

7.3

PRELIMINARY

1. Insert a RSM-3X remote speaker/microphone into the test microphone jacks on the front of the Repeater.
2. Remove the hole plug located on the front panel.
3. Rotate the power control (R243-TX MODULE) fully counterclockwise to set the transmit power to 0 W.
4. Connect an RF signal generator to the receiver input port (J101).
5. Connect a Wattmeter to the transmitter output port (J201).
6. Place the RRX-450/ RRX-452 in programming mode. (See page 8.) Program the TX and RX frequencies as desired.
7. Set the internal (i.e.: microcontroller programmable) CTCSS tone to the desired code.
8. Set the PTT code the same as step 7. Either a QC or DQC code may be programmed.
9. Read out the data to verify it is correct.
10. Power cycle the unit and proceed.

7.4

POWER SUPPLY

1. At the feed-thru capacitor on the transmit module (C253), adjust R320 for +12.6 VDC.
2. At the external battery connector (J301), adjust R311 for +13.75 VDC.

7.5

TRANSMITTER

Since the RRX-450 and RRX-452 are each operated with a single channel, both synthesizer control voltages are set to the same level, approximately +4 VDC. (The normal voltage swing required in multiple-channel radios is not necessary.) If a key component is replaced, ensure the control voltage measures +4 VDC (TP-7 on the transmitter board, TP-9 on the receiver).

1. Remove the module and synthesizer lids from the transmitter.
2. Apply power to the Repeater.
3. Make sure the power control pot (R243) is tuned fully counterclockwise (low power).
- 4.a On the RRX-450, readjust the control voltage (TP-7) to 4 VDC by tuning L207. The core is potted to reduce microphonics.
- 4.b On the RRX-452, adjust C903.
5. Reattach the synthesizer lid and secure it by bending all tabs.
6. Key the Repeater by grounding pin 10 of the control board accessory connector (J401).
- 7.a On the RRX-450, adjust C208 so the TX frequency is above center (+200 Hz at room temperature, to maintain +/-2.5PPM specification) as seen on the frequency counter.
- 7.b On the RRX-452, at room temperature, set the trimmer in the TCVCXO to -200Hz to maintain +/-1.5PPM over the full temperature range.
8. Slowly adjust R243 fully clockwise and observe the power reading on the Wattmeter.
9. Adjust C277, C279 and C280 for maximum power as seen on the Wattmeter (8W typical @ 2 Amps). Absolute minimum power is 7 Watts.
10. Recheck the center frequency and adjust if necessary.
11. Ensure all spurious and harmonics are at least -52 dBc.
- 12.a For 5KHz systems, adjust R243 on the control board to produce 600 Hz of transmitted QC deviation (1 KHz DQC).
- 12.b For 2.5KHz systems, set QC at 450Hz, DQC and DATA (e.g.: LTR) at 500Hz.
13. Reattach the module box lid and secure.
14. Set the voice deviation by keying the RSM-3X microphone while speaking. Adjust R426 on the control board for 4.0 KHz maximum deviation, or 2.0 KHz maximum, as required. (Acceptable procedure is to inject a 1 V p-p 1 KHz signal into J401, Pin 9 or J402, Pin 1 and manually key the transmitter while adjusting R426.)
15. Unkey the transmitter.
16. Attach a duplexer TX cable to the transmitter and terminate the duplexer antenna port into a duplex-capable service monitor.

7.6**RECEIVER**

1. Remove the 4 mounting screws securing the RX module to the RRX-450 enclosure. Remove the module box and synthesizer lids. Check and adjust, if necessary, the control voltage at TP-9 so it measures about +4 VDC using C180. Reattach the lids and secure them by bending all tabs.
2. Adjust R112 fully counterclockwise to open squelch.
3. Connect a SINADDER to R431.
4. Set the signal generator to the input frequency of the Repeater and modulate the signal with a 1 KHz tone set at 3 KHz of deviation. Set the generator level high enough to achieve a SINAD reading (about -40 dBm). If completely de-tuned, adjust C102, C103, C110 and C111 for best SINAD, while lowering the generator output as needed. NOTE: Holes in the side panel allow access to C103 and C111.
5. Connect a probe (set to 10 X) to the oscilloscope AC-coupled Y input. Connect the tone generator output to the DC-coupled X input.
6. Connect the 10 X probe to IC101 pin 16. Set the oscilloscope for X-Y mode.
7. Modulate the RF generator with a 30 Hz tone at 20 KHz of deviation. Set the generator level high enough to observe the 21.4 MHz IF response on the oscilloscope.
8. Tune C102, C103, C110 and C111 for maximum amplitude of the passband. Reduce the generator level as needed to minimize saturation of the RF amplifier and Q101.
9. Tune C115 for maximum amplitude and flattest response. DO NOT retune C115 after this adjustment.
10. Remove the scope probe from IC101 pin 16.
11. Inject a 1 KHz tone at 7.5 KHz deviation and adjust C206 for best SINAD.
12. Reduce the deviation to 3 KHz and increase the generator level to full-quieting.
13. With the oscilloscope in normal mode, connect the 10 X probe to R431 on the control board, and tune T101 for maximum amplitude of the 1 KHz tone. The waveform is to be undistorted and symmetrical.
14. Readjust C102, C103, C110 and C111 for best sensitivity (.2 μ V or better).
15. Increase the input signal by 3 dB; then increase the deviation until the SINAD returns to 12 dB. This deviation is the minimum acceptance bandwidth of the receiver. Minimum frequency is +/- 7.5 KHz; less than 7.5 KHz indicates the IF was misaligned or the local oscillator frequency is incorrect.
16. Disconnect the RF signal generator from J101 and reattach the synthesizer and module box lids to the RX unit. Connect a duplexer cable to the receiver.
17. Ensure the transmitter is disabled (or that the generator output port is protected) before connecting the duplexer to the signal generator output.
18. Put the unit in "Test Mode" by keying the transmitter to lock its synthesizer, and inserting a tool between the front panel and the programming button. This drops the unit out of tone mode and allows you to listen to the signal.
19. Readjust C102, C103, C110 and C111 for best sensitivity. Sensitivity is to be better than .32 μ V through the duplexer.
20. Set the signal generator to give a 12 dB SINAD reading.
21. Make sure that R112 (carrier squelch) is fully clockwise. Attach a voltmeter or oscilloscope to J410 (control module) pin 8. It should read +5 VDC.
22. Adjust R112 counterclockwise to the point that pin 8 drops low (0 VDC).
23. Decrease the generator level slowly, making sure the squelch closes with at least 2 dB of hysteresis; i.e.: not before 10dB SINAD.
24. Increase the signal level slowly, making sure the unit unsquelches at 12 dB SINAD.

7.7**CONTROL AND FINAL ALIGNMENT**

1. With the transmitter and receiver modules connected to the duplexer, apply a 1 KHz tone @ 3 KHz of deviation on the receive input frequency. Ensure there is no sub-audible tone.
2. Inject a full-quieting 1 KHz signal @ 3 KHz deviation, and adjust R475 on the control board to 2.1 V p-p signal at J401 pin 1
3. Key the transmitter with the RSM-3X remote speaker/microphone; adjust C277 for a minimum of 5 Watts at the antenna port. (Set R243 fully clockwise for maximum output.)
4. With the unit still in "Test Mode", set the generator for 12 dB SINAD. Increase the generator level by 1 dB and key the transmitter with the remote speaker/microphone. The SINAD should remain at 12 dB or better. Observe the following guidelines when measuring desense:
 - Normal or inverted split/ no amp: <0.5 dB
 - Normal split with amp: <1.5 dB
 - Inverted split with amp: <2 dB

NOTE: Optional 6-cavity duplexers can improve these specifications.

5. Take the unit out of "Test Mode".
6. Increase the generator level to achieve a full-quieting signal, apply sub-audible tone, and adjust R468 (10-turn trim pot on rev D control board) for 50% duty cycle at IC408, pin 11.
7. Adjust R406 (Repeat Audio) for 3.6 KHz of transmitting deviation.

7.8**HANGTIME**

If the Repeater will be used in a Telenexus or Leased-Line system, program 0 (zero) seconds hang time (9200). Refer to the Programming section, page 101.

If the Repeater will be used with Patriot handhelds and/or a RP-200, program 3 seconds hang time (9299).

7.9**Program Jumper Settings**

Jumper	A	B
PJ401	Normal	Beep GEN Text Tone
PJ402	Flat Audio (10 - 3,000 Hz)	Normal (High Pass; 300 - 3,000Hz)
PJ403	Normal (FLAT AUDIO TO)	External Controller
PJ404	Normal	Repeat Disable/External Controller Enable
PJ407	Normal	Carrier Detect to J401, J411

8. EXTERNAL CONTROLLER INTERFACE SETUP

8.1 SETUP

To transfer PTT/TX control to an External Controller (Tone Panel, LTR Controller, etc.), you must set the internal controller to NOT be able to give a TX command. Do this by:

1. a. On REV.F and future units, move PJ403 to the "B" position, OR
b. On prior production Control Boards (not having PJ403), remove R465 from the control board. NOTE: Either action—1.a. or 1.b.—breaks the audio path to the on-board tone decoder. (Even though the internal decoder looks for a specific tone, it cannot see it if only the External Controller activates the transmitter.)
2. a. PJ403 in the "B" position ALSO sends 10 - 3,000Hz audio to J411, pin 1 and the external DB25 connector, pin 14.
b. On the REV D and prior Control Board, place a jumper between IC401 pins 1 and 11, to bring the 10 - 3,000Hz audio out to the controller. (LTR controllers may require a direct discriminator connection at DB25 pin9, the negative terminal of C464).
3. a. For Carrier-Detect output on current-production units, move PJ407 to "B", connector DB25 pin 4.
b. On the REV D and prior Control Board, add R903, a 10K 1/4 Watt resistor. Refer to R903 on prior edition parts placement diagrams—lower right, between J411 and J410, page 59. NOTE: With R903 installed OR PJ407 in the "B" position, an external connection causes the CD LED to glow dimly. This is normal, and does not affect operation.
4. a. On current production units, move PJ404 to the "B" position, AND program "Y" in the RP-200 field so that audio control functions will pass to the External Controller. See the following screen simulation.
b. On the REV D and prior Control Board, jumper J401 pins 3 and 4 together and program "Y" in the RP-200 field for that tone to pass control externally; e.g.: to an external Tone/Trunking Control panel. Also jumper J401 pins 3 and 7 together to deactivate the internal encoder. Set R423 and R406 fully counterclockwise to set the internal tone deviation and the repeat audio to zero. Set repeat audio and sub-tone levels in the External Controller.

----- RITRON PROGRAMMABLE REPEATER, MAIN PROGRAMMING SCREEN -----

Repeater Transmit Frequency: 464.5000 MHz (Mobile Receive)		
Repeater Receive Frequency: 469.5000 MHz (Mobile Transmit)		
Quiet Call Coded Squelch Options		Features & Options
#	TYPE	CODE

1:	QC / CTCSS	18 3Z 123.0 Y
2:	Inactive	N
3:	Inactive	N
4:	Inactive	N
PTT/EXT Encode: 18 3Z 123.0		
Custom QC Freq Hz: 175.1		
Firmware Version: 09		
RP-200		
AC Power Fail Alert: Y		
RWR-10 Installed: N		
Morse Code ID: STANDARD		
ID Transmit Interval: 10.0 (min)		
QC Encode with ID: N		
TX Time Out Timer: 3.0 (min)		
Transmit Hang Time: 3.000 (sec)		
Squelch Tail Mute Time: 0.500 (sec)		
Fan Control Mode: On Transmit		
Fan ON Temperature: * n/a		
Fan OFF Temperature: * n/a		
Customer ID Number: RRX-450		
Radio Serial Number: 123456		
Synthesizer Resolution: 12.5 (KHz)		

-- F1:Field Help F2:Full Help F3:Undo F4: F9:Print F10:Exit --

Location of "Y" in RP-200 field

RRX-450 Programming Software Screen

5. a. Make the controller connections to the external DB25F connector OR
b. to J411, a 10-pin polarized header by the RX port if using RRX-XCI; see the Control Board schematic, page 59 for pinouts.
6. Adjust the audio output level to the controller at R475 (RX Audio) only if required. NOTE: It is better to use the Controller audio input level controls.

8.2 PROGRAMMING

NOTE: Be sure to set a QC or DQC in the RRX. PJ403 in "B" position ensures RRX cannot detect the tone.

7. Set any valid tone (RITRON recommends 100 Hz), by:
 - a. using the programmer, OR
 - b. key-clicking "84" (latch data in by push/release of program button), then "8112" (latch data),
 - c. RP-200 "Y" by "88", then "8512".

8.3 ALIGNMENT

8. Adjust all audio levels in the controller for TX deviations.

9.

VOLTAGE CHARTS

MEASUREMENT CONDITIONS:

Supply @ +12.6 VDC, Unit in operating mode; readings taken with repeater programmed.

IMPORTANT: Because the RRX-450 repeater is constructed with grounding "sub-planes," use a system Ground in the same proximity as the circuit being measured. All readings indicated as GND are true system Ground.

KEY: All measurements given in Volts DC, unless indicated otherwise below.

GND = GROUND

NC = NOT CONNECTED

DEVICE	PIN	TRANSMITTER BOARD VOLTAGES			FUNCTION
		RECEIVE	TRANSMIT	STANDBY	
IC201	1	5.1	5.1	5.1	+5 V Regulator
	2	0	----	----	
	3	0	----	----	
	4	0	----	----	
	5	0	----	----	
	6	0	----	----	
	7	0	----	----	
	8	12.6	12.6	12.6	
IC202	1	2.5	2.5	2.5	UHF Synthesizer
	2	2.5	2.5	2.5	
	3	5.1	5.1	5.1	
	4	5.1	5.1	5.1	
	5	0.12	0.02	0.12	
	6	0	0	0	
	7	5.1	5.1	5.1	
	8	3.7	3.7	3.7	
	9	0	0	0	
	10	0	0	0	
	11	0	0	0	
	12	5.1	5.1	5.1	
	13	0	0	0	
	14	0	0	0	
	15	7.8	7.8	7.8	
	16	0	0	0	
IC204	1	12.6	12.6	12.6	+8 V Regulator
	2	0	0	0	
	3	7.9	7.9	7.9	

DEVICE	PIN	TRANSMITTER BOARD VOLTAGES			FUNCTION
		RECEIVE	TRANSMIT	STANDBY	
Q201	D	7.8	7.8	7.8	Reference Oscillator (Biased @ 0V)
	S	2	2	2	
	G	Clock	---	---	
Q202	E	7.9	7.9	7.9	Charge Source for VCO
	B	7.9	7.9	7.9	
	C	2.8	2.8	2.8	
Q203	E	0	0	0	Charge Drain for VCO
	B	0	0	0	
	C	2.8	2.8	2.8	
Q204	D	6.6	6.6	6.6	VCO Oscillator
	S	2	2	2	
	G	0	0	0	
Q205	E	0	0	0	VCO Buffer Amplifier
	B	0.5	0.5	0.5	
	C	5.5	5.5	5.5	
Q206	E	0	0.2	0	VCO Output Buffer
	B	0	0.7	0	
	C	-0.5	5.5	-0.5	
Q207	E	0	0	0	Driver
	B	0.25	0.01	0.25	
	C	11.6	11.2	11.6	
Q208	E	11.6	11.2	11.6	Power Pass Element (R259 Fully CW)
	B	12.6	12.4	12.6	
	C	12.7	12.5	12.7	
Q209	E	0	0	0	
	B	0	0	0	
	C	12.7	12.4	12.7	
Q210	E	0	3	0	TX Enable Pass Switch
	B	0	3.6	0	
	C	7.9	7.2	7.9	
Q211	E	7.9	7.9	7.9	TX +V Pass Element
	B	7.9	7.2	7.9	
	C	-0.5	7.8	-0.5	
Q212	E	7.8	7.8	7.8	Twin-T Oscillator
	B	6.7	6.7	6.7	
	C	5.3	5.3	5.3	
Q213	E	0	0	0	Pre-driver
	B	0	0.3	0	
	C	0.5	6	0.5	

DEVICE	PIN	RECEIVER BOARD VOLTAGES			FUNCTION
		RECEIVE	TRANSMIT	STANDBY	
IC101	1	4.5	4.5	4.5	IF Subsystem
	2	4	4	4	
	3	3.63	3.63	3.63	
	4	4.1	4.1	4.1	
	5	3.6	3.6	3.6	
	6	3.4	3.4	3.4	
	7	3.3	3.3	3.3	
	8	4.5	4.5	4.5	
	9	1.7	1.7	1.8	
	10	0.63	0.63	0.6	
	11	3.3	3.3	3.2	
	12	0	0	0	
	13	2.3	2.3	1	
	14	0	0	0	
	15	0	0	0	
	16	1.73	1.73	1.73	
IC102	1	5	5	5	+5 V Regulator
	2	0	0	0	
	3	0	0	0	
	4	0	0	0	
	5	0	0	0	
	6	0	0	0	
	7	0	0	0	
	8	12.6	12.6	12.6	
IC103	1	2.2	2.2	2.2	UHF Synthesizer
	2	2.5	2.5	2.5	
	3	-0.13	-0.13	-0.13	
	4	5	5	5	
	5	-0.05	-0.05	-0.05	
	6	0	0	0	
	7	5	5	5	
	8	3.6	3.6	3.6	
	9	0	0	0	
	10	0	0	0	
	11	0	0	0	
	12	5	5	5	
	13	0	0	0	
	14	0	0	0	
	15	7.9	7.9	7.9	
	16	0	0	0	
IC104	1	6.7	6.7	0	
	2	0.3	0.3	1	
	3	1	1	10.83	

DEVICE	PIN	RECEIVER BOARD VOLTAGES			FUNCTION
		RECEIVE	TRANSMIT	STANDBY	
IC104	4	0	0	0	
	5	0	0	0	
	6	0	0	0	
	7	0	0	0	
	8	8	8	8	
IC105	1	8	8	8	+8 V Regulator
	2	0	0	0	
	3	0	0	0	
	4	0	0	0	
	5	0	0	0	
	6	0	0	0	
	7	0	0	0	
	8	12.6	12.6	12.6	
Q101	E	0	0	0	RF Amplifier
	B	0.8	0.8	0.8	
	C	6.25	6.25	6.25	
Q102	D	7.35	7.35	7.35	Mixer
	G	0	0	0	
	S	2.8	2.8	2.8	
Q103	E	0	0	0	IF Amplifier
	B	0.7	0.7	0.7	
	C	1	1	1	
Q104	E	0	0	0	Carrier Detect Switch
	B	6.7	6.7	0	
	C	0	0	5	
Q105	E	8	8	8	Charge Source for VCO
	B	8	8	8	
	C	4.2	4.2	4.2	
Q106	E	0	0	0	Charge Drain for VCO
	B	0	0	0	
	C	4.2	4.2	4.2	
Q107	D	7	7	7	VCO Oscillator
	G	0	0	0	
	S	2.3	2.3	2.3	
Q108	E	0	0	0	VCO Buffer/Amplifier
	B	0.5	0.5	0.5	
	C	6.7	6.7	6.7	
Q109	E	0	0	0	VCO Output Buffer
	B	0.32	0.32	0.32	
	C	2.85	2.85	2.85	
Q110	D	7.8	7.8	7.8	Reference Oscillator
	G	2	2	2	
	S	CLOCK	--	--	

DEVICE	PIN	CONTROL BOARD VOLTAGES			FUNCTION
		RECEIVE	TRANSMIT	STANDBY	
IC301	1	12.9	0	12.9	3-Terminal Adjust Regulator
	2	14.2	1.25	14.2	
	3	26.8	24.8	26.8	
IC405	1	0	0	0	Voltage Regulator
	2	0	0	0	
	3	0	-0.15	0	
	4	7	7	7	
	5	7	7	7	
	6	7	7	7	
	7	0	0	0	
	8	0	0	0	
	9	3	3.5	3	
	10	9.8	9.7	9.8	
	11	26.3	24.3	26.3	
	12	26	24	24	
	13	11.1	11.1	11.1	
	14	0	0	0	
Q301	E	0	0	0	Battery Charge Switch
	B	0	0.6	0	
	C	12.6	0	12.6	
Q302	E	0	0	0	Battery Charge Current Limit Switch
	B	0	0	0	
	C	12.6	0	12.6	
Q303	E	26	24	26	Battery Charge Current Limiter
	B	26	24	26	
	C	0	0	0	
Q304	E	0	0	0	AC Main Indication Switch
	B	0.7	0.7	0.7	
	C	0	0	0	
Q305	E	0	0	0	Relay Switch
	B	0.7	0.7	0.7	
	C	0.2	0.2	0.2	
Q306 (Also Q308 on 9 Amp Units)	E	26	24	26	Main Pass Element
	B	25.3	23.7	25.3	
	C	12.7	12.7	12.7	
Q307	E	0	0	0	Fan Switch
	B	0	1.4	0	
	C	12.4	0.7	12.4	

DEVICE	PIN	CONTROL BOARD VOLTAGES			FUNCTION
		RECEIVE	TRANSMIT	STANDBY	
IC401	1	4	4	4	Audio Routing Gates
	2	0	4	0	
	3	5	5	5	
	4	5	5	5	
	5	8	8	8	
	6	0	5	0	
	7	0	0	0	
	8	4	4	4	
	9	4	4	4	
	10	4	4	4	
	11	4	4	4	
	12	0	5	0	
	13	0	4.7	0	
	14	8	8	8	
IC402	1	6.75	6.75	6.75	Audio Buffer/Amplifier
	2	0	0	0	
	3	4	4	4	
	4	8	8	8	
	5	4	4	4	
	6	4	4	4	
	7	4	4	4	
	8	4	4	4	
	9	4	4	4	
	10	4	4	4	
	11	0	0	0	
	12	4	4	4	
	13	4	4	4	
	14	4	4	4	
IC403	1	3	3	3	Switched Capacitor
	2	2.3	3	2.3	
	3	2.8	2.8	2.8	
	4	6.8	6.8	6.8	
	5	3	3	3	
	6	8	8	8	
	7	3	3	3	
	8	3.7	3	3.7	
	9	Clock	---	---	
	10	0	0	0	
	11	Clock	---	---	
	12	0	0	0	
	13	4	4	4	
	14	4	4	4	

DEVICE	PIN	CONTROL BOARD VOLTAGES			FUNCTION
		RECEIVE	TRANSMIT	STANDBY	
IC404	1	4	4	4	Switched Capacitor Filter
	2	4	4	4	
	3	3.6	3.6	3.6	
	4	4	4	4	
	5	4	4	4	
	6	8	8	8	
	7	4	4	4	
	8	4	4	4	
	9	Clock	---	---	
	10	0	0	0	
	11	Clock	---	---	
	12	0	0	0	
	13	4	4	4	
	14	4	4	4	
IC405	1	4	4	4	Switched Capacitor Filter
	2	3.9	3.9	3.9	
	3	3.9	3.9	3.9	
	4	3.8	3.5	3.3	
	5	3.8	3.8	3.8	
	6	8	8	8	
	7	4	4	4	
	8	3.9	3.9	3.9	
	9	Clock	---	---	
	10	0	0	0	
	11	Clock	---	---	
	12	0	0	0	
	13	3.8	3.8	3.8	
	14	4	4	4	
IC406	1	1.35	1.35	1.35	Audio Amplifier
	2	0	0	0	
	3	0	0	0	
	4	0	0	0	
	5	6.5	6.4	6.5	
	6	12.6	12.5	12.6	
	7	6.4	6.3	6.4	
	8	1.36	1.36	1.36	
IC407	1	5	5	5	+5 V Regulator
	2	0	0	0	
	3	0	0	0	
	4	0	0	0	
	5	0	0	0	
	6	0	0	0	
	7	0	0	0	
	8	12.6	12.6	12.6	

DEVICE	PIN	CONTROL BOARD VOLTAGES			FUNCTION
		RECEIVE	TRANSMIT	STANDBY	
IC408	1	5	5	5	Microcontroller
	2	5	5	5	
	3	0	0	0	
	4	4.5	4.5	4.5	
	5	5	2.6	5	
	6	0	0	0	
	7	5	5	5	
	8	5	5	5	
	9	5	5	5	
	10	0	5	0	
	11	0	2.2	2	
	12	0	4.9	0	
	13	0	5	0	
	14,15,16	5	5	--	(No External Tone Board installed)
	14,15,16	5	5	--	(External Tone Board, NO Detect)
	14,15,16	0	0	--	(w/ExternalToneBoard,ValidTone)
	17	0	0	5	(If fan enabled on TX)
	18	0	0	0	
	19	5	5	5	
	20	0	0	0	
	21	5	5	5	
	22	0	0	0	
	23	0	0	0	
	24	0	0	0	
	25	0	0	0	
	26	0	0	0	
	27	0	0	0	
	28	0	0	0	
	29	0	0	0	
	30	0	3.73	0	AC Mains Power DC Power
	31	0	0.3	0	
	32	5	5	5	
	33	5	5	5	
	34	0	0	0	
	35	0	0	0	
	36	0	0	0	
	37	0	0	0	
	38	0	0	0	
	39	0	0	0	
	39	5	5	5	
	40	0	0	0	
	41	5	5	5	
	42	2.3	2.3	2.3	
	43	2.5	2.4	2.5	
	44	5	5	5	

DEVICE	PIN	CONTROL BOARD VOLTAGES			FUNCTION
		RECEIVE	TRANSMIT	STANDBY	
IC409	1	0	0	0	EEPROM
	2	0	0	0	
	3	0	0	0	
	4	0	0	0	
	5	0.09	0.1	0.09	
	6	0	0	0	
	7	0	0	0	
	8	5	5	5	
IC410	1	4	4	4	Conditioning Filters
	2	4	4	4	
	3	4	4	4	
	4	8	8	8	
	5	3.9	3.8	3.9	
	6	4	4	4	
	7	4	4	4	
	8	4	4	4	
	9	4	4	4	
	10	4	4	4	
	11	0	0	0	
	12	4	4	4	
	13	4	4	4	
	14	4	4	4	
Q401	E	0	0	0	Tone Squelch Switch (with correct tone)
	B	4.9	4.9	0	
	C	0	0	0	
Q402	E	5.7	5.7	5.7	Reset Switch
	B	5	5	5	
	C	5.7	5.7	5.7	
Q404	E	5	5	5	Key Switch (upon PTT)
	B	5	4.4	5	
	C	0	5	0	
Q405	E	0	0	0	Key switch (upon PTT)
	B	0	5	0	
	C	5	0	5	
Q408	E	5	5	5	Lock Detect Switch (If locked)
	B	5	5	5	
	C	0	0	0	
Q410	E	0	0	0	QC Decode Switch Square wave biased @ 2.2 VDC Square wave biased @ 2.2 VDC
	B	6 Vp-p	6 Vp-p	6 Vp-p	
	C	5 Vp-p	5 Vp-p	5 Vp-p	

DEVICE	PIN	CONTROL BOARD VOLTAGES			FUNCTION
		RECEIVE	TRANSMIT	STANDBY	
Q411	E	0	0	0	Beep Generator
	B	2.5	2.5	2.5	
	C	0.25	0.25	0.25	
Q412	E	5	5	5	Beep Generator Switch "Off"
	B	0	0	0	
	C	0	0	0	

19. RRX-450 CONTROL BOARD PARTS LIST

NOTE: This parts list reflects component values current with ECN 2348. If a value in this parts list differs from the value shown in the schematic on page 57, the parts list is to be considered more current.

The first number in the "location" column is the "X" coordinate, the second number is the "Y" coordinate. At the end of the line, "T" indicates the component is on the top side of the PC board, "B" indicates the bottom side.

REF#	RITRON#	DESCRIPTION	LOCATION	REF#	RITRON#	DESCRIPTION	LOCATION
CAPACITORS, CHIP, FIXED, 50V, UNLESS STATED OTHERWISE				C 468	15121153	.015μF X7R 1206 50V	2.253 4.019 T
C 401	15121222	.0022μF X7R 1206 50V	3.120 5.364 T	C 469	15110330	33pF NPO 0805 50V	2.200 4.150 T
C 402	15120331	330pF NPO 1206 50V	3.167 4.771 T	C 470	15110470	47pF NPO 0805 50V	2.050 4.150 T
C 403	15121104	.1μF X7R 1206 50V	3.136 5.560 T	C 471	15110180	18pF NPO 0805 50V	2.125 4.150 T
C 404	15110680	68pF NPO 0805 50V	3.249 4.928 T	C 472	15121153	.015μF X7R 1206 50V	2.611 3.805 T
C 405	15121104	.1μF X7R 1206 50V	3.260 4.771 T	C 473	15121153	.015μF X7R 1206 50V	2.821 3.908 T
C 406	15121104	.1μF X7R 1206 50V	3.684 5.364 T	C 474	15121153	.015μF X7R 1206 50V	2.810 4.236 T
C 407	15110101	100pF NPO 0805 50V	3.412 5.334 T	C 475	15110330	33pF NPO 0805 50V	2.640 4.150 T
C 408	15110101	100pF NPO 0805 50V	3.761 4.913 T	C 476	15110470	47pF NPO 0805 50V	2.715 4.115 T
C 409	15110151	150pF NPO 0805 50V	3.518 3.142 T	C 477	15110180	18pF NPO 0805 50V	2.790 4.115 T
C 410	15110821	820pF NPO 0805 50V	3.891 2.600 T	C 478	15121104	.1μF X7R 1206 50V	1.701 3.872 T
C 411	15111122	.0012μF X7R 0805 50V	3.974 2.748 T	C 479	15121104	.1μF X7R 1206 50V	1.790 3.872 T
C 412	15121104	.1μF X7R 1206 50V	3.578 2.527 T	C 480	15111102	.001μF X7R 0805 50V	0.967 3.281 T
C 413	152A8105	1μF 16V 3.2 X 1.6 TANT	3.034 3.762 T	C 481	15121104	.1μF X7R 1206 50V	2.332 4.689 T
C 414	15121104	.1μF X7R 1206 50V	3.362 3.694 T	C 482	15121104	.1μF X7R 1206 50V	0.950 2.487 T
C 415	15110470	47pF NPO 0805 50V	3.219 3.808 T	C 483	15121104	.1μF X7R 1206 50V	0.929 2.864 T
C 416	15110471	470pF NPO 0805 50V	3.887 3.269 T	C 484	15111102	.001μF X7R 0805 50V	1.831 0.537 T
C 417	15110101	100pF NPO 0805 50V	3.929 3.681 T	C 485	15111103	.01μF X7R 0805 50V	1.886 2.317 T
C 418	15121104	.1μF X7R 1206 50V	3.233 3.271 T	C 486	15121104	.1μF X7R 1206 50V	2.133 3.102 T
C 419	15110221	220pF NPO 0805 50V	3.215 3.482 T	C 487	152C8106	10μF 16V 6.0X3.2 TANT	2.469 4.730 T
C 420	15121104	.1μF X7R 1206 50V	3.134 3.577 T	C 501	01503011	220μF ELT 16V	0.060 4.162 T
C 421	15111103	.01μF X7R 0805 50V	2.022 2.657 T	C 502	01503021	10μF ELT 50V	0.058 4.485 T
C 422	152C8106	10μF 16V 6.0X3.2 TANT	1.759 2.465 T	C 503	15110330	33pF NPO 0805 50V	1.955 5.308 T
C 423	15110330	33pF NPO 0805 50V	3.259 3.918 T	C 504	01503211	100μF ELT 16V	2.522 5.071 T
C 424	15111102	.001μF X7R 0805 50V	1.569 2.432 T	C 505	15121104	.1μF X7R 1206 50V	2.657 4.387 T
C 425	15111223	.022μF X7R 0805 50V	1.493 2.359 T	C 506	15111223	.022μF X7R 0805 50V	1.594 1.477 T
C 428	15110821	820pF NPO 0805 50V	4.016 4.126 T	C 507	15111223	.022μF X7R 0805 50V	1.724 1.363 T
C 429	15111102	.001μF X7R 0805 50V	2.600 1.000 T	C 508	15111223	.022μF X7R 0805 50V	1.401 1.401 T
C 430	15111102	.001μF X7R 0805 50V	1.914 1.205 T	C 509	15111223	.022μF X7R 0805 50V	1.479 1.401 T
C 431	15111102	.001μF X7R 0805 50V	1.702 3.711 T	C 511	15110101	100pF NPO 0805 50V	0.484 2.956 T
C 432	15111102	.001μF X7R 0805 50V	1.539 3.764 T	C 512	15110101	100pF NPO 0805 50V	0.064 2.377 T
C 433	15111102	.001μF X7R 0805 50V	1.539 3.688 T	C 513	15111102	.001μF X7R 0805 50V	0.467 2.735 T
C 434	15121104	.1μF X7R 1206 50V	0.682 1.847 T	C 514	15110101	100pF NPO 0805 50V	0.142 2.377 T
C 435	15110390	39pF NPO 0805 50V	1.270 2.370 T	C 515	15110101	100pF NPO 0805 50V	0.467 2.599 T
C 436	15110390	39pF NPO 0805 50V	1.161 2.331 T	C 516	15110101	100pF NPO 0805 50V	4.667 5.863 T
C 437	15121104	.1μF X7R 1206 50V	0.574 2.376 T	C 518	15111102	.001μF X7R 0805 50V	4.347 5.864 T
C 440	15121104	.1μF X7R 1206 50V	1.534 4.929 T	C 519	15110101	100pF NPO 0805 50V	4.272 5.278 T
C 441	15111102	.001μF X7R 0805 50V	1.438 4.152 T	C 520	15111102	.001μF X7R 0805 50V	4.349 5.278 T
C 442	15111102	.001μF X7R 0805 50V	1.466 1.003 T	C 521	15110101	100pF NPO 0805 50V	4.117 5.278 T
C 443	15121104	.1μF X7R 1206 50V	1.814 1.046 T	C 522	15110101	100pF NPO 0805 50V	4.195 5.278 T
C 444	152A8105	1μF 16V 3.2 X 1.6 TANT	1.937 1.770 T	C 524	15111102	.001μF X7R 0805 50V	4.116 5.128 T
C 445	15121104	.1μF X7R 1206 50V	1.844 1.688 T	C 525	15111102	.001μF X7R 0805 50V	4.195 5.128 T
C 446	01503011	220μF ELT 16V	2.134 1.015 T	C 526	15111102	.001μF X7R 0805 50V	4.272 5.128 T
C 447	15121104	.1μF X7R 1206 50V	2.735 1.045 T	C 527	15111102	.001μF X7R 0805 50V	4.638 5.129 T
C 448	15110330	33pF NPO 0805 50V	2.381 1.262 T	C 528	15111102	.001μF X7R 0805 50V	4.782 5.129 T
C 449	15110330	33pF NPO 0805 50V	1.916 1.340 T	C 529	15111103	.01μF X7R 0805 50V	2.493 5.308 T
C 450	01503211	100μF ELT 16V	2.583 1.302 T	C 530	15111103	.01μF X7R 0805 50V	2.034 5.309 T
C 451	15121104	.1μF X7R 1206 50V	1.996 1.481 T	C 531	15111102	.001μF X7R 0805 50V	1.453 2.253 T
C 452	15121104	.1μF X7R 1206 50V	1.844 1.503 T	C 532	15121104	.1μF X7R 1206 50V	3.251 5.187 T
C 453	15111102	.001μF X7R 0805 50V	1.183 1.153 T	C 532	15121104	.1μF X7R 1206 50V	3.251 5.187 T
C 454	15111102	.001μF X7R 0805 50V	1.118 1.230 T	DIODES, 23-SOT, UNLESS STATED OTHERWISE			
C 455	15110151	150pF NPO 0805 50V	3.813 4.564 T	CR401	48A1005C	MMBD7000 DUAL SOT-23	4.594 3.044 T
C 456	15110150	15pF 0805 50V	3.285 4.500 T	CR402	48A1005C	MMBD7000 DUAL SOT-23	4.466 2.617 T
C 457	15111122	.0012μF X7R 0805 50V	4.096 4.229 T	CR403	48A1005C	MMBD7000 DUAL SOT-23	4.655 2.461 T
C 458	15110101	100pF NPO 0805 50V	3.913 4.086 T	CR404	48A1005C	MMBD7000 DUAL SOT-23	3.623 5.612 T
C 459	15121104	.1μF X7R 1206 50V	3.351 4.128 T	CR405	48A1005C	MMBD7000 DUAL SOT-23	3.662 3.105 T
C 460	152A8105	1μF 16V 3.2 X 1.6 TANT	3.077 4.625 T	CR407	48A1005C	MMBD7000 DUAL SOT-23	3.446 5.610 T
C 461	15110330	33pF NPO 0805 50V	2.310 4.525 T	CR408	48A1005C	MMBD7000 DUAL SOT-23	1.115 1.341 T
C 462	15110101	100pF NPO 0805 50V	2.165 4.490 T	CR414	02450014	LED, DUAL COLOR, R/A	1.645 0.345 T
C 463	15110330	33pF NPO 0805 50V	2.125 4.385 T	CR415	02450015	LED, GREEN, R/A	0.905 0.345 T
C 464	15226475	4.7μF 10V 5.1 X 3.2 TANT	1.413 4.900 T	CR416	48A1005B	MMBD 6100 LT1 SOT23	2.354 3.553 T
C 465	152A8105	1μF 16V 3.2 X 1.6 TANT	2.080 4.255 T	CR501	02450013	LED, RED, R/A	0.175 0.345 T
C 466	15121153	.015μF X7R 1206 50V	2.442 3.692 T	CR901	48A1005C	MMBD7000 DUAL SOT-23	3.213 4.456 T
C 467	15121153	.015μF X7R 1206 50V	2.105 3.777 T				

PROGRAMMABLE UHF FM REPEATER *Control Board Parts List*

REF#	RITRON#	DESCRIPTION	LOCATION
INTEGRATED CIRCUITS			
IC401	31124066	MC14066 QUAD ANALOG SW SO-14	2.432 3.186 T
IC402	31020324	LMT324AD/NJM324E QUAD OP-AMP	3.551 5.051 T
IC403	31020001	MF6CWM-50 6-POLE FILT. SOLIC	3.589 2.807 T
IC404	31020001	MF6CWM-50 6-POLE FILT. SOLIC	3.544 3.431 T
IC405	31020001	MF6CWM-50 6-POLE FILT. SOLIC	3.707 4.329 T
IC406	31010004	LM386MX-1 AUDIO AMP SO-8	2.149 1.327 T
IC407	31010002	78L05AC 5V REG. SO-8	2.057 2.450 T
IC408	314A1001	MICRO, MC68HC705C8FN PROGRAMMED	1.480 3.171 T
IC409	31210001	X24C01S EEPROM	1.283 4.107 T
IC410	31020324	LMT324AD/NJM324E QUAD OP-AMP	2.420 4.255 T
IC501	31010009	78L08 8V VOLT REG SO-08	2.264 5.273 T

JACKS

J 401	02100062	10 PIN FEMALE CONN.	4.865 2.515 T
J 402	02100082	6 PIN MALE HEADER	3.436 5.855 T
J 403	02100001	2.5MM PC-MT JACK ANT-CHGR	2.159 0.407 T
J 404	02100053	3.5MM STEREO JACK PANEL MOUNT	
J 406	02100347	HEADER, IDC 10-COND.	0.142 3.075 T
J 407	02100350	HEADER 8-PIN .1" CTR	1.093 7.090 T
J 408	02100350	HEADER 8-PIN .1" CTR	1.093 6.421 T
J 409	02100350	HEADER 8-PIN .1" CTR	1.093 5.752 T
J 410	02100347	HEADER, IDC 10-COND.	4.490 5.664 T
J 411	02100313	10-PIN PLRZD PC MNT	5.007 4.850 T

JUMPERS AND SHORTING PLUGS

P 501	02100072	5-PIN PLRZD PC MNT	0.112 3.504 T
PJ401	02100024	3-PIN HEADER	1.158 1.638 T
PJ402	02100024	3-PIN HEADER	2.773 3.300 T
PJ403	02100024	3-PIN HEADER	3.947 4.691 T
PJ404	02100024	3-PIN HEADER	4.666 2.231 T
PJ407	02100024	3-PIN HEADER	4.486 5.244 T
SP401	02100075	2-PIN SHORTING PLUG	
SP402	02100075	2-PIN SHORTING PLUG	
SP403	02100075	2-PIN SHORTING PLUG	
SP404	02100075	2-PIN SHORTING PLUG	
SP407	02100075	2-PIN SHORTING PLUG	

TRANSISTORS, SOT-23, UNLESS STATED OTHERWISE

Q 401	48010R02	MUN2211T1 W/BIAS RES	4.374 3.016 T
Q 402	4801002A	MMBT3906 "SOT23"	1.660 2.617 T
Q 404	4801002A	MMBT3906 "SOT23"	1.599 1.110 T
Q 405	48010R02	MUN2211T1 W/BIAS RES	1.628 1.252 T
Q 408	4801002A	MMBT3906 "SOT23"	1.581 3.961 T
Q 410	48010R02	MUN2211T1 W/BIAS RES	3.042 4.458 T
Q 411	4801002V	MMBTA64 PNP DARL.	1.476 1.678 T

RESISTORS, CHIP, FIXED, UNLESS STATED OTHERWISE

R 401	47100473	47KΩ 0805	4.331 2.566 T
R 402	47100273	27KΩ 0805	3.139 5.449 T
R 403	47100104	100KΩ 0805	3.167 4.928 T
R 404	47100273	27KΩ 0805	2.950 5.396 T
R 405	47100104	100KΩ 0805	3.091 4.928 T
R 406	04750008	10KΩ TRIM POT/ HORZ MNT	2.808 4.769 T

REF#	RITRON#	DESCRIPTION	LOCATION
R 407	47100154	150KΩ 0805	3.326 4.928 T
R 408	47100103	10KΩ 0805	3.349 4.791 T
R 409	47100153	15KΩ 0805	3.302 4.642 T
R 410	47100472	4.7KΩ 0805	3.411 5.471 T
R 411	47100104	100KΩ 0805	3.489 5.335 T
R 412	47100153	15KΩ 0805	3.296 5.316 T
R 413	47100683	68KΩ 0805	3.567 5.335 T
R 414	47100221	220Ω 0805	3.730 4.778 T
R 415	47100472	4.7KΩ 0805	3.652 4.778 T
R 416	47100224	220KΩ 0805	3.841 4.912 T
R 417	47100104	100KΩ 0805	3.862 5.041 T
R 419	47100155	1.5MΩ 0805	3.779 3.105 T
R 420	47100105	1MΩ 0805	3.859 3.065 T
R 421	47100224	220KΩ 0805	3.518 3.064 T
R 422	47100333	33KΩ 0805	3.891 2.747 T
R 423	04750028	100KΩ MINI POT; HORZ	2.959 2.767 T
R 424	47100224	220KΩ 0805	2.972 3.597 T
R 425	47100474	470KΩ 0805	3.300 3.809 T
R 426	04750028	100KΩ MINI POT; HORZ	3.684 3.889 T
R 427	47100104	100KΩ 0805	3.052 3.462 T
R 428	47100104	100KΩ 0805	3.052 3.597 T
R 429	47100472	4.7KΩ 0805	3.847 3.380 T
R 430	47100473	47KΩ 0805	2.931 4.457 T
R 431	4700142L	5.6KΩ 5% 1/4W CF	1.548 4.683 T
R 432	47100102	1KΩ 0805	1.770 2.617 T
R 433	47100472	4.7KΩ 0805	1.875 2.657 T
R 434	47100562	5.6KΩ 0805	1.545 2.685 T
R 435	47100473	47KΩ 0805	1.416 2.358 T
R 436	47100332	3.3KΩ 0805	3.261 2.656 T
R 437	47100103	10KΩ 0805	3.280 3.028 T
R 439	47100000	ZERO Ω 0805	4.599 2.785 T
R 440	47100105	1MΩ 0805	1.161 2.408 T
R 441	47100104	100KΩ 0805	3.823 4.777 T
R 443	47100473	47KΩ 0805	4.222 2.693 T
R 444	47100473	47KΩ 0805	3.193 5.643 T
R 446	47100224	220KΩ 0805	2.500 3.809 T
R 447	47100274	270KΩ 0805	2.318 3.845 T
R 449	47100102	1KΩ 0805	1.836 1.205 T
R 450	47100224	220KΩ 0805	2.686 3.977 T
R 451	47100473	47KΩ 0805	1.730 1.066 T
R 452	47100103	10KΩ 0805	1.624 1.003 T
R 453	47100103	10KΩ 0805	1.758 1.207 T
R 454	47100562	5.6KΩ 0805	1.937 1.609 T
R 455	471004A7	4.7Ω 0805	2.590 1.100 T
R 456	04750008	10KΩ TRIM POT/ HORZ MOUNT	2.261 1.715 T
R 457	47100392	3.9KΩ 0805	
R 458	47100471	470Ω 0805	1.302 1.188 T
R 459	47100103	10KΩ 0805	1.302 1.324 T
R 460	47100471	470Ω 0805	1.223 1.266 T
R 461	47100473	47KΩ 0805	1.773 1.857 T
R 462	47100274	270KΩ 0805	2.833 4.354 T
R 463	47100123	12KΩ 0805	3.233 4.335 T
R 464	47100682	6.8KΩ 0805	3.310 4.335 T
R 465	47100683	68KΩ 0805	3.813 4.666 T
R 466	47100333	33KΩ 0805	4.011 4.268 T
R 467	47100224	220KΩ 0805	3.695 4.626 T
R 468	47270103	VARIABLE 10KΩ SEALED	3.101 4.223 T
R 469	47100225	2.2MΩ 0805	3.210 4.501 T
R 471	47100104	100KΩ 0805	3.363 4.501 T
R 473	47100473	47KΩ 0805	2.415 4.510 T
R 474	47100224	220KΩ 0805	2.165 4.565 T
R 475	04750008	10KΩ TRIM POT/ HORZ MOUNT	1.992 4.836 T
R 476	47100472	4.7KΩ 0805	2.200 4.385 T
R 477	47100153	15KΩ 0805	2.424 3.809 T
R 478	47100563	56KΩ 0805	2.317 3.919 T
R 479	47100154	150KΩ 0805	2.411 4.019 T

RITRON PROGRAMMABLE REPEATER *Control Board Parts List*

REF#	RITRON#	DESCRIPTION	LOCATION
R 480	47100154	150KΩ 0805	1.975 4.150 T
R 481	04732496	34.8KΩ 1% METAL FILM 1/4	2.116 3.923 T
R 482	47100332	3.3KΩ 0805	2.214 3.910 T
R 483	47100153	15KΩ 0805	2.611 3.977 T
R 484	47100152	1.5 Ω 0805	2.308 3.738 T
R 485	47100563	56KΩ 0805	2.752 4.354 T
R 486	47100154	150KΩ 0805	2.514 3.978 T
R 487	47100154	150KΩ 0805	2.865 4.115 T
R 488	04732496	34.8KΩ 1% METAL FILM 1/4	2.833 3.808 T
R 489	47100392	3.9KΩ 0805	2.792 4.010 T
R 490	47100473	47KΩ 0805	0.893 6.836 T
R 491	47100473	47KΩ 0805	0.833 6.208 T
R 492	47100473	47KΩ 0805	0.833 6.122 T
R 493	47100103	10KΩ 0805	1.540 3.840 T
R 494	47100104	100KΩ 0805	1.740 4.000 T
R 495	47100104	100KΩ 0805	1.618 4.113 T
R 496	47100000	ZERO Ω 0805	2.582 2.737 T
R 498	47100271	270Ω 0805	0.487 3.321 T
R 499	47100271	270Ω 0805	0.881 0.853 T
R 501	04710030	680Ω 5% 1/2W	0.423 0.693 T
R 502	47100103	10KΩ 0805	2.262 5.032 T
R 503	47100822	8.2KΩ 0805	2.770 4.480 T
R 504	47100103	10KΩ 0805	0.778 3.023 T
R 505	47100473	47KΩ 0805	0.921 0.765 T
R 506	47100473	47KΩ 0805	2.342 2.933 T
R 507	47100473	47KΩ 0805	0.828 2.865 T
R 508	47100220	22Ω 0805	1.363 1.678 T
R 509	04750008	10KΩ TRIM POT/ HORZ MOUNT	1.383 1.987 T
R 510	47100333	33KΩ 0805	1.594 1.741 T
R 511	47100822	8.2KΩ 0805	1.594 1.607 T
R 512	47100103	10KΩ 0805	1.479 1.541 T
R 513	47100103	10KΩ 0805	1.705 1.478 T
R 514	47100222	2.2KΩ 0805	1.586 1.361 T
R 515	47100103	10KΩ 0805	1.787 2.317 T
R 516	04720009	ZERO Ω 5% 1/4W CF	4.883 5.067 T
R 517	47100224	220KΩ 0805	3.219 3.619 T
R 518	47100272	2.7KΩ 0805	1.021 3.731 T
R 519	47100472	4.7KΩ 0805	1.265 1.677 T
R 520	47100103	10KΩ 0805	1.061 3.825 T
R 521	47100103	10KΩ 0805	1.061 3.906 T
R 523	47100154	150KΩ 0805	3.802 5.136 T
R 524	47100473	47KΩ 0805	4.411 2.790 T
R 528	47100103	10KΩ 0805	4.379 5.127 T
R 529	47100332	3.3KΩ 0805	2.172 3.313 T
R 530	47100000	ZERO Ω 0805	2.462 3.499 T
R 531	47100000	ZERO Ω 0805	2.217 3.601 T
R 532	47100000	ZERO Ω 0805	0.772 2.716 T

CRYSTAL

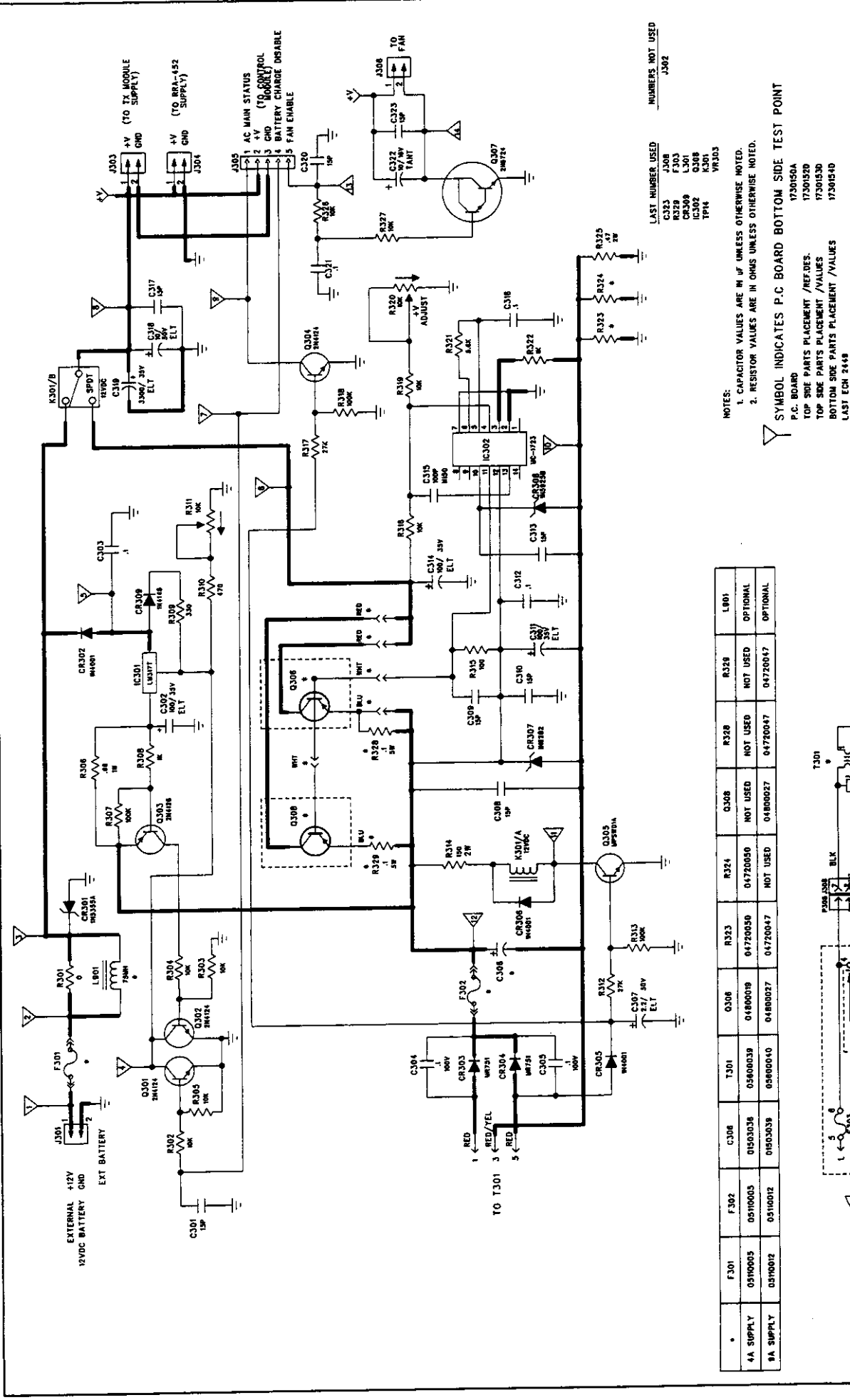
Y 401	02300066	4.003125MHZ	1.282 2.554 T
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FERRITE BEADS

