MAINTENANCE MANUAL
DELTA-S
136-174 MHz TRANSMITTER/RECEIVER/SYNTHESIZER ASSEMBLY 19D901720G1-G4

TABLE OF CONTENTS

DESCRIPTION

The Transmitter/Receiver/System board (TRS) for DELTA-S provides all functions necessary for two-way communications in the 136-174 MHz range. The TRS board is provided in several groups. TRS boards 19D901720G1,3 are used in radios operating in the 150.8-174 MHz range, while 19D901720G2,4 are used in radios operating in the 136-153 MHz range. Depending on the specific range of operating frequencies used, it may be necessary to install/remove Rx VCO and Tx VCO tuning plugs. Refer to the Rx VCO and Tx VCO description and to the schematic diagram for additional information. Maximum channel spacing is limited to 5.5 MHz transmit and 2.0 MHz receive or 2.5 MHz with 1 dB degradation of receive sensitivity.

An optional receiver preamplifier is available and will increase the receiver gain by approximately 6 dB.

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.

Thirty-three standard EIA tones are programmable with the additional capability of programming any Channel Guard tone within the 67-210 Hz range ±0.5%. Eighty-three standard digital codes from 023 (H) to 526 (H) can be programmed. Programming data is located in the Programmers Manual.

The transmitter PA is mounted on a separate board located along the side of the radio near the heat sink assembly. 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 eraseable 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 EE PROM may be programmed serially through the front connector using the General Electric Universal Radio Programmer Model TQ2310. The TQ2310 permits complete PROM programming information to be programmed through its mini computer.

The TRS board also provides access for parallel loading (through program connector J711) on a per channel basis using the General Electric 4EX22A10 Single Channel Programmer. P706 must be removed to program with the 4EX22A10 and should be replaced when programming is complete.

For S950 control unit applications without downloading, add P707 to disable programming function. P707 will prevent destruction of PROM program and must be removed when programming with the TQ2310 or 4EX22A10.

The microcomputer interfaces with the control unit through J601 and responds to all user commands and control functions originating from the control unit. It provides the transmit and receive frequency data to the frequency synthesizer, switching information for tone and digital Channel Guard, and provides 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 are 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 on the PA board by applying a low to the DPTT line. The microcomputer then delays 15 milliseconds before the transmit 9V is switched on by applying a low to the $\overline{\text{TX ENBL}}$ line P15. This is done to guarantee the antenna relay contacts are closed before the transmitter is energized. Once DPTT is low the receive audio is muted. Buffers Q716 and Q717 provide DPTT to the audio control circuits, antenna relay, and the option board.

The $\overline{\text{TX ENBL}}$ line is controlled by microcomputer port 15 through inverter Q718 and bilateral switch U302C & D. A low level on P15 turns Q718 off, allowing the bilateral switches to be turned on and A- applied on the $\overline{\text{TX ENBL}}$ line. Inverter Q720 is also turned on during this time to inhibit the alert tone PTT.

CHANNEL SELECTION

The microcomputer and EE PROM provides the radio with up to 32 independent transmit and receive frequencies. Each time the PTT switch is operated the microcomputer transfers frequency data from the EE PROM 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. At the same time PROM power switch Q715 is turned on and applies +5 VDC to the EE PROM. When the buffers are on channel select data is loaded into microcomputer input/output ports P20-P23. Power is then applied to the EE PROM and the tri-state buffers are turned off. The microcomputer converts the channel select data into address information, accesses the EE PROM, and receives the frequency data stored in the addressed location. This data then passes through the I/O ports of the EE PROM and P20-P23 of the microcomputer. The conversion process is repeated eight times in succession (eight locations are required for each channel) and the data loaded serially into the frequency synthesizer over 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 taken into consideration at this time is the status of frequency bit 5 (FB5) and the PTT line U705-38. 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 determines which EE PROM contains the requested data.

A second EE PROM is required if more than 16 channels are provided. The second EE PROM is plugged piggy back

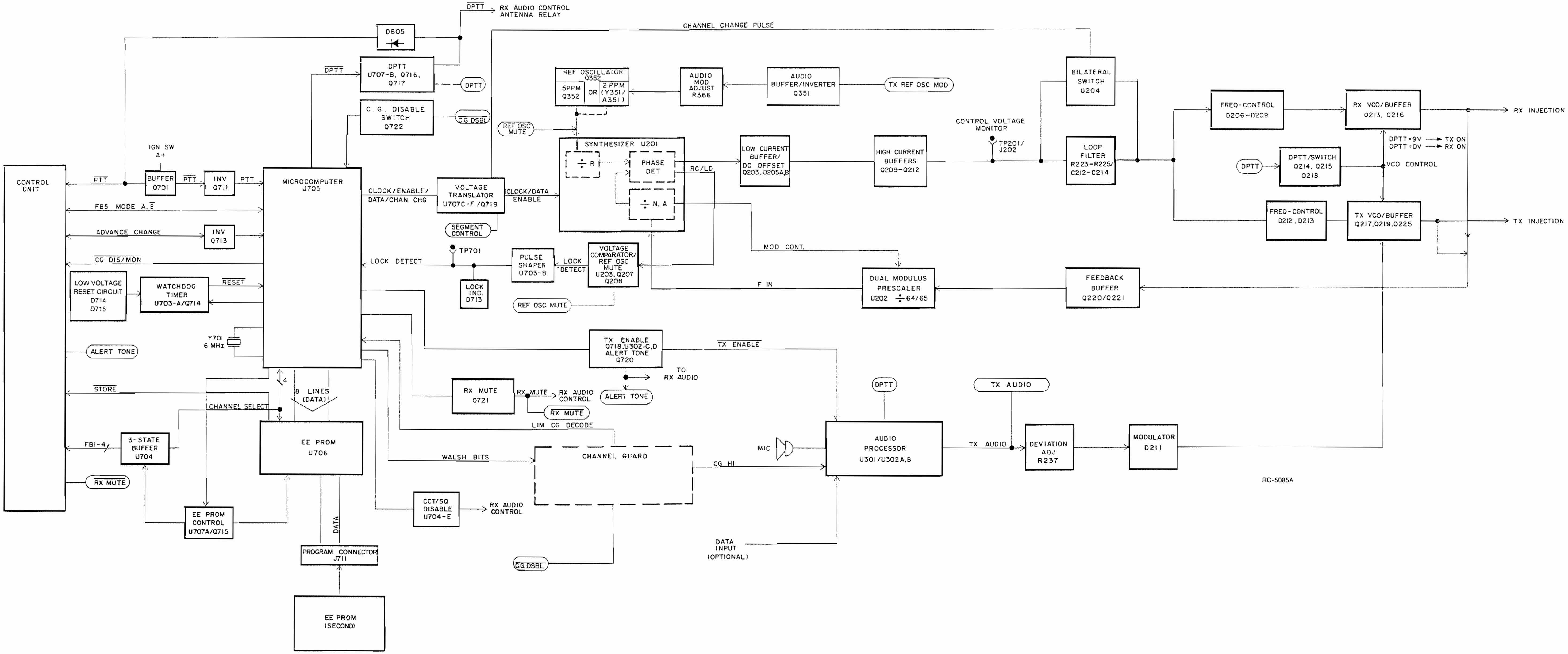


Figure 1 - System Control & Frequency Synthesizer

fashion directly into pins extending above the top of the first EE PROM. Programming Jack J711 may be used to program both PROMS (using PROM Programmer 4EX22A10). P706 must be removed to program with the 4EX22A10 and should be replaced when programming is complete. Diodes D718A and B and D719A and B provide spike protection for the microcomputer. D717A and B provide spike protection for the EE PROMS.

WATCHDOG TIMER

The watchdog timer consisting of a timer, 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 U705-35 and is applied to the base of inverter Q714, momentarily turning it on and inhibiting any reset pulse from timer U703-A. A voltage discharging circuit consisting of R754 and C719 forces the microcomputer to toggle U705-35. 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 frequency unlocked indicator 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 front connector J601 and applied to the microcomputer interrupt port on pin 6 through inverter Q713. The advance change pulse is active in radios equipped with PSLM. When a call is received on a priority channel the advance change pulse which occurs at each frequency change, 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 on the microcomputer, applied to the audio PA, and heard on the speaker. The CCT is programmed for 1 minute from the factory standard or can be disabled via programming in the field.

VOLTAGE TRANSLATION

Inverter buffers U707B-F, Q721, Q712 and Q718 translate the 5 VDC levels required by the microcomputer to the +9 VDC level used by the frequency synthesizer. Inverter Q719 restores the proper polarity to the clock.

Channel Guard

The Channel Guard encode and decode functions are implemented in the microcomputer under software control. The microcomputer will provide digital and 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 port P12 (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.

The Channel Guard Disable signal from the Channel Guard board is applied to system metering jack J602 for service monitoring and to microcomputer port T1 through buffer Q722. A low on the $\overline{\text{CG DIS}}$ line turns Q722 off guaranteeing a low on T1. When the $\overline{\text{CG DIS}}$ pulse is gone Q722 turns on providing a logic 1 to T2.

FREQUENCY SYNTHESIZER

The frequency synthesizer receives clock, data, and control information from the microcomputer and from this generates the Tx/Rx RF frequencies. It also provides frequency lock status to the microcomputer. It consists of synthesizer chip U201, low and high current buffers, loop filter, Tx and Rx voltage controlled oscillators (VCO's), feedback amplifiers, dual modulus prescaler, and the 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 IC.

Reference Oscillator

The reference oscillator consists of a 5 PPM oscillator, audio amplifier with Audio MOD ADJUST Control R366. The standard reference oscillator frequency is 13.2 MHz.

The temperature compensation network for the 5 PPM oscillator consists of R351-R356 and D351. R351, R354 and R356 are thermistors having a negative temperature coefficient. Their resistance increases with a decrease in temperature.

Compensation voltage may be monitored at J352. Typically, this voltage will be 5.55 VDC ±0.1 VDC at 25°C (77°F). The response curve of the temperature compensator is designed to complement the typical "S" curve exhibited by crystals. The "S" curve reflects the way crystal frequency varies with temperature. The output voltage of the temperature compensator then varies the voltage applied to varicap D351 to maintain the oscillator frequency within ±5 PPM.

C353 absorbs any voltage spikes that are present on the line to prevent any sudden changes in voltage and output frequency. Power is provided by the +9V SYN/EXCTR supply.

The 5 PPM oscillator is a modified Colpitts circuit using a FET transistor, Q352, and fundamental crystal Y351. The oscillator frequency is tuned by L352. Oscillator output is typically 0.7 VPP. Audio deviation is set by R366.

An optional 2 PPM oscillator is available for high stability applications. The oscillator is incorporated into the circuit by replacing the 5 PPM crystal Y351 with a 2 PPM crystal and by also removing three resistors--R352, R353 and R355. These three resistors are replaced by a plug-in resistor network, A351. A351 plugs into connector J351.

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 4.166667 kHz channel reference for the synthesizer. This divide value can be changed by PROM programming. 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 is programmed by the microcomputer. This comparison results in a ± error voltage when the phase 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 VCO DC offset and 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 frequency unlocked indicator is turned on when the VCO is unable to lock on 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 buffer Q201 and diodes D205A, B receive the error voltage from the synthesizer and increase this level by 1.8 VDC to extend 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 either Q209 or Q211 on. These two transistors control high current buffers Q210 and Q212. Q210 and Q212 complete a high current rapid charge or discharge path for C212-C214.

If the error voltage decreases Q211 is turned off and Q212 is turned on completing a discharge path for C212-C214 through bilateral switches U204A-D. At the same time, Q209 is turned on and Q210 is turned off, blocking the charge path. The opposite conditions exist when the error voltage goes positive. U204 is turned on for 4 milliseconds each time a channel is changed while in the receive mode 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 dual priority scan. 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 and maintain the VCO frequency.

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

Receiver Voltage Controlled Oscillator

The Receiver VCO consists of a low noise JFET oscillator, Q213, followed by high gain buffer Q216. Q216 prevents external loading and provides power gain. The VCO is a Colpitts oscillator with the various varactors and capacitors forming the tank circuit along with L203. Capacitor C220 allows manual adjustment of the VCO across a 15 MHz band at HB frequencies. Removing plug P201 moves the tuning range from the lower portion of the frequency split to the upper portion of the split (See Table 1). 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 (Q215 is off, Q214 is on). Oscillator output is typically +10 dBm, and VCO lock time is 4.0 milliseconds maximum.

Depending on the programmed receive frequencies, Rx VCO tuning plug P201 may be required. Refer to Table 1 and the schematic diagram.

Transmitter (VCO)

The transmit VCO is basically the same as the Receiver VCO except that coil, L209, is tuned to provide a manual tuning range of approximately 15 MHz. Removing plugs P203 and P204 moves the tuning range from the lower portion of the frequency split to the upper portion of the split (See Table 1). The varactors provide a voltage controlled adjustment range of approximately 6 MHz at HB frequencies. The high gain series buffers Q219 and Q225 provide a typical output of +18 dBm. Transmit audio is applied to deviation adjustment control R237. Deviation is set for 4.5 kHz (3.75 kHz with tone or digital Channel Guard).

VCO control switch Q218 turns the Transmit VCO on when DPTT is high. VCO lock time is 2.0 milliseconds.

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

Depending on the programmed transmit frequencies, Tx VCO tuning plugs P203 and P204 may be required. Refer to Table 1 and the schematic diagram.

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 Q220 and Q221 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 or 6.25 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 (receive) when the PLL is locked or 3 to 8.0 VDC (transmit).

Lock Detect

The lock detect circuit consists of comparator IC U203, diodes D201 and D203, 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

TABLE 1 - Tuning Plug Use

	RADIO OPERATING FREQUENCY		Rx VCO TUNING PLUGS P201	Tx VCO TUNING PLUGS P203 & P204
	HIGH SPLIT-GP1 150.8-174 MHz	LOW SPLIT-GP2 136-153 MHz		
RX	150.8-159 MHz	136-145 MHz	IN	IN
	155-174 MHz	141-153 MHz	REMOVE	REMOVE
TX	150.8-167 MHz	136-149 MHz	IN	IN
	161-174 MHz	143-153 MHz	REMOVE	REMOVE

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 into synchronization rapidly.

If a large frequency error exists the LD positive lead from the synthesizer will carry negative spikes to the microcomputer through D203B to activate the lock indicator circuit, turning lock indicator D713 on. 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 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 U301B-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 can be 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. U301A 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.

