REPEATER CONTROL
RCL - 54 B
Sub - Assembly No.14.0571

TABLE OF CONTENTS

1 SPECIFICATIONS

POWER REQUIREMENTS	13 VDC at 5 mA.nominal
DROP-OUT DELAY RANGE	0.15 to 5 seconds, nominal
TIME LIMIT	4 min.
P.C.EDGE CONNECTOR	22 pin, 3.96 mm spacing
DIMENSIONS LXWXH	154 mm x 20 mm x 107 mm

2 DESCRIPTION

The RCL-54B Repeater Control is an 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 labelled front panel allows easy access to the adjustment controls and a folded metal card-holder allows quick removal of the plug-in assembly for service or testing. An on-board front-panel switch is provided for disabling the repeater transmit function during tests.

3 FUNCTIONAL CONNECTIONS (BY PIN NUMBER)

1	GND	Common ground.
2	RX AF IN LO	Receiver low-level audio input.
3	RX AF IN HI	Receiver high-level audio input.
6	+13V IN	+13 volt supply input.
8	+8V OUT	+8 volt supply output. Used to power 8 volt accessory circuits.
10	MOD	Leveled output of the audio coupler for voice-modulation input to the transmitter.
11	AF OUT	An amplified version of receiver audio input. Used for driving the inputs of tone decoders or accessory circuits.
12	AF IN	Input to the AF Switch. This input is normally connected to AF OUT at pin 11.

13	$\overline{\text{RPT EN}}$	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 and 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	$\overline{\text{COS OUT DIS}}$	COS OUT is disabled when this pin is grounded.
17	$\overline{\text{TRANSMIT}}$ IN	Grounding this pin will ground the PTT, provided S1 is in REPEAT position and the COS driven limit timer permits.
18	PTT	An internal open-collector NPN switch grounds this pin to key the transmitter. It will connect to the transmitter's PTT input.
19	$\overline{\text{LIMIT DIS}}$	The limit timer is disabled when this pin is grounded.
20	$\overline{\text{SW MUTE}}$ IN	A low applied to this pin will mute the AF switch.
21	TRANSMIT OUT	This output is high (+8V CMOS) when the transmitter is in the transmit state via pin 18 (PTT).
22	GND	Common ground.

4 CIRCUIT DESCRIPTION

The carrier-operated switch (COS) is made up with Q1 as a threshold detector and U1C to form a fast-acting switch with hysteresis. U1D and Q3 provide a buffered $\overline{\text{COS OUT}}$ that will source up to 15 mA. If a low is applied to $\overline{\text{COS OUT DIS}}$ then COS OUT will be disabled. The COS signal output from U1C is ANDED with a repeater enable signal from U1A to provide an enabled $\overline{\text{COS}}$

at U1B output. This $\overline{\text{COS}}$ signal is enabled when $\overline{\text{RPT EN}}$ input is low. The $\overline{\text{COS}}$ signal is fed to the delay timer, limit timer and pre-emphasizing switch.

The delay timer U2D will provide a high at its output if either $\overline{\text{COS}}$ is low or if $\overline{\text{TRANSMIT}}$ IN is low. In the case that $\overline{\text{COS}}$ is low and $\overline{\text{TRANSMIT}}$ IN is high (or no connection) the output of U2D will remain high after $\overline{\text{COS}}$ goes high (loss of a carrier at the receiver) for the time set using the DELAY control R3. This will cause the transmitter to be active for a drop out delay time after the loss of received signal (adjustable 0.15 to 5 s). For test purposes U2C allows switch S1 to manually disable the electronic keying of the transmitter PTT through this card.

The limit timer uses a stable 2 kHz oscillator and a delay counter U4 to provide a limit of 4 minutes on $\overline{\text{COS}}$ being low before the output at U3B disables keying of the transmitter PTT through gate U3A. The time can be changed in octaves from 1 to 64 minutes by cutting the PC trace provided and placing a wire to an appropriate pin as shown on the schematic diagram. The limit timer can be disabled by applying a low to $\overline{\text{LIMIT DIS}}$. Q2 is the PTT keying switch. The logic drive is available at TRANSMIT OUT.

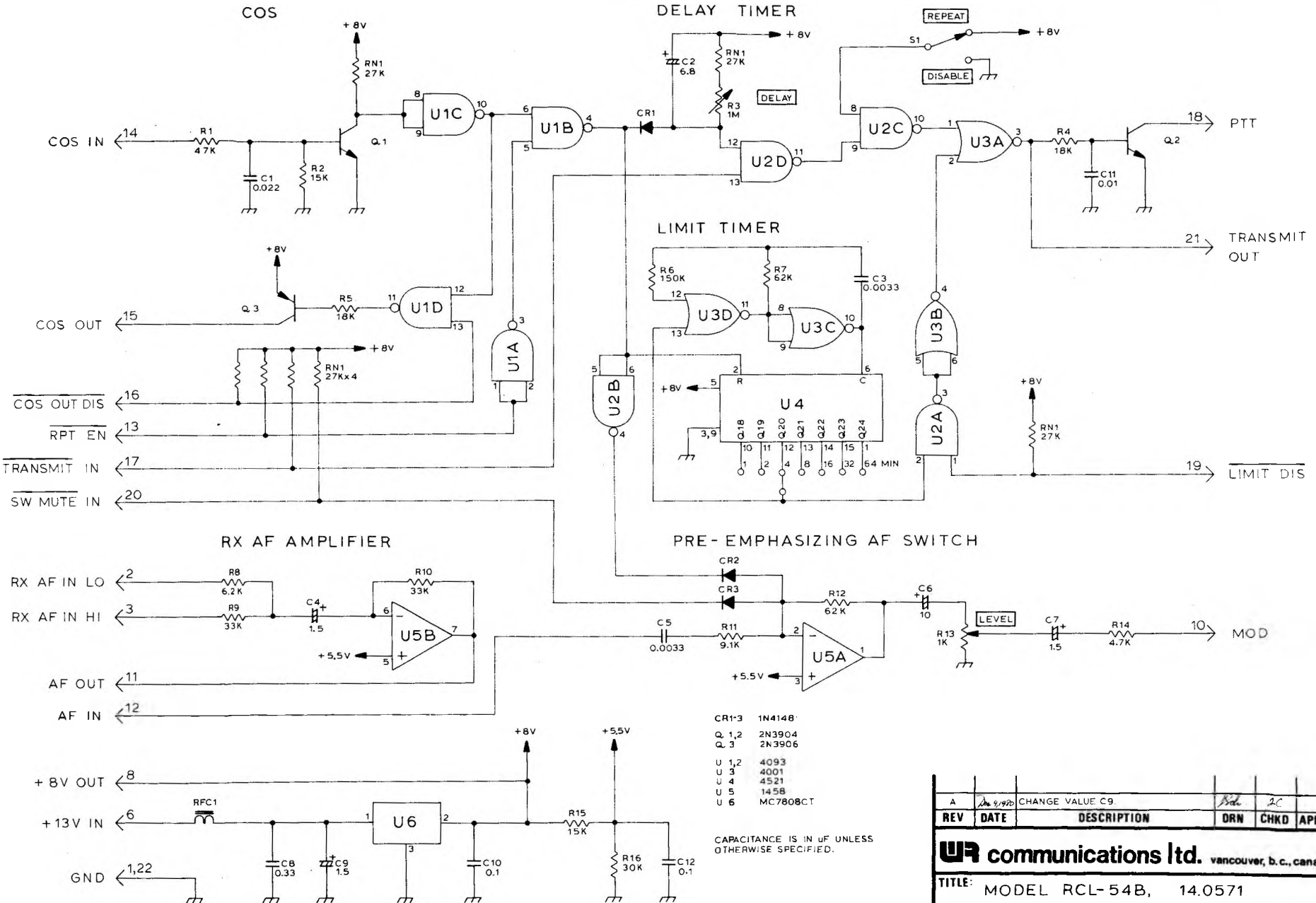
$\overline{\text{COS}}$ is inverted with U2B and applied to CR2 to gate open the pre-emphasizing switch when $\overline{\text{COS}}$ is low (a signal is received and the card is enabled). CR3 allows an external device to mute this switch when $\overline{\text{SW MUTE}}$ IN is low. U5B accepts both standard low level and high level RX AF inputs and produces a buffered output at AF OUT. This output can be connected directly or through an external filter to AF IN which is the input to the pre-emphasizing switch U5A. The LEVEL control, R13, is used to adjust the repeater audio gain.

