

OPTION		SCREW SWITCH DESIGNATION											
FUNCTION	DESIG	S1A	S1B	S2A	S2B	S3A	S3B	S4A	S4B	S5A	S5B	S6A	S6B
Supervisory Transmitter CP-2 (BA)													
Rev Only	A			X		X		X	X	X	X	X	X
Trmt Only	B, ZN	X	X					X	X	X	X	X	X
2-Point *	ZC			X		X		X	X	X	X	X	X
3-Point *	ZD				X		X		X	X		X	X
4-Point *	ZE				X		X			X			X
5-Point *	ZF				X		X						X
Multipoint Combiner CP-7 (EA)													
3-Point *	ZD	X	X	X	X	X	X	X	X				
4-Point *	ZE		X		X		X		X				
5-Point *	ZF												

Notes: Switches marked "X" are in the closed (fully clockwise) position.
Asterisk denotes bidirectional system.

TABLE M
TRIP TURNOFF DELAY OPTIONS ON
RECEIVER CP-5 (CC)

OPTION		REMOVE STRAPS
DESIG	DELAY	
ZI	5 ms	B and C
ZJ	20 ms	A and C
ZK	100 ms	A and B

Note: Straps A, B, and C are furnished in place. Cut straps and remove per above table. Use care in cutting the proper straps, as they are not replaceable in the field.

TABLE N

**OPTION AND WIRING CONNECTIONS
RECEIVER BACKPLANE—TERMINAL STRIPS A, B, AND C**

TERM.	OPTION(S)	CONNECT TO	NOTES
<i>Terminal Strip A</i>			
5	K	TS A 4	
6	M	TS A 4	
7	N	TS A 4	
8	R	TS A 10 of Dual Channel "A" Rcvr	
10	M, K	TS A 8 of Dual Channel "B" Rcvr	
11	M, K	TS A 15 of Dual Channel "B" Rcvr	
15	K, M, N	TS M 6	
	R	TS A 11 of Dual Channel "A" Rcvr	
<i>Terminal Strip B</i>			
1	B, ZN ZN	TS D 9 TS B 1	
2	A ZA ZB ZB	TS P 1 TS L 2 TS B 3 TS L 2	1, 2 1, 2
3	A ZO ZA, ZB	TS C 4 TS B 5 TS F 11	2 2 1, 2
4		TS P 2 TS B 4	2 2
10		TS D 13	
11	ZB	TS B 10	2
11	ZB	TS D 14 TS B 11	2
<i>Terminal Strip C</i>			
1		TS I 2 or 5 TS F 1, or TS C 1 of Other Unit in Same Side of Adjacent Mounting	
2		TS I 3 or 6 TS F 2, or TS C 2 of Other Unit in Same Side of Adjacent Mounting	
13		TS C 3 of Other Receiver, or F 3 of Transmitter TS G 10	3, 4 5
4		TS C 4 of Other Receiver TS I 9	3 5
7		Trip Recorder (RMA)	6
8		Trip Recorder (RMB)	6

TABLE N (CONT)
OPTION AND WIRING CONNECTIONS
RECEIVER BACKPLANE—TERMINAL STRIPS A, B, AND C

TERM.	OPTION(S)	CONNECT TO	NOTES
9		Customer Interface (CLFA)	6
10		Customer Interface (CLFB)	6
11		Customer Interface (CTA)	6
12		Customer Interface (CTB)	6
13		Customer Interface (CRLA)	6
14		Customer Interface (CRLB)	6
15		Customer Interface (CRTA)	6
16		Customer Interface (CRTB)	6
17		Telephone Line (Ring)	
18		Telephone Line (Tip)	

Notes:

1. In multipoint system, make connection from TS B 2 of first receiver to TS B 3 of first intermediate receiver. Make connection from TS B 2 of first intermediate receiver to TS B 3 of second intermediate receiver, etc, or to TS B 3 of last receiver. Make connection from TS B 2 of last receiver to TS L 2.
2. See Fig. 8.
3. Connect from right to left receiver where there are two receivers in one mounting or to transmitter in same mounting.
4. Multiple to receivers and transmitters in other mountings in same bay (see Fig. 9 and 10).
5. Connection for transmitter and receiver (Fig. 9 and 10), single receiver, or left receiver of two receivers (as viewed from rear) in one mounting.
6. Customer option.

