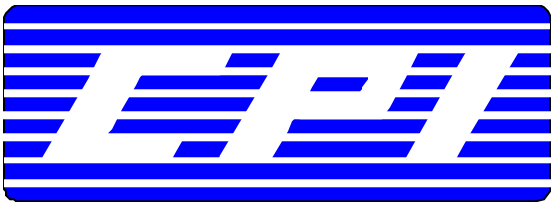
Instruction Manual

MR200(N) Series
Tone Termination Panel
06/2003
Board Assembly MR200N Rev.B



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MR200(N) Specifications

Specifications:	Subject to change without notice
Size:	5.5” wide 1.5” high 5.3” depth
Weight	1.5 lbs
Connections:	modular to phone line (remote) RJ45 to radio mic jack
Line impedence:	600 ohms
Input voltage:	+12 to +13.8 VDC @ 150 mA (18 mA idle)
Line output to phone line:	+10 dBm maximum. Preset to 0 dBm
Line ouput from phone line:	-40 dBm to +10 dBm (function tone referenced)
RX input from radio:	70 mVrms or greater
Notch filter:	2175 Hz down 50 dB from 1000 Hz reference
Control tones:	Guard tone = 2175 Hz for 40 mS Function tones F1 = 1950 Hz for 40 mS F2 = 1850 Hz for 40 mS Monitor = 2050 Hz for 40 mS Hold tone = 2175 Hz for duration of PTT
Control function outputs:	PTT and Monitor selection are form “C” relay contacts 1 amp @ 30 VDC F1/F2 are form “C” relay contact

Manual Contents

2.0 General Infomation

The CPI MR200(N) series termination panel provides a reliable means of interfacing a tone remote to most Motorola mobiles that use the 8 pin microphone jack. The MR series can be used with any tone remote that uses the industry standard EIA sequential tone format such as the CPI TR series remotes. The only available option for the MR200(N) is special software for non-standard keying tones and F1/F2 operation - MR202(N).

Jumper selectable -4W/FD is standard as well as automatic gain control, and transmit and receive audio notch filters are standard.

3.0 Installation

The MR200(N) is housed in a sturdy vinyl clad steel and aluminum enclosure. Connection to the radio is made through the included RJ45 cable that is simply plugged into the radio microphone jack of the radio and the radio input jack on the front of the MR200(N). Due to the design of many of the newer Motorola radios, remote volume may be affected by adjusting the radio volume.

A modular jack is also provided on the front of the MR200(N) for a control station desk or palm microphone. If a local microphone is not used, pins 2 & 3 of JP13 **must** be shorted to allow monitor function to operater correctly.

The MR202(N) provides a two channel relay that can be used in momentary or latched mode. Two channel operation varies from radio to radio and this feature may not be used in some applications. Jumper settings are on schematic sheet 1. Note: F1/F2 operation requires that a jumper be added in the radio to toggle the channel selection or a channel select line at the accessory connector may also be used.

Remotes are connected to the MR200(N) at the J3 modular connector on the rear of the unit or to the J4 screw terminal connector.

Power to the termination panel is made by providing +13.8 Vdc and ground to the J4 terminals (pins 1 & 2) on the back of the panel.

TX and RX audio levels are preset for 0 dBm and should not require adjustment. Instructions for re-adjustment are provided on page 4 and 5.

2 Wire/4 Wire Full Duplex operation

The MR200(N) termination panel is 2 wire/ 4 wire full duplex capable by selection of the JP1 jumper on the panel.

2 Wire - Jumper JP1 should be in the 1 & 2 position
4 Wire/ Full Duplex - Jumper JP1 should be in the 2 & 3 position

4.0 Tuning

The MR200N termination panels 2175 Hz notch and bandpass filters and line balance adjusters have been factory set. These adjustments have been "painted" and should not require readjustment in the field.

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

TX Audio notch filter

1) Connect: Signal generator (600 ohm) set at 2175 Hz. 0 dBm to phone line (J3 or J4 pins 3 & 4)
+12 volt power to J4-1
Ground to J4-2
Scope probes to TP4 & TP5, set scope to X-Y mode

2) Adjust R21 until signal on scope is in phase (loop closes on scope).

3) Remove scope probe from test point 4 & 5. With scope in signal channel mode, connect 1 probe to TP6. Adjust R16 to obtain minimum signal on scope. Adjust R21 to further reduce signal level. Re-check R16 then R21. Notch will be approximately -58 dB.

