

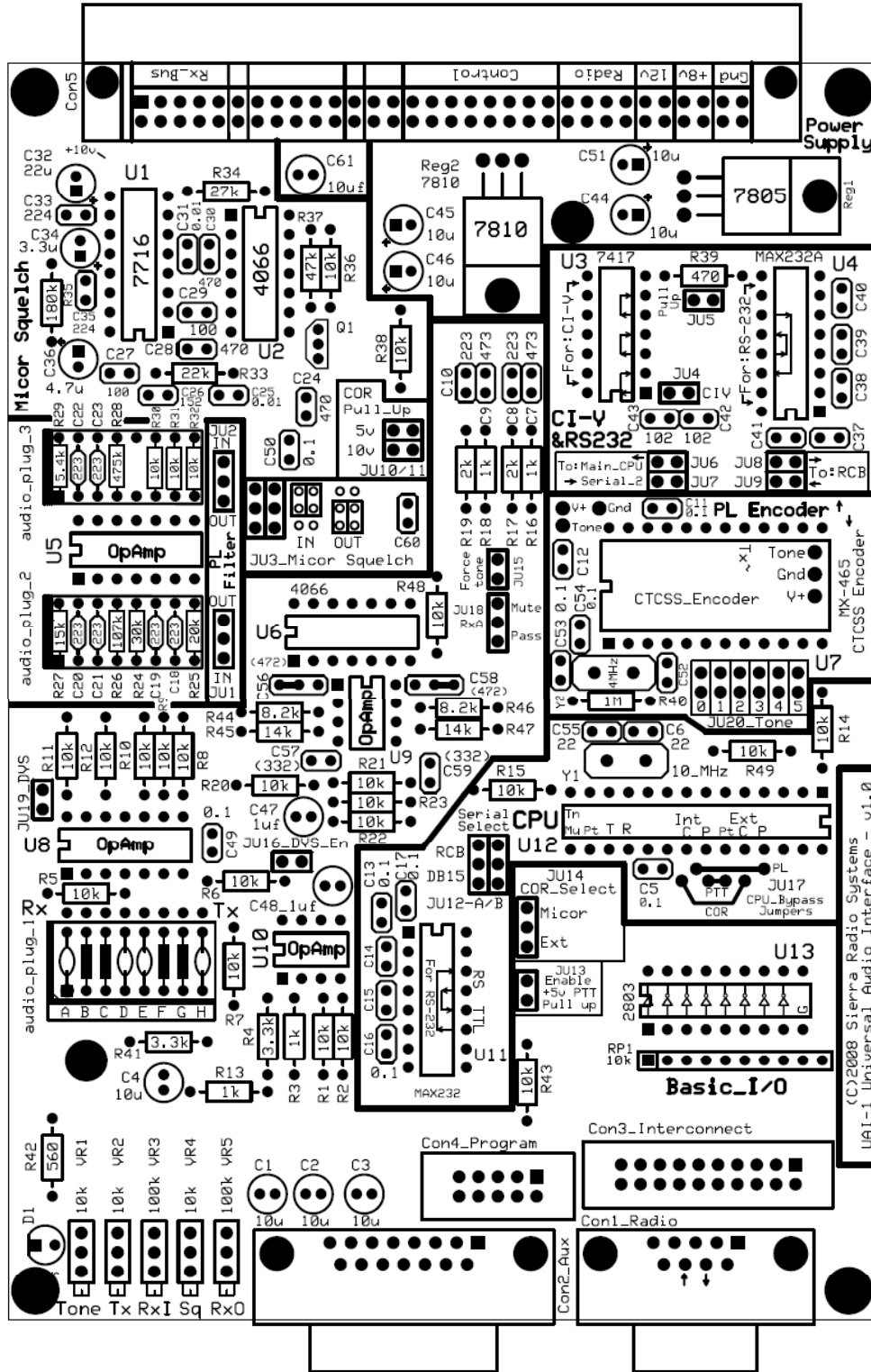
Sierra Radio Systems

UAI-1
Universal Audio Interface

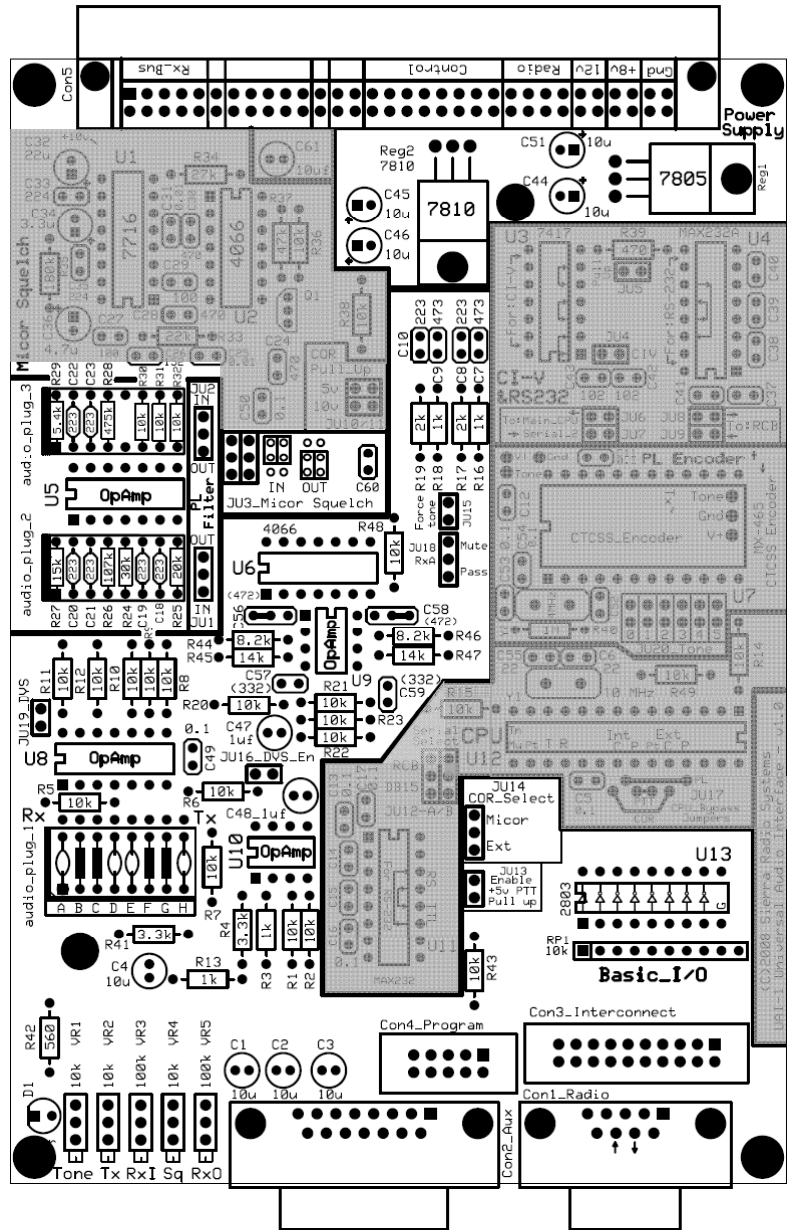
Version 1.0
July 2008



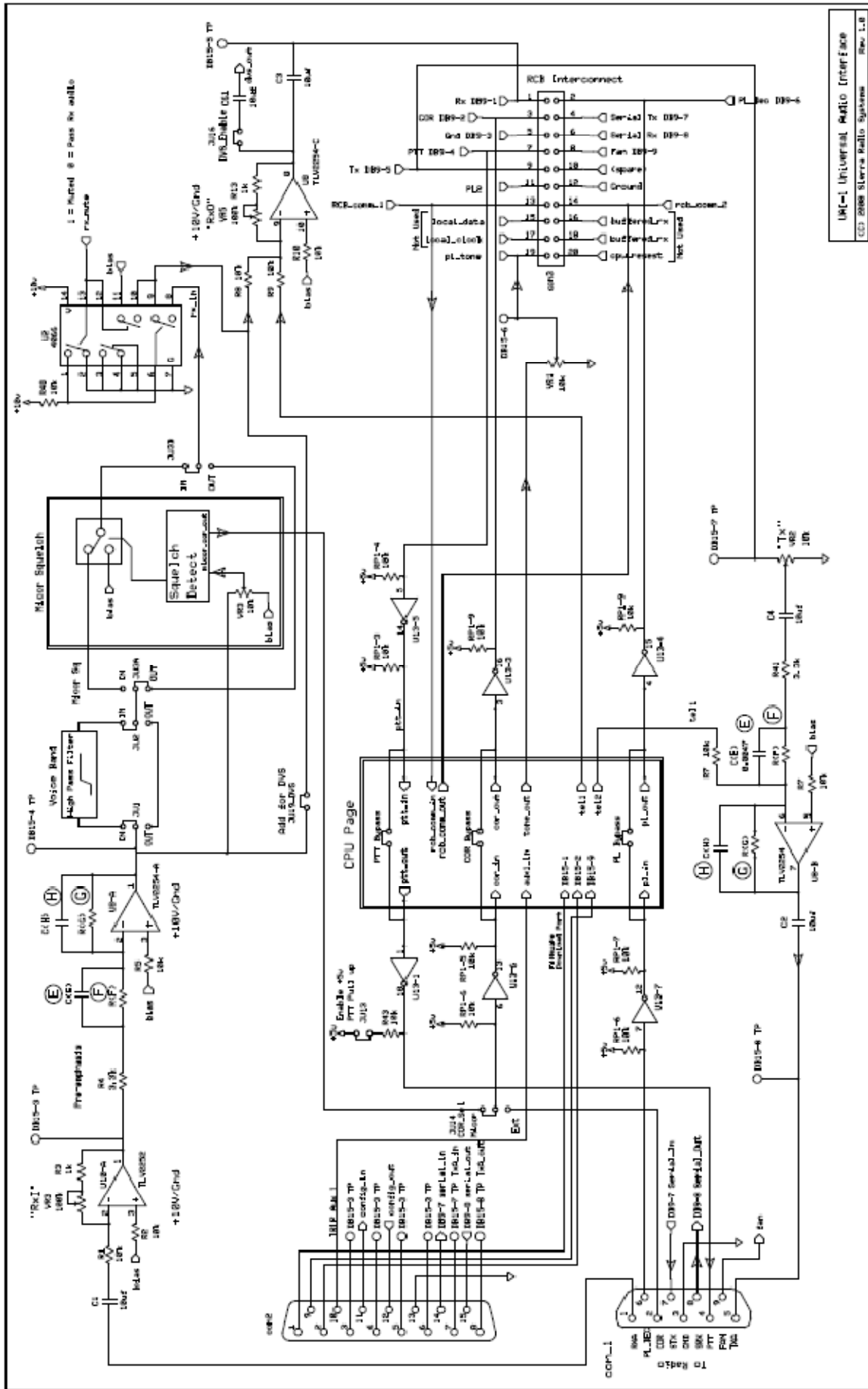
UAI-1 - Universal Audio Interface



UAI-1 Basic Configuration



Top Level

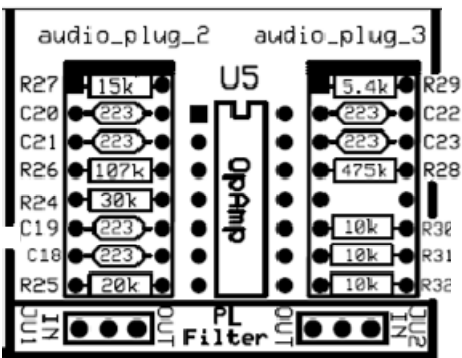
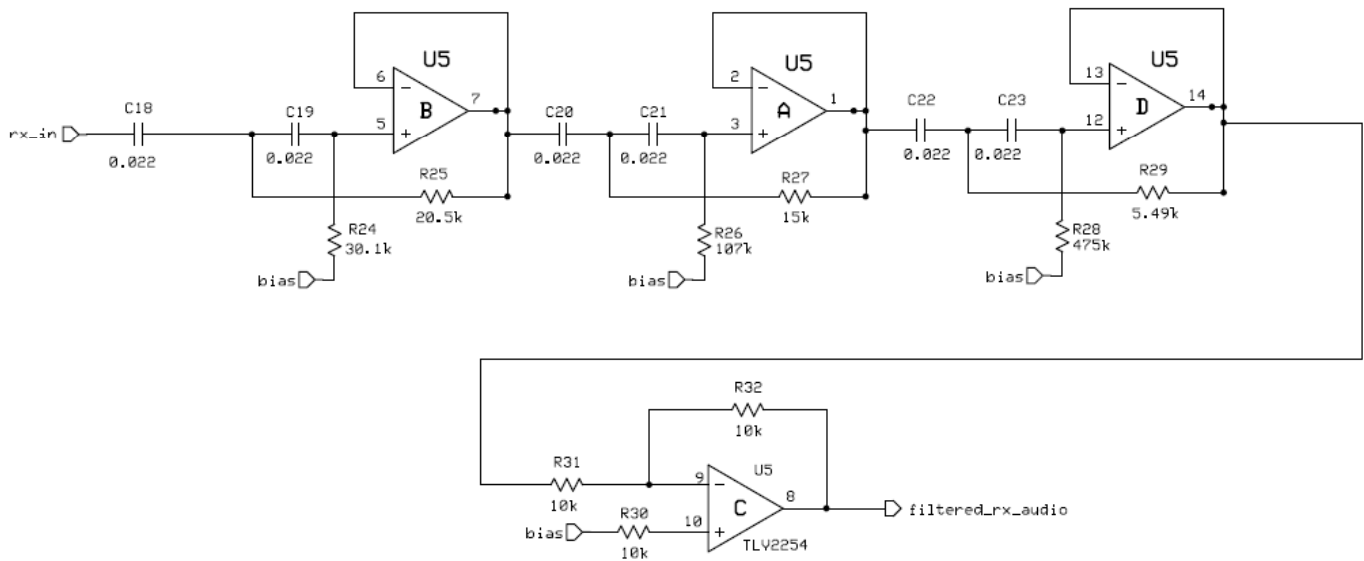


UAI-1 Universal Audio Interface

PL High Pass Filter

This 6 pole high pass filter removes low frequency PL and DPL tones from the receiver audio. Most PL filters roll off starting at 250 or 300 Hz. This filter is user-programmable by selecting specific resistor values. Three typical resistor sets are characterized in this documentation and provide roll off starting at 150 Hz, 200 Hz and 250 Hz. In each case, the capacitor values are all the same, 0.022uf (223).

The last stage of the filter is an buffer amplifier that can be used to amplify or attenuate the signal depending on the specific radio requirements.



The frequency determining resistors and capacitors can be mounted directly to the PCB or can be mounted on 16 pin component carriers that plug into DIP sockets or are soldered to the PCB. This allows easy component installation or removal without damaging the PCB board. Using component carriers also allows you to easily swap out components as your needs change.

For example you may use a PL frequency of 156 Hz for a repeater input and frequencies below 100 Hz for linking. In this example you may choose to use different roll off points requiring different component values. If, in the future you want to swap boards from link to repeater service, rather than having to de-solder components, you can simply unplug the two carriers and plug in new carriers with the appropriate resistor installed.

PL High pass filter - 150 Hz roll off

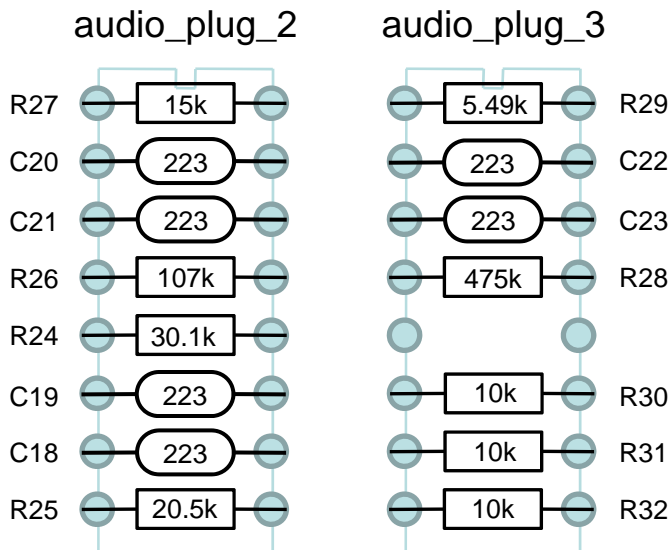
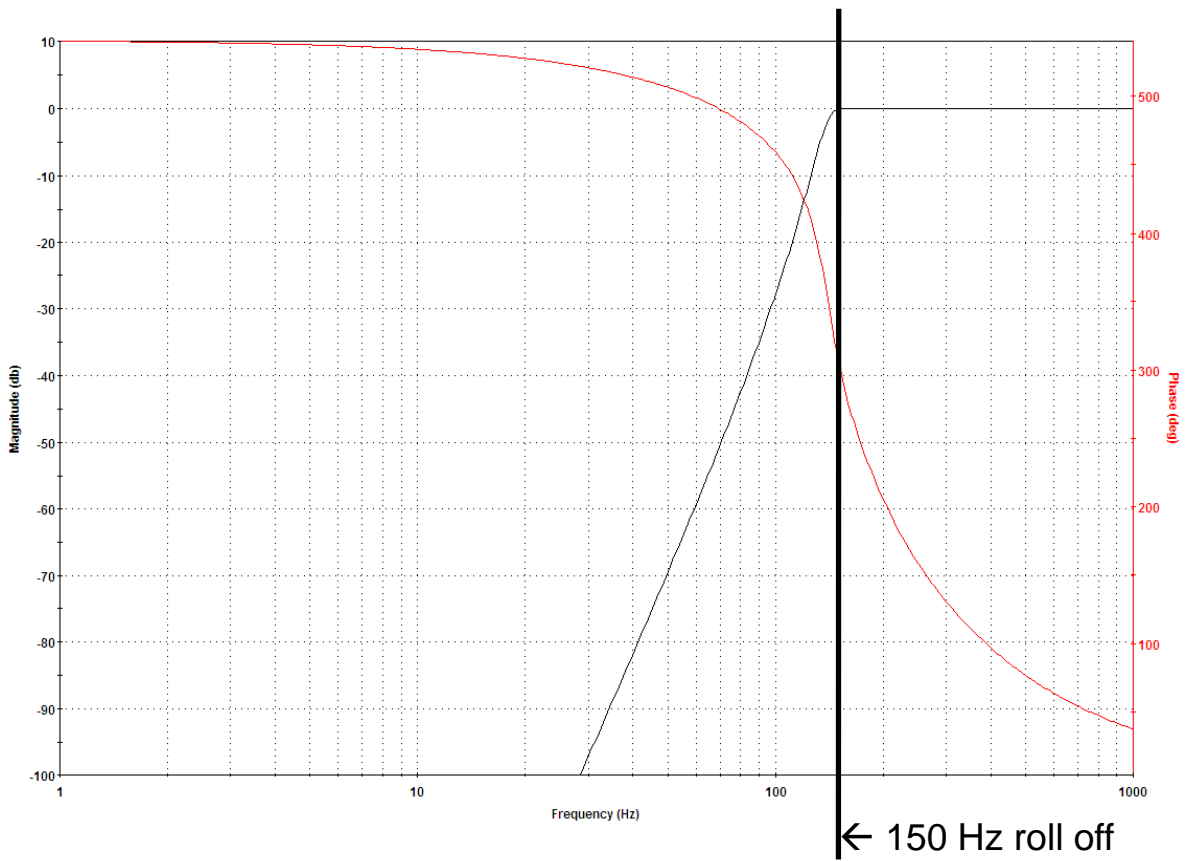
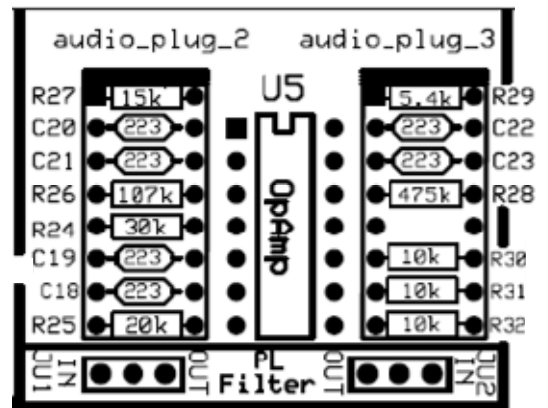


Image silkscreened on the PCB with default component values for 150 Hz roll off.



PL High pass filter - 200 Hz roll off

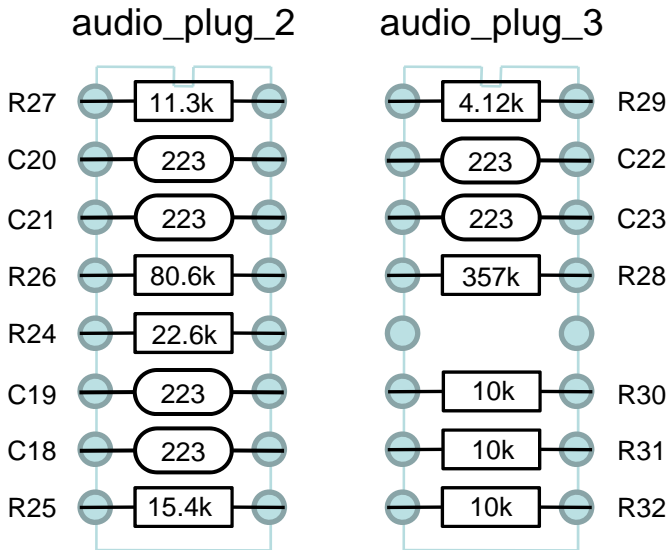
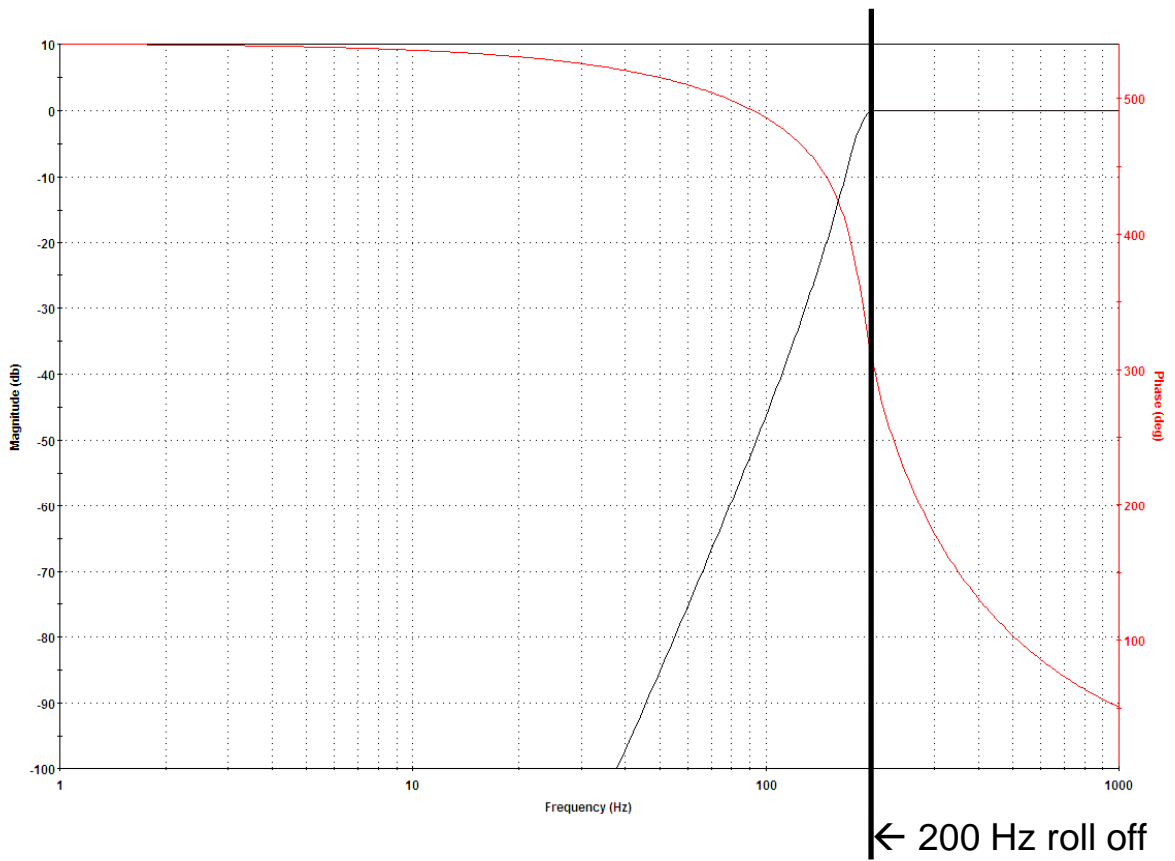
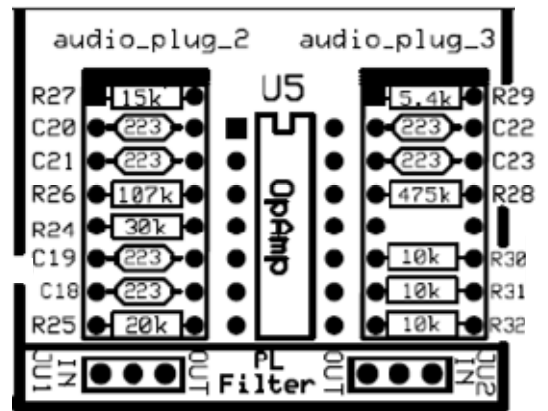


Image silkscreened on the PCB with default component values for 150 Hz roll off.



PL High pass filter - 250 Hz roll off

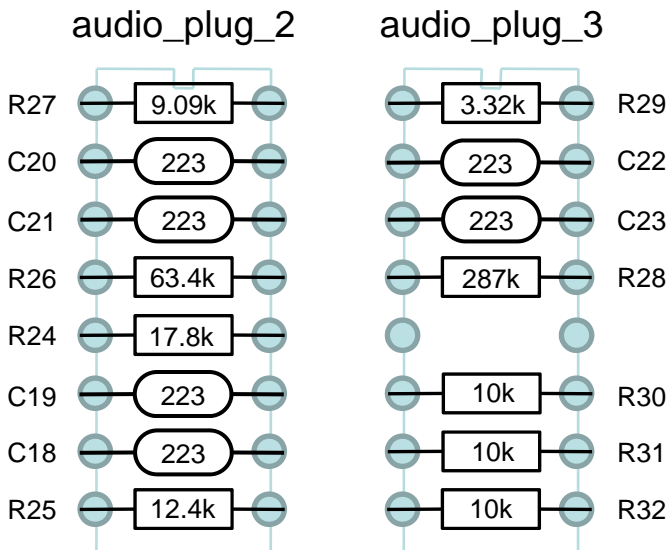
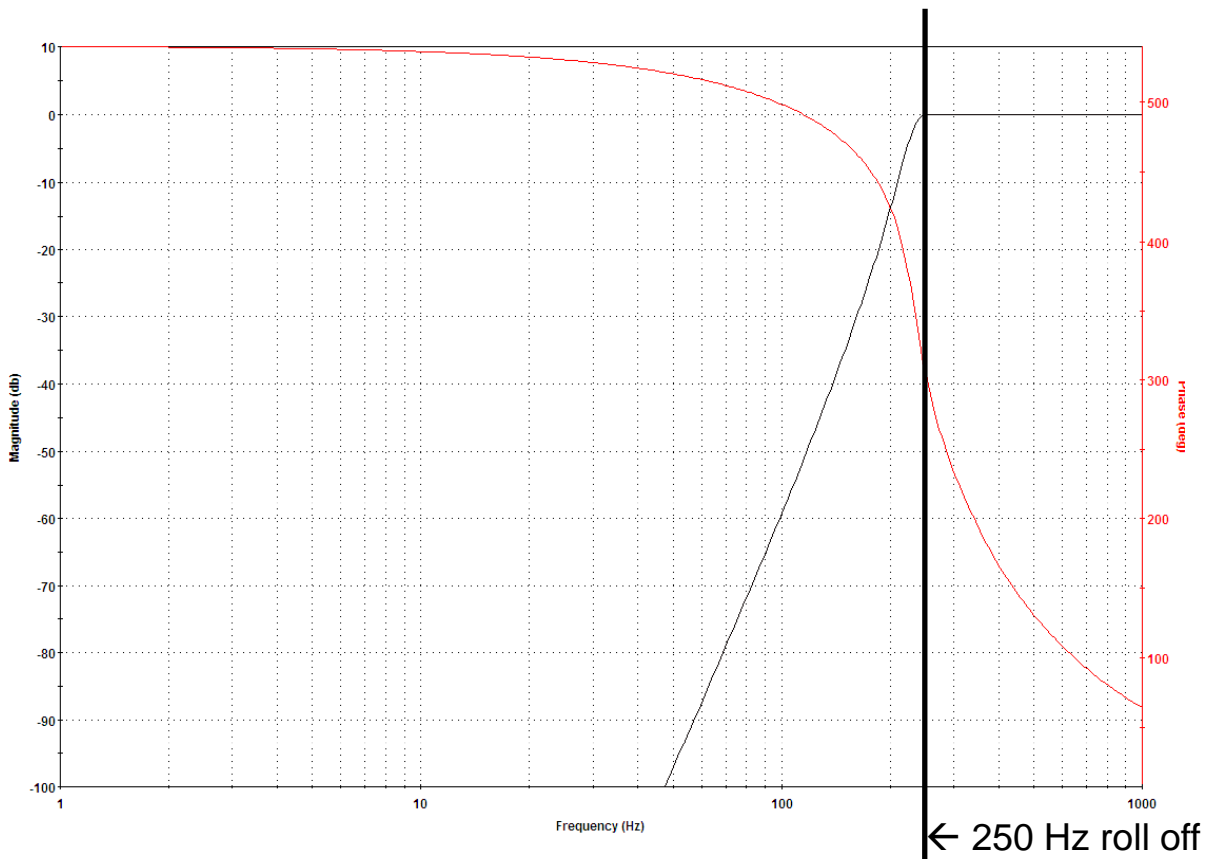
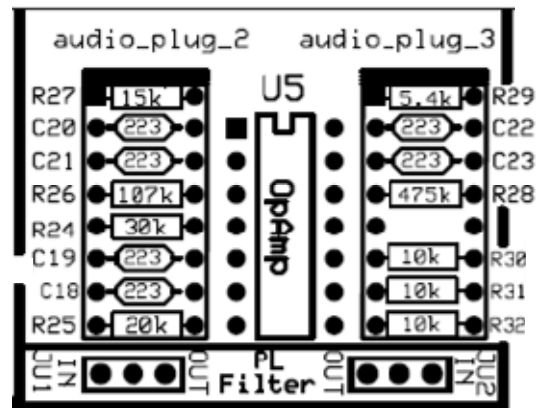


Image silkscreened on the PCB with default component values for 150 Hz roll off.



UAI-1

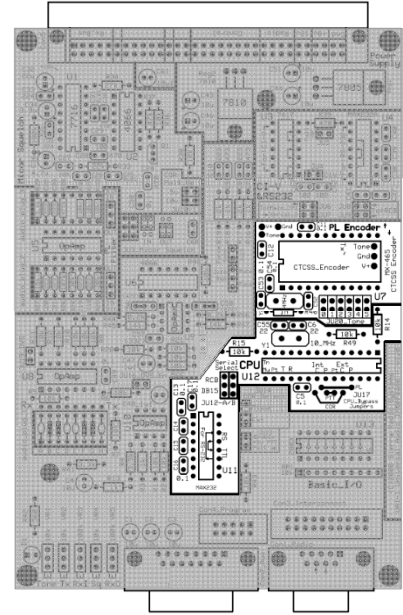
CPU, PL Encoder and Serial config interface

The UAI-1 board includes an optional microprocessor controlled PL tone generator. The CPU can also control the timing of the COR, PTT and PL encode control signals between the RCB and the radio.

This timing control allows you to shut off the PL encoder before dropping the PTT signal. If you set your mobile or portable radio to PL decode, this delay allows you to completely mute your mobile receiver before the carrier drops eliminating the annoying squelch tail in your mobile receiver.

The RS-232 port allows you to configure the CPU's parameters through a simple serial interface.

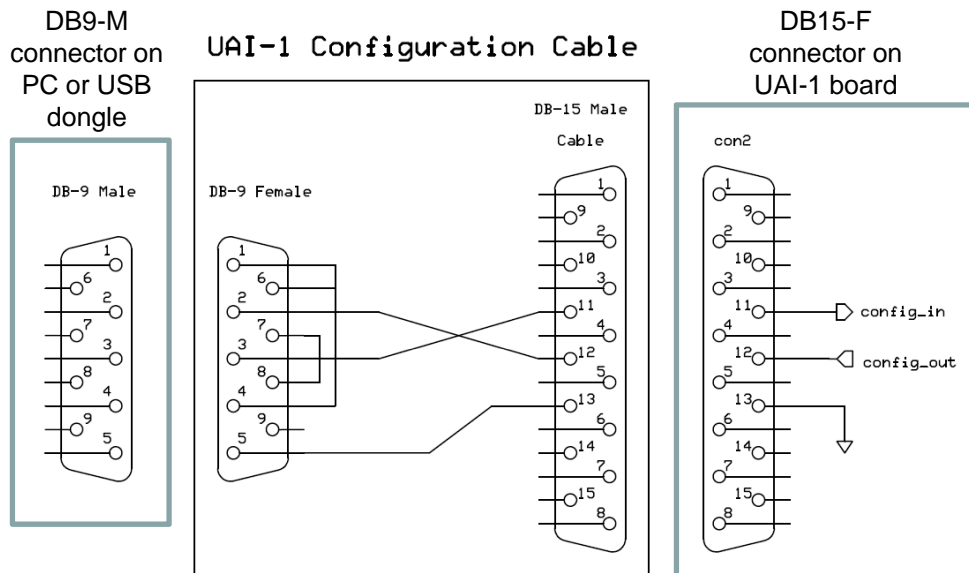
If the CPU and / or PL encoder are not used, they must be bypassed using the three jumpers at JU17.



UAI-1

Serial configuration cable

When using the on-board microcontroller, you can program the PL tone or COR, PL and PTT delay behavior and “add on” unkey telemetry by sending various commands through the serial port. You will need to build a serial cable that has a DB-9 female connector on one end and a DB-15 male connector on the other end. The serial protocol is 9600 baud, 8 bit, no parity.



UAI-1

Configuration Commands

Command Summary

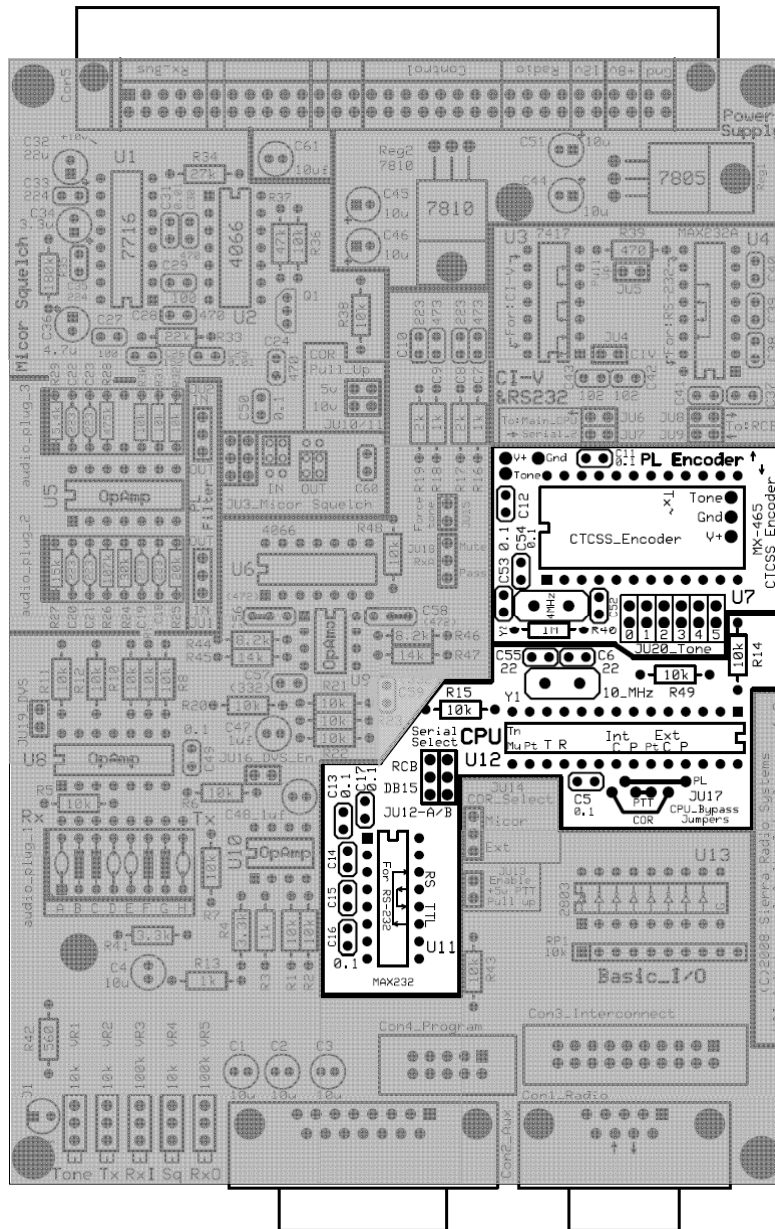
TONE	xxxx	Set PL tone encoder to xxxx Hz
RXSTART	xxxx	Set the wait time after the external COR drop input before starting the unkey telemetry generation xxxx ms.
RXTONE _n	xxxx	Set unkey telemetry tone n to xxxx Hz
RXTIME _n	xxxx	Set unkey telemetry tone n duration to xxxx ms.
RXWAIT _n	xxxx	Set the wait time between telemetry tone n and the next tone to xxxx ms.
RXSTOP	xxxx	Set the wait time after the last telemetry tone before dropping COR by xxxx ms.
TXSTART	xxxx	Set the wait time after the external COR drop input before starting the unkey telemetry generation xxxx ms.
TXTONE _n	xxxx	Set unkey telemetry tone n to xxxx Hz
TXTIME _n	xxxx	Set unkey telemetry tone n duration to xxxx ms.
TXWAIT _n	xxxx	Set the wait time between telemetry tone n and the next tone to xxxx ms.
TXSTOP	xxxx	Set the wait time after the last telemetry tone before dropping COR by xxxx ms.
PTTDELAY	xxxx	Set the PTT delay time after PL encoder stops.
STATUS		Display the current UAI configuration
HELP		Display this help information
LISTTONE		Display list of supported PL tone frequencies

Internal testing and debugging commands

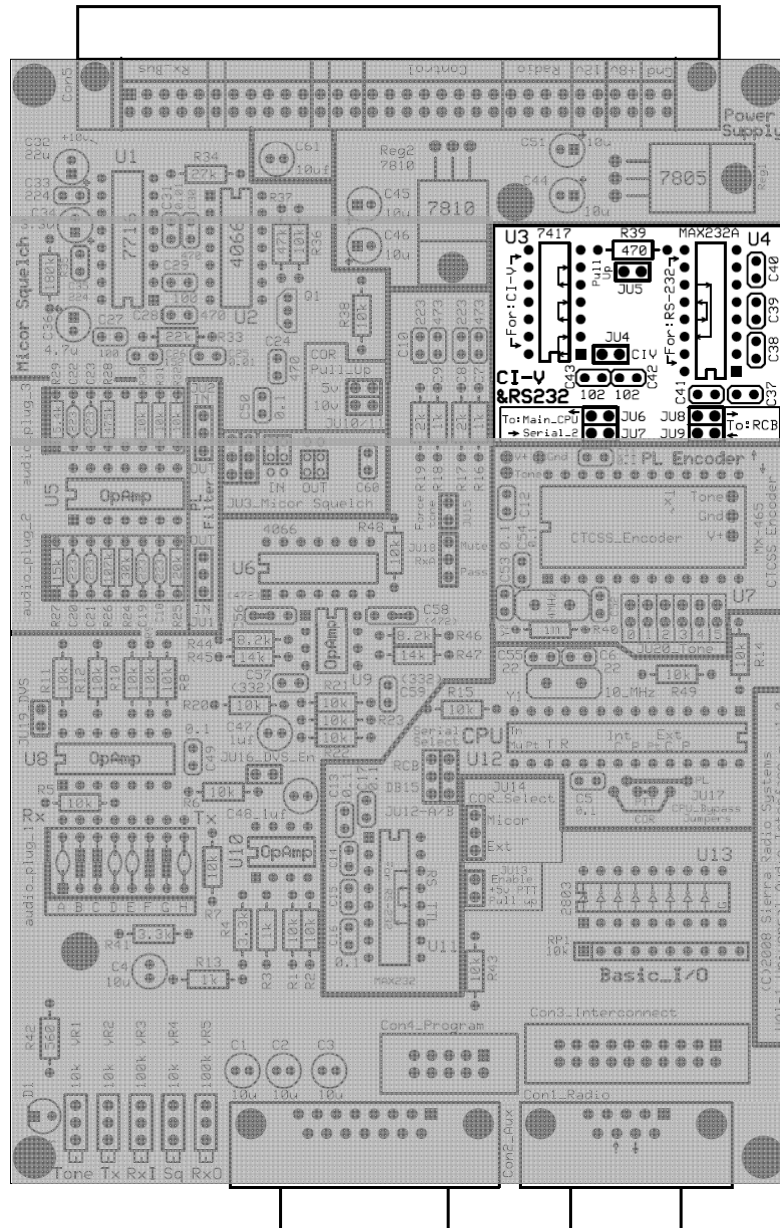
PLTONEON	Turn on PL tone generator
PLTONEOFF	Turn oFF PL tone generator
TESTTONE	Generate 1 Khz tone for 5 seconds
DEBUGON	Turn on debugging messages
DEBUGOFF	Turn off debugging messages
RXMUTE1	Mute Rx audio
RXMUTE0	Pass Rx audio

UAI-1

CPU, PL Encoder and Serial config interface



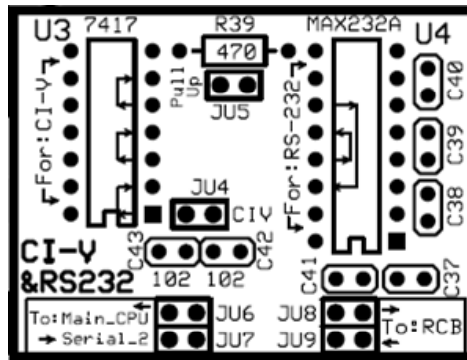
UAI-1 CI-V & RS232 Remote Base



UAI-1 CI-V & RS232 Remote Base

This section of the UAI-1 board provides the appropriate signal conditioning to interface a Radio Control Board (RCB) in the SRS control system with either an Icom CI-V or RS-232 programmable radio. Each RCB provides a 5 volt TTL level serial data connection at the RCB's DB-9 radio connector. Most commercial radios require a different signal level. Icom uses a proprietary two wire serial interface called CI-V. Kenwood and Yaesu radios use a standard RS-232 voltages and ASCII characters. The SRS Series 200 control system supports both signaling interfaces with the UAI-1 board. The TTL level signals are passed from the RCB through con_3 the 20 pin inter-board connector.

Note: Do NOT install all components in this section. It is VERY important to determine which radio interface you will need then install only those components required. If you install all the components, the interface will not work.



Components for Icom radios

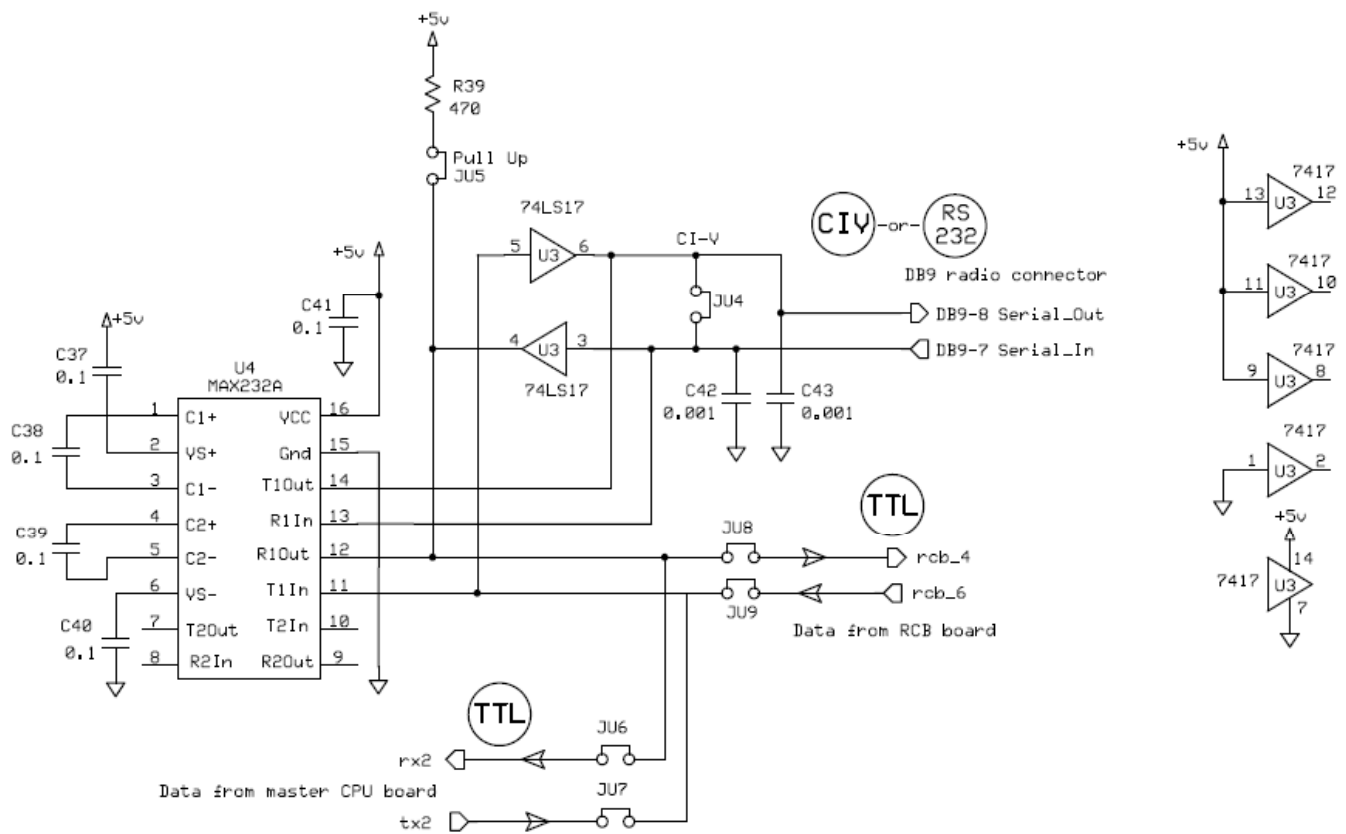
C42	0.001
C43	0.001
JU4	2x1
JU5	2x1 pin male header
JU6	2x1 pin male header
JU7	2x1 pin male header
JU8	2x1 pin male header
JU9	2x1 pin male header
R39	470
SOC3	14 pin DIP socket
U3	7417

Components for RS-232 radios

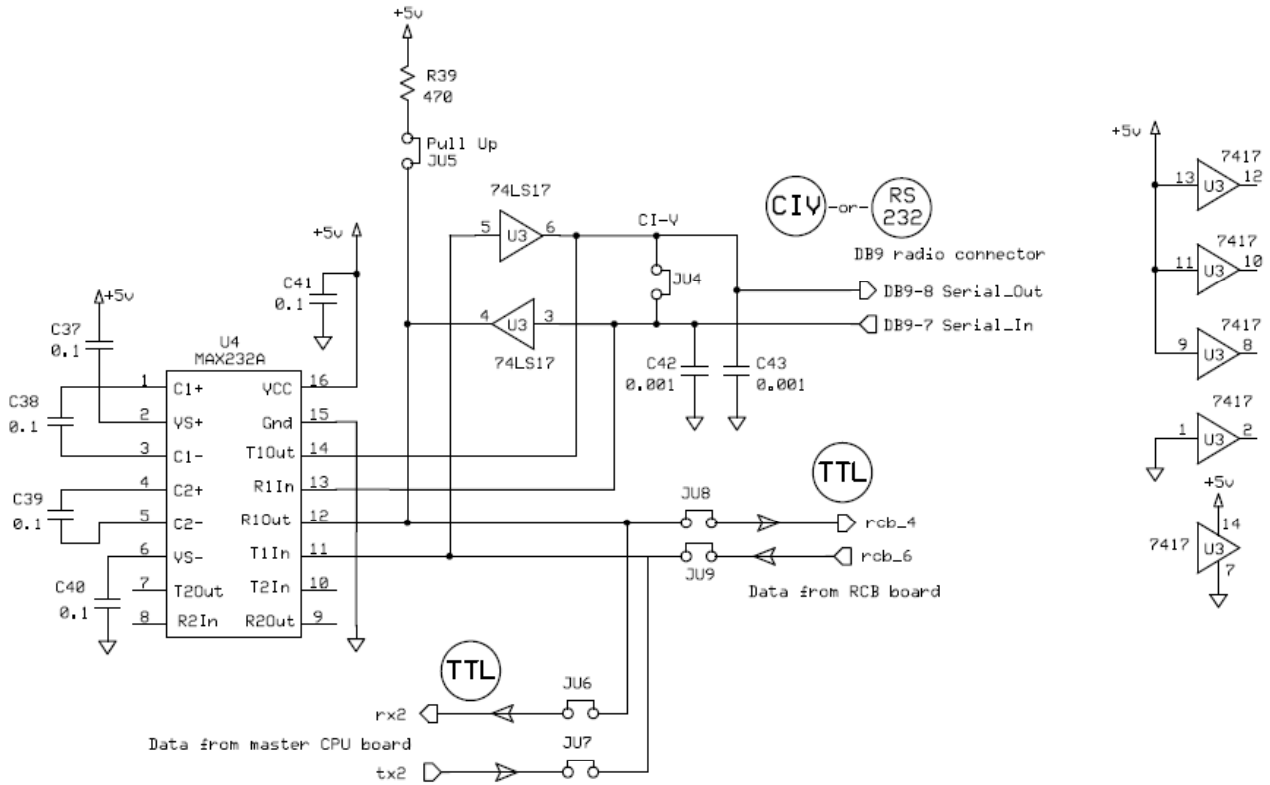
C37	0.1
C38	0.1
C39	0.1
C40	0.1
C41	0.1
C42	0.001
C43	0.001
JU6	2x1 pin male header
JU7	2x1 pin male header
JU8	2x1 pin male header
JU9	2x1 pin male header
SOC4	16 pin DIP socket
U4	MAX232A

Notice that the main difference is the installation of either U3 for Icom OR U4 for RS-232 radios. Do NOT install both integrated circuits.

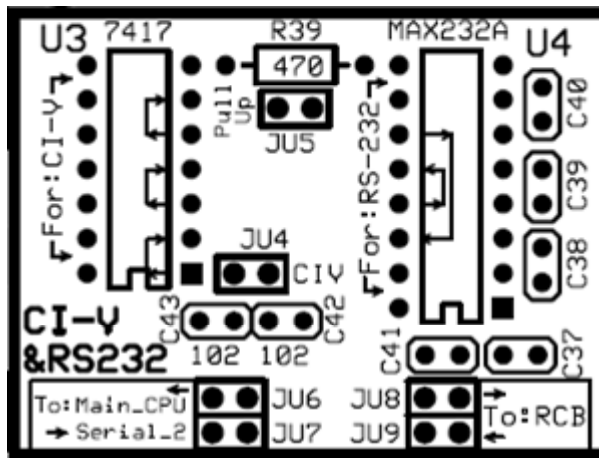
Icom CI-V and RS-232 Interface



UAI-1 CI-V & RS232 Remote Base



UAI-1 Jumper Settings

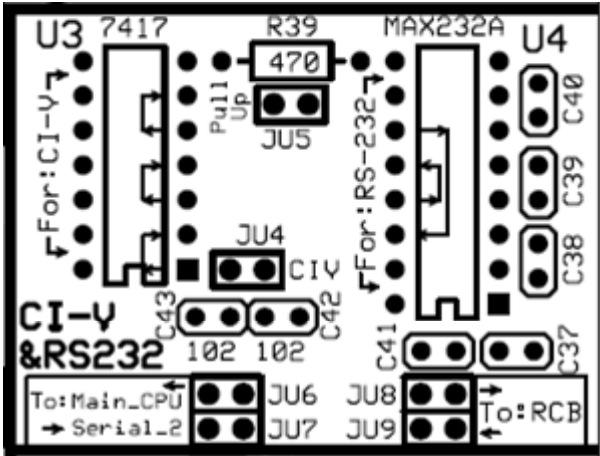


JU	Purpose
JU4	Install when using Icom CI-V radios.
JU5	Install when using Icom CI-V radios.
JU6	Install when using the DVS. Connects UAI to the master CPU.
JU7	Install when using the DVS. Connects UAI to the master CPU.
JU8	Install when using RS-232 radios. Connects UAI to the RCB
JU9	Install when using RS-232 radios. Connects UAI to the RCB

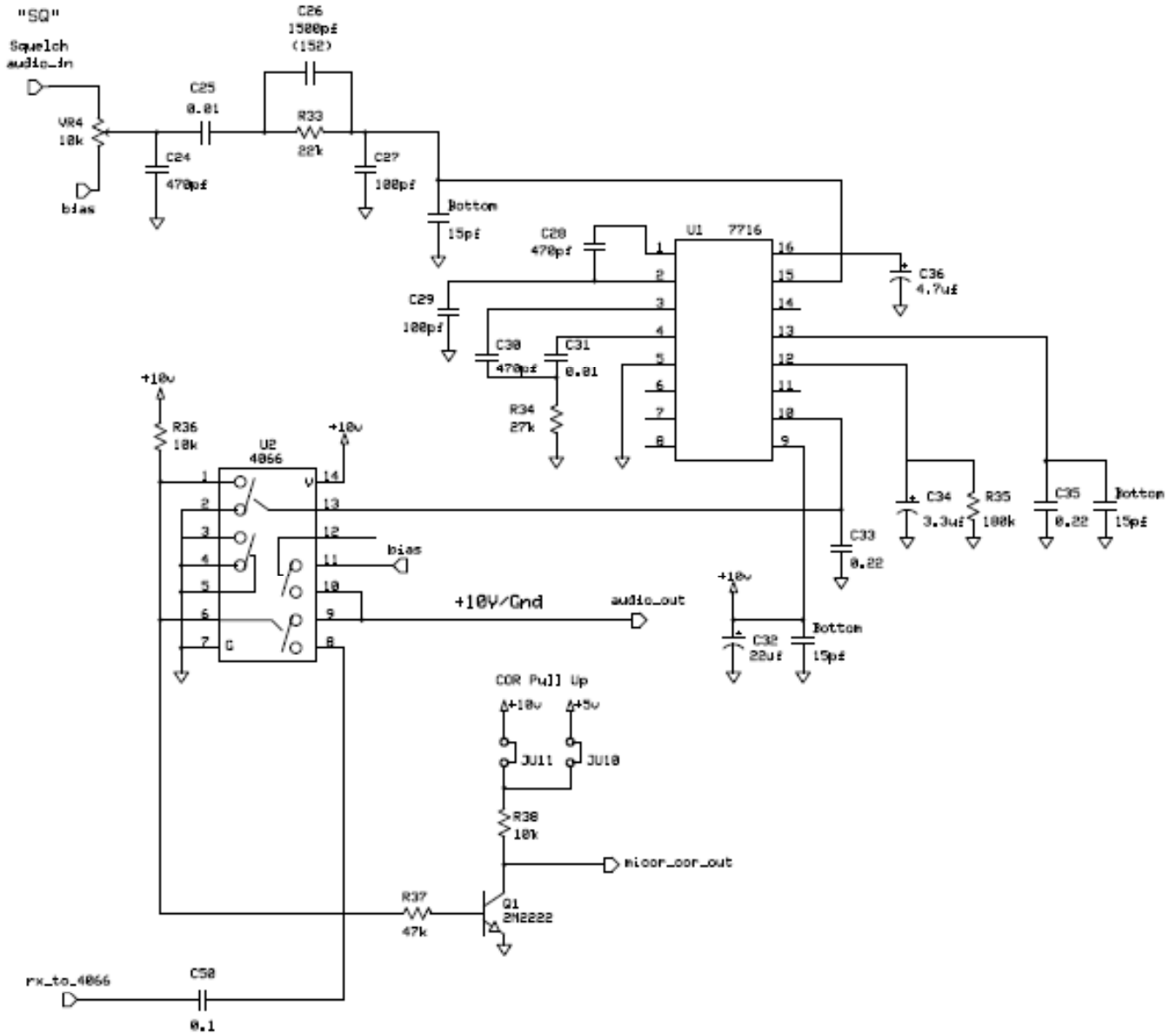
UAI-1 CI-V & RS232 Remote Base

Mode	U3 MAX 232	U4 7417	JU4	JU5	JU 6	JU7	JU8	JU9	Notes
CI-V Icom	⊘	✓	✓	✓	⊘	⊘	✓	✓	
RS23 2 Kenwood Yaesu	✓	⊘	⊘	⊘	⊘	⊘	✓	✓	
DVS	✓	⊘	⊘	⊘	✓	✓	✓	✓	

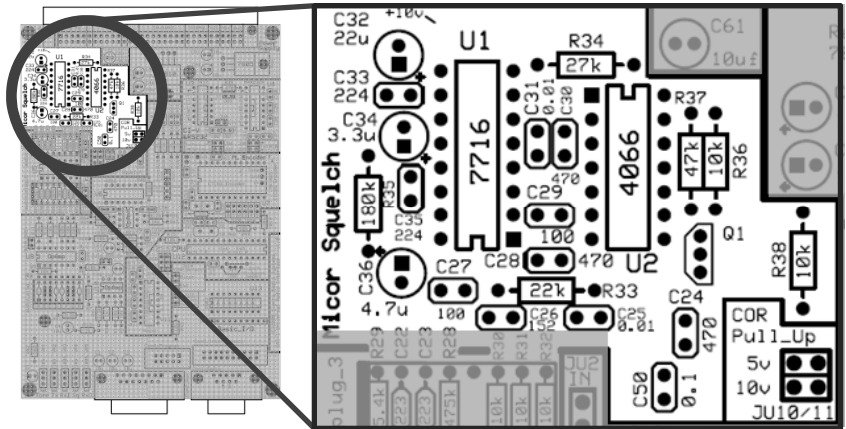
UAI-1 Jumper Settings



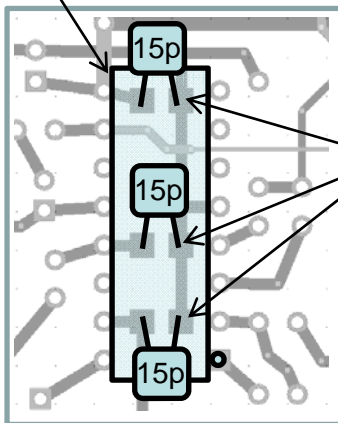
Micor Squelch



UAI-1 Micor Squelch

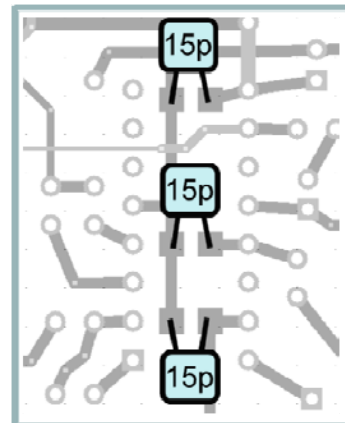


U1 Micor squelch chip



View from the top through the PCB

Solder the 15 pf capacitors to the square solder pads on the bottom of the PCB.

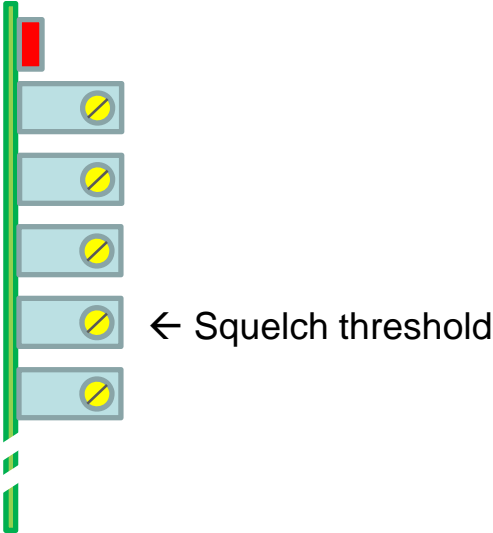


View from the bottom of the PCB

UAI-1 Micor Squelch

The Micor squelch section provides a local squelch detection circuit that produces a logic “pull to ground” output that indicates the presence of a carrier on the receiver’s frequency.

The squelch threshold is adjusted with VR4, the fourth 10 turn pot.



