RADIO COMMUNICATIONS
FOR PROFESSIONALS

RITRON, INC.

MAINTENANCE AND OPERATING MANUAL
MODEL RPQC-2
PAGING QUIET-CALL MODULE

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505 West Carmel Drive
Carmel, Indiana 46032
317-846-1201

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SPECIFICATIONS

Operating Voltage	6.5 to14VDC
Operating Current	7 to 8 ma
Tone Detection Time	250 ms (typical)
Decoder Output	NPN open collector
Size	2.3"L x 1.5"W x 0.6"H
Interface	8 Pin Connector

	PAGING MODE	CTCSS MODE
Signal Format	Two-Tone Sequential	CTCSS
Interdigit Time	0 to 300 ms	NA
Frequency Range	330.5 to 832.5 Hz	67 to 250.3 Hz

This manual has been updated to include Engineering Change Notice (ECN) 1701.

OPERATING INSTRUCTIONS

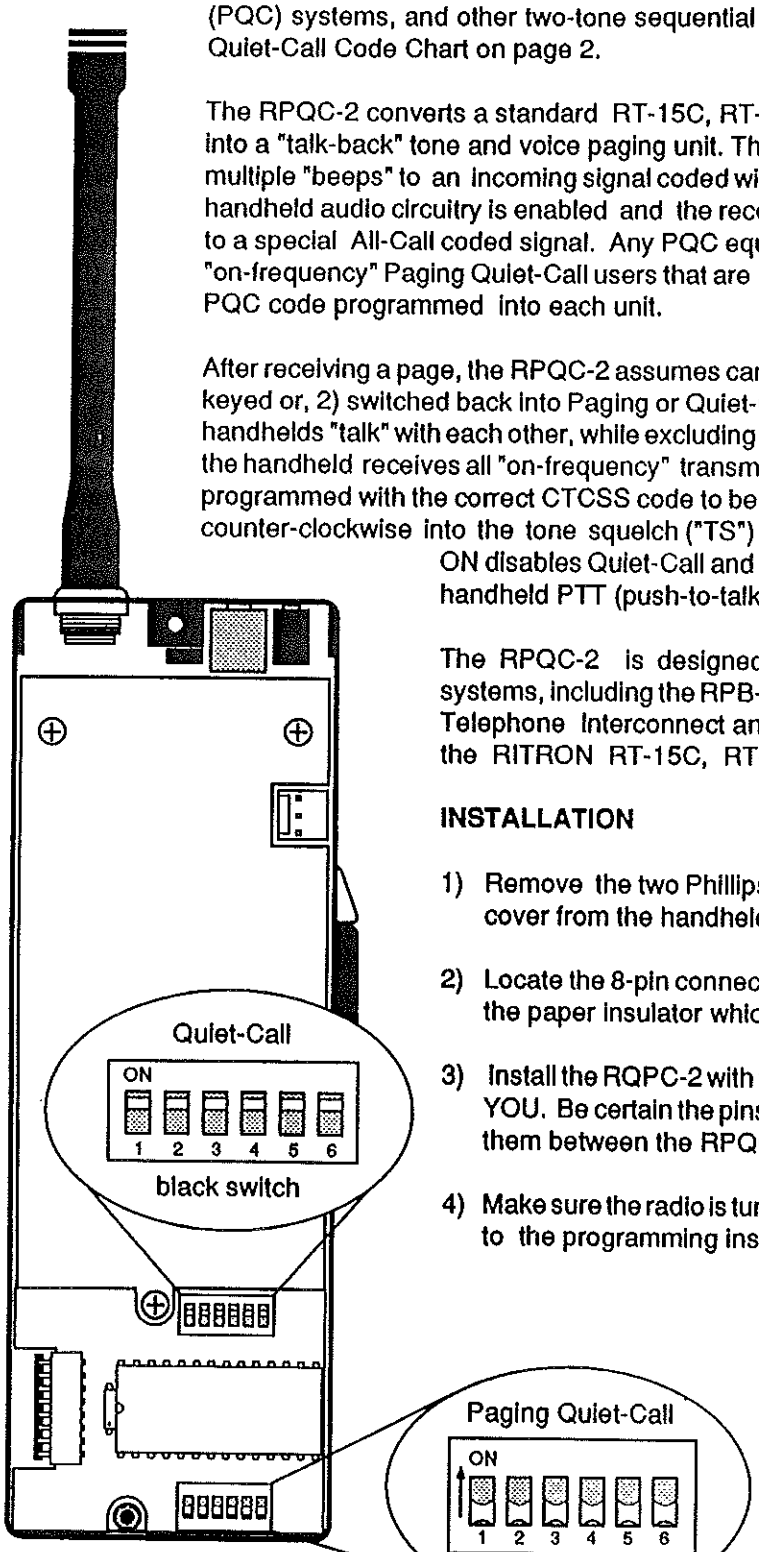
GENERAL DESCRIPTION

The RPQC-2 accessory module is both a two-tone sequential decoder (63 codes, plus All-Call) and a 36-tone CTCSS (Continuous Tone Coded Squelch System) encoder/decoder. The RPQC-2 functions with RITRON Paging Quiet-Call (PQC) systems, and other two-tone sequential systems within the code limits given in the Paging Quiet-Call Code Chart on page 2.

