# MAINTENANCE MANUAL

# 29.7-50 MHz TRANSMITTER/RECEIVER/SYNTHESIZER ASSEMBLY 19D901630G1-6

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## DESCRIPTION

The transmitter/receiver/system board (TRS) for DELTA-S provides all functions necessary for two-way communications in the 29.7-50 MHz range. The TRS board is provided in three groups. TRS board 19D901630G1 is used in radios operating in the 29.7-36 MHz range, 19D901630G2 operates in the 36-42 MHz range, and 19D901630G3 operates in the 42-50 MHz range. Maximum channel separation for each frequency split is shown in Table 1.

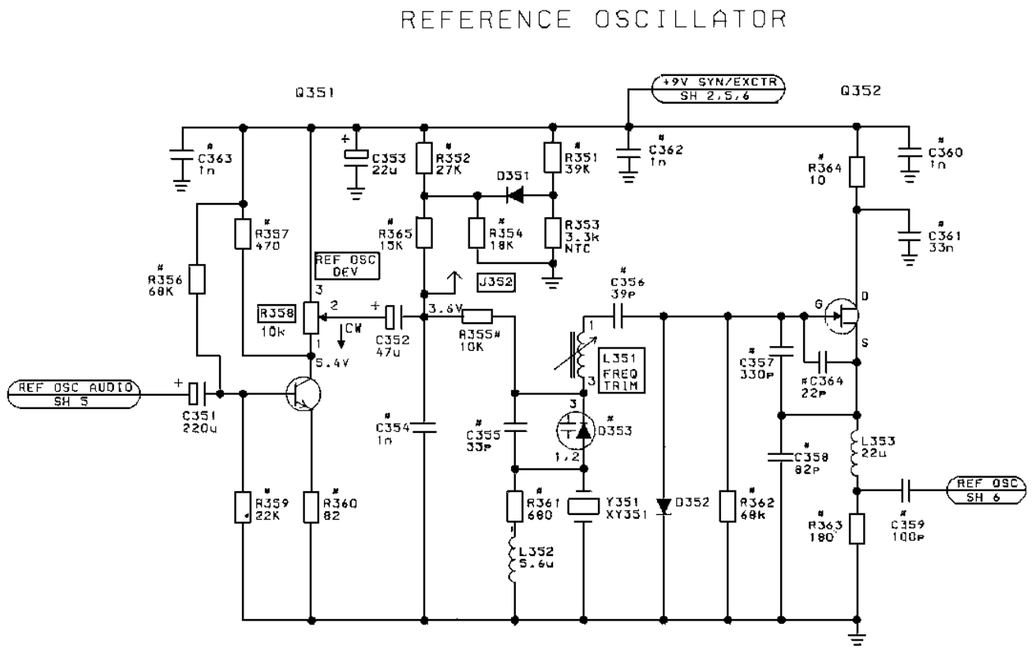
The TRS board contains the transmitter (less PA) and receiver circuitry, microcomputer and EEPROM, frequency synthesizer, audio processor, and voltage regulators. The microcomputer controls all system functions, supplies frequency data to the frequency synthesizer, and tone/code data to the Channel Guard option board. All RF frequencies are generated by the frequency synthesizer.

The transmitter PA is mounted on a separate board located along the side of the radio near the heat sink assembly.

Table 1 - Maximum Channel Separation

| FREQUENCY SPLIT (MHz) | NO CENTER TUNING | W/CENTER TUNING | W/CENTER TUNING | |
|---|---|---|---|---|
| | | | 1 dB DEGRADATION | 3 dB DEGRADATION |
| 29.7-36 | 0.5 MHz | 1.0 MHz | 1.5 MHz | 1.75 |
| 36-42 | 0.625 MHz | 1.25 MHz | 1.75 MHz | 2.0 |
| 42-50 | 0.75 MHz | 1.5 MHz | 2.0 MHz | 2.5 |






### 29.7-50 MHz REFERENCE OSCILLATOR/ MICROCOMPUTER BOARD

(19D901626, Sh. 7, Rev. 2)

ERICSSON
Ericsson GE Mobile Communications Inc.
Mountain View Road • Lynchburg, Virginia 24502

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The TRS board is controlled by the control unit. The control unit interconnects with the radio by a power/control cable connected to front connector J601.

In addition to the normal radio functions, the microcomputer contains self diagnostic routines to aid in troubleshooting the radio. Included are internal tests of the microcomputer and input/output tests to assure proper operation of the data port and data bus. Diagnostic and Troubleshooting Procedures are included in the Service Section of this manual.

Centralized metering jacks are accessible from the top of the radio, and provide access for system, RF and PA metering.

# CIRCUIT ANALYSIS

## SYSTEM CONTROL & INTERFACE

The system control and interface circuits consist of the microcomputer, electrically erasable PROM (EEPROM), interface circuits for voltage shifting and protection and a watchdog timer. The EEPROM gives the user the capability to program or reprogram the radio's personality as desired. The EEPROM contains the receive and transmit frequency data, Channel Guard tone frequencies/digital codes and the CCT delay on a per channel basis.

**NOTE**

The EEPROM may be programmed serially through the front connect using the General Electric Universal Radio Programmer Model TQ2310.

The TRS board also provides access for parallel loading (through program connector J111) on a per channel basis using the General Electric Programmer 4EX22A10.

The microcomputer interfaces with the control unit through J601, responding to all user commands and control functions originating from the control unit. It provides the transmit and receive data to the frequency synthesizer, switching information for tone and digital Channel Guard, and the carrier control timer (CCT) function when the radio is in the transmit mode. A block diagram of the system control functions and frequency synthesizer is shown in Figure 1.

When the microphone is keyed the PTT line from the control unit goes low. This low is applied to the microcomputer through buffer Q701 and inverter Q711. Q701 is controlled by ignition switch A+. The ignition switch must be on and A+ applied to the base of Q701. Q701 must be turned on to permit keying of the transmitter.



When Channel Guard is present the release of the PTT signal is delayed by the microcomputer for approximately 160 milliseconds to eliminate any squelch tails.

The microcomputer immediately closes the antenna relay switch by applying a low level to DPTT at A701-28. The microcomputer then delays 15 milliseconds before the transmit 9V is switched on by applying a low level on TX ENBL at A701-32. This is done to guarantee that the antenna relay contacts are closed before the transmitter is energized. Once DPTT is at a low level the receive audio is muted. Buffers Q716 and Q717 provide DPTT to the audio control circuits, antenna relay, and the option board.

The TX ENBL line is controlled by microcomputer port 1 (bit 5 A701-32) through inverter Q718 and bilateral through inverter Q718 and bilateral switch U302C & D. A low level on A701-32 turns Q718 off, allowing the bilateral switches to be turned on and A- applied on the TX ENBL line. Inverter Q720 is also turned on during this time to inhibit the alert tone PTT.

### Channel Selection

The microcomputer and EEPROM provide the radio with up to 32 independent transmit and receive frequencies. Each time the PTT switch is operated the microcomputer transfers channel data from the EEPROM and converts it to frequency data assigned to the selected channel. The frequency data is then loaded serially into the frequency synthesizer.

The microcomputer continually monitors the status of tri-state buffers U704A-D. These buffers are periodically turned off by a positive 5 volt, 1 millisecond pulse from A701-36. At the same time PROM power switch Q715 is turned on and applies +5 VDC to the EEPROM. When the buffers are turned on channel select data is 1oaded into input/output ports of the microcomputer through ports P20-P23. Power is then applied to the EEPROM and the tri-state buffers are turned off. The microcomputer converts the channel select data into address information, accesses the EEPROM, and receives the frequency data stored in the addressed location. This data then passes through the I/O ports of the EEPROM and P20-P23 of the microcomputer. The conversion process is repeated eight times in rapid succession (eight locations are required for each channel) and the data loaded serially into the frequency synthesizer using the clock and data lines. This data also includes Channel Guard information, if present, and carrier control timer information on a per channel basis. A 4-millisecond channel change pulse from port P16 of the microcomputer is also sent to the frequency synthesizer to speed up channel acquisition.

Also considered at this time is the status of frequency bit 5 (FB5) and the PTT line A701-38. The status of the PTT line is used to determine if the radio is in the transmit or receive mode to assure the right frequency data is accessed. The status of FB5 also determines which EEPROM contains the requested data.

A second EEPROM is required if more than 16 channels are provided. The second EEPROM is plugged directly into pins extending above the top of the first EEPROM. Programming Jack J711 may be used to program both PROMS (using PROM Programmer 4EX22A1O).

Diodes D718A and B and D719A and B provide spike protection for the microcomputer. D717A and B provide spike protection for the EEPROMS.

### Watchdog Timer

The watchdog timer, consisting of a digital counter U703-A and Q714, monitors the operation of the microcomputer and U703A generates a reset pulse in the unlikely condition that the microcomputer gets lost and does not execute the software properly. A 6 MHz crystal, Y701, steps the microcomputer through the software. As programmed in software a random pulse appears at A701-35 and is applied to the base of inverter Q714, momentarily turning it on and inhibiting any reset pulse from timer U703-A. If the timer does not receive any inputs for a specified period of time, Q714 turns off and U703-A times out and applies a reset pulse to pin 4 of the microcomputer. The watchdog reset will normally restore the microcomputer to normal operation so that only one pulse will occur. In the event the microcomputer is not restored to normal operation a 6 Hz square wave will appear on the reset line and the indicator D713 (now unlocked) will turn on. Refer to the Service Section of this manual and run the self diagnostics routine to determine the problem.

### Advance Change Pulse

The advance change pulse is received from the option board through connector J601 and applied to the microcomputer interrupt port A701-6 through inverter Q713. The advance change pulse is required in radios equipped with PSLM. When a call is received on a priority channel the advance change pulse interrupts the microcomputer forcing it to service immediately the I/O circuits. The tri-state buffers are turned on and new channel select information read in.

### Carrier Control Timer

The carrier control timer function is executed by the microcomputer under software control on a per channel basis. When the programmed time has lapsed an alert tone is generated from P13 (A701-30) on the microcomputer, applied to the audio PA and heard on the speaker. The CCT may be programmed for 1, 2, or 3 minutes or disabled (not programmed).

### Voltage Translation

Inverter buffers U707D-F, and Q721 translate the 5 VDC levels required by the microcomputer to the +9 VDC level used by the frequency synthesizer. Inverter Q719 restores clock polarity.

#### Channel Guard

The Channel Guard encode and decode functions are implemented in the microcomputer under software control. The microcomputer provides digital and/or tone Channel Guard with STE.

If the radio is in the receive mode, the Channel Guard tone/code is hard limited and inputted into the microcomputer through A701-29 (LIM CG Tone Decode). If the correct tone code is present, the receiver is opened by the RX MUTE line. If the radio is in the transmit mode, the microcomputer generates the Channel Guard tone using WALSH BIT 1 and WALSH BIT 2. Those outputs are summed together and filtered on the optional Channel Guard board to generate a smooth sinewave for tone Channel Guard or a digital waveform for digital Channel Guard.

### Frequency Synthesizer

The frequency synthesizer receives clock, data, and control information from the microcomputer and from this generates the TX/RX RF frequencies and provides frequency lock status to the microcomputer. It consists of synthesizer chip U201, low and high current buffers, loop filter, TX & RX voltage controlled oscillators (VCO's), feedback amplifiers, dual modulus prescaler, and reference oscillator. The VCO's are locked to the reference oscillator by a single direct divide synthesis loop consisting of the feedback buffer, prescaler, and synthesizer. The VCO's operate over a frequency range of 29.7 MHz to 50 MHz.

#### Reference Oscillator

The reference oscillator consists of a 5 PPM oscillator, an audio amplifier and temperature compensation network. The standard reference oscillator frequency is 13.2 MHz.

The 5 PPM oscillator is a standard Colpitts circuit using a FET transistor Q352 and fundamental crystal Y351. Oscillator output is typically 0.7 VPP. Audio deviation is set by R358 for ±1 kHz.

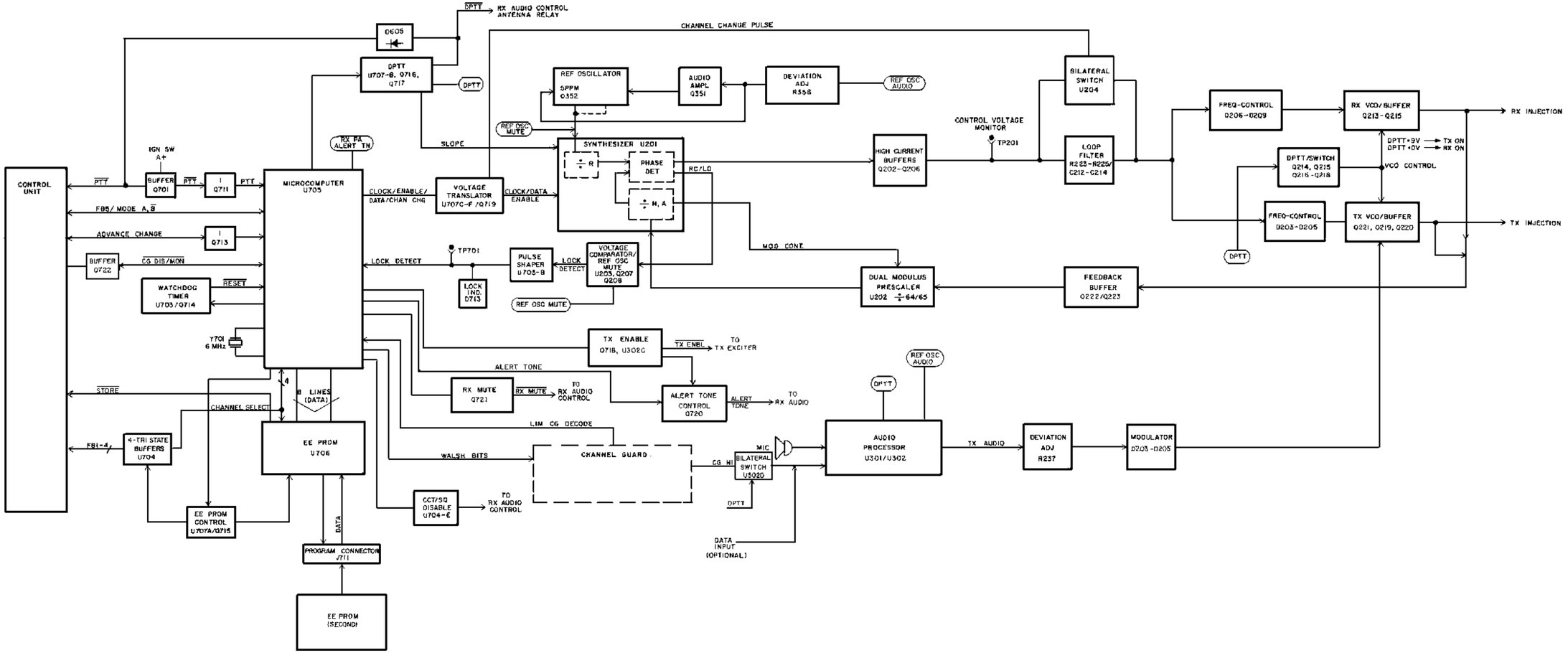



Figure 1- Block Diagram System Control and Synthesizer

The temperature compensation network consists of R351-R354 and D351. R353 is a thermistor having a negative temperature coefficient. Its resistance increases with a decrease in temperature. The output voltage of the temperature compensator varies the voltage applied to varicap D353 to maintain the oscillator frequency within ±5 PPM.

The output of the reference oscillator is applied to the synthesizer input, XI along with Q203 and Q205.

## Synthesizer

Synthesizer U201 contains a programmable reference oscillator divider (+R), phase detector, and programmable VCO dividers (+N, A). The reference frequency, 13.2 MHz from the reference oscillator is divided by a fixed integer number to obtain a 5 kHz channel reference for the synthesizer. The internal phase detector compares the output of the reference divider with the output of the internal +N, A counter. The +N, A counter receives as its input the VCO frequency divided by the dual modulus prescaler and programmed by the microcomputer. This comparison results in a ± error voltage when the phases differ and a constant output voltage when the phase detector inputs compare in frequency and phase.

If a phase error is detected an error voltage is developed and applied to the high current buffers and loop filter to reset the VCO frequency. The count of the +N, A counters is controlled by the frequency data received on the clock and data lines from the microcomputer. Thus, when a different channel is selected or when changing to the transmit or receive mode an error voltage is generated and appears at the phase detector output, ANO, causing the phase locked loop to acquire the new frequency.

The enable pulse from the microcomputer enables the synthesizer and allows frequency data to be internally stored.

### DC Offset and High Current Buffers

DC offset buffers Q203, Q205 and Q206 receive the error voltage from the synthesizer and increases this level by 1.8

VDC to extending the operating range of the high current buffers. When the PLL is off frequency due to a channel change or frequency drift the error voltage from the synthesizer (ANO) rises or falls turning Q206 on or off. Q206 controls the DC offset buffers Q203 and Q205 and high current buffers Q202 and Q204. Q202 and Q204 complete a high current rapid charge path for C212-C214. Q205 and Q206 provide the rapid discharge path.

As the error voltage decreases Q206, Q203 and Q205 turn on completing a discharge path for C212-C214 through bilateral switches U204A-D. When the error voltage goes positive Q203, Q205 and Q206 are turned off, allowing C212-C214 to charge through Q202 and R223-R225. U204 is turned on for 4 milliseconds each time a channel is changed in receive or when changing from transmit to receive. The time is 20 milliseconds when in transmit.

### Loop Filter

The loop filter consists of R223-R225, and C212-C214. This filter controls the bandwidth and stability of the synthesizer loop. Bilateral switch U204 is controlled by the 4 millisecond, 9 volt channel change pulse. When the channel change pulse is present the bilateral switch shorts out the low pass filter greatly increasing the loop bandwidth to achieve the 4 millisecond channel acquisition time required for PSLM. The low pass filter removes noise and other extraneous signals internal to the synthesizer chip.

The output of the filter is applied to the varicaps in the transmit and receive VCO's to adjust or correct the VCO frequency.

### Receiver Voltage Controlled Oscillator

The Receiver VCO consists of a low noise JFET oscillator, Q213, followed by high gain buffers Q214 and Q215. These buffers prevent external loading and improves power gain. The VCO is a Colpitts oscillator with the various varactors, capacitors and inductors forming the tank circuit. Capacitor C220 allows manual adjustment of the VCO across the frequency split. The varicaps provide voltage controlled frequency adjustment of about 3 MHz. The VCO is switched on and off under control of the DPTT line. When the DPTT line is low the Receiver VCO is turned on (Q218 is on). Oscillator output is typically +10 dBm. RX VCO lock time is 4 milliseconds maximum.

### Transmitter VCO

The Transmit VCO is basically the same as the Receiver VCO except that coil L211 is tuned to provide an operating range of approximately 8 MHz, depending on which frequency split the radio is operating on. The varactors provide a voltage controlled adjustment range of approximately 3 MHz. The high gain series buffers Q219 and Q220 provide a typical output of +10 dBm. Transmit audio is applied to deviation adjustment control R237. Deviation is set for 4.5 kHz. TX VCO lock time is 20 milliseconds maximum.

TX VCO control switch Q216 and Q217 turn the Transmit VCO on when DPTT is high. Q216 is off, Q217 is on.

The use of two VCO's allows rapid independent selection of transmit and receive frequencies across the frequency split.

### VCO Characteristics

The synthesizer has two VCO's or voltage controlled oscillators. The VCO frequency is directly related to a control voltage generated by the synthesizer circuitry and must remain within specified limits for the synthesizer to function properly. The RX VCO typically will increase in frequency about 4 MHz when the control voltage moves from its lower limit to its upper limit. The TX VCO moves about 6 MHz for the same situation. By tuning the coil for the TX VCO or the capacitor in the RX VCO, the same control voltage frequency spread can be moved up or down through the full range of frequencies that the radio operates on.

In order to maintain the excellent selectivity and hum and noise performance of the radio, the frequency range that the VCO's can be voltage tuned must be kept to a minimum. This requires that all the available voltage range be fully utilized. The alignment procedure, therefore, instructs the user to accurately set the control voltage to the upper limit of the voltage range at the highest frequency channel.

**NOTE**

Going too high with the voltage setting at the highest frequency channel may cause problems over temperature extremes as the VCO's will drift slightly. Set the voltage too low and you may not remain within the required lower voltage limit as you cover the radio's maximum two frequency spread.

If the required frequency spread is less than the maximum two frequency spread, then there are no restrictions on setting the lowest and highest frequencies within the required voltage limits.

The minimum tuning requirement of the VCO's is to cover the proper frequency range. For instance, to cover 29.7 to 50 MHz the VCO must be tunable such that at 29.7 MHz the control voltage is at least greater than or equal to the lower voltage limit, and at 50 MHz the voltage must be less than the upper limit. If the control voltage can be tuned higher than the lower limit at 29.7 MHz, this simply means that you can program channels below 29.7 until you finally run into the lower voltage limit. When tuning the VCO's to a channel close to 50 MHz, the control voltage may not reach the upper control voltage limit. This is normal for some radios and is due to the tolerances on the many capacitors in the VCO. Even though it takes very little change in capacitance to shift the VCO frequency range a few megahertz, this variation has been carefully compensated for by increased tuning range for the VCO. Therefore, if you tune to 50 MHz, you may not achieve the maximum control voltage for all radios, but you will always be greater than the lower voltage limit.

Note that the RX & TX VCO's have totally different tuning adjustment devices. The TX VCO will tune as any coil will by reaching a peak voltage setting at the 50 MHz frequency, assuming that the peak falls within the control voltage limits of the VCO. The RX VCO uses a multi-turn trimmer capacitor which lowers the VCO frequency linearly with clockwise turns of the screw-type slotted piston. Unlike the coil used in the TX VCO, the trimmer C does not peak but simply reaches a maximum setting (lowest frequency is maximum setting) and stops turning. The 50 MHz receive channel should have a control voltage greater than the lower limit. The trimmer cap is a very high quality device which allows the RX VCO to always have consistent state-of-the-art noise performance necessary for a high quality synthesized radio.

