



144/430 MHz Twin Band FM Handy Transceiver

C528

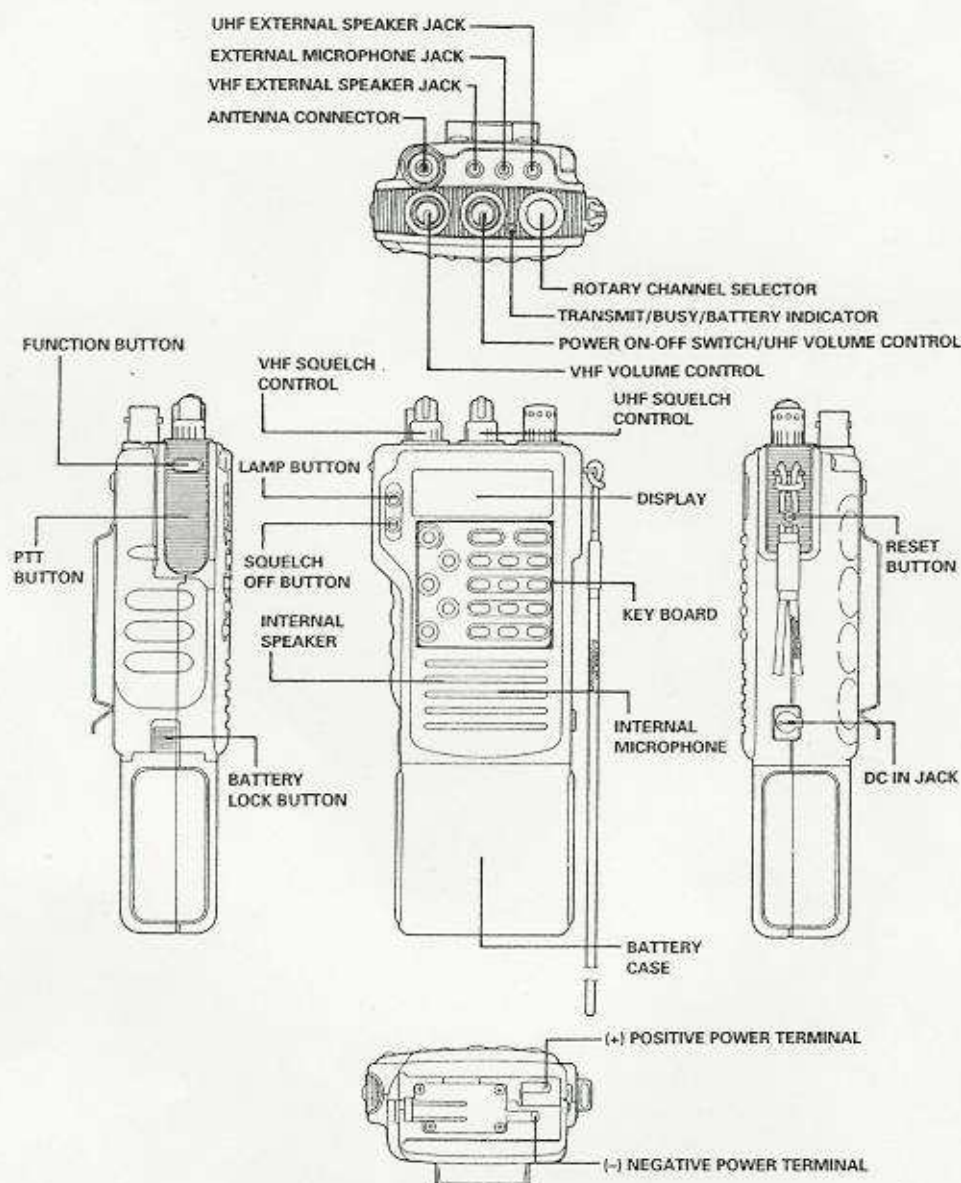
SERVICE MANUAL

STANDARD COMMUNICATIONS
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1. CONTROLS AND CONNECTIONS



OPTIONAL ACCESSORIES

CTN520: CTCSS (tone squelch) unit
 CNB150: Compact rechargeable battery pack
 (7.2 V, 400 mAh)
 CNB150: Rechargeable battery pack
 (7.2 V, 700 mAh)
 CNB152: High-power rechargeable battery pack
 (12 V, 600 mAh)
 CNB153: Long-life rechargeable battery pack
 (7.2 V, 1200 mAh)
 CWC150: AC charger (for CNB150, CNB151 and
 CNB153)
 CWC151: AC charger (for CNB152)
 CSA150: Desk-top charger (Rapid charger)
 CAW150: Mobile power cable

CMC150: Mobile charger
 (for CNB150, CNB151 and CNB153)
 CMB111: Mobile bracket
 CLC520: Soft case
 (used with CNB151 or CBT151)
 CLC521: Long-sized soft case
 (used with CNB152 or CNB153)
 CBT151: Battery tray (for 6 "AA"-size batteries)
 CMP111: Microphone/speaker
 CMP112: Compact microphone/speaker
 CHP111: Headset with PTT button
 CMP113: Tiepin microphone
 CAW151: Base station power cable
 CAX02: Bottom cap

2. MAINTENANCE

2.1 Disassembly

Turn the power switch off and remove the battery and antenna before disassembly and reassembly

2.1.1 Bottom Cover and Front Case

– Bottom Cover –

Remove the two screws (A) and detach the bottom cover, then remove the two screws (B) fixing the front case.

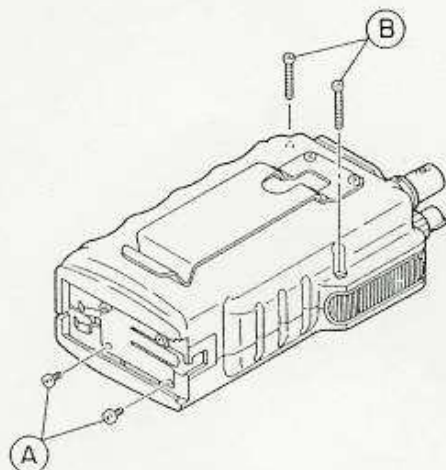


Figure 2-1

– Front Case –

Open the front case in the direction of an arrow and disconnect the connector (C).

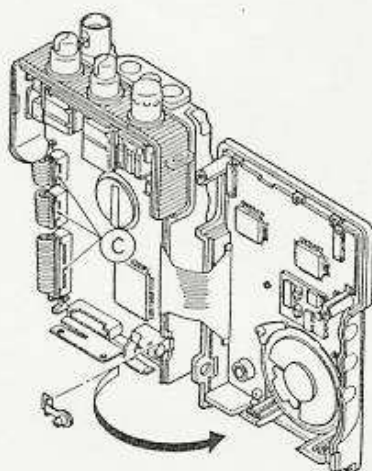


Figure 2-2

2.1.2 Display P.C. Board

Remove the six screws (D) and two screws (E), and you will be able to disconnect the display P.C. board.

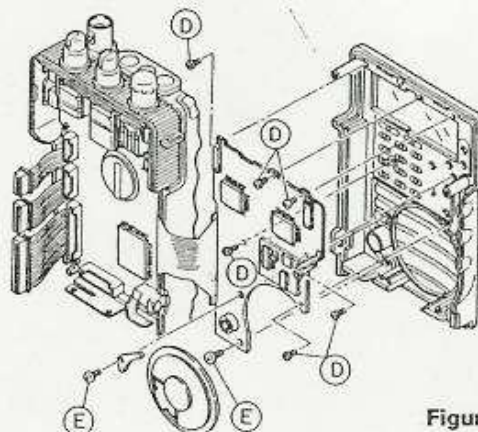


Figure 2-3

2.1.3 AF and RF P.C. Boards

Remove the four screws (F), then the four screws (G), four spacers (H) and (I) and five screws (J), and you will be able to disconnect each board.

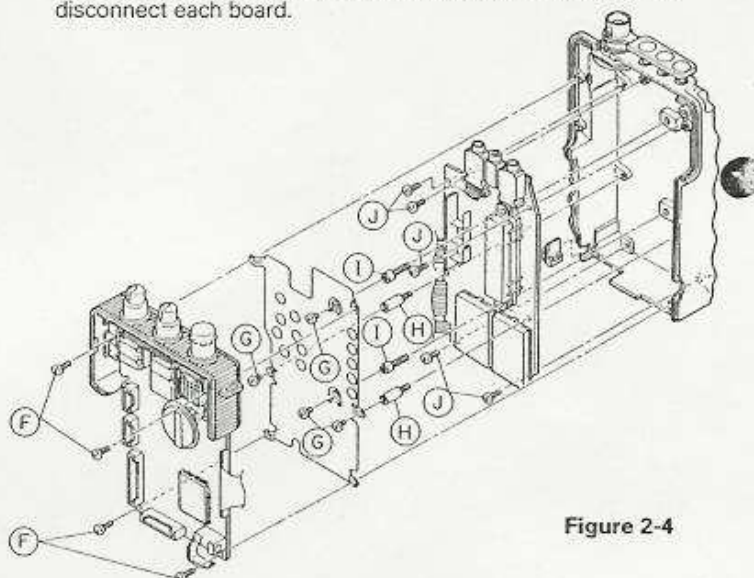


Figure 2-4

2.1.4 Accessory (Tone Squelch Board: CTN520)

- Turn OFF the power of the transceiver, and install the tone squelch board to the transceiver by two accessory screws.
- Plug the connector of the tone squelch board securely into the socket of the transceiver.

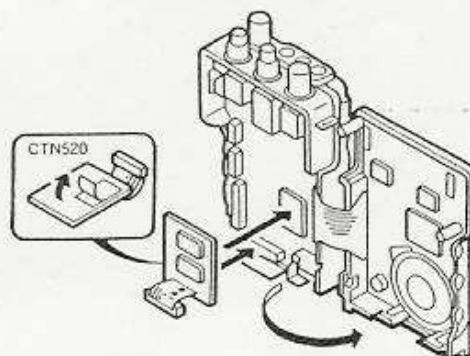


Figure 2-5

Warm up the instruments for at least 30 minutes before use.

General Conditions

Note: Of RF alignment, the audio output is 10 mW.

Supply voltage 7.2 V DC
Audio output 75 mW

AF dummy load	8 Ω
Standard modulation	± 3.5 kHz at 1 kHz
RF dummy load	50 Ω
Adjustment frequencies	
Receive frequency	VHF 145.990 MHz
	UHF 435.000 MHz
Transmit frequency	VHF 145.990 MHz
	UHF 435.000 MHz

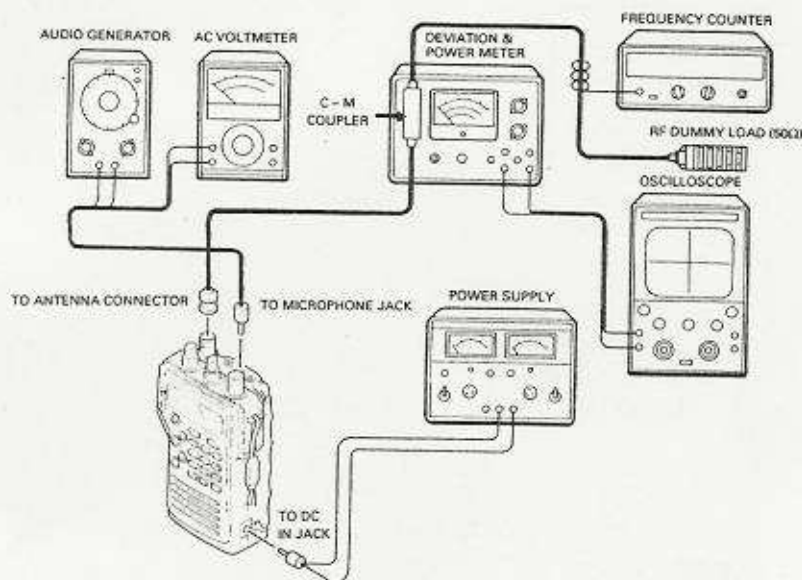


Figure 2-6 Transmitter test set up

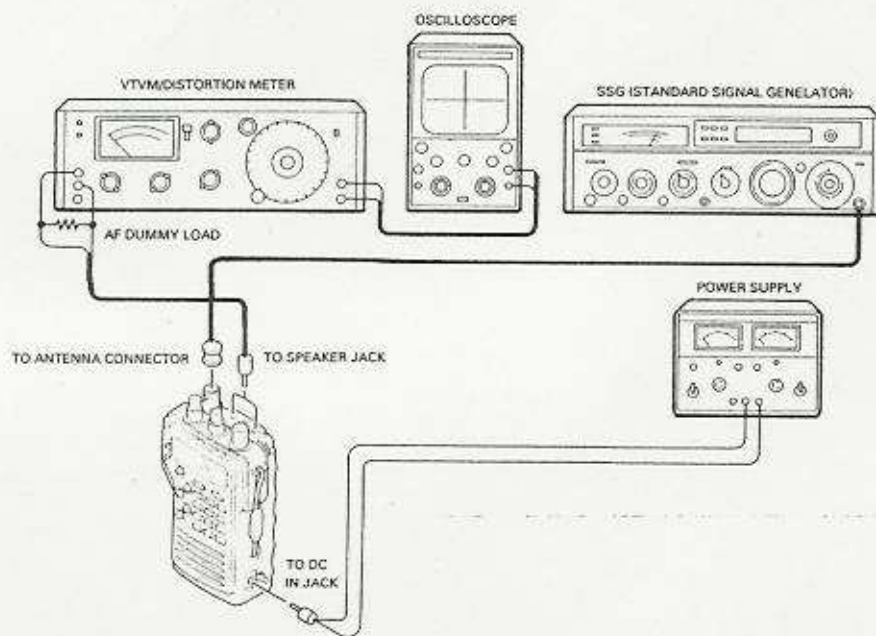


Figure 2-7 Receiver test set up

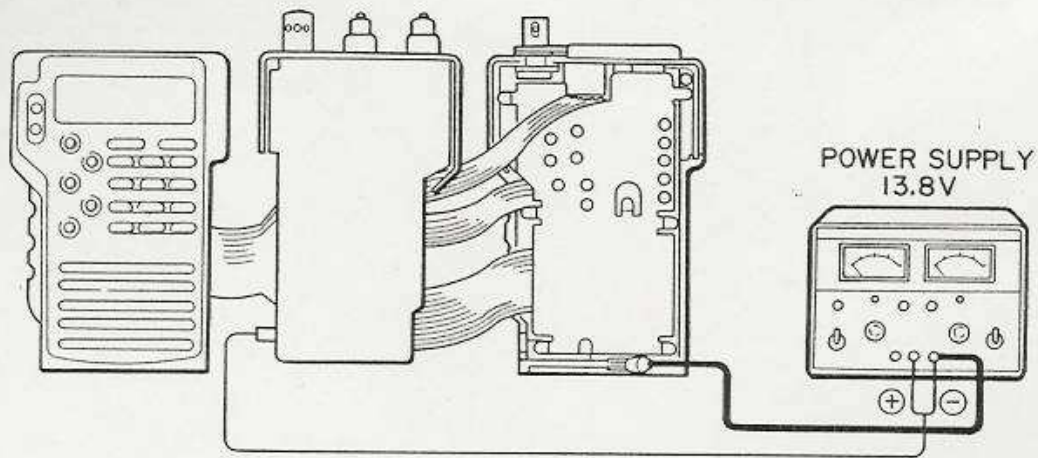


Figure 2-8 Ground cable running for transmit power alignment

2.3 Alignment Reference Points

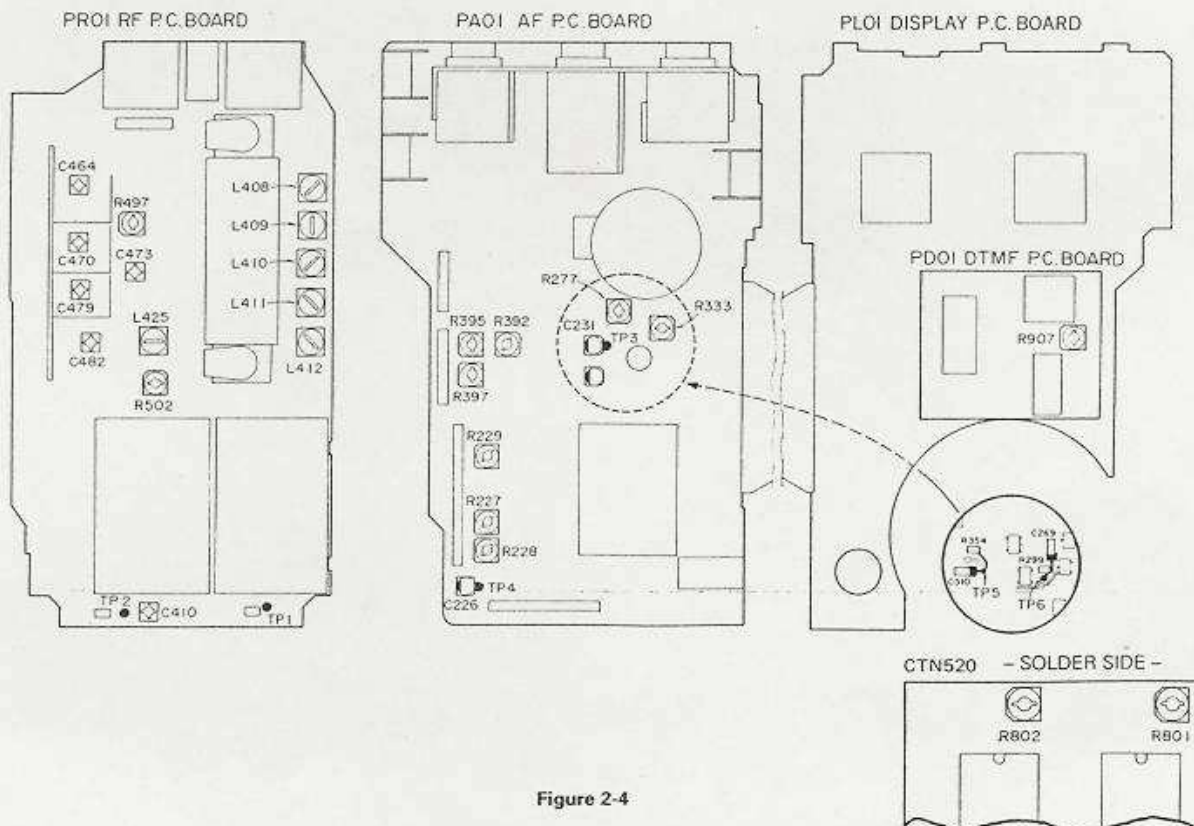


Figure 2-4

2.4 Alignment and Performance Check

2.4.1 Power Supply

- 4 V/5 V Regulator -

- Apply a supply voltage of 7.2 V DC to the transceiver, and set the power switch to ON.
- Connect a voltmeter to TP3 and check that the regulator voltage at TP3 is between 4.75 and 5.25 V DC.
- Connect a voltmeter to TP4 and check that the regulator voltage at TP4 is between 3.8 and 4.2 V DC.
- The VHF current drain will be around 38 mA with squelch ON, and the UHF current consumption around 45 mA with squelch ON.

2.4.2 Microprocessor

- Clock -

NOTE: The microprocessor clock is 4 MHz. The internal tone frequency is produced from the microprocessor clock. Accordingly, the tone frequency alignment becomes the microprocessor clock alignment.

2.4.3 PLL Synthesizer

- VCO Frequency Setting -

- Set the channel frequency of the transceiver to 145.990 MHz in the receive mode.
- Connect a voltmeter to TP1 and check that the voltage at TP1 is between 1.25 and 1.55 V DC.
- Key the transmitter and check that the voltage at TP1 is between 1.4 and 1.7 V DC.
- Set the channel frequency of the transceiver to 435.000 MHz in the receive mode.
- Connect a voltmeter to TP2 and check that the voltage at TP2 is between 2.35 and 2.65 V DC.
- Key the transmitter and check that the voltage at TP2 is between 1.65 and 1.95 V DC.