TABLE O

OPTION AND WIRING CONNECTIONS
TRANSMITTER BACKPLANE—TERMINAL STRIPS D, E, AND F

TERM	OPTION(S)	CONNECT TO	NOTES
<i>Terminal Strip D</i>			
1	A, ZC, ZD, ZE, ZF	TS A 1 on Rcvr 1	
2	A, ZC, ZD, ZE, ZF	TS A 2 on Rcvr 1	
3	ZD, ZE, ZF	TS A 1 on Rcvr 2	
4	ZD, ZE, ZF	TS A 2 on Rcvr 2	
5	ZE, ZF	TS A 1 on Rcvr 3	
6	ZE, ZF	TS A 2 on Rcvr 3	
7	ZF	TS A 1 on Rcvr 4	
8	ZF	TS A 2 on Rcvr 4	
10	A, ZC	TS B 6	
11	A, ZC	TS B 7	
12	A, ZC	TS B 8	
15	A	TS D 16	
17	A	TS F 4	
<i>Terminal Strip E</i>			
1	ZD, ZE, ZF	TS B 6 on Rcvr 1	
2	ZD, ZE, ZF	TS B 7 on Rcvr 1	
3	ZD, ZE, ZF	TS B 8 on Rcvr 1	
4	ZD, ZE, ZF	TS B 9 on Rcvr 1	
5	ZD, ZE, ZF	TS B 6 on Rcvr 2	
6	ZD, ZE, ZF	TS B 7 on Rcvr 2	
7	ZD, ZE, ZF	TS B 8 on Rcvr 2	
8	ZD, ZE, ZF	TS B 9 on Rcvr 2	
9	ZE, ZF	TS B 6 on Rcvr 3	
10	ZE, ZF	TS B 7 on Rcvr 3	
11	ZE, ZF	TS B 8 on Rcvr 3	
12	ZE, ZF	TS B 9 on Rcvr 3	
13	ZF	TS B 6 on Rcvr 4	
14	ZF	TS B 7 on Rcvr 4	
15	ZF	TS B 8 on Rcvr 4	
16	ZF	TS B 9 on Rcvr 4	
<i>Terminal Strip F</i>			
1		TS I 2 or 5 TS C 1 or TS F 1 of Other Unit in Same Side of Adjacent Mounting	

TABLE O (CONT)

**OPTION AND WIRING CONNECTIONS
TRANSMITTER BACKPLANE--TERMINAL STRIPS D, E, AND F**

TERM.	OPTION(S)	CONNECT TO	NOTES
2		TS I 3 or 6 TS C 2 or TS F 2 of Other Unit in Same Side of Adacent Mounting	
3		TS C 3 or TS G 10 TS F 3 of Other Trmtr	1, 2 3
4		TS C or TS I 9 TS F 4 of Other Trmtr	4 3
7		Trip Recorder (TMA)	5
8		Trip Recorder (TMB)	5
9		Cust Interface (TFA)	5
10		Cust Interface (TFB)	5
17		Telephone Line (Ring)	
18		Telephone Line (Tip)	

Notes:

1. Connect to TS C 3 when mounting contains transmitter and a receiver (Fig. 9 and 10). When mounting contains a transmitter and no receiver, or two transmitters, connect TS F 3 of single transmitter or right transmitter (as viewed from rear) to TS G 10.
2. Multiple to receivers and transmitters in other mountings in same bay (Fig. 9 and 10).
3. When mounting contains two transmitters, connect from right transmitter to left transmitter.
4. Connect to TS C 4 when mounting contains a transmitter and a receiver (Fig. 9 and 10). When mounting contains a transmitter and no receiver, or two transmitters, connect TS I 9 of single transmitter or right transmitter (as viewed from rear) to TS G 10.
5. Customer option.

TABLE P
 OPTION AND WIRING CONNECTIONS
 CONVERTER INPUT MODULE—TERMINAL STRIPS G AND H

TERM.	OPTION(S)	CONNECT TO	NOTES
		<i>Terminal Strip G</i>	
1	ZL	Cust Battery (Pos) (48V or 125V) TS G 3	1
2		Cust Battery (Neg) (48V or 125V) TS G 4	1
3	ZM	Cust Battery (Pos) (250V Only)	1, 2
4	ZM	Cust Battery (Neg) (250V Only)	1, 2
8		Power Co. Station Ground	3
9		TS O, M, or K 9	3
		TS G 10	3
		TS I 9	3
10		TS J 10	3
		TS O, M, or K 10	3
		TS C 3 or TS F 3	3
		<i>Terminal Strip H</i>	
1	V T	TS I 8	
2		TS H 1 (Pos Grd)	
		TS H 3 (Neg Grd)	
		No Connection (Ungrounded)	
3		TS I 10	
9		TS K 1	4
		TS M 1	5
10		TS K 2	4
		TS M 2	5

- Notes:**
1. Before making these connections, request the customer to deenergize the station battery circuit to the PR terminal.
 2. To be used only when customer control circuit operates on 250V supply, and 48V or 125V is available for the converter input supply. (Fig. 11).
 3. See Fig. 9 and 10.
 4. Make this connection if keying input module is used at this site.
 5. Make this connection if receiver trip output module is used at this site.

TABLE Q
OPTION AND WIRING CONNECTIONS
FUSE AND CONVERTER MODULE—TERMINAL STRIP I

TERM.	OPTIONS	CONNECT TO	NOTES
2		TS M 5, associated with Left Backplane TS C 1, Left Backplane or TS F 1, Left Backplane	1 1 2
3		TS C 2, Left Backplane or TS F 2, Left Backplane	1 2
5		TS M 5, associated with Right Backplane TS C 1, Right Backplane or TS F 1, Right Backplane	3 3 4
6		TS C 2, Right Backplane or TS F 2, Right Backplane	3 4
7		TS O 8	

- Notes:*
1. When mounting contains receiver in left side.
 2. When mounting contains transmitter in left side.
 3. When mounting contains receiver in right side.
 4. When mounting contains transmitter in right side.

