

GX1500U



15 Watt, UHF
Mobile
Transceiver

CONTAINS:

Specifications
FCC Information
Installation Procedure
Operation
Theory of Operation
Performance Test
Alignment Procedure
Complete Illustrations
Parts Lists

SERVICE MANUAL



GX1500U

Fifteen Watt UHF/FM

Mobile Transceiver

This manual is intended for use by qualified technicians and includes all necessary information pertaining to the GX1500U operation, installation, circuit design, and maintenance. Changes which occur after the printed date will be incorporated through Service Manual Inserts or in a later Service Manual printing.

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FOREWORD

SCOPE OF THIS SERVICE MANUAL

This manual is offered to Standard Communications Corp. (SCC) service dealers to provide detailed service information for the indicated equipment. This information includes service diagrams, parts list, and printed circuit board layouts.

MODEL IDENTIFICATION

Standard Communications Corp. equipment is identified by the complete model number printed on the name plate. Please use this complete number when requesting information or replacement parts.

PRODUCTION CHANGES

As production or engineering changes become necessary, changes to the parts list or drawings will be indicated in the appropriate effectivity columns. Changes pertaining to a particular production run will reference the serial numbers affected. If the change affects only a specific model number, it will be noted in the model effectivity column.

SERVICE MANUAL REVISIONS

Changes which may occur after a Service Manual has been printed will be documented in a service manual insert. These inserts will provide service personnel with updated information and will include any drawing affected by the changes. These inserts will be incorporated into future printing of this document.

SAFETY INFORMATION

This equipment has been designed to meet all applicable federal safety and health regulations in effect at the time of manufacture. Proper operating and service techniques will result in continued compliance with these regulations.

1. Do not key the transmitter without an appropriate load connected to the output connector.
2. Do not hold the transmit switch depressed unless transmission is in progress.

3. Do not allow unauthorized persons to operate any radio transmitting equipment.
4. Do not operate a radio transmitter near unshielded electrical blasting caps or other explosive environments unless it is specifically approved for such use.

COMPUTER SOFTWARE COPYRIGHTS

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SPECIFICATIONS

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

GENERAL

Frequency Range	450 to 470 MHz
Number of Channels	4
Input Voltage	13.8 VDC
Current Drain	
Standby	500 mA
Transmit	5 A
Dimensions	
Height	50 mm
Width	142 mm
Depth	190 mm
Weight	2 lb. 14 oz.
Channel Spacing	25 KHz
Color	Black
Compliance	FCC Parts 22, 90, and 95
FCC Type Number	APV9T20789

RECEIVER

(Receiver measurements are made in accordance with EIA Standards RS 204C.)

Sensitivity:

12dB SINAD	.045 uV max.
20 dB Quieting	0.5 uV max.
Squelch Sensitivity	
Threshold	.025 uV max.
Modulation Bandwidth	+/-5.5 KHz
Selectivity	65 dB
Spurious and Image Rejection	55 dB
Intermodulation Rejection	60 dB
Audio Distortion	5%
Frequency Stability	+/-0.0005% or 5PPM (-30 to +60 degrees C)
Channel Spacing	25 KHz

TRANSMITTER

(Transmitter measurements are made in accordance with EIA Standards RS 152B.)

RF Power Output	15 Watts
Spurious and Harmonic Emissions	60 dB
Modulation	16K0F3E
Audio Distortion	5%
Frequency Stability	+/-0.0005% or 5PPM (-30 to +60 degrees C)
Channel Spacing	25 KHz

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GENERAL INFORMATION

1.1 LICENSING INFORMATION

The GX1500U mobile transceiver complies with U.S and Canadian airway regulations. Both regulations require that the modulation deviation and frequency of the transmitter be checked annually.

1.1.1 FCC Information

The GX1500U complies with the Federal Communications Commission (FCC) requirements that regulate the Business Radio Service. The user must know and comply with all applicable parts of the FCC Rules and Regulations. Rules applicable to each service may be ordered from:

SUPERINTENDANT OF DOCUMENTS

Government Printing Office
Washington, D.C. 20402

A valid station license and call sign issued by the FCC is required before operating the transceiver. It is the user's responsibility to apply for and obtain an FCC radio license.

The following data pertaining to the GX1500U should be included on the FCC license application.

Type Acceptance	. . . . .	APV9T20789
Type Accepted	. . . . .	FCC Parts 22, 90, and 95
Output Power	. . . . .	15 Watts
Emissions	. . . . .	.16K0F3E
Frequency	. . . . .	450 to 470 MHz

1.1.2 DOC Information

To obtain the Canadian Department of Communications (DOC) license application, contact their nearest field or regional office, or write:

Government of Canada
Department of Communications
300 Slater Street
Ottawa, Ontario
Canada, K1A 0C8

1.2 DESCRIPTION

The Standard Communications Corp. (SCC) GX1500U is a four (4) channel 15 Watt UHF/FM mobile transceiver. It operates in the 450 to 470 MHz frequency range. The GX1500U is a compact, synthesized, cloneable transceiver with built in CTCSS. A temperature compensating circuit maintains stable frequencies over varying temperatures.

1.2.1 Controls and Connections

1. POWER/VOLUME

Turns power on and off and adjusts the volume level. Turning this control clockwise increases the volume.

2. SQUELCH CONTROL

Turns off white noise. Turning the squelch control counterclockwise allows the white noise to be heard. Turning the squelch control clockwise will eventually turn the white noise off. Adjust the squelch control by starting from a point where white noise is heard, then turn the control slowly clockwise, just to the point where the white noise is gone.

3. CHANNEL SELECTOR

Selects the desired channel. Channels 1, 2, 3, or 4 can be selected by rotating this control.

4. MONITOR SWITCH

Switches the radio from TONE SQL to NOISE SQL. Select a channel where a tone is programmed in the EEPROM. TONE SQL is enabled when the microphone is hung up and the Monitor switch is turned off (push-button out). NOISE SQL is enabled when the Monitor switch is turned on (push button in). This switch is not functional when a tone is not programmed in the EEPROM.

5. CH LED

The transmit or receive channel is displayed.

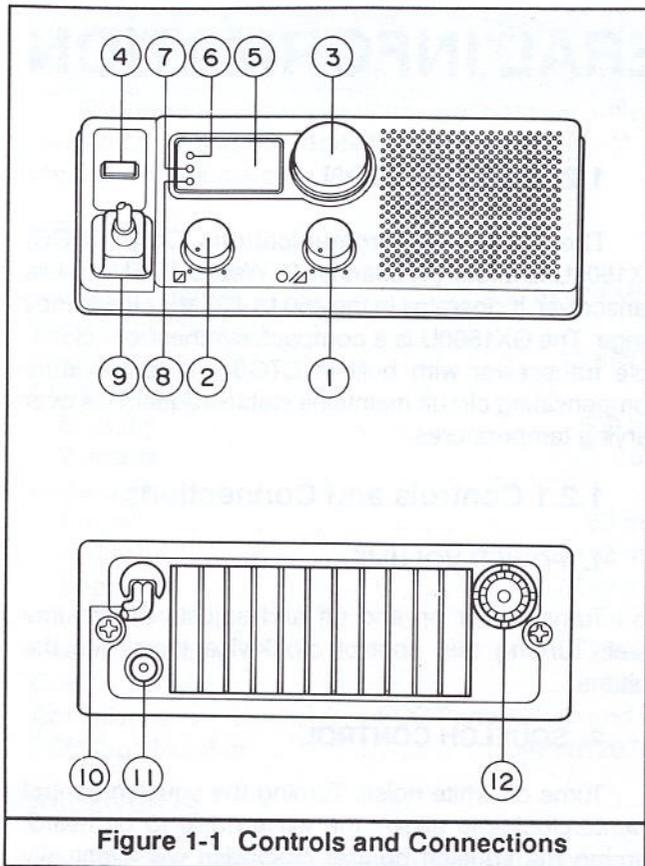


Figure 1-1 Controls and Connections

6. CALL LED

For future expansion of GX1500U features.

7. TX LED

The TX LED is illuminated during a transmission.

8. BUSY LED

The BUSY LED is illuminated when the squelch is open.

9. MIC Jack

This jack connects the microphone to the radio.

10. Power Cord

This cord connects a DC power source to the radio. The input voltage is 13.8 VDC (20%)

11. External Speaker Jack

This jack connects an external speaker to the radio. Use a speaker with an impedance of 4 or 8 ohms.

12. ANT Jack

This jack connects an antenna to the radio. Use antenna with an impedance of 50 ohms.

MICROPHONE

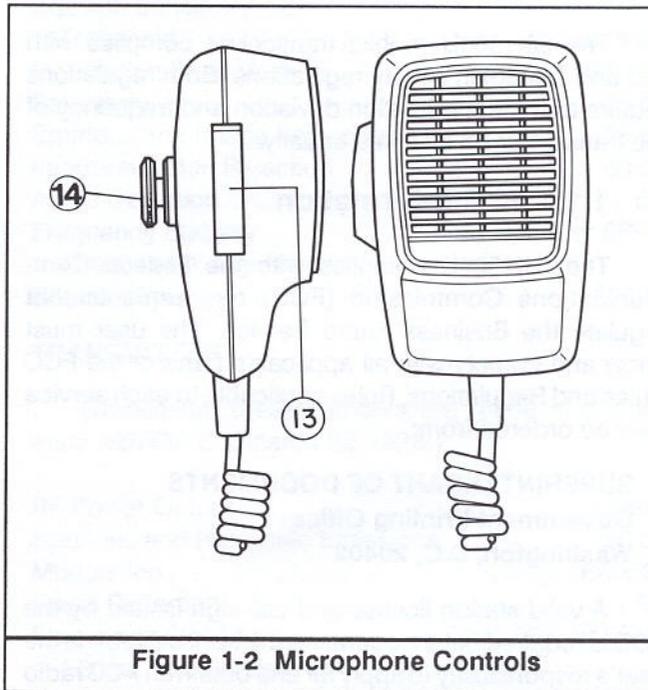


Figure 1-2 Microphone Controls

13. PTT Switch

Press the PTT switch to transmit.

14. MIC Hanger

Grounding this hanger allows the following to occur:

- (1) Disables the PTT switch
- (2) Turns on the Tone squelch if a tone is programmed for the selected channel

1.2.2 Installation

1. Visually inspect the radio shipping container for any physical damage.
2. Remove the radio and all hardware from the shipping container.
3. Remove the mounting bracket and attach to the mounting surface ensuring that ample space is provided for proper ventilation around the heatsink assembly.

4. Attach the radio to the mounting bracket as shown in Figure 1-3.

5. Connect the dc power leads to an appropriate power source, ensuring proper polarity is observed.

3. Position the Channel Selector so that the desired channel is displayed on the LED display.

4. Adjust the Squelch control clockwise to the point where the background noise disappears. If the

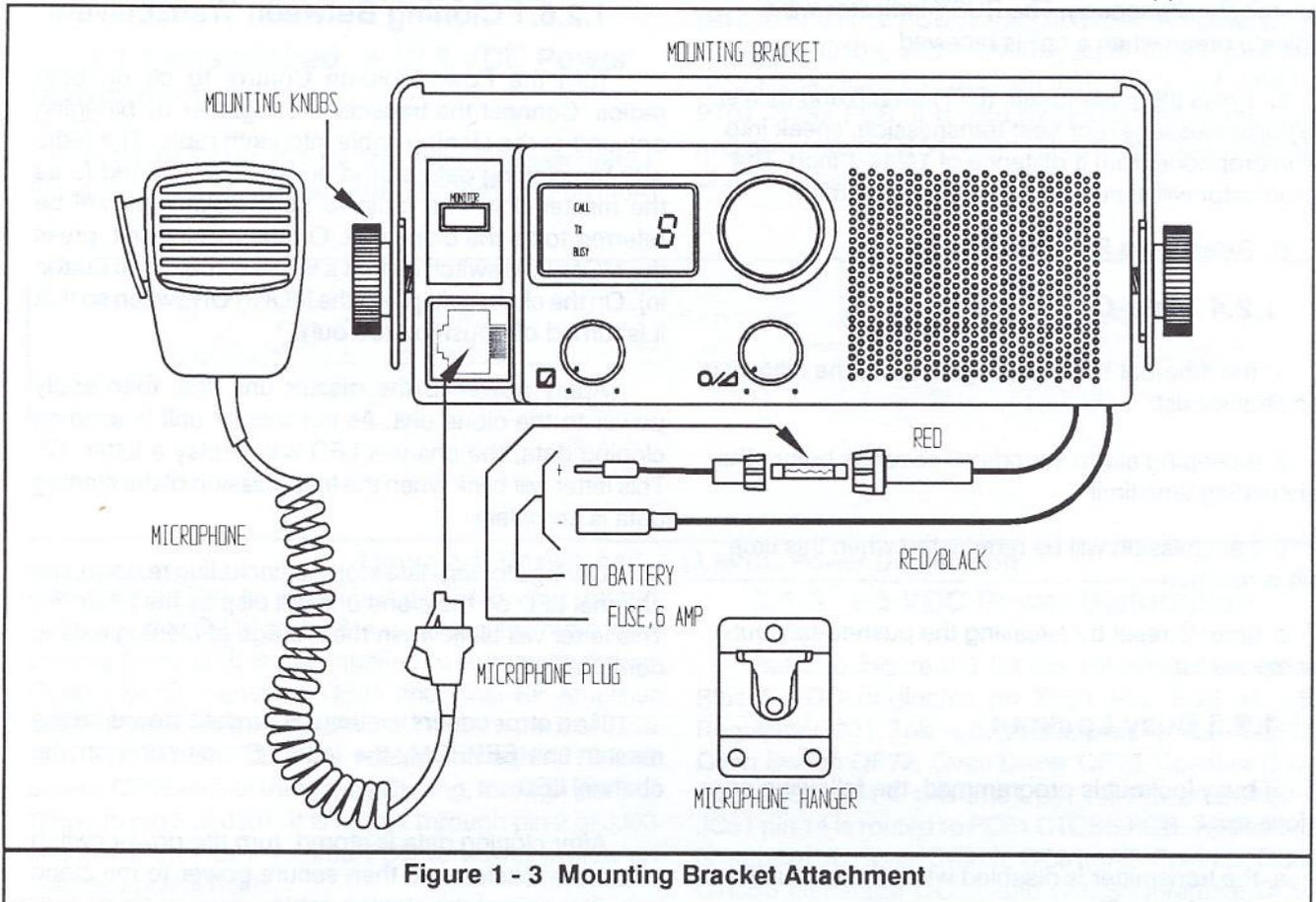


Figure 1 - 3 Mounting Bracket Attachment

6. Connect the antenna coaxial cable connector to the ANT jack.

1.2.3 Operating Instructions

1. Ensure the following connections are made:

a. the power cord with a 6 amp fuse is connected to the power source

b. the antenna is connected to the jack marked "ANT" on the back of the unit

c. the CMP872 Microphone is connected to the front panel jack

2. Turn the Power/Volume Control clockwise until the desired volume is obtained. If the channel is tone protected, press the MONITOR switch (pushbutton in) to hear audio through the speaker.

channel is tone protected, no signal or noise is heard through the speaker with the Squelch Control at minimum (fully counterclockwise), open the tone squelch by either removing the microphone from the bracket or by pressing the MONITOR switch (pushbutton in). Adjust the squelch control clockwise until the background noise disappears. This is the proper squelch setting, and the control should not be rotated beyond this point or the receiver sensitivity will be degraded.

5. When a message is received, adjust the volume to a desirable listening level.

6. Transmission is accomplished by performing the following operations:

a. Monitor the selected channel. It is an FCC requirement to monitor a channel before transmitting.

Press the MONITOR switch (pushbutton in) to listen for any channel activity.

b. If receiving a call, transmit only after the incoming call ends. The GX1500U cannot receive a call and transmit simultaneously. The BUSY indicator will illuminate green when a call is received.

c. Press the push-to-talk (PTT) switch and deliver the voice message. For best transmission, speak into the microphone from a distance of 1/2 to 1 inch. The TX indicator will illuminate red during transmit.

d. Release the PTT switch.

1.2.4 Time-Out Timer

If the time-out timer is programmed, the following conditions exist:

a. a beeping alarm sounds 10 seconds before the transmitting time limit

b. transmission will be terminated when this time limit is reached

c. timer is reset by releasing the push-to-talk button momentarily

1.2.5 Busy Lockout

If busy lockout is programmed, the following conditions exist:

a. the transmitter is disabled when the channel is busy with other traffic

b. a tone will be heard when the push-to-talk button is pressed while the channel is busy and the GX1500 will not transmit

1.2.6 Cloning Procedure

Cloning is accomplished by either using another transceiver or a personal computer.

1.2.6.1 Cloning Between Transceivers

Turn the Power/Volume Control to off on both radios. Connect the transceivers together by plugging one end of the cloning cable into each radio. The radio with the cloning data stored on it will be referred to as the master unit. The radio to be programmed will be referred to as the clone unit. On the master unit, press the MONITOR switch so that it is turned on (push button in). On the clone unit, press the MONITOR switch so that it is turned off (push button out).

Apply power to the master unit first, then apply power to the clone unit. As the master unit is sending cloning data, the channel LED will display a letter "C". This letter will blink when the transmission of the cloning data is complete.

During cloning data storage (including restore), the channel LED on the clone unit will display the letter "P". This letter will blink when the storage of cloning data is complete.

If an error occurs, or there is no data stored on the master unit EEPROM, the letter "E" will blink on the channel LED.

After cloning data is stored, turn the power switch off on the master unit, then secure power to the clone unit. Disconnect the cloning cable.

1.2.6.2 Cloning Between Transceiver and the Personal Computer

Use Program Package number 8 (PP8) to run the software that programs the GX1500 series transceiver.

2.1 DC POWER DISTRIBUTION

2.1.1 Unswitched +13.8 VDC Power Distribution

Refer to Figure 2-1 for the following description. Power is applied to the rear of the unit through F001 (6A)

is routed from pin 4 of PG01 Volume PCB through WG01 pin 4, to PP01 PLL PCB. It is applied to AF Amplifier Q101, Regulator Q102, and +5V Regulator Q201. Switched +13.8 VDC is routed through J301 pin 3 and WR60 to PT01 TX/RX PCB. It is also routed to First Mixer QR05 and zener diode QT54 which sets a fixed bias to the base of APC transistor QT52.

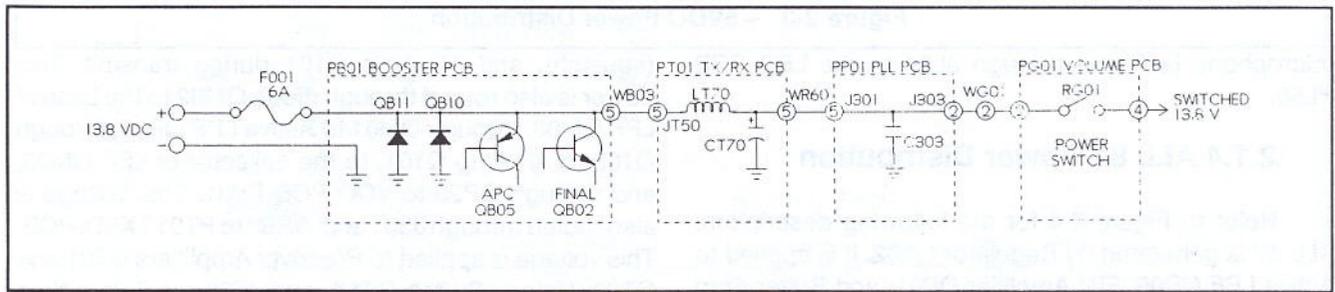


Figure 2-1 Unswitched +13.8VDC Power Distribution

fuse and applied to PB01 Booster PCB. It is routed across diodes QB10 and QB11 to protect the radio from polarity reversal. It is also applied to Automatic Power Control (APC) transistor QB05 and Final RF Amplifier QB02. It is routed through pin 5 of WB03 to pin 5 of JT50 on PT01 TX/RX PCB. It is routed through LT70 and across CT70 for low frequency filtering, through pin 5 of WR60 to pin 5 of J301. It is routed through pin 2 of J303 and pin 2 on PG01 Volume PCB to power switch on Volume control RG01.

2.1.2 Switched +13.8 VDC Power Distribution

Refer to Figure 2-2 for the following description. When the power switch is in the ON position, +13.8 VDC

2.1.3 +5 VDC Power Distribution

Refer to Figure 2-3 for the following description. Plus 5 VDC originates on PP01 PLL PCB at +5V Regulator Q201. This voltage is applied to PLL IC QP02, Oven Switch QP72, Oven Driver QP70, Speaker Driver Q301, J302 pin 4 and JC51 pin 14. Power applied to JC51 pin 14 is routed to PC01 CTCSS PCB. This voltage is applied to Tone Switch QC01, AF Preamp QC04, CTCSS Generator QC03, and CTCSS Interface QC02. Power applied to J302 pin 4 is routed to PL01 Control PCB. This voltage is applied to Reset IC QL02, Mic Hangup Switch QL07, Reset Driver QL03, Squelch Switch QL12, and Microcomputer QL01. This voltage is also routed off the board through JL02 to the

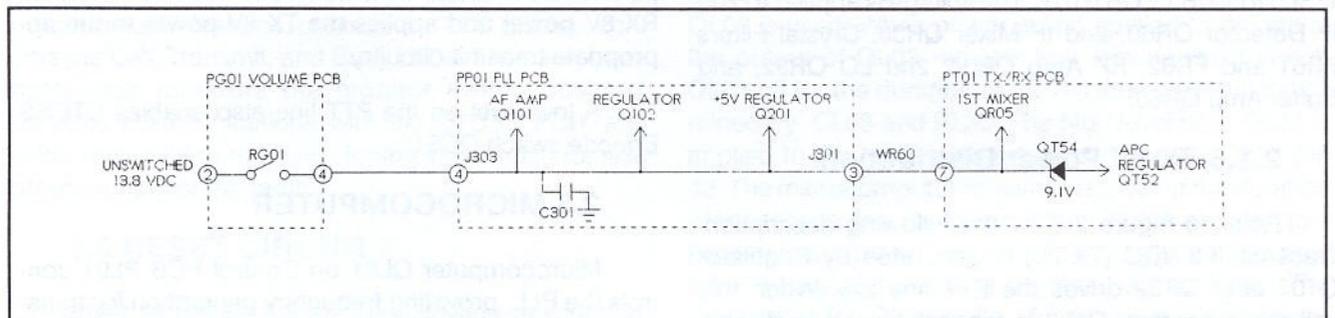


Figure 2-2 Switched +13.8VDC Power Distribution

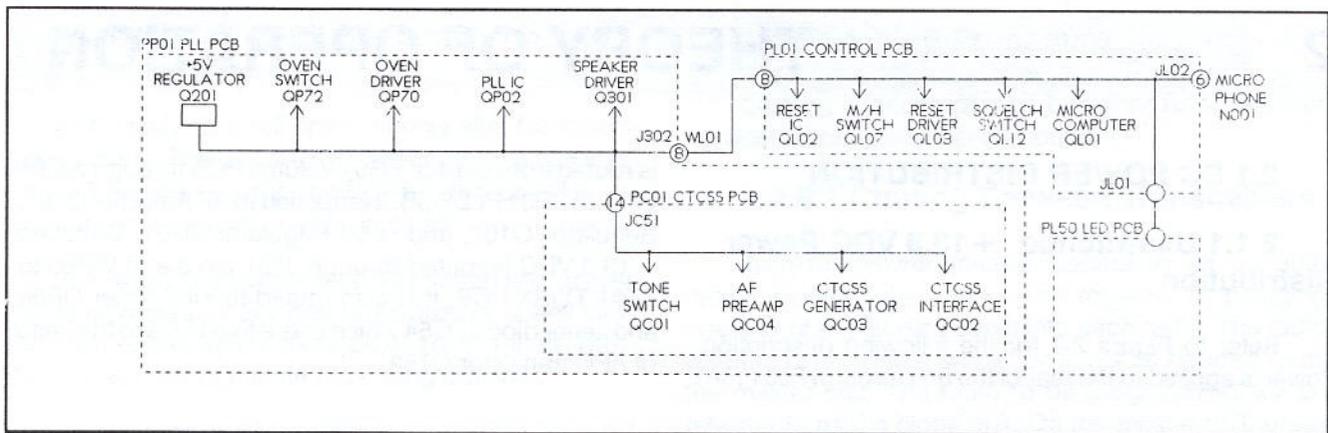


Figure 2-3 +5VDC Power Distribution

microphone jack and through JL01 to the LED PCB PL50.