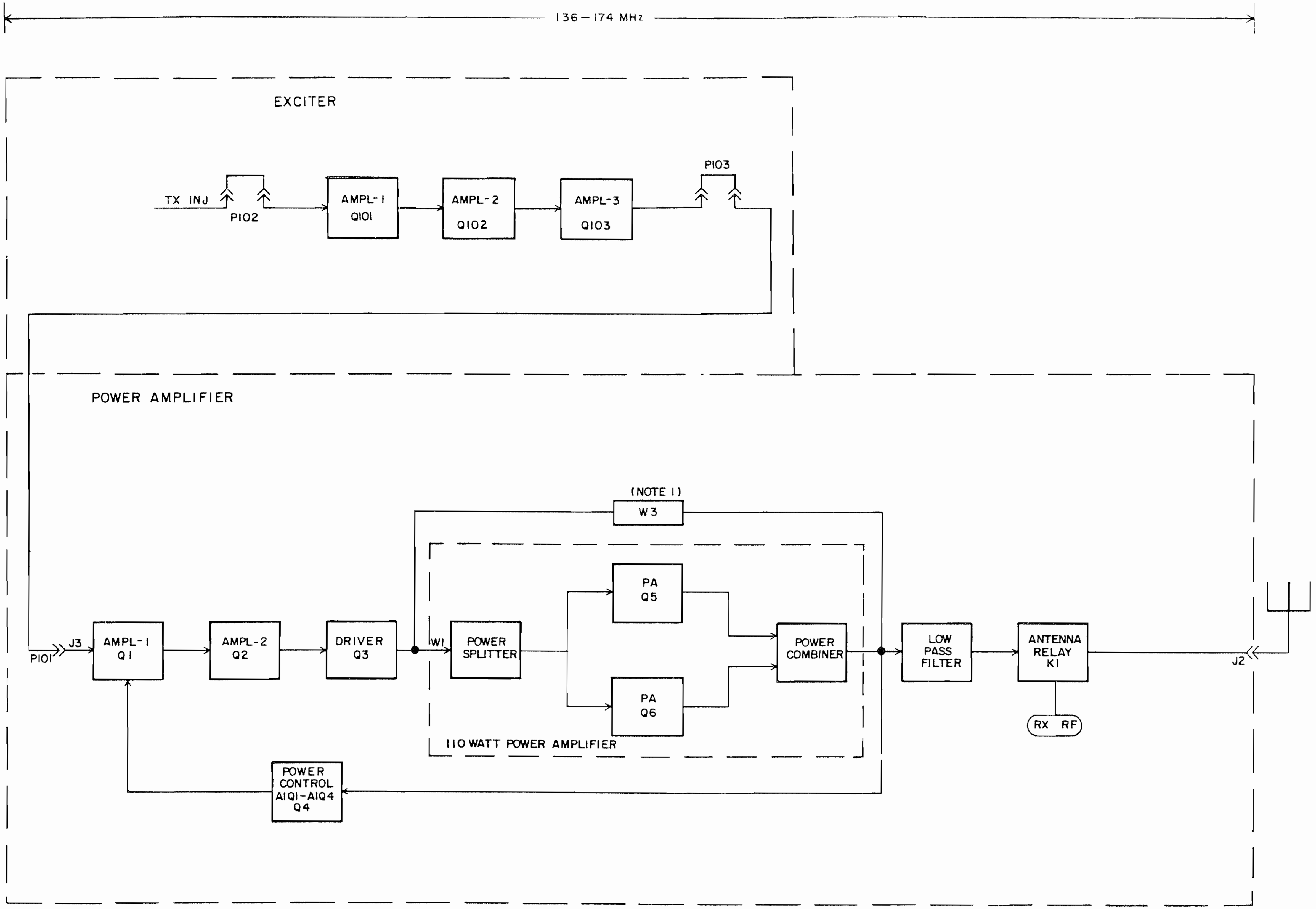
SERVICE NOTE

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

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.

EXCITER

The exciter consists of three wideband amplifier stages and operates over a frequency range of 136-174 MHz without any tuning. An attentuator pad (R101-



NOTE:
1. W3 PRESENT ONLY IN 40/60 WATT TRANSMITTERS.
W1 PRESENT ONLY IN 110 WATT TRANSMITTERS.

Figure 2 - Exciter and Power Amplifier

RC- 4416

R103) at the input of the exciter provides a constant load for the VCO and attenuates the signal from the VCO to approximately 1 milliwatt. The exciter amplifies the 1 milliwatt signal from the VCO to provide 250 milliwatts drive to the power amplifier.

The 136-174 MHz Tx injection 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. R104 and R105 set the bias voltage for the Q101. Collector voltage is applied direct from the +9V synth/EXCTR line through collector feed network L102 and R107. C104 provides noise decoupling.

The output of Q101 is coupled to the base of amplifier Q102 through C105 and impedance matching components C106 and L103. R109 and R110 set the bias voltage for Q102.

The output of Q102 is coupled to the base of amplifier Q103 in the same manner as Q102. The 250 millivolt output of Q103 is coupled to the power amplifier board through 50 ohm microstrip Z101, service plug P103 and output plug P101.

Collector voltage for Q102 and Q103 is supplied by +9V synth/EXCTR through 9V Tx switch Q104. Q104 is controlled by TX ENBL from the microcomputer. When TX ENBL is low Q104 is turned on providing voltage to amplifiers Q102 and Q103. When TX ENBL goes high (receive mode) Q102 and Q103 are turned off, preventing any interference by the Tx VCO frequencies.

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 C124 and R119. 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 R120, R121 and C125. This point typically is 0.45 V on the GE test set.

The third metering point at J101-8 monitors the relative power output of amplifier Q103. The metering network consists of R122, D101, C126 and C127. The relative exciter power output can be read at the test jack on the power amplifier assembly.

SERVICE NOTE

The 50 ohm microstrip and P101 can be used for measuring the RF levels throughout the exciter.

The exciter is energized by pressing the PTT switch. A regulated 9 volts is present on all exciter stages when the radio is turned on. It is normal to have a residual reading of several tenths of a volt at J101-10 when the transmitter is not keyed.

Capacitors C119 through C123 isolate the exciter board from vehicle ground for operation in vehicles with positive or negative ground.

RECEIVER

The receiver uses an intermediate frequency of 10.7 MHz. Adjacent channel selectivity is obtained by using one 2-pole and two 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.

An optional preamplifier may be provided for increased sensitivity. A block diagram of the receiver is shown in Figure 3.

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

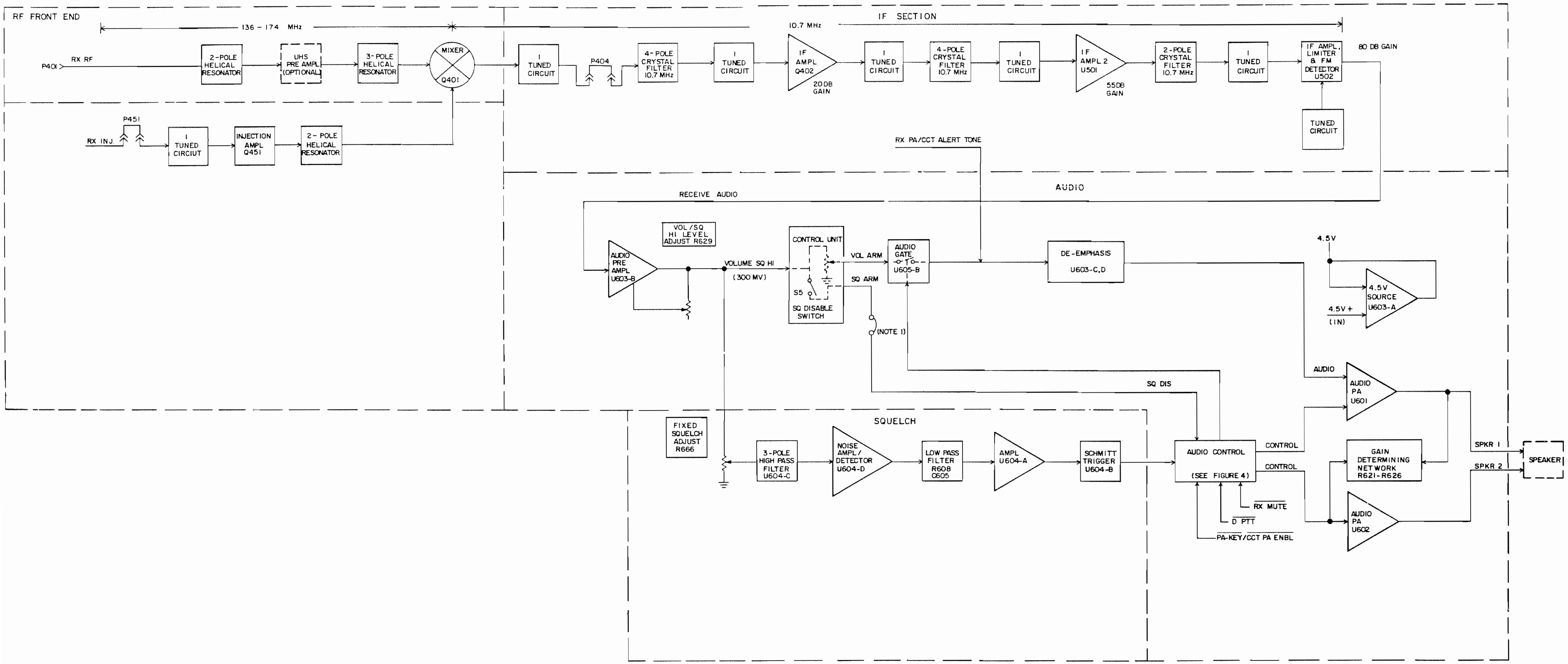
- Receiver Front End
- LO Injection Amplifier
- Mixer
- 10.7 MHz IF Circuitry
- Limiter/FM Detector
- Audio PA
- Squelch

RECEIVER FRONT END

An RF signal from the antenna is coupled through five helical resonators (L401-L405 and C1-C5) to the gate of mixer Q401. Front end selectivity is provided by the resonators.

An optional Ultra High Sensitivity (UHS) preamplifier may be used to increase the front end gain. The preamplifier plugs into J401, which is located between the second and third resonators. When the preamplifier is not used, L420 couples the RF between the two resonators. When the preamplifier is used, L420 is removed.

CIRCUIT ANALYSIS



NOTES:
1. REFER TO SCHEMATIC DIAGRAM FOR VARIABLE SQUELCH OPTION.

Figure 3 - Receiver Block Diagram

RF PREAMPLIFIER

The preamplifier is present only in UHS receivers and uses a dual-gate MOS FET transistor to provide an overall gain of 10 dB. Receiver sensitivity is increased by approximately 6 dB.

RF from the second resonator is coupled to gate 1 of dual-gate MOS FET Q1 through P1-7 and C2. C2, L2, and C5 comprise an impedance matching network to match the filter output with the MOS FET input. Bias on gate 2 is set by R2 and R3. The output is taken from the drain and coupled to the 3-pole resonator through C6 and P1-2.

LO INJECTION

The receiver L.O. injection from the synthesizer (5-15 dBm) is applied to the base of buffer Q451 through isolating jack J451 and tuned circuit L451.

The output of Q451 is coupled through L453, C459 and a two-pole resonator (C6 and C7) to the source of mixer Q401.

The mixer injection metering (Rx MIX) is taken from the source of mixer Q401 and metered at J101-3 (position H on test set). The reading is typically 0.6 volt with injection and 0.5 volt without injection. The synthesizer frequency may be measured at TP401.

MIXER

Mixer Q401 is a junction field effect transistor (JFET). The JFET mixer provides a low input impedance, moderate power gain, and an output relatively free of harmonics (low in intermodulation products).

In the mixer stage, RF from the helical resonators is applied to the gate of the mixer. Injection voltage from the frequency synthesizer is applied to the source of the mixer. The 10.7 MHz mixer IF output signal is coupled from the drain of Q401 through an impedance matching network (C407, C405, L410 and R403) and isolating jack J404 to a 4-pole crystal band-pass filter. Voltage to the drain of Q401 is supplied from the +9V Rx supply through L501, L502, R410, R411 and L407.

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 (C411, R404 and L411) G1 of IF amplifier Q402.

IF & DETECTOR STAGES

IF amplifier Q402 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 Q402 is matched into a second 4-pole crystal filter by tuned circuit L412, C414 and R407. The output of the band-pass 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 2-pole crystal band-pass filter (Z503) which provides the final stage of IF selectivity.

IF signal from the 2-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 J602-4 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 DPTT delayed Push-To-Talk) and PA KEY/CCT PA ENBL 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 (with the correct Channel Guard frequency for radios equipped with Channel Guard) 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 push-pull 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 below the squelch threshold level.

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 the 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 hystersis 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 hystersis 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.

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 DPTT (Delayed Push-To-Talk), RX MUTE (Receiver Mute), PA KEY/CCT PA ENBL (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 bases of the transistors are connected in parallel 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 603-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.

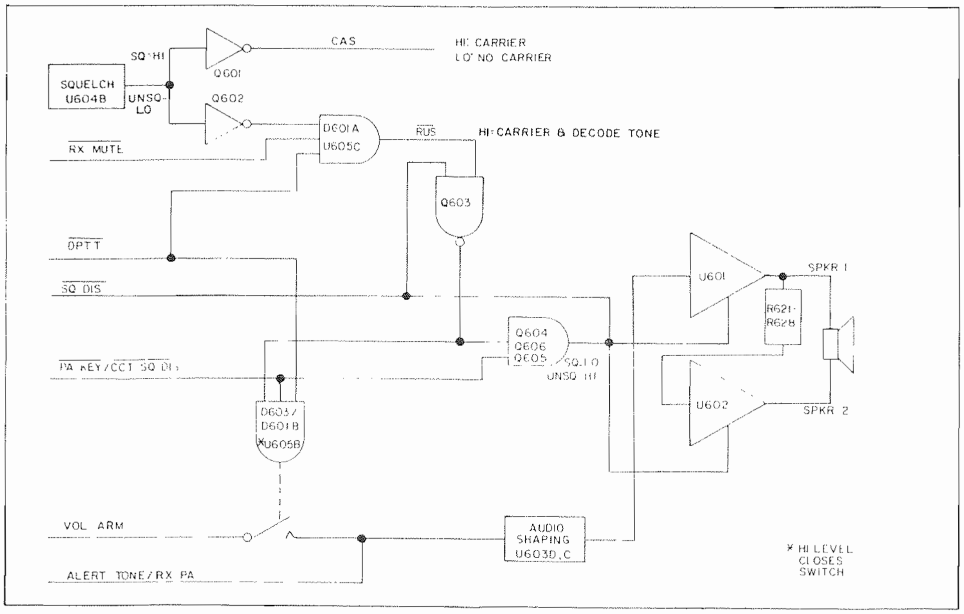


Figure 4 - Audio Control Circuits

POWER DISTRIBUTION

Battery supply A+ enters the radio through the front connector at J601-20. 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.

This board is for negative ground applications only. A positive ground converter must be used for positive ground applications.

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.

MODIFICATION INSTRUCTIONS FOR VOICE GUARD™ OPTION

To apply the VOICE GUARD™ option to the DELTA-S UHF radio the interface board must be installed in the radio. To make the radio compatible with the VG option minor changes must be made to the T/R/S board.

P612 should be removed from the T/R/S board. The black wire of interconnect cable W1 should be connected to J612 pin 1 and the white wire should be connected to J612 pin 2. The interconnect cable can then be plugged onto J3 of the VG interface board.

