

**RADIO COMMUNICATIONS
FOR PROFESSIONALS**

RITRON, INC.

MAINTENANCE AND OPERATING MANUAL MODEL RT-453 UHF-FM HANDHELD TRANSCEIVER

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

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SPECIFICATIONS: RT-453 UHF-FM TRANSCEIVER

General

FCC ID:	AIE9QZRT-453
FCC Rule Parts:	22, 74, 90, 95
Frequency Range:	450 to 470 MHz
Channels:	2
Power Supply:	8.40 Volts 500 mAH Nickel-Cadmium Battery Pack
Battery Drain:	Standby: 11 mA, Nom. Receive: 75 mA, Nom. Transmit: 1100 mA, Nom.
Battery Life:	7 Hours (At 90% Standby, 5% Receive, 5% Transmit)
Dimensions:	7.21" H; 2.6" W; 1.8" D
Weight:	1.0 Lbs.

Receiver

Receiving System: Double-Conversion Superhetrodyne

Audio Output: 1.3 Watts into 8 Ohms with less than 10% THD

Frequency Stability: +/- .0005% from -10 to +50 Deg. C.

Modulation Acceptance: +/- 7.5 KHz, Maximum

Selectivity: -65 dB at 25 KHz

Intermodulation: -65 dB at 25 KHz

Sensitivity: .35 uV Maximum at 12 dB Sinad

Squelch Sensitivity: 25 uV to .50 uV, Adjustable

Channel Separation: 5 MHz with no degradation

Crystal Specification: (Receive Freq - 21.4MHz)/9
Third Overtone, Parallel Mode, 32 pF
RITRON Specification No. 2300400

Transmitter

RF Output:	3.0 Watts, Min. at 8.40 Volts; Adjustable at factory to 2 Watts
Frequency Stability:	+/- .0005% from -30 to +50 Deg. C
Modulation:	Type 16K0F3E, +/- 5 KHz Deviation
Spurious and Harmonics:	Greater than 50 dB below the Carrier
Audio Response:	Meets FCC requirements
Output Impedance:	50 Ohms
Channel Separation:	5 MHz with no degradation
Crystal Specification:	(Transmit Freq.)/36, Fundamental Mode, 32 pF RITRON Specification No. 2300001

OPTIONAL EQUIPMENT

The RT-453 may be equipped with several options. Some options may require factory installation. Not all of the options can be used together with one radio— consult the factory for more information.

Options Available:

CTCSS Encoder/Decoder

DTMF Encoder Pad

Discrete Address Unit

"Digital Quiet-Call"

Earphone

"Paging Quiet-Call" Two-Tone-Sequential Decoder/CTCSS Encoder

RT-453 OPERATING INSTRUCTIONS

The RT-453 is a 2-way radio that operates in the UHF-FM communications band. This radio has the capability of transmitting on frequencies assigned to the user by the F.C.C. and, therefore, **MUST BE LICENSED BEFORE USE**. Your Ritron Dealer will help you obtain an F.C.C. license.

The charger cube, which is included with the radio, should be plugged into the unit (with the radio turned OFF) for at least 8 hours to charge the batteries before the portable is used for the first time.

The radio's On/Off switch 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.

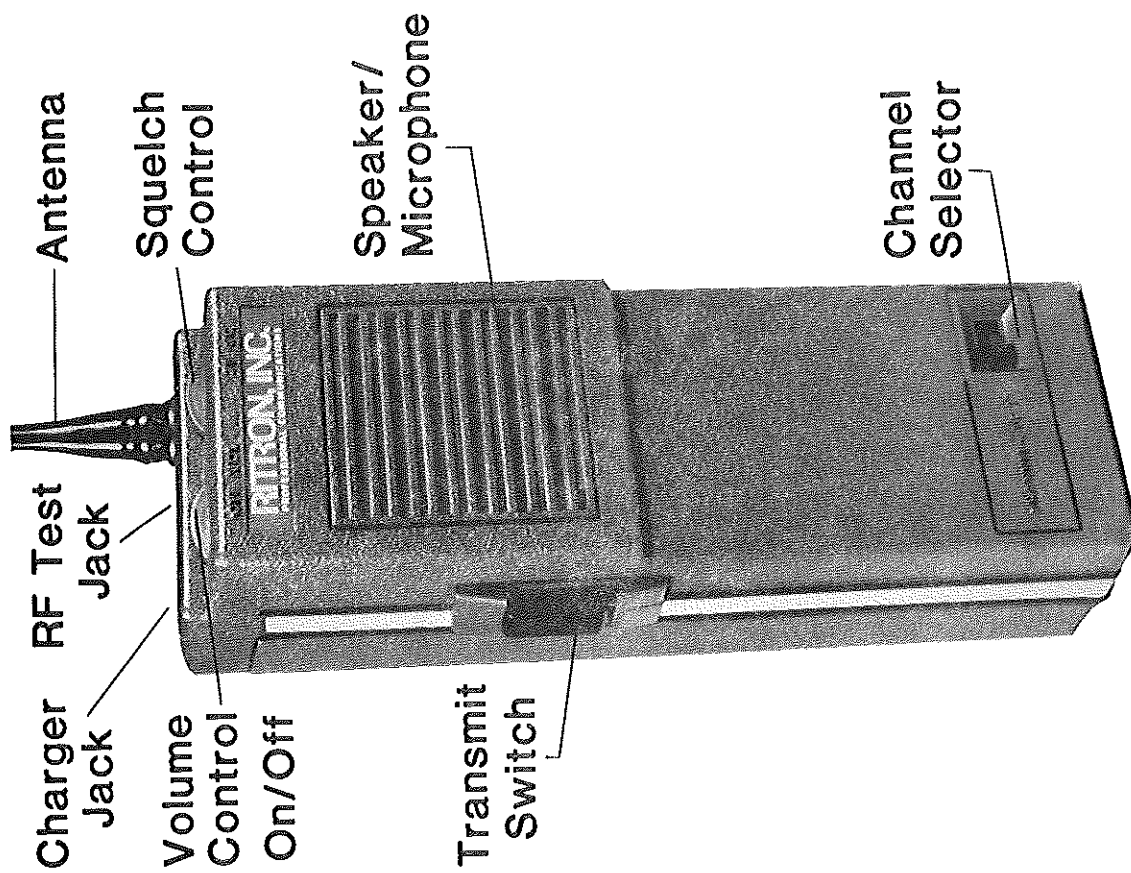
The Squelch Control can be set by the user to eliminate the noise between transmissions. Rotate the Squelch Control knob COUNTER-CLOCKWISE until noise is heard; then, set the squelch by rotating the control CLOCKWISE until the noise is just eliminated. An option is available which reverses the squelch rotation; so your squelch might operate opposite to that described above.

If your radio is equipped with a sub-audible tone squelch system (CTCSS), tone squelch can be activated by turning the Squelch Control fully COUNTER-CLOCKWISE until the switch "clicks." Then, only radios using the same CTCSS code as your unit will be heard. If you have tone squelch, always disable it by rotating Squelch Knob CLOCKWISE so that you can monitor the channel before transmitting-- to avoid interfering with others using the channel.

To talk with other stations, simply press and hold the "Push-to-Talk" (PTT) button on the side of the case while speaking into the grille at the top-front of the handheld. Hold the radio about 2 inches away and speak in a normal tone. Release the PTT to hear a reply.

The "Channel Selector" allows you to select either of two, 2-way frequencies that can be installed.

When the radio's battery pack has become discharged, turn the unit OFF, plug the charger into the "Charging Jack" at the top-left of the case, plug the charger into a 110 VAC wall outlet and allow the batteries to charge for 12 to 14 hours. The battery pack can be accessed by removing the Phillips head screws from the rear of the radio case and lifting away the rear panel. The "Drop-In" battery pack can then be unplugged from the battery connector.



THEORY OF OPERATION

The RT-453 incorporates a 2-channel, crystal-controlled, dual conversion super-heterodyne FM receiver. The transmitter supplies a power output of 3 Watts minimum, with a frequency stability of .0005%. The receiver and transmitter are each capable of operating between 450 and 470 MHz. Seven Nickel-Cadmium, 500 mA/H cells connected in series (BPE-7N) supply power for the UHF transmitter. While reading the Theory of Operation, refer to the Transceiver Schematic in this manual.

