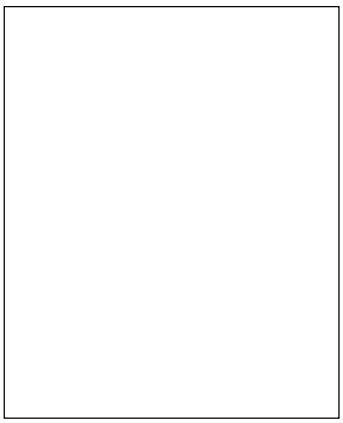
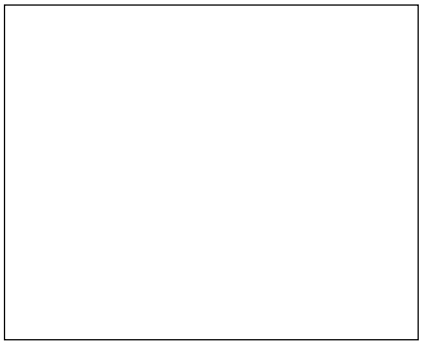
# Instruction Manual

## TR Series
## Tone Remotes

Rev. C



TR10



TR20

TR30

TR40

CPI Communications, Inc. • 1186 Commerce Drive • Richardson, TX 75081-2307
Phone (972) 437-5320 • WATS (800) 869-9128 • FAX (972) 437-5360

# CONTENTS

**Topic ..... Page #**



***SPECIFICATIONS*** Subject to change without notice.

| | |
|---|---|
| **Power Requirements** | 120 VAC, 60 Hz for wall pack (provided) operation<br>12 VDC to 16 VDC @ 600 mA maximum. Fused on circuit board. |
| **Dimensions** | 9" x 4" x 7" inches |
| **Weight** | TR10 - 5 lbs, TR20 - 5 lbs, TR30 - 5 lbs, TR40 - 5 lbs. |
| **Audio Output to Speaker** | 2 Watts at 3% THD into 8 ohms, using supplied wall pack or 12 VDC. |
| **Handset Earpiece Level** | Volume Control Adjustable. |
| **Frequency Response** | +/- 3dB from 300 to 3000 Hz, except at notch freq. 1000 Hz reference. |
| **Hum and Noise** | 50 dB below operating levels |
| **Notch Filter** | 2175 Hz down 50 dB from 1000 Hz reference level. |
| **Compression** | Less than 3 dB increase in output with 30 dB increase in input beyond threshold. Threshold is adjustable from -20 dBm to +10 dBm. |
| **Line Impedance** | 600 ohms or 5000 ohms, dip switch selectable. |
| **Line Output Level** | Factory set at 0 dBm. Adjustable to +10 dBm maximum. |
| **Control Tone Frequencies** | Security Tone: 2175 Hz +/- 0.01% @ +10 dBm for 140 mS.<br>Function Tone: F1 1950 Hz +/- 0.01% @ 0 dBm for 40 mS.<br>F2 1850 Hz +/- 0.01% @ 0 dBm for 40 mS.<br>Monitor Tone: 2050 Hz +/- 0.01% @ 0 dBm for 40 mS.<br>Hold Tone: 2175 Hz +/- 0.01% @ -20 dBm for duration of PTT. |
| **Operating Modes** | Standard: Two wire simplex<br>Optional: Two wire duplex, four wire simplex and four wire duplex. |

## *General Description*

The TR series tone remotes are designed to provide remote control of a conventional or trunked two way radio base station or repeater via a leased wire line, in-house twisted pair or RF link.

The TR series is available in four different housing configurations. They are: the TR10 telephone style unit with handset, the TR20 desktop console with desk microphone, the TR30 desktop console with built in electret condenser microphone and the TR40 desktop console with goose neck microphone.

Standard features on all TR models include front panel PTT switch, LED transmit indicator, monitor function, intercom function, two watt amplified speaker with volume control.

The TR10, 20, 30 and 40 may be wall mounted by ordering the -WM option. When wall mounting the TR20 please note, no provisions are made for mounting the desk microphone.

TR series units are normally powered by the supplied wall plug-in transformer. The may also be powered from a 12 volt DC source by removing the wall pack and making the appropriate DC connections to TB1.

## *Installation*

The TR series tone remotes will work with any remote system using the EIA standard tone control format. They are designed with protection against both power and telephone line surges. This protection circuitry requires a properly grounded AC outlet be used to power the wall pack. If the remote is to be powered directly from DC, a well grounded 12 to 16 volt DC supply is required.

**Phone lines** - The TR series is designed to work with a good quality leased voice grade pair (phone line) or in house twisted pair wiring.

**Parallel operation** - When several remote control units are connected in parallel the total system impedance will decrease to a point where operation is degraded. This occurs when three or more remotes are connected in parallel.

To compensate for this effect, TR series remotes provide a switch selectable 600 ohm or 5000 ohm impedeance. In parallel remote installations using the same phone line, dip switch 1 should be in the OFF position (5000 ohms), in all remotes except the last one in the chain. For multi-point installations using more than one phone line the above procedure applies to each phone line.

Up to ten TR series tone remotes may be connected in parallel. The maximum loss between any remote and the termination panel must not exceed 20db.

**Level Setting**

The following adjustments assume that the termination panel has been properly installed.

**Line Input** - The receive line input, R89, adjusts the audio level to the input of the compression amplifier circuitry. This allows the threshold of compression be adjusted from -20 dBm to +10 dBm.

While applying an RF signal modulated with a 1000 Hz tone at 60% system deviation to base station receiver, adjust the termination panel line output control for 0 dbm to the phone line. Adjust each remote as follows:

a. Connect a scope or analog AC volt meter to ground and pin 14 of U2.

b. With R89 fully clockwise, adjust in a counter-clockwise direction until the AC voltage level on scope (approx. 1V peak to peak) or meter (approx. 360 mVrms) just stops increasing. This point is the threshold of compression.

c. Remove the RF Signal from the base station.

**Line Out** - This level is preset at the factory for 0 dbm out to the phone line and may not require readjustment at installation. If needed, the procedure is as follows:

1. With the handset off-hook, if applicable, depress the intercom switch and adjust the mod out pot (R63) while speaking in a normal voice until 0 dbm is measured across the phone line at the termination panel.

2. Move dip switch 7 to the on position and key the remote. Adjust R80 (Tone Level) until the 1950Hz function tone measures 0 dBm across the phone line at the termination panel.