### Feedback Buffers

The RX injection and TX injection voltage output from the RX VCO and TX VCO are supplied to the receiver mixer and the exciter respectively and to the feedback buffers. Buffering is provided by Q222 and Q223 and the output applied to dual modulus prescaler U202.

### Dual Modulus Prescaler

The dual modulus prescaler completes the PLL feedback path from the synthesizer to loop filter, to the VCO's and feedback buffers and then back to the synthesizer through the prescaler. The prescaler divides the VCO frequency by 64 or 65 under control of MOD C from the synthesizer. The output of the prescaler is applied to the synthesizer where it is divided down to 5 kHz by an internal +N, A counter and compared in frequency and phase with the divided down frequency from the reference oscillator. The result of this comparison is the error voltage used to maintain frequency lock. The +N, A counter is controlled by data received from the microcomputer. Depending on the operating frequency, the DC voltage at TP201 should be within the range 3.5 to 7.5 VDC when the PLL is locked.

### Lock Detect

The lock detect circuit consists of comparator IC U203, diodes D201 and D202, and reference oscillator mute switch Q207 and Q208. It is used to quickly synchronize the phase relation of the divided down VCO frequency and the reference oscillator if the loop loses lock. It also provides a fast lock detect signal to the microcomputer to turn on the out-of-lock indicator. If a large change in frequency is required the ramp capacitor output (RC) of the synthesizer may increase to near 7.5 VDC and cause the comparator output to decrease. This decrease in voltage turns Q207 off and allows Q208 to be turned on by the positive LD line from the synthesizer. Thus Q208 disables the reference oscillator and allows the PLL to be brought back to synchronization rapidly.

If a large frequency error exists the LD positive lead from the synthesizer will carry negative spikes to the microcomputer through D202B to activate the lock indicator circuit. Pulse shaper U703 is a one-shot multivibrator which increases the pulse width to span 1 computer cycle. Q207 is turned on, keeping Q208 off thereby preventing Q208 from muting the reference oscillator.

## TRANSMITTER

The transmitter section of the TRS board includes the audio processor and exciter. The power amplifier is contained on a separate board adjacent to the TRS board and next to the heat sink assembly. Information related to the PA is included in a separate insert. Figure 2 is a transmitter block diagram showing the exciter and PA. The audio processor is shown in Figure 1.

### Audio Processor U301

The audio processor provides audio pre-emphasis with amplitude limiting and post limiter filtering and a total gain of approximately 24 dB. Approximately 20 dB gain is provided by U301B and 4 dB by U301A.

The 9 Volt regulator powers the audio processor and applies regulated 9 volts to a voltage divider consisting of R303, R313, R308 and R312. The +4.5 V output from the voltage divider establishes the operating reference point for operational amplifiers

U301B and U301A. C302 provides an AC ground at the summing input of both operational amplifiers.

The voltage divider and diodes D301 and D302 provide limiting for U301B. Diodes D301 and D302 are reversed biased at +1.7 VDC. Voltage divider network R303, R308, R312 and R313 provides +6.2 VDC at the cathode of D301 and +2.8 VDC at the anode of D302. The voltage junction of D301 and D302 is 4.5 V. C308 and C312 permit a DC level change between U301B-7 and the voltage divider network for diode biasing.

When the input signal to U301B-6 is of a magnitude such that the amplifier output at U30lB-7 does not exceed 4 volts PP, the amplifier provides a nominal 20 dB gain. When the audio signal level at U301B-7 exceeds 4 volts PP, diodes D301 and D302 conduct on the positive and negative half cycles providing 100% negative feedback to reduce the amplifier gain to 1. This limits the audio amplitude at U301B-7 to .5 volts PP.

Resistors R309, R310 and R311 and C311 comprise the audio pre-emphasis network that enhances the signal-to-noise ratio. R311 and C311 control the pre-emphasis curve below limiting. R306 and C311 control the cut-off point for high frequency pre-emphasis. As high frequencies are attenuated, the gain of U301 is increased.

Audio from the microphone is coupled to the audio processor through C307 and R307.

The amplified output of U301B is coupled through R305, C306, R314, R315 and bilateral switch U302-A to a second operational amplifier U301A. The bilateral switch is controlled by the DPTT line so that TX audio is transmitted only when the PTT switch is pressed.

The Channel Guard tone input is applied to U301A-2 through J603-15, R301 and bilateral switch U302A. The CG tone is then combined with the microphone audio at U301A. U301-A provides a signal gain of approximately 4 dB.

A post limiter filter consisting of U301A, R314-R316, C309 and C313 provides 12 dB per octave roll-off. R305 and C305 provide an additional 6 dB per octave roll-off for a total of 18 dB. The output of the post limiter filter is coupled through R236 to the transmitter VCO.

TX enable switch U302-B shorts out operational amplifier U301-A when the radio is in the receive mode. The TX ENABLE signal is generated by the microcomputer when the PTT switch is released and is less than 2.7 VDC in the receive mode.

**SERVICE NOTE**

Some resistors have a tolerance of 1%. This tolerance must be maintained to assure proper operation of the post limiter filter. Use exact replacements.

Provisions for data input are provided by J303.

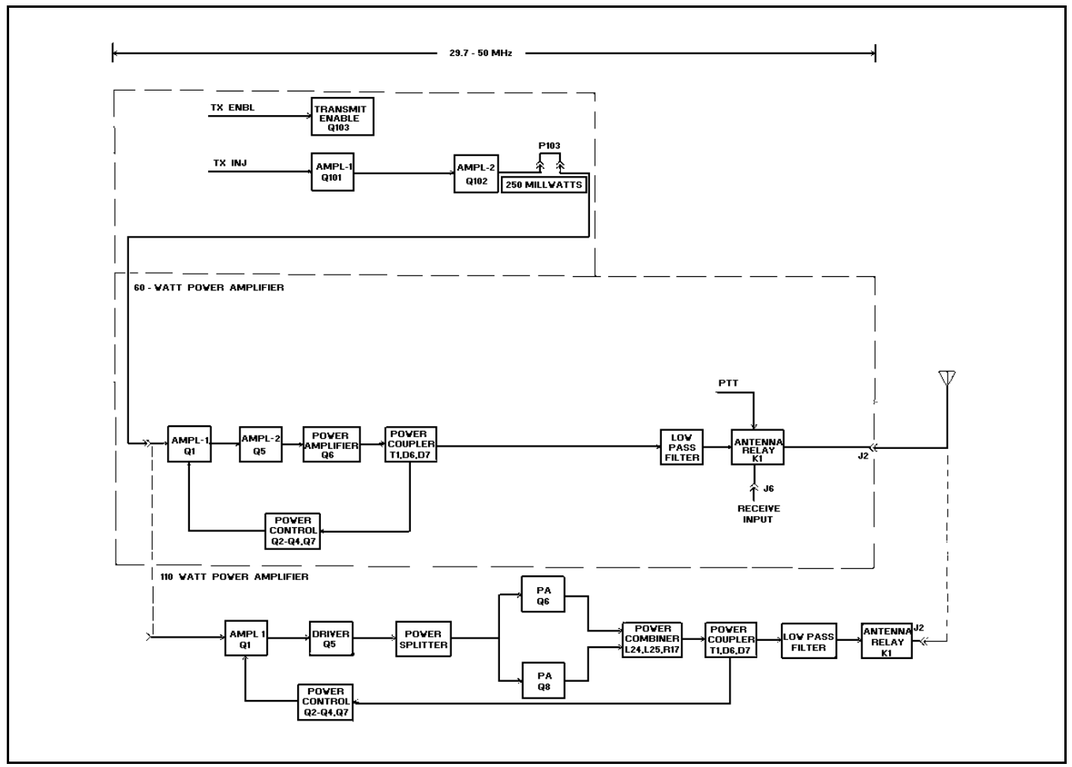



Figure 2 - Transmitter Block Diagram

### Exciter

The exciter consists of two broadband fix tuned amplifier stages operating over a frequency range of 29.7-50 MHz. An attenuator pad (R101-R103) at the input of the exciter provides a constant load for the VCO and attenuates the signal from the VCO to approximately 18 dBm. The exciter amplifies the 18 dBm signal from the VCO to provide 250 milliwatts drive to the power amplifier.

The injection frequency input from the TX VCO is applied to the base of amplifier Q101 through an attenuator pad and impedance matching components C101, C102 and L101. The impedance matching network matches the VCO output to the base of Q101. R106 and R107 set the bias voltage for the Q101. Collector voltage is applied direct from the +9V SYNTH/EXCTR line through TX ENBL switch. Q103 and collector feed network L102 and R109. C103 provides noise decoupling.

The output of Q101 is coupled to the base of transmitter driver Q102 through C106 and impedance network C109, L103 and R113. The 250 milliwatt output of Q102 is coupled to the power amplifier board through 50 ohm impedance matching network C116, L105, C117, and service plug P103 and output plug P101.

Collector voltage for Q101 is supplied by +9V SYNTH/EXCTR through 9V TX switch Q103. Q103 is controlled by TX ENBL from the microcomputer. When TX ENBL is low Q103 is turned on providing voltage to amplifiers Q101. When TX ENBL goes high (receive mode) Q101 is turned off, preventing any interference by the TX VCO frequencies.

Collector voltage for driver Q102 is supplied from the +9V SYNTH/EXCTR source through R114 and R115 and collector feed network L102 and R109.

P101 consists of a pin soldered to the end of the microstrip. The outer shield consists of a hole in the casting through which the pin connects to the PA.

Three exciter metering points are accessible at RF metering jack J101. The first metering point at J101-10 monitors the emitter voltage of Q101 through metering network C104, R117 and R110. Typical reading is 0.65 V on the GE test set.

The second metering point at J101-9 monitors the collector voltage of amplifier Q102, through R111, R118 and C110. This point typically is 0.45 V on the GE test set.

The third metering point at J101-8 monitors the collector voltage of driver Q102. The metering network consists of R112, R119, and C108. The relative exciter power output can be read at the test jack on the power amplifier assembly.

**SERVICE NOTE**

J103 can be used for troubleshooting purposes and measuring the RF output level of the exciter.

The exciter is energized by pressing the PTT switch. A regulated 9 volts is present on Q102 when the radio is turned on. It is normal to read collector voltage at J101-9 when the transmitter is not keyed.

Capacitors C112, C114 and C115 isolate the exciter board from vehicle ground for operation in vehicles with positive or negative ground.

## RECEIVER

The FM receiver used in DELTA-S radios is a single conversion receiver using 10.7 MHz as the IF frequency. Adjacent channel selectivity is provided by three 4-pole crystal filters.

The nine volt regulator supplies power to all receiver circuits except the audio PA IC's which receive power directly from the A+ supply through the power on switch. A block diagram of the receiver is shown in Figure 3.

All receiver circuitry is mounted on the TRS board and consists of:

- Receiver Front End
- LO Injection Amplifier
- Diode Mixer
- 10.7 MHz IF Circuitry
- Limiter/FM Detector
- Audio PA
- Squelch

### Receiver Front End

The RF signal is coupled through a 2-pole LC filter (L402 and L403) to a common gate JFET pre-amplifier, Q401. After amplification by Q401, the RF signal is coupled through a 4-pole LC filter and T401 to the double-balanced diode mixer D401-D404.

### RX Injection

The injection frequency from the synthesizer (5-15 dBm) is applied to the base of injection buffer/amplifier Q406 through 50 ohm microstrip Z403. The output of Q406 is filtered by a 2-pole LC filter (L415, L416) to remove spurious signals and coupled to the diode mixer through T402.

Injection metering (INJ METER) is taken from the emitter of injection amplifier Q406 and metered at J101-3 (position H on the Test Set). The reading is typically 0.4 volts with injection and 0.1 volts without injection. The synthesizer frequency may be monitored at C435.

### Mixer

The diode mixer, D401-D404, provides low input impedance, spurious protection, and an output relatively free of harmonics (low in intermod products).

Receiver RF from the pre-amplifier and LC filters is applied across D402 and D404 of the diode mixer. Injection voltage from the frequency synthesizer is amplified by injection amplifier Q406, filtered by 2-pole LC filter, L415 and L416, and applied to the diode mixer across D401 and D403. The 10.7 MHz output is coupled from the center tap of T401 through C420 and R405 to the source input of IF AMPL Q402. Q402 is a JFET amplifier/buffer stage. The output of the JFET buffer is coupled through C421 to the optional noise blanker (W401 removed) or through impedance matching networks L411, L412, and associated circuitry (bypassing IF blanking FETS Q403 and Q404) to a 4-pole XTAL bandpass filter (W401 connected).

The highly-selective crystal filter consisting of Z401 and Z402 provides the first portion of receiver IF selectivity. The output of the filter is coupled through a second impedance matching network (C431, R414 and L413) to G1 of IF amplifier Q405.

Voltage to the drain of Q405 is supplied from the +9V RX supply through L501, L502, R415, R418 and L414.

### IF & Detector Stages

IF amplifier Q405 is a dual-gate low-noise MOS FET amplifier. The filter output is applied to gate 1 of the amplifier, and the output is taken from the drain. The biasing on gate 2 and the drain load determines the gain of the stage. The amplifier provides approximately 20 dB of IF gain. The output of Q405 is matched into a second 4-pole crystal filter by tuned circuit L414, C433 and R419. The output of the crystal filter is applied to IF amplifier IC U501 through impedance matching network L507, C502, C503, and R501.

U501 provides approximately 55 dB of gain. Following U501 is a third 4-pole crystal band-pass filter (Z503 and Z504) which provides the final stage of IF selectivity.

IF signal from the 4-pole crystal filter is applied to the IF amplifier/ limiter/FM detector IC (U502) through impedance matching network L508, C511, C512, and R503. The amplifier provides approximately 80 dB of gain to insure that the signal is well into limiting.

U502 also contains the quadrature FM detector. The single-tuned LRC network, consisting of L509, C515, C516, and R504, provides the 90° phase shift necessary to produce the recovered audio. The low level detected audio is applied to audio preamplifier U603-B.

The metering for the FM detector and IF amplifier is provided by the red systems metering jack J602-1 and 10 respectively. The metered outputs are taken from U502.

### Audio And Squelch Circuits

#### Audio

Received audio from the FM detector is applied to the input of audio preamplifier U603-B. The audio output level of the audio preamplifier is adjusted by Volume/Squelch HI level control R629 for 300 millivolts RMS. The audio is then applied to the volume and squelch (optional) controls in the control unit through front connector J601-7.

Audio is returned on VOL ARM through J601-8 and applied to audio gate (bilateral switch) U605-B. The audio gate is controlled by $\overline{\text{DPTT}}$ (delayed Push-To-Talk) and $\overline{\text{PA KEY/CCT PA ENBL}}$ through Q603 and is turned on when the control input (pin 5) exceeds 7 VDC. The gate is turned off when the control input is less than 2 volts. Receipt of an on frequency signal (if present) with sufficient signal to noise level and the correct Channel Guard frequency will cause the audio control circuit to apply +9 volts to U605-B turning the audio gate on.

Audio from the audio gate is applied to the de-emphasis network consisting of a 2-pole low-pass filter (U603D), a 2-pole high pass filter (U603C) and associated circuitry. The low pass filter consisting of R614, R615, C606, C607 and U603-D provides a 6 dB per octave roll-off between 300 and 3000 Hz. C608, C609, R617, R616, R618, R619 and U603-C form a 2-pole high pass filter that attenuates frequencies below 300 Hz. The audio output from the de-emphasis network is applied to the non-inverting input of the audio power amplifier. The audio power amplifier is comprised of U601, U602, and associated circuitry, and forms a bridge amplifier to provide 12 watts (6.93 VRMS across a 4 ohm load) of audio output power at radio output metering terminals J602-6 and 7. The output of U601 is applied to one side of the speaker and through a voltage divider (R621 and R622) to the inverting input of U602. The output of U602 is equal in amplitude but 180° out of phase with U601 and is applied to the other side of the speaker. U601 and U602 provide a balanced pushpull output to the speaker. The gain of U601 and U602 provide a balanced pushpull output to the speaker. The gain of U602 is determined by the value of R623 and R624.

#### Squelch Circuits

The squelch circuit monitors noise on the VOL/SQ HI input line and allows the receiver to be unmuted when an on frequency signal reduces the noise level below the squelch threshold setting.

The 300 millivolt output of the audio preamplifier is applied to the squelch circuit through the variable squelch control (optional) in the control unit or the fixed squelch control. The squelch control sets the noise threshold level required to operate the squelch circuit. When the noise falls below the threshold level, the receiver is unmuted.

The squelch circuit consists of a 3-pole high pass filter, an averaging detector, DC amplifier, and a Schmitt trigger. The high pass filter, consisting of R601-R603, C601-C603, and U604-C, removes all voice signals from the VOL/SQ HI input and couples noise to U604-D.

Noise in the 6-8 kHz range is applied to the averaging detector consisting of U604-D and associated circuitry. The noise is rectified and filtered by U604-D, R608, and C605 to provide an average DC output level proportional to the noise input.

The average DC level is amplified by U604A to a level ranging from 0 to 6.0 VDC, and applied to the non-inverting input of tbe Schmitt trigger, U604B. The inverting input of U604B is referenced to 4.5 VDC. U603A provides the stable 4.5 VDC reference voltage.

When the DC level exceeds 4.5 VDC, Schmitt trigger U604B switches and provides a positive voltage to the CAS (Carrier Activity Sensor) and RUS (Receiver Unsquelched Sensor) control transistors in the audio control circuits. The Schmitt trigger will remain on until the threshold level falls below approximately 4.3 VDC. This difference in voltage between the firing point and turn-off point provides sufficient hysteresis to eliminate "bubbling" -- i.e., noise popping in the speaker. The "bubbling" would normally be caused by transitional changes in the DC level around the reference point which allows the receiver to be unmuted. The hysteresis is provided by R611 and R612.

When an on frequency signal is received, there will be little or no noise present at the squelch input. This results in an absence of voltage at the output of the squelch circuit Schmitt trigger, allowing the receiver to be unmuted.

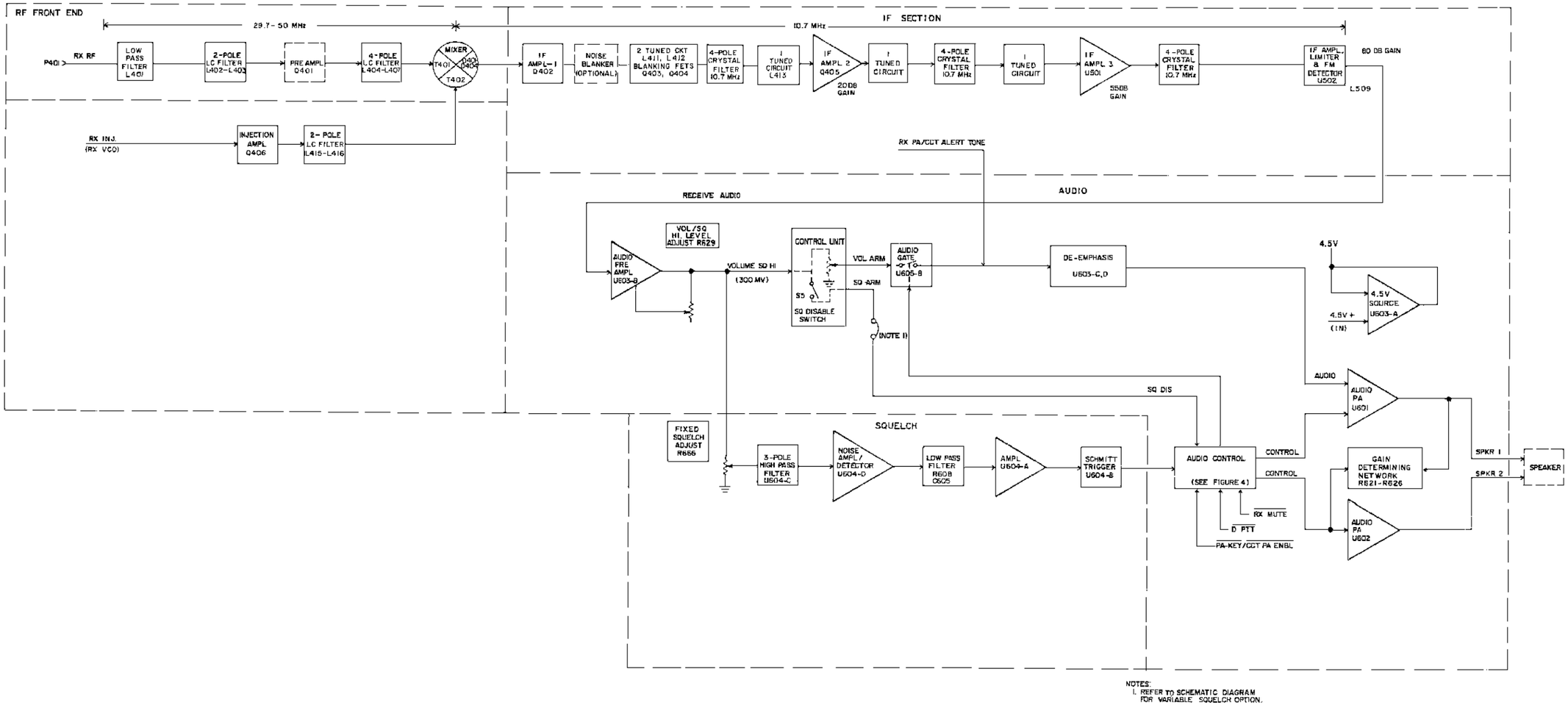



Figure 3 - Block Diagram Receiver

**Audio Control**

The audio control circuits shown by Figure 4 control the operation of the audio gate (U605-B) and the final audio PA and consists of Q601-Q606, inverter U605-C and associated circuitry. The audio control circuit inputs consist of $\overline{\text{DPTT}}$ (Delayed Push-To-Talk), $\overline{\text{RX MUTE}}$ (Receiver Mute), $\overline{\text{PA KEY/CCT}}$ $\overline{\text{SQ DSBL}}$ (Public Address Key/Carrier Control Timer Squelch Disable), and the output of the squelch circuit.