Power Source

Seven "AA," series-connected, 500 mA/H Nickel-Cadmium cells form a BPE-7N battery pack which supplies power for the unit via a three-pin connector J303/P304. The battery pack may be charged in the radio from a plug-in "cube" charger, supplied with the radio, by means of charge-jack J302 and a diode, CR301, which prevents the battery from accidentally discharging through either the CHARGE jack or the RF TEST jack. F301 protects the batteries and associated circuitry from current overloads, while CR302 protects the radio from reverse-polarity battery hook-up.

Receiver

The transceiver contains a selective, crystal-controlled, dual-conversion superheterodyne FM receiver, using a 21.4 MHz two pole crystal filter and a 455 KHz six-pole ceramic filter.

In the "receive" mode, signals from the flexible antenna or from RF test jack, J301, pass through a low-pass filter consisting of C302, L302, C303, L303, and C304 to the Push-to-Talk switch, SW102A. C305 and C101 are DC blocking capacitors which couple RF to and from the Push-to-Talk switch contacts. SW102A applies the filter-output signals to the receiver input. C102 and L101 form a single-stage tank section to provide input selectivity, while C103 couples RF energy to common-emitter RF amplifier, Q101. R101 and R103 set the base bias for Q101; LR102 routes collector voltage to Q101. C104 and L110 match the amplified RF into a helical-resonator pair, FL101, whose bandpass response limits the frequency range of amplified signals.

L103 helps match the helical-resonator output to the gate of common-source FET mixer Q102. L104, C107, and C109 match the mixer output into YF101, a two-pole monolithic crystal filter centered at 21.4 MHz. The FET mixer helps reduce intermodulation interference, and the 21.4 MHz 1st IF aids in reducing spurious responses. R142 and C110 match the output of YF101 to the input of the balanced mixer in the FM-IF integrated circuit chip, IC101.

The 1st Local Oscillator, Q105, is a crystal-controlled, modified Clapp type. Channel switch SW101A connects the desired crystal, Y101 or Y102, through "netting capacitors" to the base of Q105. C146 nets Y101 to the proper frequency while C145 limits the minimum capacitance. C147 and C148 function in the same manner with Y102 (if used). Feedback capacitors C133 and C134 aid in temperature compensation.

R134 and R135 set the base bias for Q105, while L107 applies collector voltage to the oscillator.

C135 and Thermistor R136 form a temperature-compensation network connected across feedback capacitor C134. In normal operating temperature, R136 will have a resistance of only 200 Ohms and this places C135 in parallel with C134; thus, the total capacity is increased. As the temperature drops, the resistance of R136 increases; thereby gradually reducing the effect of C135 and lowering the total capacity—causing the oscillator frequency to increase.

L107, C136, and C137 tune the collector of Q105 to the third harmonic of the crystal frequency, and match this signal to the base of 1st L.O. Tripler, Q106. R138 and R139 provide base bias for Q106. L108, C138, C139, C140, and C141 tune the collector of Q106 to nine times the crystal frequency, and match the signal into the base of the FET mixer, Q102. C131, C106, Z101, C132, Z102, Z104, C138, and C139 filter the DC supply voltage for the 1st L.O./Tripler stages.

IC101 is a multifunction FM IF integrated circuit. The 21.4 MHz IF signal drives IC101 pin 16, which is the input of a balanced mixer. IC101 pins 1 and 2, C113, C114, and Y103 (20.945 MHz) form the 2nd L.O. This L.O. signal is the other input to the balanced mixer which then provides a 455 KHz 2nd IF signal at IC101 pin 3. YF102, a 455 KHz, 6-pole ceramic filter, connects the 2nd IF signal to the input of the limiting IF amplifier, IC101 pin 5. The limiter output, IC101 pin 7, drives a multiplier, both internally and also through a quadrature coil, T101, to detect FM on the carrier.

R120 and C143 filter the recovered audio present at IC101 pin 9; C125, R123, R122, and C126 de-emphasize the audio signal. Volume Control R121 attenuates the audio signal and applies it to pin 7 of IC102, the input of a bridge-output audio stage. The audio from the output stage appears on IC102 pins 1 and 3, which connect to Speaker/Microphone SP101 through the optional earphone jack. A series circuit (R124 and C129) from IC102 pin 3 to ground reduces noise and oscillation from that side of the audio-bridge. Another series circuit (R125 and C130) from IC102 pin 1 connects to ground when Push-to-Talk switch SW102B is in the "receive" mode; this reduces noise from the other side of the audio bridge. In the "transmit" mode, Push-to-Talk switch SW102B grounds one side of SP101. The other connection of SP101 is permanently connected to the input of the transmitter speech amplifier and to pin 1 of IC102. Thus, SP101 serves both as a speaker and as a microphone.

R117 routes recovered audio from IC101 pin 9 to an 8 KHz bandpass filter, consisting of an inverting operational amplifier IC101 pins 10 and 11, C123, R115, C122, and R116. C121 couples the amplifier/filter output to a noise detector, CR102, CR103, and C120. R140, Squelch Control R114, and either SW103 or R113 form a voltage divider across the noise detector output. R114 selects a portion of the detected noise and applies it to the input of a Schmitt trigger, IC101 pin 12. The Schmitt trigger output IC101 pin 14, with R118 and R119, provides hysteresis for the squelch circuit.

Note that the SPST switch, SW103, is part of Squelch Control R114. If the transceiver DOES NOT have a CTCSS tone board installed, SW103 is automatically CLOSED when the Squelch Control is set to eliminate noise in the speaker. When the transceiver DOES HAVE a CTCSS tone board, rotating the Squelch Control, R114, fully counter-clockwise to its "click" position (SW103 "open") activates the Tone Squelch. This also places R114 in the "minimum squelch position"; thus, an internal squelch potentiometer, R113, provides a separate means of setting the noise squelch level when using the tone squelch option. With Tone Squelch, only stations transmitting the same CTCSS tone as programmed into your tone board will be heard. Prior to ORIGINATING a call, rotate the Squelch Control clockwise from its "click" position and listen for any stations that may be using the channel.

Without a CTCSS option installed, the receiver is squelched as follows: With NO signal on the "receive" frequency, IC101 pin 13 is OPEN; therefore, Q103 is OFF and the "high" on its collector turns OFF transistor Q104. This, in turn, disables the output stage, IC102, by removing its voltage from pin 2. However, with an incoming signal on the "receive" frequency, IC101 pin 13 supplies current to the base of Q103 which turns ON and pulls the base of Q104 "low"; thereby, causing Q104 to conduct and apply operating voltage to IC102 pin 2.

With a CTCSS Tone Board installed in the transceiver, the tone board de-modulated input (RX AUD) connects to the junction of C143, CR104, and R120 in the transceiver. The tone board "open-collector" output (RX MUTE -) connects to the junction of R126 and R127 in the transceiver. The tone board checks the recovered audio on IC101 pin 9 for a signal carrying the same TONE FREQ. as selected on the tone board "Tone Switch." If there is NO tone or a WRONG tone, the "open-collector" output (RX MUTE) pulls to ground; however, if the correct code is found, the "open-collector" output OPENS. In the ABSENCE of a "received" signal, Q103, Q104, and IC102 squelch the receiver as described earlier. If a "received" signal has the WRONG tone, the tone board RX MUTE line pulls the junction of R126 and R127 to ground. This keeps Q103, Q104, and IC102 turned OFF. If the signal carries the CORRECT tone, the tone board RX MUTE line OPENS which removes the ground from the junction of R126 and R127; then, IC101 pin 13 turns ON Q103, Q104, and IC102.

Push-To-Talk Function

SW102 is a DPDT, Push-to-Talk switch which simultaneously switches both DC Voltage and RF signals for the RECEIVE or the TRANSMIT circuits. In the RECEIVE mode, SW102A switches the antenna and low-pass filter to the "receive" input-tank circuit through blocking capacitor C101. At the same time, SW102A applies DC voltage to the oscillator/tripler circuitry and to the "receive" voltage regulator, IC103. L109 and C142 prevent incoming RF signals from appearing on the "receive" DC supply lines, while L304 and C307 keep "transmit" or "receive" RF from the battery and the +V SW line. In "receive" mode, SW102B grounds the free end of the series RC network, R125 and C130, connected to IC102 pin 1.

In the TRANSMIT mode, SW102A switches the low-pass filter and antenna to the "transmitter" output circuitry. SW102A also switches DC voltage to the entire transmitter circuitry through L218 and L219. In "transmit" mode, SW102B grounds the side of SP101 which connects to IC102 pin 3; thus SP101 becomes a microphone during "transmit."