The RPQC-2 converts a standard RT-15C, RT-15D or RT-15H RITRON handheld two-way radio into a "talk-back" tone and voice paging unit. The RPQC-2 equipped handheld alerts the user with multiple "beeps" to an incoming signal coded with the two-tone code programmed by the user. The handheld audio circuitry is enabled and the received message is heard. The unit will also respond to a special All-Call coded signal. Any PQC equipped radio can use the All-Call code to page all "on-frequency" Paging Quiet-Call users that are in paging mode and within range, regardless of the PQC code programmed into each unit.

After receiving a page, the RPQC-2 assumes carrier squelch operation until the portable is either: 1) keyed or, 2) switched back into Paging or Quiet-Call mode. Quiet-Call (QC) lets a specific group of handhelds "talk" with each other, while excluding all other users on the same radio channel. Although the handheld receives all "on-frequency" transmissions, Quiet-Call only permits signals from radios programmed with the correct CTCSS code to be heard. With the squelch control knob rotated fully counter-clockwise into the tone squelch ("TS") position, turning the handheld OFF and then back ON disables Quiet-Call and restores Paging Quiet-Call operation. Pressing the handheld PTT (push-to-talk) button for about one second deactivates PQC.

The RPQC-2 is designed to operate with all RITRON Paging Quiet-Call systems, including the RPB-15 (JBS-100) Paging Base Station and the RP-200 Telephone Interconnect and Paging Terminal, and can be easily installed in the RITRON RT-15C, RT-15D or RT-15H.



RPQC-2
Installed in Portable

INSTALLATION

1) Remove the two Phillips-head screws from the rear cover and lift the rear cover from the handheld. Unplug the battery.

2) Locate the 8-pin connector at the bottom of the circuit board and make sure the paper insulator which protects the circuit board is still in place.

3) Install the RQPC-2 with the component side of the module facing TOWARD YOU. Be certain the pins are plugged into the socket (it is possible to wedge them between the RPQC-2 board and the connector).

4) Make sure the radio is turned OFF. Program the RPQC-2 module according to the programming instructions below.

5) Plug-in the battery; be certain the battery connector is properly aligned with its socket. Re-assemble the case.

PROGRAMMING THE RPQC-2

Programming is done by setting two DIP switches on the RPQC-2 module. One switch sets the Quiet-Call code (CTCSS frequency); the other sets the Paging Quiet-Call code (two-tone frequency). The diagram at left identifies the two switches.

The RPQC-2 microcomputer recognizes switch configurations when the handheld is turned ON.

Important: *MAKE ALL PROGRAMMING CHANGES WITH THE POWER OFF to ensure that the microcontroller is "reset."*

PROGRAMMING STEPS

1) Refer to the CODE PROGRAMMING CHARTS and select the desired Paging Quiet-Call (chart shown below) and Quiet-Call (chart displayed on the next page) codes.

2) Set the six levers on each code switch to the positions indicated in the CODE PROGRAMMING CHARTS. For a logic "0," set the lever to the "ON" position marked on the DIP switch. For a "1," set the lever to the "OFF" position. In order for Quiet-Call or Paging Quiet-Call to work, the appropriate code switches in all radios meant to use the same code must be set identically, with the tone squelch knob on portables rotated fully counter-clockwise (until the knob "clicks").

Frequencies shown in the following code charts are in Hertz.

Paging Quiet-Call Codes and Frequencies

switch lever 123456	code	lo freq	hi freq	switch lever 123456	code	lo freq	hi freq	
111111	111	330.5	569.1	111110	311	410.8	569.1	
011111	112	330.5	600.9	011110	312	410.8	600.9	
101111	113	330.5	634.5	101110	313	410.8	634.5	
001111	114	330.5	669.9	001110	314	410.8	669.9	
110111	121	330.5	707.3	110110	321	410.8	707.3	
010111	122	330.5	746.8	010110	322	410.8	746.8	
100111	123	330.5	788.5	100110	323	410.8	788.5	
000111	124	330.5	832.5	000110	324	410.8	832.5	
111011	131	349.0	569.1	111010	331	433.7	569.1	
011011	132	349.0	600.9	011010	332	433.7	600.9	
101011	133	349.0	634.5	101010	333	433.7	634.5	
001011	134	349.0	669.9	001010	334	433.7	669.9	
110011	141	349.0	707.3	110010	341	433.7	707.3	
010011	142	349.0	746.8	010010	342	433.7	746.8	
100011	143	349.0	788.5	100010	343	433.7	788.5	
000011	144	349.0	832.5	000010	344	433.7	832.5	
111101	211	368.5	569.1	111100	411	457.9	569.1	
011101	212	368.5	600.9	011100	412	457.9	600.9	
101101	213	368.5	634.5	101100	413	457.9	634.5	
001101	214	368.5	669.9	001100	414	457.9	669.9	
110101	221	368.5	707.3	110100	421	457.9	707.3	
010101	222	368.5	746.8	010100	422	457.9	746.8	
100101	223	368.5	788.5	100100	423	457.9	788.5	
000101	224	368.5	832.5	000100	424	457.9	832.5	
111001	231	389.0	569.1	111000	431	483.5	569.1	
011001	232	389.0	600.9	011000	432	483.5	600.9	
101001	233	389.0	634.5	101000	433	483.5	634.5	
001001	234	389.0	669.9	001000	434	483.5	669.9	
110001	241	389.0	707.3	110000	441	483.5	707.3	
010001	242	389.0	746.8	010000	442	483.5	746.8	
100001	243	389.0	788.5	100000	443	483.5	788.5	
000001	244	389.0	832.5	----------	444	483.5	832.5	All-Call

codes above ≈ 100 hz, are increasingly inaccurate.

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

CODE SWITCH

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

MODES OF OPERATION

PAGING QUIET-CALL MODE

This mode keeps the radio silent until paged. To place the unit into Paging Quiet-Call (Paging) mode, turn the portable OFF. Rotate the squelch control knob fully counter-clockwise until it "clicks" into the "TS" position; then turn the radio back ON. The portable is now in Paging mode and will remain silent until either paged or taken out of Paging mode by the user. Adjust the volume control knob mid-way to hear an incoming page.

Note: *After the unit receives a page or is keyed, it must be turned OFF and then ON again before it will receive another page.*

To switch the portable out of Paging mode, either press and hold the push-to-talk (PTT) button for two seconds, or rotate the squelch control knob clockwise out of the "TS" position. This will place the portable in Monitor mode.

MONITOR MODE

The Monitor mode allows the user to hear all other users on the same channel, regardless of the particular Quiet-Call codes programmed into other units.

To place the unit in Monitor mode, rotate the squelch control knob clockwise out of the "TS" position. The handheld will not "beep" if paged while in Monitor mode.

QUIET-CALL MODE

This mode permits the RPQC-2 equipped portable to receive transmissions only from other units programmed with the same Quiet-Call code, while excluding all transmissions from other users of the same channel. The handheld will not respond to pages while in this mode.

To place the portable in "Quiet-call" mode, turn the radio ON and rotate the squelch control knob fully counter-clockwise into the "TS" (tone squelch) position, or, press the PTT button for two seconds.

If the squelch control knob is in the "TS" position before the radio is turned ON, Paging mode will be enabled as indicated above. To enter Quiet-Call mode from Paging mode, rotate the squelch control knob clockwise out of tone squelch, then counter-clockwise back into the "TS" position, or, press the PTT button for two seconds.

ALL-CALL TRANSMIT MODE

The All-Call Transmit mode allows the portable to page all units on your channel that are within range and in Paging mode, regardless of the code programmed into each unit.

To send an All-Call page, turn the radio OFF. Press and hold the PTT button. Turn the portable ON and continue to press the PTT button for ten seconds. Momentarily release the PTT to stop sending the All-Call code. Press and hold the PTT again and talk.

Note: *All-Call paging operates independently of the squelch control knob position.*

THEORY OF OPERATION

The RPQC-2 consists of two special purpose integrated circuits (ICs) and associated support circuitry. Refer to the schematic on page 9 while reading this section.

POWER SUPPLY

The handheld transceiver supplies the tone module with power at P101 pin 8; +V SW is applied to a low-dropout voltage regulator, IC103, which limits the supply reaching RPQC-2 circuitry to +5VDC.