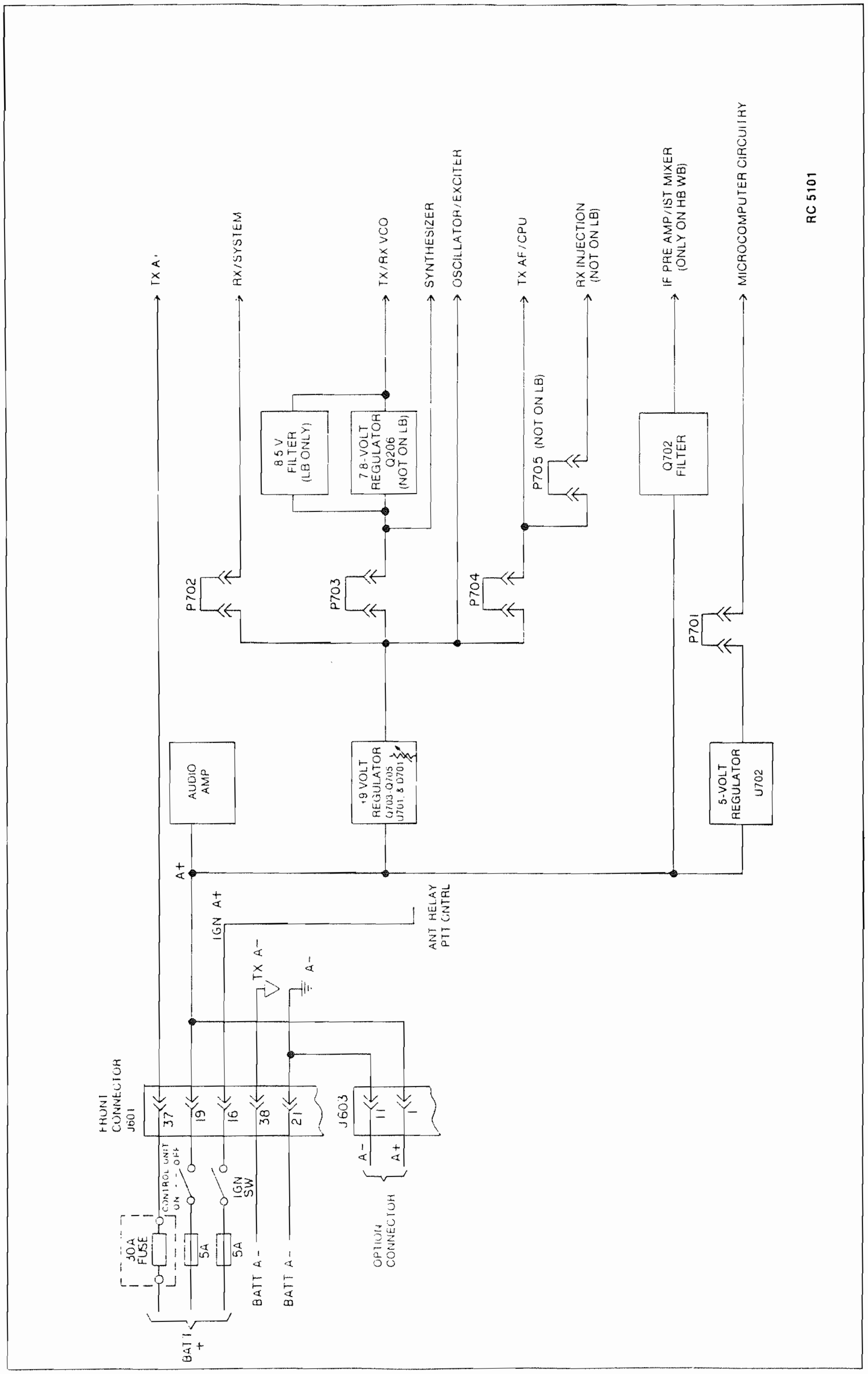


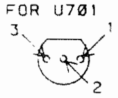
Figure 5 - Power Distribution

CAUTION

OBSERVE PRECAUTIONS FOR HANDLING

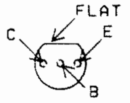
ELECTROSTATIC SENSITIVE DEVICES

LEAD IDENTIFICATION FOR U701



TOP VIEW

LEAD IDENTIFICATION FOR ALL TRANSISTORS NOT OTHERWISE IDENTIFIED

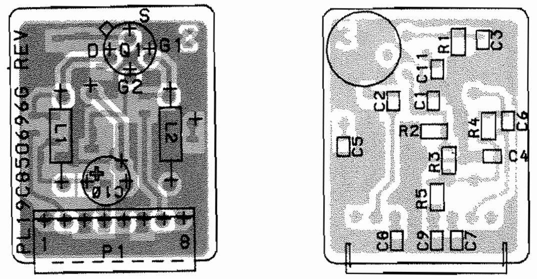


IN-LINE

TOP VIEW

NOTE: CASE SHAPE IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

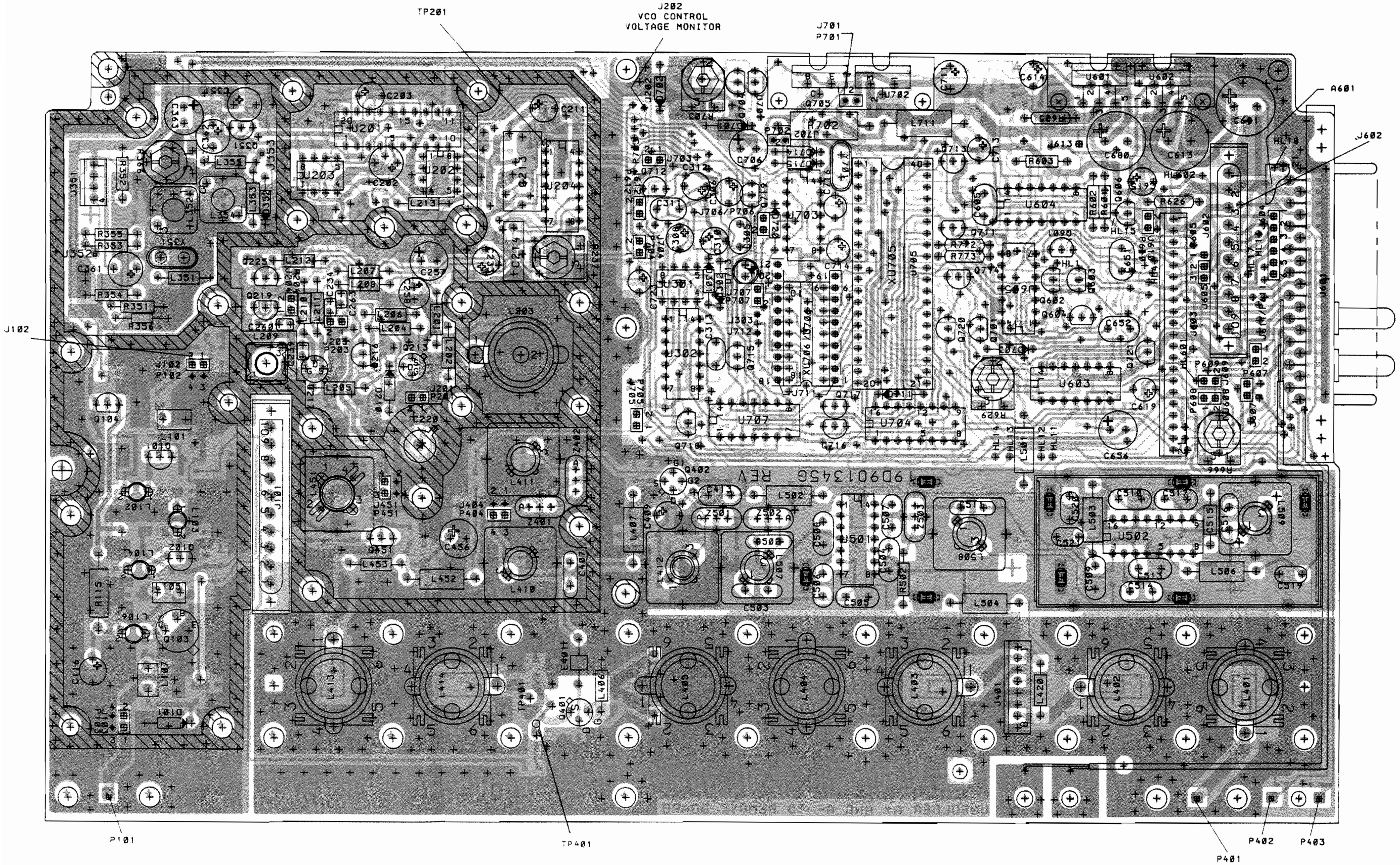
RF PRE AMP



BACK VIEW OF COMPONENT BOARD

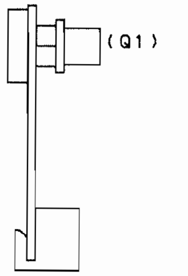
(19C850770, Rev. 4)
(19A701688, Sh. 1, Rev. 3)
(19A701688, Sh. 2, Rev. 3)

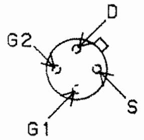
(19C850770, Rev. 4)
(19A701688, Sh. 2, Rev. 3)



(19D901347, Sh. 1, Rev. 3)
(19A704202, Sh. 1, Rev. 4)
(19A704202, Sh. 2, Rev. 4)
(19A704202, Sh. 3, Rev. 4)
(19A704202, Sh. 4, Rev. 4)

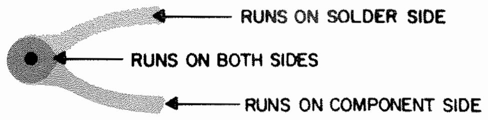
LEAD IDENTIFICATION FOR Q1





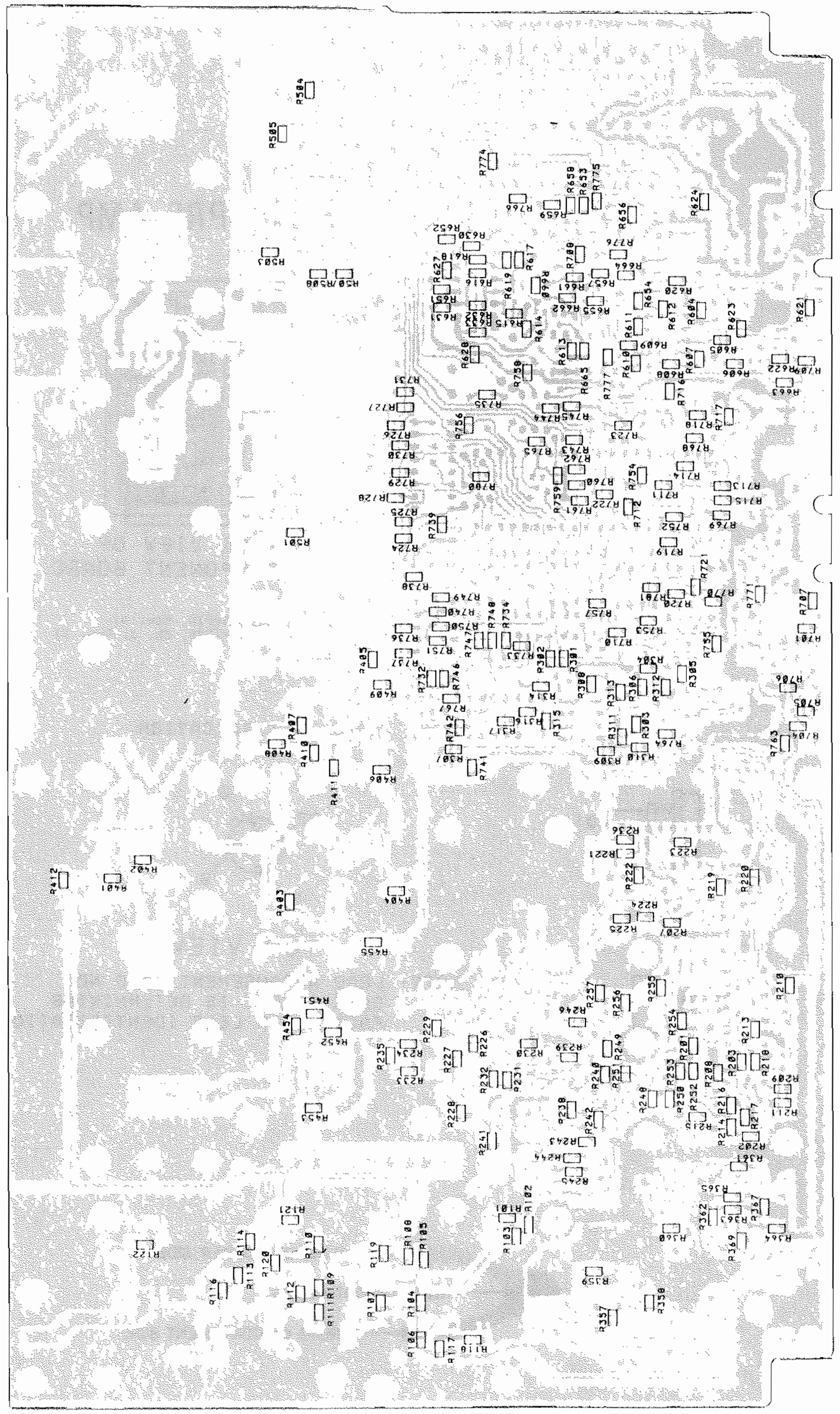
TOP VIEW

NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.