When an on frequency signal with the correct Channel Guard Tone is received, CAS control transistor Q601 and RUS control transistor Q602 are turned off by the absence of a positive voltage at their bases. The CAS line from the collector of Q601 rises to +9 VDC and is supplied to J601-12 and option connector J603-7.

The collector of RUS Transistor Q602 also rises to +9 VDC and turns on inverter U605-C. A- is then applied to the base of inverter Q603, turning it off and allowing its collector to go high. The positive voltage on the collector is applied to audio gate U605-B, turning it on. Q604 is biased on but has no affect on audio switches Q605 and Q606. The base of the transistors are parallel connected to the output of audio control switch (U605C-9) which is at A-. Therefore Q605 and Q606 are both turned off, allowing the audio PA's to turn on and complete the audio path to the speaker.

When the microphone is keyed, the PTT/DPTT input is low. This low is applied to audio gate U605-B through D603-B, turning U605-B off. It is also applied to audio control switch U605-C (through D601B) turning it off. Q603 is also off and Q604-Q606 are on. Q605 and Q606 turn off audio PA's U601 and U602.

## POWER DISTRIBUTION

Battery supply A+ enters the radio through the front connector at J601-37. A- enters through J601-21. Figure 5 is a block diagram of the power distribution system. Two heavy connections are provided for transmit A+ and transmit A- and connect to two busses. The busses are connected to the PA through a special feed through arrangement. A second set of wires is routed through the control unit and supplies power to the audio amplifier and 9 volt regulator.

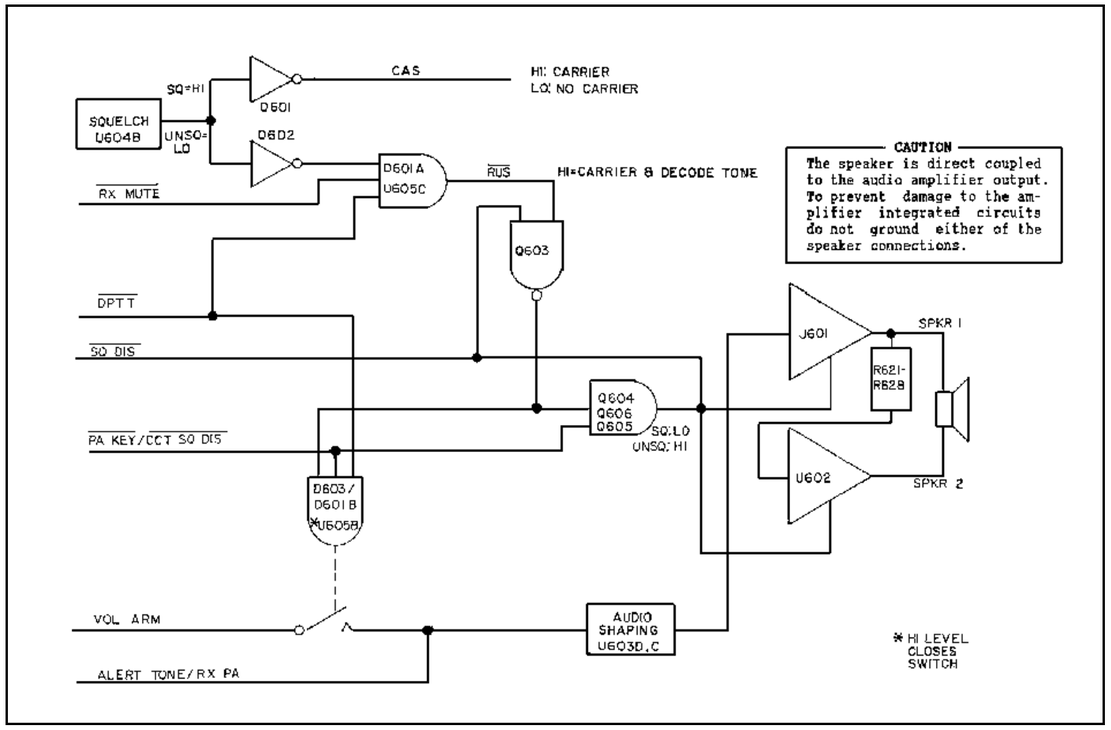



Figure 4 - Audio Control

## 9 Volt Regulator

The 9 volt regulator receives the 13.8 VDC supply voltage and regulates it down to +9 VDC. The regulated voltage is then distributed throughout the radio. The 9 volt regulator consists of pass transistor Q705, shunt regulator IC U701, as well as Q703 and Q704. Normally all transistors are turned on except Q704 which turns on only when the 9 volt output is shorted to ground.

As the input voltage increases so does the output of the regulator begin to increase. This increases the voltage on U701 from pin 1 to ground. The shunt regulator IC U701 tries to maintain the voltage at pin 2 to about 2.5 volts by sinking more current into its pin 3. This lowers the voltage at pin 3 and thus reduces the current flowing through D701 and Q703. When this current decreases it causes Q705 to provide less current to the 9 volt output and brings the 9 volt output back down where it belongs. When the input voltage decreases then the opposite occurs.

If the 9 volt output were shorted for any reason then Q704 would forward conduct causing its base voltage to sit around 1.4 VDC. That voltage is low enough to cause D701 in conjunction with Q703 to turn off shutting down the regulator until the short is removed. C701 thru C705 are for RF bypassing. R703 is provided as an adjustment of the 9 volt regulator output level.

**CAUTION**

The CMOS Integrated Circuit devices used in this equipment can be destroyed by static discharges. Before handling one of these devices, the service-man should discharge himself by touching the case of a bench test instrument that has a 3-prong power cord connected to an outlet with a known good earch ground. When soldering or desoldering a CMOS device, the soldering iron should also have a 3-prong power cord connected to an outlet with a known good earth ground. A battery-operated soldering may be used in place of the regular soldering iron.

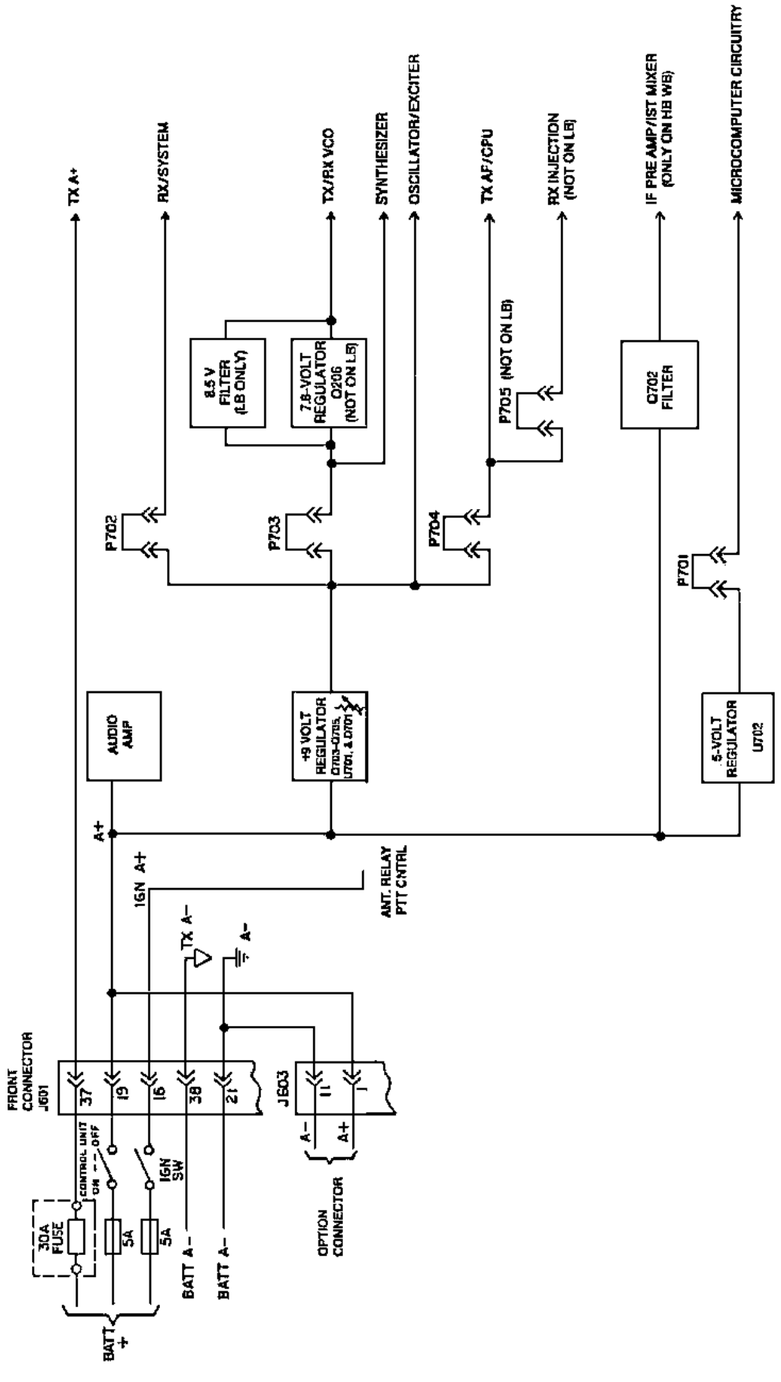



Figure 5 - Power Distribution

# MODIFICATION INSTRUCTIONS

This modification instruction covers the installation of Mod Kit 19A704915G1 along with shielded power/control cable and modified radio bottom cover 19B800686G4 to a Delta S/SX mobile radio to provide improved RFI performance where antenna is in close proximity to power/control cable.

**PARTS REQUIRED**

- Shielded power/control cable
- Modified radio bottom cover 19B8000686G4
- Modification Kit 19A704915G1 consisting of:

  Filter Board Assembly ..... 19B801399G1
  Modified Plastic Spacer ..... 19B801402G1
  #12-24 Slotted Head Machine Screw ..... N37P19012B
  #12 External Tooth Lock Washer ..... N403P21C6
  Aluminum Offset Spacer ..... 19A704893P2
  M3.5 x 10 Thread Forming Screw ..... 19A702381P510

**TOOLS REQUIRED**

- #12-24 NC Fluted Taper Tap and Tap Handle
- #15 & #30 TORX® Screwdrivers
- Flat Blade Screwdriver

**PROCEDURE**

STEP 1 Remove radio from vehicle to a convenient work area. Tap existing hole on right front corner of radio frame using #12-24 NC fluted taper tap.

STEP 2 Remove radio top cover and plug in filter board assembly 19B801399G1 to top row of J60l pins 26 thru 34 taking care to align connector correctly with rubber pad positioned towards front of radio. Mount ground lead as shown using M3.5 x 10 thread forming screw supplied or under screw retaining channel guard board. (See Figure 6) replace top cover.

STEP 3 Remove and discard radio bottom cover. Remove and discard plastic block atJ601 front connector and replace with modified plastic block 19B80I402G1. Install modified radio bottom cover 19B800686G4 with notch in gasket towards front of radio (cover is marked on outside "This End to Front").

STEP 4 Remove power/control cable from vehicle if installed and install new shielded power/control cable. Connect shield to hole tapped in radio frame using #12-24 slotted head screw N37Pl90l2B, external tooth lock washer N403P21C6 and spacer 19A704893P2. See Figure 6.

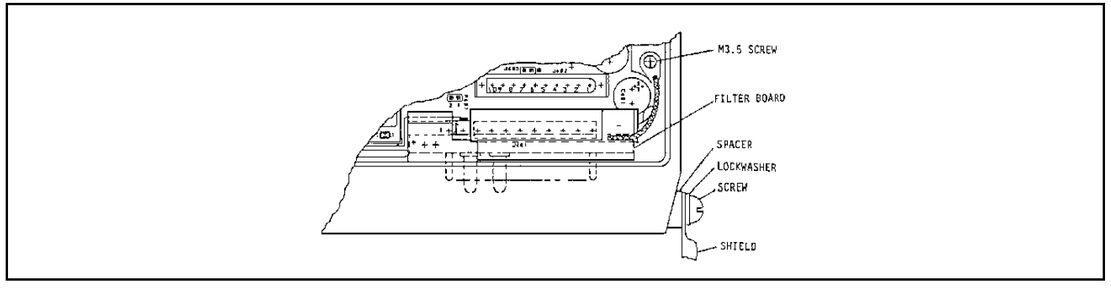
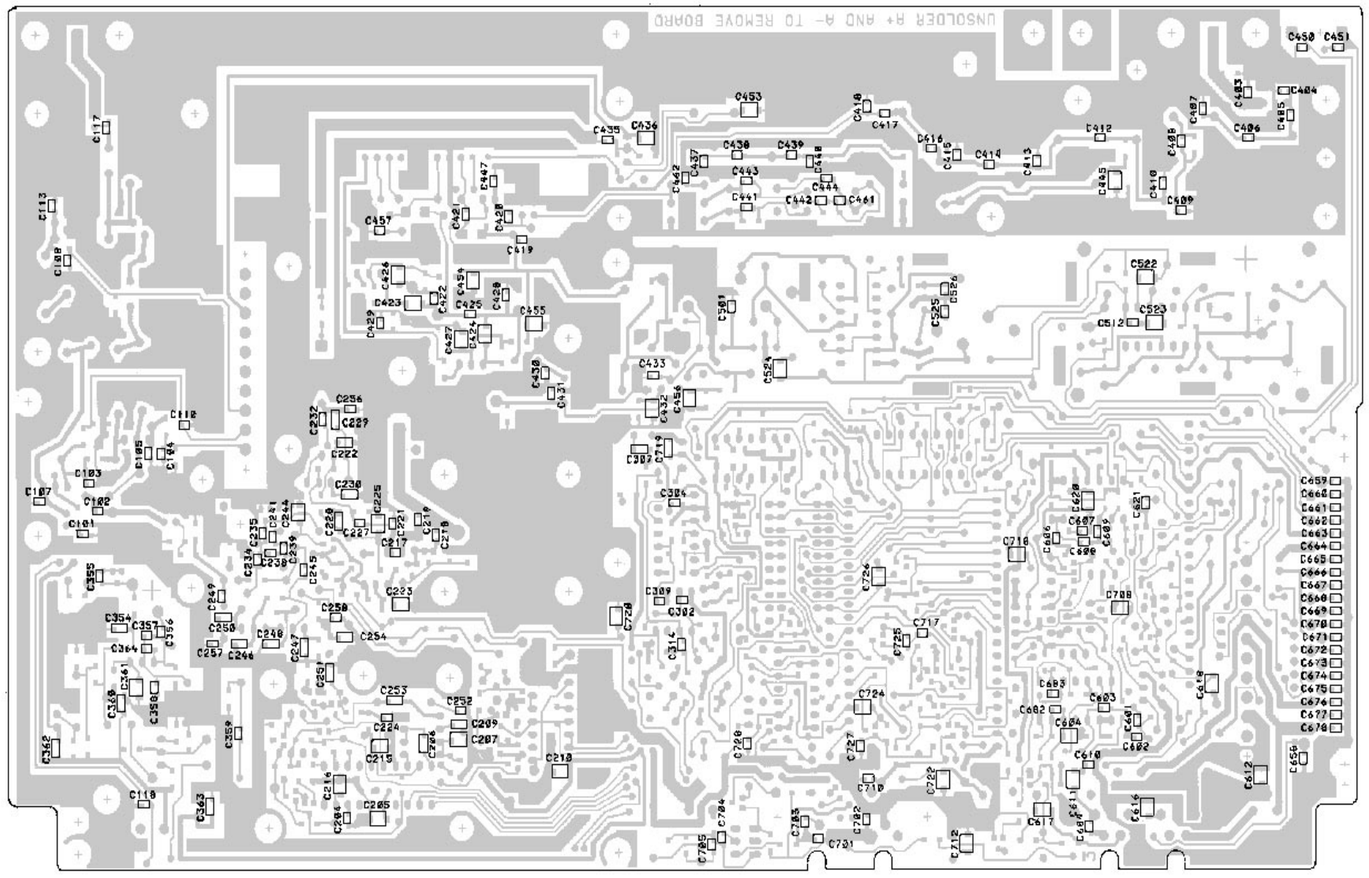
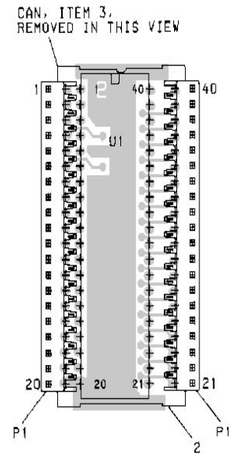


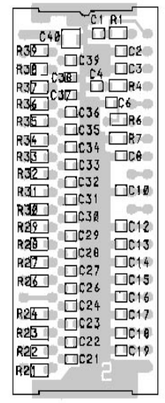

Figure 6 - Shielded Power/Control Cable Installation

## CHIP COMPONENT LOCATION




(19C851149, Rev. 6)
(19A703549, Sh. 1, Rev. 2)

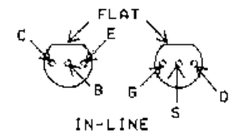


BACK VIEW OF COMPONENT BOARD

(19C851149, Rev. 6)
(19A703549, Sh. 2, Rev. 2)

CAUTION
OBSERVE PRECAUTIONS FOR HANDLING
ELECTROSTATIC SENSITIVE DEVICES

LEAD IDENTIFICATION
FOR ALL TRANSISTORS
NOT OTHERWISE IDENTIFIED




IN-LINE
TOP VIEW

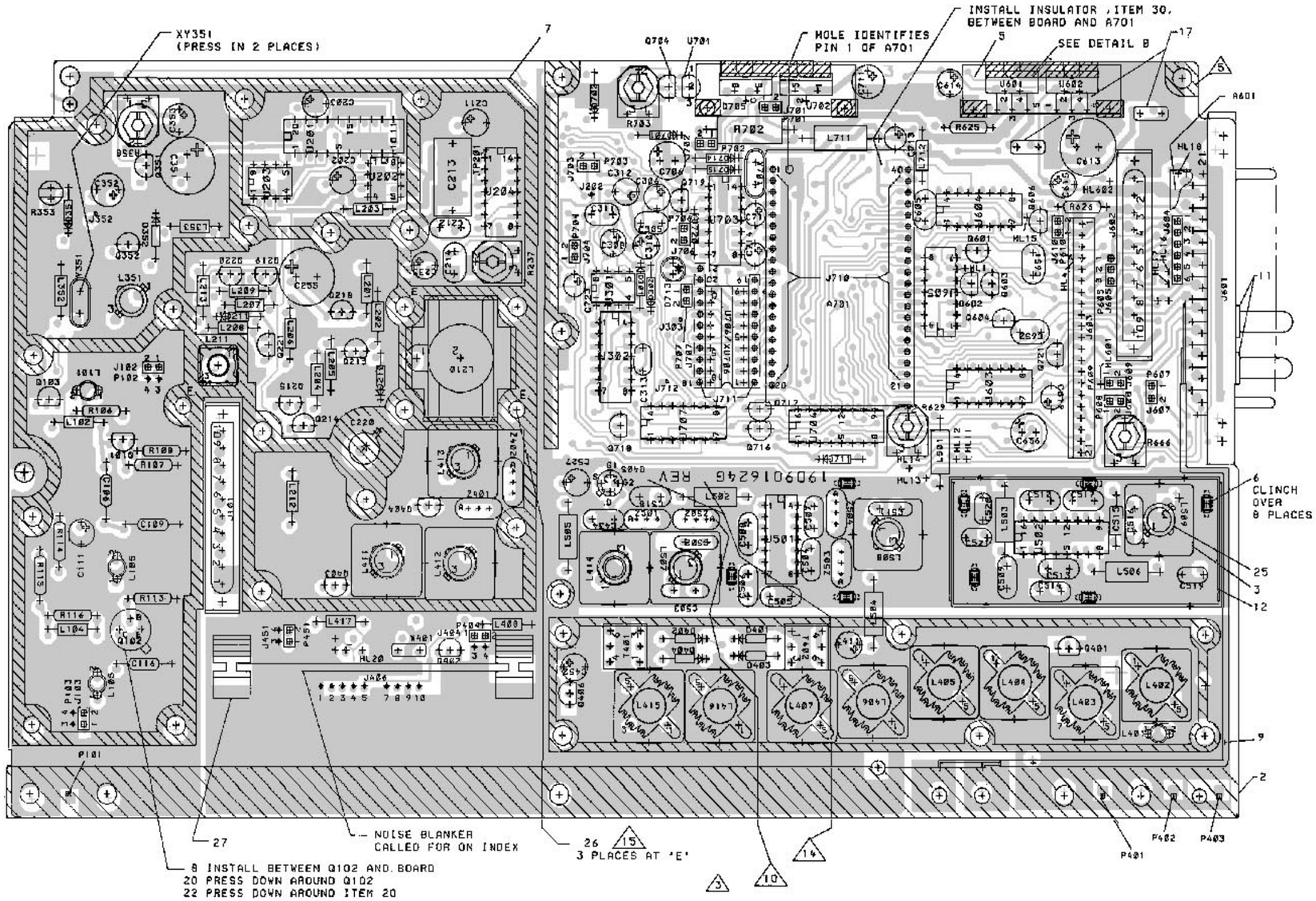
NOTE: CASE SHAPE IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

**29.7-50 MHz TRANSMIT/RECEIVER SYSTEM BOARD**

(19D901624, Sh. 2, Rev. 3)

(19A704621, Sh. 3, & 4, Rev. 3)

## COMPONENT SIDE



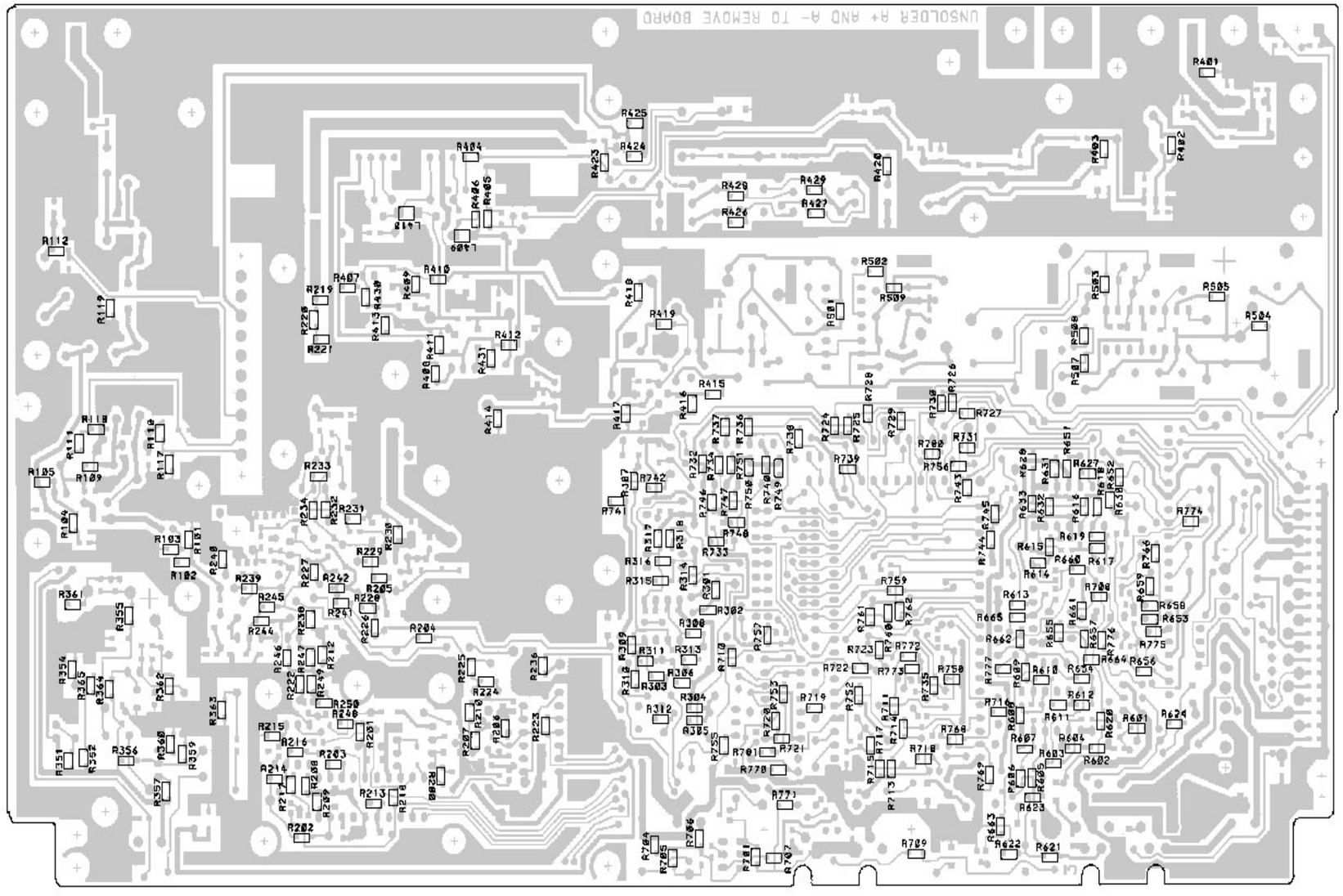

**29.7-50 MHz TRANSMIT/RECEIVER SYSTEM BOARD**

(19D901624, Sh. 1, Rev. 9)

(19A704621, Sh. 1 & 2, Rev. 3)

CAUTION
OBSERVE PRECAUTIONS FOR HANDLING
ELECTROSTATIC SENSITIVE DEVICES

## CHIP RESISTOR LOCATION



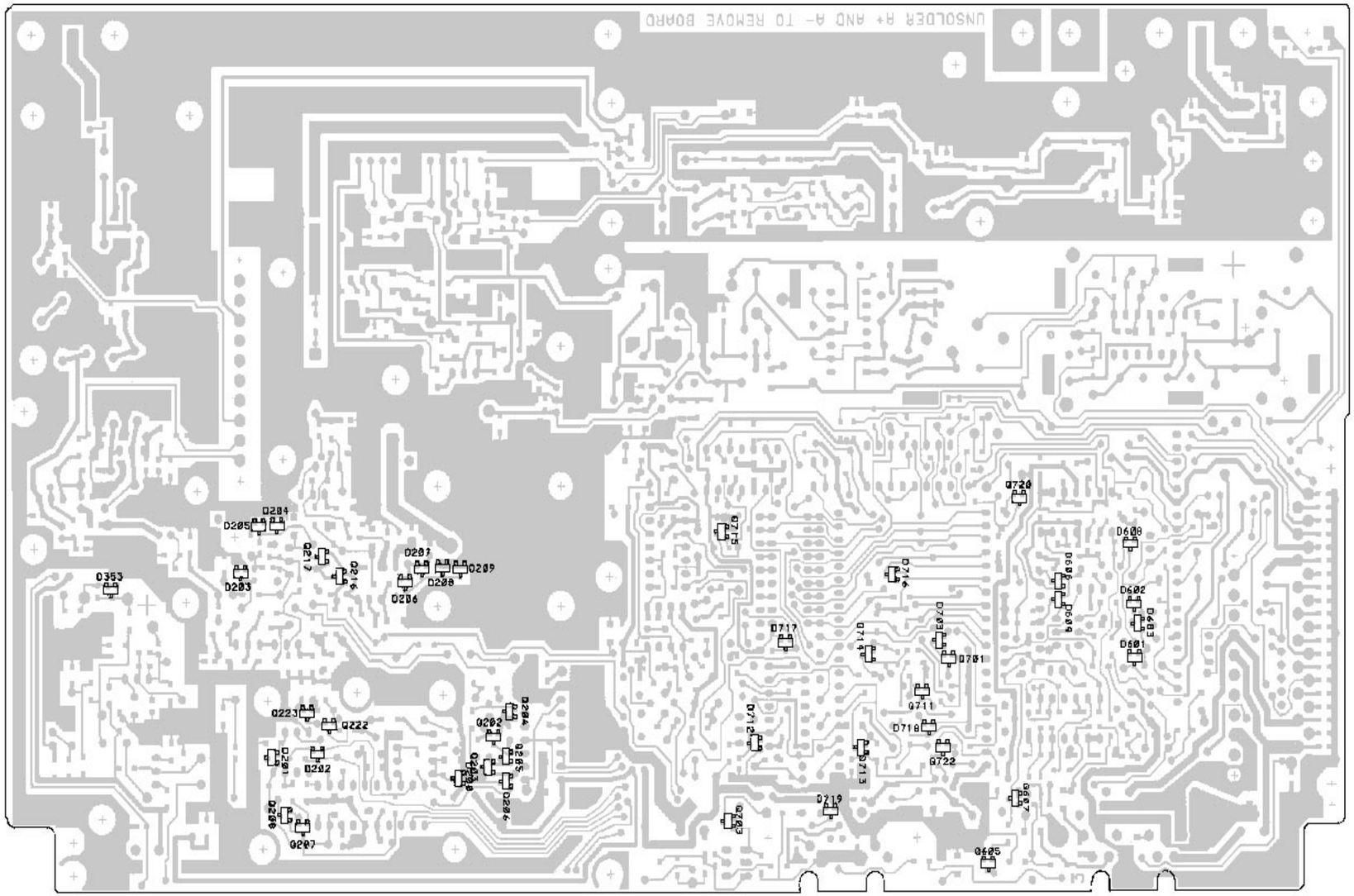

CAUTION
OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES

**29.7-50 MHz TRANSMIT/RECEIVER SYSTEM BOARD**

(19D901624, Sh. 4, Rev. 3)

(19A704621, Sh. 3, & 4, Rev. 3)

## CHIP DIODE AND TRANSISTOR LOCATION




**29.7-50 MHz TRANSMIT/RECEIVER SYSTEM BOARD**

(19D901624, Sh. 3, Rev. 2)

(19A704621, Sh. 3, & 4, Rev. 3)

CAUTION
OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES

**29.7-50 MHz TRANSMIT/RECEIVE/SYSTEM BOARD**

| | |
|---|---|
| 19D901630G1 | 29.7-36 MHz |
| 19D901630G2 | 36-42 MHz |
| 19D901630G3 | 42-50 MHz |
| 19D901630G4 | 29.7-36 MHz (Gold Contacts) |
| 19D901630G5 | 36-42 MHz (Gold Contacts) |
| 19D901630G6 | 42-50 (Gold Contacts) |

| SYMBOL | PART NUMBER | DESCRIPTION |
|---|---|---|
| | | ———— ASSEMBLIES ——— |
| A1 | | **System Board**<br>**19D901624G1 29.7 MHz-36 MHz**<br>**19D901624G2 36 MHz-42 MHz**<br>**19D901624G3 42 MHz-50 MHz**<br>**19D901624G4 29.7 MHz-36 MHz (Gold Contacts)**<br>**19D901624G5 36 MHz-42 MHz (Gold Contacts)**<br>**19D901624G6 42 MHz-50 MHz (Gold Contacts)** |
| | | ———— CAPACITORS ——— |
| C101 | 19A702052P14 | Ceramic: 0.01 µF ±10%, 50 VDCW. |
| C102 | 19A702052P5 | Ceramic: 1000 pF ±10%, 50 VDCW. |
| C103 thru C105 | 19A702052P14 | Ceramic: 0.01 µF ±10%, 50 VDCW. |
| C106 | 19B800590P27 | Ceramic: 39 pF ±5%, 50 VDCW; OPPM temp coef. (Used in G1 and G4). |
| C106 | 19B800590P25 | Ceramic: 33 pF ±5%, 50 VDCW; OPPM temp coef. (Used in G2 and G5). |
| C106 | 19B800590P23 | Ceramic: 27 pF ±5%, 50 VDCW; OPPM temp coef. (Used in G3 and G6). |
| C107 and C108 | 19A702052P14 | Ceramic: 0.01 µF ±10%, 50 VDCW. |
| C109 | 19B800590P639 | Ceramic: 128 pF ±5%, 50 VDCW, temp coef -220 +700 PPM. (Used in G1 and G4). |
| C109 | 19B800590P637 | Ceramic: 100 pF ±5%, 50 VDCW, temp coef -220+700 PPM. (Used in G2 and G5). |
| C109 | 19B800590P633 | Ceramic: 68 pF ±5%, 50 VDCW; +350 -1000 PPM temp coef. (Used in G3 and G6). |
| C110 | 19A702052P14 | Ceramic: 0.01 µF ±10%, 50 VDCW. |
| C111 | 19A701534P7 | Tantalum: 10 µF ±20%, 16 VDCW. |
| C113 | 19A702052P14 | Ceramic: 0.01 µF ±10%, 50 VDCW. |
| C116 | 19B800590P629 | Ceramic: 47 pF ±5%, 50 VDCW, temp coef -150 PPM. (Used in G1 and G4). |
| C116 | 19B800590P27 | Ceramic: 39 pF ±5%, 50 VDCW; OPPM temp coef. (Used in G2, G3, G5 and G6). |
| C117 and C118 | 19A702052P5 | Ceramic: 1000 pF ±10%, 50 VDCW. |
| | | ———— JACKS ———— |
| J101 | 19B800555G3 | Connector: metering, block. Includes: (10) 19A700237P1 contacts. |
| J102 | 19A703248P1 | Post: Tin Plated, 10 mm length. (Used in G1, G2 and G3). |
| J102 | 19A703248P11 | Post: Gold Plated, 10 mm length. (Used in G4, G5 and G6). |
| J103 | 19A703248P1 | Post: Tin Plated, 10 mm length. (Used in G1, G2 and G3). |
| J103 | 19A703248P11 | Post: Gold Plated, 10 mm length. (Used in G4, G5 and G6). |

| SYMBOL | PART NUMBER | DESCRIPTION |
|---|---|---|
| | | ———— INDUCTORS ———— |
| L101 | 19B800937P10 | Coil, RF: 0.115 nH; sim to Paul Smith SK-887-1. |
| L102 | 19A700024P11 | Coil, RF: 680 nH ±10%. (Used in G1 and G4). |
| L102 | 19A700024P10 | Coil, RF: 560 nH ±10%. (Used in G2, G3, G5 and G6). |
| L103 | 19B801084P12 | Coil, RF: sim to Paul Smith SK917-1. (Used in G1 and G4). |
| L103 | 19B800937P10 | Coil, RF: 0.115 nH; sim to Paul Smith SK-887-1 (Used in G2, G3, G5 and G6). |
| L104 | 19A700024P17 | Coil, RF: 2.2 µH ±10%. |
| L105 | 19B800937P8 | Coil, RF: 0.090 nH; sim to Paul Smith SK-887-1. |
| | | ———— PLUGS ———— |
| P101 | 19A701785P3 | Contact, electrical. |
| P102 | 19A702104P1 | Connector: Shorting Jumper, Tin Plated. (Used in G1, G2 and G3). |
| P102 | 19A702104P2 | Connector: Shorting Jumper, Gold Plated. (Housing Color: White). (Used in G4, G5 and G6). |
| P103 | 19A702104P1 | Connector: Shorting Jumper, Tin Plated. (Used in G1, G2 and G3). |
| P103 | 19A702104P2 | Connector: Shorting Jumper, Gold Plated. (Housing Color: White). (Used in G4, G5 and G6). |
| | | ——— TRANSISTORS ———— |
| Q101 | 19A702084P2 | Silicon, NPN: sim to MPS 2369. |
| Q102 | 19J706357P1 | Silicon, NPN; sim to Type 2N4427. |
| Q103 | 19A700022P2 | Silicon, PNP: sim to 2N3906. |
| | | ———— RESISTORS ———— |
| R101 | 19B800607P121 | Metal film: 120 ohms ±5%, 1/8 w. |
| R102 | 19B800607P510 | Metal film: 51 ohms ±5%, 1/8 w. |
| R103 | 19B800607P121 | Metal film: 120 ohms ±5%, 1/8 w. |
| R104 and R105 | 19B800607P103 | Metal film: 10K ohms ±5%, 1/8 w. |
| R106 | H212CRP212C | Deposited carbon: 1.2K ohms ±5%, 1/4 w. |
| R107 | H212CRP210C | Deposited carbon: 1K ohms ±5%, 1/4 w. |
| R108 | H212CRP110C | Deposited carbon: 100 ohms ±5%, 1/4 w. |
| R109 | 19B800607P222 | Metal film: 2.2K ohms ±5%, 1/8 w. |
| R110 thru R112 | 19B800607P103 | Metal film: 10K ohms ±5%, 1/8 w. |
| R113 | H212CRP018C | Deposited carbon: 18 ohms ±5%, 1/4 w. (Used in G1, G2, G4 and G5). |
| R113 | H212CRP022C | Deposited carbon: 22 ohms ±5%, 1/4 w. (Used in G3 and G6). |
| R114 and R115 | H212CRP018C | Deposited carbon: 18 ohms ±5%, 1/4 w. |
| R116 | H212CRP127C | Deposited carbon: 270 ohms ±5%, 1/4 w. (Used in G1 and G4). |
| R116 | H212CRP133C | Deposited carbon: 330 ohms ±5%, 1/4 w. (Used in G2 and G5). |
| R116 | H212CRP139C | Deposited carbon: 390 ohms ±5%, 1/4 w. (Used in G3 and G6). |
| R117 thru R119 | 19B800607P102 | Metal film: 1K ohms ±5%, 1/8 w. |
| | | ———— CAPACITORS ——— |
| C202 and C203 | 19A701534P7 | Tantalum: 10 µF ±20%, 16 VDCW. |
| C204 | 19A702061P69 | Ceramic: 220 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. |
| C205 | 19A702061P93 | Ceramic: 2200 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. |
| C206 | 19A702061P99 | Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. |
| C207 | 19A702052P20 | Ceramic: 0.033 µF ±10%, 50 VDCW. |
| C209 | 19A702061P99 | Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. |
| C210 | 19A702052P20 | Ceramic: 0.033 µF ±10%, 50 VDCW. |
| C211 | 19A701534P7 | Tantalum: 10 µF ±20%, 16 VDCW. |
| C212 | T644ACP333K | Polyester: .033 µF ±10%, 50 VDCW. |
| C213 | 19A703232P2 | Metallized: 1 µF ±10%, 100 VDCW. |
| C214 | 19A702250P113 | Polyester: 0.1 µF ±10%, 50 VDCW. |
| C215 and C216 | 19A702052P20 | Ceramic: 0.033 µF ±10%, 50 VDCW. |
| C217 | 19A702061P65 | Ceramic: 150 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. (Used in G1 and G4). |
| C217 | 19A702061P61 | Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Used in G2 and G5). |
| C217 | 19A702061P57 | Ceramic: 82 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Used in G3 and G6). |
| C218 | 19A702236P38 | Ceramic: 33 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. |
| C219 | 19A702061P21 | Ceramic: 15 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. |
| C220 | 19A134227P5 | Variable: 1.5 to 14 pF, 100 VDCW. |
| C221 | 19A702236P44 | Ceramic: 56 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. |
| C222 | 19A702061P99 | Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. |
| C223 | 19A702052P20 | Ceramic: 0.033 µF ±10%, 50 VDCW. |
| C224 | 19A702052P14 | Ceramic: 0.01 µF ±10%, 50 VDCW. |
| C225 | 19A702061P93 | Ceramic: 2200 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. |
| C227 | 19A702061P7 | Ceramic: 3.3 pF ±0.5 pF, 50 VDCW, temp coef 0 ±120 PPM. |
| C228 thru C230 | 19A702061P99 | Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. |
| C232 | 19A702061P1 | Ceramic: 1 pF ±0.5 pF, 50 VDCW. |
| C233 | 19A701534P7 | Tantalum: 10 µF ±20%, 16 VDCW. |
| C234 | 19A702061P5 | Ceramic: 2.2 pF ±0.5 pF, 50 VDCW, temp coef 0 ±120 PPM. |
| C235 | 19A702061P45 | Ceramic: 47 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Used in G1, G2, G4 and G5). |
| C235 | 19A702236P38 | Ceramic: 33 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. (Used in G3 and G6). |
| C238 | 19A702061P21 | Ceramic: 15 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. |
| C239 | 19A702061P65 | Ceramic: 150 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. (Used in G1 and G4). |
| C239 | 19A702061P61 | Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Used in G2, G3, G5 and G6). |
| C241 | 19A702061P45 | Ceramic: 47 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Used in G1, G2, G4 and G5). |
| C241 | 19A702236P44 | Ceramic: 56 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. (Used in G3 and G6). |
| C244 | 19A702061P93 | Ceramic: 2200 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. |
| C245 | 19A702061P7 | Ceramic: 3.3 pF ±0.5 pF, 50 VDCW, temp coef 0 ±120 PPM. |
| C246 thru C248 | 19A702061P99 | Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. |
| C249 | 19A702061P1 | Ceramic: 1 pF ±0.5 pF, 50 VDCW. |
| C250 and C251 | 19A702061P99 | Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. |
| C252 | 19A702052P5 | Ceramic: 1000 pF ±10%, 50 VDCW. |
| C253 and C254 | 19A702061P99 | Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. |
| C255 | 19A701225P8 | Electrolytic: 470 µF -10+75%, 16 VDCW, sim to Sprague 5002D477-G016DGIC. |
| C256 | 19A702061P29 | Ceramic: 22 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Used in G1 and G4). |
| C256 | 19A702061P25 | Ceramic: 18 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. (Used in G2 and G5). |
| C256 | 19A702061P21 | Ceramic: 15 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Used in G3 and G6). |
| C257 | 19A702061P33 | Ceramic: 27 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. (Used in G1 and G4). |
| C257 | 19A702061P29 | Ceramic: 22 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Used in G2 and G5). |
| C257 | 19A702061P25 | Ceramic: 18 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. (Used in G3 and G6). |
| C258 | 19A702052P14 | Ceramic: 0.01 µF ±10%, 50 VDCW. |
| | | ———— DIODES ———— |
| D200 | 19A700083P22 | Diode, silicon, zener: 5.1 Volt, sim to C5V1LT1. |
| D201 | 19A700053P2 | Silicon: 2 Diodes in Series; sim to BAV99. |
| D202 | 19A703561P2 | Silicon, fast recovery (2 diodes in series). |
| D203 thru D209 | 19A700085P4 | Silicon, capacitive. |
| D210 | 19A700047P2 | Silicon, 100 mW, continuous dissipation; sim to DO-15. |
| D211 | 19A700028P1 | Silicon: 75 mA, 75 PIV; sim to 1N4148. |

★ COMPONENTS, ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

| SYMBOL | PART NUMBER | DESCRIPTION |
|---|---|---|
| | | ——————— JACKS ——————— |
| J202 | 19A703248P1 | Post: Tin Plated, 10 mm length. (Used in G1, G2 and G3). |
| J202 | 19A703248P11 | Post: Gold Plated, 10 mm length. (Used in G4, G5 and G6). |
| | | ——————— INDUCTORS ——————— |
| L201 thru L209 | 19A700024P25 | Coil, RF: 10.0 µH ±10%, 3.70 ohms DC res max. |
| L210 | 19B801055P6 | Coil, RF: sim to Standex SK916-1. (Used in G1 and G4). |
| L210 | 19B801055P5 | Coil, RF: sim to Standex SK916-1. (Used in G2 and G5). |
| L210 | 19B801055P4 | Coil, RF: sim to Standex SK916-1. (Used in G3 and G6). |
| L211 | 19B801036P15 | Coil, RF: sim to Paul Smith SK918-1. (Used in G1 and G4). |
| L211 | 19B801036P11 | Coil, RF: sim to Paul Smith SK918-1. (Used in G2 and G5). |
| L211 | 19B801036P9 | Coil, RF: sim to Paul Smith SK918-1. (Used in G3 and G6). |
| L212 | 19A700024P10 | Coil, RF: 560 nH ±10%. (Used in G1 and G4). |
| L212 | 19A700024P9 | Coil, RF: 470 nH ±10%. (Used in G2 and G5). |
| L212 | 19A700024P8 | Coil, RF: 390 nH ±10%. (Used in G3 and G6). |
| L213 | 19A700024P12 | Coil, RF: 820 nH ±10%. (Used in G1 and G4). |
| L213 | 19A700024P11 | Coil, RF: 680 nH ±10%. (Used in G2 and G5). |
| L213 | 19A700024P10 | Coil, RF: 560 nH ±10%. (Used in G3 and G6). |
| | | ——————— TRANSISTORS ——————— |
| Q202 thru Q206 | 19A700059P2 | Silicon, PNP: sim to MMBT3906, low profile. |
| Q207 and Q208 | 19A700076P2 | Silicon, NPN: sim to MMBT3904, low profile. |
| Q213 | 19A700060P3 | N-Type, field effect; sim to J310. |
| Q214 and Q215 | 19A700023P2 | Silicon, NPN: sim to 2N3904. |
| Q216 and Q217 | 19A700059P2 | Silicon, PNP: sim to MMBT3906, low profile. |
| Q218 | 19A700022P2 | Silicon, PNP: sim to 2N3906. |
| Q219 and Q220 | 19A700023P2 | Silicon, NPN: sim to 2N3904. |
| Q221 | 19A700060P3 | N-Type, field effect; sim to J310. |
| Q222 and Q223 | 19A700076P2 | Silicon, NPN: sim to MMBT3904, low profile. |
| | | ——————— RESISTORS ——————— |
| R200 | 19B800607P331 | Metal film: 330 ohms ±5%, 1/8 w. |
| R201 and R202 | 19B800607P100 | Metal film: 10 ohms ±5%, 1/8 w. |
| R203 | 19B800607P103 | Metal film: 10K ohms ±5%, 1/8 w. |
| R204 | 19B800607P510 | Metal film: 51 ohms ±5%, 1/8 w. |
| R205 | 19B800607P100 | Metal film: 10 ohms ±5%, 1/8 w. |
| R206 | 19B800607P472 | Metal film: 4.7K ohms ±5%, 1/8 w. |
| R207 | 19B800607P510 | Metal film: 51 ohms ±5%, 1/8 w. |
| R208 | 19B800607P224 | Metal film: 220K ohms ±5%, 1/8 w. |
| R209 | 19B800607P473 | Metal film: 47K ohms ±5%, 1/8 w. |
| R210 | 19B800607P681 | Metal film: 680 ohms ±5%, 1/8 w. |
| R212 | 19B800607P100 | Metal film: 10 ohms ±5%, 1/8 w. |
| R213 | 19B800607P273 | Metal film: 27K ohms ±5%, 1/8 w. |
| R214 | 19B800607P223 | Metal film: 22K ohms ±5%, 1/8 w. |
| R215 | 19B800607P152 | Metal film: 1.5K ohms ±5%, 1/8 w. |
| R216 | 19B800607P104 | Metal film: 100K ohms ±5%, 1/8 w. |
| R217 and R218 | 19B800607P273 | Metal film: 27K ohms ±5%, 1/8 w. |
| R219 | 19A702931P141 | Metal film: 261 ohms ±1%, 200 VDCW, 1/8 w. |
| R220 | 19B800607P180 | Metal film: 18 ohms ±5%, 1/8 w. |
| R221 | 19A702931P141 | Metal film: 261 ohms ±1%, 200 VDCW, 1/8 w. |
| R222 | 19B800607P151 | Metal film: 150 ohms ±5%, 1/8 w. |
| R223 | 19B800607P154 | Metal film: 150K ohms ±5%, 1/8 w. |
| R224 | 19B800607P103 | Metal film: 10K ohms ±5%, 1/8 w. |
| R225 | 19B800607P682 | Metal film: 6.8K ohms ±5%, 1/8 w. |
| R226 thru R228 | 19B800607P103 | Metal film: 10K ohms ±5%, 1/8 w. |
| R229 | 19B800607P121 | Metal film: 120 ohms ±5%, 1/8 w. |
| R230 | 19B800607P683 | Metal film: 68K ohms ±5%, 1/8 w. |
| R231 | 19B800607P821 | Metal film: 820 ohms ±5%, 1/8 w. |
| R232 | 19B800607P101 | Metal film: 100 ohms ±5%, 1/8 w. |
| R233 | 19B800607P152 | Metal film: 1.5K ohms ±5%, 1/8 w. |
| R234 | 19B800607P182 | Metal film: 1.8K ohms ±5%, 1/8 w. |
| R236 | 19A702931P350 | Metal film: 32.4K ohms ±1%, 200 VDCW, 1/8 w. |
| R237 | 19B800784P108 | Variable: 10K ohms ±20%, 1/2 w. |
| R238 and R239 | 19B800607P683 | Metal film: 68K ohms ±5%, 1/8 w. |
| R240 | 19B800607P121 | Metal film: 120 ohms ±5%, 1/8 w. |
| R241 and R242 | 19B800607P103 | Metal film: 10K ohms ±5%, 1/8 w. |
| R244 | 19B800607P182 | Metal film: 1.8K ohms ±5%, 1/8 w. |
| R245 | 19B800607P152 | Metal film: 1.5K ohms ±5%, 1/8 w. |
| R246 | 19B800607P821 | Metal film: 820 ohms ±5%, 1/8 w. |
| R247 | 19B800607P101 | Metal film: 100 ohms ±5%, 1/8 w. |
| R248 | 19B800607P182 | Metal film: 1.8K ohms ±5%, 1/8 w. |
| R249 | 19B800607P821 | Metal film: 820 ohms ±5%, 1/8 w. |
| R250 | 19B800607P152 | Metal film: 1.5K ohms ±5%, 1/8 w. |
| | | —— INTEGRATED CIRCUITS —— |
| U201 | 19B800902P4 | Digital: Synthesizer, CMOS Serial Input. |
| U202 | 19A703091P1 | Digital: /64, /65 Prescaler; sim to MC12017P. |
| U203 | 19J706579P2 | Comparator. Sim to LM311. |
| U204 | 19A700029P44 | Digital: BILATERAL SWITCH. |
| | | ——————— CAPACITORS ——————— |
| C302 | 19A702061P65 | Ceramic: 150 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. |
| C304 | 19A702061P65 | Ceramic: 150 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. |
| C305 | 19A702250P212 | Polyester: 0.68 µF ±5%, 50 VDCW. |
| C306 | 19A701534P7 | Tantalum: 10 µF ±20%, 16 VDCW. |
| C307 | 19A702052P28 | Ceramic: 0.022 µF ±10%, 50 VDCW. |
| C308 | 19A701534P7 | Tantalum: 10 µF ±20%, 16 VDCW. |
| C309 | 19A702052P5 | Ceramic: 1000 pF ±10%, 50 VDCW. |
| C310 | 19A701534P7 | Tantalum: 10 µF ±20%, 16 VDCW. |
| C311 | 19A702250P211 | Polyester: 0.47 µF ±5%, 50 VDCW. |
| C312 | 19A701534P7 | Tantalum: 10 µF ±20%, 16 VDCW. |
| C313 | T644ACP268J | Polyester: .0068 µF ±5%, 50 VDCW. |
| C314 | 19A702061P25 | Ceramic: 18 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. |
| C351 | 19A701225P3 | Electrolytic: 220 µF, -10+50%, 25 VDCW. |
| C352 | 19A701534P9 | Tantalum: 47 µF ±20%, 6.3 VDCW. |
| C353 | 19A701534P8 | Tantalum: 22 µF ±20%, 16 VDCW. |
| C354 | 19A702061P99 | Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. |
| C355 | 19A702236P38 | Ceramic: 33 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. |
| C356 | 19A702236P40 | Ceramic: 39 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. |
| C357 | 19A702061P73 | Ceramic: 330 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. |
| C358 | 19A702061P57 | Ceramic: 82 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. |
| C359 | 19A702061P61 | Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. |
| C360 | 19A702061P99 | Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. |
| C361 | 19A702052P20 | Ceramic: 0.033 µF ±10%, 50 VDCW. |
| C362 and C363 | 19A702061P99 | Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. |
| C364 | 19A702061P29 | Ceramic: 22 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. |
| | | ——————— DIODES ——————— |
| D301 and D302 | 19A702015P1 | Silicon; sim to IN458A. |
| D351 and D352 | 19A700028P1 | Silicon: 75 mA, 75 PIV; sim to 1N4148. |
| D353 | 19A700085P3 | Silicon, capacitive. |
| J303 | 19A703248P1 | ———————JACKS ——————— Post: Tin Plated, 10 mm length. (Used in G1, G2 and G3). |
| J303 | 19A703248P11 | Post: Gold Plated, 10 mm length. (Used in G4, G5 and G6). |
| J352 | 19A703248P1 | Post: Tin Plated, 10 mm length. (Used in G1, G2 and G3). |
| J352 | 19A703248P11 | Post: Gold Plated, 10 mm length. (Used in G4, G5 and G6). |
| | | ——————— INDUCTORS ——————— |
| L351 | 19C850701P101 | Coil, RF: variable, wire size No. 34 AWG. |
| L352 | 19A700024P22 | Coil, RF: 5.6 µH ±10%. |
| L353 | 19A700024P29 | Coil, RF: 22 µH ±10%. |
| | | ——————— TRANSISTORS ——————— |
| Q351 | 19A700023P2 | Silicon, NPN: sim to 2N3904. |
| Q352 | 19A700060P3 | N-Type, field effect; sim to J310. |
| | | ———————RESISTORS ——————— |
| R301 | 19B800607P473 | Metal film: 47K ohms ±5%, 1/8 w. |
| R302 | 19B800607P103 | Metal film: 10K ohms ±5%, 1/8 w. |
| R303 | 19A702931P303 | Metal film: 10.5K ohms ±1%, 200 VDCW, 1/8 w. |
| R304 | 19B800607P472 | Metal film: 4.7K ohms ±5%, 1/8 w. |
| R305 | 19A702931P212 | Metal film: 1300 ohms ±1%, 200 VDCW, 1/8 w. |
| R306 | 19B800607P272 | Metal film: 2.7K ohms ±5%, 1/8 w. |
| R307 | 19B800607P273 | Metal film: 27K ohms ±5%, 1/8 w. |
| R308 | 19A702931P278 | Metal film: 6340 ohms ±1%, 200 VDCW, 1/8 w. |
| R309 | 19B800607P223 | Metal film: 22K ohms ±5%, 1/8 w. |
| R310 | 19B800607P331 | Metal film: 330 ohms ±5%, 1/8 w. |
| R311 | 19A702931P369 | Metal film: 51.1K ohms ±1%, 200 VDCW, 1/8 w. |
| R312 | 19A702931P303 | Metal film: 10.5K ohms ±1%, 200 VDCW, 1/8 w. |
| R313 | 19A702931P278 | Metal film: 6340 ohms ±1%, 200 VDCW, 1/8 w. |
| R314 | 19A702931P330 | Metal film: 20K ohms ±1%, 200 VDCW, 1/8 w. |
| R315 | 19A702931P310 | Metal film: 12.4K ohms ±1%, 200 VDCW, 1/8 w. |
| R316 | 19A702931P350 | Metal film: 32.4K ohms ±1%, 200 VDCW, 1/8 w. |
| R317 | 19B800607P222 | Metal film: 2.2K ohms ±5%, 1/8 w. |
| R318 | 19B800607P105 | Metal film: 1M ohms ±5%, 1/8 w. |
| R351 | 19B800607P393 | Metal film: 39K ohms ±5%, 1/8 w. |
| R352 | 19B800607P273 | Metal film: 27K ohms ±5%, 1/8 w. |
| R353 | 19A701828P5 | Thermistor: 3.3K ohms ±5%; sim to Midwest ID2299. |
| R354 | 19B800607P183 | Metal film: 18K ohms ±5%, 1/8 w. |
| R355 | 19B800607P103 | Metal film: 10K ohms ±5%, 1/8 w. |
| R356 | 19B800607P683 | Metal film: 68K ohms ±5%, 1/8 w. |
| R357 | 19B800607P471 | Metal film: 470 ohms ±5%, 1/8 w. |
| R358 | 19B800784P108 | Variable: 10K ohms ±20%, 1/2 w. |

| SYMBOL | PART NUMBER | DESCRIPTION |
|---|---|---|
| R359 | 19B800607P223 | Metal film: 22K ohms ±5%, 1/8 w. |
| R360 | 19B800607P820 | Metal film: 82 ohms ±5%, 1/8 w. |
| R361 | 19B800607P681 | Metal film: 680 ohms ±5%, 1/8 w. |
| R362 | 19B800607P683 | Metal film: 68K ohms ±5%, 1/8 w. |
| R363 | 19B800607P181 | Metal film: 180 ohms ±5%, 1/8 w. |
| R364 | 19B800607P100 | Metal film: 10 ohms ±5%, 1/8 w. |
| R365 | 19A702931P318 | Metal film: 15K ohms ±1%, 200 VDCW, 1/8 w. |
| | | —— INTEGRATED CIRCUITS — |
| U301 | 19A700086P4 | Linear: Dual Op Amp; sim to 4558. |
| U302 | 19A700029P44 | Digital: BILATERAL SWITCH. |
| | | ————— SOCKETS ———— |
| XY351 | 19A702742P1 | Crystal socket. |
| | | ———— CAPACITORS ——— |
| C403 | 19A702061P33 | Ceramic: 27 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. |
| C404 | 19A702061P71 | Ceramic: 270 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. (Used in G1 and G4). |
| C404 | 19A702061P69 | Ceramic: 220 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. (Used in G2, G3, G5 and G6). |
| C405 | 19A702236P46 | Ceramic: 68 pF ±5%, 50 VDCW, temp coef 0 PPM ±30 PPM. (Used in G1 and G4). |
| C405 | 19A702236P42 | Ceramic: 47 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Used in G2 and G5). |
| C405 | 19A702236P40 | Ceramic: 39 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Used in G3 and G6). |
| C406 | 19A702061P8 | Ceramic: 3.9 pF ±0.5 pF, 50 VDCW, temp coef 0 ±120 PPM. (Used in G1 and G4). |
| C406 | 19A702061P6 | Ceramic: 2.7 pF ±0.5 pF, 50 VDCW, temp coef 0 ±120 PPM. (Used in G2 and G5). |
| C406 | 19A702061P5 | Ceramic: 2.2 pF ±0.5 pF, 50 VDCW, temp coef 0 ±120 PPM. (Used in G3 and G6). |
| C407 | 19A702236P44 | Ceramic: 56 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. (Used in G1 and G4). |
| C407 | 19A702236P40 | Ceramic: 39 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Used in G2 and G5). |
| C407 | 19A702236P38 | Ceramic: 33 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. (Used in G3 and G6). |
| C408 | 19A702052P14 | Ceramic: 0.01 µF ±10%, 50 VDCW. |
| C409 | 19A702061P13 | Ceramic: 10 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. |
| C410 | 19A702236P44 | Ceramic: 56 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. (Used in G1 and G4). |
| C410 | 19A702236P40 | Ceramic: 39 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Used in G2 and G5). |
| C410 | 19A702236P38 | Ceramic: 33 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. (Used in G3 and G6). |
| C411 | 19A701534P7 | Tantalum: 10 µF ±20%, 16 VDCW. |

| SYMBOL | PART NUMBER | DESCRIPTION |
|---|---|---|
| C412 | 19A702061P7 | Ceramic: 3.3 pF ±0.5 pF, 50 VDCW, temp coef 0 ±120 PPM. (Used in G1 and G4). |
| C412 | 19A702061P5 | Ceramic: 2.2 pF ±0.5 pF, 50 VDCW, temp coef 0 ±120 PPM. (Used in G2 and G5). |
| C412 | 19A702061P4 | Ceramic: 1.8 pF ±0.5 pF, 50 VDCW, temp coef 0 ±250 PPM. (Used in G3 and G6). |
| C413 | 19A702236P44 | Ceramic: 56 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. (Used in G1 and G4). |
| C413 | 19A702236P40 | Ceramic: 39 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Used in G2 and G5). |
| C413 | 19A702236P38 | Ceramic: 33 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. (Used in G3 and G6). |
| C414 | 19A702061P6 | Ceramic: 2.7 pF ±0.5 pF, 50 VDCW, temp coef 0 ±120 PPM. (Used in G1 and G4). |
| C414 | 19A702061P4 | Ceramic: 1.8 pF ±0.5 pF, 50 VDCW, temp coef 0 ±250 PPM. (Used in G2 and G5). |
| C414 | 19A702061P3 | Ceramic: 1.5 pF ±0.5 pF, 50 VDCW, temp coef 0 ±250 PPM. (Used in G3 and G6). |
| C415 | 19A702236P44 | Ceramic: 56 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. (Used in G1 and G4). |
| C415 | 19A702236P40 | Ceramic: 39 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Used in G2 and G5). |
| C415 | 19A702236P38 | Ceramic: 33 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. (Used in G3 and G6). |
| C416 | 19A702061P9 | Ceramic: 4.7 pF ±0.5 pF, 50 VDCW, temp coef 0 ±60 PPM. (Used in G1 and G4). |
| C416 | 19A702061P7 | Ceramic: 3.3 pF ±0.5 pF, 50 VDCW, tempcoef 0 ±120 PPM. (Used in G2 and G5). |
| C416 | 19A702061P6 | Ceramic: 2.7 pF ±0.5 pF, 50 VDCW, temp coef 0 ±120 PPM. (Used in G3 and G6). |
| C417 | 19A702061P61 | Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Used in G1 and G4). |
| C417 | 19A702236P44 | Ceramic: 56 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. (Used in G2 and G5). |
| C417 | 19A702061P45 | Ceramic: 47 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Used in G3 and G6). |
| C418 | 19A702061P63 | Ceramic: 120 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Used in G1 and G4). |
| C418 | 19A702061P57 | Ceramic: 82 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Used in G2 and G5). |
| C418 | 19A702061P61 | Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Used in G3 and G6). |
| C419 and C420 | 19A702052P14 | Ceramic: 0.01 µF ±10%, 50 VDCW. |
| C421 | 19A702236P38 | Ceramic: 33 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. |
| C422 | 19A702061P45 | Ceramic: 47 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. |

| SYMBOL | PART NUMBER | DESCRIPTION |
|---|---|---|
| C423 and C424 | 19A702052P24 | Ceramic: 0.068 µF ±10%, 50 VDCW. |
| C425 | 19A702061P11 | Ceramic: 6.8 pF ±0.5 pF, 50 VDCW, temp coef 0 ±60 PPM. |
| C426 and C427 | 19A702052P24 | Ceramic: 0.068 µF ±10%, 50 VDCW. |
| C428 | 19A702061P33 | Ceramic: 27 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. |
| C429 | 19A702061P73 | Ceramic: 330 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. |
| C430 | 19A702061P10 | Ceramic: 5.6 pF ±0.5 pF, 50 VDCW, temp coef 0 ±60 PPM. |
| C431 | 19A702061P33 | Ceramic: 27 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. |
| C432 | 19A702052P24 | Ceramic: 0.068 µF ±10%, 50 VDCW. |
| C433 | 19A702236P38 | Ceramic: 33 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. |
| C434 | T644ACP333K | Polyester: .033 µF ±10%, 50 VDCW. |
| C435 | 19A702052P14 | Ceramic: 0.01 µF ±10%, 50 VDCW. |
| C436 | 19A702052P20 | Ceramic: 0.033 µF ±10%, 50 VDCW. |
| C437 | 19A702236P38 | Ceramic: 33 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. (Used in G1 and G4). |
| C437 | 19A702061P33 | Ceramic: 27 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. (Used in G2, G3, G5 and G6). |
| C438 | 19A702061P1 | Ceramic: 1 pF ±0.5 pF, 50 VDCW. (Used in G1 and G4). |
| C438 | 19A702061P4 | Ceramic: 1.8 pF ±0.5 pF, 50 VDCW, temp coef 0 ±250 PPM. (Used in G2 and G5). |
| C438 | 19A702061P2 | Ceramic: 1.2 pF ±0.5 pF, 50 VDCW, temp coef 0 ±250 PPM. (Used in G3 and G6). |
| C439 | 19A702236P38 | Ceramic: 33 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. (Used in G3 and G6). |
| C439 | 19A702236P40 | Ceramic: 39 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Used in G1, G2, G4 and G5). |
| C440 | 19A702061P69 | Ceramic: 220 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. (Used in G1 and G4). |
| C440 | 19A702061P61 | Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Used in G2, G3, G5 and G6). |
| C441 thru C444 | 19A702052P14 | Ceramic: 0.01 µF ±10%, 50 VDCW. |
| C445 | 19A702052P24 | Ceramic: 0.068 µF ±10%, 50 VDCW. |
| C447 | 19A702061P13 | Ceramic: 10 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. |
| C450 and C451 | 19A702052P14 | Ceramic: 0.01 µF ±10%, 50 VDCW. |
| C452 | 19A701534P7 | Tantalum: 10 µF ±20%, 16 VDCW. |
| C453 thru C456 | 19A702052P24 | Ceramic: 0.068 µF ±10%, 50 VDCW. |
| C457 | 19A702061P65 | Ceramic: 150 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. |

