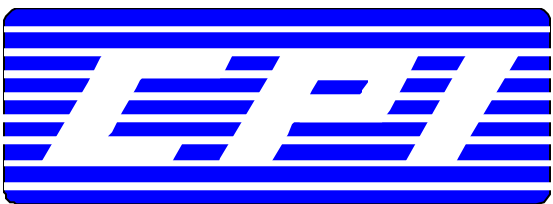


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# Instruction Manual

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TRML Series  
Multi-Line Tone Remote  
01/2013



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# TABLE OF CONTENTS

<b><i>SPECIFICATIONS</i></b>	<b>4</b>
<b><i>GENERAL DESCRIPTION</i></b>	<b>5</b>
<b><i>FRONT PANEL CONTROLS AND INDICATORS</i></b>	<b>6-7</b>
<b><i>INSTALLATION</i></b>	
POWER	<b>8</b>
PHONELINES	<b>8</b>
LOCAL CONTROL CONTACT CLOSURES	<b>8</b>
DESK MIC	<b>9</b>
HEADSET	<b>9</b>
FOOTSWITCH	<b>9</b>
EXTERNAL SPEAKER	<b>9</b>
PARALLEL OPERATION	<b>9</b>
<i>Line Impedance</i>	<b>10</b>
<i>Crossmute</i>	<b>10</b>
LEVEL SETTINGS	
<i>Microphone Sensitivity</i>	<b>10</b>
<i>Earpiece Adjust</i>	<b>10</b>
<i>Rx Audio Line Input</i>	<b>10-11</b>
<i>Tx Line Output</i>	<b>11-12</b>
<i>Notch Filters</i>	<b>12</b>
<b><i>PROGRAMMING</i></b>	
ENTERING PROGRAMMING	<b>13</b>
ENABLING/DISABLING LINE SELECT BUTTONS	<b>13</b>
ENABLING/DISABLING SELECT ALL BUTTON	<b>13</b>
EXIT PROGRAMMING	<b>13</b>
<b><i>OPERATION</i></b>	
SELECTING A LINE	<b>13</b>
SELECTING MULTIPLE LINES	<b>13</b>
SELECTING A FREQUENCY	<b>14</b>
TRANSMITTING/INITIATING CALLS	<b>14</b>
INTERCOM	<b>14</b>
RECEIVING CALLS	<b>14</b>
MUTING A LINE	<b>14</b>
PRIVACY	<b>14</b>
<b><i>DIP SWITCH AND JUMPER SETTINGS</i></b>	
MISC. DIP SWITCH - BASE BOARD	<b>15</b>
LINE IMPEDANCE DIP SWITCH - MIDDLE BOARD	<b>15</b>
PARALLEL AUDIO DIP SWITCH - MIDDLE BOARD	<b>15</b>
LINE ACTIVITY DIP SWITCH - MIDDLE BOARD	<b>16</b>
2 WIRE & 4 WIRE / RX AUDIO OPTIONS JUMPERS - MIDDLE BOARD	<b>16</b>
FOOTSWITCH PTT JUMPER - MIDDLE BOARD	<b>16</b>
MISC. SOLDER JUMPERS - BASE BOARD	<b>16-17</b>
MISC. SOLDER JUMPERS - TOP BOARD	<b>17</b>

<b><i>AUDIO CONTROLS</i></b>	
LINE AUDIO - MIDDLE BOARD	<b>17</b>
MISC. AUDIO - BASE BOARD	<b>17</b>
<b><i>PICTORIALS</i></b>	
BACK VIEW	<b>18</b>
<b><i>WARRANTY</i></b>	<b>19</b>
<b><i>SCHEMATICS AND BOARD LAYOUT</i></b>	
AUDIO CONTROL LOCATIONS	<b>20</b>
BASE BOARD	<b>21-25</b>
MIDDLE BOARD	<b>26-35</b>
TOP BOARD	<b>36-39</b>
<b>Parts List</b>	
BASE BOARD	<b>40-42</b>
MIDDLE BOARD	<b>43-44</b>
TOP BOARD	<b>45-46</b>
MISC	<b>47</b>

**SPECIFICATIONS** subject to change without notice

<b>Power Requirements</b>	120VAC, 60Hz for wall pack (provided). Fused on circuit board.
<b>Dimensions</b>	9.5" x 4" x 7"
<b>Weight</b>	TRML - 4.5lbs, with Deskmic Option - 5.2lbs
<b>Audio Output to Speaker</b>	2 Watts at 3% THD into 8 ohms, using supplied wall pack or
<b>Handset Earpiece Level</b>	Adjustable via internal potentiometer
<b>Frequency Response</b>	+/- 3dB from 300 to 3000Hz, except at notch frequency. 1000Hz reference.
<b>Hum and Noise</b>	50dB below operating levels
<b>Transmit Notch Filter</b>	2175Hz down 50dB from 1000Hz reference level
<b>Receive Notch Filter</b>	2175Hz down 50dB from 1000Hz reference level
<b>Transmit Audio Compression</b>	Less than 3dB increase in output with 30dB increase in input beyond threshold.
<b>Receive Audio Compression</b>	Less than 3dB increase in output with 30dB increase in input beyond threshold. Threshold is adjustable from -24dBm to +15dBm.
<b>Line Impedance</b>	2 wire: 600 ohms or 2.4k ohms, dip switch selectable per line 4 wire: 600 ohms or 10K ohms, dip switch selectable per line
<b>Line Output Level</b>	Factory set at 0dBm. Adjustable to +10dBm maximum
<b>Control Tone Frequencies</b>	Guard Tone: 2175Hz @ +10dBm for 140ms Function Tone: F1 1950Hz @ 0dBm for 40ms F2 1850Hz @ 0dBm for 40ms F3 1750Hz @ 0dBm for 40ms F4 1650Hz @ 0dBm for 40ms F5 1550Hz @ 0dBm for 40ms F6 1450Hz @ 0dBm for 40ms F7 1350Hz @ 0dBm for 40ms F8 1250Hz @ 0dBm for 40ms Monitor Tone: 2050Hz @ 0dBm for 40ms Hold Tone: 2175Hz @ -20dBm for duration of PTT
<b>Operating Modes</b>	Standard: Two wire simplex per line Optional: Four wire simplex per line, Four wire duplex per line
<b>Maximum Parallel Remotes</b>	10 remotes per line
<b>Connections</b>	Phone lines: 8 pin RJ45 modular jacks - TIA/EIA T568-B Relay Outputs: 8 pin RJ45 modular jacks - TIA/EIA T568-B Handset: 4 pin modular jack Deskmic: 6 pin modular jack Headset: 6 pin modular jack Gooseneck: 3 pin plug, screw lock connector Power: 3 pin EN3® weather tight locking connector

## **GENERAL DESCRIPTION**

The TRML series multi line tone remote allows users to reliably control up to four separate conventional and/or trunked two way base stations and/or repeaters via twisted pair wiring. One TRML remote allows users to communicate on 4 separate radios individually or a combination of 2 to 4 radios simultaneously. Incoming receive audio signals are controlled by independent select and unselect audio controls with the capability of each line being muted.

Programmable features include line enable/disable and select all enable/disable. The TRML does not require additional software for programming. Data is stored in a nonvolatile EEPROM and will retain the data when power is lost. Programming is accomplished using the standard front panel buttons on the face of the remote allowing fully field programmability.

When a PTT occurs from the handset, front panel, optional desk mic, optional gooseneck, or optional headset interface the other mics will mute to eliminate background noise during the transmission. Receive audio is transferred to the handset earpiece when taken off hook.

Parallel Status Indication allows the remote to update when a channel change function is performed from another remote on the system. The TRML activates the Parallel Transmit Indication (PTI) by lighting the TX LED when parallel remotes key and can also be configured to mute the speaker by enabling the crossmute function to prevent audio feedback when remotes are in close proximity.

Standard features include volume controls for selected and unselected lines, individual activity line indicators, front panel PTT switch, LED transmit indicator, monitor function with LED indicator, intercom function with LED indicator, select all function with indicator, individual receive mute switches with LED indicators, receive and transmit audio compression, 2175Hz transmit and receive notch filters, PTI indication, crossmute, 2 wire and 4 wire selection per line, locking quick disconnect power supply, and RJ45 connections to termination panels.

The TRML is available in many optional configurations. Some of the available options include: (-DM) Desk mic in addition to handset, (-GN) Gooseneck mic replaces the handset, (-FS) Foot switch to activate PTT, (-CC) Contact Closure PTT relay output, (-8F) Eight frequency control per line, (-SPK/JACK) 3.5mm jack for amplified speaker, and (-SPKR) Speaker (external, amplified, requires 12VDC).

## FRONT PANEL CONTROLS AND INDICATORS

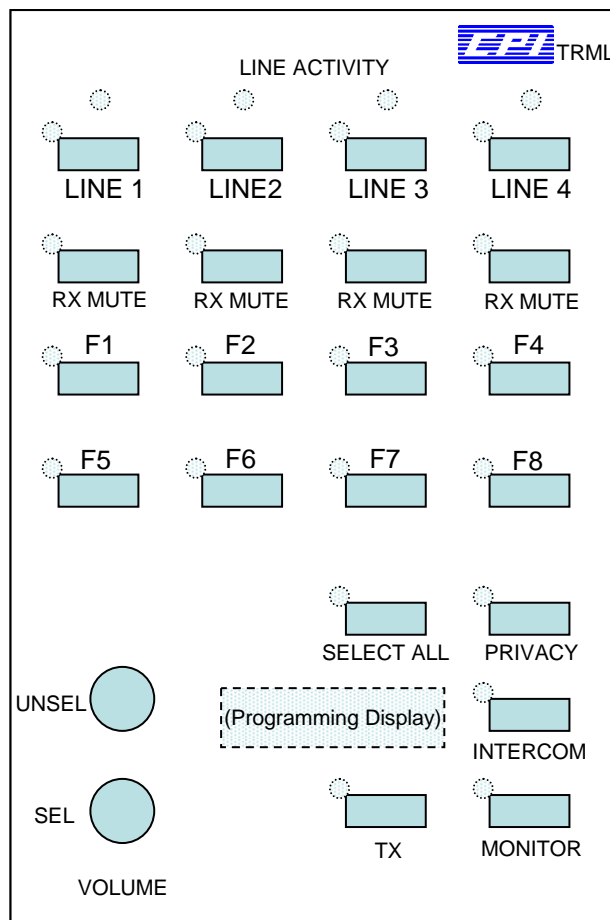


Figure 1 - Front Panel

### Front panel

Figure 1 shows a view of the front panel of the TRML series. The front panel features line activity indicators, line selection, Rx mute per line, select all line function, intercom and monitor functions, Tx function, and volume controls for selected and unselected audio. Optional eight channel frequency selection is available on the TRML-8F. The programming display and Privacy button are for future applications and/or special applications. All functions and features include indicators except the volume controls.

### Controls and Indicators

**LINE ACTIVITY indicators:** Orange LED's located above each LINE button will light indicating Rx audio activity on that line. The orange activity indicators remain lit while audio is present and for 3 seconds (factory default) after audio is absent.

**LINE1-LINE4 Buttons:** Selects one of four lines to be the selected line and is indicated by green a LED. When one line is selected, the previous selected line is canceled. Only one line can be selected *unless* Select All is activated, which then any combination of lines can be selected and/or unselected to be transmitted on.

**RX MUTE Button:** Mutes and unmutes incoming Rx audio, of the above respective Line button, from being monitored on the handset or speaker and lights a green LED to indicate the line is muted.

**F1-F8 Buttons:** Selects frequency and sends corresponding function tone on the selected line. When a frequency is selected, it lights the frequency LED. Selection will remain on last selected frequency until a different frequency is selected regardless of other remote functions.

**SELECT ALL Button:** Allows user to select multiple lines to transmit on. Once the button has been pressed, a green LED shows the Select All function has been activated and the user can now select and unselect desired lines using the LINE1-LINE4 buttons. The last selected line *before* entering into the Select All mode is still controlled by the Selected Volume control and the other lines are controlled by the unselected volume control.

**PRIVACY Button:** Non operational. Reserved for future applications.

**INTERCOM Button:** When pressed and held, provides intercom capability to other parallel remotes on the selected line(s) without keying the radio. A yellow LED will light as long as the intercom button is pressed.

**MONITOR Button:** Sends the monitor tone burst, on the selected line, placing the radio into monitor mode to disable coded squelch (CTCSS/CDCSS) so the line may be monitored before transmitting. A green LED lights as long as the monitor button is pressed.

**TX Button:** When pressed and held, allows the user to key the radio and transmit on selected lines. A red TX LED lights as long as the button is pressed. The TX LED also lights when any PTT occurs from the TRML and will also light as a parallel transmit indication (PTI) that parallel remotes on the selected line are currently transmitting.

**SEL Volume Control:** Adjusts the speaker level of the Selected audio when the remote is set to control volumes independently or adjusts the speaker level of the summed Selected and Unselected audio when the remote is set to control both.

**UNSEL Volume Control:** Adjusts the speaker level of the Unselected audio.

**Programming Display:** Non operational. Reserved for future applications.

## INSTALLATION

The TRML series tone remote will operate with any remote system using the EIA standard tone control format.

### Power

The remote is powered from 120V 60Hz AC using the supplied wall pack transformer. In most cases, when the supplied wall pack is used, a standard grounded outlet is acceptable. An ideal ground point would consist of a 1/2 inch copper rod driven six feet into the earth with at least a #16 AWG copper wire connecting it to the GND terminal of the remote, taking the shortest path possible.

### Phone lines

The TRML is designed to work with a high quality voice grade circuit such as leased lines or in-house twisted pair wiring for each line used. Circuits and wiring must have no dial tone, talk battery, or signaling. DC continuity is not required.

Connections are made to the remote, via the supplied 6 foot modular Cat5/5e/6 cable, to J5 for two wire operation and to J4 and J5 for four wire operation. J5 provides Tx and Rx connections for two wire lines. J4 provides Tx connections and J5 provides Rx connections for four wire lines. Figure 2 shows the back views of J5 and J4. The TRML comes standard with jumper selectable two wire or four wire operation. The TRML is shipped from the factory in the two wire mode. Refer to Table 3 to configure jumpers for four wire mode.

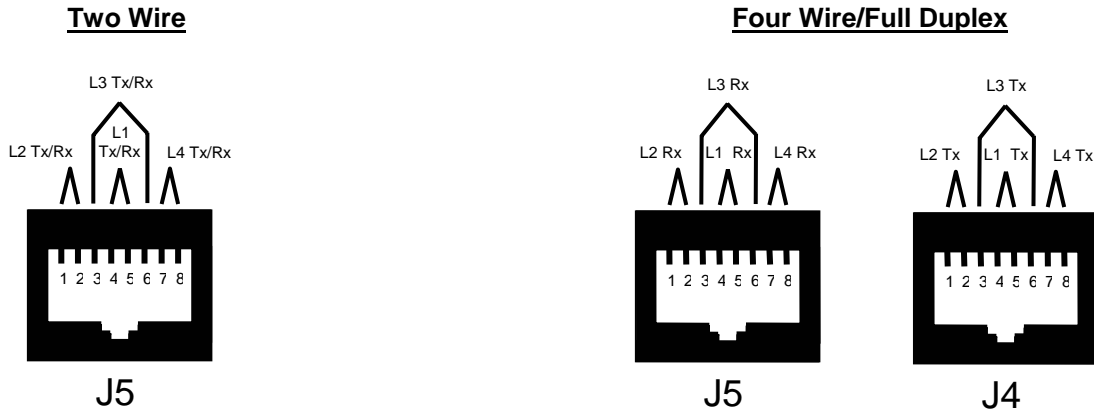


Figure 2 - Phone line Connections

### Local Control Contact Closure (-CC option)

The optional local control contact closure provides a normally open dry relay contact closure during PTT on each individual line. The relay is not activated during intercom. Each relay can be also be configured to close to ground by installing 2.7 ohm resistors in R180, R179, R178, R177 on the middle board for Lines 1, 2, 3, 4, respectively. Figure 3 shows the back view of J3.

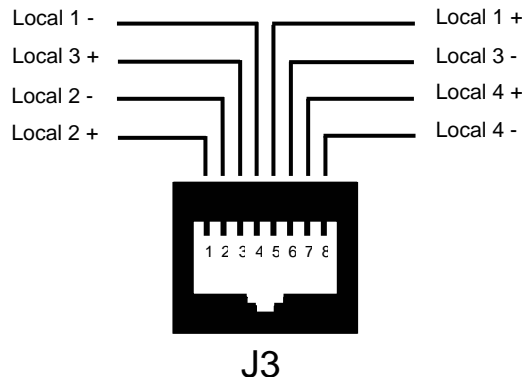
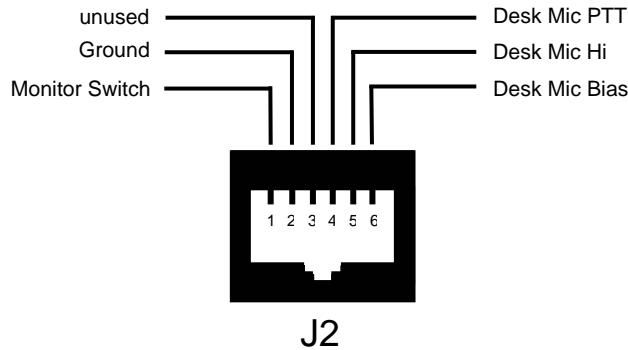


Figure 3 - Contact Closure Connection



**Desk Mic (-DM option)**

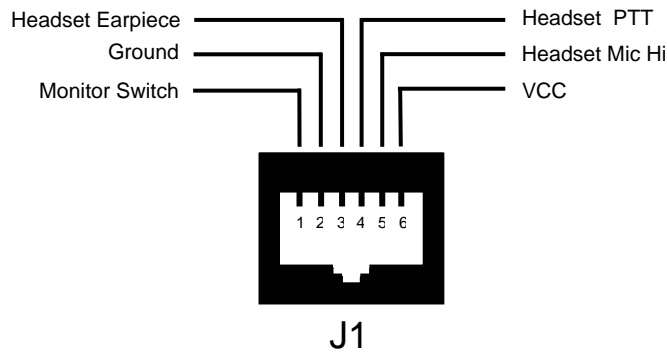
The optional Desk Mic feature provides connections to accommodate a CPI desk mic for console use. Figure 4 shows the back view of J2.



**Figure 4 - Desk Mic Connection**

**Headset (-HS Box option)**

The optional headset input provides availability to directly connect the CPI headset box (sold separately) for hands free dispatch operation when paired with a compatible headset. Select and/or Unselect audio in the headset earpiece is determined by jumper selectable configurations (see Table 3 - JU14, JU15). Figure 5 shows the back view of J1.



**Figure 5 - Headset Connection**

**Footswitch (-FS option)**

Optional footswitch connection allows the PTT to be activated by the supplied footswitch. Activated PTT is determined by selectable jumper configuration (see Table 3 - JU13).

**Speaker Jack (-SPK/JACK option)**

Optional speaker jack provides a 3.5mm jack for connecting the CPI amplified external speaker (sold separately) to provide a left and right audio effect, for separating audio, which allows easier audio differentiating between the Select and Unselect calls. Select or Unselect audio can be routed to the external speaker determined by the selectable jumper configuration (see Table 3 - JU9).

**Parallel Operation**

Parallel remotes on the same line(s) are an integral part of the remote control system which allows more users and also allows future expansion of the system. Connecting multiple remotes requires line impedance settings to be configured for optimal performance of the system.

### **Line Impedance**

When several remote control units are connected in parallel on one line, the total system impedance for that line will decrease to a point where operation is degraded. This occurs when 3 or more remotes are connected in parallel to the line. Up to ten remotes may be connected in parallel on the same Line. The maximum loss between any remote and termination panel must not exceed 20dB.

To compensate for this effect, the TRML remote provides dip switch selectable line impedance settings. Two wire operation provides 600 ohm or 2.4K ohm impedance. Four wire operation provides 600 ohm or 2.4K ohm impedance on the Tx pair and 600 ohm or 10K ohm impedance on the Rx pair. Line impedance settings are configured via the S1 and S2 dip switch packages located on the middle board (see Table 2 - S1, S2).

In parallel remote installations using the same phone line for two wire operation, dip switch S1-5 should be in the OFF position (2.4K ohms) in all remotes except the last one in the chain on Line 1, S1-6 should be in the OFF position for Line 2, S1-7 should be in the OFF position for Line 3, S1-8 should be in the OFF position for Line 4.

In parallel remote installation using the same phone line for four wire operation, dip switch S1-1 should be in the OFF position (10K ohms) in all remotes except the last one in the chain on Line 1, S1-2 should be in the OFF position for Line 2, S1-3 should be in the OFF position for Line 3, S1-4 should be in the OFF position for Line 4 for the Rx pairs. Dip switch S1-5 should be in the OFF position (2.4K ohms) in all remotes except the last one in the chain on Line 1, S1-6 should be in the OFF position for Line 2, S1-7 should be in the OFF position for Line 3, S1-8 should be in the OFF position for Line 4 for the Tx pairs.

### **Crossmute**

The crossmute feature allows the remote to mute the speaker during PTT from a parallel remote to prevent audio feedback. Crossmute is ideal when multiple remotes are installed in close proximity that audio feedback occurs on parallel remote speakers. No additional wires between remotes are needed to activate the crossmute feature. The crossmute feature works by decoding the PTT control tones when parallel remotes key and mutes the speaker cutting off the audio path to feedback through. Intercom has no effect and will be heard on parallel remotes.

The crossmute feature is enabled when shipped from the factory. Configuring the crossmute feature is dip switch selectable with dip switch 6 located on the bottom of the unit (Table 1 - S1-6). "On" enables crossmute, "Off" disables crossmute. *Note: speaker becomes active all the time regardless of the handset in the off hook position when crossmute is disabled.*

### **Level Settings**

Typical level settings require only a small flathead screwdriver for adjustments and a standard phillips head screwdriver to remove the screws securing the top half of the housing to access most of the adjustments. Some adjustments can be accessed from the bottom of the remote.

The following adjustments assume the termination panel has been properly installed and the phone line meets above requirements.

### **Microphone Sensitivity**

R75 controls the microphone audio level into the transmit compression circuits and therefore acts as a sensitivity control. The potentiometer has been factory set to provide adequate compression for normal voice audio with a relatively quiet background noise level. Adjustment is located on the bottom baseboard and is also accessible from the bottom of the remote. *Note: adjustment will affect transmit audio on all lines.*

### **Earpiece Adjust**

R96 controls the Rx audio into the earpiece. The potentiometer has been factory set to provide a comfortable earpiece level for most environments. Adjustment is located on the bottom baseboard and is also accessible from the bottom of the remote. *Note: adjustment will affect receive audio over the earpiece of all lines.*

### **Rx Audio Line Input**

The receive line input adjusts the audio level to the input of the compression amplifier circuitry. This allows the threshold of compression to be adjusted from -24dBm to +15dBm. Separate compression amplifiers and adjustments are used for each line.

While applying an RF signal modulated with 1000Hz tone at 60% system deviation to the base station receiver, adjust the termination panel line output for 0dBm to the phone line. Adjust all remotes and each line used as follows:

*Note: Adjustments and measurements are located and taken on the middle board.*

Line 1:

- a. Apply RF signal as described above.
- b. Connect a scope or analog AC volt meter to ground and U10 pin 1.
- c. With R154 fully counter-clockwise, adjust in a clockwise direction until the AC voltage level on scope (approx. 1Vpp) or meter (approx. 370mVrms) just stops increasing. This point is the threshold of compression for Line 1.
- d. Remove the RF signal from the base station and proceed to the next line input adjustment.

Line 2:

- a. Apply RF signal as described above.
- b. Connect a scope or analog AC volt meter to ground and U10 pin 8.
- c. With R159 fully counter-clockwise, adjust in a clockwise direction until the AC voltage level on scope (approx. 1Vpp) or meter (approx. 370mVrms) just stops increasing. This point is the threshold of compression for Line 2.
- d. Remove the RF signal from the base station and proceed to the next line input adjustment.

Line 3:

- a. Apply RF signal as described above.
- b. Connect a scope or analog AC volt meter to ground and U19 pin 1.
- c. With R174 fully counter-clockwise, adjust in a clockwise direction until the AC voltage level on scope (approx. 1Vpp) or meter (approx. 370mVrms) just stops increasing. This point is the threshold of compression for Line 3.
- d. Remove the RF signal from the base station and proceed to the next line input adjustment.

Line 4:

- a. Apply RF signal as described above.
- b. Connect a scope or analog AC volt meter to ground and U19 pin 8.
- c. With R155 fully counter-clockwise, adjust in a clockwise direction until the AC voltage level on scope (approx. 1Vpp) or meter (approx. 370mVrms) just stops increasing. This point is the threshold of compression for Line 4.
- d. Remove the RF signal from the base station.

### ***Tx Line Output***

This level is preset at the factory for 0dBm out to the phone line and may not require readjustment at installation. If needed, the procedure for each line used is as follows:

*Note: Adjustments are located on the middle board and baseboard of the TRML and measurements are taken at the termination panel which may require two people to perform the procedure.*

Line 1:

- a. With the handset off-hook, if applicable, press the intercom button (the handset PTT can be used but audio may be passed over the air) and adjust the Line 1 Tx audio pot (R125) while saying and holding the word "Five" into the handset until 0dBm is measured across the phone line at the termination panel.
- b. Turn "on" dip switch 7 (located on bottom of unit) and key the remote to lock up the 1950Hz function tone. Adjust R80 tone level (located on baseboard, underneath middle board) until the 1950Hz function tone measures 0dBm across the phone line at the termination panel.
- c. Return dip switch 7 to the "off" position and proceed to the next line output adjustment.

Line 2:

- a. With the handset off-hook, if applicable, press the intercom button (the handset PTT can be used but audio may be passed over the air) and adjust the Line 2 Tx audio pot (R142) while saying and holding the word "Five" into the handset until 0dBm is measured across the phone line at the termination panel.
- b. Turn "on" dip switch 7 (located on bottom of unit) and key the remote to lock up the 1950Hz function tone. Adjust R80 tone level (located on baseboard, underneath middle board) until the 1950Hz function tone measures 0dBm across the phone line at the termination panel.
- c. Return dip switch 7 to the "off" position and proceed to the next line output adjustment.

Line 3:

- a. With the handset off-hook, if applicable, press the intercom button (the handset PTT can be used but audio may be passed over the air) and adjust the Line 3 Tx audio pot (R104) while saying and holding the word "Five" into the handset until 0dBm is measured across the phone line at the termination panel.
- b. Turn "on" dip switch 7 (located on bottom of unit) and key the remote to lock up the 1950Hz function tone. Adjust R80 tone level (located on baseboard, underneath middle board) until the 1950Hz function tone measures 0dBm across the phone line at the termination panel.
- c. Return dip switch 7 to the "off" position and proceed to the next line output adjustment.

Line 4:

- a. With the handset off-hook, if applicable, press the intercom button (the handset PTT can be used but audio may be passed over the air) and adjust the Line 4 Tx audio pot (R85) while saying and holding the word "Five" into the handset until 0dBm is measured across the phone line at the termination panel.
- b. Turn "on" dip switch 7 (located on bottom of unit) and key the remote to lock up the 1950Hz function tone. Adjust R80 tone level (located on baseboard, underneath middle board) until the 1950Hz function tone measures 0dBm across the phone line at the termination panel.
- c. Return dip switch 7 to the "off" position and proceed to the next line output adjustment.

### **Tx Notch Filter**

The Tx 2175Hz notch filter is tuned at the factory and should not be readjusted. In the event that the notch filter needs to be adjusted, the procedure follows:

*Note: Adjustment and measurements are made on the baseboard.*

- a. Apply 0dBm, 2.2Vpp, 2175Hz signal on the Line 1 red and green phone line input.
- b. Using a test clip, jumper left side of R6 to left side of R61.
- c. With the scope in the single channel mode, connect probe to U8 pin 7. Adjust R52 to obtain a minimum signal level. Adjust R54 to further reduce the signal level. Recheck R52 then R54 for the smallest minimum signal level achievable.

### **Selected Rx Notch Filter**

The selected Rx 2175Hz notch filter is tuned at the factory and should not be readjusted. In the event that the notch filter needs to be adjusted, the procedure follows:

*Note: Adjustments and measurements are made on the baseboard with Line 1 selected.*

- a. Apply 0dBm, 2.2Vpp, 2175Hz signal on the Line 1 red and green phone line input.
- b. Using a dual channel scope in the X-Y mode, connect one probe to U2 pin 14 and the other probe to U3 pin 8.
- c. Adjust R39 until the lissajous pattern closes to a flat line. Remove probes.
- d. With the scope in the single channel mode, connect probe to U3 pin 14. Adjust R38 to obtain a minimum signal level. Readjust R39 slightly to further reduce the signal level. Recheck R38 then R39 for the smallest minimum signal level achievable.

### **Unselected Rx Notch Filter**

The unselected Rx 2175Hz notch filter is tuned at the factory and should not be readjusted. In the event that the notch filter needs to be adjusted, the procedure follows:

*Note: Adjustments and measurements are made on the middle board with Line 2 selected.*

- a. Apply 0dBm, 2.2Vpp, 2175Hz signal on the Line 1 red and green phone line input.
- b. Using a dual channel scope in the X-Y mode, connect one probe to U3 pin 1 and other probe to U8 pin 8.
- c. Adjust R55 until the lissajous pattern closes to a flat line. Remove probes.
- d. With the scope in the single channel mode, connect probe to U8 pin 14. Adjust R73 to obtain a minimum signal level. Readjust R55 slightly to further reduce the signal level. Recheck R73 then R55 for the smallest minimum signal level achievable.

## **PROGRAMMING**

Programmable features include line enable/disable and select all enable/disable. The TRML does not require additional software for programming. Programming is accomplished using the standard front panel buttons on the face of the remote allowing field programmability.

TRML's are shipped from the factory with all Lines and Select All buttons activated.

### **To enter the programming mode:**

1. Remove power.
2. Press and **hold** the front panel TX button while reapplying power.
3. Once the LINE ACTIVITY indicators flash momentary in sequence and any of the green Line Select LED's repeatedly flash on/off, release the TX button.
4. The TX LED will repeatedly flash on/off indicating the programming mode is activated.

### **Enabling/Disabling Line Select Buttons:**

*Note: Line is enabled when the green LED next to the button is "on". Line is disabled when green LED is "off".*

1. Enter the programming mode.
2. Select or deselect the lines that are to be enabled or disabled indicated by the LED's.
3. Exit programming or move to next programming parameter.

### **Enabling/Disabling Select All Button:**

*Note: Select All is enabled when green LED next to button is "on". Select All is disabled when green LED is "off".*

1. Enter the programming mode.
2. Select or deselect the Select All to enable or disabled indicated by the LED.
3. Exit programming or move to next programming parameter.

### **To exit the programming mode:**

1. Press the front panel TX button one time.
2. Unit is now in normal operation with most recent programming parameters programmed.

## **OPERATION**

The operation of the TRML is designed, with the end user in mind, without the complexity of multi-programmable buttons and over populated LCD displays. Individual buttons and indicators are used to provide straight forward operation.

When power is applied to the unit, the LINE ACTIVITY indicators flash momentary in sequence, F1 frequency is selected (models with multiple frequencies will have the indicator lit also), Line 1 is selected with indicator lit (or the first available Line if line(s) have been disabled in programming). The unit is now ready for use.

### **Selecting a Line**

Lines can be selected individually by pressing one of the LINE1 - LINE 4 buttons. The selected line is indicated by the green illuminated LED next to the button.

### **Selecting Multiple Lines**

Press the SELECT ALL button to activate the select all feature. Once the button has been pressed, a green LED shows the Select All function has been activated and the user can now select and unselect desired lines to transmit on using the LINE1-LINE4 buttons. The last selected line *before* entering into the Select All mode is still controlled by the Selected Volume control and the other lines are controlled by the unselected volume control.

Pressing one of the F1 - F8 buttons will select the frequency and will send the corresponding function tone out the selected line(s) and will light a green LED next to the frequency button pressed. The last selected frequency will be the active frequency until a different frequency button is pressed.

### Selecting a Frequency (if equipped)

#### Transmitting/Initiating Calls

Select the line or lines to transmit on. Press and hold the front panel TX button, handset PTT button, deskmic PTT button, or footswitch pedal to activate and speak into the corresponding mic (footswitch mic determined by Table 3 - JU13). When a PTT occurs from the handset, front panel, or deskmic the other mics will mute to eliminate background noise during the transmission.

Use of the handset is recommended in noisy environments or when private conversation is desired.

Use of the front panel internal mic should only be used in low noise environments. The panel mic is not design to be used regularly and is intended for quick, short responses.

*Note: when the handset is off hook, transmit audio is passed through the handset mic no matter which PTT is activated.*

#### Intercom

Select the line or lines to intercom on. Press and hold the front panel INTERCOM button and speak into the front panel mic when on hook. Speak into the handset mic when off hook. Intercom audio will only be heard on parallel remotes and will not activate the radio's PTT or transmit audio over the radio.

#### Receiving Calls

When Rx audio is present on a line, the orange LINE ACTIVITY indicator lights up above the LINE button indicating Rx audio activity on that line. The orange activity indicators remain lit while audio is present and 3 seconds after audio is absent (factory default - see Table 2 Line Activity Timing). Rx audio is heard over the speaker while on hook and transferred to the earpiece when the handset is lifted off hook. Parallel transmit audio from other remotes are heard on the unit unless the crossmute feature has been enabled and activated.

#### Muting a Line

Pressing the RX MUTE button, respectively located under the LINE buttons, will mute the RX audio on that particular line and illuminate the green LED next to the button. Press again to unmute and the LED will turn off.

#### Privacy Function

Non-functional. Reserved for future applications.

## **DIP SWITCH AND JUMPER SETTINGS**

The TRML series remotes have a number of dip switches, shunt plug jumpers, and solder pad jumpers. Following are tables indicating the designation, location, description, and factory settings of each. Factory settings are underlined.

**Table 1 - Dip Switch Settings - Base Board**

Misc. Dip Switch Settings		
S1	ON	OFF
1	Full duplex	<u>Two wire</u>
2	Not Used	<u>Not Used</u>
3	Not Used	<u>Not Used</u>
4	Not Used	<u>Not Used</u>
5	<u>Allows speaker volumes to be turned down completely</u>	Prevents speaker volumes from being turned down completely
6	Speaker active all the time / Crossmute disabled	<u>Speaker mute with handset off-hook / Crossmute enabled</u>
7	Locks up function tone (0dBm)	<u>Normal operation</u>
8	Disables tone attenuation (all tones at +10dBm)	<u>Normal operation</u>

\* Table 1 describes the functions provided by the dip switch located and accessible on the bottom of the unit.

**Table 2 - Dip Switch Settings - Middle Board**

Line Impedance		
S1	ON	OFF
1	Line 1 - 4 Wire RX 600 Ohm Impedance	<u>Line 1 - 4 Wire RX 10K Ohm Impedance</u>
2	Line 2 - 4 Wire RX 600 Ohm Impedance	<u>Line 2 - 4 Wire RX 10K Ohm Impedance</u>
3	Line 3 - 4 Wire RX 600 Ohm Impedance	<u>Line 3 - 4 Wire RX 10K Ohm Impedance</u>
4	Line 4 - 4 Wire RX 600 Ohm Impedance	<u>Line 4 - 4 Wire RX 10K Ohm Impedance</u>
5	<u>Line 1 - 2 Wire / 4W TX 600 Ohm Impedance</u>	Line 1 - 2 Wire / 4W TX 2.4K Ohm Impedance
6	<u>Line 2 - 2 Wire / 4W TX 600 Ohm Impedance</u>	Line 2 - 2 Wire / 4W TX 2.4K Ohm Impedance
7	<u>Line 3 - 2 Wire / 4W TX 600 Ohm Impedance</u>	Line 3 - 2 Wire / 4W TX 2.4K Ohm Impedance
8	<u>Line 4 - 2 Wire / 4W TX 600 Ohm Impedance</u>	Line 4 - 2 Wire / 4W TX 2.4K Ohm Impedance
Parallel Audio		
S2	ON	OFF
1	<u>Line 1 - 4W No Parallel TX Audio Reception</u>	Line 1 - 4 Wire Parallel TX Audio Reception
2	<u>Line 2 - 4W No Parallel TX Audio Reception</u>	Line 2 - 4 Wire Parallel TX Audio Reception
3	<u>Line 3 - 4W No Parallel TX Audio Reception</u>	Line 3 - 4 Wire Parallel TX Audio Reception
4	<u>Line 4 - 4W No Parallel TX Audio Reception</u>	Line 4 - 4 Wire Parallel TX Audio Reception
5	<u>Line Activity Indication - See Chart Below</u>	Line Activity Indication - See Chart Below
6	Line Activity Indication - See Chart Below	<u>Line Activity Indication - See Chart Below</u>
7	Line Activity Indication - See Chart Below	<u>Line Activity Indication - See Chart Below</u>
8	Speaker active while headset connected	<u>Speaker disabled when headset connected</u>

**Line Activity Indication Timing**

SECONDS	SWITCH S2 - 5	SWITCH S2 - 6	SWITCH S2 - 7
2	Off	Off	Off
3	On	Off	Off
4	Off	On	Off
5	On	On	Off
6	Off	Off	On
7	On	Off	On
8	Off	On	On
9	On	On	On

\* Table 2 describes the functions of the dip switches located on the middle board. Top housing must be removed.

**Table 3 - Shunt Plug Jumpers Settings - Middle Board**

2 Wire & 4 Wire / Rx Audio Options			
JUMPER	FUNCTION	1 TO 2	2 TO 3
JU1	Line 4 - 2 Wire / 4 Wire	<u>2 Wire</u>	4 Wire
JU2	Line 4 - 2 Wire / 4 Wire	<u>2 Wire</u>	4 Wire
JU3	Line 3 - 2 Wire / 4 Wire	<u>2 Wire</u>	4 Wire
JU4	Line 3 - 2 Wire / 4 Wire	<u>2 Wire</u>	4 Wire
JU5	Line 2 - 2 Wire / 4 Wire	<u>2 Wire</u>	4 Wire
JU6	Line 2 - 2 Wire / 4 Wire	<u>2 Wire</u>	4 Wire
JU7	Line 1 - 2 Wire / 4 Wire	<u>2 Wire</u>	4 Wire
JU8	Line 1 - 2 Wire / 4 Wire	<u>2 Wire</u>	4 Wire
JU9	External Speaker Audio	<u>Unselected</u>	Selected
JU10	Unselected Mute w/ PTT	Yes	<u>No</u>
JU11	Unselected Volume	Selected (summed audios)	<u>Independent</u> (results in no unsel on handset)
JU12	External Speaker Mutes	<u>No</u>	Internal Selected
JU13	See Chart Below	See Chart Below	See Chart Below
JU14	Headset Earpiece	Unselected	<u>N/A</u>
JU15	Headset Earpiece	<u>Selected</u>	N/A

Footswitch PTT				
JUMPER	FUNCTION	1 TO 2	3 TO 4	5 TO 6
JU13	Footswitch PTT Activates	Headset	Desk Mic	<u>Handset / Gooseneck Mic / Front Panel</u>

\* Table 3 describes the functions of the shunt plug jumpers located on the middle board. Top housing must be removed to gain access. Pin 1 is designated with a white square, silk-screened on board, encompassing pin 1.

**Table 4 - Solder Jumper Settings - Base Board**

JUMPER	IN	OUT
JU1		<u>Out</u>
JU2		<u>Out</u>
JU3		<u>Out</u>
JU4		<u>Out</u>
JU5	<u>In</u>	



JU6	<u>In</u>	Increases deskmic, panel / gooseneck audio
JU7	<u>In</u>	
JU8		<u>Out</u>
JU9	<u>In</u>	

\* Table 4 lists the solder jumpers located on the base board. Jumpers are considered to be “in” when solder has been applied to form a short across the two solder pads. Jumpers are considered “out” when no solder has been applied or when solder has been removed to form an open across the two solder pads.

\*\* Base board solder jumpers are listed to show factory settings and are not to be changed. Any jumper changes will disable the unit from operating correctly.

**Table 5 - Solder Jumper Settings - Top Board**

JUMPER	IN	OUT
JU1	Reserved for future applications	<u>Reserved for future applications</u>
JU2	Disables off-hook monitor burst tone	<u>Enables off-hook monitor burst tone</u>
JU3	Provides +9Vdc at JP1-1 (opt. encoder V+)	<u>Removes +9Vdc at JP1-1 (opt. encoder V+)</u>
JU4	Provides +18Vdc at JP1-1 (opt. encoder V+)	<u>Removes +18Vdc at JP1-1 (opt. encoder V+)</u>
JU5	Reserved for future applications	<u>Reserved for future applications</u>

\* Table 5 lists the solder jumpers located on the top board. Jumpers are considered to be “in” when solder has been applied to form a short across the two solder pads. Jumpers are considered “out” when no solder has been applied or when solder has been removed to form an open across the two solder pads.

## AUDIO CONTROLS

The TRML series remotes have a number of potentiometers. Following are tables indicating the pot designation, control, and location. Audio controls are provided below for quick reference. Note that some controls can or will effect other settings. Pictorial of locations can be found on page 20.

**Table 6 - Line Audio Controls - Middle Board**

Audio Controls			
POT	CONTROL	DESCRIPTION	NOTE:
R125	Line 1 Tx	Adjusts Line 1 Tx audio level	
R142	Line 2 Tx	Adjusts Line 2 Tx audio level	
R104	Line 3 Tx	Adjusts Line 3 Tx audio level	
R85	Line 4 Tx	Adjusts Line 4 Tx audio level	
R154	Line 1 Rx	Adjusts Line 1 Rx audio level	
R159	Line 2 Rx	Adjusts Line 2 Rx audio level	
R174	Line 3 Rx	Adjusts Line 3 Rx audio level	
R155	Line 4 Rx	Adjusts Line 4 Rx audio level	

\* Table 6 lists the audio controls located on the middle board. Top housing must be removed to gain access.

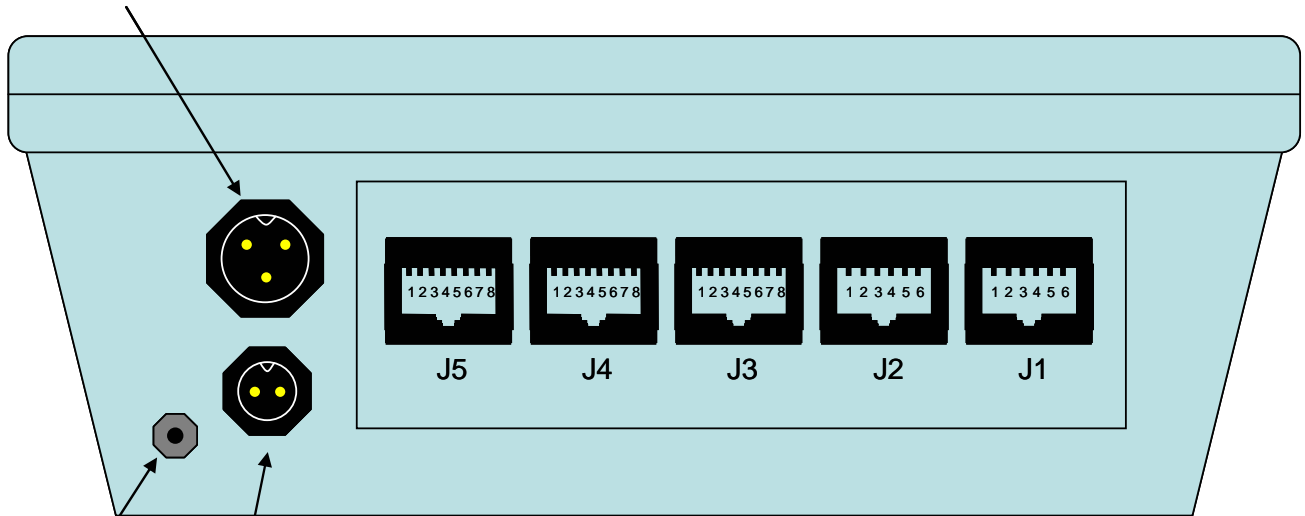
**Table 7 - Audio Controls - Base Board**

POT	CONTROL	DESCRIPTION	NOTE:
R63	Tx Mod Out	Adjusts overall Tx audio	Effects all lines
R75	Mic Level	Adjusts mic levels	Effects all mics and all lines
R80	Tone Level	Adjusts control tones	Effects all lines
R96	Earpiece Level	Adjusts earpiece audio	Effects Select & Unselect audio

\* Table 7 lists the audio controls located on the base board and accessible the bottom of the remote (except R80).

# TRML Back View

Wall Pack Connection



Optional External Speaker Jack

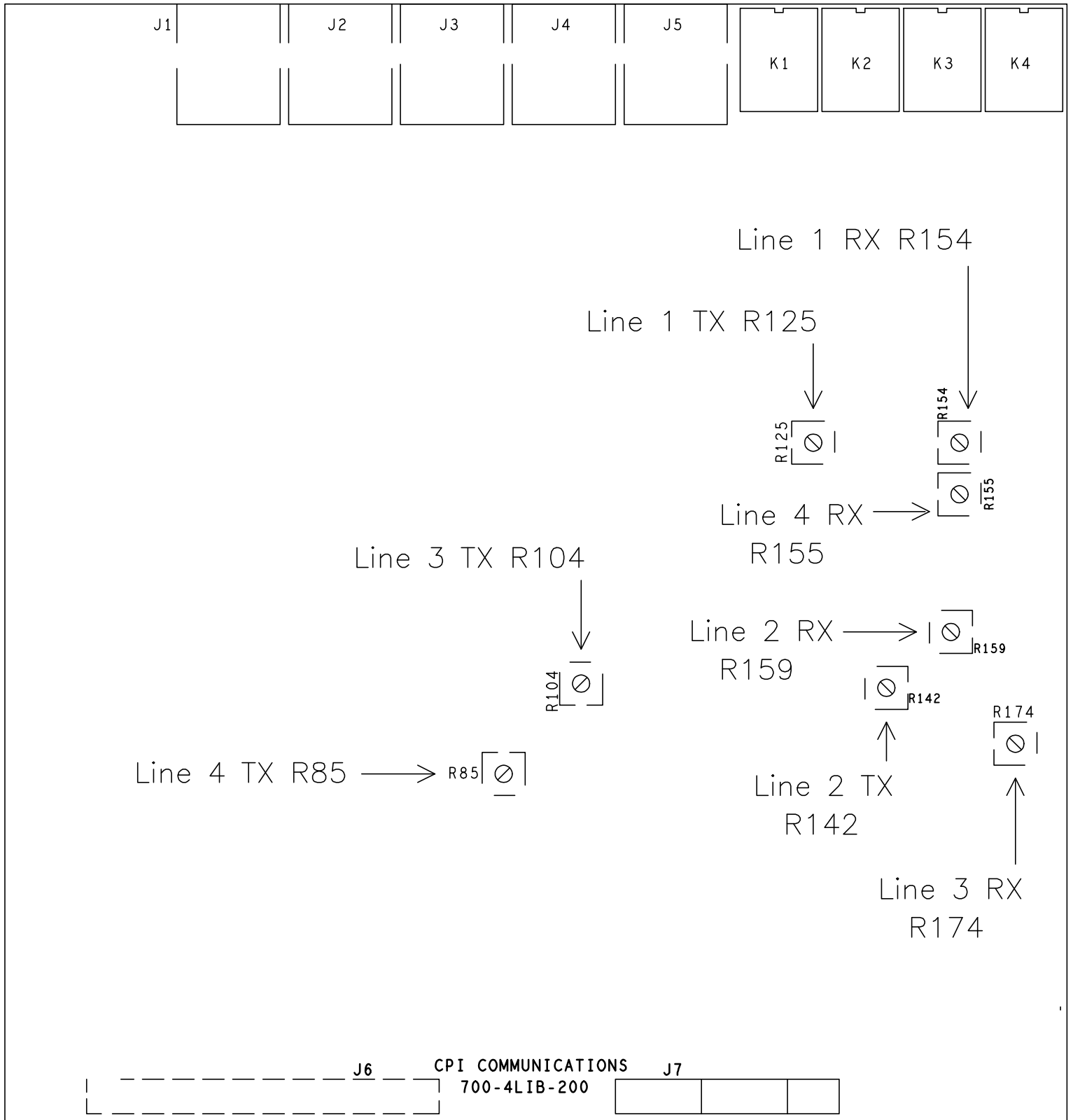
Optional Footswitch Connection

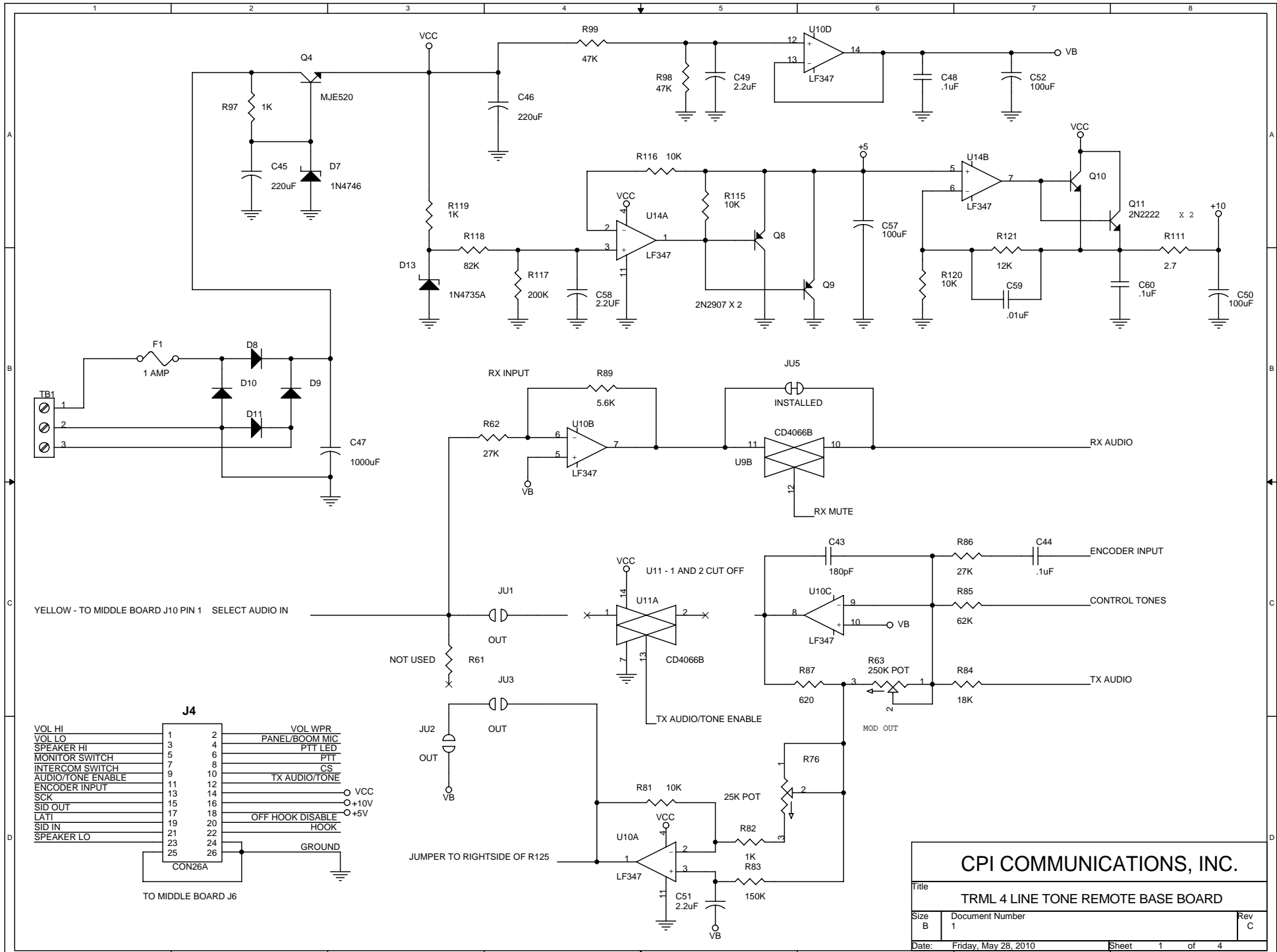
2 WIRE / 4 WIRE RX AUDIO	4 WIRE TX AUDIO	CONTACT CLOSURE	DESK MIC	HEADSET
1 2 3 4 5 6 7 8 L4 2W / 4W RX- L4 2W / 4W RX+ L3 2W / 4W RX- L3 2W / 4W RX+ L1 2W / 4W RX- L1 2W / 4W RX+ L2 2W / 4W RX- L2 2W / 4W RX+	1 2 3 4 5 6 7 8 L4 4W TX- L4 4W TX+ L3 4W TX- L3 4W TX+ L1 4W TX- L1 4W TX+ L2 4W TX- L2 4W TX+	1 2 3 4 5 6 7 8 LOCAL 4- LOCAL 4+ LOCAL 3- LOCAL 3+ LOCAL 1- LOCAL 1+ LOCAL 2- LOCAL 2+	1 2 3 4 5 6 7 8 DESK MIC BIAS DESK MIC HI DESK MIC PTT NOT USED GROUND MONITOR SWITCH	1 2 3 4 5 6 7 8 VCC HEADSET MIC HI HEADSET PTT HEADSET EARPIECE GROUND MONITOR SWITCH

## **WARRANTY**

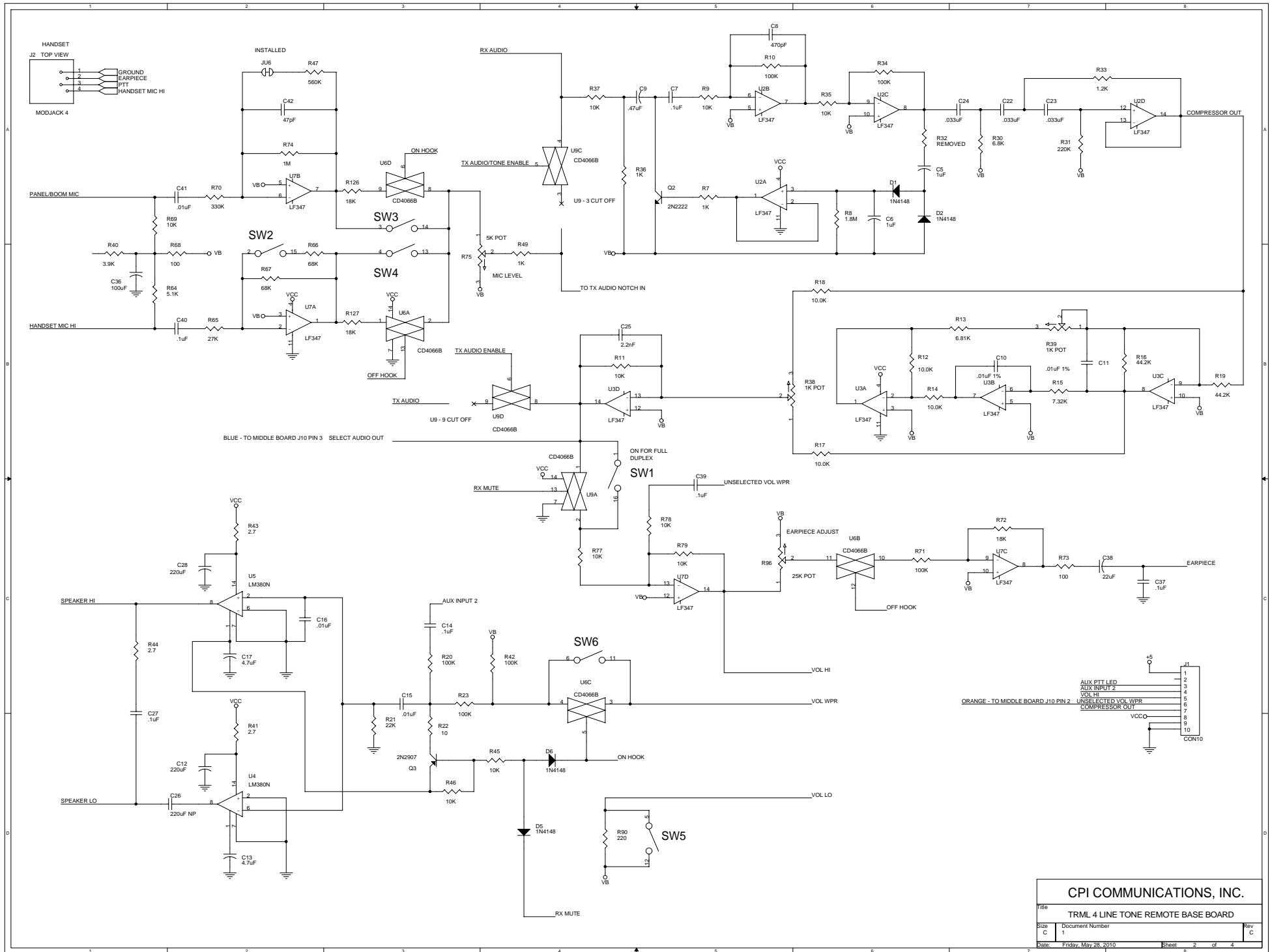
CPI Communications, Inc. warrants each product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defects or to furnish a new part in exchange for any part of any unit of its manufacturer which under normal installation use or service disclosed such defects, provided the unit is delivered by the customer to our authorized service center intact, with all transportation charges pre paid within two years from the date shipment to original purchaser. Exceptions are semiconductors which carry only the manufacture'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, not to furnish 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 sale of our products. CPI Communications, Inc. shall never be liable for consequential or indirect damages.

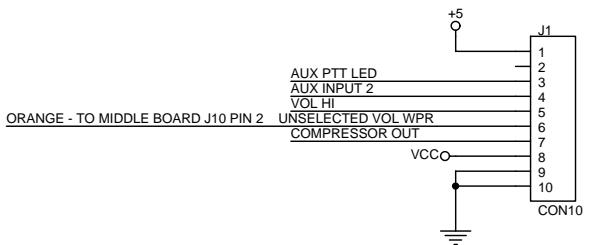
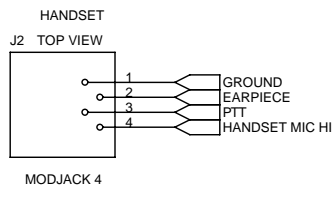
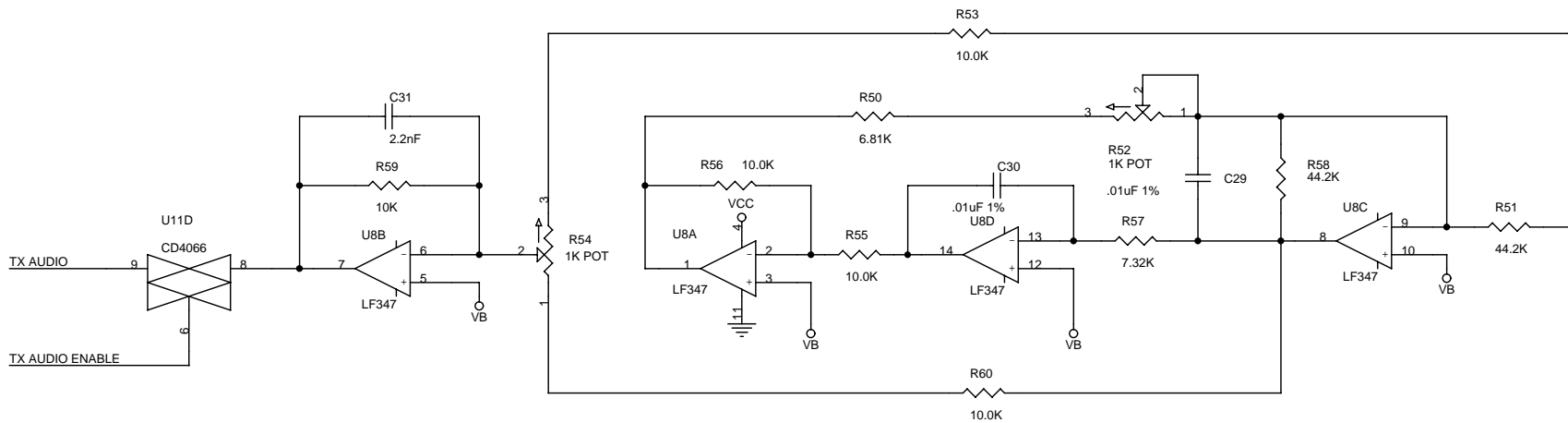
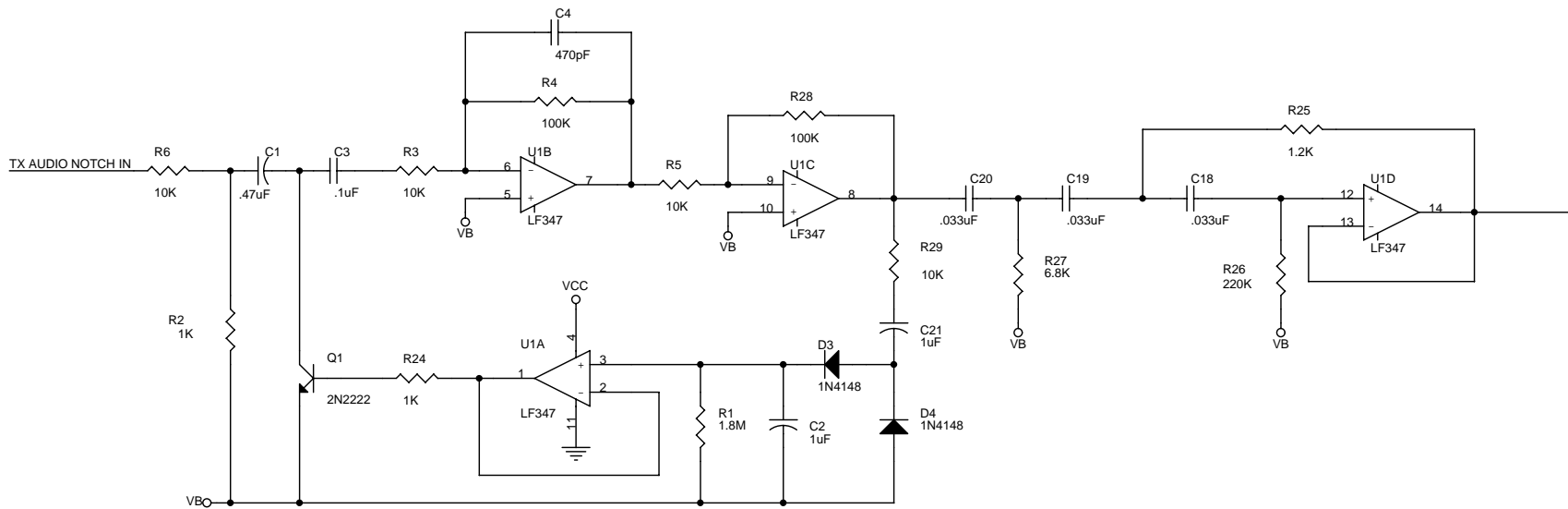




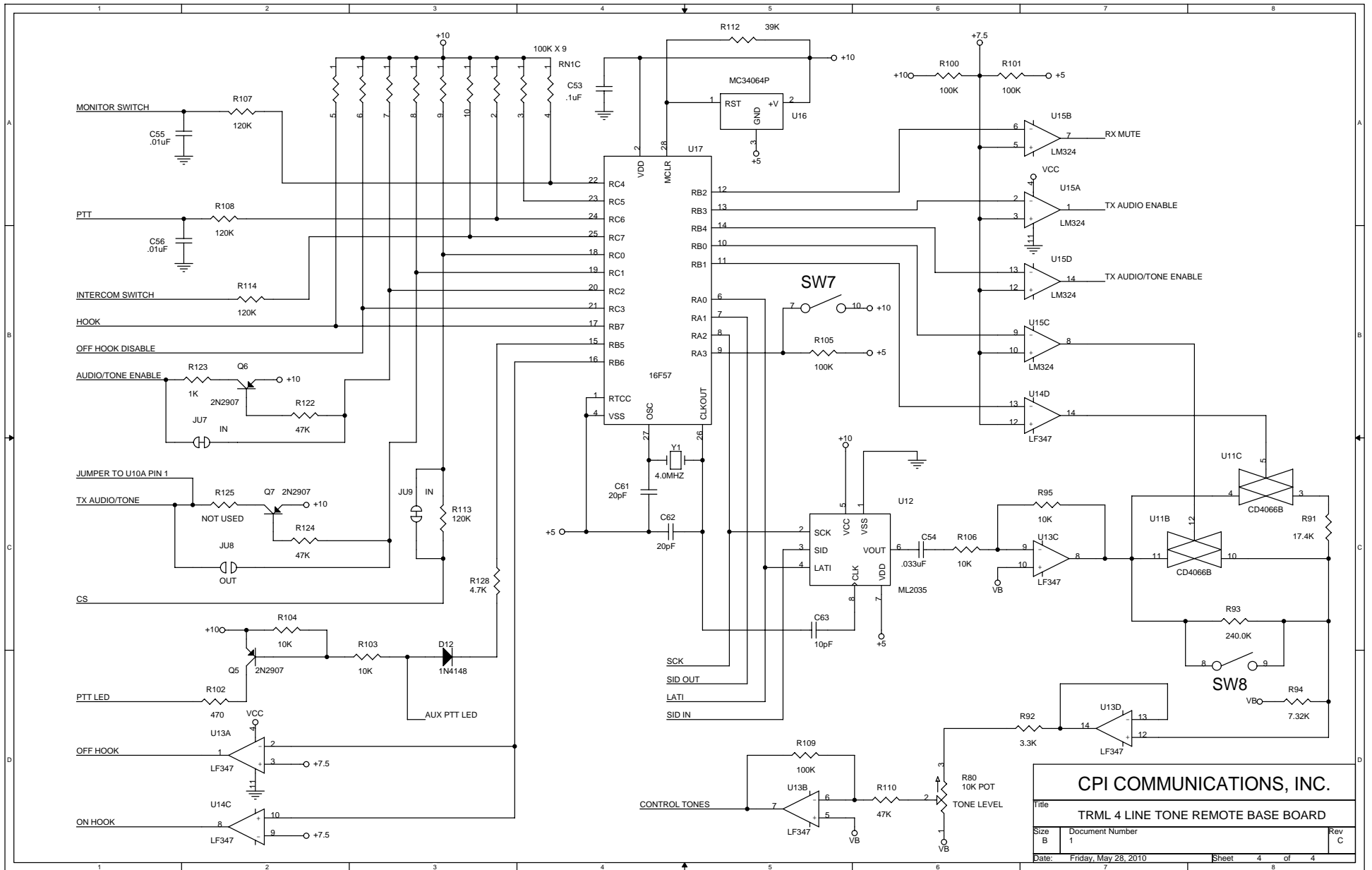
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Size B	Document Number 1	Rev C
Date: Friday, May 28, 2010	Sheet 1	of 4



<b>CPI COMMUNICATIONS, INC.</b>		
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Size	Document Number	Rev
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Date:	Friday, May 28, 2010	Sheet 2 of 4



<b>CPI COMMUNICATIONS, INC.</b>		
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Size B	Document Number 1	Rev C
Date: Friday, May 28, 2010	Sheet 3	of 4



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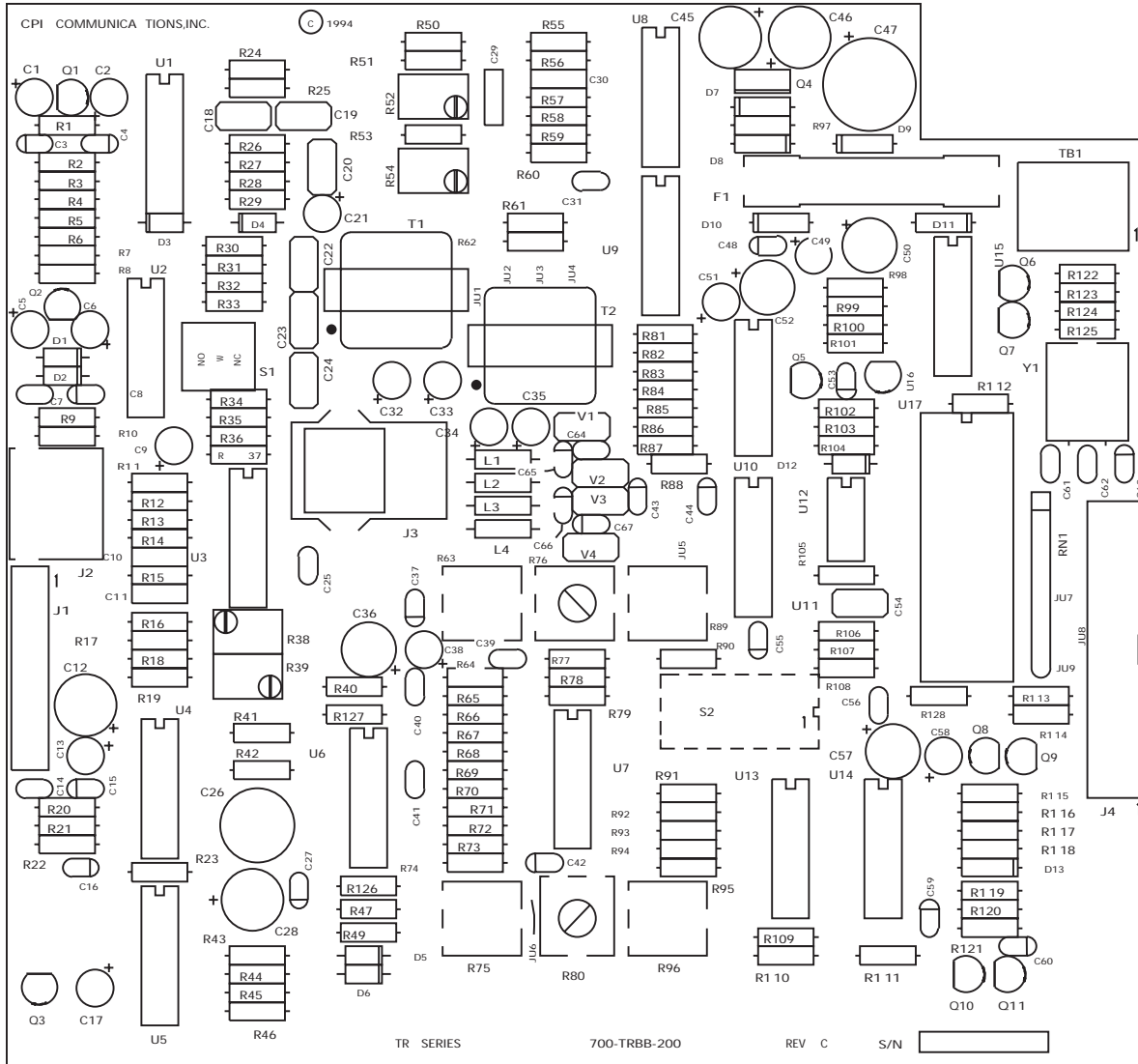
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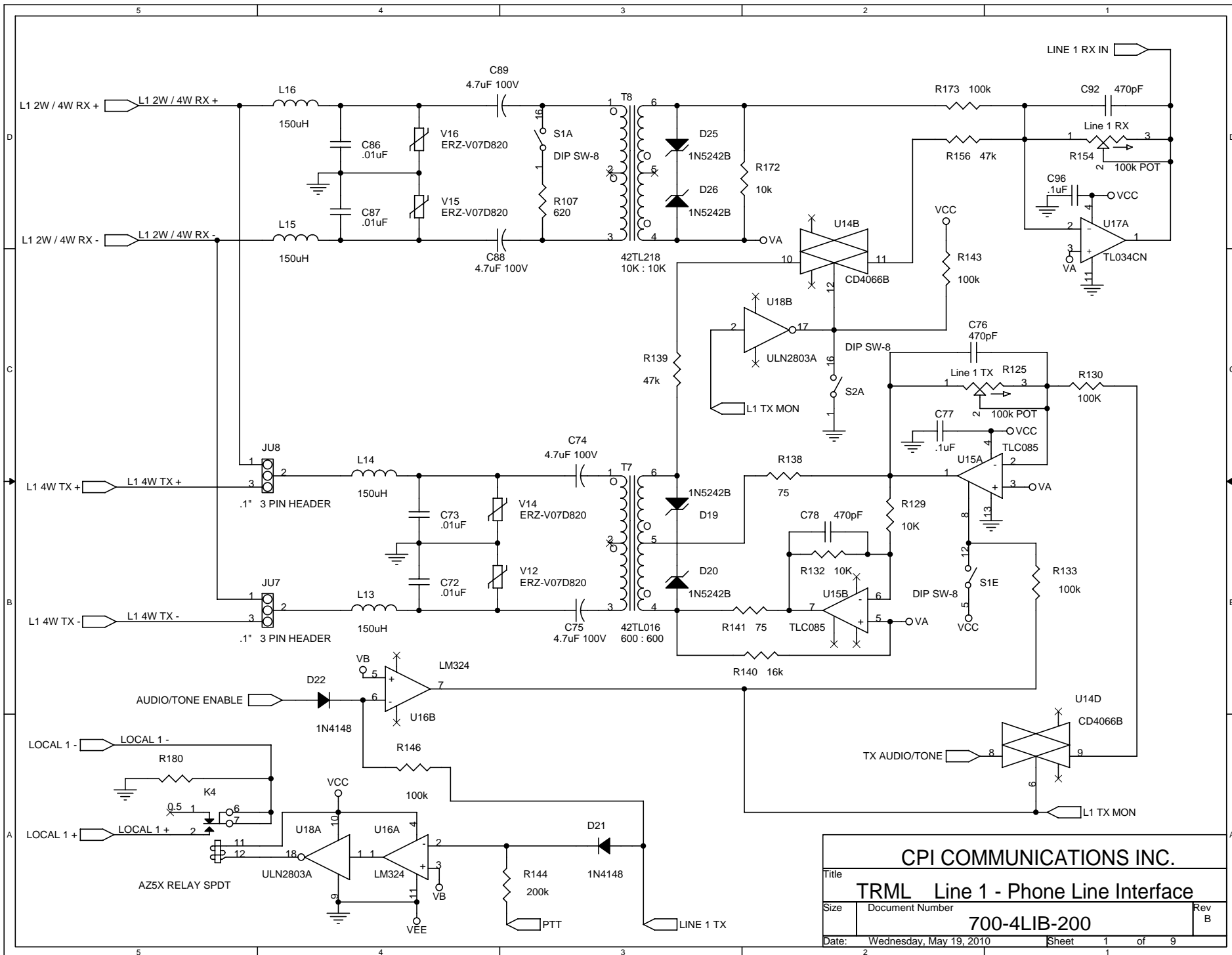
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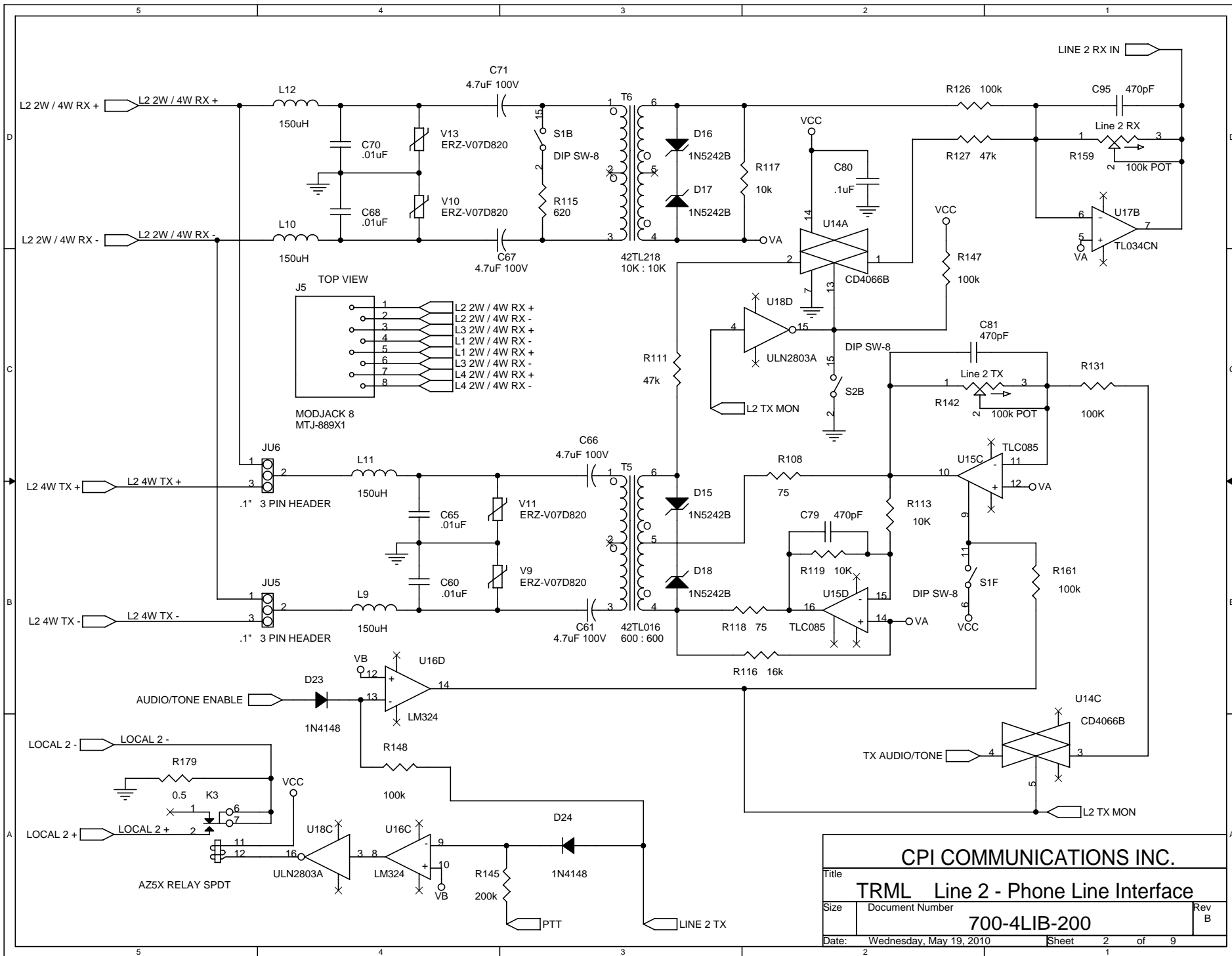


# 700-TRBB-100 Component Locations

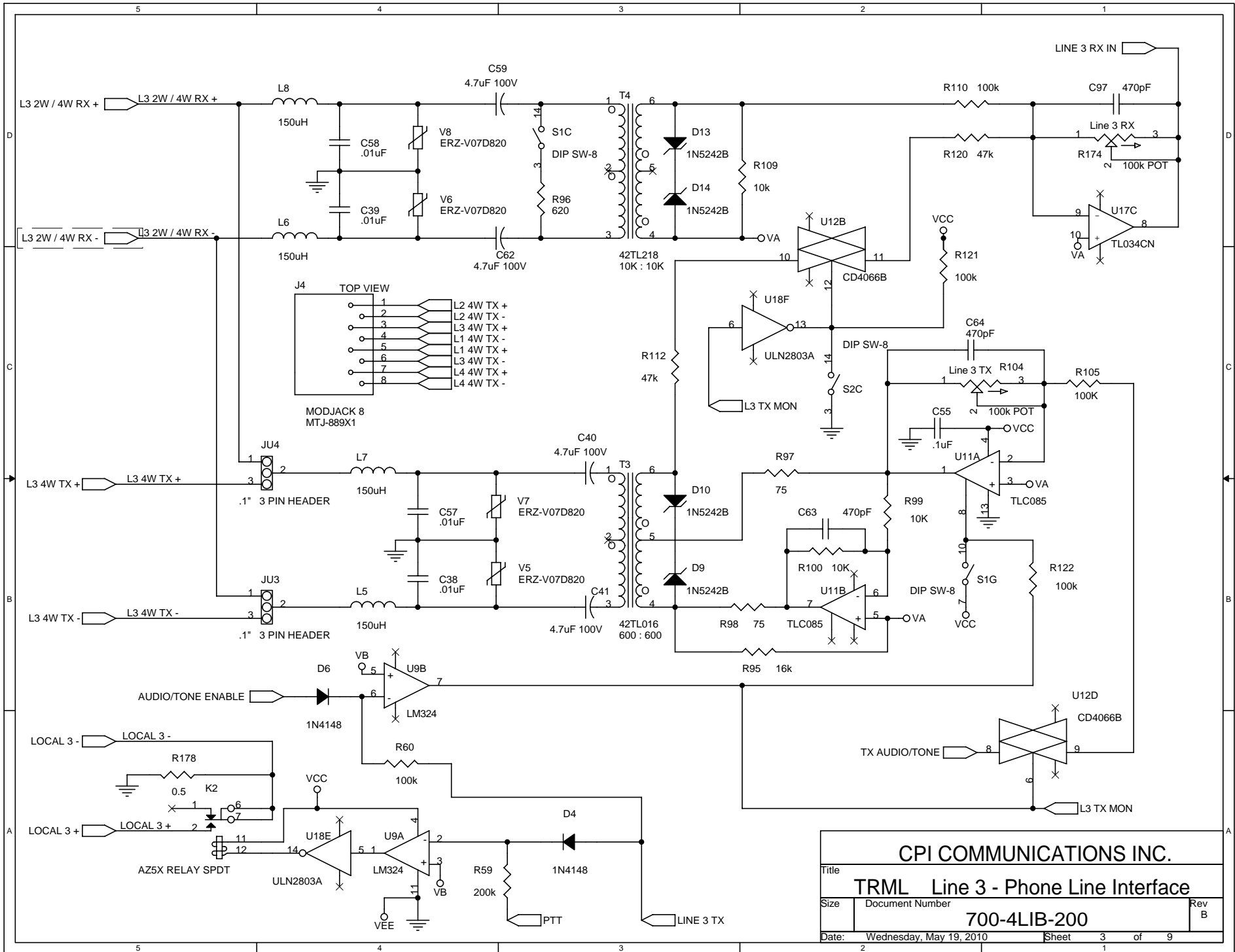




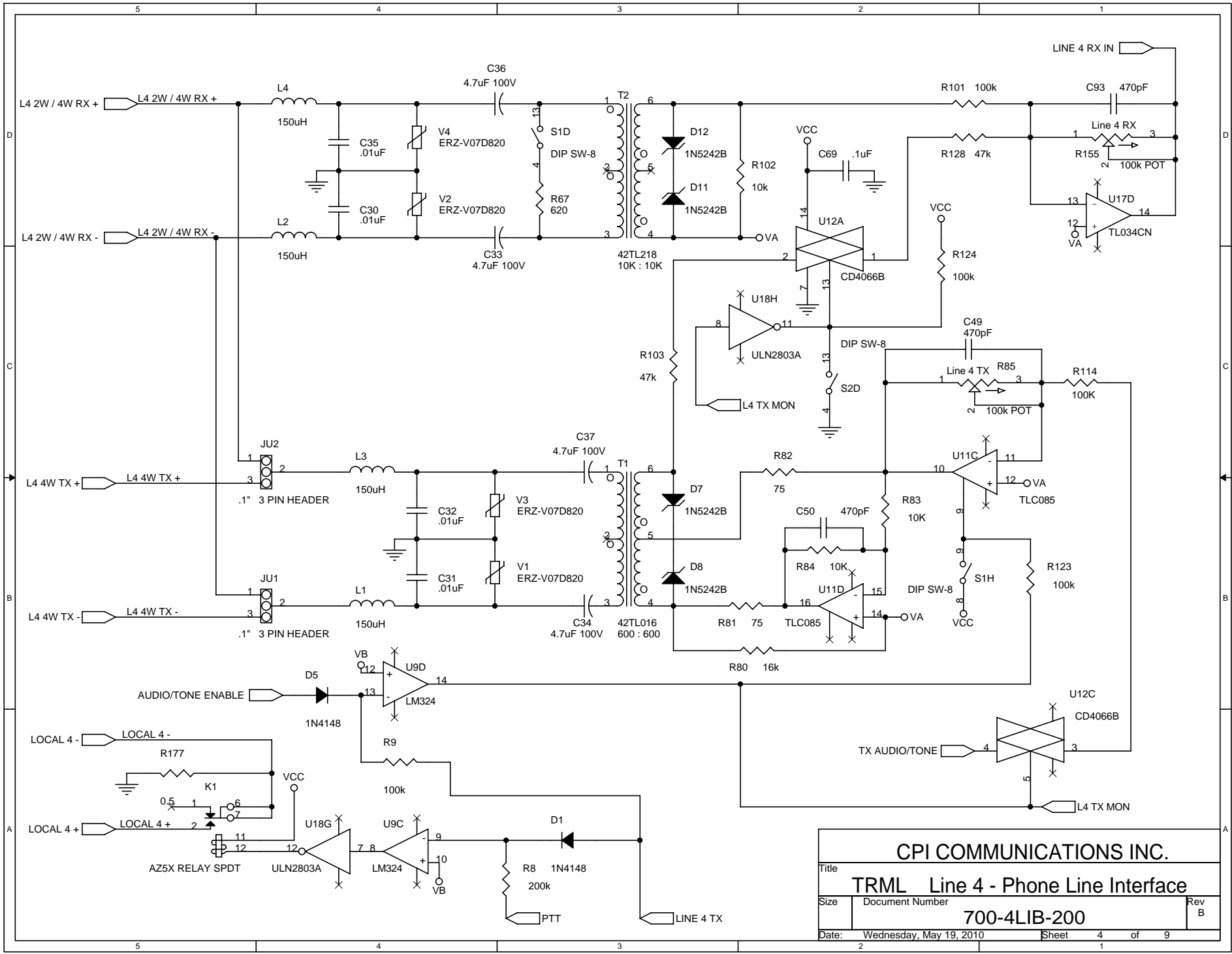
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Size	Document Number	Rev B
700-4LIB-200		
Date: Wednesday, May 19, 2010	Sheet	1 of 9
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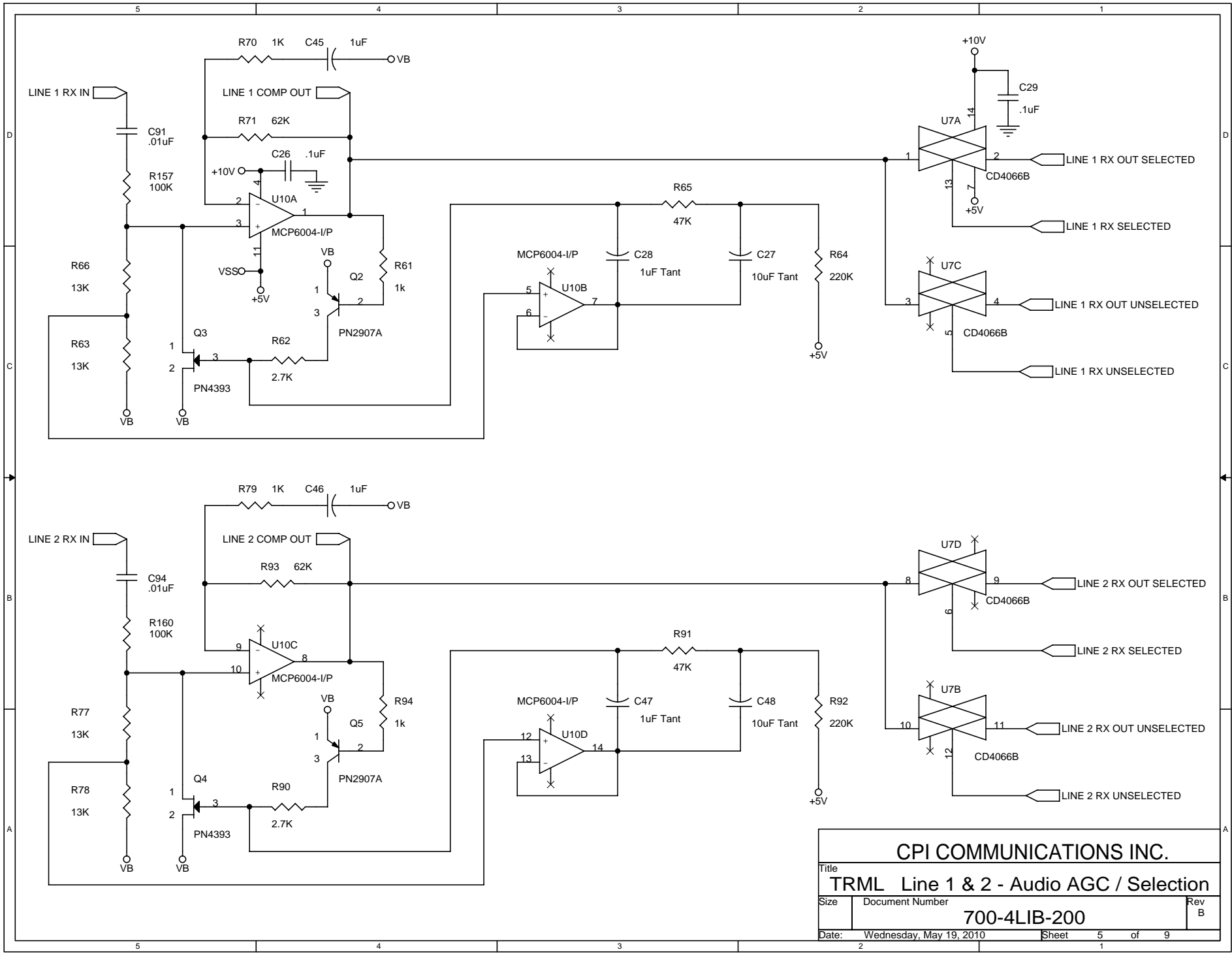
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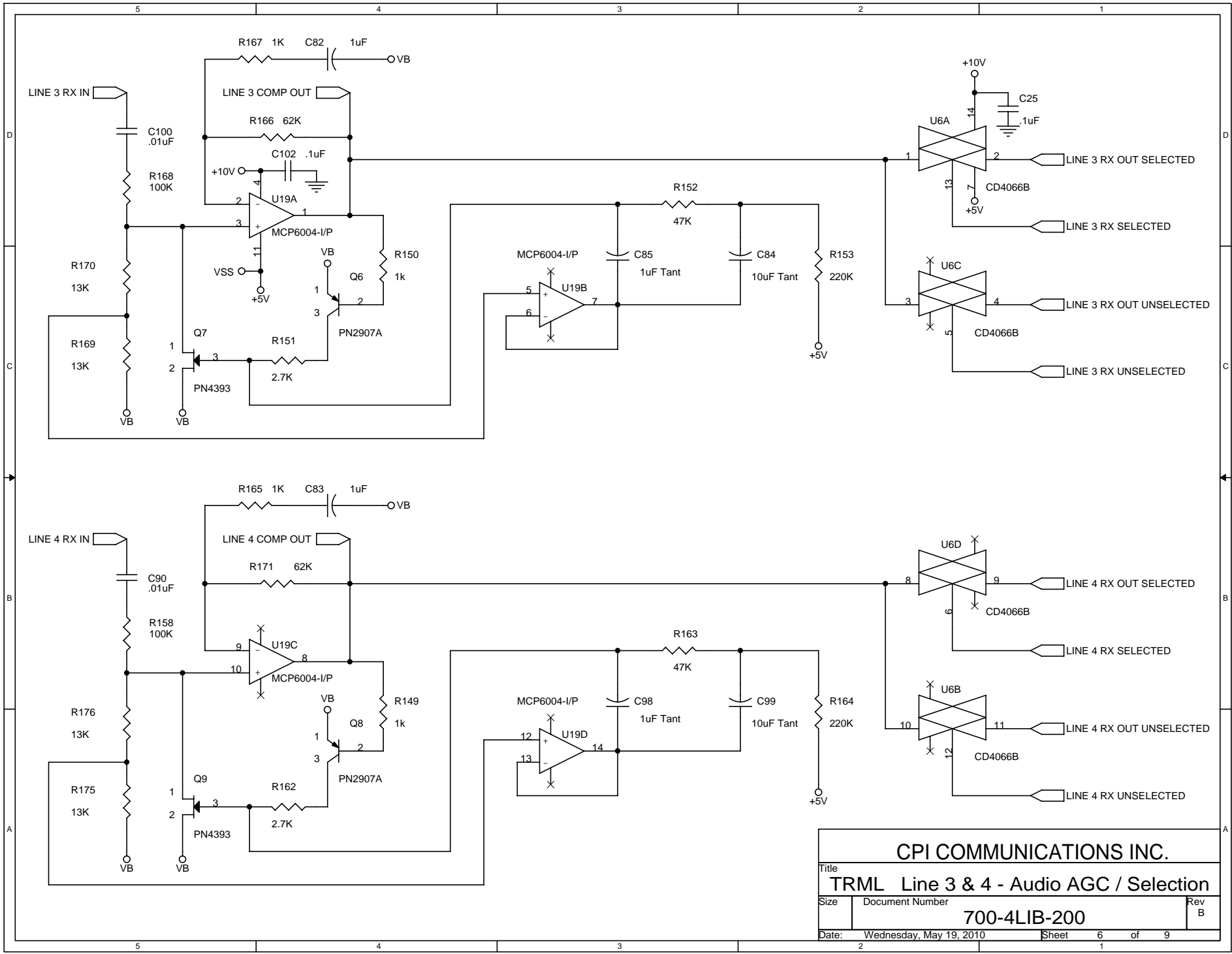
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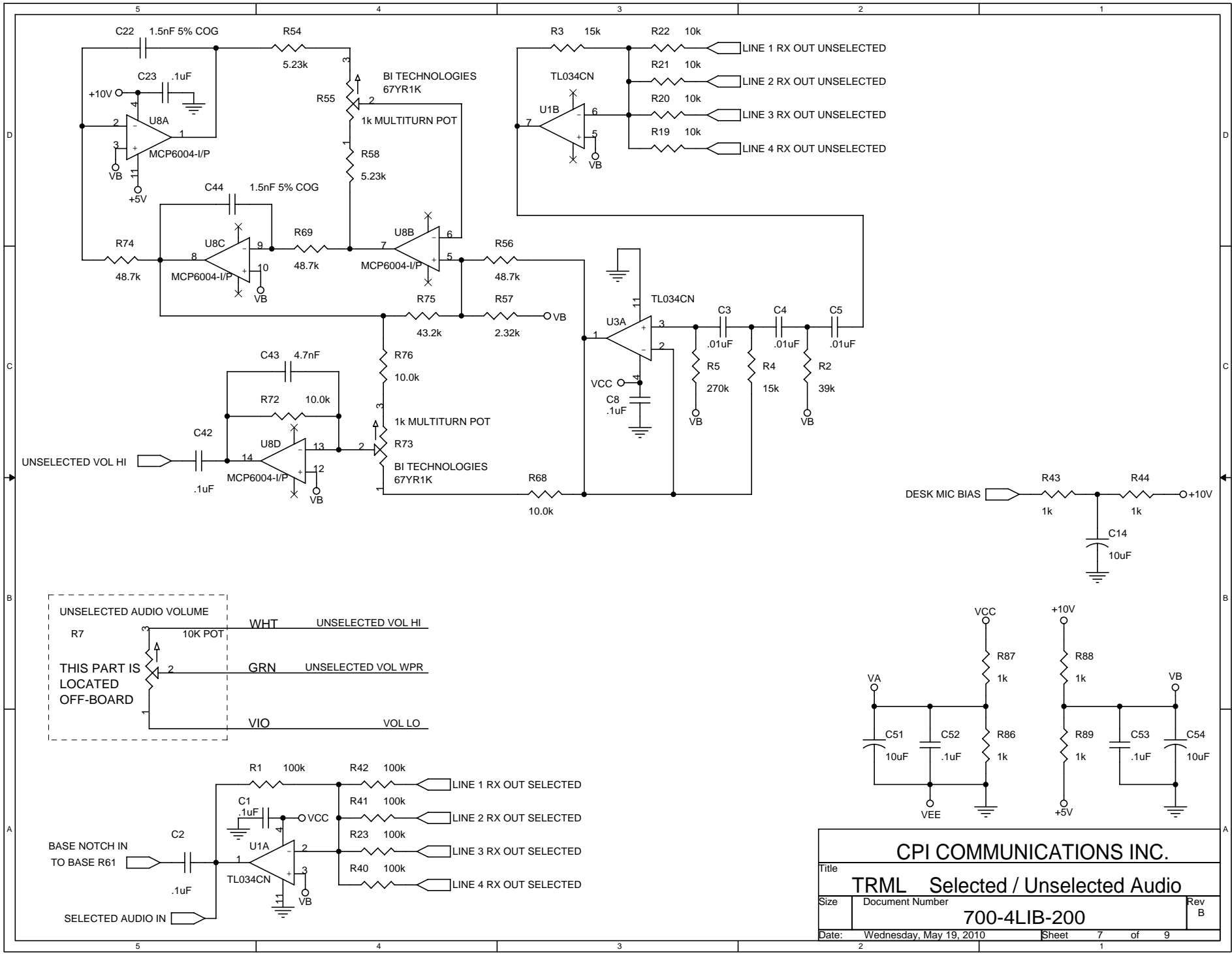
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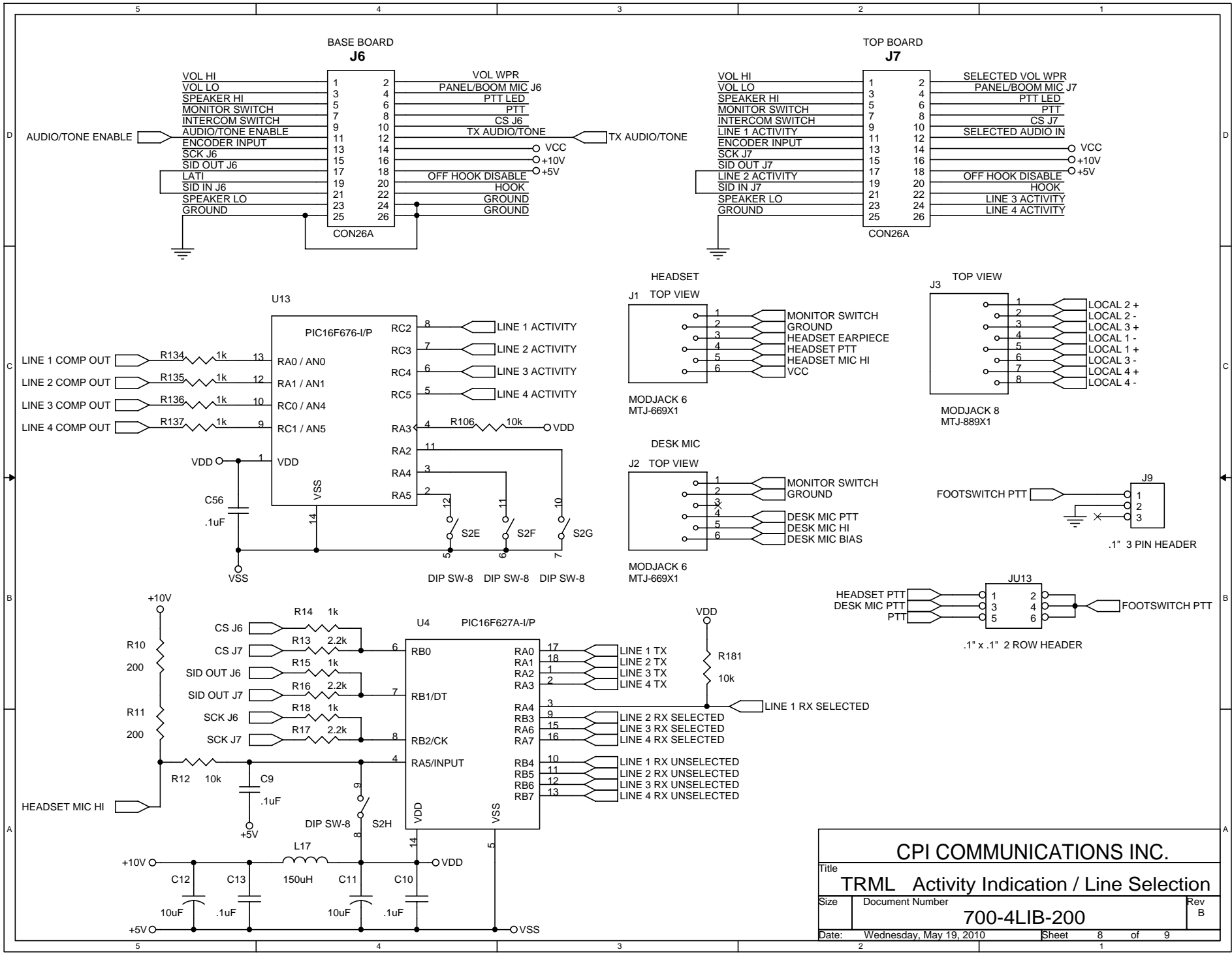


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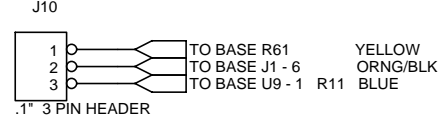
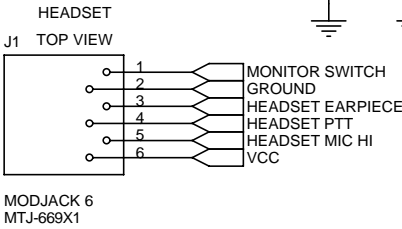
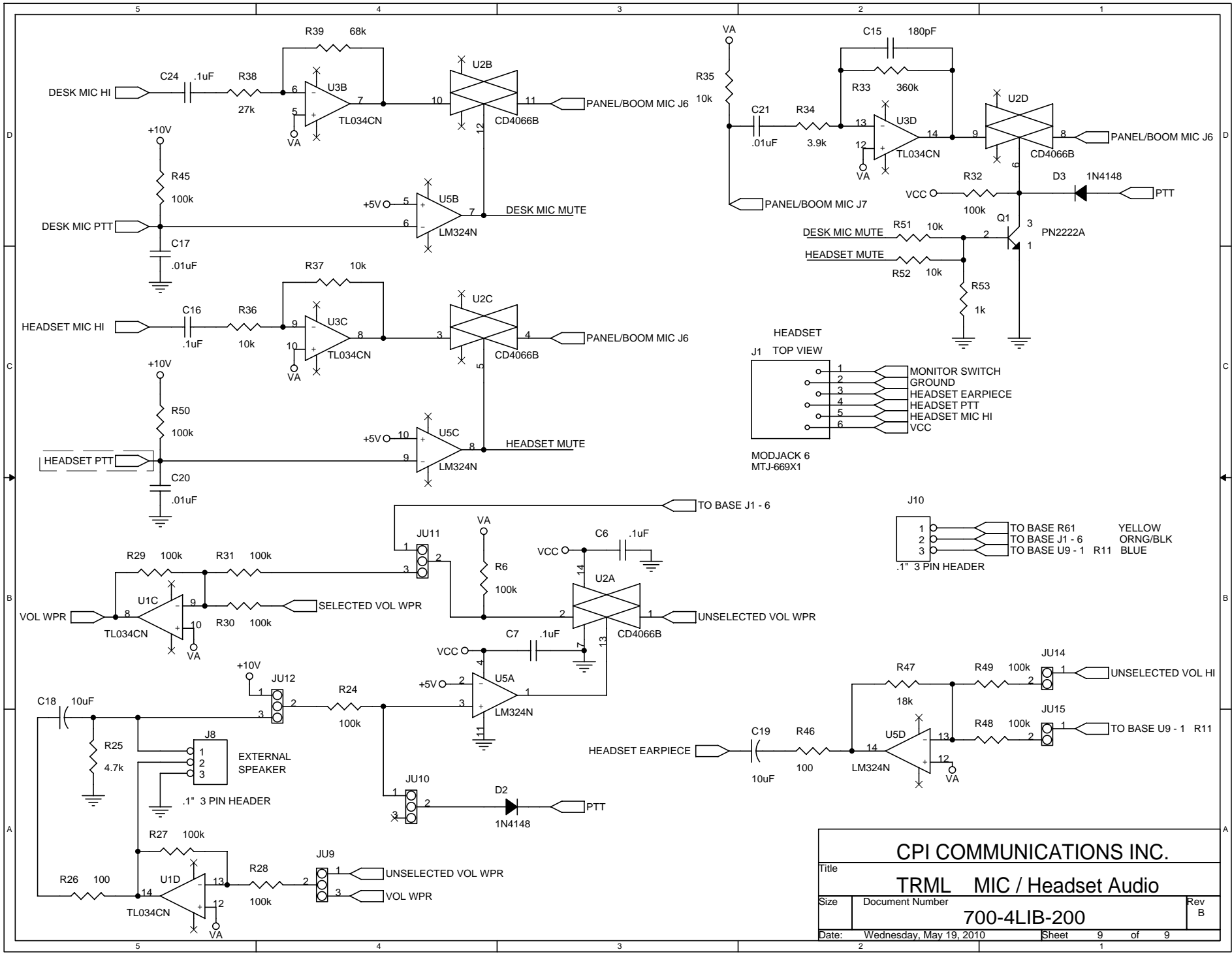


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Size	Document Number	Rev
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Date:	Wednesday, May 19, 2010	Sheet 7 of 9
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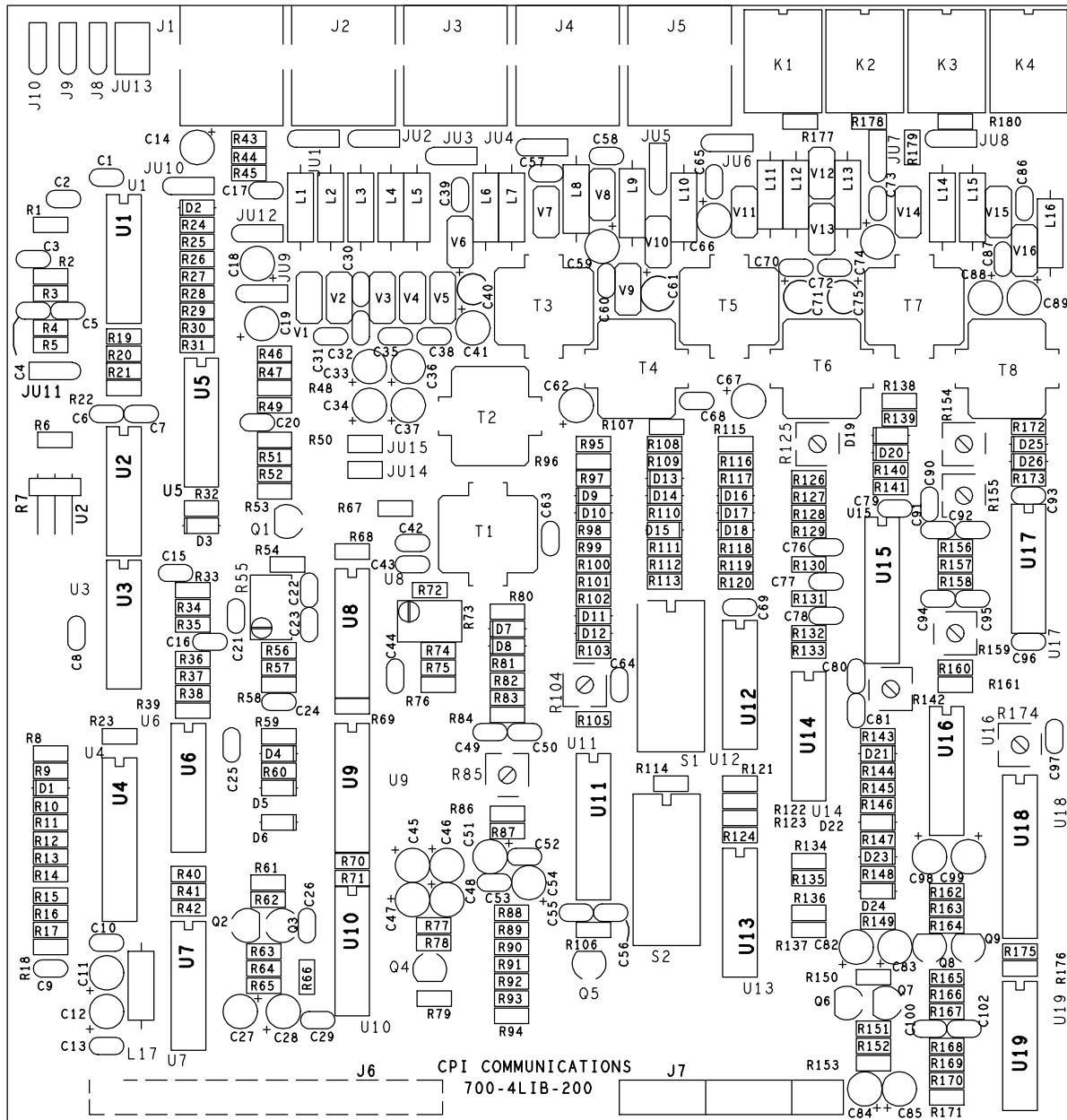


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Size	Document Number	Rev
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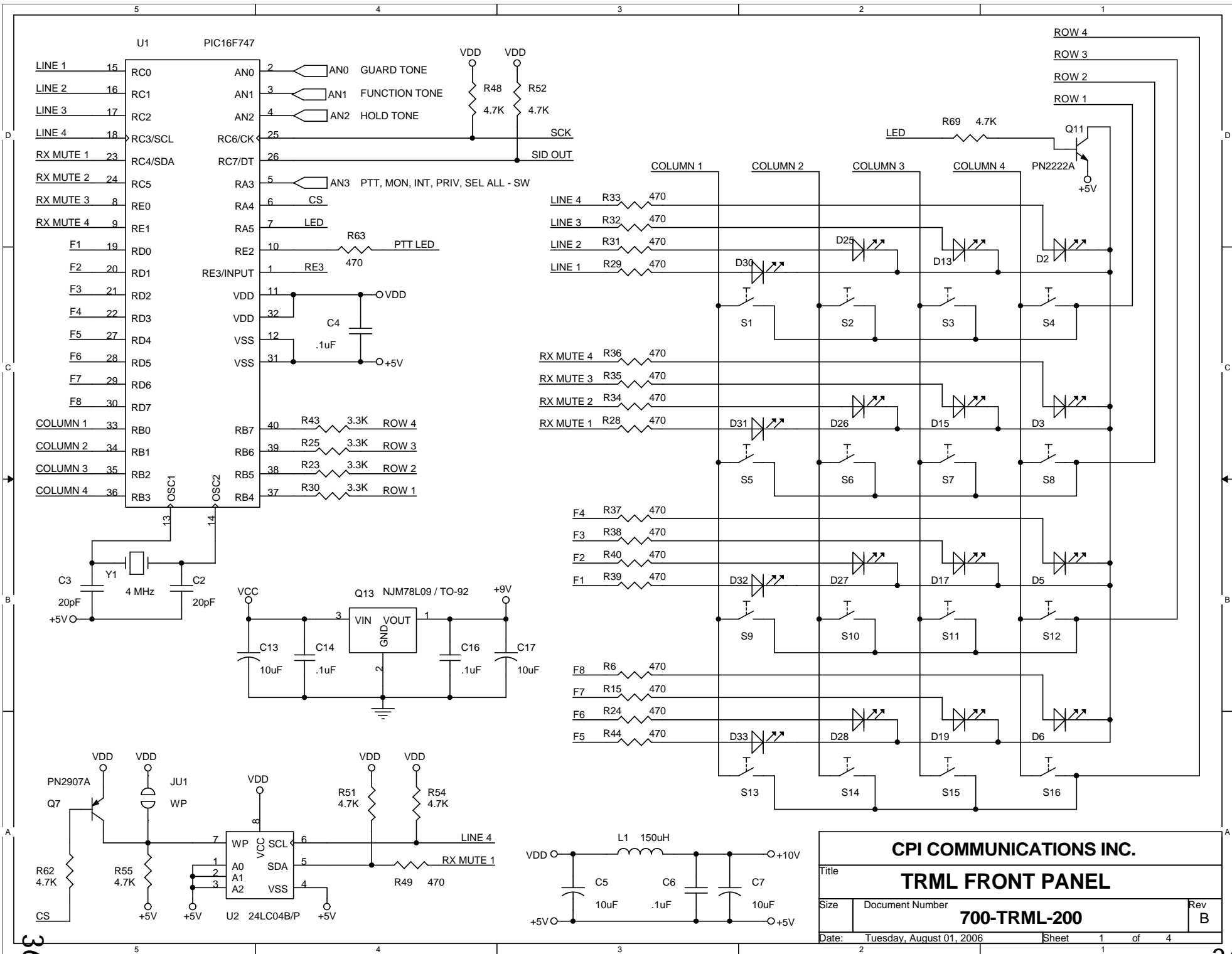


CPI COMMUNICATIONS INC.		
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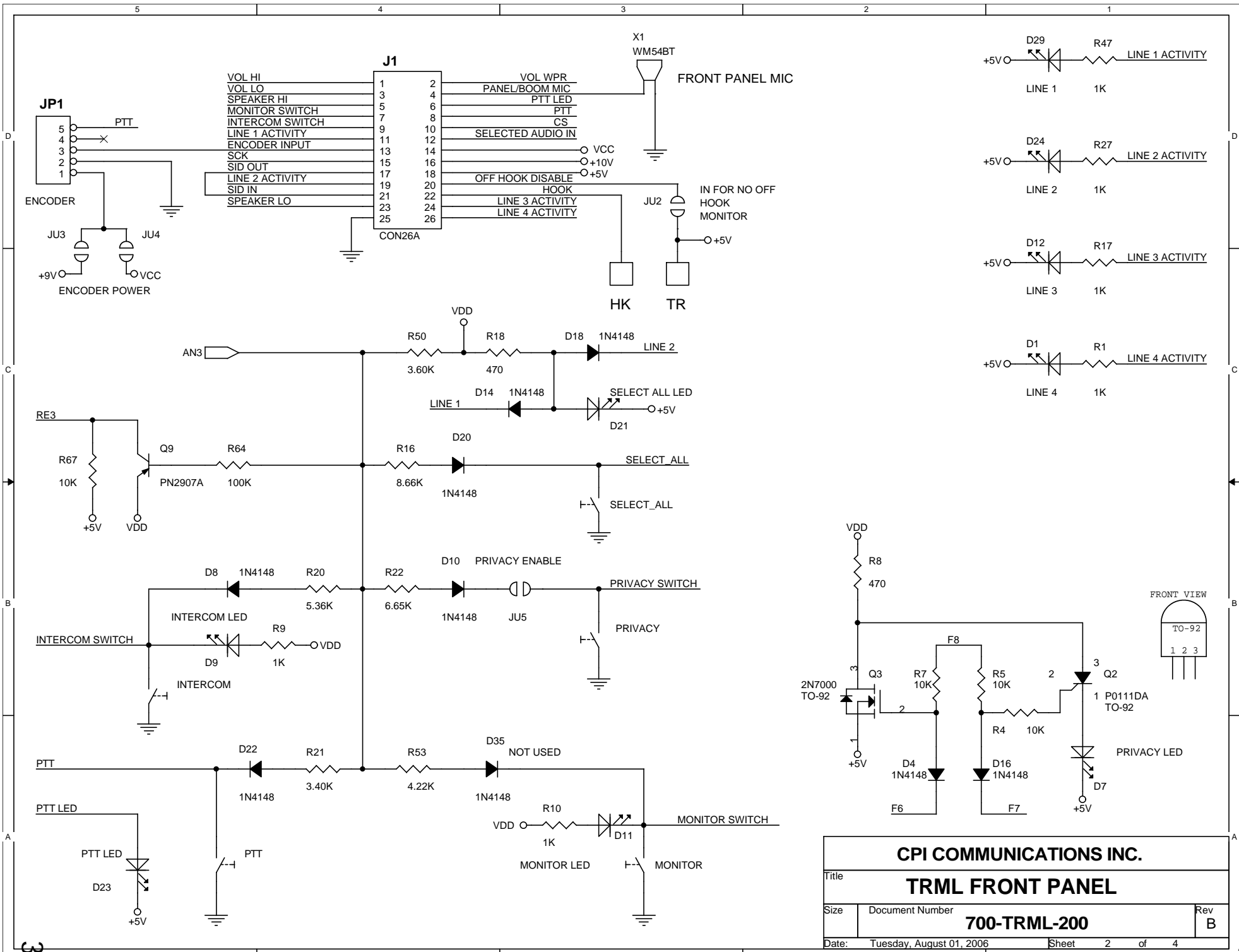
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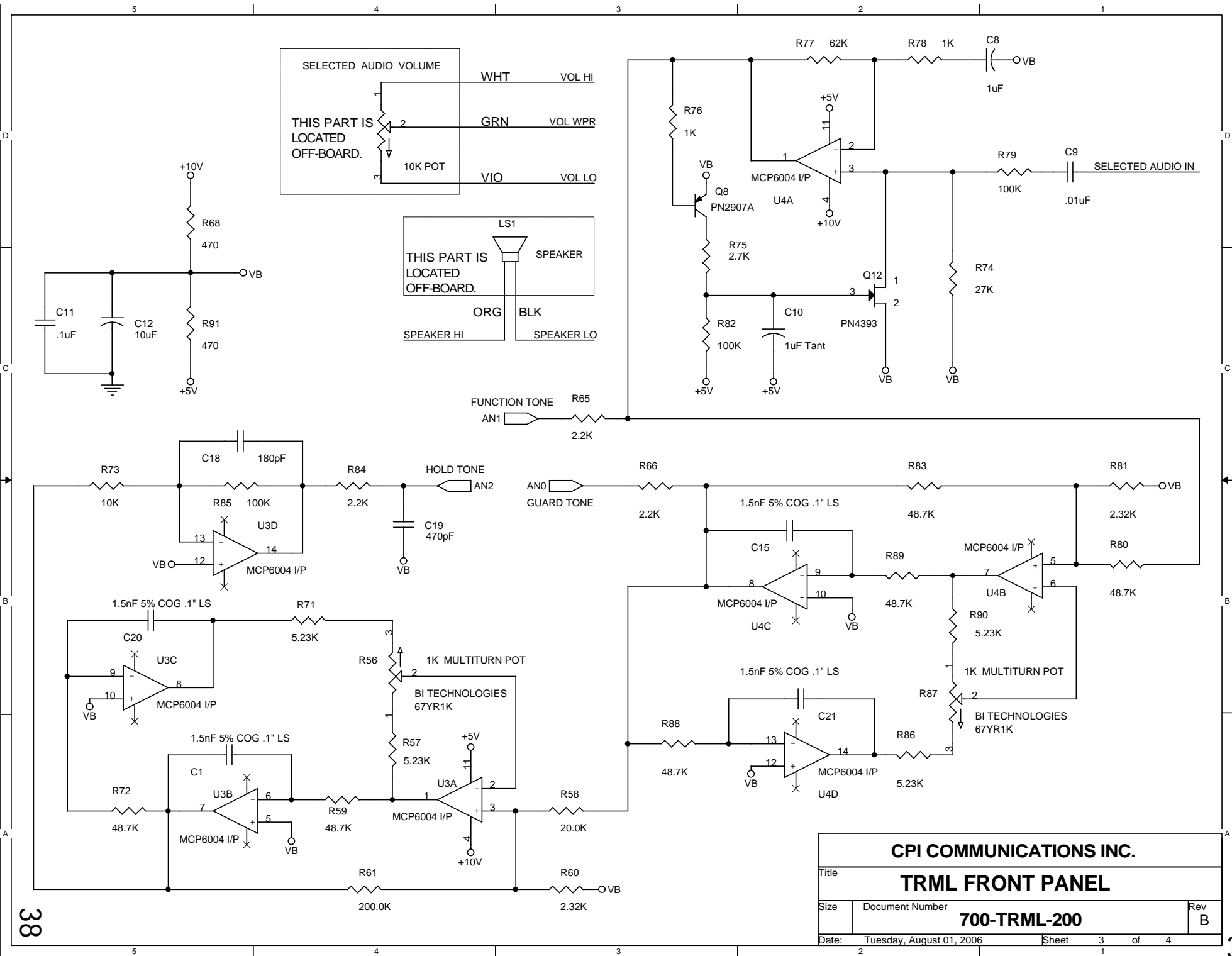
CPI COMMUNICATIONS  
P/N 700-4LIB-200  
TOP SILKSCREEN



<b>CPI COMMUNICATIONS INC.</b>		
<b>TRML FRONT PANEL</b>		
Size	Document Number	Rev
	<b>700-TRML-200</b>	<b>B</b>
Date:	Tuesday, August 01, 2006	Sheet 1 of 4

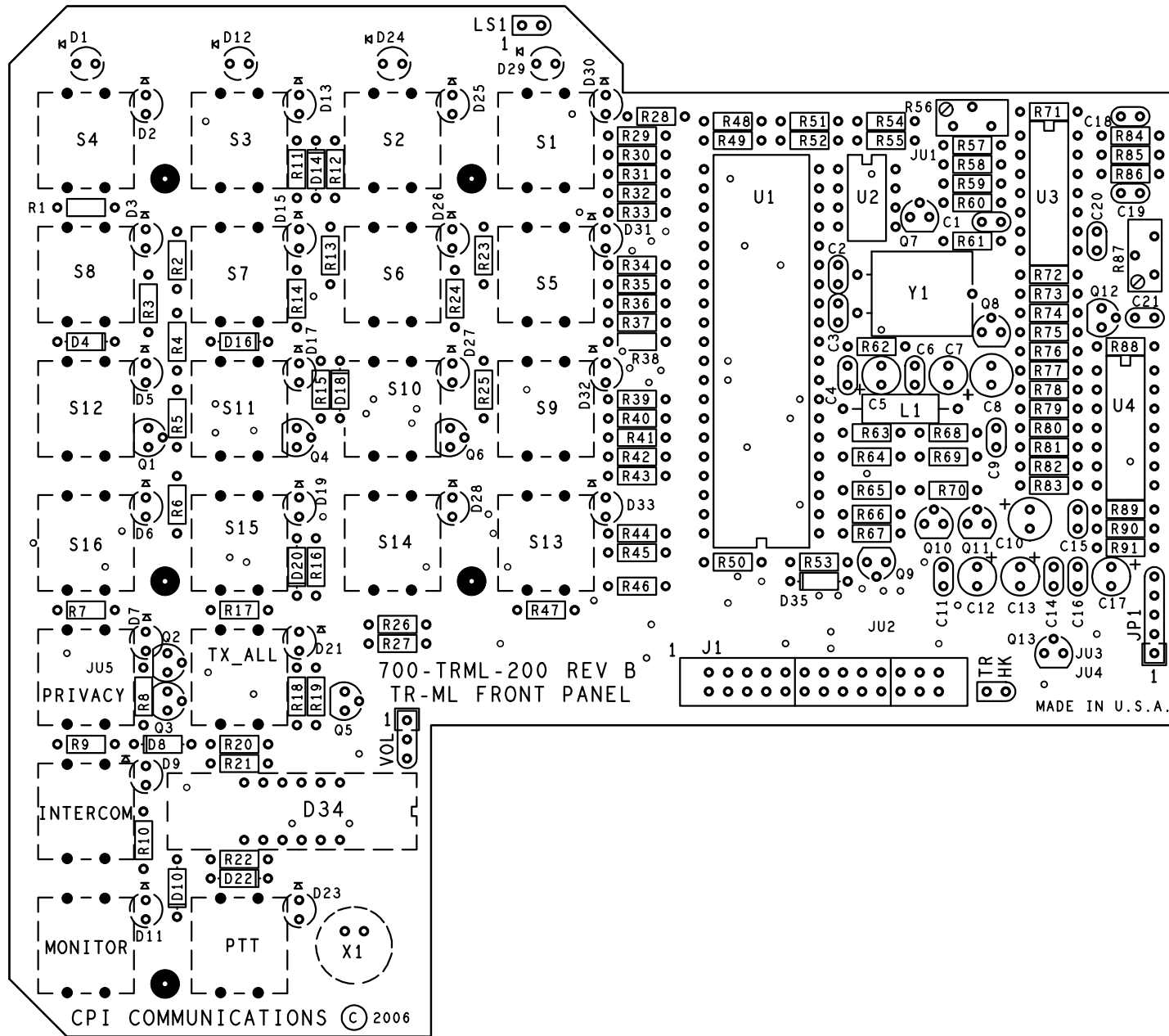


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<b>Title</b>		
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<b>CPI COMMUNICATIONS INC.</b>		
<b>TRML FRONT PANEL</b>		
Size	Document Number	Rev
	<b>700-TRML-200</b>	<b>B</b>
Date:	Tuesday, August 01, 2006	Sheet 3 of 4

Component Layout 700-TRML-200



**PARTS LIST for 900-TRBB-100(BASE BOARD) modified for TRML**

QTY PER	CPI PART#	DESCRIPTION	REF DESIGNATION	NOTES
4	242-0001-027	2.7 ohm 1/4 watt	R41,43,44,111	
2	242-0001-101	100 ohm 1/4 watt	R68,73	
1	242-0001-221	220 ohm 1/4 watt	R90	
1	242-0001-471	470 ohm 1/4 watt	R102	
1	242-0001-621	620 ohm 1/4 watt	R87	
8	242-0001-102	1K 1/4 watt	R2,7,24,36,49,82,97,119	
1	242-0001-122	1.2K 1/4 watt	R33	
1	242-0001-332	3.3K 1/4 watt	R92	
1	242-0001-122	1.2K 1/4 watt	R25	
1	242-0001-392	3.9K 1/4 watt	R40	
1	242-0001-472	4.7K 1/4 watt	R128	
1	242-0001-512	5.1K 1/4 watt	R64	
1	242-0001-562	5.6K 1/4 watt	R89	
2	242-0001-682	6.8K 1/4 watt	R27,30	
21	242-0001-103	10K 1/4 watt	R3,5,6,9,11,29,35,37,59,69,77,78,79,81,95,103, 104,106,115,116,120	
1	242-0001-027	12K 1/4 watt	R121	
4	242-0001-183	18K 1/4 watt	R72,84,126,127	
1	242-0001-223	22K 1/4 watt	R21	
3	242-0001-273	27K 1/4 watt	R62,65,86	
1	242-0001-393	39K 1/4 watt	R112	
5	242-0001-473	47K 1/4 watt	R98,99,110,122,124	
1	242-0001-623	62K 1/4 watt	R85	
2	242-0001-683	68K 1/4 watt	R66,67	
2	242-0001-823	82K 1/4 watt	R45,118	
12	242-0001-104	100K 1/4 watt	R4,10,20,23,28,34,42,71,100,101,105,109	
4	242-0001-124	120K 1/4 watt	R107,108,113,114	
1	242-0001-154	150K 1/4 watt	R83	
1	242-0001-204	200K 1/4 watt	R117	
2	242-0001-224	220K 1/4 watt	R26,31	
1	242-0001-334	330K 1/4 Watt	R70	
1	242-0001-564	560K 1/4 watt	R47	
1	242-0001-105	1 MEG 1/4 watt	R74	
2	242-0001-185	1.8MEG 1/4 watt	R1,8	
2	242-0013-681	6.81K 1% 1/4 watt	R13,50	
3	242-0013-732	7.32K 1% 1/4 watt	R15,57,94	
8	242-0014-100	10K 1% 1/4 watt	R12,14,17,18,53,55,56,60	
1	242-0014-174	17.4K 1% 1/4 watt	R91	
4	242-0014-442	44.2K 1% 1/4 watt	R16,19,51,58	
1	242-0015-240	240K 1% 1/4 watt	R93	
1	242-0117-104	100K resistor ntwrk	RN1	
1	242-0101-502	PT10V-5K	R75	
1	242-0101-103	PT10V-10K	R80	



2	242-0101-253	PT10V-25K	R76,96	
1	242-0101-254	PT10V-250K	R63	
4	242-0104-102	1K Multi Turn Pot	R38,39,52,54	
1	208-0001-106	10 Pf cer	C63	
2	208-0001-200	20 Pf cer	C61,62	
2	208-0002-471	470 Pf cer	C4,C8	
4	208-0071-103	.01 uf 1% dip 100V	C10,11,29,30	
1	208-0071-181	180 Pf cer Mono	C43	
2	208-0071-222	2200 Pf Mono dip	C25,31	
1	208-0071-470	47 Pf Mono dip	C42	
10	208-0092-103	.01 uf Mono dip	C15,16,41,55,56,59,64,65,66,67	
11	208-0092-104	.1 uf Mono dip	C3,7,14,27,37,39,40,44,48,53,60	
7	208-0212-333	.033 uf Mylar	C18,19,20,22,23,24,54	
4	208-2021-107	100 uf E/R	C36,50,52,57	
4	208-2021-227	220 uf E/R	C12,28,45,46	
1	208-2022-226	22 uf E/R	C38	
1	208-2031-108	1000 uf E/R 25V	C47	
1	208-2031-227	220 uf E/R NP	C26	
4	208-2062-475	4.7 uf 100V E/R	C32,33,34,35	
4	208-4052-105	1 uf E/R LL	C2,5,6,21	
3	208-4052-225	2.2 uf E/R LL	C49,51,58	
2	208-4052-474	.47 uf E/R LL	C1,9	
2	208-4042-475	4.7 uf E/R LL	C13,17	
6	212-0001-001	1N4148 / 1N914	D1,2,3,4,5,12	
4	212-0002-004	1N4004	D8,9,10,11	
1	212-0100-008	1N4735A	D13	
1	212-0100-019	1N4746	D7	
2	256-0010-001	Fuse Clip	F1	
1	228-0041-026	Bottom Entry Jack	J3	
1	228-0101-001	CA26HL-1F Jack/TSR	J4	
4	232-0000-150	150uH Choke	L1,2,3,4	
4	240-2222-000	2N2222	Q1,2,10,11	
5	240-2907-000	2N2907	Q5,6,7,8,9	
1	212-0001-002	MJE521	Q4	
1	258-0002-002	4 MHz Crystal	Y1	
2	242-0119-330	ERZC05DK330	V1,2,3,4	
1	244-0002-008	Dip SW - K40-8	S2	
1	248-0020-103	Header /3 Pin mod	TB1	
1	256-0001-008	IC Soc 8 Pin	U12	
12	256-0001-014	IC Soc 14 Pin	U1,2,3,6,7,8,9,10,11,13,14,15	
1	256-0001-028	IC Soc 28 Pin	U17	
3	412-4066-000	CD4066BE	U6,9,11	

1	420-0324-000	LM324	U15	
2	420-0380-000	LM380	U4,5	
8	420-L347-000	LF347	U1,2,3,7,8,10,13,14	
1	420-2035-000	ML2035CP	U12	
1	420-7757-000	TL7757	U16	
1	425-1657-07P	PIC16F57 controller	U17	
1	700-TRBB-200	PCB		

NOTES:

U9 4066 should have pins 3 and 9 removed from IC  
U11 4066 should have pins 1 and 2 removed from IC

Baseboard Jumpers JU5,6,7,9 only installed

Jumper wire from right side of R125 hole to T2 pin 5

Jumper wire from U9 pin 1 to U11 pin 1  
Jumper wire from U9 pin 2 to U11 pin 2

Wiring harness from Middle board (3 pin molex connector J10)  
Yellow wire to left side of R61 hole  
Orange/black to J1 pin 6  
Blue to right side of R11

**PARTS LIST for 900-4LIB-100 (middle board)**

QTY PER	CPI PART#	DESCRIPTION	REF DESIGNATION	NOTES
24	208-0092-104	.1 Uf CK05	C1,2,6,7,8,9,10,13,16,23,24,25,26,29,42,52, 53,55,56,69,77,80,96,102	
26	208-0092-103	.01 uf Mono	C3,4,5,17,20,21,30,31,32,35,38,39,57,58,60, 65,68,70,72,73,86,87,90,91,94,100	
2	208-0092-152	1500 Pf 100V COG Mono	C22,44	
1	208-2021-107	100 Uf E/R	C54	
1	208-0071-181	180 Pf 50V Mono Cer Dip	C15	
12	208-0071-470	470 Pf 100V Mono Dip	C49,50,63,64,76,78,79,81,92,93,95,97	
4	208-0400-105	1 Uf Tant	C28,47,85,98	
6	208-0400-106	10 Uf Tant	C11,12,27,48,84,99	
16	208-2062-475	4.7 Uf 100V E/R	C33,34,36,37,40,41,59,61,62,66,67,71,74, 75,88,89	
4	208-4022-106	10 Uf E/R LL	C14,18,19,51	
4	208-4052-105	1Uf E/R LL	C45,46,82,83	
1	208-0092-475	.0047 Uf Mono	C43	
10	212-0001-001	1N4148 Diode	D1,2,3,4,5,6,21,22,23,24	
16	212-0110-013	1N5242B Zenner	D7,8,9,10,11,12,13,14,15,16,17,18,19,20, 25,26	
17	232-0000-150	150 uH Choke	L1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17	
1	240-2222-000	PN2222A	Q1	
4	240-2907-000	PN2907A	Q2,5,6,8,	
4	240-J201-000	PN4393	Q3,4,7,9	
16	242-0118-820	820 Varistor ERZ07D820	V1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16	
1	242-0018-232	2.32K 1/8W 1%	R57	
2	242-0018-523	5.23K 1/8W 1%	R54,58	
3	242-0018-100	10.0K 1/8W 1%	R68,72,76	
3	242-0119-487	48.7K 1/8W 1%	R56,69,74	
1	242-0019-432	43.2K 1/8W 1%	R75	
8	242-0003-750	75 Ohm 1/8W 5%	R81,82,97,98,108,118,138,141	
2	242-0003-101	100 Ohm 1/8W 5%	R26,46	
2	242-0003-201	200 Ohm 1/8W 5%	R10,11	
4	242-0003-621	620 Ohm 1/8W 5%	R67,96,107,115	
22	242-0003-103	1K 1/8W 5%	R14,15,18,43,44,53,61,70,79,86,87,88,89, 94,134,135,136,137,100,000,000,000	
3	242-0003-222	2.2K 1/8W 5%	R13,16,17	
4	242-0003-272	2.7K 1/8W 5%	R62,90,151,162	
1	242-0003-392	3.9K 1/8W 5%	R34	
1	242-0003-472	4.7K 1/8W 5%	R25	
24	242-0003-103	10K 1/8W 5%	R12,19,20,21,22,35,36,37,51,52,83,84,99, 100,102,106,109,113,117,119,129,132, 172,181	

8	242-0003-133	13K 1/8W 5%	R63,66,77,78,169,170,175,176	
2	242-0003-153	15K 1/8W 5%	R3,4	
4	242-0003-163	16K 1/8W 5%	R80,95,116,140	
1	242-0003-183	18K 1/8W 5%	R47	
1	242-0003-273	27K 1/8W 5%	R38	
1	242-0003-393	39K 1/8W 5%	R2	
12	242-0003-473	47K 1/8W 5%	R65,91,103,111,112,120,127,128,139,152, 156,163	
3	242-0003-623	62K 1/8W 5%	R71,93,166,171	
1	242-0003-683	68K 1/8W 5%	R39	
41	242-0003-104	100K 1/8W 5%	R1,6,9,23,24,27,28,29,30,31,32,40,41,42,45, 48,49,50,60,101,105,110,114,121,122,123, 124,126,130,131,133,143,146,147,148,157, 158,160,161,168,173	
4	242-0003-204	200K 1/8W 5%	R8,59,144,145	
4	242-0003-224	220K 1/8W 5%	R64,92,153,164	
1	242-0003-274	270K 1/8W 5%	R5	
1	242-0003-364	360K 1/8W 5%	R33	
2	242-0104-102	1K Multi Pot	R55,73	
8	242-0108-104	100K Pot LOG-WT	R85,104,125,142,154,155,159,174	
3	228-0005-003	Right Angle Header (3)	R7	
17	228-0003-003	3 Pin Header PH1-3	JU1,2,3,4,5,6,7,8,9,10,11,12 2x13	
4	228-0003-025	2 Pin Header (2)	JU14,15	
1	228-0101-002	26P Jack/PCB Mt	J7	
2	228-0041-186	Mod Jack/JM	J1,2	
	228-0041-006	Mod Jack 8P/Moto/MR	J3,4,5	
15	228-0030-004	Shunt Plug	JU1-15	
4	230-0001-002	Relay	K1-4	
2	244-0002-008	K40-8 Dip Switch	S1,2	
1	600-OTSR-025	26P Cable	J6	
4	246-0100-005	600CT/600CT Audio Transformer 42TL016	T1,3,5,7,	
4	246-0100-006	10KCT/KCT Audio Transformer 42TL218	T2,4,6,8,	
15	256-0001-014	14 Pin Socket	U1,2,3,5,6,7,8,9,10,12,13,14,16,17,19	
2	256-0001-016	16 Pin Socket	U11,15	
2	256-0001-018	18 Pin Socket	U4,18	
1	420-2803-000	ULN2803A	U18	
5	412-4066-000	CD4066B	U2,6,7,12,14	
3	420-0324-000	LM324	U16,9,5	
3	420-L034-000	TL034CN	U1,3,17	
3	425-6004-I/P	MCP6004-I/P	U8,10,19	
2	420-C085-000	TLC085AIN	U11,15	
1	425-F627-I/P	PIC16F627A-I/P	U4	
1	425-F676-I/P	PIC16F676-I/P	U13	
1	700-4LIB-200	PCB		

Parts list for 900-TRML-100 REV B (TOP BOARD)

QTY PER	CPI PART#	DESCRIPTION	REF DESIGNATION	NOTES
2	208-0001-200	20 PF MONO	C2,3	
1	208-0071-181	180 PF MONO	C18	
1	208-0071-471	470 PF MONO	C19	
1	208-0092-103	.01 UF MONO	C9	
5	208-0092-104	.1 UF MONO	C4,6,11,14,16	
4	208-0092-152	1500 PF 100V MONO	C1,15,20,21	
1	208-0400-105	1UF TANT	C10	
4	208-4022-106	10UF LL	C5,7,12,13	
1	208-4052-105	1 UF LL	C8	
6	212-0001-001	IN4148	D8,10,14,18,20,22	
1	228-0101-001	26 PIN CONNECTOR	J1	
1	232-0000-150	150uH CHOKE	L1	
2	240-2907-000	PN2907A	Q8,9	
1	240-2222-000	PN2222A	Q11	
1	240-J201-000	PN4393	Q12	
1	417-7809-001	78L09	Q13	
2	242-0018-232	2.32K 1/8W 1%	R60,81	
1	242-0018-357	3.57K 1/8W 1%	R50	
4	242-0018-523	5.23K 1/8W 1%	R57,71,86,90	
1	242-0018-536	5.36K 1/8W 1%	R20	
1	242-0018-665	6.65K 1/8W 1%	R22	
1	242-0018-866	8.66K 1/8W 1%	R16	
1	242-0018-200	20.0K 1/8W 1%	R58	
1	242-0018-221	22.1K 1/8W 1%	R21	
6	242-0018-487	48.7K 1/8W 1%	R59,72,80,83,88,89	
1	242-0020-200	200.0K 1/8W 1%	R61	
1	242-0003-027	2.7 OHM 1/8W	R49	
21	242-0003-471	470 OHM 1/8W	R6,15,18,24,28,29,31,32,33,34,35,36, 37,38,39,40,44,49,63,68,91	
8	242-0003-102	1K 1/8W	R1,9,10,17,27,47,76,78	
3	242-0003-222	2.2K 1/8W	R65,66,84	
1	242-0003-272	2.7K 1/8W	R75	
4	242-0003-332	3.3K 1/8W	R23,25,30,43	
2	242-0003-472	4.7K 1/8W	52,69	
2	242-0003-103	10K 1/8W	R67,73	
1	242-0003-273	27K 1/8W	R74	
1	242-0003-623	62 K 1/8W	R77	
6	242-0003-104	100K 1/8W	R48,52,64,79,82,85	
2	242-0104-102	POT 1K MULTI	R56,87	
1	258-0005-002	4MHZ CRYSTAL	Y1	
2	256-0001-014	14 PIN IC SOCKET	U3,4	

1	256-0001-040	40 PIN IC SOCKET	U1	
2	425-6004I/P	MCP6004-I/P	U3,4	
1	425-F914-I/P	16F914	U1	
1	600-OTSR-100	26 Pin cable	J1	
1	700-TRML-200	PCB		
19 possible	244-0095-001	SWITCH	S-S16,PTT,MON,INT	
1	254-0109-003	ORANGE WIRE	LS1	
1	254-0109-000	BLACK WIRE	LS1	
1	254-0109-009	WHITE WIRE	VOL1	
1	254-0109-005	GREEN WIRE	VOL1	
1	254-0109-007	PURPLE WIRE	VOL1	

**Parts List MISC for TRML**

<b>QTY PER</b>	<b>CPI PART#</b>	<b>DESCRIPTION</b>	<b>REF DESIGNATION</b>	<b>NOTES</b>
1	106-2001-091	CPI Housing Top		
1	106-2002-092	CPI Housing Base		
1	112-TRML-200	Overlay Standard		
1	112-TRML-200	Overlay 8 Freq		
4	122-0020-006	Housing feet		
1	128-0001-005	CPI knob		
1	214-0002-001	LED red		
1	214-0002-002	LED orange		
5	214-0002-003	LED yellow		
10	214-0002-004	LED green		
1	218-0001-006	Fuse 1 amp		
1	228-0038-001	3 pin panel mt for power		
1	228-0038-002	3 pin for power pack		
1	228-0041-010	handset jack		
2	228-0043-006	6 pin line adap		
3	228-0043-008	8 pin line adap		
1	234-0001-004	speaker 2x3		
1	234-0002-004	speaker mic		
1	234-0005-013	handset jack		
2	242-0117-103	pot 10K audio		
12	244-0095-000	cap black push button		
13	244-0095-001	switch tactile		
1	244-0095-002	cap red push button		
1	246-0001-007	wall pack 1.6 amp 12V		
1	248-0020-003	plug 3 pos modular		
1	600-0013-007	handset cord		