Transmitter—RF

Q201 is a crystal-controlled, modified Clapp, untuned crystal oscillator that controls the transmitter frequency. Channel switch SW101B connects the desired crystal, Y201 or Y202, through "netting inductors" to the base of Q201. L202 nets Y201 to the proper frequency, whereas L203 adjusts Y202 to its proper frequency. C207 and C208 are the feedback capacitors and are chosen to aid in temperature compensation. R208 and R207 set the base bias for Q201. CR202 regulates the base and collector voltages of Q201 to make the transmit frequency independent of the battery voltage. At low temperatures, CR201, R201, and Thermistor R203 supply a DC frequency-correction voltage through R235 to voltage-variable-capacitance diode, CR203, to provide frequency correction of the crystals to maintain the +/- .0005% frequency stability below 0 degrees C. R204 couples CTCSS encoder tones (if used) to modulator diode, CR203.

A three-pole bandpass filter consisting of L220, L204, C211, C213, L205, C214, C215, L206, C216, and C217 tunes buffer/multiplier Q202 to the 4th harmonic of the crystal frequency and matches this signal into the base of Q203, the first tripler stage.

Q203 triples the input frequency to approximately 150 MHz. R212 and R214 bias the base of Q203 for efficient operation, while L209, R213, and C219 tune the collector of Q203 to approx. 150 MHz. C212 and C218 provide an RF ground for the collector tank and in conjunction with L207, L208, and C221 filter the DC supply for the 1st tripler. A matching network, C222, L210, C223, and C224, feeds the 150 MHz signal into Q204, the second tripler stage.

Q204 triples the frequency from 150 MHz to 450 MHz. R216 provides a DC return for the base-emitter circuit. LR218 applies DC voltage to the collector of Q204 and forms the collector load. C226 and C227 form an RF ground for the collector load and in conjunction with Z202 and Z207 filter the DC supply for the stage. L211 and C225 couple the output of Q204 into a helical-resonator pair, FL201. A matching network, C228, C229, L212, and C230, couples the filter output into driver stage, Q205.

R231, R230, and Z203 set the bias for the base of driver Q205. L214, C232, and C231 tune the driver output to approximately 450 MHz and match it to the input of final amplifier, Q206. C234 is an RF ground for L214, and with Z204 filters the DC supply for Q205.

Q206 and its associated components comprise the final RF amplifier stage which, with an input of 8.40 VDC, provides approximately 3.0 Watts, minimum, of RF output. Z205 and L216 provide a DC return for the base-emitter circuit of Q206.

LR217 couples collector voltage to Q206. C235 is an RF ground for LR217, and with Z206 filters the DC supply for Q206. A "capacitor-tap" filter, L219, C239 and C257 matches the output of Q206 to 50 Ohms. SW102A then connects the RF output of the "capacitor-tap" filter through the low-pass filter, C304, L303, C303, L302 and C302 to RF Test Jack, J301, and to the flexible antenna mounted on the radio.

Microphone Amplifier

The transmitter audio amplifier, limiter, and low-pass filter (Q210, Q209, Q208, Q207, and associated components) limit the amplitude and frequency components of the voice signal prior to being applied to the voltage-variable-capacitance modulator diode, CR203. Z208 prevents any RF on the microphone line from being applied to the input of amplifier Q210. Q210 amplifies and provides pre-emphasis. The required limiting occurs with Q209 and Q208, while Q207 and associated circuitry provide a -18 dB/octave characteristic for frequencies above 3 KHz. R217 sets the maximum deviation of the carrier by setting the amplitude of the audio applied to the varactor modulator diode, CR203.

RT-453 TUNE-UP PROCEDURE

Test Equipment Required

- 1) 0 to 10 VDC, 2 Ampere current-limited supply, with current meter.
- 2) RF Wattmeter, 5 Watts full-scale.
- 3) RF Signal Generator.
- 4) Deviation Meter.
- 5) Frequency Counter (to 470 MHz).
- 6) VTVM or 20KV VOM.
- 7) Oscilloscope (to 25 MHz).
- 8) Test Circuit, see Figure 1 below.

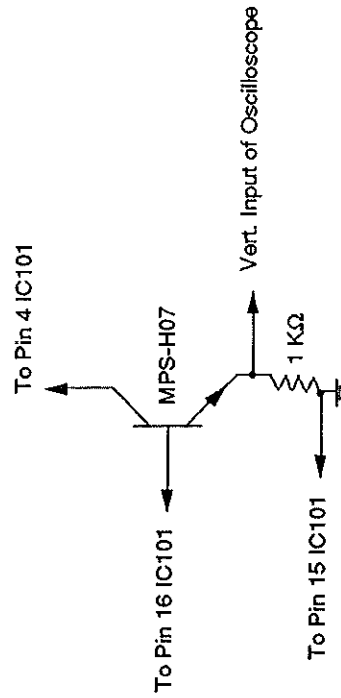


FIG-1 Test Circuit

Receiver Alignment

Set-Up: Connect the radio to an RF Signal Generator through the 2.5 mm 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. Set the power supply to 9.1 VDC. Connect the power supply to the "CHG" jack.

- 1) Frequency modulate the signal generator with a 15 Hz sine or triangle wave. Set the deviation to +/- 15 KHz.
- 2) Connect the 15 Hz signal directly to the HORIZONTAL input of the oscilloscope, and set the scope horizontal sweep to EXTERNAL.
- 3) Set the output of the signal generator to 2000 micro-Volts.
- 4) Set the oscilloscope input sensitivity to approximately 0.1 Volts/Div.
- 5) Connect the Test Circuit, as shown in Figure 1, to the RT-453 transceiver.

- 6) Connect the oscilloscope VERTICAL input to the Test Circuit.
- 7) Adjust C107 for a waveform, as shown in Figure 2 below.

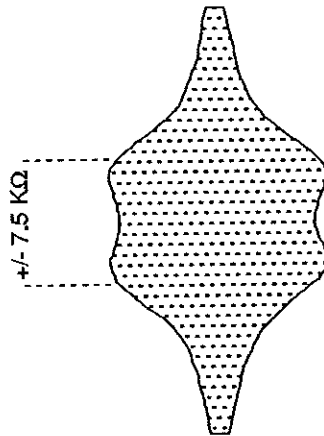


FIG-2 Typical Waveform

- 8) Connect the Sinad meter to ONE of the speaker terminals and GROUND. Remove the Test Circuit from the RT-453.
- 9) Set the signal generator to produce ± 3 KHz deviation with a modulating frequency of 1 KHz.
- 10) Adjust the volume control to produce a low level of audio from the speaker.
- 11) Adjust C102, FL101, L107, and L108 for maximum sensitivity. Decrease the output of the signal generator as necessary to maintain the SINAD reading at 12 dB or less.
- 12) After best possible sensitivity, set DEVIATION of Signal Generator to ± 7.5 KHz, and raise the RF level to 10 micro-volts.
- 13) Connect oscilloscope to ONE speaker terminal and GROUND.
- 14) Adjust T101 for maximum amplitude of 1 KHz sine wave.
- 15) Adjust associated RECEIVE crystal-netting capacitor for best SINAD measurement.
- 16) Set Signal Generator DEVIATION to ± 3 KHz.
- 17) Tune C102, FL101, L107, and L108 for best SINAD. 12 dB SINAD should be .35 uV or less.
- 18) Remove SINAD meter and oscilloscope.

- 19) Disconnect the RT-453 from the Signal Generator.
- 20) Rotate Squelch Control fully counter-clockwise (CCW) to the "click" position.
- 21) Adjust R113 clockwise (CW) until noise is heard; then, adjust R113 counter-clockwise (CCW) just until no noise is heard. This is the setting for THRESHOLD tone squelch for use with the RTS-4P Tone Board.

This completes the receiver alignment.

RT-453 RECEIVER DC VOLTAGES

CONDITIONS: Receiver unsquelched; Volume Control at minimum; Channel Selector on installed crystal; No signal input; PTT in receive position; Battery Voltage 8.4 Volts ("CHARGE" voltage = 9.1 VDC)

Device	Pin	VDC	Device	Pin	VDC
Q101	E	0.0	Q106	E	0.0
	B	0.82		B	0.17
	C	3.20		C	8.4
Q102	G	0.0	IC101	1	5.2
	S	0.66		2	4.5
	D	5.22		3	5.0
				4	5.2
Q103	E	0.0		5	1.0
	B	0.72		6	1.0
	C	0.10		7	1.0
Q104	E	8.40		8	5.2
	B	7.67		9	2.6
	C	8.40		10	2.0
Q105	E	2.70		11	2.2
	B	3.46		12	0.0
	C	8.40		13	4.6
			IC102	1	8.40
				2	0.0
				3	5.23
			IC103	1	8.40
				2	0.0
				3	5.23

Transmitter Alignment

NOTE: Activate the Push-to-Talk to make these adjustments.