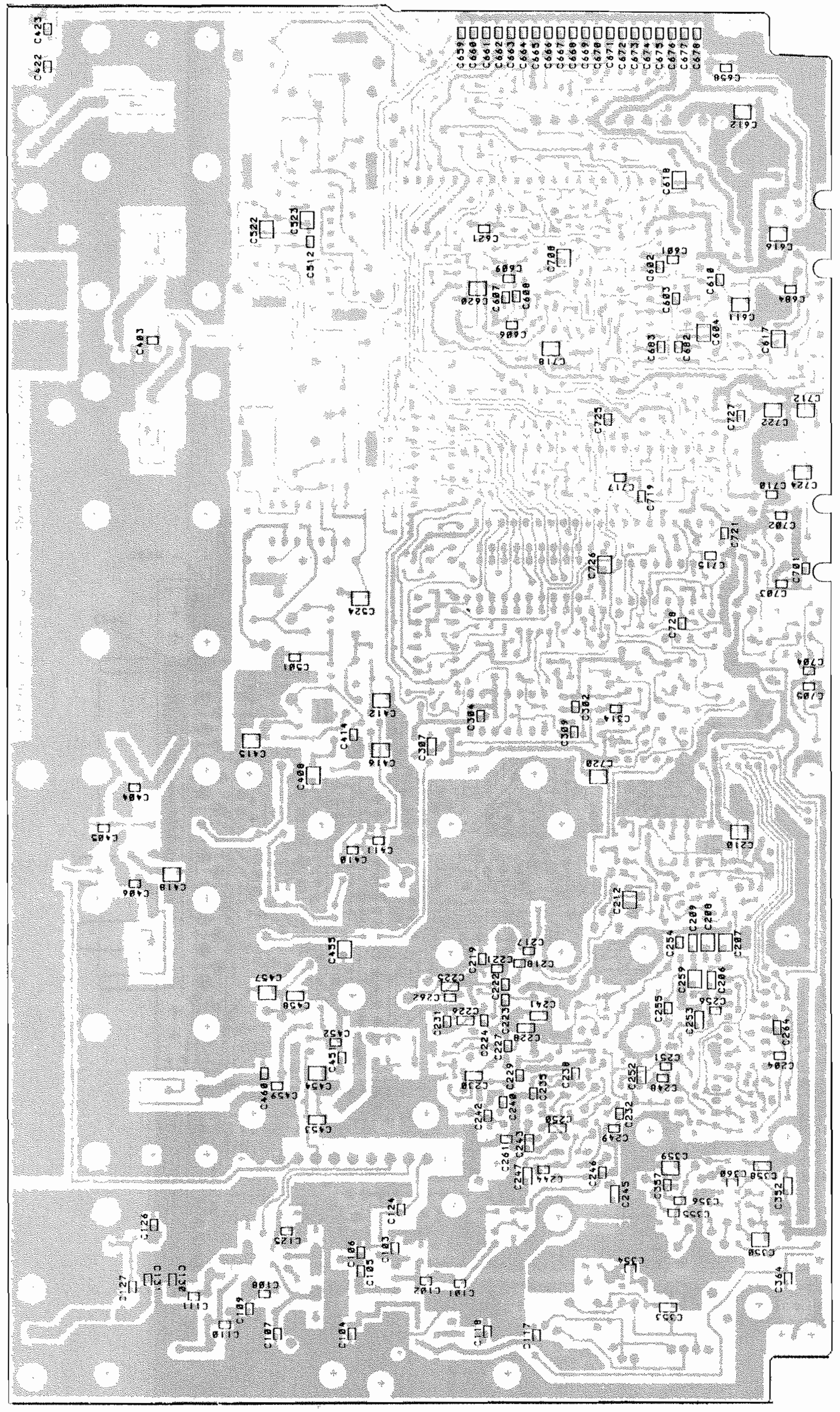
OUTLINE DIAGRAM

136-174 MHz TRANSMIT/RECEIVE
SYNTHERSIZED BOARD



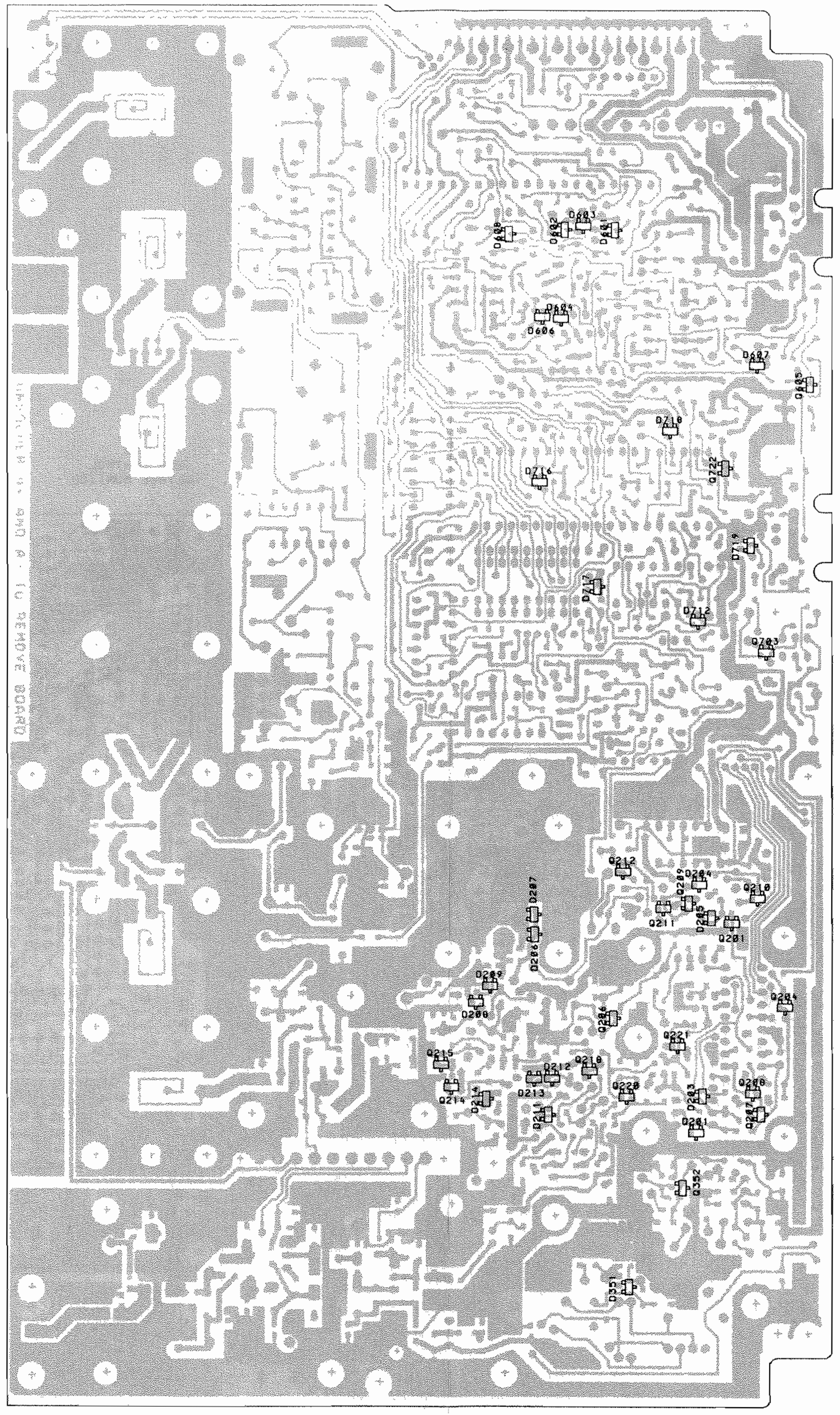
CHIP RESISTOR LOCATION

(19D901345, Sh. 4, Rev. 2)
(19A704202, Sh. 3, Rev. 1)
(19A704202, Sh. 4, Rev. 1)



CHIP CAPACITOR LOCATION

(19D901345, Sh. 2, Rev. 2)
(19A704202, Sh. 3, Rev. 1)
(19A704202, Sh. 4, Rev. 1)

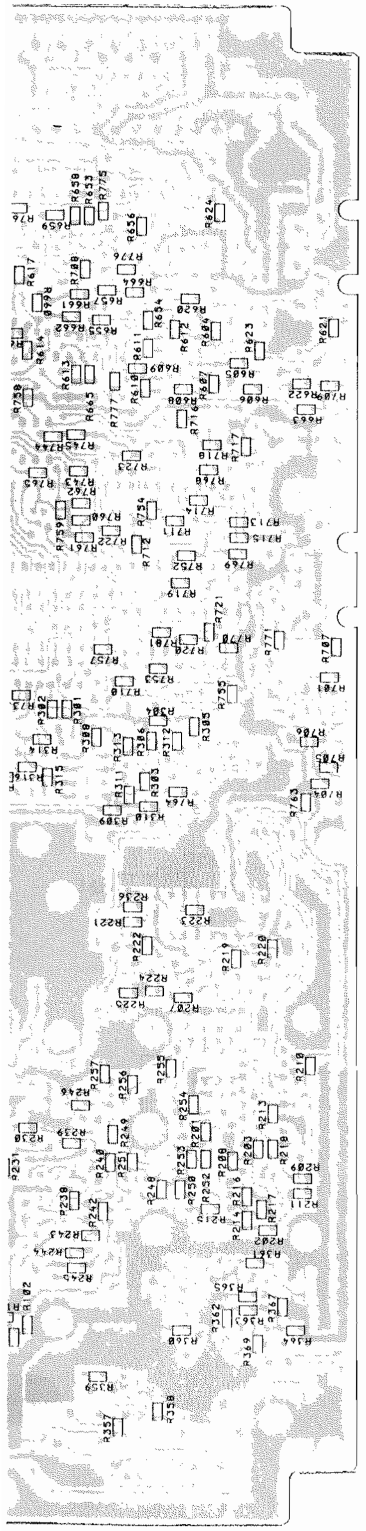


CHIP DIODE & TRANSISTOR LOCATION

(19D901345, Sh. 3, Rev. 0)
(19A704202, Sh. 3, Rev. 1)
(19A704202, Sh. 4, Rev. 1)

CHIP COMPONENT LOCATIONS

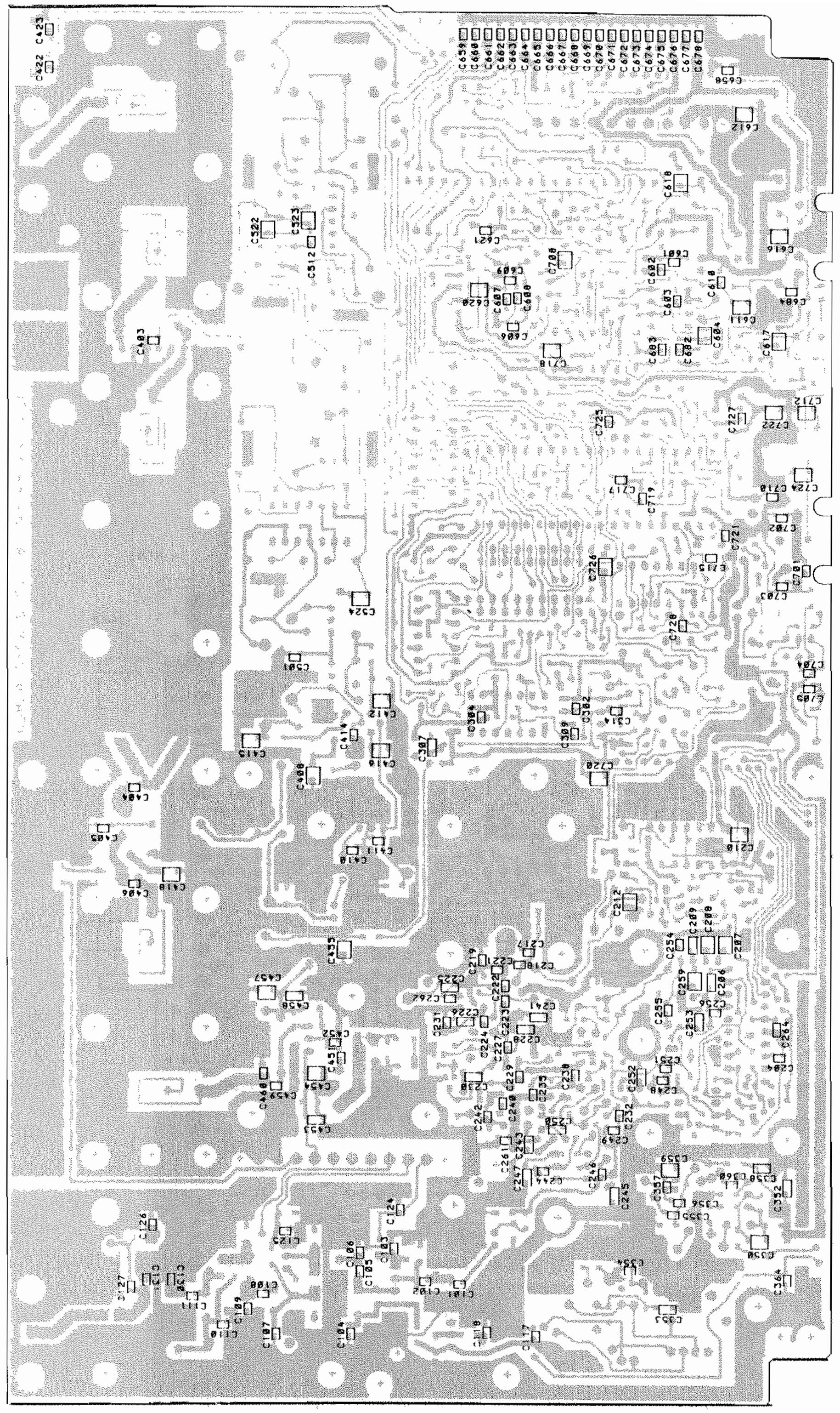
136 -174 MHz TRANSIT/RECEIVE SYNTHERSIZED BOARD



LOCATION

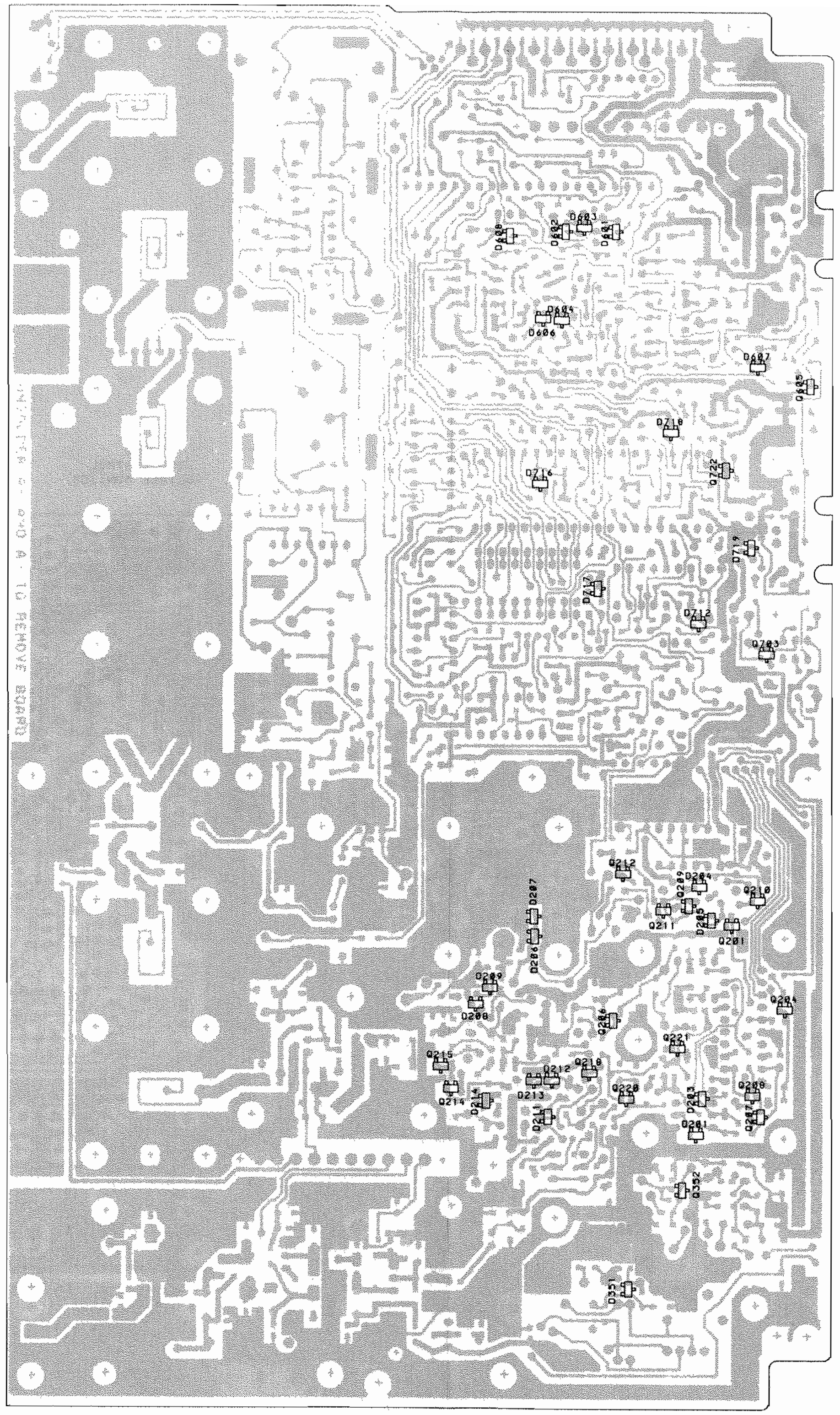
19D901345, Sh. 4, Rev. 2)
19A704202, Sh. 3, Rev. 1)
19A704202, Sh. 4, Rev. 1)

SYNTHERSIZED BOARD



CHIP CAPACITOR LOCATION

(19D901345, Sh. 2, Rev. 2)
(19A704202, Sh. 3, Rev. 1)
(19A704202, Sh. 4, Rev. 1)

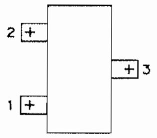


CHIP DIODE & TRANSISTOR LOCATION

(19D901345, Sh. 3, Rev. 0)
(19A704202, Sh. 3, Rev. 1)
(19A704202, Sh. 4, Rev. 1)

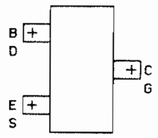
LEAD IDENTIFICATION FOR (SOT) DIODES

(TOP VIEW)



LEAD IDENTIFICATION FOR (SOT) TRANSISTORS

(TOP VIEW)



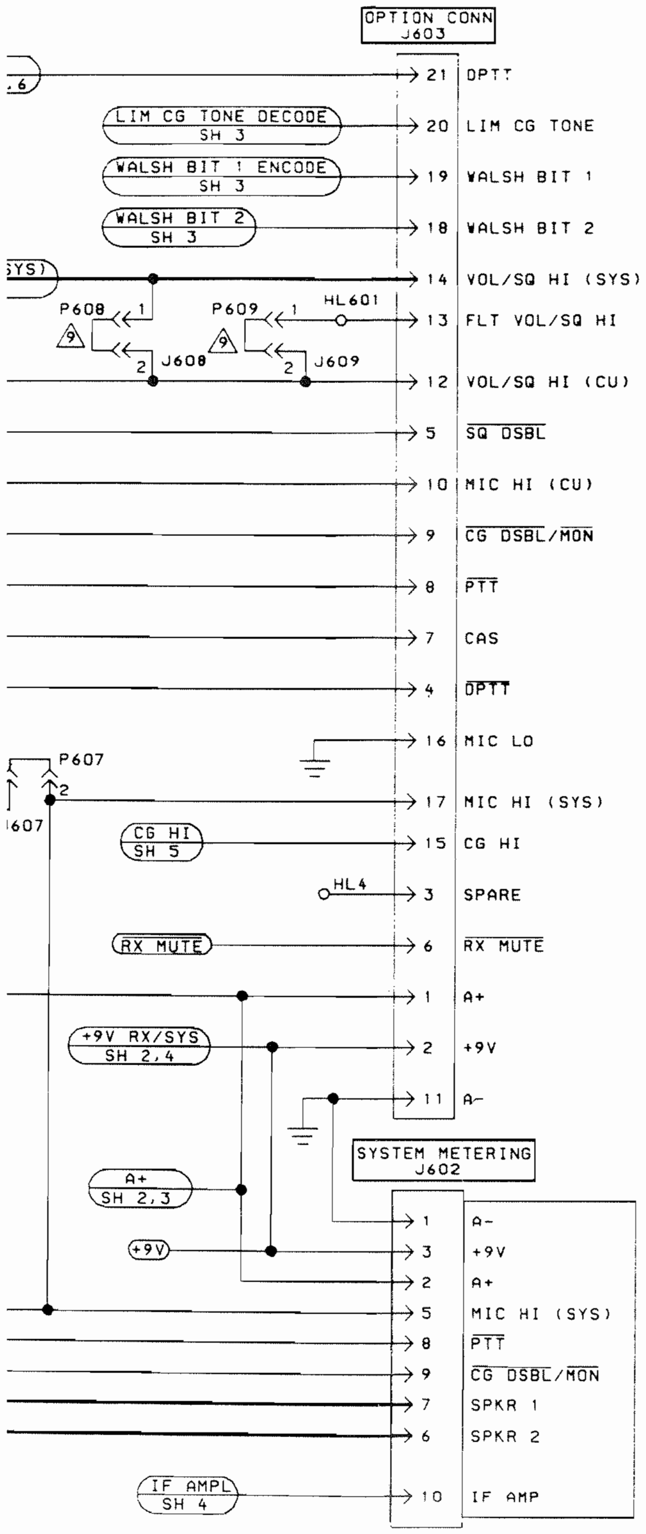


TABLE OF CONTENTS

△ COMPONENT IDENTIFICATION CHART

PART	GP1,5 150.8-174	GP3,7 136-153
C205	560p	
C217	15p	12p
C219	2.7p	6.8p
C221	47p	39p
C235	27p	30p
C238	12p	6.8p
C261		12p
C264		680p
C451	10p	12p
C452	27p	39p
C459	5.6p	10p
C460	18p	22p
L406	150n	220n
L420	120n	100n
L453	120n	150n
R233	150	261
R234	39	10
R235	150	261
R454	3.9k	560

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 A351 RESISTOR NETWORK AND CODED Y351 CRYSTAL MAKE UP 2PPM OSCILLATOR KIT 19C851230. FOR 2PPM OPERATION, REMOVE R352,R353,R355, & Y351. PLUG IN RESISTOR NETWORK A351 AND NEW CODED CRYSTAL Y351 SUPPLIED IN KIT.