| SYMBOL | PART NUMBER | DESCRIPTION |
|---|---|---|
| C461 | 19A702061P3 | Ceramic: 1.5 pF ±0.5 pF, 50 VDCW, temp coef 0 ±250 PPM. (Used in G1 and G4). |
| C462 | 19A702061P33 | Ceramic: 27 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. (Used in G2 and G5). |
| | | ————— DIODES ————— |
| D401 thru D404 | 19A700047P4 | Silicon, Schottky: 100 Mw. |
| | | ————— JACKS ————— |
| J404 | 19A70324BP1 | Post: Tin Plated, 10 mm length. (Used in G1, G2 and G3). |
| J404 | 19A703248P11 | Post: Gold Plated, 10 mm length. (Used in G4, G5 and G6). |
| J406 | 19A703248P11 | Post: Gold Plated, 10 mm length. (Used in G4, G5 and G6). |
| J406 | 19A703248P1 | Post: Tin Plated, 10 mm length. (Used in G1, G2 and G3). |
| J451 | 19A703248P1 | Post: Tin Plated, 10 mm length. (Used in G1, G2 and G3). |
| J451 | 19A703248P11 | Post: Gold Plated, 10 mm length. (Used in G4, G5 and G6). |
| | | ———— INDUCTORS ———— |
| L401 | 19B801084P10 | Coil, RF: sim to Paul Smith SK917-1. |
| L402 | 19C851187P800 | Coil, RF: sim to Paul Smith SK923-1. (Used in G1, G2, G4 and G5). |
| L402 | 19C851187P700 | Coil, RF: sim to Paul Smith SK923-1. (Used in G3 and G6). |
| L403 | 19C851187P810 | Coil, RF: sim to Paul Smith SK923-1. (Used in G1, G2, G4 and G5). |
| L403 | 19C851187P711 | Coil, RF: sim to Paul Smith SK923-1. (Used in G3 and G6). |
| L404 | 19C851187P800 | Coil, RF: sim to Paul Smith SK923-1. (Used in G1, G2, G4 and G5). |
| L404 | 19C851187P700 | Coil, RF: sim to Paul Smith SK923-1. (Used in G3 and G6). |
| L405 | 19C851187P800 | Coil, RF: sim to Paul Smith SK923-1. (Used in G1, G2, G4 and G5). |
| L405 | 19C851187P700 | Coil, RF: sim to Paul Smith SK923-1. (Used in G3 and G6). |
| L406 | 19C851187P800 | Coil, RF: sim to Paul Smith SK923-1. (Used in G1, G2, G4 and G5). |
| L406 | 19C851187P700 | Coil, RF: sim to Paul Smith SK923-1. (Used in G3 and G6). |
| L407 | 19C851187P800 | Coil, RF: sim to Paul Smith SK923-1. (Used in G1, G2, G4 and G5). |
| L407 | 19C851187P700 | Coil, RF: sim to Paul Smith SK923-1. (Used in G3 and G6). |
| L408 | 19A700024P33 | Coil, RF: 47 µH ±10%. |
| L409 | 19A705470P35 | Coil, Fixed: 6.8 µH ±20%. |
| L410 | 19A705470P37 | Coil, Fixed. |
| L411 thru L414 | 19C850701P101 | Coil, RF: variable, wire size No. 34 AWG. |
| L415 | 19C851187P811 | Coil, RF: sim to Paul Smith SK923-1. (Used in G1 and G4). |
| L415 | 19C851187P710 | Coil, RF: sim to Paul Smith SK923-1. (Used in G2 and G5). |

| SYMBOL | PART NUMBER | DESCRIPTION |
|---|---|---|
| L415 | 19C851187P610 | Coil, RF: sim to Paul Smith SK923-1. (Used in G3 and G6). |
| L416 | 19C851187P600 | Coil, RF: sim to Paul Smith SK923-1. (Used in G1 and G4). |
| L416 | 19C851187P700 | Coil, RF: sim to Paul Smith SK923-1. (Used in G2 and G5). |
| L416 | 19C851187P600 | Coil, RF: sim to Paul Smith SK923-1. (Used in G3 and G6). |
| L417 | 19A700024P15 | Coil, RF: 1.5 µH ±10%. |
| | | ——— PLUGS ——— |
| P401 thru P403 | 19A701785P3 | Contact, electrical. |
| P404 | 19A702104P2 | Connector: Shorting Jumper, Gold Plated. (Housing Color: White). (Used in G4, G5 and G6). |
| P404 | 19A702104P1 | Connector: Shorting Jumper, Tin Plated. (Used in G1, G2 and G3). |
| P451 | 19A702104P1 | Connector: Shorting Jumper, Tin Plated. (Used in G1, G2 and G3). |
| P451 | 19A702104P2 | Connector: Shorting Jumper, Gold Plated. (Housing Color: White). (Used in G4, G5 and G6). |
| | | ——— TRANSISTORS ——— |
| Q401 and Q402 | 19A700060P3 | N-Type, field effect; sim to J310. |
| Q403 and Q404 | 19A134137P6 | N-Type, field effect. |
| Q405 | 19A116818P3 | N Channel, field effect; sim to Type 3N1877. |
| Q406 | 19A701808P2 | Silicon, NPN; sim to MPS 6595. |
| | | ——— RESISTORS ——— |
| R401 | 19B800607P473 | Metal film: 47K ohms ±5%, 1/8 w. |
| R402 | 19B800607P221 | Metal film: 220 ohms ±5%, 1/8 w. |
| R403 | 19B800607P272 | Metal film: 2.7K ohms ±5%, 1/8 w. |
| R404 | 19B800607P390 | Metal film: 39 ohms ±5%, 1/8 w. |
| R405 | 19B800607P221 | Metal film: 220 ohms ±5%, 1/8 w. |
| R406 | 19B800607P272 | Metal film: 2.7K ohms ±5%, 1/8 w. |
| R407 and R408 | 19B800607P103 | Metal film: 10K ohms ±5%, 1/8 w. |
| R409 | 19B800607P332 | Metal film: 3.3K ohms ±5%, 1/8 w. |
| R410 | 19A702931P273 | Metal film: 5620 ohms ±1%, 200 VDCW, 1/8 w. |
| R411 | 19B800607P332 | Metal film: 3.3K ohms ±5%, 1/8 w. |
| R412 | 19A702931P273 | Metal film: 5620 ohms ±1%, 200 VDCW, 1/8 w. |
| R413 | 19B800607P681 | Metal film: 680 ohms ±5%, 1/8 w. |
| R414 | 19B800607P272 | Metal film: 2.7K ohms ±5%, 1/8 w. |
| R415 | 19B800607P223 | Metal film: 22K ohms ±5%, 1/8 w. |
| R416 | 19B800607P153 | Metal film: 15K ohms ±5%, 1/8 w. |
| R417 | 19B800607P221 | Metal film: 220 ohms ±5%, 1/8 w. |
| R418 | 19B800607P510 | Metal film: 51 ohms ±5%, 1/8 w. |
| R419 | 19B800607P272 | Metal film: 2.7K ohms ±5%, 1/8 w. |

| SYMBOL | PART NUMBER | DESCRIPTION |
|---|---|---|
| R420 | 19B800607P100 | Metal film: 10 ohms ±5%, 1/8 w. |
| R423 | 19B800607P182 | Metal film: 1.8K ohms ±5%, 1/8 w. |
| R424 | 19B800607P181 | Metal film: 180 ohms ±5%, 1/8 w. |
| R425 | 19B800607P220 | Metal film: 22 ohms ±5%, 1/8 w. |
| R426 | 19B800607P821 | Metal film: 820 ohms ±5%, 1/8 w. (Used in G1 and G4). |
| R426 | 19B800607P221 | Metal film: 220 ohms ±5%, 1/8 w. (Used in G2, G3, G5 and G6). |
| R427 | 19B800607P821 | Metal film: 820 ohms ±5%, 1/8 w. (Used in G1 and G4). |
| R427 | 19B800607P221 | Metal film: 220 ohms ±5%, 1/8 w. (Used in G2, G3, G5 and G6). |
| R428 | 19B800607P821 | Metal film: 820 ohms ±5%, 1/8 w. (Used in G1 and G4). |
| R428 | 19B800607P221 | Metal film: 220 ohms ±5%, 1/8 w. (Used in G2, G3, G5 and G6). |
| R429 | 19B800607P821 | Metal film: 820 ohms ±5%, 1/8 w. (Used in G1 and G4). |
| R429 | 19B800607P221 | Metal film: 220 ohms ±5%, 1/8 w. (Used in G2, G3, G5 and G6). |
| R430 and R431 | 19B800607P104 | Metal film: 100K ohms ±5%, 1/8 w. |
| | | ——— TRANSFORMERS ——— |
| T401 and T402 | 19B801143P1 | Transformer, Balun. |
| | | ——— CABLES ——— |
| W401 | 19B800890P1 | Coil, RF: 9.5 nH ±5%; sim to Paul Smith SK-896-1. |
| | | ——— FILTER ——— |
| Z401 | 19A702068G1 | Crystal, filter: 4 pole, 2 coupled-dual crystals. |
| | | ——— CAPACITORS ——— |
| C501 | 19A702061P10 | Ceramic: 5.6 pF ±0.5 pF, 50 VDCW, temp coef 0 ±60 PPM. |
| C502 | 19A700235P21 | Ceramic: 47 pF ±5%, 50 VDCW. |
| C503 | 19A700235P24 | Ceramic: 82 pF ±5%, 50 VDCW. |
| C504 thru C510 | T644ACP333K | Polyester: .033 µF ±10%, 50 VDCW. |
| C511 | 19A700235P21 | Ceramic: 47 pF ±5%, 50 VDCW. |
| C512 | 19A702061P57 | Ceramic: 82 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. |
| C513 and C514 | T644ACP333K | Polyester: .033 µF ±10%, 50 VDCW. |
| C515 | 19A700013P10 | Phenolic: 0.56 pF ±5%, 500 VDCW. |
| C516 | 19A701624P132 | Ceramic: 100 pF ±5%, 500 VDCW, temp coef 0 ±30 PPM. |
| C517 and C518 | T644ACP333K | Polyester: .033 µF ±10%, 50 VDCW. |
| C519 | T644ACP215K | Polyester: .0015 µF ±10%, 50 VDCW. |
| C520 and C521 | T644ACP310K | Polyester: .010 µF ±10%, 50 VDCW. |

| SYMBOL | PART NUMBER | DESCRIPTION |
|---|---|---|
| C522 and C523 | 19A702052P20 | Ceramic: 0.033 µF ±10%, 50 VDCW. |
| C524 | 19A702052P24 | Ceramic: 0.068 µF ±10%, 50 VDCW. |
| C525 | 19A702061P10 | Ceramic: 5.6 pF ±0.5 pF, 50 VDCW, temp coef 0 ±60 PPM. |
| C526 | 19A702061P3 | Ceramic: 1.5 pF ±0.5 pF, 50 VDCW, temp coef 0 ±250 PPM. |
| C527 | 19A701534P7 | Tantalum: 10 µF ±20%, 16 VDCW. |
| | | ——— INDUCTORS ——— |
| L501 thru L506 | 19A701761P45 | Coil, RF: 68 uh ±10%, 3.30 ohms DC res max. |
| L507 and L508 | 19C850701P101 | Coil, RF: variable, wire size No. 34 AWG. |
| L509 | 19C850701P102 | Coil, RF: variable, wire size No. 34 AWG. |
| | | ——— RESISTORS ——— |
| R501 | 19A702931P141 | Metal film: 261 ohms ±1%, 200 VDCW, 1/8 w. |
| R502 | 19B800607P182 | Metal film: 1.8K ohms ±5%, 1/8 w. |
| R503 | 19A702931P141 | Metal film: 261 ohms ±1%, 200 VDCW, 1/8 w. |
| R504 | 19B800607P223 | Metal film: 22K ohms ±5%, 1/8 w. |
| R505 | 19B800607P472 | Metal film: 4.7K ohms ±5%, 1/8 w. |
| R507 | 19B800607P223 | Metal film: 22K ohms ±5%, 1/8 w. |
| R508 | 19B800607P472 | Metal film: 4.7K ohms ±5%, 1/8 w. |
| R509 | 19B800607P681 | Metal film: 680 ohms ±5%, 1/8 w. |
| | | —— INTEGRATED CIRCUITS —— |
| U501 | 19A700044P1 | Linear, IF Amplifier & Detector; sim to ULN2111A. |
| U502 | 19A700091P1 | Linear, IF Amplifier & Detector; sim to CA3089E. |
| | | ——— FILTER ——— |
| Z501 | 19A702068G3 | Crystal filter. |
| Z503 | 19A702068G3 | Crystal filter. |
| | | — SYSTEM/AUDIO/SQUELCH — |
| A601 | 19C851003P1 | Printed Wire Board. |
| | | ——— CAPACITORS ——— |
| C601 thru C603 | 19A702052P6 | Ceramic: 1500 pF ±10%, 50 VDCW. |
| C604 | 19A702052P22 | Ceramic: 0.047 µF ±10%, 50 VDCW. |
| C605 | 19A702250P113 | Polyester: 0.1 µF ±10%, 50 VDCW. |
| C606 thru C609 | 19A702052P14 | Ceramic: 0.01 µF ±10%, 50 VDCW. |
| C610 | 19A702052P10 | Ceramic: 4700 pF ±10%, 50 VDCW. |
| C611 | 19A702052P22 | Ceramic: 0.047 µF ±10%, 50 VDCW. |
| C612 | 19A702052P20 | Ceramic: 0.033 µF ±10%, 50 VDCW. |
| C613 | 19A701225P3 | Electrolytic: 220 µF, -10+50%, 25 VDCW. |

| SYMBOL | PART NUMBER | DESCRIPTION |
|---|---|---|
| C614 and C615 | 19A701534P7 | Tantalum: 10 µF ±20%, 16 VDCW. |
| C616 thru C618 | 19A702052P22 | Ceramic: 0.047 µF ±10%, 50 VDCW. |
| C619 | 19A701534P3 | Tantalum: 0.47 µF ±20%, 35 VDCW. |
| C620 | 19A702052P2 | 2Ceramic: 0.047 µF ±10%, 50 VDCW. |
| C621 | 19A702052P3 | Ceramic: 470 pF ±10%, 50 VDCW. |
| C651 and C652 | 19A702250P113 | Polyester: 0.1 µF ±10%, 50 VDCW. |
| C656 | 19A701225P1 | Electrolytic: 15 µF -10 +75%, 25 VDCW; sim to Sprague 501D156-GO25BB1C. |
| C658 thru C678 | 19A702052P5 | Ceramic: 1000 pF ±10%, 50 VDCW. |
| C682 thru C684 | 19A702052P3 | Ceramic: 470 pF ±10%, 50 VDCW. |
| | | ——— DIODES ——— |
| D601 | 19A703561P2 | Silicon, fast recovery (2 diodes in series). |
| D602 | 19A700053P2 | Silicon: 2 Diodes in Series; sim to BAV99. |
| D603 | 19A703561P2 | Silicon, fast recovery (2 diodes in series). |
| D604 | 19A700053P2 | Silicon: 2 Diodes in Series; sim to BAV99. |
| D606 thru D608 | 19A700053P2 | Silicon: 2 Diodes in Series; sim to BAV99. |
| | | ——— JACKS ——— |
| J601 | 19C850591G4 19A701246G2 19A701254P1 19A701254P2 C | Connector. Includes: Shell; Connector; onnector. |
| J602 | 19B800555G4 | Connector: metering, red. Includes (10) 19A700237P1 contacts. |
| J603 | 19A700072P47 | Printed wire: 21 contacts rated at 2 1/2 amps per contact; sim to Molex 22-27-2211. (Used in G1, G2 and G3). |
| J603 | 19A704852P47 | Printed wire: 21 contacts rated @ 2 1/2 amps; sim to Molex 22-29-2211. (Used in G4, G5 and G6). |
| J604 | 19B801421P1 | Cable, flat: 6 contacts, sim to UL Style 2651. |
| J605 | 19A703248P1 | Post: Tin Plated, 10 mm length. (Used in G1, G2 and G3). |
| J605 | 19A703248P11 | Post: Gold Plated, 10 mm length. (Used in G4, G5 and G6). |
| J607 | 19A703248P11 | Post: Gold Plated, 10 mm length. (Used in G4, G5 and G6). |
| J607 | 19A703248P1 | Post: Tin Plated, 10 mm length. (Used in G1, G2 and G3). |
| J608 | 19A703248P11 | Post: Gold Plated, 10 mm length. (Used in G4, G5 and G6). |
| J608 | 19A703248P1 | Post: Tin Plated, 10 mm length. (Used in G1, G2 and G3). |

| SYMBOL | PART NUMBER | DESCRIPTION |
|---|---|---|
| J609 | 19A703248P11 | Post: Gold Plated, 10 mm length. (Used in G4, G5 and G6). |
| J609 and J610 | 19A703248P1 | Post: Tin Plated, 10 mm length. (Used in G1, G2 and G3). |
| J610 | 19A703248P11 | Post: Gold Plated, 10 mm length. (Used in G4, G5 and G6). |
| | | ——— PLUGS ——— |
| P605 | 19A702104P1 | Connector: Shorting Jumper, Tin Plated. (Used in G1, G2 and G3). |
| P605 | 19A702104P2 | Connector: Shorting Jumper, Gold Plated. (Housing Color: White). (Used in G4, G5 and G6). |
| P607 | 19A702104P1 | Connector: Shorting Jumper, Tin Plated. (Used in G1, G2 and G3). |
| P607 | 19A702104P2 | Connector: Shorting Jumper, Gold Plated. (Housing Color: White). (Used in G4, G5 and G6). |
| P608 | 19A702104P1 | Connector: Shorting Jumper, Tin Plated. (Used in G1, G2 and G3). |
| P608 | 19A702104P2 | Connector: Shorting Jumper, Gold Plated. (Housing Color: White). (Used in G4, G5 and G6). |
| P609 | 19A702104P1 | Connector: Shorting Jumper, Tin Plated. (Used in G1, G2 and G3). |
| P609 | 19A702104P2 | Connector: Shorting Jumper, Gold Plated. (Housing Color: White). (Used in G4, G5 and G6). |
| P610 | 19A702104P1 | Connector: Shorting Jumper, Tin Plated. (Used in G1, G2 and G3). |
| P610 | 19A702104P2 | Connector: Shorting Jumper, Gold Plated. (Housing Color: White). (Used in G4, G5 and G6). |
| | | ——— TRANSISTORS ——— |
| Q601 thru Q604 | 19A700023P2 | Silicon, NPN: sim to 2N3904. |
| Q605 | 19A700076P2 | Silicon, NPN: sim to MMBT3904, low profile. |
| Q606 | 19A700023P2 | Silicon, NPN: sim to 2N3904. |
| | | ——— RESISTORS ——— |
| R601 | 19A702931P318 | Metal film: 15K ohms ±1%, 200 VDCW, 1/8 w. |
| R602 | 19A702931P273 | Metal film: 5620 ohms ±1%, 200 VDCW, 1/8 w. |
| R603 | 19A702931P393 | Metal film: 90.9K ohms ±1%, 200 VDCW, 1/8 w. |
| R604 | 19B800607P472 | Metal film: 4.7K ohms ±5%, 1/8 w. |
| R605 | 19B800607P822 | Metal film: 8.2K ohms ±5%, 1/8 w. |
| R606 | 19B800607P103 | Metal film: 10K ohms ±5%, 1/8 w. |
| R607 | 19B800607P104 | Metal film: 100K ohms ±5%, 1/8 w. |
| R608 | 19B800607P334 | Metal film: 330K ohms ±5%, 1/8 w. |
| R609 | 19B800607P103 | Metal film: 10K ohms ±5%, 1/8 w. |
| R610 | 19B800607P154 | Metal film: 150K ohms ±5%, 1/8 w. |
| R611 | 19B800607P223 | Metal film: 22K ohms ±5%, 1/8 w. |
| R612 | 19B800607P124 | Metal film: 120K ohms ±5%, 1/8 w. |
| R613 | 19B800607P223 | Metal film: 22K ohms ±5%, 1/8 w. |

| SYMBOL | PART NUMBER | DESCRIPTION |
|---|---|---|
| R614 | 19A702931P355 | Metal film: 36.5K ohms ±1%, 200 VDCW, 1/8 w. |
| R615 | 19A702931P293 | Metal film: 9090 ohms ±1%, 200 VDCW, 1/8 w. |
| R616 and R617 | 19A702931P369 | Metal film: 51.1K ohms ±1%, 200 VDCW, 1/8 w. |
| R618 | 19B800607P104 | Metal film: 100K ohms ±5%, 1/8 w. |
| R619 | 19B800607P124 | Metal film: 120K ohms ±5%, 1/8 w. |
| R620 | 19B800607P103 | Metal film: 10K ohms ±5%, 1/8 w. |
| R621 | 19B800607P681 | Metal film: 680 ohms ±5%, 1/8 w. |
| R622 | 19B800607P330 | Metal film: 33 ohms ±5%, 1/8 w. |
| R623 | 19B800607P390 | Metal film: 39 ohms ±5%, 1/8 w. |
| R624 | 19B800607P152 | Metal film: 1.5K ohms ±5%, 1/8 w. |
| R625 and R626 | H212CRP947C | Deposited carbon: 4.7 ohms ±5%, 1/4 w. |
| R627 | 19B800607P154 | Metal film: 150K ohms ±5%, 1/8 w. |
| R628 | 19B800607P822 | Metal film: 8.2K ohms ±5%, 1/8 w. |
| R629 | 19B800784P111 | Variable, conductive: 100K ohms ±20%, 0.33 w max. |
| R630 | 19B800607P102 | Metal film: 1K ohms ±5%, 1/8 w. |
| R631 and R632 | 19B800607P104 | Metal film: 100K ohms ±5%, 1/8 w. |
| R633 | 19B800607P102 | Metal film: 1K ohms ±5%, 1/8 w. |
| R651 and R652 | 19B800607P561 | Metal film: 560 ohms ±5%, 1/8 w. |
| R653 thru R658 | 19B800607P103 | Metal film: 10K ohms ±5%, 1/8 w. |
| R659 | 19B800607P472 | Metal film: 4.7K ohms ±5%, 1/8 w. |
| R660 | 19B800607P223 | Metal film: 22K ohms ±5%, 1/8 w. |
| R661 | 19B800607P103 | Metal film: 10K ohms ±5%, 1/8 w. |
| R662 | 19B800607P473 | Metal film: 47K ohms ±5%, 1/8 w. |
| R663 and R664 | 19B800607P103 | Metal film: 10K ohms ±5%, 1/8 w. |
| R665 | 19B800607P224 | Metal film: 220K ohms ±5%, 1/8 w. |
| R666 | 19B800784P108 | Variable: 10K ohms ±20%, 1/2 w. |
| | | —— INTEGRATED CIRCUITS —— |
| U601 and U602 | 19A701830P1 | Linear: Audio Power Amplifier; sim to TDA2003. |
| U603 and U604 | 19A701789P1 | Linear: Quad Op Amp; sim to LM324. |
| U605 | 19A700029P44 | Digital: BILATERAL SWITCH. |
| **A701** | | **Microcomputer Component Board 19C851149G12** |
| | | ——— CAPACITORS ——— |
| C1 | 19A702052P14 | Ceramic: 0.01 µF ±10%, 50 VDCW. (Used in G12). |
| C2 | 19A702061P13 | Ceramic: 10 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Used in G12). |