- 1) Install the crystal(s) for the desired TRANSMIT frequency.
- 2) Connect the Wattmeter and the Deviation Meter to the RF Test Jack.
- 3) Connect the power supply to the CHG jack, and set the voltage to 9.1 Volts.
- 4) If both channels are used, place Channel Switch to highest frequency.
- 5) Connect the voltmeter at Test Point 11 (emitter of Q203).
- 6) Tune L204, L205, and L206 for maximum voltage on the voltmeter.
- 7) Connect the voltmeter to Test Point 13 (base of Q205).
- 8) Tune L209, L210, and FL201 for minimum voltage on the voltmeter.
- 9) Adjust C231 and C239 for maximum power on the Wattmeter.
- 10) Retune L204, L205, L206, L209, L210, FL201, C231, and C239 for maximum power on the Wattmeter.
- 11) If both channels are used, switch to the lower frequency to check power.
- 12) If the power is less than 3.0 Watts, retune FL201, C231, and C239, switching between channels after each adjustment until both channels have at least 3.0 Watts.
- 13) Adjust L202 and L203 for the proper operating frequency.
- 14) Speak loudly into the microphone and adjust R228 for +/- 5 KHz deviation on the Deviation Meter.
- 15) Disconnect the Watt Meter and Deviation Meter from the RF Test Jack.
- 16) Disconnect the power supply and install the radio into the case.
- 17) Connect the flexible antenna to the threaded bushing.

This completes the transmitter alignment.

RT-453 TRANSMITTER DC VOLTAGES

CONDITIONS: Channel Select on installed crystal; Dummy load connected to the RF test jack; PTT switch depressed; Battery Voltage = 8.4 Volts ("CHARGE" Voltage = 9.1 VDC)

Device	Pin	VDC	Device	Pin	VDC
Q201	E	2.0	Q206	E	0.0
	B	2.1		B	-0.2
	C	5.3		C	8.4
Q202	E	1.9	Q207	E	3.2
	B	2.0		B	2.2
	C	8.3		C	0.0
Q203	E	0.74	Q208	E	5.3
	B	-0.02		B	4.2
	C	8.30		C	2.2
Q204	E	0.0	Q209	E	2.7
	B	-0.4		B	3.2
	C	8.4		C	4.2
Q205	E	0.0	Q210	E	0.0
	B	0.1		B	0.64
	C	8.4		C	3.2

RTS-4P CTCSS ENCODER/DECODER

General Description

The RTS-4P, a sub-audible tone encoder/decoder module designed for use in handhelds manufactured by RITRON, INC., allows selected radios to communicate without interference from other "on-channel" units that do not receive and transmit a specially coded signal.

This system, referred to as "Quiet-Call" or CTCSS (Continuous Tone Coded Squelch System), utilizes an encoder/decoder IC that directs received audio to the radio speaker when one of the following occurs: 1) the RTS-4P detects an incoming code (sub-audible tone) that matches the code programmed into the DIP switch or, 2) the handheld is "monitoring" the channel or 3) the RTS-4P is programmed with a special "NOTONE" code.

Received audio enters the RTS-4P microprocessor IC, which samples the signal for the appropriate sub-audible tone (CTCSS code). If the correct tone is recognized, the microprocessor routes the high-pass filtered received audio to the radio PC board, and directs a sequence that opens the squelch and applies audio to the handheld's speaker.

When the radio is in Monitor mode (the squelch control knob is rotated CLOCKWISE), the RTS-4P enables the RX Mute line, allowing the squelch to open when an "on-frequency" carrier signal appears. Received audio is filtered and sent to the radio volume control and audio amplifier circuits.

"NOTONE" permits the RTS-4P user to hear transmissions (while the radio is in tone squelch) that are not coded with a CTCSS tone. Programming "NOTONE" with the DIP switch directs received audio through the RTS-4P and returns the radio receiver to carrier-operated squelch.

The RTS-4P encodes all of the codes shown in the "Quiet-Call" code chart at right except "NOTONE," which is not a sub-audible tone that can be transmitted with a carrier signal, but a switch-programmed code that returns the unit to carrier-operated squelch.

The RTS-4P can be programmed using the built-in 6-position DIP switch to any one of the 38 EIA standard tone frequencies (67.0 Hz to 250.3 Hz) or "NOTONE."

NOTE: The RTT-1 DTMF encoder (Touch Tone pad) can be used in conjunction with the RTS-4P signaling module.

Programming Instructions

- 1) Refer to the "Quiet-Call" code chart at right and select one of the 38 EIA standard tone frequencies or "NOTONE."
- 2) Set each of the six programming switch levers to the position given in the "Quiet-Call" code chart. For a logic "0," set the lever to the "ON" position (lever toward the bottom of the handheld). For a logic "1," set the lever to the "OFF" position (lever toward the top of the radio). See the RTS-4P module illustration at lower right for switch location and lever number identification.
- 3) Set program jumper PJ501 in place (if not done at the factory). Refer to the diagram at right for program jumper locations. PJ501 routes B+ voltage to the RTS-4P when the radio is in transmit, which signals the RTS-4P microprocessor to encode. Program jumpers PJ502 and PJ503 must be removed when the RTS-4P is used with the RT-453 portable.

NOTE: All radios intended to communicate with one another using "Quiet-Call" must be programmed with the same "Quiet-Call" code.

Installation Instructions

- 1) Make sure the RTS-4P is programmed correctly, according to the programming instructions and "Quiet-Call" code chart.

- 2) Remove the Phillips head screws from the rear panel of the handheld.
- 3) Remove the radio case rear panel and unplug the battery connector.
- 4) Locate the 10-pin right-angle connector found at the bottom-right of the radio transceiver board. A paper insulator (should be provided) MUST be aligned between the handheld PC board and the tone module PC board to prevent shorts.
- 5) Install the RTS-4P with the component side of the PC board facing toward you, by mating the 10-pin socket of the tone module to the 10-pin connector of the handheld. Be sure that all ten pins are fully inserted into the socket.
- 6) Plug-in the battery connector and replace the rear case panel with the Phillips head screws.
- 7) Rotate the handheld's squelch control knob fully counter-clockwise into the "click" or "TS" position.
- 8) Check that the unit encodes and decodes the desired tone frequency.