TABLE R
OPTION AND WIRING CONNECTIONS
KEYING INPUT MODULE—TERMINAL STRIPS K AND L

TERM.	OPTION(S)	CONNECT TO	NOTES
		<i>Terminal Strip K</i>	
1		TS K 1 of Other System	1
2		TS K 2 of Other System	1
7		TS F 16 of Dual Chan "A" or Single Chan Trmtr	
8		TS F 16 of Dual Chan "B" Trmtr	
9		TS M, O, or G 9	2
10		TS M, O, or G 10	2
		<i>Terminal Strip L</i>	
3	ZA, ZB	TS P 1	3
4		Customer Interface (FA4)	4
5		Customer Interface (FA5)	4
6		Customer Interface (FA6)	4
7		TS F 15 of Dual Chan "A" or Single Chan Trmtr	
8		TS F 14 of Dual Chan "A" or Single Chan Trmtr	
9		TS F 15 of Dual Chan "B" Trmtr	
10		TS F 14 of Dual Chan "B" Trmtr	

- Notes:**
1. Used only in applications where transmitters of two or three systems are served by the same converter input module.
 2. See Fig. 9 and 10.
 3. See Fig. 8.
 4. Customer option.

TABLE S
 OPTION AND WIRING CONNECTIONS
 RECEIVER TRIP OUTPUT MODULE—TERMINAL STRIPS M AND N

TERM.	OPTION(S)	CONNECT TO	NOTES
		<i>Terminal Strip M</i>	
1		TS M 1 of Other System	1
2		TS M 2 of Other System	1
7	G, J	TS M 8	
8	F	Customer Logic (L2)	
	E	TS M 9	
9	F	Customer Logic (L1)	
		TS K, O, or G 9	2
10		TS K, O, or G 10	2
		<i>Terminal Strip N</i>	
6	G	TS N 5	
	J	TS N 7	
9		TS A 14 Dual Chan "A" or Single Chan Rcvr	
10		TS A 14 Dual Chan "B" Rcvr	

- Notes:**
1. Connect only in applications where receivers of two systems are served by same converter input module.
 2. See Fig. 9 and 10.

TABLE T
OPTIONS AND WIRING CONNECTIONS
ALARM MODULE—TERMINAL STRIPS O AND P

TERM.	OPTION(S)	CONNECT TO	NOTES
		<i>Terminal Strip O</i>	
1		Telco Alarm (Tip)	
2		Telco Alarm (Ring)	
3		Customer Interface	
4		Customer Interface	
8		Lamps on Interface Mtg Unit Panel (-15)	
		<i>Terminal Strip P</i>	
9		Lamps on Interface Mtg Unit Panel (CAS)	
10		Lamps on Interface Mtg Unit Panel (CAL)	

TABLE U
SWITCH SETTINGS

MODULE	SWITCH	POSITION
Keying Input	ON LINE — TEST	ON LINE
Rcvr Trip Output	NORMAL — TEST	NORMAL
Alarm	TRIP	NORMAL
	ALM	NORMAL
	AUD ALM	DISABLE

TABLE V

SCREW SWITCH SETTINGS
SUPERVISORY RECEIVER CP-6(DA)

LINE LOSS IN 1400 TO 1600 HZ RANGE (A)	SUPERVISORY SIGNAL RECEIVE LEVEL (L)	SCREW SWITCH DESIGNATION	
		S1A	S1B
$A > 18 \text{ dB}$	$L < -32 \text{ dBm}$		
$16 \text{ dB} < A \leq 18 \text{ dB}$	$-32 \text{ dBm} \leq L < -30 \text{ dBm}$	X *	*
$12 \text{ dB} < A \leq 16 \text{ dB}$	$-30 \text{ dBm} \leq L < -26 \text{ dBm}$		X
$A \leq 12 \text{ dB}$	$-26 \text{ dBm} \leq L$	X	X

Notes: Switches marked "X" are in the closed (fully clockwise) position.

* Denotes normal setting for line with 16-dB loss.