FILTER/AMPLIFIER

An incoming audio signal that reaches the RPQC-2 is first processed by IC102, a 6-pole switched capacitor filter. IC102 contains two general purpose operational amplifiers, amplifier IC102A and comparator IC102C. The filter's cutoff frequency is set by varying the total capacitance from IC102 pin 9 to ground. When the unit enters Paging Quiet-Call mode, microcomputer IC101 "removes" C114 and C115 from the filter circuit (the ground connections through IC101 pins 12 and 13 go "tri-state"), allowing C116 to set the cutoff frequency to about 1500 Hz. When the unit enters Quiet-Call mode, the microcontroller changes the cutoff frequency to approximately 250 Hz by switching C114 into the circuit. If the Quiet-Call (CTCSS) frequency programmed into the RPQC-2 module is below 123 Hz, IC101 also switches C115 into the filter circuit, lowering the cutoff frequency to about 130 Hz.

INPUT AMPLIFIER

Received audio at P101 pin 3 is applied to R130 and coupled by C110 to the input of IC102A. The amplified signal at IC102A pin 4 is then routed to both IC102B pin 8 (input of low-pass filter), and C108 (input of the high-pass filter Q101 and associated components).

HIGH-PASS FILTER

Q101 and associated circuitry form a fixed corner, high-pass filter that has a corner frequency at about 250 Hz. The high-pass filtered signal appears at P101 pin 2, where it is fed to the radio receiver volume control and audio amplifier. The filter significantly reduces sub-audible frequencies in the composite incoming signal, resulting in crisp, "buzz-free" audio at the loudspeaker. When the radio transmitter is activated, P101 pin 1 applies TX +V to the base of Q105, which pulls the emitter of Q101 to ground. Q101 turns OFF, eliminating audio feedback.

LOW-PASS FILTER

IC102B is a low-pass filter that allows only the CTCSS and two-tone frequencies of the received signal to pass unattenuated. The cutoff frequency of the low-pass filter is determined by R137, C114, C115 and C116, as described in the section above, "IC102." Microcomputer IC101 controls the cutoff frequency by switching C114 (for CTCSS tones at 118.8 Hz and below) or C115 (CTCSS tones at123 Hz and above) to ground when in the CTCSS mode. While in Paging mode, no caps are switched in. The filter output exits IC102 pin 3, and then travels to the input of IC102C, a comparator.

COMPARATOR

Comparator IC102C, configured as a Schmidt Trigger, converts the low-pass sine wave output into a square wave for application to Q104, which then inverts the square wave and routes it to IC101 pin 2. The emitter of Q104 is connected through IC101 pin17 to ground. There are intervals when the microcontroller cannot accept an input from Q104: for instance, when the RPQC-2 is announcing an incoming page and sending a "beep" to the radio's audio amp. During these intervals, the microcomputer disables its own input (pin 2) by lifting the emitter of Q104 from ground via pin 17.

AUDIO GATES

The RPQC-2 contains two audio gating transistors, Q103 and Q102. IC101 controls Q103, which gates the incoming audio. For instance, the microcontroller pulls pin 11 to ground, which switches OFF Q103 and keeps the audio path to IC102A gated open. Received audio is gated OFF during: 1) standby intervals and 2) periods in which the module issues "beep" signals that acknowledge an incoming page. Q102 indirectly gates the output audio by pulling P101 pin 4 to ground. When pulled to ground, pin 4 squelches the handheld's audio amplifier. When the unit is in the Monitor mode, the monitor circuit (explained below) turns OFF the audio gates.

MONITOR CIRCUIT

The monitor circuit consists of IC101, Q102 and Q103. Q102 and Q103 are "ON" while the squelch control knob is rotated fully counter-clockwise ("TS" or tone squelch position). When the squelch control knob is rotated out of the "TS" position, the unit enters the Monitor mode. The following sequence then occurs:

1) P101 pin 7 is pulled to ground, placing a "low" (zero volts)on IC101 pin 24.

2) IC101 pins 11 and 16 are switched "low" (internal to the IC).

3) A "low" at the base of Q103 (routed from IC101 pin 11) turns OFF Q103. This allows the RX audio present at P101 pin 3 to reach R131 and IC102A.

4) A "low" at the base of Q102 (from IC101 pin 16) turns OFF Q102. Q102's collector goes "high," which, via P101 pin 4, returns audio amplifier control to the radio's carrier-squelch circuit.

CODE PROGRAMMING SWITCHES

The RPQC-2 microcomputer (IC101) is pre-programmed with 63 RITRON standard two-tone codes (plus All-Call) and 36 standard CTCSS codes. The configurations of six-position DIP switches SW101 (two-tone codes) and SW102 (CTCSS codes) determine which codes the microcontroller "looks" for.