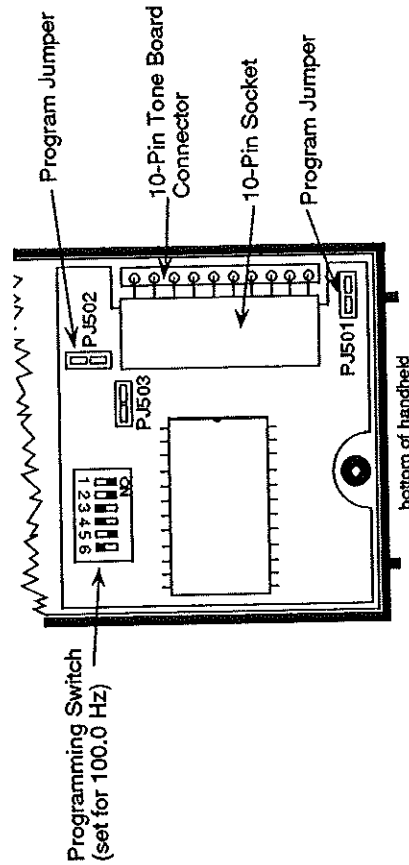
"Quiet-Call" Codes and Frequencies

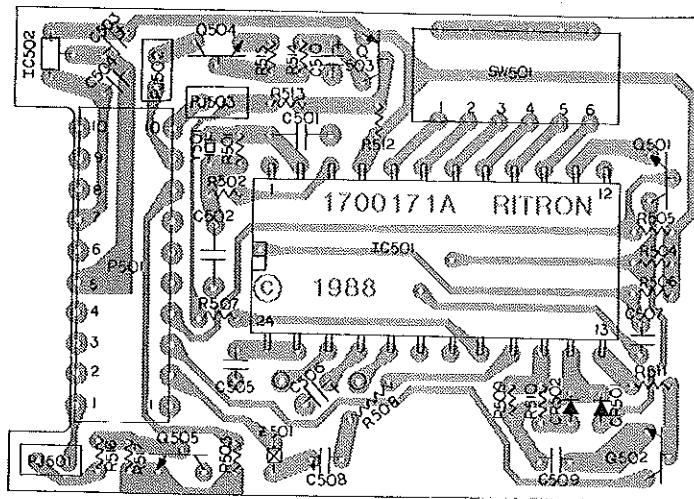
code	freq.	switch lever 1 2 3 4 5 6	code	freq.	switch lever 1 2 3 4 5 6
1	67.0	1 1 1 1 1 1	21	136.5	0 1 1 0 0 0
2	71.9	0 1 1 1 1 1	22	141.3	0 0 1 0 0 0
3	74.4	1 1 1 1 1 0	23	146.2	0 1 0 1 1 1
4	77.0	0 0 1 1 1 1	24	151.4	0 0 0 1 1 1
5	79.7	1 1 1 1 0 1	25	156.7	0 1 0 1 1 0
6	82.5	0 1 1 1 1 0	26	162.2	0 0 0 1 1 0
7	85.4	1 1 1 1 0 0	27	167.9	0 1 0 1 0 1
8	88.5	0 0 1 1 1 0	28	173.8	0 0 0 1 0 1
9	91.5	1 1 1 0 1 1	29	179.9	0 0 1 0 1 0
10	94.8	0 1 1 1 0 1	30	186.2	0 0 1 0 0 0
11	97.4	1 1 1 0 1 0	31	192.8	0 1 0 0 1 1
12	100.0	0 0 1 1 0 1	32	203.5	0 0 0 0 1 1
13	103.5	0 1 1 1 0 0	33	210.7	0 1 0 0 1 0
14	107.2	0 0 1 1 0 0	34	218.1	0 0 0 0 1 0
15	110.9	0 1 0 1 1 1	35	225.7	0 1 0 0 0 1
16	114.8	0 0 1 0 1 1	36	233.6	0 0 0 0 0 1
17	118.8	0 1 1 0 1 0	37	241.8	0 1 0 0 0 0
18	123.0	0 0 1 0 1 0	38	250.3	0 0 0 0 0 0
19	127.3	0 1 1 0 0 1		NOTONE	1 1 0 0 0 0
20	131.8	0 0 1 0 0 1			



CODE SWITCH

NOTE:
"1" = open or OFF
"0" = closed or ON

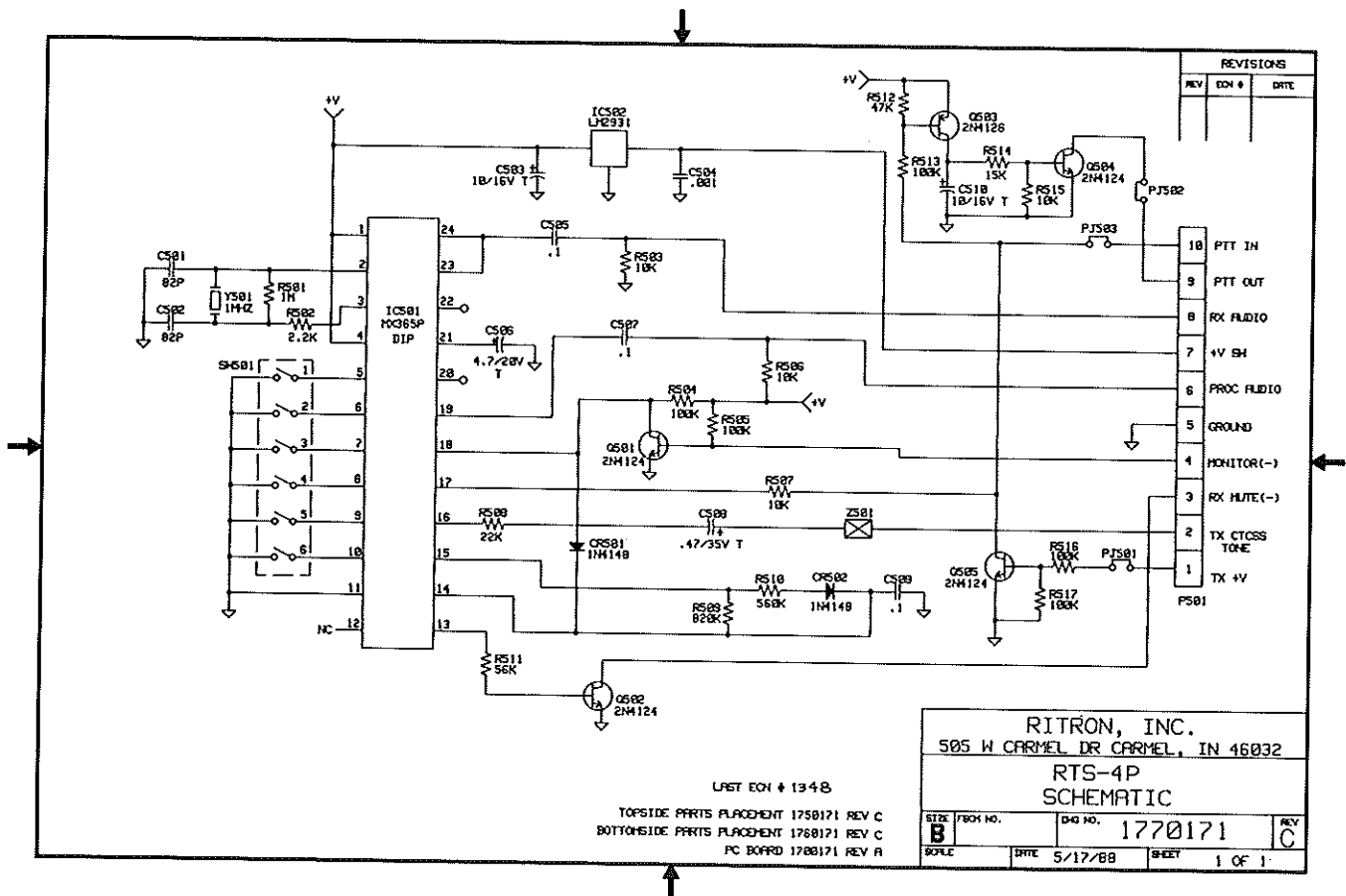




SCHEMATIC 1770171 REV C
TOP SIDE PARTS PLACEMENT 1750171 REV C
P.C. BOARD 1700171 REV A

TOLERANCES		REVISIONS		RITRON, INC. 46032	
DECIMAL	1	NO	DATE	505 W. CARMEL DR. CARMEL, IN.	
FRACTIONAL	2	BY		RTS-4P	
ANGULAR	3	DESIGNED BY		BOTTOM SIDE PARTS PLACEMENT	
	4	CHECKED		SCALE 4X	
	5	DATE		2-18-88	
	6	APPROVED		1760171	REV C

97 TELEPHONE PORT 174206 -111117



LAST EON # 1348
TOPSIDE PARTS PLACEMENT 1750171 REV C
BOTTOMSIDE PARTS PLACEMENT 1760171 REV C
P.C. BOARD 1700171 REV A

RITRON, INC.		505 W. CARMEL DR. CARMEL, IN. 46032	
RTS-4P		SCHEMATIC	
SIZE	FROM NO.	DWG NO.	1770171
SCALE	DATE	SHEET	1 OF 1

RT-453 SCHEMATIC REFERENCE PARTS LIST (ECN 1896)