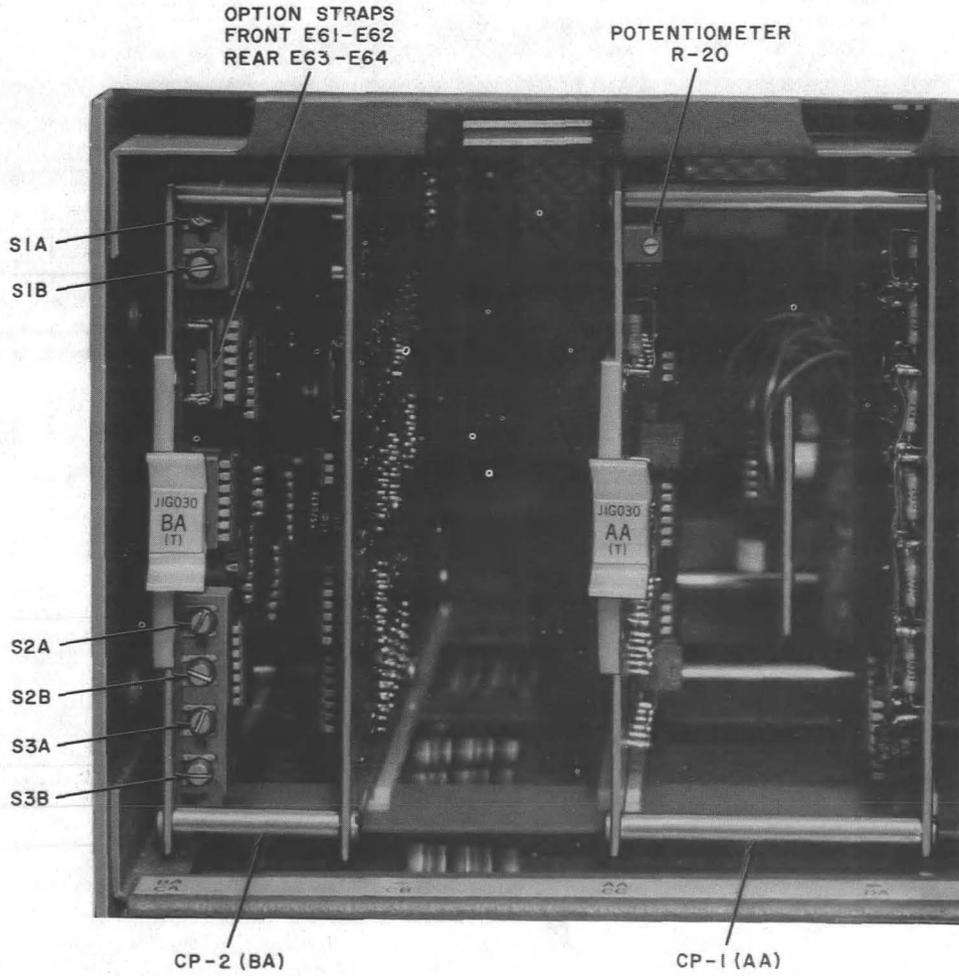


Fig. 1—Screw Switch and Strap Options on Front of CP-2 (BA) and Potentiometer R20 on CP-1 (AA)