MICROCONTROLLER

All RPQC-2 control functions are handled by IC101, a single IC microcomputer that contains special program instructions designed to manage the tone module's internal workings-- such as, switch scanning, tone decoding, tone encoding, receiver muting and alert "beeping" tone generation. IC101 operates using +5VDC (applied to pin 28) and a timing circuit that features a 3.58 MHz crystal, Y101 (connected between pins 4 and 5). When power is switched ON, the microcontroller is "reset" via the power-on reset circuit comprised of R109 and C104. IC101 scans the two DIP switch configurations and internally sets up the appropriate two-tone and CTCSS code timing constants before executing a routine which tests the input at pin 2 for a valid tone sequence. In addition, the microcomputer "looks" for the All-Call tone. When IC101 detects a valid tone, one of the following happens, depending upon the unit's existing mode of operation (see DECODE MODES and ENCODE MODES on the next page):

DECODE MODES

PAGING QUIET-CALL (TWO-TONE)

When the proper two-tone sequence or an All-Call is detected:

1) Pin 16 goes "low," which turns OFF Q102, unsquelching the radio audio amplifier (if not already gated open).

2) A sequence of ten "beeping" tones is routed from pin 15 through IC102A, C108, C107, C106 and finally Q101, where the tones enter the handheld's audio circuit via P101 pin 2.

3) With the audio path open, the microcontroller "waits" in carrier-squelch mode until the handheld transmits. The microcomputer then enters into the CTCSS mode.

Due to the timing of the input signals, the microcontroller can place the RPQC-2 into a "standby" condition while in Paging Quiet-Call mode and during intervals between periodic input signal sampling. This "periodic input sampling" reduces current drain and extends battery life, without sacrificing tone detection reliability.

QUIET-CALL (CTCSS)

When the correct CTCSS tone is detected:

1) IC101 pin 16 goes "low," which turns OFF Q102, gating open the audio path via P101 pin 4. Squelch opens and received audio reaches the radio speaker.

2) When P101 pin 1 goes "high" (indicating that the radio is in transmit), the microcomputer switches the tone module into the encode mode.

ENCODE MODES

QUIET-CALL (CTCSS)

During the encode mode, the sub-audible tone generated at IC101 pin 15 (a tri-level pseudo-sine wave) is sent to input amp IC102A through R124. IC102A attenuates the CTCSS signal by a factor of two before routing it to the low-pass filter. IC102B acts as a sine wave converter during CTCSS encode mode, attenuating all but the sinusoidal fundamental harmonic portion of the psuedo-sine wave output from IC102A. The low-pass filter's output, now a sine wave, is applied to P101 pin 6 (TX CTCSS ENCODE) for connection to the radio transmitter.

ALL-CALL PAGING

All-Call paging mode is implemented by holding down the push-to-talk button while turning ON the radio; when the microcontroller detects this condition, it generates a square wave at pin 16 at the All-Call frequency (483.5 Hz). This signal is coupled through C121 to P101 pin 6.

RPQC-2 VOLTAGE CHART

CONDITIONS:

5-cell battery pack - 6.4VDC
All code switch levers set to the ON position (closed)
Portable's squelch control knob rotated to the "TS" position, no input signal: i.e., receiver squelched
Measurements taken using a digital multimeter with a 1uH choke in series with the positive lead
All measured data in Volts DC

DEVICE	PIN	VOLTAGE
Q101	E	3.5
	B	2.4
	C	0.0
Q102	E	0.0
	B	0.7
	C	0.0
Q103	E	0.0
	B	0.0
	C	3.0
Q104	E	0.0
	B	0 - 5.0V SQR WAVES
	C	0 - 0.7V SQR WAVES
Q105	E	0.0
	B	0.0
	C	3.5