2.1.4 ALL 8V Power Distribution

Refer to Figure 2-4 for the following description. ALL 8V is generated by Regulator Q102. It is applied to Active LPF QP05, FIN Amplifier QP01, and Buffer Amp QP50.

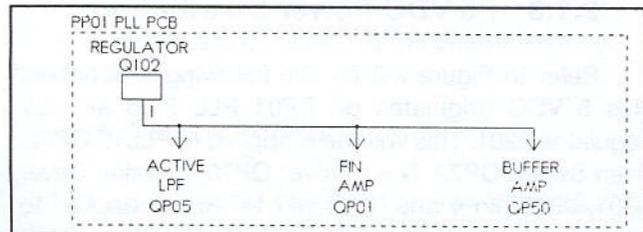


Figure 2-4 ALL 8V Power Distribution

2.1.5 RX 8V Power Distribution

Refer to Figure 2-5 for the following description. When the PTT (push-to-talk) line is high out of QP02 pin 6, Regulator Q102 outputs +8 VDC (RX 8V) to enable the receive mode. This voltage is applied to VCO PCB PV01. This voltage is also routed through J301 and WR60 to TX/RX PCB PT01. The voltage is applied to 2nd IF Detector QR60, 2nd IF Mixer QR30, Crystal Filters FR61 and FR62, RF Amp QR04, 2nd LO QR32, and Buffer Amp QR63.

2.1.6 TX 8V Power Distribution

Refer to Figure 2-6 for the following description. Transmit +8 VDC (TX 8V) is generated by Regulator Q102 after QP02 drives the PTT line low. When this voltage is present, Q103 is forward biased to disable diode switch QC50 (Tone detection), diode switch Q106

(squelch), and AF Amp Q101 during transmit. This power is also routed through diode QM02 to the base of LPF QM03, through QM01 to Active LPF QP05, through Q103 to AF Amp Q101, to the collector of LPF QM03, and through QP20 to VCO PCB PV01. This voltage is also routed through J301 and WR60 to PT01 TX/RX PCB. This voltage is applied to Predriver Amplifiers QT01 and QT02, Unlock Switch QT50, and JT50 pin 3. It is then routed through WB03 pin 3 to pin 3 on PB01 Booster PCB, through RB02 and LT70 to pin diode QB03. QB03 is forward biased, applying the TX 8V through LB13 to pin diode QB04. This voltage forward biases QB04 and shorts the input to the receiver. QB03 forward biased allows the transmit RF to pass through CB19 to the antenna connector.

2.2 PTT CIRCUIT

Refer to Figure 2-7 for the following description. Push-to-talk (PTT) is initiated when the PTT switch on the microphone is pressed. A ground is applied through microphone connector JL02 pin 5 and applied to pin 30 on Microcomputer QL01. Once the microcomputer detects the presence of PTT, it generates Clock, Strobe, and data outputs to PLL IC QP02 on PP01 PLL PCB to pull the PTT line low. Regulator Q102 then removes the RX 8V power and applies the TX 8V power to the appropriate transmit circuitry.

A low level on the PTT line also enables CTCSS Encode switch QC51.

2.3 MICROCOMPUTER

Microcomputer QL01 on Control PCB PL01 controls the PLL, providing frequency generation for transmit and receive, monitors such activities as an unlocked PLL, Monitor inhibit signal from microphone hang-up,

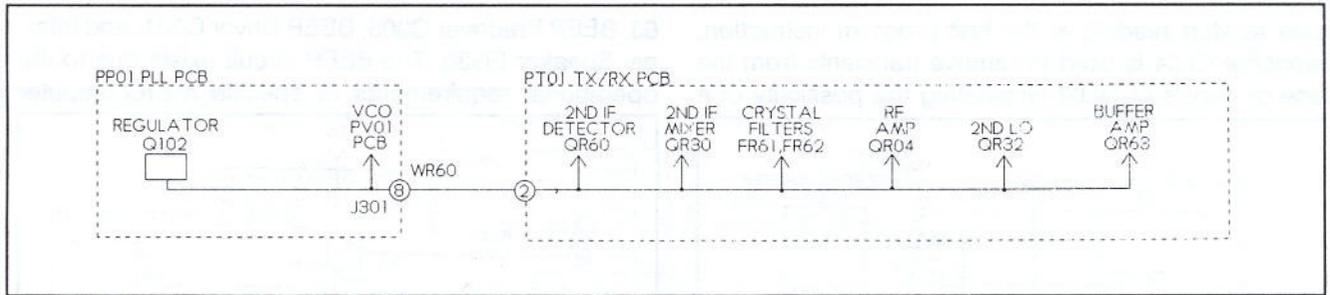


Figure 2-5 RX 8V Power Distribution

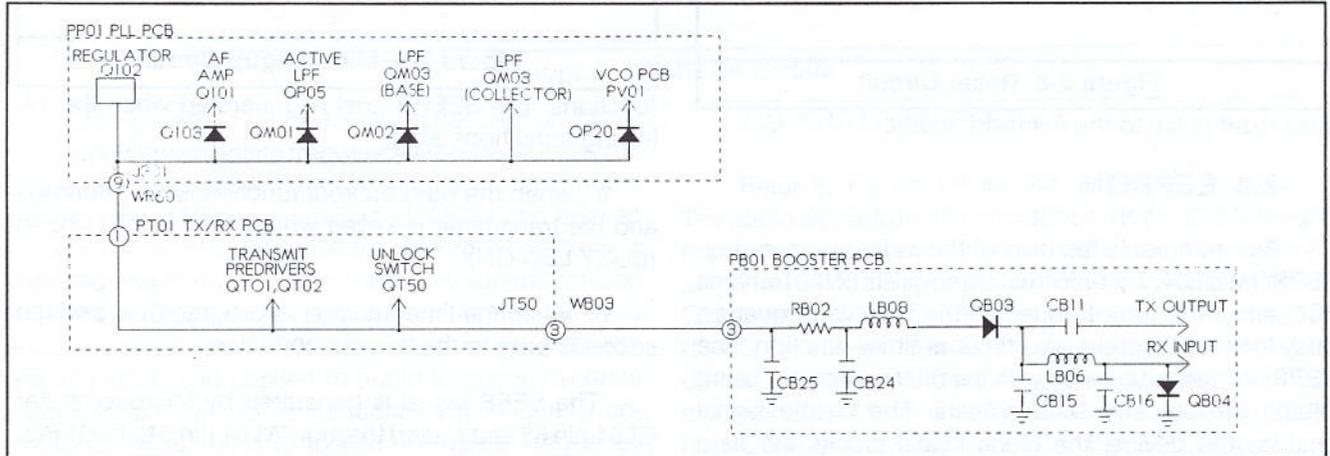


Figure 2-6 TX 8V Power Distribution

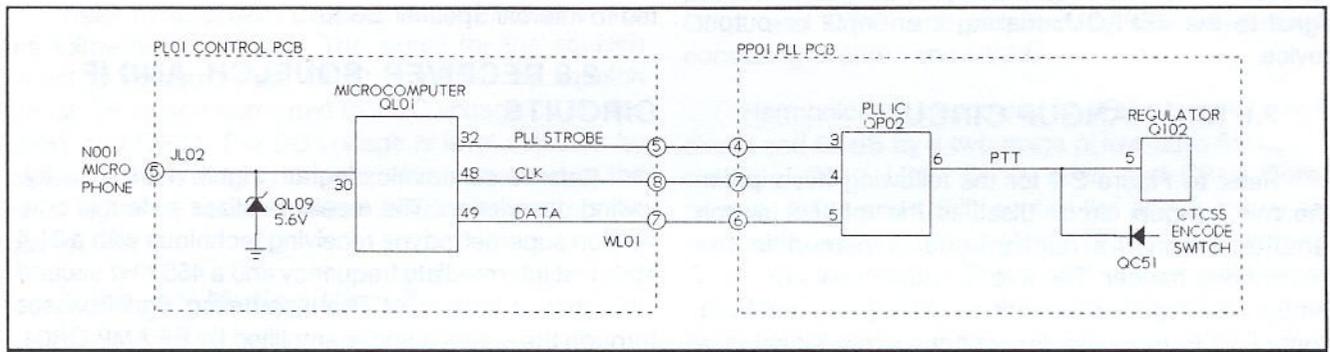


Figure 2-7 PTT Circuit

monitors squelch status, retrieves stored data for the programmable features, controls the LED display, controls the Call, Transmit, and Busy LEDs. The microcomputer also monitors the monitor switch position, provides communications with the CTCSS PCB, and either transmits or receives cloning information for field programming of the radio.

2.4 RESET CIRCUIT

Refer to Figure 2-8 for the following description. When power is applied to the radio, it is necessary to ensure that the microcomputer always starts up the

same way. To ensure that this condition exists, Reset IC QL02 is used. When power is first applied to the radio, the output of QL02 remains low, leaving reset switch QL03 off for the duration of the RC time constant determined by CL03 and RL33. The high level from QL03 is applied to the reset input on microcomputer QL01 pin 43. The microcomputer remains inactive for the duration of the reset pulse. Once capacitor CL03 is charged to a predetermined level, pin 1 of QL02 toggles the output (pin 3) to a high, turning on reset switch QL03. The conduction of QL03 pulls pin 43 on microcomputer QL01 low, releasing the reset condition on the microcomputer. The reset pulse forces the microcom-

puter to start reading at the first program instruction. Capacitor CL04 is used to remove transients from the base of transistor QL03 eliminating the possibility of a

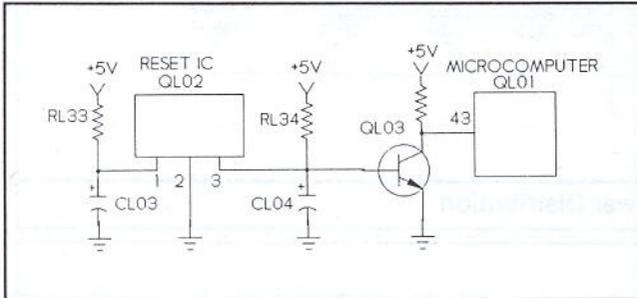


Figure 2-8 Reset Circuit

false reset pulse to the microcomputer.

2.5 EEPROM

Programmable features of the radio are stored on EEPROM QL04. This information consists of the transmit frequency, the tone frequency, the receive frequency, busy lockout function, and timeout timer function. The EEPROM communicates with the microcomputer using Clock, Strobe, and Data signals. The strobe signal enables the device, the clock signal clocks the data present on the data line either into or out of the EEPROM. The microcomputer provides a read/write signal to the EEPROM, making it an input or output device.

2.6 MIC HANGUP CIRCUIT

Refer to Figure 2-9 for the following description. The mic hangup circuit disables the monitor switch function when the microphone is placed in the microphone hanger. The mic hangup signal comes in through microphone connector JL02 pin 4 on PL01 Control PCB from the microphone. This signal is a ground routed through RL44 to drive the base of Mic Hangup switch QL07. With a ground applied to the base of QL07, this transistor is turned on, applying +5 VDC to pin 59 on microcomputer QL01. The microcomputer detects the mic hangup signal, inhibits the PTT line, and bypasses the monitor switch so that only tone squelch is active, if the EEPROM has a stored tone for the selected operating frequency. If there is no stored tone for the operating frequency, this function is disabled.

2.7 BEEP CIRCUIT

Refer to Figure 2-10 for the following description. The BEEP circuit consists of Microcomputer QL01 pin

63, BEEP Predriver Q303, BEEP Driver Q301, and Internal Speaker EG30. The BEEP circuit exists due to the operational requirements of specific microcomputer

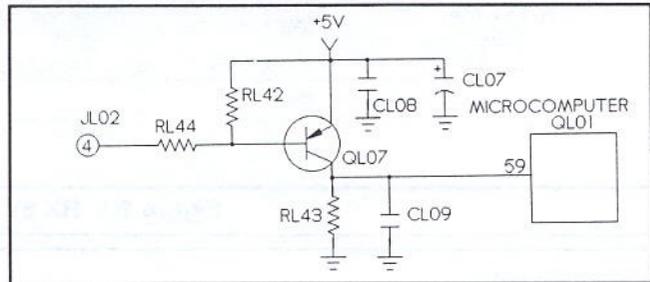


Figure 2-9 Mic Hangup Circuit

functions. The BEEP signal is generated when the following conditions exist:

- when the busy lockout function is programmed and the transmitter is keyed while the squelch is open (BUSY LED ON)
- when the timeout timer is programmed and ten seconds prior to the timeout condition

The BEEP signal is generated by Microcomputer QL01 pin 63 and routed through WL01 pin 9 to PP01 PLL PCB J302 pin 9. This signal is applied to BEEP Predriver Q303 and BEEP Driver Q301. The BEEP signal is then fed to Internal Speaker EG30.

2.8 RECEIVER, SQUELCH, AND IF CIRCUITS

Refer to schematic diagram Figure 4-6 for the following description. The receiver utilizes a double conversion superhetrodyne receiving technique with a 21.4 MHz first Intermediate frequency and a 455 KHz second intermediate frequency. The incoming signal passes through the antenna and is amplified by RF AMP QR04.

The amplified signal passes on to the gate of the first mixer QR05. The PLL signal is applied to the source of QR05 as the first local oscillator signal. A resultant 21.4 MHz signal is output from QR05 and passed through crystal filter FR30 to improve selectivity and cross modulation characteristics.

The signal from FR30 is applied to the base of second mixer QR30. The 21.855 MHz second local oscillator signal from QR32, generated by third overtone crystal XR30, is applied to second mixer QR30. The resultant 455 KHz signal from QR30 is passed through ceramic filter FR60 and applied to QR60.

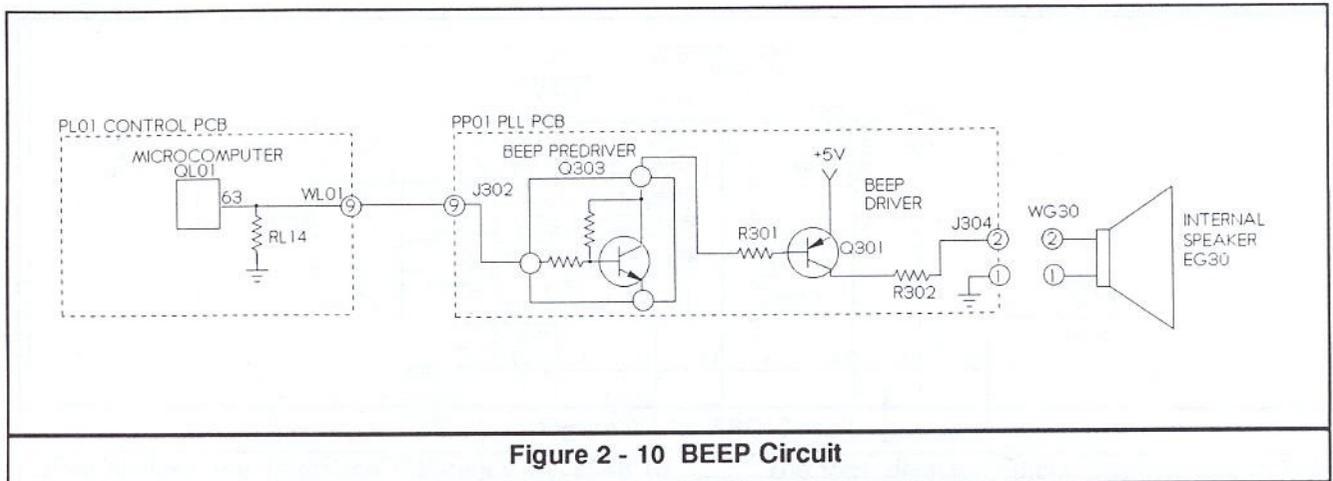


Figure 2 - 10 BEEP Circuit

See Figure 2-11 for the following description. QR60 is a second intermediate frequency amplifier, a detector, and squelch amplifier. The detected tone and audio signals from QR60 are amplified by QC04 and applied to tone decoder/encoder QC03. The received tone is decoded and compared with the tone frequency stored in EEPROM QL04. If the two tones match, the received audio is output from QC03, passed through a de-emphasis circuit, and applied to audio frequency volume control RG01. The audio frequency signal is level adjusted by RG01 and amplified by audio frequency amplifier Q101 which drives speaker EG30.

Refer to schematic diagram (3 of 3) Figure 4- for the following description. The signal for the squelch circuit is obtained from QR60, amplified by squelch circuit QR60, and converted to a DC voltage by diodes QR61 and QR62. The DC voltage is level adjusted by squelch control RG02. This signal is converted to the Hi/Lo signal by squelch switch QR60 and controls the gain of Q101.

2.8.1 AF Muting Circuit

Refer to Figure 2-12 for the following description. Audio muting occurs when the TX 8V is present, when the squelch threshold is set to turn squelch on, and when a tone detect output is generated by CTCSS Encoder/Decoder QC03. Regulator Q102 provides TX 8V output when the PTT output from QP02 goes low. Regulator Q102 switches from receive to transmit mode. The +8VDC from Q102 pin 8 forward biases Q103, applying +8VDC to the mute input on AF Amp Q101. The squelch signal, generated on the TX/RX PCB is routed to diode switch Q106. When squelch is set, this input will be a high level, forward biasing Q106 and applying +5VDC to the mute input on AF Amp Q101.

2.9 TRANSMITTER

Refer to Figure 4-6 for the following description. The audio signal from the microphone is passed through a pre-emphasis circuit and amplified by microphone amplifier QP05. The signal is limited by diode limiter QM01 and QM02. The limited signal is attenuated 18 dB/oct by roll-off filter QM03 and applied to varactor diode QV03 in the VCO as a modulated signal. The tone encoder output from QC03 is passed through low-pass-filter QC04 and applied to QV03 in the VCO as a modulated signal. The VCO output is amplified by QP50 and passed through a younger stage comprised of QT01, QT02, and QT03, and amplified by a booster stage consisting of QB01 and QB02.

Harmonics are attenuated 30 dB by the final stage circuit and 60 dB by a two stage pi low-pass-filter consisting of CB12, LB04, CB13, LB05, and CB14. Components QT03 and QB01 control the power out by an automatic power control (APC) circuit consisting of QT52, QT53, and QB05. This APC circuit prevents transmissions when the PLL is unlocked. The unlock signal is derived from PLL unlock switch QT05.

2.9.1 APC Circuit

Refer to Figure 2-13 for the following description. The Automatic Power Control (APC) circuit controls power output. The APC circuit monitors the PLL lock signal and the temperature of the heatsink assembly. If the PLL is inlocked, this circuit will turn off the driver to prevent transmission of any RF. The temperature of the heatsink assembly is monitored by using a thermal resistor. As the temperature of the heatsink rises, the thermal resistance will increase, dropping the amount of current to the driver, thus decreasing the amount of drive

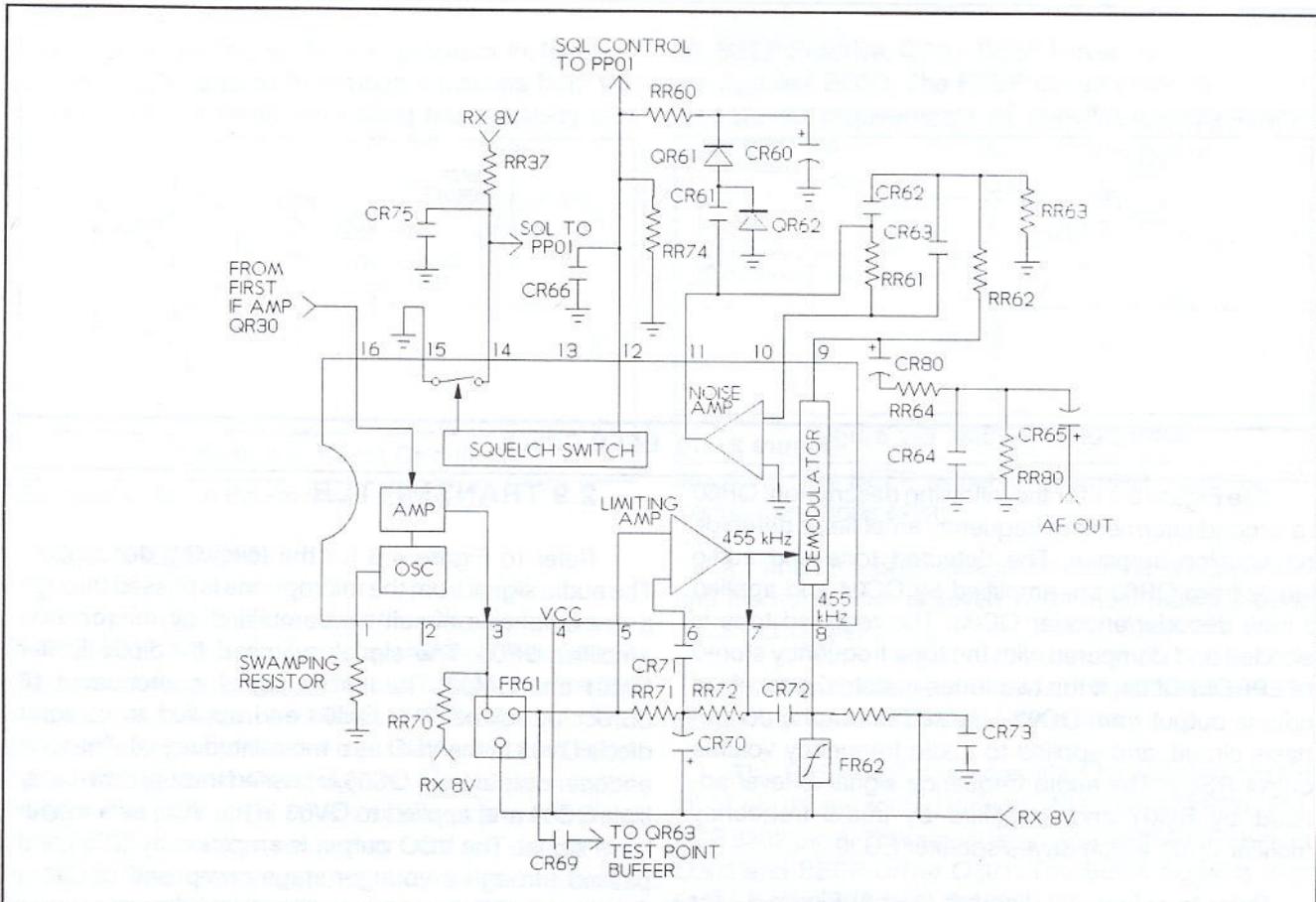


Figure 2 - 11 Second IF and Squelch Circuit

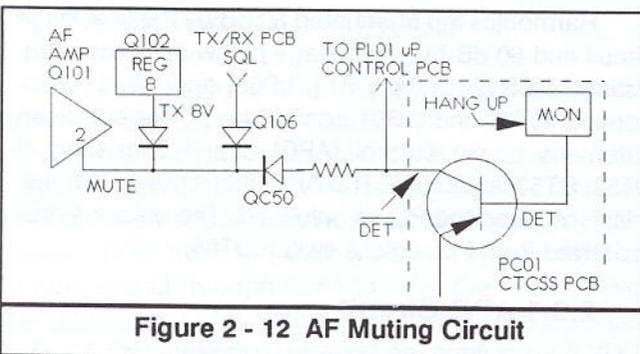


Figure 2 - 12 AF Muting Circuit

to the final. The unlock switch signal is applied to the base of unlock switch QT50. In transmit, TX 8V is applied to the emitter. This forces QT50 into saturation providing +8 VDC to QT51 and RT50. These two components are in parallel. As the temperature increases, the internal resistance of QT51 will increase, changing the voltage drop across the two resistors. This voltage will decrease, thus providing less drive through transistor QT52, dropping the drive level to QT53, decreasing the amount of

drive to current driver QB05. The current flow through QB05 will decrease, providing less drive to the final.