UAI Bill of Materials

Basic configuration

AP1	16 pin component carrier	R1	10k
C1	10uf non-polarized electrolytic cap	R2	10k
C2	10uf non-polarized electrolytic cap	R3	1k
C3	10uf non-polarized electrolytic cap	R4	3.3k
C4	10uf non-polarized electrolytic cap	R5	10k
C7	0.047uf (473)	R6	10k
C8	0.022uf (223)	R7	10k
C9	0.047uf (473)	R8	10k
C10	0.022uf (223)	R9	10k
C44	10 uf	R10	10k
C45	10 uf	R11	10k
C46	10 uf	R12	10k
C47	1 uf non-polarized electrolytic cap	R13	1k
C48	1 uf non-polarized electrolytic cap	R16	1k
C49	0.1	R17	2k
C51	10 uf	R18	1k
C56	0.0047uf (472)	R19	2k
C57	0.0033uf (332)	R20	10k
C58	0.0047uf (472)	R21	10k
C59	0.0033uf (332)	R22	10k
C60	0.1	R23	10k
C61	10uf non-polarized electrolytic cap	R41	3.3k
CD	0.01	R42	560
CH	0.0047	R43	10k
CON1	DB9-F	R44	8.2k 1%
CON2	DB15-F	R45	13.8k 1% (use 13.0k)
CON3	2x10 Long male header interconnect	R48	10k
CON4	2x5 pin male header connector	RB	10k - User defined
CON5	64 pin DIN male right angle connector	RC	10k - User defined
D1	LED	RF	10k - User defined
JP	Jumper	RG	10k - User defined
JU3a	3x1 pin male header	RP1	10k x 9 SIP resistor package
JU3b	3x1 pin male header	REG1	7805
JU13	2x1 pin male header	REG2	7810
JU14	3x1 pin male header	SOC6	14 pin DIP socket
JU15	2x1 pin male header	SOC8	14 pin DIP socket
JU16	2x1 pin male header	SOC9	8 pin DIP socket
JU18	3x1 pin male header	SOC10	8 pin DIP socket
JU19	2x1 pin male header	SOC13	18 pin DIP socket
PCB1	UAI-1 PCB	SOC14	16 pin DIP socket
		U6	CD4066
		U8	TLV2254
		U9	TLV2252
		U10	TLV2252
		U13	ULN2803
		VR1	10k 10 turn right angle trim pot
		VR2	10k 10 turn right angle trim pot
		VR3	100k 10 turn right angle trim pot
		VR4	10k 10 turn right angle trim pot
		VR5	100k 10 turn right angle trim pot

UAI Bill of Materials

Optional Blocks

PL Filter Parts

AP2	16 pin component carrier
AP3	16 pin component carrier
C18	0.022 (223)
C19	0.022 (223)
C20	0.022 (223)
C21	0.022 (223)
C22	0.022 (223)
C23	0.022 (223)
JU1	3x1 male header
JU2	3x1 male header
R30	10k
R31	10k
R32	10k
SOC5	14 pin DIP socket
SOC15	16 pin DIP socket
SOC16	16 pin DIP socket
U5	TLV2254

Parts for 150 Hz Rolloff

R24	30k
R25	20k
R26	107k (use 110k)
R27	15k
R28	475k (use 470k)
R29	5.4k (use 5.6k)

PL Encoder Parts

C11	0.1
C12	0.1
C52	22
C53	22
C54	0.1
JU20	2x6
R40	1M
SOC7	24 pin DIP socket (0.6" spacing)
U7	CML MX-465
Y2	4 MHz
YINS2	Crystal insulator

CPU Parts

C6	22
C13	0.1
C14	0.1
C15	0.1
C16	0.1
C17	0.1
C55	22
JP	Jumper
JU12a	3x1 male header
JU12b	3x1 male header
R14	10k
R15	10k
R49	10k
SOC11	16 pin DIP socket
SOC12	28 pin DIP socket (0.3" spacing)
U11	MAX232A
U12	18F2620
Y1	10 MHz crystal
YINS1	Crystal insulator

UAI Bill of Materials

Optional Blocks

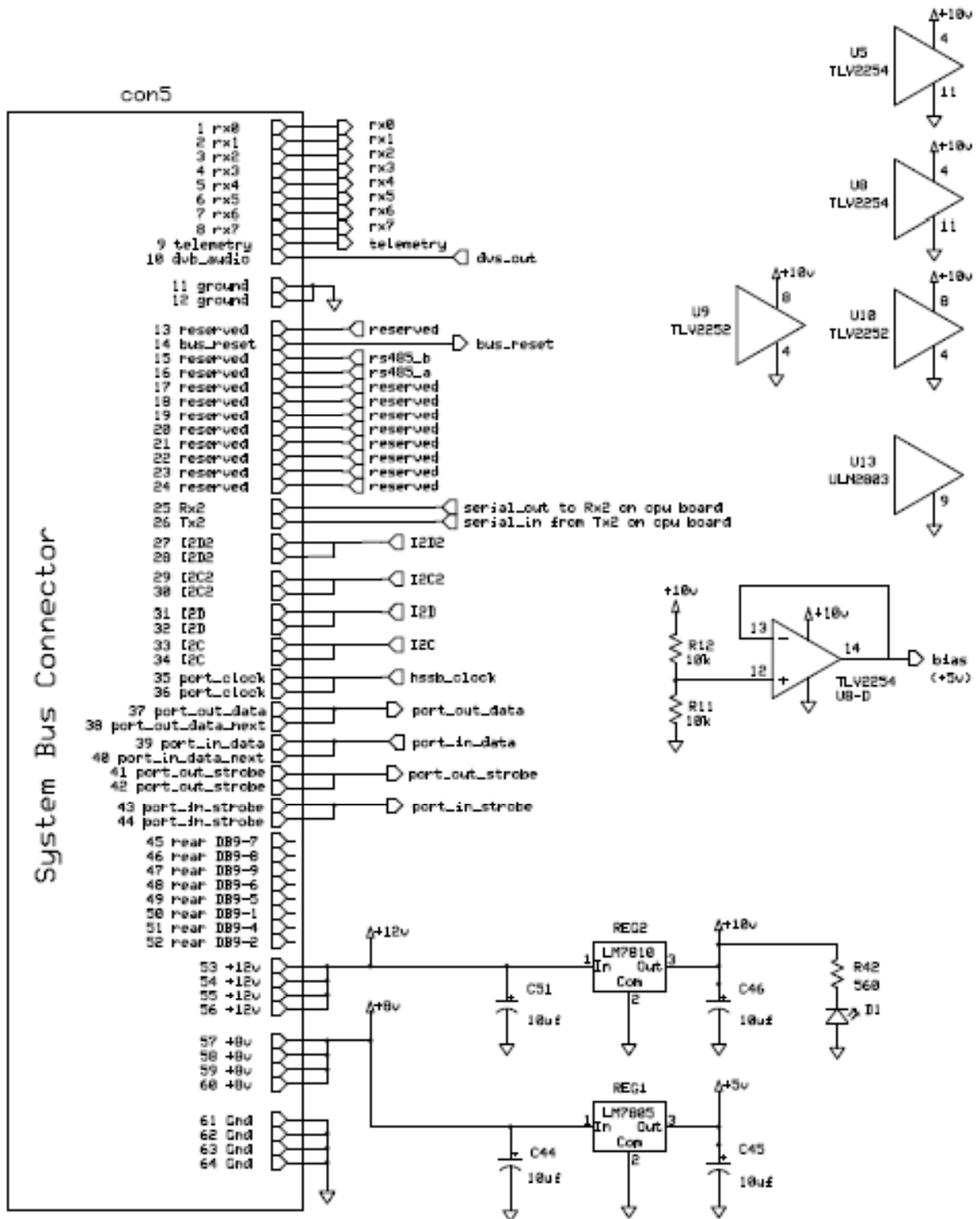
CI-V / RS232 Serial Interface Parts

C37	0.1
C38	0.1
C39	0.1
C40	0.1
C41	0.1
C42	0.001
C43	0.001
JP	Jumper
JU4	2x1
JU5	2x1 pin male header
JU6	2x1 pin male header
JU7	2x1 pin male header
JU8	2x1 pin male header
JU9	2x1 pin male header
R39	470
SOC3	14 pin DIP socket
SOC4	16 pin DIP socket
U3	7417
U4	MAX232A

Micor Squelch Parts

C24	470 pf
C25	0.01
C26	1500 pf (152)
C27	100 pf
C28	470 pf
C29	100 pf
C30	470 pf
C31	0.01
C32	22uf
C33	0.22 (224)
C34	3.3 uf
C35	0.22 (224)
C36	4.7uf
C50	0.1
JP	Jumper
JU10a	2x1 male header
JU10b	2x1 male header
Q1	2N2222
R33	22k
R34	27k
R35	180k
R36	10k
R37	47k
R38	10k
SOC1	16 pin DIP socket
SOC2	14 pin DIP socket
U1	Motorola 7716
U2	CD4066

SRS System Bus and Power Supply



UAI / Computer Interface for VoIP