- Local Frequency -

- Display frequencies of the VHF and UHF bands (in twin mode), and set the channel frequency of the transceiver to 435.000 MHz.
- Key the transmitter and measure by a frequency counter the output passed through a C - M coupler.
- Adjust C410 so that the frequency counter reads 435.00000 MHz.

2.4.4 Receiver

NOTE: Perform alignment with the RF P.C. board's shield plate remaining attached.

- UHF Sensitivity -

- Rotate the UHF and VHF squelch control knobs of the transceiver fully counterclockwise and clockwise, respectively.
- Set the channel frequency of the (Standard Signal Generator) transceiver and the SSG frequency to 435.000 MHz. The SSG signal shall be subject to standard modulation. Connect the speaker plug in to the SPU terminal (UHF external speaker jack).
- Connect a voltmeter to TP5 and raise the SSG output level so that the voltage at TP5 becomes about 0.5 V DC.
- Set the channel frequency of the transceiver to 435.050 MHz. Adjust C464, C470, C473, C479, C482 and L425 in this order and repeat this sequence twice to maximize the reading of the voltmeter.
- Set the channel frequency of the transceiver to 439.950 MHz, and adjust C482 so that the reading of the voltmeter is maximized.
- Set the channel frequency of the transceiver to 435.050 MHz, and adjust C464, C470, C473 and C479 in this order so that the reading of the voltmeter is maximized.
- Set the channel frequency of the transceiver to 435.050 MHz, and check that SINAD is less than -8 dBu.
- Check that SINAD is less than 1.5 dB against the center value in a range of 430.050 MHz to 439.950 MHz.
- Set the channel frequency of the transceiver to 435.050 MHz, and check that 20 dB QS is less than -5 dBu.
- Set the channel frequency of the transceiver to 439.950 MHz, and check that the first image ratio is more than 45 dB.

NOTE: If out of standard, reperform from step d).

- Set the channel frequency of the transceiver to 435.050 MHz, and check that the S/N ratio is more than 44 dB.
- With the SSG output level set to 20 dBu, adjust R333 so that the reading of the signal meter maximized.
- Check that when the reading of the signal meter is maximum between 430.050 MHz and 439.950 MHz the SSG output level is between 16 dBu and 24 dBu.

- VHF Sensitivity -

- Rotate the VHF and UHF squelch control knobs of the transceiver fully counterclockwise and clockwise, respectively.
- Set the channel frequency of the transceiver and the SSG frequency to 145.990 MHz. The SSG signal shall be subject to standard modulation. Connect the speaker plug in to the SPV terminal (VHF external speaker jack).
- Connect a voltmeter to TP6 and raise the SSG output level so that the voltage at TP6 becomes about 0.5 V DC.
- Set the channel frequency of the transceiver to 145.990 MHz, and adjust L408, L409, L410, L411 and L412 in this numerical order so that the reading of the voltmeter is maximized. At this time, check that SINAD is less than -9.5 dBu.
- Set the channel frequency of the transceiver and the SSG frequency to 145.500 MHz. Then, with the SSG output level set to 20 dBu, adjust R277 so that the reading of the signal meter is maximized.

2.4.5 Transmitter

– UHF RF Output –

NOTE: Before alignment, put the supply voltage and the transceivers voltage in agreement with each other. For accurate alignment of the transmission output, the RF P.C. board's shield plate should remain attached. Then, connect the ground cable as shown in Figure 2-8.

- a) Set the supply voltage of the transceiver to 13.8 V, and the transmission output to the high power mode. Then, rotate R228 fully counterclockwise.
- b) Connect a voltmeter to the antenna connector and set the channel frequency of the transceiver to 435.000 MHz. Key the transmitter and check that the maximum output power is more than 6.5 W.
- c) After step b), set the transceiver to the VHF, transmission output and high power mode. Key the transmitter and check the output power is more than 5.5 W.
- d) Set the channel frequency of the transceiver to 435.000 MHz, and set the transmission output to the high power mode. Key the transmitter and adjust R502 so that the output power is 6.5 W.
- e) Set the supply voltage of the transmitter to 7.2 V DC, and set the transmission output to the low power mode.
- f) Set the channel frequency of the transceiver to 435.000 MHz. Then, Key the transmitter and adjust R229 so that the output power is 0.4 W. At this time, check that the current drain is between 480 mA and 580 mA.
- g) Set the supply voltage of the transceiver to 13.8 V DC, and set the RF output to the high power mode. Key the transmitter and adjust R227 so that the output power is 5.2 W. At this time, check that the current drain is between 1.2 A and 1.5 A.
- h) Set the RF output to the middle power mode. Key the transmitter and adjust R228 so that the output power is 2.8 W. At this time, check that the current drain is between 900 mA and 1100 mA.
- i) Set the supply voltage of the transceiver to 6.0 V DC, and set the RF output to the high power mode. Key the transmitter and check that the output power is more than 1.2 W.
- j) Set the supply voltage of the transceiver to 13.8 V DC and set the transmission output to the high power mode.
- k) Check that between 430.000 MHz and 439.950 MHz, when Key the transmitter the difference between maximum and minimum in RF output level is within 0.5 W.

– VHF RF Output –

NOTE: Be sure to perform the VHF transmission output alignment after the termination of the UHF transmission output alignment.

- a) Set the supply voltage of the transceiver to 13.8 V, and set the RF output to the high power mode.
- b) Connect a voltmeter to the antenna connector, and set the channel frequency of the transceiver to 145.990 MHz. Key the transmitter and adjust R497 so that the output power is 5.2 W. At this time, check that the current drain is between 0.9 A and 1.25 A.
- c) Set the RF output to the mid power mode. Then, check that the output level is between 2.2 W and 2.8 W. At this time, check that the current drain is between 800 mA and 1100 mA.
- d) Set the supply voltage of the transceiver to 7.2 V DC, and set the RF output to the low power mode. Check that the output level is between 0.24 watt and 0.45 W. At this time, check that the current drain is between 480 mA and 580 mA.

– UHF Modulation –

- a) Set the supply voltage and channel frequency of the transceiver to 7.2 V DC and 435.000 MHz. Connect the microphone plug as shown in Figure 2-10 below in to the external microphone jack, and adjust R397 so that the frequency deviation is ± 5 kHz provided that the AG output is a sine wave of 1 kHz, 60 mV.
- b) Turn ON the time constant 750 usec of the linear detector filter. Then, check that the frequency difference between the plus and minus areas in ± 5.0 kHz deviation is within 0.30 kHz.
- c) Adjust the AG output and set the deviation to ± 3.5 kHz, thereupon measure the distortion. At this time, check that the distortion is within 3%.
- d) After step c), check that with the microphone plug released from AG, the AG output voltage is between 4 mV AC and 8 mV AC.

- VHF Modulation -

- Set the supply voltage and channel frequency of the transceiver to 7.2 V DC and 145.990 MHz. Connect the microphone plug as shown in Figure 2-10 below in to the external microphone jack, and adjust R395 so that the frequency deviation is ± 5 kHz provided that the AG output is a sinewave of 1 kHz, 60 mV.
- Turn ON the time constant 750 usec of the linear detector filter. Then, check that the frequency difference between the plus and minus areas in ± 5.0 kHz deviation is within 0.30 kHz.
- Adjust the AG output and set the deviation to ± 3.5 kHz, thereupon measure the distortion. At this time, check that the distortion is within 5%.
- After step c), check that with the microphone plug released from AG, the AG output voltage is between 4 mV AC and 8 mV AC.

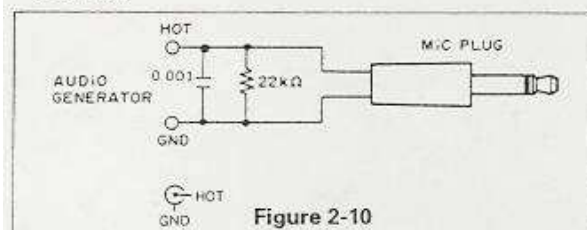


Figure 2-10

- Built-in Touch Tone Board -

- Perform transmission with the microphone plug connected in to the external microphone jack. At this time, the audio generator (AG) output shall be zero.
- Set the channel frequency of the transceiver to 435.000 MHz.
- Adjust R907 so that when the "8" key is pressed, the frequency deviation is ± 3.2 kHz. At this time, check that the monitor sound is heard from the speaker.
- Set the channel frequency of the transceiver to 145.950 MHz, and connect the microphone plug in to the external microphone jack, then Key the transmitter.
- Check that when the "8" key is pressed, the frequency deviation is between ± 2.7 kHz and ± 3.8 kHz.

- UHF Tone Squelch Board: CTN520 -

- Install the tone squelch board into the transceiver, after which set the pertinent switch of the transceiver to ON.
- Turn ON the tone squelch and set the tone frequency to 67 Hz.
- Set the channel frequency of the transceiver to 430.050 MHz. Then, check that the tone frequency deviation is between ± 0.5 kHz and ± 0.9 kHz, and the distortion is within 15%. If without, adjust R802 so that the deviation is ± 0.6 kHz.
- Set the tone frequency to 250.3 Hz. Then, check that the tone frequency deviation is between ± 0.5 kHz and ± 0.9 kHz, and the distortion is within 15%.

- VHF Tone Squelch Board: CTN520 -

- Install the tone squelch board into the transceiver, after which set the pertinent switch of the transceiver to ON.
- Turn ON the tone squelch and set the tone frequency to 67 Hz.
- Set the channel frequency of the transceiver to 145.990 MHz. Then, check that the tone frequency deviation is between ± 0.5 kHz and ± 0.9 kHz, and the distortion is within 15%. If without, adjust R80 so that the deviation is ± 0.75 kHz.
- Set the tone frequency to 250.3 Hz. Then, check that the tone frequency deviation is between ± 0.5 kHz and ± 0.9 kHz, and the distortion is within 15%.

Table 2-1

TONE FREQUENCY (Hz)			
67.0	97.4	136.5	192.8
71.9	100.0	141.3	203.5
74.4	103.5	146.2	210.7
77.0	107.2	151.4	218.1
79.7	110.9	156.7	225.7
82.5	114.8	162.2	233.6
85.4	118.8	167.9	241.8
88.5	123.0	173.8	250.3
91.5	127.3	179.9	
94.8	131.8	186.2	

- UHF Tone Burst -

- Set the channel frequency of the transceiver to 435.000 MHz.
- Engage the transmission mode with the microphone plug connected in to the external microphone jack.
- Press the CALL button and emit the burst signal.
- Adjust R392 so that the frequency deviation is ± 3.5 kHz.
- Check that the tone burst frequency is between 1,730 Hz and 1,770 Hz, the frequency deviation is between ± 3.2 kHz and ± 3.8 kHz and the distortion is within 7%.

- VHF Tone Burst -

- Set the channel frequency of the transceiver to 146.000 MHz.
- Engage the transmission mode with the microphone plug connected in to the external microphone jack.
- Press the CALL button and emit the burst signal.
- Check that the tone burst frequency is between 1,730 Hz and 1,770 Hz, the frequency deviation is between ± 3.2 kHz and ± 3.8 kHz, and the distortion is within 7%.

3. Specifications

Unless otherwise noted, the following specifications apply to both UHF and VHF bands for the C528.

3.1 General Specifications

Transmit/receive frequency range	VHF 144.000 to 147.995 MHz UHF 430.000 to 439.995 MHz
Tuning step	5, 10, 12.5, 20, 25, 50 kHz
Modulation type	16 F3
Nominal voltage	7.2 V DC
Input voltage range	6.0 to 16.0 V DC (with external voltage jack)
Current drain	
Transmit	
13.8 V DC Hi	
Hi (5.0 W):	Approx. 1100 mA (VHF) Approx. 1300 mA (UHF)
Mid (2.5 W):	Approx. 900 mA (VHF) Approx. 1000 mA (UHF)
7.2 V DC Hi (2.0 W):	Approx. 850 mA (VHF) Approx. 1000 mA (UHF)
Mid (2.0 W):	Approx. 850 mA (VHF) Approx. 1000 mA (UHF)
13.8/7.2 V DC Lo (0.35 W):	Approx. 480 mA (VHF) Approx. 480 mA (UHF)
Standby receive (Twin band mode):	Approx. 70 mA (VHF/UHF)
(Mono band mode):	Approx. 36 mA (VHF) Approx. 45 mA (UHF)
Battery save (Twin band mode):	Approx. 32 mA (VHF/UHF)
(Mono band mode):	Approx. 17 mA (VHF) Approx. 18 mA (UHF)
Auto Power OFF (A.P.O.):	Approx. 1 mA (VHF/UHF)
Microphone input impedance	600 Ω
Speaker impedance	8 Ω
Dimensions of transceiver itself (without projections):	157 (H) x 55 (W) x 31 (D) mm
Weight	450 g (with batteries and antenna)

3.2 Receiver

— Measurements are made in accordance with EIA-J Standard ART-04. —

Receiving system	Double superheterodyne
Intermediate frequency	VHF: First IF 21.80 MHz (lower) Second IF 455 kHz (lower) UHF: First IF 23.05 MHz (lower) Second IF 455 kHz (upper)
Receive sensitivity (12 dB SINAD):	-10 dB (-16 dB for JAIA method)
S/N ratio (at input 0.5 V)	30 dB or more
Squelch open sensitivity	-14 dB
Audio output power	200 mW (distortion 10% at 8 Ω)

3.3 Transmitter

— Measurements are made in accordance with EIA-J Standard ART-03. —

RF output power	Hi: 2.4 W (with VHF CBT151) 2.0 W (with UHF CBT151) 2.8 W (with VHF CNB150, CNB151, CNB153) 2.5 W (with UHF CNB150, CNB151, CNB153) 5.0 W (with VHF CNB152) 5.0 W (with UHF CNB152) Mid: 2.3 W (with VHF CBT151) 1.8 W (with UHF CBT151) 2.5 W (with VHF CNB150, CNB151, CNB153) 2.5 W (with UHF CNB150, CNB151, CNB153) Lo: 0.35 W (VHF/UHF)
Spurious ratio	-60 dB or better
Maximum frequency deviation	± 5.0 kHz
Modulation method	Reactance modulation

3.4 Internal Touch Tone Board

— Decoder —

Squelch open sensitivity: ≤ 20 dB SINAD
(* The squelch open sensitivity refers to the value when the conditions a)–d) to follow are met.)

- When the frequency response of modulation is flat.
- When the frequency deviation with the "8" key is ± 3.2 kHz.
- When operation is made on paging mode 777*777.
- When signal is operated at the timing of 50 msec ON and 50 msec OFF for each digit of transmission code.

3.5 Accessory

Tone Squelch Board: CTN520

— Encoder —

Tone frequency (f): $67.0 \leq f \leq 250.3$ Hz
Tone frequency deviation within: $\leq \pm 5\%$
Output level (with VOL max.): ≥ 350 mV (at 179.9 Hz)
Tone frequency distortion: $\leq \pm 10\%$

— Decoder —

Open level: ≤ 25 mV (at 179.9 Hz)
Response time: ≤ 200 m Sec (at 166.2 Hz)
Current drain: ≤ 8 mA (max)

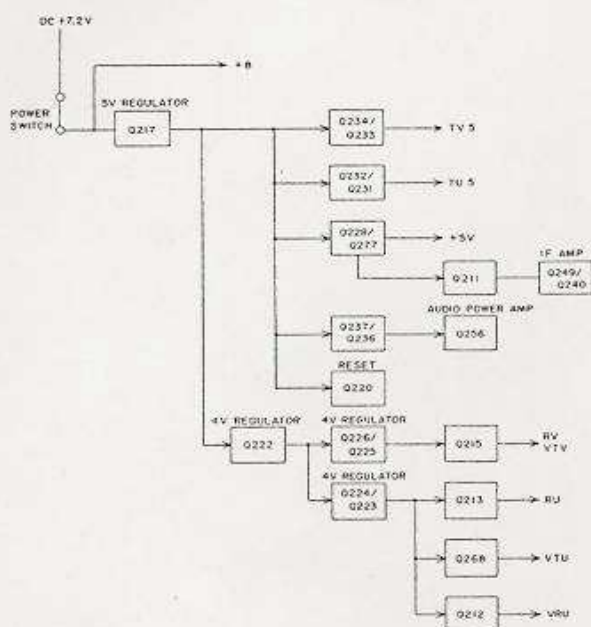
Performance specifications are nominal, unless otherwise indicated, and are subject to change without notice.

4. THEORY OF OPERATION

4.1 Power Supply

Those voltages on which C528 operates are summarized in the following.

Table 4-1 Voltages



4.2 PLL Synthesizer

4.2 PLL Synthesizer

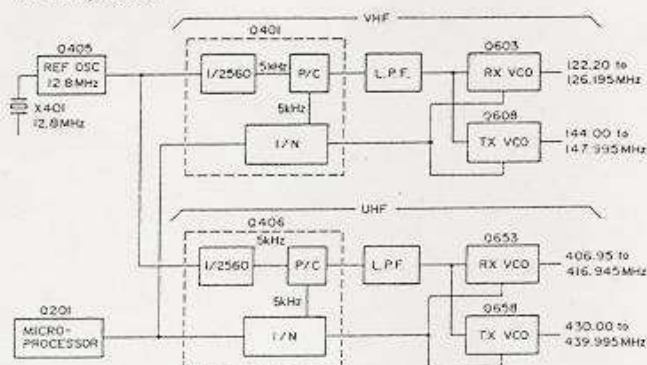


Figure 4-1 PLL Block Diagram

- VHF/UHF -

The PLL circuit contains two systems for VHF and UHF, respectively. Moreover, are incorporated total four VCO members, two for VHF transmission and reception, and other two for UHF transmission and reception. Each VCO oscillation frequency is determined by the information from the micro-processor. During reception, a VCO oscillation frequency is lower by 21.8 MHz than the display frequency in case of VHF and lower by 23.05 MHz in case of UHF. During transmission, a VCO oscillates just at the display frequency whether VHF or UHF.

- VHF -

The PLL local oscillation frequency is made by VCO Q603 for reception, and by VCO Q608 for transmission. The output signal of either VCO is input to the transmission or reception circuit. Part of this output signal is applied to the input pin 8 of the prescaler of the PLL IC by way of switching diode Q605, and is thereafter divided into 5 kHz (tuning step 25 kHz) by a programmable counter (into 6.25 kHz for tuning step 12.5 kHz). The PLL reference oscillation frequency which is 12.8 MHz due to X401 and Q405 is divided into the reference frequency of 5 kHz (or 6.25 kHz) by programmable counter Q401. This reference frequency is phase compared with the former 5 kHz (or 6.25 kHz) at phase comparator Q402. That phase difference is output to pin 5, from which it is then applied to the PLL loop filter (low pass filter). Thereby removing the 5 kHz (6.25 kHz) component, it is converted into a form of a DC voltage, which is in turn applied as the control voltage to vari-cap diode Q601 and Q602 for reception, and to vari-cap diode Q606 and Q607 for transmission. In the modulation circuit, the VCO signal is subject to direct modulation by vari-cap diode Q609.

- UHF -

The PLL local oscillation frequency is made by VCO Q653 for reception, and by VCO Q658 for transmission. The output signal of either VCO is input to the transmission or reception circuit. Part of this output signal is applied to the input pin 8 of the prescaler of the PLL IC by way of buffer amplifier Q655, and is thereafter divided into 5 kHz (tuning step 25 kHz) by a programmable counter (into 6.25 kHz for tuning step 12.5 kHz). The PLL reference oscillation frequency which is 12.8 MHz due to X401 and Q405 is common with VHF. The subsequent process up to the control voltage is the same as with VHF. The control voltage is applied to vari-cap diode Q651 and Q652 for reception, and to vari-cap diode Q656 and Q657 for transmission. In the modulation circuit, the VCO signal is subject to direct modulation by vari-cap diode Q659.

4.3 Receiver

The receiving system is a double-conversion super-heterodyne system with the first IF of 21.8 MHz (lower) and the second IF of 455 kHz (lower) for VHF, and the first IF of 23.05 MHz (lower) and the second IF of 455 kHz (upper) for UHF.

4.3.1 Front End

The RF signal picked up by the antenna is subject to discrimination between VHF and UHF by way of a duplexer (VHF: low pass filter, UHF: band pass filter).

- VHF -

The RF signal through the duplexer is applied to RF coil L408 by way of the antenna switching circuit. The signal tuned by L408, after being amplified by RF amplifier Q412, is applied to the gate of a first mixer Q413 by way of a band pass filter (L409, L410, L411).

– UHF –

The RF signal through the duplexer is applied to RF coil L417 by way of the antenna switching circuit. The signal tuned by L417, after being amplified by RF amplifier Q415, is further amplified by another RF amplifier Q416 through a band pass filter (L418, L419), after which it is then applied to the base of a first mixer Q417 by way of another band pass filter (L420, L421).

4.3.2 First Mixer

– VHF –

The receive signal (f_0) amplified by RF amplifier Q412 is applied to the gate of Q413, and the PLL local signal ($f_0 - 21.8$ MHz) is applied to the source of Q413. At Q413, there are created a sum and a difference of f_0 and ($f_0 - 21.8$ MHz). However, by a crystal filter circuit (L412, F401, F403), the difference of 21.8 MHz is selected, and after removal of spurious signal, applied to IF amplifier Q414.

– UHF –

The receive signal (f_0) amplified by RF amplifier Q416 and the PLL local signal ($f_0 - 21.8$ MHz) are applied to the base of Q417. At Q417, there are created a sum and a difference of f_0 and ($f_0 - 21.8$ MHz). However, by a crystal filter circuit (L425, F402, F404), the difference of 21.8 MHz is selected, and after removal of spurious signal, applied to IF amplifier Q421.

4.3.3 IF

– VHF –

The signal converted into the first IF is applied to a first IF amplifier Q414, and after amplification thereof, applied to the pin 20 of VHF detector circuit Q240. The first IF signal applied to the pin 20 is mixed with the second local signal of 21.345 MHz at the second mixer in Q240, after which it is then converted into the second IF of 455 kHz.

The second IF signal is output from pin 4 and, after removal of spurious signal by ceramic filter F201, is applied to pin 6.

The second IF signal applied to pin 6 is demodulated at the second IF limiter amplifier and quadrature detector circuit in Q240, and is output as an audio signal from pin 11.

– UHF –

The signal converted into the first IF is applied to a first IF amplifier Q421, and after amplification thereof, applied to the pin 20 of UHF detector circuit Q249. The first IF signal applied to the pin 20 is mixed with the second local signal of 23.05 MHz at the second mixer in Q249, after which it is then converted into the second IF of 455 kHz.

The second IF signal is output from pin 4 and, after removal of spurious signal by ceramic filter F202, is applied to pin 6.

The second IF signal applied to pin 6 is demodulated at the second IF limiter amplifier and quadrature detector circuit in Q249, and is output as an audio signal from pin 11.

4.3.4 Audio Circuitry

– VHF –

The audio signal output from the pin 11 of Q240, after making its AF frequency response of less than 3 kHz by the deemphasis circuit (R307, C272, R308, C273), is applied to muting circuit Q246. The output of Q246 is volume-controlled by AF volume control R312 and is amplified at audio preamplifier Q248 for driving speaker E101, after which it is applied to the pin 6 of audio power amplifier Q256 (1/2) for amplification.

– UHF –

The audio signal output from the pin 11 of Q249, after making its AF frequency response of less than 3 kHz by the deemphasis circuit (R358, C313, R359, C314), is applied to muting circuit Q253. The output of Q253 is volume-controlled by AF volume control R363.

With the speaker plug unconnected in to the SPU terminal (UHF external speaker jack), the signal is amplified at audio preamplifier Q248 by way of analog switch Q254, after which it is applied to the pin 6 of audio power amplifier Q256 (1/2) for amplification. At this time, VHF and UHF sounds are heard from the speaker at the same time.

With the speaker plug connected in to the SPU terminal (UHF external speaker jack), the signal is amplified at audio preamplifier Q255 with analog switch Q254 OFF, after which it is applied to the pin 7 of audio power amplifier Q256 (1/2) for amplification. At this time, the VHF audio signal is output from the SPV terminal (VHF external speaker jack), while from the SPU terminal the UHF audio signal is output, thus in a UHF/VHF separate manner.

4.3.5 Squelch Circuitry

– VHF –

Of the audio signal from the pin 11 of Q240, its 455 kHz component is removed by a low pass filter (R283, C256) and a squelch adjustment line is set by squelch control R285. Subsequently, the noise component alone is extracted by a high pass filter (C258, R287, C259) and is applied to pin 12. The noise component amplified in Q240 is output from pin 14, then rectified in Q241 into a DC voltage and applied to the pin 15 of Q201. At this time, when the DC voltage at pin 15 is 0.7 V or more, the squelch signal from pin 16 becomes "low" so that the squelch operates, whereas the DC voltage at pin 15 is less than 0.7 V, the squelch signal from pin 16 becomes "high" so that the squelch does not operate.

The squelch signal from pin 16 is input to the pin 24 of Q201 for use in control over a feature operation.

- UHF -

Of the audio signal from the pin 11 of Q249, its 455 kHz component is removed by a low pass filter (R339, C296) and a squelch adjustment line is set by squelch control R341. Subsequently, the noise component alone is extracted by a high pass filter (C298, R342, C299) and is applied to pin 12. The noise component amplified in Q249 is output from pin 14, then rectified in Q250 into a DC voltage and applied to the pin 15 of Q241. At this time, when the DC voltage at pin 15 is 0.7 V or more, the squelch signal from pin 16 becomes "low" so that the squelch operates, whereas the DC voltage at pin 15 is less than 0.7 V, the squelch signal from pin 16 becomes "high" so that the squelch does not operate. The squelch signal from pin 16 is input to the pin 24 of Q201 for use in control over a feature operation.

4.3.6 Signal Meter Circuitry

- VHF -

A part of the signal from the pin 6 of Q240, as the signal meter signal, is applied to semi-fixed resistor R277 and is amplified at Q242. The signal meter signal thus amplified is converted into a DC voltage at Q243 and is applied to the pin 32 of Q201, after which it is A/D converted and then works for the signal meter on the display.

- UHF -

A part of the signal from the pin 6 of Q249, as the signal meter signal, is applied to semi-fixed resistor R333 and is amplified at Q242. The signal meter signal thus amplified is converted into a DC voltage at Q252 and is applied to the pin 32 of Q201, after which it is A/D converted and then works for the signal meter on the display.

4.4 Transmitter

4.4.1 Microphone Amplifier and Modulation

- VHF/UHF -

The sound, after being converted into an audio signal through the internal or external microphone, is applied to microphone amplifier Q261 for amplification. Q261 consists of an single stage of an operation amplifier, including a pre-emphasis circuit. The audio signal thus amplified is input to the low pass filter consisting of an single stage of an operation amplifier. By the low pass filter in Q261 attenuates audio frequency of more than 3 kHz by 18 dB/oct. The deviation is level adjusted by semi-fixed resistor R395 (VHF) or R397 (UHF), and is applied to the VCO modulation circuit. The tone burst signal is level adjusted by semifixed resistor R392 (dev. adjustment), and through a low pass filter (R392, R393, C343), is applied to the noninverting input pin 3 of a low pass filter in Q261.

4.4.2 Power Amplifier

- VHF -

The signal output from the OTV pin of a VCO for VHF is amplified at younger amplifier Q424 and is input to the pin 1 of power module Q425. The signal amplified at Q424 is further amplified at Q425 to 5.0 W (at 13.8 V) in the high power operation.

The signal amplified at Q425 is output from pin 4, and after the sufficient attenuation of the second and third harmonics by way of a low pass filter, an antenna switching circuit and a low pass filter in the duplexer, is supplied to the antenna.

In the transmission output adjustment, by R497, the "high" power is set to 5.0 W, the "mid" power is to between 2.0 and 3.0 W, and the "low" power is to between 0.2 and 0.6 W.

- UHF -

The signal output from the OTV pin of a VCO for UHF is amplified at younger amplifier Q432 and is input to the pin 1 of power module Q433. The signal amplified at Q432 is further amplified at Q433 to 5.0 W (at 13.8 V) in the high power operation.

The signal amplified at Q433 is output from pin 5, and after the sufficient attenuation of the second and third harmonics by way of a low pass filter, an antenna switching circuit and a low pass filter in the duplexer, is supplied to the antenna.

In the transmission output adjustment, by R227, the "high" power is set to 5.0 W, the "mid" power is to 2.5 W and the "low" power is to 0.35 W.

4.4.3 A.P.C (Automatic Power Control) Circuit

- VHF -

A part of the RF output to a low pass filter (L406, C580, C435, C434) is detected by diode Q429 and converted into a DC voltage. The detection voltage converted into a DC voltage is input to the APC circuit (Q439, Q440, Q441, Q442). The detection voltage to the pin 1 of Q493 controls the APC voltage supplied to the VHF VCO by way of Q440, Q442 and Q441 to keep the RF output constant.

- UHF -

A part of the RF output to a low pass filter (L415, C539, C460, C581) is detected by diode Q434 and converted into a DC voltage. The detection voltage converted into a DC voltage is input to the APC circuit (Q439, Q440, Q441, Q442). The detection voltage to the pin 1 of Q493 controls the emitter current of younger amplifier Q432 by way of Q440, Q442, Q441 and Q443 to keep the RF output constant.

4.5 Control Section

The I/O port functions are as follows:

4.5.1 Microprocessor Q201

Table 4-2

Pin No.	I/O	Symbol	Description
1	O	OE	High: Output of output data control signal to touch tone decoder IC Q901.
2	O	PD	High: Output of power down signal to touch tone decoder IC Q901.
3	O	CSLV	VHF LCD driver Q101 chip select signal output.
4	O	CSLU	Low: UHF LCD driver Q102 chip select signal output.
5	O	D U/V	Output selection between VHF and UHF of IF detection signal to touch tone decoder IC Q901. High: VHF Low: UHF
6	O	LCSO	Serial data output to LCD drivers Q101, Q102, and touch tone decoder IC Q901.
7	I	RESET	Low: Microprocessor reset
8	—	X2	Ceramic oscillator connection pin
9	—	X1	Ceramic oscillator connection pin
10	O	LCKC	Data clock signal output to LD drivers Q101, Q102 and touch tone decoder IC Q901.
11	O	SQCU	UHF squelch operation High: Operation Low: Non-operation
12	O	SQCV	VHF squelch operation High: Operation Low: Non-operation
13	O	RX LED	Low: Reception of UHF or VHF, or both
14	I/O	KD3 (BUSY)	
15	I/O	KD2	
16	I/O	KD1	
17	I/O	KD1Ø	Keyboard data line
18	I/O	K3 (SQOF)	Low: When squelch OFF button is pressed
19	I/O	K2 (LAMP)	Low: When lamp button is pressed
20	I/O	K1 (VHF)	Low: VHF button is pressed
21	I/O	KØ (UHF)	Low: When UHF button is pressed
22	—	MTX2	
23	—	MTX1	Diode matrix line
24	I	SQLV	VHF squelch input signal High: Squelch non-operation Low: Squelch operation
25	I	SQLU	UHF squelch input signal High: Squelch non-operation Low: Squelch operation
26	—	VSS	Ground
27	I	CALL	High: When CALL button is pressed
28	I	BACK UP	High: Operation on regular power Low: Power backup
29	I	EU	High: The UP signal when the rotary channel selector is rotated clockwise is subject to signal counting.
30	I	ED	High: The DOWN signal when the rotary channel selector is rotated counterclockwise is subject to signal counting.
31	I	SMU	UHF signal meter analog signal input
32	I	SMV	VHF signal meter analog signal input
33	I	SQTU	UHF tone detection input with tone squelch connected High: For tone decoding
34	I	SQTV	VHF tone detection input with tone squelch connected High: For tone decoding
35	I	PTT	High: When PTT button is pressed
36	I	FUNC	High: When FUNCTION button is pressed
37	O	MUTE	High: Mute operation for touch tone output
38	—	—	
39	O	BZ/BST	Buzzer/tone square wave output
40	O	TEU	Tone squelch UHF tone data strobe signal output
41	I	SI (BST)	High: when tone burst is set
42	O	SO	Serial data signal output to PLL and tone squelch
43	O	SCK	Data clock signal output to PLL and tone squelch
44	I	UL	High: With VHF/UHF PLL not in phase lock Low: With VHF/UHF PLL in phase lock

Table 4-2

Pin No.	I/O	Symbol	Description
45	O	RU	Low: For UHF reception
46	O	RV	Low: For VHF reception
47	—	—	—
48	—	—	—
49	O	TUV	Low: Power supply to UHF VCO for transmission
50	O	TVV	Low: Power supply to VHF VCO for transmission
51	O	TU	Low: For UHF transmission
52	O	TV	Low: For VHF transmission
53	O	POW	High: Power backup Low: Operation on regular power
54	O	PEU	Data strobe signal output to UHF PLL High: Latch up
55	O	PEV	Data strobe signal output to VHF PLL High: Latch up
56	O	LAMP	Low: LCD back light lights.
57	—	VDD	Power supply pin (positive), approx. 4.3 V DC
58	I	VDD	Power supply pin (positive), approx. 4.3 V DC
59	O	H	Low: For high power operation of transmission
60	O	M	Low: For middle power operation of transmission
61	O	C/D (DV)	LCD drivers Q101/Q102 command/data signal output
62	O	MONI	High: Audio power amplifier ON
63	O	TEV	Tone squelch VHF tone data strobe signal output
64	O	EN	Touch tone encode shift register Q902 enable signal output High: Latch up

4.6 Built-in Touch Tone Board

4.6.1 Decoder

As to a part of the second IF signal from the pin 11 of Q240 or Q249, the inverter Q257 and VHF/UHF selection switch Q258 or Q259 are operated by the signal from the pin 5 of microprocessor Q201 to input the IF detection signal to the AFD pin. The IF detection signal input to the AFD pin is then entered to the pin 2 of DTMF encoder Q901. The signal thus entered is judged as to whether it is valid or invalid. When valid, from the pins 12 to 15 of Q901, the DTMF signal decoded into digital form is output to the D0 to D3 pins.

4.6.2 Encoder

The serial data output from the pin 6 of Q201 is entered to the pin 2 of 8-stage shift register Q902. The serial data thus entered is converted into a 8-bit parallel form, and output from pins 4 to 7 and 11 to 14.

The parallel signal output from these pins is input to the pins 4 to 6, 10 and 12 to 15 of DTMF encoder Q903, after which the DTMF signal corresponding to the input data is emitted from pin 17.

4.7 Tone Squelch Board: CTN520

4.7.1 Decoder

— VHF —

From the AFIV pin, the VHF IF detection signal is input to the pin 27 of Q801, and Q803 is switched according to the output of the pin 17 of Q801 so that the tone squelch signal is output to the SQTU pin. When the tone signal is in agreement, the pin 17 of Q801 becomes "high". Thereby, the SQTU pin goes open so that the squelch turns OFF.

When the tone signal is not in agreement, the pin 17 of Q801 becomes "low". Thereby, the SQTU pin becomes "high" so that the squelch turns ON.

— UHF —

From the AFIU pin, the UHF IF detection signal is input to the pin 27 of Q802, and Q804 is switched according to the output of the pin 17 of Q802 so that the tone squelch signal is output to the SQTU pin. When the tone signal is in agreement, the pin 17 of Q802 becomes "high". Thereby, the SQTU pin goes open so that the squelch turns OFF.

When the tone signal is not in agreement, the pin 17 of Q802 becomes "low". Thereby, the SQTU pin becomes "high" so that the squelch turns ON.

4.7.2 Encoder

— VHF —

The tone signal, after output from the pin 18 of Q801, is emitted to the TONEV pin through semi-fixed resistor R801.

— UHF —

The tone signal, after output from the pin 18 of Q802, is emitted to the TONEU pin through semi-fixed resistor R802.

4.8 Terminal Description

4.8.1 Transceiver Board

Terminal	Description
W401 (J201)	
RV	4.0 V DC for VHF reception
IFV	VHF 21.80 MHz IF line
5V	5.0 V DC line
MODU	UHF VCO modulation line
MODV	VHF VCO modulation line
VTU	UHF TX VCO 4.0 V DC line
VRU	UHF RX VCO 4.0 V DC line
TVS	5.0 V DC line for VHF transmission
VTV	VHF TX VCO 4.0 V DC line
UL	Unlock signal line High when unlock
SCK	PLL IC data clock signal
SO	PLL IC data signal
PEU	UHF PLL IC data strobe signal
PEV	VHF PLL IC data strobe signal
W402 (J202)	
TU5	5.0 V DC for UHF transmission
POW	TX power level line
RU	4.0 VDC for UHF transmission
+B	Line passing the power switch
IFU	UHF 23.05 MHz IF line
GND	Ground
W403 (J203)	
SPA	VHF speaker line
SPK	Internal speaker line
SPG	Speaker ground
SPS	Speaker switch (Low to High when SPU terminal is plugged)
SPU	UHF speaker line
MIC	Microphone line

Terminal	Description
W101	
GND	Ground
CALL	CALL signal line (High to Low when calling)
K0	Keyboard data lines
K1	
K2	
K3	
KD0	Keyboard data lines (Touch tone data lines)
KD1	
KD2	
KD3	
C/D (DV)	LCD driver command/data signal
CSTU	UHF LCD driver chip select signal
CSLV	VHF LCD driver chip select signal
MICG	High to Low when PTT button is pressed
MIC	Microphone line
LCSO	LCD driver touch tone data signal
LCCK	LCD driver touch tone data clock signal
AFD	Touch tone IF detection signal input line
PD	Touch tone decode IC Q901 Power down signal (High: Power down)
OE	Touch tone decode IC Q901 Output data control signal (High: Enabled)
EN	Touch tone encode shift register enable signal
DTMF	Touch tone signal output line
5V	5.0 V DC line
SP	Internal speaker line
SPG	Speaker ground
LAMP	Lamp line
GND	Ground

4.8.2 Built-in Touch Tone Board

Terminal	Description
—	
DTMF	Touch tone signal output line
AFD	Touch tone IF detection signal input line
5V	5.0 V DC line
EN	Touch tone encode shift register enable signal
OE	Touch tone decode output data control (High: Enabled)
PD	Touch tone decode power down signal (High: Power down)
DO	Touch tone data line
D1	
D2	
D3	
DV	Touch tone decode detection signal line (When detected: High)
GND	Ground
LCSO	Touch tone encode shift register data signal
LCCK	Touch tone encode shift register data clock signal

4.8.3 Tone Squelch Board

Terminal	Description
W801 (J204) (Tone Squelch Board)	
TONU	UHF TX tone signal output
TONV	VHF TX tone signal output
AFIU	UHF RX tone squelch IF detection input line
AFIV	VHF RX tone squelch IF detection input line
SO	Tone squelch IC data signal
SCK	Tone squelch data clock signal
SQTU	UHF RX tone squelch detection output (Squelch ON/OFF signal)
SQTV	VHF RX tone squelch detection output (Squelch ON/OFF signal)
GND	Ground
TEU	UHF tone data strobe signal
TEV	VHF tone data strobe signal
5V	5.0 V DC line

6. EXPLODED PARTS VIEW AND PARTS LIST

6.1 General

Information on most electrical and mechanical parts is included in the parts list. The parts are listed by reference symbols in alpha-numeric order.