**Notch filter** - The 2175 Hz notch filter is factory tuned and should not need readjustment except in the event of repair. Adjustment procedure is as follows:

a. Apply a 0 dBm, 2.2Vpp, 2175 Hz signal across the red and green phone line inputs.

b. Using a dual channel scope in the X-Y mode, connect one probe to pin 14 of U2, the other to pin 8 of U3.

c. Adjust R39 until the lissajous pattern on the screen closes to a flat line. Remove probes.

d. With the scope in the single channel mode, connect probe to pin 14 of U3. Adjust R38 to obtain minimum signal

level on the scope. Readjust R39 slightly to further reduce signal level. Recheck R38 then R39. Notch will be approximately 58 dB deep.

**Microphone Sensitivity** - R75 controls the microphone audio level into the transmit compression circuit and therefore acts as a sensitivity control. This potentiometer has been factory set to provide adequate compression for normal voice audio with a relatively quiet background noise level.

### *Jumper Settings*

The TR series circuit board has 9 "Dot" jumpers. These jumpers are "in" if there is a solder short across it and "out" if there is not. Table 1 lists the jumpers by number and explains their function. Factory settings are underlined.

**Table 1**

### *Dip Switch Settings*

Table 2 describes the functions provided by the dip switch on the bottom of the unit. The factory setting are underlined.

| JP# | IN | OUT |
|---|---|---|
| 1 | For 2 wire operation. | For 4 Wire or FD operation. |
| 2 | For 4 Wire or FD operation. | For 2 wire operation. |
| 3 | For 2 wire operation. | For 4 Wire or FD operation. |
| 4 | For FD operation. | For Non-FD operation. |
| 5 | For FD operation. | For Non-FD operation. |
| 6 | Normal boom/panel mic gain. | Increased boom/panel mic gain. |
| 7 | Three to ten frequency models. | One and two frequency models. |
| 8 | Three to ten frequency models. | One and two frequency models. |
| 9 | Three to ten frequency models. | One and two frequency models. |

**Table 2**

| Switch # | ON | OFF |
|---|---|---|
| 1 | 600 ohm termination | 5000 ohm termination |
| 2 | TR 10 (Does not affect TR30 or TR40) | TR20 (Does not affect TR30 or TR40) |
| 3 | TR30 or TR40 | TR10 or TR20 |
| 4 | TR20 | TR10, TR30 or TR40 |
| 5 | Allows volume to be turned down completely. | Prevents volume from being turned down completely. |
| 6 | TR20, TR30 or TR40 - SPKR always ON | TR10 - SPKR mute with handset off-hook |
| 7 | Locks up function tone (0 dBm) | Normal operation |
| 8 | Disables tone attenuation (All tones at +10 dBM) | Normal operation |

## Circuit Analysis

**Receive Audio Path**

Receive audio from the phone line enters through transformer T1. The control for Receive line input, R89, adjusts the signal level passed to the remaining receive audio circuitry. This signal is coupled through audio gate U9-B to the compression amplifier formed by U2-A, B and C. The compression amplifier operates by sampling the output of U2-C through C5 and R32 and then rectifying it with D1 and D2. The rectified DC voltage, which varies as the receive audio level varies, controls the impedance of Q2. The varying impedance of Q2 controls the signal level input to U2-B. C6 and R8 control the compressor attack and decay time. U2D and it's associated circuitry form a high pass audio filter which reduces 60 Hz components by as much as 40 db.

The compressor output is passed to the notch filter through R19. The notch filter is made up of U3, sections A, B, C and D, and their associated components. It is tuned to the notch frequency by adjusting R39 and R38. When properly tuned, the 2175 Hz component of the audio signal is reduced by as much as 50 db. The output of the notch is passed to the front panel volume control through audio gate U9-A. Padded output audio is gated through U6-C to the receive audio amplifiers U4 and U5. Low level audio for the handset earpiece is provided by U7-D and adjusted by R96. It is then gated through U6-B, buffered by U7-C and sent to the handset.

**Transmit Audio Path**

Mic level audio is fed to preamp U7-A or U7-B, depending on which mic is used. Preamplified transmit audio is routed through audio gate U6-A or U6-D, depending on which mic is used, to the mic level adjustment R75. R75 sets the signal level passed to the compression amplifier formed by U2. The compression amplifier operates by sampling the output of U2-C through R32 and C5 and then rectifying it with D1 and D2. The rectified DC voltage, which varies as the transmit audio level varies, controls the impedance of Q2. The varying impedance of Q2 controls the signal level input to U2-B. C6 and R8 control the compressor attack and decay time. U2-D and it's associated circuitry form a high pass audio filter which reduces 60 Hz components by as much as 40 dB.

The compressor output is passed to the notch filter through R19. The notch filter is made up of U3, sections A, B, C and D, and their associated components. It is tuned to the notch frequency by adjusting R39 and R38. When properly tuned, the 2175 Hz component of the audio signal is reduced by as much as 50 db. The output of the notch is gated through U9-D and fed to the phone line driver circuit of U10-A and U10-C. U10-A and U10-C form a push-pull amplifier to drive transformer T1.

**Transmit Mode**

When the PTT line is grounded, pin 24 of U17 senses the ground and provides timed logic high outputs from pins 10 and 11 enabling audio gates U11-B and U11-C. U12 simultaneously passes a 16 bit digital word to the monolithic sine wave generator U12 determining the frequency to be output to control tone amplifier U13. The control tone amplification is adjusted by R80. Amplified control tones from U13-B are fed to the phone line driver circuit of U10-A and U10-C. U10-A and U10-C form a push-pull amplifier to drive transformer T1. Simultaneously, pins 12, 13 and 14 of U17 are manipulated to control transmit and receive audio gating through control lines 1, 2 and 3.

## Parts List
## TR Series main PCB #700-DRBB-200 Rev. B

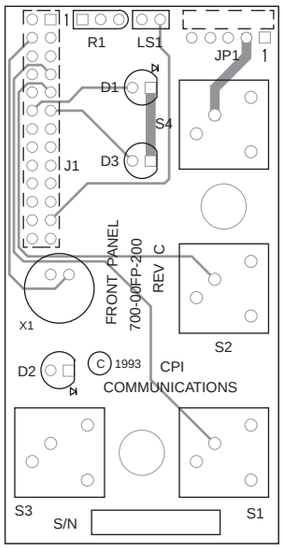
| Reference | Description | CPI Part # |
|---|---|---|
| **CAPACITORS** | | |
| C5, 6 | 1uF Elec Rad | 208-4052-105 |
| C7,14,27,37,39,40,44,48,53,60 | .1uF Mono Cer Dip | 208-0092-104 |
| C8 | 470pF Cer Disc | 208-0002-471 |
| C9 | .47uF Elec Rad | 208-4052-474 |

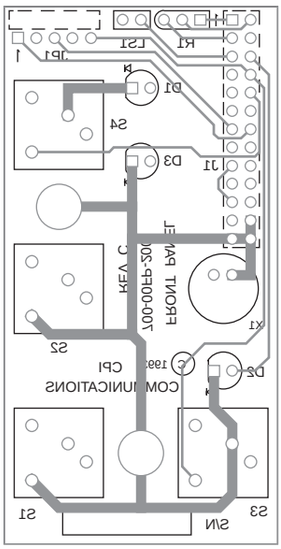
| Reference | Description | CPI Part # |
|---|---|---|
| C10,11 | .01uF 1% Mono Cer Dip | 208-0071-103 |
| C12,28,45,46 | 220uF Elec Rad | 208-2021-227 |
| C13,17 | 4.7uF Elec Rad | 208-4042-475 |
| C15,16,41,55,56,59,65,67 | .1uF Mono Cer Dip | 208-0092-103 |
| C22,23,24,54 | .033uF Met Mylar | 208-0212-333 |
| C25 | 2200pF | 208-0071-103 |
| C26 | 220uF Elec Rad NP | 208-2031-227 |
| C32,33 | 4.7uF Elec Rad | 208-2062-475 |
| C36,50,52,57 | 100uF Elec Rad | 208-2021-107 |
| C38 | 22uF Elec Rad | 208-2022-226 |
| C42 | 47pF Mono Cer Dip | 208-0071-470 |
| C43 | 180pF Mono Cer Dip | 208-0071-181 |
| C47 | 1000uF Elec Rad | 208-2031-108 |
| C49,51,58 | 2.2uF Elec Rad | 208-4052-225 |
| C61,62 | 20pF Cer Disc | 208-0001-200 |
| C63 | 10pF Cer Disc | 208-0001-106 |
| **DIODES** | | |
| D1,2,12 | 1N4148 | 212-0001-001 |
| D7 | 1N4746 | 212-0100-019 |
| D8,9,10,11 | 1N4004 | 212-0002-004 |
| D13 | 1N4935A | 212-0100-008 |
| **TRANSISTORS** | | |
| Q2,10,11 | 2N2222 NPN | 240-2222-000 |
| Q4 | MJE521 NPN | 212-0001-002 |
| Q5,6,7,8,9 | 2N2907 PNP | 242-2907-000 |
| **RESISTORS** | | |
| R7,32,36,49,82,97,102,119,123,125 | 1K 1/4W 5% | 242-0001-102 |
| R8 | 1.8M 1/4W 5% | 242-0001-185 |
| R9,11,35,37,69,77,78,79,81,95,103,104, 106,115,116,120 | 10K 1/4W 5% | 242-0001-103 |
| R10,20,23,34,42,71,100,105,109 | 100K 1/4W 5% | 242-0001-104 |
| R12,14,17,18 | 10.0K 1/4W 1% | 242-0014-100 |
| R13 | 6.81K 1/4W 1% | 242-0013-681 |
| R15,74 | 7.32K 1/4W 1% | 242-0013-732 |
| R16,19 | 44.2K 1/4W 1% | 242-0014-442 |
| R21 | 22K 1/4W 5% | 242-0001-223 |
| R30 | 6.8K 1/4W 5% | 242-0001-682 |
| R31 | 220K 1/4W 5% | 242-0001-224 |
| R33 | 1.2K 1/4W 5% | 242-0001-122 |
| R40,70 | 3.9K 1/4W 5% | 242-0001-392 |
| R41,43,44,111 | 2.7 1/4W 5% | 242-0001-027 |
| R47 | 560K 1/4W 5% | 242-0001-564 |
| R64 | 5.1K 1/4W 5% | 242-0001-512 |
| R65,62,86 | 27K 1/4W 5% | 242-0001-273 |
| R66,67 | 68K 1/4W 5% | 242-0001-683 |
| R68,73 | 100 1/4W 5% | 242-0001-101 |
| R72,84,126,127 | 18K 1/4W 5% | 242-0001-183 |
| R74 | 1M 1/4W 5% | 242-0001-105 |
| R83 | 150K 1/4W 5% | 242-0001-154 |
| R85 | 62K 1/4W 5% | 242-0001-623 |
| R87,88 | 620 1/4W 5% | 242-0001-621 |
| R90 | 220 1/4W 5% | 242-0001-221 |
| R91 | 17.4K 1/4W 1% | 242-0014-174 |

| Reference | Description | CPI Part # |
|---|---|---|
| R92 | 3.3K 1/4W 5% | 242-0001-332 |
| R93 | 240K 1/4W 1% | 242-0015-240 |
| R98,99,110,122,124 | 47K 1/4W 5% | 242-0001-473 |
| R107,108,113,114 | 120K 1/4W 5% | 242-0001-124 |
| R112 | 39K 1/4W 5% | 242-0001-393 |
| R117 | 200K 1/4W 5% | 242-0001-204 |
| R118 | 82K 1/4W 5% | 242-0001-823 |
| R121 | 12K 1/4W 5% | 242-0001-123 |
| R128 | 4.7K 1/4W 5% | 242-0001-472 |
| RN1 | Resistor Network 100K x 9 | 242-0117-104 |
| **POTENTIOMETERS** | | |
| R38,39 | 1K Multi-turn Vert Adj | 242-0104-102 |
| R63 | 250K Single turn Vert Adj | 242-0101-254 |
| R75 | 5K Single turn Vert Adj | 242-0101-502 |
| R76,89,96 | 25K Single turn Vert Adj | 242-0101-253 |
| R80 | 10K Single turn Vert Adj | 242-0101-103 |
| **INTEGRATED CIRCUITS** | | |
| U2,3,7,10,13,14 | Quad Bi-FET Op Amp | 420-L347-000 |
| U4,5 | Audio Power Amp | 420-0380-000 |
| U6,9,11 | Quad Bilateral Switch | 420-4066-000 |
| U12 | Tone Generator | 420-2035-000 |
| U15 | Quad Low Power Op Amp | 420-0324-000 |
| U16 | Under Voltage Sensor | 425-7757-000 |
| U17 | Micro-Controller | 425-1655-000 |
| **MISC.** | | |
| J2 (TR10) | Handset Jack | 228-0041-010 |
| J2 (TR20) | Desk Mic Jack | 228-0041-186 |
| J3 | Mod Jack Bottom Entry | 228-0041-026 |
| J4 | Header Shrouded 26 Position | 228-0101-001 |
| L1, L2, L3, L4 | 150uH Choke | 232-0000-150 |
| V1, V2, V3, V4 | MOV ERZC05DK 330 26V | 242-0119-241 |
| S1 (TR10) | Hook Switch | 244-0100-009 |
| S2 | 8Position Dip Switch | 244-0002-008 |
| T1 | Transformer Audio 600:600 | 246-0100-003 |
| Y1 | Crystal 4Mhz | 258-0002-002 |
| **TR series Top PCB #700-00FP-200 revision C** | | |
| D1,D3 | LED Green Dot | 214-0005-002 |
| D2 | LED Red Dot | 214-0003-001 |
| R1 | 10K Volume Pot | 242-0115-103 |
| LS1 | 8 Ohm Oval | 234-0001-004 |
| S1,S2,S4 | Push Button Switch, Black | 244-0030-000 |
| S3 | Push Button Switch, Red | 244-0030-002 |
| X1 (DR10 & DR30) | Electret Microphone | 234-0002-004 |
| X1 (DR40) | Gooseneck Microphone | 234-0003-003 |
| | 26 position cable assembly | 600-0TSR-025 |

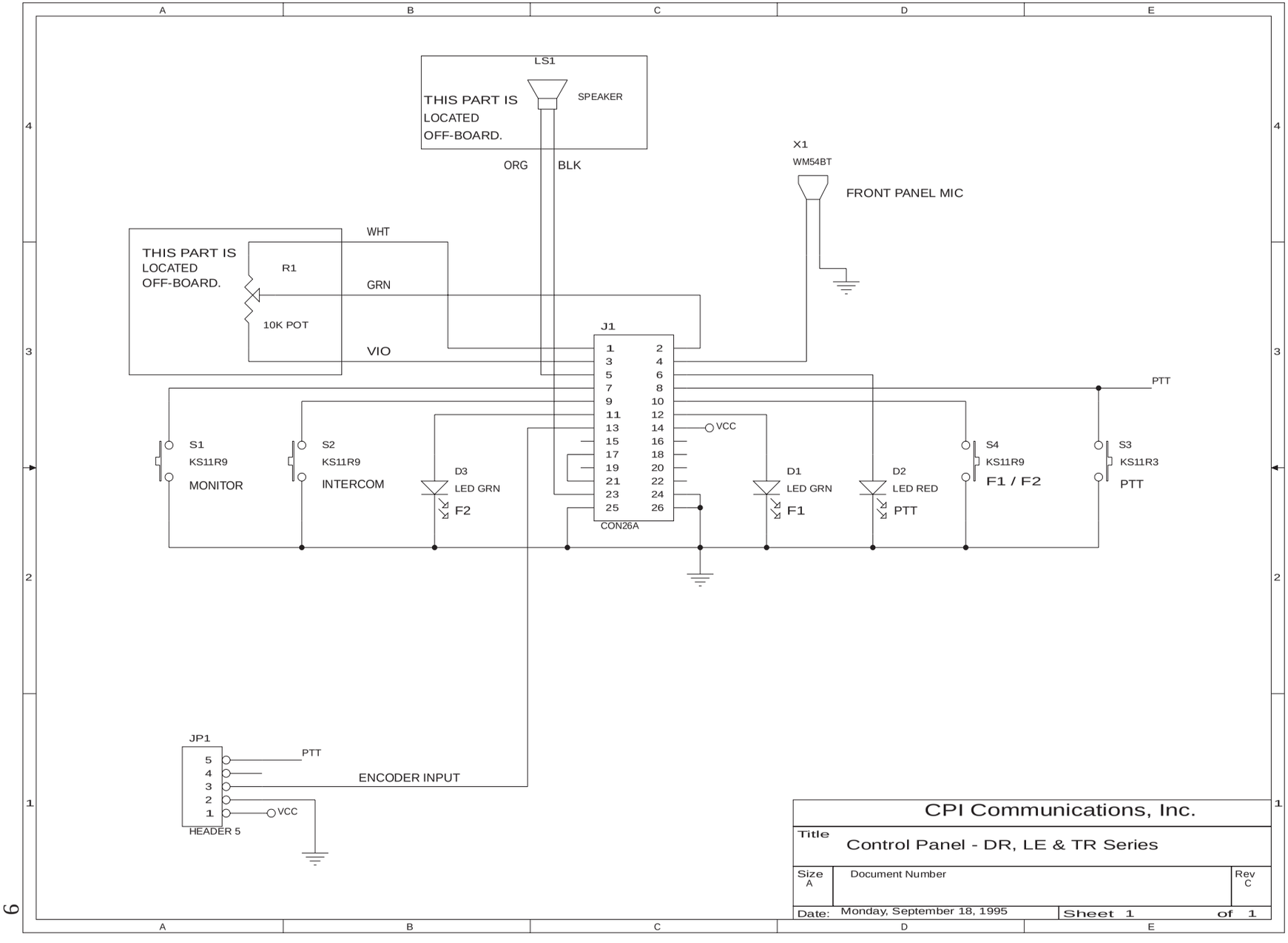
***PCB View - Control Panel #700-00FP-200***

Component Side



Solder Side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FRONT PANEL MIC
THIS PART IS LOCATED OFF-BOARD.
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WHT
GRN
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J1
CON26A
PTT
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S2
KS11R9
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F1
D2
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ENCODER INPUT
VCC
CPI Communications, Inc.
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Size A
Document Number
Rev C
Date: Monday, September 18, 1995
Sheet 1 of 1

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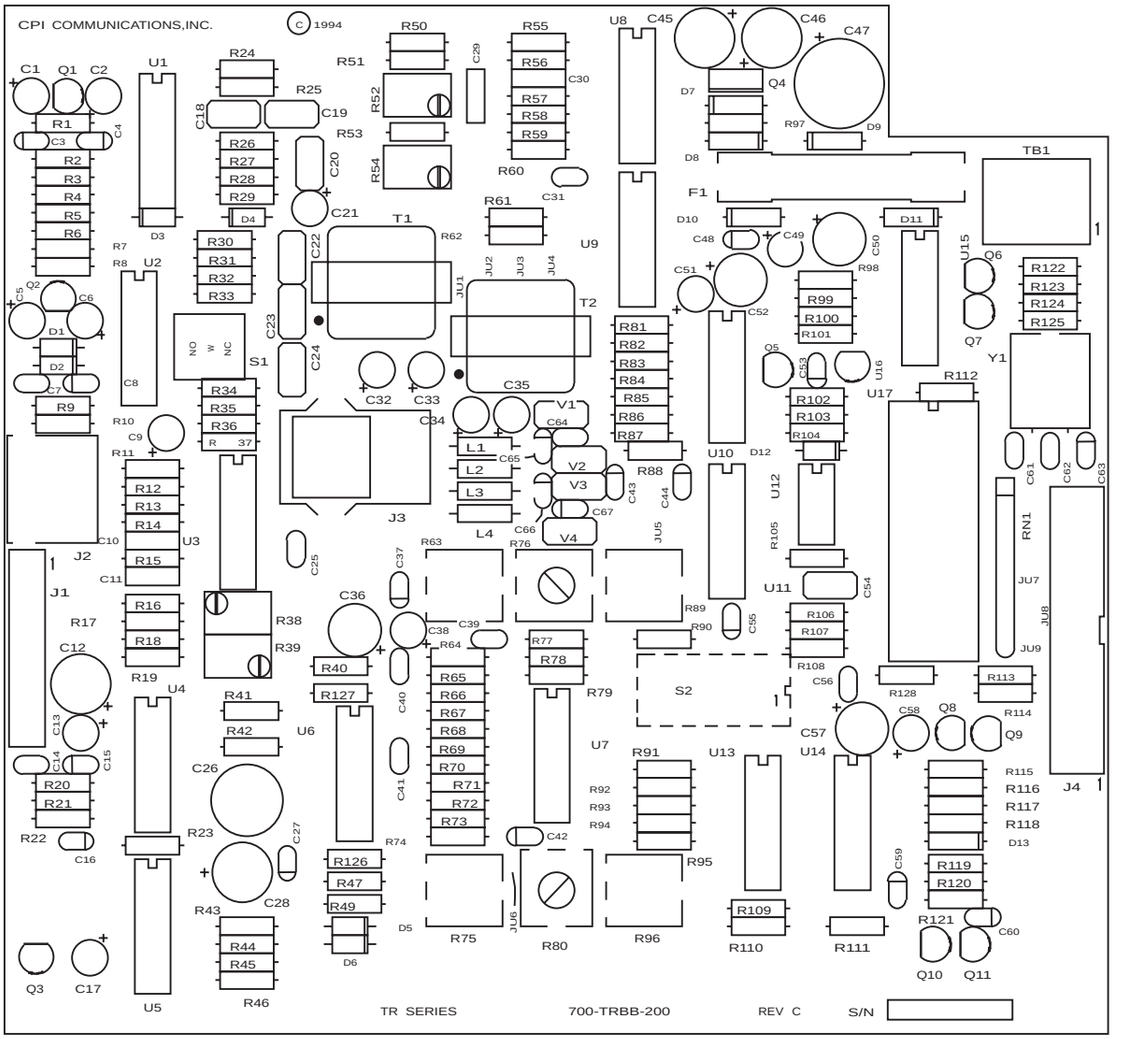

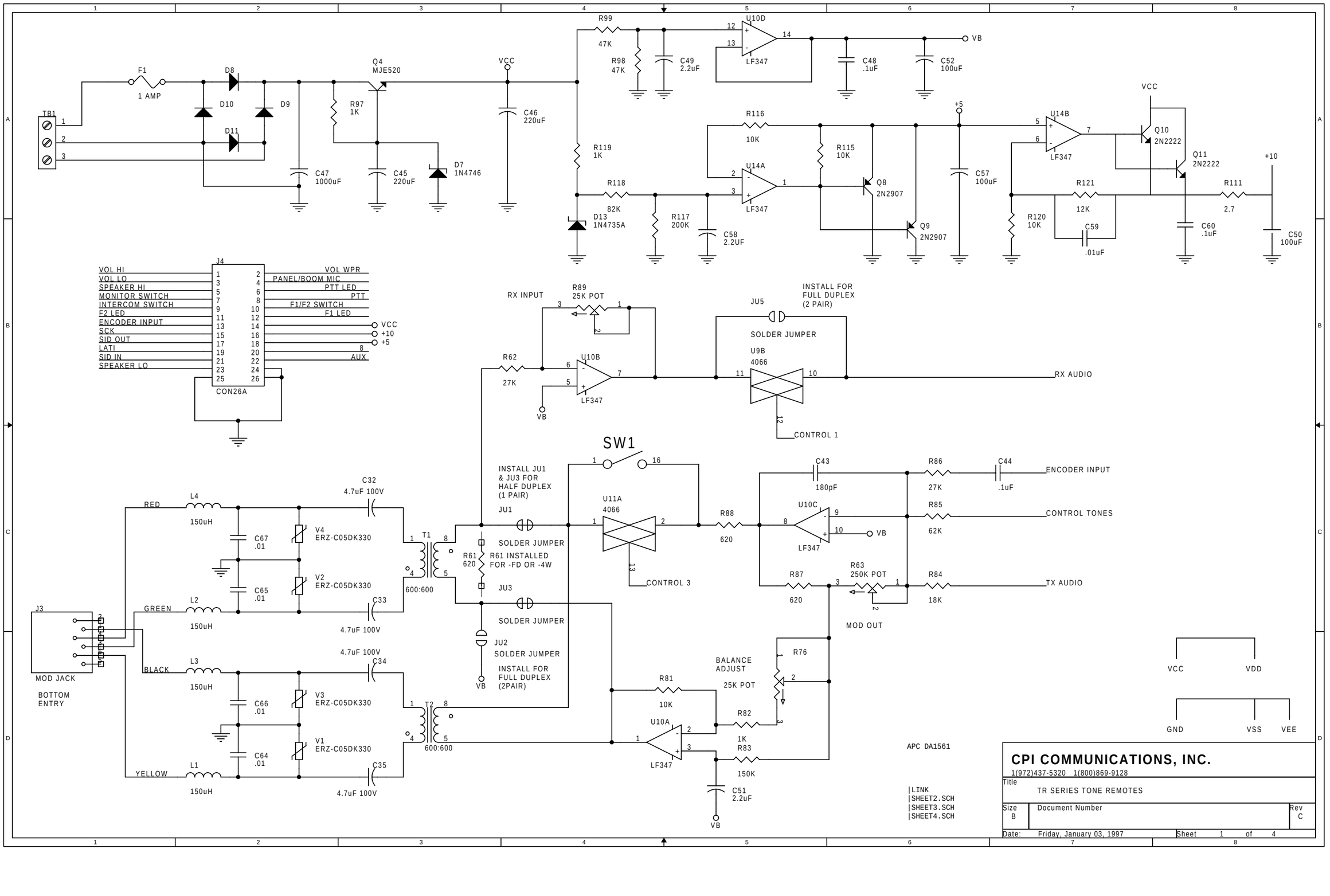
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VOL LO
SPEAKER HI
MONITOR SWITCH
INTERCOM SWITCH
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ENCODER INPUT
SCK
SID OUT
LATI
SID IN
SPEAKER LO
VOL WPR
PANEL/BOOM MIC
PTT LED
PTT
F1/F2 SWITCH
F1 LED
VCC
+10
+5
AUX
CON26A
RX INPUT
R89
25K POT
R62
27K
U10B
LF347
VB
JU5
INSTALL FOR
FULL DUPLEX
(2 PAIR)
SOLDER JUMPER
U9B
4066
RX AUDIO
CONTROL 1
SW1
INSTALL JU1
& JU3 FOR
HALF DUPLEX
(1 PAIR)
JU1
SOLDER JUMPER
R61
620
R61 INSTALLED
FOR -FD OR -4W
JU3
SOLDER JUMPER
JU2
SOLDER JUMPER
INSTALL FOR
FULL DUPLEX
(2PAIR)
VB
U11A
4066
CONTROL 3
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620
C43
180pF
R86
27K
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.1uF
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CONTROL TONES
R87
620
R63
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R84
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L3
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R83
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U10A
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|SHEET3.SCH
|SHEET4.SCH
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VSS
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CPI COMMUNICATIONS, INC.
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Size
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Document Number
Rev
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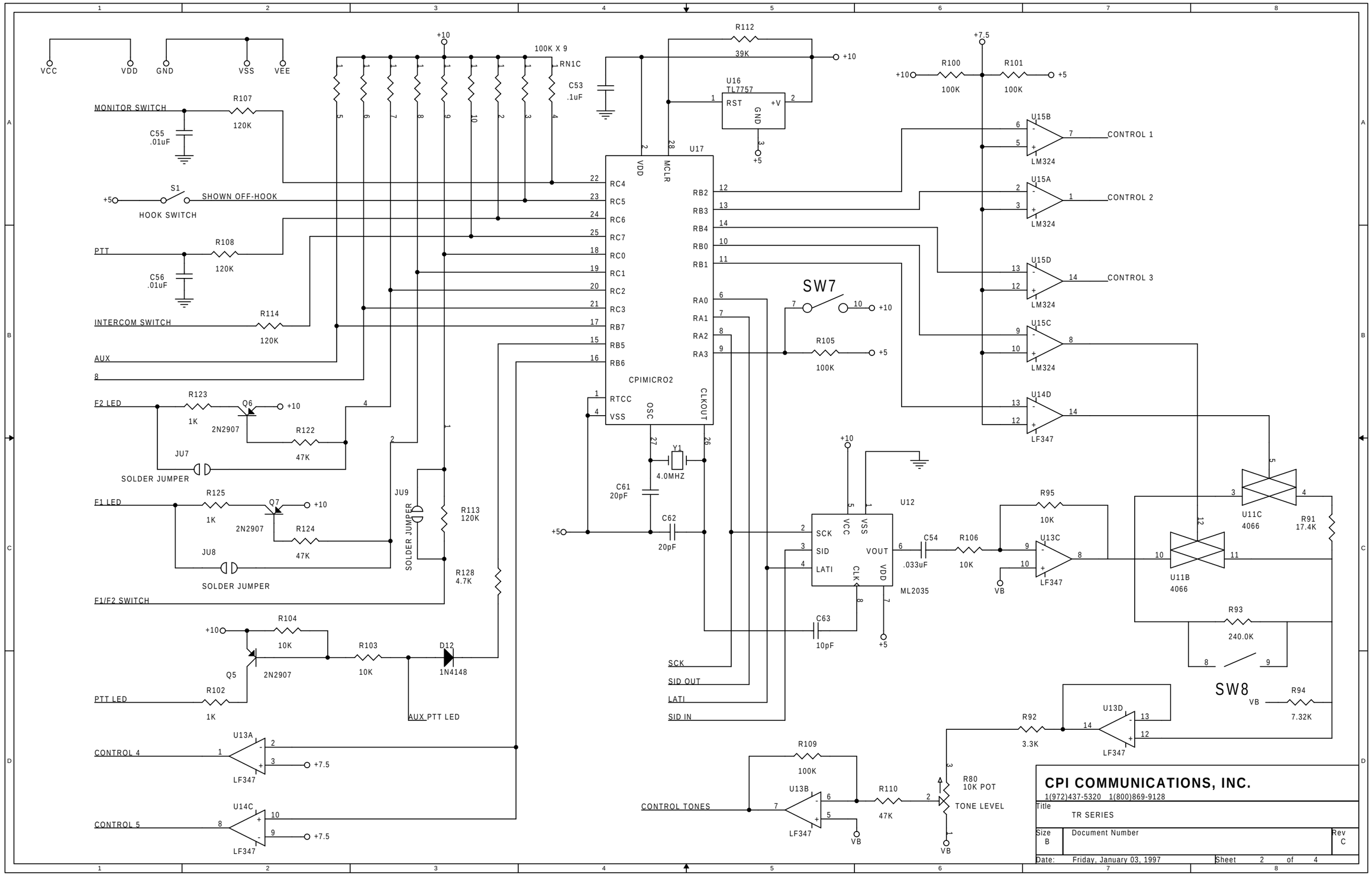
Sheet 1 of 4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R112
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U16
TL7757
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+V
GND
+7.5
R100
100K
R101
100K
+5
MONITOR SWITCH
R107
120K
C55
.01uF
S1
SHOWN OFF-HOOK
HOOK SWITCH
PTT
R108
120K
C56
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R114
120K
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VDD
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RC4
RC5
RC6
RC7
RC0
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RB7
RB5
RB6
RB2
RB3
RB4
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RB1
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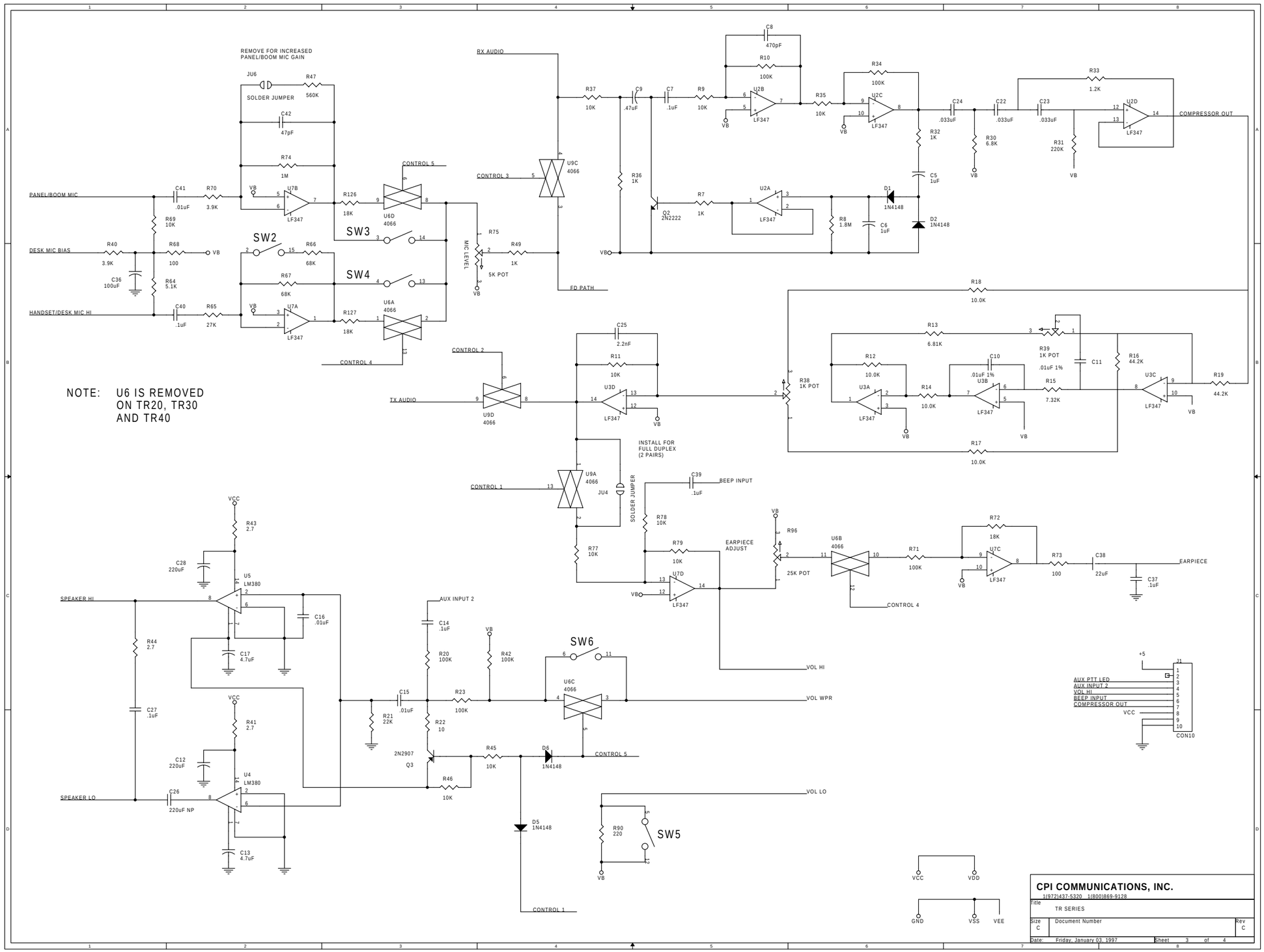
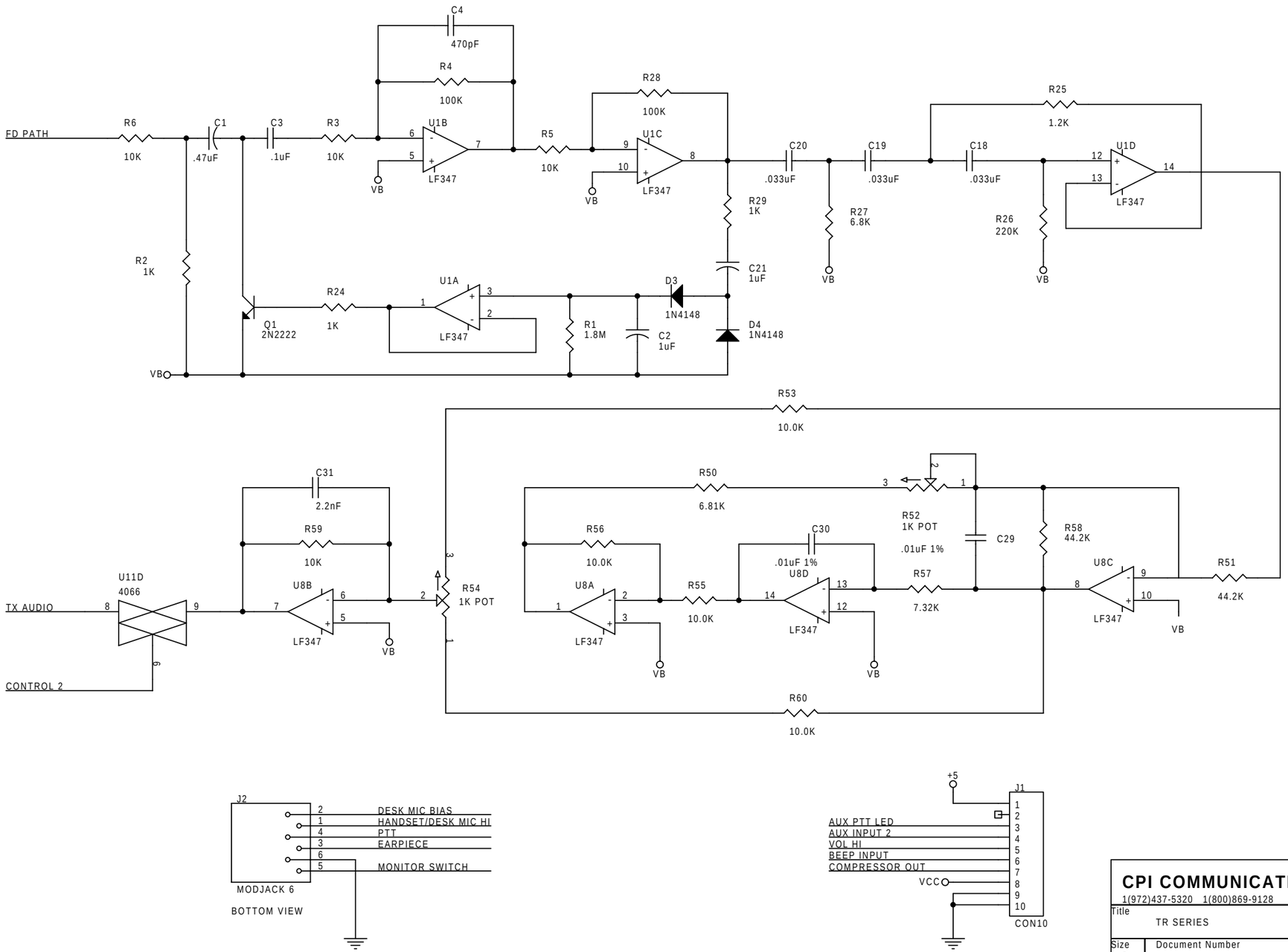
RA1
RA2
RA3
CPIMICRO2
RTCC
VSS
OSC
CLKOUT
Y1
4.0MHZ
C61
20pF
C62
20pF
U15B
LM324
CONTROL 1
U15A
LM324
CONTROL 2
U15D
LM324
CONTROL 3
U15C
LM324
U14D
LF347
SW7
R105
100K
F2 LED
R123
1K
Q6
2N2907
R122
47K
JU7
SOLDER JUMPER
F1 LED
R125
1K
Q7
2N2907
R124
47K
JU8
SOLDER JUMPER
JU9
SOLDER JUMPER
R113
120K
R128
4.7K
F1/F2 SWITCH
R104
10K
R103
10K
D12
1N4148
Q5
2N2907
PTT LED
R102
1K
AUX PTT LED
U13A
LF347
CONTROL 4
U14C
LF347
CONTROL 5
SCK
SID OUT
LATI
SID IN
U12
VCC
VSS
SCK
SID
LATI
VOUT
CLK
VDD
ML2035
C54
.033uF
R106
10K
C63
10pF
R95
10K
U13C
LF347
VB
U11C
4066
U11B
4066
R91
17.4K
R93
240.0K
SW8
R94
7.32K
VB
U13D
LF347
R92
3.3K
CONTROL TONES
R109
100K
U13B
LF347
R110
47K
R80
10K POT
TONE LEVEL
VB
CPI COMMUNICATIONS, INC.
1(972)437-5320 1(800)869-9128
Title
TR SERIES
Size B
Document Number
Rev C
Date: Friday, January 03, 1997
Sheet 2 of 4


REMOVE FOR INCREASED PANEL/BOOM MIC GAIN
JU6
SOLDER JUMPER
R47 560K
C42 47pF
R74 1M
PANEL/BOOM MIC
DESK MIC BIAS
HANDSET/DESK MIC HI
C41 .01uF
R70 3.9K
R69 10K
R40 3.9K
R68 100
C36 100uF
R64 5.1K
C40 .1uF
R65 27K
U7B
U7A
LF347
VB
R126 18K
R127 18K
U6D 4066
U6A 4066
CONTROL 5
CONTROL 4
SW2
SW3
SW4
R66 68K
R67 68K
MIC LEVEL
R75 5K POT
R49 1K
RX AUDIO
CONTROL 3
U9C 4066
FD PATH
TX AUDIO
CONTROL 2
U9D 4066
C25 2.2nF
R11 10K
U3D
LF347
R38 1K POT
CONTROL 1
U9A 4066
JU4
SOLDER JUMPER
INSTALL FOR FULL DUPLEX (2 PAIRS)
C39 .1uF
BEEP INPUT
R78 10K
R77 10K
R79 10K
EARPIECE ADJUST
U7D
LF347
R96
25K POT
U6B 4066
R71 100K
R72 18K
U7C
LF347
R73 100
C38 22uF
C37 .1uF
EARPIECE
CONTROL 4
R37 10K
C9 .47uF
C7 .1uF
R9 10K
C8 470pF
R10 100K
U2B
LF347
R35 10K
R34 100K
U2C
LF347
C24 .033uF
C22 .033uF
C23 .033uF
R33 1.2K
U2D
LF347
COMPRESSOR OUT
R32 1K
R30 6.8K
R31 220K
C5 1uF
R36 1K
R7 1K
Q2 2N2222
U2A
LF347
R8 1.8M
C6 1uF
D1 1N4148
D2 1N4148
R18 10.0K
R13 6.81K
R39 1K POT
.01uF 1%
C11
R16 44.2K
R12 10.0K
C10 .01uF 1%
U3B
R14 10.0K
U3A
LF347
R15 7.32K
U3C
LF347
R19 44.2K
R17 10.0K
VCC
R43 2.7
C28 220uF
U5 LM380
SPEAKER HI
C16 .01uF
C17 4.7uF
R44 2.7
C27 .1uF
R41 2.7
C12 220uF
U4 LM380
SPEAKER LO
C26 220uF NP
C13 4.7uF
AUX INPUT 2
C14 .1uF
R20 100K
R42 100K
C15 .01uF
R23 100K
R21 22K
R22 10
2N2907
Q3
R45 10K
D6 1N4148
R46 10K
D5 1N4148
CONTROL 1
SW6
U6C 4066
VOL HI
VOL WPR
VOL LO
R90 220
SW5
+5
J1
AUX PTT LED
AUX INPUT 2
VOL HI
BEEP INPUT
COMPRESSOR OUT
VCC
CON10
VCC
VDD
GND
VSS
VEE
NOTE: U6 IS REMOVED ON TR20, TR30 AND TR40
CPI COMMUNICATIONS, INC.
1(972)437-5320 1(800)869-9128
Title
TR SERIES
Size C
Document Number
Rev C
Date: Friday, January 03, 1997
Sheet 3 of 4

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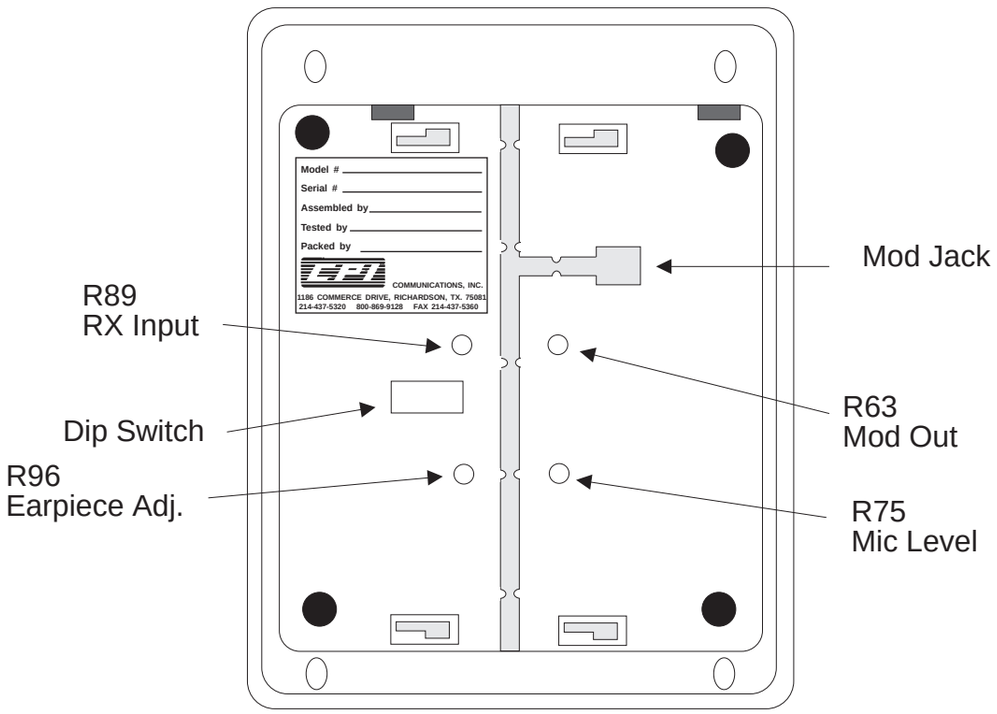
| Title: TR SERIES | | |
| Size: B | Document Number | Rev: C |
| Date: Friday, January 03, 1997 | Sheet 4 of 4 | |

Location of externally adjustable controls.



### *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: