$3.00 per copy

GX3000V

40 Watt VHF/FM Transceiver

Contains:

- ☐ Specifications
- ☐ FCC Information
- ☐ Operation
- ☐ Installation
- ☐ Theory of Operation
- ☐ Performance Tests
- ☐ Alignment Procedure
- ☐ Complete Drawings
- ☐ Parts Lists

Service Manual



GX3000V

Standard Communications

GX3000V

Sixty-four-channel Forty-watt VHF/FM Transceiver

This manual is intended for use by qualified technicians and includes all necessary information pertaining to GX3000V operation, installation, circuit design, and Maintenance. Information on the installation of the TN22 and TN23 tone board is also included. Changes which occur after the printed date will be incorporated in supplemental service publications.

The complete GX3000V transceiver model numbers are:

- GX3000VAA111
- GX3000VAA131
- GX3000VAA151

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Printed: 2/85

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Specifications 1

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

1.1 General

Frequency Range	138-174 MHz*
Number of Channels	64
Input Voltage	13.6 VDC
Current Drain:	
Standby	500 mA
Receive	1.5 A
Transmit	10 A
Channel Spacing	30 kHz
Dimensions	2.36-H x 7.24-W x 10.08-D in.
Weight	5.5 lbs.
Compliance	FCC Parts 22 and 90
FCC Type Acceptance Numbers	APV9T20184
DOC Type Acceptance Numbers	Pending

*F1 = 138 to 150 MHz
F2 = 150 to 162 MHz
F3 = 162 to 174 MHz

1.2 Transmitter

Measurements are made in accordance with EIA Standard RS-152-B.

RF Power Output	40W (±1.5 MHz) 36W (±3 MHz)
Spurious and Harmonic Emissions	65 dB
FM Hum and Noise	40 dB min.
Modulation	±5 kHz
Audio Distortion	5% max.
Frequency Stability:	
-30° to +60° C	±5 ppm

1.3 Receiver

Measurements are made in accordance with EIA Standard RS-152-B.

Sensitivity:	
12 dB SINAD	0.3 uV
20 dB Quieting	0.4 uV
Squelch Sensitivity:	
Threshold	0.3 uV
Modulation	
Acceptance Bandwidth	± 7.0 kHz
Selectivity	75 dB
Spurious and Image Rejection	85 dB
Intermodulation Rejection	70 dB
Audio Power Output at 5% Distortion	4.0 W
Frequency Stability:	
-30° to +60° C	±5 ppm max.
Channel Spread	±2 MHz (±5 MHz optional)

General Information 2

2.1 Description

The Standard Communications Corp. (SCC) GX3000V is a semiduplex VHF/FM mobile transceiver that incorporates operator-programmable priority scan. Frequencies for each of 64 channels may be programmed into the GX3000V EPROM. A temperature compensating circuit provides frequency stabilization over -30°C to +60°C.

The scanning function looks for a signal on any of the channels programmed for scanning. If a priority channel is programmed, the scanning starts with this channel. If no priority channel is programmed, scanning starts with the displayed channel.

The following features may be programmed into the EPROM:

- busy channel lockout
- one priority channel
- up to 37 discrete EIA CTCSS tone frequencies (when TN22 is installed)
- time out timer with programmable time ranging from 0.5 min to 7.5 min in increments of .5 min
- channel frequencies

The priority channel may be changed by the operator, and scan channels are programmable by the operator.

A back-up feature permits operator programmed channels and the working channel to be retained in memory when the power is off. If back-up is not in effect, the unit powers up to channel one or the priority channel if one is programmed in the EPROM.

The EPROM is programmed by SCC or the dealer. An EPROM Burner (A3400) is available for programming the EPROM. EPROM's may be reprogrammed numerous times after they are erased.

2.2 Options

Options available for use with the GX3000V include:

A00416006.....Tower Clamp for AT26 & AT27
AT9.....VHF 3 dB Gain Antenna
AT26.....VHF 4.5 dB Gain Antenna
AT55.....VHF 6 dB Gain Antenna
BM1.....Mobile Mount
BST-1.....Base Station Tray
CM1.....Cowl Mount
MM1.....Magnetic Mount
MP600.....Base Station Microphone
MP502.....Telephone Type Microphone; black or white (used with PH506B)
PH506B.....Hanger for MP502 with PC Switch; black
RCU-1.....Remote Control Unit
REU-1.....Remote Extension Unit
RTU-51A.....Remote Terminal Unit
TM1.....Trunk Mount
TN22.....CTCSS Multiple Tone Board
TN23.....CTCSS Single Tone Board
UG-1186/U.....Antenna Connector
WW1.....1/4 Wave Whip Antenna
12/120-12.....12 Amp Power Supply
201S.....7 Watt Extension Speaker; brown, grey or white

All necessary service information for each of these devices is included separately with each unit.

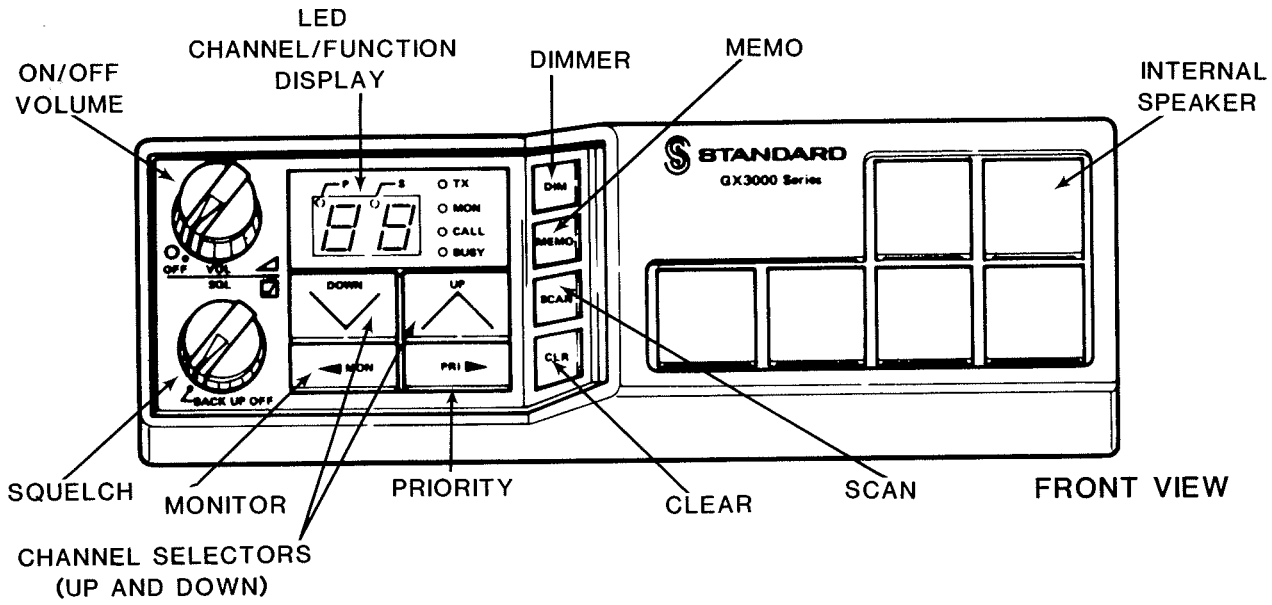
FCC Information 3

The GX3000V complies with the Federal Communications Commission (FCC) requirements that regulate Business Radio Service and other services within the 138 to 174 MHz range. The user must know and comply with all applicable part of the FCC Rules and Regulations. Rules applicable to each service may be ordered from:

SUPERINTENDENT OF DOCUMENTS
Government Printing Office
Washington, D.C. 20402

A valid station license and call sign are required before operating the GX3000V. It is the user's responsibility to apply for and obtain an FCC radio license. The following data pertaining to the GX3000V will by included on the FCC license application.

Type Accepted ..... FCC Parts 22 and 90
Output Power ..... 40 watt
Emission 16F3
Frequency Range ..... 138 to 174 MHz
Type Number APV9T20184



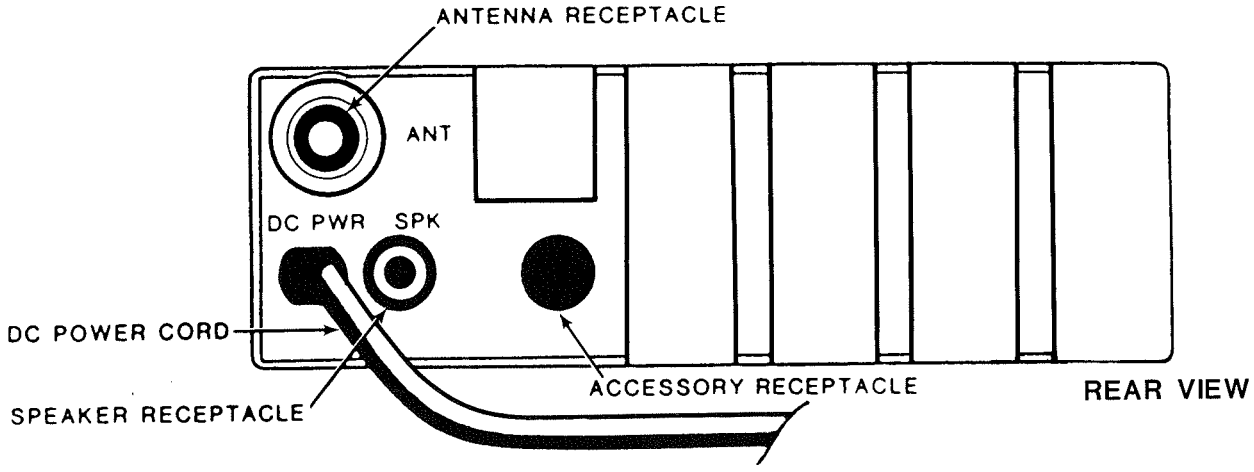


Figure 1. GX3000V Controls and Connections

Installation 5

5.1 FCC Requirements

FCC regulations require that the transceiver's deviation and frequency be tested before initial installation or operation. Before conducting the following procedure, conduct the performance test in the Maintenance Section of this manual.

5.2 Procedure

1. The transceiver can be mounted at any angle. Choose a location to mount the transceiver that allows:

   - accessibility to front panel controls
   - connections to a power source and an antenna
   - nearby space for installation of a microphone hanger

2. The front panel of the GX3000V may be positioned in one of two positions. The normal position, tilted upward, is for installation on or below the dash. For overhead installation, the following steps invert the front panel to allow viewing of the controls and display:

   a. Remove four screws from each side of the transceiver.

   b. Remove the top and bottom covers.

   c. Two screws on each side attach the front panel to the transceiver. Remove these screws.

   d. Invert the front panel position.

   e. Attach the front panel using the screws removed in Step c.

   f. Attach the top and bottom covers using the screws removed in Step a.

   g. Install the transceiver in an inverted position so that the front panel is tilted downward.

3. Mount the bracket using the washers, nuts, and long hex head bolts.

4. Thread the mylar washers onto the mounting bracket knobs.

5. Position the transceiver within the bracket arms, matching the bracket and transceiver notches to effect the desired positioning.

6. Secure the transceiver to the brackets with the mounting knobs.

7. At the rear of the transceiver, connect the antenna cable to the antenna jack (see Figure 2).

8. Connect the red power cord to a suitable DC source (13.6 VDC $\pm$20%, 10 amp current). Connect the black power cord to negative ground. See Figure 2 for this step.

9. Use a through line wattmeter to confirm that the voltage/standing-wave ratio is 1.5 to 1 or better.

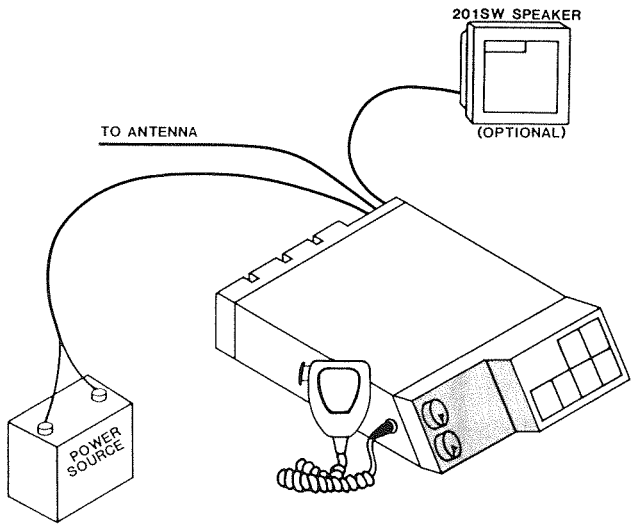


Figure 2. GX3000V Installation Interconnections

5.3 Optional Installation

The GX3000V also accepts tone boards TN22 and TN23.

- TN22 is a multi-tone tone board capable of separate tones for each channel.

- TN23 is a single-tone tone board having one tone for all channels.

To use a CTCSS tone board, the following three steps are necessary:

1. Reprogram the EPROM.

2. Install the tone board.

3. Unsolder a jumper.

The following instructions describe installation and alignment for both tone boards. Refer to Figure 3 for the installation location.

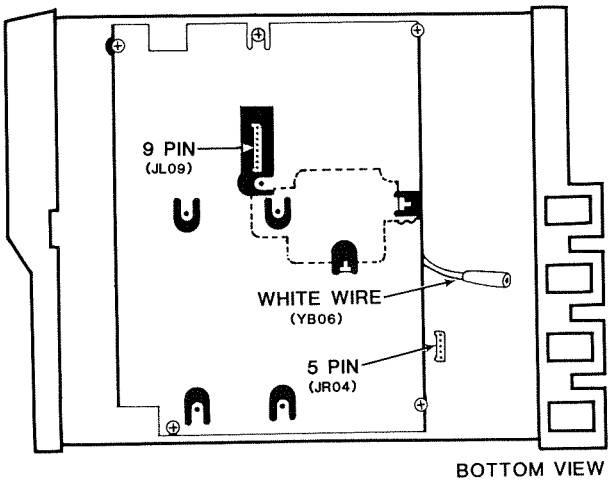


Figure 3. Tone Board Installation

5.3.1 TN22 Tone Board

A. Installation

1. Remove the transceiver top and bottom cover.

2. Install the TN22 in the following manner.

   a. Ensure that the tone board is installed in such a way that it is sitting atop the transceiver shield bracket (see Figure 3) with the component side up.

   b. Hook the TN22 tone board to the hook at point A so that the model number end can be screwed onto the tab at point B (see Figure 3).

   c. With a 2.6 mm self-tapping screw, secure the model end of the tone board to the tab at point B (see Figure 3).

   d. Plug the 9-pin socket into transceiver plug JL09.

   e. Plug the 5-pin socket into transceiver plug JR04.

   f. Plug the white wire from TN22 into socket YB06 of white wire from the radio.

3. On the component side (top of radio) of the GX3000 series, unsolder "Flying Joint" JR10. JR10 is located near the 8-pin connector JR01.

   NOTE: The frequency must be programmed by the EPROM, (FX10) in radio.

B. Encoder Alignment

1. Connect the test equipment as shown in Figure 4.

2. Select any programmed CTCSS channel.

3. Set the tone generator to the desired frequency.

4. Set the communications monitor to the radio transmitter frequency.

5. Key the transmitter and ensure that the Lissajous figure in the communications monitor is a stationary circle.

6. Key the transmitter and adjust R106 on the tone board until the tone deviation is $\pm$650 Hz.

C. Decoder Alignment and Test

1. If the GX3000 MON LED is on, depress the MON key until the MON LED turns off.

2. Set the communications monitor to the receive frequency of the radio .

3. Modulate the signal with the desired tone frequency, with a deviation of $\pm$500 Hz.

4. Set the signal generator output to the "OFF" position.

5. Connect the hang up button on the rear of the microphone to ground. Audible noise should disappear.

6. Gradually increase the RF signal level. The tone squelch opening level should not exceed 10 dB QS.

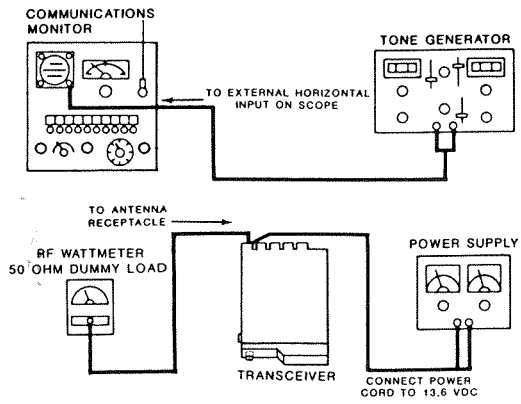


Figure 4. Tone Board Encoder Alignment

5.3.2 TN23 Tone Board

A. Installation

1. Remove the transceiver top and bottom cover.

2. Install the TN23 in the following manner.

   a. Ensure that the tone board is installed in such a way that it is sitting atop the transceiver shield bracket (see Figure 3).

   b. Hook the TN23 tone board to the hook at point A so that the model number end can be screwed onto the tab at point B (see Figure 3).

   c. With a screw, secure the model number end to the tab at point B (see Figure 3).

   d. Plug in the 9-pin socket into the transceiver plug JL09.

   e. Plug in the 5-pin socket into the transceiver plug JR04.

3. On the component side (top of radio) of the GX3000 series, unsolder "Flying Joint" JR10. Refer to Figure 8.

4. Use the six DIP switches on TN23 to program the tone frequencies (see Figure 16).

   NOTE: If the tone board is installed in the radio, the EPROM (FX10) must be programmed to accept tone board installation/operaton in receive mode.

5. For programmed tones in the frequency range of 67 thru 120 Hz, cut RA25 on the tone board . RA25 is located near QA02 at end of 8-pin IC TL062.

B. Encoder Alignment and Decoder Test.

1. Connect the test equipment as shown in Figure 12.

2. Set the communications monitor to the radio transmitter frequency.

3. Key the transmitter and adjust R07 until the tone deviation is ±650 Hz.

4. If the MON LED is on, push the MON key until the MON LED turns off.

5. Set the communications monitor to the receive frequency of the radio.

6. Modulate the signal with the desired tone frequency, with a deviation of ±500 Hz.

7. Set the signal generator output to the "OFF" position.

8. Connect the hang up button on the rear of the microphone to ground. Audible noise should disappear.

9. Gradually increase the RF signal generator level. The tone squelch opening level should not exceed 10 dB QS.

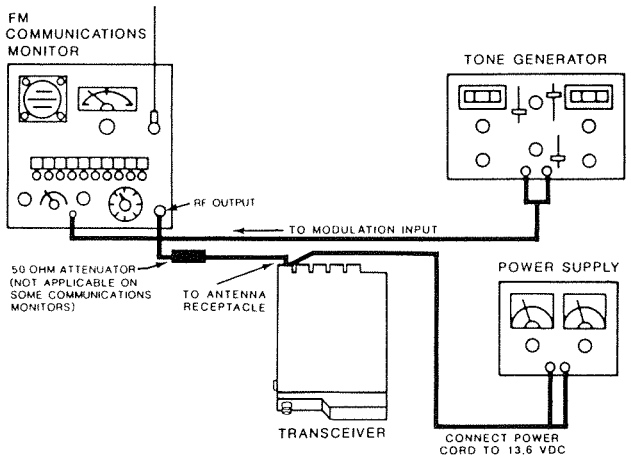


Figure 5. Tone Board Decoder Test

Operation 6

1. Ensure the following connections are made:

   - The power cord with a 10 amp fuse is connected to the power source.
   - The antenna is connected to the jack marked "ANT" on the back of the unit.
   - The MP566 Microphone is connected to 5-prong jack on the left side of unit.

2. Rotate OFF/VOLUME control clockwise to ON.

3. Select desired channel using the UP and DOWN keys as follows:

   - Press the UP key to select the next higher channel.
   - Press the DOWN key to select the next lower channel.
   - Channel selection automatically steps while the UP or DOWN key is held depressed. Selection stops when key is released.

     NOTE: If the selected channel is the priority channel, the dot labeled "P" will light.

4. Adjust the ON/VOLUME control to the desired volume of received signals.

5. With no signal present, rotate the SQUELCH control clockwise until the background noise just disappears.

FEATURES

Priority Channel

Program a channel as the priority channel as follows:

- Select desired channel as in Step 3.
- Press the PRI key.
- Program the channel as a scan channel (see Scan Channels).

A channel which has been programmed as a priority channel may be disabled as follows:

- Select the priority channel as in Step 3.
- Press the PRI key to disable the priority status of the channel.

Back Up

The back up feature enables the working channel and the operator-programmed priority and scan channels to be retained in memory when the power is turned off. Back up is in effect when the SQL control has not been turned counterclockwise past the click to the BACK UP OFF position.

Scan Channels

Program scan channels as follows:

- Select the desired channel as in Step 3.
- Press the MEMO key.
- Pressing the MEMO key again returns the channel to normal, non-scan status.
- Repeat this procedure for each channel to be programmed as a scan channel.

Scanning

To use the scan feature, the squelch must be set as in step 5, there must be no signal present, and the microphone must be hung up. The scan mode is then entered by pressing the SCAN key. The channel display will be blank, and the dot labeled "S" will blink. Scanning then procedes in one of the following two modes:

a) Regular scan (no priority channel is programmed):

   Scanning starts with the lowest channel and procedes sequentially through channels selected as scan channels until a signal is encountered.

   When a signal is encountered, the busy channel is displayed and scanning stops.

b) Priority scan (priority channel is programmed):

   Scanning starts with priority channel.

   If a signal is detected on the priority channel, scanning stops.

   If no signal is detected on the priority channel:

   - Other scan channels are scanned alternately with priority channel.

- The priority channel continues to be scanned even when the scanning stops on a channel other than the priority channel.

  If the working channel is no longer busy, scanning begins again.

  All keys except the CLR key are disabled during scanning.

Taking the microphone off its hanger will stop scanning, but scan mode will not be exited.

Returning the microphone to its hanger before transmitting causes scanning to resume.

Scan mode is exited when the CLR key is pressed or the transmitter is keyed.

Clear

The CLR key operates as follows:

- When in scan mode, pressing CLR exits scan mode.
- When the current channel is other than priority channel, pressing CLR recalls the priority channel. An additional push at this point returns to the previous channel.

Priority Scan

In priority scan, the time spent sampling the busy channel and the time spent scanning are as follows:

a) Without tone board:

- Stay at working channel for 1,000 milliseconds.
- Scan priority channel for 50 milliseconds.

b) With tone board:

- Stay at working channel for 1000 milliseconds.
- Scan priority channel for 300 milliseconds.

Monitor

It is illegal to transmit on a channel without first monitoring it. A channel is monitored as follows:

a) If a tone frequency is programmed for the channel:

Lift the microphone off the bracket
or
Press the MON key to suppress the tone frequency and monitor the channel.

- Press MON again to mute audio and reinstate the tone frequency.

b) If no tone frequency is programmed for the channel:

- Monitoring is continuous.

Display Brightness

The brightness of channel display can be controlled by the DIM key. There are three levels of brightness, and the GX3000V powers up to the brightest level. Pressing the DIM key dims the brightness by one step.

- If DIM is pushed when display is at the dimmest level, display defaults to the brightest level.

LED Indicators

The LED indicators function as follows:

- S is lit during scanning mode.
- P is lit during priority scanning or when the current channel is the priority channel.
- TX is lit during transmission. When programmed for time out timing, the time out timer stops transmission, and the TX light is off.
- MON

  If CTCSS is programmed for the channel:
  MON is lit when the MON key is pushed and channel monitoring is in progress.

  If CTCSS is not programmed for the channel:
  MON is lit during RX mode.

- BUSY is on when the channel status is busy, without regard to CTCSS tone presence.
- CALL is used only for applications as required.

Time out timer

If the time out timer feature is programmed:

- A beeping alarm sounds 10 seconds before the transmitting time limit.
- Transmission is cut off when this limit has been reached.
- Timer is reset by releasing push-to-talk button momentarily.

Theory of Operation 7

Refer to the transceiver block diagram (Figure 6) and the schematics at the rear of the manual for the following description.

7.1 Phase-Locked-Loop Frequency Synthesizer

7.1.1 Reference Signal

The output of the 5.12 MHz reference oscillator circuit QP03 is divided by QP01 to produce a 5 kHz reference signal.

The oven circuit provides heat compensation for crystal XP01 in order to prevent the frequency drift when the temperature is low. Frequency drift is kept within ± 5 ppm.

7.1.2 VCO

The oscillation frequency of the VCO is controlled by the voltage applied to QV03 and QV04. The VCO output is divided according to the pulse swallow counter created by QP02 and QP01, corresponding to the channel frequency.

7.1.3 N Number

QP01 contains the N number. This number is the frequency set in the EPROM. It is serially transfered to QP01.

7.1.4 Phase Detector

The phase detector in QP01 compares the divided VCO frequency with the reference frequency. If these two frequencies are in phase, the DC correction voltage from QP01 to the VCO remains constant. If the divided frequency is lower than the reference frequency, the DC correction voltage from QP01 is increased. If the divided frequency is greater than the reference frequency, the DC correction voltage is decreased.

7.1.5 VCO Correction

The correction voltage travels through QP32(2/2) to QV03(RX) or QV04(TX) . The capacitance of QV03 and QV04 varies indirectly with the DC correction voltage.

7.1.6 Phase-Locked-Loop

The VCO output then travels through the phase-locked-loop circuit again and again. The loop becomes locked when the reference frequency matches the divided frequency from the VCO.

7.2 Receiver

The receiver uses a double conversion superheterodyne to operate in the frequency range 138 to 174 MHz.

7.2.1 RF Stage

The incoming RF signal passes through the antenna and is amplified by RF AMP QR03. The amplified signal passes on to the gate of the first mixer QR04 to be mixed with the first local oscillator.

7.2.2 First Local Oscillator

The VCO originates the first local oscillator. The first local oscillator from the VCO passes through LP61 and LP62 and is appplied to the source of the first mixer QR04.

7.2.3 First Intermediate Frequency (IF)

The heterodyning action of the first mixer produces a 45 MHz intermediate frequency (first IF) which is fed through a bandpass filter (LR33 and LR34), passed through two two-pole crystal filters (FR30 and FR31), and amplified by the first IF AMP (QR31 and QR33).

7.2.4 Second Local Oscillator

Crystal XR50 generates a second local oscillator signal of 45.455 MHz. This is applied to the base of the second mixer QR50.

7.2.5 Second Mixer, Second IF

The signal from the first IF AMP is applied to the base of QR50 and heterodyned with the signal from the second local oscillator. A second IF of 455 kHz is produced and passed through ceramic filters FR50 and FR51.

The second IF is then applied to QR56 and passed through QR56's internal detector circuit to recover the audio.

7.2.6 Volume Control and AF Amplifier

The detected signal, passed through the de-emphasis circuit (CR80 and RR63), is amplified by AF PREAMP QA03 and applied to AF volume control RG01. The AF signal which passed through RG01 is amplified by AF AMP QA01. This signal drives speaker NG01.

7.2.7 Squelch Circuit

The signal for the squelch circuitry is obtained from QR56, detected by QR54 and QR55, and applied to squelch control RG02. This DC voltage controls a switch in QR56 which in turn controls QA04 to disable AUDIO PREAMP QA03.

7.3 Transmitter

The transmitter delivers 40 watts in the frequency range of 150 to 174 MHz.

7.3.1 Microphone Amplifier

The audio signal from the microphone travels through QM01. QM01 and associated circuitry constitute a pre-emphasis characteristic microphone amplifier.

7.3.2 Filter and Attenuator

The amplified signal then procedes through additional circuitry of QM01 where it is limited and passed through a roll-off filter. The signal from QM01 is amplified by AMP QP32 (1/2) and then travels through the FET attenuator QP33.

7.3.3 RF Signal

Next, the signal is applied to the VCO, and then directly to the 5.12 MHz REF circuit to obtain a modulated signal.

7.3.4 RF Amplifier

The output from the VCO is output to the pre-amp stage and is amplified by QT01, QT02, and QT03. The QT03 output is controlled by APC B+ to maintain constant RF output power.

7.3.5 Power Amplifier

The signal amplified by QT03 is amplified by QB01 and further amplified by QB02. The QB01 output is controlled by APC B+ to maintain constant RF output power.

7.3.6 Automatic Power Control (APC)

The RF output power is sampled by RB05, rectified by QB05, and applied to APC control RC04. This voltage is applied to QC04, QC05, and QC06 to control the supply voltage on QT03 and Driver QB01, maintaining constant power output.

As the temperature of QB01 and QB02 increases, the resistance of posistor QB07 increases. The voltage that flows to QB01 and QB02 decreases.

7.3.7 SWR Protector Circuit

QB06 rectifies any reflected power caused by antenna mismatch. This rectified power is applied to QC03 and then passes on to the APC circuit. RC02 adjusts the maximum SWR level before the RF power is reduced.

