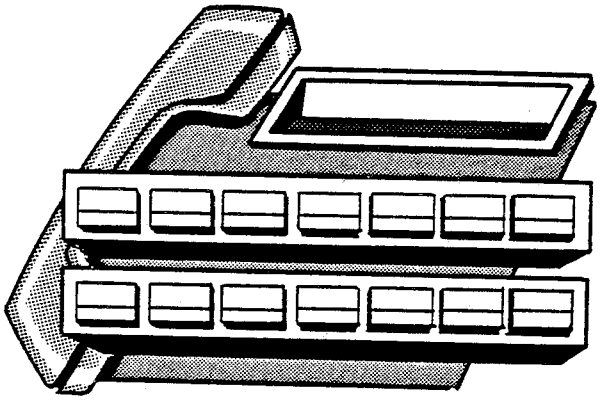
TIE®

TCX-128
OFF PREMISES EXTENSION SUPPLEMENT



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REVISION CONTROL

REVISION	DATE	CHANGE
0-1	13 JUL 83	First Draft
0-2	18 JUL 83	Second Draft. Revised per Engineering changes.
0-3	19 JUL 83	Third Draft. Revised with minor corrections.
0-4	21 JUL 83	Fourth Draft. Revised with minor corrections. Never issued.
0-5	22 JUL 83	Fifth Draft. Revised for Technical Service changes.

TCX-128

OFF PREMISES EXTENSION SUPPLEMENT

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1. GENERAL

1.Ø1 The Off Premises Extension (OPX) Adaptor Printed Circuit Board (PCB), B-OBX-A, enables a Class C OPX line supplied by the local telephone company to be connected to a TCX-128 Computerized Branch Exchange system via a port on the 8B-SLU-B PCB. This adaptor meets the requirements defined in FCC Facility Interface Code OL13C and EIA Specification 464-1. A telephone in a distant location connected to the TCX-128 via the OPX Interface Circuit, will have access to all system features available to single line telephones. The B-OPX-A PCB requires ancillary equipment and additional connections.

1.Ø2 The OPX equipment installed in a system can also be used to enhance the performance of a single line telephone assigned as an On Premises Extension (ONX). A single line telephone, assigned as an ONX, does not need to be modified with a TIE Electronic Tone Ringer.

NOTE: The OPX must be installed by a certified technician.

Required Equipment

1.Ø3 An OPX interface requires additional connections and the following equipment: B-OPX-A PCB, 8B-SLU-B PCB, a 48V Power Supply, Ringing Generator and a 13 Card Key Service Unit (KSU) or a 6 Card KSU. The recommended units are the Tellabs 48V Power Supply, the Tellabs Ringing Generator and the ITT 13 Card KSU or the ITT 6 Card KSU. The 13 Card KSU allows for future expansion and is recommended for systems which may require tie-lines at a later date.

Each B-OPX-A PCB provides circuitry for one off premises extension. The PCB is inserted into a standard 6 card or 13 Card KSU.

One 8B-SLU-B PCB is required in the TCX 128 KSU when an OPX is installed in the system. An 8B-SLU-B PCB can serve up to 8 OPXs.

6 Card KSU and Power Supply

1.Ø4 The 6 Card KSU is designed for wall mounting and holds a maximum of 6 B-OPX-A PCBs. These boards are inserted into the hinged shelf or rack (Figure 1). The 48V Power Supply and Ringing Generator are mounted inside the KSU cabinet (Figure 2). The shelf containing the PCBs is hinged so that it can be opened to provide access to two 5Ø-pin connecting blocks. One block is split.

Functions of the connecting blocks are as follows:

Block A -- Contains connections from the TCX-128 8B-SLU-B PCB to the OPX extensions.

Block B -- Contains internal wiring of the 6 Card KSU and requires no additional wiring.

Block C -- Contains connections from the 48V Power Supply and Ringing Generator. Provides connections for telco lines.

13 Card KSU and Power Supply

1.Ø5 The 13 Card KSU is designed for wall mounting. Eight of the 13 card positions can be used for B-OPX-A PCBs (Figure 3). Remaining positions can be used to accommodate future tie-line applications. The 13 Card KSU is similar to the 6 Card KSU in that the Power Supply and Ringing Generator are mounted on the shelf (Figure 4). The 13 Card KSU contains four 5Ø-pin plugs located on the back of the unit and a terminal block located on the front.

Assignments of the plugs when installing an OPX are as follows:

Plugs 1 and 2 -- Used for connections from the TCX-128 8B-SLU-B PCB to the OPX extensions and from the OPX extensions to the telco lines.

Plug 3 -- Contains internal wiring and requires no additional wiring.

Plug 4 -- Provides connections for power supply and ground to each station.

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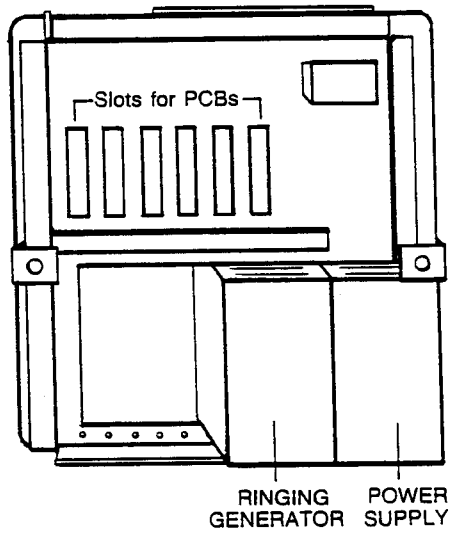

Figure 1 6 CARD KSU OUTSIDE VIEW

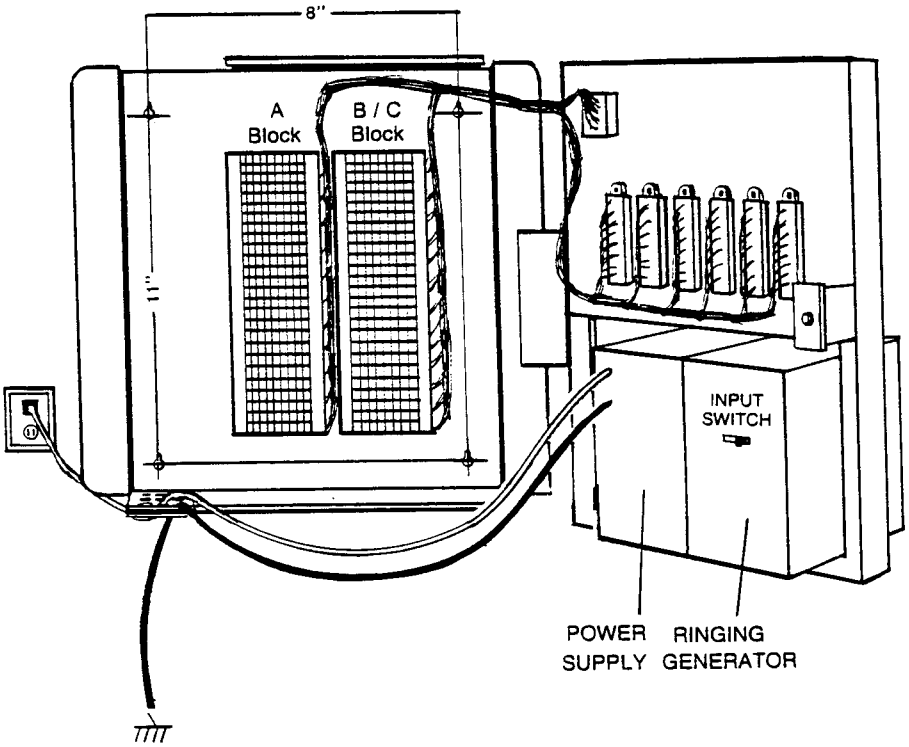

Figure 2 6 CARD KSU WITH HINGED SHELF OPENED

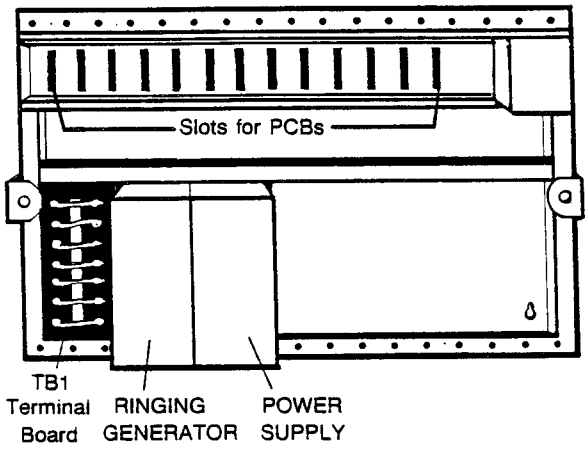

Figure 3 13 CARD KSU OUTSIDE VIEW

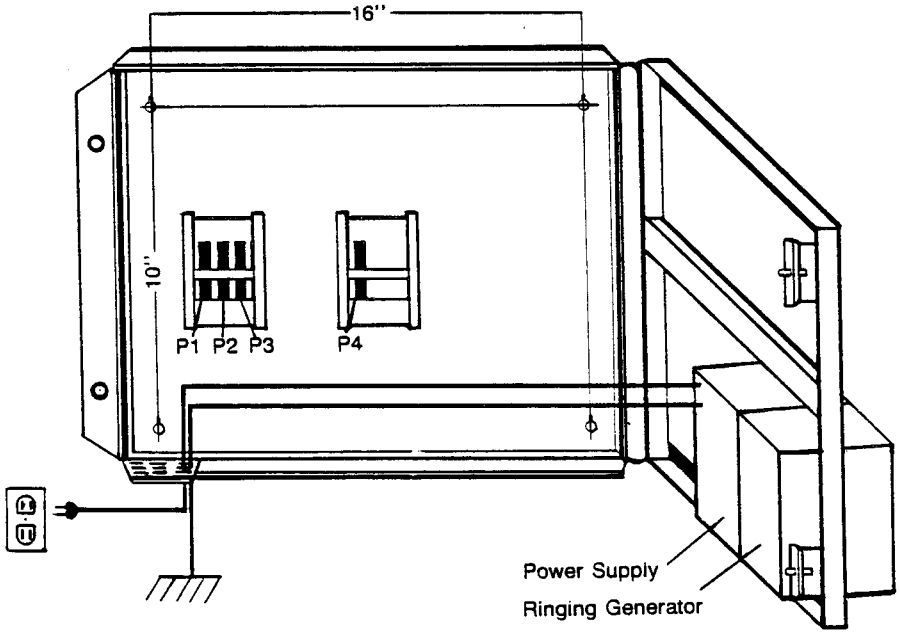

Figure 4 13 CARD KSU WITH HINGED SHELF OPENED

2. SPECIFICATIONS

2.Ø1 Refer to Table 1 for technical specifications pertaining to the OPX.

Table 1: SPECIFICATIONS

a. OPX Capacity:
Single line telephone as OPX, maximum number - 8

b. Tellabs 81Ø2 Ringing Generator
Input voltage:
22 to 26VDC or 44 to 56VDC, switch selectable. Set switch to 48V position.

Input Current at 48VDC:
75mA idle, 25ØmA full load (48Vdc is used with the OPX).

Output:
85 to 135VAC, 5 Watts maximum.

Ring Equivalence:
Up to 5 high impedance ringers simultaneously.

Fusing:
Input to ringing generator: 1 amp slow-blow cartridge type. (Bussman 3AG or equivalent)

Polarity:
Floating output may be biased positively or negatively.

Dimensions and Weight:
3" W x 7" H x 7" D (18cm x 7cm x 18cm), 5lbs (3 kg).

Operating Environment:
2Ø to 13Ø degrees F (-7 to 54 degrees C), humidity-95%, non condensing.

Part Number:
5W 81Ø2.

c. Power Supply:
Tellabs 8ØØ1 Power Supply.

Input voltage range:
1Ø5 to 13ØVAC rms, 57 to 63Hz, single phase.

Output:
24 or 48VDC, switchable, 1 ampere maximum current. Set switch to 48V position.

Regulation:
+1.Ø or -1.Ø volt, no load to full load, low line to high line

Ripple:
2mV RMS typical; 5mV RMS maximum, measured at full load and low line voltage.

Output protection:
Current/voltage foldback, activated at approximately 1.2 amperes output current.

Short circuit protection:
Will tolerate output short circuit of any duration.

Polarity:
Either positive or negative output terminal can be referenced to ground.

Fusing:
Line fuse, 1.5 ampere.

Operating Environment:
20-120 degrees F (-7 to 49 degrees C), no load to full load, low line to high line (humidity to 95%, non condensing).

Weight:
Approximately 7 lbs.

Dimensions:
3"W x 7"H x 7"D (18cm x 7cm x 18cm).

Part Number:
1A-8001.

d. KSUs

Dimensions:
6 Card KSU: 13"W x 16"H x 11"D (33cm x 41cm x 30cm).
13 Card KSU: 25"W x 16"H x 11"D (64cm x 41cm x 30cm).

Part Numbers:
ITT 6 Card KSU: 501A00-101.
ITT 13 Card KSU: 512A00-101.

3. FEATURES

3.01 The following paragraphs provide information on the features that are available to a single line telephone used as an OPX. This information defines the features by their use and provides instruction on using the features.

Answering a Call

3.02 Incoming calls can be answered from any extension if the extension is programmed to receive calls. Incoming Central Office (CO) calls provide a distinctive tone signal at the extension.

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To answer call:

-*Lift handset.

Placing An Outside Call

3.Ø3 Outside calls can be initiated from any extension providing the system-programmed Class of Service (COS) for the extension does not restrict the outgoing call.

To place an outside call:

-*Lift handset.
-*Dial 9.
-*Dial Line group number (1-1Ø) to receive dial tone.+
-*Dial telephone number.

+With LCR installed, a single line telephone cannot access a specific line group. Dial 9 and then the telephone number.

Intercom

3.Ø4 Internal (Intercom) calls can be initiated from any OPX extension in the system.

To place an Intercom call:

-*Lift handset.
-*Dial extension number.
-*Make announcement.

If the extension called is a key telephone set, then that extension will receive the call in a handsfree mode, unless otherwise programmed.

To ring a key set extension:

-*Lift handset.
-*Dial 1.
-*Dial extension number.

The extension will ring with a distinctive tone.

Hold

3.Ø5 Hold is a permanent feature for placing a call in a temporary waiting condition. The call can only be accessed by the extension placing the call on hold. This feature is referred to as Exclusive Hold since no other extension can pick up the call.

To place a call on Exclusive Hold:

-*Press and release hookswitch.

To return to call:

-*Press and release hookswitch.
-*Dial *.

NOTE: If the call is left on Hold longer than the programmed period, the call will re-ring at the extension that placed the call on Hold.

Transfer

3.Ø6 Transfer enables a user to send an outside call to another extension.

Unscreened (Unannounced) Transfer:

To Transfer an Unscreened call:

-*Press and release hookswitch. (Call placed on hold.)
-*Dial destination extension number.
-*Hang up.

If the party does not take the call, then the call will ring back to the extension that initiated the transfer. Answer the returned call and take a message.

Screened (Announced) Transfer:

To Transfer a Screened call:

-*Press and release hookswitch.
-*Dial destination extension number.
-*Announce call.
-*Hang up.

If the party does not take the call, then return to the outside call as follows:

-*Press and release hookswitch.
-*Dial # #.
-*Dial extension number where call was transferred.

Paging

3.Ø7 Paging is a system programmable feature. There are two types of paging: All Call and Zone Page.

All Call Page

All Call paging is broadcast over all extensions in the system programmed to receive page announcements. A volume control located on the key telephones regulates the page level from the speaker. Optional external amplifiers and speakers can be connected to broadcast pages.

Zone Page

Zone Page provides paging to groups of extensions. The KSU and Expansion Cabinet each have four page zones.

The paging zones are programmable on an extension-by-extension basis. The following chart shows the access codes associated with each zone:

ZONE	ACCESS CODE
1	61
2	62
3	63
4	64

Systems with an Expansion Cabinet have four additional zones:

5	65
6	66
7	67
8	68

All Call Page

To initiate All Call Page:

-*Lift handset.
-*Dial 60.
-*Make announcement.
-*Hang up.

Zone Page

To initiate Zone Page:

-*Lift handset.
-*Dial desired zone (61-68).
-*Make announcement.
-*Hang up.

Park

3.08 A user can park an outside call, page a third person and have that person pick up the parked call from an extension in the system.

General Park Orbit

General Park Orbit provides access to parked calls from any extension by dialing designated codes.

To place a call into a General Park Orbit:

-*Press and release hookswitch. Internal dial tone audible.
-*Dial General Park Orbit code (50-59).
-*Press and release hookswitch. Internal dial tone audible.
-*Dial 60 (All Call), or 61-68 (Zone Page).
-*Announce call and orbit number (50-59).
-*Hang up.

To retrieve a call from General Park Orbit:

-*Lift handset.
-*Dial General Park Orbit code (50-59).

Personal Park Orbit

Personal Park Orbit provides access to calls that are parked at a particular extension. These calls can be answered from any other extension by dialing the extension number of the extension where the call is parked.

If a call is transfered and announced, but no response is received:

-*Press and release hookswitch. Internal dial tone audible.
-*Dial 60 (All Call), 61-68 (Zone Page).
-*Announce call and extension number.
-*Hang up.

To retrieve a call from a Personal Park Orbit:

-*Lift handset.
-*Dial # #.
-*Dial your extension number.

Split (Alternate) Between Two Calls

3.09 Split enables a user to answer a second incoming call and place the first call on hold automatically.

While already on a call, a transfer camp-on tone serves as an alert that another outside call is waiting.

To talk to the second caller:

-*Press and release hookswitch. First call placed on Hold.
-*Attendant announces call and transfers second call to user.

Or, if dial tone is heard:

-*Dial *.

To return to first caller:

-*Press and release hookswitch.
-*Dial *.

To alternate between two outside calls:

-*Press and release hookswitch.
-*Dial *.

Repeat this procedure each time to alternate between the calls.

Conference Call

3.10 Conference Call is a permanent feature that permits a three-way telephone conversation.

The Single Line Telephone cannot initiate conference calls; however, these telephones can be included in conference calls initiated by other key telephones.

To join a conference:

-*Pick up handset when telephone rings.

Group Pick Up

3.11 Group Pick Up is a station programmable feature. It permits an incoming (not internal) call to be answered from any extension within a selected group. Up to 64 pick up groups can be established in the system. However, each extension can belong to only one group.

The user can select an optional audio (ring) in the pick-up group. To receive audio signals when a call is received in a pick-up group, dial 1-803. To cancel this feature, dial 1-802. This feature must be entered at the extension when the system is reset, or after a power outage.

To pick up a call to another extension within the same pick up group:

-*Lift handset.
-*Dial 22.

Directed Call Pick-Up

3.12 Directed Call Pick-Up is a permanent system feature that permits a transferred CO call to be answered at an extension other than the called extension. If the call is unanswered, then it will revert to the attendant automatically.

To answer outside calls to other extensions:

-*Lift handset.
-*Dial # #.
-*Dial number of extension receiving call.

Last Number Redial

3.13 Last Number Redial is a permanent system feature available to all extensions programmed to place outside calls. This feature automatically stores the last CO line telephone number dialed regardless of whether the call was answered, not answered, or busy.

The last number dialed is placed in memory and can be redialed automatically.

To initiate Last Number Redial:

-*Lift handset.
-*Dial #.
-*Dial 1.

Speed Dial

3.14 Speed Dial is a programmable feature that permits automatic dialing of stored telephone numbers. There are two types of Speed Dial: System Speed Dial and Station Speed Dial. Station Class of Service and Toll Restriction programming can deny or limit Speed Dial for a particular extension. Station Speed Dial is available to the first 50 extensions only.

Station Speed Dial

Up to 10 frequently-dialed numbers may be stored at an extension.

To store Station Speed Dial numbers:

-*Lift handset. Listen for dial tone.
-*Dial #.
-*Dial 7.
-*Dial line group (1-10) unless LCR is installed.+
-*Dial bin 0-9 (10 storage locations).
-*Dial number to be stored (maximum 16 digits).++
-*Dial *.

+If LCR is installed, do not select a line group. LCR will automatically select the line group.

++Up to 16 digits can be stored in a bin. Pauses, entered by dialing #, count as a digit.
To use Station Speed Dial:

-*Lift handset.
-*Dial 7.
-*Dial bin where desired number was stored (Ø-9).

System Speed Dial

Up to 1ØØ frequently-dialed numbers can be programmed into system memory by the main attendant and can be made available to every extension in the system that is not limited by class of service or toll restriction. Only the attendant can program or change System speed Dial numbers.

NOTE: System Speed Dial numbers cannot be chained.

To dial a System Speed Dial number:

-*Lift handset. Listen for dial tone.
-*Dial desired code (8ØØ-899).

Universal Night Answer (UNA)

3.15 When more than one incoming CO line is ringing while the system is in the night mode, a single-line instrument will automatically access the first incoming call.

NOTE: The incoming CO lines which will ring at all extensions (universal night answer) are programmed individually. This allows special lines, such as Direct Inward Lines (DILs) or Private Lines to ring only at selected extensions as they do when the system is in the normal daytime mode. These special lines will not ring over the paging circuit.

When programmed for Universal Night Answer, to answer a Night Ring:

-*Lift handset.

To answer Night Ringing heard over the paging circuit if not programmed for night ringing on that line:
-*Lift handset.
-*Dial 69.

Barge-In

CAUTION: Unauthorized monitoring of calls using the Barge-In feature may be interpreted as an invasion of privacy.

3.16 Calls can be interrupted by certain extensions authorized and programmed during installation. The interrupted user will hear four short tone bursts before a Barge-In occurs. An extension can be programmed to block Barge-In.

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NOTE: Only the party who barges in on a conversation can release the barge-in status unless the barged-in on party terminates the call.

Toll Restriction

3.17 Toll Restriction is a system programmable feature that prohibits selected extensions from placing unauthorized long distance (toll) calls. Extensions can be restricted to internal calls, local calls, Speed Dial, or selected area codes depending on the Class of Service designated for that extension.

4. INSTALLATION

Preparation

4.Ø1 The following paragraphs provide instructions for connecting the OPX to the TCX equipment. It is recommended that the 6 Card and 13 Card KSU be mounted on a separate mounting board to the right of the TCX equipment and near a separate 115VAC, 15 amp outlet (Figures 5a and b).

4.Ø2 Before proceeding with the installation, have the necessary hardware and cables available. This includes: exterior grade plywood backboard, 25-pair cable for telco connection, standard 4-conductor (quad) station cabling, grounding wire (14 AWG), connecting blocks (66M1-5Ø type with bridging clips), modular jack (625 A, 625 F, or equivalent) and the appropriate mounting hardware.

Mount the 6 Card or 13 Card KSU as follows:

- *Attach the plywood backboard in the designated location with the appropriate fasteners. Mark the equipment layout on the board using the installation layout drawing (Figure 5).
- *Drill pilot holes at these points and insert suitable fasteners having a 1/4 inch shank diameter. Screw in fasteners until the clearance between the fastener head and the mounting surface is 1/4 inch.
- *Mount the KSU on the four fasteners and tighten each fastener until the KSU is securely attached to the mounting surface.

4.Ø3 The Power Supply and Ringing Generator are mounted on the hinged rack of the 6 Card or 13 Card KSU (Figures 2, 4). The Power Supply and Ringing Generator should be mounted near the terminal board on a 13 Card KSU to facilitate cross connecting.

4.Ø4 Mount three additional 66M1-5Ø connecting blocks to the left of the TCX-128 KSU when a 13 Card KSU is installed. These blocks are used to access the connections on the connectors P1, P2 and P4 located inside the 13 Card KSU. P1 and P2 provide access to TCX-128 and telco connections; P4 provides access to the power supply.

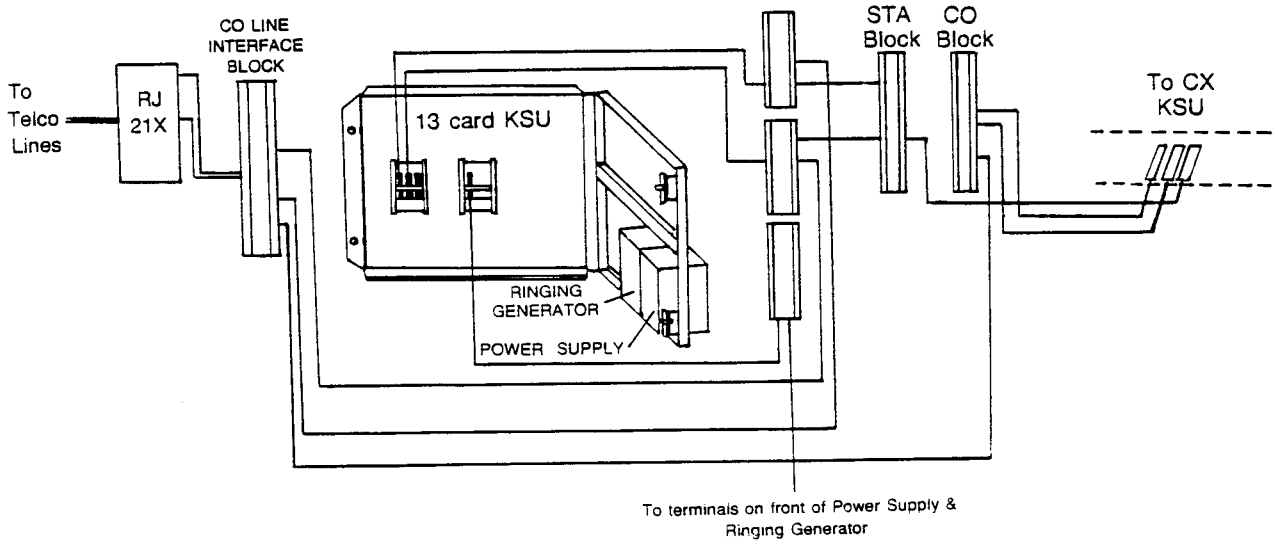

Figure 5a OPX INSTALLATION WITH 6 CARD KSU

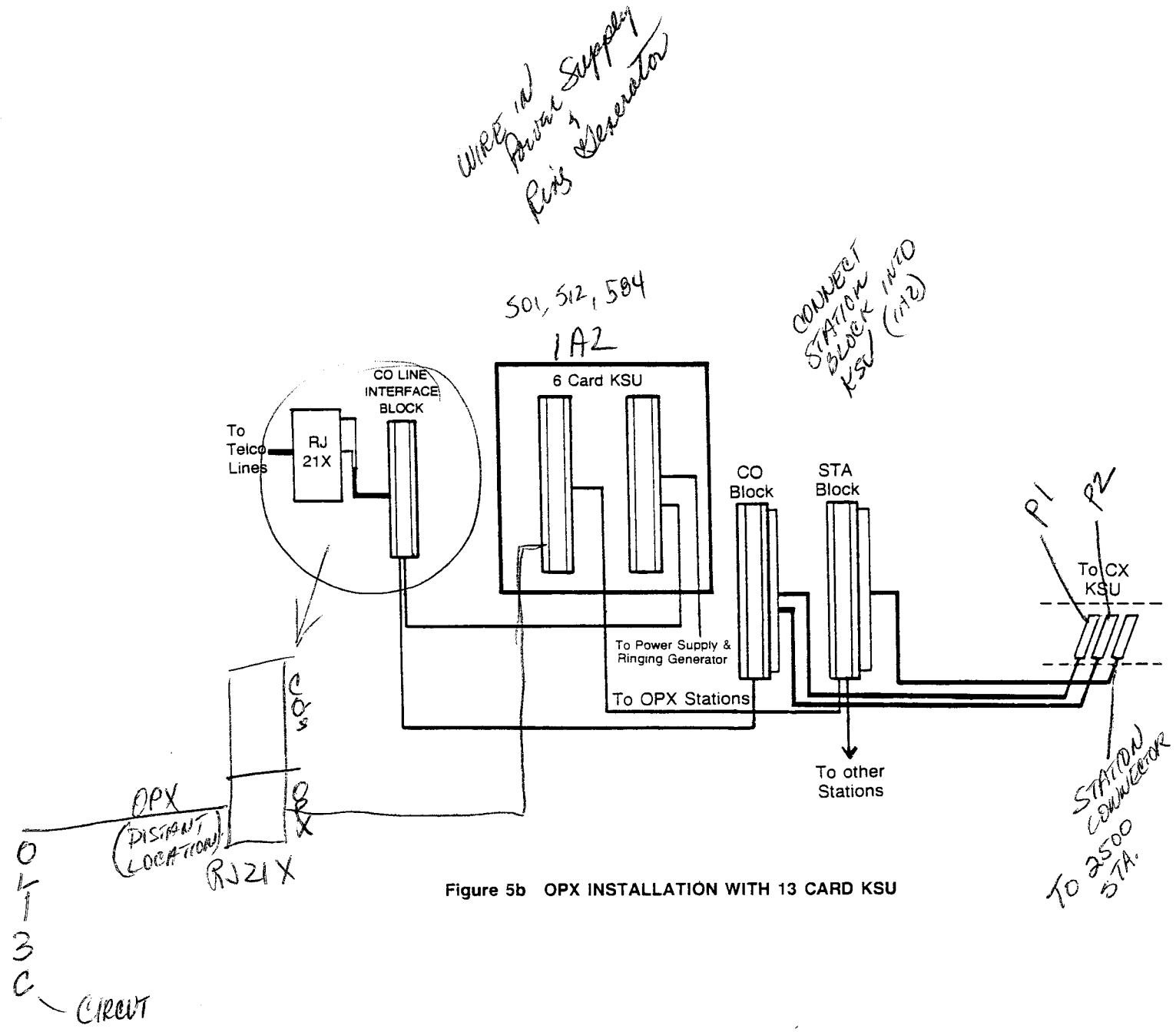

Figure 5b OPX INSTALLATION WITH 13 CARD KSU

4.Ø5 Check to ensure that the station plug (P3-P8 in the main TCX-128 KSU or P3 to P9 in the expansion cabinet), which corresponds to 8B-SLU-B serving the OPX, is connected to the appropriate station/OPX block. Refer to Section 5, INSTALLATION, of the Description and Installation Manual.

NOTE: It is recommended that the 8B-SLU-B serving the OPX be inserted in the TCX-128 KSU slots J13, J12, J1Ø, J9 or J8. This prevents having to cross connect to two station blocks to access the connections for the eight OPXs. The expansion cabinet, when applicable, can also be used. It is recommended that the 8B-SLU-B be inserted into slot J16, J14, J13, J11, J1Ø or J9 of the expansion cabinet.

4.Ø6 Ground the KSU and Power Supply by connecting a 14 AWG wire to the positive (+) terminal on the Power Supply and a cold water pipe ground (Figures 6, 7).

4.Ø7 Connect the 6 Card or 13 Card KSU to the Power Supply and Ring Generator as follows (Figures 6, 7):

NOTE: Check to ensure the switches on both units are in the OFF position when cross connecting. Switches should be in the position labeled 48V when the system is operating.

To connect the 6 Card KSU to the Power Supply and Ringing Generator (Figure 6, Table 2):

- *The AG connections for each OPX on block C must be jumpered (terminals 1, 3, 5, 7, 9 and 11) and connected to terminal 43, also on the C block.
- *The AB connections for each OPX on block C must be jumpered (terminals 2, 4, 6, 8, 1Ø and 12) and connected to terminal 44, also on the C block.
- *Connect terminal 44, designated as AB, from the C Block in the KSU to the -V screw terminal on the Ringing Generator.
- *Connect terminal 48, designated as RB, from the C Block to the screw terminal labeled +/- 1Ø5 on the Ringing Generator.
- *Connect terminal 43, designated AG on the C Block to the terminal labeled +V on the Ringing Generator.
- *Jumper the -V terminal on the Ringing Generator to the COM terminal on the Ringing Generator.
- *Connect the screw terminal labeled +V on the Ringing Generator to the + terminal on the Power Supply.
- *Connect the COM terminal on the Ringing Generator to the negative (-) terminal on the Power Supply.