2.9.2 Modulation Limiting Circuit

Audio input amplified by QP05 passes through a pre-emphasis circuit, then the amplitude of the audio input is limited by diode limiter QM01 and QM02. Frequencies above 3 KHz are attenuated 18 dB/oct by roll-off filter QM03.

2.10 PLL

Refer to Figure 2-14 for the following Description. The phase-locked-loop (PLL) is used as a first local oscillator during receive and an oscillator during transmit. QP02 is a PLL IC containing a dual modulus prescaler, programmable divider, reference oscillator, reference oscillator divider, and phase detector. These comprise a pulse counter. Crystal oscillator XP01 generates a 12.8 MHz reference frequency. PLL IC

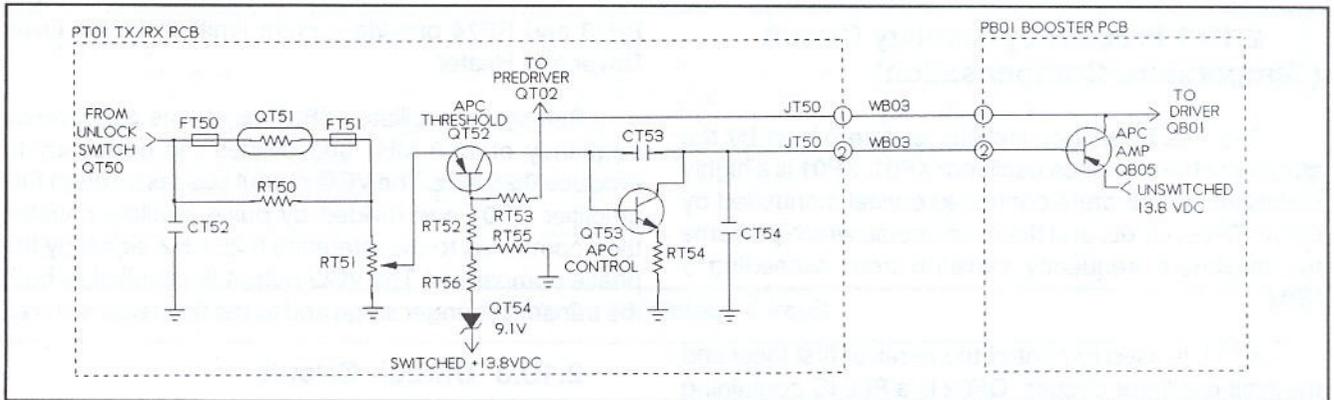


Figure 2 - 13 APC Circuit

QP02 divides the reference frequency by 2048 to produce a 6.25 KHz reference frequency.

The VCO output is amplified by FIN amplifier QP01 and applied to the dual modulus prescaler of QP02 to be divided by 128 or 129. The output is also divided by N by the programmable divider. The dividing ratio of this

The lock detector output prevents transmission when the PLL is unlocked or when the PLL IC is receiving information from the microcomputer.

The signal passed through QP05 is applied to varactor diode QV01 to control the frequency of the VCO.

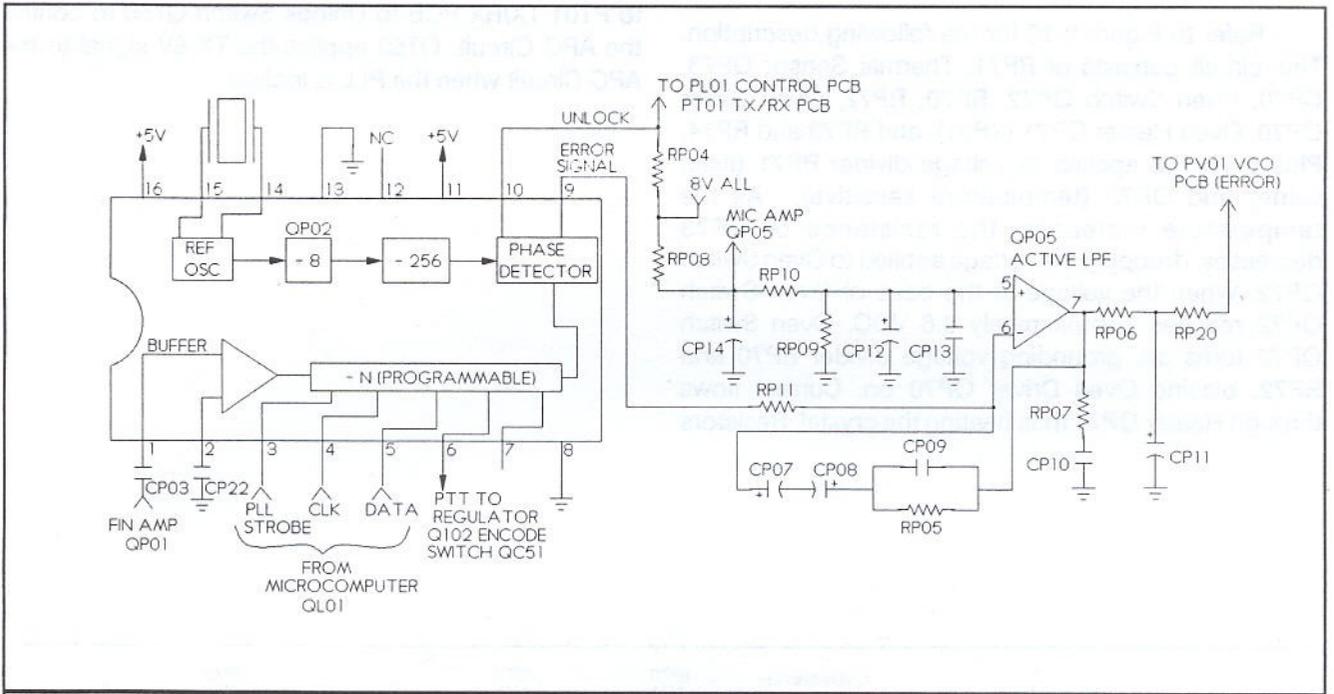


Figure 2 - 14 PLL Circuit

pulse counter is determined by a 21 bit signal from microcomputer QL01.

The reference frequency from XP01 and the VCO output pass through the pulse counter and are compared by the phase detector. The phase detector output is applied to active low-pass-filter QP05.

The VCO output is amplified by QP50 and applied to the Transmit Predrivers during transmit or applied to the first mixer as the first local oscillator signal during receive.

2.10.1 Frequency Stability Circuit (Temperature Compensation)

The PLL frequency stability is determined by the stability of the reference oscillator XP01. XP01 is a highly stabilized, temperature controlled crystal, controlled by CP04, CP05, CP06, and the oven circuit, which prevents the maximum frequency variation from exceeding 5 PPM.

A PLL is used to control the receiver first local and transmit oscillator circuits. QP02 is a PLL IC containing a dual modulus prescaler, a programmable counter, a reference oscillator, a reference frequency divider, and a phase comparator which forms a pulse counter. The output of the phase comparator is passed through active low-pass-filter QP05, converted to a dc voltage, and applied to the VCO.

2.10.2 Oven Circuit

Refer to Figure 2-16 for the following description. This circuit consists of RP71, Thermal Sensor QP73, CP70, Oven Switch QP72, RP70, RP72, Oven Driver QP70, Oven Heater QP71 (XP01), and RP73 and RP74. Plus 5 VDC is applied to voltage divider RP71 (fixed value) and QP73 (temperature sensitive). As the temperature increases, the resistance of QP73 decreases, dropping the voltage applied to Oven Switch QP72. When the voltage at the base of Oven Switch QP72 reaches approximately 0.6 VDC, Oven Switch QP72 turns on, grounding voltage divider RP70 and RP72, biasing Oven Driver QP70 on. Current flows through Heater QP71 thus heating the crystal. Resistors

RP73 and RP74 provide current limiting for the Oven Driver and Heater.

Reference oscillator XP01 produces a reference frequency of 12.8 MHz and divides the frequency to produce 6.25 KHz. The VCO output passes through FIN amplifier QP01 and divided by pulse swallow counter, then compared to the reference 6.25 KHz signal by the phase comparator. The VCO output is supplied to both the transmit younger stage and to the first receive mixer.

2.10.3 Unlock Circuit

Refer to Figure 2-15 for the following description. The unlock circuit prevents the transmitter from keying when the PLL is not locked. This eliminates the possibility of transmitting on the wrong frequency.

The unlock signal originates from PLL IC QP02 pin 10 on PP01 PLL PCB. This signal is routed to PL01 Control PCB to the microcomputer as a status input and to PT01 TX/RX PCB to Unlock Switch QT50 to control the APC Circuit. QT50 applies the TX 8V signal to the APC Circuit when the PLL is locked.

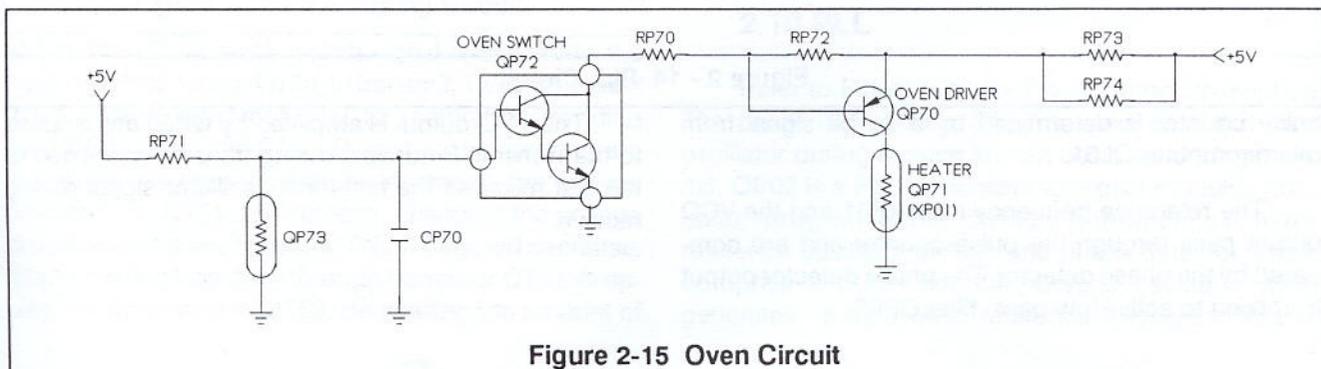


Figure 2-15 Oven Circuit

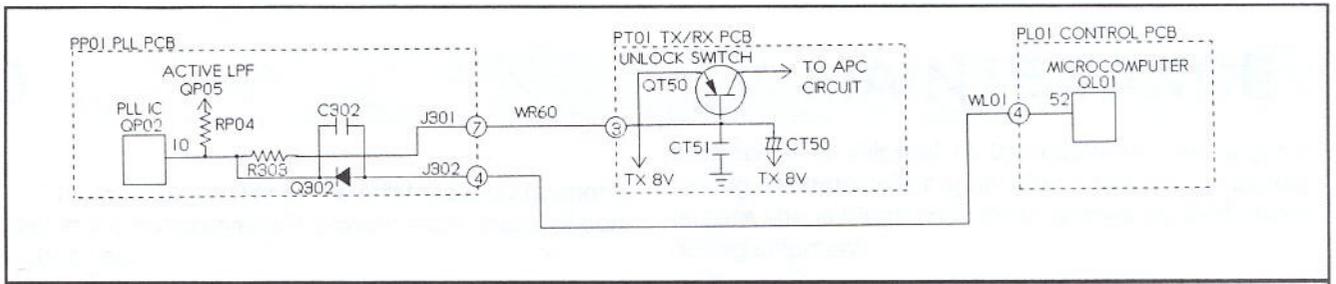


Figure 2 - 16 Unlock Circuit

3

MAINTENANCE

The inherent quality of the solid state components used in the transceiver will provide many years of continuous use.

3.1 PRECAUTIONS

Take the following precautions to prevent damage to the modile transceiver.

- 1.Keep the microphone jack covered at all times to prevent corrosion of electrical contacts.
- 2.Ensure that the input voltage does not exceed 16 VDC.
- 3.Never key the transmitter unless an antenna or a dummy load is connected to the transceiver antenna receptacle.
- 4.Use only approved SCC accessories and replacement parts.

3.2 TEST EQUIPMENT

The following pieces of equipment, or their equivalent, are recommended to test the GX1500U's performance or to check its alignment.

- AC/DC Voltmeter Fluke Model 8060
- Deviation Meter 1000 MHz; 5 KHz
- FM Communications Monitor - 1000 MHz, IFR 1200 (Signal Generator)
- Frequency Counter1000 MHz, HP5314A
- Oscilloscope Dual Trace, 20 MHz
- Power Supply 13.8 VDC: 7A
- RF Dummy Load 50 ohm; 50 watts
- RF Wattmeter . 50 watts; 1000 MHz, (Bird 6154)
- SINAD Meter Helper Instruments
- Spectrum Analyzer . . . Hewlett Packard, 8558B
- Speaker Load4 ohms
- Modulation Test Set TS-1191 (if available)

3.3 PERFORMANCE

The performance test is conducted to check overall transceiver operation. This test is performed before the

transceiver is shipped to the customer. We suggest testing the transceiver again after it has left the factory in case the settings have been altered by mild shock during shipment.

3.3.1 General

- 1.Visuallly inspect the unit for scratches, cracks, and other defects.

3.4 DISASSEMBLY PROCEDURE

- 1.Place unit on table with the rear of radio facing you.
- 2.Remove two phillips head screws that secure the cover to the chassis.
- 3.Grasp the front panel with one hand and gently pull the cover towards the rear of the unit.
- 4.Ensure that the power cable does not hang up on the cover.
- 5.Refer to exploded parts view for further disassembly.

3.5 ALIGNMENT PROCEDURE

NOTE: Prior to tuning, the GX1500U must be programmed using the A3500 with Program Package number 8 (PP8) and programming cable.

Use the factory programmed frequencies stored in channel locations 1, 2, and 3, as shown in Table 3 - 1 , when performing the alignment procedure or use the customers frequencies. Note the customer's lowest, highest, and approximate center frequencies and use these frequencies when called for in the alignment procedure.

Table 3 - 1 Factory Programmed Frequencies

Channel 1:

Frequency Range	Tone
TX 460.1 MHz	179.9 Hz
RX 460.0 MHz	179.9 Hz

Channel 2:		
Frequency Range	.....	Tone
TX 456.6 MHz	.....	67.0 Hz
RX 456.5 MHz	.....	67.0 Hz

Channel 3:		
Frequency Range	.....	Tone
TX 463.6 MHz	.....	250.3 Hz
RX 463.5 MHz	.....	250.3 Hz

3.5.1 General

1. Configure the test equipment setup as shown in Figure 3 - 1.
2. Position the channel selector to channel 2.
3. Confirm that the power supply voltage at the radio is 13.8 VDC.
4. Set the squelch control fully counterclockwise. Set the volume control to its approximate mechanical center.

3.5.2 Phase-Locked-Loop

1. Connect the voltmeter (with an internal resistance greater than 500 k-ohms) to CV23 and to the chassis. Position the channel selector to the center frequency.
2. Adjust LV03 for a reading of 3.0 volts. See Figure 3 - 2 for the location of LV03.

3.5.3 Transmitter

3.5.3.1 TX Deviation

1. Maintain the same test equipment setup shown in Figure 3 - 1.

2. Turn RC53 fully counterclockwise.

NOTE: If the TS1191 is not available, attach a 10 μ F/16 V electrolytic capacitor between the audio generator and the tip of the microphone jack. Connect the positive "+" side of the capacitor to the transceiver. See Figure 3 - 3 on how to connect the capacitor.

3. Apply a sine wave signal of approximately 50 mV, 1 kHz to the capacitor mentioned in the note under step 2.

4. Key the transmitter and adjust the output of the audio signal generator for a deviation of ± 3 kHz.

5. Increase the audio generator output level by 20 dB. Adjust RM13 to within ± 4.5 kHz deviation.

6. Decrease the audio generator output level by 20 dB and check for ± 3 kHz of deviation. Repeat steps 4, 5, and 6 several times until further adjustment is unnecessary.

7. Key the transmitter and adjust CP06 for the correct frequency.

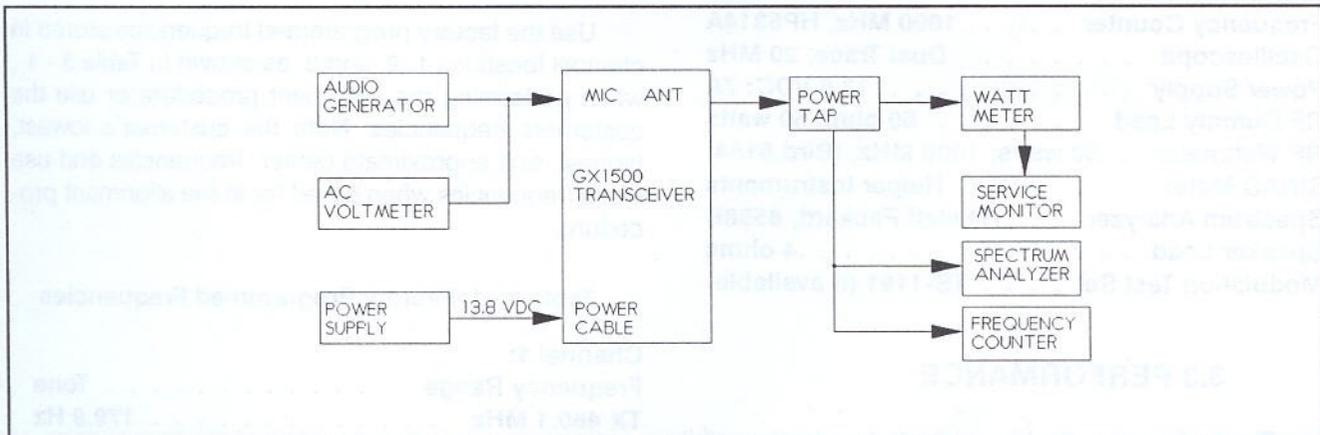


Figure 3 - 1 Equipment Test Setup

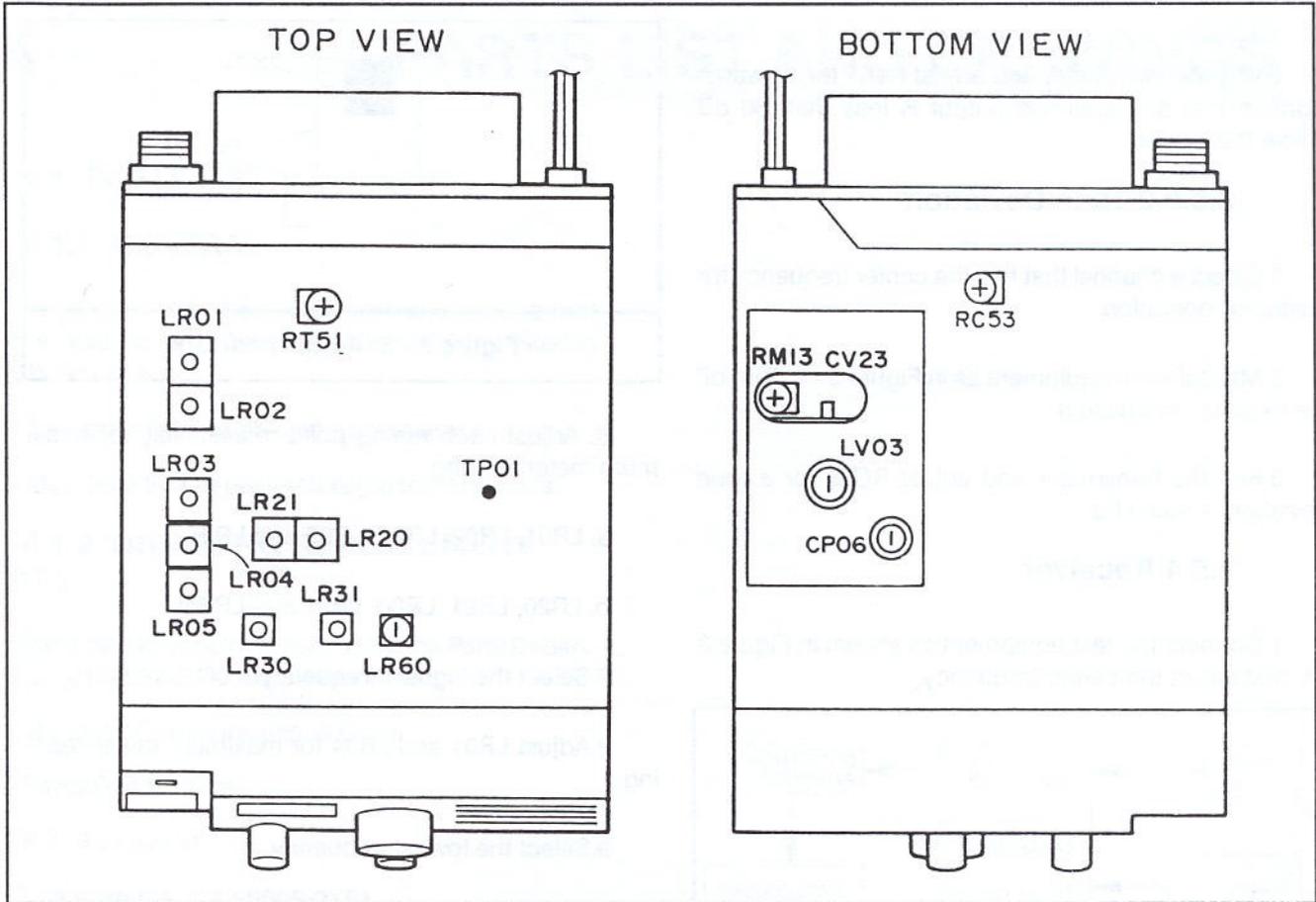


Figure 3 - 2 Alignment Reference Points

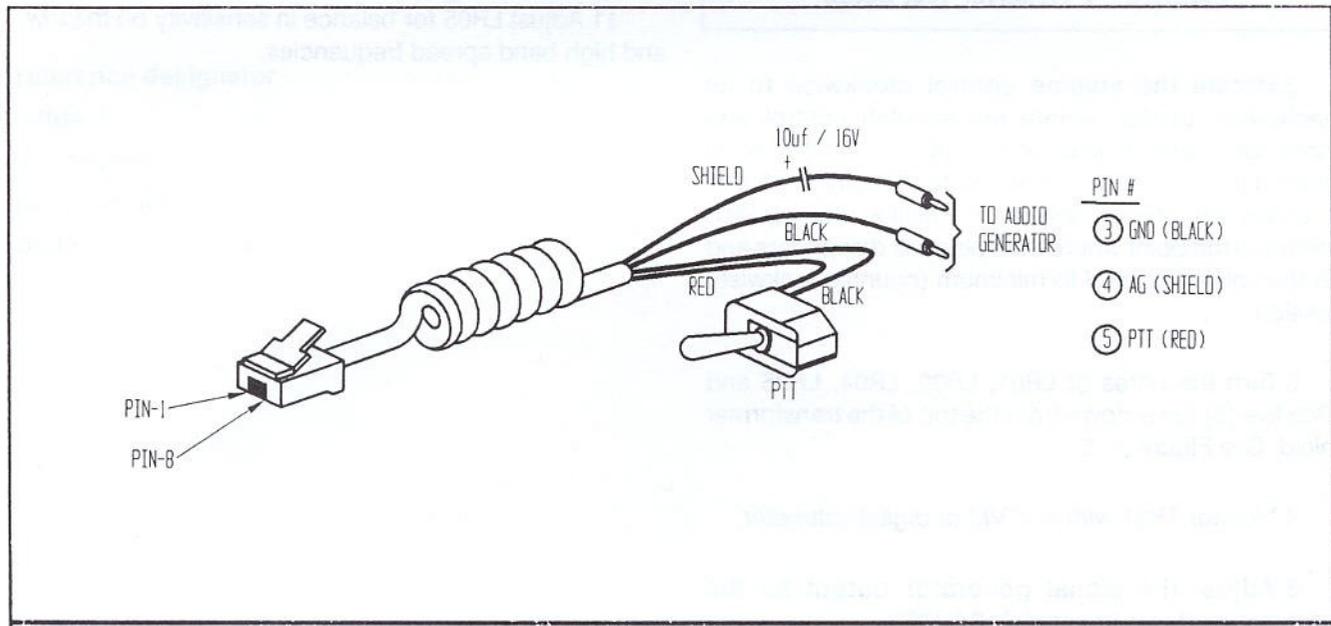


Figure 3 - 3 Modulation Test Setup

8. Key the transmitter and adjust RT51 for 15 watts. Confirm that any spurious output is less than 60 dB below the carrier.

3.5.3.2 Tone Deviation

1. Select a channel that has the center frequency for customer operation.

2. Maintain test equipment as in Figure 3 - 1. Turn off the external modulation.

3. Key the transmitter and adjust RC53 for a tone deviation ± 0.6 kHz.

3.5.4 Receiver

1. Connect the test equipment as shown in Figure 3 - 4, and select the center frequency.

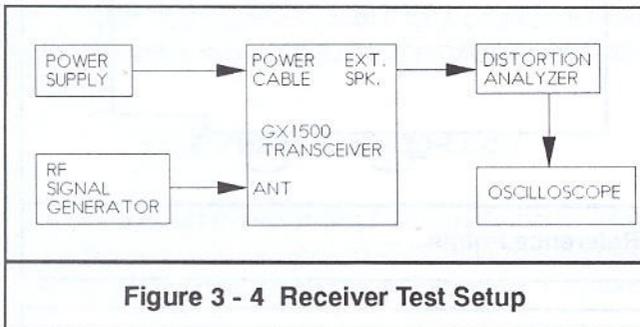


Figure 3 - 4 Receiver Test Setup

2. Rotate the volume control clockwise to its mechanical center. Rotate the squelch control and check for proper squelch operation. Leave in the open squelch (noise) position, then rotate the volume control to check for proper operation. Position the squelch control to the point where the noise just disappears and set the volume control to minimum (counterclockwise) position.

3. Turn the cores of LR01, LR02, LR04, LR05 and LR06 five (5) turns down from the top of the transformer shield. See Figure 3 - 5.

4. Monitor TP01 with a VTVM or digital voltmeter.

5. Adjust the signal generator output so the voltmeter reads approximately 0.5 VDC.

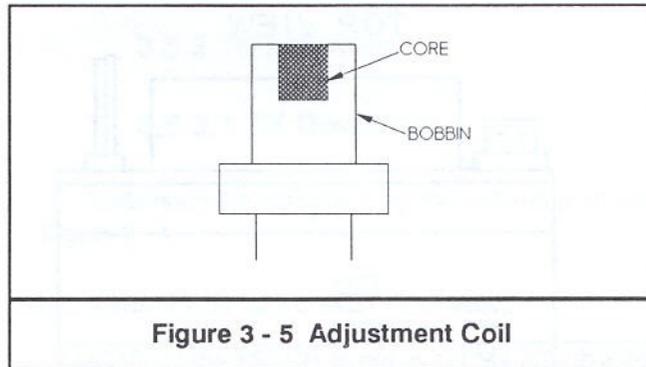


Figure 3 - 5 Adjustment Coil

6. Adjust each tuning point respectively for maximum meter reading:

a. LR01, LR02, LR04, LR05 and LR06.

b. LR20, LR21, LR30, LR31 and LR60.

7. Select the highest frequency.

8. Adjust LR01 and LR04 for maximum meter reading.

9. Select the lowest frequency.

10. Adjust LR02 and LR05 for maximum meter reading.

11. Adjust LR05 for balance in sensitivity on the low and high band spread frequencies.

4

PARTS LIST AND DRAWINGS

4.1 PARTS LIST

4.1.1 GENERAL

Information on most electrical and mechanical parts is included in the parts list. The parts are listed in alphabetic order.

- Use only SCC approved accessories.
- Use only SCC approved replacement parts

4.1.2 ORDERING REPLACEMENT PARTS

Parts orders should be referred to the Parts Department at (213) 532-5300 ext. 248 or write:

Standard Communications Corp.

Parts Department

P.O. Box 92151

Los Angeles, CA 90009-2151

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

- reference designator
- value
- description
- part number
- unit model number

REF DES	MODEL EFF	SERIAL NO EFF	DESCRIPTION	PART NUMBER
CAPACITORS				
CC50			CAPACITOR, ELECT. 0.22UF 50V	EA22405010
CC51			CAPACITOR, ELECT 10 UF 16V	EA10601690
CM01			CAPACITOR, CERAMIC 1000 PF	DA16102110
CM02			CAPACITOR, ELECT 1 UF 50V	EA10505090
CM03			CAPACITOR, ELECT 10 UF 16V	EA10601690
CM04		U010001	CAPACITOR, FILM 0.1 UF	DF15104350
CM05			CAPACITOR, ELECT 10 UF 16V	EA10601690
CM06			CAPACITOR, FILM 0.01 UF	DF15103350
CM07			CAPACITOR, FILM 0.01 UF	DF15103350
CM08			CAPACITOR, CERAMIC 220 PF	DK16221300
CM09			CAPACITOR, FILM 0.15UF	DF15154350
CM10			CAPACITOR, ELECT 10 UF 16V	EA10601690
CM11			CAPACITOR, ELECT 10 UF 16V	EA10601690
CM12			CAPACITOR, FILM 0.01 UF	DF15103350
CM13			CAPACITOR, CERAMIC 1000 PF	DA16102110
CP01			CAPACITOR, CERAMIC 1000 PF	DA16102110
CP01		U010001	CAPACITOR, CERAMIC 1 PF	DD10010300
CP02			CAPACITOR, CERAMIC 1.5 PF	DD10015300
CP03			CAPACITOR, CERAMIC 1000 PF	DA16102110
CP04			CAPACITOR, CERAMIC 1000 PF	DA16102110
CP05			CAPACITOR, CERAMIC 47 PF	DD15470360
CP06			CAPACITOR, CERAMIC 7 PF	DD11070360
CP07			CAPACITOR, TRIMMING 7PF	CT10600090
CP08			CAPACITOR, TANTALUM 3.3UF 10V	EV33501070
CP09			CAPACITOR, TANTALUM 3.3UF 10V	EV33501070
CP10			CAPACITOR, SEMICON 0.022 UF	DS17223010
CP11			CAPACITOR, SEMICON 0.022 UF	DS17223010
CP12			CAPACITOR, ELECT 0.1 UF 16V	EV10401670
CP13			CAPACITOR, ELECT 10 UF 16V	EA10601690
CP14			CAPACITOR, CERAMIC 0.022 UF	DA17223110
CP15			CAPACITOR, ELECT 10 UF 16V	EA10601690
CP20			CAPACITOR, CERAMIC 1000 PF	DA16102110
CP22			CAPACITOR, ELECT 47 UF 10V	EA47601010
CP23			CAPACITOR, CERAMIC 1000 PF	DA16102110
CP24			CAPACITOR, CERAMIC 1000 PF	DA16102110
CP25			CAPACITOR, CERAMIC 470 PF	DK16471300
CP25		U010001	CAPACITOR, CERAMIC 0.022 UF	DA17223110
CP26			CAPACITOR, CERAMIC 1000 PF	DA16102110
CP27			CAPACITOR, ELECT 10 UF 16V	EA10601690
CP28			CAPACITOR, CERAMIC 1000 PF	DA16102110
CP30			CAPACITOR, CERAMIC 0.022 UF	DA17223110
CP30			CAPACITOR, ELECT 470 UF 10V	EA47701010
CP31		U010001	CAPACITOR, CERAMIC 0.001 UF	DK16102300
CP50			CAPACITOR, CERAMIC 1000 PF	DA16102110
CP51			CAPACITOR, ELECT 10 UF 16V	EA10601690
CP52			CAPACITOR, CERAMIC 1000 PF	DA16102110
CP53			CAPACITOR, CERAMIC 4 PF	DD10040300
CP70			CAPACITOR, CERAMIC 1000 PF	DA16102110
CP71		U010001	CAPACITOR, CERAMIC 0.001 UF	DK16102300
C101			CAPACITOR, ELECT 22 UF 25V	EA22602590
C102			CAPACITOR, CERAMIC 1000 PF	DA16102110
C103			CAPACITOR, ELECT 1 UF 50V	EA10505090

REF DES	MODEL EFF	SERIAL NO EFF	DESCRIPTION	PART NUMBER
C104			CAPACITOR, ELECT 22 UF 25V	EA22602590
C105			CAPACITOR, ELECT 10 UF 16V	EA10601690
C106			CAPACITOR, FILM 0.15 UF	DF15154350
C107			CAPACITOR, ELECT 100 UF 10V	EA10701090
C108			CAPACITOR, ELECT 470 UF 10V	EA47701010
C109			CAPACITOR, ELECT 470 UF 25V	EA47702510
C110			CAPACITOR, FILM 0.15 UF	DF15154350
C111			CAPACITOR, ELECT 10 UF 16V	EA10601690
C112			CAPACITOR, CERAMIC 1000 PF	DA16102110
C201			CAPACITOR, CERAMIC 1000 PF	DA16102110
C202			CAPACITOR, ELECT 100 UF 10V	EA10701090
C203			CAPACITOR, ELECT 22 UF 25V	EA22602590
C204			CAPACITOR, CERAMIC 1000 PF	DA16102110
C301			CAPACITOR, CERAMIC 1000 PF	DA16102110
C302			CAPACITOR, CERAMIC 1000 PF	DA16102110
C303			CAPACITOR, CERAMIC 1000 PF	DA16102110
C304			CAPACITOR, CERAMIC 1000 PF	DA16102110

INDUCTORS

LP20			COIL, CHOKE 390 UH	LC13940010
LP50			COIL, CHOKE 0.050 UH	LC15000010
LP51			COIL, CHOKE 9T	LC17400020

SEMICONDUCTORS

QC50			DIODE, MA165	HD20005020
QC51			DIODE, MA165	HD20005020
QC52			TRANSISTOR, 2SC2785	HT327851H0
QM01			DIODE, MA165	HD20005020
QM02			DIODE, MA165	HD20005020
QM03			TRANSISTOR, 2SC2785	HT327851H0
QP01			TRANSISTOR, 2SC2026	HT32026100
QP02			I.C. M54959 P PLL	HC10051200
QP05			I.C. NJM062D	HC10044090
QP20			DIODE, MA165	HD20005020
QP50			TRANSISTOR, 2SC2026	HT32026100
QP70			TRANSISTOR, 2SB562	HT205621B0
QP71			VARISTOR	HP00020230
QP72			TRANSISTOR, 2SC2062	HT320621C0
QP73			THERMISTOR, ERT-D2FGL102S	HH00023020
Q101			I.C. TA7252P	HC10120050
Q102			I.C. MB3756	HC10003180
Q103			DIODE, MA165	HD20005020
Q104			DIODE, MA165	HD20005020
Q105			DIODE, MA165	HD20005020
Q106			DIODE, MA165	HD20005020
Q201			I.C. NJM7805	HC38905090

SEMICONDUCTORS

Q301			TRANSISTOR, 2SA1175	HT111751R0
Q302			DIODE, MA165	HD20005020
Q303			SEMICONDUCTOR, COMP DTC144TS	BA20016210

RESISTORS

RC50			RESISTOR, CRBN FLM 100K OHM I/6W	GD05104160
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REF DES	MODEL EFF	SERIAL NO EFF	DESCRIPTION	PART NUMBER
RC51			RESISTOR, CRBN FLM 10K OHM 1/6W	GD05103160
RC53			RESISTOR, TRIMMING 10K OHM	RA01030750
RC54			RESISTOR, CRBN FLM 4.7K OHM 1/6W	GD05472160
RM01			RESISTOR, CRBN FLM 4.7K OHM 1/6W	GD05472160
RM02			RESISTOR, CRBN FLM 1M OHM 1/6W	GD05105160
RM02		U010001	RESISTOR, 470K OHM J 1/16W	GD05474160
RM03			RESISTOR, CRBN FLM 4.7K OHM 1/6W	GD05472160
RM04			RESISTOR, CRBN FLM 6.8K OHM 1/6W	GD05682160
RM05			RESISTOR, CRBN FLM 47K OHM 1/6W	GD05473160
RM06			RESISTOR, CRBN FLM 8.2K OHM 1/6W	GD05822160
RM07			RESISTOR, CRBN FLM 39K OHM 1/6W	GD05393160
RM08			RESISTOR, CRBN FLM 33K OHM 1/6W	GD05333160
RM09			RESISTOR, CRBN FLM 6.8K OHM 1/6W	GD05682160
RM10			RESISTOR, CRBN FLM 33K OHM 1/6W	GD05333160
RM11			RESISTOR, CRBN FLM 33K OHM 1/6W	GD05333160
RM12			RESISTOR, CRBN FLM 2.2K OHM 1/6W	GD05222160
RM13			RESISTOR, TRIMMING 4.7K	RA04720750
RM14			RESISTOR, CRBN FLM 33K OHM 1/6W	GD05333160
RP01			RESISTOR, CRBN FLM 10K OHM 1/6W	GD05103160
RP01		U010001	RESISTOR, CRBN FLM 4.7K OHM 1/6W	GD05472160
RP02			RESISTOR, CRBN FLM 4.7K OHM 1/6W	GD05472160
RP02		U010001	RESISTOR, CRBN FLM 1K OHM 1/6W	GD05102160
RP03			RESISTOR, CRBN FLM 220 OHM 1/6W	GD05221160
RP03		U010001	RESISTOR, CRBN FLM 100 OHM 1/6W	GD05101160
RP04			RESISTOR, CRBN FLM 5.6K OHM 1/6W	GD05562160
RP05			RESISTOR, CRBN FLM 2.7K 1/16W	GD05272160
RP06			RESISTOR, CRBN FLM 4.7K OHM 1/6W	GD05472160
RP07			RESISTOR, CRBN FLM 560 OHM 1/6W	GD05561160
RP08			RESISTOR, CRBN FLM 4.7K OHM 1/6W	GD05472160
RP09			RESISTOR, CRBN FLM 2.7K 1/16W	GD05272160
RP10			RESISTOR, CRBN FLM 2.2K OHM 1/6W	GD05222160
RP11			RESISTOR, CRBN FLM 1K OHM 1/6W	GD05102160
RP20			RESISTOR, CRBN FLM 0 OHM 1/6W	GD05000160
RP21			RESISTOR, CRBN FLM 0 OHM 1/6W	GD05000160
RP22			RESISTOR, CRBN FLM 56 OHM 1/6W	GD05560160
RP23			RESISTOR, CRBN FLM 0 OHM 1/6W	GD05000160
RP24			RESISTOR, CRBN FLM 56 OHM 1/6W	GD05560160
RP25			RESISTOR, CRBN FLM 0 OHM 1/6W	GD05000160
RP50			RESISTOR, CRBN FLM 4.7K OHM 1/6W	GD05472160
RP51			RESISTOR, CRBN FLM 1K OHM 1/6W	GD05102160
RP52			RESISTOR, CRBN FLM 56 OHM 1/6W	GD05560160
RP53			RESISTOR, CRBN FLM 56 OHM 1/6W	GD05560160
RP70			RESISTOR, CRBN FLM 1K OHM 1/6W	GD05102160
RP71			RESISTOR, CRBN FLM 6.8K OHM 1/6W	GD05682160
RP72			RESISTOR, CRBN FLM 1K OHM 1/6W	GD05102160
RP73			RESISTOR, CRBN FLM 47 OHM 1/6W	GD05470160
RP73		U010001	RESISTOR, CRBN FLM 150 OHM 1/6W	GD05151160
RP74			RESISTOR, CRBN FLM 150 OHM 1/6W	GD05151160
RP74			RESISTOR, CRBN FLM 47 OHM 1/6W	GD05470160
R101			RESISTOR, 6.8 OHM 2W	GA05068020
R102			RESISTOR, CRBN FLM 56 OHM 1/6W	GD05560160
R103			RESISTOR, CRBN FLM 1.5K OHM 1/6W	GD05152160
R104			RESISTOR, CRBN FLM 220 OHM 1/6W	GD05221160
R105			RESISTOR, CRBN FLM 10K OHM 1/6W	GD05103160
R301			RESISTOR, CRBN FLM 1.5K OHM 1/6W	GD05152160
R302			RESISTOR, CRBN FLM 56 OHM 1/6W	GD05560160
R303			RESISTOR, CRBN FLM 6.8K OHM 1/6W	GD05682160

REF DES	MODEL EFF	SERIAL NO EFF	DESCRIPTION	PART NUMBER
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MISCELLANEOUS ELECTRICAL

J101			JACK, RCA TYPE PCB MOUNT	YT02010460
XP01			CRYSTAL, 12.8 MHZ	JX12004110

..... TONE SQL PCB PC01 (02)

CAPACITORS

CC01			CAPACITOR, TANT CHIP 1 UF 16V	EY10501610
CC02			CAPACITOR, TANT CHIP 1 UF 16V	EY10501610
CC03			CAPACITOR, TANT CHIP 1 UF 16V	EY10501610
CC04			CAPACITOR, TANT CHIP 0.22 UF 35V	EY22403510
CC05			CAPACITOR, TANT CHIP 0.22 UF 35V	EY22403510
CC06			CAPACITOR, TANTALUM 47 UF 6V	EV47600660
CC07			CAPACITOR, CERAMIC CHIP 0.01 UF	DK56103300
CC08			CAPACITOR, TANT CHIP 10 UF 16V	EY10600610
CC10			CAPACITOR, CERAMIC CHIP 15 PF	DD55150300
CC11			CAPACITOR, CERAMIC CHIP 15 PF	DD55150300
CC12			CAPACITOR, CERAMIC CHIP 0.01 UF	DK56103300
CC20			CAPACITOR, CERAMIC 0.0047 UF	DK56472300
CC21			CAPACITOR, CERAMIC CHIP 0.068 UF	DK58683300
CC22			CAPACITOR, CERAMIC 270 PF	DK56271300
CC23			CAPACITOR, CERAMIC 1500 PF	DK56152300
CC24			CAPACITOR, TANT CHIP 1 UF 16V	EY10501610
CC25			CAPACITOR, CERAMIC 0.022 UF	DK56223300
CC26			CAPACITOR, CERAMIC 0.015 UF	DK56153300

SEMICONDUCTORS

QC01			SEMICONDUCTOR, COMP RN2402	BA10006050
QC02			I.C. UPD4094BG	HC409406Z0
QCC3			I.C. MN6520	HC10061020
QC04			I.C. NJM062M	HC10054090
QC05			DIODE, CHIP ISS294	HZ20013050

RESISTORS

RC01			RESISTOR, CHIP 2.2K OHM 1/10W	NI05222110
RC02			RESISTOR, CHIP 220K OHM 1/10W	NI05224110
RC03			RESISTOR, CHIP 12K OHM 1/10W	NI05123110
RC05			RESISTOR, CHIP 10K OHM 1/10W	NI05103110
RC06			RESISTOR, CHIP 47K OHM 1/10W	NI05473110
RC07			RESISTOR, CHIP 10K OHM 1/10W	NI05103110
RC08			RESISTOR, CHIP 10K OHM 1/10W	NI05103110
RC09			RESISTOR, CHIP 47K OHM 1/10W	NI05473110
RC10			RESISTOR, CHIP 56K 1/8W	RI05563180
RC20			RESISTOR, CHIP 15K OHM 1/10W	NI05153110
RC21			RESISTOR, CHIP 10K OHM 1/10W	NI05103110
RC22			RESISTOR, CHIP 47K OHM 1/10W	NI05473110
RC23			RESISTOR, CHIP 12K OHM 1/10W	NI05123110
RC24			RESISTOR, CHIP 68K OHM 1/10W	NI05683110
RC25			RESISTOR, CHIP 68K OHM 1/10W	NI05683110
RC26			RESISTOR, CHIP 33K OHM 1/10W	NI05333110
RC27			RESISTOR, CHIP 100K OHM 1/10W	NI05104110
RC30			RESISTOR, CHIP 0 OHM 1/10W	NI05000110

REF DES	MODEL EFF	SERIAL NO EFF	DESCRIPTION	PART NUMBER
RC31			RESISTOR, CHIP 0 OHM 1/10W	NI05000110

MISCELLANEOUS ELECTRICAL

XC01			CRYSTAL, 4.19304 MHZ	XL112002L2
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VOLUME PCB PG01 (03)

RESISTORS

RG01			RESISTOR, VARIABLE 20K OHM (D)	RB12030200
RG02			RESISTOR, VARIABLE 20K OHM (B)	RB02030300

LED PCB PL50 (04)

SEMICONDUCTORS

QL50			SEMICONDUCTOR, COMP FMG8	BA90002210
QL51			SEMICONDUCTOR, COMP FMG8	BA90002210
QL53			LED 7 SEGMENT GL-9E03D	HI11205320
QL54			SEMICONDUCTOR, COMP FMG8	BA90002210
QL55			SEMICONDUCTOR, COMP FMG8	BA90002210
QL56			LED GREEN PG3433SY	HI10069300
QL57			LED RED PR3433S	HI10070300
QL58			LED YELLOW PY3433S	HI10071300

RESISTORS

RL72			RESISTOR, CHIP 220 OHM 1/10W	NI05221110
RL73			RESISTOR, CHIP 220 OHM 1/10W	NI05221110
RL74			RESISTOR, CHIP 220 OHM 1/10W	NI05221110
RL75			RESISTOR, CHIP 220 OHM 1/10W	NI05221110
RL76			RESISTOR, CHIP 220 OHM 1/10W	NI05221110
RL77			RESISTOR, CHIP 220 OHM 1/10W	NI05221110
RL78			RESISTOR, CHIP 220 OHM 1/10W	NI05221110
RL79			RESISTOR, CHIP 220 OHM 1/10W	NI05221110
RL80			RESISTOR, CHIP 220 OHM 1/10W	NI05221110
RL81		U050001	RESISTOR, CHIP 220 OHM 1/10W	NI05221110

CONTROL PCB PL01 (05)

CAPACITORS

CL01			CAPACITOR, CERAMIC CHIP 30 PF	DD55300300
CL02			CAPACITOR, CERAMIC CHIP 30 PF	DD55300300
CL03			CAPACITOR, TANTALUM 10 UF 6V	EV10600660
CL04			CAPACITOR, TANTALUM 1 UF 16V	EV10501670
CL05			CAPACITOR, CERAMIC CHIP 0.001 UF	DK56102300
CL07			CAPACITOR, TANT CHIP 10 UF 16V	EY10600610
CL08			CAPACITOR, CERAMIC CHIP 0.01 UF	DK56103300
CL09			CAPACITOR, CERAMIC CHIP 0.001 UF	DK56102300
CL10			CAPACITOR, CERAMIC CHIP 0.01 UF	DK56103300

SEMICONDUCTORS

QL01			I.C. MICROPROCESSOR HD404008F	HIU10012010
QL02			I.C. PST523D	HC10010550
QL03			TRANSISTOR, CHIP 2SC2712 (BL)	HX327121B0

REF DES	MODEL EFF	SERIAL NO EFF	DESCRIPTION	PART NUMBER
QL04			I.C.EEPROM CXX1013P	HC10019250
QL05			DIODE, CHIP ISS294	HZ20013050
QL07			TRANSISTOR, CHIP 2SA1162(GR)	HX111621A0
QL08			DIODE, CHIP 02CZ5.64	HZ30006050
QL09			DIODE, CHIP 02CZ5.64	HZ30006050
QL10			DIODE, CHIP 02CZ5.64	HZ30006050
QL12			TRANSISTOR, CHIP 2SC2712 (BL)	HX327121B0

RESISTORS

RL01			RESISTOR, CHIP 10K OHM 1/10W	NI05103110
RL02			RESISTOR, CHIP 100K OHM 1/10W	NI05104110
RL03			RESISTOR, CHIP 10K OHM 1/10W	NI05103110
RL04			RESISTOR, CHIP 10K OHM 1/10W	NI05103110
RL05			RESISTOR, CHIP 100K OHM 1/10W	NI05104110
RL06			RESISTOR, CHIP 100K OHM 1/10W	NI05104110
RL08			RESISTOR, CHIP 100K OHM 1/10W	NI05104110
RL10			RESISTOR, CHIP 0 OHM 1/10W	NI05000110
RL13			RESISTOR, CHIP 100K OHM 1/10W	NI05104110
RL14			RESISTOR, CHIP 100K OHM 1/10W	NI05104110
RL15			RESISTOR, CHIP 100K OHM 1/10W	NI05104110
RL16			RESISTOR, CHIP 10K OHM 1/10W	NI05103110
RL17			RESISTOR, CHIP 10K OHM 1/10W	NI05103110
RL18			RESISTOR, CHIP 10K OHM 1/10W	NI05103110
RL19			RESISTOR, CHIP 10K OHM 1/10W	NI05103110
RL20			RESISTOR, CHIP 10K OHM 1/10W	NI05103110
RL21			RESISTOR, CHIP 10K OHM 1/10W	NI05103110
RL22			RESISTOR, CHIP 10K OHM 1/10W	NI05103110
RL23			RESISTOR, CHIP 10K OHM 1/10W	NI05103110
RL24			RESISTOR, CHIP 10K OHM 1/10W	NI05103110
RL25			RESISTOR, CHIP 10K OHM 1/10W	NI05103110
RL26			RESISTOR, CHIP 100K OHM 1/10W	NI05104110
RL27			RESISTOR, CHIP 10K OHM 1/10W	NI05103110
RL28			RESISTOR, CHIP 10K OHM 1/10W	NI05103110
RL29			RESISTOR, CHIP 10K OHM 1/10W	NI05103110
RL30			RESISTOR, CHIP 10K OHM 1/10W	NI05103110
RL31			RESISTOR, CHIP 10K OHM 1/10W	NI05103110
RL32			RESISTOR, CHIP 10K OHM 1/10W	NI05103110
RL33			RESISTOR, CHIP 1.2K OHM 1/10W	NI05122110
RL34			RESISTOR, CHIP 47K OHM 1/10W	NI05473110
RL35			RESISTOR, CHIP 47K OHM 1/10W	NI05473110
RL36			RESISTOR, CHIP 1M OHM 1/10W	NI05105110
RL37			RESISTOR, CHIP 10K OHM 1/10W	NI05103110
RL38			RESISTOR, CHIP 10K OHM 1/10W	NI05103110
RL39			RESISTOR, CHIP 10K OHM 1/10W	NI05103110
RL40			RESISTOR, CHIP 4.7K OHM 1/10W	NI05472110
RL42			RESISTOR, CHIP 4.7K OHM 1/10W	NI05472110
RL43			RESISTOR, CHIP 100K OHM 1/10W	NI05104110
RL44			RESISTOR, CHIP 6.8K OHM 1/10W	NI05682110
RL45			RESISTOR, CHIP 1K OHM 1/10W	NI05102110
RL47			RESISTOR, CHIP 10K OHM 1/10W	NI05103110
RL48			RESISTOR, CHIP 10K OHM 1/10W	NI05103110

MISCELLANEOUS ELECTRICAL

JL02			JACK, 8P MICROPHONE	YJ90000770
J302			JACK, 11 PIN	YJ06003110
SL01			SWITCH, PUSH	SP02011260

REF DES	MODEL EFF	SERIAL NO EFF	DESCRIPTION	PART NUMBER
SL04			SWITCH, ROTARY 16 POSITION	SR01040070
XL01			VIBRATOR, CERAMIC	FQ02004010

BOOSTER PCB PB01 (06)

CAPACITORS

CB01			CAPACITOR, CERAMIC CHIP 10 PF	DD41100330
CB02			CAPACITOR, CERAMIC CHIP 12 PF	DD45120300
CB03			CAPACITOR, CERAMIC CHIP 27 PF	DD45270300
CB04			CAPACITOR, CERAMIC CHIP 10 PF	DD41100330
CB05			CAPACITOR, CERAMIC CHIP 27 PF	DD45270300
CB06			CAPACITOR, CERAMIC CHIP 39 PF	DD45390360
CB07			CAPACITOR, CERAMIC CHIP 13 PF	DD55130300
CB08			CAPACITOR, CERAMIC CHIP 13 PF	DD55130300
CB09			CAPACITOR, CERAMIC CHIP 5 PF	DD40050360
CB10			CAPACITOR, CERAMIC 0.001 UF	DK16102300
CB11			CAPACITOR, CERAMIC 0.001 UF	DK16102300
CB12			CAPACITOR, CERAMIC 7 PF	DD11070300
CB13			CAPACITOR, CERAMIC 10 PF	DD11100300
CB14			CAPACITOR, CERAMIC 5 PF	DD10050300
CB15			CAPACITOR, CERAMIC CHIP 5 PF	DD40050360
CB16			CAPACITOR, CERAMIC CHIP 5 PF	DD40050360
CB17			CAPACITOR, CERAMIC CHIP 0.001 UF	DK56102300
CB18			CAPACITOR, CERAMIC CHIP 0.001 UF	DK56102300
CB19			CAPACITOR, ELECT 10 UF 25V	EJ10602510
CB20			CAPACITOR, CERAMIC CHIP 0.001 UF	DK56102300
CB21			CAPACITOR, CERAMIC CHIP 0.001 UF	DK56102300
CB22			CAPACITOR, CERAMIC CHIP 0.001 UF	DK56102300
CB23			CAPACITOR, ELECT 10 UF 25V	EJ10602510
CB24			CAPACITOR, CERAMIC CHIP 0.001 UF	DK56102300
CB25			CAPACITOR, CERAMIC CHIP 0.001 UF	DK56102300
CC02		U010001	CAPACITOR, TANT CHIP 10 UF 16V	EY10600610
CC24		U010001	CAPACITOR, TANT CHIP 10 UF 16V	EY10600610

INDUCTORS

LB01			COIL, CHOKE 0.050 UH	LC15000010
LB02			COIL, CHOKE 0.050 UH	LC15000010
LB03			COIL, CHOKE	LC11800010
LB04			COIL, 2T	LL635002A0
LB05			COIL, 2T	LL635002A0
LB06			COIL, 2T	LL635002A0
LB07			COIL, CHOKE 0.20 UH	LC12010010
LB08			COIL, CHOKE 1 UH	LC11020020

SEMICONDUCTORS

QB01			TRANSISTOR, 2SC3006	HT33006100
QB02			TRANSISTOR, 2SC2642	HT32642100
QB03			DIODE, MI308	HD20006200
QB04			DIODE, MI308	HD20006200
QB05			TRANSISTOR, 2SA770	HT107701B0
QB10			DIODE, ISS99	HD20003000
QB11			DIODE, ISS99	HD20003000

REF DES	MODEL EFF	SERIAL NO EFF	DESCRIPTION	PART NUMBER
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RESISTORS

RB01			RESISTOR, CRBN FLM 220 OHM 1/6W	GD05221160
RB02			RESISTOR, MTL OXIDE FLM 180 OHM 1W	GJ05181010

MISCELLANEOUS ELECTRICAL

F001			FUSE, 6 AMP	FS10600600
JB01			JACK, ANTENNA	YJ10002980
Y001			CONNECTIVE CORD	YB00400400
Z001			POWER CORD EXTENSION	YC01300030

TX/RX PCBPT01 (07)

CAPACITORS

CR01			CAPACITOR, CERAMIC 7 PF	DD11070300
CR01	U010001		CAPACITOR, CERAMIC 8 PF	DD11080350
CR02			CAPACITOR, CERAMIC 3 PF	DD10030300
CR03			CAPACITOR, CERAMIC 1 PF	DD10010300
CR03	U010001		CAPACITOR, CERAMIC 1.5 PF	DD10015300
CR04			CAPACITOR, CERAMIC 3 PF	DD10030300
CR05			CAPACITOR, CERAMIC 3 PF	DD10030300
CR05	U010001		CAPACITOR, CERAMIC 4 PF	DD10040300
CR06			CAPACITOR, CERAMIC 1000 PF	DA16102110
CR07			CAPACITOR, CERAMIC 1000 PF	DA16102110
CR08			CAPACITOR, CERAMIC 1000 PF	DA16102110
CR09			CAPACITOR, CERAMIC 3 PF	DD10030300
CR10			CAPACITOR, CERAMIC 0.5 PF	DD10005300
CR10	U010001		CAPACITOR, CERAMIC 0.8 PF	DD10008370
CR11			CAPACITOR, CERAMIC 2 PF	DD10020300
CR11	U010001		CAPACITOR, CERAMIC 3 PF	DD10030300
CR12			CAPACITOR, CERAMIC 3 PF	DD10030300
CR13			CAPACITOR, CERAMIC 0.5 PF	DD10005300
CR13	U010001		CAPACITOR, CERAMIC 1 PF	DD10010300
CR14			CAPACITOR, CERAMIC 3 PF	DD10030300
CR14	U010001		CAPACITOR, CERAMIC 4 PF	DD10040300
CR15			CAPACITOR, CERAMIC 3 PF	DD10030300
CR16			CAPACITOR, CERAMIC 1000 PF	DA16102110
CR17			CAPACITOR, CERAMIC 1000 PF	DA16102110
CR19			CAPACITOR, CERAMIC 15 PF	DD15150300
CR20			CAPACITOR, CERAMIC 2 PF	DD10020300
CR20	U010001		CAPACITOR, CERAMIC 15 PF	DD15150300
CR21	U010001		CAPACITOR, SEMICON 0.022 UF	DS17223010
CR22			CAPACITOR, CERAMIC 3 PF	DD10030300
CR23			CAPACITOR, CERAMIC 1000 PF	DA16102110
CR24			CAPACITOR, CERAMIC 0.8 PF	DD10008370
CR25			CAPACITOR, CERAMIC 1 PF	DD10010300
CR25	U010001		CAPACITOR, CERAMIC 0.5 PF	DD10005300
CR26			CAPACITOR, CERAMIC 3 PF	DD10030300
CR27			CAPACITOR, CERAMIC 1000 PF	DA16102110
CR28			CAPACITOR, CERAMIC 1000 PF	DA16102110
CR29			CAPACITOR, CERAMIC 1000 PF	DA16102110
CR30			CAPACITOR, CERAMIC 470 PF	DK16471300
CR31			CAPACITOR, CERAMIC 3 PF	DD10030300
CR32			CAPACITOR, CERAMIC 0.047 UF	DA17473110
CR33			CAPACITOR, CERAMIC 0.047 UF	DA17473110

REF DES	MODEL EFF	SERIAL NO EFF	DESCRIPTION	PART NUMBER
CR34			CAPACITOR, CERAMIC 1000 PF	DA16102110
CR35			CAPACITOR, CERAMIC 15 PF	DD15150300
CR35			CAPACITOR, CERAMIC 33 PF	DD15330300
CR36			CAPACITOR, CERAMIC 51 PF	DD15510300
CR37			CAPACITOR, CERAMIC 51 PF	DD15510300
CR38			CAPACITOR, CERAMIC 51 PF	DD15510300
CR39			CAPACITOR, CERAMIC 0.022 UF	DA17223110
CR40			CAPACITOR, TANTALUM 10 UF 10V	EV10601060
CR60			CAPACITOR, ELECT 1 UF 50V	EA10505090
CR61			CAPACITOR, SEMICON 0.047 UF	DS17473010

CAPACITORS

CR62			CAPACITOR, CERAMIC 0.0022 UF	DK16222300
CR63			CAPACITOR, CERAMIC 220 PF	DK16221300
CR64			CAPACITOR, FILM 0.01 UF	DF15103350
CR65			CAPACITOR, ELECT 1 UF 50V	EA10505090
CR66			CAPACITOR, ELECT 1 UF 50V	EA10505090
CR67			CAPACITOR, CERAMIC 0.022 UF	DA17223110
CR68			CAPACITOR, CERAMIC 0.022 UF	DA17223110
CR69			CAPACITOR, CERAMIC 39 PF	DD15390300
CR70			CAPACITOR, ELECT 0.1 UF 16V	EV10401670
CR71			CAPACITOR, CERAMIC 0.047 UF	DA17473110
CR72			CAPACITOR, CERAMIC 100 PF	DD15101300
CR73			CAPACITOR, CERAMIC 0.022 UF	DA17223110
CR74			CAPACITOR, CERAMIC 1000 PF	DA16102110
CR75			CAPACITOR, CERAMIC 1000 PF	DA16102110
CR76			CAPACITOR, CERAMIC 10 PF	DD11100300
CR80			CAPACITOR, ELECT 1 UF 50V	EA10505090
CR81			CAPACITOR, CERAMIC 1000 PF	DA16102110
CT01			CAPACITOR, CERAMIC 39 PF	DD15390300
CT01		U010001	CAPACITOR, CERAMIC 15 PF	DD15150300
CT02			CAPACITOR, CERAMIC 1000 PF	DA16102110
CT03			CAPACITOR, CERAMIC 1000 PF	DA16102110
CT04			CAPACITOR, CERAMIC 1000 PF	DA16102110
CT05			CAPACITOR, CERAMIC 12 PF	DD15120300
CT05		U010001	CAPACITOR, CERAMIC 5 PF	DD10050300
CT07			CAPACITOR, CERAMIC 1000 PF	DA16102110
CT08			CAPACITOR, ELECT 10 UF 16V	EA10601690
CT09			CAPACITOR, CERAMIC 1000 PF	DA16102110
CT10			CAPACITOR, CERAMIC 4 PF	DD10040300
CT10		U010001	CAPACITOR, CERAMIC 12 PF	DD15120300
CT11			CAPACITOR, CERAMIC 4 PF	DD10040300
CT11		U010001	CAPACITOR, CERAMIC 6 PF	DD11060300
CT12			CAPACITOR, CERAMIC 1000 PF	DA16102110
CT13			CAPACITOR, ELECT 10 UF 16V	EA10601690
CT14			CAPACITOR, CERAMIC 1000 PF	DA16102110
CT15			CAPACITOR, CERAMIC 12 PF	DD15120300
CT15		U010001	CAPACITOR, CERAMIC 18 PF	DD15180300
CT16		U010001	CAPACITOR, CERAMIC 1000 PF	DA16102110
CT17		U010001	CAPACITOR, ELECT 22 UF 25V	EA22602590
CT50			CAPACITOR, ELECT 4.7 UF 35V	EQ47503530
CT51			CAPACITOR, CERAMIC 1000 PF	DA16102110
CT52			CAPACITOR, CERAMIC 1000 PF	DA16102110
CT53			CAPACITOR, CERAMIC 1000 PF	DA16102110
CT54			CAPACITOR, CERAMIC 1000 PF	DA16102110
CT55			CAPACITOR, CERAMIC 1000 PF	DA16102110

REF DES	MODEL EFF	SERIAL NO EFF	DESCRIPTION	PART NUMBER
CT70			CAPACITOR, ELECT 470 UF 25V	EA47702510
CT71			CAPACITOR, CERAMIC 1000 PF	DA16102110

INDUCTORS

LR06			COIL, CHOKE 9T	LC17400020
LR07			COIL, CHOKE 0.050 UH	LC15000010
LR30			I.F.T.	LI70280030
LR31			I.F.T.	LI70280030
LR60			I.F.T. 455KHZ IF COIL	LI71016220
LT01			COIL, CHOKE 0.050 UH	LC15000010
LT02			COIL, CHOKE 0.034 UH	LC13400010
LT03			COIL, CHOKE	LC11800010
LT04			COIL, CHOKE 0.20 UH	LC12010010
LT05			COIL, CHOKE 0.034 UH	LC13400010
LT06		U010001	COIL, AIR 1/125T 1.7MM	MK01704010
LT70			COIL, CHOKE 1.0 MH	LC21060030
LT71			COIL, CHOKE 0.20 UH	LC12010010

SEMICONDUCTORS

QR01			DIODE, MA165	HD20005020
QR02			DIODE, MA165	HD20005020
QR04			FET, 3SK95	HF40095000
QR05			FET, 2SK507H	HF205071B0
QR30			TRANSISTOR, 2SC461	HT304611B0
QR31			VARISTOR, MA27T-B	HV00014020
QR32			TRANSISTOR, 2SC2785	HT327851H0
QR60			I.C. TK10420	HC10007420
QR61			DIODE, 1SS198	HD20022010
QR62			DIODE, 1SS198	HD20022010
QR63			TRANSISTOR, 2SC2785	HT327851H0
QR64			DIODE, 1SS198	HD20022010
QT01			TRANSISTOR, 2SC2026	HT32026100
QT02			TRANSISTOR, 2SC2407	HT32407100
QT03			TRANSISTOR, 2SC3019	HT33019100
QT50			TRANSISTOR, 2SA1175	HT111751R0
QT51			VARISTOR, PTH487A0IBE222T	HP00004230
QT52			TRANSISTOR, 2SA1175	HT111751R0
QT53			TRANSISTOR, 2SD468	HT404681B0
QT54			DIODE, ZENER 9.1V	HD30911000

RESISTORS

RR01			RESISTOR, CRBN FLM 47K OHM 1/6W	GD05473160
RR04			RESISTOR, CRBN FLM 56 OHM 1/6W	GD05560160
RR04		U010001	RESISTOR, CRBN FLM 100 OHM 1/6W	GD05101160
RR05			RESISTOR, CRBN FLM 56 OHM 1/6W	GD05560160
RR05		U010001	RESISTOR, CRBN FLM 100 OHM 1/6W	GD05101160
RR06			RESISTOR, CRBN FLM 5.6K OHM 1/6W	GD05562160
RR07			RESISTOR, CRBN FLM 1.5K OHM 1/6W	GD05152160
RR07		U010001	RESISTOR, CRBN FLM 1K OHM 1/6W	GD05102160
RR08			RESISTOR, CRBN FLM 100 OHM 1/6W	GD05101160
RR20			RESISTOR, CRBN FLM 22 OHM 1/6W	GD05220160
RR20		U010001	RESISTOR, CRBN FLM 100 OHM 1/6W	GD05101160
RR30			RESISTOR, CRBN FLM 1K OHM 1/6W	GD05102160
RR31			RESISTOR, CRBN FLM 3.3K OHM 1/6W	GD05332160
RR32			RESISTOR, CRBN FLM 330 OHM 1/6W	GD05331160

REF DES	MODEL EFF	SERIAL NO EFF	DESCRIPTION	PART NUMBER
RR33			RESISTOR, CRBN FLM 120K OHM 1/6W	GD05124160
RR34			RESISTOR, CRBN FLM 47K OHM 1/6W	GD05473160
RR35			RESISTOR, CRBN FLM 4.7K OHM 1/6W	GD05472160
RR36			RESISTOR, CRBN FLM 100 OHM 1/6W	GD05101160
RR37			RESISTOR, CRBN FLM 4.7K OHM 1/6W	GD05472160
RR38			RESISTOR, CRBN FLM 3.9K OHM 1/6W	GD05392160
RR39			RESISTOR, CRBN FLM 8.2K OHM 1/6W	GD05822160
RR40			RESISTOR, CRBN FLM 2.2K OHM 1/6W	GD05222160
RR41			RESISTOR, CRBN FLM 100 OHM 1/6W	GD05101160
RR60			RESISTOR, CRBN FLM 10K OHM 1/6W	GD05103160
RR61			RESISTOR, CRBN FLM 390K 1/6W	GD05394160
RR62			RESISTOR, CRBN FLM 6.8K OHM 1/6W	GD05682160
RR63			RESISTOR, CRBN FLM 3.3K OHM 1/6W	GD05332160
RR64			RESISTOR, CRBN FLM 6.8K OHM 1/6W	GD05682160
RR65			RESISTOR, CRBN FLM 220K OHM 1/6W	GD05224160
RR66			RESISTOR, CRBN FLM 1K OHM 1/6W	GD05102160
RR67			RESISTOR, CRBN FLM 5.6K OHM 1/6W	GD05562160
RR68			RESISTOR, CRBN FLM 0 OHM 1/4W	GD05000140
RR69			RESISTOR, CRBN FLM 22K OHM 1/6W	GD05223160
RR70			RESISTOR, CRBN FLM 2.2K OHM 1/6W	GD05222160
RR71			RESISTOR, CRBN FLM 2.2K OHM 1/6W	GD05222160
RR72			RESISTOR, CRBN FLM 47K OHM 1/6W	GD05473160
RR73			RESISTOR, CRBN FLM 1.5K OHM 1/6W	GD05152160
RR80			RESISTOR, CRBN FLM 2.2K OHM 1/6W	GD05222160
RT01			RESISTOR, CRBN FLM 100 OHM 1/6W	GD05101160
RT01		U010001	RESISTOR, CRBN FLM 56 OHM 1/6W	GD05560160
RT02			RESISTOR, CRBN FLM 1K OHM 1/6W	GD05102160
RT03			RESISTOR, CRBN FLM 3.3K OHM 1/6W	GD05332160
RT03		U010001	RESISTOR, CRBN FLM 4.7K OHM 1/6W	GD05472160
RT04			RESISTOR, CRBN FLM 56 OHM 1/6W	GD05560160
RT05			RESISTOR, CRBN FLM 220HM 1/6W	GD05220160
RT05		U010001	RESISTOR, CRBN FLM 56 OHM 1/6W	GD05560160
RT06			RESISTOR, CRBN FLM 560 OHM 1/6W	GD05561160
RT06		U010001	RESISTOR, CRBN FLM 330 OHM 1/6W	GD05331160
RT07			RESISTOR, CRBN FLM 3.9K OHM 1/6W	GD05392160
RT08			RESISTOR, CRBN FLM 22OHM 1/6W	GD05220160
RT09			RESISTOR, CRBN FLM 100 OHM 1/6W	GD05101160
RT11			RESISTOR, CRBN FLM 18 OHM 1/6w	GD05180160
RT11		U010001	RESISTOR, CRBN FLM 10 OHM 1/6W	GD05100160
RT20			RESISTOR, CRBN FLM 0 OHM 1/6W	GD05000160
RT50			RESISTOR, CRBN FLM 3.3K OHM 1/6W	GD05332160
RT51			RESISTOR, TRIMMING 22K OHMS	RA02230750
RT52			RESISTOR, CRBN FLM 2.2K OHM 1/6W	GD05222160
RT53			RESISTOR, CRBN FLM 3.3K OHM 1/6W	GD05332160
RT54			RESISTOR, MTL OXIDE 47 OHM 2W	GA05470020
RT55			RESISTOR, CRBN FLM 220 OHM 1/6W	GD05221160
RT56			RESISTOR, CRBN FLM 470 OHM 1/6W	GD05471160

MISCELLANEOUS ELECTRICAL

FR30			FILTER, CRYSTAL 21.4 MHZ	XU421400N5
FR60			FILTER, CERAMIC 455 KHZ	FG455304E0
FR61			FILTER, CERAMIC 455 KHZ	FG455304E0
FR62			DISCRIMINATOR, CERAMIC	FH455301B0
JR01			JACK	YJ07000360
JT01			JACK	YJ07000360
WB01			COAXIAL CABLE, RF	YB00080390

REF DES	MODEL EFF	SERIAL NO EFF	DESCRIPTION	PART NUMBER
WB02			COAXIAL CABLE, RF	YB00080390
WR20			COAXIAL CABLE, 20MM	YB00100590
XR30			CRYSTAL, 21.855 MHZ	XB101001G0

CHASSIS ASSEMBLY (30)

MISCELLANEOUS ELECTRICAL

EG30			SPEAKER, MYLAR 4.6CM	QK00468020
JP50			JACK	YJ07000360

MECHANICAL PARTS (70)

MISCELLANEOUS MECHANICAL

001S			CUSHION PACKING	423C809010
004S			REINFORCING, CUSHION LID	423C807010
008B			LOGO, STANDARD	012S251010
020B			COVER, BUTTON	431C053010
024B			SCREEN, SPEAKER	420C107010
024S			BRACKET, MOUNTING (BLACK)	420C160100
026S			WASHER, MOUNTING BRACKET	420C056040
027B			KNOB, CHANNEL	431C154500
028S			KNOB, MOUNTING (BLACK)	414C154040
032S			HEX HEAD BOLT, P	52030520B9
036B			KNOB, VOLUME/SQUELCH	431C154020
036S			FLAT WASHER, P.	54020501E0
040S			SPRING WASHER	54040502N0
044S			HEXAGON NUT	53110503E9
048B			CIRCULAR NUT	53218069E0
052B			BUTTON, MONITOR	431C270010
056S			SPACER	414C118010
064B			PACKING, BUTTON	431C277020
068B			CHASSIS, FRONT	431C105010
072B			B.H. TAP. SCREW	51282606B0
076B			SPACER, LED	431C118010
078B			SPACER, LED	419C118010
084B			B.H. TAP. SCREW	51282606B0
086B			CLAMPER	4220005030
088B			BRACKET, MAIN PWB SUPPORT	431C110010
096B			CHASSIS, SIDE	431C105020
098B			SCREW B.H.M.	51102605A0
100B			B.H. TAP. SCREW	51282605B0
105B			CLAMPER	431C005010
110B			INSULATOR	431C120030
137B			STICKER	218C122010
148B			SHIELD COIL CASE	420C109020
156B			P.H.M. SCREW	51060310E9
157B			COLLAR	101C055020
158B			B.H.M. SCREW	51100315E9
160B			INSULATOR	431C120020
164B			P.H.M. SCREW	51060312E9
165B			F.H. TAP SCREW	51502608B0
168B			SEAL, EXTERNAL SPEAKER	420C277050
172B			BUSHING	1455259130
176B			F.H. TAP SCREW	51502608B0
190B			SEAL, REAR	420C277040

REF DES	MODEL EFF	SERIAL NO EFF	DESCRIPTION	PART NUMBER
203B			B.H. TAP. SCREW	51282606B0
205B			T.L. WASHER OR	54052600R0
214B			INDICATOR	5508245710
218B			GASKET, REAR CASE (BLACK)	431C277010
222B			CASE, SLEEVE (BLACK)	420C064100
226B			BUSHING, (BLACK)	4618259150
232B			F. WASHER SCREW	51480310E9

AVAILABLE SUBASSEMBLIES (80)

MISCELLANEOUS ELECTRICAL

PB01	ASSY., BOOSTER PWB	ZZ432C0210
P001	ASSY., TONE SQL PWB	ZZ431C0020
PG01	ASSY., VOLUME PWB	ZZ431C2330
PL01	ASSY., CONTROL PWB	ZZ431C2310
PL50	ASSY., LED PWB (P/O CONTROL PWB)	ZZ431C2310
PP01	ASSY., PLL PWB	ZZ432C1210
PT01	ASSY., TX/RX PWB	ZZ432C1220
ZZ01	ASSY., VCO F3	ZZ431C3010

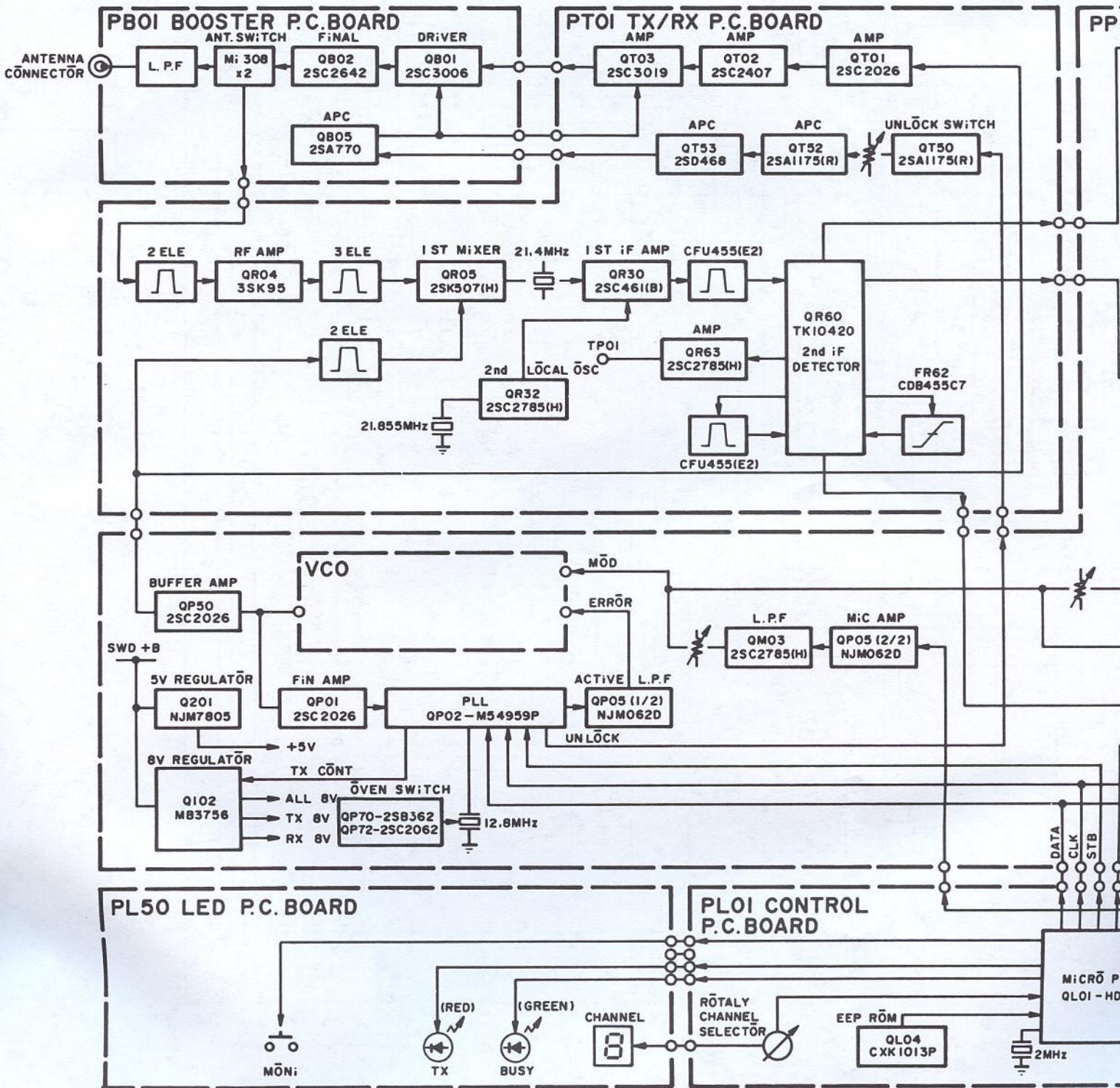
MISCELLANEOUS MECHANICAL

001B	ASSY., FRONT CASE	431C064500
001V	ASSY., MICROPHONE MP872	MP11001190

4.2 DRAWINGS

The drawings in this section show the electrical and mechanical parts locations and interconnections of the GX1500U. The values of most electrical parts are indicated on the schematic diagram.





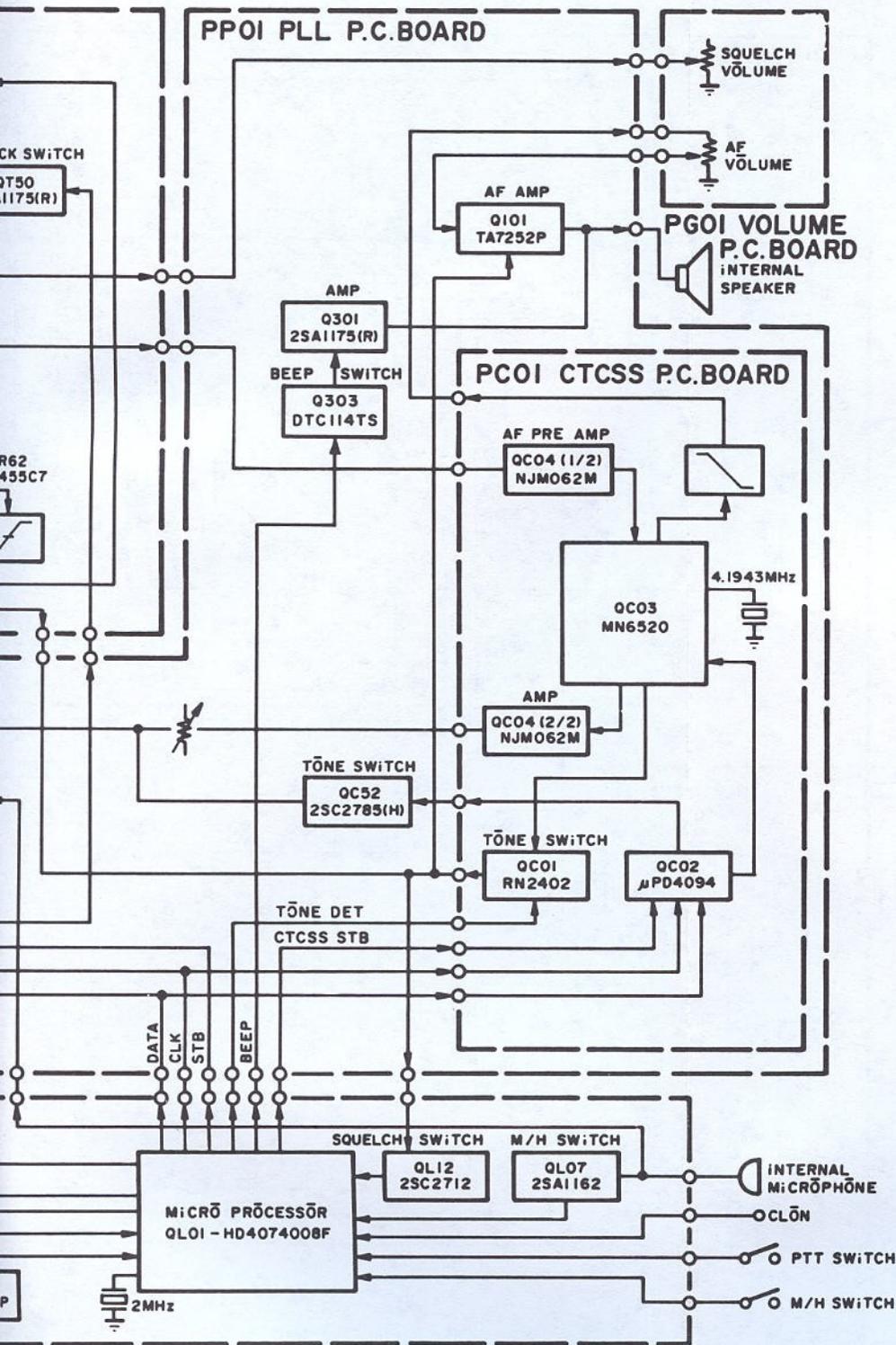
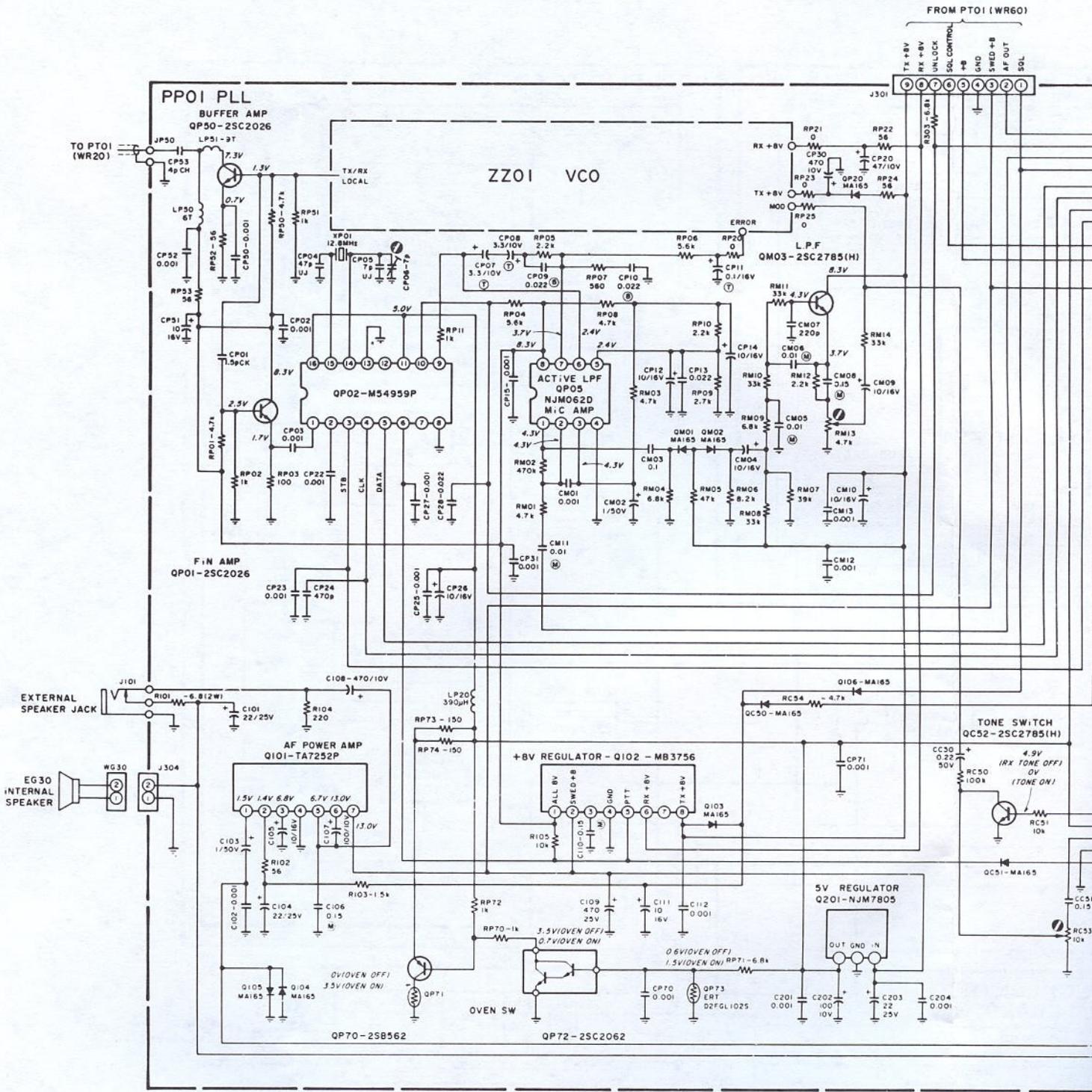
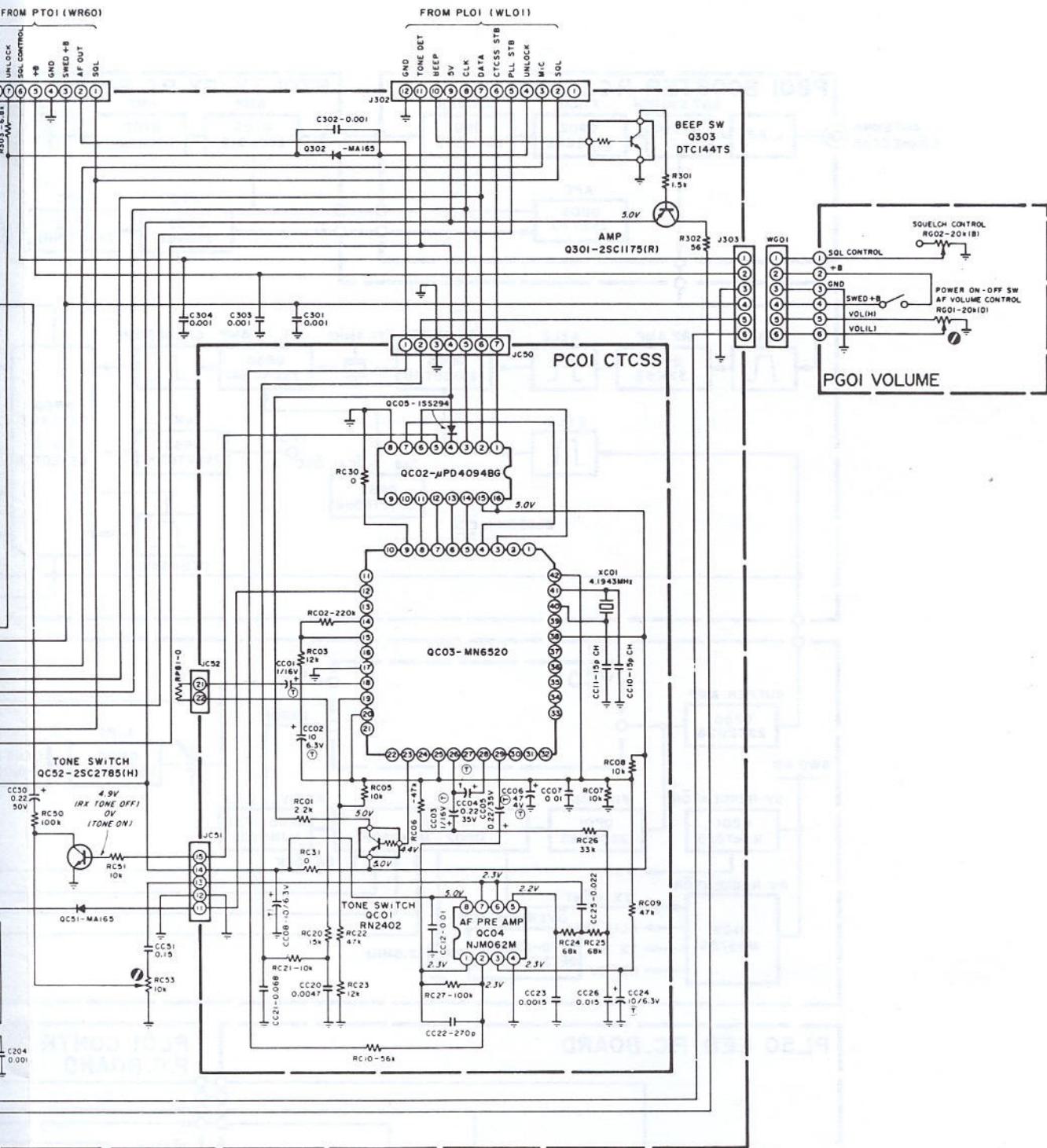


Figure 4-1 GX1500U Functional Block Diagram

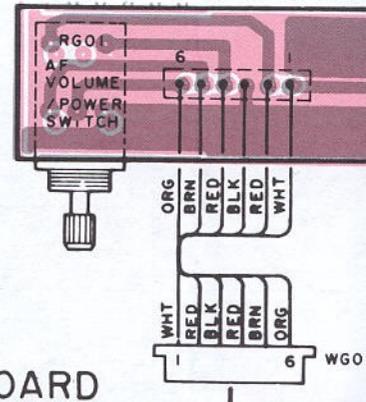




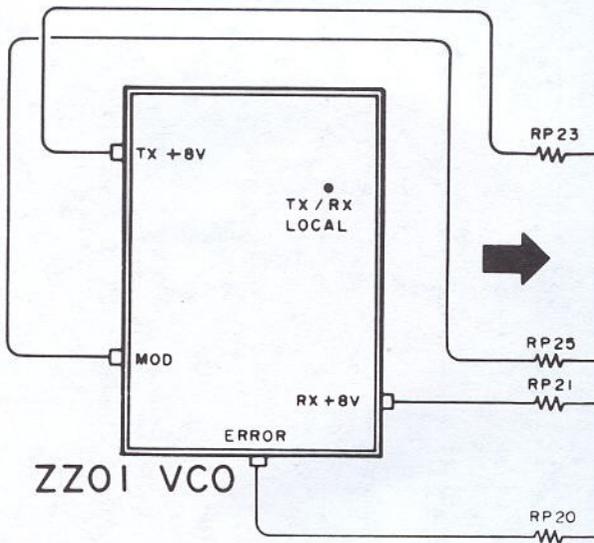
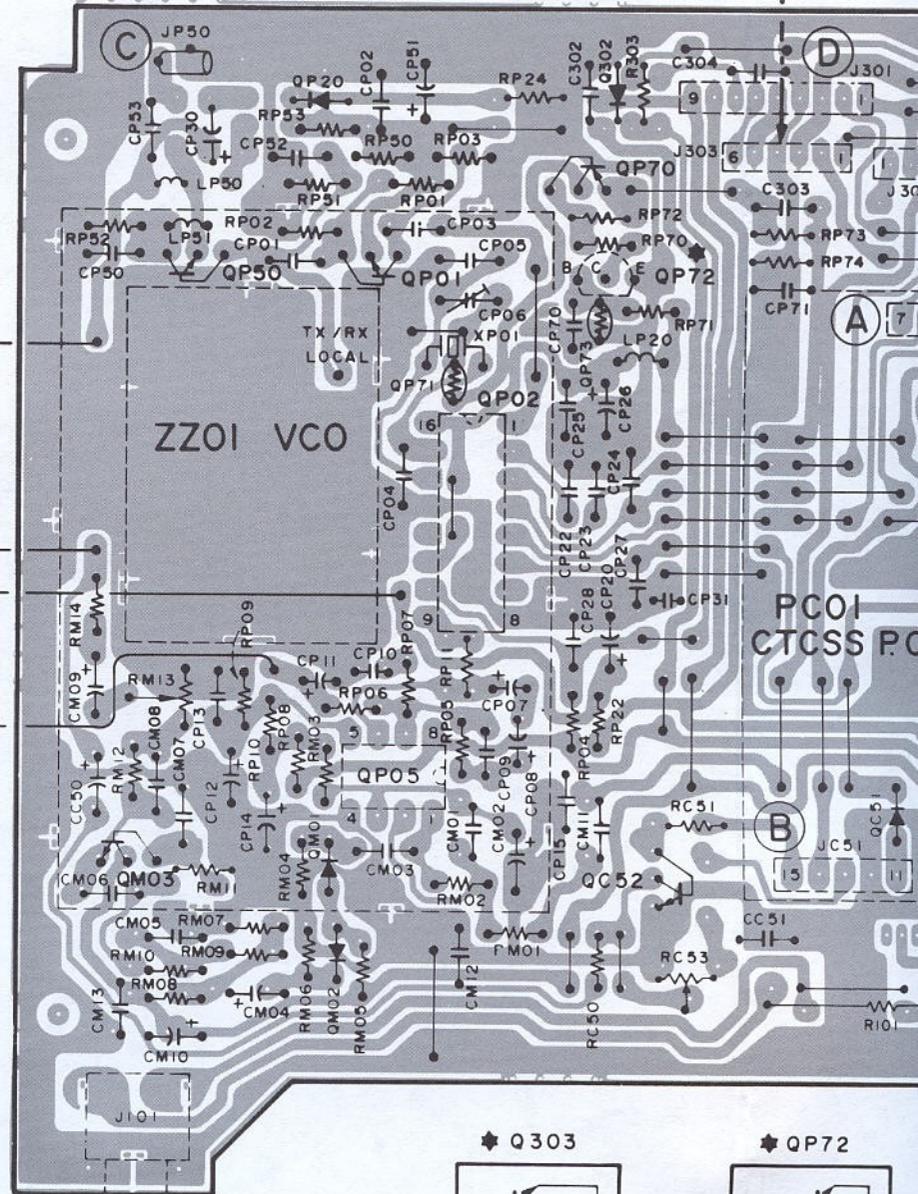
NOTES:
 1. REFER TO PARTS LIST FOR COMPONENT VALUES.
 2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS, AND CAPACITOR VALUES ARE IN MICROFARADS.

Figure 4-2 PLL Schematic Diagram
 Page 4-18

PG01 VOLUME P.C.

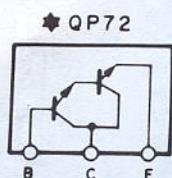
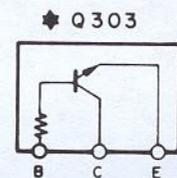


PP01 PLL P.C. BOARD

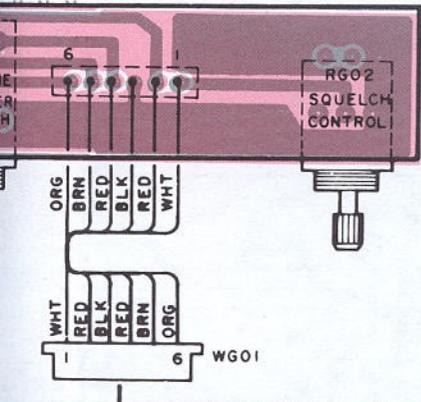


ZZ01 VCO

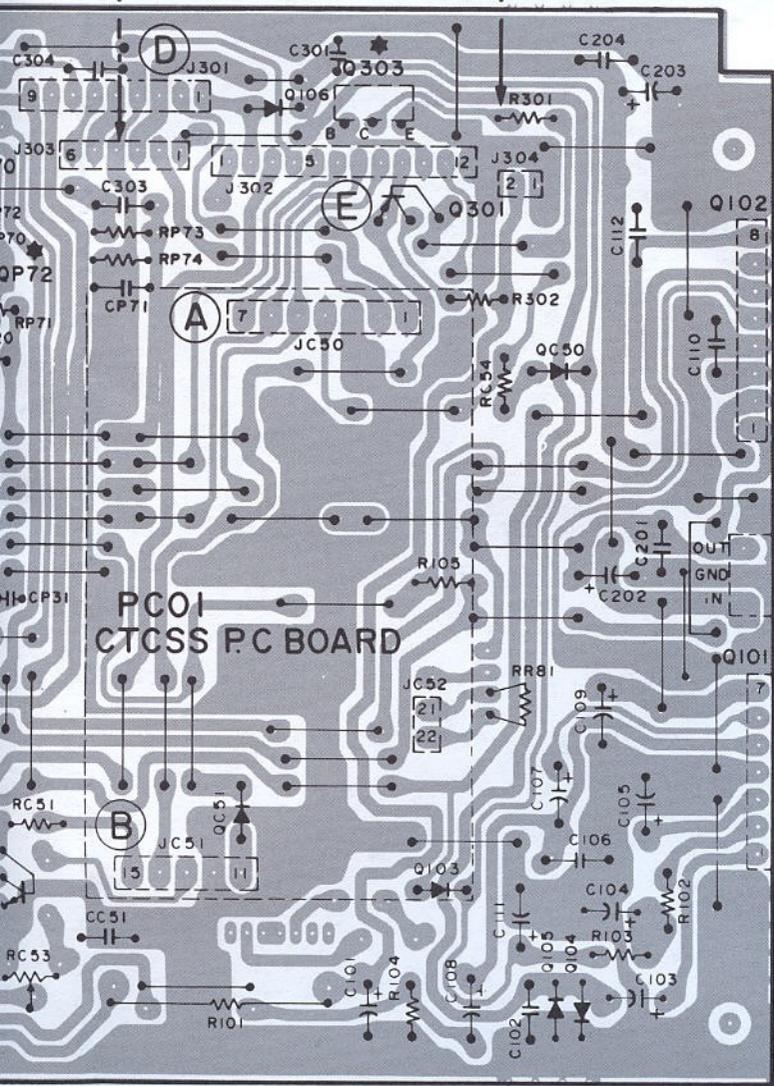
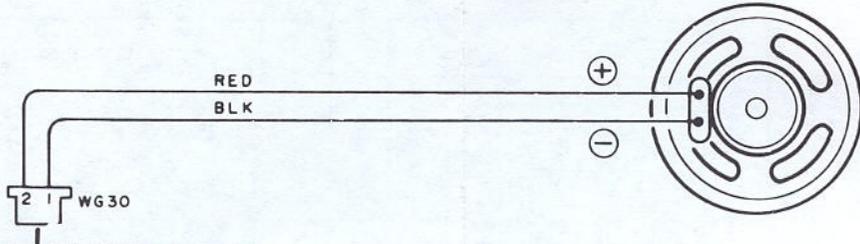
EXTERNAL SPEAKER JACK



VOLUME P.C. BOARD



EG30
INTERNAL
SPEAKER (4Ω)



PC01 CTCSS P.C. BOARD

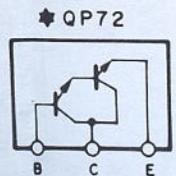
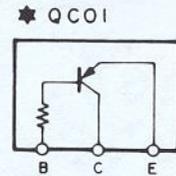
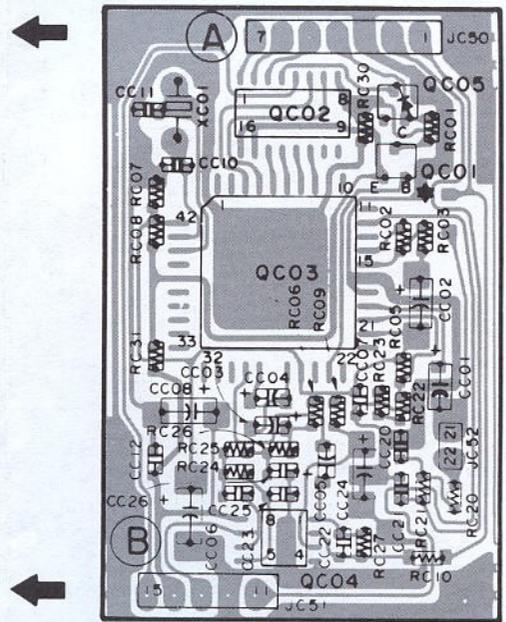
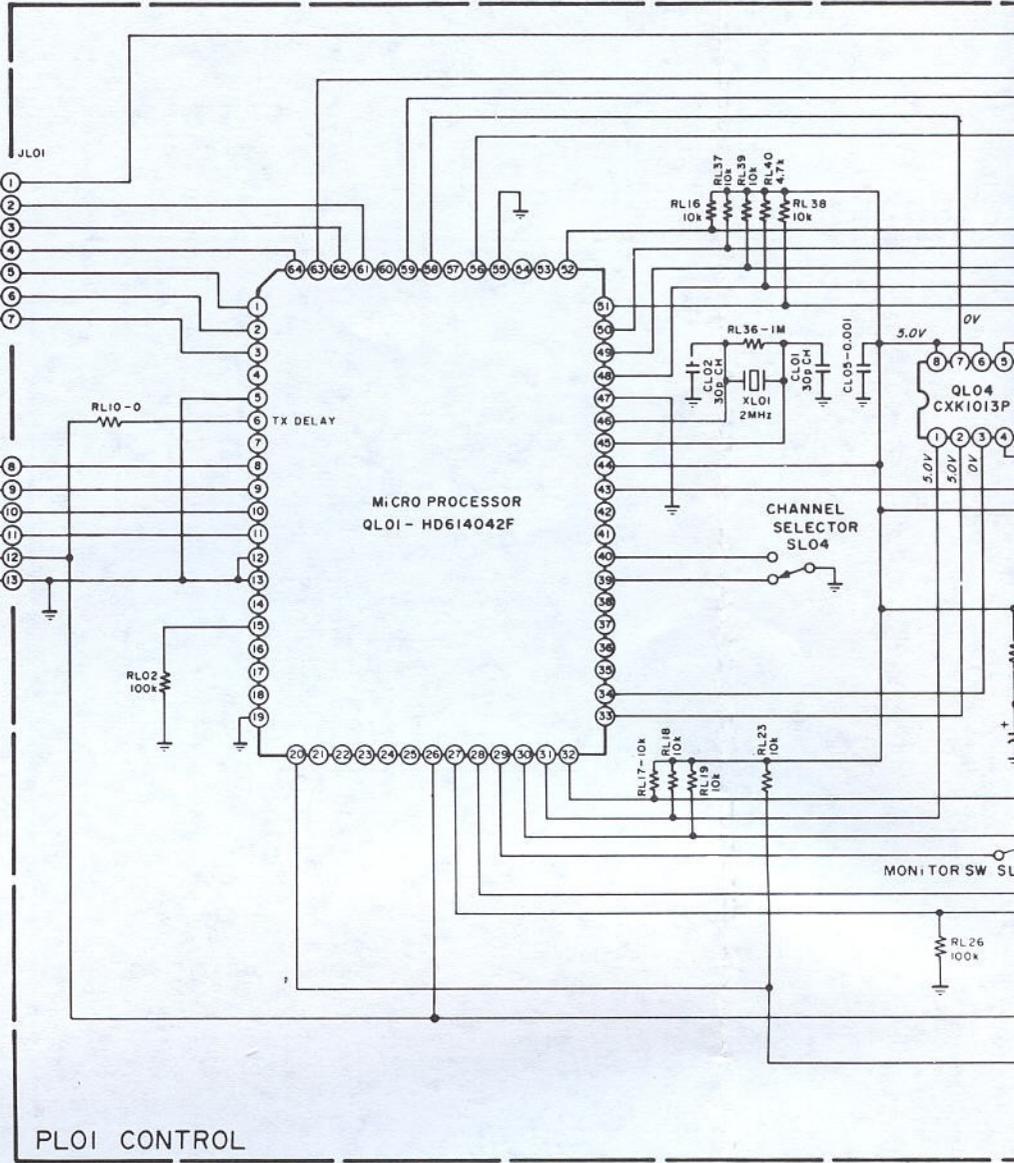
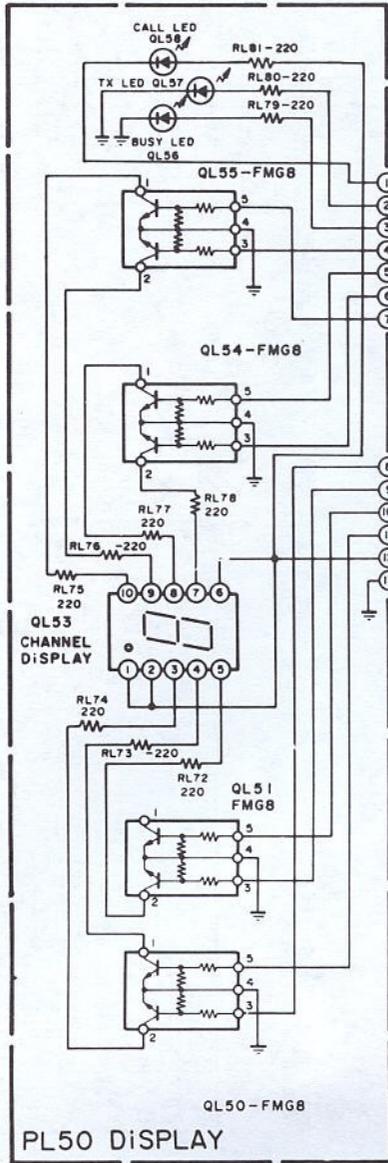
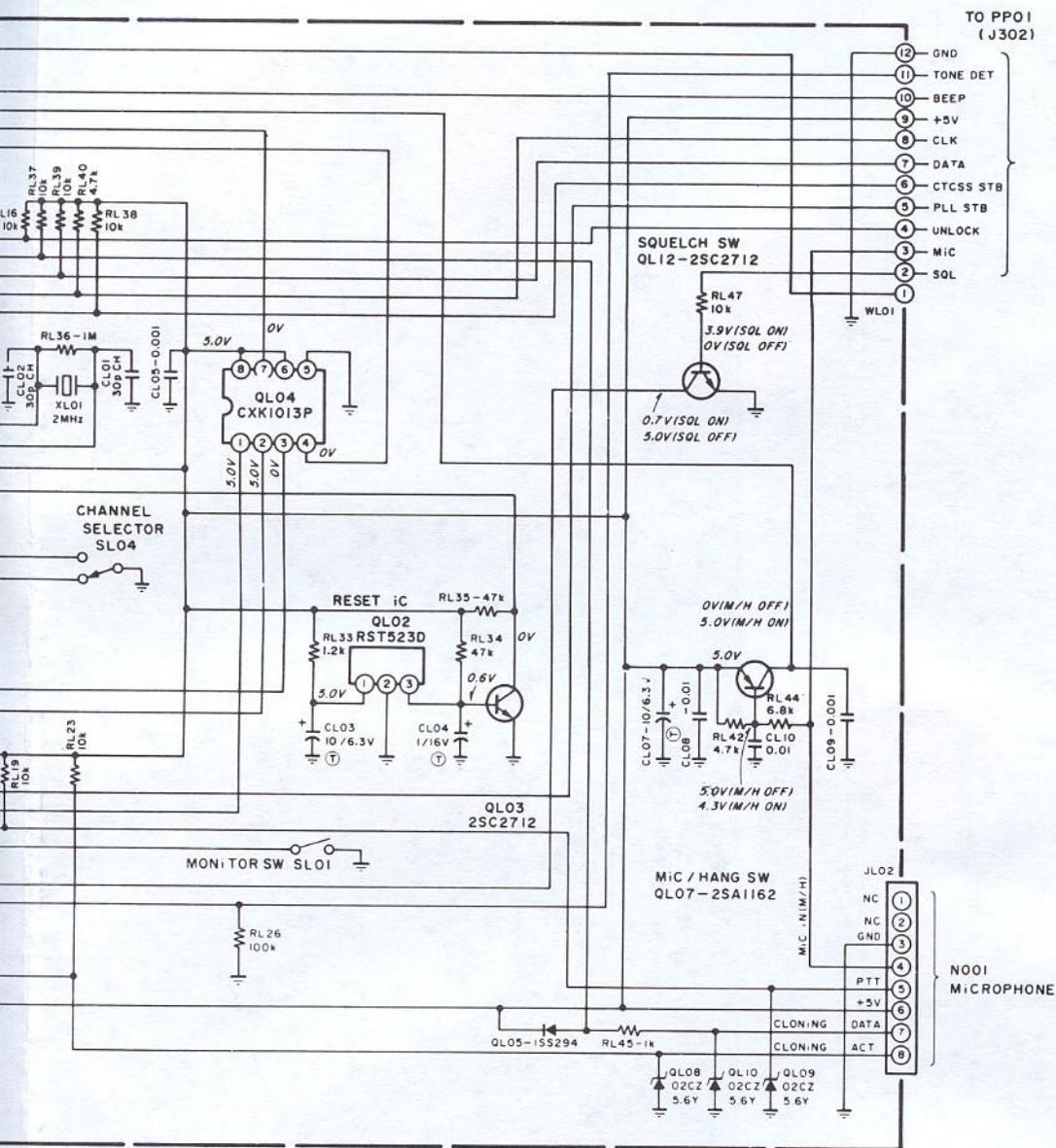


Figure 4-3 PLL Wiring Diagram

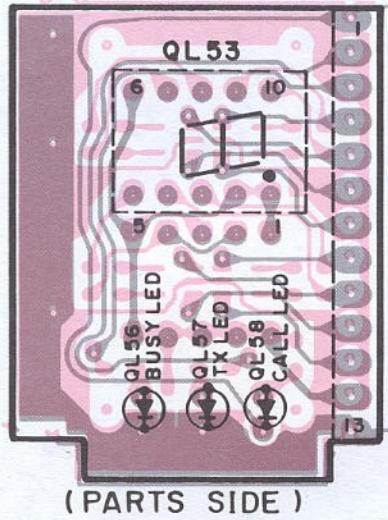




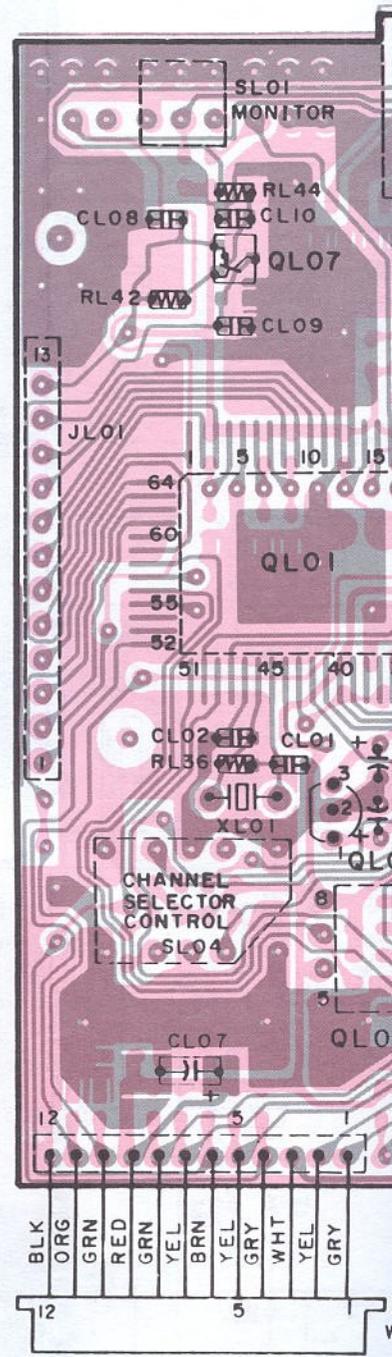
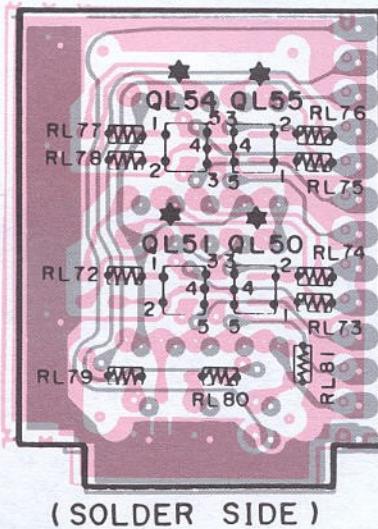
- NOTES:
1. REFER TO PARTS LIST FOR COMPONENT VALUES.
 2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS, AND CAPACITOR VALUES ARE IN MICROFARADS.

Figure 4-4 Control Schematic Diagram

PL50 DISPLAY P.C.BOARD



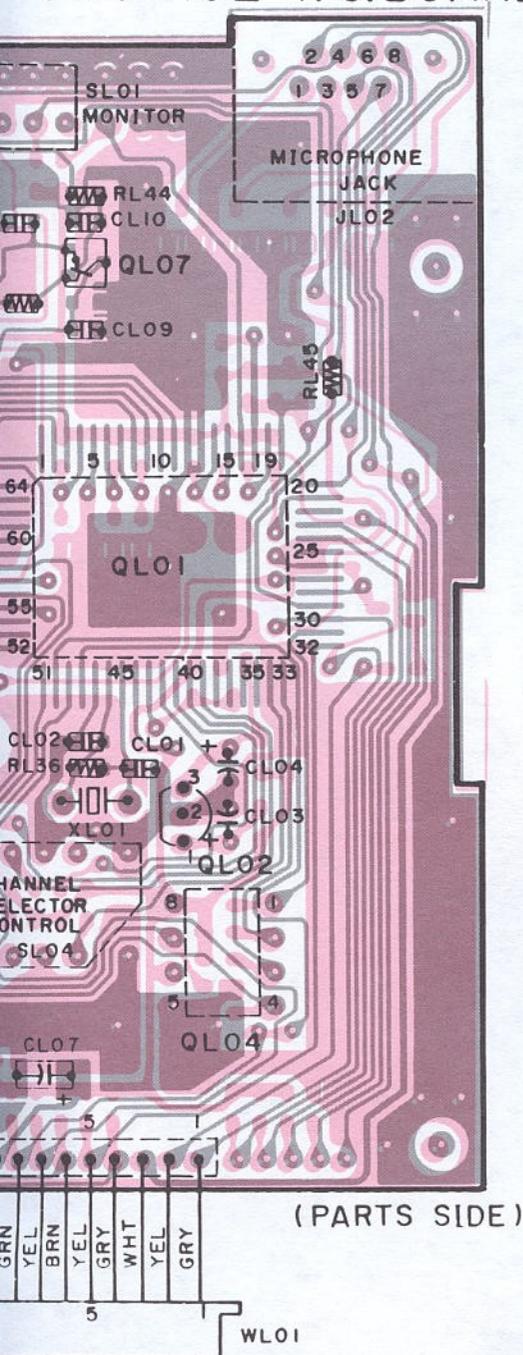
PL50 DISPLAY P.C. BOARD



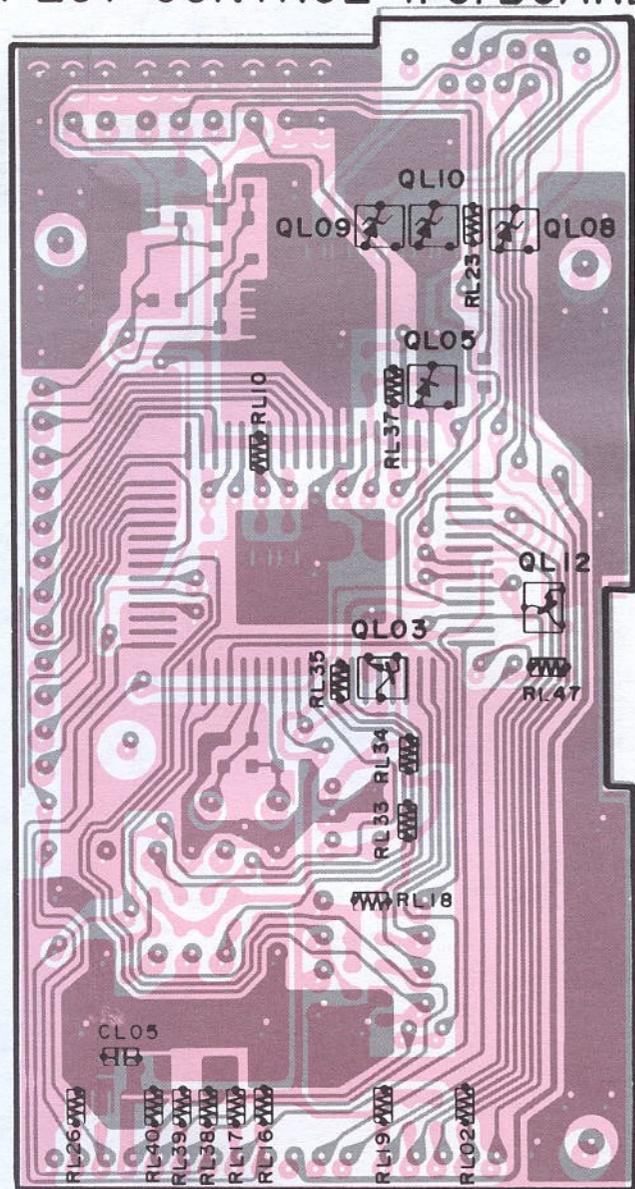
(E)

CONTROL P.C. BOARD

PLO1 CONTROL P.C. BOARD



(PARTS SIDE)

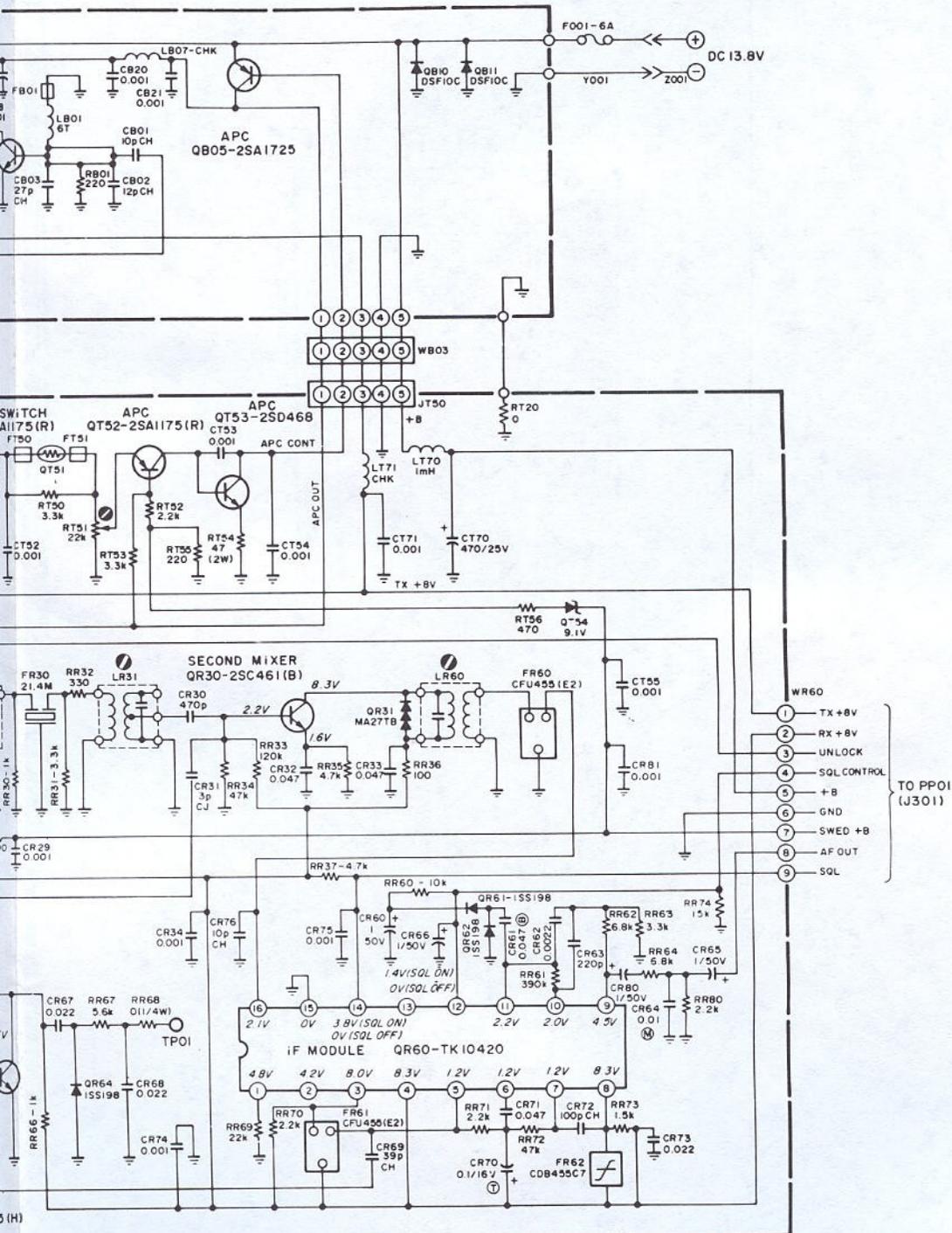


(SOLDER SIDE)

PPO1 (J302)

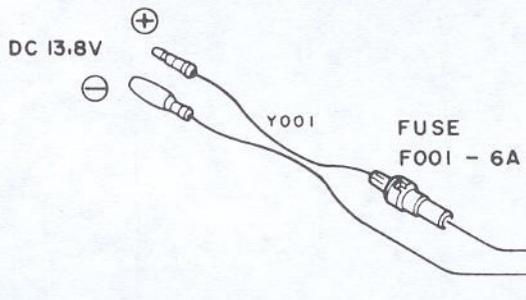
(E)

Figure 4-5 Control Wiring Diagram

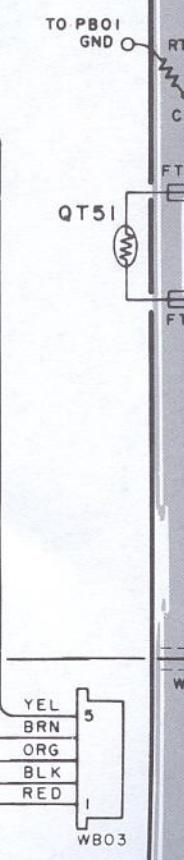
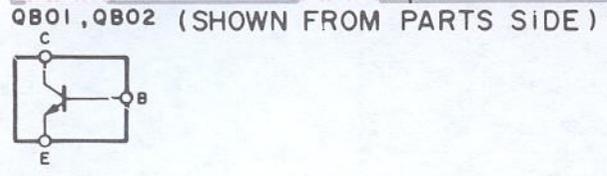
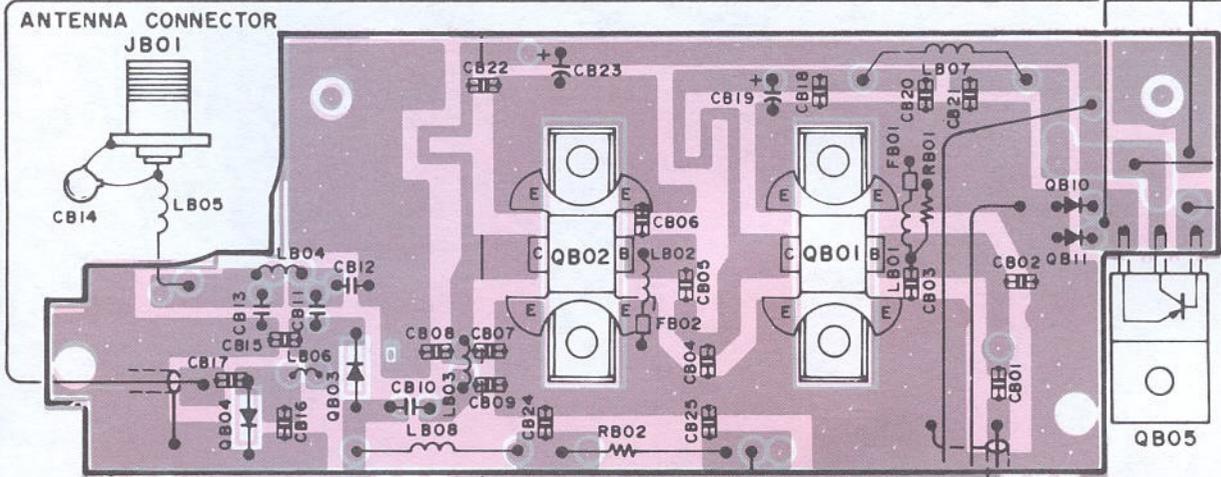


- NOTES:
1. REFER TO PARTS LIST FOR COMPONENT VALUES.
 2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS, AND CAPACITOR VALUES ARE IN MICROFARADS.

Figure 4-6 TX/RX and Booster Schematic Diagram



PB01 BOOSTER P.C. BOARD



PT01 TX / RX P.C. BOARD

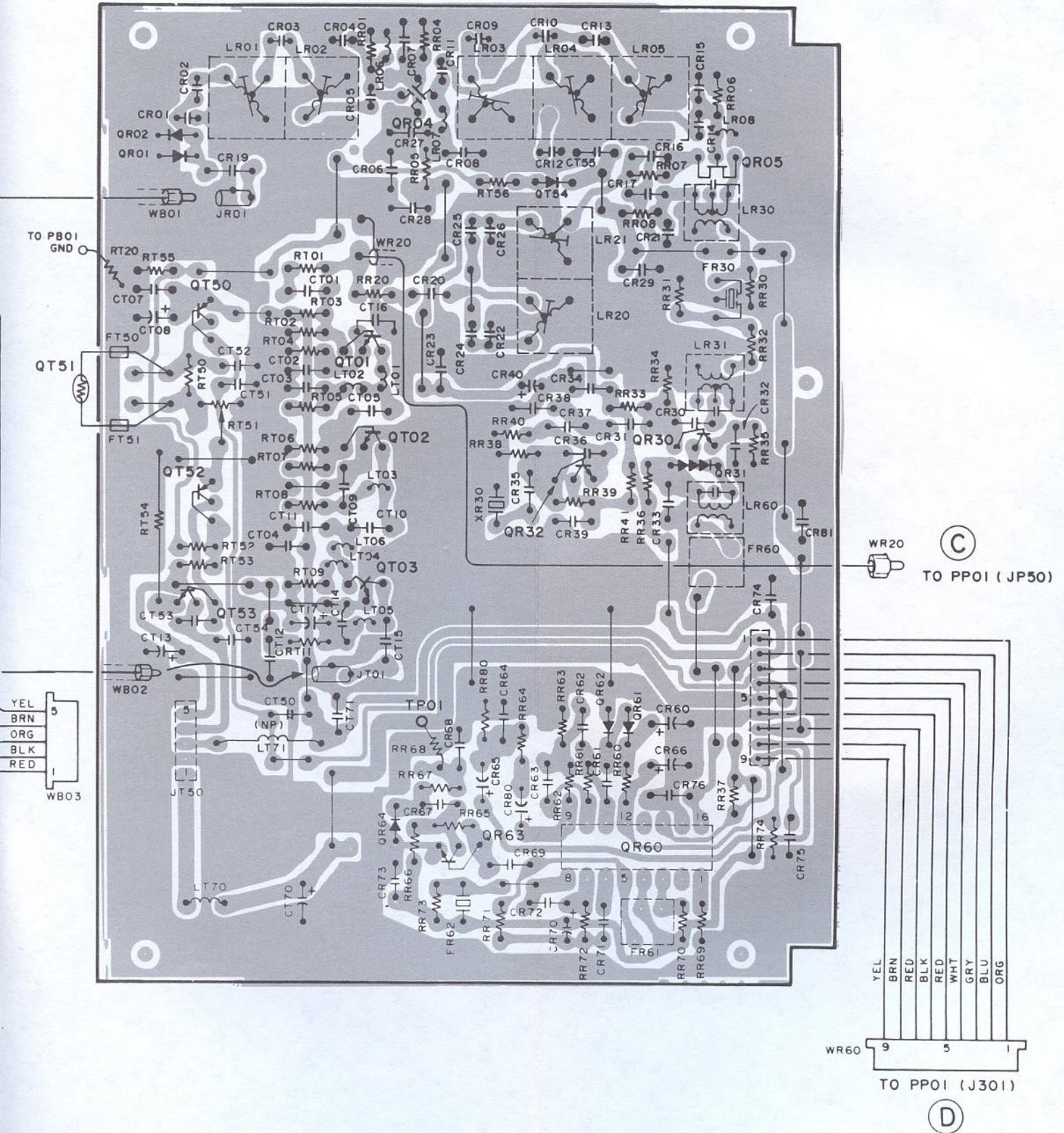


Figure 4-7 RX/TX and Booster Wiring Diagram

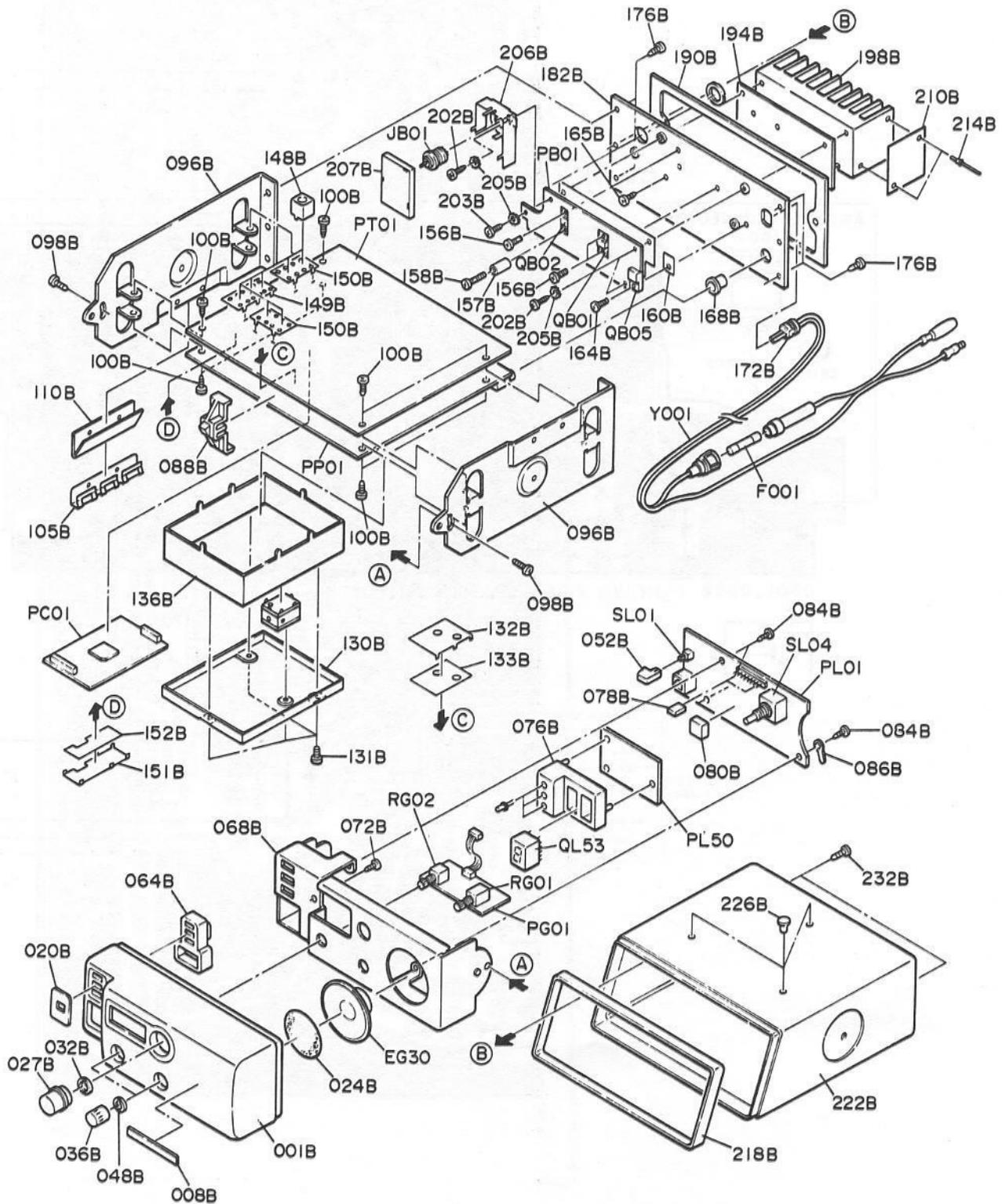


Figure 4-8 Exploded Parts View

SERVICE MANUAL COMMENTS

We would like to know your opinion of our service manual. Was it helpful? Could it be better? Or did you find it inaccurate and troublesome to follow? Your comments are important to us, so if you could take a moment to check the boxes below that best indicate your impressions of the manual, we'll see that your remarks reach the proper people to respond to them.

Sincerely,
Standard Communications Corp.

1. The Installation Section was ___ Good ___ Fair ___ Poor. It could be improved by _____

2. Did you read the Circuit Description? ___ Yes ___ No. If yes, how would you rate it? ___ Good ___ Fair ___ Poor

3. Did you find the Troubleshooting Section useful? ___ Yes ___ No
If not, could you tell us what's wrong with it? _____

4. On a scale of 1 to 5, how would you rate the following sections?
1 = Most Helpful, 5 = Least Helpful.

Test Set Ups? ___ Alignment Procedures? ___

Schematics? ___ Board Layouts? ___

5. Was there anything you think should have been included that was not? _____

6. Was the Parts List easy to use? ___ Yes ___ No Comments _____

7. Was the manual well written? ___ Yes ___ No Remarks _____

8. General Comments _____

Thank You For Your Comments

Your Name _____

Company Name _____

Address _____

City _____ State ___ Phone () _____

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