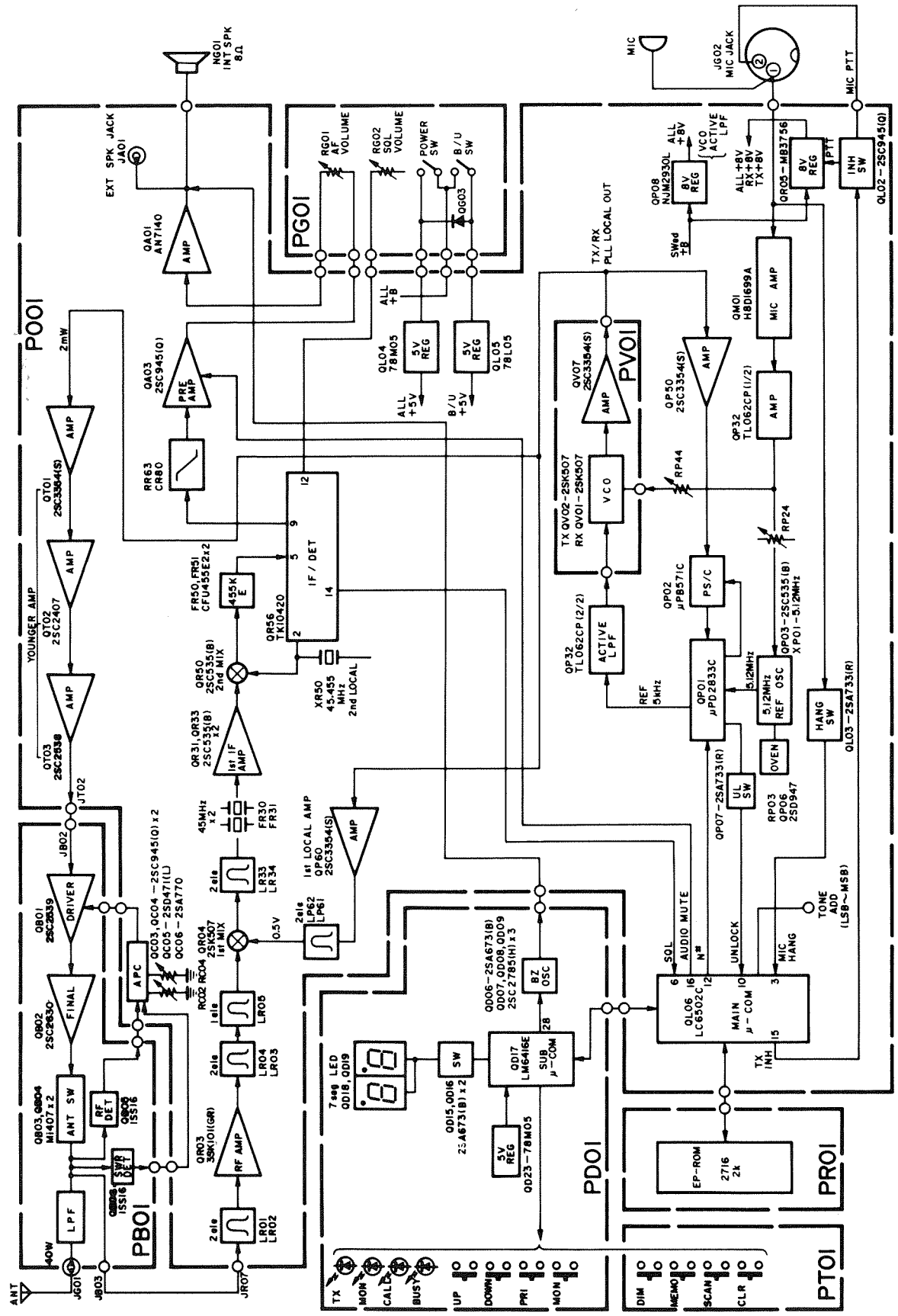


Figure 6. GX3000V Block Diagram

8.1 FCC Requirements

The FCC requires that the deviation and frequency of the transceiver be checked annually.

8.2 Precautions

The inherent quality of the solid-state components used in this transceiver provides many years of continuous use. Take the following precautions to prevent damage to the transceiver.

- Never key the transmitter unless an antenna or suitable dummy load is connected to the tranceiver's antenna receptacle.
- Ensure that the input voltage does not exceed 16 VDC or fall below 11 VDC.

8.3 Test Applications

- Performance test: conducted to check overall transceiver operation. This should be performed before transceiver sale/installation.
- Alignment: conducted if the transceiver fails the performance test or if a critical electrical component has been replaced. SCC recommends that alignment be performed whenever maintenance is performed.
- Troubleshooting: conducted after alignment to isolate a fault in the transceiver.

8.4 Test Equipment

The following test equipment, or its equivalent, is necessary for GX3000V maintenance.

EQUIPMENT	MODEL
FM Communications Monitor (service monitor)	Cushman CE-6A
RF Wattmeter with 50 load	Bird 6154
Tone Generator	Cushman CE-11
Voltmeter	Hewlett Packard 427A
RF Probe	Hewlett Packard 11096B
Frequency Counter	Hewlett Packard 5314A
Oscilloscope	Hewlett Packard 1220A
DC Ampere Meter	Simpson 374
Power Supply	Adjustable 11 to 13.6V, 25 Amp

8.5 Alignment

The GX3000V alignment points are shown in Figure 7. After connecting the test equipment, ensure that the supply voltage is 13.6 V.

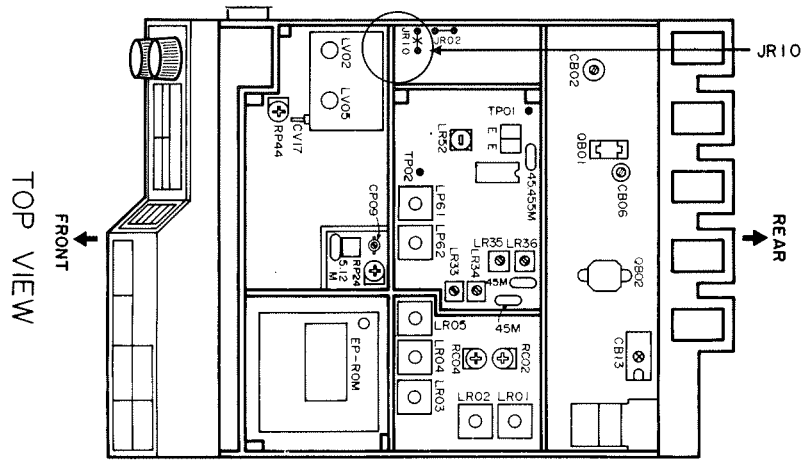


Figure 7. GX3000V Alignment Points

8.5.1 PLL

Connect the test equipment as illustrated in Figure 8.

1. Connect a voltmeter with an internal resistor greater than 500 k ohm to CV17.
2. Set the transceiver to the programmed frequency , and key the PTT (push to talk button).
3. Adjust LV05 so that the voltage at CV17 in the TX mode is 4.0 V.
4. Unkey the PTT.
5. Adjust LV02 so that the voltage at CV17 is 4.0 V.
6. Repeat Steps 2 through 5.
7. Connect a frequency counter to TP02, and set the transceiver to the programmed frequency.
8. Adjust CP09 so that the RX PLL Local frequency is 45 MHz higher than the programmed frequency.

8.5.2 Transmitter

1. Connect the test equipment as illustrated in Figure 8.
2. Connect an RF power meter and a dummy load to the antenna connector of the unit.
3. Rotate RC04 fully clockwise.
4. Adjust CB02, CB06, and CB13, in this order, for maximum output power.
5. Adjust RC04 so that output power is 43.0 W.
6. Connect a linear detector and dummy load to the antenna connector of the transceiver.

   NOTE: Attach a capacitor (10 uF/16 V) between the audio generator and Mic connector pin 1 , with the "+" side connected to the transceiver.
7. Apply 1000 Hz, 50MV to the mic connector.
8. Using RP44, adjust the deviation to ±4.5 kHz.
9. Lower the audio generator output by 20 dB.
10. Using RP24, adjust the deviation to ±3.0 kHz.
11. Repeat Steps 7 through 10 two or three times.
12. Using RP24, adjust the distortion to the lowest possible level while the deviation is ±3.0 kHz.
13. Repeat Steps 7 through 10.

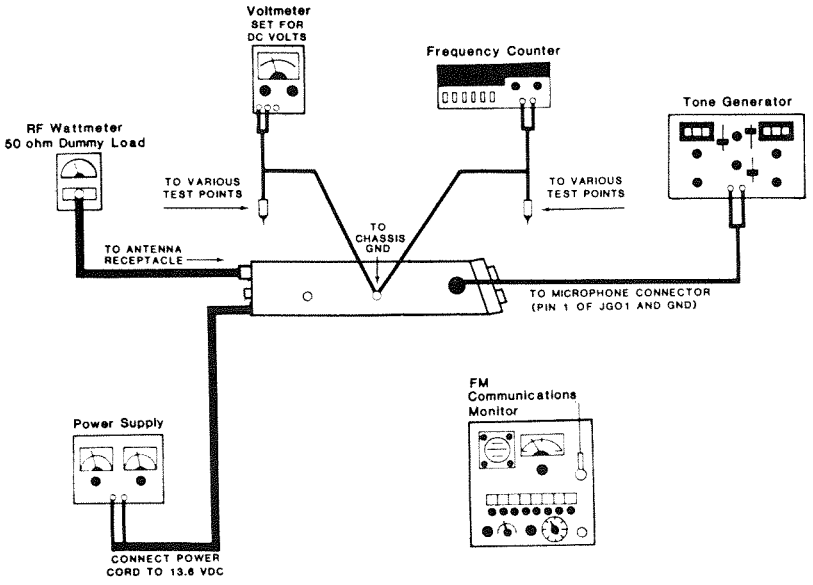


Figure 8. TX/PLL Test Setup

8.5.3 Receiver

1. Connect the test equipment as illustrated in Figure 9.
2. Connect a signal generator to the antenna connector.
3. Connect a 4 ohm dummy load, VTVM and an AC voltmeter, and an oscilloscope to the external speaker jack.
4. Connect a 30 uA meter to TP01.
5. Set the receiver to a programmed frequency and apply a signal equal to this frequency from the signal generator to the antenna connector.
6. Adjust LR01 through LR05, LP61, LP62, and LR33 through LR36, in that order, for peak meter reading.
7. Adjust the speaker output to approximately 2V (1W) using the volume knob of the transceiver.
8. Adjust LR52 until the VTVM indication is maximized.
9. Repeat Steps 6 through 8 several times.

Perform the following additional steps when the ±5 MHz band width is required:

NOTE: The adjustment must be within a total of 10 MHz.

10. Set the receiver to a channel with a programmed frequency.
11. Apply a signal from the signal generator equal to the programmed frequency (±3 kHz deviation).
12. Set the transceiver to the high side frequency.
13. Adjust LR01 and LR03 for maximum sensitivity.
14. Set the transceiver to the low side frequency.
15. Adjust LR02, LR03, and LR04 for maximum sensitivity.
16. Ensure that the high and low sides equal QS. If they do not, then adjust LR01 and LR03 until the high and low sides are equal.

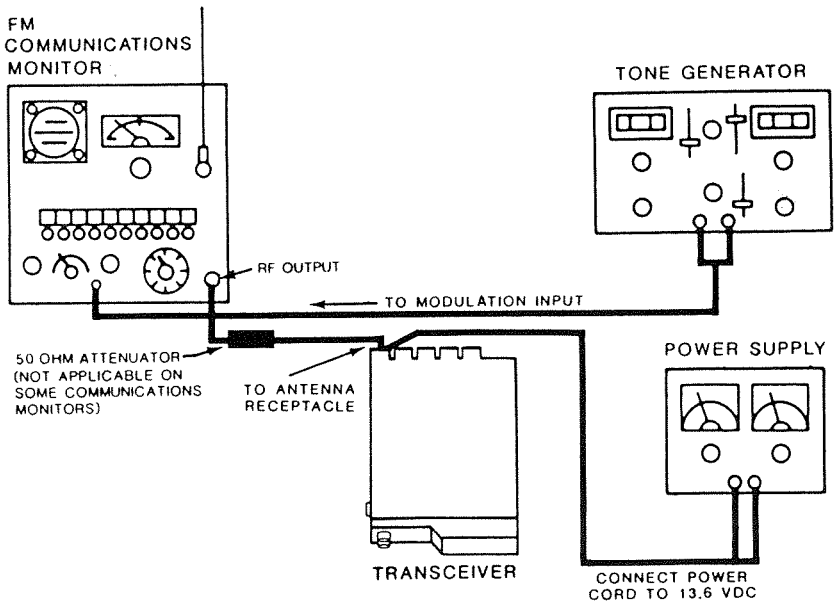


Figure 9. RX Test Setup

8.6 Performance Test

8.6.1 Microprocessor

Many of the features unique to the GX3000V are governed by the microprocessor. The program written for the microprocessor controls the following functions:

- channel display
- time out timer
- transmit and receive frequencies
- priority scan
- tone encode and decode frequencies

Perform the following steps to test these functions.

1. Connect a 50 ohm dummy load to the antenna receptacle.
2. Turn on the off/volume control. Confirm that the channel display illuminates showing either the lowest channel or the priority channel (if the priority channel is programmed).
3. Press the UP button several times. Confirm that the channel number increases one step each time the UP button is depressed.
4. Press the UP button and hold it depressed. Confirm that the channel numbers increase at a rate of approximately 6 ch per second.
5. Repeat Steps 3 and 4 for the DOWN button.
6. Ensure that the squelch control is in the BACK UP OFF position. Make note of the current channel.
7. Turn the off/volume control off and then on. If the current channel in Step 6 was the priority channel programmed into the EPROM, the transceiver must power up to the priority channel. Otherwise, the transceiver must power up to channel 1.
8. Press the MON key. If a tone board is installed, the audio must be muted.
9. Press the MON key again. If a tone board is installed, ensure that the audio returns.
10. Depress the DIM button. Confirm that the display illumination level changes. There are three levels of illumination.
11. Depress the PRI button once. If the current channel is not on the EPROM priority channel, the "P" indicator must illuminate. Depress the PRI button a second time and confirm that the "P" indicator goes out.
12. Depress the MEMO button. Confirm that the "S" indicator illuminates.
13. Depress the MEMO button a second time. Confirm that the "S" indicator goes out.
14. Enter several channels into scan memory by depressing the MEMO button while stopped on each of several different channels.
15. Ground the microphone hanger to the chassis.
16. Set the squelch fully clockwise.
17. Depress the SCAN button. The "S" indicator must start blinking and the channel display must go blank. This indicates that scanning is taking place.
18. Unground the microphone. The transceiver must stop scanning. The "S" indicator must stop blinking and remain on. The channel display must show the channel that was being scanned when the microphone was ungrounded.
19. Ground the microphone. The transceiver must start scanning.
20. Depress the CLR button. Scanning must stop.
21. Depress the SCAN button. Confirm that the display is blank and that the "S" indicator starts blinking. This indicates that scanning is taking place.
22. Unground the microphone. Confirm that scanning stops.
23. Depress the PTT button on the microphone. The TX light must illuminate.
24. Ground the microphone hanger. Confirm that the transceiver stays on the channel that was transmitted on.
25. Unground the microphone hanger and press the PTT button. Ten seconds before the time out timer duration is reached, confirm the following:
    - The radio beeps a 10 second warning.
    - The radio stops transmitting 10 seconds after the beep warning.