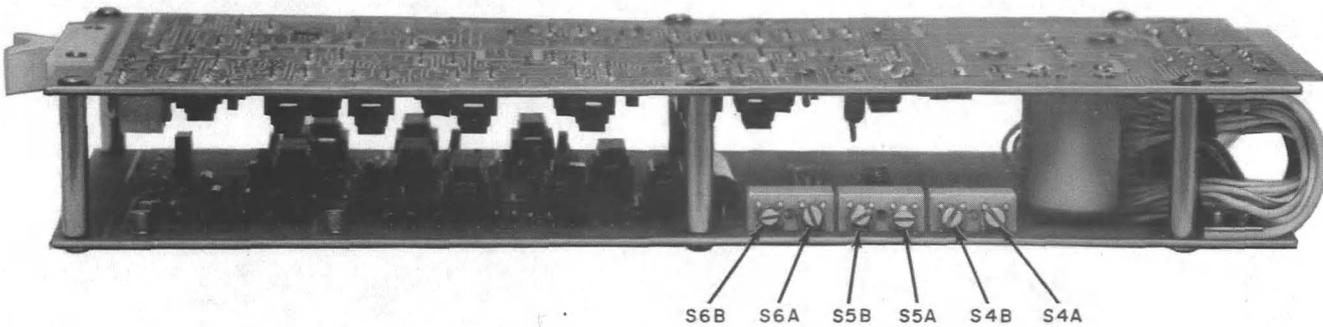


Fig. 2—Side View of CP-2 (BA) Showing Screw Switch Options

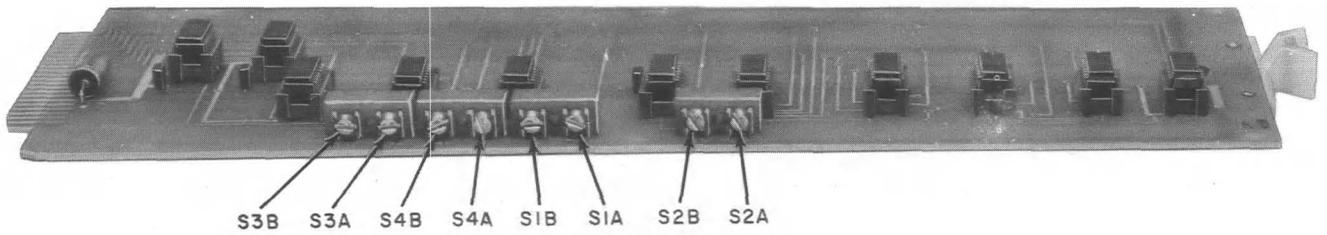


Fig. 3—CP-7 (EA) Screw Switch Options

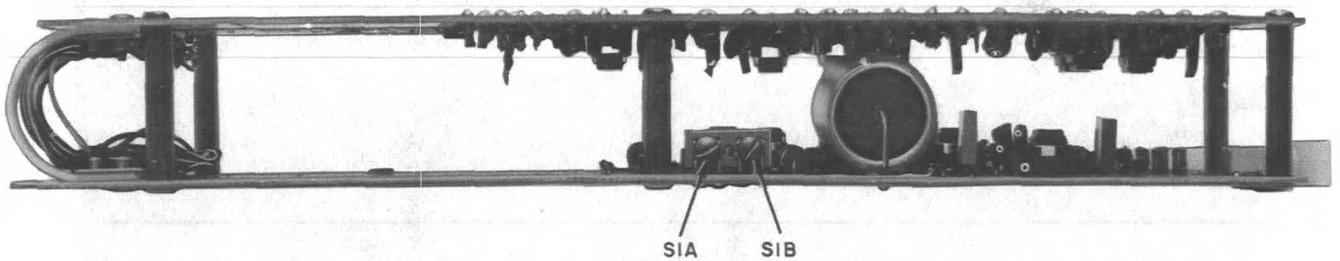