5. ⏚ INDICATES VEHICULAR GROUND

△7 WHEN PREAMP OPTION IS CALLED FOR, REMOVE L420.

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

SHEET 5,6:
VOLTAGE READINGS ARE TAKEN WITH THE TRANSMITTER UNKEYED/KEYED.
EX: .45 (UNKEYED)/.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 (EXCEPT P610).
FOR FIXED SQUELCH OPTION, MOVE P605 TO J605-1 & 2 & ADD R666 (19A700185P4).
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.
ADD P610 FOR APPLICATIONS WITH S950 AND S990 CONTROL UNIT,DTMF ENCODER WITH SIDE TONE, PUBLIC ADDRESS OPTION,OR DELTA DESK TOP STATION.

△10 REGULATED +5V AND +9V CAN BE OPENED BY P701 THRU P705 FOR TROUBLESHOOTING.

△11 FOR SERIAL LOAD OF EE PROM FROM RADIO FRONT CONNECTOR J601

J601-10	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. ALTERNATE FREQUENCY IS 13.8 MHZ AND REQUIRES CHANGE OF EE PROM PROGRAMING.

△14 PROVIDED FOR TEST/TROUBLESHOOTING.

△15 REMOVE P706 TO USE MINI E^2 PROM PROGRAMMER. REPLACE WHEN PROGRAMMING COMPLETE.

△16 ADD P707 TO DISABLE E^2PROM PROGRAMMING FUNCTION. (RECOMENDED FOR S950 AND S990 CONTROL UNIT APPLICATIONS WITHOUT DOWNLOAD).

△17 P201, P203 & P204 ARE PROVIDED TO ALLOW FULL FREQUENCY SPLIT TUNING OF THE SYNTHESIZER. REFER TO TEST SPECIFICATION.

△18 VOLTAGE AT Q102 AND Q103 BASE WILL READ 0V IF RF DRIVE IS PRESENT.

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,n OR u.

SPARE GATES

DEVICE	INPUT	OUTPUT	CONTROL
U605D	11	10	12
U605A	1	2	13
U704F	14	13	

POWER & GROUND CONNECTIONS

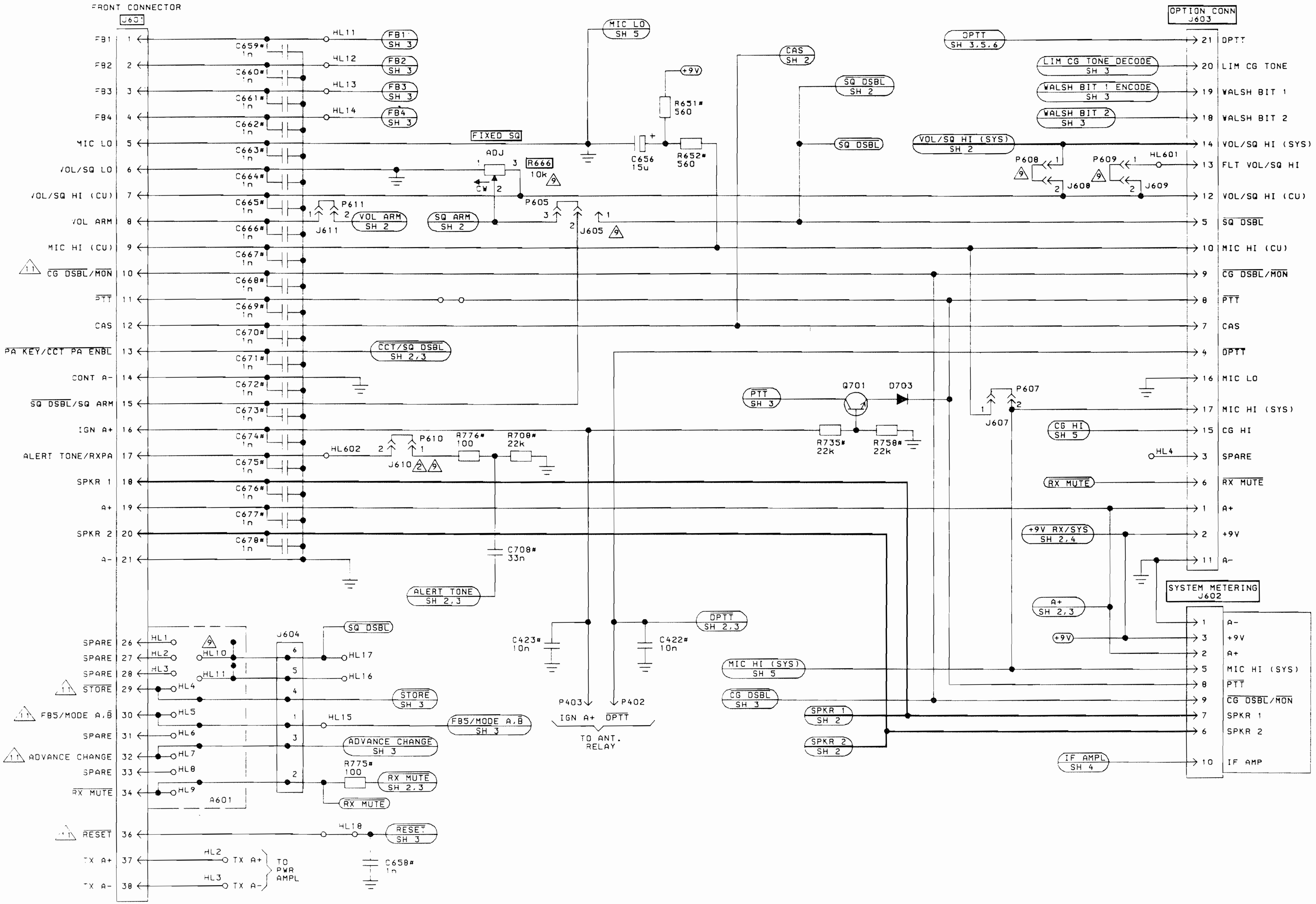
DEVICE	+9V PIN NO.	A- PIN NO.	+5V PIN NO.
U203	8	1,4	
U204	14	7	
U301	8	4	
U302	14	7	
U603	4	11	
U604	4	11	
U605	14	1,7,11,12,13	
U703		7	14
U704		8,14	16
U707		7	14

MODEL NO.	REV. LETTER	FREQ	COMMENTS
PL19D901720G1		150.8-174 MHZ	TIN CONNECTORS
PL19D901345G1	B		
PL19D901720G2		136-153 MHz	
PL19D901345G3	B		
PL19D901720G3		150.8-174 MHZ	GOLD CONNECTORS
PL19D901345G5			
PL19D901720G4		136-153 MHz	
PL19D901345G7			

(19D901346, Sh. 1, Rev. 3)

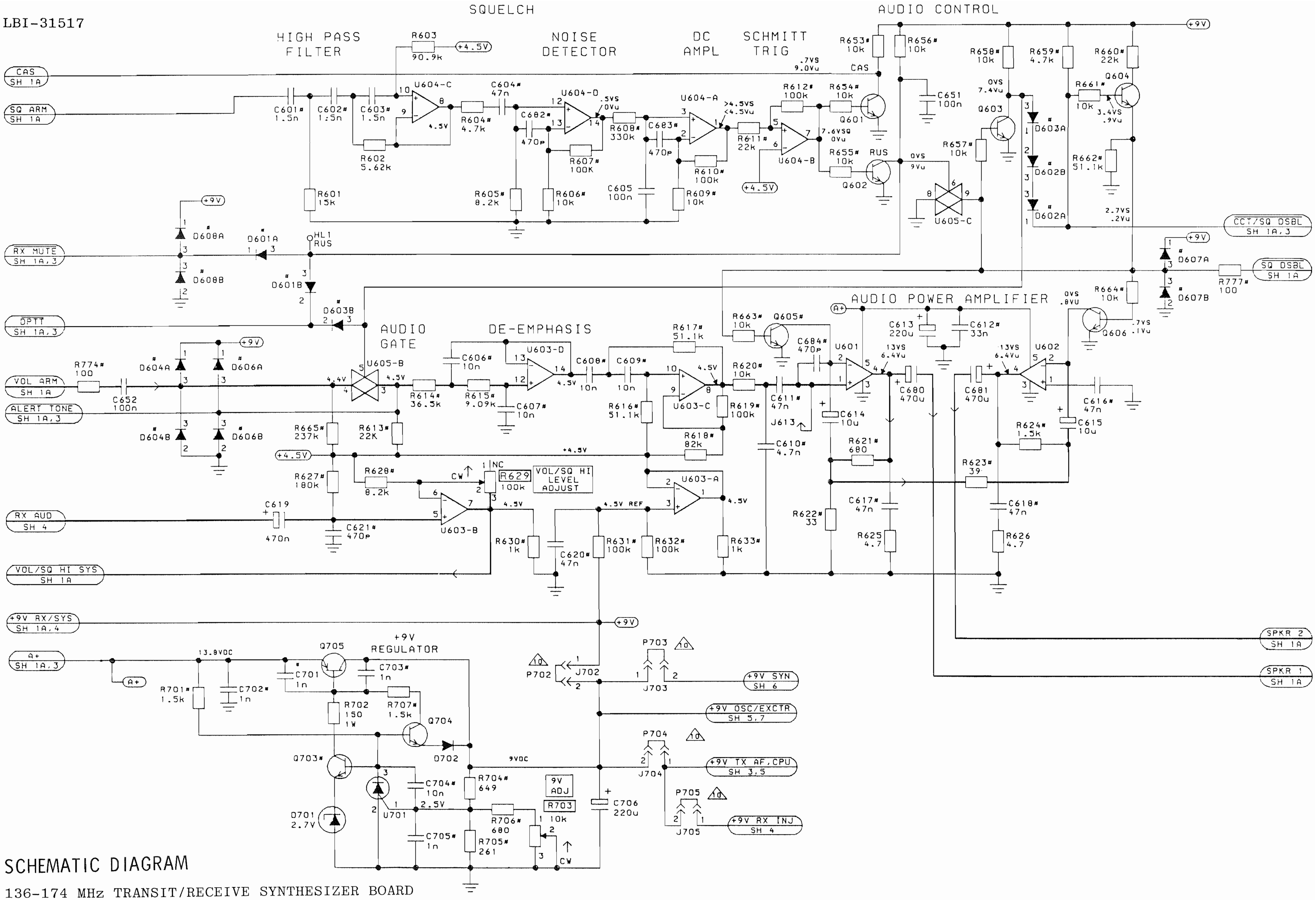
SCHEMATIC DIAGRAM & NOTES:

136-174 MHz TRANSIT/RECEIVE SYNTHESIZED BOARD



(19D901346, Sh. 1A, Rev. 2)

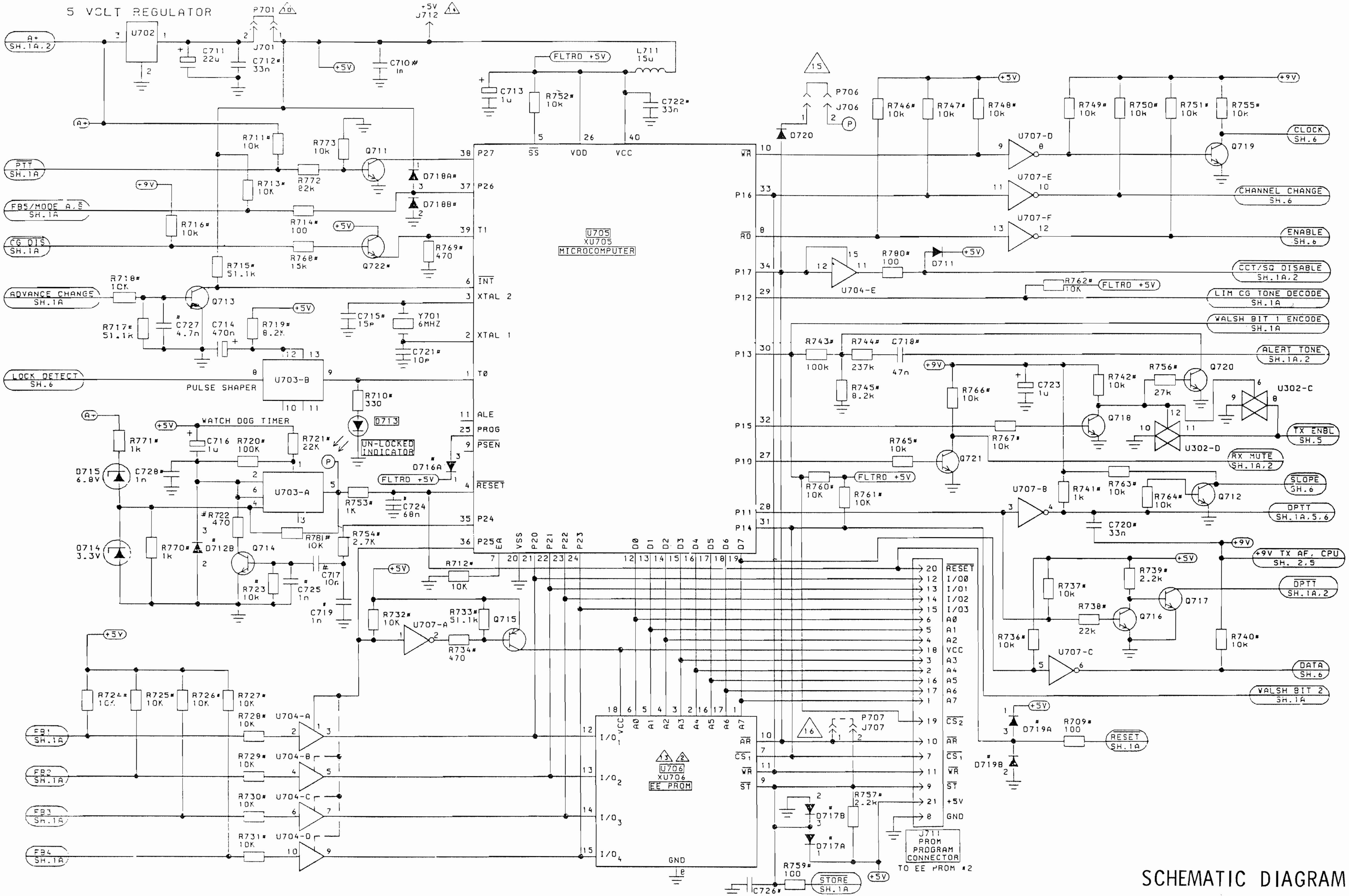
NOTES
SECTI
SYS



SCHEMATIC DIAGRAM

136-174 MHz TRANSIT/RECEIVE SYNTHESIZER BOARD

(19D901346, Sh. 2, Rev. 0)