6.2 Chip Parts

First through fourth digital of part number indicates chip part as follows:

– CAPACITORS –

DD4
DD5
DD9
DK4
DK5
DK9
DF9
EY

– SEMICONDUCTORS –

BA
HX
HY
HZ

– RESISTORS –

RI
NI
NN

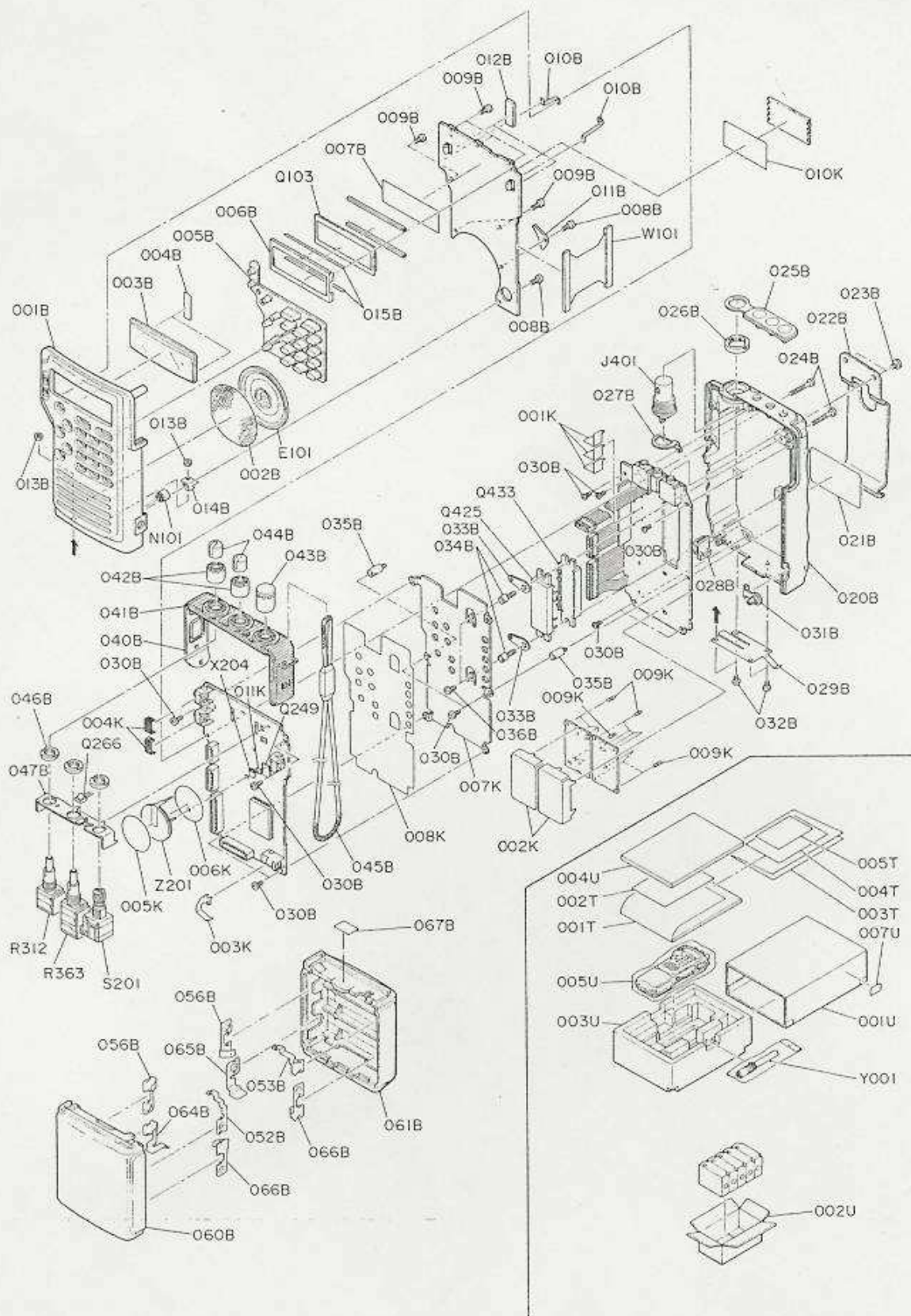
– INDUCTORS –

LU

6.3 Ordering Replacement Parts

Please note that dealer may not be able to fill replacement parts orders without such identifying information as:

- Reference Symbol
- Part Number
- Description
- Unit Model Serial Number



< 0027 >

REF. DESIG.	QTY	PART NO.	DESCRIPTION	REF. DESIG.	QTY	PART NO.	DESCRIPTION
0018	1	097X064030	FRONT CASE	E101	1	QK0036202R	INTERNAL SPEAKER
0028	1	097X107010	NET FOR INTERNAL SPEAKER	N101	1	MS5000026R	INTERNAL MICROPHONE
0038	1	097X158010	WINDOW FOR LCD	J401	1	YJ10002220	ANTENNA CONNECTOR
0048	2	061X120010	INSULATOR FOR LCD	W101	1	WE061X010R	27 PIN FLEXIBLE P.C. BOARD
0058	1	097X270010	BUTTON FOR KEYPAD	Y001	1	YR9901204R	FLEXIBLE ANTENNA
0068	1	097X303010	MASK FOR LCD				
0078	1	097X120020	INSULATOR FOR LCD	PA01	1	WZ097X0200	AF P.C. BOARD
0088	2	5130020580	SCREW FOR CONTROL P.C. BOARD				
0098	6	2962010010	SCREW FOR CONTROL P.C. BOARD	C201	1	DD95270300	27 PF +-5% CH
0108	2	032X129010	CONTACTOR FOR GROUND	C202	1	DD95270300	27 PF +-5% CH
0118	1	2962005010	CLAMPER FOR INTERNAL SPEAKER	C203	1	DK96102300	0.001 UF +-10%
0128	2	061X056010	BUFFER FOR LAMP	C204	1	DK96102300	0.001 UF +-10%
0138	2	53110203A0	NUT FOR GROUND SPRING	C205	1	DK96102300	0.001 UF +-10%
0148	1	097X123020	CONTACTOR FOR GROUND	C206	1	DK96102300	0.001 UF +-10%
0158	2	097X120040	INSULATOR FOR LCD	C207	1	DK56473200	0.047 UF +-10%
0208	1	097X064020	REAR CASE	C208	1	EY47502520	ELECT CAP 4.7 UF/25V
0218	1	097X861030	LABEL FOR C528	C209	1	DK96102300	0.001 UF +-10%
0228	1	097X258010	BELT CLIP	C210	1	DK96102300	0.001 UF +-10%
0238	2	5110260350	SCREW FOR BELT CLIP	C211	1	DK5668320R	0.068 UF +-10%
0248	2	032X010020	SCREW FOR REARCASE	C212	1	DK5668320R	0.068 UF +-10%
0258	1	097X053010	CAP FOR MICROPHONE/SPEAKER JACK	C213	1	DK96102300	0.001 UF +-10%
0268	1	224C011010	NUT FOR ANTENNA	C214	1	DK96102300	0.001 UF +-10%
0278	1	097X123010	CONTACTOR FOR ANTENNA	C215	1	DK56473200	0.047 UF +-10%
0288	1	061X1270030	BUTTON FOR LOCK	C216	1	EJ22700610	ELECT CAP 220 UF/6.3V
0298	1	061X116010	SPRING FOR LOCK	C217	1	DK96102300	0.001 UF +-10%
0308	1	51060203A0	SCREW FOR MAIN P.C. BOARD	C218	1	DK96102300	0.001 UF +-10%
0318	1	061X067020	CAP FOR DC IN JACK	C219	1	DK96102300	0.001 UF +-10%
0328	4	2962010060	SCREW FOR SPRING	C220	1	DK96102300	0.001 UF +-10%
0338	2	62031340W0	LUG FOR POWER MODULE	C221	1	DK96102300	0.001 UF +-10%
0348	2	097X101020	SUPPORT FOR SHIELD	C222	1	KC097X001R	TANTAL CAP 4.7 UF/6.3V
0358	2	097X101010	SUPPORT FOR SHIELD	C223	1	DK96102300	0.001 UF +-10%
0368	2	51060202A0	SCREW FOR SHIELD	C224	1	DK56473200	0.047 UF +-10%
0408	1	097X160010	BRACKET FOR ESCUTCHEON	C225	1	KC097X001R	TANTAL CAP 4.7 UF/6.3V
0418	1	097X063010	ESCUTCHEON	C226	1	EY33600620	ELECT CAP 33 UF/6.3V
0428	2	097X154030	KNOB FOR SQUELCH CONTROL	C227	1	DK96102300	0.001 UF +-10%
0438	1	097X154020	KNOB FOR ROTARY CHANNEL SELECTOR	C228	1	KC097X001R	TANTAL CAP 4.7 UF/6.3V
0448	2	097X154010	KNOB FOR VOLUME CONTROL	C229	1	EY33600620	ELECT CAP 33 UF/6.3V
0458	1	061X156010	HAND STRAP FOR C528	C230	1	DK96102300	0.001 UF +-10%
0468	3	2962011010	NUT FOR VOLUME CONTROL	C231	1	EY33600620	ELECT CAP 33 UF/6.3V
0478	1	061X160020	BRACKET FOR VOLUME CONTROL	C232	1	DK96102300	0.001 UF +-10%
0528	1	061X123010	CONTACTOR	C233	1	DK96102300	0.001 UF +-10%
0538	1	061X123020	CONTACTOR	C234	1	DK96102300	0.001 UF +-10%
0568	2	061X123050	CONTACTOR	C235	1	EY33600620	ELECT CAP 33 UF/6.3V
0608	1	339C064010	BATTERY CASE (FRONT)	C236	1	DK96102300	0.001 UF +-10%
0618	1	339C064020	BATTERY CASE (REAR)	C237	1	DK96102300	0.001 UF +-10%
0648	1	061X123130	CONTACTOR	C238	1	DK96102300	0.001 UF +-10%
0658	1	061X123140	CONTACTOR	C239	1	EY33600620	ELECT CAP 33 UF/6.3V
0668	2	061X123150	CONTACTOR	C240	1	DK96102300	0.001 UF +-10%
0678	1	159C861020	MONTHLY PRODUCTION LABEL	C241	1	EY10505020	ELECT CAP 1 UF/50V
001X	3	062X109020	SHIELD FOR UHF	C242	1	DK96102300	0.001 UF +-10%
002X	2	097X109020	SHIELD FOR VCO	C243	1	EJ1070161R	ELECT CAP 100 UF/16V
003X	1	061X123060	CONTACTOR FOR BATTERY CASE	C244	1	DK96102300	0.001 UF +-10%
004X	2	061X120020	INSULATOR FOR PIT BUTTON	C245	1	DK96102300	0.001 UF +-10%
005X	1	2962107020	SHEET FOR BATTERY	C246	1	DK96102300	0.001 UF +-10%
006X	1	2962107030	SHEET FOR BATTERY	C247	1	DD95229300	22 PF +-5% CH
007X	1	097X109010	SHIELD FOR RF P.C. BOARD	C248	1	DD95300300	30 PF +-5% CH
008X	1	097X120010	INSULATOR FOR SHIELD	C249	1	DK96102300	0.001 UF +-10%
009X	14	097X1254010	PIN FOR VCO	C250	1	DK9622320R	0.022 UF +-10%
010X	1	097X120030	INSULATOR FOR CTD	C251	1	DK9622320R	0.022 UF +-10%
011X	1	061X122010	ADHESIVE FOR CRYSTAL	C252	1	DD95101300	100 PF +-5% CH
001T	1	097X851010	OWNER'S MANUAL				
001U	1	097X804C20	SLEEVE FOR C528				
002U	5	097X805020	MASTER CARTON FOR C528				
003U	1	097X809010	CUSHION				
004U	1	2962809020	CUSHION LID				
005U	1	9011530010	POLYETHYLENE BAG FOR C528				
007U	3	9523019010	SERIAL NUMBER LABEL				

REF. DESIG.	QTY	PART NO.	DESCRIPTION
C253	1	DK96102300	0.001 UF +-10%
C254	1	KC0971004R	TANTAL CAP 22 UF/6.3V
C256	1	DK96103200	0.01 UF +-10%
C257	1	DK96102300	0.001 UF +-10%
C258	1	DK96222300	0.0022 UF +-10%
C259	1	DK96102300	0.001 UF +-10%
C260	1	DK9622320R	0.022 UF +-10%
C261	1	DK46224200	0.22 UF +-10%
C262	1	DK46224200	0.22 UF +-10%
C263	1	DK96102300	0.001 UF +-10%
C264	1	DK96102300	0.001 UF +-10%
C265	1	DD95330300	33 PF +-5% CH
C266	1	DK96102300	0.001 UF +-10%
C267	1	DK9622320R	0.022 UF +-10%
C268	1	DK96103200	0.01 UF +-10%
C269	1	DK46224200	0.22 UF +-10%
C270	1	DK5668320R	0.068 UF +-10%
C271	1	DK96103200	0.01 UF +-10%
C272	1	DK46104200	0.1 UF +-10%
C273	1	DK46104200	0.1 UF +-10%
C274	1	DK56473200	0.047 UF +-10%
C275	1	DK5668320R	0.068 UF +-10%
C277	1	DK96103200	0.01 UF +-10%
C278	1	DK96102300	0.001 UF +-10%
C279	1	DK96102300	0.001 UF +-10%
C280	1	DK96682300	0.0068 UF +-10%
C281	1	EY47502520	ELECT CAP 4.7 UF/25V
C282	1	DK9622320R	0.022 UF +-10%
C283	1	DK9627320R	0.027 UF +-10%
C284	1	DK96682300	0.0068 UF +-10%
C285	1	EY10505020	ELECT CAP 1 UF/50V
C286	1	DK5656320R	0.056 UF +-10%
C287	1	EJ22700610	ELECT CAP 220 UF/6.3V
C288	1	DD95220300	22 PF +-5% CH
C289	1	DD95300300	30 PF +-5% CH
C290	1	DK96102300	0.001 UF +-10%
C291	1	DK9622320R	0.022 UF +-10%
C292	1	DK9622320R	0.022 UF +-10%
C293	1	DD95101300	100 PF +-5% CH
C294	1	KC0971004R	TANTAL CAP 22 UF/6.3V
C295	1	DK9622320R	0.022 UF +-10%
C296	1	DK96103200	0.01 UF +-10%
C297	1	DK96102300	0.001 UF +-10%
C298	1	DK96223200	0.0022 UF +-10%
C299	1	DK96102300	0.001 UF +-10%
C301	1	DK9622320R	0.022 UF +-10%
C302	1	DK46224200	0.22 UF +-10%
C303	1	DK46224200	0.22 UF +-10%
C304	1	DK96102300	0.001 UF +-10%
C305	1	DK96102300	0.001 UF +-10%
C306	1	DD95330300	33 PF +-5% CH
C307	1	DK96102300	0.001 UF +-10%
C308	1	DK9622320R	0.022 UF +-10%
C309	1	DK96103200	0.01 UF +-10%
C310	1	DK46224200	0.22 UF +-10%
C311	1	DK5668320R	0.068 UF +-10%
C312	1	DK96103200	0.01 UF +-10%
C313	1	DK46104200	0.1 UF +-10%
C314	1	DK46104200	0.1 UF +-10%
C315	1	DK56473200	0.047 UF +-10%

REF. DESIG.	QTY	PART NO.	DESCRIPTION
C316	1	DK5668320R	0.068 UF +-10%
C318	1	DK96472300	0.0047 UF +-10%
C319	1	DK46224200	0.22 UF +-10%
C320	1	DK9622320R	0.022 UF +-10%
C321	1	DK96102300	0.001 UF +-10%
C322	1	DK9622320R	0.022 UF +-10%
C323	1	EY10505020	ELECT CAP 1 UF/50V
C324	1	DK5656320R	0.056 UF +-10%
C325	1	EJ22700610	ELECT CAP 220 UF/6.3V
C326	1	DK96102300	0.001 UF +-10%
C327	1	EJ22700610	ELECT CAP 220 UF/6.3V
C328	1	DK96102300	0.001 UF +-10%
C329	1	DK96102300	0.001 UF +-10%
C330	1	DK96103200	0.01 UF +-10%
C331	1	DK96472300	0.0047 UF +-10%
C332	1	DK9622320R	0.022 UF +-10%
C333	1	DK9622320R	0.022 UF +-10%
C334	1	DK46104200	0.01 UF +-10%
C335	1	DD95680300	68 PF +-5% CH
C336	1	DK96102300	0.001 UF +-10%
C337	1	EY47502520	ELECT CAP 4.7 UF/25V
C338	1	DK5668320R	0.068 UF +-10%
C339	1	DK96223200	0.0022 UF +-10%
C340	1	DK96471300	470 PF +-10%
C341	1	DK5668320R	0.068 UF +-10%
C343	1	DK46562300	0.0056 UF +-10%
C344	1	DK96102300	0.001 UF +-10%
C345	1	EY33600620	ELECT CAP 33 UF/6.3V
C346	1	DK96102300	0.001 UF +-10%
C347	1	DK5668320R	0.068 UF +-10%
C348	1	DK5668320R	0.068 UF +-10%
C349	1	DK96102300	0.001 UF +-10%
C350	1	DK96102300	0.001 UF +-10%
C351	1	DK96102300	0.001 UF +-10%
C352	1	DK96102300	0.001 UF +-10%
C353	1	DK96102300	0.001 UF +-10%
C354	1	DK96102300	0.001 UF +-10%
C355	1	DK96102300	0.001 UF +-10%
F201	1	FC455304E3	CERAMIC FILTER CF0455E
F202	1	FC455304E3	CERAMIC FILTER CF0455E
J201	1	YJ0700402R	15 PIN JACK TO W401
J202	1	YJ0700403R	8 PIN JACK TO W402
J203	1	YJ0700404R	6 PIN JACK TO W403
J204	1	YJ06011960	12 PIN JACK TO W401
J205	1	YJ04001530	DC IN JACK
L201	1	FC9002002R	FERRITE BEAD
L202	1	FC9002002R	FERRITE BEAD
L203	1	FC9002002R	FERRITE BEAD
L204	1	FC9002002R	FERRITE BEAD
L205	1	FC9002002R	FERRITE BEAD
Q201	1	HU1003706R	MICROPROCESSOR UP075108CF
Q202	1	HZ2000320R	DIODE MC2846
Q203	1	HZ2001221R	DIODE DA112
Q204	1	BA1000220R	DIGITAL TRANSISTOR RTIP441N
Q205	1	BA1001521R	DIGITAL TRANSISTOR DTA123YU
Q206	1	BA2000120R	DIGITAL TRANSISTOR RTIN441N
Q207	1	HZ2000320R	DIODE MC2846
Q208	1	HZ2000320R	DIODE MC2846
Q209	1	HZ2000320R	DIODE MC2846
Q210	1	HZ2000320R	DIODE MC2846