4) Move scope probe to TP7. Adjust R46 to maximum signal on the scope. (This is the 2175 bandpass adjustment.)

5) To set the balance, remove signal generator from phone line. Re-connect between ground and E2-16. Set generator for 1500 Hz, at 2 Vpp. Terminate J3 with a tone remote or other suitable 600 ohm load. Move scope probe to TP4 and adjust R100 for minimum.

RX Audio notch filter

1) Connect: Signal generator (600 ohm) set at 2175 Hz. 0 dBm to E2-16 and ground
+13.8 volt power to J4-1
Ground to J4-2
Scope probes to TP1 & TP2, set scope to X-Y mode

2) Adjust R8 until signal on scope is in phase. (loop closes on scope)

3) Remove scope probe from TP1 & TP2. With scope in signal channel mode, connect one probe to TP3. Adjust R13 to obtain minimum signal on scope. Adjust R8 to further reduce signal level. Re-check R13 then R8. Notch will be approximately -58 dB.

5.0 Level Adjustments

RX Audio Adjustment

R101 controls the RX audio level to the phone line. With the phone line connected at J3, connect a RMS volt meter to the leads of L3 and L4. Un-squelch the receiver so that continuous noise is present and adjust R101 for 0 dBm or 0.8 Vrms on the meter. If additional gain is needed to achieve 0 dBm, move jumper JP6 to short pins 2 & 3.

Line In Adjustment

Auto level adjustment:
The MR200(N) series has an AGC (automatic gain control circuit). This circuit eliminates the need to adjust the line input level from the tone remotes or consoles. Selection of automatic or manual gain control is selected by the JP2 jumper.

Automatic gain control - JP2 should be set in the 1&2 position.
Manual gain control - JP2 should be set in the 2&3 position.

The line input level is adjusted via R104. Adjustment should be made with the MR200(N) 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 MR200(N) will usually be less than 0 dBm due to line loss.

With an RMS voltmeter measure the signal level from test point 4 (TP4) of the MR200(N) to ground. Adjust R104 for a reading of 460 mVrms (1.3Vpp)

Note: If you are using the hold tone (low level guard tone) to make the adjustment, set R104 so that 46 mVrms (130 mVpp) is measured at TP4. If you are using the high level guard tone to make the adjustment, set R104 so that 1.49 Vrms is measured at TP4.

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 console press and hold the PTT switch. With a voice coming from the remote, adjust R102 to provide proper transmitter deviation.

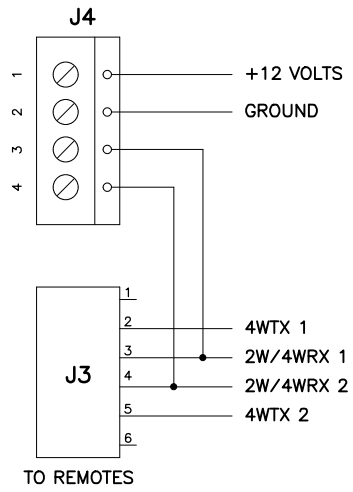
Monitor Adjustment

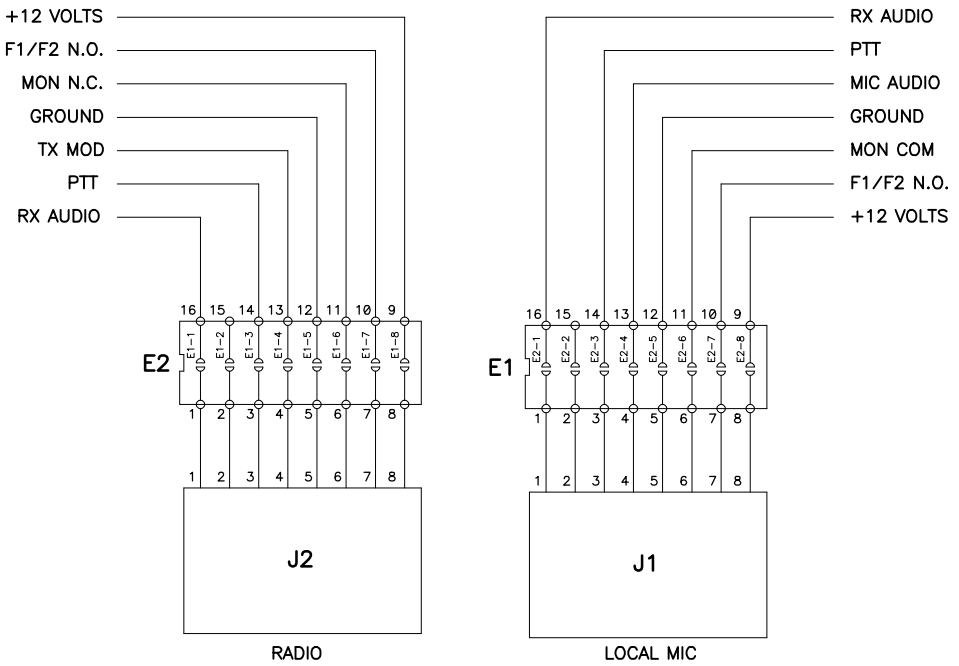
The monitor function can be used in one of two modes:

Momentary mode: (JP12 in position 2 &3) - The monitor relay energizes for approximately 6 seconds or until a PTT command is received.

Latched mode: (JP12 in position 1 & 2) - 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 by shorting pins 2 &3 of JP11.





JUMPER SETTINGS

JUMPER	FUNCTION	1 TO 2	2 TO 3	
JP1	2 WIRE / 4 WIRE SELECT	2 WIRE	4 WIRE	
JP2	LINE LEVEL ADJUST	AUTO	MANUAL	
JP3	MOD OUT SOURCE Z	LOW	HIGH	
JP4	LOCAL MIC AUDIO GAIN	LOW GAIN	HIGH GAIN	
JP5	SQUELCH CONTROL MODE	LO MUTE	HI MUTE	
JP6	RX AUDIO GAIN	LOW GAIN	HIGH GAIN	
JP7	PTT KEYING	TO GROUND	TO +12 VOLTS	
JP8	LOCAL MIC AUDIO CONTROL	KEY TO GND	KEY TO + V	
JP9	F1 / F2 GROUND	DISABLED	ENABLED	
JP10	F1 / F2 RELAY	ENABLED	DISABLED	
JP11	MONITOR WITH PTT	DISABLED	ENABLED	
JP12	MONITOR MODE	LATCHED	MOMENTARY	
JP13	MONITOR GROUND	DISABLED	ENABLED	
JP14	F1/F2 OUTPUT	LATCHED	MOMENTARY	
JP15	LOCAL MIC TERMINATION	1 TO 3 NONE	1 TO 2 +12 VOLTS	3 TO 4 GROUND
E1	LOCAL MIC JACK JUMPERS	SEE MANUAL		
E2	RADIO JACK JUMPERS	SEE MANUAL		

AUXILIARY PADS

PAD	FUNCTION
A	F1/F2 COM
B	F1/F2 N.C.
C	MON N.O.
D	SQUELCH CONTROL

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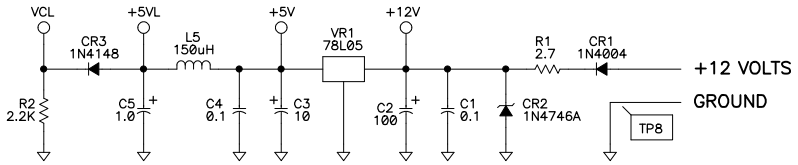
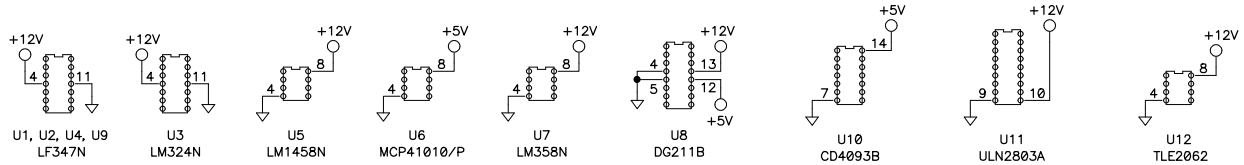
MR200N TONE TERMINATION PANEL

A	200	MR200N_s01.sch	MAIN BOARD
DATE: 02/05/03		SHEET 1 OF 7	





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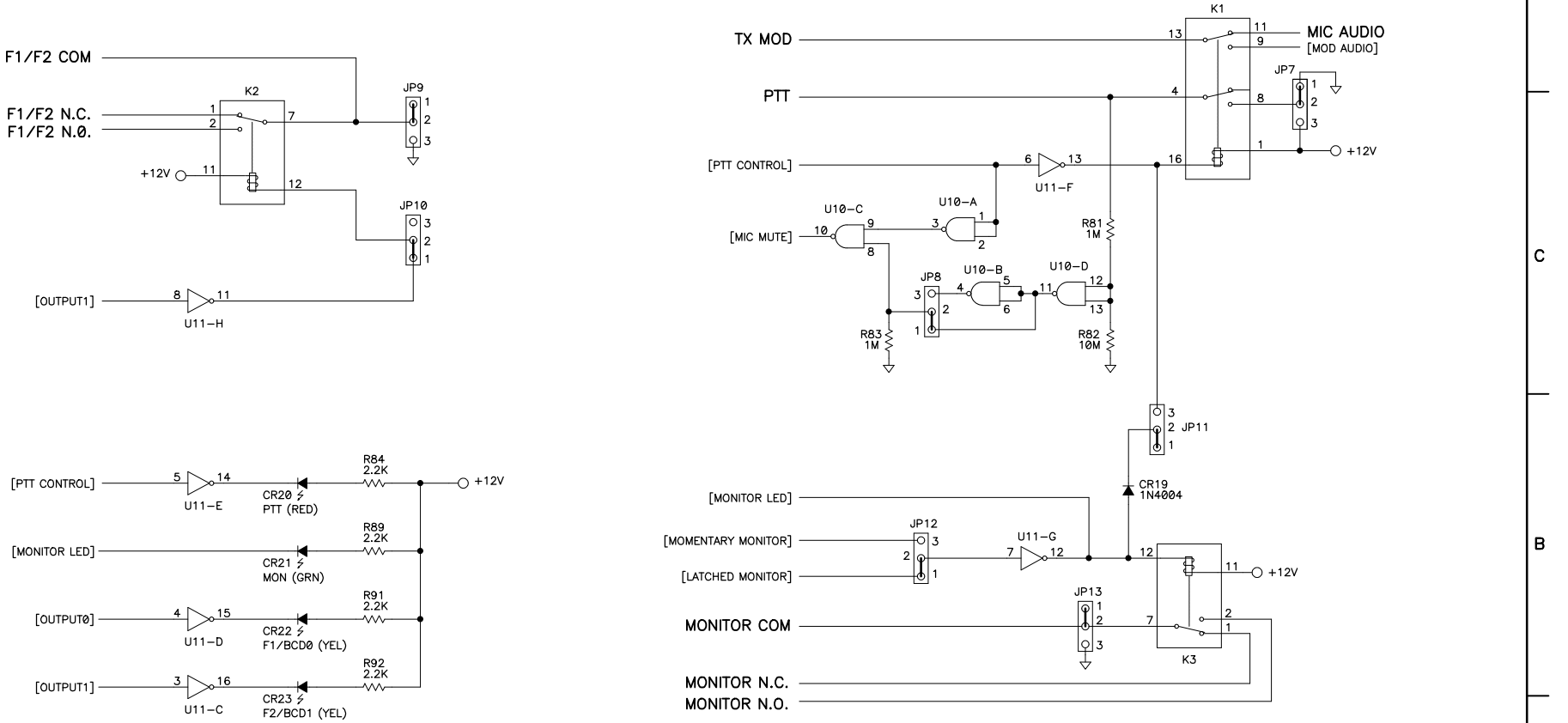
MR200N TONE TERMINATION PANEL

A	200	MR200N_s02.sch	MAIN BOARD
DATE: 01/30/03		SHEET 2 OF 7	



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MR200N TONE TERMINATION PANEL

A	200	MR200N_s03.sch	MAIN BOARD
DATE: 04/29/03		SHEET 3 OF 7	

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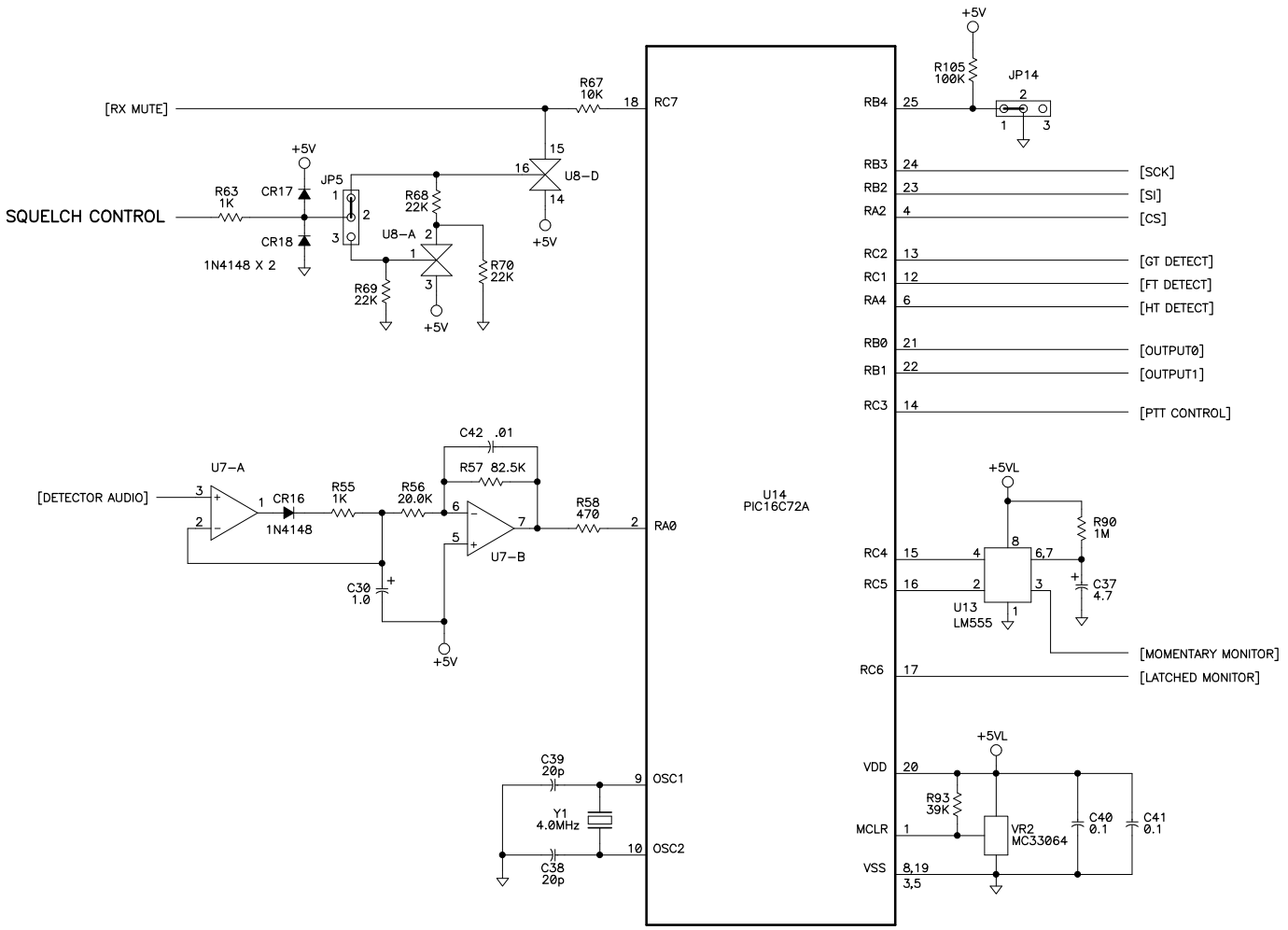

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MR200N TONE TERMINATION PANEL

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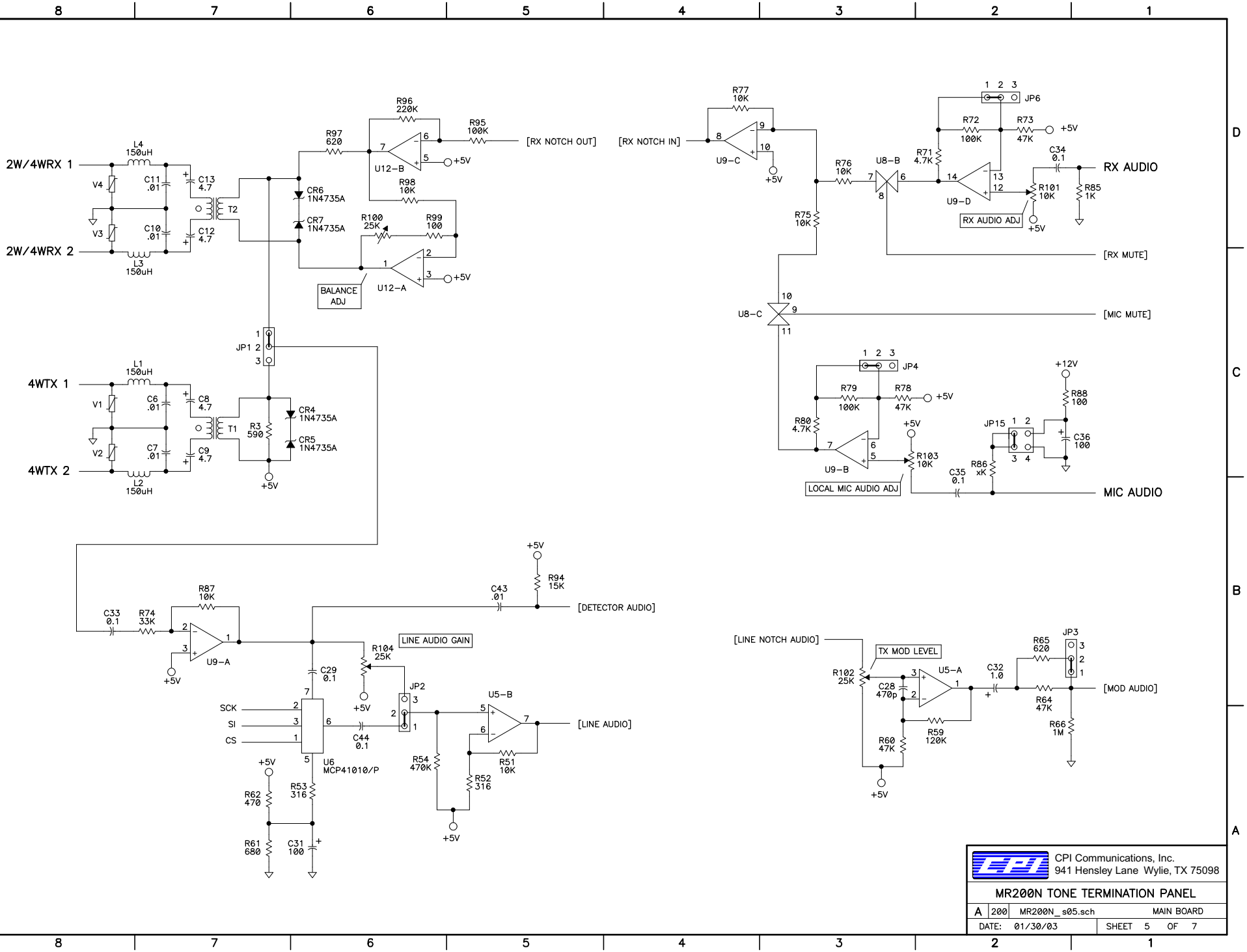

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MR200N TONE TERMINATION PANEL

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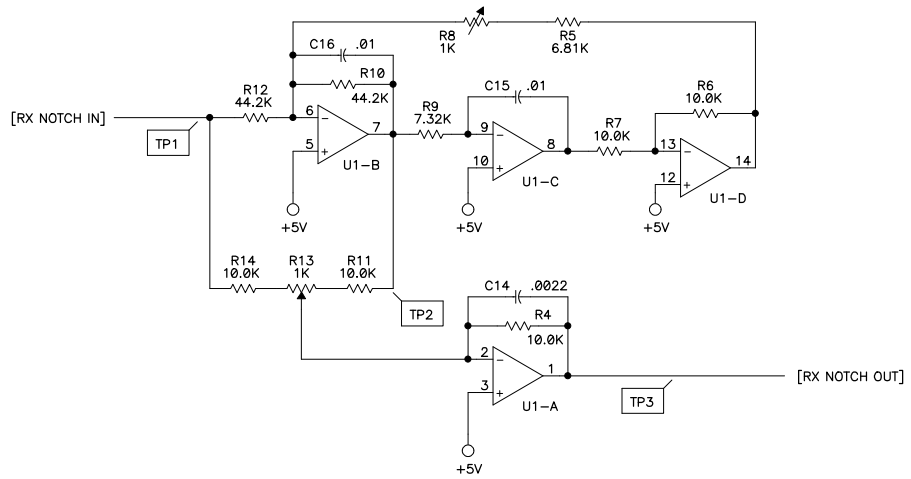

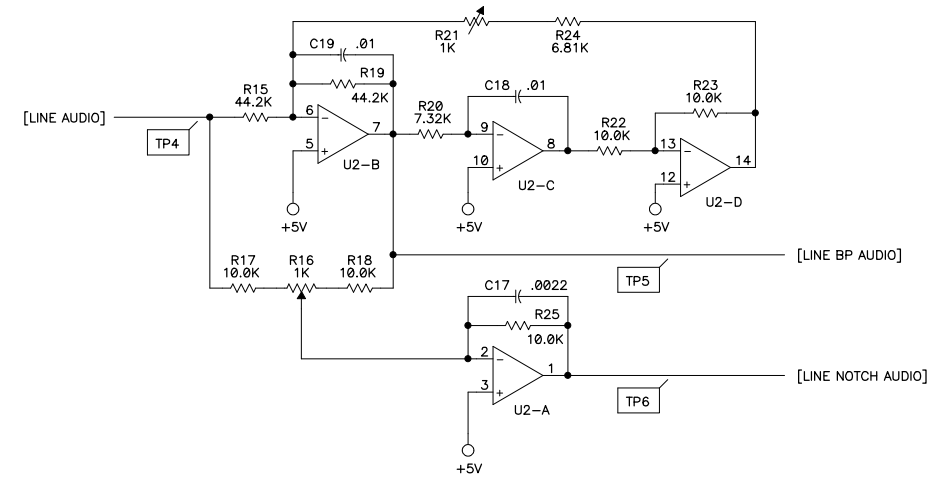

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MR200N TONE TERMINATION PANEL

E	200	MR200N_s06.sch	MAIN BOARD
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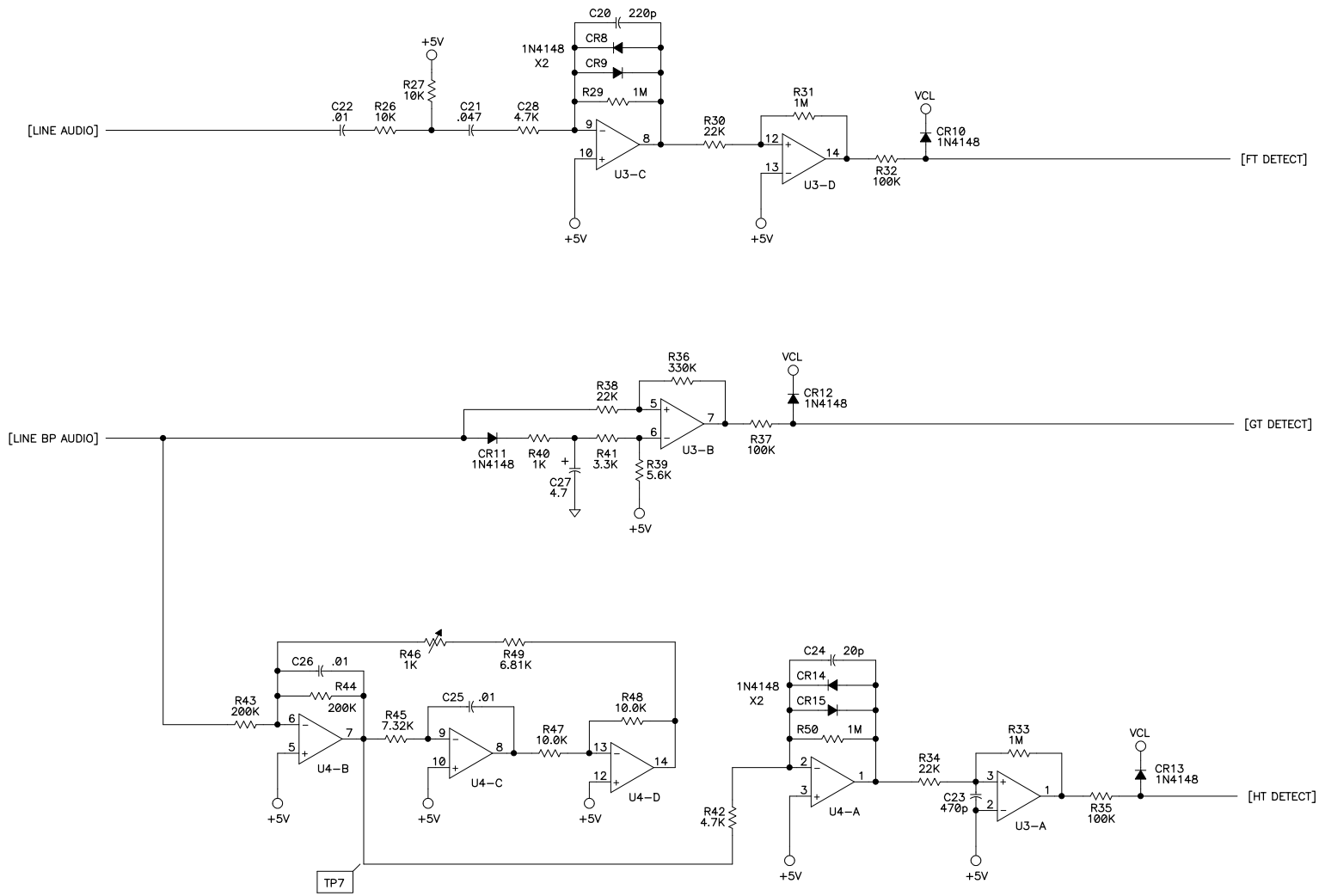