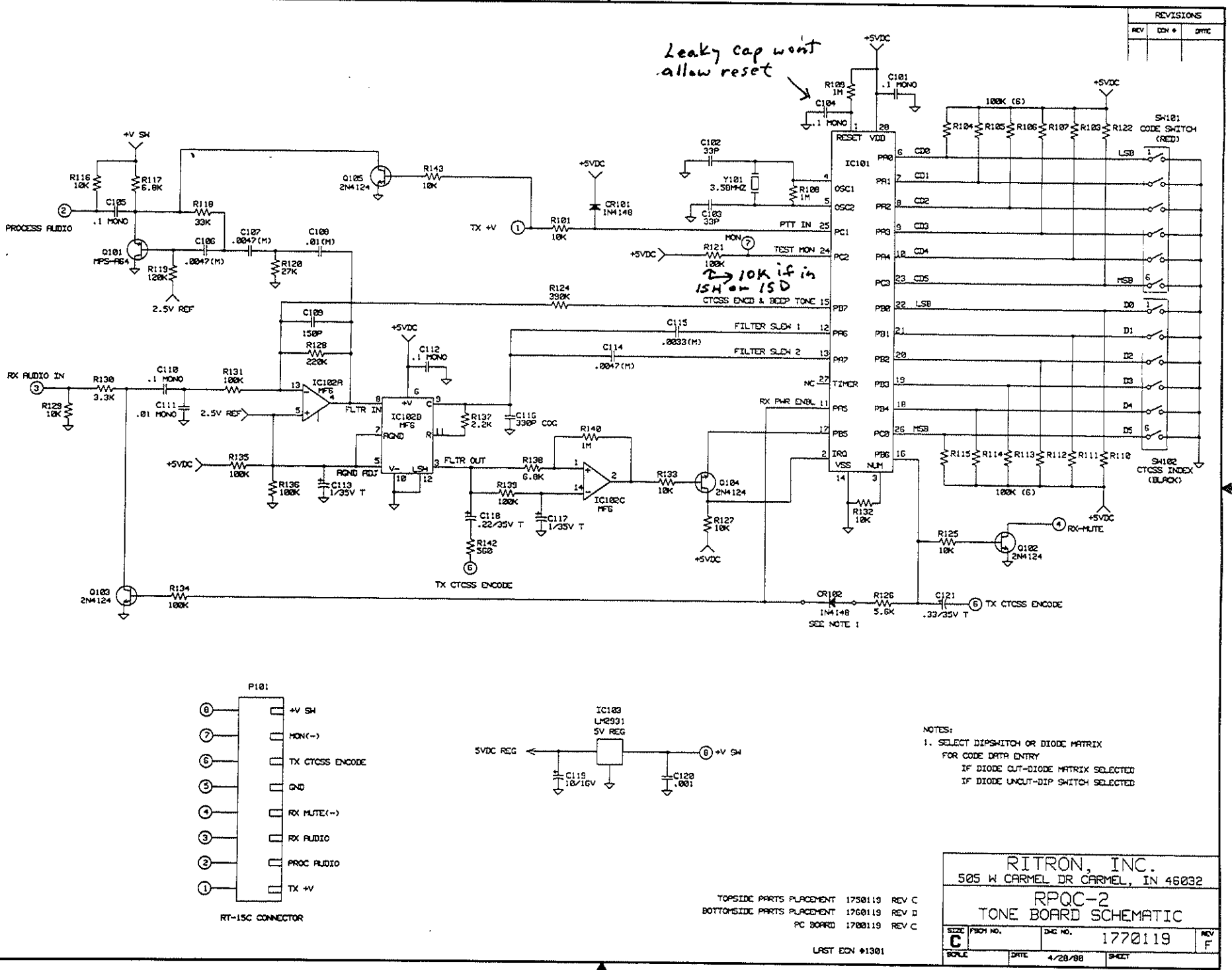
DEVICE	PIN	VOLTAGE
IC101	1	4.2
	2	0 - 5.0V SQR WAVES
	3	0.0
	4	2.5
	5	2.5
	6	0.0
	7	0.0
	8	0.0
	9	0.0
	10	0.0
	11	0.0
	12	0.8
	13	0.0
	14	0.0
	15	2.3
	16	5.0
	17	0.0
	18	0.0
	19	0.0
	20	0.0
	21	0.0
	22	0.0
	23	4.9
	24	4.9
	25	0.0
	26	0.0
	27	NC
	28	5.0

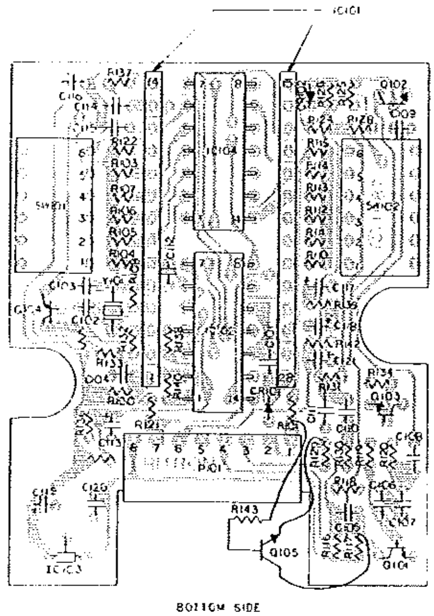
DEVICE	PIN	VOLTAGE
IC102	1	2.2
	2	0.0 - 4.0V SQR WAVE
	3	2.2
	4	2.5
	5	2.5
	6	5.0
	7	2.5
	8	2.5
	9	2.7
	10	0.0
	11	2.7
	12	0.0
	13	2.5
	14	2.1
IC103	IN	6.4
	GND	0.0
	OUT	5.0