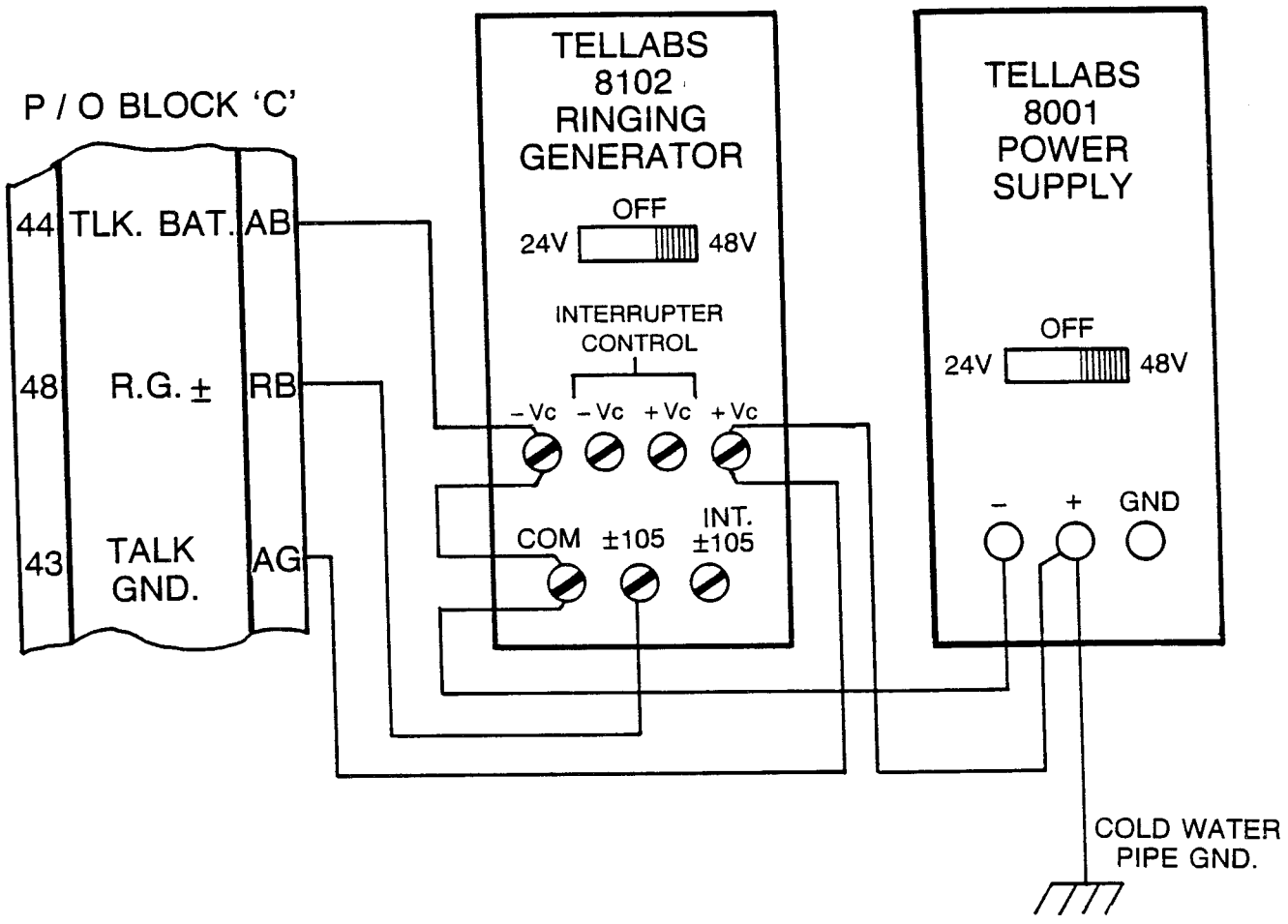

Figure 6 CONNECTING 6 CARD KSU TO POWER SUPPLY AND RINGING GENERATOR

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BLOCK B					BLOCK C			
FEATURE	LEAD DESIG	TERMINAL NUMBER	CLIP 1 2 3	CLIP 3 2 1	TERMINAL NUMBER	LEAD DESIG	FEATURE	
	B	1	* * **	** * *	1	AG		
	R 2	2			2	AB	LINE 1	
	B	3			3	AG		
	R 3	4			4	AB	LINE 2	
	B	5			5	AG		
	R 4	6			6	AB	LINE 3	
	B	7			7	AG		
	R 5	8			8	AB	LINE 4	
	B	9			9	AG		
	R 6	10			10	AB	LINE 5	
	B	11			11	AG		
	R 7	12			12	AB	LINE 6	
	B	13			13			
	R 8	14			14			
	B	15			15			
	R 9	16			16			
	B	17			17	BZ		
	R 0	18			18	BZ1		
LINE 1	B1 BZ1	19			19	RN		
	R1 BZ	20			20	ST		
LINE 2	B1 BZ1	21			21	LF1		
	R1 BZ	22			22	LW1		
LINE 3	B1 BZ1	23			23	LF2		
	R1 BZ	24			24	LW2		
LINE 4	B1 BZ1	25			25	T	LINE 1	OPX
	R1 BZ	26			26	R		
LINE 5	B1 BZ1	27			27	T	LINE 2	LINES
	R1 BZ	28			28	R		
LINE 6	B1 BZ1	29			29	T	LINE 3	TO
	R1 BZ	30			30	R		
	CAS	31			31	T	LINE 4	TELCO
	CAS	32			32	R		
	CAS	33			33	T	LINE 5	
	CAS	34			34	R		
	CAS	35			35	T	LINE 6	
	CAS	36			36	R		
		37			37	LG1	LP.GND.	
		38			38	LB1	LP.BAT.	
		39			39	LG2	LP.GND.	
		40			40	LG2	LP.BAT.	
		41			41	BG	RLY.GND.	
		42			42	BR	RLY.BAT.	
SPARE		43			43	AG	TLK.GND.	
		44			44	AB	TLK.BAT.	
		45			45	BG	RLY.GND.	
		46			46			
		47			47	RG	R.G.GND.	
		48			48	RB	R.G.	
		49			49	RG	B.Z.GND.	
		50			50	RB	BZ	

* Connect to clips as required.
** Pre-wiring is terminated on this clip, no additional wiring is required.

Table 2 6 CARD KSU B / C BLOCK CONNECTIONS

To connect the 13 Card KSU to the Power Supply and Ringing Generator (Figure 7, Table 3):

-*Terminals 1, 4, 7, 1Ø, 13, 16, 19 and 22 (designated as GND) on the P4 block must be jumpered together and cross connected to the GND terminal on the TB1 terminal board in the 13 Card KSU.
-*Terminals 3, 6, 9, 12, 15, 18, 21 and 24 (designated as -48VT) on the P4 block must be jumpered together and cross connected to the AB terminal on the TB1 terminal board in the 13 Card KSU.
-*Connect the AB terminal on TB1 terminal board on the 13 Card KSU to the -V terminal on the Ringing Generator.
-*Connect the RNG terminal to the +/- 1Ø5 terminal on the Ring Generator.
-*Connect the GND terminal to the +V terminal on the Ring Generator.
-*Jumper the -V terminal to the COM terminal on the Ring Generator.
-*Connect the COM terminal on the Ringing Generator to the negative (-) terminal on the Power Supply.
-*Connect the +V terminal on the Ringing Generator to the positive (+) terminal on the Power Supply.

Crossconnections to the 6 Card KSU

4.Ø8 Connections from the 8B-SLU-B are made on the A block (Figure 8 and Table 4) in the 6 Card KSU. Use two pair wire to cross connect the appropriate SLU connector block to the A Block in the 6 Card KSU. For each OPX, cross connect clips 1-5 as follows:

-*Cross connect the GRN wire from the AT lead on the station block to the T terminal of the A block in the 6 Card KSU.
-*Cross connect the RED wire from the AR terminal on the station block to the R terminal of the A block.
-*Cross connect the BLK wire from the BT terminal on the station block to the A terminal of the A block.
-*Cross connect the YEL wire from the BR terminal on the station block to the L terminal on the A block.

NOTE: Clip 6 on block A contains connections for internal wiring and requires no additional connections.

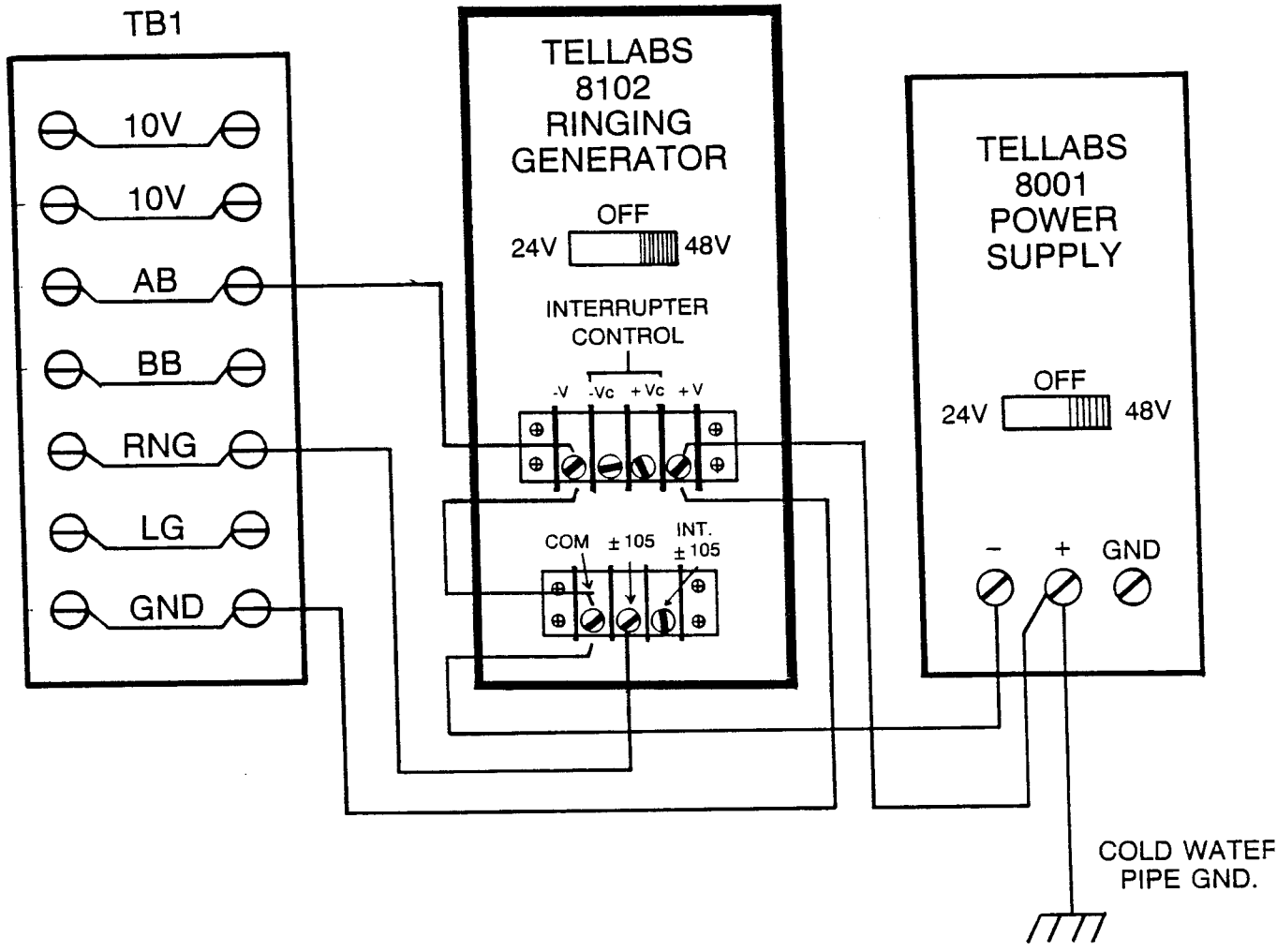

Figure 7 CONNECTING 13 CARD KSU TO POWER SUPPLY AND RINGING GENERATOR

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25 Pair Cable		P4 Connector	
Conn Pin	Color Code	Block Term.	Function
26	WHT-BLU	1	GND
1	BLU-WHT	2	
27	WHT-ORN	3	-48 VT
2	ORN-WHT	4	GND
28	WHT-GRN	5	
3	GRN-WHT	6	-48 VT
29	WHT-BRN	7	GND
4	BRN-WHT	8	
30	WHT-SLT	9	-48 VT
5	SLT-WHT	10	GND
31	RED-BLU	11	
6	BLU-RED	12	-48 VT
32	RED-ORN	13	GND
7	ORN-RED	14	
33	RED-GRN	15	-48 VT
8	GRN-RED	16	GND
34	RED-BRN	17	
9	BRN-RED	18	-48 VT
35	RED-SLT	19	GND
10	SLT-RED	20	
36	BLK-BLU	21	-48 VT
11	BLU-BLK	22	GND
37	BLK-ORN	23	
12	ORN-BLK	24	-48 VT
38	BLK-GRN	25	
13	GRN-BLK	26	
39	BLK-BRN	27	
14	BRN-BLK	28	
40	BLK-SLT	29	
15	SLT-BLK	30	
41	YEL-BLU	31	
16	BLU-YEL	32	
42	YEL-ORN	33	
17	ORN-YEL	34	
43	YEL-GRN	35	
18	GRN-YEL	36	
44	YEL-BRN	37	
19	BRN-YEL	38	
45	YEL-SLT	39	
20	SLT-YEL	40	
46	VIO-BLU	41	
21	BLU-VIO	42	
47	VIO-ORN	43	
22	ORN-VIO	44	
48	VIO-GRN	45	
23	GRN-VIO	46	
49	VIO-BRN	47	
24	BRN-VIO	48	
50	VIO-SLT	49	
25	SLT-VIO	50	

Table 3 13 CARD KSU P4 CONNECTIONS

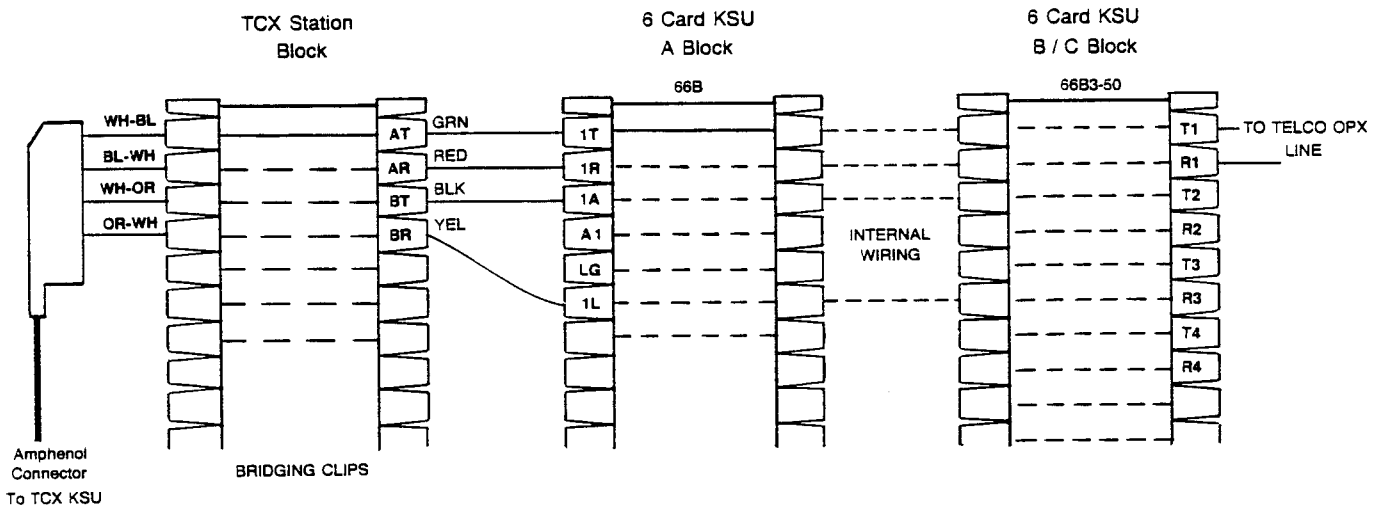

Figure 8: 6 CARD KSU CROSSCONNECTIONS

BLOCK A									
OPX NUMBER FROM SLU BLOCK	STATION CABLE	LEAD DESIGNATION	TERMINAL NUMBER	CLIP 1 *	2 *	3 *	4 *	5 *	6 **
STA. 1	GREEN	T	1						
	RED	R	2						
	BLACK	A	3						
		A1	4						
		LG.	5						
	YELLOW	L	6						
STA. 2	GREEN	T	7						
	RED	R	8						
	BLACK	A	9						
		A1	10						
		LG	11						
	YELLOW	L	12						
STA. 3	GREEN	T	13						
	RED	R	14						
	BLACK	A	15						
		A1	16						
		LG	17						
	YELLOW	L	18						
STA. 4	GREEN	T	19						
	RED	R	20						
	BLACK	A	21						
		A1	22						
		LG	23						
	YELLOW	L	24						
STA. 5	GREEN	T	25						
	RED	R	26						
	BLACK	A	27						
		A1	28						
		LG	29						
	YELLOW	L	30						
STA. 6	GREEN	T	31						
	RED	R	32						
	BLACK	A	33						
		A1	34						
		LG	35						
	YELLOW	L	36						
NOT APPLICABLE		T	37						
		R	38						
		T	39						
		R	40						
		LG	41						
		L	42						
		LG	43						
		L	44						
NOT APPLICABLE		B	45						
		R	46						
		B	47						
		R	48						
		B	49						
		R	50						

* Connect to clips as required.
** Pre-wiring is teminated on this clip, no additional wiring is required.

Table 4 6 CARD KSU A BLOCK CONNECTIONS

Crossconnections to 13 Card KSU

4.09 Connections from the TCX-128 8B-SLU-B are made via connectors P1 and P2. Plug a 25-pair cable into P1 (extensions 1-5) and P2 (extensions 6-8) connectors and punch down the free conductors according to standard telephony code on the two additional 66M1-50 blocks to be designated as a P1 and P2 block. Use quad wire to cross connect the TCX-128 station/OPX block to the P1 and P2 block (Tables 5, 6).

-*Cross connect the GRN lead to AR terminal on the station block to terminal 13 on the P1 Block.
-*Cross connect the RED lead to AT terminal on the station block to terminal 4 on the P1 Block.
-*Cross connect the YEL lead to BT terminal on the station block to terminal 8 on the P1 Plug.
-*Cross connect the BLK lead to BR terminal on the station block to terminal 25 on the P1 Plug.

NOTE: P3 requires no additional wiring.

4.10 Repeat the preceeding procedure for each OPX.

PCB Strapping

4.11 One 8B-SLU-B PCB is required to serve the maximum of eight extensions. The PCB must be strapped in the 1-2 position to indicate that single line telephones are used (Figure 9). The SLU PCB can be inserted on any station position in the TCX-128 main or expansion cabinet. However it is recommended that the PCB be inserted in positions J13, J12, J10, J9, or J8 in the main KSU or positions J16, J14, J13, J11, J10, or J9 in the expansion cabinet. This prevents cross connecting two station blocks to access the 8 OPXs.

4.12 The B-OPX-A PCB serves one Off Premises extension. It must be strapped for the desired ring mode. Strap E1 and E2 to provide the Norm ring mode (1 second on; 3 seconds off). Strap E2 and E3 to provide the Extend ring mode (2 seconds on; 2 seconds off) (Figure 10). An OPX with a longer loop may require the Extend strapping to ensure proper ring detection.

Connections to Telco

4.13 Each OPX requires one OPX line. Access to OPX lines are provided on the RJ21X connecting block with CO lines. The OPX line(s) is designated as 1LM. Plug a female ended 25-pair cable into the telco RJ21X. Punch down free connectors into a 66M1-50 connecting block to be designated as CO Line Interface Block.

Connect the 6 Card KSU to the OPX lines as follows (Table 2):

-*Cross connect terminals 25-36 in the C Block, depending on the number of OPX lines required, to the terminals for the OPX lines on the CO Line Interface Block.

25 Pair Cable		P1 Connector			Station Cable	Interconnect
Conn Pin	Color Code		Block Term.	Function	To Station Block	To Trunk Interface
26	WHT-BLU	OPX 1	1	OPX 1T		WHT-BLU
1	BLU-WHT		2	OPX 1R		BLU-WHT
27	WHT-ORN		3	CX T	GRN	
2	ORN-WHT		4	CX R	RED	
28	WHT-GRN		5	CX†	BLK	
3	GRN-WHT		6			
29	WHT-BRN		7			
4	BRN-WHT		8	CX†	YEL	
30	WHT-SLT		9			
5	SLT-WHT		10			
31	RED-BLU	OPX 2	11	OPX 2T		WHT-BLU
6	BLU-RED		12	OPX 2R		BLU-WHT
32	RED-ORN		13	CX T	GRN	
7	ORN-RED		14	CX R	RED	
33	RED-GRN		15	CX†	BLK	
8	GRN-RED		16			
34	RED-BRN		17			
9	BRN-RED		18	CX†	YEL	
35	RED-SLT		19			
10	SLT-RED		20			
36	BLK-BLU	OPX 3	21	OPX 3T		WHT-BLU
11	BLU-BLK		22	OPX 3R		BLU-WHT
37	BLK-ORN		23	CX T	GRN	
12	ORN-BLK		24	CX R	RED	
38	BLK-GRN		25	CX†	BLK	
13	GRN-BLK		26			
39	BLK-BRN		27			
14	BRN-BLK		28	CX†	YEL	
40	BLK-SLT		29			
15	SLT-BLK		30			
41	YEL-BLU	OPX 4	31	OPX 4T		WHT-BLU
16	BLU-YEL		32	OPX 4R		BLU-WHT
42	YEL-ORN		33	CX T	GRN	
17	ORN-YEL		34	CX R	RED	
43	YEL-GRN		35	CX†	BLK	
18	GRN-YEL		36			
44	YEL-BRN		37			
19	BRN-YEL		38	CX†	YEL	
45	YEL-SLT		39			
20	SLT-YEL		40			
46	VIO-BLU	OPX 5	41	OPX 5T		WHT-BLU
21	BLU-VIO		42	OPX 5R		BLU-WHT
47	VIO-ORN		43	CX T	GRN	
22	ORN-VIO		44	CX R	RED	
48	VIO-GRN		45	CX†	BLK	
23	GRN-VIO		46			
49	VIO-BRN		47			
24	BRN-VIO		48	CX†	YEL	
50	VIO-SLT		49			
25	SLT-VIO		50			

† Provides POWER/CONTROL signals to the electronic ringer.