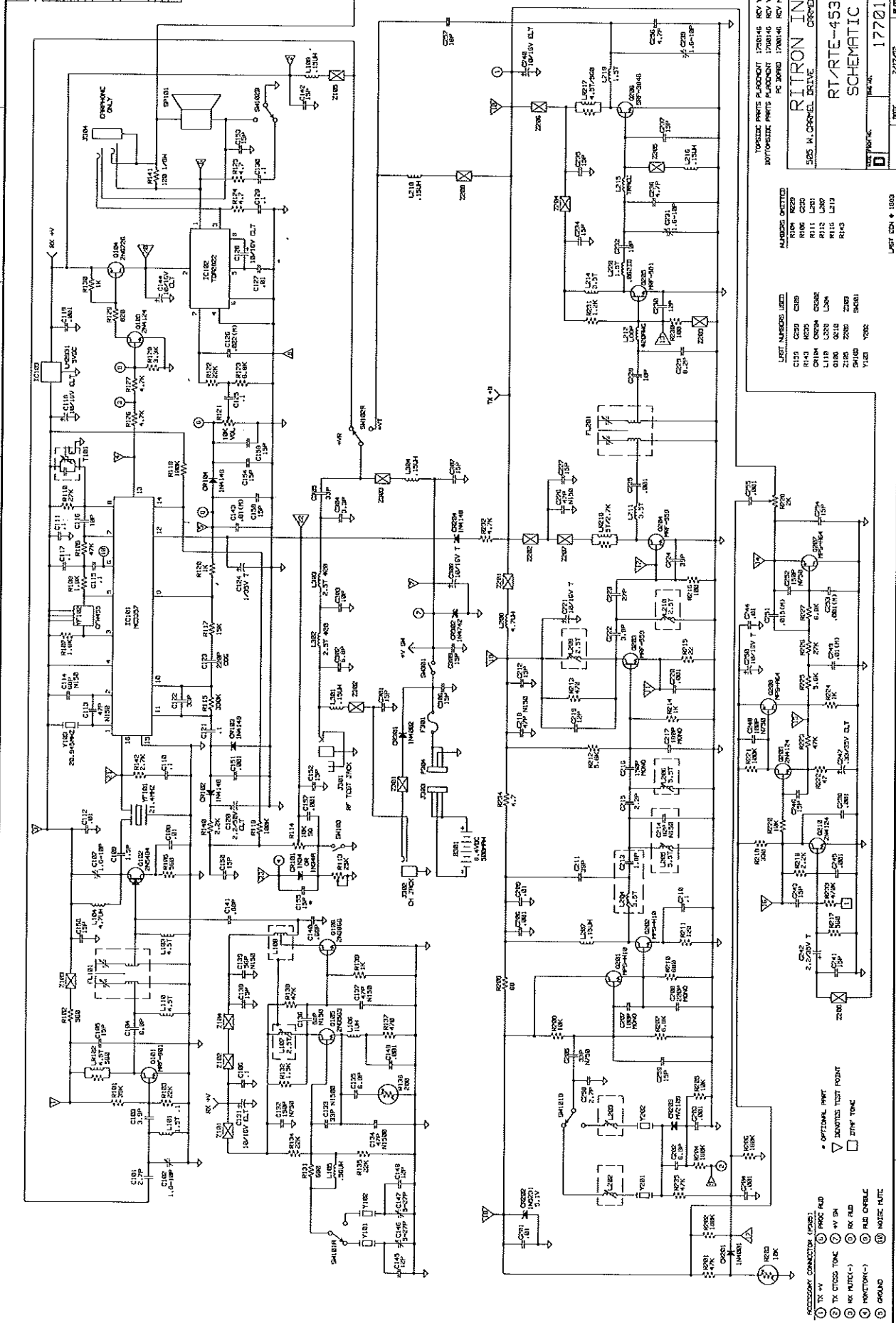
NOTE: This parts list reflects current component values (through Engineering Change Notice 1896). If a component value given in the schematic differs from that in the parts list, the parts list should be considered correct.

REF#	DESCRIPTION	RITRON#	REF#	DESCRIPTION	RITRON#
B 301	AA .5A/H NICAD	04000001	C 205	33pF N750 DISC	01510721
C 101	2.7 pF NPO DISC	01510008	C 206	.001 μ F/Y5P 10% CD 50V	01516239
C 102	1.6-10pF TEFLON TRIMMER	01550010	C 207	100pF/COG 10% .1"LS 50V	01515027
C 103	3.9pF/NPO .1"LS	01510010	C 208	220 pF/COG 10% .1 LS	01515031
C 104	6.8pF/NPO 5% .1"LS	01510013	C 209	.01 μ F/Y5V .2"LS	01516451
C 105	15pF/NPO 5% .1"LS	01510017	C 210	.1 μ F/X7R 10% .1"LS CD	01515463
C 106	.1 μ F/X7R 10% .1"LS CD	01515463	C 211	39pF N150 DISC	01510022
C 107	1.6-10pF TEFLON TRIMMER	01550010	C 212	15pF/NPO 5% .1"LS	01510017
C 108	.01 μ F/Y5V .2"LS	01516451	C 213	1.8 pF NPO .1"LS	01510006
C 109	1.5 pF NPO DISC	01510005	C 214	82pF N150 DISC	01510126
C 110	.1 μ F/X7R 10% .1"LS CD	01515463	C 215	2.2pF NPO DISC	01510007
C 111	.1 μ F/X7R 10% .1"LS CD	01515463	C 216	150 pF COG	01515029
C 112	.01 μ F/Y5V .2"LS	01516451	C 217	180 pF MONO COG	01515030
C 113	47pF N150 DISC	01510123	C 218	47pF N150 DISC	01510123
C 114	68pF N150 DISC	01510125	C 219	12pF/NPO .1" LS DISC	01510016
C 115	.1 μ F/X7R 10% .1"LS CD	01515463	C 220	.001 μ F/Y5P 10% CD 50V	01516239
C 116	10 pF/NPO 5% .1"LS 50V	01510015	C 221	10 μ F 16V TANT	01502013
C 117	.1 μ F/X7R 10% .1"LS CD	01515463	C 222	3.9pF/NPO .1"LS	01510010
C 118	10 μ F 16V SUBMINI ELT	01503201	C 223	27pF NPO DISC	01510020
C 119	.001 μ F/Y5P 10% CD 50V	01516239	C 224	39pF/NPO 5% .1"LS CD 50V	01510022
C 120	2.2 μ F 50VDC ELT	01503003	C 225	.001 μ F/Y5P 10% CD 50V	01516239
C 121	.1 μ F/X7R 10% .1"LS CD	01515463	C 226	47pF N150 DISC	01510123
C 122	33pF/NPO 5% .1"LS CD	01510021	C 227	15pF/NPO 5% .1"LS	01510017
C 123	220 pF/COG 10% .1 LS	01515031	C 228	10 pF/NPO 5% .1"LS 50V	01510015
C 124	1 μ F 35VDC TANT.	01502007	C 229	8.2 pF/NPO 5% .1"LS	01510014
C 125	.1 μ F/X7R 10% .1"LS CD	01515463	C 230	12pF/NPO .1" LS DISC	01510016
C 126	.022 μ F MYLAR	01501051	C 231	1.6-10pF TEFLON TRIMMER	01550010
C 127	.01 μ F/Y5V .2"LS	01516451	C 232	10 pF/NPO 5% .1"LS 50V	01510015
C 128	10 μ F 16V SUBMINI ELT	01503201	C 233	15pF/NPO 5% .1"LS	01510017
C 129	.1 μ F/X7R 10% .1"LS CD	01515463	C 234	15pF/NPO 5% .1"LS	01510017
C 130	.1 μ F/X7R 10% .1"LS CD	01515463	C 235	15pF/NPO 5% .1"LS	01510011
C 131	10 μ F 16V SUBMINI ELT	01503201	C 236	4.7pF/NPO 5% DISK	01510017
C 132	150pF/N750 5% .2LS	01510729	C 237	15pF/NPO 5% .1"LS	01510017
C 133	33pF N1500 DISC	01510800	C 238	.001 μ F/Y5P 10% CD 50V	01516239
C 134	47pF N1500 DISC	01510802	C 239	1.6-10pF TEFLON TRIMMER	01550010
C 135	6.8pF/NPO 5% .1"LS	01510013	C 240	10 μ F 16V SUBMINI ELT	01503201
C 136	68pF N150 DISC	01510125	C 241	15pF/NPO 5% .1"LS	01510017
C 137	47pF N150 DISC	01510123	C 242	2.2 μ F 35VDC TANT	01502009
C 138	15pF/NPO 5% .1"LS	01510017	C 243	15pF/NPO 5% .1"LS	01510017
C 139	56pF N150 DISC	01510124	C 244	.01 μ F/Y5V .2"LS	01516451
C 140	.68 pF/P100 .25 pF .1 LS	01508001	C 245	.001 μ F/Y5P 10% CD 50V	01516239
C 141	.68 pF/P100 .25 pF .1 LS	01508001	C 246	15pF/NPO 5% .1"LS	01510017
C 142	15pF/NPO 5% .1"LS	01510017	C 247	.35 μ F/25VDC ELT	01503000
C 143	.01 μ F MYLAR	01501050	C 248	100pF/N750 DISC	01510727
C 144	10 μ F 16V SUBMINI ELT	01503201	C 249	.01 μ F MYLAR	01501050
C 145	12pF/NPO .1" LS DISC	01510016	C 250	10 μ F 16V TANT	01502013
C 146	5-27pF POLYCARB	01550003	C 251	.015 μ F MYLAR	01501062
C 147	5-27pF POLYCARB	01550003	C 252	150pF/N750 5% .2LS	01510729
C 148	12pF/NPO .1" LS DISC	01510016	C 253	.001 μ F MYLAR .12"	01501040
C 149	.001 μ F/Y5P 10% CD 50V	01516239	C 254	15pF NPO DISC	01510017
C 150	15pF/NPO 5% .1"LS	01510017	C 255	.001 μ F/Y5P 10% CD 50V	01516239
C 151	.001 μ F/Y5P 10% CD 50V	01516239	C 256	4.7pF NPO DISC .1"LS	01510011
C 152	15pF/NPO 5% .1"LS	01510017	C 258	2.7pF NPO 1206 50V	151202A7
C 153	15pF/NPO 5% .1"LS	01510017	C 259	15pF NPO 1206 50V	15120150
C 154	15pF/NPO 5% .1"LS	01510017	C 301	15pF NPO DISC	01510017
C 155	15pF/NPO 5% .1"LS	01510017	C 302	6.8pF/NPO 5% .1"LS	01510013
C 158	15pF/NPO 5% .1"LS	01510017	C 303	10 pF/NPO 5% .1"LS 50V	01510015
C 201	.01 μ F/Y5V .2"LS	01516451	C 304	3.3pF NPO DISC	01510009
C 202	6.8pF/NPO 5% .1"LS	01510013	C 305	33pF/NPO 5% .1"LS CD	01510021
C 203	.001 μ F/Y5P 10% CD 50V	01516239	C 306	15pF NPO DISC	01510017
C 204	.001 μ F/Y5P 10% CD 50V	01516239	C 307	15pF NPO DISC	01510017
			C 308	10 μ F 16V TANT	01502013