Z 401	18360001	SURFACE MOUNT	1.694 0.890 T
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HARDWARE

HW 01	02800114	CRYSTAL SUPPORT
HW 02	02100229	PLCC SOCKET 44 PIN SURFACE MNT
HW 03	02800020	STANDOFF; 4-40 X 3/16"
HW 04	02800020	STANDOFF; 4-40 X 3/16"
HW 05	02800020	STANDOFF; 4-40 X 3/16"
HW 06	02800020	STANDOFF; 4-40 X 3/16"
HW 07	02800020	STANDOFF; 4-40 X 3/16"



LAST NUMBER USED

C323	J302
R329	F303
CR309	L301
IC302	Q308
TP14	K301
	VR303

NUMBERS NOT USED

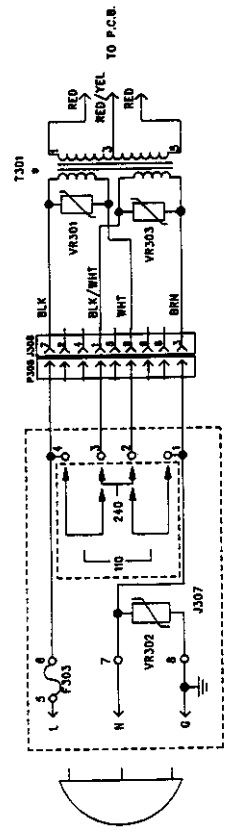
J302

NOTES:
1. CAPACITOR VALUES ARE IN μ F UNLESS OTHERWISE NOTED.
2. RESISTOR VALUES ARE IN OHMS UNLESS OTHERWISE NOTED.

SYMBOL INDICATES P.C. BOARD BOTTOM SIDE TEST POINT

P.C. BOARD
1730150A
TOP SIDE PARTS PLACEMENT /REFDES. 1730152D
TOP SIDE PARTS PLACEMENT /VALUES 1730153D
BOTTOM SIDE PARTS PLACEMENT /VALUES 1730154D
LAST ECH 2448

	F301	F302	C308	T301	R323	R324	Q308	R328	R329	L301
4A SUPPLY	0510005	0510005	0503036	05400039	04720050	04720050	04720050	NOT USED	NOT USED	OPTIONAL
5A SUPPLY	0510002	0510002	0503039	05400040	04720047	04720047	04720047	NOT USED	NOT USED	OPTIONAL



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		APPROVALS	DATE	RITRON, INC.	
DESIGN	DATE	BY	DATE	505 W. CARMEL DR. CARMEL, IN. 46032	
CHECKED	DATE	BY	DATE	RRX-450 REPEATER	
DESIGNED	DATE	BY	DATE	POWER SUPPLY	
MATERIAL	DATE	BY	DATE	1730151D	
FORM	DATE	BY	DATE	REV. D	
DIMENSIONS		DO NOT SCALE DRAWING		SCALE	1 OF 1
SHEET		1730150.50H		SHEET 1 OF 1	

22.

RRX-450 POWER SUPPLY PARTS LIST

NOTE: This parts list reflects component values current with ECN 2449. If a value in this parts list differs from the value shown in the schematic on page 64, the parts list is to be considered more current.

REF# RITRON# DESCRIPTION

CAPACITORS

C 301	01510017	15pF NP0 CERDIS 50V
C 302	01503024	100μF ELT 35V
C 303	01515463	.1μF X7R MLCER 50V
C 304	01517006	.1μF X7R MLCER 100V
C 305	01517006	.1μF X7R MLCER 100V
C 306	shown on TOP SIDE PARTS PLACEMENT, page 65.	
C 307	01503003	2.2μF ELT 50V
C 308	01510017	15pF NP0 CERDIS 50V
C 309	01510017	15pF NP0 CERDIS 50V
C 310	01510017	15pF NP0 CERDIS 50V
C 311	01503024	100μF ELT 35V
C 312	01515463	.1μF X7R MLCER 50V
C 313	01510017	15pF NP0 CERDIS 50V
C 314	01503024	100μF ELT 35V
C 315	01510127	100pF N150 CERDIS 50V
C 316	01515463	.1μF X7R MLCER 50V
C 317	01510017	15pF NP0 CERDIS 50V
C 318	01503021	10μF ELT 50V
C 319	01503028	3300μF ELT 35V
C 320	01510017	15pF NP0 CERDIS 50V
C 321	01501063	.1μF MYLAR 100V
C 322	01502013	10μF TANT 16V(C)
C 323	01510017	15pF NP0 CERDIS 50V

DIODES

CR301	04820119	1N5355A ZENER 18V 5W
CR302	04810003	1N4001
CR303	04810009	MR751
CR304	04810009	MR751
CR305	04810003	1N4001
CR306	04810003	1N4001
CR307	04820028	1N6282 SURGE SUPPRESSOR
CR308	04820038	1N5925B ZENER 10V 1.5 W
CR309	04810001	1N4148 GENERAL PURPOSE

FUSES

F 301	shown on TOP SIDE PARTS PLACEMENT, page 65.	
F 302	shown on TOP SIDE PARTS PLACEMENT, page 65.	

INTEGRATED CIRCUITS

IIC301	03131027	LM317T ADJ. VOLTAGE REG.
IC302	03131053	VOLTAGE REGULATOR IC; MC1723

RELAY

K 301	04500008	12 VDC SPDT RELAY
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JACKS

J 301	02100305	2 PIN POLAR HDR
J 303	02100305	2 PIN POLAR HDR
J 304	02100305	2 PIN POLAR HDR
J 305	02100072	5-PIN POLAR HDR PC MNT
J 306	02100305	2 PIN POLAR HDR

INDUCTOR

L 901	shown on TOP SIDE PARTS PLACEMENT, page 65.	
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REF# RITRON# DESCRIPTION

TRANSISTORS

Q 301	04800006	MPS-4124 NPN LOW NOISE AUD.
Q 302	04800006	MPS-4124 NPN LOW NOISE AUD.
Q 303	04800011	2N4126 PNP GP AUDIO TO-92
Q 304	04800006	MPS-4124 NPN LOW NOISE AUD.
Q 305	04800048	TRANSISTOR NPN 1W MPSW01A
Q 306	shown on TOP SIDE PARTS PLACEMENT, page 65.	
Q 307	04800012	MPSW45/MPSW45A NPN DARL TO 134
Q 308	shown on TOP SIDE PARTS PLACEMENT, page 65.	

RESISTORS

R 301	04720009	ZERO Ω 5% 1/4W CF
R 302	04700145	10KΩ 5% 1/4W CF
R 303	04700145	10KΩ 5% 1/4W CF
R 304	04700145	10KΩ 5% 1/4W CF
R 305	04700145	10KΩ 5% 1/4W CF
R 306	04720052	.68Ω 1W 1% WIREWOUND
R 307	04700157	100KΩ 5% 1/4W CF
R 308	04700133	1KΩ 5% 1/4W CF
R 309	04700127	330Ω 5% 1/4W CF
R 310	04700129	470Ω 5% 1/4W CF
R 311	04750008	10KΩ TRIM POT/HORZ MOUNT
R 312	04700150	27KΩ 5% 1/4W CF
R 313	04700157	100KΩ 5% 1/4W CF
R 314	04720016	150Ω 2 WATT 5% CARBON FILM
R 315	04700121	100Ω 5% 1/4W CF
R 316	04700145	10KΩ 5% 1/4W CF
R 317	04700150	27KΩ 5% 1/4W CF
R 318	04700157	100KΩ 5% 1/4W CF
R 319	04700145	10KΩ 5% 1/4W CF
R 320	04750008	10KΩ TRIM POT/HORZ MOUNT
R 321	04700142	5.6KΩ 5% 1/4W CF
R 322	04700133	1KΩ 5% 1/4W CF
R 323	shown on TOP SIDE PARTS PLACEMENT, page 65.	
R 324	shown on TOP SIDE PARTS PLACEMENT, page 65.	
R 326	04700145	10KΩ 5% 1/4W CF
R 327	04700145	10KΩ 5% 1/4W CF
R 328	shown on TOP SIDE PARTS PLACEMENT, page 65.	
R 329	shown on TOP SIDE PARTS PLACEMENT, page 65.	

RITRON# DESCRIPTION

HARDWARE

HW 01	02600003	HEATSINK TO-220 LAY DOWN
HW 02	05120002	FUSE HOLDER PC BOARD MOUNT
HW 03	05120002	FUSE HOLDER PC BOARD MOUNT
HW 04	05120002	FUSE HOLDER PC BOARD MOUNT
HW 05	05120002	FUSE HOLDER PC BOARD MOUNT
HW 06	02800020	STANDOFF 4-40 X 3/16"
HW 07	02800020	STANDOFF 4-40 X 3/16"
HW 08	02800020	STANDOFF 4-40 X 3/16"
HW 09	02800020	STANDOFF 4-40 X 3/16"
HW 10	02800020	STANDOFF 4-40 X 3/16"

RRX-450-D40F0 (STD.) PARTS LIST

RITRON#	DESCRIPTION	QTY.
HW 01 to		
HW 03 02100129	CRIMP CONTACT TERM .156"	(3)
HW 04 02100150	5-PIN SOCKET.156" LOCKING	(1)
HW 05 02100202	9 POS. RECPT. W/DETENT LOCK	(1)
HW 06 02100203	9 POS.PLUG W/O MNTG. EARS	(1)
HW 07 to		
HW 10 02100327	DC POWER CONNECTOR PIN	(4)
HW 11 to		
HW 14 02100328	DC POWER CONTACT SOCKET	(4)
HW 15 02100349	AC INLET VOLT. SELCTBLE FUS.	(1)
HW 16 02500028	TO-220 INS BUSHING SM	(1)
HW 17 02500029	INS. WSHR FOR TO-220 TRANS	(1)
HW 19 to		
HW 21 02800079	ANGLE BRACKET STEEL 6/32 TAP	(3)
HW 22 02800116	#6 SOLDER LUG	(1)
HW 23 02800120	TERM #4 LUG FASTON .02 TN 45D	(1)
HW 24 to		
HW 27 02800121	PAD, STICK-ON, BUMPER, BLACK	(4)
HW 28 to		
HW 42 02801005	4-40 1/4" PHILLIPS PAN	(15)
HW 43 to		
HW 44 02801011	10-32 X 1/2" HX HEAD WSHR SCR	(2)
HW 45 02801012	4-40 X 3/8" PHIL (PHMS)	(1)
HW 46 to		
HW 47 02801014	SCR 4-40 X 3/8" PFHMS	(2)
HW 48 to		
HW 50 02802003	4-40 X 1/4" X 3/32" HX NUT/ZINC	(3)
HW 51 to		
HW 53 02802007	6-32 X 5/16" X 7/64" HEX NUT	(3)
HW 54 to		
HW 55 02802017	10-32 X 3/8" X 1/8" HEX STL NUT	(2)
HW 56 to		
HW 72 02803004	#4 INT TOOTH L'WSHER	(17)
HW 73 to		
HW 75 02803006	#6 INT TOOTH L'WSHER	(3)
HW 76 to		
HW 77 02803008	#10 INT TOOTH STL WSHR	(2)
HW 78 to		
HW 79 02803025	#8 FLAT WASHER STL	(2)
HW 80 06002013	1/4" DIA CLR HEAT SHRK/IN	(1)

RITRON#	DESCRIPTION	QTY.
HW 81 13241000	PANEL FRONT RRX-450	(1)
HW 82 13242000	PANEL REAR RRX-450	(1)
HW 83 13244000	PANEL, BOTTOM, RRX-450	(1)
HW 84 to		
HW 85 13247000	EXTRUSION, SD PNL, RRX-450	(2)
HW 86 to		
HW 91 28110601	SCR 6-32 X 3/8 TORX THFORMG	(6)
HW 92 to		
HW109 2811DH01	SCR TAPTITE TRSHD 6-32 X 3/8	(18)
HW110 28721007	SPCR 1/4 HX NYL 6-32 INT TH .1"	(1)
HW111 to		
HW114 02801005	4-40; 1/4" PHILLIPS PAN	(4)
HW115 to		
HW118 02803004	#4 INT TOOTH L'WSHER	(4)
HW119 13523000	PANEL, TOP, RRX-450	(1)
HW120 25200500	PUSH-IN FAST NYL BLK .140 D.	(1)
HW121 to		
HW125 2811DH01	SCR TAPTITETRSHD 6-32 X 3/8	(5)
HW126 01410044	SHPG CTN 21" X 14" X 9"	(1)
HW127 02100079	3-PIN POLAR RECEPTCL	(1)
HW128 to		
HW129 02100081	.093" MALE CONTACT PIN	(2)
HW130 06001059	CORD 3-COND AC POWER	(1)

REF#	RITRON#	DESCRIPTION
C 306	01503036	CAPACITOR 4700uf ELT CAP 35V
CA 01	06001113	CBLE ASY,10-COND IDC RRX-450 TX TO
CA 02	06001113	CBLE ASY,10-COND IDC RRX-450 RX TO
CA 03	06001115	CBLE RRX-450 CNTL TO
CA 04	06001116	CBLE RRX-450 EXT DC
F 301	05110005	FUSE 3 AMP 250V FUSE
F 302	05110005	FUSE 3 AMP 250V FUSE
F 303	05110018	FUSE 5 X 20mm SLO-BLO 250V 3A
T 301	05600039	PWR XFORMR 110/240 RRX-450 (4A)
VR301	05111002	VARISTOR 130 V
VR302	05111002	VARISTOR 130 V
VR303	05111002	VARISTOR 130 V
	02600031	DC FAN
	02500124	SCREEN
	02600025	HEATSINK (9A)
	02500062	MICA INS. (9A)

RITRON#	DESCRIPTION
HARDWARE	
HW 01 25700100	SHIELD; SYNTHESIZER REV D
HW 02 25700100	SHIELD; SYNTHESIZER REV D
HW 03 25700600	LID; SYNTHESIZER REV E
HW 04 02100129	.156" CRIMP CONTACT TERM
HW 05 02100129	.156" CRIMP CONTACT TERM
HW 06 02500122	BRKT, MTG, XSISTOR RF PWR MRF652
HW 07 02500123	HEATSINK, MTG NUT 8-32 .625 X .075"
HW 08 02800020	STANDOFF; 4-40 X 3/16"
HW 09 02800020	STANDOFF; 4-40 X 3/16"
HW 10 02800020	STANDOFF; 4-40 X 3/16"
HW 11 02800020	STANDOFF; 4-40 X 3/16"
HW 12 02801005	4-40; 1/4" PHILLIPS PAN
HW 13 02801005	4-40; 1/4" PHILLIPS PAN
HW 14 02801005	4-40; 1/4" PHILLIPS PAN
HW 15 02801009	4 X 1/4" PPHMS SELF-TAP/TYPE 25
HW 16 02801009	4 X 1/4" PPHMS SELF-TAP/TYPE 25
HW 19 02802003	4-40 X 1/4" X 3/32" HEX NUT/ZINC PLT.
HW 20 02802005	8-32 X 11/32" X 1/8" HEX NUT
HW 21 02803004	#4 INTERNAL TOOTH LOCKWASHER
HW 22 13403000	ENCLOSURE, TOP, RX, TX, RRX-450
HW 23 13414000	ENCLOSURE, BOTTOM, RX, TX, RRX-450
HW 24 25103900	BRKT, MTG, FEED-THRU
HW 25 25104300	SHIELD, VCO, RRX-450
HW 27 25702000	SHIELD, VCO CUP, RTX

16.

RRX-450 TRANSMITTER PARTS LIST

NOTE: This parts list reflects component values current with ECN 2425. If a value in this parts list differs from the value shown in the schematic on page 49, the parts list is to be considered more current.

The first number in the "location" column is the "X" coordinate, the second number is the "Y" coordinate. At the end of the line, "T" indicates the component is on the top side of the PC board, "B" indicates the bottom side.

REF#	RITRON#	DESCRIPTION	LOCATION		REF#	RITRON#	DESCRIPTION	LOCATION	
CAPACITORS, CHIP, FIXED, 50V, UNLESS STATED OTHERWISE									
C 201	15110390	39pF NPO 0805 50V	4.324	2.629 T	C 260	151106A8	6.8pF NPO 0805 50V	1.016	0.389 T
C 202	152A6105	1μF 10V 3.2X1.6 TANT	2.518	1.083 T	C 261	15110330	33pF NPO 0805 50V	2.201	0.653 T
C 204	01517502	.001μF FTCER 50V			C 262	152C8106	10μF 16V 6.0X3.2 TANT	2.654	0.734 T
C 205	1511Q331	330pF 0805 N750 50V	2.123	1.387 T	C 263	15111102	.001μF X7R 0805 50V	1.730	1.511 T
C 206	15111103	.01μF X7R 0805 50V	2.060	1.664 T	C 264	15111102	.001μF X7R 0805 50V	1.600	0.780 T
C 207	15110330	33pF NPO 0805 50V	1.983	1.387 T	C 265	15110220	22pF NPO 0805 50V		
C 208	15400003	4.5 - 20pF CERAMIC TRIM	2.053	1.189 T	C 266	15110220	22pF NPO 0805 50V		
C 209	15110390	39pF NPO 0805 50V	2.400	1.101 T	C 267	15111102	.001μF X7R 0805 50V	1.096	0.977 T
C 210	15121104	.1μF X7R 1206 50V	2.143	1.683 T	C 268	15110330	33pF NPO 0805 50V	1.016	1.026 T
C 211	15110101	100pF NPO 0805 50V	2.068	1.901 T	C 269	15111103	.01μF X7R 0805 50V	1.176	0.977 T
C 212	15121104	.1μF X7R 1206 50V	2.347	2.830 T	C 270	15121104	.1μF X7R 1206 50V	1.261	0.959 T
C 213	15121104	.1μF X7R 1206 50V	2.164	2.401 T	C 271	01503006	10μF ELT 16V	0.966	1.318 T
C 214	01503110	100μF ELT 10V	2.084	2.087 T	C 274	151241A0	1.0pF NPO 1206 100V	0.190	1.958 T
C 215	15111102	.001μF X7R 0805 50V	2.485	1.719 T	C 275	151243A9	3.9pF NPO 1206 100V	0.260	2.181 T
C 216	15121104	.1μF X7R 1206 50V	2.567	1.700 T	C 276	151243A9	3.9pF NPO 1206 100V	0.142	2.463 T
C 217	15110101	100pF NPO 0805 50V	2.686	1.640 T	C 277	01550010	1.6-10pF VARTEF 100V	0.612	2.897 T
C 218	15111103	.01μF X7R 0805 50V	2.752	2.082 T	C 278	15110150	15pF 0805 NPO 50V	0.593	0.354 T
C 219	15111103	.01μF X7R 0805 50V	2.679	1.764 T	C 279	01550010	1.6-10pF VARTEF 100V	0.232	1.713 T
C 220	15111102	.001μF X7R 0805 50V	4.328	2.910 T	C 280	01550010	1.6-10pF VARTEF 100V	0.609	1.784 T
C 221	15111102	.001μF X7R 0805 50V	4.328	2.986 T	C 281	15111102	.001μF X7R 0805 50V	3.169	1.009 T
C 222	15111102	.001μF X7R 0805 50V	4.248	2.629 T	C 282	15110150	15pF 0805 NPO 50V	2.299	0.465 T
C 223	15111103	.01μF X7R 0805 50V	3.011	2.556 T	C 283	15121104	.1μF X7R 1206 50V	3.192	1.700 T
C 224	01503006	10μF ELT 16V	3.005	2.365 T	C 284	15121104	.1μF X7R 1206 50V	3.178	1.512 T
C 225	15121104	.1μF X7R 1206 50V	3.298	2.494 T	C 290	15110330	33pF NPO 0805 50V	3.298	2.012 T
C 226	15110101	100pF NPO 0805 50V	3.193	2.343 T	C 292	01503211	100μF ELT 16V	2.995	1.491 T
C 227	151100A5	.5pF NPO 0805 50V	3.403	2.030 T	C 293	152C8106	10μF 16V 6.0X3.2 TANT	2.118	2.772 T
C 228	15110101	100pF NPO 0805 50V	4.072	2.092 T	C 294	15111102	.001μF X7R 0805 50V	4.211	1.700 T
C 229	15121104	.1μF X7R 1206 50V	3.913	2.163 T	C 295	152C8106	10μF 16V 6.0X3.2 TANT	3.151	2.135 T
C 230	15110101	100pF NPO 0805 50V	3.985	1.915 T	C 296	152C8106	10μF 16V 6.0X3.2 TANT	2.016	2.280 T
C 231	01503110	100μF ELT 10V	3.999	1.772 T	C 297	152C8106	10μF 16V 6.0X3.2 TANT	3.017	1.707 T
C 232	15110101	100pF NPO 0805 50V	4.047	1.624 T	C 299	15111102	.001μF X7R 0805 50V	1.347	2.166 T
C 233	15121104	.1μF X7R 1206 50V	3.517	1.261 T	C 300	15110330	33pF NPO 0805 50V	1.953	1.031 T
C 234	15110101	100pF NPO 0805 50V	3.543	1.043 T	C 301	151104A7	4.7pF 0805 50V	1.055	0.257 T
C 235	151103A3	3.3pF NPO 0805	3.905	1.042 T	C 305	15110101	100pF NPO 0805 50V	2.401	1.025 T
C 236	01501071	.22μF MLPOLY 50V	4.040	2.348 T	C 306	15110120	12pF NPO 0805 50V	3.300	2.306 T
C 237	01501070	.022μF MLPOLY 50V	3.909	2.420 T	C 307	15111102	.001μF X7R 0805 50V	1.600	2.130 T
C 238	15111102	.001μF X7R 0805 50V	3.431	2.655 T	C 308	01510004	1.2pF NPO CERDIS 50V	0.388	2.859 T
C 239	15110101	100pF NPO 0805 50V	3.467	2.489 T	DIODES, SOT-23, UNLESS STATED OTHERWISE				
C 240	151102A2	2.2pF NPO 0805 50V	3.480	2.084 T	CR201	48A1005B	MMBD 6100 LT1	2.283	1.455 T
C 241	151105A6	5.6pF NPO 0805 50V	3.708	1.750 T	CR202	48C1005L	MMBV609L VVC 40PF	2.458	1.238 T
C 242	151103A3	3.3pF NPO 0805	3.634	1.590 T	CR203	48C1004E	MMBV-105G VVC	3.299	2.197 T
C 243	151103A3	3.3pF NPO 0805	3.498	1.452 T	CR204	48C1004E	MMBV-105G VVC	3.454	2.223 T
C 244	151100A5	.5pF NPO 0805 50V	3.747	1.491 T	CR205	04820119	1N5355A; ZENER 18V; 5W	1.018	1.513 T
C 245	15110101	100pF NPO 0805 50V	3.372	1.523 T	CR206	48A1005C	MMBD7000 DUAL	1.952	1.937 T
C 246	151103A3	3.3pF NPO 0805	3.879	1.274 T	FUSE				
C 247	15110100	10pF NPO 0805 50V	4.014	1.249 T	F 201	05110016	FUSE, SUMMINI 3AMP AXIAL PICO		
C 248	15110330	33pF NPO 0805 50V	4.333	0.366 T	INTEGRATED CIRCUITS				
C 249	151106A8	6.8pF NPO 0805 50V	4.334	0.289 T	IC201	31010002	78L05AC 5V REG S0-8	2.108	2.570 T
C 250	15110101	100pF NPO 0805 50V	3.368	0.607 T	IC202	31330001	MB1504 UHF SYNTH	2.411	2.098 T
C 251	15110101	100pF NPO 0805 50V	3.144	0.800 T	JACKS				
C 252	15111102	.001μF X7R 0805 50V	3.228	0.800 T	J 201	02100091	PC PHONO JACK R/A	0.057	2.798 T
C 253	01517502	.001μF FTCER 50V			J 202	02100351	IDC BOX, 10-COND. R/A	4.576	2.053 T
C 254	01503024	100μF ELT 35V							
C 255	15111102	.001μF X7R 0805 50V	2.356	0.729 T					
C 256	15110101	100pF NPO 0805 50V	2.435	0.729 T					
C 257	151105A6	5.6pF NPO 0805 50V	2.936	0.520 T					
C 258	151106A8	6.8pF NPO 0805 50V	2.897	0.412 T					
C 259	15110330	33pF NPO 0805 50V	2.021	0.765 T					

PROGRAMMABLE UHF FM REPEATER *Transmitter Parts List*

REF#	RITRON#	DESCRIPTION	LOCATION
INDUCTORS			
L 202	01870953	3.5T AIRFCW COIL	2.673 1.902 T
L 203	18110101	CHIP INDUCTOR 0.1μHy	3.752 1.598 T
L 204	01870952	2.5T AIRFCW COIL	4.058 1.479 T
L 205	01870953	3.5T AIRFCW COIL	3.448 1.071 T
L 206	18110101	CHIP INDUCTOR 0.1μHy	3.427 2.372 T
L 207	01850301	1.5T SHIELDED COIL	3.701 1.985 T
L 208	18110101	CHIP INDUCTOR 0.1μHy	3.516 1.584 T
L 209	01870952	2.5T AIRFCW COIL	3.245 0.586 T
L 210	01870955	5.5T AIRFCW COIL	1.736 0.746 T
L 212	01870956	6.5T AIRFCW COIL	0.201 0.567 T
L 213	01800101	.15 uh PHE FCW COIL	0.666 1.050 T
L 215	01804203	3.5T #20AWG MAG WIRE	0.516 2.123 T
L 216	01804204	4.5T #20AWG MAG WIRE	0.415 2.463 T
L 217	01804203	3.5T #20AWG MAG WIRE	0.612 2.684 T

PLUG

P 210 02100306 2 POS POLAR CONN .2" LS

TRANSISTORS, SOT-23, LO-PWR RF, UNLESS STATED OTHERWISE

Q 201	4841006U	MMBFJ309L N-CH SOT23	1.952 1.661 T
Q 202	4801002A	MMBT3906 "SOT23"	3.222 2.694 T
Q 203	4801001Q	MMBT-5088 "SOT-23"	3.675 2.672 T
Q 204	4841006T	MMBFJ310T1 NFET	
		GP SOT-23	3.606 1.452 T
Q 205	4821007Y	MMBR941LT1 SOT-23	3.879 1.383 T
Q 206	4821007Y	MMBR941LT1 SOT-23	3.737 1.074 T
Q 207	04801030	MRF-555 NPN RF BIPOLAR	
		MACRO-X PKG	1.927 0.513 T
Q 208	04800023	TIP-122; NPN PWR DARL	1.469 1.471 T
Q 209	04801021	MRF652 UHF RF PWR AMP	0.429 0.824 T
Q 210	4801001Q	MMBT-5088 "SOT-23"	3.227 1.273 T
Q 211	48180001	BCP-69 PNP RF PWR	
		SOT-223	3.011 1.172 T
Q 213	48220001	MRF-5812 NPN SO-8	3.328 0.364 T

RESISTORS

R 201	47100683	68KΩ 0805	2.466 1.531 T
R 202	47100124	120KΩ 0805	2.302 1.671 T
R 204	47300103	10KΩ SMT THERM	2.405 1.385 T
R 205	47100104	100KΩ 0805	2.325 1.296 T
R 207	47100101	100Ω 0805	2.226 1.670 T
R 208	47100273	27KΩ 0805	2.567 1.239 T
R 209	47100224	220KΩ 0805	2.248 1.297 T
R 210	47100102	1KΩ 0805	3.295 1.418 T
R 211	47100103	10KΩ 0805	1.919 1.800 T
R 212	47100102	1KΩ 0805	2.089 1.031 T
R 213	47100333	33KΩ 0805	2.675 2.082 T
R 215	47100103	10KΩ 0805	3.085 2.661 T
R 216	47100272	2.7KΩ 0805	3.090 2.556 T
R 217	47100102	1KΩ 0805	2.940 2.216 T
R 218	47100102	1KΩ 0805	3.169 2.556 T
R 219	47270104	100KΩ SEALED VARIABLE	3.082 2.871 T
R 220	47100102	1KΩ 0805	3.300 2.383 T
R 221	47100104	100KΩ 0805	3.299 2.088 T
R 222	47100470	47Ω 0805	3.984 1.991 T
R 223	47100470	47Ω 0805	3.869 1.596 T
R 224	47100101	100Ω 0805	3.944 1.596 T
R 225	47100822	8.2KΩ 0805	3.904 1.492 T
R 226	47100221	220Ω 0805	3.631 1.177 T
R 227	47100103	10KΩ 0805	3.740 1.191 T
R 228	47100103	10KΩ 0805	3.607 2.782 T
R 229	47100472	4.7KΩ 0805	3.712 2.822 T
R 230	47100102	1KΩ 0805	3.554 2.672 T
R 231	47100103	10KΩ 0805	3.784 2.672 T

REF#	RITRON#	DESCRIPTION	LOCATION
R 232	47100103	10KΩ 0805	3.330 2.694 T
R 233	47100103	10KΩ 0805	3.388 2.578 T
R 234	47100101	100Ω 0805	3.372 1.601 T
R 235	47100102	1KΩ 0805	3.743 1.414 T
R 236	47100101	100Ω 0805	3.877 1.197 T
R 237	47100152	1.5KΩ 0805	3.902 1.118 T
R 238	04700115	33Ω 1/4W 5%	3.025 0.754 T
R 239	47100682	6.8KΩ 0805	3.586 0.447 T
R 240	47100102	1KΩ 0805	3.588 0.282 T
R 241	47100222	2.2KΩ 0805	2.536 0.683 T
R 242	47100470	47Ω 0805	2.328 0.305 T
R 243	04750008	10KΩ TRIM POT/ HORZ MOUNT	1.544 1.086 T
R 246	47100103	10KΩ 0805	3.368 1.237 T
R 248	47100103	10KΩ 0805	3.186 1.384 T
R 258	04700104	4.7Ω 5% 1/4W CF	1.725 2.091 T
R 259	47100102	1KΩ 0805	1.730 1.371 T
R 265	47100180	18Ω 0805	3.624 1.043 T
R 266	47100180	18Ω 0805	3.766 1.303 T
R 267	47100221	220Ω 0805	3.137 0.614 T
R 268	47300104	100KΩ 5% 0805 THERM	2.405 1.676 T
R 269	47100563	56KΩ 0805	2.286 1.565 T
R 270	04750101	220Ω THERM	3.362 1.686 T

CRYSTAL

Y 201 02300611 16.0125MHz UM-1 18PF -RRX GRADE

FERRITE BEADS

Z 201	18360001	SURFACE MOUNT	2.962 2.076 T
Z 202	18360001	SURFACE MOUNT	2.178 0.768 T
Z 203	18360001	SURFACE MOUNT	2.178 0.351 T
Z 204	18360001	SURFACE MOUNT	0.018 0.607 T
Z 205	01801029	ON AXIAL LEADS	0.866 1.149 T
Z 206	01801029	ON AXIAL LEADS	1.177 1.167 T
Z 207	01801029	ON AXIAL LEADS	0.966 1.679 T
Z 208	18360001	SURFACE MOUNT	3.358 0.793 T
Z 209	18360001	SURFACE MOUNT	3.270 1.124 T
Z 210	01801029	ON AXIAL LEADS	1.482 2.016 T
Z 211	01801003	2643000301	1.725 2.240 T

13. RRX-450 RECEIVER BOARD PARTS LIST

NOTE: This parts list reflects component values current with ECN 2430. If a value in this parts list differs from the value shown in the schematic on page 41, the parts list is to be considered more current.

The first number in the "location" column is the "X" coordinate, the second number is the "Y" coordinate. At the end of the line, "T" indicates the component is on the top side of the PC board, "B" indicates the bottom side.

REF#	RITRON#	DESCRIPTION	LOCATION	REF#	RITRON#	DESCRIPTION	LOCATION
CAPACITORS, CHIP, 50V, UNLESS STATED OTHERWISE							
C 101	1508001L	.68pF P100 .25pF	4.881 1.541 T	C 167	152C8106	10µF 16V 6.0X3.2 TANT	1.796 1.308 T
C 102	01550004	0.5/3pF VARCER		C 168	15121104	.1µF X7R 1206 50V	1.971 1.185 T
C 103	01550004	0.5/3pF VARCER		C 169	15110101	100pF NPO 0805 50V	2.352 1.229 T
C 104	1510004L	1.2pF NPO .25pF	4.051 1.541 T	C 170	151102A2	2.2pF NPO 0805 50V	2.457 1.336 T
C 105	152A8105	1µF 16V 3.2 X 1.6 TANT	3.979 0.458 T	C 171	15110100	10pF NPO 0805 50V	2.475 1.108 T
C 106	15110330	33pF NPO 0805 50V	3.964 0.888 T	C 172	151105A6	5.6pF NPO 0805 50V	2.180 1.301 T
C 107	15110180	18pF NPO 0805 50V	3.805 0.378 T	C 173	01501071	.22uf MLPOLY 50V	1.597 1.199 T
C 108	15110330	33pF NPO 0805 50V	2.943 0.402 T	C 174	01501070	.022uf MLPOLY 50V	1.463 1.217 T
C 109	1508001L	.68pF P100 .25pF	2.904 1.430 T	C 175	15111102	.001µF X7R 0805 50V	1.686 0.753 T
C 110	01550004	0.5/3pF VARCER		C 176	15111102	.001µF X7R 0805 50V	1.817 0.774 T
C 111	01550004	0.5/3pF VARCER		C 177	151104A7	4.7pF 0805 50V	2.093 0.736 T
C 112	1508001L	.68pF P100 .25pF	3.734 1.430 T	C 178	151108A2	8.2pF NPO 0805 50V	2.229 0.788 T
C 113	151104A7	4.7pF 0805 50V	2.690 1.730 T	C 179	151104A7	4.7pF 0805 50V	2.429 0.640 T
C 114	15111103	.01µF X7R 0805 50V	2.338 2.056 T	C 180	15400001	3-10pF CERAMIC TRIM	2.654 0.501 T
C 115	15400002	6.5-30pF CERAMIC TRIM	2.530 2.060 T	C 181	15110101	100pF NPO 0805 50V	2.683 0.719 T
C 116	15111103	.01µF X7R 0805 50V	2.530 1.725 T	C 182	151100A5	.5pF NPO 0805 50V	2.372 0.931 T
C 117	151101A8	1.8pF NPO 0805 50V	2.688 2.231 T	C 185	15121104	.1µF X7R 1206 50V	2.238 2.891 T
C 118	15110330	33pF NPO 0805 50V	2.338 2.148 T	C 186	15111103	.01µF X7R 0805 50V	1.785 2.910 T
C 119	15111103	.01µF X7R 0805 50V	1.225 2.388 T	C 187	15121104	.1µF X7R 1206 50V	1.397 1.565 T
C 120	15110330	33pF NPO 0805 50V	1.305 2.387 T	C 189	152C8106	10µF 16V 6.0X3.2 TANT	1.662 2.860 T
C 121	151106A8	6.8pF NPO 0805 50V	2.414 2.344 T	C 190	151105A6	5.6pF NPO 0805 50V	2.453 0.769 T
C 122	15110470	47pF NPO 0805 50V	1.501 2.381 T	C 191	15110220	22pF NPO 0805 50V	
C 123	15121104	.1µF X7R 1206 50V	1.338 2.227 T	C 192	15110100	10pF NPO 0805 50V	2.450 1.670 T
C 124	15111102	.001µF X7R 0805 50V	1.470 2.251 T	C 193	15110101	100pF NPO 0805 50V	0.419 1.367 T
C 125	15110390	39pF NPO 0805 50V	1.135 2.387 T	C 194	15110101	100pF NPO 0805 50V	0.390 1.537 T
C 126	15110101	100pF NPO 0805 50V	0.701 2.348 T	C 195	15121104	.1µF X7R 1206 50V	2.435 2.231 T
C 127	15121104	.1µF X7R 1206 50V	0.841 1.722 T	C 196	15110101	100pF NPO 0805 50V	2.009 1.766 T
C 128	15121104	.1µF X7R 1206 50V	0.930 1.723 T	C 197	15110221	220pF NPO 0805 50V	1.869 1.920 T
C 129	15110330	33pF NPO 0805 50V	1.013 1.530 T	C 198	15110221	220pF NPO 0805 50V	1.870 2.153 T
C 130	01503110	100uf ELT 10V	0.670 1.704 T	C 199	15110101	100pF NPO 0805 50V	0.769 2.587 T
C 131	15121104	.1µF X7R 1206 50V	1.909 1.792 T	C 200	15110101	100pF NPO 0805 50V	1.832 2.628 T
C 132	15111102	.001µF X7R 0805 50V	1.534 1.883 T	C 201	1511Q331	330pF 0805 N750 50V	0.651 0.926 T
C 133	15121104	.1µF X7R 1206 50V	1.496 2.098 T	C 202	15110390	39pF NPO 0805 50V	0.960 0.465 T
C 134	15110330	33pF NPO 0805 50V	1.644 2.098 T	C 203	15111103	.01µF X7R 0805 50V	1.017 0.736 T
C 135	15121104	.1µF X7R 1206 50V	2.008 2.211 T	C 204	15121104	.1µF X7R 1206 50V	0.985 0.823 T
C 136	15111102	.001µF X7R 0805 50V	1.352 1.973 T	C 205	15110360	36pF NPO 0805 50V	
C 137	01502003	.22uf TANT 35V	2.216 2.075 T	C 206	01550021	2-10pF VARCER 250V	0.695 0.508 T
C 138	15110330	33pF NPO 0805 50V	1.636 1.689 T	C 207	15110101	100pF NPO 0805 50V	1.064 0.441 T
C 140	15111103	.01µF X7R 0805 50V	1.675 1.560 T	DIODES, 23-SOT, UNLESS STATED OTHERWISE			
C 141	15110330	33pF NPO 0805 50V	0.831 2.875 T	CR101	48A1005C	MMBD7000 DUAL	2.141 1.813 T
C 142	15121104	.1µF X7R 1206 50V	0.274 2.499 T	CR102	48A1005C	MMBD7000 DUAL	1.869 2.032 T
C 147	15111102	.001µF X7R 0805 50V	0.098 2.199 T	CR103	04820007	1N5232B ZENER	0.878 1.535 T
C 148	01503110	100uf ELT 10V	0.106 1.917 T	CR106	48C1004E	MMBV-105G VVC	1.931 0.769 T
C 149	15121104	.1µF X7R 1206 50V	0.393 1.988 T	CR107	48C1005L	MMBV609L VVC	0.615 1.034 T
C 150	15110101	100pF NPO 0805 50V	0.411 0.635 T	CR108	48A1005B	MMBD 6100 LT1	
C 151	15111103	.01µF X7R 0805 50V	1.198 0.431 T	CR109	48A1005C	MMBD7000 DUAL	0.617 0.682 T
C 152	15111103	.01µF X7R 0805 50V	1.630 0.673 T	CR908	48A1005C	MMBD7000 DUAL	
C 153	15110101	100pF NPO 0805 50V	0.850 1.313 T	INTEGRATED CIRCUITS			
C 154	15121104	.1µF X7R 1206 50V	0.720 1.336 T	IC101	31030003	MC3371D SUBSYSTEM	1.105 2.046 T
C 155	15121104	.1µF X7R 1206 50V	1.152 1.290 T	IC102	31010002	78L05AC 5V REG SO-8	0.291 2.266 T
C 156	152C8106	10µF 16V 6.0X3.2 TANT	1.046 1.249 T	IC103	31330001	MB1504 UHF SYNTH	1.328 0.676 T
C 157	15111102	.001µF X7R 0805 50V	0.419 1.238 T	IC104	31010005	TLC272 DUAL PKG OP AMP SO-8	1.331 2.873 T
C 158	15111102	.001µF X7R 0805 50V	0.300 1.663 T	JACKS			
C 159	15111102	.001µF X7R 0805 50V	0.423 1.640 T	J 101	02100091	R/A PC PHONO JACK	4.091 2.897 T
C 161	15110101	100pF NPO 0805 50V	1.854 1.185 T	J 102	02100351	HEADER IDC BOX 10-COND R/A	0.221 1.428 T
C 162	15121104	.1µF X7R 1206 50V	2.060 1.186 T				
C 163	15110101	100pF NPO 0805 50V	2.140 1.086 T				
C 164	01503110	100uf ELT 10V	2.098 0.913 T				
C 165	15110101	100pF NPO 0805 50V	2.554 1.001 T				
C 166	151108A2	8.2pF NPO 0805 50V					

PROGRAMMABLE UHF FM REPEATER Receiver Board Parts List

REF# RITRON# DESCRIPTION LOCATION

INDUCTORS

L 101	01801008	M 1.75T AIRFSW COIL		
L 102	01801008	M 1.75T AIRFSW COIL		
L 103	18110151	CHIP INDUCTOR .15μHy	3.844	0.969 T
L 104	01801008	M 1.75T AIRFSW COIL		
L 105	01801008	M 1.75T AIRFSW COIL		
L 106	18110332	CHIP INDUCTOR 3.3μHy	2.434	1.850 T
L 107	01870951	1.5T AIRFCW COIL .03 a L	2.713	2.030 T
L 108	01870951	1.5T AIRFCW COIL .03 a L	2.387	1.863 T
L 110	01870956	6.5T AIRFCW COIL .12 a L		
L 111	18110101	CHIP INDUCTOR 0.1μHy	1.820	0.933 T
L 113	18110101	CHIP INDUCTOR 0.1μHy	2.270	0.935 T
L 114	18110101	CHIP INDUCTOR 0.1μHy	2.555	0.684 T
L 115	01870953	3.5T AIRFCW COIL		
L 116	01870954	4.5T AIRFCW COIL		

JUMPERS AND SHORTING PLUGS

P 501	02100072	5-PIN PLRZD PC MNT	0.112	3.504 T
PJ401	02100024	3-PIN HEADER	1.158	1.638 T
PJ402	02100024	3-PIN HEADER	2.773	3.300 T
PJ403	02100024	3-PIN HEADER	3.947	4.691 T
PJ404	02100024	3-PIN HEADER	4.666	2.231 T
PJ407	02100024	3-PIN HEADER	4.486	5.244 T
SP401	02100075	2-PIN SHORTING PLUG		
SP402	02100075	2-PIN SHORTING PLUG		
SP403	02100075	2-PIN SHORTING PLUG		
SP404	02100075	2-PIN SHORTING PLUG		
SP407	02100075	2-PIN SHORTING PLUG		

TRANSISTORS, SOT-23, UNLESS STATED OTHERWISE

Q 101	4821007Y	MMBR941LT1	3.844	1.203 T
Q 102	4841006T	MMBFJ310T1 NFET GP	2.610	1.842 T
Q 103	4821003E	MMBT-H10 VHF	1.795	2.297 T
Q 104	48010R02	MUN2211T1 W/BIAS	0.973	2.908 T
Q 105	4801002A	MMBT3906	1.330	1.199 T
Q 106	4801001Q	MMBT-5088	1.332	1.061 T
Q 107	4841006T	MMBFJ310T1 NFET GP	2.335	0.790 T
Q 108	4821007Y	MMBR941LT1	2.664	0.903 T
Q 109	4821007Y	MMBR941LT1	2.597	1.311 T
Q 110	4841006U	MMBFJ309L, N-CHAN RF		
Q 910	4841006T	MMBFJ310T1 NFET GP		

RESISTORS, CHIP, FIXED, UNLESS STATED OTHERWISE

R 101	47100123	12KΩ 0805	3.964	1.127 T
R 102	47100222	2.2KΩ 0805	3.844	1.314 T
R 103	47100221	220Ω 0805	3.805	0.457 T
R 104	47100221	220Ω 0805	2.344	1.973 T
R 105	47100221	220Ω 0805	1.691	2.376 T
R 106	47100102	1KΩ 0805	2.530	1.625 T
R 107	47100152	1.5KΩ 0805	1.929	2.344 T
R 108	47100182	1.8KΩ 0805	1.417	2.384 T
R 109	47100153	15KΩ 0805	1.648	2.257 T
R 110	47100393	39KΩ 0805	1.013	1.750 T
R 111	47100332	3.3KΩ 0805	0.585	2.310 T
R 112	04750005	2KΩ TRIM POT; LINEAR	0.571	2.823 T
R 113	47100471	470Ω 0805	1.066	2.765 T
R 114	47100331	330Ω 0805	0.357	2.989 T
R 115	47100563	56KΩ 0805	1.105	2.909 T
R 116	47100472	4.7KΩ 0805	2.107	1.929 T
R 117	47100394	390KΩ 0805	1.764	1.882 T
R 118	47300103	THERMISTOR, 10K SMT	1.655	1.990 T
R 119	47100474	470KΩ 0805	1.486	2.003 T
R 120	47100103	10KΩ 0805	2.104	2.207 T
R 121	47100104	100KΩ 0805	2.048	2.032 T
R 122	47100821	820Ω 0805	1.634	1.882 T

REF# RITRON# DESCRIPTION LOCATION

R 124	47100222	2.2KΩ 0805	1.520	1.725 T
R 125	47100123	12KΩ 0805	1.434	1.884 T
R 132	47100333	33KΩ 0805	1.413	0.432 T
R 133	47100100	10Ω 0805	0.931	1.234 T
R 134	47100182	1.8KΩ 0805	1.191	1.159 T
R 135	47100102	1KΩ 0805	1.308	1.312 T
R 136	47100682	6.8KΩ 0805	1.129	1.071 T
R 137	47100103	10KΩ 0805	1.146	0.958 T
R 139	47100472	4.7KΩ 0805	1.226	0.957 T
R 140	47100102	1KΩ 0805	1.408	0.943 T
R 141	47100103	10KΩ 0805	1.556	0.970 T
R 142	47100124	120KΩ 0805	1.576	0.865 T
R 143	47100104	100KΩ 0805	1.696	0.891 T
R 144	47100470	47Ω 0805	1.944	0.959 T
R 145	47100330	33Ω 0805	2.217	1.086 T
R 146	47100271	270Ω 0805	2.293	1.086 T
R 147	47100123	12KΩ 0805	2.463	1.001 T
R 148	47100561	560Ω 0805		
R 149	47100271	270Ω 0805	2.683	0.794 T
R 150	47100471	470Ω 0805	2.177	1.195 T
R 151	47100123	12KΩ 0805	2.714	1.205 T
R 152	47100101	100Ω 0805	2.633	1.119 T
R 153	47100102	1KΩ 0805	2.709	1.314 T
R 159	47100101	100Ω 0805	2.322	1.337 T
R 160	47100563	56KΩ 0805	1.502	1.546 T
R 164	47100124	120KΩ 0805		
R 165	47100683	68KΩ 0805		
R 166	47100563	56KΩ 0805		
R 167	47300104	100KΩ 5% 0805 THERM	0.983	0.996 T
R 168	47300103	THERMISTOR, 10K SMT	0.840	1.166 T
R 169	47100224	220KΩ 0805	0.583	1.179 T
R 170	47100104	100KΩ 0805	0.584	1.316 T
R 171	47100103	10KΩ 0805	0.620	0.817 T
R 172	47100102	1KΩ 0805	0.881	0.492 T
R 173	47100101	100Ω 0805	0.993	0.917 T
R 962	04700139	3.3KΩ 5% 1/4W CF		
R 963	47300103	THERMISTOR, 10K SMT		
R 964	47100753	RESISTOR, 75KΩ 0805		
R 965	47100393	39KΩ 0805		
R 966	47100623	62KΩ 0805		

TRANSFORMER

T 101	05600018	455KHZ IF (5MM)	1.209	1.689 T
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RESONATOR

TL101	23030575	COAX 575MHZ	2.036	0.545 T
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CRYSTALS

Y 101	02300408	20.945MHZ HC-44/U	0.908	2.365 T
Y 102	02300611	16.0125MHZ UM-1 18PF -RRX GRADE		

FILTERS

YF101	02301401	21.4MHz +/- 7.5KHz HC-44	2.617	2.375 T
YF102	02301401	21.4MHz +/- 7.5KHz HC-44	2.210	2.384 T

FERRITE BEADS

Z 101	18360001	SURFACE MOUNT	2.081	2.653 T
Z 102	18360001	SURFACE MOUNT	3.119	0.403 T
Z 103	18360001	SURFACE MOUNT	1.786	1.068 T

RITRON#	DESCRIPTION
HARDWARE	
HW 01 02500016	RF SHIELD; UHF HELICAL RESONATOR
HW 02 02500016	RF SHIELD; UHF HELICAL RESONATOR
HW 03 02500016	RF SHIELD; UHF HELICAL RESONATOR
HW 04 02500016	RF SHIELD; UHF HELICAL RESONATOR
HW 05 02500020	RF SHIELD LID; DR-450
HW 06 02500020	RF SHIELD LID; DR-450
HW 07 02800017	STANDOFF; #4-40 X 1/8~ (ROUND)
HW 08 02800017	STANDOFF; #4-40 X 1/8~ (ROUND)
HW 09 02800017	STANDOFF; #4-40 X 1/8~ (ROUND)
HW 10 02800017	STANDOFF; #4-40 X 1/8~ (ROUND)
HW 11 02800050	SHIELD PLATE .3~ X .8~
HW 12 02800050	SHIELD PLATE .3~ X .8~
HW 13 25700100	SHIELD; SYNTHESIZER REV D
HW 14 25700100	SHIELD; SYNTHESIZER REV D
HW 15 25101000	SPACER, MALE/FEMALE
HW 16 25101000	SPACER, MALE/FEMALE
HW 17 25101000	SPACER, MALE/FEMALE
HW 18 25101000	SPACER, MALE/FEMALE
HW 21 13403000	ENCLOSURE, TOP, RX,TX,RRX-450
HW 22 13414000	ENCLOSURE, BOTTOM,RX,TX,RRX-450
HW 26 25700600	LID; SYNTHESIZER REV E
HW 27 25701900	SHIELD VCO REV D RPM-150