RPQC-2 SCHEMATIC REFERENCE PARTS LIST (ECN 1701)

REF #	DESCRIPTION	RITRON #
C 101	.1MF/X7R 20% .1"LS MONO	01515463
C 102	33PF/NPO 5% .1"LS 50V	01510021
C 103	33PF/NPO 5% .1"LS 50V	01510021
C 104	.1MF/X7R 20% .1"LS MONO	01515463
C 105	.1MF/X7R 20% .1"LS MONO	01515463
C 106	.0047MF/MYLAR .12"LS 10%	01501045
C 107	.0047MF/MYLAR .12"LS 10%	01501045
C 108	.01MF/ MYLAR CAP	01501050
C 109	150 PF/COG 10% .1"LS	01515029
C 110	.1MF/X7R 20% .1"LS MONO	01515463
C 111	.01 MF/Y5V 20% .2"LS 25V	01516451
C 112	.1MF/X7R 20% .1"LS MONO	01515463
C 113	1MF 35V TANTALUM CAP	01502007
C 114	.0047MF/MYLAR .12"LS 10%	01501045
C 115	.0033MF/MYLAR .12"LS 10%	01501043
C 116	330PF/COG 10% .1"LS	01515033
C 117	1MF 35V TANTALUM CAP	01502007
C 118	2.2UF 35V TANTALUM CAP	01502004
C 119	10MF 16V ELEC CAP	01503[illegible]
C 120	.001 MF/Y5P 10% .1"LS	01516[illegible]
C 121	.33MF 35V 20% TANT CAP	01502004
CR101	1N4148 GEN PURPOSE DIODE	04810001
CR102	1N4148 GEN PURPOSE DIODE	04810001
HW101	RPQC-2 OPERATIONS MANUAL	01451074
HW101	RPQC-2 PC BOARD REV-D	01700119
HW103	GREEN SOCKET PIN	02100118
IC101	146805F2 SNGL CHIP uC/DIP	03132031
IC102	MF6 6 POLE FILTER IC	03132027
IC103	LM2931 5V REGULATOR IC	03131019
P 102	8 POS RT ANGL SOCKET	02100116
Q 101	MPS-A64 PNP DARLINGTON	04800008
Q 102	SPS8161/2N4124 NPN GEN PR	04800006
Q 103	SPS8161/2N4124 NPN GEN PR	04800006
Q 104	SPS8161/2N4124 NPN GEN PR	04800006
Q 105	SPS8161/2N4124 NPN GEN PR	04800006
R 101	10 KΩ 5% 1/8W CF	04700845
R 103	100 KΩ 5% 1/8W CF	04700857
R 104	100 KΩ 5% 1/8W CF	04700857
R 105	100 KΩ 5% 1/8W CF	04700857
R 106	100 KΩ 5% 1/8W CF	04700857
R 107	100 KΩ 5% 1/8W CF	04700857
R 108	1 MΩ 5% 1/8W CF	04700869
R 109	1 MΩ 5% 1/8W CF	04700869
R 110	100 KΩ 5% 1/8W CF	04700857
R 111	100 KΩ 5% 1/8W CF	04700857
R 112	100 KΩ 5% 1/8W CF	04700857
R 113	100 KΩ 5% 1/8W CF	04700857
R 114	100 KΩ 5% 1/8W CF	04700857
R 115	100 KΩ 5% 1/8W CF	04700857
R 116	10 KΩ 5% 1/8W CF	04700845
R 117	6.8 KΩ 5% 1/8W CF	04700843
R 118	33 KΩ 5% 1/8W CF	04700851
R 119	120 KΩ 5% 1/8W CF	04700858
R 120	27 KΩ 1/8W 5% CF	04700850
R 121	10 KΩ 5% 1/8W CF	04700845
R 122	100 KΩ 5% 1/8W CF	04700857
R 124	470 KΩ 1/8W CF	04700865
R 125	10 KΩ 5% 1/8W CF	04700845
R 126	5.6 KΩ 1/8W 5% CF	04700842
R 127	10 KΩ 5% 1/8W CF	04700845
R 128	220 KΩ 5% 1/8W CF	04700861
R 129	10 KΩ 5% 1/8W CF	04700845
R 130	3.3 KΩ 5% 1/8W CF	04700839
R 131	100 KΩ 5% 1/8W CF	04700857
R 132	10 KΩ 5% 1/8W CF	04700845
R 133	10 KΩ 5% 1/8W CF	04700845
R 134	100 KΩ 5% 1/8W CF	04700857
R 135	100 KΩ 5% 1/8W CF	04700857
R 136	100 KΩ 5% 1/8W CF	04700857
R 137	2.2 KΩ 5% 1/8W CF	04700837
R 138	6.8 KΩ 5% 1/8W CF	04700843
R 139	100 KΩ 5% 1/8W CF	04700857
R 140	1 MΩ 5% 1/8W CF	04700869
R 142	560 OHM 1/8W 5% CF	04700830
R 143	10 KΩ 5% 1/8W CF	04700845
SW101	6 POSITION DIP SW (RED)	05100036
SW102	6 POSITION DIP SW (BLACK)	05100023
Y 101	3.58MHZ CERAMIC RESONATOR	02302002

