THE RPT81 REPEATER CONTROLLER

1.0 GENERAL

1.1 The system consists of a built up logic board and an interface board kit.

1.2 The following functions are provided:
Anti-Kerchunk - reduces the annoyance of having the repeater hang on for stray noise keyups.
Courtesy Beep - forces the user to allow a time for other stations to break in.
Hang - keeps the transmitter keyed after use to avoid it going up & down with each user in a QSO.
Time-out - FCC requirement. Shuts the xmtr down if it is keyed up by a continuous carrier.
Remote shutdown - Lets the control operator shut down the transmitter in an emergency.
CWID - FCC requirement. Identifies the repeater.
Autopatch - allows the users to make phone calls. Toll calls can be allowed or prohibited.
Quick dialing for 911 & a user programmable number.
Reverse patch - Allows people to call in to the repeater and be answered by a user.
Enable/disable for autopatch , reverse patch, & 911 dial.
A paging tone(941Hz) for alerting members, etc.

1.3 The following functions are programmable with a serial data terminal:

* Antikerchunk delay, .1 to .9 sec or no antikerchunk
* Beep delay, .1 to .9 sec or no beep
* Hang time, 1 to 9 sec or no hang
* ID period, 1 to 9 min (10 to 90 min for commercial operation)
* Time-out period, 1 to 9 min
* Enable and Disable DTMF codes
* Autopatch DTMF code
* User bits on and off DTMF codes(2 each)
* Disable codes for patch, reverse patch, and 911 dial.
* Master enable code for patch, reverse patch, and 911 dial.
* User number dial code
* User number(7 digits). 10 digits available by special request.
* Call sign, etc. max. 8 characters

2.0 OPERATION

2.1 Normal. A typical operation is begun when the COS goes active. The Xmit key is immediately activated. If the antikerchunk feature is enabled and the carrier stays on for less than the programmed delay, the Xmit key is dropped as soon as the carrier drops. If antikerchunk is disabled or the carrier is on longer than the delay, and hang is activated, then when the carrier is dropped, the Xmit stays on.

If the ID wait time has expired when carrier drops, the controller will send ID.

If beep is selected, the controller waits the programmed delay time and then beeps. If hang is selected, it waits the programmed time and then drops the Xmit key. If 1/2 of the programmed ID wait time has expired, the ID will be sent 30 sec after the Xmit drops("Final ID").

2.2 Time-out. If the programmed time-out time expires before the carrier drops, the Xmit key will drop. The controller then waits until either the carrier drops or the ENABLE input(hardware or DTMF) is detected, and then reverts to normal operation. The time-out timer can also be reset before the Xmit drops by the ENABLE input or sending a DTMF #.

2.3 Xmit disable. If the DISABLE input is detected, the Xmit key will go low and stay low until the ENABLE input is detected. Enable and disable can be by either the hardware inputs(0.5 sec min.) or DTMF codes.

2.4 DTMF codes. The system will respond to 1 or 3 digit commands. Commands are decoded while the carrier is on, and are recognized when the carrier drops.

3.0. MODIFICATIONS TO THE LOGIC BOARD

3.1 Serial Port. As supplied, the UART TX and RX lines are wired to a bi-directional line driver/receiver, Z13, and RTS is wired to Z19, an identical chip. To provide a pseudo RS-232 port:

1. Cut the trace between Z19-4 and Z10-5 (between Z10-5 & the via).
2. Wire Z19-4 to Z10-6(Transmit data) (jump the via to Z10-6).
3. Cut trace between Z13-2&3 and Z15-19 (long trace from Z13-3).
4. Wire Z13-2&3 to Ground (jumper Z13-3 to Z13-5).

Now J1-8 is data in, J1-22 is out(0 to +5V, OK with most terminals).
Note: A via is a plated through hole without a component lead.

3.2 Output bits: Autopatch control.	Wire Z15-5 to pin 32.	Alternate beep	Wire Z15-6 to pin 20.
Reverse Patch(ring)	Wire Z17-15 to pin 54	User bit 0	Wire Z15-19 to pin 36.

4.0 LOGIC BOARD SIGNALS

4.1 POWER(1,35,58). +5V at about 180 mA.

4.2 COS(55). This input comes from the receiver squelch output to indicate when a carrier is present. The proper polarity must be selected by S1:1.

4.3 PROGRAM'(51). Leave J2:7 open for normal operation and ground for the programming mode. This selection is valid only at power up.

4.4 SERIAL IN(8) & OUT(22). These are used for programming via an RS-232 terminal(1200N81).

4.5 ENABLE(47) & DISABLE(49). Active low inputs, internally pulled to +5V, can be left open if not used. Connect to a tone detector or other signal to provide remote control. Disable turns the transmitter off until the enable input is active. Enable also resets the time-out timer. DTMF commands do the same things. These pins are normally not used, but are available if needed, wire them to unused pins of J2. Must be low 0.5 sec. to be valid.

4.7 XMIT KEY(44). Active high output to key transmitter.

4.8 BEEP/ID(18). Active high output to key the beep/ID tone.

4.9 ALT. BEEP(20). Alternate output for courtesy beep. Set S1:7 on(ground board pin 15) to activate this output and prevent the courtesy beep from being sent to the BEEP/ID line.

4.10 TOLL ALLOW(57). Set S1:8 on(gnd) to defeat toll call prevention and hence allow toll calls.

4.11 COML.(53). Set S1:6 to select commercial operation. The ID time is multiplied by 10. ID is sent only after the transmitter has been off for 1 min and the ID time has expired.

4.12 PATCH ON(32). Active high output to connect the phone line.

4.13 DTMF input(37-45). This reads the output of the DTMF decoder(U2)

4.14 USER BIT0(36). This bit can be turned on and off by DTMF signals. The second bit is avail. from U13-9.

5.0 PROGRAMMING

In order to program the controller, ground J2:7 to select the programming mode, connect a terminal set to 1200 baud, no parity, 8 data bits, & 1 stop bit, and apply power. The terminal should be set to not display the characters locally since the controller echoes them. The terminal will display the following(without the blanks & notes):

Id wait time	6 MIN	_____	
Time-out time	3 MIN	_____	
Hang time	5 SEC	_____	
Beep delay	.4 SEC	_____	
anti Kerch.	.2 SEC	_____	Notes:
Enable code	321	_____	This enables the transmitter or resets the time-out timer.
Disable code	123	_____	This disables the transmitter.
autoPatch	*8#	_____	This activates the autopatch for normal dialing.
user bit 0 oN	456	_____	These control the user bits.
user bit 0 ofF	654	_____	
User bit 1 on	*3B	_____	
useR bit 1 off	393	_____	
Master enable.	325	_____	This enables autopatch, reverse patch, and 911 dial.
A/p disable.	D#0	_____	This disables autopatch including number x dial.
reV a/p disable	737	_____	This disables the reverse autopatch.
emerG disable	363	_____	This disables the 911 dial.
call x cOde	537	_____	This is the code to dial the number x programmed below.
number X	5832476	_____	User programmable number x to dial(Digits 0 to 9 only).
Call sign	W8SBD/R	_____	Repeater call sign, max. 8 characters.
Save in eeprom	This must be used to save the data for use in operation.		
ENTER CODE	Enter the one letter code of the data to be changed.		

This will be displayed every time the controller is powered up with J2-7 grounded and after each code entry. The values it shows at power up are what has been saved in the EEPROM. At the initial power up, it might show garbage. Each parameter must then be programmed. Use the blanks to record your own data.

On the "ENTER CODE" line, type the one letter code shown by the capital letter in the name of the function to be programmed. The terminal will display a message to enter the value to be programmed. Enter a single digit 0 to 9 or 1 to 9 as indicated for times, digits 0 to D(hex), *, #, for control codes, or letters and numbers for the ID code. A 0 for anti kerchunk, beep, or hang disables the function. The ID code is limited to numbers, upper case letters, /(slant bar), space, and comma.

After the new value is entered, the terminal will display the new program. When the desired program has been entered, use S to save it to the EEPROM so that it will be available after power is removed. If commercial operation is used, the ID period will be 10 times the value shown. When the codes are detected, they are scanned in the order shown, except for the autopatch, so if 2 or more codes are the same, only the first will be recognized.

Turn power off, remove the ground from J2-7 and turn power on to start normal operation.

6.0 AUTOPATCH

6.1 Calling. The autopatch is activated when one of the correct access codes is received, and carrier drops. It will then dial the requested number, using the DTMF generator(U14).

To dial manually, enter the 3 digit code(P) programmed above and without dropping your carrier, enter the number to be dialed. If 7 digits are not dialed, or the first digit is 1 or 0, it will not dial. If the Toll Call Allow line is low, the 7 digit requirement and the 1 and 0 hangups are disabled. A version allowing 10 digits is available.

To dial number X or 911, simply enter the 3 digit code(O) programmed as shown above, or enter 911.

After connecting, it waits for a # to hang-up. If the carrier is inactive for 1 min, it will send 5 beeps at 1 sec intervals and hang up after the 5th beep if carrier is not activated. The normal repeater time-out is active during the phone call, but it can be reset only by dropping carrier.

6.2 Reverse patch. When the phone rings, a signal consisting of both the ID and alternate beep tones is sent. To answer the phone, send a DTMF "*" DURING the ring signal. The repeater will beep during the remainder of the ring and then connect the phone. From this point on, it works as in 6.1 above.

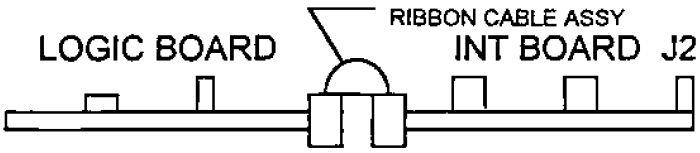
7.0 TONE OUTPUT

DTMF code 359 causes the system to put out a 941 Hz tone for 2 sec. This can be used to activate a bulletin board which will play a message on the repeater, either locally or from someones home, or it could be used as an alarm or to page people. A simple tone detector(see Misc. Schematics) is all that is needed to recognize it.

8.0 HOOKUP

8.1 Between boards

Plug both boards into the ribbon jumper with component sides up as shown. The boards can be rotated to parallel each other or to other angles if desired.



8.2 To repeater, pin numbers of J2(also wire number of the ribbon cable). Refer to the suggested repeater schematic. Note that pin 1 of J2 is identified by a square pad on the PC board, and is near C23.

1,2	Power to the board, can be 11 to 15VDC. About 400 to 500 mA is drawn.
3,4	Power ground
7	Program mode select. Ground to select program mode on power up, open for normal operation.
8	Serial data input for programming. COM port pin 2.
9	Serial data output for programming. COM port pin 3.
10	Aux. xmit audio input. Nominally 500 mV. See description of xmit audio amp. for options.
11	User bit 0. 5V logic.
12	User bit 1. 5V logic.
13	COS from rec. Pulled up to 5V. Do not exceed the voltage on pins 1&2.
16	Speaker audio in. Nominally 70mV. See description. of spkr. amp for options.
17	Speaker input ground. Connect directly to volume control.
18	Speaker ground. Connect only to the speaker.
19	Speaker output. Route this wire away from the speaker input.
22	Xmit audio out. Nominally 500 mV. See description of xmit audio amp for options.
23	Telephone connect LED. Activates when phone line is connected. Note LED goes to +V.
26	Receive audio. Nominally 700 mV. See description of ALC circuit for options.
29	Xmit voltage out. Connect to low power section of transmitter if possible. 2 amps max.
31	COS active LED. Activates when COS is active. Note LED goes to gnd.

9.0 CIRCUIT DESCRIPTIONS

9.1 5V regulator

U1, a 7805 regulator generates 5V for the logic board and other circuits. The heat sink is needed. CR1 is provided to short out a reversed polarity input. An external fuse is blown by this short to protect the circuitry. If you need a large fuse for your transmitter, use a smaller one for the control. 1 to 3 amps is OK.

9.2 Xmit switch

Q1 is turned on by the logic output bit. It turns on Q2 which applies the +V to the xmtr. Q2 is rated at 3 amps and a small heat sink is provided, though usually not needed. Be sure the heat sink doesn't short to the U1 heat sink. For best performance, use this voltage only on the low level stages of the transmitter and wire +V directly to the output stage. For low currents, R2 can be raised, for higher ones, it can be lowered. Be sure that Q2 is in saturation for your load, that is, there is little voltage drop across Q2.

If your xmtr needs a ground closure for PTT, omit R2, R3, & Q2 and wire Q1-C to J2-29.

9.3 Telephone power converter.

The CH1810 telephone coupler requires plus and minus 12V +/- 10% which is generated as follows. U15 provides a regulated 9V to eliminate the effects of input voltage variations.

U10 provides a rectangular wave which drives the base of Q4. When Q4 is on, current builds up in L1. When Q4 is off, the coil discharges through CR7, charging C28 to a negative voltage. This is a flyback inverter. CR10, CR4, and CR5 regulate the voltage to -12V. The ratio of R36 to R37 determines how long Q4 is on and therefore the amount of current available. If the CH1810 is not used, reduce R37 to 3.9 K or less to cut down on power dissipation in CR10. For minimum current drain, select R37 so that about 5mA flows through CR10. CAUTION: While measuring the current in CR10, do NOT allow the circuit to be open or the voltage will increase and probably damage U8, Q4 and C28. Alternately, select R37 for about -11 to -11.5V & be sure CR10 is not too hot.

The output of U10 is also buffered by Q6 and Q7. The peak-to-peak output of Q6-Q7 is added to the system voltage through CR8 and CR9 to provide an input voltage to U11, a +12V regulator.

9.4 ALC

U5 is a dual compander, connected to provide ALC. See the Signetics data book for full data. This part can hold a constant 0dBm output over a very wide range of input voltage. Using its maximum gain however, results in undesirable pops when the input goes from zero to normal due to the slow response of the detector. This problem is lessened by biasing the detector output to reduce the maximum gain. This is controlled by R17 for the receive side, and R18 for the phone. The values shown work for most applications. If you have an unusually low input, increase the resistor value for more gain, if there are objectionable pops, then lower it.

9.5 Xmit and Telephone Audio

U6A combines audio from several sources to be sent to the transmitter. It is set up for unity gain, but the gain can be customized by changing resistor values. The voltage gain to any one input is equal to R32 divided by the input resistor. U6D does the same thing for the telephone audio.

9.6 Telephone coupler

U8 connects the audio system to the telephone line. The audio input at pin 8 cannot exceed 0 dBm(about 700mVRMS) or the chip will turn the audio to the phone line off. Normally, for voice, the chip attenuates the signal 9.5 dB. This attenuation cannot be tolerated for dialing, so pin 2 is pulled low during dialing to eliminate the attenuation. If you need more audio for voice, you could ground pin 2, but this voids the FCC approval. Q3 sinks current to light an LED when the phone is connected. On U8, the jumper from E1 to E2 must be removed to allow it to dial quickly. NOTE: U8 refers to the complete assembly which includes an IC, relay and many other parts on a small PC board. Pin numbers refer to the pins of the board, not the IC.

9.7 Telephone audio blanking

Switch U7B disconnects the telephone audio from the transmitter when the receiver carrier is active. This is to allow the ham on frequency to blank out objectionable language. The blanking control is from U6C which monitors the COS line. DIP switches set it up for active high or low carrier. Q5 sources current to light an LED when carrier is active. To defeat blanking, short U7-4 to U7-3.

9.8 DTMF blanking

Switch U7A cuts off DTMF tones to avoid transmitting control codes. This is controlled by U6B. Normally U6 pin 7 is high which allows receive audio to go to the transmitter. The Data Valid signal from the DTMF detector U2 is delayed by R26 and C3 to avoid false blanking since some peoples voice will cause a false detect. CR2 gives it a slow attack, fast decay. Once C3 has been charged, U6-7 goes low which discharges C4 through CR3 and blanks the audio. When the DTMF ends, C4 charges through R27 which slows the unblanking. This is to keep it blanked between digits, so that although the very first part of the first digit will be transmitted, nothing else will. You can adjust the values to change the timing if you want, or move R43 from C4 to +5V to disable blanking.

9.9 DTMF detection

U2, a 75T202 or SSI202 detects the DTMF signals in the receive audio. It needs from -30 to -2 dBm per tone. If your receiver doesn't supply an appropriate level, change R52 or 53.

9.10 DTMF generation

U13 is a latch which decodes an 8 bit word from the logic board. 7 bits drive tone generator U14. It generates DTMF or single tones. Bit 3 is user bit 1. U14 also outputs the Dial' signal to change the attenuation of the CH1810 for dialing.

9.11 Tone generators

U3 & U4 generate the beep and CWID tones. Their tones are set by R8 and R10.

9.12 Speaker amp.

U9 provides a speaker output if desired. It has a lot of gain, so R50 and R51 are included to reduce the gain to a reasonable level. Separate grounds are included so that the output and input signal grounds can be isolated to avoid feedback. You can change the gain by changing R50 or 51. If the gain is very high, you will need to be careful about lead dress to avoid feedback.

10.0 CONSTRUCTION

10.1 Board

In order to keep the 4066(U7) cool, two traces have been cut(on top of board near R14 & C34) and you need to add two jumpers, shown on a drawing. This was done because U7 was operating on too high a voltage. The schematic now shows U6, U7, and Q5 operating from +5V instead of the system 12V(11-15V) as before.

To be safe, you should probably build the power section first and make sure it works before putting any more IC's on the board. If connected wrong, the flyback inverter can put out a high negative voltage. Be sure you have +12V at U8-1 and -12V at U8-10 before installing U8(the whole module, not just the IC). Tolerance is 10%. Also check for +5V at the output of U1. After installing the parts, with Q2 omitted for easy access, recheck the -12V on U8-10. If necessary, select R37 so that you have at least -11V. For minimum power drain, R37 should be as low as possible while still providing -11V. Don't go below about 3.0K. Make sure there is still +12V on U8-1.

U1 is now supplied with a double heat sink riveted to it. This lets it run cooler than the original version, which was just one of these sinks. The larger sink slightly interferes with the other parts, but is worth it for the cooler operation at higher supply voltage. You could drill out the rivet and use only one if you want.

Use ordinary good construction techniques and you should do OK. You can use sockets if you want, but they are not supplied. Be careful to get the parts in the right holes. Refer to the parts list and layout. Observe proper polarity and pin orientation. The large electrolytics are marked with a stripe on their negative side, while the small ones have a + by their positive lead. Be sure the + lead goes in the square pad. CAUTION: The IC's do not all have pin 1 in the same direction! Be sure you don't have any unwanted solder bridges.

10.2 Chassis

The suggested schematic can be followed or you can hook it up some other way. S2 is shown to allow you to key the xmtr manually, keep it off, or allow the board to control it. No parts are provided except the cables. C1 & C2 might be needed to bypass the ripple introduced by the -12V flyback inverter. This could cause some transmitters to put out spurious signals. Be sure to check for spurs and increase the filtering if necessary. For convenience, R3 should have an audio taper. Radio Shack sells them. 100K is a good value, but it is not critical.