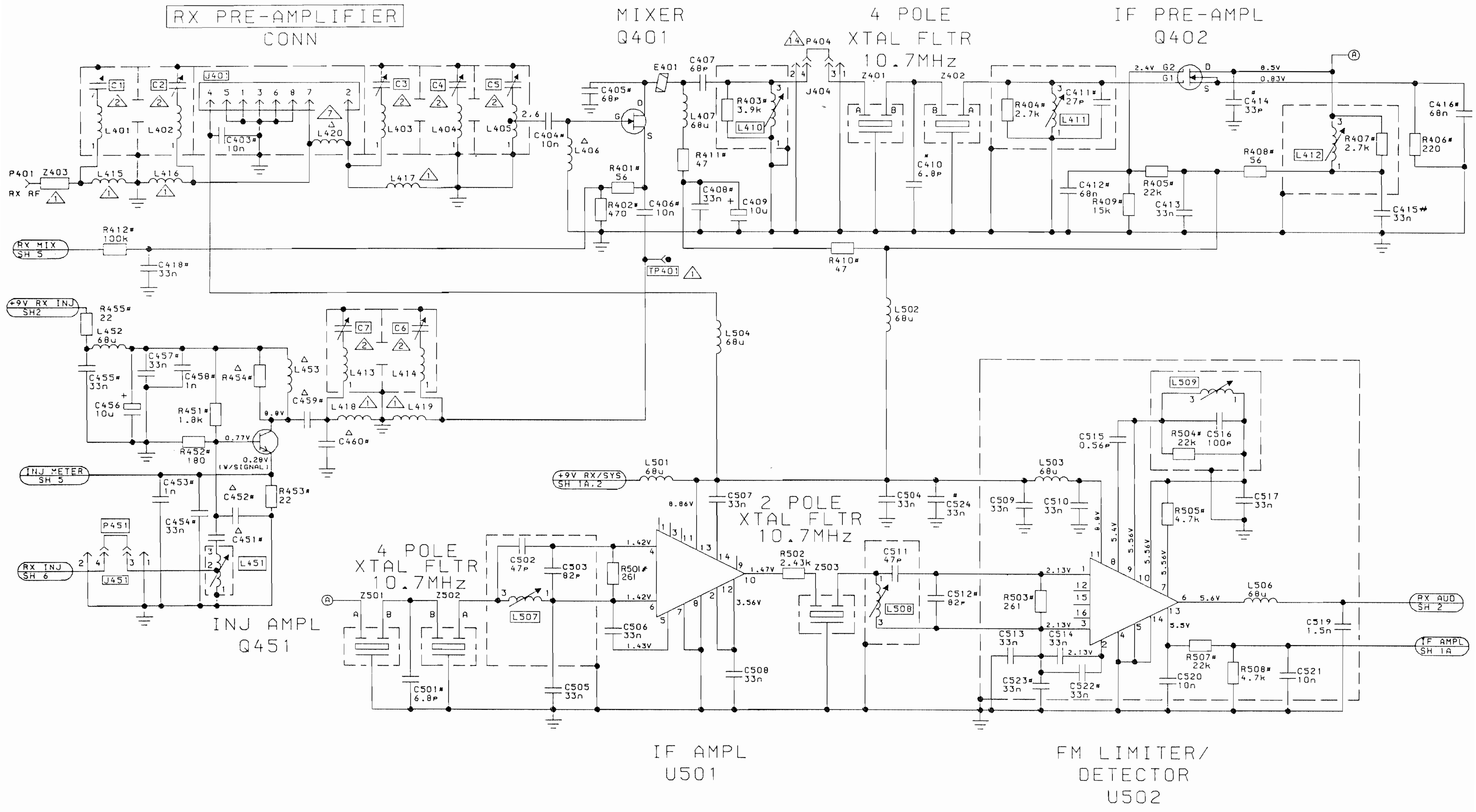


SCHEMATIC DIAGRAM

TRANSIT/RECEIVE SYNTHESIZER BOARD

(19D901346, Sh. 3, Rev. 1)

Issue 1



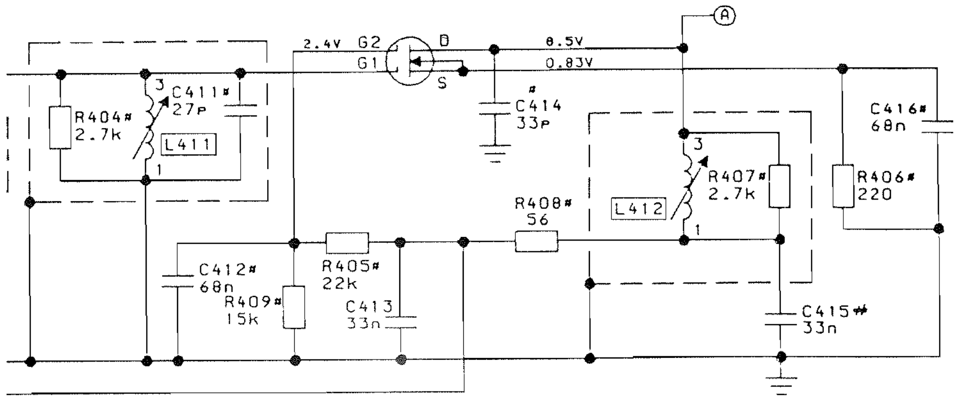
SCHEMATIC DIAGRAM

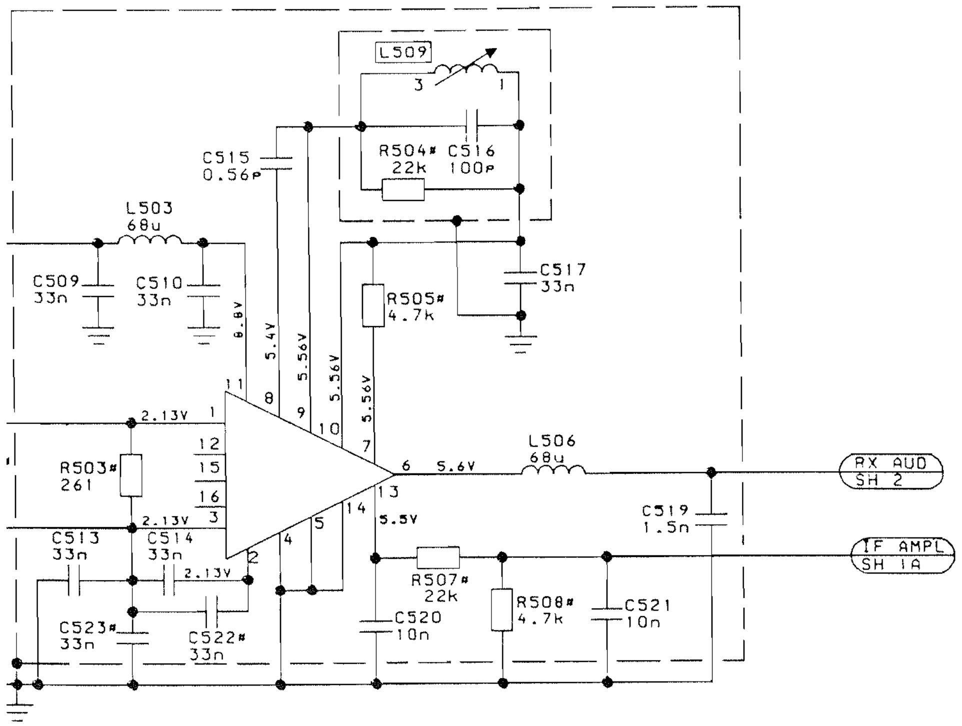
TRANSIT/RECEIVE SYNTHESIZER BOARD

RECEIVER

(19D901346, Sh. 4, Rev. 0)

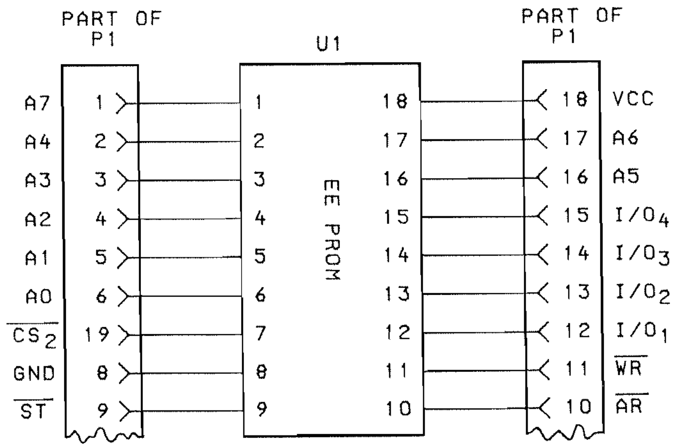
IF PRE-AMPL
Q402



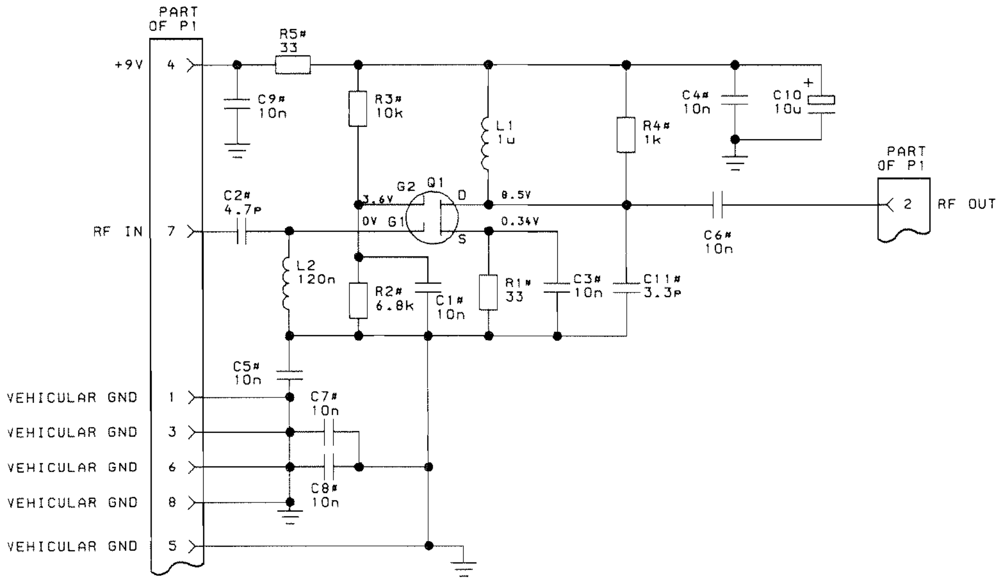


FM LIMITER/
DETECTOR
U502

E^2 PROM INTERCONNECTIONS



(19B800996, Rev. 0)



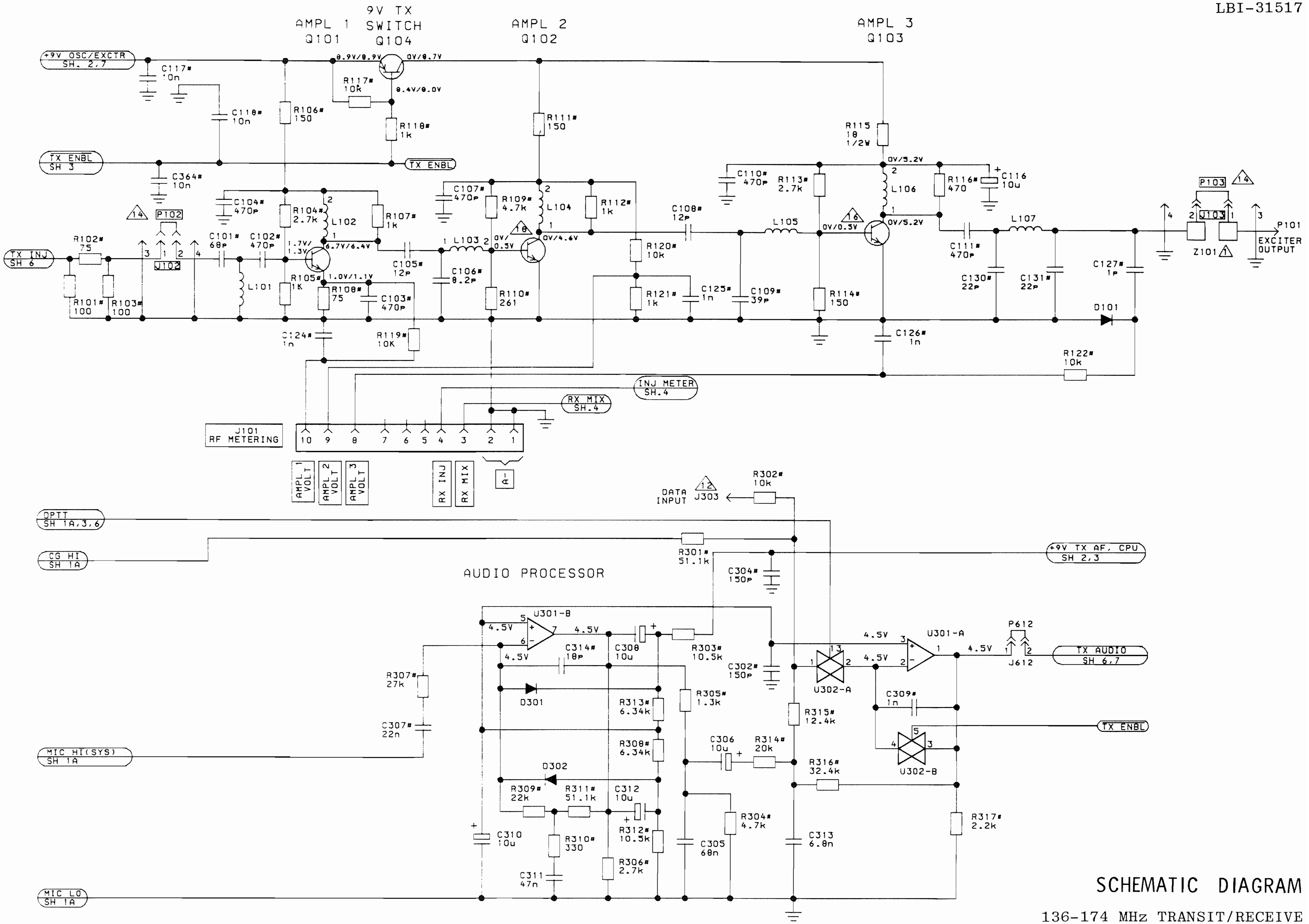
NOTES:

1. "#" IDENTIFIES "CHIP" COMPONENTS (EXAMPLE: R3#) WHICH ARE LOCATED ON THE SOLDER SIDE OF THE BOARD.

ALL 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 μ, n OR p.
INDUCTANCE VALUES IN H UNLESS FOLLOWED BY MULTIPLIER m OR μ.