Fig. 4—CP-3 (CA) Showing Option Switches

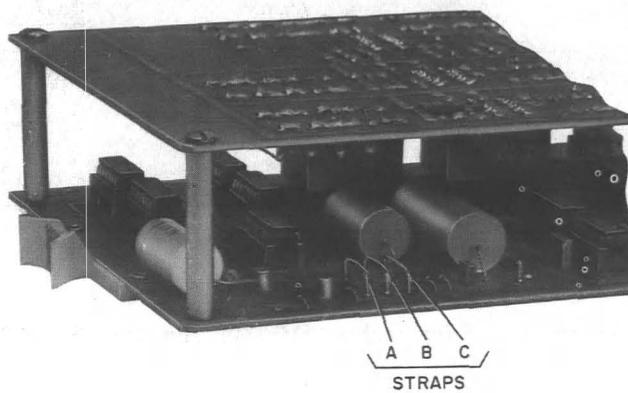


Fig. 5—CP-5 (CC) Strap Options

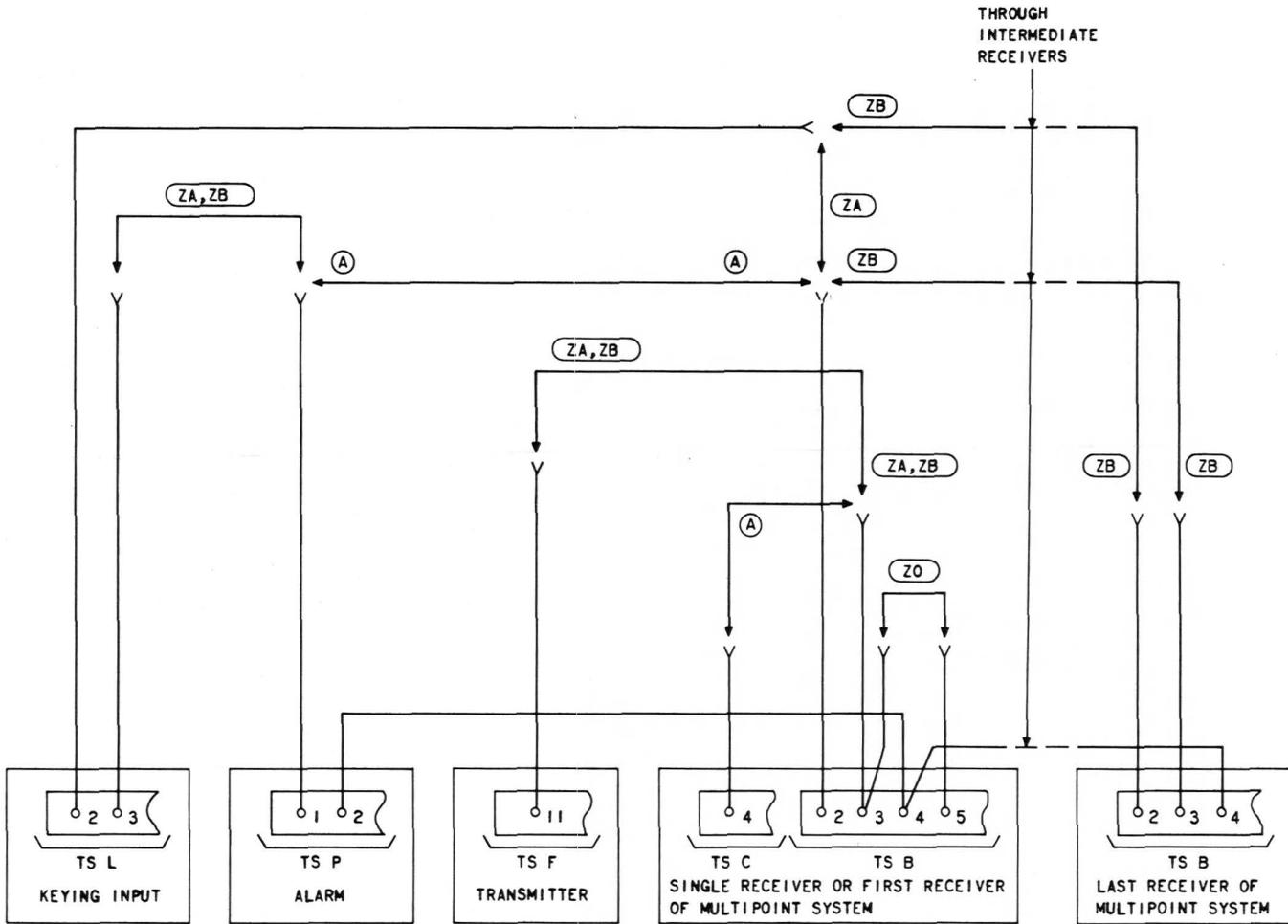
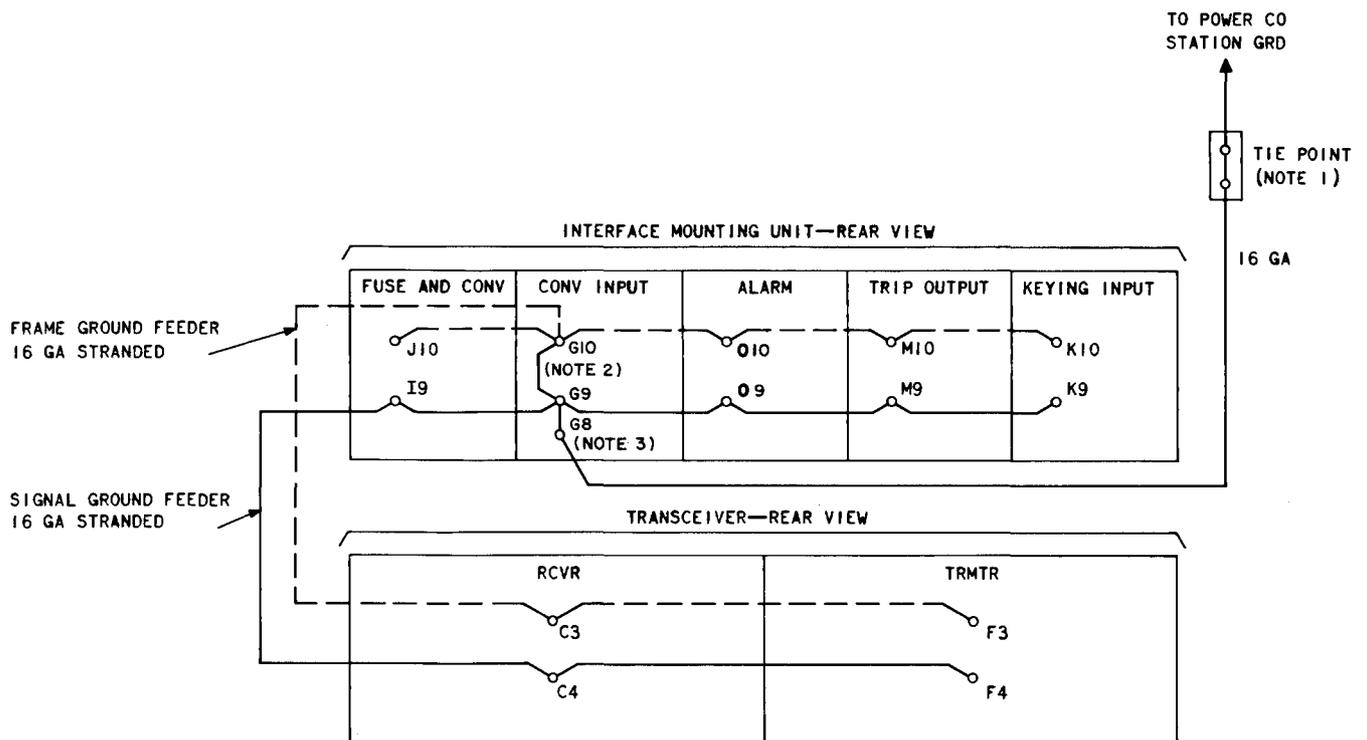