8.6.2 Transmitter

1. Connect a wattmeter with a 50 ohm dummy load to the antenna receptacle.
2. Turn on the off/volume control.
3. Key the transmitter and confirm the following:
   - The minimum power output is 40 watts.
   - The TX indicator illuminates.
   - The receiver background audio turns off.
4. Set the service monitor to a programmed channel frequency.
5. Key the transmitter. Confirm that the service monitor indicates a transmit frequency within ±500 Hz.
6. Set the service monitor to measure the transmitter deviation.
7. Key the transmitter. Speak into the microphone. Confirm that the deviation does not exceed ±4.5 kHz.
8. Repeat Steps 3 through 7 for all other programmed channels.

8.6.3 Receiver

1. Connect the signal generator output of a service monitor to the transceiver's antenna receptacle.
2. Connect an AC voltmeter to the external speaker jack with a 4 ohm, 5 watt resistor in parallel.
3. Turn the squelch control fully counterclockwise.
4. Adjust the volume control for a voltmeter reading of 1.4 VAC.
5. With modulation turned off, set the service monitor's signal generator to the receive frequency of the selected programmed channel.
6. Slowly increase the signal level until the voltmeter reading is reduced to 0.14 VAC (20 dB decrease). Confirm that the service monitor's signal generator output does not exceed 0.5 uV.
7. Reduce the service monitor's signal generator output to zero.
8. Adjust the squelch control clockwise until the static just disappears (threshold squelch).
9. Set the internal modulation of the service monitor's signal generator to ±3 kHz, with a 1 kHz audio tone.
10. Increase the service monitor's signal generator output until audio is regained. Confirm that the signal generator output does not exceed 0.35 uV.
11. Turn the squelch control fully clockwise (tight squelch).
12. Increase the service monitor's signal generator output until audio is regained. Confirm that the service monitor's signal generator output does not exceed 3.5 uV.
13. Repeat Steps 5 through 12 for other all programmed channels.

Drawings 9

The drawings in this section show the electrical and mechanical parts locations and interconnections of the GX3000V. The values of most electrical parts are indicated on the schematic diagrams.

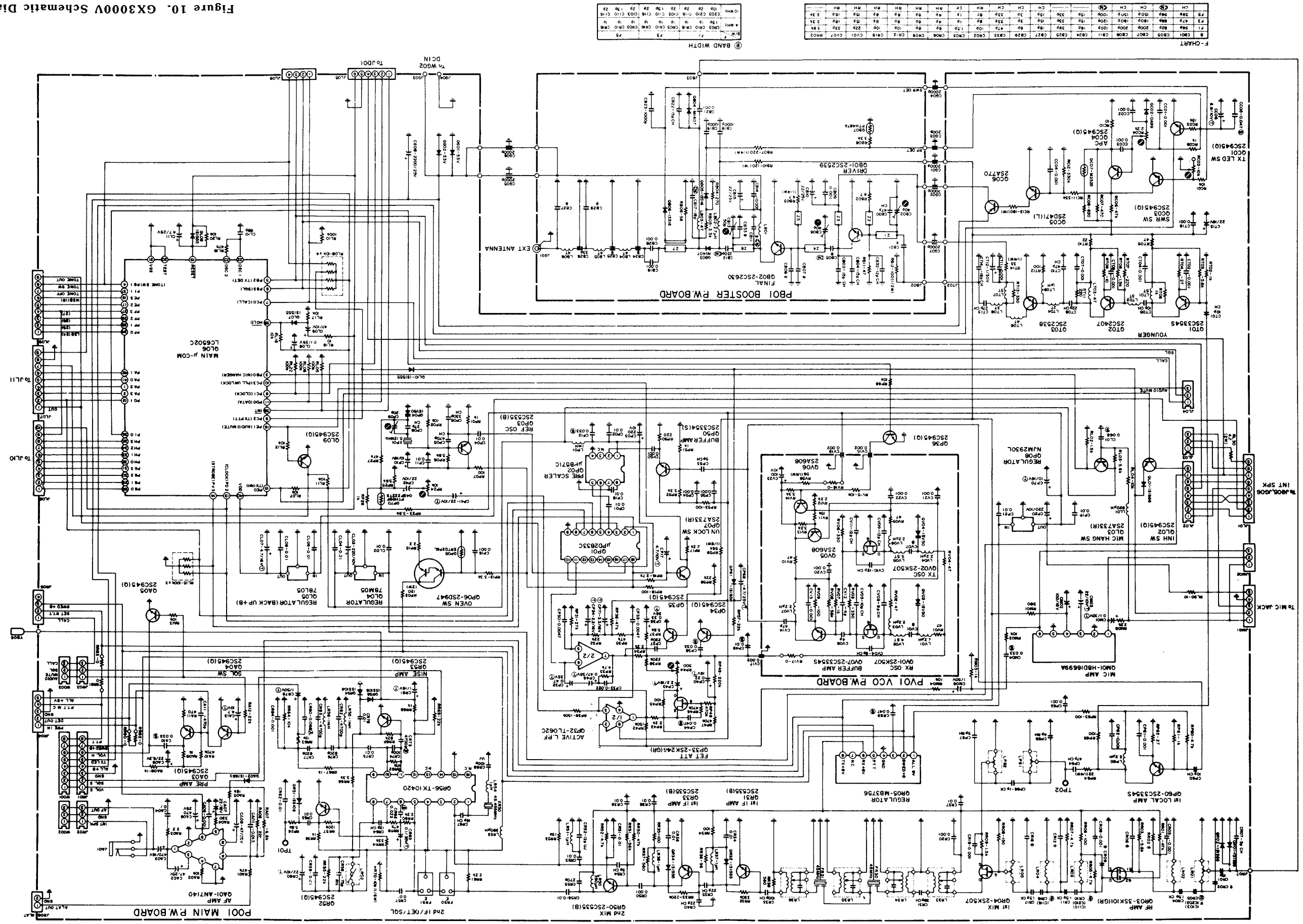


Figure 10. GX3000V Schematic Diagram

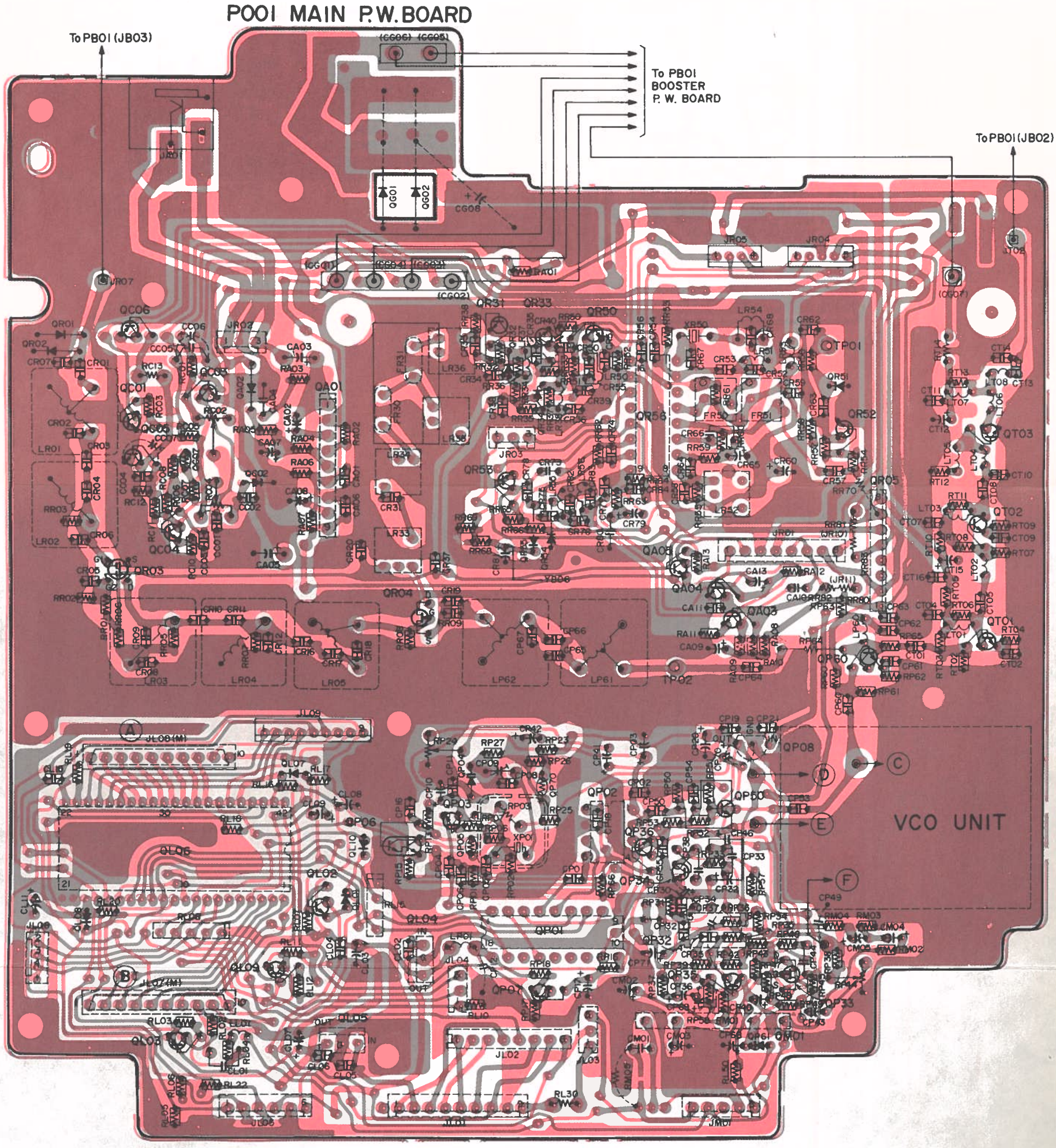
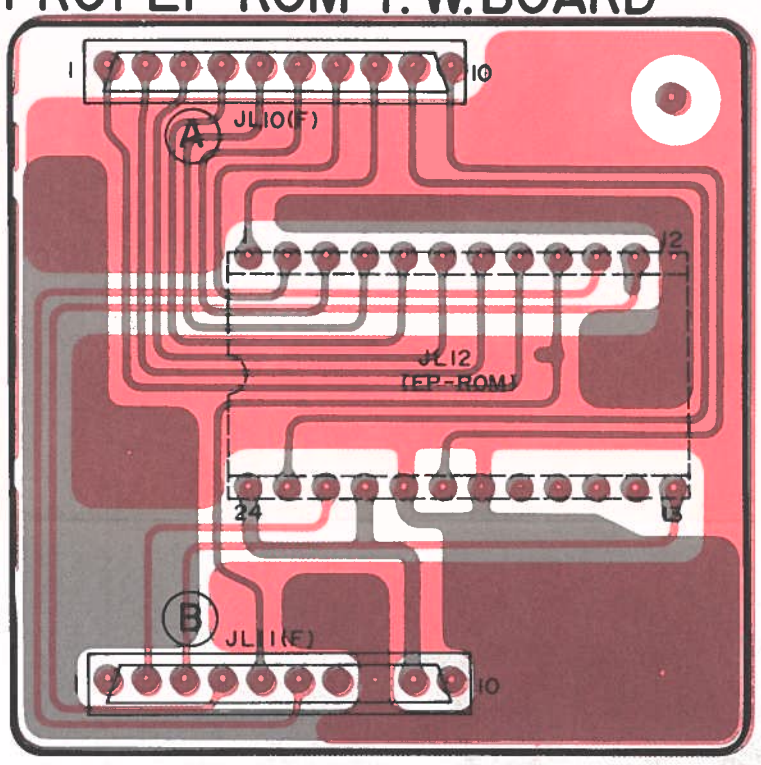


Figure 11. GX3000V Main P.C. Board Layout

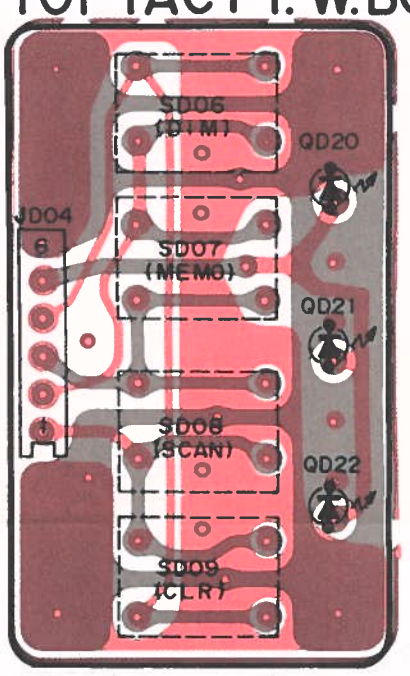
PG01 VOLUME P.W.BOARD



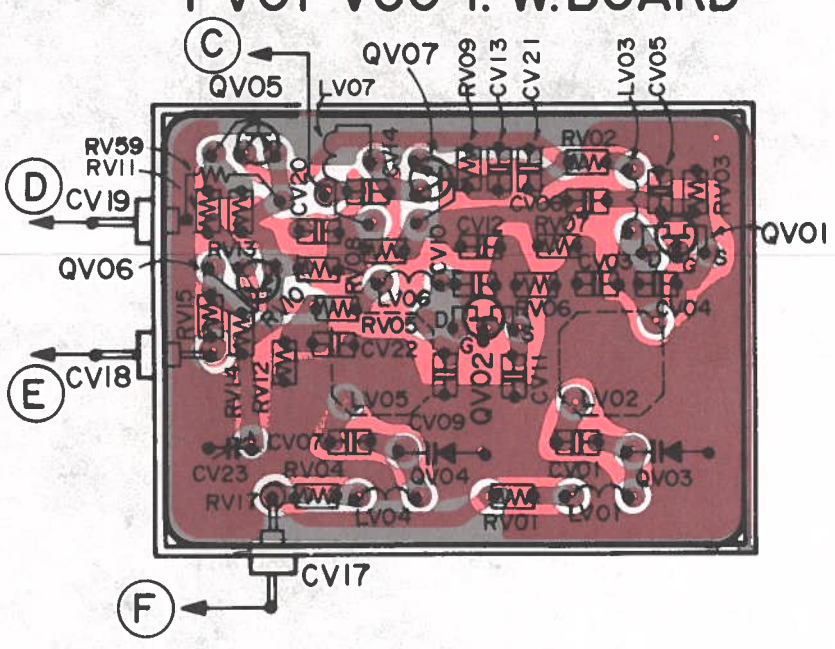
PR01 EP-ROM P.W.BOARD



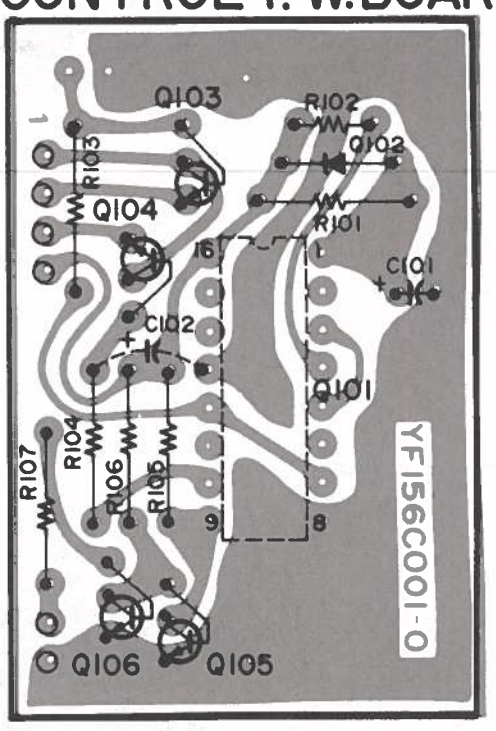
PT01 TACT P.W.BOARD



PV01 VCO P.W.BOARD



P101 μ-COM CONTROL P.W.BOARD



● COMPONENT SIDE
● SOLDER SIDE

Figure 12. GX3000V Volume, EPROM, VCO, and TACT P.C. Boards

PB01 BOOSTER P. W. BOARD

PD01 DISPLAY P. W. BOARD

Antenna Jack
(JG01)

● COMPONENT SIDE
● SOLDER SIDE

Figure 13. GX3000V Display and Booster P.C. Boards

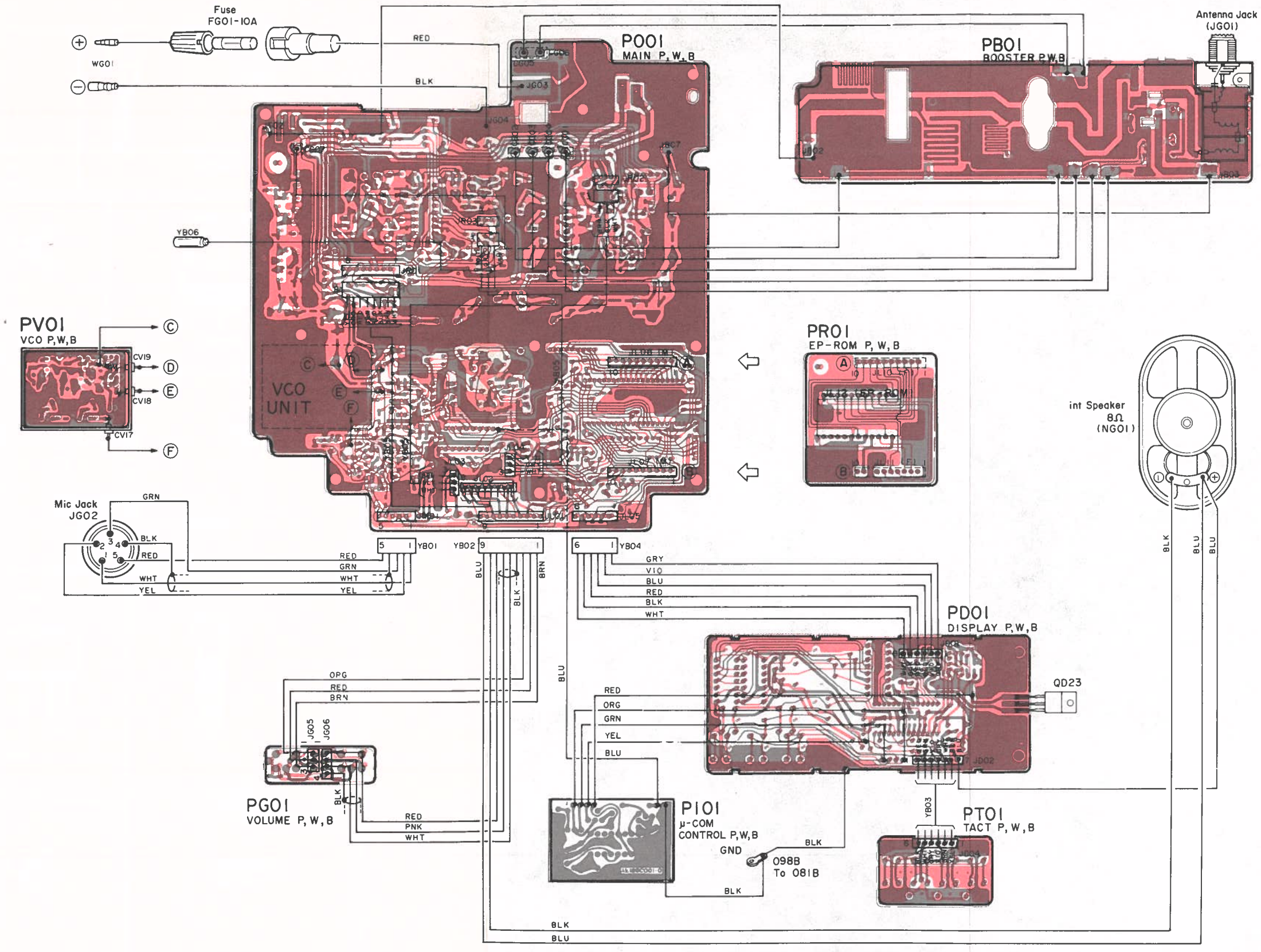
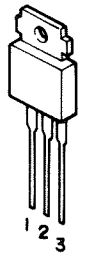
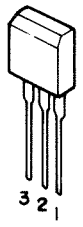


Figure 14. GX3000V Interconnection Schematic Diagram



1· INPUT
2· GND
3·OUTPUT

μPC78M05



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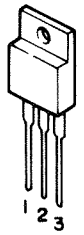
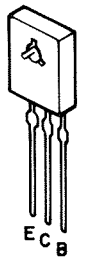
2· GND
3· OUTPUT

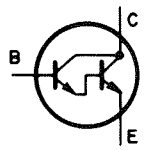
μPC78L05



1· INPUT
2· GND
3· OUTPUT

NJM2930L





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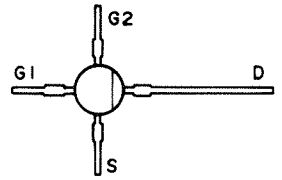



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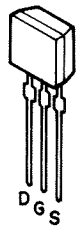

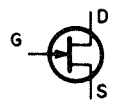

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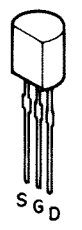

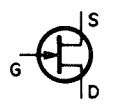

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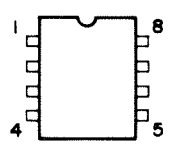
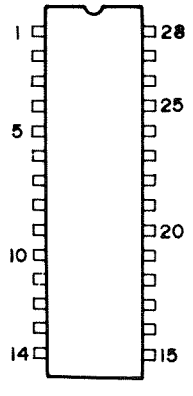


μPB571C

TOP VIEW

LC6502C

TOP VIEW



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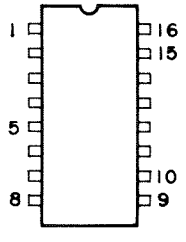

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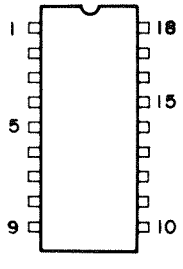

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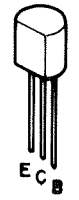

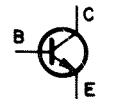

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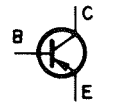

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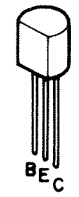

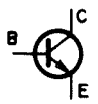

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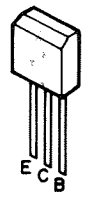

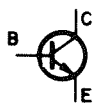

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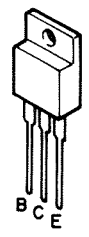

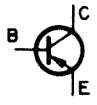

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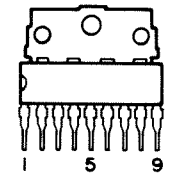
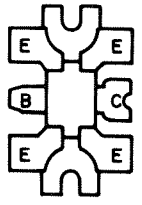
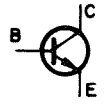
FRONT VIEW



AN7140

TOP VIEW





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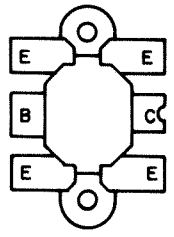

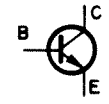

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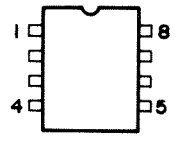

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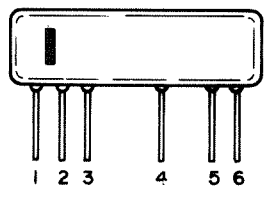
FRONT VIEW



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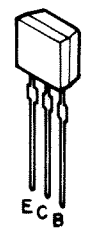

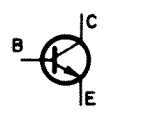

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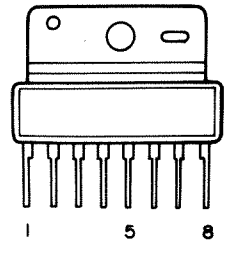
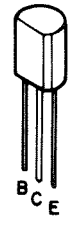
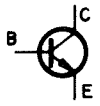
FRONT VIEW