REF. DESIG.	QTY	PART NO.	DESCRIPTION	REF. DESIG.	QTY	PART NO.	DESCRIPTION
Q211	1	BA2001821R	DIGITAL TRANSISTOR FMA2	R203	1	N105000110	0 OHM 1/10W
Q212	1	BA1000120R	DIGITAL TRANSISTOR RT1P434M	R204	1	NN05223610	22 KOHM 1/16W +-5%
Q213	1	BA1000320R	DIGITAL TRANSISTOR RT1P141M	R205	1	NN05223610	22 KOHM 1/16W +-5%
Q214	1	BA2001821R	DIGITAL TRANSISTOR FMA2	R206	1	NN05223610	22 KOHM 1/16W +-5%
Q215	1	BA10006210	DIGITAL TRANSISTOR FMA4	R207	1	NN05223610	22 KOHM 1/16W +-5%
Q216	1	BA1000320R	DIGITAL TRANSISTOR RT1P141M	R208	1	NN05473610	47 KOHM 1/16W +-5%
Q217	1	HC98005530	5V REGULATOR S81250RG	R209	1	NN05474610	470 KOHM 1/16W +-5%
Q218	1	HZ2000420R	DIODE MC2846	R210	1	NN05473610	47 KOHM 1/16W +-5%
Q219	1	HZ2000320R	DIODE MC2846	R211	1	NN05474610	470 KOHM 1/16W +-5%
Q220	1	BA2000320R	DIGITAL TRANSISTOR RT1N141M	R212	1	NN05104610	100 KOHM 1/16W +-5%
Q221	1	HX341541AR	2SC4154(F)	R213	1	NN05471610	470 OHM 1/16W +-5%
Q222	1	HC9800453R	4V REGULATOR S81240AC	R215	1	N105000110	0 OHM 1/10W
Q223	1	BA2003121R	DIGITAL TRANSISTOR FFW1	R216	1	NN05000610	0 OHM 1/16W
Q224	1	HX207981A0	2SB798(DL)	R217	1	NN05223610	22 KOHM 1/16W +-5%
Q225	1	BA2003121R	DIGITAL TRANSISTOR FFW1	R218	1	NN05103610	10 KOHM 1/16W +-5%
Q226	1	HX10812180	2SA812(M5)	R219	1	NN05473610	47 KOHM 1/16W +-5%
Q227	1	BA2003121R	DIGITAL TRANSISTOR FFW1	R220	1	NN05000610	0 OHM 1/16W
Q228	1	HX207981A0	2SB798(DL)	R221	1	NN05103610	10 KOHM 1/16W +-5%
Q229	1	BA2003121R	DIGITAL TRANSISTOR FFW1	R222	1	NN05473610	47 KOHM 1/16W +-5%
Q230	1	HX207981A0	2SB798(DL)	R223	1	NN05103610	10 KOHM 1/16W +-5%
Q231	1	BA2003121R	DIGITAL TRANSISTOR FFW1	R224	1	NN05104610	100 KOHM 1/16W +-5%
Q232	1	HX207981A0	2SB798(DL)	R225	1	NN05101610	100 OHM 1/16W +-5%
Q233	1	BA2003121R	DIGITAL TRANSISTOR FFW1	R226	1	NN05101610	100 OHM 1/16W +-5%
Q234	1	HX207981A0	2SB798(DL)	R227	1	NY05030050	VARIABLE RESISTOR 50 KOHM
Q235	1	HZ2000420R	DIODE MC2848	R228	1	NY05030050	VARIABLE RESISTOR 50 KOHM
Q236	1	BA2003121R	DIGITAL TRANSISTOR FFW1	R229	1	NY05040050	VARIABLE RESISTOR 500 KOHM
Q237	1	HX207981A0	2SB798(DL)	R230	1	NN05104610	100 KOHM 1/16W +-5%
Q238	1	HD2002801R	DIODE V06C	R231	1	N105103110	10 KOHM 1/10W +-5%
Q239	1	HD2002801R	DIODE V06C	R232	1	NN05000610	0 OHM 1/16W
Q240	1	HC10013420	TK10420M	R233	1	NN05000610	0 OHM 1/16W
Q241	1	HZ20006020	DIODE MA714	R234	1	NN05000610	0 OHM 1/16W
Q242	1	BA2003121R	DIGITAL TRANSISTOR FFW1	R235	1	NN05470610	47 OHM 1/16W +-5%
Q243	1	HZ20006020	DIODE MA714	R236	1	N105000110	0 OHM 1/10W
Q244	1	BA2000120R	DIGITAL TRANSISTOR RT1N441M	R237	1	NN05473610	47 KOHM 1/16W +-5%
Q245	1	HZ2000420R	DIODE MC2846	R238	1	NN05000610	0 OHM 1/16W
Q246	1	HY101441AR	2SJ144(Y)	R239	1	NN05472610	4.7 KOHM 1/16W +-5%
Q247	1	HX341541AR	2SC4154(F)	R241	1	NN05473610	47 KOHM 1/16W +-5%
Q248	1	BA2003121R	DIGITAL TRANSISTOR FFW1	R242	1	NN05472610	4.7 KOHM 1/16W +-5%
Q249	1	HC10013420	TK10420M	R244	1	NN05472610	4.7 KOHM 1/16W +-5%
Q250	1	HZ20006020	DIODE MA714	R245	1	NN05101610	100 OHM 1/16W +-5%
Q251	1	BA2003121R	DIGITAL TRANSISTOR FFW1	R246	1	NN05473610	47 KOHM 1/16W +-5%
Q252	1	HZ20006020	DIODE MA714	R247	1	NN05000610	0 OHM 1/16W
Q253	1	HY101441AR	2SJ144(Y)	R248	1	NN05472610	4.7 KOHM 1/16W +-5%
Q254	1	HY101441AR	2SJ144(Y)	R249	1	NN05472610	4.7 KOHM 1/16W +-5%
Q255	1	HX341541AR	2SC4154(F)	R250	1	NN05473610	47 KOHM 1/16W +-5%
Q256	1	HC10067090	NJM2073M	R251	1	NN05103610	10 KOHM 1/16W +-5%
Q257	1	HC10185050	TC4569F	R252	1	NN05101610	100 OHM 1/16W +-5%
Q258	1	HC1025405R	TC4566F	R253	1	NN05473610	47 KOHM 1/16W +-5%
Q259	1	HC1025405R	TC4566F	R254	1	NN05562610	5.6 KOHM 1/16W +-5%
Q260	1	HC1025405R	TC4566F	R255	1	NN05223610	22 KOHM 1/16W +-5%
Q261	1	HC1005709R	NJM4558E	R256	1	NN05000610	0 OHM 1/16W
Q262	1	HZ30750050	ZENER DIODE 02C27.5V	R257	1	N105222110	2.2 KOHM 1/10W +-5%
Q263	1	BA2003221R	DIGITAL TRANSISTOR FFA9	R258	1	NN05000610	0 OHM 1/16W
Q264	1	HZ20008210	DIODE DA204U	R259	1	NN05101610	100 OHM 1/16W +-5%
Q265	1	HZ20008210	DIODE DA204U	R260	1	NN05473610	47 KOHM 1/16W +-5%
Q266	1	W11007702R	RX/TX LED	R261	1	NN05000610	0 OHM 1/16W
Q268	1	BA1000120R	DIGITAL TRANSISTOR RT1P434M	R262	1	NN05222610	2.2 KOHM 1/16W +-5%
Q269	1	HC1001753R	REGULATOR S80730AL	R263	1	NN05101610	100 OHM 1/16W +-5%
R201	1	NN05473610	47 KOHM 1/16W +-5%	R264	1	NN05473610	47 KOHM 1/16W +-5%
R202	1	NN05103610	10 KOHM 1/16W +-5%	R265	1	NN05472610	4.7 KOHM 1/16W +-5%

REF. DESIG.	QTY	PART NO.	DESCRIPTION
R266	1	NN05101610	100 OHM 1/16W +-5%
R267	1	NN05473610	47 KOHM 1/16W +-5%
R268	1	NN05473610	47 KOHM 1/16W +-5%
R269	1	NN05102610	1 KOHM 1/16W +-5%
R270	1	NN05102610	1 KOHM 1/16W +-5%
R271	1	NN05103610	10 KOHM 1/16W +-5%
R272	1	NN05101610	100 OHM 1/16W +-5%
R273	1	NN05473610	47 KOHM 1/16W +-5%
R274	1	NN0502261R	2.2 OHM 1/16W +-5%
R275	1	NN05152610	1.5 KOHM 1/16W +-5%
R276	1	NN05103610	10 KOHM 1/16W +-5%
R277	1	NY05030050	VARIABLE RESISTOR 50 KOHM
R278	1	NN05182610	1.8 KOHM 1/16W +-5%
R279	1	NN05473610	47 KOHM 1/16W +-5%
R280	1	NN05152610	1.5 KOHM 1/16W +-5%
R281	1	NN05470610	47 OHM 1/16W +-5%
R282	1	NN05103610	10 KOHM 1/16W +-5%
R283	1	NN05331610	330 OHM 1/16W +-5%
R284	1	NN05102110	1 KOHM 1/16W +-5%
R286	1	NN05000610	0 OHM 1/16W
R287	1	NN05332610	3.3 KOHM 1/16W +-5%
R288	1	NN05474610	470 KOHM 1/16W +-5%
R289	1	NN05222610	2.2 KOHM 1/16W +-5%
R290	1	NN05103610	10 KOHM 1/16W +-5%
R291	1	NN05104610	100 KOHM 1/16W +-5%
R292	1	NN05103610	10 KOHM 1/16W +-5%
R293	1	NN05105610	1 KOHM 1/16W +-5%
R294	1	NN05332610	3.3 KOHM 1/16W +-5%
R295	1	NN05474610	470 KOHM 1/16W +-5%
R296	1	NN05332610	3.3 KOHM 1/16W +-5%
R297	1	NN05101610	100 OHM 1/16W +-5%
R298	1	NN05104610	100 KOHM 1/16W +-5%
R299	1	NN05102610	1 KOHM 1/16W +-5%
R301	1	NN05472610	4.7 KOHM 1/16W +-5%
R302	1	NN05333610	39 KOHM 1/16W +-5%
R303	1	NN05223610	22 KOHM 1/16W +-5%
R304	1	NN05474610	470 KOHM 1/16W +-5%
R305	1	NN05104610	100 KOHM 1/16W +-5%
R306	1	NN05000610	0 OHM 1/16W
R307	1	NN05272610	2.7 KOHM 1/16W +-5%
R308	1	NN05472610	4.7 KOHM 1/16W +-5%
R309	1	NN05473610	47 KOHM 1/16W +-5%
R310	1	NN05474610	470 KOHM 1/16W +-5%
R311	1	NN05472610	4.7 KOHM 1/16W +-5%
R313	1	NN05151610	150 OHM 1/16W +-5%
R314	1	NN05103610	10 KOHM 1/16W +-5%
R315	1	NN05474610	470 KOHM 1/16W +-5%
R316	1	NN05103610	10 KOHM 1/16W +-5%
R317	1	NN05474610	470 KOHM 1/16W +-5%
R318	1	NN05474610	470 KOHM 1/16W +-5%
R319	1	NN05102610	1 KOHM 1/16W +-5%
R320	1	NN05154610	150 KOHM 1/6W +-5%
R321	1	NN05154610	150 KOHM 1/6W +-5%
R322	1	NN05222610	2.2 KOHM 1/16W +-5%
R323	1	NN05154610	150 KOHM 1/6W +-5%
R324	1	NN05154610	150 KOHM 1/6W +-5%
R325	1	NN05222610	2.2 KOHM 1/16W +-5%
R326	1	NN05000610	0 OHM 1/16W
R327	1	NN05223610	22 KOHM 1/16W +-5%
R328	1	NN05101610	100 OHM 1/16W +-5%

REF. DESIG.	QTY	PART NO.	DESCRIPTION
R329	1	NN05331610	330 OHM 1/16W +-5%
R330	1	NN0502261R	2.2 OHM 1/16W +-5%
R331	1	NN05152610	1.5 KOHM 1/16W +-5%
R332	1	NN05103610	10 KOHM 1/16W +-5%
R333	1	NY05030050	VARIABLE RESISTOR 50 KOHM
R334	1	NN05182610	1.8 KOHM 1/16W +-5%
R335	1	NN05473610	47 KOHM 1/16W +-5%
R336	1	NN05152610	1.5 KOHM 1/16W +-5%
R337	1	NN05470610	47 OHM 1/16W +-5%
R338	1	NN05103610	10 KOHM 1/16W +-5%
R339	1	NN05331610	330 OHM 1/16W +-5%
R340	1	NN05102610	1 KOHM 1/16W +-5%
R342	1	NN05332610	3.3 KOHM 1/16W +-5%
R343	1	NN05474610	470 KOHM 1/16W +-5%
R344	1	NN05222610	2.2 KOHM 1/16W +-5%
R345	1	NN05103610	10 KOHM 1/16W +-5%
R346	1	NN05104610	100 KOHM 1/16W +-5%
R347	1	NN05103610	10 KOHM 1/16W +-5%
R348	1	NN05105610	1 KOHM 1/16W +-5%
R349	1	NN05332610	3.3 KOHM 1/16W +-5%
R350	1	NN05474610	470 KOHM 1/16W +-5%
R351	1	NN05332610	3.3 KOHM 1/16W +-5%
R352	1	NN05101610	100 OHM 1/16W +-5%
R353	1	NN05104610	100 KOHM 1/16W +-5%
R354	1	NN05102610	1 KOHM 1/16W +-5%
R355	1	NN05472610	4.7 KOHM 1/16W +-5%
R356	1	NN05333610	39 KOHM 1/16W +-5%
R357	1	NN05223610	22 KOHM 1/16W +-5%
R358	1	NN05272610	2.7 KOHM 1/16W +-5%
R359	1	NN05472610	4.7 KOHM 1/16W +-5%
R360	1	NN05473610	47 KOHM 1/16W +-5%
R361	1	NN05474610	470 KOHM 1/16W +-5%
R362	1	NN05472610	4.7 KOHM 1/16W +-5%
R363	1	RD1103003R	VARIABLE RESISTOR 10 KOHM
R365	1	NN05223610	22 KOHM 1/16W +-5%
R366	1	NN05333610	39 KOHM 1/16W +-5%
R367	1	NN05334610	330 KOHM 1/16W +-5%
R368	1	NN05154610	150 KOHM 1/6W +-5%
R369	1	NN05821610	820 OHM 1/16W +-5%
R370	1	NN05332610	3.3 KOHM 1/16W +-5%
R371	1	NN05103610	10 KOHM 1/16W +-5%
R372	1	NN05104610	100 KOHM 1/16W +-5%
R373	1	NN05223610	22 KOHM 1/16W +-5%
R374	1	NN05101610	100 OHM 1/16W +-5%
R375	1	NN05331610	330 OHM 1/16W +-5%
R376	1	NN0502261R	2.2 OHM 1/16W +-5%
R377	1	NN05333610	33 KOHM 1/16W +-5%
R378	1	NN05222610	2.2 KOHM 1/16W +-5%
R379	1	NN05473610	47 KOHM 1/16W +-5%
R380	1	NN05473610	47 KOHM 1/16W +-5%
R381	1	NN05105610	1 KOHM 1/16W +-5%
R382	1	NN05333610	33 KOHM 1/16W +-5%
R383	1	NN05103610	10 KOHM 1/16W +-5%
R384	1	NN05333610	33 KOHM 1/16W +-5%
R385	1	NN05473610	47 KOHM 1/16W +-5%
R386	1	NN05273610	27 KOHM 1/16W +-5%
R387	1	NN05471610	470 OHM 1/16W +-5%
R388	1	NN05684610	680 KOHM 1/16W +-5%
R389	1	NN05474610	470 KOHM 1/16W +-5%
R390	1	NN05104610	100 KOHM 1/16W +-5%

REF. DESIG.	QTY	PART NO.	DESCRIPTION	REF. DESIG.	QTY	PART NO.	DESCRIPTION
R381	1	NN05333610	33 KOHM 1/16W +-5%	PH03	1	WZ097X1752	ROTARY CHANNEL SELECTOR P.C. BOARD
R392	1	NY05040050	VARIABLE RESISTOR 500 KOHM	S201	1	SR0202012R	ROTARY CHANNEL SELECTOR
R393	1	NN05473610	47 KOHM 1/16W +-5%	PL01	1	WZ097X2400	DISPLAY P.C. BOARD
R394	1	NN05473610	47 KOHM 1/16W +-5%	C101	1	DK9622320R	0.022 UF +-10%
R395	1	NY01020050	VARIABLE RESISTOR 10 KOHM	C102	1	DK9622320R	0.022 UF +-10%
R396	1	NN05103610	10 KOHM 1/16W +-5%	C103	1	KC097X002R	TANTAL CAP 10 UF/6.3V
R397	1	NY01020050	VARIABLE RESISTOR 10 KOHM	C104	1	DK9622320R	0.022 UF +-10%
R398	1	NN05103610	10 KOHM 1/16W +-5%	C105	1	DK9622320R	0.022 UF +-10%
R399	1	NN05224610	220 KOHM 1/16W +-5%	C106	1	DK9622320R	0.022 UF +-10%
R701	1	NN05224610	220 KOHM 1/16W +-5%	C107	1	DK96103200	0.01 UF +-10%
R702	1	NN05333610	330 OHM 1/16W +-5%	C108	1	DD95101300	100 PF +-5% CH
R703	1	NN05101610	100 OHM 1/16W +-5%	C109	1	DK96102300	0.001 UF +-10%
R704	1	NN05153610	15 KOHM 1/16W +-5%	C110	1	DK96102300	0.001 UF +-10%
R716	1	NN05104610	100 KOHM 1/16W +-5%	C111	1	DK96102300	0.001 UF +-10%
R717	1	NN05223610	22 KOHM 1/16W +-5%	C112	1	DK96102300	0.001 UF +-10%
R718	1	NN05221610	220 OHM 1/16W +-5%	C113	1	DK96102300	0.001 UF +-10%
R719	1	NN05104610	100 KOHM 1/16W +-5%	C114	1	DD91100300	10 PF +-0.5 PF CH
S202	1	SP0101131R	PTT BUTTON	C115	1	DD91100300	10 PF +-0.5 PF CH
S203	1	SP01011200	FUNCTION BUTTON	C116	1	DD91100300	10 PF +-0.5 PF CH
S204	1	SP0101121R	RESET BUTTON	C117	1	DD91100300	10 PF +-0.5 PF CH
X201	1	FQ0400402R	CERAMIC RESONATOR 4 MHZ	C118	1	DD91100300	10 PF +-0.5 PF CH
X202	1	JX2100131R	CRYSTAL RESONATOR 21.345 MHZ	C119	1	DD91100300	10 PF +-0.5 PF CH
X203	1	FM45530182	CERAMIC FILTER CDBH455C7	C120	1	DD91100300	10 PF +-0.5 PF CH
X204	1	JX2300131R	CRYSTAL RESONATOR 23.505 MHZ	C121	1	DD91100300	10 PF +-0.5 PF CH
X205	1	FM45530182	CERAMIC FILTER CDBH455C7	C122	1	DK96102300	0.001 UF +-10%
Z201	1	ZB0906002R	LITHIUM BATTERY	C123	1	DK96102300	0.001 UF +-10%
PD01	1	WZ097X0400	DTMF P.C. BOARD	C124	1	DK96102300	0.001 UF +-10%
C901	1	DK9622320R	0.022 UF +-10%	C125	1	DK96102300	0.001 UF +-10%
C902	1	DD95360300	36 PF +-5% CH	C126	1	DK96102300	0.001 UF +-10%
C903	1	DD95360300	36 PF +-5% CH	C127	1	DK96102300	0.001 UF +-10%
C904	1	DK9668320R	0.068 UF +-10%	C128	1	DK96102300	0.001 UF +-10%
C905	1	DK9622320R	0.022 UF +-10%	L101	1	FC9002002R	FERRITE BEAD
C906	1	KC097X001R	TANTAL CAP 4.7 UF/6.3V	L102	1	FC9002002R	FERRITE BEAD
C907	1	DK9622320R	0.022 UF +-10%	Q101	1	HC1020806R	UHF LCD DRIVER UPD7225GB
C908	1	DD9525030R	25 PF +-5% CH	Q102	1	HC1020806R	UHF LCD DRIVER UPD7225GB
C909	1	DD9525030R	25 PF +-5% CH	Q103	1	KZ0310432R	LCD LF7530M
Q901	1	HC10253050	TC35310F	Q104	1	HC10185050	TC4S69F
Q902	1	HC40940620	UPD4094BG	Q105	1	HC10185050	TC4S69F
Q903	1	HC10018320	LE40872	Q106	1	HZ2000420R	DIODE MC2848
Q904	1	HZ2000320R	DIODE MC2846	Q107	1	BA1000220R	DIGITAL TRANSISTOR RTIP441M
R901	1	NN05104610	100 KOHM 1/16W +-5%	Q108	1	HZ2000320R	DIODE MC2846
R902	1	NN05104610	100 KOHM 1/16W +-5%	Q109	1	HZ3001905R	ZENER DIODE 02CZ4.3Y
R903	1	NN05223610	22 KOHM 1/16W +-5%	Q110	1	HZ2001205R	DIODE 1SS272
R904	1	NN05223610	22 KOHM 1/16W +-5%	Q111	1	HZ2001205R	DIODE 1SS272
R905	1	NN05224610	220 KOHM 1/16W +-5%	Q112	1	HZ2001205R	DIODE 1SS272
R906	1	NN05224610	220 KOHM 1/16W +-5%	Q113	1	HZ2001205R	DIODE 1SS272
R907	1	NY05020050	VARIABLE RESISTOR 5 KOHM	Q114	1	HZ2000420R	DIODE MC2848
R908	1	NN05103610	10 KOHM 1/16W +-5%	R101	1	NN05470610	47 OHM 1/16W +-5%
X901	1	FQ0358404R	CERAMIC RESONATOR 3.579545 MHZ	R102	1	NN05332610	3.3 KOHM 1/16W +-5%
X902	1	FQ0358404R	CERAMIC RESONATOR 3.579545 MHZ	R103	1	NN05333610	33 KOHM 1/16W +-5%
PH01	1	WZ097X1752	VHF VOLUME CONTROL P.C. BOARD	R104	1	NN05103610	10 KOHM 1/16W +-5%
C276	1	DK9622320R	0.022 UF +-10%	R105	1	NN05103610	10 KOHM 1/16W +-5%
R312	1	RD0103009R	VARIABLE RESISTOR 10 KOHM	R106	1	NN05472610	4.7 KOHM 1/16W +-5%
PH02	1	WZ097X1762	UHF VOLUME CONTROL P.C. BOARD	R107	1	NN05000610	0 OHM 1/16W
R364	1	NN05151610	150 OHM 1/16W +-5%	R108	1	NN05104610	100 KOHM 1/16W +-5%
C317	1	DK9622320R	0.022 UF +-10%	R109	1	NN05103610	10 KOHM 1/16W +-5%
				R110	1	NN05103610	10 KOHM 1/16W +-5%