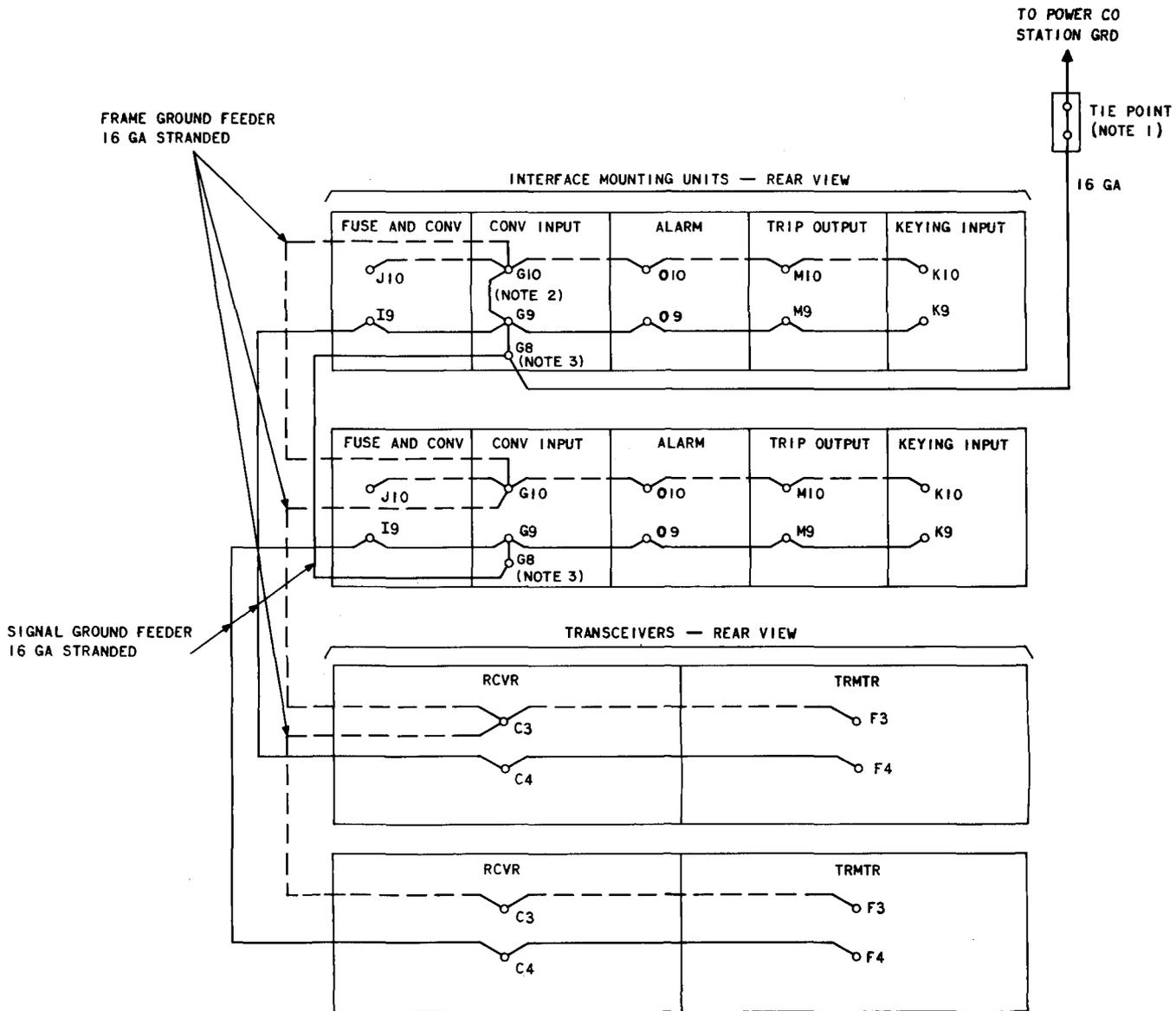
Fig. 8—Option Connections A, B, ZA, and ZB



NOTES:

1. TERMINAL G8 ON THE CONVERTER INPUT MODULE IS DESIGNATED STATION GROUND. MAXIMUM WIRE SIZE ACCOMODATED BY TERMINALS IS NO. 16 AWG. IF THE POWER COMPANY SUPPLIES A LARGER SIZE GROUND WIRE, AN INTERMEDIATE TIE POINT SHOULD BE USED.
2. USE KULKA 600 RJ OR 600 RJS JUMPERS FOR ADJACENT STRAP CONNECTIONS.
3. TERMINALS G8 AND G9 ON THE CONVERTER INPUT MODULE ARE STRAPPED INTERNALLY. BOTH TERMINALS MAY BE USED TO AVOID CROWDING ONE TERMINAL.
4. USE NO. 20 AWG SOLID WIRE UNLESS SPECIFIED OTHERWISE.

Fig. 9—2-Point Single Channel System Grounding



NOTES:

1. TERMINAL G8 ON THE UPPER CONVERTER INPUT MODULE IS DESIGNATED STATION GROUND. MAXIMUM WIRE SIZE ACCOMMODATED BY TERMINALS IS NO. 16 AWG. IF THE POWER COMPANY SUPPLIES A LARGER SIZE GROUND WIRE, AN INTERMEDIATE TIE POINT SHOULD BE USED.
2. USE KULKA 600 RJ OR 600 RJS JUMPERS FOR ADJACENT STRAP CONNECTIONS.
3. TERMINALS G8 AND G9 ON THE CONVERTER INPUT MODULE ARE STRAPPED INTERNALLY. BOTH TERMINALS MAY BE USED TO AVOID CROWDING ONE TERMINAL.
4. USE NO. 20 AWG SOLID WIRE UNLESS SPECIFIED OTHERWISE.

Fig. 10—2-Point Dual Channel System Grounding

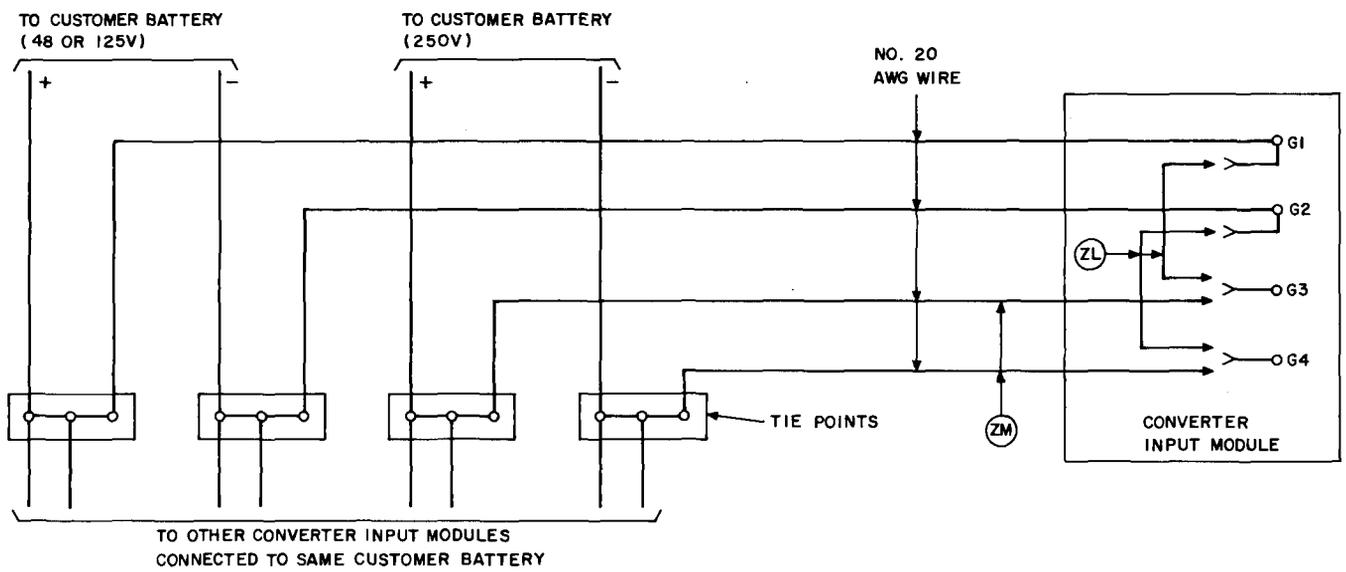


Fig. 11—Converter Input Module Option Connections ZL and ZM

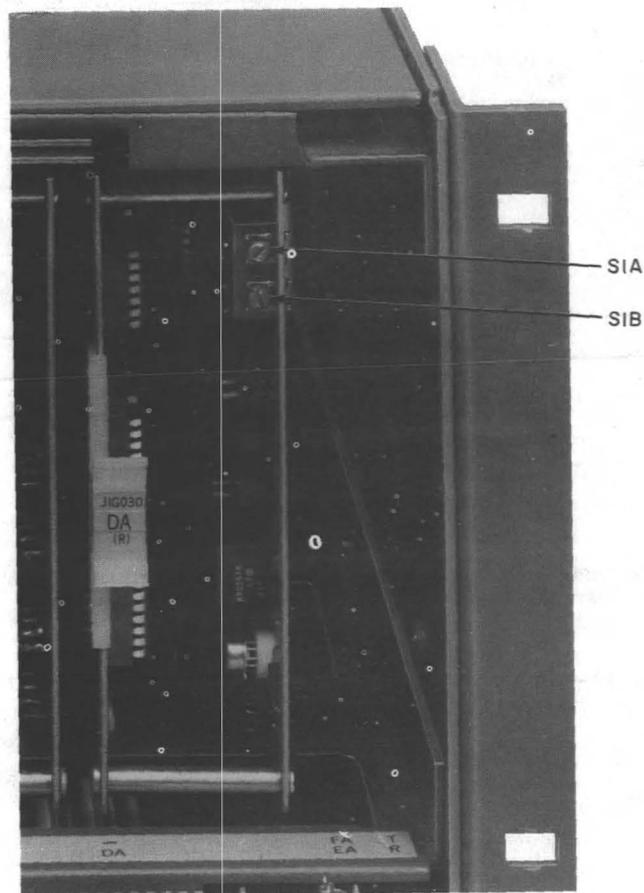


Fig. 12—CP-6 (DA) Showing Screw Switches