| SYMBOL | PART NUMBER | DESCRIPTION |
|---|---|---|
| C3 | 19A702061P21 | Ceramic: 15 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Used in G12). |
| C4 | 19A702061P65 | Ceramic: 150 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. (Used in G12). |
| C6 | 19A702061P65 | Ceramic: 150 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. (Used in G12). |
| C8 | 19A702061P61 | Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Used in G12). |
| C10 | 19A702061P61 | Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Used in G12). |
| C12 thru C19 | 19A702061P13 | Ceramic: 10 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Used in G12). |
| C21 thru C24 | 19A702061P65 | Ceramic: 150 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. (Used in G12). |
| C26 and C27 | 19A702052P5 | Ceramic: 1000 pF ±10%, 50 VDCW. (Used in G12). |
| C28 and C29 | 19A702052P14 | Ceramic: 0.01 µF ±10%, 50 VDCW. (Used in G12). |
| C30 and C31 | 19A702061P69 | Ceramic: 220 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. (Used in G12). |
| C32 | 19A702052P5 | Ceramic: 1000 pF ±10%, 50 VDCW. (Used in G12). |
| C33 | 19A702061P69 | Ceramic: 220 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. (Used in G12). |
| C34 | 19A702061P65 | Ceramic: 150 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. (Used in G12). |
| C35 | 19A702052P5 | Ceramic: 1000 pF ±10%, 50 VDCW. (Used in G12). |
| C36 | 19A702061P69 | Ceramic: 220 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. (Used in G12). |
| C37 thru C39 | 19A702052P14 | Ceramic: 0.01 µF ±10%, 50 VDCW. (Used in G12). |
| C40 | 19A702052P24 | Ceramic: 0.068 µF ±10%, 50 VDCW. (Used in G12). |
| | | ——— RESISTORS ——— |
| R1 | 19B800607P101 | Metal film: 100 ohms ±5%, 1/8 w. (Used in G12). |
| R4 | 19B800607P101 | Metal film: 100 ohms ±5%, 1/8 w. (Used in G12). |
| R6 | 19B800607P101 | Metal film: 100 ohms ±5%, 1/8 w. (Used in G12). |
| R7 | 19B800607P103 | Metal film: 10K ohms ±5%, 1/8 w. (Used in G12). |
| R21 thru R24 | 19B800607P101 | Metal film: 100 ohms ±5%, 1/8 w. (Used in G12). |
| R26 | 19B800607P100 | Metal film: 10 ohms ±5%, 1/8 w. (Used in G12). |
| R27 | 19B800607P103 | Metal film: 10K ohms ±5%, 1/8 w. (Used in G12). |
| R28 thru R31 | 19B800607P101 | Metal film: 100 ohms ±5%, 1/8 w. (Used in G12). |
| R32 | 19B800607P103 | Metal film: 10K ohms ±5%, 1/8 w. (Used in G12). |

| SYMBOL | PART NUMBER | DESCRIPTION |
|---|---|---|
| R33 and R34 | 19B800607P101 | Metal film: 100 ohms ±5%, 1/8 w. (Used in G12). |
| R35 | 19B800607P272 | Metal film: 2.7K ohms ±5%, 1/8 w. (Used in G12). |
| R36 thru R39 | 19B800607P101 | Metal film: 100 ohms ±5%, 1/8 w. (Used in G12). |
| | | —— INTEGRATED CIRCUITS —— |
| U1 | 19A703244P23 | Digital: MICROCOMPUTER, HMOS, 8-bit. (Used in G12). |
| | | ——— CAPACITORS ——— |
| C701 thru C703 | 19A702052P5 | Ceramic: 1000 pF ±10%, 50 VDCW. |
| C704 | 19A702052P14 | Ceramic: 0.01 µF ±10%, 50 VDCW. |
| C705 | 19A702052P5 | Ceramic: 1000 pF ±10%, 50 VDCW. |
| C706 | 19A703893P10 | Electrolytic: 200 µF -10+50%, 10 VDCW. |
| C708 | 19A702052P20 | Ceramic: 0.033 µF ±10%, 50 VDCW. |
| C710 | 19A702052P5 | Ceramic: 1000 pF ±10%, 50 VDCW. |
| C711 | 19A701534P8 | Tantalum: 22 µF ±20%, 16 VDCW. |
| C712 | 19A702052P20 | Ceramic: 0.033 µF ±10%, 50 VDCW. |
| C713 | 19A701534P4 | Tantalum: 1 µF ±20%, 35 VDCW. |
| C714 | 19A701534P3 | Tantalum: 0.47 µF ±20%, 35 VDCW. |
| C716 | 19A701534P4 | Tantalum: 1 µF ±20%, 35 VDCW. |
| C717 | 19A702052P14 | Ceramic: 0.01 µF ±10%, 50 VDCW. |
| C718 | 19A702052P22 | Ceramic: 0.047 µF ±10%, 50 VDCW. |
| C719 | 19A702061P99 | Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C. |
| C720 | 19A702052P20 | Ceramic: 0.033 µF ±10%, 50 VDCW. |
| C722 | 19A702052P20 | Ceramic: 0.033 µF ±10%, 50 VDCW. |
| C723 | 19A701534P4 | Tantalum: 1 µF ±20%, 35 VDCW. |
| C724 | 19A702052P24 | Ceramic: 0.068 µF ±10%, 50 VDCW. |
| C725 | 19A702052P5 | Ceramic: 1000 pF ±10%, 50 VDCW. |
| C727 | 19A702052P10 | Ceramic: 4700 pF ±10%, 50 VDCW. |
| C728 | 19A702052P5 | Ceramic: 1000 pF ±10%, 50 VDCW. |
| | | ——— DIODES ——— |
| D701 | 19A700025P2 | Silicon, zener: 400 mW max; sim to BZX55-C2V7. |
| D702 | 19A700028P1 | Silicon: 75 mA, 75 PIV; sim to 1N4148. |
| D703 | 19A700053P2 | Silicon: 2 Diodes in Series; sim to BAV99. |
| D711 | 19A700047P2 | Silicon, 100 mW, continuous dissipation; sim to DO-15. |
| D712 | 19A700053P2 | Silicon: 2 Diodes in Series; sim to BAV99. |
| D713 | 162B3011P0002 | Light Emitting Diode: Red; sim to GE 22L-2. |
| D714 | 19A700025P3 | Silicon, zener: 400 mW max; sim to BZX55-C3V3. |
| D715 | 19A700025P8 | Silicon, zener: 400 mW max; sim to BZX55-C6V8. |

| SYMBOL | PART NUMBER | DESCRIPTION |
|---|---|---|
| D716 thru D719 | 19A700053P2 | Silicon: 2 Diodes in Series; sim to BAV99. |
| D720 | 19A700047P2 | Silicon, 100 mW, continuous dissipation; sim to DO-15. |
| | | ————— JACKS ————— |
| J701 | 19A703248P1 | Post: Tin Plated, 10 mm length. (Used in G1, G2 and G3). |
| J701 | 19A703248P11 | Post: Gold Plated, 10 mm length. (Used in G4, G5 and G6). |
| J702 | 19A703248P1 | Post: Tin Plated, 10 mm length. (Used in G1, G2 and G3). |
| J702 | 19A703248P11 | Post: Gold Plated, 10 mm length. (Used in G4, G5 and G6). |
| J703 | 19A703248P1 | Post: Tin Plated, 10 mm length. (Used in G1, G2 and G3). |
| J703 | 19A703248P11 | Post: Gold Plated, 10 mm length. (Used in G4, G5 and G6). |
| J704 | 19A703248P1 | Post: Tin Plated, 10 mm length. (Used in G1, G2 and G3). |
| J704 | 19A703248P11 | Post: Gold Plated, 10 mm length. (Used in G4, G5 and G6). |
| J706 | 19A703248P11 | Post: Gold Plated, 10 mm length. (Used in G4, G5 and G6). |
| J706 and J707 | 19A703248P1 | Post: Tin Plated, 10 mm length. (Used in G1, G2 and G3). |
| J707 | 19A703248P11 | Post: Gold Plated, 10 mm length. (Used in G4, G5 and G6). |
| J710 | 19A703248P13 | Post: Gold Plated, 16 mm length. (Used in G4, G5 and G6). |
| J710 | 19A703248P3 | Post: Tin Plated, 16 mm length. (Used in G1, G2 and G3). |
| J711 | 19A703248P4 | Post: Tin Plated, 19 mm length. (Used in G1, G2 and G3). |
| J711 | 19A703248P14 | Post: Gold Plated, 19 mm length. (Used in G4, G5 and G6). |
| J712 | 19A703248P1 | Post: Tin Plated, 10 mm length. (Used in G1, G2 and G3). |
| J712 | 19A703248P11 | Post: Gold Plated, 10 mm length. (Used in G4, G5 and G6). |
| | | ————— INDUCTORS ————— |
| L711 | 19A700000P25 | Coil, RF: 15 µH ±10%; sim to Jeffers 4421-9K. |
| L712 | 19A700024P21 | Coil, RF, fixed: 4.7 µH ±10%; sim to Jeffers 4436-8K. |
| | | ————— PLUGS ————— |
| P701 | 19A702104P2 | Connector: Shorting Jumper, Gold Plated. (Housing Color: White). (Used in G4, G5 and G6). |
| P701 and P702 | 19A702104P1 | Connector: Shorting Jumper, Tin Plated. (Used in G1, G2 and G3). |
| P702 and P703 | 19A702104P2 | Connector: Shorting Jumper, Gold Plated. (Housing Color: White). (Used in G4, G5 and G6). |
| P703 and P704 | 19A702104P1 | Connector: Shorting Jumper, Tin Plated. (Used in G1, G2 and G3). |
| P704 | 19A702104P2 | Connector: Shorting Jumper, Gold Plated. (Housing Color: White). (Used in G4, G5 and G6). |
| P706 | 19A702104P2 | Connector: Shorting Jumper, Gold Plated. (Housing Color: White). (Used in G4, G5 and G6). |
| P706 and P707 | 19A702104P1 | Connector: Shorting Jumper, Tin Plated. (Used in G1, G2 and G3). |
| P707 | 19A702104P2 | Connector: Shorting Jumper, Gold Plated. (Housing Color: White). (Used in G4, G5 and G6). |
| | | ——— TRANSISTORS ——— |
| Q701 | 19A700076P2 | Silicon, NPN: sim to MMBT3904, low profile. |
| Q703 | 19A700076P2 | Silicon, NPN: sim to MMBT3904, low profile. |
| Q704 | 19A702503P2 | Silicon, NPN: sim to 2N4401. |
| Q705 | 19A116375P1 | Silicon, PNP. |
| Q711 | 19A700076P2 | Silicon, NPN: sim to MMBT3904, low profile. |
| Q713 and Q714 | 19A700076P2 | Silicon, NPN: sim to MMBT3904, low profile. |
| Q715 | 19A700059P2 | Silicon, PNP: sim to MMBT3906, low profile. |
| Q716 thru Q719 | 19A700023P2 | Silicon, NPN: sim to 2N3904. |
| Q720 | 19A700076P2 | Silicon, NPN: sim to MMBT3904, low profile. |
| Q721 | 19A700023P2 | Silicon, NPN: sim to 2N3904. |
| Q722 | 19A700076P2 | Silicon, NPN: sim to MMBT3904, low profile. |
| | | ———— RESISTORS ———— |
| R701 | 19B800607P152 | Metal film: 1.5K ohms ±5%, 1/8 w. |
| R702 | 19A700112P43 | Composition: 150 ohms ±5%, 1 w. |
| R703 | 19B800784P108 | Variable: 10K ohms ±20%, 1/2 w. |
| R704 | 19A702931P179 | Metal film: 649 ohms ±1%, 200 VDCW, 1/8 w. |
| R705 | 19A702931P141 | Metal film: 261 ohms ±1%, 200 VDCW, 1/8 w. |
| R706 | 19B800607P681 | Metal film: 680 ohms ±5%, 1/8 w. |
| R707 | 19B800607P152 | Metal film: 1.5K ohms ±5%, 1/8 w. |
| R708 | 19B800607P223 | Metal film: 22K ohms ±5%, 1/8 w. |
| R709 | 19B800607P101 | Metal film: 100 ohms ±5%, 1/8 w. |
| R710 | 19B800607P331 | Metal film: 330 ohms ±5%, 1/8 w. |
| R711 | 19B800607P103 | Metal film: 10K ohms ±5%, 1/8 w. |
| R713 | 19B800607P103 | Metal film: 10K ohms ±5%, 1/8 w. |
| R714 | 19B800607P101 | Metal film: 100 ohms ±5%, 1/8 w. |
| R715 | 19B800607P473 | Metal film: 47K ohms ±5%, 1/8 w. |
| R716 | 19B800607P103 | Metal film: 10K ohms ±5%, 1/8 w. |
| R717 | 19B800607P473 | Metal film: 47K ohms ±5%, 1/8 w. |
| R718 | 19B800607P103 | Metal film: 10K ohms ±5%, 1/8 w. |
| R719 | 19B800607P822 | Metal film: 8.2K ohms ±5%, 1/8 w. |
| R720 | 19B800607P104 | Metal film: 100K ohms ±5%, 1/8 w. |

TABLE OF CONTENTS



| △ COMPONENT IDENTIFICATION CHART | | | |
|---|---|---|---|
| PART | GP1,4 29.7-36 MHz | GP2,5 36-42 MHz | GP3,6 42-50 MHz |
| C106 | 39p | 33p | 27p |
| C109 | 120p | 100p | 68p |
| C116 | 47p | 39p | 39p |
| C237 | 150p | 100p | 82p |
| C235 | 47p | 47p | 33p |
| C239 | 150p | 100p | 100p |
| C241 | 47p | 47p | 56p |
| | | | |
| C256 | 22p | 18p | 15p |
| C257 | 27p | 22p | 18p |
| C404 | 270p | 220p | 220p |
| C405 | 68p | 47p | 39p |
| C406 | 3.9p | 2.7p | 2.2p |
| C407 | 56p | 39p | 33p |
| C410 | 56p | 39p | 33p |
| C412 | 3.3p | 2.2p | 1.8p |
| C413 | 56p | 39p | 33p |
| C414 | 2.7p | 1.8p | 1.5p |
| C415 | 56p | 39p | 33p |
| C416 | 4.7p | 3.3p | 2.7p |
| C417 | 100p | 56p | 47p |
| C418 | 120p | 82p | 100p |
| C437 | 33p | 27p | 27p |
| C438 | 1p | 1.8p | 1.2p |
| C439 | 39p | 39p | 33p |
| C440 | 220p | 100p | 100p |
| C461 | 1.5p | | |
| C462 | | 27p | |
| L102 | 680n | 560n | 560n |
| L103 | 150n | 115n | 115n |
| L212 | 560n | 470n | 390n |
| L213 | 820n | 680n | 560n |
| R113 | 18 | 18 | 22 |
| R116 | 270 | 330 | 390 |
| R426 | 820 | 220 | 220 |
| R427 | 820 | 220 | 220 |
| R428 | 820 | 220 | 220 |
| R429 | 820 | 220 | 220 |

NOTES:

1. PART OF PWB.
2. PART OF HIGHER ASSEMBLY LEVEL.
3. # IDENTIFIES "CHIP" COMPONENTS (EXAMPLE: R456#) WHICH ARE LOCATED ON SOLDER SIDE OF PWB.
4. TO ADD NOISE BLANKER OPTION, REMOVE W401, AND PLUG IN NOISE BLANKER BOARD INTO J406.
5. ⏚ INDICATES VEHICULAR GROUND
7. FOR IMPROVED RX INTERMOD PERFORMANCE (WITHOUT NOISE BLANKER) REMOVE Q403 AND Q404.
8. VOLTAGE READINGS:

   ALL VOLTAGES ARE TYPICAL, VOLTAGES ARE MEASURED WITH A 20,000 OHM PER VOLT METER, REFERENCE TO A- AND NOT CHASSIS GROUND, UNLESS OTHERWISE INDICATED.

   SHEET 2:
   S - SQUELCHED RECEIVER
   U - UNSQUELCHED RECEIVER
   R - RECEIVER MODE (PTT HIGH)
   T - TRANSMIT MODE (PTT LO)

   SHEET 5,6:
   VOLTAGE READINGS ARE TAKEN WITH THE TRANSMITTER UNKEYED/KEYED. EX: 1.45 (UNKEYED)/7.65 (KEYED). A 22 uH CHOKE MUST BE USED IN THE HOT METER LEAD TO AVOID DETUNING RF CIRCUITS.

   SHEET 3,4,7:
   VOLTAGE READINGS ARE TAKEN WITH THE TRANSMITTER UNKEYED. INTEGRATED CIRCUIT VOLTAGES ARE MEASURED WITH A HIGH INPUT IMPEDANCE DIGITAL VOLTMETER.

9. JUMPER PLUG CONNECTIONS FOR OPTIONS.

   THE BOARD IS ASSEMBLED WITH ALL JUMPER PLUGS PRESENT.
   FOR FIXED SQUELCH OPTION, MOVE P605 TO J605-1 & 2 & ADD A666 (19A700185P41, ADD JUMPER FROM A601-HL2 TO A601-HL10 FOR FIXED SQUELCH WITH S500 OR MII TYPE CONTROL UNITS.
   FOR MII INTERFACE OPTION AND/OR CHANNEL GUARD OPTION, REMOVE P608. WITH BOTH OPTIONS ALSO REMOVE P609.
   FOR FIXED SQUELCH WITH DUAL CONTROL, REMOVE P605.

10. REGULATED +5V AND +9V CAN BE OPENED BY P701 THRU P704 FOR TROUBLE SHOOTING.
11. FOR SERIAL LOAD OF EE PROM FROM RADIO FRONT CONNECTOR J601
    J601-19 SERIAL CONTROL
    J601-29 STORE
    J601-30 SERIAL DATA
    J601-32 SERIAL CLOCK
    J601-36 RESET
12. FUNCTION INTERFACE POINTS PROVIDED FOR DATA INTERFACE.
13. STANDARD REFERENCE OSCILLATOR FREQUENCY = 13.2 MHZ.
14. PROVIDED FOR TEST/TROUBLE SHOOTING.
15. REMOVE P706 TO USE MINI $E^2$ PROM PROGRAMMER. REPLACE WHEN PROGRAMMING COMPLETE.
16. P707 DISABLES $E^2$ PROM PROGRAMMING FUNCTION AND IS RECOMENDED FOR S950 AND S990 CONTROL UNIT APPLICATIONS WITHOUT DOWNLOAD AND ALL OTHER CONTROL UNIT APPLICATIONS.

ALL CHIP RESISTORS ARE 1/8 WATT
ALL OTHER RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED.
RESISTOR VALUES IN Ω UNLESS FOLLOWED BY MULTIPLIER k, OR M.
CAPACITOR VALUES IN F UNLESS FOLLOWED BY MULTIPLIER u, n OR p.
INDUCTANCE VALUES IN H UNLESS FOLLOWED BY MULTIPLIER m, u OR n.