REF. DESIG.	QTY	PART NO.	DESCRIPTION
R111	1	NN05103610	10 KOHM 1/16W +-5%
R112	1	NN05472610	4.7 KOHM 1/16W +-5%
R113	1	NN05103610	10 KOHM 1/16W +-5%
R114	1	NN05103610	10 KOHM 1/16W +-5%
R115	1	NN05103610	10 KOHM 1/16W +-5%
R116	1	NN05103610	10 KOHM 1/16W +-5%
R117	1	NN05103610	10 KOHM 1/16W +-5%
R118	1	NN05103610	10 KOHM 1/16W +-5%
R119	1	NN05102610	1 KOHM 1/16W +-5%
R120	1	NN05102610	1 KOHM 1/16W +-5%
R121	1	NN05223610	22 KOHM 1/16W +-5%
R122	1	NN05223610	22 KOHM 1/16W +-5%
R123	1	NN05102610	1 KOHM 1/16W +-5%
R124	1	NN05102610	1 KOHM 1/16W +-5%
R125	1	NN05223610	22 KOHM 1/16W +-5%
R126	1	NN05223610	22 KOHM 1/16W +-5%
R127	1	NN05102610	1 KOHM 1/16W +-5%
R128	1	NN05102610	1 KOHM 1/16W +-5%
R129	1	NN05223610	22 KOHM 1/16W +-5%
R130	1	NN05223610	22 KOHM 1/16W +-5%
R131	1	NN05102610	1 KOHM 1/16W +-5%
R132	1	NN05102610	1 KOHM 1/16W +-5%
R133	1	NN05223610	22 KOHM 1/16W +-5%
R134	1	NN05223610	22 KOHM 1/16W +-5%
R135	1	NN05102610	1 KOHM 1/16W +-5%
R136	1	NN05102610	1 KOHM 1/16W +-5%
R137	1	NN05223610	22 KOHM 1/16W +-5%
R138	1	NN05102610	1 KOHM 1/16W +-5%
R139	1	NN05102610	1 KOHM 1/16W +-5%
R140	1	NN05223610	22 KOHM 1/16W +-5%
R141	1	NN05102610	1 KOHM 1/16W +-5%
R142	1	NN05102610	1 KOHM 1/16W +-5%
R143	1	NN05223610	22 KOHM 1/16W +-5%
R144	1	NN05102610	1 KOHM 1/16W +-5%
R145	1	NN05102610	1 KOHM 1/16W +-5%
R146	1	NN05223610	22 KOHM 1/16W +-5%
R147	1	NN05102610	1 KOHM 1/16W +-5%
R148	1	NN05102610	1 KOHM 1/16W +-5%
R149	1	NN05102610	1 KOHM 1/16W +-5%
R150	1	NN05102610	1 KOHM 1/16W +-5%
R151	1	NN05333610	33 KOHM 1/16W +-5%
R152	1	NN05101610	100 OHM 1/16W +-5%
R153	1	NN05102610	1 KOHM 1/16W +-5%
R154	1	NN05102610	1 KOHM 1/16W +-5%
R155	1	NN05102610	1 KOHM 1/16W +-5%
R156	1	NN05102610	1 KOHM 1/16W +-5%
R157	1	NN05102610	1 KOHM 1/16W +-5%
R158	1	NN05104610	100 KOHM 1/16W +-5%
R159	1	NN05000610	0 OHM 1/16W
V101	1	IN10050148	LCD LAMP
V102	1	IN10050148	LCD LAMP
PR01	1	WZ097X1712	RF P.C. BOARD
C401	1	DK96102300	0.001 UF +-10%
C402	1	DK95470300	47 PF +-5%
C403	1	KC097X002R	TANTAL CAP 10 UF/6.3V
C404	1	DK56473200	0.047 UF +-10%
C405	1	KC097X001R	TANTAL CAP 10 UF/6.3V
C406	1	DK96102300	0.001 UF +-10%

REF. DESIG.	QTY	PART NO.	DESCRIPTION
C407	1	DK56472300	0.047 UF +-10%
C408	1	DK96102300	0.001 UF +-10%
C409	1	DK96102300	0.001 UF +-10%
C410	1	CX11000030	TRIMMING CAP 0.001 UF
C411	1	DD95270300	27 PF +-5% CH
C412	1	DD9510136R	100 PF +-5% UJ
C413	1	DD9556036R	56 PF +-5% UJ
C414	1	DD96102300	0.001 UF +-10%
C415	1	DD96102300	0.001 UF +-10%
C416	1	DD90050300	5 PF +-0.25 PF CH
C417	1	DK46224200	0.22 UF +-10%
C418	1	KC097X002R	TANTAL CAP 10 UF/6.3V
C419	1	DK56473200	0.047 UF +-10%
C420	1	DD96102300	0.001 UF +-10%
C421	1	DD96102300	0.001 UF +-10%
C422	1	EY10601620	ELECT CAP 10 UF/16V
C423	1	KC097X001R	TANTAL CAP 4.7 UF/6.3V
C424	1	DD96102300	0.001 UF +-10%
C425	1	DD96102300	0.001 UF +-10%
C426	1	KC097X003R	TANTAL CAP 22 UF/6.3V
C427	1	DD96102300	0.001 UF +-10%
C428	1	DD96102300	0.001 UF +-10%
C429	1	DK96102300	0.001 UF +-10%
C434	1	DD95220300	22 PF +-5% CH
C435	1	DD91060300	6 PF +-0.5 PF CH
C436	1	DK96102300	0.001 UF +-10%
C437	1	DD95270300	27 PF +-5% CH
C438	1	DD95220300	22 PF +-5% CH
C439	1	DD95470300	47 PF +-5% CH
C440	1	DD90050300	5 PF +-0.25 PF CH
C441	1	DK96102300	0.001 UF +-10%
C442	1	DK96102300	0.001 UF +-10%
C443	1	DK96102300	0.001 UF +-10%
C444	1	DD91080300	8 PF +-0.5 PF CH
C445	1	DD90010300	1 PF +-0.25 PF CH
C446	1	DD91090300	9 PF +-0.5 PF CH
C447	1	DD90015300	1.5 PF +-0.25 PF CH
C448	1	DD91080300	8 PF +-0.5 PF CH
C449	1	DK96102300	0.001 UF +-10%
C450	1	DD95470300	47 PF +-5% CH
C451	1	DD95470300	47 PF +-5% CH
C452	1	DK96103200	0.01 UF +-10%
C453	1	DD90040300	4 PF +-0.25 PF CH
C454	1	DK96103200	0.01 UF +-10%
C455	1	DK96102300	0.001 UF +-10%
C457	1	DD91070300	7 PF +-0.5 PF CH
C458	1	DD91070300	7 PF +-0.5 PF CH
C459	1	DD90040300	4 PF +-0.25 PF CH
C460	1	DD95120300	12 PF +-5% CH
C461	1	DD55150300	15 PF +-5% CH
C462	1	DD90030300	3 PF +-0.25 PF CJ
C463	1	DD90030300	3 PF +-0.25 PF CJ
C464	1	CX10400010	TRIMMING CAP 6 PF
C465	1	DD90050300	5 PF +-0.25 PF CH
C466	1	DD90030300	3 PF +-0.25 PF CJ
C467	1	DK96102300	0.001 UF +-10%
C468	1	DD91090300	9 PF +-0.5 PF CH
C469	1	DD95220300	22 PF +-5% CH
C470	1	CX10160010	TRIMMING CAP 3 PF
C471	1	DD90010300	1 PF +-0.25 PF CH

REF. DESIG.	QTY	PART NO.	DESCRIPTION	REF. DESIG.	QTY	PART NO.	DESCRIPTION
C472	1	DD90010300	1 PF +-0.25 PF CK	C534	1	EJ10605010	ELECT CAP 10 UF/50V
C473	1	CX10160010	TRIMMING CAP 3 PF	C535	1	DK96102300	0.001 UF +-10%
C474	1	DD91070300	7 PF +-0.5 PF CK	C536	1	DK96102300	0.001 UF +-10%
C475	1	DD95150300	15 PF +-5% CH	C537	1	DK96102300	0.001 UF +-10%
C476	1	DK96102300	0.001 UF +-10%	C538	1	DK96102300	0.001 UF +-10%
C477	1	DD91080300	8 PF +-0.5 PF CH	C539	1	DD90020300	2 PF +-0.25 PF CK
C478	1	DD95180300	18 PF +-5% CH	C540	1	DD90010300	1 PF +-0.25 PF CK
C479	1	CX10160010	TRIMMING CAP 3 PF	C541	1	DD90050300	5 PF +-0.25 PF CH
C480	1	DD90010300	1 PF +-0.25 PF CK	C542	1	DK96102300	0.001 UF +-10%
C481	1	DD90015300	1.5 PF +-0.25 PF CK	C543	1	DD55390300	39 PF +-5% CH
C482	1	CX10400010	TRIMMING CAP CAP 6 PF	C544	1	DK96102300	0.001 UF +-10%
C483	1	DD91080300	8 PF +-0.5 PF CH	C545	1	DK96102300	0.001 UF +-10%
C484	1	DD90050300	5 PF +-0.25 PF CH	C546	1	DK96102300	0.001 UF +-10%
C485	1	DD90050300	0.5 PF +-0.25 PF CK	C547	1	DK96102300	0.001 UF +-10%
C486	1	DK96102300	0.001 UF +-10%	C548	1	DK96102300	0.001 UF +-10%
C487	1	DK96102300	0.001 UF +-10%	C549	1	DK96102300	0.001 UF +-10%
C488	1	DD90050300	5 PF +-0.25 PF CH	C550	1	KC097X002R	TANTAL CAP 10 UF/6.3V
C489	1	DK96102300	0.001 UF +-10%	C551	1	DK96102300	0.001 UF +-10%
C490	1	DD91100300	10 PF +-0.5 PF CH	C552	1	DK96102300	0.001 UF +-10%
C491	1	DD91100300	10 PF +-0.5 PF CH	C553	1	DK96102300	0.001 UF +-10%
C492	1	DD95220300	22 PF +-5% CH	C554	1	DK96102300	0.001 UF +-10%
C493	1	DD95220300	22 PF +-5% CH	C555	1	DK96102300	0.001 UF +-10%
C494	1	DD90030300	3 PF +-0.25 PF CJ	C556	1	DK96102300	0.001 UF +-10%
C495	1	DD90030300	3 PF +-0.25 PF CJ	C557	1	DK96102300	0.001 UF +-10%
C496	1	DD95220300	22 PF +-5% CH	C558	1	DK96102300	0.001 UF +-10%
C497	1	DD95220300	22 PF +-5% CH	C559	1	DK96102300	0.001 UF +-10%
C498	1	DD90050300	0.5 PF +-0.25 PF CK	C560	1	DK96102300	0.001 UF +-10%
C499	1	DD95390300	39 PF +-5% CH	C561	1	DK96102300	0.001 UF +-10%
C501	1	DK96103200	0.01 UF +-10%	C562	1	DK96102300	0.001 UF +-10%
C502	1	DD91060300	6 PF +-0.5 PF CH	C563	1	DK96102300	0.001 UF +-10%
C503	1	DK96103200	0.01 UF +-10%	C564	1	DD90008300	0.75 PF +-0.25 PF CK
C504	1	DD90040300	4 PF +-0.25 PF CH	C567	1	KC097X001R	TANTAL CAP 4.7 UF/6.3V
C505	1	DD95150300	15 PF +-5% CH	C568	1	DK96102300	0.001 UF +-10%
C506	1	DD95150300	15 PF +-5% CH	C569	1	DK96102300	0.001 UF +-10%
C507	1	DK96102300	0.001 UF +-10%	C570	1	DK96102300	0.001 UF +-10%
C508	1	DK96102300	0.001 UF +-10%	C571	1	DK96102300	0.001 UF +-10%
C509	1	DK96102300	0.001 UF +-10%	C572	1	DK96102300	0.001 UF +-10%
C510	1	DK96102300	0.001 UF +-10%	C574	1	DK9622320R	0.022 UF +-10%
C511	1	DK96102300	0.001 UF +-10%	C577	1	DK96102300	0.001 UF +-10%
C512	1	DK9622320R	0.022 UF +-10%	C580	1	DD91100300	10 PF +-0.5 PF CH
C513	1	DD95120300	12 PF +-5% CH	C582	1	DD95150300	15 PF +-5% CH
C515	1	DK96102300	0.001 UF +-10%	C583	1	DD95101300	100 PF +-5% CH
C516	1	DK96102300	0.001 UF +-10%	C586	1	DD95330300	33 PF +-5% CH
C517	1	DD95150300	15 PF +-5% CH	F401	1	XU821800NS	CRYSTAL FILTER 21S150V MCF
C518	1	DD90020300	2 PF +-0.25 PF CK	F402	1	XU823050NS	CRYSTAL FILTER 23S150V MCF
C519	1	DD95220300	22 PF +-5% CH	J402	1	YJ0100307R	EXTERNAL MICROPHONE JACK
C520	1	DD90015300	1.5 PF +-0.25 PF CK	J403	1	YJ0100325R	EXTERNAL SPEAKER JACK (V,U)
C521	1	DD90050300	5 PF +-0.25 PF CH	J404	1	YJ0100325R	EXTERNAL SPEAKER JACK (U)
C522	1	DK96102300	0.001 UF +-10%	L401	1	LU01102010	CHIP COIL 1 OH
C523	1	DD95221300	220 PF +-5% CG	L402	1	LU21330010	CHIP COIL 33 NH
C524	1	DK96102300	0.001 UF +-10%	L403	1	LU01102010	CHIP COIL 1 OH
C525	1	DK96102300	0.001 UF +-10%	L404	1	FC9002002R	FERRITE BEAD
C526	1	DD90040300	4 PF +-0.25 PF CH	L405	1	NL030050HR	AIR COIL 2.5T
C527	1	DK96102300	0.001 UF +-10%	L406	1	NL030050JR	AIR COIL 3.5T
C528	1	DD90050300	5 PF +-0.25 PF CH	L407	1	NL030050KR	AIR COIL 4.5T
C529	1	DD90050300	5 PF +-0.25 PF CH	L408	1	LA5501812R	ANTENNA COIL
C530	1	DK96102300	0.001 UF +-10%	L409	1	LA5501813R	ANTENNA COIL
C531	1	DK96102300	0.001 UF +-10%	L410	1	LA5501813R	ANTENNA COIL
C532	1	DK96102300	0.001 UF +-10%	L411	1	LA5501813R	ANTENNA COIL
C533	1	DD91070300	7 PF +-0.5 PF CH	L412	1	LA5501814H	ANTENNA COIL

REF. DESIG.	QTY	PART NO.	DESCRIPTION
L413	1	ML030050GR	AIR COIL 1.5T
L414	1	ML030050GR	AIR COIL 1.5T
L415	1	ML030050GR	AIR COIL 1.5T
L416	1	ML030050GR	AIR COIL 1.5T
L417	1	ML030050GR	AIR COIL 1.5T
L418	1	ML030050GR	AIR COIL 1.5T
L419	1	ML030050GR	AIR COIL 1.5T
L420	1	ML030050GR	AIR COIL 1.5T
L421	1	ML030050GR	AIR COIL 1.5T
L422	1	ML030050GR	AIR COIL 1.5T
L423	1	ML030050GR	AIR COIL 1.5T
L424	1	ML030050GR	AIR COIL 1.5T
L425	1	LA5501814R	ANTENNA COIL
L426	1	LU21680010	CHIP COIL 68 NH
L427	1	FC9002002R	FERRITE BEAD
L428	1	ML030050JR	AIR COIL 3.5T
L429	1	LU01102010	CHIP COIL 1 OH
L430	1	FC9002002R	FERRITE BEAD
L431	1	FC9002002R	FERRITE BEAD
L432	1	LC1102017R	CHOKE COIL 1 OH
L433	1	ML030050JR	AIR COIL 3.5T
L434	1	ML030050GR	AIR COIL 1.5T
L435	1	ML030050GR	AIR COIL 1.5T
L436	1	ML030050GR	AIR COIL 1.5T
L437	1	LC1102017R	CHOKE COIL 1 OH
L438	1	FC9002002R	FERRITE BEAD
L439	1	FC9002002R	FERRITE BEAD
L440	1	FC9002002R	FERRITE BEAD
L441	1	FC9002002R	FERRITE BEAD
L442	1	FC9002002R	FERRITE BEAD
L443	1	FC9002002R	FERRITE BEAD
L444	1	FC9002002R	FERRITE BEAD
L445	1	FC9002002R	FERRITE BEAD
L446	1	LC1102013R	CHOKE COIL 1 OH
Q401	1	HC1004618R	VHF PLL IC M81504PF-G
Q402	1	BA2000220R	DIGITAL TRANSISTOR RT1N140N
Q403	1	HZ20018050	DIODE 1SS302
Q404	1	BA2003121R	DIGITAL TRANSISTOR FMW1
Q405	1	HX341541AR	2SC4154(F)
Q407	1	BA2000220R	DIGITAL TRANSISTOR RT1N140N
Q408	1	HZ20018050	DIODE 1SS302
Q409	1	HZ20006020	DIODE MA714
Q410	1	HZ2000320R	DIODE MC2846
Q411	1	BA1000220R	DIGITAL TRANSISTOR RT1P441N
Q412	1	HY203021BN	2SK302(Y2)
Q413	1	HY203021AR	2SK302(Y1)
Q414	1	HX327141CR	2SC2714(Y)
Q415	1	HX33583010	2SC3583(R34)
Q416	1	HX3342901R	2SC3429
Q417	1	HX3424500R	2SC4245
Q418	1	HZ2001705R	DIODE 1SS241
Q419	1	HX3342901R	2SC3429
Q420	1	HX3424500R	2SC4245
Q421	1	HX327141CR	2SC2714(Y)
Q422	1	HZ2002605R	DIODE 1SS309
Q423	1	HZ2001705R	DIODE 1SS241
Q424	1	HT32053000	2SC2053
Q425	1	HC10068200	M57796NA
Q426	1	HZ2001721R	DIODE RLS135
Q427	1	HZ2001721R	DIODE RLS135