MB3756





2SC2538

Figure 15. Semiconductor Pin Details

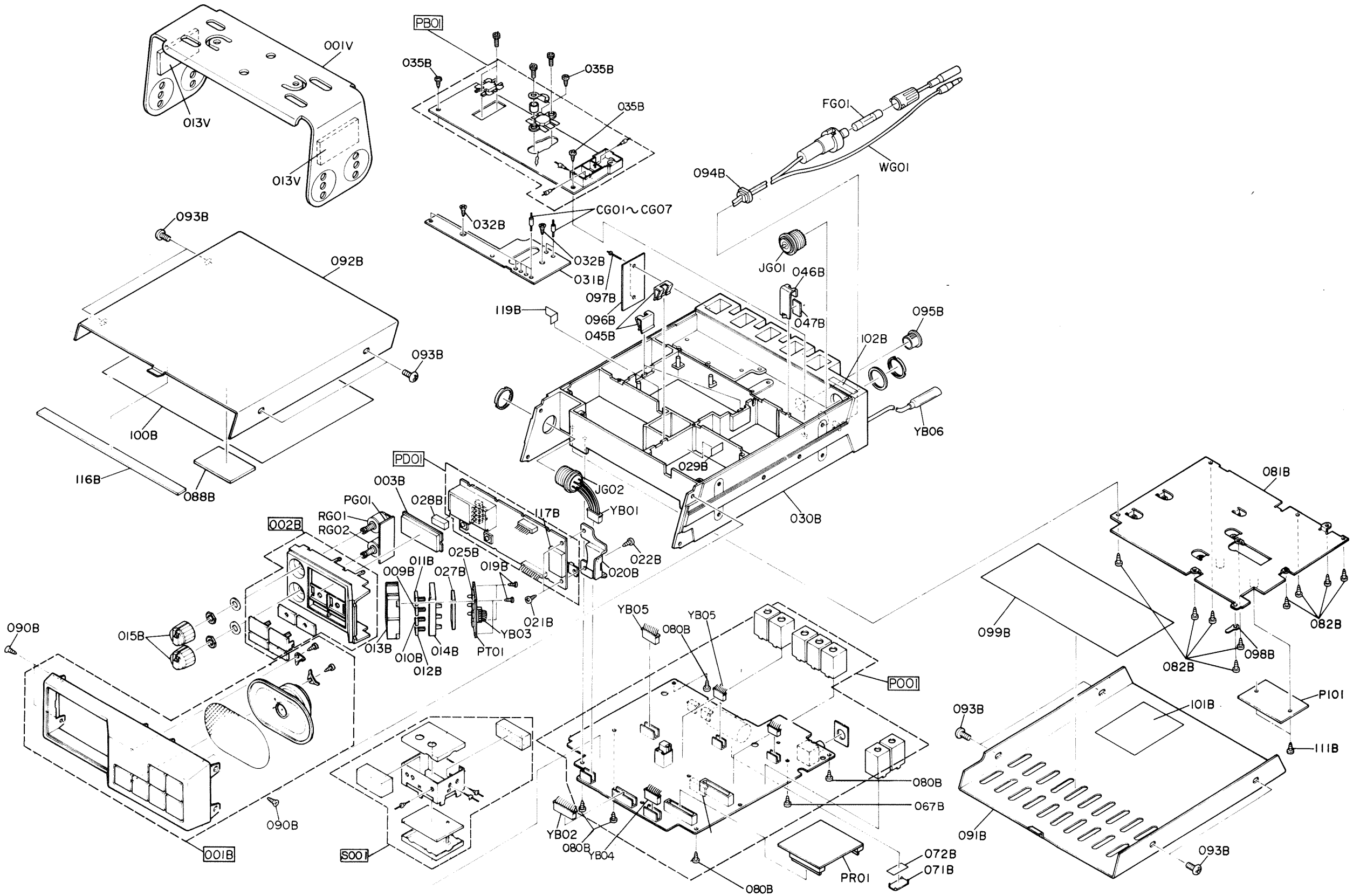


Figure 17. GX3000V Exploded Parts View

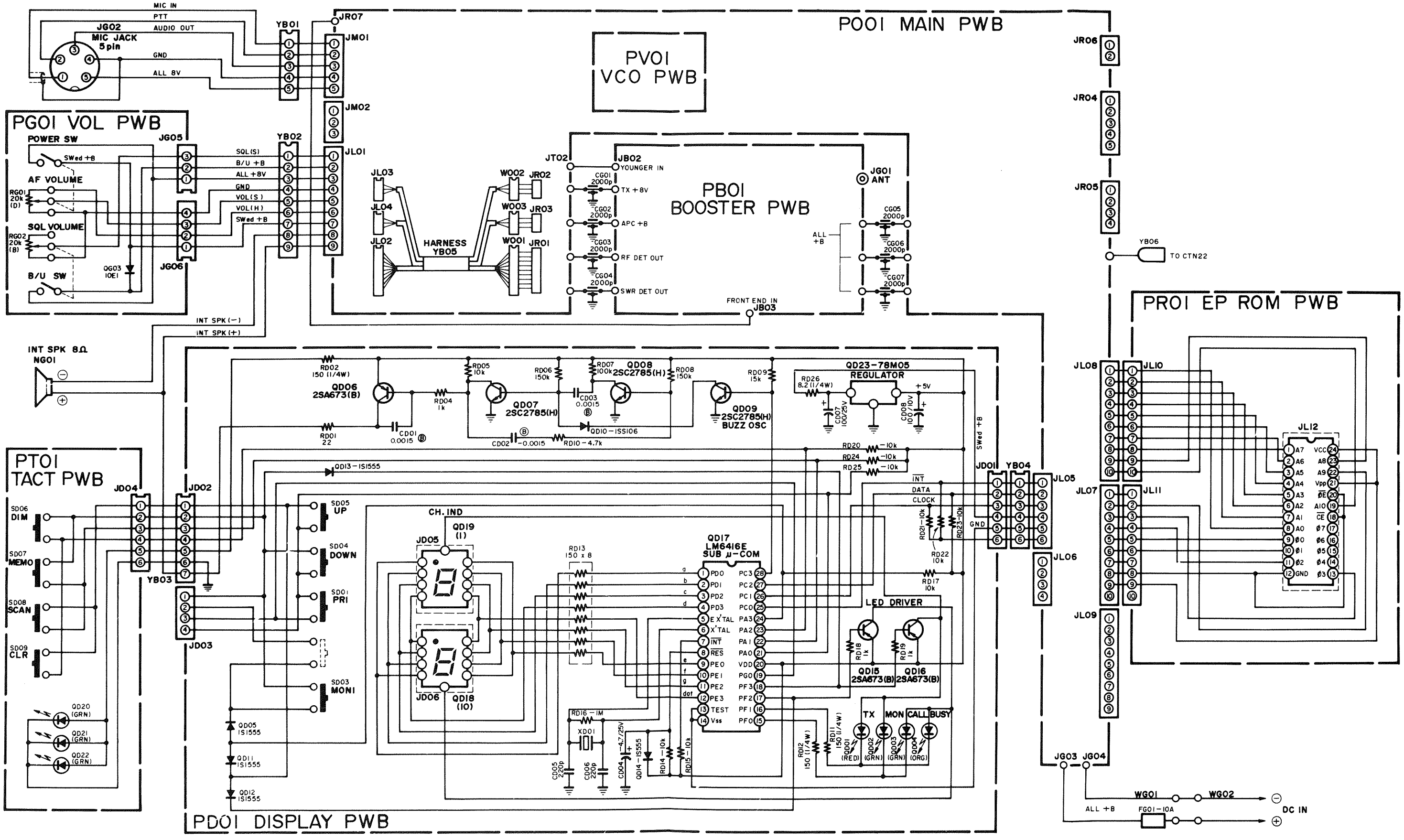


Figure 18. GX3000V Front Control P.C. Board Schematic Diagram

Tone Frequency	Switch # 1 2 3 4 5 6
67.0	1 0 1 1 1 0
71.9	0 0 1 1 1 0
74.4	1 1 0 1 1 0
77.0	0 1 0 1 1 0
79.7	1 0 0 1 1 0
82.5	0 0 0 1 1 0
85.4	1 1 1 0 1 0
88.5	0 1 1 0 1 0
91.5	1 0 1 0 1 0
94.8	1 0 0 1 1 1
100.0	0 0 0 1 1 1
103.5	1 1 1 0 1 1
107.2	0 1 1 0 1 1
110.9	1 0 1 0 1 1
114.8	0 0 1 0 1 1
118.8	1 1 0 0 1 1
123.0	0 1 0 0 1 1
127.3	1 0 0 0 1 1
131.8	0 0 0 0 1 1
136.5	1 1 1 1 0 1
141.3	0 1 1 1 0 1
146.2	1 0 1 1 0 1
151.4	0 0 1 1 0 1
156.7	1 1 0 1 0 1
162.2	0 1 0 1 0 1
167.9	1 0 0 1 0 1
173.8	0 0 0 1 0 1
179.9	1 1 1 0 0 1
186.2	0 1 1 0 0 1
192.8	1 0 1 0 0 1
203.5	0 0 1 0 0 1
210.7	1 1 0 0 0 1
218.1	0 1 0 0 0 1
225.7	1 0 0 0 0 1
233.6	0 0 0 0 0 1
241.8	1 1 1 1 1 0
250.3	0 1 1 1 1 0

Logic 0 = SW. ON
Logic 1 = SW. OFF

Figure 16. Program Truth Table

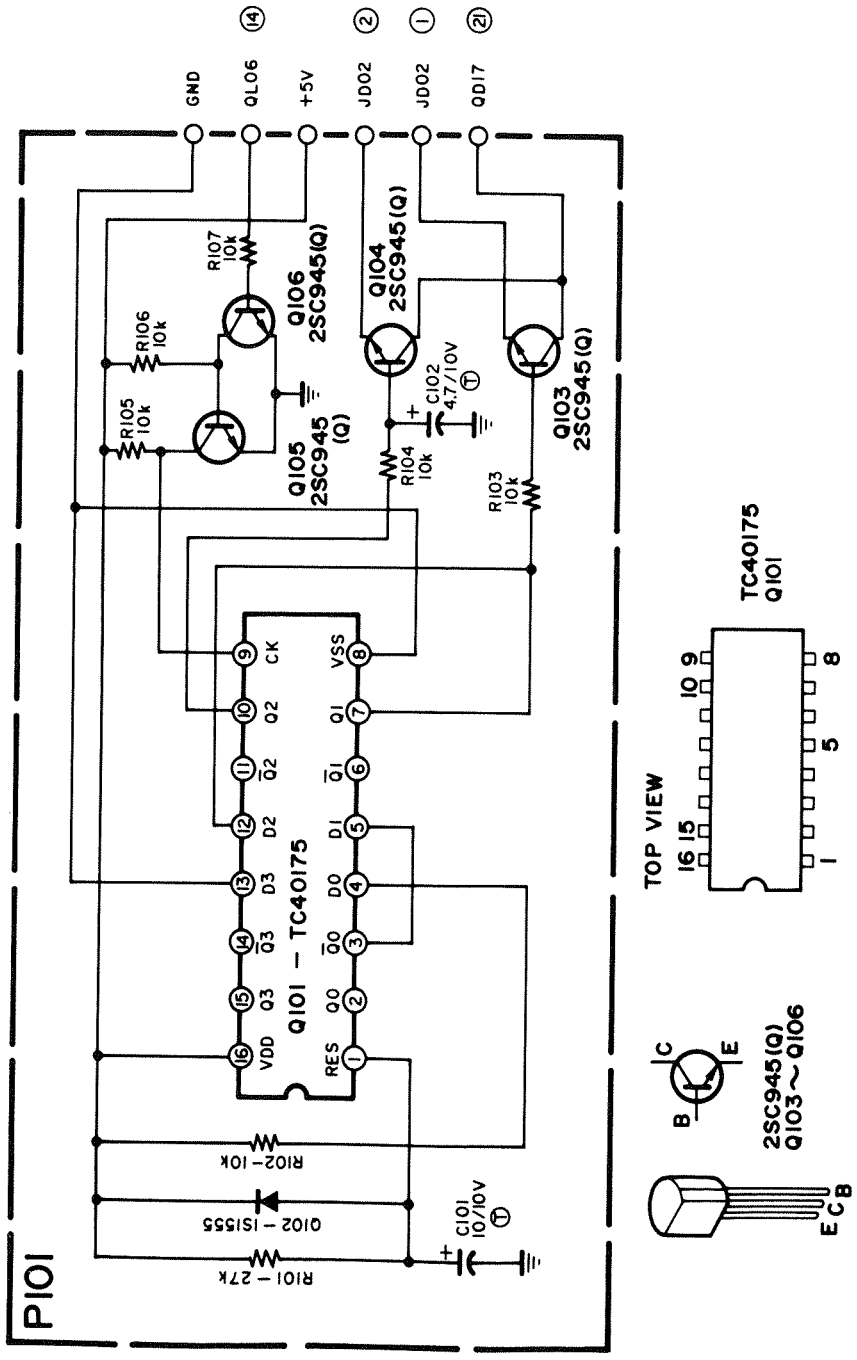


Figure 19. GX3000V Micro Computer P.C. Board Schematic Diagram

Parts List 10

10.1 General

Information on most electrical and mechanical parts is included in the parts lists. The parts are listed by reference designators in alphanumeric order.

10.2 Ordering Replacement Parts

Crystal orders should be referred to the Frequency Management Department at (213) 532-5300 ext. 251, or write:

Standard Communications Corp.
Frequency Management Department
P.O. Box 92151
Los Angeles, CA 90009-2151

All other 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

Reference Designator	Description	SCC Part Number
Capacitors		
CA01	Ceramic, 0.015 uF	DK5615330Y
CA02	Electrolytic, 47 uF, 25 V	EA47602510
CA03	Electrolytic, 470 uF, 16 V	EA47701610
CA04	0.1 uF	DS17104010
CA05	Electrolytic, 470 uF, 25 V	EA47702510
CA06	Ceramic, 0.001 uF	DK5610230Y
CA07	Electrolytic, 22 uF, 16 V	EA22601610
CA08	Electrolytic, 47 uF, 25 V	EA47602510
CA09	Electrolytic, 22 uF, 16 V	EA22601610
CA10	0.033 uF	DS17333010
CA11	Ceramic, 470 pF	DK5647130Y
CA13	Electrolytic, Tantalum, 4.7 uF, 10 V, T	EV47501060

CB01	Ceramic, 56 pF, CH	DD5556030Y
CB01	Ceramic, 47 pF, CH	DD5547030Y
CB01	Ceramic, 39 pF, CH	DD5539030Y
CB02	Trimming, 40 pF	CT14000020
CB03, CB04	Ceramic, 15 pF, CH	DD45150300
CB05	Mica Chip, 82 pF, 500, WV	DF95820500
CB05	Mica Chip, 68 pF, 500, WV	DF95680500
CB05	Mica Chip, 56 pF, 500, WV	DF95560500
CB06	Trimming, 40 pF	CT14000040
CB07	Ceramic, 200 pF, CH	DD45201300
CB07	Ceramic, 180 pF, CH	DD45181300
CB07	Ceramic, 150 pF, CH	DD45151300
CB08	Ceramic, 200 pF, CH	DD45201300
CB08	Ceramic, 180 pF, CH	DD45181300
CB08	Ceramic, 150 pF, CH	DD45151300
CB09	Ceramic, 0.001 uF	DK5610230Y
CB10	Electrolytic, 220 uF, 25 V	EA22602530
CB11	Mica Chip, 120 pF	DF95121500
CB11	Mica Chip, 100 pF	DF95101500
CB12	Mica Chip, 220 pF	DF95221500
CB13	Trimming, 50 pF	CT15000040
CB14	Ceramic, 0.001 uF	DK5610230Y
CB15	Electrolytic, 220 uF, 25 V	EA22602530
CB16	Ceramic, 0.001 uF	DK16102300
CB17	Mica Chip, 18 pF	DF95180500
CB18, CB19	Ceramic, 0.001 uF	DK5610230Y
CB21	Ceramic, 0.001 uF	DK5610230Y
CB22	Ceramic, 15 pF, CH	DD5515030Y
CB23	Ceramic, 0.001 uF	DK5610230Y
CB27	Ceramic, 18 pF, CH	DD15180300
CB27	Ceramic, 15 pF, CH	DD15150300
CB28	Ceramic, 0.001 uF	DK16102300
CB29	Ceramic, 6 pF, CH	DD11060300
CB29	Ceramic, 3 pF, CH	DD10030300
CB30	Ceramic, 47 pF, CH	DD5547030Y
CB32	Ceramic, 12 pF, CH	DD45120300
CB33	Ceramic, 47 pF, CH	DD15470300
CB33	Ceramic, 33 pF, CH	DD15330300
CC01, CC02, CC03, CC04	Ceramic, 0.001 uF	DK5610230Y
CC05	0.047 uF	DS17473010
CC06	Electrolytic, Tantalum, 6.8 uF, 10 V	EV68501060
CD01, CD02, CD03	1500 pF	DS17152010
CD04	Electrolytic, 4.7 uF, 25 V	EA47502510
CD05, CD06	Ceramic, 220 pF, CH	DD5522130Y
CD07	Electrolytic, 100 uF, 25 V	EA10702510
CD08	Electrolytic, 100 uF, 10 V	EA10701010
CL01	0.068 uF	DS17683010
CL02	Ceramic, 10000 pF	DK5610330Y
CL03	Electrolytic, 220 uF, 10 V	EA22701010
CL04, CL05, CL06	Ceramic, 10000 pF	DK5610330Y
CL07	Electrolytic, Tantalum, 4.5 u, 16 V	EV47501660
CL08	Electrolytic, Tantalum, 0.1 uF, 35 V, T	EV10403560
CL09	Electrolytic, 47 uF, 10 V	EA47601010
CL10	Ceramic, 68 pF, CH	DD5568030Y
CL11	Electrolytic, 4.7 uF, 25 V	EA47502510
CM01	Electrolytic, Tantalum, 0.1 uF, 35 V	EV10403560
CM02	Electrolytic, 100 uF, 16 V	EA10701610