these tend to have RFI problems with 215c radios, but not 15c radios


Leaky cap wont allow reset
REVISIONS
REV
ECN #
DATE
+5VDC
+V SW
PROCESS AUDIO
TX +V
RX AUDIO IN
2.5V REF
IC101
RESET VDD
OSC1
OSC2
PTT IN
TEST MON
CTCSS ENCD & BEEP TONE
FILTER SLCH 1
FILTER SLCH 2
TIMER
RX PWR ENBL
IRQ
VSS
NUM
IC102A MFB
IC102B MFB
IC102C MFB
FLTR IN
FLTR OUT
AGND
AGND ADJ
Y101 3.58MHZ
Q101 MPS-A64
Q102 2N4124
Q103 2N4124
Q104 2N4124
Q105 2N4124
CR101 1N4148
CR102 1N4148
SEE NOTE 1
SW101 CODE SWITCH (RED)
SW102 CTCSS INDEX (BLACK)
LSB
MSB
100K (6)
RX-MUTE
TX CTCSS ENCODE
P101
RT-15C CONNECTOR
IC103 LM2931 5V REG
5VDC REG
NOTES:
1. SELECT DIPSWITCH OR DIODE MATRIX FOR CODE DATA ENTRY
IF DIODE CUT-DIODE MATRIX SELECTED
IF DIODE UNCUT-DIP SWITCH SELECTED
TOPSIDE PARTS PLACEMENT 1750119 REV C
BOTTOMSIDE PARTS PLACEMENT 1760119 REV D
PC BOARD 1700119 REV C
LAST ECN #1301
RITRON, INC.
505 W CARMEL DR CARMEL, IN 46032
RPQC-2
TONE BOARD SCHEMATIC
SIZE C
FSCM NO.
DWG NO. 1770119
REV F
SCALE
DATE 4/28/08
SHEET

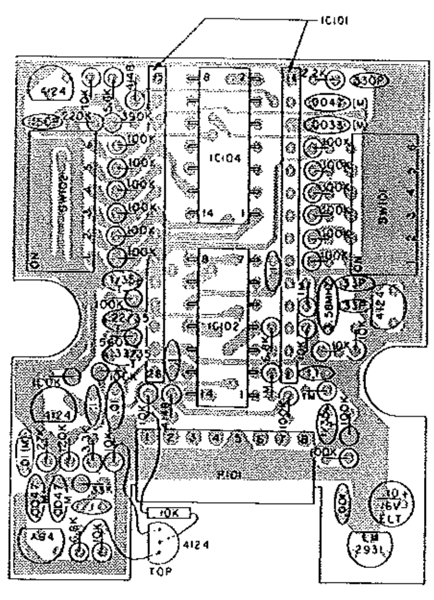


BOTTOM SIDE

TOP SIDE COMPONENT PLACEMENT 1750-9
P.C. BOARD 1700-19 C
SCHEMATIC 1770-15 F

TOLERANCES	REVISIONS	RITRON, INC. 505 W. CARMEL DR. CARMEL, IN. 46032
		RPC C-2 BOTTOM SIDE COMPONENT PLACEMENT
		KAESSEL · SCALE 4X · DATE 1-12-87 · DRAWING NO. 1750-9 · REV D

LAST ECN #1301



TOP SIDE

BOTTOM SIDE COMPONENT PLACEMENT 1750-9
P.C. BOARD 1700-19 C
SCHEMATIC 1770-19 F

TOLERANCES	REVISIONS	RITRON, INC. 505 W. CARMEL DR. CARMEL, IN. 46032
		RPC C-2 TOP SIDE COMPONENT PLACEMENT
		KAESSEL · SCALE 4X · DATE 1-12-87 · DRAWING NO. 1750-9 · REV C

LAST ECN #1301