
Instruction Manual

TTP1 / TTP2 Tone Termination Panel

Board Assembly TTP2B Rev. A



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1.0 Specifications Subject to change without notice.

Power Requirements	+12 to +16 Vdc. 18 mA idle, 150 mA max.
Line Input/Output Impedance	600 ohms balanced
Notch Filter	2175 Hz down 50 dB from 1000 Hz reference.
Line Input Level (From Phone Lines)	-40 dBm to + 10 dBm (Function tone referenced)
Modulation Output Level (To mlc Input)	0 to 1.3 Vrms adj. into 600 ohms (with 0 dBm voice level on phone lines)
RX Input level (From Radio)	70 mVrms or greater to provide 0 dBm to phone line.
Line Output Level (To Phone lines)	+10 dBm max. Preset to 0 dBm
Size	5.5 in. L, 3 in. W, 1.25 in. H
Weight	1.6 lbs.
Connections	Modular to phone line, Screw terminals for radio connections.
Control tones	Guard Tone = 2175 Hz. for 140 mS. Function Tones Monitor = 2050 Hz. for 40 mS. F1 = 1950 Hz. for 40 mS. F2 = 1850 Hz. for 40 mS. (TTP2) Hold Tone =2175 Hz. for duration of PTT.
Control Outputs	PTT, Monitor and Frequency selection: Relay contacts rated 1 Amp @ 30 Vdc.

2.0 General Information

The CPI Communications TTP series tone termination panels provide a reliable means of interfacing a tone remote system to a two-way radio base station.

The TTP series can be used with any tone remote that use the industry standard EIA sequential tone format such as CPI's TR series remotes.

The TTP tone termination panels are available in the following variations, all of which provide PTT and monitor functions:

MODEL	DESCRIPTION
TTP1	Board only, provides PTT and monitor functions.
TTP2	Board only, provides PTT, F1/F2, and monitor functions.
-C	Metal enclosure. (For board assemblies TTP2A Rev. A and later)
-4W	Four wire operation.
-FD	Full duplex operation on four wires.

3.0 Installation

Connect the leased line, twisted-pair 600 ohm line, or microwave link to the TTP board via J2. (the RJ-11 jack)

Connect an external 12 to 16 volt semi-regulated DC power supply to J1 with the positive lead to J1-2 and the negative lead to J1-7.

Connect receive audio from the radio to J1-6. Receive audio output from the radio should be a source that is after the squelch circuit and not affected by the radio volume control adjustment. If such a point is not easily accessible you may use unsquelched audio and use the squelch circuit provided on the TTP.

Connect the radio microphone input to J1-1. If microphone input is high-impedance, shielded cable should be used and R12 on the TTP board should be removed.

Connect the monitor circuit of the radio to the TTP board using the form "C" relay contacts at J1-8, J1-9, and J1-10.

Connect the radio PTT line to the TTP using the contact provided at J1-4. Jumper J6 allows you to select "key to ground", by shorting pins 1 and 2 or "key to + Voltage", by shorting pins 2 and 3.

The TTP2 provides a form "C" set of latching relay contacts at J1-12, J1-13, and J1-14 for two channel frequency selection. The TTP1 does not provide these contacts.

4.0 Tuning

The TTP-Multifunction remote adapters have had the 2175 Hz notch and band pass filters and line balance adjustments set at the factory. These adjustments have been "painted", and should not require readjusting in the field.

If it does become necessary to "retune" the panel, the procedure is as follows.

- 1) Connect: Signal generator (600 ohm) set at 2175 Hz. 0 dBm to phone line (J2)
+12volts to J1- 2
Gnd to J1- 7
Scope probes to TP1 & TP2, set scope for X - Y mode.

- 2) Adjust R59 until signal on scope is in phase. (loop closes on scope)

- 3) Remove scope probe from test point 1 & 2. With scope in signal channel mode, connect one probe to TP3. Adjust R57 to obtain minimum signal on scope. Adjust R59 to further reduce signal level. Recheck R57 then R59. Notch will be approximately -58 dB.