U6 provides a regulated +8 volts DC supply for the on-board electronics and up to 100 mA of external load.

5 ADJUSTMENTS

DELAY — Sets transmitter drop-out delay. Front-panel, single-turn pot., (slot-driver) adjustable from 0.15 to 5 s nominal.

LEVEL — Sets repeater deviation ratio. Normally set for one to one at 2 kHz deviation for 1000 Hz tone.



CR1-3 1N4148

Q 1,2 2N3904
Q 3 2N3906

U 1,2 4093
U 3 4001
U 4 4521
U 5 1458
U 6 MC7808CT

CAPACITANCE IS IN uF UNLESS OTHERWISE SPECIFIED.

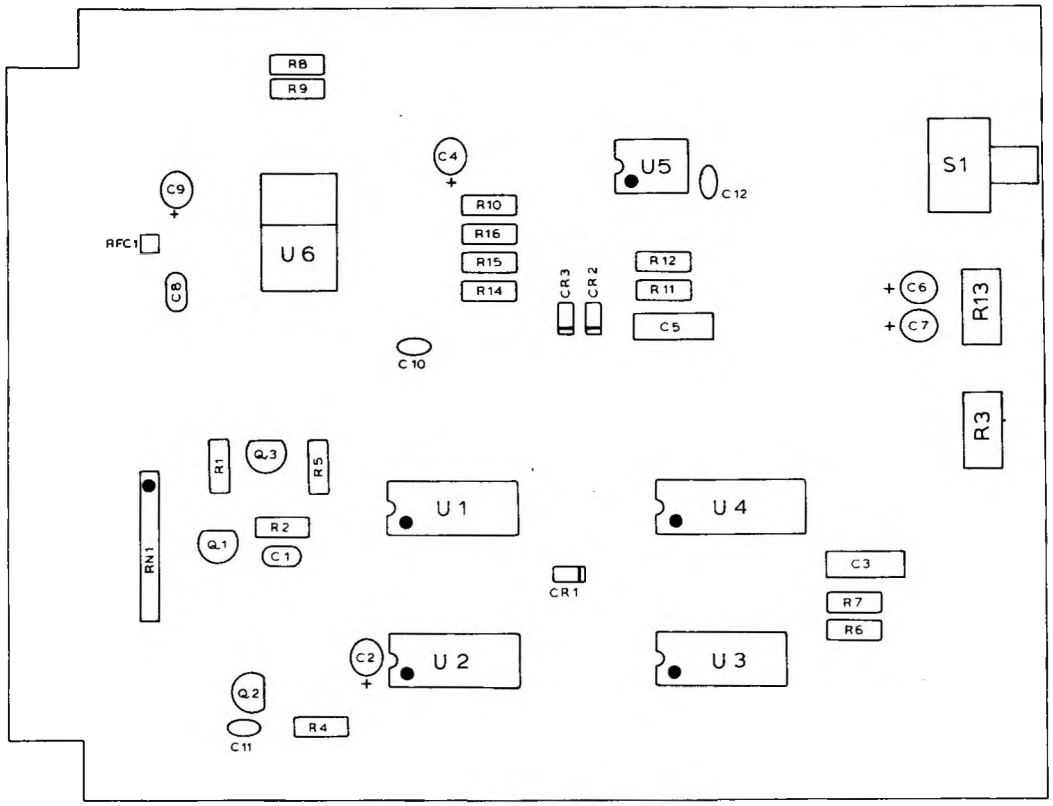
REV	DATE	DESCRIPTION	DRN	CHKD	APPVD
A	Dec 4/80	CHANGE VALUE C9	Bal	JC	

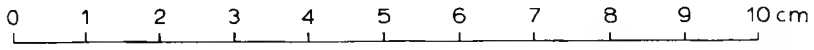
UR communications ltd. vancouver, b.c., canada.

TITLE: MODEL RCL-54B, 14.0571
REPEATER CONTROL
SCHEMATIC DIAGRAM

DRAWN	DATE MAY 23, 1980.	DRAWING NUMBER
CHECKED JC	SCALE	9-4
APPROVED	PCB C9-2	

VIEW FROM COMPONENT SIDE





REV	DATE	DESCRIPTION	DRN	CHKD	APPVD
A	[illegible]	CHANGE OF TYPE C9	[illegible]	[illegible]	

communications ltd. vancouver, b.c., canada.

TITLE: MODEL RCL-54B, 14.0571
REPEATER CONTROL
P.C. ASSEMBLY

DRAWN [illegible]	DATE JUN 5,1980	DRAWING NUMBER
CHECKED [illegible]	SCALE	9-5
APPROVED		

Ref	Description	Mfr	Mfr Part No	WR Part No	Qty	Item
C1	0.022 uF ceramic	Kemet	C330C223M1R5CA	24.4050		
C2	6.8 uF tant. 25V			26.1022		
C3	0.0033 uF polystyrene	Phil.	279AHC 3K3	25.0008		
C4	1.5 uF tant., 35V			26.1032		
C5	0.0033 uF polystyrene	Phil.	279AHC 3K3	25.0008		
C6	10 uF tant., 25V			26.1023		
C7	1.5 uF tant., 35V			26.1032		
C8	0.33 uF ceramic	Kemet	C330C334M5U1CA	24.4051		
C9	1.5 uF tant.	"	T362B155M035AS	26.1002		
C10	0.1 uF ceramic	"	C320C104M5R5CA	24.4045		
C11	0.01 uF "	"	C320C103M5R5CA	24.4044		
C12	0.1 uF "	"	C320C104M5R5CA	24.4045		
CR1-3	Si		1N4148	37.0600	3	
Q1	NPN trans.		2N3904	64.0120		
Q2	NPN "		2N3904	64.0120		
Q3	PNP "		2N3906	64.0122		
R1	47K ¼W 5% tol.	Rohm	R25J	55.2473		
R2	15K "	"	"	55.2153		
R3	1M pot. single-turn P.C.	Spect.	63 X 105	54.5202		
R4	18K ¼W 5% tol.	Rohm	R25J	55.2183		
R5	18K "	"	"	55.2183		
R6	150K "	"	"	55.2154		
R7	62K "	"	"	55.2623		
R8	6.2K "	"	"	55.2622		
R9	33K "	"	"	55.2333		

REV	APP	DATE	ITEM	CHANGE TO	WR PART NO.
A	JC	Dec 2,80	C9	change type/value	

UR communications ltd.
vancouver, b.c., canada.

PARTS LIST

DATE: May 27, 1980
APPROVED: JC

MODEL: RCL-54B
ASSY. NO. 14.0571
SHEET 1 OF 2

Ref	Description	Mfr	Mfr Part No	WR Part No	Qty	Item
R10	33K ¼W 5% tol.	Rohm	R25J	55.2333		
R11	9.1K "	"	"	55.2912		
R12	62K "	"	"	55.2623		
R13	1K pot. single-turn P.C.	Spect	63 X 102	54.5200		
R14	4.7K ¼W 5% tol.	Rohm	R25J	55.2472		
R15	15K "	"	"	55.2153		
R16	30K "	"	"	55.2303		
RFC1	1 - ½ turn #24 on bead			31.1065		
RN1	res. network 7 pos. 27K	Beck.	764-1R27K	56.0201		
S1	SPDT toggle	C&K	7101A	61.0601		
U1	CMOS quad Schmitt NAND	Mot.	MC14093BCP	41.1796		
U2	CMOS quad Schmitt NAND	"	MC14093BCP	41.1796		
U3	CMOS quad NOR	"	MC14001BCP	41.1700		
U4	CMOS 24-bit count.	"	MC14521BCP	41.1909		
U5	dual Op. Amp.	"	MC1458CP1	41.1403		
U6	3-term. reg. 8V	"	MC7808CT	41.1603		
	PCB			51.0571		
	Card Handle			23.1070		
	Card Holder			23.1083		
	Heatsink	Therm	THM6106-14	23.2151		
	IC Socket 8-pin	TI	C8408-02	33.1175		
	" " 14-pin	"	C8414-02	33.1176	3	
	" " 16-pin	"	C8416-02	33.1177		

REV	APP	DATE	ITEM	CHANGE TO	WR PART NO.

UR communications ltd.
vancouver, b.c., canada.

PARTS LIST

DATE : May 27,1980 | MODEL : RCL-54B

APPROVED : JC | ASSY. NO. 14.0571

SHEET 2 OF 2