MODEL NO.	REV. LETTER	COMMENTS
PL19C850696G1	C	TIN CONNECTOR
PL19C850696G3		GOLD CONNECTOR

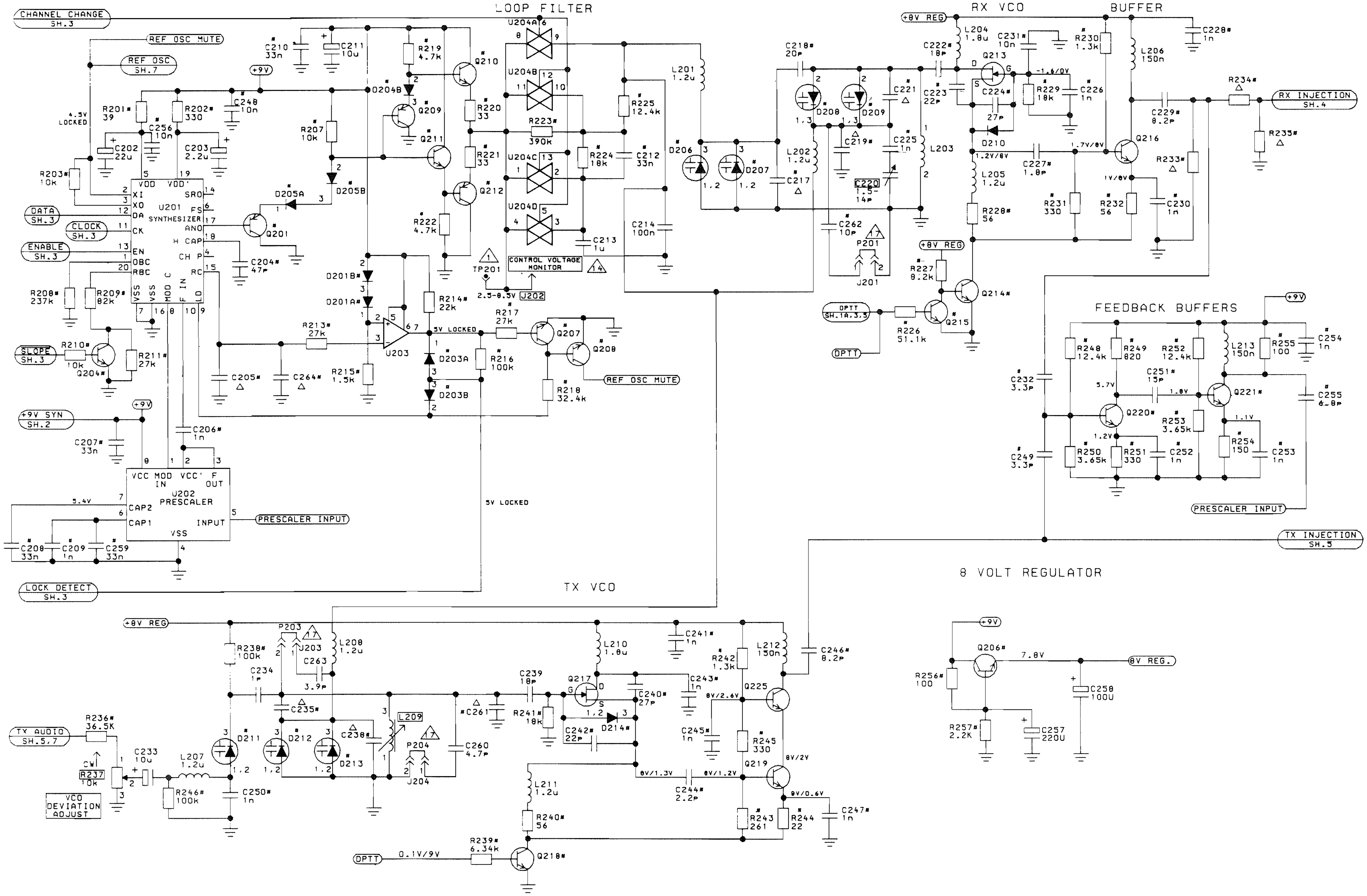
(19C850776, Rev. 5)



SCHEMATIC DIAGRAM

136-174 MHz TRANSIT/RECEIVE SYNTHESIZER BOARD

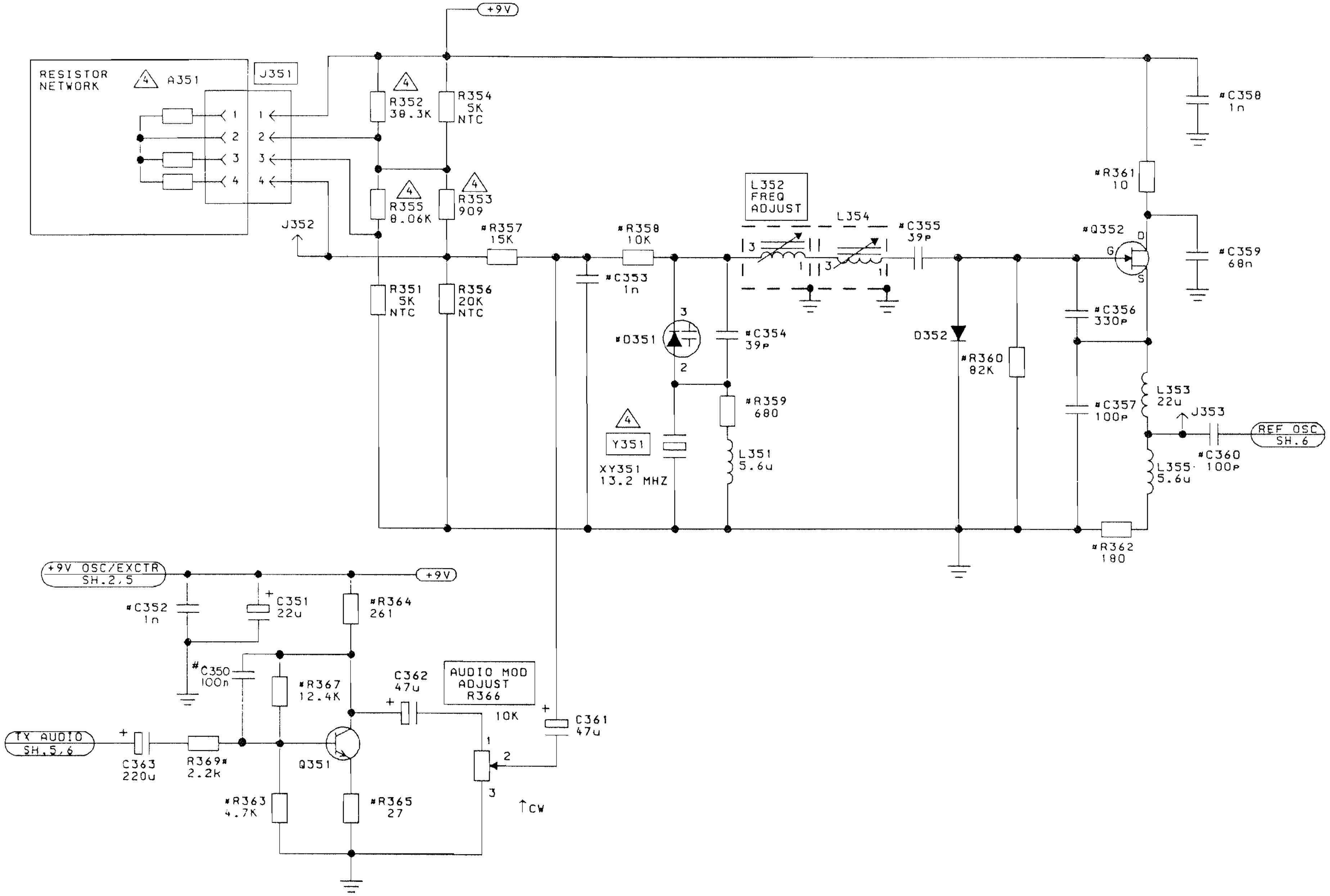
(19D901346, Sh. 5, Rev. 2)



TRANSIT/RECEIVE SYNTHESIZER BOARD

(19D901346, Sh. 6, Rev. 1)

REFERENCE OSCILLATOR



(19D901346, Sh. 7, Rev. 1)

PARTS LIST

136-174 MHz
TRANSMIT/RECEIVE/SYNTHESIZER BOARD
19D901720G1 150.8 - 174 MHz
19D901720G2 136 - 153 MHz
19D901720G3 150.8 - 174 MHz (Gold Contacts)
19D901720G4 136 - 153 MHz (Gold Contacts)
ISSUE 1

SYMBOL	GE PART NO.	DESCRIPTION
		NOTE: WHEN REPLACING BOARDS, CARE SHOULD BE TAKEN TO ASSURE THAT BOARDS WITH GOLD CONTACTS ARE NOT INTERMIXED WITH BOARDS HAVING TIN CONTACTS. REPLACE THE BOARD ONLY WITH ONE HAVING THE SAME GROUP NUMBER AS THE ORIGINAL.
A1		SYSTEM BOARD 19D901345G1 150.8-174 MHz 19D901345G3 136-153 MHz 19D901345G5 150.8-174 MHz (Gold Contacts) 19D901345G7 136-153 MHz (Gold Contacts)
		EXCITER
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C101	19A702061P53	Ceramic: 68 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM
C102 thru C104	19A702061P77	Ceramic: 470 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C105	19A702236P28	Ceramic: 12 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM
C106	19A702061P12	Ceramic: 8.2 pF ±0.5 pF, 50 VDCW, temp coef 0 ±60 PPM.
C107	19A702061P77	Ceramic: 470 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C108	19A702236P28	Ceramic: 12 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM
C109	19A702236P40	Ceramic: 39 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM
C110 and C111	19A702061P77	Ceramic: 470 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C116	19A701534P7	Tantalum: 10 uF ±20%, 16 VDCW.
C117 and C118	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C124 thru C126	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C127	19A702061P1	Ceramic: 1 pF ±0.5 pF, 50 VDCW.
C130 and C131	19A702236P34	Ceramic: 22 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
		- - - - - - - - - - - DIODES - - - - - - - - - -
D101	19A700028P1	Silicon, fast recovery: fwd current 75 mA, 75 PIV; sim to Type 1N4148.
		- - - - - - - - - - - JACKS - - - - - - - - - - -
J101	19B800555G3	Connector: metering, block. Includes: (10) 19A700237P1 contacts.
J102 and J103	19A703248P1	Contact, electrical. (Quantity 4 each). (Groups 1 & 3).
	19A703248P11	Contact, electrical. (Groups 5 & 7).
		- - - - - - - - - - - COILS - - - - - - - - - - -
L101	19B800891P5	Coil, RF: .064 uH; sim to Paul Smith SK-890-1.
L102 and L103	19B800937P10	Coil, RF: sim to Paul Smith SK887-1.
L104	19B800937P8	Coil, RF: sim to Paul Smith SK887-1.
L105	19B800891P3	Coil, RF Choke; sim to Paul Smith SK890-1.
L106	19B800937P8	Coil, RF: sim to Paul Smith SK887-1.
L107	19B800891P3	Coil, RF Choke: sim to Paul Smith SK890-1.
		- - - - - - - - - - - PLUGS - - - - - - - - - - -
P101	19A701785P3	Contact, electrical.
P102 and P103	19A702104P1	Receptacle: 2 position, shorting, rated at 3 amps; sim to Berg 65474-002. (Groups 1 & 3).
	19A702104P2	Receptacle: gold plated, two positions shorting; sim to Berg 65474-003. (Groups 5 & 7).
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q101 and Q102	19A702084P2	Silicon, NPN; sim to MPS 2369.
Q103	19J706357P1	Silicon, NPN; sim to Type 2N4427.
Q104	19A702504P2	Silicon, PNP; sim to 2N4403.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R101	19B800607P101	Metal film: 100 ohms ±5%, 200 VDCW, 1/8 w.
R102	19B800607P750	Metal film: 75 ohms ±5%, 200 VDCW, 1/8 w.
R103	19B800607P101	Metal film: 100 ohms ±5%, 200 VDCW, 1/8 w.
R104	19B800607P272	Metal film: 2.7K ohms ±5%, 200 VDCW, 1/8 w.
R105	19B800607P102	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 w.
R106	19B800607P151	Metal film: 150 ohms ±5%, 200 VDCW, 1/8 w.
R107	19B800607P102	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 w.
R108	19B800607P750	Metal film: 75 ohms ±5%, 200 VDCW, 1/8 w.
R109	19B800607P472	Metal film: 4.7K ohms ±5%, 200 VDCW, 1/8 w.
R110	19A702931P141	Metal film: 261 ohms ±1%, 200 VDCW, 1/8 w.
R111	19B800607P151	Metal film: 150 ohms ±5%, 200 VDCW, 1/8 w.
R112	19B800607P102	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 w.
R113	19B800607P272	Metal film: 2.7K ohms ±5%, 200 VDCW, 1/8 w.
R114	19B800607P151	Metal film: 150 ohms ±5%, 200 VDCW, 1/8 w.
R115	19A700113P27	Composition: 33 ohms ±5%, 1/2 w.
R116	19B800607P471	Metal film: 470 ohms ±5%, 200 VDCW, 1/8 w.
R117	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R118	19B800607P102	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 w.
R119 and R120	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R121	19B800607P102	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 w.
R122	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
		- - - - - - - - - - - NETWORKS - - - - - - - - -
Z101		Part of printed board 19D900839P1.
		SYNTHESIZER
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C202	19A701534P8	Tantalum: 22 uF ±20%, 16 VDCW.
C203	19A701534P5	Tantalum: 2.2 uF, ±20%, 35 VDCW.
C204	19A702236P42	Ceramic: 47 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM
C205	19A702061P79	Ceramic: 560 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C206	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C207 and C208	19A702052P20	Ceramic: 0.033 uF ±10%, 50 VDCW.
C209	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C210	19A702052P20	Ceramic: 0.033 uF ±10%, 50 VDCW.
C211	19A701534P7	Tantalum: 10 uF ±20%, 16 VDCW.
C212	19A702052P20	Ceramic: 0.033 uF ±10%, 50 VDCW.
C213	19A703232P2	Metallized: 1 uF ±10%, 100 VDCW.
C214	19A703232P1	Metallized: 0.1 uF ±10%, 100 VDCW.
C217	19A702236P30	Ceramic: 15 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Groups 1 & 5).
C217	19A702236P28	Ceramic: 12 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Groups 3 & 7).
C218	19A702236P33	Ceramic: 22 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM
C219	19A702236P11	Ceramic: 2.7 pF ±0.25 pF, 50 VDCW, temp coef 0 ±30 PPM. (Groups 1 & 5).
C219	19A702236P21	Ceramic: 6.8 pF ±0.5 pF, 50 VDCW, temp coef 0 ±60 PPM. (Groups 3 & 7).
C220	19A134227P5	Variable: 1.5 to 14 pF, 100 VDCW.
C221	19A702236P42	Ceramic: 47 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Groups 1 & 5).
C221	19A702236P40	Ceramic: 39 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Groups 3 & 7).
C222	19A702236P32	Ceramic: 18 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM
C223	19A702236P34	Ceramic: 22 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM
C224	19A702236P36	Ceramic: 27 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM
C225 and C226	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C227	19A702236P9	Ceramic: 1.8 pF ±0.25 pF, 50 VDCW, temp coef 0 ±30 PPM.
C228	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C229	19A702061P12	Ceramic: 8.2 pF ±0.5 pF, 50 VDCW, temp coef 0 ±60 PPM.
C230	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C231	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C232	19A702061P7	Ceramic: 3.3 pF ±0.5 pF, 50 VDCW, temp coef 0 ±120 PPM.
C233	19A701534P7	Tantalum: 10 uF ±20%, 16 VDCW.
C234	19A700219P1	Ceramic: 1 pF ±10%, 100 VDCW, temp coef 0 PPM.
C235	19A702236P36	Ceramic: 27 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Groups 1 & 5).
C235	19A702236P37	Ceramic: 30 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Groups 3 & 7).
C238	19A702236P28	Ceramic: 12 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Groups 1 & 5).
C238	19A702236P21	Ceramic: 6.8 pF ±0.5 pF, 50 VDCW, temp coef 0 ±60 PPM. (Groups 3 & 7).
C239	19A700224P38	Ceramic: 18 pF ±5%, 100 VDCW, temp coef -330 PPM.
C240	19A702236P36	Ceramic: 27 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C241	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C242	19A702236P34	Ceramic: 22 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM
C243	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C244	19A702236P10	Ceramic: 2.2 pF ±2.5 pF, 50 VDCW, temp coef 0 ±30 PPM.
C245	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C246	19A702061P12	Ceramic: 8.2 pF ±0.5 pF, 50 VDCW, temp coef 0 ±60 PPM.
C247	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C248	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C249	19A702061P7	Ceramic: 3.3 pF ±0.5 pF, 50 VDCW, temp coef 0 ±120 PPM.
C250	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C251	19A702236P30	Ceramic: 15 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

PART NO.	DESCRIPTION
	- - - - - - - - - - - JACKS - - - - - - - - - - -
3248P1	Contact, electrical. (Groups 1 & 3).
3248P11	Contact, electrical. (Groups 5 & 7).
	- - - - - - - - - - RESISTORS - - - - - - - - - -
2931P369	Metal film: 51.1K ohms ±1%, 200 VDCW, 1/8 w.
0607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
2931P303	Metal film: 10.5K ohms ±1%, 200 VDCW, 1/8 w.
0607P472	Metal film: 4.7K ohms ±5%, 200 VDCW, 1/8 w.
2931P212	Metal film: 1300 ohms ±1%, 200 VDCW, 1/8 w.
0607P272	Metal film: 2.7K ohms ±5%, 200 VDCW, 1/8 w.
0607P273	Metal film: 27K ohms ±5%, 200 VDCW, 1/8 w.
2931P278	Metal film: 6340 ohms ±1%, 200 VDCW, 1/8 w.
0607P223	Metal film: 22K ohms ±5%, 200 VDCW, 1/8 w.
0607P331	Metal film: 330 ohms ±5%, 200 VDCW, 1/8 w.
2931P369	Metal film: 51.1K ohms ±1%, 200 VDCW, 1/8 w.
2931P303	Metal film: 10.5K ohms ±1%, 200 VDCW, 1/8 w.
2931P278	Metal film: 6340 ohms ±1%, 200 VDCW, 1/8 w.
2931P330	Metal film: 20K ohms ±1%, 200 VDCW, 1/8 w.
2931P310	Metal film: 12.4K ohms ±1%, 200 VDCW, 1/8 w.
2931P350	Metal film: 32.4K ohms ±1%, 200 VDCW, 1/8 w.
0607P222	Metal film: 2.2K ohms ±5%, 200 VDCW, 1/8 w.
	- - - - - - - - INTEGRATED CIRCUITS - - - - - - -
0086P4	Operation Amplifier, Dual OP AMP; sim to 4558 Type.
0029P44	Digital: BILATERAL SWITCH.
	OSCILLATOR
	- - - - - - - - - - CAPACITORS - - - - - - - - -
2052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
1534P8	Tantalum: 22 uF ±20%, 16VDCW.
2061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
2248P304	Ceramic: 39 pF ±5%, 50 VDCW, N470 ±60 PPM.
2236P40	Ceramic: 39 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
2061P73	Ceramic: 330 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
2061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
2061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
2052P24	Ceramic: 0.068 uF ±10%, 50 VDCW.
2061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
1534P9	Tantalum: 47 uF ±20%, 6.3 VDCW.
3893P10	Electrolytic: 200 uF -10+50%, 10 VDCW.
2052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
	- - - - - - - - - - - DIODES - - - - - - - - - -
0085P3	Silicon, capacitive.
0028P1	Silicon, fast recovery: fwd current 75 mA, 75 PIV; sim to Type 1N4148.
	- - - - - - - - - - - JACKS - - - - - - - - - - -
0072P30	Printed wire: 4 contacts rated at 2.5 amps; sim to Molex 22-27-2041. (Groups 1 & 3).