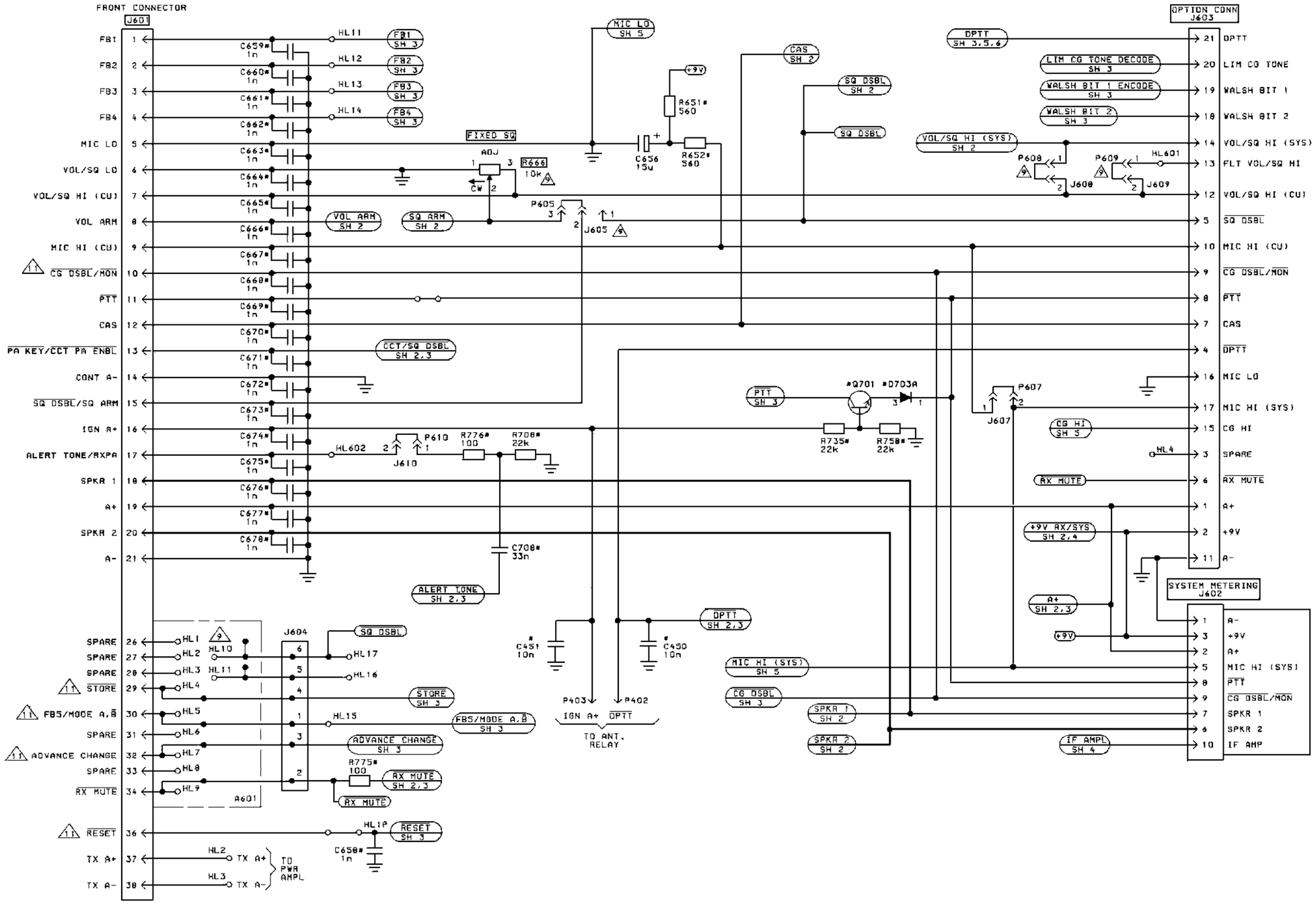
| SPARE GATES | | | |
|---|---|---|---|
| DEVICE | INPUT | OUTPUT | CONTROL |
| U605D | 11 | 10 | 12 |
| U605A | 1 | 2 | 13 |
| U704F | 14 | 13 | |

| POWER & GROUND CONNECTIONS | | | |
|---|---|---|---|
| DEVICE | +9V PIN NO. | A- PIN NO. | +5V PIN NO. |
| U203 | 8 | 7,4 | |
| U204 | 14 | 7 | |
| U301 | 8 | 4 | |
| U302 | 14 | 7 | |
| U603 | 4 | 11 | |
| U604 | 4 | 11 | |
| U605 | 14 | 1,7,11,12,13 | |
| U703 | | 7 | 14 |
| U704 | | 8,14 | 16 |
| U707 | | 7 | 14 |

| MODEL NO. | REV. LETTER | FREQ RANGE | OPTION CONNECTORS |
|---|---|---|---|
| PL19D901630G1 | | 29.7-36 MHz | TIN |
| PL19D901624G1 | F | | |
| PL19D901630G4 | | | GOLD |
| PL19D901624G4 | C | | |
| PL19D901630G2 | | 36-42 MHz | TIN |
| PL19D901624G2 | E | | |
| PL19D901630G5 | | | GOLD |
| PL19D901624G5 | C | | |
| PL19D901630G3 | | 42-50 MHz | TIN |
| PL19D901624G3 | E | | |
| PL19D901630G6 | | | GOLD |
| PL19D901624G6 | C | | |

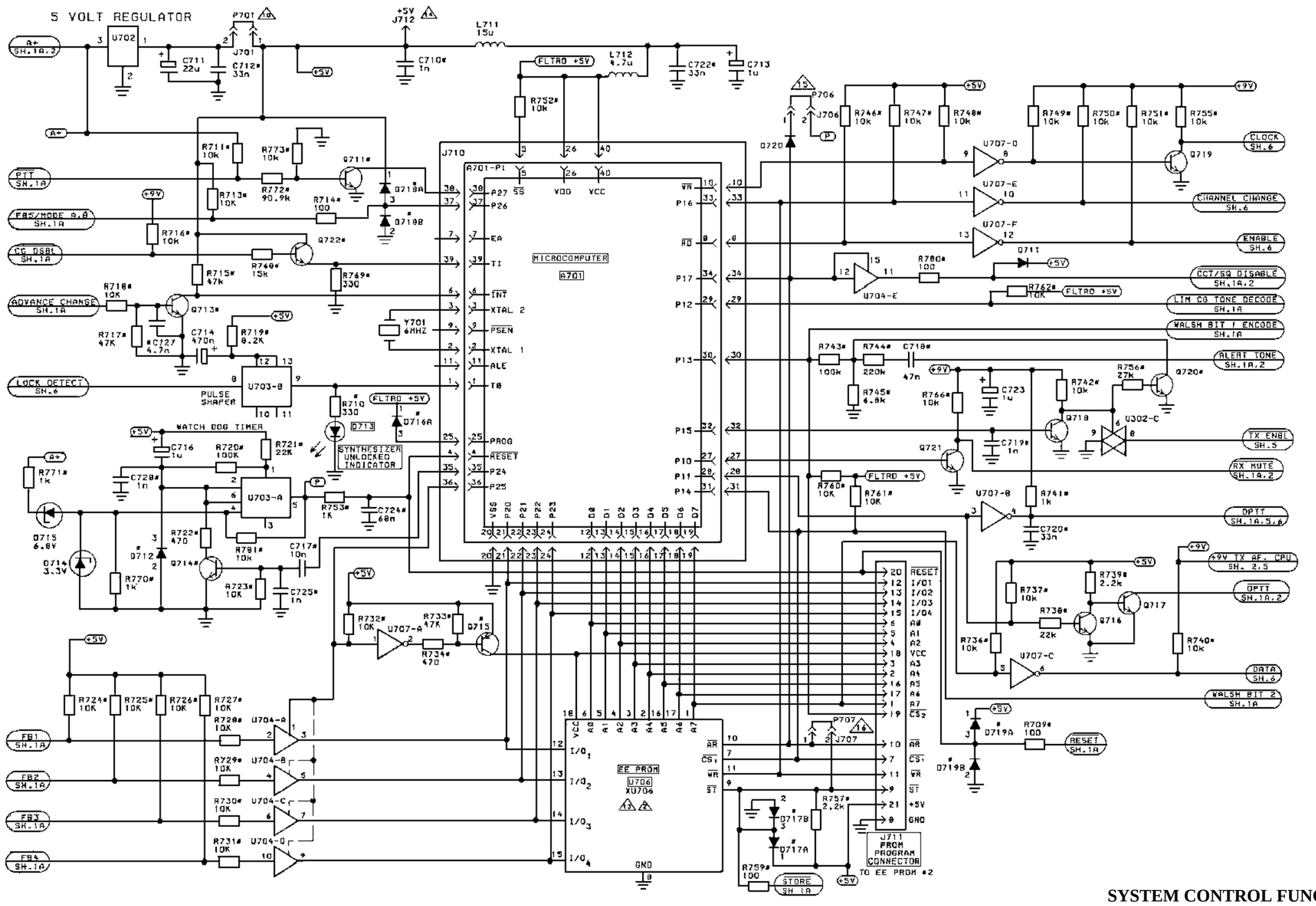
**29.7-50 MHz RADIO**

(19D901626, Sh. 1, Rev.8)



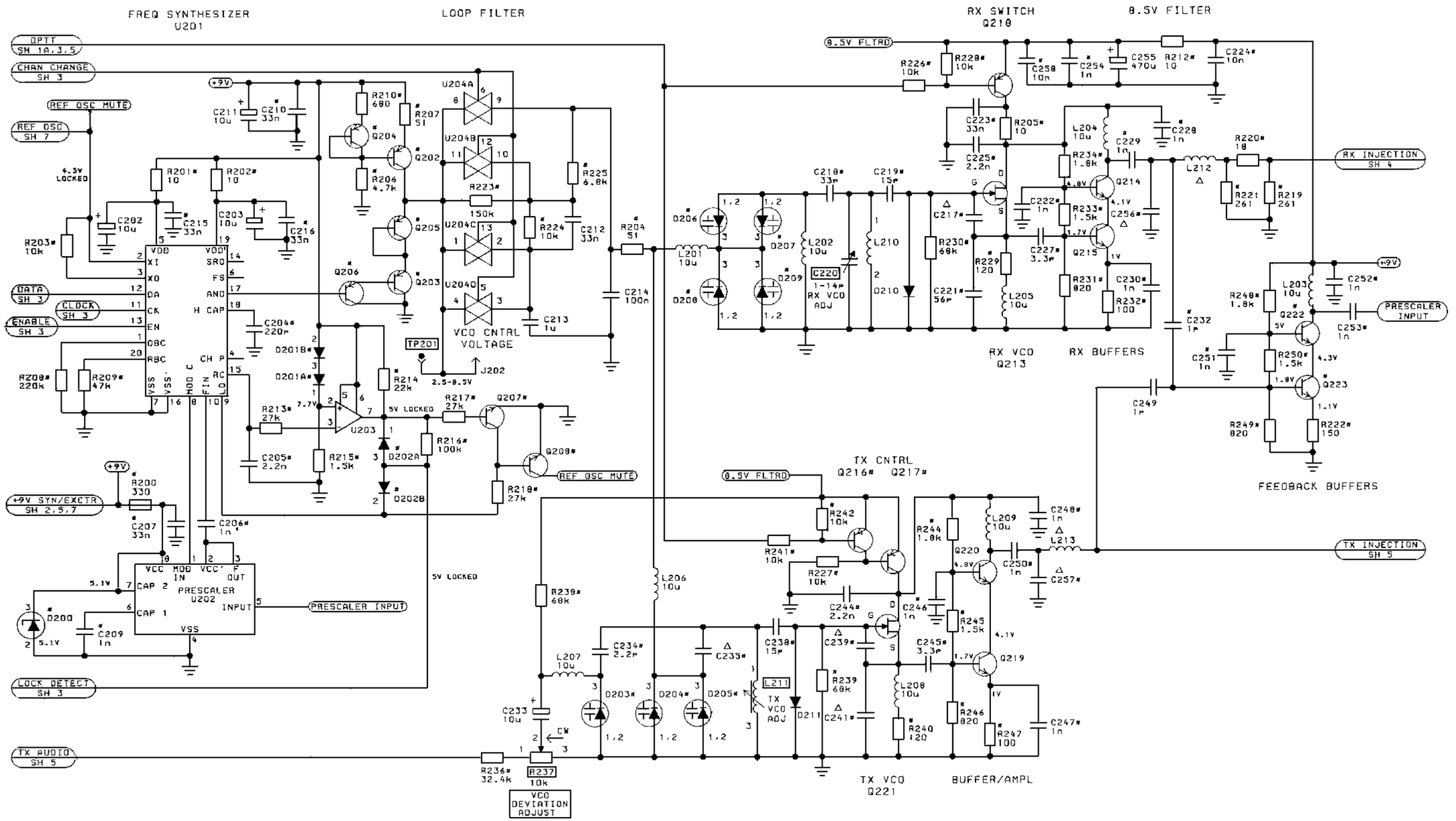

## 29.7-50 MHz RADIO

(19D901626, Sh. 1A, Rev. 3)



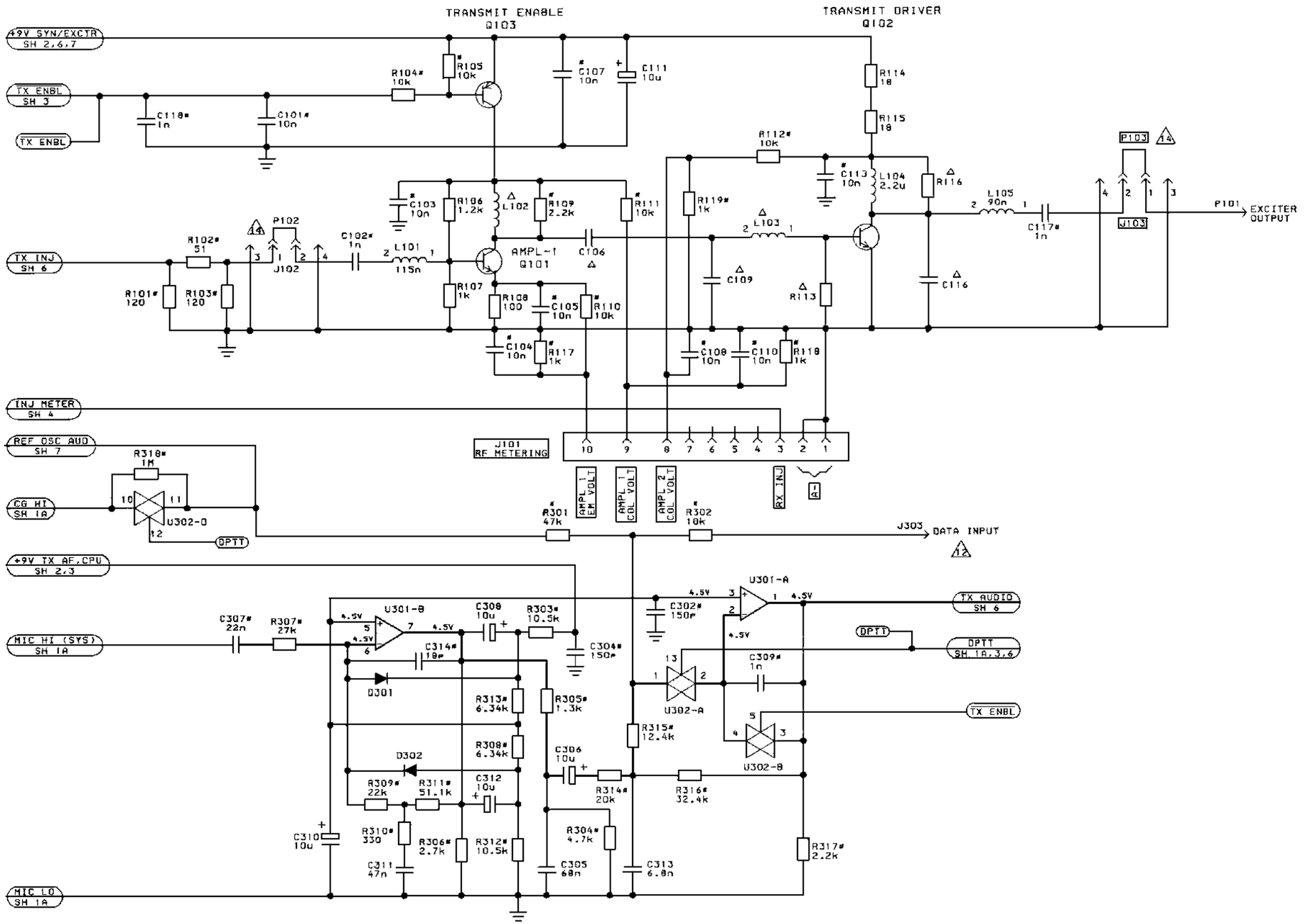

**SYSTEM CONTROL FUNCTIONS**

(19D901626, Sh. 3, Rev. 3)



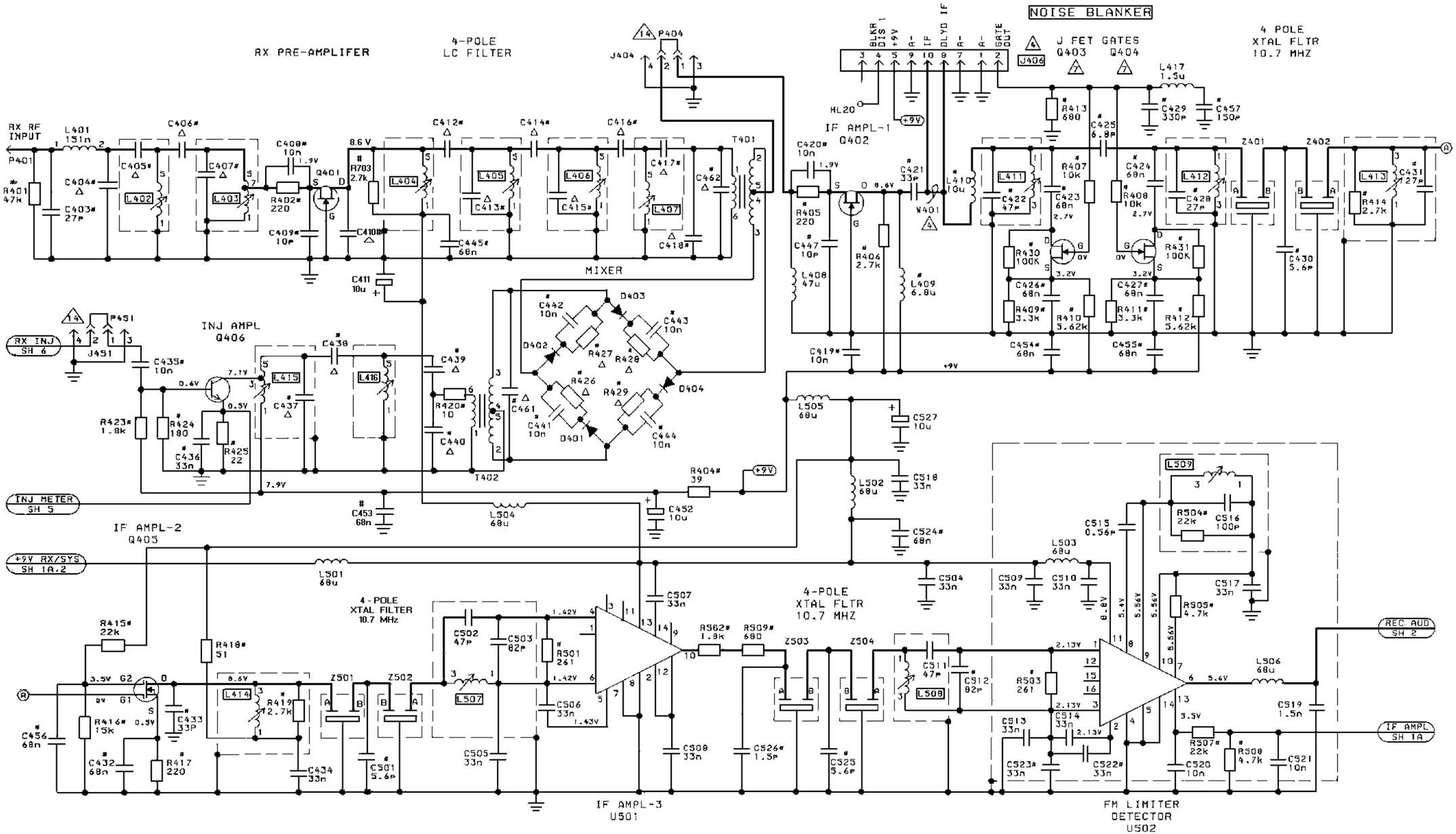

## 29.7-50 MHz SYNTHESIZER/VCO

(19D901626, Sh. 6, Rev. 4)



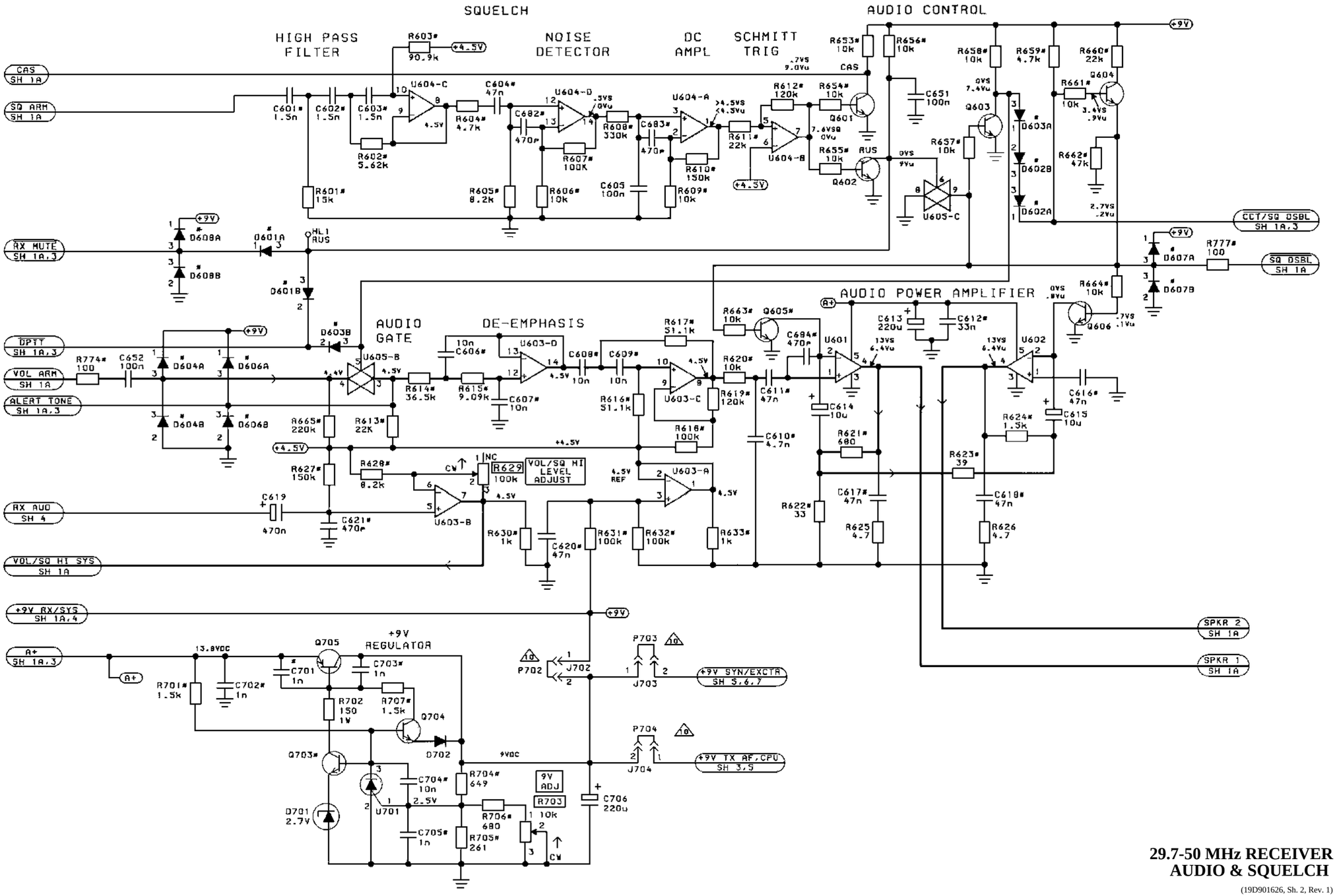

**29.7-50 MHz TRANSMITTER**

(19D901626, Sh. 5, Rev. 0)




## 29.7-50 MHz RECEIVER

(19D901626, Sh. 4, Rev. 3)




**29.7-50 MHz RECEIVER**
**AUDIO & SQUELCH**

(19D901626, Sh. 2, Rev. 1)