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MR200N TONE TERMINATION PANEL

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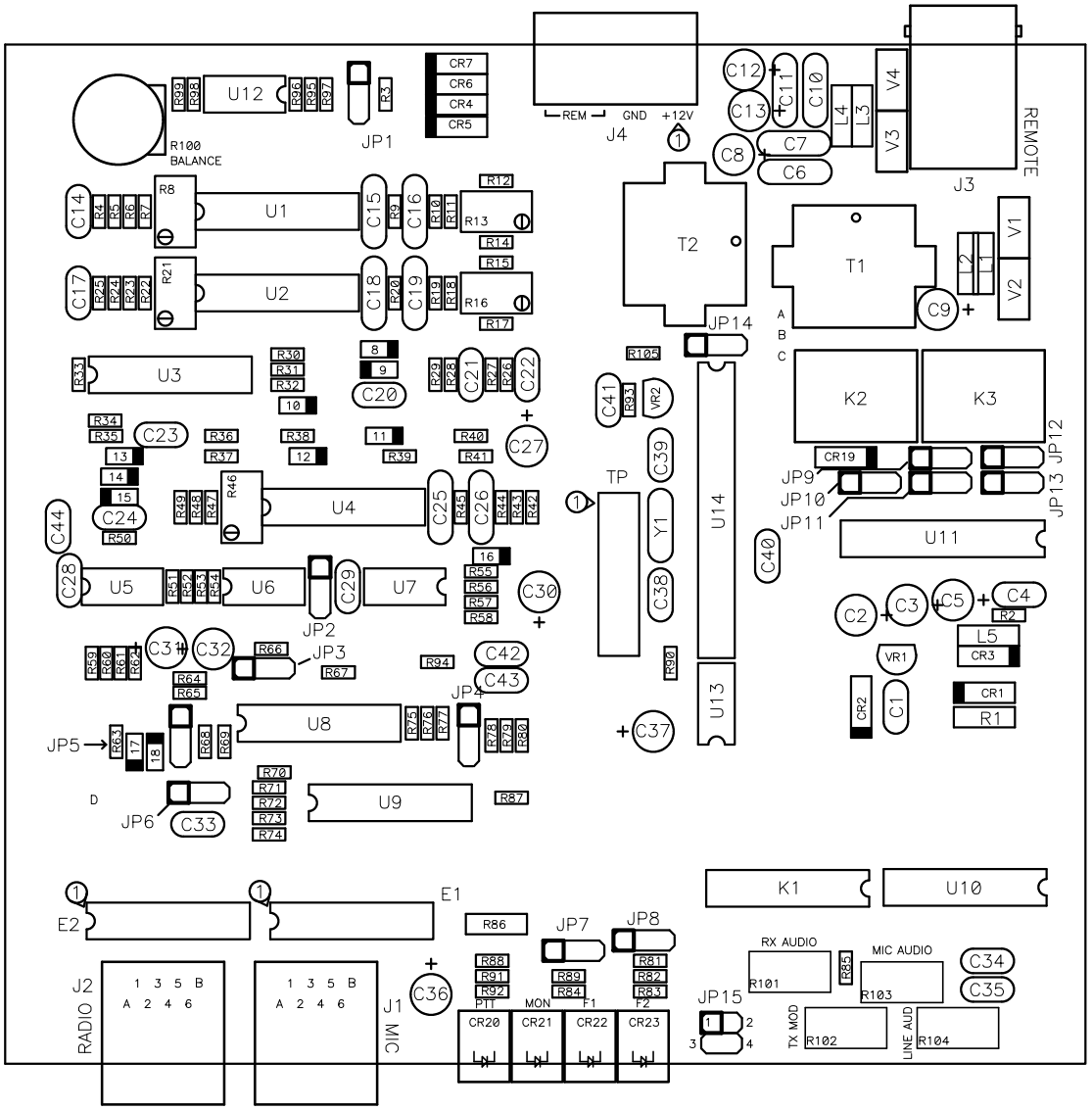

MR200N TERMINATION PANEL

MR200N.PCB

REV B

04/29/03

COMPONENT LOCATIONS