

WR WESTERN RADIO SERVICES LTD.

VANCOUVER, CANADA

RCL-54A REPEATER CONTROL

Specifications:

Power requirements	13 VDC. at 12 mA. typ.
Drop-out delay range	0.08 to 3 sec. nom.
Time-limit range	18 to 200 sec. nom.
200 KHz. clock stability	$\pm 0.01\%$, -30 to +60 °C
P.C. edge connector	22 pin, 3.96 mm spacing
Physical size LxWxH	154 mm x 20 mm x 107 mm

Description:

The RCL-54A Repeater Control contains electronic interface to operate a radio transmitter and receiver in a radio-repeater configuration. The circuit board plugs into a 22 pin P.C. edge connector. A labeled front panel allows easy access to the adjustment controls. A folded-metal card-holder allows quick removal of the plug-in assembly for service or testing.

The Repeater Control has provision for CTCSS operation with an audio high-pass filter to remove the input tone from the coupled audio and allow insertion of newly generated and leveled tones. A 200 KHz. clock generator is included that is capable of driving a clock bus for multi-tone systems with synthesized tone encoder-decoders. An on-board front-panel switch is provided for disabling the repeater transmit function during tests.

Functional Connections (by pin number):

1 GND	Common ground.
2 RX AF IN LO	Receiver low-level audio input. Used for WR-154 receiver.
3 RX AF IN HI	Receiver high-level audio input. Used for WR-454 receiver.
6 +13V IN	+13 volt supply input.

Functional Connections (by pin number)(cont.)

8	+8V OUT	+8 volt supply output. Used to power 8 volt accessory circuits.
9	MOD FIXED	Unleveled output of the audio coupler.
10	MOD	Leveled output of the audio coupler for voice-modulation input to the transmitter.
11	RX AF OUT	An amplified version of receiver audio input. Used for driving the inputs of tone decoders or accessory circuits.
12	FLT RX AF OUT	The same as RX AF OUT except that the CTCSS band (below 250 Hz.) is removed.
13	<u>TOS</u> IN	Application of ground to this pin enables the audio coupler and PTT circuits to function according to the state of COS IN. This pin is used as a control gate for tone operated squelch systems. This pin must be grounded externally for carrier-squelch systems.
14	COS IN	Carrier-operated switch input. This circuit is connected to the receiver squelch circuit and will detect an input carrier as being present for more than about 3 volts input.
15	COS OUT	Carrier-operated switch output. This output is buffered for loads up to 15 mA.
16	<u>LIMIT</u> DIS	The time-limit timer is disabled when this pin is grounded.
17	<u>PTT</u> DIS	Grounding this pin disables the PTT.
18	PTT	An internal open-collector NPN switch grounds this pin to key the transmitter. It will connect to the transmitter's PTT input.
21	200 KHz. CLOCK	Clock bus driver output providing a 200 KHz. clock for synthesized tone encoder-decoder accessory circuits.
22	GND	Common ground.

Circuit Description:

The carrier-operated switch is made up with Q1 as a threshold detector and U2 pin 11 a fast-acting switch with hysteresis. Q3 is a buffer for sourcing output loads up to 15 mA. at COS OUT. CR1 isolates U2 pin 11 from the internal COS bus. Q6 will hold this bus low when $\overline{\text{TOS}}$ IN is high, thus blocking the repeater. CR4 switches the audio coupler (output at U3 pin 7). CR2 and R5 reset the time-limit timer U2 pin 3, every time COS goes low. R7 is the time-limit control (18 to 200 sec.) and C2 is the timing capacitor. U2 pin 10 is $\overline{\text{COS}}$ gated by the time-limit timer. CR3 and R9 reset the drop-out delay timer each time COS goes high ($\overline{\text{COS}}$ goes low). R10 is the drop-out delay control. C3 is the timing capacitor.

U2 pin 4 is the transmit indicator. It will be high whenever the transmitter is to be activated. U2 pin 4 is high when COS IN is high provided the time limit timer has not timed out or if COS has been low for less than the drop-out delay time. Note that U2 pin 4 will not go high if $\overline{\text{TOS}}$ IN is high, which would be the case for an input signal with an invalid or missing CTCSS tone. Q2 is an inverting buffer switch to sink the required current of the PTT line. S1 is a front-panel control to disable Q2 for test purposes.

R13, R14 and R15 comprise a level-equalizing input attenuator so that high-level and low-level receiver audio inputs can be processed at the same level. U3 pin 1 is an amplified and buffered version of the receiver audio input. U4 is used in an audio high-pass filter to eliminate the CTCSS band (below 250 Hz.). R30 and R31 convert the filter output impedance and level to that of the attenuator R13-15. Jumper JU-1 selects flat receiver audio as the coupler input and JU-2 selects high-pass filtered receiver audio as for CTCSS. At the audio coupler input, C6 and R18 pre-emphasize the audio for the voice band to 3000 Hz. R22 sets the gain of the coupler and thus the deviation ratio of the repeater. R23 sets the output impedance of the coupler to a value that will allow paralleling of audio sources to the transmitter voice modulation input.

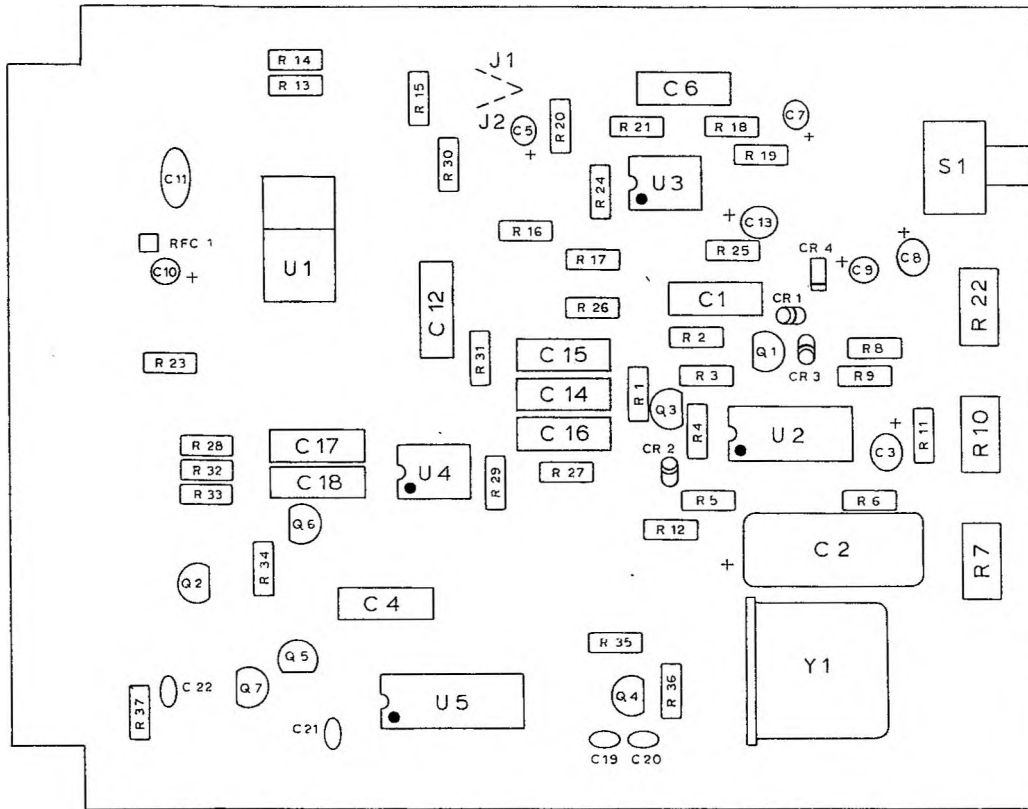
Q4 is a crystal controlled oscillator whose frequency is set by Y1 to 1600 KHz. U5 divides the frequency down to 200 KHz. Q5 and Q7 are bus drivers. C21, C22 and R37 smooth out the clock waveform to prevent ringing and load variation effects. U1 is a 3-terminal 8-volt regulator capable of supplying external loads up to 100 mA.

Adjustments:

- DELAY -Sets transmitter drop-out delay. Front-panel, single-turn pot., (slot-driver) adjust from 0.08 to 3 sec. nom.
- LIMIT -Sets time limit for continuous input signal to the repeater. Front-panel, single-turn pot., (slot-driver) adjust from 18 to 200 sec.
- LEVEL -Sets repeater deviation ratio. Normally set for one to one at 2 KHz. deviation for 1000 Hz. tone.


Jumpers-place one only:

- JU-1 -Place for normal operation without audio high-pass filter.
- JU-2 -Place for operation with audio high-pass filter for CTCSS.



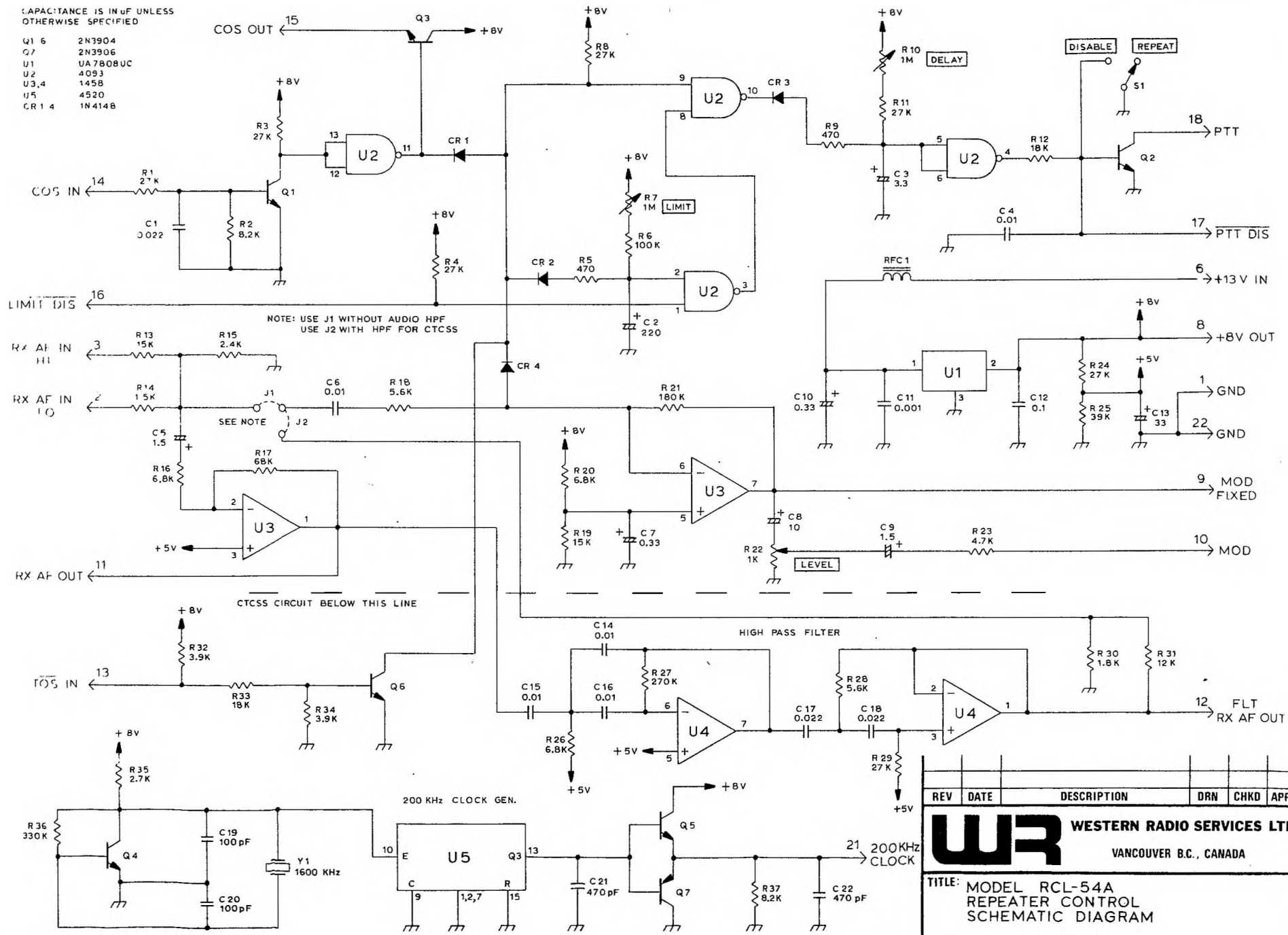
VIEW FROM COMPONENT SIDE



REV	DATE	DESCRIPTION	DRN	CHKD	APPVD
 WESTERN RADIO SERVICES LTD. VANCOUVER B.C. CANADA					
TITLE: MODEL RCL-54A REPEATER CONTROL P.C. ASSEMBLY					
DRAWN K S N		DATE APR 13, '69		DRAWING NUMBER	
CHECKED		SCALE		93	
APPROVED					

CAPACITANCE IS IN uF UNLESS OTHERWISE SPECIFIED

- Q1 6 2N3904
- Q2 7 2N3906
- U1 UA7808UC
- U2 4093
- U3,4 1458
- U5 4520
- C.R 1 4 1N4148



REV	DATE	DESCRIPTION	DRN	CHKD	APPVD

WR WESTERN RADIO SERVICES LTD.
VANCOUVER B.C., CANADA

TITLE: MODEL RCL-54A
REPEATER CONTROL
SCHEMATIC DIAGRAM

DRAWN KSN	DATE APR. 12, 1976	DRAWING NUMBER
CHECKED J.C.	SCALE	9-2
APPROVED		