11.0 SETUP AND ADJUSTMENT

11.1 DIP switches

Set switches 1-5 per the following table:

Switch	1	2	3	4	5
COS active high	OFF	ON	OFF	OFF	ON
COS active low	ON	OFF	ON	ON	OFF

Set switch 6 ON for commercial ID timing.

Set switch 7 ON to select the alternate tone gen.(U3) for the courtesy beep.

Set switch 8 ON to allow unrestricted dialing including toll calls.

11.2 Levels

Adjust the receiver output to have the desired compression in the ALC circuit. If necessary, change the gain(see 9.4). This is best done with a steady tone into the receiver with the deviation selectable between about 1 and 4 kHz. Adjust the receiver audio level so that the output only varies a little bit when the deviation is changed from 4 to 1 kHz. More audio in produces more compression. Too much will produce distortion and also bring up receiver noise when there is no audio. Too little will not provide compression. This is a matter for individual taste.

Adjust the following pots for the desired transmitter audio:

R22 Receive-normally set for 4 or 5 kHz on the most highly deviated input signal.

R14 Tones(Beep and CWID)-set a little below normal voice level.

R23 Telephone-same as receive.

R6 DTMF-since audio comes back from the phone, setting this to zero will not stop the dialing tones from being transmitted. This must be set for the paging tone to work. Set it to about 4 kHz.

Adjust R21 for the desired level to the phone line.

Adjust R8 and R10 for the desired beep/ID tones. Ground U8-5 to simulate a telephone ring. This activates both tones. Check that an acceptable ring signal is transmitted.

12.0 OPTIONS

12.1 General

Use one of the user bits to allow toll dialing by connecting it to S1:8(switch off).

Use one of the user bits to select the courtesy beep tone by wiring it to S1:7(switch off).

Have an indication of something external such as AC power failure by wiring a logic level signal to S1:7(switch off). Then the tone of the beep would indicate that something had happened. Use caution not to apply a voltage greater than 5V. Use an open collector pull down if needed.

Leave out U3 and wire its trigger signal to set off some special external voice or tone generator and wire the external signal to the aux xmit audio input.

Use one of the user bits to have a tape player, WX receiver, etc. play into the aux xmit audio input.

Use one of the user bits to drive external logic to select that the COS comes from the receiver or from a CTCSS(sub audible tone) detector. Logic to do this is shown on the Misc. Schematics sheet. The tone detector shown can detect a CTCSS tone. See 12.2-2 for a discussion of this tone detector.

12.2 Remote Control.
If control via a separate receiver is desired, there are 2 options. See the Misc. Schematics sheet.

1. Connect the control receiver audio to tone detectors such as shown, and connect their outputs to the Enable and Disable hardware bit inputs. The tone detector circuit shown will detect a single tone. Two of them can be connected through a logic AND circuit to provide dual tone control. The formulas for setting the detection frequency and bandwidth are shown. The narrower the bandwidth the less chance there is of false detection, but also the better chance that the frequency will drift so that the incoming tone will not be detected. Be sure to use good quality parts to avoid drift due to temperature and aging. C4 controls the speed of response. Twice C3 is recommended as the minimum, higher values help reduce chatter and false detections.

2. Combine the main and control receiver outputs and send them to the DTMF detector as shown. In this case, the controller would respond to audio from the control receiver the same as from the main one. All commands would be available. The repeater transmitter would key up during control operations, but little or no control rec. audio would be transmitted. Note that to receive commands, the squelch(COS) from the control receiver must be combined with that from the main receiver. A circuit is shown which allows any number of active high or low signals to be connected. The output which is fed to the controller is active low so that the logic must be programmed that way(see 11.1). If the external circuit does not pull all the way to ground, it might be necessary to short out the diode connected to pin 55 of the logic board(CR3).

13.0 PARTS LIST

Quan	Type	Value	Ref Designators
1	5089 or CD22859		U14
1	74HC273		U13
1	75T202 or SSI202		U2
1	4066		U7
1	CH1810		U8
1	3403 or 324		U6
1	LM380		U9
3	555		U10,U3,U4
1	7805(with heat sink)		U1
1	7809 or SR0114		U15
1	7812		U11
1	NE571		U5
22	CAP	0.1(104)	C1,C10,C11,C14,C15,C16,C19,C20,C21,C24,C25,C31, C32,C33,C34,C35,C36,C5,C6,C7,C8,C9
2	CAP	0.01(103)	C17,C18
1	CAP	0.001(102)	C27
7	POLCAP	1.0 uF	C12,C13,C28,C29,C3,C30,C4
3	POLCAP	100 uF	C2,C22,C23
1	POLCAP	330 uF	C26
1	CONN,	TEL JACK	J1
1	CONN, 34 HEAD	REPEATER	J2
1	INDUCTOR	150 uh	L1
1	CRYSTAL	3.579 MHz	Y1
1	DIODE	1N4001	CR1
8	DIODE	1N4148	CR2 TO CR9
1	DIODE, 11V ZENER	1N4741	CR10
3	NPN	2N3904	Q1,Q3,Q6
1	PNP	TIP32	Q2
1	PNP	2N6489	Q4
2	PNP	2N3906	Q5,Q7
2	POT	100 K	R10,R8

Quan	Type	Value	Ref Designators
3	POT	20 K	R21,R22,R6
2	POT	10 K	R14,R23
3	RES	1 K	R9,R11,R49
15	RES	10 K	R1,R3,R12,R13,R24,R4,R41,R42, R43,R44,R46,R51,R52,R53,R7
4	RES	33 K	R15,R16,R19,R20
1	RES	220 K	R17
2	RES	330 K	R18,R27
1	RES	220	R2
1	RES	22 K	R25
11	RES	100 K	R26,R28,R29,R30,R31,R32, R33,R34,R40,R45,R50
1	RES	10	R35
1	RES	8.2 K	R36
1	RES	6.8 K	R37
1	RES	200	R38
1	RES	22	R39
2	RES	680	R47,R48
1	RES	1 M	R5
1	SWITCH, DIP		S1
1	HEAT SINK FOR Q2		
1	60 conductor ribbon cable assembly with 2 edge card connectors		
1	34 conductor ribbon cable assembly with header connector		

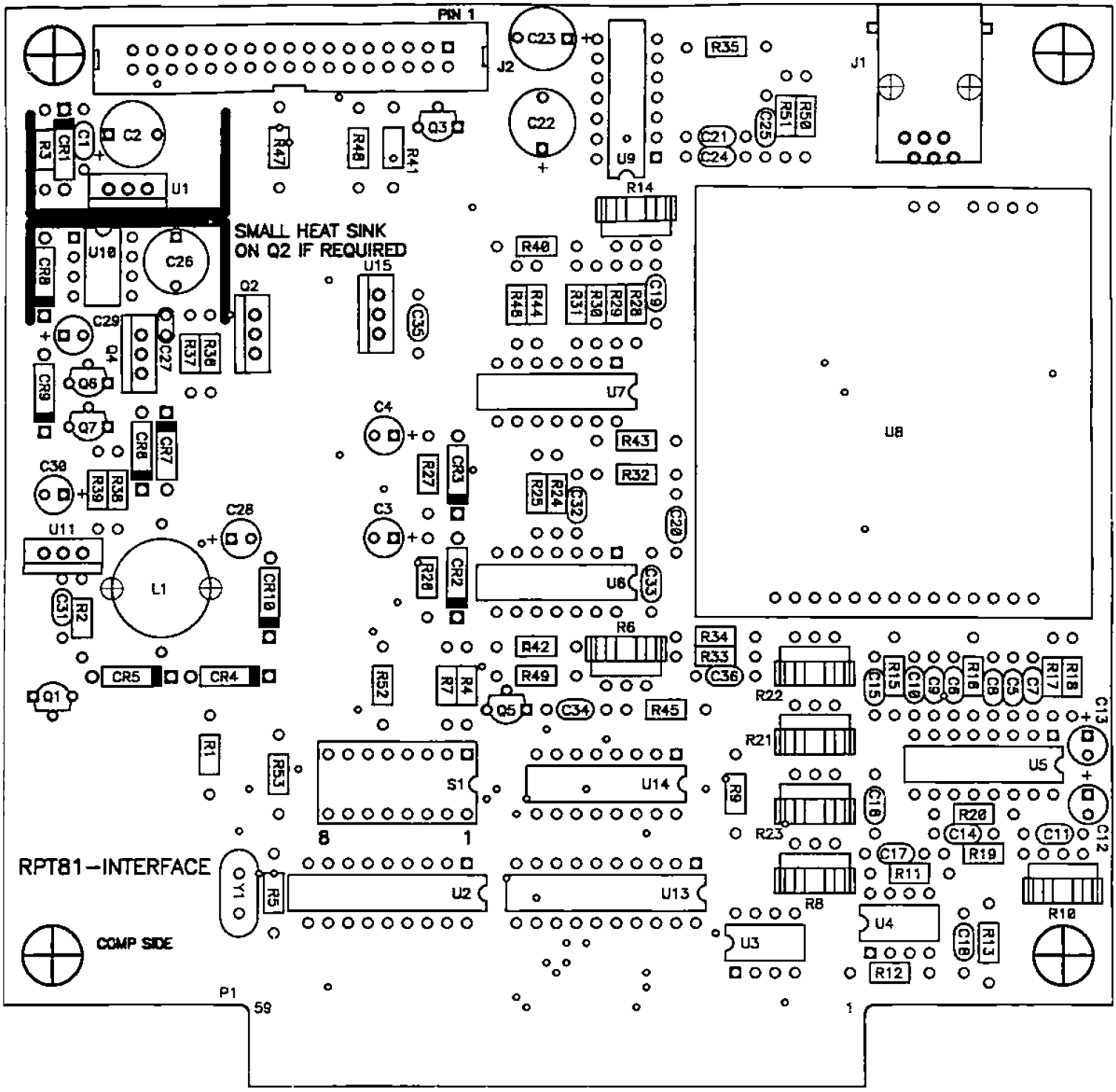
14.0 SUPPORT

I will provide a limited amount of advice to purchasers of this system, but cannot afford to spend a lot of time on it. Please don't ask me to accept collect calls, or return long distance calls. Use Email if possible. Software upgrades might be available and will be priced at the time(maybe free), send a SASE to be notified.

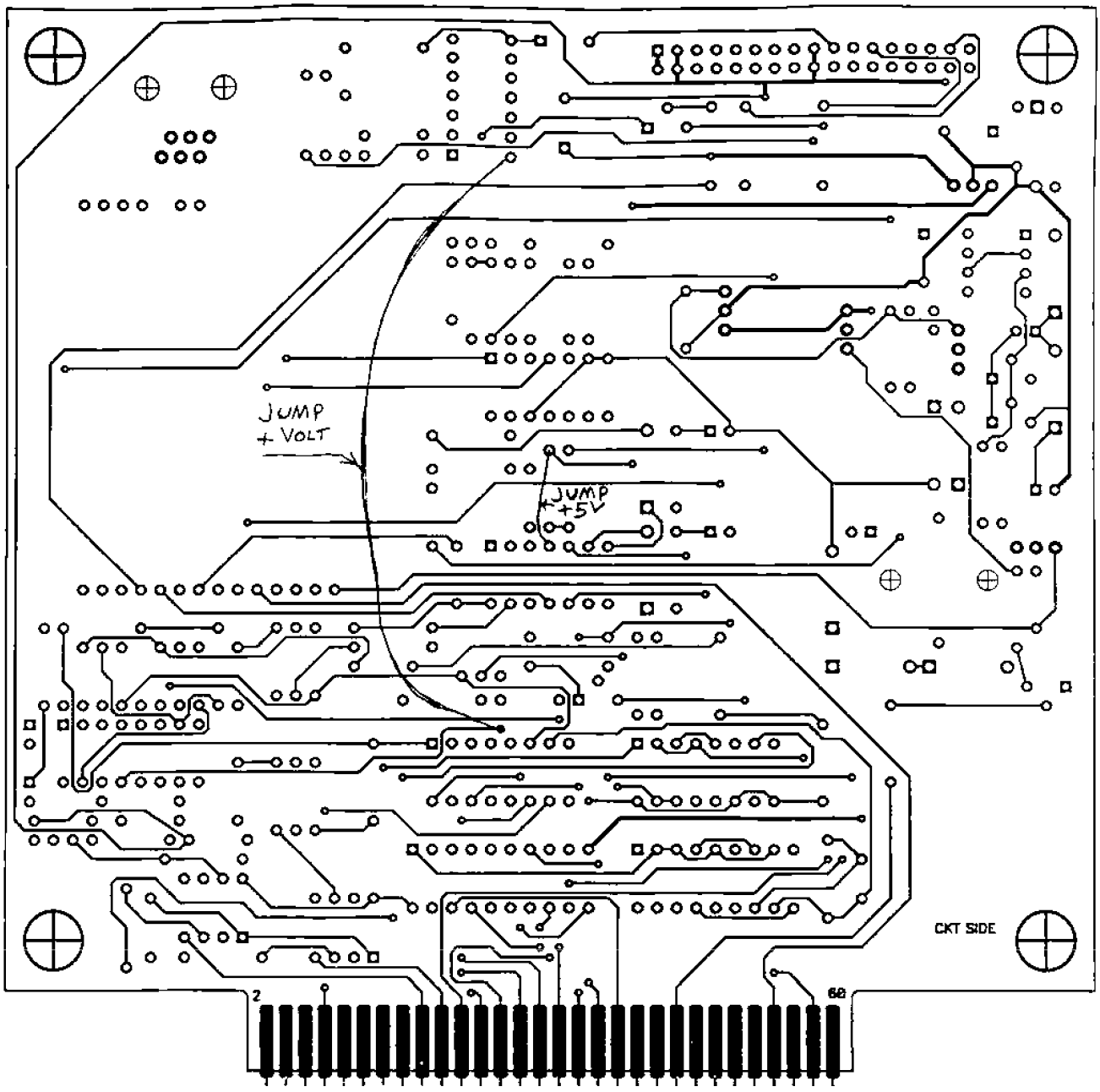
I would like to hear from users as to how it works and if they have any suggestions for improvements. There will probably be no software upgrade charge to the first one who suggests an improvement.

73 and good luck!

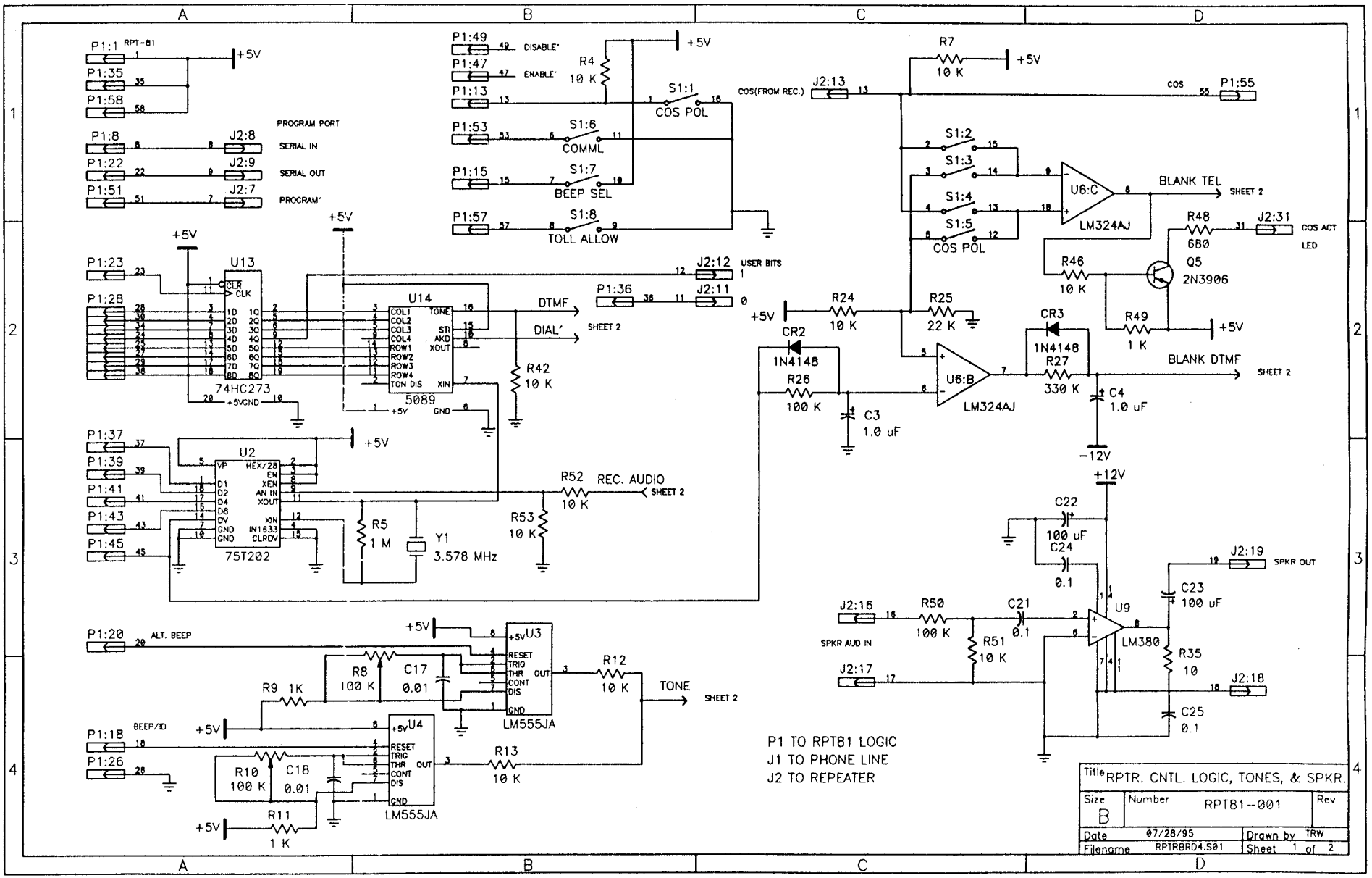
Tom Walker, W8SBD 209 Dawson St. Mason, OH 45040-1909
(513) 398-1516 E-Mail: trwalk@aol.com

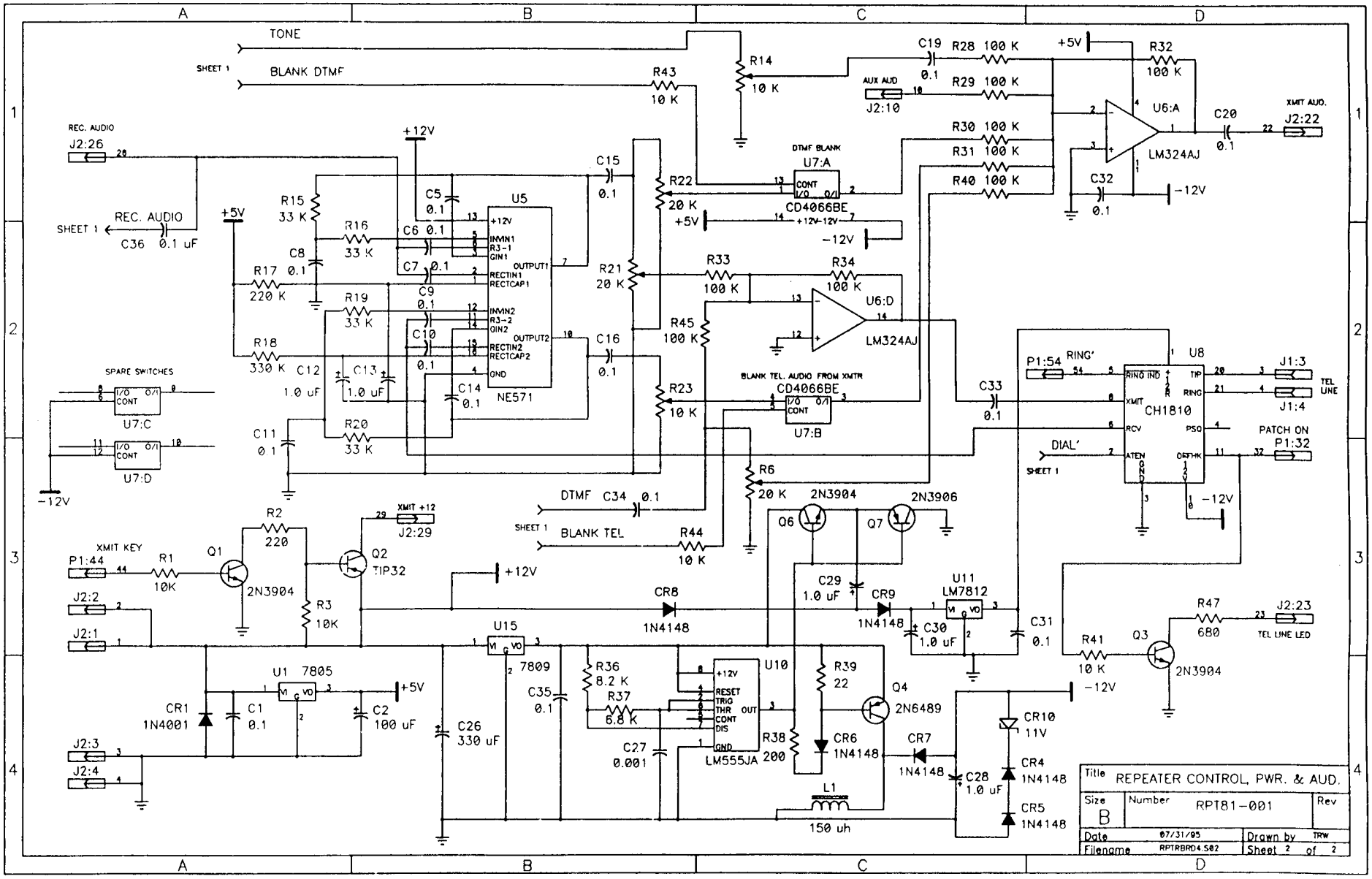


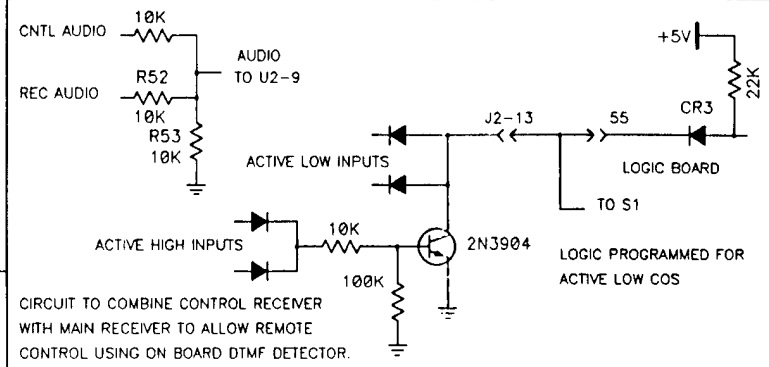
RPT-81 INTERFACE BOARD

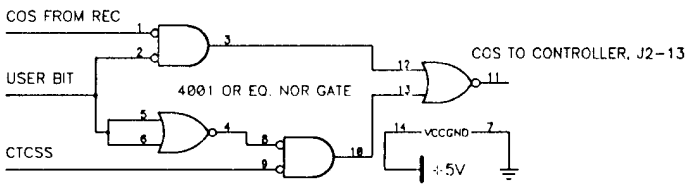


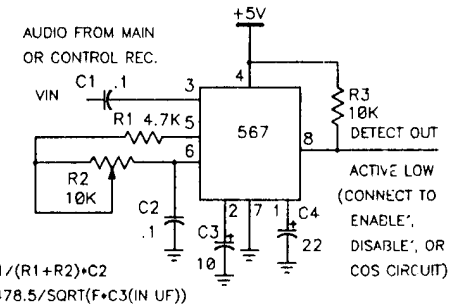
Jumps to re-connect system voltage
and
connect +5V to U6, U7, & Q5.

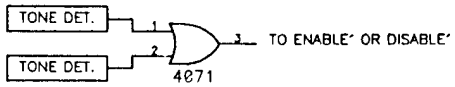

P1:1 RPT-81
P1:35
P1:58
+5V
P1:8
J2:8
SERIAL IN
P1:22
J2:9
SERIAL OUT
P1:51
J2:7
PROGRAM'
PROGRAM PORT
P1:49
DISABLE'
P1:47
ENABLE'
P1:13
P1:53
P1:15
P1:57
R4
10 K
S1:1
COS POL
S1:6
COMM'L
S1:7
BEEP SEL
S1:8
TOLL ALLOW
J2:13
COS(FROM REC.)
R7
10 K
COS
P1:55
S1:2
S1:3
S1:4
S1:5
COS POL
U6:C
LM324AJ
BLANK TEL
SHEET 2
R48
680
J2:31
COS ACT LED
R46
10 K
Q5
2N3906
R49
1 K
U13
74HC273
P1:23
P1:28
J2:12
USER BITS
P1:36
J2:11
U14
5089
DTMF
DIAL'
SHEET 2
R42
10 K
R24
10 K
R25
22 K
CR2
1N4148
R26
100 K
C3
1.0 uF
U6:B
LM324AJ
CR3
1N4148
R27
330 K
C4
1.0 uF
BLANK DTMF
SHEET 2
-12V
+12V
P1:37
P1:39
P1:41
P1:43
P1:45
U2
75T202
R52
10 K
REC. AUDIO
SHEET 2
R5
1 M
Y1
3.578 MHz
R53
10 K
C22
100 uF
C24
0.1
J2:19
SPKR OUT
C23
100 uF
J2:16
SPKR AUD IN
R50
100 K
C21
0.1
R51
10 K
U9
LM380
R35
10
J2:18
J2:17
C25
0.1
P1:20
ALT. BEEP
U3
LM555JA
R8
100 K
C17
0.01
R9 1K
R12
10 K
TONE
SHEET 2
P1:18
BEEP/ID
P1:26
U4
LM555JA
R10
100 K
C18
0.01
R13
10 K
R11
1 K
P1 TO RPT81 LOGIC
J1 TO PHONE LINE
J2 TO REPEATER
Title RPTR. CNTL. LOGIC, TONES, & SPKR.
Size B
Number RPT81--001
Rev
Date 07/28/95
Drawn by TRW
Filename RPTRBRD4.SCH
Sheet 1 of 2

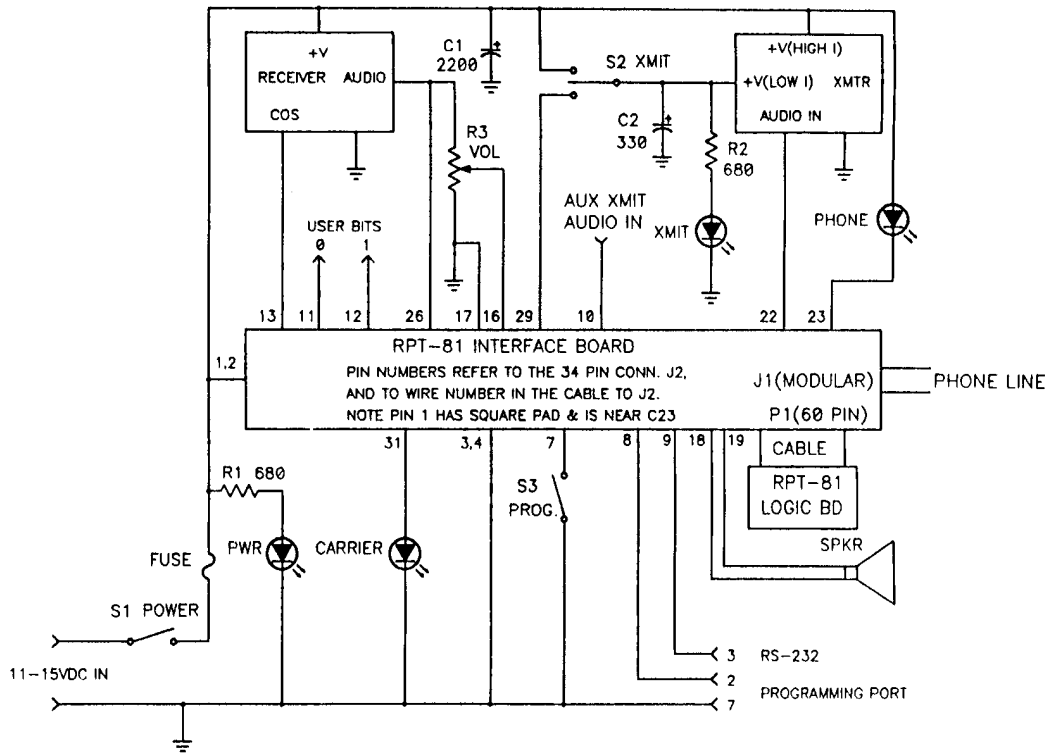

TONE
BLANK DTMF
SHEET 1
R14
10 K
R43
10 K
C19 0.1
R28 100 K
R29 100 K
R30 100 K
R31 100 K
R40 100 K
AUX AUD
J2:10
+5V
R32
100 K
U6:A
LM324AJ
C20
0.1
XMIT AUD.
J2:22
C32
0.1
-12V
REC. AUDIO
J2:26
REC. AUDIO
SHEET 1
C36 0.1 uF
+12V
+5V
R15
33 K
R16
33 K
C5
0.1
C6 0.1
C7 0.1
C8
R17 0.1
220 K
C9
0.1
R19
33 K
C10
0.1
R18
330 K
C12
1.0 uF
C13
1.0 uF
C14
0.1
C11
0.1
R20
33 K
U5
+12V
INVIN1
R3-1
GIN1
OUTPUT1
RECTIN1
RECTCAP1
INVIN2
R3-2
GIN2
OUTPUT2
RECTIN2
RECTCAP2
GND
NE571
C15
0.1
R22
20 K
R21
20 K
C16
0.1
R23
10 K
DTMF BLANK
U7:A
CD4066BE
+5V
-12V
R33
100 K
R34
100 K
R45
100 K
U6:D
LM324AJ
BLANK TEL AUDIO FROM XMTR
CD4066BE
U7:B
C33
0.1
P1:54
RING'
U8
CH1810
RING IND
XMIT
RCV
ATEN
TIP
RING
PSQ
DET HK
J1:3
J1:4
TEL LINE
PATCH ON
P1:32
DIAL'
SHEET 1
-12V
SPARE SWITCHES
U7:C
U7:D
-12V
R6
20 K
2N3904
Q6
Q7
2N3906
DTMF C34 0.1
SHEET 1
BLANK TEL
R44
10 K
XMIT +12
J2:29
R2
220
XMIT KEY
P1:44
R1
10K
Q1
2N3904
Q2
TIP32
R3
10K
J2:2
J2:1
+12V
CR8
1N4148
C29
1.0 uF
CR9
1N4148
U11
LM7812
C30
1.0 uF
C31
0.1
R47
680
J2:23
TEL LINE LED
R41
10 K
Q3
2N3904
-12V
U15
7809
C35
0.1
U1 7805
+5V
CR1
1N4001
C1
0.1
C2
100 uF
C26
330 uF
R36
8.2 K
R37
6.8 K
C27
0.001
U10
+12V
RESET
TRIG
THR
CONT
DIS
OUT
GND
LM555JA
R39
22
Q4
2N6489
R38
200
CR6
1N4148
CR7
1N4148
CR10
11V
CR4
1N4148
CR5
1N4148
C28
1.0 uF
L1
150 uh
J2:3
J2:4
Title REPEATER CONTROL, PWR. & AUD.
Size B
Number RPT81-001
Rev
Date 07/31/95
Drawn by TRW
Filename RPTRBRD4.SCH
Sheet 2 of 2











SUGGESTED REPEATER SCHEMATIC

Title	MISC SCHEMATICS	
Size B	Number RPT81-002	Rev
Date 04/06/96		Drawn by TRW
Filename RPTREX.S01		Sheet 1 of 1