CM03	Electrolytic, Tantalum, 22 uF, 10 V	EV22601060
CM04	0.033 uF	DS17333010
CM05	Electrolytic, 1 uF, 50 V	EA10505010
CP01, CP02	Ceramic, 0.0 uF	DK5610330Y
CP03	Electrolytic, 220 uF, 10 V	EA22701010
CP04	Ceramic, 0.01 uF	DK5610330Y
CP05	Ceramic, 470 pF, CH	DD5547130Y
CP06	Ceramic, 330 pF, CH	DD5533130Y
CP08	Ceramic, 27 pF, CH	DD5527030Y
CP09	Trimming, 20 pF	CT12000130
CP10	Electrolytic, 10 uF, 16 V	EA10601610
CP11	Ceramic, 0.01 uF	DK5610330Y
CP12	0.033 uF	DS17333010
CP16	Ceramic, 0.001 uF	DK5610230Y
CP17	Electrolytic, Tantalum, 4.7 uF, 10 V, T	EV47501060
CP18, CP19	Ceramic, 0.01 uF	DK5610330Y
CP20	Electrolytic, 220 uF, 10 V	EA22701010
CP21	Ceramic, 0.01 uF	DK5610330Y
CP30	Ceramic, 0.0047 uF	DK5647230Y
CP32	Eletrcolytic, Tantalum, 0.47 uF, 35 V	EV47403560
CP33	0.022 uF	DS17223010
CP34	Electrolytic, Tantalum, 2.2 uF, 16 V, T	EV22501660
CP35	Ceramic, 0.001 uF	DK5610230Y
CP36	Electrolytic, Tantalum, 0.33 uF, 35 V	EV33403560
CP37	Ceramic, 220 pF	DK16221300
CP38	0.033 uF	DS17333010
CP40	Electrolytic, Tantalum, 0.22 uF, 35 V, T	EV22403560
CP41, CP42	Electrolytic, Tantalum, 22 uF, 10 V	EV22601060
CP43	Electrolytic, Tantalum, 2.20 UF, 16 V, T	EV22501660
CP44	0.47 uF	DS17473010
CP46	Electrolytic, Tantalum, 0.47 uF, 35 V	EV47403560
CP49	0.01 uF	DS17103010
CP50	Ceramic, 0.001 uF	DK5610230Y
CP53	Ceramic, 10 pF, CH	DD5110030Y
CP54, CP55	Ceramic, 0.001 uF	DK5610230Y
CP60	Ceramic, 10 pF, CH	DD5110030Y
CP61, CP62, CP63	Ceramic, 0.001 uF	DK5610230Y
CP64	Ceramic, 47 pF, CH	DD5547030Y
CP65	Ceramic, 4 pF, RH	DD5004033Y
CP66	Ceramic, 1 pF, CK	DD5001030Y
CP67	Ceramic, 5 pF, RH	DD5005033Y
CP68	Electrolytic, Tantalum, 4.7 uF, 25 V	EV47502560
CP70	Electrolytic, Tantalum, 10 uF, 16 V	EV10601660
CP71	Electrolytic, Tantalum, 3.3 uF, 16 V	EV33501660
CR01	Ceramic, 15 pF, CH	DD5515030Y
CR02	Ceramic, 10 pF, RH	DD5110033Y
CR02	Ceramic, 8 pF, RH	DD5108033Y
CR03	Ceramic, 1.5 pF, CK	DD5001530Y
CR03	Ceramic, 1 pF, CK	DD5001030Y
CR04	Ceramic, 1.5 pF, CK	DD5001530Y
CR05	Ceramic, 0.001 uF	DK5610230Y

CR06	Ceramic, 6 pF, RH	DD5106033Y
CR06	Ceramic, 4 pF, RH	DD5004033Y
CR07	Ceramic, 5 pF, CH	DD5005030Y
CR08	Ceramic, 0.001 uF	DK5610230Y
CR09	Ceramic, 8 pF, RH	DD5108033Y
CR09	Ceramic, 6 pF, RH	DD5108033Y
CR09	Ceramic, 6 pF, RH	DD5106033Y
CR10	Ceramic, 1 pF, CH	DD5001030Y
CR11	Ceramic, 1.5 pF, CH	DD5001530Y
CR12	Ceramic, 10 pF, RH	DD5110033Y
CR12	Ceramic, 8 pF, RH	DD5108033Y
CR16	Ceramic, 1 pF, CH	DD5001030Y
CR17	Ceramic, 1.5 pF, CH	DD5001030Y
CR18	Ceramic, 10 pF, RH	DD5110033Y
CR18	Ceramic, 8 pF, RH	DD5108033Y
CR19	Ceramic, 0.001 uF	DK5610230Y
CR20	Ceramic, 0.01 uF	DK5610230Y
CR31	Ceramic, 39 pF, CH	DD5539030Y
CR33	Ceramic, 100 pF, CH	DD5510130Y
CR34	Ceramic, 0.01 uF	DK5610330Y
CR35	Ceramic, 22 pF, CH	DD5522030Y
CR36, CR37, CR38, CR39	Ceramic, 0.01 uF	DK5610330Y
CR40	Ceramic, 22 pF, CH	DD15220300
CR50	Ceramic, 0.001 uF	DK5610230Y
CR51	Ceramic, 0.01 uF	DK5610330Y
CR52	Ceramic, 12 pF, UJ	DD5512036Y
CR53	Ceramic, 0.01 uF	DK5610330Y
CR54	Ceramic, 5 pF, CH	DD5005030Y
CR55	Ceramic, 270 pF, CH	DK5627130Y
CR56, CR57	Ceramic, 0.01 uF	DK5610330Y
CR58	Ceramic, 43 pF, RH	DD5575033Y
CR59	Ceramic, 0.01 uF	DK5610330Y
CR60	Electrolytic, Tantalum, 22 uF, 10 V	EV22601060
CR62, CR63	Ceramic, 0.01 uF	DK5610330Y
CR64	Ceramic, 12 pF, CH	DD5512030Y
CR65	Electrolytic, Tantalum, 0.1 uF, 35 V	EV10403560
CR66	0.022 uF	DS17223010
CR67	Ceramic, 16 pF, CH	DD5516030Y
CR68	Ceramic, 100 pF, UJ	DD5510136Y
CR69	0.047 uF	DS17473010
CR73	0.0047 uF	DS17472010
CR74	Ceramic, 100 pF, CH	DD5510130Y
CR75	Ceramic, 0.01 uF	DK5610330Y
CR76, CR77	Ceramic, 820 pF	DK5682130Y
CR78	Ceramic, 0.01 uF	DK5610330Y
CR79	Electrolytic, 1 uF, 50 V	EA10505010
CR80	0.068 uF	DS17683010
CR81	Electrolytic, Tantalum, 1 uF, 16 V	EV10501670
CR82, CR83	Ceramic, 0.0047 uF	DK5647230Y
CR84	Ceramic, 0.001 uF	DK5610230Y
CT01	Ceramic, 10 pF, CH	DD5110030Y
CT02, CT04	Ceramic, 0.001 uF	DK5610230Y
CT05	Ceramic, 10 pF, CH	DD5110030Y
CT07	Ceramic, 0.001 uF	DK5610230Y
CT08	Ceramic, 22 pF, CH	DD5522030Y
CT09	Ceramic, 0.001 uF	DK5610230Y
CT10	Ceramic, 47 pF, CH	DD5547030Y
CT11	Ceramic, 0.001 uF	DK5610230Y
CT12	Electrolytic, 1 uF, 50 V	EA10505010
CT13	Ceramic, 27 pF, CH	DD5527030Y

CT14	Ceramic, 18 pF, CH	DD5518030Y
CT15	Electrolytic, 22 uF, 16 V	EA22601610
CT16	Ceramic, 0.001 uF	DK5610230Y
CV01	Ceramic, 22 pF, RH	DD5522033Y
CV01	Ceramic, 15 pF, RH	DD5515033Y
CV03	Ceramic, 8 pF, RH	DD5108033Y
CV04	Ceramic, 8 pF, CH	DD5108030Y
CV05	Ceramic, 10 pF, CH	DD5110030Y
CV06	Ceramic, 4 pF, CK	DD5004030Y
CV07	Ceramic, 33 pF, RH	DD5533033Y
CV07	Ceramic, 18 pF, RH	DD5518033Y
CV07	Ceramic, 16 pF, RH	DD5516033Y
CV09, CV10, CV11	Ceramic, 12 pF, CH	DD5512030Y
CV12	Ceramic, 4 pF, CH	DD5004030Y
CV13	Ceramic, 0.001 uF	DK5610230Y
CV14	Ceramic, 47 pF, CH	DD5547030Y
CV20, CV21, CV22	Ceramic, 0.001 uF	DK5610230Y
CV23	Electrolytic, 100 uF, 10 V	EA10701010
C103	Ceramic, 2 pF	DD5002030Y
C110	Ceramic, 1.5 pF	DD5001530Y
C116	Ceramic, 2 pF	DD5002030Y
C203	Ceramic, 10 pF, F1	DD5110030Y
C210	Ceramic, 2 pF, F1	DD5002030Y

Inductors

LB01	Coil, Choke, 1 T	LC12500040
LB02	Coil, Choke, 2.7 uF	LC12720020
LB03, LB04, LB05, LB06	Coil, Air, 4 T	ML04007010
LL01	Coil, Choke, 820 uH	LC18240030
LP01	Coil, Choke, 1 MH	LC11050040
LP60	Coil, Choke, 2.2 uH	LC11220030
LP61, LP62	Coil, Ant, 3.5 T	LA14026020
LR01	Coil, Frontend, 3.5 T	LA14026020
LR02, LR03, LR04	Coil, Frontend, 3.5 T	LA14026010
LR05	Coil, Frontend, 3.5 T	LA14026020
LR33, LR34, LR35, LR36	I.F.T., 45 MHz	LI17036420
LR37, LR38	Coil, Choke, 1 uH	LC11020070
LR50	Coil, Choke, 390 uH	LC13940010
LR51	Coil, Choke, 1 uH	LC11020070
LR52	I.F.T., 455 KHz	LI71016090
LR53	Coil, Choke, 390 uH	LC13940010
LR54	Coil, Choke, 1 uH	LC11020020
LR55, LR56	Coil, Choke, 1 MH	LC11050070
LT01	Coil, 5 T	LL635005A0
LT02	Coil, 3 T	LL635003A0
LT03	Coil, 4 T	LL635004A0
LT04	Coil, 2 T	LL635002A0
LT05	Coil, Choke, 1 MH	LC11020070
LT06	Coil, 4 T	LL635004A0
LT07	Coil, 5 T	LL635005A0
LT08	Coil, 3 T	LL635003A0
LV01	Coil, Choke, 2.2 uH	LC12220030
LV02	Coil, Ant, 4.5 T	LA10486012
LV03, LV04	Coil, Choke, 2.2 uH	LC12220030
LV05	Coil, Ant, 5.5 T	LA10486020
LV06, LV07	Coil, Choke, 2.2 uH	LC12220030

Semiconductors

QA01	IC, AN7140	HC10060020
QA02	Diode, 1S1555	HD20011050
QA03, QA04, QA05	Transistor, 2SC945 (Q)	HT309451Q0
QB03, QB04	Pin Diode, M1407	HD50001200
QB05, QB06	Diode, 1SS16	HD20005060
QC01	Transistor, 2SC945 (Q)	HT309451Q0
QC02	Diode, OA99	HD10005020
QC03, QC04	Transistor, 2SC945 (Q)	HT309451Q0
QC05	Transistor, 2SD471 (L)	HT404711L0
QC06	Transistor, 2SA770	HT107701A0
QC07	Thermistor, M2325, 1 K	HH00002120
QD01	L.E.D., SEL2210S, Red	HI10030080
QD02, QD03	L.E.D., SEL2410E, Green	HI10029080
QD04	L.E.D., SEL2910A, Orange	HI10031080
QD05	Diode, 1S1555	HD20011050
QD06	Transistor, 2SA673B	HT10673180
QD07, QD08, QD09	Transistor, 2SC2785H	HT327851H0
QD10	Diode, 1SS106	HD20016010
QD11, QD12, QD13, QD14	Diode, 1S1555	HD20011050
QD15, QD16	Transistor, 2SA673B	HT106731B0
QD17	IC, LM6416E	HC10152030
QD18, QD19	L.E.D., 7 Seg, GL-9E03	HI10043320
QD20, QD21, QD22	L.E.D., SEL2410E, Green	HI10029080
QG01, QG02	Diode, S3V20	HD20027290
QG03	Diode, 10E1	HD20023100
QL01	Diode, 1S1555	HD20011050
QL02	Transistor, 2SC945Q	HT309451Q0
QL03	Transistor, 2SA733R	HT107331R0
QL04	IC, UPC78M05	HC10051060
QL05	IC, 78L05	HC10031060
QL06	IC, LC6502C	HC10153030
QL07, QL08	Diode, 1S1555	HD20011050
QL09	Transistor, 2SC945Q	HT309451Q0
QL10	Diode, 1S1555	HD20011050
QM01	IC, H8D1699A	HC10032230
QP01	IC, UPD2833C	HC10086060
QP02	IC, UPB571C	HC10087060
QP03	Transistor, 2SC535B	HT305351B0
QP04	Varicap, 1SV50	HD40001060
QP05	Thermistor, ERT-D2FGL1025	HH00023020
QP06	Transistor, 2SD947	HT40947010
QP07	Transistor, 2SA733R	HT107331R0
QP08	IC, NJM2930L	HC31008090
QP32	IC, TL062CP	HC10027370
QP33	F.E.T., 2SK246 GR	HF202461C0
QP34, QP35	Transistor, 2SC945Q	HT309451Q0
QP36	Transistor, 2SC945G	HT309451Q0
QP50, QP60	Transistor, 2SC3354	HT333541S0
QP61	Diode, 1S1555	HD20011050
QP70	Varistor, PTH59F04BF222TS	HP00015230
QR01, QR02	Diode, 1S1555	HD20011050
QR03	F.E.T., 3SK101 GR	HF40101180
QR04	F.E.T., 2SK507	HF205071A0
QR05	IC, MB3756	HC10003180
QR31	Transistor, 2SC535B	HT305351B0
QR32	Diode, 1S1555	HD20011050
QR33	Transistor, 2SC535B	HT305351B0
QR34	Diode, 1S1555	HD20011050
QR50	Transistor, 2SC535B	HT305351B0
QR51	Diode, 1SS106	HD20016010
QR52, QR53	Transistor, 2SC945Q	HT309451Q0

RV08	Chip, 5.6 kΩ	NI0556211Y
RV09	Chip, 100Ω	NI0510111Y
RV10	Chip, 47Ω	NI0547011Y
RV11	Chip, 15 kΩ	NI0515311Y
RV12	Chip, 2.2 kΩ	NI0522211Y
RV13, RV14	Chip, 3.3 kΩ	NI0533211Y
RV15	Chip, 10 kΩ	NI0510311Y
RV16, RV17	0Ω	RC00000120
RV59	56Ω	GD05560140