- 4) Move scope probe to TP4. Adjust R58 to maximum signal on the scope. (This is the 2175 bandpass adjustment)

5) To set line balance, remove signal generator from phone line. Reconnect between GND and J1 - 6. Set generator for 1500 Hz. at 2 Vpp. Terminate J2 with a tone remote or other suitable 600 ohm load. Move scope probe to TP1, adjust R56 for minimum.

5.0 Level Adjustments

The following level adjustments are normally required only at the time of installation.

RX Audio Adjustment

R53 controls the RX audio level to the phone line. With the phone line connected at J2, connect an RMS voltmeter to the leads of L1 and L2. Unsquench the receiver so that continuous noise is present and adjust potentiometer R53 for 0 dBm or 0.8 Vrms on the meter. If additional gain is needed to achieve 0 dBm, move jumper J5 to short pins 2 and 3.

Line In Adjustment

The line input level is adjusted via R64. Adjustment should be made with the TTP connected to the phone line and a tone remote connected at the far end.

Follow the procedure for your remote to generate a constant function tone. Ideally the function tone will measure 0 dBm on the phone line at the remote site. The function tone level measured across the phone line at the TTP will usually be less than 0 dBm due to line loss.

With an RMS volt meter measure the signal level from test point one (TP1) of the TTP to ground. Adjust R64 for a reading of 460 mVrms (1.3 Vpp).

NOTE: If you are using the hold tone (low level guard tone) to make the adjustment, set R64 so that 46 mVrms (130 mVpp) is measured at TP1. If you are using the high level guard tone to make the adjustment, set R64 so that 1.49 Vrms (4.2 Vpp) is measured at TP1.

TX MOD Adjustment

This section assumes that each remote in the system has been set to provide an average voice audio level of 0 dBm measured at the remote.

Have someone at the remote control console depress and hold the PTT switch. With a voice coming from the remote, adjust R54 to provide proper transmitter deviation.

MONITOR Adjustment

The monitor function can be used in one of two modes:

a: Momentary mode: (J3 pins 2 and 3 shorted) - monitor relay energizes for 6 seconds (approx.), or until a PTT command is decoded, whichever comes first.

b: Latched mode: (J3 pins 1 and 2 shorted) - The monitor relay stays energized until a valid PTT command is decoded.

Note: Some radios require that the monitor circuit be activated while keying. This can be accomplished, on TTP PCB's by installing diode CR17.

1.7 PARTS LIST

Reference	Part Number	Value
Capacitors (all values in microfarads unless otherwise stated)		
C1,18,21,23,24,25,33	208-0092-104	.1 Mono-Ceramic dip
C2,6,22	208-4052-105	1 Electrolytic
C3	208-4042-475	4.7 Electrolytic
C4,5,7	208-0001-200	20 Pf Ceramic-Disc 50V
C8	208-0400-475	4.7 Tantalum 25V
C9,11,12,15	208-0071-103	.01 Mono-Ceramic NPO
C10	208-0071-222	2200 pf Mono-Ceramic dip
C13	208-0071-220	220 pf Mono-Ceramic dip
C14	208-0092-473	.047 Mono-Ceramic
C16,29,30	208-0092-103	.01 Mono-Ceramic
C17,26	208-2062-475	4.7 Electrolytic 100V
C19	208-2021-107	100 Electrolytic
C20	208-4022-106	10 Electrolytic
Diodes		
CR1,2,3,4,5,6,7,8,9,10,11,12,20	212-0001-001	1N4148
CR13,14	212-0100-008	1N4735A 6.2 Volt Zener 5%
CR16	212-0002-004	1N4004
Relays		
K1	230-0002-002	12V DPDT relay
K2,3	230-0001-002	PCB SPDT relay
Transistors		
Q1,2,3,4,5	240-2222-000	2N2222 NPN TRANSISTOR
Resistors		
R1,2,35,44,60,61,68,69,73	242-0001-472	4.7K 1/4W 5%
R3,7,8,33,67	242-0001-104	100K 1/4W 5%
R4	242-0001-222	2.2K 1/4W 5%
R5,10,29	242-0001-223	22K 1/4W 5%
R6,9,11,14,32,43	242-0001-105	1 M 1/4W 5%
R12,55	242-0001-621	620 1/4W 5%
R13,16,19,21,70	242-0001-473	47K 1/4W 5%
R15,45,46,49,63,66	242-0001-103	10K 1/4W 5%
R17,26	242-0001-102	1K 1/4W 5%
R18	242-0001-270	27 1/4W 5%
R25,71	242-0001-224	220K 1/4W 5%
R27	242-0001-124	120K 1/4W 5%
R28	242-0001-334	330K 1/4W 5%
R30	242-0001-562	5.6K 1/4W 5%
R31,65	242-0001-332	3.3K 1/4W 5%
R62	242-0001-822	8.2K 1/4W 5%
R20,23,24,38,39,48,50	242-0014-100	10K 1/4W 1%
R22,41	242-0013-732	7.32K 1/4W 1%
R34,40	242-0013-681	6.81K 1/4W 1%