Table 5 13 CARD KSU P1 CONNECTIONS

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25 Pair Cable		P2 Connector			Station Cable	Interconnect
Conn Pin	Color Code		Block Term.	Function	To Station Block	To Trunk Interface
26	WHT-BLU		1	OPX 6T		WHT-BLU
1	BLU-WHT		2	OPX 6R		BLU-WHT
27	WHT-ORN		3	CX T	GRN	
2	ORN-WHT		4	CX R	RED	
28	WHT-GRN		5	CX†	BLK	
3	GRN-WHT	OPX 6	6			
29	WHT-BRN		7			
4	BRN-WHT		8	CX†	YEL	
30	WHT-SLT		9			
5	SLT-WHT		10			
31	RED-BLU		11	OPX 7T		WHT-BLU
6	BLU-RED		12	OPX 7R		BLU-WHT
32	RED-ORN		13	CX T	GRN	
7	ORN-RED		14	CX R	RED	
33	RED-GRN		15	CX†	BLK	
8	GRN-RED	OPX 7	16			
34	RED-BRN		17			
9	BRN-RED		18	CX†	YEL	
35	RED-SLT		19			
10	SLT-RED		20			
36	BLK-BLU		21	OPX 8T		WHT-BLU
11	BLU-BLK		22	OPX 8R		BLU-WHT
37	BLK-ORN		23	CX T	GRN	
12	ORN-BLK		24	CX R	RED	
38	BLK-GRN		25	CX†	BLK	
13	GRN-BLK	OPX 8	26			
39	BLK-BRN		27			
14	BRN-BLK		28	CX†	YEL	
40	BLK-SLT		29			
15	SLT-BLK		30			
41	YEL-BLU		31			
16	BLU-YEL		32			
42	YEL-ORN		33			
17	ORN-YEL		34			
43	YEL-GRN		35			
18	GRN-YEL		36			
44	YEL-BRN		37			
19	BRN-YEL		38			
45	YEL-SLT		39			
20	SLT-YEL		40			
46	VIO-BLU		41			
21	BLU-VIO		42			
47	VIO-ORN		43			
22	ORN-VIO		44			
48	VIO-GRN		45			
23	GRN-VIO		46			
49	VIO-BRN		47			
24	BRN-VIO		48			
50	VIO-SLT		49			
25	SLT-VIO		50			

† Provides POWER/CONTROL signals to the electronic ringer.

Table 6 13 CARD KSU P2 CONNECTIONS

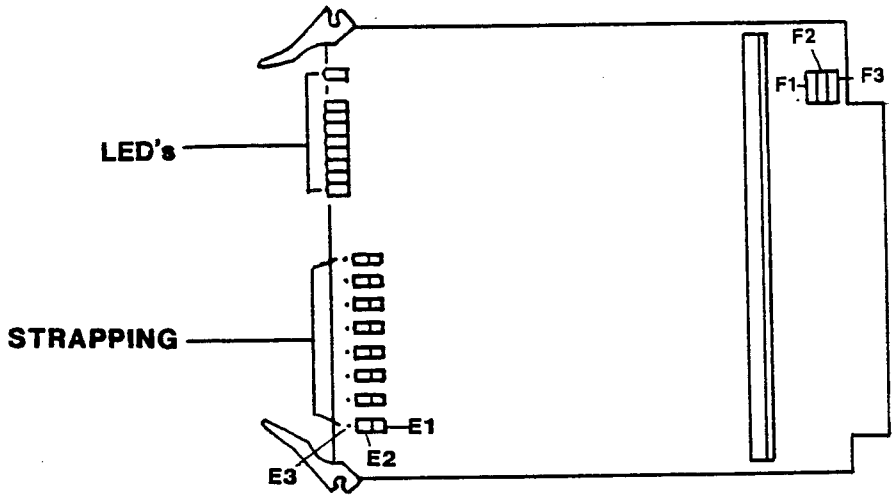

Figure 9 8B-SLU-B PCB

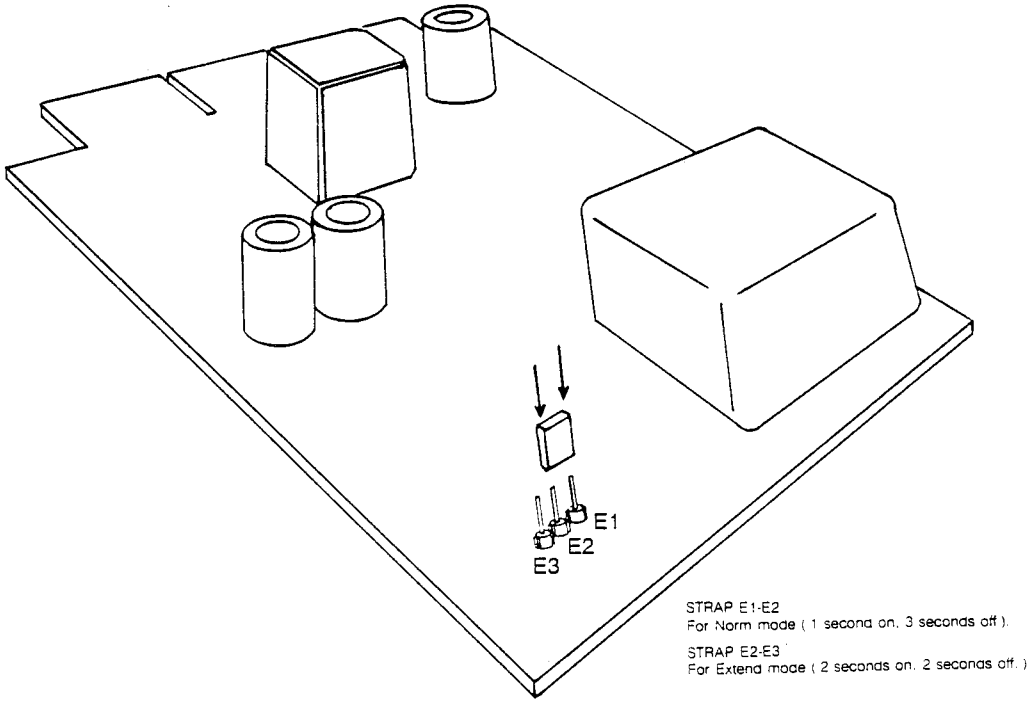

Figure 10 B-OPX-A PCB WITH STRAP OPTIONS

Connect the 13 Card KSU, depending on the number of OPX lines required, as follows (Tables 5, 6):

-*Cross connect terminals 1 and 2 for OPX line 1; 11 and 12 for OPX line 2; terminals 21 and 22 for OPX line 3; terminals 31 and 32 for OPX line 4; and terminals 41 and 42 for OPX line 5 on the P1 Block to the CO Line Interface Block.
-*Cross connect terminals 1 and 2 for OPX line 6; terminals 11 and 12 for OPX line 7; and terminals 21 and 22 for OPX line 8 on P2 Block to the CO Line Interface Block.

On Premises Extension

4.14 The same installation procedures are used when connecting an On Premises Extension (ONX). The telephone used as an ONX is connected to the terminals on the C block (or P1 and P2 block) that are normally connected to the CO Line Interface Block.

5. CIRCUIT DESCRIPTIONne

General

5.Ø1 An on-card voltage regulator provides 12 volts DC to power all logic circuits. OPX Tip and OPX Ring are protected by metal-oxide varistors (MOVs) against possible lightning strikes.

Refer to Figure 11 for electrical connections to OPX adaptor.

5.Ø2 Ring Equivalence Number (REN) considerations when connecting off-premise stations are provided in Figure 12.

Figure 12 shows the relationship between the ring enable signals found on one SLU card. The ring equivalence number (REN) of the station pairs shown (1 and 2), (3 and 4), (5 and 6), (7 and 8) must not exceed 5.ØB, when both stations in each pair be addressed to ring at the same time.

Call Originating

5.Ø3 When the OPX station connected to the adaptor is signaled by the TCX-128, the Ring Detect Circuit senses the change in DC voltage (from 24VDC to 9VDC) on the SLU Tip lead referenced to SLU BLK and generates a Ring Enable signal. The Ring Relay Drive Circuit uses this Enable signal to turn on the Ring Relay (RR). This relay applies GND to OPX Tip and ringing generator (9ØVAC @ 2ØHz) to OPX Ring. A strap option is provided for 2 modes of ringing: Norm (1 second on, 3 seconds off) or Extend (2 seconds on, 2 seconds off). This option is provided because 1 second may not be long enough for reliable ring detection by remote equipment on long loops. The ringing generator must be biased to -48 volts DC. When the called party goes off-hook, a DC current is generated. The Ring Trip Circuit senses this current and generates a Reset signal which shuts off the ring relay. The talk path is now established.

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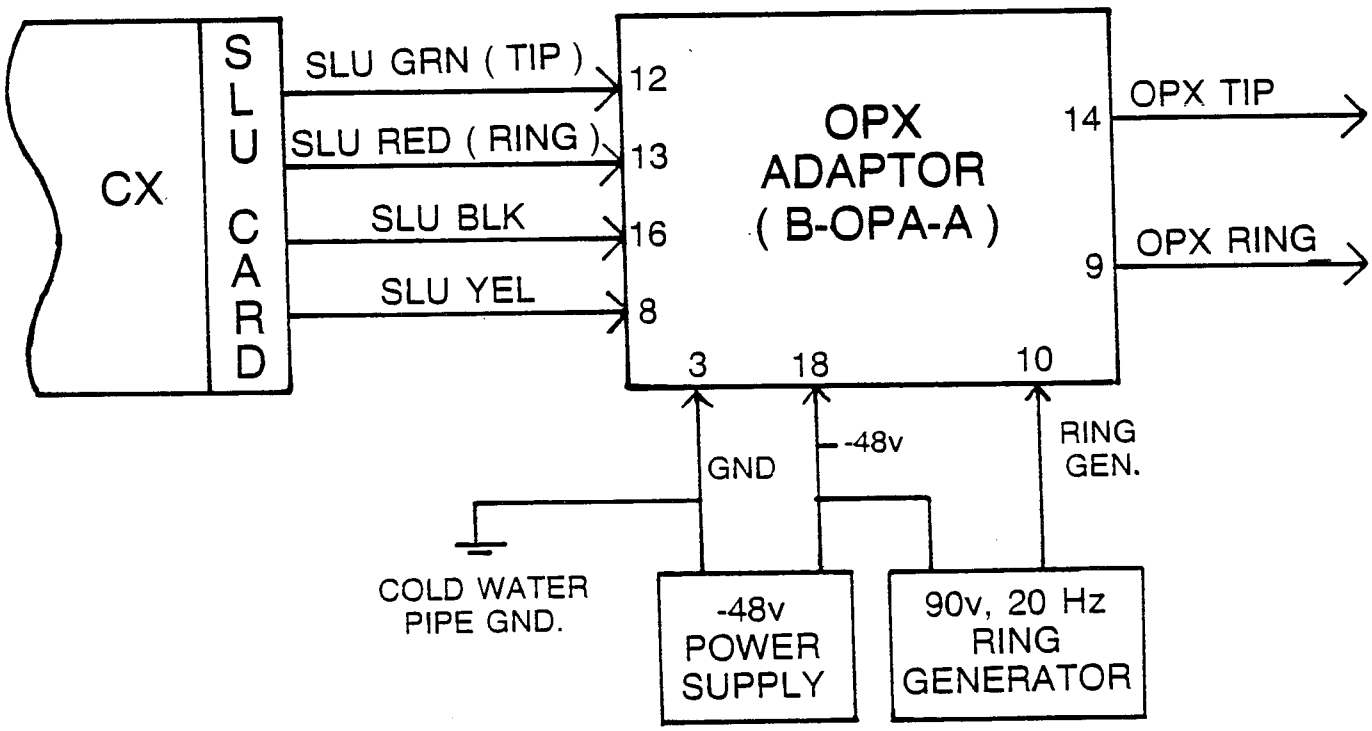

Figure 11 ELECTRICAL CONNECTIONS TO B-OPX-A PCB

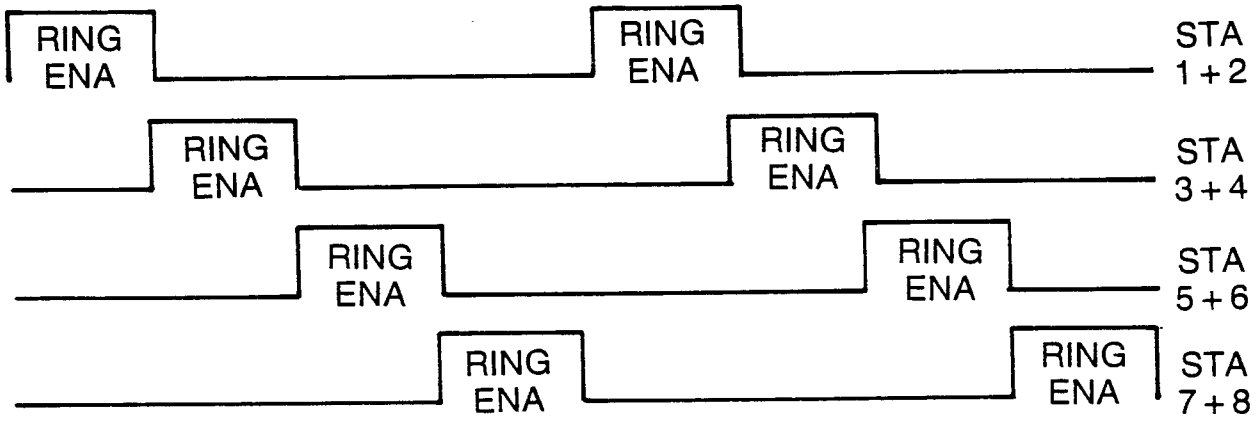

Figure 12 8B-SLU-B PCB RING ENABLE CYCLES

Call Answering

5.Ø4 When the OPX station goes off-hook, a DC current of at least 2Ømа flows through the battery-feed coil (T1) and the two resistors (Figure 13). This current is detected by the Loop-Current Detector. This detector closes a DC path across SLU Tip and SLU Ring. Current flows through this path and an off-hook condition is detected on the SLU card. TCX-128 ICM dial tone is heard at the OPX station.

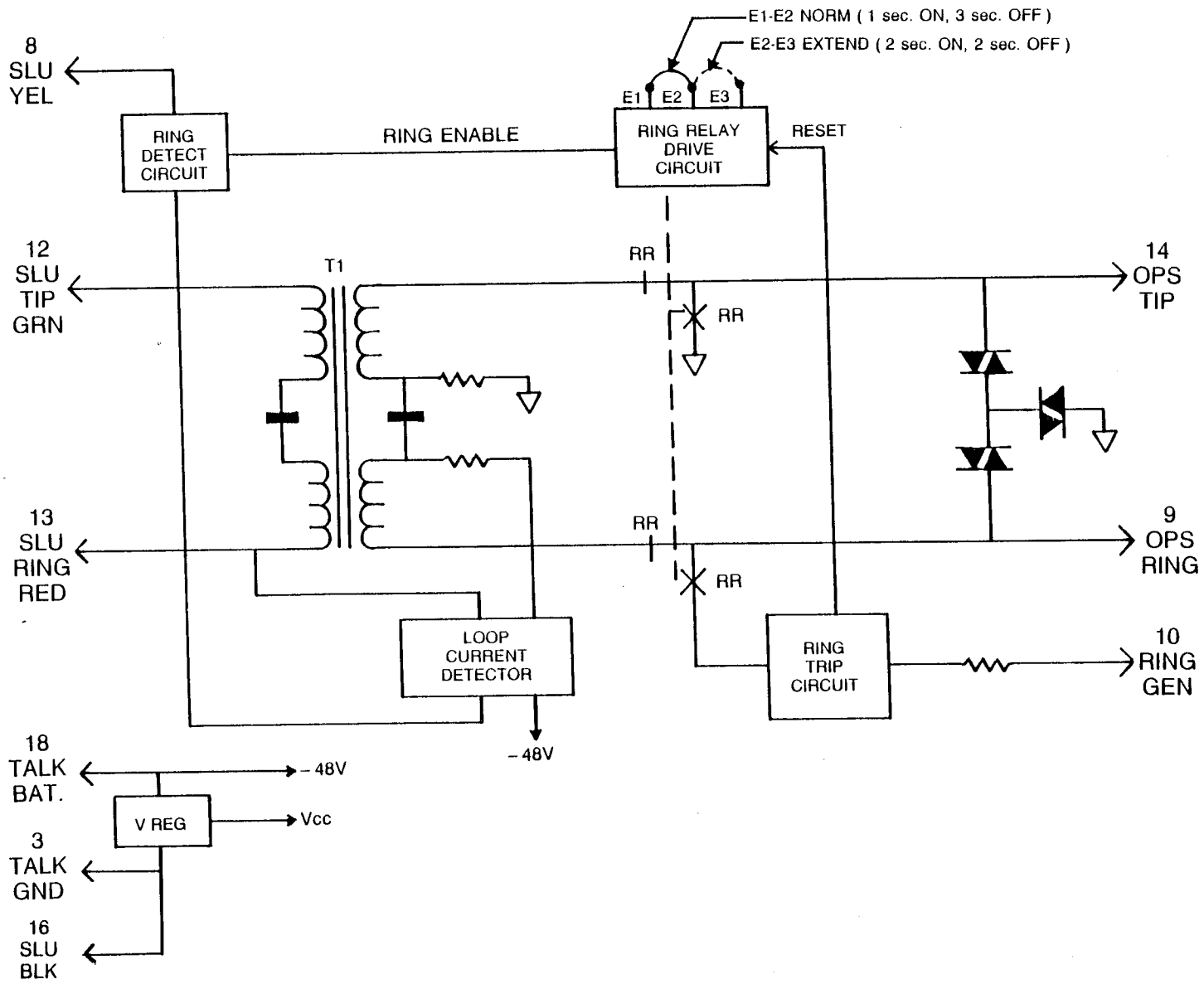

Figure 13 B-OPX-A PCB SCHEMATIC

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When problems or questions arise during installation or servicing that cannot be resolved using this or related documents, then contact TIE Technical Service Department as follows:

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