Mechanical, Chassis Electrical

CB24	Feedthrough, Capacitor, 18 pF	DC15180010
CB25	Feedthrough, Capacitor, 33 pF	DC15330010
CG01, CG02, CG03, CG04	Feedthrough, Capacitor, 2000 pF	DC18202110
CG05, CG06, CG07	Feedthrough, Capacitor, 2000 pF	DC18202110
FG01	Fuse 10 A	FS11000600
FR30, FR31	Crystal, Filter, 45 MHz	XU245000Z3
FR50, FR51	Filter, Ceramic, CFU455E2	FG455304E2
JD05, JD06	Socket, 14-Pin	YJ90000410
JG01	Jack, Antenna	YJ10001580
JG02	Jack, Microphone	YJ10001872
JL01	Plug, 9-Pin	YP06002780
JL05	Plug, 6-Pin	YP06002750
JL07, JL08	Plug	YP10000264
JL10, JL11	Plug	YP10002650
JL12	Socket	YJ90000520
JM01	Plug, 5-Pin	YP06002740
JR01	Plug, 8-Pin	YP06002770
JR02, JR03	Plug, 3-Pin	YP06002720
SD01	Switch, PRI	SP01010580
SD03	Switch, MON	SP01010580
SD04	Switch, DOWN	SP01010580
SD05	Switch, UP	SP01010580
SD06	Switch, DIM	SP01010580
SD07	Switch, MEMO	SP01010580
SD08	Switch, SCAN	SP01010580
SD09	Switch, CLR	SP01010580
WG01	Cord, A.C. Power	YC02000370
WG02	Cord, Connective	YB01002620
XD01	Crystal, Ceramic	FQ04003010
XP01	Crystal, 5.12 MHz	XC01220030
XR50	Crystal, 45.455 MHz	XL03010010
YB01	Cord, Connective	YB00101020
YB02	Cord, Connective	YB00201150
YB03	Cord, Connective	YB00101010
YB04	Cord, Connective	YB00150460
YB06	Cord, Connective	YB00101060
003B	LED Window	156C158010
009B	Button, MEMO	156C270040
010B	Button, SCAN	156C270050
011B	Button, DIM	156C270060
012B	Button, CLR	156C270070
013B	Board Cover	156C053024
014B	Board Reflector	156C274012
015B	Knob, Volume/Squelch	156C154010
019B	Screw	51380206P0
020B	Heatsink	156C267010
021B	Screw	51280306B0
022B	Screw	51280306B0

RD11, RD12	150Ω, 1/4W	GD05151140
RD13	150Ω	BW20151010
RD14, RD15	Chip, 10 kΩ	NI0510311Y
RD16	Chip, 1 mΩ	NI0510511Y
RD17	Chip, 10 kΩ	NI0510311Y
RD18, RD19	Chip, 1 kΩ	NI0510211Y
RD20, RD21, RD22, RD23	Chip, 10 KΩ	NI0510311Y
RD24, RD25	Chip, 10 kΩ	NI0510311Y
RD26	8.2Ω, J	GD05082147
RG01	Variable, 20 k, D	RK12030150
RG02	Variable, 20 k, B	RK12030160
RL02	Chip, 1.5 kΩ	NI0515211Y
RL03	Chip, 5.6 kΩ	NI0556211Y
RL04	Chip, 10 kΩ	NI0510311Y
RL05, RL06	Chip, 100 kΩ	NI0510411Y
RL07	Chip, 10 kΩ	NI0510311Y
RL08	10 kΩ	BW05103020
RL10	Chip, 100 kΩ	NI0510411Y
RL11, RL12	Chip, 10 kΩ	NI0510311Y
RL15	100 kΩ	BW05104010
RL16, RL17	Chip, 10 kΩ	NI0510311Y
RL18	Chip, 10Ω	NI0510011Y
RL19	Chip, 47 kΩ	NI0547311Y
RL20	Chip, 10 kΩ	NI0510311Y
RL22	Chip, 100 kΩ	NI0510411Y
RL30	Metal, 4.7Ω, 2W	NK15047020
RL50	Chip, 10Ω	NI0510011Y
RM01	Chip, 560Ω	NI0556111Y
RM02	Chip, 10 kΩ	NI0510311Y
RM03	Chip, 1 kΩ	NI0510211Y
RM04	Chip, 10 kΩ	NI0510311Y
RM05	2.2 kΩ, 1/6W	GD05222160
RP01	Chip, 1 kΩ	NI0510211Y
RP02	Chip, 10 kΩ	NI0510311Y
RP03	120Ω, 2W	GS10121020
RP06	Chip, 5.6 kΩ	NI0556211Y
RP07	Chip, 100Ω	NI0510111Y
RP13	Chip, 3.3 kΩ	NI0533211Y
RP15	Chip, 2.2Ω	NI0502211Y
RP16	Chip, 2.7 kΩ	NI0527211Y
RP17	Chip, 2.2 kΩ	NI0522211Y
RP18	Chip, 100Ω	NI0510111Y
RP23	Chip, 3.9 kΩ	NI0539211Y
RP24	Trimming, 10 kΩ	RA01030710
RP25	Chip, 5.6 kΩ	NI0556211Y
RP26	Chip, 1 kΩ	NI0510211Y
RP27	Chip, 47 kΩ	NI0547311Y
RP31	Chip, 27 kΩ	NI0527311Y
RP32	Chip, 22 kΩ	NI0522311Y
RP33	Chip, 4.7 kΩ	NI0547211Y
RP34	Chip, 2.2 kΩ	NI0522211Y
RP35, RP36	Chip, 47 kΩ	NI0547311Y
RP37	Chip, 5.6 kΩ	NI0556211Y
RP38	Chip, 220 kΩ	NI0522411Y
RP39, RP42	Chip, 150 kΩ	NI0515411Y
RP43	Chip, 2.2 kΩ	NI0522211Y
RP44	Trimming, 500Ω	RA05010280
RP45	Chip, 100Ω	NI0510111Y
RP46	Chip, 47 kΩ	NI0547311Y
RP47, RP48	Chip, 470 kΩ	NI0547411Y
RP49	Chip, 220 kΩ	NI0522411Y
RP50	Chip, 220Ω	NI0522111Y
RP51	Chip, 1 kΩ	NI0510211Y

RP52	Chip, 3.3 kΩ	NI0533211Y
RP53	Chip, 100Ω	NI0510111Y
RP57, RP58	Chip, 22 kΩ	NI0522311Y
RP59	56 kΩ, 1/6W	GD05563160
RP60	Chip, 4.7 kΩ	NI0547211Y
RP61	Chip, 1 kΩ	NI0510211Y
RP62	Chip, 27Ω	NI0527011Y
RP63	Chip, 100Ω	NI0510111Y
RP64	22Ω, 1/4W	GD05220140
RP65	Chip, 100Ω	NI0510111Y
RP66	Chip, 10 kΩ	NI0510311Y
RR01	Chip, 47 kΩ	NI0547311Y
RR02	Chip, 3.9 kΩ	NI0539211Y
RR02	Chip, 3.3 kΩ	NI0533211Y
RR03	Chip, 5.6 kΩ	NI0556211Y
RR05	Chip, 4.7 kΩ	NI0547211Y
RR06	Chip, 100Ω	NI0510111Y
RR07	Chip, 4.7 kΩ	NI0547211Y
RR08	Chip, 150Ω	NI0515111Y
RR09	Chip, 1.5 kΩ	NI0515211Y
RR32	Chip, 330 kΩ	NI0533411Y
RR33	Chip, 220 kΩ	NI0522411Y
RR34, RR35	Chip, 100Ω	NI0510111Y
RR36	Chip, 56Ω	NI0556011Y
RR37, RR38	Chip, 560Ω	NI0556111Y
RR50	Chip, 47 kΩ	NI0547311Y
RR51	Chip, 56 kΩ	NI0556311Y
RR52	Chip, 4.7 kΩ	NI0547211Y
RR53	Chip, 15 kΩ	NI0515311Y
RR54	Chip, 33 kΩ	NI0533311Y
RR55	Chip, 22 kΩ	NI0522311Y
RR56	Chip, 5.6 kΩ	NI0556211Y
RR57	Chip, 120 kΩ	NI0512411Y
RR58	Chip, 1 kΩ	NI0510211Y
RR59	Chip, 47 kΩ	NI0547311Y
RR60, RR61	Chip, 2.2 kΩ	NI0522211Y
RR62, RR63, RR64	Chip, 10 kΩ	NI0510311Y
RR65	Chip, 82 kΩ	NI0582311Y
RR66	Chip, 3.3 kΩ	NI0533211Y
RR67	1 kΩ, 1/6W	GD05102160
RR68	Chip, 1 kΩ	NI0510211Y
RR69	Chip, 22 kΩ	NI0522311Y
RR70	10 kΩ, 1/6W	GD05103160
RR80, RR81, RR82, RR83	0Ω	RC00000120
RT02	Chip, 1 kΩ	NI0510211Y
RT03	Chip, 5.6Ω	NI0556211Y
RT04	Chip, 27Ω	NI0527011Y
RT05	Chip, 47Ω	NI0547011Y
RT06	Chip, 1 kΩ	NI0510211Y
RT07	Chip, 220Ω	NI0522111Y
RT08	Chip, 1.5Ω	NI0515211Y
RT09	Chip, 10Ω	NI0510011Y
RT10	Chip, 22Ω	NI0522011Y
RT11	Chip, 220Ω	NI0522111Y
RT12	Chip, 100Ω	NI0510111Y
RT13	Chip, 330Ω	NI0533111Y
RT14	33Ω, 1/4W	GD05330140
RV01, RV02	Chip, 47Ω	NI0547011Y
RV03	Chip, 330Ω	NI0533111Y
RV04	Chip, 47Ω	NI0547011Y
RV05	Chip, 47 kΩ	NI0547011Y
RV06	Chip, 330Ω	NI0533111Y
RV07	Chip, 1 kΩ	NI0510211Y

RV08	Chip, 5.6 kΩ	NI0556211Y
RV09	Chip, 100Ω	NI0510111Y
RV10	Chip, 47Ω	NI0547011Y
RV11	Chip, 15 kΩ	NI0515311Y
RV12	Chip, 2.2 kΩ	NI0522211Y
RV13, RV14	Chip, 3.3 kΩ	NI0533211Y
RV15	Chip, 10 kΩ	NI0510311Y
RV16, RV17	0Ω	RC00000120
RV59	56Ω	GD05560140

Mechanical, Chassis Electrical

CB24	Feedthrough, Capacitor, 18 pF	DC15180010
CB25	Feedthrough, Capacitor, 33 pF	DC15330010
CG01, CG02, CG03, CG04	Feedthrough, Capacitor, 2000 pF	DC18202110
CG05, CG06, CG07	Feedthrough, Capacitor, 2000 pF	DC18202110
FG01	Fuse 10 A	FS11000600
FR30, FR31	Crystal, Filter, 45 MHz	XU245000Z3
FR50, FR51	Filter, Ceramic, CFU455E2	FG455304E2
JD05, JD06	Socket, 14-Pin	YJ90000410
JG01	Jack, Antenna	YJ10001580
JG02	Jack, Microphone	YJ10001872
JL01	Plug, 9-Pin	YP06002780
JL05	Plug, 6-Pin	YP06002750
JL07, JL08	Plug	YP10000264
JL10, JL11	Plug	YP10002650
JL12	Socket	YJ90000520
JM01	Plug, 5-Pin	YP06002740
JR01	Plug, 8-Pin	YP06002770
JR02, JR03	Plug, 3-Pin	YP06002720
PB01	Assembly, Power Amp	L34649005A
PD01	Assembly,LED/Control P.C. Board	L34649004A
PG01	Volume P.C. Board	WZ155C1550
P001	Assembly,PLL/RX/TX P.C. Board	L34649006A
PR01	EPROM P.C. Board	WZ155C1530
SD01	Switch, PRI	SP01010580
SD03	Switch, MON	SP01010580
SD04	Switch, DOWN	SP01010580
SD05	Switch, UP	SP01010580
SD06	Switch, DIM	SP01010580
SD07	Switch, MEMO	SP01010580
SD08	Switch, SCAN	SP01010580
SD09	Switch, CLR	SP01010580
WG01	Cord, A.C. Power	YC02000370
WG02	Cord, Connective	YB01002620
XD01	Crystal, Ceramic	FQ04003010
XP01	Crystal, 5.12 MHz	XC01220030
XR50	Crystal, 45.455 MHz	XL03010010
YB01	Cord, Connective	YB00101020
YB02	Cord, Connective	YB00201150
YB03	Cord, Connective	YB00101010
YB04	Cord, Connective	YB00150460
YB06	Cord, Connective	YB00101060
001B	Assembly, Front Panel	L34649002A
002B	Assembly, Front Panel	L34649003A
003B	LED Window	156C158010
009B	Button, MEMO	156C270040
010B	Button, SCAN	156C270050
011B	Button, DIM	156C270060
012B	Button, CLR	156C270070

025B	Spacer	156C118023
027B	Buffer	156C056040
029B	Insulator	156C120040
030B	Frame	156C401013
031B	Bracket	156C160012
032B	Screw	51500306B0
035B	Screw	51290308B0
039B	Collar	101C055020
045B	Clamper	156C005030
046B	Clamper	156C005042
047B	Insulator	156C120010
067B	Screw	51100306A9
071B	Shield	109C109040
072B	Insulator	109C120060
080B	Screw	51290308B0
081B	Bracket	156C160023
082B	Screw	51290308B0
088B	Buffer	156C056030
090B	Screw	51502606B0
091B	Lid	156C257013
092B	Lid	156C257022
093B	Screw	51480305B9
094B	Bushing	1455259070
095B	Bushing	239H259030
096B	Name Plate	155C265010
097B	Name Plate Fix	5508245710
099B	Sheet	156C107010
100B	Diagram	155C853010
101B	Label	156C861012
102B	Label	101C861040
104B	Screw	51282606B0
105B	Bushing	156C259020
106B	Clamper	4220005040
116B	Buffer	156C056060
117B	Buffer	156C056070
119B	Insulator	156C120060
009S	Bag	9011020010
001V	Bracket	156C160040
003V	Washer, Spring	54040502N0
004V	Washer, Flat	54020501E0
005V	Adjuster	101C164010
006V	Bolt	52030520B9
007V	Nut, Hexagon	53110503E9
008V	Washer, Spring	54040502N0
009V	Washer, Flat	54020501E0
012V	Microphone, MP566	MP11000740
013V	Buffer	156C056020

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