1.7 PARTS LIST *continued*

Reference	Part Number	Value
R36,37	242-0015-200	200K 1/4W 1%
R42,47	242-0014-442	44.2K 1/4W 1%
R53	242-0101-103	10K Pot
R54,56	242-0101-253	25K Pot
R64	242-0106-104	100K Pot Log taper
R57,58,59	242-0104-102	1K Multi-turn Pot

Integrated Circuits

U1	425-1654-000	Microcontroller
U2	420-0555-000	LM555 Timer
U3	420-0324-000	LM324N Quad Op Amp
U4,5	420-3403-000	LF347N Quad Op Amp
U6	420-0358-000	LM358 Dual Op Amp
U7	420-2062-000	TLE2062 Dual Op Amp
U8	420-C272-000	TLC272 Dual Op Amp

Miscellaneous

L1, L2	232-0000-150	150 uH choke
V1,2	242-0119-330	MOV 26 volt ERZCKO5DK330
VR1	417-7805-001	78L05 5 volt regulator
T1	246-0100-003	Audio line transformer
Y1	258-0002-002	4mHz crystal
J1	248-0022-011	11 position modular terminal strip
J2	228-0040-006	6 position modular jack
J3,J4,J5,J6,J7	228-0003-004	3 pos Shunt plug

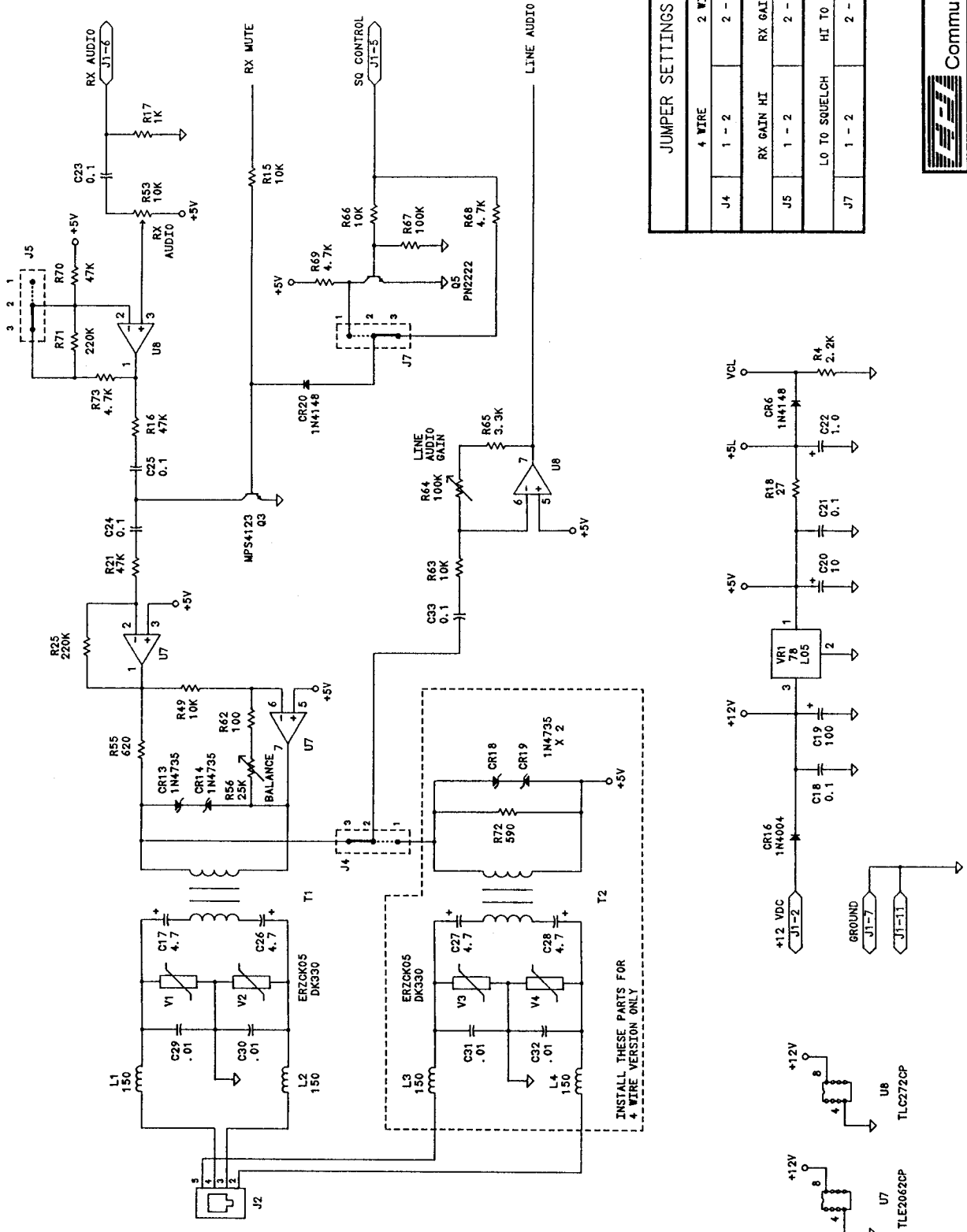
4 Wire Option

L3, L4	232-0000-150	150 uH choke
V3, V4	242-0119-330	MOV 26 volt ERZCKO5DK330
T2	246-0100-003	Audio line transformer
CR18,19	212-0100-008	1N4735A 6.2 Volt Zener 5%
C27, C28	208-2062-475	4.7 Electrolytic 100V
R72	242-0001-621	620 1/4W 5%

TTP1 / TTP2 Termination Panel Component Locations Assembly TTP2B Rev. A



8.0 Schematic



JUMPER SETTINGS			
4 WIRE	2 WIRE	2 WIRE	2 WIRE
J4	1 - 2	2 - 3	
J5	1 - 2	2 - 3	
J7	1 - 2	2 - 3	



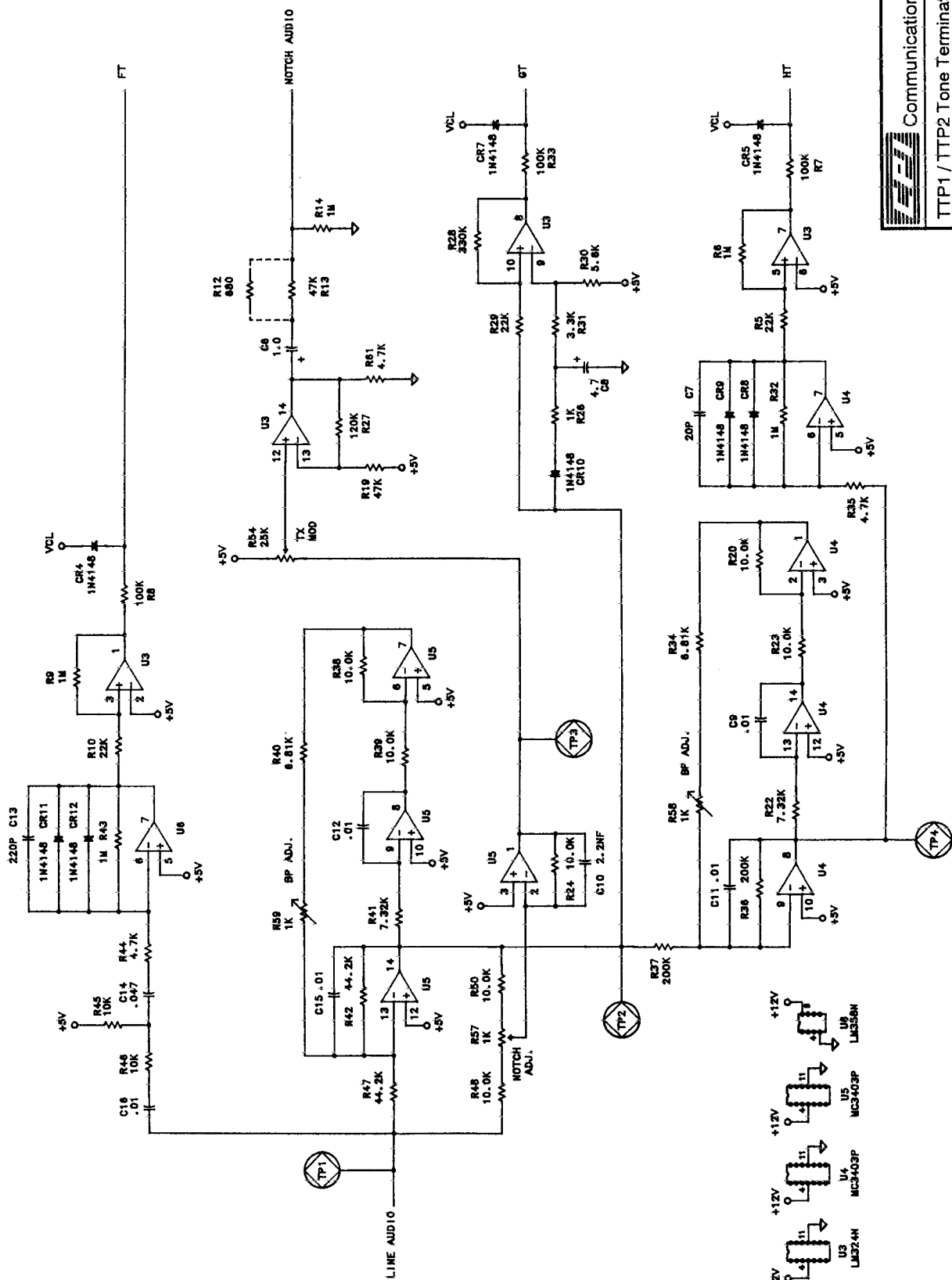
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TTP1 / TTP2 Tone Termination Panel

Schematic Diagram PCB Rev. 020698

Date: 5/1/96 Sheet 1 of 3

8.0 Schematic



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TTP1 / TTP2 Tone Termination Panel

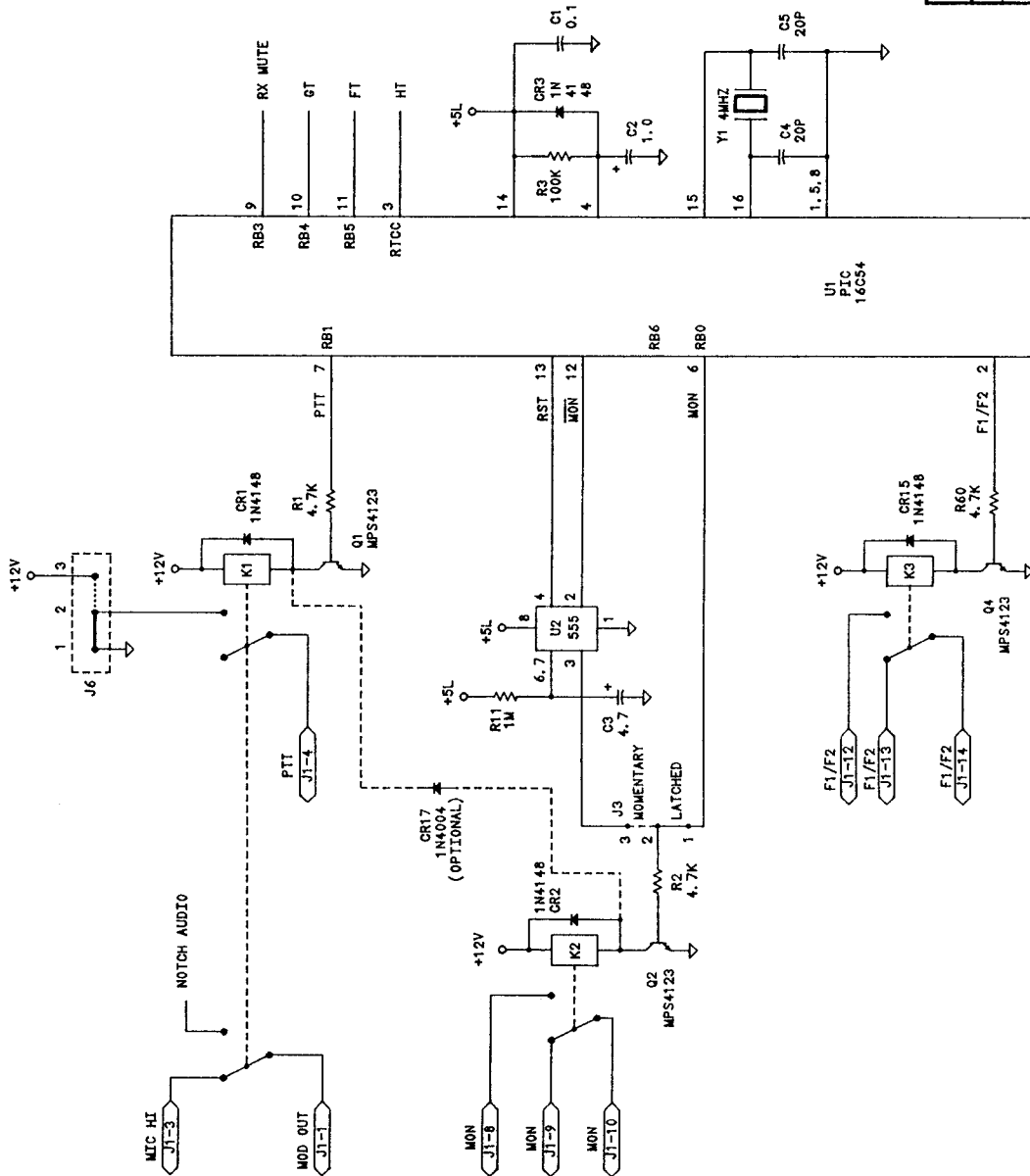
Schematic Diagram

PCB Rev. 020698

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8.0 Schematic



JUMPER SETTINGS		
KEY TO GND	KEY TO +12V	
J6	1 - 2	2 - 3



Communications, Inc.

TTP1 / TTP2 Tone Termination Panel

Schematic Diagram PCB Rev. 020698

Date: 5/1/98 Sheet 3 of 3

9.0 Warranty

CPI Communications, Inc. warrants each product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defects or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation use or service discloses such defects, provided the unit is delivered by the customer to our authorized service center intact, with all transportation charges pre paid within two years from date of shipment to the original purchaser. Exceptions are semiconductors which carry only the manufacturer's standard warranty and lamp indicators and fuses which are warranted to be operational when shipped from the factory. No credit will be given for unauthorized repair.

This warranty does not extend to any of our products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us nor extended to units which have been repaired or altered outside of our factory or authorized service center, nor to cases where the serial number thereof has been removed, defaced, or changed, nor to accessories used therewith not of our own manufacture, nor to finish or appearance items.

This warranty is in lieu of all other warranties expressed or implied and no person is authorized to assume for us any other liability in connection with the sale of our products.

Please Note: CPI products are not authorized for use in applications where nonperformance may be life threatening, or where substantial risk to life and property may be present, without express written consent of the president of CPI Communications, Inc. CPI Communications, Inc. shall never be liable for consequential or indirect damages.

Notes: