

RADIO COMMUNICATIONS
FOR PROFESSIONALS

RITRON, INC.

MAINTENANCE AND OPERATING MANUAL MODEL RT-50 VHF-FM HANDHELD TRANSCEIVER

Limited 90 Day Warranty

To the original consumer purchaser only, RITRON, INC. warrants this product and its components and parts to be free from defects in materials and/or workmanship for a period of 90 days from the date of purchase. If the product malfunctions within 90 days from the date of purchase as a result of any defect in materials and/or workmanship and is sent at the sender's expense and received ("Attention Warranty Department") within 110 days of the date of purchase, then RITRON, INC. will restore the product to proper operating condition without additional charge to the original consumer purchaser by either repairing or replacing the product, its components or parts. ANY AND ALL TECHNICAL INFORMATION PROVIDED WITH THIS OR ANY OTHER RITRON, INC. PRODUCT IS EXPRESSLY EXCLUDED FROM THIS WARRANTY. This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

Not Responsible for All Malfunctions

RITRON, INC. shall have no responsibility if this product malfunctions as a result of anything other than a defect in materials and/or workmanship. For example, we shall not be responsible if the product malfunctions as a result of accident, abuse or misuse of the product. As a further example, if the product is used with a non-RITRON, INC. supplied or approved product or accessory, or, if you permit our product to be repaired, modified or installed by anyone other than a RITRON, INC. authorized service dealer, then we shall have no responsibility in the event the product malfunctions if the defect or damage causing the malfunction results from such unauthorized or unapproved use, repair, modification or installation.

Exclusive Express Warranty

This warranty is the only express warranty made by RITRON, INC. relating to this product. No person is authorized to make any other warranty on behalf of RITRON, INC. with respect to this product. And no representation made by any person about this product is included in the warranty.

Duration of Implied Warranty

THE DURATION OF ANY AND ALL IMPLIED WARRANTIES APPLICABLE TO THIS PRODUCT, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, SHALL BE THE SAME 90-DAY PERIOD AS FOR THIS EXPRESS WARRANTY. (Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you).

Limitation of Actions

Any law suit for breach of warranty, whether express or implied, with respect to this product, must be commenced within one year and 90 days after its original purchase by a consumer or be permanently barred.

Not Responsible For Consequential Damages

RITRON, INC. shall have NO RESPONSIBILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUSINESS LOSS, PROPERTY DAMAGE OR PERSONAL INJURY, FOR BREACH OF THIS WARRANTY OR ANY IMPLIED WARRANTY in connection with any malfunction of this product. The sole remedy for any such breach is that established in the first paragraph of this Limited 90 Day Warranty. (Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you).

PUBLICATION NO. 01450010E

COPYRIGHT ©1989, 1990, 1992 RITRON, INC. ALL RIGHTS RESERVED
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE
RITRON IS A REGISTERED TRADEMARK OF RITRON, INC.

505 West Carmel Drive
Carmel, Indiana 46032
Phone: 317/846-1201
FAX: 317/846-4978

CONTENTS

DESCRIPTION	PAGE
Specifications	1
Operating Instructions	2
Theory of Operation	
Power Source	3
Receiver	3
Push-To-Talk Function	3
Transmitter	3
Tune-up Procedure	
Test Equipment Required	4
Radio Preparation	4
Receiver Alignment	4
IF Sweep Alignment	4
Transmitter Alignment	5
Receiver Voltages	6
Transmitter Voltages	6
Signalling Products Installation	6
Parts List	7
Schematic	11
Components Location (bottom-view)	12

If a component value shown in the schematic differs from the value given in the parts list, the parts list should be considered correct. This manual has been updated to include Engineering Change Notice (ECN) 1457.

*** SPECIFICATIONS ***

RT-50 VHF-FM TRANSCEIVER

RT-50 SPECIFICATIONS (Cont'd)

GENERAL:

FCC ID:

AIE9QZRT-L50 (25 to 30 MHz)
AIE9QZRT-M50 (30 to 35.5 MHz)
AIE9QZRT-N50 (35.5 to 42 MHz)
AIE9QZRT-O50 (42 to 50 MHz)

Squelch Sensitivity: 0.15 uV to 0.5 uV, adjustable
Channel Separation: 1 MHz with no degradation
Crystal Specification: (Receive Freq + 10.7 MHz)
Third Overtone, Parallel Mode,
32 pF

FCC Rule Parts:

21, 74, 90

TRANSMITTER:

Frequency Range:

25 to 50 MHz (1)

RF Output:

4 Watts minimum at 8.4 Volts

Channels:

2

Frequency Stability:

+/- .002% from -30 to +50 Deg. C.

Power Supply:

7.7 to 9.1 Volts, 8.4 VDC nominal
500 mAh Nickel-Cadmium Battery Pack

Battery Drain:

Standby: 14 mA, nom.
Receive: 75 mA, nom.
Transmit: 950 mA, nom.

Modulation:

Type 16F3, +/- 5 KHz Deviation

Battery Life:

8 Hours
(At 90% Standby, 5% Receive,
5% Transmit)

Output Impedance:

50 Ohms

Dimensions:

7.21" H; 2.6" W; 1.8" D

Weight:

1 Pound

RECEIVER:

Receiving System:

Double-Conversion Superhetrodyne

Audio Output:

500 mW Into 8 Ohms with less than
10% THD

Frequency Stability:

+/- .002% from -30 to +50 Deg. C.

Modulation Acceptance:

+/- 7.5 KHz, maximum

Spurious and Image Rejection:

Greater than 60 dB

Selectivity:

Greater than 50 dB at 20 KHz

Intermodulation:

More than 50 dB

Sensitivity:

0.25 uV max. for 12 dB SINAD

Notes:

(1) The circuit configuration is capable of covering this range; however, several component values will need to be changed to allow operation at a specific frequency. See Alignment Procedures in this manual for actual component values.

*** RT-50 OPERATING INSTRUCTIONS ***

The RT-50 is a two-way radio operating in the 25 to 50 MHz VHF-FM communications band. This radio has the capability of transmitting and receiving on frequencies assigned to the user by the F.C.C. and MUST BE LICENSED BEFORE USE. Your Ritron Dealer will help you obtain an F.C.C. license.

This unit contains an internal battery pack that may have become discharged during shipment. Before first using the transceiver, it is recommended that the charger cube included with the radio be plugged into the unit for at least 8 hours to charge the batteries.

The On/Off switch for the radio is incorporated with the Volume Control. Turn this knob CLOCKWISE until the switch "clicks," to turn the unit ON. Further rotation will increase the volume of a received signal.

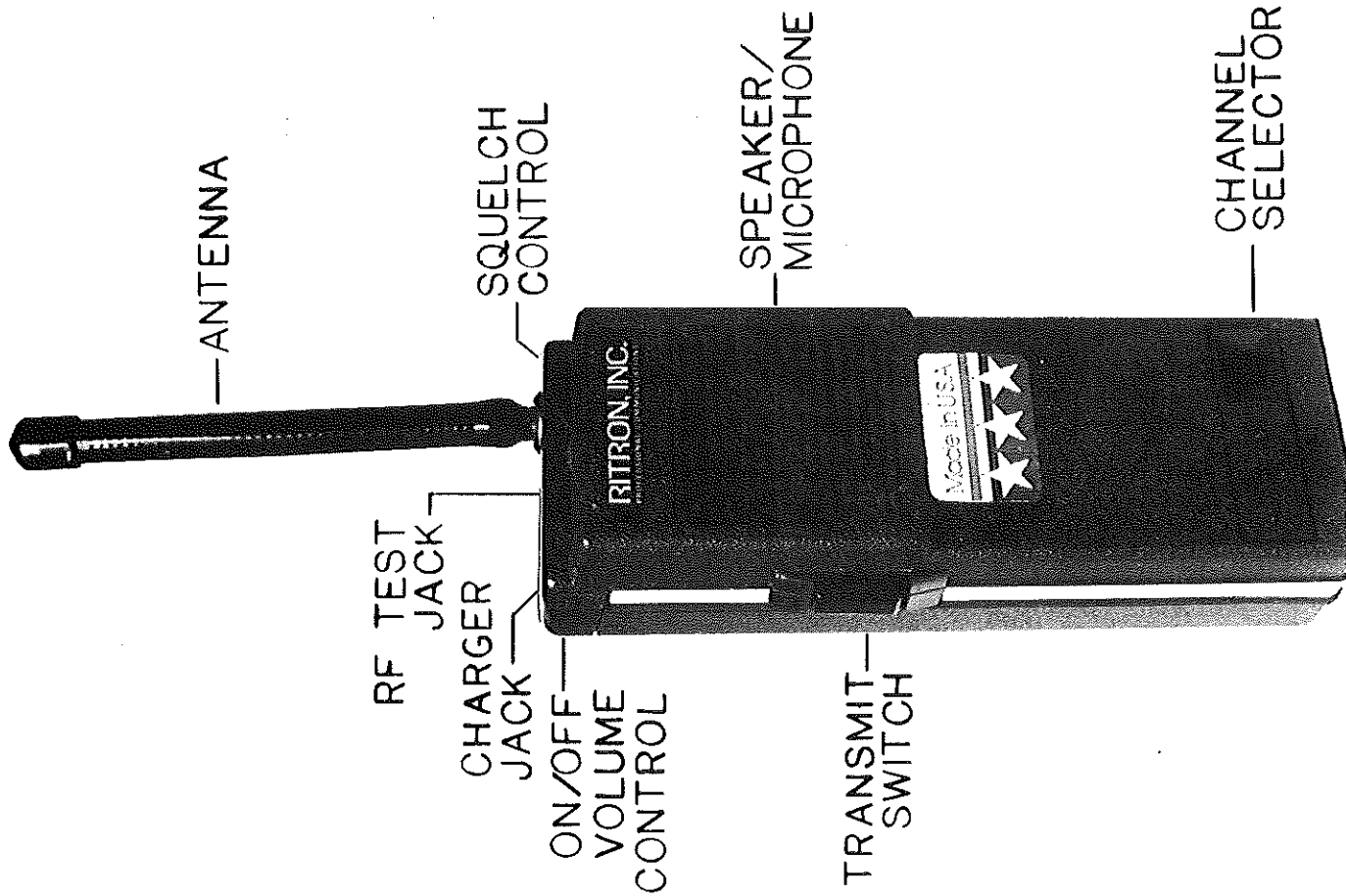
The Squelch Control can be set by the user to eliminate the noise between transmissions and, to block out unreadable signals. Rotate the Squelch Control COUNTER-CLOCKWISE until noise is heard, and then set the squelch by rotating the control CLOCKWISE until the noise is just eliminated.

If the radio is equipped with a sub-audible tone squelch system (CTCSS), it can be activated by turning the squelch control fully COUNTER-CLOCKWISE until the switch "clicks." Then, only stations having the same CTCSS code as this unit will be heard. If you have tone squelch, always disable it by rotating the Squelch Knob CLOCKWISE and monitoring the channel before transmitting to avoid interference with other users of your channel.

To talk to other stations simply push the "transmit switch" on the side of the case, and hold it down while speaking into the grille at the top-front of the case. Hold the radio about 2 inches from your lips and speak in a normal tone. Release the "transmit switch" to hear a reply.

The Channel Selector allows you to select either of two frequencies that can be installed.

When the radio's batteries are discharged, turn the unit OFF, plug the charger plug into the "Charging Jack" at top-left of the case, plug the charger into a 110 VAC wall outlet, and allow the batteries at least 12 hours to charge fully. The unit may be left to charge indefinitely with no damage to the batteries.



*** THEORY OF OPERATION ***

POWER SOURCE:

The RT-50 is powered by 7 "AA," 500 milli-Ampere hour, rechargeable Nickel-Cadmium cells connected in series (BP-7NM).

RECEIVER:

The RT-50 transceiver has a 2 channel, crystal-controlled, dual-conversion superheterodyne FM receiver. A signal from the attached antenna, or from the RF test Jack J303, passes through the antenna switch (SW303B) to a common-base RF amplifier (Q103) via a two-section filter (L107, L106, L105, C143, C142, C141, C140, and C139). A single-section filter (L104 and C136) further reduces the RF bandwidth, and C135 couples the signal to the first mixer (Q102).

The receiver first Local Oscillator is a crystal-controlled Clapp type, consisting of Q101 and associated components. C106 couples the oscillator output to the mixer circuit.

The mixer output is matched into a 10.7 MHz, two-pole, monolithic crystal filter, YF101. CR106 clamps the 10.7 MHz signal to prevent overdrive of the 2nd mixer in IC101.

IC101 is a multifunction FM IF integrated circuit. The 10.7 MHz IF signal is applied to IC101 pin 16 which is the input of a balanced mixer. The mixer provides a 455 KHz 2nd IF signal at IC101 pin 3. A 455 KHz, 4-pole ceramic filter (YF102) connects between the 2nd-mixer output and the limiting IF amplifier input, IC101 pin 5. The limiter output, IC101 pin 7, drives a multiplier, both internally and through a quadrature coil (T101), to detect FM on the carrier.

The recovered audio present at IC101 pin 9 is filtered by R111 and C118; de-emphasized by R113, R114, and C116; attenuated by the Volume Control (R115); and applied to IC102, a 0.5 Watt audio amplifier. C123 and SW303A connect the audio output to the 8-Ohm speaker, SP101.

An 8 KHz bandpass filter consists of an "on-chip" inverting operational amplifier, IC101 pins 10 and 11, and associated parts. This amplifier/filter output is applied to a noise detector, CR101 and CR102. The detector output is connected to a Schmitt trigger input, IC101 pin 12. The Schmitt trigger output, IC101 pin 14, is GROUND in the presence of noise and OPENS when no noise is applied to the detector. A carrier on the input frequency causes pin 14 to OPEN which allows IC102 to function as an audio amplifier. When noise is present at the detector, the output of the Schmitt trigger (IC101 pin 14) is LOW which mutes the audio amplifier. R105, the Squelch Control, sets the threshold of squelch action.

PUSH-TO-TALK SWITCH FUNCTION:

In receive, the speaker is connected to the output of the audio amplifier through SW303A. The receiver RF input is connected to the antenna through SW303B. SW303B also applies battery voltage, isolated with chokes, to the receive circuitry.

In transmit, SW303A couples the speaker, which is used as a microphone during transmit, to the input of the speech amplifier. The transmitter RF output and the battery voltage are switched through SW303B to the antenna and to the choke-fed battery distribution bus, respectively.

TRANSMITTER:

The transmitter limiter and low-pass filter (Q201, Q202, Q203, Q204, and associated components) limit the amplitude and frequency components of the voice signal prior to application to the modulator. R215 or R216, depending on the channel selected, is used to set the maximum deviation of the carrier. Q201 and Q202 amplify and provide pre-emphasis. Limiting occurs with Q203. Q204 and associated circuitry provide a -18 dB/octave characteristic for frequencies above 3 KHz.

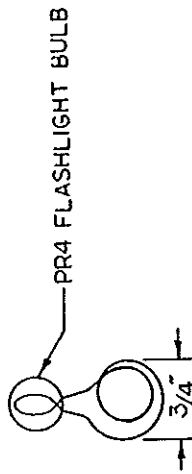
The transmitter frequency is controlled by a Clapp crystal oscillator, Q205. CR202 or CR203 function as voltage variable-capacitance modulators to vary the frequency of the crystal oscillator. Variable inductors L201 and L202 are included for setting the transmitter to frequency. L206, C223, C224, L207, C225, and C226 select the 3rd harmonic of the crystal frequency and match it into the base of Q206, an amplifier. C227 and L208 match the output of Q206 to the input of the driver amplifier, Q207. C235, C236, C238, C240, and L210 match the output of Q207 to the input of the power-output device, Q208. C244, C245, C250, C247, and L212 match the output of Q208 to 50 Ohms. An elliptic-function low-pass filter (C246, C248, L213, and C249) removes harmonics, and couples the RF output through the antenna switch to the antenna and the RF test Jack, J303.

*** TUNE-UP PROCEDURE ***

TEST EQUIPMENT REQUIRED:

- 1) 0 to 12 Volt, 1.5 Amp current-limited supply, with current meter.
- 2) RF Wattmeter, 5 Watts full-scale.
- 3) RF Signal Generator.
- 4) Deviation Meter.
- 5) Frequency Counter (to 75 MHz).
- 6) VTVM or 20K/V VOM.
- 7) Oscilloscope (to 15 MHz).

- 8) PR4 Flashlight bulb with current loop connected as shown below:



RADIO PREPARATION:

- 1) Remove antenna from the threaded fitting.
- 2) Open the radio by removing the two #4 screws from the rear cover.
- 3) Disconnect the battery pack.
- 4) Remove the three #4 circuit-board-mounting screws and remove the printed-circuit board from the case.
- 5) Connect the radio to the power supply through the "CHG" jack on the top of the unit, and set the output voltage to 9.1 VDC.

RECEIVER ALIGNMENT:

SET-UP: Connect the radio to an RF signal generator through the 2.5mm RF test jack at the top of the PC board. Install a "receive" crystal and connect it to the circuitry with the channel switch. Tune the signal generator to the "receive" frequency.

IF SWEEP FREQUENCY:

NOTE: This adjustment should not vary significantly from the factory alignment and SHOULD NOT be required in the field. When changing crystals, perform only the adjustments in parts F and H.

- A) Frequency Modulate the signal generator with a 20 Hz sine wave. Set the deviation to ± 20 KHz. Connect the 20 Hz signal directly to the HORIZONTAL input of the oscilloscope.
- B) Connect the secondary of T102 to the VERTICAL input of the oscilloscope. Set the scope sensitivity for 1 to 5 mV/div.
- C) Set the output of the signal generator to the level required to produce a pattern of 2 divisions peak-to-peak on the oscilloscope.
- D) Adjust T103 and T102 to give a shape of maximum amplitude and flatness. Lower the output of the signal generator whenever required to maintain a maximum reading of 2 divisions peak-to-peak.
- E) Adjust L107, L106, and L104 to provide maximum amplitude of the IF response. Again lower the signal generator output as required.
- F) Adjust C102 or C103 to center the response of the IF signal.
- G) Set the output of signal generator to 1 micro-Volt. Set the oscilloscope input sensitivity for 2 Volts/Div. Connect the oscilloscope input to the junction of R111 and C118. Adjust T101 for a centered and linear "S" curve.
- H) A final adjustment of L107, L106, and L104 for maximum sensitivity using the quieting or SINAD measurement technique may be made.

TRANSMITTER ALIGNMENT:

!! NOTE !!

Activate the Push-to-Talk switch to make these adjustments.

- 1) Install the crystal for the desired "transmit" frequency.
- 2) Connect the Wattmeter to the RF test jack.
- 3) Connect the power supply to the Charging Jack and set the voltage to 9.1 VDC.
- 4) Connect a VTVM or VOM to the base of Q206 through a 10K resistor.
- 5) Adjust L206 and L207 for a minimum (or maximum negative) voltage.
- 6) Adjust L208 for maximum current draw as indicated on the power supply.
- 7) Set C238 to approximately 1/2 of its maximum capacity.
- 8) Adjust L208, L210, C244, and C247 for maximum power indication on the Wattmeter. Repeat step 5, however, tune for maximum power.
- 9) Readjust C238 and C244 toward MAXIMUM capacity which will reduce the output power slightly and lower the DC current drain. Adjust C247 for maximum power after each change in C238 and C244. Repeat these adjustments until the current drain is 1.2 amps or less. The minimum power output is 4 Watts.
- 10) Adjust the crystal-netting inductor for the proper operating frequency.
- 11) Speak loudly into the speaker/microphone and adjust R215 or R216, as appropriate, for ± 5 KHz deviation.
- 12) Disconnect the Wattmeter from the RF test Jack.
- 13) Disconnect the power supply and install the radio into the front half of the case; then, reconnect the power supply.
- 14) Connect the flexible antenna supplied by Ritron to the threaded bushing and remove the plastic cap from the top.

NOTE: The antenna MUST be pretuned to the operating frequency of the radio! Failure to do this will severely limit the operating range of the radio and cause overheating of the RF output transistor.

- 15) Loop the PR4 test lamp and loop assembly over the end of the antenna and attach it approximately 2.75 inches from the top with a piece of tape.

NOTE! Do NOT place the lamp any less than 2 inches from the end or improper tuning may result.

- 16) Adjust L303 for maximum brilliance in the lamp. Move the lamp toward the radio as the proper tuning point is approached to keep the lamp at a dull red glow. This adjustment should be repeated several times to assure proper turning.
- 17) When no further increase in the lamp brightness can be obtained, remove the lamp.
- 18) This completes the tuning of the transmitter. Disconnect the power supply and re-assemble the radio.

RT-50 RECEIVER VOLTAGES

Conditions:

Receiver unswitched; Volume Control at minimum; Channel Selector on installed crystal; No sig. Input; PTT In receive position; Battery Voltage 8.4 Volts. ("CHG" voltage = 9.1 V)

Device	Pin	VDC
Q101	E	2.8
	B	3.6
	C	7.2
Q102	E	0.0
	B	0.72
	C	4.5
Q103	E	0.0
	B	0.75
	C	4.4
IC101	1	7.4
	2	6.7
	3	6.9
	4	7.4
	5	1.0
	6	1.0
	7	1.0
	8	7.5
	9	3.6
	10	2.0
	11	2.0
	12	0.8
	13	0.0
	14	1.2
	15	0.0
	16	2.1
IC102	1	1.3
	2	0.0
	3	0.0
	4	0.0
	5	4.1
	6	7.9
	7	4.0
	8	1.3

RT-50 TRANSMITTER VOLTAGES

Conditions:

Channel Sel on installed crystal; Dummy load connected to the RF test jack; PTT switch depressed; Battery voltage = 8.4 Volts ("CHG" voltage = 9.1 VDC)

Device	Pin	VDC
Q201	E	0.0
	B	0.63
	C	2.0
Q202	E	0.0
	B	0.63
	C	2.3
Q203	E	0.0
	B	1.1
	C	2.7
Q204	E	4.0
	B	2.7
	C	0.0
Q205	E	1.1
	B	1.6
	C	7.9
Q206	E	0.0
	B	0.1
	C	7.3
Q207	E	0.0
	B	-0.41
	C	7.3
Q208	E	0.0
	B	0.0
	C	7.0

*** SIGNALING PRODUCTS INSTALLATION ***

RITRON, INC. offers a wide variety of signaling products for installation in the RT-50. The following points are suggested for connection of such devices:

GRND should be connected physically close to the location of the signaling device. The ground track on the edge of the board near the crystals is recommended.

TX +V (Encode Enable) should be taken from the decoupled side of Z201 (Z201 at L206).

+V SW is available at the ON/OFF switch, or at the cathode of CR302.

RX AUD is provided at the junction of R111, R112, and C118 in non-de-emphasized form.

RX MUTE (-). The RT-50 receiver is muted by pulling the cathode of CR105 to ground with an open collector type drive or a relay contact.

MONITOR (-) Connects to UNGROUNDED side of squelch pot. switch. The switch grounds monitor lead to enable monitoring.

MODULATION INPUT TO THE TRANSMITTER:

TX (CTCSS) TONE signals should be connected to the negative side of C216. DTMF and other audio-frequency tones should be applied through the speech amplifier at the base of Q203. A 10K resistor and a 0.1 uF capacitor should be used in series with the input signal.

The signaling products sold by RITRON, INC. have been checked out in all of our transceivers. Modifications to standard devices are often done by the manufacturer at Ritron's request to improve their performance in our units.

If you have any questions regarding the installation of a particular device, our Customer Service Department will be glad to help you.

RITRON, INC.

Customer Service: 317-845-1201.

RT-50 SCHEMATIC REFERENCE PARTS LIST (ECN 1457)

REF #	DESCRIPTION	RITRON#	REF #	DESCRIPTION	RITRON#	REF #	DESCRIPTION	RITRON#
B 301	AA .5A/H NICAD	04000001	C 137	.001 MF YSP .1"C	01516239	C 238	5.5-80 PF TRIMMER	01550007
B 302	AA .5A/H NICAD	04000001	C 138	.01 MF YSV .15"C 50V	01516451	C 239	100MFD 16V ELT	01503010
B 303	AA .5A/H NICAD	04000001	C 139	FACTORY SELECT CAPACITORS	01510000	C 240	150 PF N750 5% .2"LS	01510729
B 304	AA .5A/H NICAD	04000001	C 140	FACTORY SELECT CAPACITORS	01510000	C 241	.1 MF X7R	01515463
B 305	AA .5A/H NICAD	04000001	C 141	FACTORY SELECT CAPACITORS	01510000	C 242	.01 MF YSV .15"C 50V	01516451
B 306	AA .5A/H NICAD	04000001	C 142	FACTORY SELECT CAPACITORS	01510000	C 243	.001 MF YSP .1"C	01516239
B 307	AA .5A/H NICAD	04000001	C 143	FACTORY SELECT CAPACITORS	01510000	C 244	5.5-80 PF TRIMMER	01550007
C 101	22 PF NP0 5% .1"LS	01510019	C 201	.001 MF YSP .1"C	01516239	C 245	FACTORY SELECT CAPACITORS	01510000
C 102	2-27PF FILM TRIM CAPS	01550003	C 202	.001 MF YSP .1"C	01516239	C 246	FACTORY SELECT CAPACITORS	01510000
C 103	2-27PF FILM TRIM CAPS	01550003	C 203	.33 MF 35V TANT	01502004	C 247	5.5-80 PF TRIMMER	01550007
C 104	22 PF NP0 5% .1"LS	01510019	C 204	.0047 MF MYLAR .12"C	01501045	C 248	FACTORY SELECT CAPACITORS	01510000
C 105	22 PF NP0 5% .1"LS	01510019	C 205	.001 MF YSP .1"C	01516239	C 249	FACTORY SELECT CAPACITORS	01510000
C 106	10 PF NP0 5% .1"LS	01510015	C 206	.0033 MF MYLAR .12"	01501043	C 250	FACTORY SELECT CAPACITORS	01510000
C 107	68 PF N150 5% .1"LS	01510125	C 207	.001 MF YSP .1"C	01516239	C 301	.01 MF YSV .15"C 50V	01516451
C 108	.001 MF YSP .1"C	01516239	C 208	.01 MF MYLAR .12"C	01501050	C 302	.001 MF YSP .1"C	01516239
C 109	.001 MF YSP .1"C	01516239	C 209	.015 MF MYLAR .1"C	01501062	C 303	FACTORY SELECT CAPACITORS	01510000
C 110	.01 MF YSV .15"C 50V	01516451	C 210	.001 MF MYLAR .12"C	01501040	C 304	FACTORY SELECT CAPACITORS	01510000
C 111	.01 MF YSV .15"C 50V	01516451	C 211	150 PF N750 5% .2"LS	01510729	C 305	.01 MF YSV .15"C 50V	01516451
C 112	.001 MF MYLAR .12"C	01501040	C 212	.1 MF X7R	01515463	CR101	1N4148A	04810001
C 113	.001 MF MYLAR .12"C	01501040	C 213	.1 MF X7R	01515463	CR102	1N4148A	04810001
C 114	.1 MF X7R	01515463	C 214	10 MF 16V ELT	01503006	CR103	1N4148A	04810001
C 115	10 MF 16V ELT	01503006	C 215	.01 MF YSV .15"C 50V	01516451	CR104	1N4148A	04810001
C 116	.1 MF X7R	01515463	C 216	1MFD 50V ELT	01503002	CR105	1N4148A	04810001
C 117	.1 MF X7R	01515463	C 217	.001 MF MYLAR .12"C	01501040	CR106	1N4148A	04810001
C 118	.005 MF 25V	01516847	C 218	.001 MF MYLAR .12"C	01501040	CR201	1N5231 5.1V 1/2W ZENER	04820006
C 119	.01 MF YSV .15"C 50V	01516451	C 219	.001 MF YSP .1"C	01516239	CR202	MV-2214 VARI CAP	04810014
C 120	10 MF 16V ELT	01503006	C 220	180 PF N750 5% .2"LS	01510730	CR203	MV-2214 VARI CAP	04810014
C 121	100MFD 16V ELT	01503010	C 221	330 PF N750 .2"C	01510733	CR301	1N4001	04810003
C 122	.1 MF X7R	01515463	C 222	.01 MF YSV .15"C 50V	01516451	CR302	1N4001	04810003
C 123	220MFD 10V ELT	01503018	C 223	FACTORY SELECT CAPACITORS	01510000	F 301	FUSE #40 AWG WIRE	06000040
C 124	.1 MF X7R	01515463	C 224	5.6 PF NP0 .25PF .1"LS	01510012	HD1	TRIM STRIPS .310 X 7.5	01400017
C 125	.001 MF YSP .1"C	01516239	C 225	FACTORY SELECT CAPACITORS	01510000	HD1	SPKR BCKING/2"DIA W/1"C	01400053
C 126	10 PF NP0 5% .1"LS	01510015	C 226	12 PF NP0 5% .1"LS	01510016	HD1	RT CASE FRONT 2-CHANNEL	01400080
C 127	.1 MF X7R	01515463	C 227	FACTORY SELECT CAPACITORS	01510000	HD1	RT CASE BACK	01400082
C 128	.1 MF X7R	01515463	C 228	.01 MF YSV .15"C 50V	01516451	HD1	RT CASE BACK	01400082
C 129	150 PF N750 5% .2"LS	01510729	C 229	33 PF NP0 5% DISC .1"LS	01510021	HD1	RT CASE BACK	01400082
C 130	39 PF NP0 5% .1"LS	01510022	C 230	.001 MF YSP .1"C	01516239	HD1	RT CASE BACK	01400082
C 131	100MFD 16V ELT	01503010	C 231	.01 MF YSV .15"C 50V	01516451	HD1	RT CASE BACK	01400082
C 132	.01 MF YSV .15"C 50V	01516451	C 232	.001 MF YSP .1"C	01516239	HD1	RT CASE BACK	01400082
C 133	2 PF; NP0; .1"C	01510080	C 233	.1 MF X7R	01516451	HD1	RT CASE BACK	01400082
C 134	.001 MF YSP .1"C	01516239	C 234	.01 MF YSV .15"C 50V	01516451	HD1	RT CASE BACK	01400082
C 135	180 PF N750 5% .2"LS	01510730	C 235	39 PF NP0 5% .1"LS	01510022	HD1	RT CASE BACK	01400082
C 136	FACTORY SELECT CAPACITORS	01510000	C 236	FACTORY SELECT CAPACITORS	01510000	HD1	RT CASE BACK	01400082
			C 237	.001 MF YSP .1"C	01516239	HD1	RT CASE BACK	01400082

RT-50 SCHEMATIC REFERENCE PARTS LIST (ECN 1457)

REF #	DESCRIPTION	RITRON#	REF #	DESCRIPTION	RITRON#	REF #	DESCRIPTION	RITRON#
HD1	TO-5 INSULATOR	02600001	P 301	3-PIN POLAR HEADER	02100114	R 203	47K OHM 5% 1/4W CF	04700153
HD1	ANTENNA RUBBER O-RING	02800029	Q 101	2N3563	04800002	R 204	10K OHM 5% 1/4W CF	04700145
HD1	RUBBER XTAL GUARD BAND	02800031	Q 102	MPS-H20	04800004	R 205	220K OHM 5% 1/4W CF	04700161
HD1	2-CH RADIO SW COVER	02800036	Q 103	MPS-H07	04800003	R 206	100K OHM 5% 1/4W CF	04700157
HD1	P.T.T. SWITCH COVER	02800038	Q 201	2N4124 GP NPN	04800006	R 207	10K OHM 5% 1/4W CF	04700145
HD1	BANK-LOK #4-40 PRESSNUT	02802020	Q 202	2N4124 GP NPN	04800007	R 208	10K OHM 5% 1/4W CF	04700145
HD1	#4 INTERNAL LOCK WASHER	02803004	Q 203	MPS-A13 NPN DARLINGTON	04800008	R 209	220K OHM 5% 1/4W CF	04700161
HD1	CHARGER CUBE W/PLUG	04000012	Q 204	MPS-A64 PNP DARLINGTON	04800016	R 210	150K OHM 5% 1/4W CF	04700159
HD1	ANTENNA BUSHING	06201003	Q 205	MPS-H10	04800016	R 211	1K OHM 5% 1/4W CF	04700133
IC101	MC3357P IF SUBSYSTEM	03131010	Q 206	MPS-H10	04800016	R 212	5.6K OHM 5% 1/4W CF	04700142
IC102	LM386N; AUDIO PWR AMP	03131009	Q 207	2N4427 MOTO	04801000	R 213	27K OHM 5% 1/4W CF	04700150
			Q 208	MRF-262 VHF POWER	04801008	R 214	6.8K OHM 5% 1/4W CF	04700143
J 101	24 GA. BUSS WIRE JNPR.	06000024	R 101	2.2K OHM 5% 1/4W CF	04700137	R 215	2K HORIZ. MINI-POT	04750005
J 102	24 GA. BUSS WIRE JNPR.	06000024	R 102	22K OHM 5% 1/4W CF	04700149	R 216	2K HORIZ. MINI-POT	04750005
J 103	24 GA. BUSS WIRE JNPR.	06000024	R 103	22K OHM 5% 1/4W CF	04700149	R 217	150 OHM 5% 1/4W CF	04700123
J 301	3-PIN POLAR CONNECTOR	02100113	R 104	2.2K OHM 5% 1/4W CF	04700137	R 218	2.2K OHM 5% 1/4W CF	04700137
J 302	JACK; 2.5 MM; PC MOUNTED	02100001	R 105	10K LINEAR W/SW	04750011	R 219	10K OHM 5% 1/4W CF	04700145
J 303	JACK; 2.5 MM; PC MOUNTED	02100001	R 106	2.7K OHM 1/4W 5% CF	04700138	R 220	10K OHM 5% 1/4W CF	04700145
L 101	.47UH FRONTIER COIL	01800209	R 107	330K OHM 5% 1/4W CF	04700163	R 221	4.7K OHM 5% 1/4W CF	04700141
L 102	FACTORY SELECT COILS	01800000	R 108	820 OHM 5% 1/4W CF	04700132	R 222	4.7K OHM 5% 1/4W CF	04700141
L 103	1.5UH WILCO ML COIL	01800109	R 109	2.2K OHM 5% 1/4W CF	04700137	R 223	4.7K OHM 5% 1/4W CF	04700141
L 104	7.5T UNICOIL 115 CW	01850027	R 110	220 OHM 5% 1/4W CF	04700125	R 226	10K OHM 5% 1/4W CF	04700145
L 105	10.5T .1"DIA COIL	01802010	R 111	2.2K OHM 5% 1/4W CF	04700137	R 227	10K OHM 5% 1/4W CF	04700145
L 106	7.5T UNICOIL 115 CW	01850027	R 112	12K OHM 1/4W 5% CF	04700146	R 228	220 OHM 5% 1/4W CF	04700125
L 107	7.5T UNICOIL 115 CW	01850027	R 113	10K OHM 5% 1/4W CF	04700145	R 229	1K OHM 5% 1/4W CF	04700133
L 201	FACTORY SELECT COILS	01800000	R 114	10K OHM 5% 1/4W CF	04700145	R 230	22K OHM 5% 1/4W CF	04700149
L 202	FACTORY SELECT COILS	01800000	R 115	10K AUDIO W/SW	04750010	R 231	470 OHM 5% 1/4W CF	04700129
L 203	1.5UH WILCO ML COIL	01800109	R 116	100 OHM 5% 1/4W CF	04700121	R 232	220 OHM 5% 1/4W CF	04700125
L 206	7.5T UNICOIL 115 CW	01850027	R 119	100 OHM 5% 1/4W CF	04700121	R 233	220 OHM 5% 1/4W CF	04700125
L 207	7.5T UNICOIL 115 CW	01850027	R 120	15K OHM 5% 1/4W CF	04700147	R 301	10K OHM 5% 1/4W CF	04700145
L 208	4.5T SPACEWOUND COIL	01850004	R 121	47K OHM 5% 1/4W CF	04700153	SP101	SPEAKER 2" RND	05500001
L 209	1UH FRONTIER COIL	01800213	R 122	1.8K OHM 5% 1/4W CF	04700136	SW301	DEDT CHANNEL SWITCH	05100002
L 210	FACTORY SELECT COILS	01800000	R 123	1.8K OHM 5% 1/4W CF	04700136	SW303	PTT SWITCH	05100001
L 211	7.5T UNICOIL 115 CW	01850027	R 124	1.5K OHM 5% 1/4W CF	04700135	T 101	455 KHZ IF TRANSFORMER	05600002
L 212	FACTORY SELECT COILS	01800000	R 125	10K OHM 5% 1/4W CF	04700145	T 102	10.7 MHZ IF TRANSFORMER	05600001
L 213	FACTORY SELECT COILS	01800000	R 126	2.2K OHM 5% 1/4W CF	04700137	T 103	10.7 MHZ IF TRANSFORMER	05600001
L 215	1 UH WILCO 205-11 COIL	01800205	R 127	1.8K OHM 5% 1/4W CF	04700136	Y 101	CRYSTAL; RECEIVE	02300016
L 301	4.7 UH WILCO	01800115	R 128	10K OHM 5% 1/4W CF	04700145	Y 102	CRYSTAL; RECEIVE	02300016
L 302	1 UH WILCO 205-11 COIL	01800107	R 129	2.2K OHM 5% 1/4W CF	04700137	Y 103	10.245MHZ 2ND LO XTAL	02300005
L 303	FACTORY SELECT COILS	01800000	R 130	10K OHM 5% 1/4W CF	04700145	Y 201	CRYSTAL; TRANSMIT	02300015

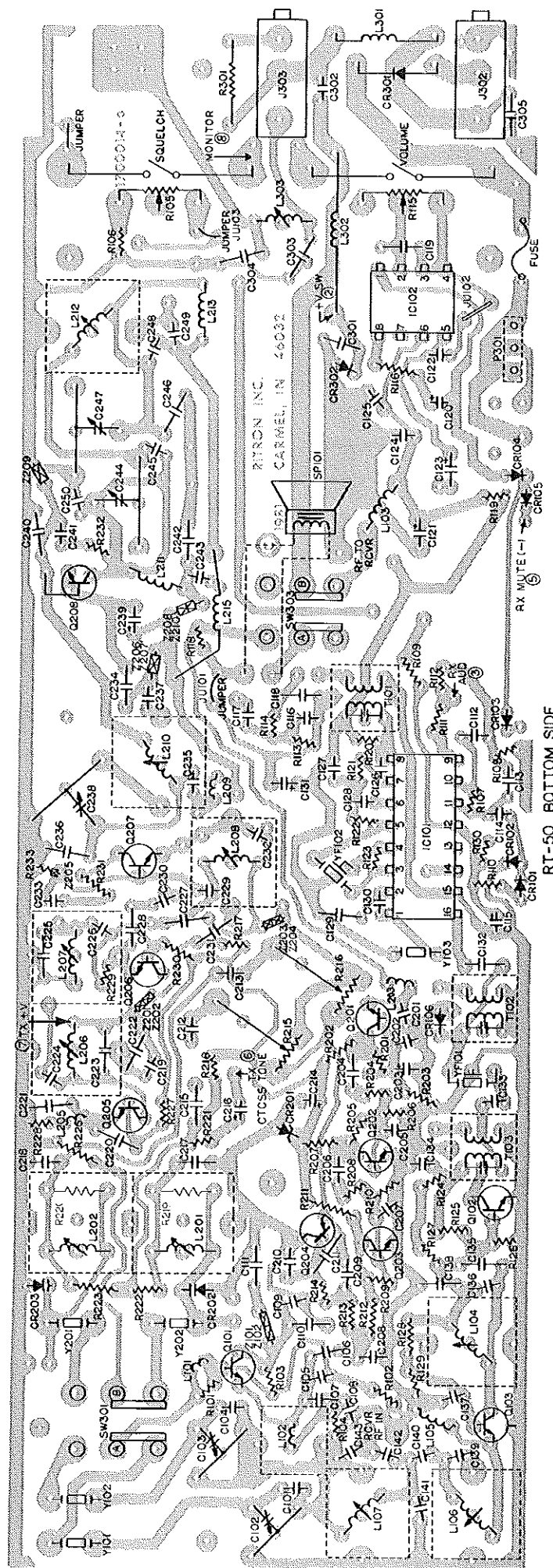
(8)

RT-50 SCHEMATIC REFERENCE PARTS LIST (ECN 1457)

TABLE OF SELECTED COMPONENTS

REF # DESCRIPTION			RITRON#		SCHEMATIC REFERENCE NUMBER		(L)		(M)		(N)		(O)	
							25 TO 30 MHz		30 TO 35.5 MHz		35.5 TO 42 MHz		42 TO 50 MHz	
Y 202	CRYSTAL; TRANSMIT	02300015			C136	100PF	68PF	39PF	18PF					
YF101	10.7MHZ 2 POLE MONO FILT	02301001			C139	100PF	68PF	47PF	33PF					
YF102	CFU-455E CERAMIC FILTER	02301008			C140	15PF	10PF	6.8PF	4.7PF					
Z 101	BEAD; FERRITE	01801003			C141	82PF	56PF	39PF	27PF					
Z 102	BEAD; FERRITE	01801003			C142	100PF	68PF	47PF	33PF					
Z 201	BEAD; FERRITE	01801003			C143	150PF	120PF	82PF	56PF					
Z 202	BEAD; FERRITE	01801003			C223	180PF	100PF	82PF	56PF					
Z 203	BEAD; FERRITE	01801003			C225	150PF	100PF	68PF	47PF					
Z 204	BEAD; FERRITE	01801003			C227	220PF	180PF	120PF	82PF					
Z 205	LEADED FERRITE	01801029			C236	150PF	120PF	100PF	82PF					
Z 206	LEADED FERRITE	01801029			C245	56PF	47PF	39PF	33PF					
Z 207	LEADED FERRITE	01801029			C246	220PF	220PF	150PF	120PF					
Z 208	LEADED FERRITE	01801029			C248	56PF	39PF	39PF	27PF					
Z 209	LEADED FERRITE	01801029			C249	120PF	100PF	82PF	68PF					
Z 210	LEADED FERRITE	01801029			C250	100PF	82PF	56PF	33PF					
					C303	220PF	150PF	120PF	120PF					
					C304	68PF	47PF	33PF	33PF					
					L102	1.5uH	1.5uH	1.0uH	.68uH					
					L201	3.8-7.6uH	2.7-5.4uH	2.0-4.0uH	1.5-3.0uH					
					L202	3.8-7.6uH	2.7-5.4uH	2.0-4.0uH	1.5-3.0uH					
					L210	6.5T SW	5.5T SW	4.5T SW	4.5T SW					
					L212	16.5T CW	14.5T CW	12.5T CW	10.5T CW					
					L213	7.5T CW	7.5T CW	6.5T SW	4.5T SW					
					L303	14.5T CW	12.5T CW	12.5T CW	10.5T CW					





TONE BOARD CONNECTIONS:

③ RX AUD

5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
119
120
121
122
123
124
125
126
127
128
129
130
131
132
133
134
135
136
137
138
139
140
141
142
143
144
145
146
147
148
149
150
151
152
153
154
155
156
157
158
159
160
161
162
163
164
165
166
167
168
169
170
171
172
173
174
175
176
177
178
179
180
181
182
183
184
185
186
187
188
189
190
191
192
193
194
195
196
197
198
199
200
201
202
203
204
205
206
207
208
209
210
211
212
213
214
215
216
217
218
219
220
221
222
223
224
225
226
227
228
229
230
231
232
233
234
235
236
237
238
239
240
241
242
243
244
245
246
247
248
249
250
251
252
253
254
255
256
257
258
259
260
261
262
263
264
265
266
267
268
269
270
271
272
273
274
275
276
277
278
279
280
281
282
283
284
285
286
287
288
289
290
291
292
293
294
295
296
297
298
299
300
301
302
303
304
305
306
307
308
309
310
311
312
313
314
315
316
317
318
319
320
321
322
323
324
325
326
327
328
329
330
331
332
333
334
335
336
337
338
339
340
341
342
343
344
345
346
347
348
349
350
351
352
353
354
355
356
357
358
359
360
361
362
363
364
365
366
367
368
369
370
371
372
373
374
375
376
377
378
379
380
381
382
383
384
385
386
387
388
389
390
391
392
393
394
395
396
397
398
399
400
401
402
403
404
405
406
407
408
409
410
411
412
413
414
415
416
417
418
419
420
421
422
423
424
425
426
427
428
429
430
431
432
433
434
435
436
437
438
439
440
441
442
443
444
445
446
447
448
449
450
451
452
453
454
455
456
457
458
459
460
461
462
463
464
465
466
467
468
469
470
471
472
473
474
475
476
477
478
479
480
481
482
483
484
485
486
487
488
489
490
491
492
493
494
495
496
497
498
499
500
501
502
503
504
505
506
507
508
509
510
511
512
513
514
515
516
517
518
519
520
521
522
523
524
525
526
527
528
529
530
531
532
533
534
535
536
537
538
539
540
541
542
543
544
545
546
547
548
549
550
551
552
553
554
555
556
557
558
559
560
561
562
563
564
565
566
567
568
569
570
571
572
573
574
575
576
577
578
579
580
581
582
583
584
585
586
587
588
589
590
591
592
593
594
595
596
597
598
599
600
601
602
603
604
605
606
607
608
609
610
611
612
613
614
615
616
617
618
619
620
621
622
623
624
625
626
627
628
629
630
631
632
633
634
635
636
637
638
639
640
641
642
643
644
645
646
647
648
649
650
651
652
653
654
655
656
657
658
659
660
661
662
663
664
665
666
667
668
669
670
671
672
673
674
675
676
677
678
679
680
681
682
683
684
685
686
687
688
689
690
691
692
693
694
695
696
697
698
699
700
701
702
703
704
705
706
707
708
709
710
711
712
713
714
715
716
717
718
719
720
721
722
723
724
725
726
727
728
729
730
731
732
733
734
735
736
737
738
739
740
741
742
743
744
745
746
747
748
749
750
751
752
753
754
755
756
757
758
759
760
761
762
763
764
765
766
767
768
769
770
771
772
773
774
775
776
777
778
779
780
781
782
783
784
785
786
787
788
789
790
791
792
793
794
795
796
797
798
799
800
801
802
803
804
805
806
807
808
809
810
811
812
813
814
815
816
817
818
819
820
821
822
823
824
825
826
827
828
829
830
831
832
833
834
835
836
837
838
839
840
841
842
843