REF#	DESCRIPTION	RITRON#	REF#	DESCRIPTION	RITRON#
CR101	IN4148A; DIO/GEN PUR	04810001	Q 102	2N5484 N-CHAN. FET	04800037
CR102	IN4148A; DIO/GEN PUR	04810001	Q 103	2N4124 NPN	04800006
CR103	IN4148A; DIO/GEN PUR	04810001	Q 104	2N6726 PNP PWR	04800018
CR104	IN4148A; DIO/GEN PUR	04810001	Q 105	2N3563 NPN RF AMP	04800002
CR201	1N4001 1A 50V GP RECT	04810003	Q 106	MPS-3866 NPN RF PWR	04800030
CR202	1N5231 5.1V .5W ZENER	04820006	Q 201	MPS-H10	04800016
CR203	MV-2209 VARI CAP	04810011	Q 202	MPS-H10	04800016
CR204	IN4148A; DIO/GEN PUR	04810001	Q 203	MRF-559 NPN RF PWR .75W	04801016
CR301	1N4002 GP 2A DIODE	04810004	Q 204	MRF-559 NPN RF PWR .75W	04801016
CR302	1N4742 12VDC ZENER	04820015	Q 205	MRF-581 1.5W RF PWR	04801020
F 301	FUSE; #40 AWG BUS WIRE	06000040	Q 206	SRF-3846 3W RF PWR	04801028
FL101	UHF HELICAL FILTER	05601001	Q 207	MPS-A64 DARL.	04800008
FL201	UHF HELICAL FILTER	05601001	Q 208	MPS-A64 DARL.	04800008
IC101	MC3357P FM IF SUBSYSTEM	03131010	Q 209	2N4124 NPN	04800006
IC102	TDA-2822M AUDIO AMP	03131033	Q 210	2N4124 NPN	04800006
IC103	LM2931 5VDC REG.	03131019	R 101	39KΩ 1/4W 5% CF	04700152
J 301	JACK 2.5MM ANT&CHARGE	02100001	R 102	560 Ω 5% 1/4W CF	04700130
J 302	JACK 2.5MM ANT&CHARGE	02100001	R 103	22KΩ 5% 1/4W CF	04700149
J 303	3 POS. POLARIZED CONN.	02100113	R 105	560 Ω 5% 1/4W CF	04700130
J 304	3.5MM STEREO JACK	02100053	R 107	1.8KΩ 1/4W 5% CF	04700136
JU101	#26 AWG SOLID INSUL. RED	06001069	R 108	1.8KΩ 1/4W 5% CF	04700136
L 101	1.5T .1" #26AWG LHH	01802001	R 109	47KΩ 5% 1/4W CF	04700153
L 103	4.5T .1"ID #26AWG LLH	01870954	R 110	27KΩ 1/4W 5% CF	04700150
L 104	4.7μH WILCO COIL	01800115	R 113	25KΩ VERT. MOUNT POT	04750013
L 105	.56μH FRONTIER MOLDED COIL	01800210	R 114	10KΩ LINEAR W/SW	04750011
L 106	1μH FRONTIER MOLDED COIL	01800213	R 115	330KΩ 1/4W 5% CF	04700163
L 107	2.5T MOLDED COIL; VARIABLE	01850042	R 117	15KΩ 1/4W 5% CF	04700147
L 108	2.5T VAR. COIL(ALUM)	01850105	R 118	100KΩ 5% 1/4W CF	04700157
L 109	.15μH FRONTIER MOLDED COIL	01800203	R 119	100KΩ 5% 1/4W CF	04700157
L 110	4.5T .1"ID #26AWG LLH	01870954	R 120	1KΩ 5% 1/4W CF	04700133
L 202	2.5-4.0μHY 5MM COIL	01850107	R 121	10KΩ AUDIO W/SW	04750010
L 203	2.5-4.0μHY 5MM COIL	01850107	R 122	22KΩ 5% 1/4W CF	04700149
L 204	3.5T MOLDED COIL; VARIABLE	01850043	R 123	6.8KΩ 5% 1/4W CF	04700143
L 205	5.5T MOLDED COIL; VARIABLE	01850045	R 124	4.7 Ω 1/4W 5% CF	04700104
L 206	5.5T MOLDED COIL; VARIABLE	01850045	R 125	4.7 Ω 1/4W 5% CF	04700104
L 207	.15μH FRONTIER MOLDED COIL	01800203	R 126	4.7KΩ 5% 1/4W CF	04700141
L 208	4.7μH WILCO COIL	01800115	R 127	4.7KΩ 5% 1/4W CF	04700141
L 209	2.5T MOLDED COIL; VARIABLE	01850042	R 128	3.3KΩ 1/4W 5% CF	04700139
L 210	2.5T MOLDED COIL; VARIABLE	01850042	R 130	1KΩ 5% 1/4W CF	04700133
L 211	3.5T .1" ID LHH	01870953	R 131	680 Ω 5% 1/4W CF	04700131
L 212	.25" LINK #20AWG	06000020	R 132	1.5KΩ 1/4W 5% CF	04700135
L 214	3.5T .1" ID LHH	01870953	R 134	22KΩ 5% 1/4W CF	04700149
L 215	.25" LINK #20AWG	06000020	R 135	22KΩ 5% 1/4W CF	04700149
L 216	.15μH FRONTIER MOLDED COIL	01800203	R 136	THERMISTOR; 200 Ω	04750101
L 217	.15μH WILCO COIL	01800101	R 137	470 Ω 5% 1/4W CF	04700129
L 218	.15μH FRONTIER MOLDED COIL	01800203	R 138	47KΩ 5% 1/4W CF	04700153
L 219	1.5T .062 ID #26 AWG LHH	01802040	R 139	1KΩ 5% 1/4W CF	04700133
L 220	1.5T .062"ID #26AWG LHH	01802040	R 140	2.2KΩ 5% 1/4W CF	04700137
L 301	.15μH FRONTIER MOLDED COIL	01800203	R 141	120 Ω 1/8W 5% CF	04700822
L 302	2.5T #20AWG .1"ID LHH	01802056	R 142	2.7KΩ 1/4W 5% CF	04700138
L 303	2.5T #20AWG .1"ID LHH	01802056	R 201	47KΩ 5% 1/4W CF	04700153
L 304	.15μH FRONTIER MOLDED COIL	01800203	R 202	180KΩ 1/4W 5% CF	04700160
LR102	4.5T COIL/560 Ω RESISTOR	01800125	R 203	10KΩ THERMISTOR	04750100
LR217	4.5T COIL/560 Ω RESISTOR	01800125	R 204	180KΩ 1/4W 5% CF	04700160
LR218	2.7K 1/4W/5T COIL	01800121	R 205	10KΩ 5% 1/4W CF	04700145
P 304	3 POS. POLARIZED HEADER	02100114	R 206	180KΩ 1/4W 5% CF	04700160
P 305	10 PIN HEADER	02100063	R 207	6.8KΩ 5% 1/4W CF	04700143
Q 101	MRF-901 RF AMP	04800017	R 208	10KΩ 5% 1/4W CF	04700145
			R 209	68 Ω 5% 1/4W CF	04700119
			R 210	680 Ω 5% 1/4W CF	04700131
			R 211	120 Ω 5% 1/4W CF	04700122
			R 212	5.6KΩ 1/4W 5% CF	04700142
			R 213	470 Ω 5% 1/4W CF	04700129
			R 214	1KΩ 5% 1/4W CF	04700133
			R 215	22 Ω 1/4W 5% CF	04700113
			R 216	100 Ω 1/4W 5% CF	04700121