REF. DESIG.	QTY	PART NO.	DESCRIPTION
Q428	1	BA2000320R	DIGITAL TRANSISTOR RT1N141N
Q429	1	HZ2002705R	DIODE 1SS239
Q430	1	HZ2000420R	DIODE MC2848
Q431	1	HX33356010	2SC3356(R24)
Q432	1	HX33357100	2SC3357(RE)
Q433	1	HC10067200	M57797NA
Q434	1	HZ2002705R	DIODE 1SS239
Q435	1	HZ2001721R	DIODE RLS135
Q436	1	HZ2001721R	DIODE RLS135
Q437	1	BA2000320R	DIGITAL TRANSISTOR RT1N141N
Q438	1	HZ2000420R	DIODE MC2848
Q439	1	HC10058210	FMS1
Q440	1	HZ3001105R	ZENER DIODE 02CZ2.4
Q441	1	HX111621A0	2SA1162(GR)
Q442	1	BA2000220R	DIGITAL TRANSISTOR RT1N140N
Q443	1	HX341541AR	2SC4154(F)
R401	1	NN05102610	1 KOHM 1/16W +-5%
R402	1	NN05223610	22 KOHM 1/16W +-5%
R403	1	NN05105610	1 MOHM 1/16W +-5%
R404	1	NN05101610	100 OHM 1/16W +-5%
R405	1	NN05471610	470 OHM 1/16W +-5%
R406	1	NN05471610	470 OHM 1/16W +-5%
R407	1	NN05153610	15 KOHM 1/16W +-5%
R408	1	NN05222610	2.2 KOHM 1/16W +-5%
R409	1	NN05102610	1 KOHM 1/16W +-5%
R410	1	NN05473610	47 KOHM 1/16W +-5%
R411	1	NN05473610	47 KOHM 1/16W +-5%
R412	1	NN05473610	47 KOHM 1/16W +-5%
R413	1	NN05223610	22 KOHM 1/16W +-5%
R414	1	NN05150610	15 OHM 1/16W +-5%
R415	1	NN05000110	0 OHM 1/10W
R416	1	NN05102610	1 KOHM 1/16W +-5%
R417	1	NN05104610	100 KOHM 1/16W +-5%
R418	1	NN05473610	47 KOHM 1/16W +-5%
R419	1	NN05332610	3.3 KOHM 1/16W +-5%
R420	1	NN05102610	1 KOHM 1/16W +-5%
R421	1	NN05101610	100 OHM 1/16W +-5%
R422	1	NN05102610	1 KOHM 1/16W +-5%
R423	1	NN05101610	100 OHM 1/16W +-5%
R424	1	NN05102610	1 KOHM 1/16W +-5%
R425	1	NN05821610	820 OHM 1/16W +-5%
R426	1	NN05103610	10 KOHM 1/16W +-5%
R427	1	NN05222610	2.2 KOHM 1/16W +-5%
R428	1	NN05473610	47 KOHM 1/16W +-5%
R429	1	NN05473610	47 KOHM 1/16W +-5%
R430	1	NN05473610	47 KOHM 1/16W +-5%
R431	1	NN05223610	22 KOHM 1/16W +-5%
R432	1	NN05102610	1 KOHM 1/16W +-5%
R433	1	NN05150610	15 OHM 1/16W +-5%
R434	1	NN05102610	1 KOHM 1/16W +-5%
R435	1	NN05563610	5.6 KOHM 1/16W +-5%
R436	1	NN05102610	1 KOHM 1/16W +-5%
R437	1	NN05103610	10 KOHM 1/16W +-5%
R438	1	NN05101610	100 OHM 1/16W +-5%
R439	1	NN05000610	0 OHM 1/16W
R440	1	NN05102610	1 KOHM 1/16W +-5%
R441	1	NI05000110	0 OHM 1/10W
R442	1	NI05102110	1 KOHM 1/10W +-5%
R443	1	NI05472110	4.7 KOHM 1/10W +-5%
R444	1	NN05153610	15 KOHM 1/16W +-5%

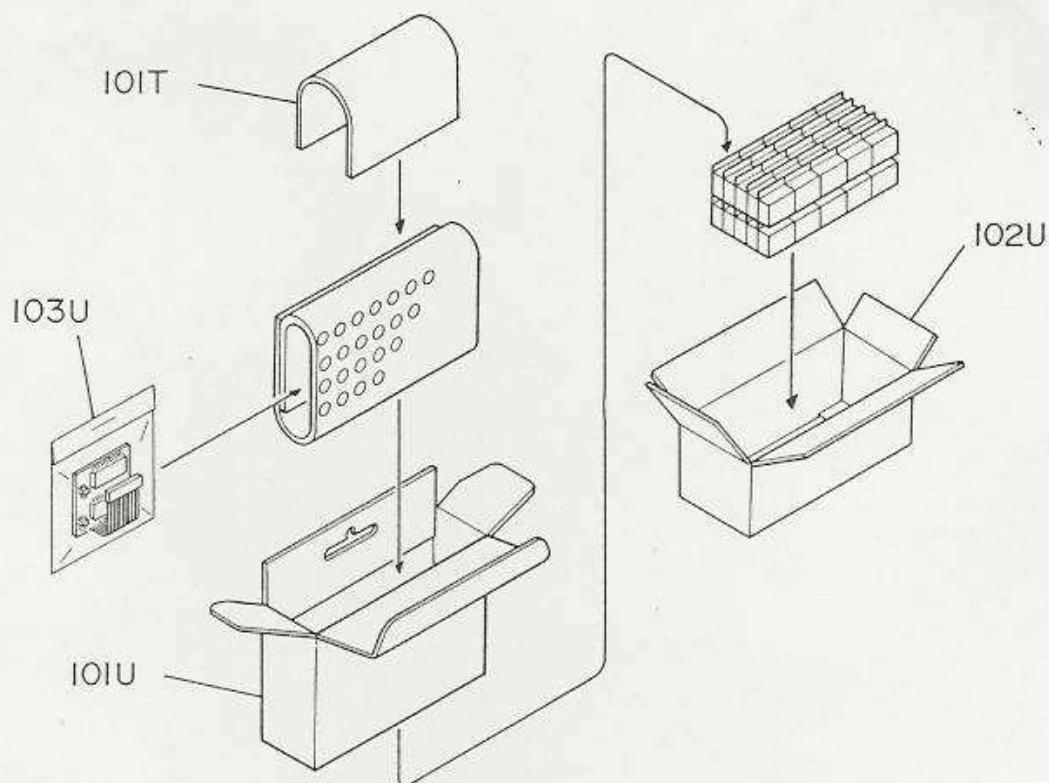
REF. DESIG.	QTY	PART NO.	DESCRIPTION	REF. DESIG.	QTY	PART NO.	DESCRIPTION
R445	1	N105472110	4.7 KOHM 1/10W +-5%	R507	1	NN0508261R	8.2 OHM 1/16W +-5%
R446	1	NN05153610	15 KOHM 1/16W +-5%	R508	1	NN05471610	470 OHM 1/16W +-5%
R447	1	N105102110	1 KOHM 1/10W +-5%	R509	1	NN05473610	47 KOHM 1/16W +-5%
R448	1	N105102110	1 KOHM 1/10W +-5%	R510	1	NN05101610	100 OHM 1/16W +-5%
R449	1	NN05101610	100 OHM 1/16W +-5%	R511	1	NN05101610	100 OHM 1/16W +-5%
R450	1	NN05470610	47 OHM 1/16W +-5%	R512	1	NN05103610	10 KOHM 1/16W +-5%
R451	1	NN05101610	100 OHM 1/16W +-5%	R513	1	NN05223610	22 KOHM 1/16W +-5%
R452	1	NN05152610	1.5 KOHM 1/16W +-5%	R514	1	NN05472610	4.7 KOHM 1/16W +-5%
R453	1	N105000110	0 OHM 1/10W	R515	1	NN05183610	18 KOHM 1/16W +-5%
R454	1	NN05472610	4.7 KOHM 1/16W +-5%	R516	1	NN05103610	10 KOHM 1/16W +-5%
R455	1	NN05470610	47 OHM 1/16W +-5%	R517	1	NN05223610	22 KOHM 1/16W +-5%
R456	1	NN05102610	1 KOHM 1/16W +-5%	R518	1	NN05103610	10 KOHM 1/16W +-5%
R457	1	NN05684610	680 KOHM 1/16W +-5%	R519	1	NN05102610	1 KOHM 1/16W +-5%
R458	1	NN05102610	1 KOHM 1/16W +-5%	R520	1	NN05103610	10 KOHM 1/16W +-5%
R459	1	NN05470610	47 OHM 1/16W +-5%	R521	1	NN05103610	10 KOHM 1/16W +-5%
R460	1	NN05153610	15 KOHM 1/16W +-5%	R522	1	NN05102610	1 KOHM 1/16W +-5%
R461	1	NN05562610	5.6 KOHM 1/16W +-5%	R523	1	NN05102610	1 KOHM 1/16W +-5%
R462	1	NN05331610	330 OHM 1/16W +-5%	R526	1	NN05223610	22 KOHM 1/16W +-5%
R463	1	NN0504761R	4.7 OHM 1/16W +-5%	R527	1	NN05223610	22 KOHM 1/16W +-5%
R464	1	NN05221610	220 OHM 1/16W +-5%	R528	1	NN05223610	22 KOHM 1/16W +-5%
R465	1	NN05153610	15 KOHM 1/16W +-5%	W401	1	Y80007069R	15 PIN CONNECTIVE CORD TO J201
R466	1	NN05562610	5.6 KOHM 1/16W +-5%	W402	1	Y80003014R	8 PIN CONNECTIVE CORD TO J202
R467	1	NN05331610	330 OHM 1/16W +-5%	W403	1	Y80003015R	6 PIN CONNECTIVE CORD TO J203
R468	1	NN0504761R	4.7 OHM 1/16W +-5%	X401	1	JX1200131R	CRYSTAL RESONATOR 12.8 MHZ
R469	1	NN05221610	220 OHM 1/16W +-5%				
R470	1	NN05333610	33 KOHM 1/16W +-5%	PV01	1	W2087X1730	VHF VCO P.C. BOARD
R471	1	NN05103610	10 KOHM 1/16W +-5%				
R472	1	NN05221610	220 OHM 1/16W +-5%	C601	1	DD9004036R	4 PF +-0.25 PF UJ
R473	1	NN05223610	22 KOHM 1/16W +-5%	C602	1	DD9004036R	4 PF +-0.25 PF UJ
R474	1	NN05103610	10 KOHM 1/16W +-5%	C603	1	DX96102300	0.001 UF +-10%
R475	1	NN05472610	4.7 KOHM 1/16W +-5%	C604	1	DD9001036R	1 PF +-0.25 PF UJ
R476	1	NN05331610	330 OHM 1/16W +-5%	C605	1	DD9001036R	1 PF +-0.25 PF UJ
R477	1	NN0504761R	4.7 OHM 1/16W +-5%	C606	1	DX96102300	0.001 UF +-10%
R478	1	NN05331610	330 OHM 1/16W +-5%	C607	1	DX96102300	0.001 UF +-10%
R479	1	NN05224610	220 KOHM 1/16W +-5%	C608	1	DD9510136R	100 PF +-5% UJ
R480	1	NN05000610	0 OHM 1/16W	C609	1	DD9004036R	4 PF +-0.25 PF UJ
R481	1	NN05470610	47 OHM 1/16W +-5%	C610	1	DD9004036R	4 PF +-0.25 PF UJ
R482	1	NN05102610	1 KOHM 1/16W +-5%	C611	1	DD9001036R	1 PF +-0.25 PF UJ
R483	1	NN05684610	680 KOHM 1/16W +-5%	C612	1	DX96102300	0.001 UF +-10%
R484	1	NN05102610	1 KOHM 1/16W +-5%	C613	1	DD9002036R	2 PF +-0.25 PF UJ
R485	1	NN05101610	100 OHM 1/16W +-5%	C614	1	DX96102300	0.001 UF +-10%
R486	1	NN05223610	22 KOHM 1/16W +-5%	C615	1	DD90010300	1 PF +-0.25 PF CK
R487	1	NN05181610	180 OHM 1/16W +-5%	C616	1	DD90050300	5 PF +-0.25 PF CK
R488	1	NN05471610	470 OHM 1/16W +-5%	C617	1	DX96102300	0.001 UF +-10%
R489	1	NN05471610	470 OHM 1/16W +-5%	L601	1	ML0320503R	AIR COIL 5.5T
R490	1	NN05102610	1 KOHM 1/16W +-5%	L602	1	LC1221015R	CHOKE COIL 2.2 OH
R491	1	NN0508261R	8.2 OHM 1/16W +-5%	L603	1	LC1221017R	CHOKE COIL 0.22 OH
R492	1	NN05471610	470 OHM 1/16W +-5%	L604	1	ML0300505R	AIR COIL 4.5T
R494	1	NN05101610	100 OHM 1/16W +-5%	L605	1	LC1221015R	CHOKE COIL 2.2 OH
R495	1	NN05101610	100 OHM 1/16W +-5%	L606	1	LU2110101R	CHIP COIL 0.1 OH
R496	1	NN05333610	33 KOHM 1/16W +-5%	Q601	1	HZ4000505R	VARI-CAP DIODE 1SV161
R497	1	NY05030050	VARIABLE RESISTOR 50 KOHM	Q602	1	HZ4000505R	VARI-CAP DIODE 1SV161
R498	1	NN05103610	10 KOHM 1/16W +-5%	Q603	1	HY202101YR	2SK210(Y2)
R499	1	NN05472610	4.7 KOHM 1/16W +-5%	Q604	1	HX3424500R	2SC4245
R501	1	NN05103610	10 KOHM 1/16W +-5%	Q605	1	HZ2001105R	DIODE 1SS268
R502	1	NY01020050	VARIABLE RESISTOR 1 KOHM	Q606	1	HZ4000505R	VARI-CAP DIODE 1SV161
R503	1	NN05101610	100 OHM 1/16W +-5%	Q607	1	HZ4000505R	VARI-CAP DIODE 1SV161
R504	1	NN05471610	470 OHM 1/16W +-5%	Q608	1	HY202101YR	2SK210(Y2)
R505	1	NN05471610	470 OHM 1/16W +-5%	Q610	1	HX3424500R	2SC4245
R506	1	NN05102610	1 KOHM 1/16W +-5%	Q609	1	HZ4000605R	VARI-CAP DIODE 1SV153

REF. DESIG.	QTY	PART NO.	DESCRIPTION
Q611	1	HX3424500R	2SC4245
R601	1	NN05222610	2.2 KOHM 1/16W +-5%
R602	1	NN05101610	100 OHM 1/16W +-5%
R603	1	NN05101610	100 OHM 1/16W +-5%
R604	1	NN05223610	22 KOHM 1/16W +-5%
R605	1	NN05103610	10 KOHM 1/16W +-5%
R606	1	NN05472610	4.7 KOHM 1/16W +-5%
R607	1	NN05102610	1 KOHM 1/16W +-5%
R608	1	NN05223610	22 KOHM 1/16W +-5%
R609	1	NN05222610	2.2 KOHM 1/16W +-5%
R610	1	NN05103610	10 KOHM 1/16W +-5%
R611	1	NN05103610	10 KOHM 1/16W +-5%
R612	1	NN05470610	47 OHM 1/16W +-5%
R613	1	NN05101610	100 OHM 1/16W +-5%
R614	1	NN05271610	270 OHM 1/16W +-5%
R615	1	NN05103610	10 KOHM 1/16W +-5%
R616	1	NN05472610	4.7 KOHM 1/16W +-5%
R617	1	NN05682610	6.8 KOHM 1/16W +-5%
R618	1	NN05472610	4.7 KOHM 1/16W +-5%
PU01	1	WZ097X1720	UHF VCO P.C. BOARD
C651	1	DK96102300	0.001 UF +-10%
C652	1	DD9510136R	100 PF +-5% UJ
C653	1	DD9515036R	15 PF +-5% UJ
C654	1	DD9515036R	15 PF +-5% UJ
C655	1	DK96102300	0.001 UF +-10%
C656	1	DD9002036R	2 PF +-0.25 PF UJ
C657	1	DK96102300	0.001 UF +-10%
C658	1	DD9002036R	2 PF +-0.25 PF UJ
C659	1	DK96102300	0.001 UF +-10%
C660	1	DD9510136R	100 PF +-5% UJ
C661	1	DK96102300	0.001 UF +-10%
C662	1	DD9106036R	6 PF +-0.5 PF UJ
C663	1	DD9110036R	0.3 PF +-0.5 PF UJ
C664	1	DD9000536R	0.53 PF +-0.25 PF UJ
C665	1	DK96102300	0.001 UF +-10%
C666	1	DD9001036R	1 PF +-0.25 PF UJ
C667	1	DK96102300	0.001 UF +-10%
C668	1	DD9002036R	2 PF +-0.25 PF UJ
C669	1	DD9002036R	2 PF +-0.25 PF UJ
C670	1	DK96102300	0.001 UF +-10%
L651	1	ML0320502R	AIR COIL 2.5T
L652	1	LC1102017R	CHOKO COIL 1 UH
L653	1	ML030050GR	AIR COIL 1.5T
L654	1	LC1102017R	CHOKO COIL 1 UH
L655	1	ML030050HR	AIR COIL 2.5T
L656	1	LC1102017R	CHOKO COIL 1 UH
L657	1	ML030050GR	AIR COIL 1.5T
L658	1	ML030050GR	AIR COIL 1.5T
Q651	1	HZ4000605R	VARI-CAP DIODE 1SV153
Q652	1	HZ4000605R	VARI-CAP DIODE 1SV153
Q653	1	HX33356010	2SC3356(R24)
Q654	1	HX33356010	2SC3356(R24)
Q655	1	HX33356010	2SC3356(R24)
Q656	1	HZ4000805R	VARI-CAP DIODE 1SV212
Q657	1	HZ4000805R	VARI-CAP DIODE 1SV212
Q658	1	HY205081A0	2SK508(K52)
Q659	1	HZ4000605R	VARI-CAP DIODE 1SV153
Q660	1	HX33356010	2SC3356(R24)

REF. DESIG.	QTY	PART NO.	DESCRIPTION
Q661	1	HX33356010	2SC3356(R24)
R651	1	NN05222610	2.2 KOHM 1/16W +-5%
R652	1	NN05102610	1 KOHM 1/16W +-5%
R653	1	NN05121610	120 OHM 1/16W +-5%
R654	1	NN05391610	390 OHM 1/16W +-5%
R655	1	NN05153610	15 KOHM 1/16W +-5%
R656	1	NN05223610	22 KOHM 1/16W +-5%
R657	1	NN05103610	10 KOHM 1/16W +-5%
R658	1	NN05472610	4.7 KOHM 1/16W +-5%
R659	1	NN05331610	330 OHM 1/16W +-5%
R660	1	NN05473610	47 KOHM 1/16W +-5%
R661	1	NN05222610	2.2 KOHM 1/16W +-5%
R662	1	NN05222610	2.2 KOHM 1/16W +-5%
R663	1	NN05101610	100 OHM 1/16W +-5%
R664	1	NN05103610	10 KOHM 1/16W +-5%
R665	1	NN05101610	100 OHM 1/16W +-5%
R666	1	NN05103610	10 KOHM 1/16W +-5%
R667	1	NN05472610	4.7 KOHM 1/16W +-5%
R668	1	NN05331610	330 OHM 1/16W +-5%
R669	1	NN05103610	10 KOHM 1/16W +-5%
R670	1	NN05472610	4.7 KOHM 1/16W +-5%
R671	1	NN05331610	330 OHM 1/16W +-5%

(0027)

Tone Squelch unit



REF. DESIG.	QTY	PART NO.	DESCRIPTION
PT01	1	WY112X0010	TONE SQUELCH P.C. BOARD
C801	1	DK9622320R	0.022 UF +-10%
C802	1	KC097X001R	TANTAL CAP 4.7 UF/6.3V
C803	1	KC097X001R	TANTAL CAP 4.7 UF/6.3V
C804	1	DD95470300	47 PF +-5%
C805	1	DD95470300	47 PF +-5%
C806	1	DK96102300	0.001 UF +-10%
C807	1	DK96103200	0.01 UF +-10%
C809	1	DK9622320R	0.022 UF +-10%
C810	1	KC097X001R	TANTAL CAP 4.7 UF/6.3V
C811	1	KC097X001R	TANTAL CAP 4.7 UF/6.3V
C812	1	DD95470300	47 PF +-5%
C813	1	DD95470300	47 PF +-5%
C814	1	DD96102300	0.001 UF +-10%
C815	1	DD96103200	0.01 UF +-10%
Q801	1	HC10008530	S-7119A
Q802	1	HC1000220R	S-7119A
Q803	1	BA1000220R	DIGITAL TRANSISTOR RT1P441M
Q804	1	BA1000220R	DIGITAL TRANSISTOR RT1P441M

REF. DESIG.	QTY	PART NO.	DESCRIPTION
101B	1	112X122010	ADHESIVE FOR CTN520 P.C. BOARD
200S	1	9510901190	MONTHLY PRODUCTION LABEL
101T	1	112X851210	USERS MANUAL
101U	1	112X801010	PACKING CASE
102U	50	112X805010	MASTER CARTON
103U	1	9011010010	POLYTHY BAG
R801	1	NY05040050	TRIM. RESISTOR 500 KOHM
R802	1	NY05040050	TRIM. RESISTOR 500 KOHM
R803	1	NN05223610	22 KOHM 1/16W +-5%
R804	1	NN05223610	22 KOHM 1/16W +-5%
W801	1	YB0003018R	CONNECTOR TO J204
X801	1	FQ0358403R	CERAMIC RESONATOR 3.579545 MHZ
X802	1	FQ0358403R	CERAMIC RESONATOR 3.579545 MHZ

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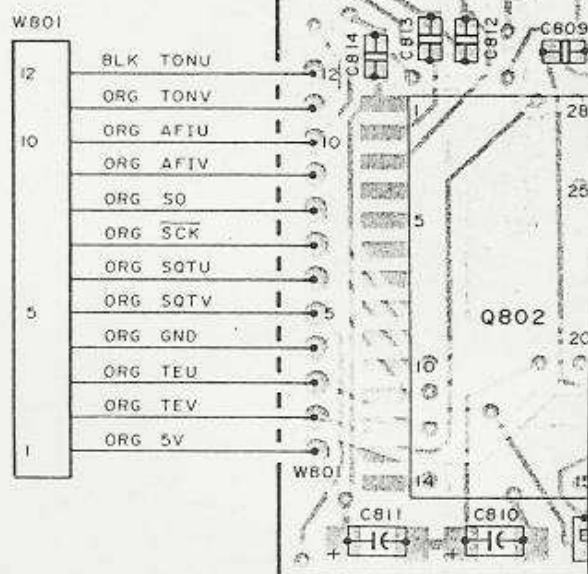
Q801, Q802 VOLTAGE

PIN -NO	TSQ OFF	TSQ RX	TONE TX
1	5.04V	5.03V	5.00V
2	3.17V	2.36V	2.33V
3	5.04V	2.45V	2.46V
4	5.01V	2.57V	4.97V
5	5.01V	5.00V	4.97V
6	5.01V	5.00V	4.97V
7	5.01V	5.00V	4.97V
8	5.01V	5.00V	4.97V
9	5.01V	5.00V	4.97V
10	0.01V	0.01V	0.01V
11	4.25V	4.25V	4.25V
12	0.01V	0.01V	0.01V
13	5.04V	5.03V	5.00V
14	0V	0V	0V
15	0V	0V	0V
16	0V	5.03V	4.81V
17	0V	0.08V TONE - HI 5.03V	0.07V
18	0V	2.51V	2.50V
19	2.52V	2.51V	2.50V
20	0V	0V	0V
21	0V	0V	0V
22	0V	0V	0V
23	2.52V	2.51V	2.49V
24	5.01V	5.00V	4.97V
25	0V	0V	0V
26	2.26V	2.26V	2.24V
27	2.26V	2.25V	2.24V
28	5.04V	5.03V	5.00V

TONE SQUELCH P.C. BOARD

TO PA01-
J204

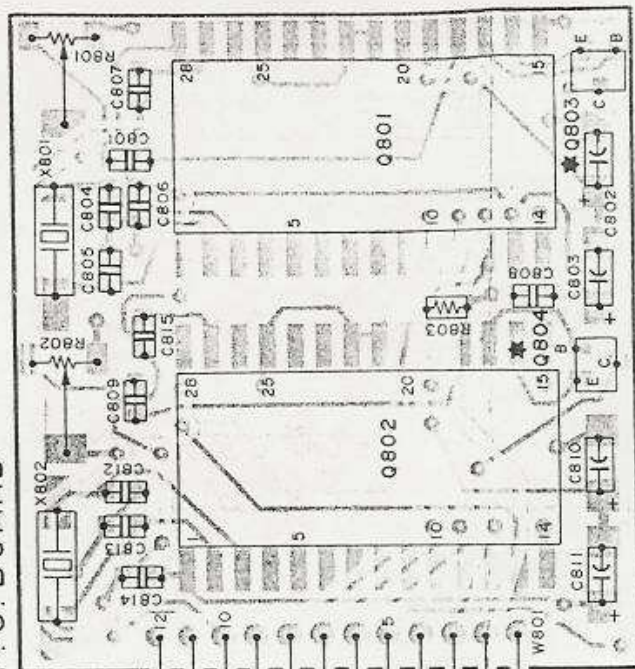
TONU
TONV
AFU
AFV
SO
SCK
SQTU
SQTV
GND
TEU
TEV
5V



Q801, Q802 VOLTAGE

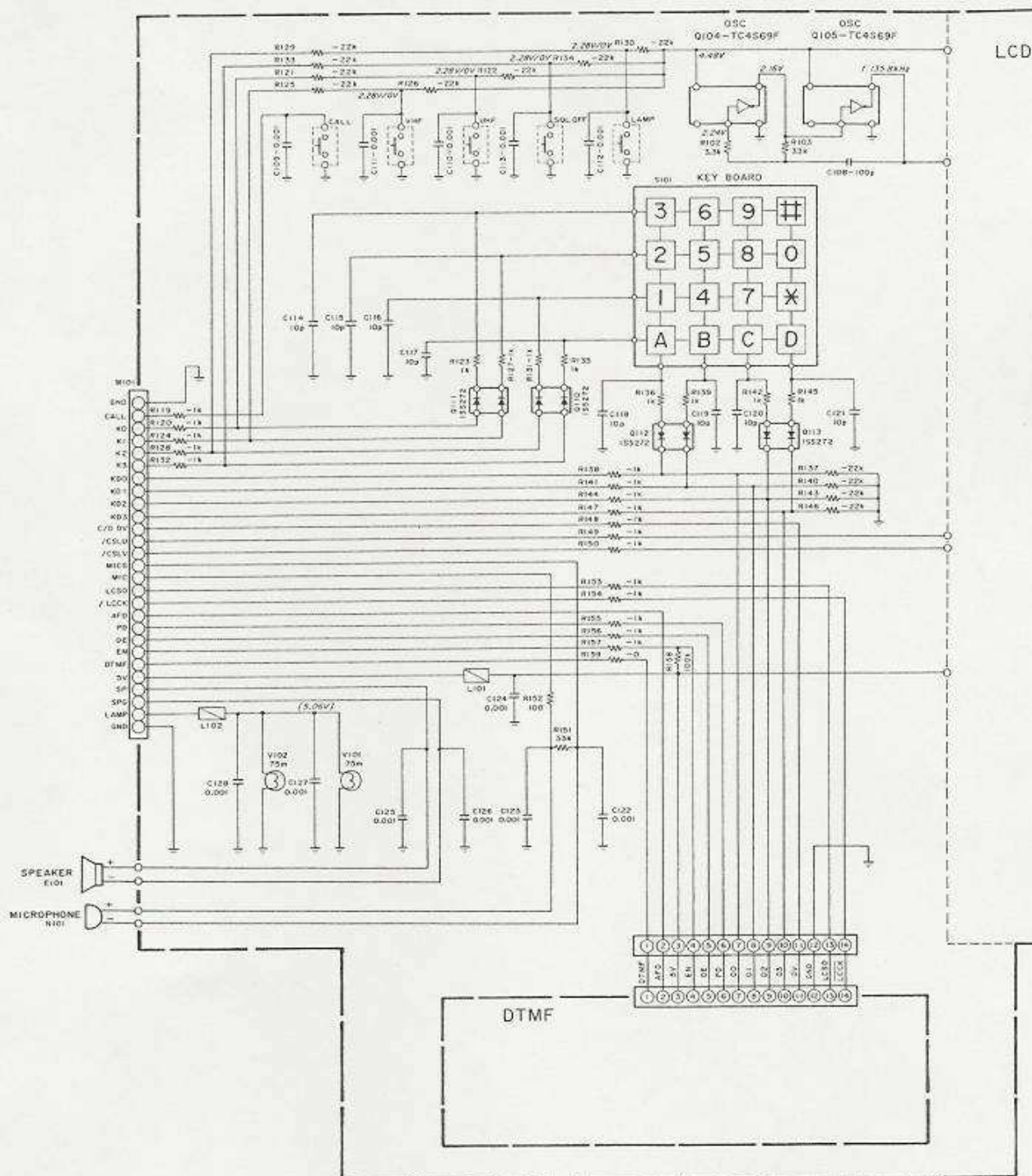
PIN -NO	TSQ OFF	TSQ RX	TONE TX
1	5.04V	5.03V	5.00V
2	3.17V	2.36V	2.33V
3	5.04V	2.45V	2.46V
4	5.01V	2.57V	4.97V
5	5.01V	5.00V	4.97V
6	5.01V	5.00V	4.97V
7	5.01V	5.00V	4.97V
8	5.01V	5.00V	4.97V
9	5.01V	5.00V	4.97V
10	0.01V	0.01V	0.01V
11	4.25V	4.25V	4.25V
12	0.01V	0.01V	0.01V
13	5.04V	5.03V	5.00V
14	0V	0V	0V
15	0V	0V	0V
16	0V	5.03V	4.81V
17	0V	0.08V TONE-HI 5.03V	0.07V
18	0V	2.51V	2.50V
19	2.52V	2.51V	2.50V
20	0V	0V	0V
21	0V	0V	0V
22	0V	0V	0V
23	2.52V	2.51V	2.49V
24	5.01V	5.00V	4.97V

TONE SQUELCH P.C. BOARD



P Δ <0000>

CONTROL

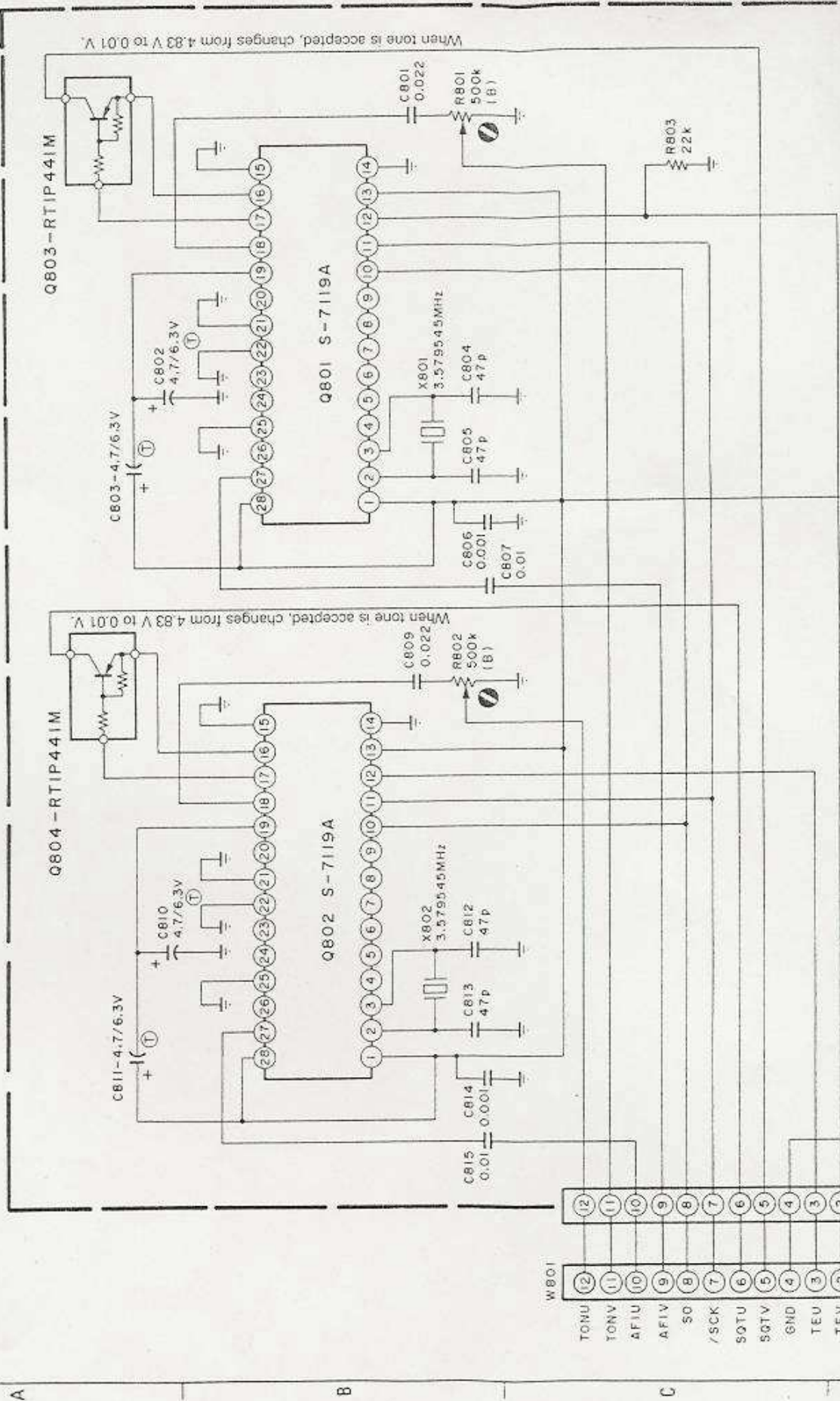


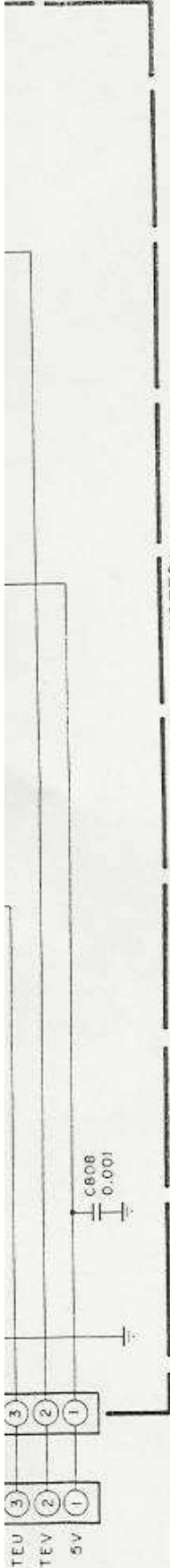
NOTES:

1. REFER TO PARTS LIST FOR COMPONENT VALUES.
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS, AND CAPACITOR VALUES ARE IN MICROFARADS.
3. VOLTAGE NOTATIONS ARE AS FOLLOWS:
() --- LAMP ON
NO MARKING --- RX VHF, UHF SOL OFF
4. NO MARKING CAPACITORS AND RESISTORS ARE ALL CHIP PARTS.

9. CTN520 COMPONENT OVERLAY AND SCHEMATIC DIAGRAMS OF TONE SQUELCH BOARD

1 2 3 4 5 6 7

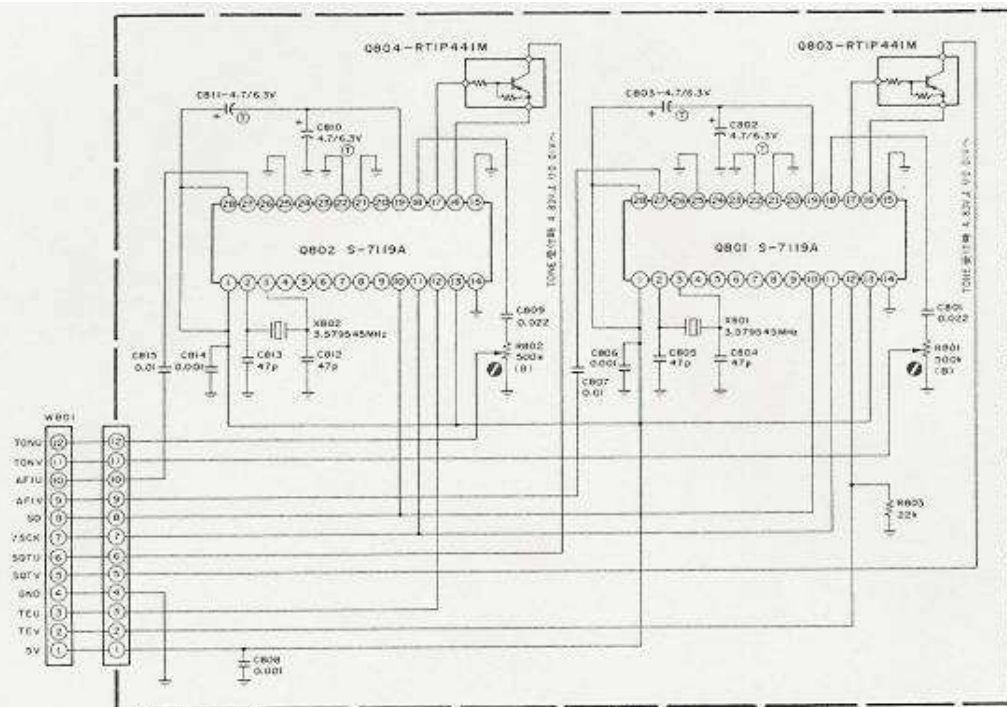




NOTES:

1. REFER TO PARTS LIST FOR COMPONENT VALUES.
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS, AND CAPACITOR VALUES ARE IN MICROFARADS.
3. NO MARKING CAPACITORS AND RESISTORS ARE ALL CHIP PARTS.

S/△ (0000)



NOTES:

1. REFER TO PARTS LIST FOR COMPONENT VALUES.
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS, AND CAPACITOR VALUES ARE IN MICROFARADS.
3. NO MARKING CAPACITORS AND RESISTORS ARE ALL CHIP PARTS.

PIN	T20	T50	T0NC
-R0	OFF	ON	TX
1	5.04V	5.03V	5.00V
2	3.17V	2.36V	2.33V
3	5.04V	2.45V	2.46V
4	5.01V	2.57V	4.97V
5	5.01V	5.00V	4.97V
6	5.01V	5.00V	4.97V
7	5.01V	5.00V	4.97V
8	5.01V	5.00V	4.97V
9	5.01V	5.00V	4.97V
10	0.01V	0.01V	0.01V
11	4.25V	4.25V	4.25V
12	0.01V	0.01V	0.01V
13	5.04V	5.03V	5.00V
14	0V	0V	0V
15	0V	0V	0V
16	0V	5.03V	4.91V
17	0V	0.08V	0.07V
18	0V	2.51V	2.50V
19	2.52V	2.51V	2.50V
20	0V	0V	0V
21	0V	0V	0V
22	3V	0V	0V
23	2.02V	2.01V	2.49V
24	5.01V	5.00V	4.97V
25	0V	0V	0V
26	2.26V	2.26V	2.24V
27	2.26V	2.25V	2.24V
28	5.04V	5.03V	5.00V