REF#	DESCRIPTION	RITRON#	REF#	DESCRIPTION	RITRON#
				HARDWARE	
R 217	560 Ω 5% 1/4W CF	04700130	HD1	ANTENNA;FLEX MOLDED UHF	01200050
R 218	2.2K Ω 5% 1/4W CF	04700137	HD1	MADE IN USA LABEL(PERM)	01400054
R 219	330 Ω 1/4W 5% CF	04700127	HD1	WEDGE	01400084
R 220	10K Ω 5% 1/4W CF	04700145	HD1	PTT SWITCH CAP	01400098
R 221	100K Ω 5% 1/4W CF	04700157	HD1	RT CASE/FRONT	01400080
R 222	47 Ω 1/4W 5% CF	04700117	HD1	RT CASE/BACK	01400082
R 223	47K Ω 5% 1/4W CF	04700153	HD1	RT KNOB	01400083
R 224	1K Ω 5% 1/4W CF	04700133	HD1	BATTERY DOOR	01400116
R 225	5.6K Ω 1/4W 5% CF	04700142	HD1	JOB COM NAMEPLATE YEL	01400564
R 226	27K Ω 1/4W 5% CF	04700150	HD1	TRIM STRIP .31X7.5 YEL	01400565
R 227	6.8K Ω 5% 1/4W CF	04700143	HD1	RT-45C BAT. COMP. LABEL	01400576
R 228	2K Ω MINI HORIZ MT	04750036	HD1	10MM SHIELD CAN	02500003
R 230	100 Ω 1/4W 5% CF	04700121	HD1	7MM SHIELD CAN AURA	02500004
R 231	1.2K Ω 1/4W 5% CF	04700134	HD1	ANTENNA STRIP CONN.	02500009
R 232	4.7K Ω 5% 1/4W CF	04700141	HD1	FIBER WASHER	02500044
R 233	470K Ω 1/4W 5% CF	04700165	HD1	RT-453 RF SHIELD	02500114
R 234	4.7 Ω 1/4W 5% CF	04700104	HD1	2 CHANNEL SWITCH COVER	02800036
R 235	47K Ω 5% 1/4W CF	04700153	HD1	PTT SWITCH COVER	02800038
SP101	SPEAKER 2" RND	05500001	HD1	CRCUIT BOARD INSULATOR	02800051
SW101	CHANNEL SWITCH	05100002	HD1	1/4" NYLON SPACER	02800113
SW102	PTT SWITCH CENTRALAB	05100001	HD1	CRYSTAL SUPPORT	02800114
T 101	455KHZ TRANSFORMER	05600002	HD1	#4-40X1/4"PHIL FHMS	02801003
Y 101	CRYSTAL; RECEIVE UHF	02300400	HD1	#4-40X1"PHIL FHMS	02801004
Y 102	CRYSTAL; RECEIVE UHF	02300400	HD1	#4-40X1/4"PHIL PHMS	02801005
Y 103	20.945MHZ XTAL	02300408	HD1	#4-40 PRESSNUT BRASS IN-X	02802002
Y 201	CRYSTAL; XMIT UHF	02300001	HD1	#4-40 SPECIAL PRESSNUT	02802008
Y 202	CRYSTAL; XMIT UHF	02300001	HD1	BANK-LOK #4-40 PRESSNUT	02802020
YF101	21.4MHZ XTAL FILTER	02301400	HD1	ANTENNA BUSHING	06201003
YF102	455KHZ 6-POLE CER. FILTER	02301009	HD1	LOW BAT. LABEL	14210004
			HD1	MALE TERMINAL	21202001
			HD1	#4-40X7/8"PHIL FLAT	28112400
			HD56	#26 AWG MAGNET WIRE	06000126
Z 101	LEADED FERRITE BEAD	01801029			
Z 102	LEADED FERRITE BEAD	01801029			
Z 103	BEAD FAIR-RITE 2643000301	01801003			
Z 104	LEADED FERRITE BEAD	01801029			
Z 105	LEADED FERRITE BEAD	01801029			
Z 201	BEAD FAIR-RITE 2643000301	01801003			
Z 202	LEADED FERRITE BEAD	01801029			
Z 203	BEAD FAIR-RITE 2643000301	01801003			
Z 204	LEADED FERRITE BEAD	01801029			
Z 205	BEAD FAIR-RITE 2643000301	01801003			
Z 206	LEADED FERRITE BEAD	01801029			
Z 207	LEADED FERRITE BEAD	01801029			
Z 208	LEADED FERRITE BEAD	01801029			
Z 209	BEAD FAIR-RITE 2643000301	01801003			
Z 301	LEADED FERRITE BEAD	01801029			
Z 302	LEADED FERRITE BEAD	01801029			
Z 303	LEADED FERRITE BEAD	01801029			

REV	DATE	BY	CHK	DESCRIPTION
1	11/20/80			INITIAL RELEASE
2	11/20/80			REVISION 1
3	11/20/80			REVISION 2
4	11/20/80			REVISION 3
5	11/20/80			REVISION 4
6	11/20/80			REVISION 5
7	11/20/80			REVISION 6
8	11/20/80			REVISION 7
9	11/20/80			REVISION 8
10	11/20/80			REVISION 9
11	11/20/80			REVISION 10
12	11/20/80			REVISION 11
13	11/20/80			REVISION 12
14	11/20/80			REVISION 13
15	11/20/80			REVISION 14
16	11/20/80			REVISION 15
17	11/20/80			REVISION 16
18	11/20/80			REVISION 17
19	11/20/80			REVISION 18
20	11/20/80			REVISION 19
21	11/20/80			REVISION 20
22	11/20/80			REVISION 21
23	11/20/80			REVISION 22
24	11/20/80			REVISION 23
25	11/20/80			REVISION 24
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96	11/20/80			REVISION 95
97	11/20/80			REVISION 96
98	11/20/80			REVISION 97
99	11/20/80			REVISION 98
100	11/20/80			REVISION 99
101	11/20/80			REVISION 100



TOPSIDE PRINT PLACEMENT 170146 REV Y
 BOTTOMSIDE PRINT PLACEMENT 170146 REV Y
 RT/ITE-453
 SCHEMATIC
 505 N. CORNELL DRIVE
 CORNELL, TN. 37622

LIST NUMBER	LIST
C101	C201
C102	C202
C103	C203
C104	C204
C105	C205
C106	C206
C107	C207
C108	C208
C109	C209
C110	C210
C111	C211
C112	C212
C113	C213
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C195	C295
C196	C296
C197	C297
C198	C298
C199	C299
C200	C300

LIST NUMBER 170146
 REV Y
 2/7/82
 170146 Y

NECESSARY CONNECTION (PINS):
 ① TX +V ② PWR FLD
 ③ TX GND ④ TX -V
 ⑤ RX PWR FLD ⑥ RX GND
 ⑦ RX -V ⑧ RX PWR FLD
 ⑨ RX GND ⑩ RX PWR FLD
 ⑪ RX -V ⑫ RX PWR FLD

OPTIONAL PART
 SHOWN TEST POINT
 JUMP TONE