SYMBOL	GE PART NO.	DESCRIPTION
	19A704852P30	Printed wire: 4 contacts rated @ 2 1/2 amps; sim to Molex 22-29-2041. (Groups 5 & 7).
J352 and J353	19A703248P1	Contact, electrical. (Groups 1 & 3).
	19A703248P11	Contact, electrical. (Groups 5 & 7).
		- - - - - - - - - - - COILS - - - - - - - - - - -
L351	19A700024P22	Coil, RF: 5.6 uH ±10%.
L352	19B801161P3	Coil, RF: sim to Standex SK950-2.
L353	19A700024P29	Coil, RF: 22 uH ±10%.
L354	19B801161P6	Coil, RF, variable: sim to Standex SK950-2.
L355	19A700024P22	Coil, RF: 5.6 uH ±10%.
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q351	19A700023P2	Silicon, NPN; sim to Type 2N3904.
Q352	19A702524P2	N-Type, field effect; sim to MMBFU310.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R351	19A703813P1	Thermal: 5K ohms ±2%; sim to Midwest Components P1H-502.
R352	19A701250P357	Metal film: 38.3K ohms ±1%, 250 VDCW, 1/4 w.
R353	19A701250P193	Metal film: 909 ohms ±1%, 250 VDCW, 1/4 w.
R354	19A703813P1	Thermal: 5K ohms ±2%; sim to Midwest Components P1H-502.
R355	19A701250P288	Metal film: 8060 ohms ±1%, 250 VDCW, 1/4 w.
R356	19A703813P2	Thermal: 20K ohms ±2%; sim to Midwest Components P1H-203.
R357	19B800607P153	Metal film: 15K ohms ±5%, 200 VDCW, 1/8 w.
R358	18B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R359	19B800607P681	Metal film: 680 ohms ±5%, 200 VDCW, 1/8 w.
R360	19B800607P823	Metal film: 82K ohms ±5%, 200 VDCW, 1/8 w.
R361	19B800607P100	Metal film: 10 ohms ±5%, 200 VDCW, 1/8 w.
R362	19B800607P181	Metal film: 180 ohms ±5%, 200 VDCW, 1/8 w.
R363	19B800607P472	Metal film: 4.7K ohms ±5%, 200 VDCW, 1/8 w.
R364	19A702931P141	Metal film: 261 ohms ±1%, 200 VDCW, 1/8 w.
R365	19B800607P270	Metal film: 27 ohms ±5%, 200 VDCW, 1/8 w.
R366	19B800784P108	Variable: 10K ohms ±20%, 1/2 w.
R367	19A702931P310	Metal film: 12.4K ohms ±1%, 200 VDCW, 1/8 w.
R369	19B800607P222	Metal film: 2.2K ohms ±5%, 200 VDCW, 1/8 w.
		- - - - - - - - - - - SOCKETS - - - - - - - - - -
XY351	19A702742P1	Crystal socket.
		- - - - - - - - - - CRYSTALS - - - - - - - - - -
Y351	19A703049G1	Quartz: 13.200 MHz.
		FRONT END/MIXER
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C403 and C404	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C405	19A702061P53	Ceramic: 68 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C406	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C407	19A700235P23	Polyester: 0.033 uF ±10%, 50 VDCW.
C408	19A702052P20	Ceramic: 0.033 uF ±10%, 50 VDCW.
C409	19A701534P7	Tantalum: 10 uF ±20%, 16 VDCW.
C410	19A702236P21	Ceramic: 6.8 pF ±0.5 pF, 50 VDCW, temp coef 0 ±60 PPM.
C411	19A702236P36	Ceramic: 27 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM
C412	19A702052P24	Ceramic: 0.068 uF ±10%, 50 VDCW.

SYMBOL	GE PART NO.	DESCRIPTION
C413	T644ACP333K	Polyester: 0.033 uF ±10%, 50 VDCW.
C414	19A702061P37	Ceramic: 33 pF ±5%, temp coef 0 ±30 PPM.
C415	19A702052P20	Ceramic: 0.033 uF ±10%, 50 VDCW.
C416	19A702052P24	Ceramic: 0.068 uF ±10%, 50 VDCW.
C418	19A702052P20	Ceramic: 0.033 uF ±10%, 50 VDCW.
C422 and C423	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C451	19A702236P25	Ceramic: 10 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Groups 1 & 5).
C451	19A702236P28	Ceramic: 12 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Groups 3 & 7).
C452	19A702236P36	Ceramic: 27 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Groups 1 & 5).
C452	19A702236P40	Ceramic: 39 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Groups 3 & 7).
C453	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C454 and C455	19A702052P20	Ceramic: 0.033 uF ±10%, 50 VDCW.
C456	19A701225P2	Electrolytic: 10 uF +50-10%, 25 VDCW.
C457	19A702052P20	Ceramic: 0.033 uF ±10%, 50 VDCW.
C458	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C459	19A702061P10	Ceramic: 5.6 pF ±0.5 pF, 50 VDCW, temp coef 0 ±60 PPM. (Groups 1 & 5).
C459	19A702236P25	Ceramic: 10 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Groups 3 & 7).
C460	19A702236P32	Ceramic: 18 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Groups 1 & 5).
C460	19A702236P34	Ceramic: 22 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (Groups 3 & 7).
		- - - - - - - - - - - CORES - - - - - - - - - - -
E401	19A700103P1	Torridal core.
		- - - - - - - - - - - JACKS - - - - - - - - - - -
J401	19A700072P34	Printed wire: 8 contacts rated at 2.5 amps; sim to Molex 22-27-2081. (Groups 1 & 3).
	19A704852P34	Printed wire: 8 contacts rated @ 2 1/2 amps; sim to Molex 22-29-2081. (Groups 5 & 7).
J404	19A703248P1	Contact, electrical. (Groups 1 & 3).
	19A703248P11	Contact, electrical. (Groups 5 & 7).
J451	19A703248P1	Contact, electrical. (Groups 1 & 3).
	19A703248P11	Contact, electrical. (Groups 5 & 7).
		- - - - - - - - - - - COILS - - - - - - - - - - -
L401	19B800761P1	Coil, RF: sim to Paul Smith SK850-1. (Groups 1 & 5).
L401	19B800761P3	Coil, RF: sim to Paul Smith SK850-1. (Groups 3 & 7).
L402	19B800761P1	Coil, RF: sim to Paul Smith SK850-1. (Groups 1 & 5).
L402	19B800761P3	Coil, RF: sim to Paul Smith SK850-1. (Groups 3 & 7).
L403	19B800761P1	Coil, RF: sim to Paul Smith SK850-1. (Groups 1 & 5).
L403	19B800761P3	Coil, RF: sim to Paul Smith SK850-1. (Groups 3 & 7).
L404	19B800761P2	Coil, RF: sim to Paul Smith SK850-1. (Groups 1 & 5).
L404	19B800761P4	Coil, RF: sim to Paul Smith SK850-1. (Groups 3 & 7).
L405	19B800761P16	Coil, RF: sim to Paul Smith SK850-1. (Groups 1 & 5).
L405	19B800761P15	Coil, RF: sim to Paul Smith SK850-1. (Groups 3 & 7).

SYMBOL	GE PART NO.	DESCRIPTION
L406	19A700024P3	Coil, RF: 150 nH ±10%. (Groups 1 & 5).
L406	19A700024P5	Coil, RF: 220 nH ±10%. (Groups 3 & 7).
L407	19A701885P135	Coil, RF: 68 nH ±10%, 2.70 ohms DC res max.
L410 thru L412	19C850701P101	Coil, RF: variable, wire size No. 34 AWG.
L413	19B800761P3	Coil, RF: sim to Paul Smith SK850-1. (Groups 1 & 5).
L413	19B800761P5	Coil, RF: sim to Paul Smith SK850-1. (Groups 3 & 7).
L414	19B800761P3	Coil, RF: sim to Paul Smith SK850-1. (Groups 1 & 5).
L414	19B800761P5	Coil, RF: sim to Paul Smith SK850-1. (Groups 3 & 7).
L415 thru L419		Part of printed board 19D900839P1.
L420	19A700024P2	Coil, RF: 120 nH ±10%. (Groups 1 & 5).
L420	19A700024P1	Coil, RF: 100 nH ±10%, 0.08 ohms DC res max, 100 v. (Groups 3 & 7).
L451	19C850765P110	Coil, RF: variable.
L452	19A701761P45	Coil, RF: 68 uH ±10%, 3.30 ohms DC res max.
L453	19A700024P2	Coil, RF: 120 nH ±10%. (Groups 1 & 5).
L453	19A700024P3	Coil, RF: 150 nH ±10%. (Groups 3 & 7).
		- - - - - - - - - - - PLUGS - - - - - - - - - - -
P401 thru P403	19A701785P3	Contact, electrical.
P404	19A702104P1	Receptacle: 2 position, shorting, rated at 3 amps; sim to Berg 65474-002. (Groups 1 & 3).
	19A702014P2	Receptacle: gold plated, two positions shorting; sim to Berg 65474-003. (Groups 5 & 7).
P451	19A702104P1	Receptacle: 2 position, shorting, rated at 3 amps; sim to Berg 65474-002. (Groups 1 & 3).
	19A702104P2	Receptacle: gold plated, two positions shorting; sim to Berg 65474-003. (Groups 5 & 7).
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q401	19A702058P1	N-Channel, field effect; sim to 2N4391.
Q402	19A116818P3	N-CHANNEL, field effect; sim to Type 3N1877. (MOS DUAL GATE).
Q451	19A701808P2	Silicon, NPN; sim to MPS 6595.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R401	19B800607P560	Metal film: 56 ohms ±5%, 200 VDCW, 1/8 w.
R402	19B800607P471	Metal film: 470 ohms ±5%, 200 VDCW, 1/8 w.
R403	19B800607P392	Metal film: 3.9K ohms ±5%, 200 VDCW, 1/8 w.
R404	19B800607P272	Metal film: 2.7K ohms ±5%, 200 VDCW, 1/8 w.
R405	19B800607P223	Metal film: 22K ohms ±5%, 200 VDCW, 1/8 w.
R406	19B800607P221	Metal film: 220 ohms ±5%, 200 VDCW, 1/8 w.
R407	19B800607P272	Metal film: 2.7K ohms ±5%, 200 VDCW, 1/8 w.
R408	19B800607P560	Metal film: 56 ohms ±5%, 200 VDCW, 1/8 w.
R409	19B800607P153	Metal film: 15K ohms ±5%, 200 VDCW, 1/8 w.
R410 and R411	19B800607P470	Metal film: 47 ohms ±5%, 200 VDCW, 1/8 w.
R412	19B800607P104	Metal film: 100K ohms ±5%, 200 VDCW, 1/8 w.
R451	19B800607P182	Metal film: 1.8K ohms ±5%, 200 VDCW, 1/8 w.
R452	19B800607P181	Metal film: 180 ohms ±5%, 200 VDCW, 1/8 w.
R453	19B800607P220	Metal film: 22 ohms ±5%, 200 VDCW, 1/8 w.
R454	19B800607P392	Metal film: 3.9K ohms ±5%, 200 VDCW, 1/8 w. (Groups 1 & 5).
R454	19B800607P561	Metal film: 560 ohms ±5%, 200 VDCW, 1/8 w. (Groups 3 & 7).

GE PART NO.	DESCRIPTION
19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
19A702236P21	Ceramic: 6.8 pF ±5%, 50 VDCW, temp coef 0 ±60 PPM.
19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
19A703893P10	Electrolytic: 200 uF -10+50%, 10 VDCW.
19A703893P9	Electrolytic: 100 uF -10+50%, 10 VDCW.
19A702052P20	Ceramic: 0.033 uF ±10%, 50 VDCW.
19A700219P18	Ceramic: 4.7 pF ±5%, 100 VDCW, temp coef 0 PPM.
19A702236P28	Ceramic: 12 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
19A702236P25	Ceramic: 10 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
19A700219P16	Ceramic: 3.9 pF ±5%, 100 VDCW, temp coef 0 PPM.
19A702061P81	Ceramic: 680 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
	- - - - - - - - - - - DIODES - - - - - - - - - -
19A700053P2	Silicon, fast recovery (2 diodes in series); sim to BAV99.
19A703561P2	Silicon, fast recovery (2 diodes in series).
19A700053P2	Silicon, fast recovery (2 diodes in series); sim to BAV99.
19A700085P3	Silicon, capacitive.
19A700047P2	Silicon.
19A700085P3	Silicon, capacitive.
19A702526P2	Silicon. (Schottky Barrier); sim to BAT 17.
	- - - - - - - - - - - JACKS - - - - - - - - - - -
19A703248P1	Contact, electrical. (Groups 1 & 3).
19A703248P11	Contact, electrical. (Groups 5 & 7).
	- - - - - - - - - - - COILS - - - - - - - - - - -
19A700024P14	Coil, RF: 1.2 uH ±10%.
19C851001P2	Coil, RF: sim to Paul Smith SK-901-1. (Used in Groups 1 & 5).
19C851001P3	Coil, RF: sim to Paul Smith SK-901-1. (Used in Groups 3 & 7).
19A700024P16	Coil, RF: 1.8 uH ±10%.
19A700024P14	Coil, RF: 1.2 uH ±10%.
19A700024P3	Coil, RF: 1.0 uH ±10%.
19A700024P14	Coil, RF: 1.2 uH ±10%.
19B800956P1	Coil, RF, variable: sim to Paul Smith SK919.
19A700024P16	Coil, RF: 1.8 uH ±10%.
19A700024P14	Coil, RF: 1.2 uH ±10%.
19A700024P3	Coil, RF: 150 nH ±10%.
	- - - - - - - - - - - PLUGS - - - - - - - - - - -
19A702104P1	Receptacle: 2 position, shorting, rated at 3 amps; sim to Berg 65474-002. (Groups 1 & 3).
19A702104P2	Receptacle: gold plated, two positions shorting; sim to Berg 65474-003. (Groups 5 & 7).
19A702104P1	Receptacle: 2 position, shorting, rated at 3 amps; sim to Berg 65474-002. (Groups 1 & 3).
19A702104P2	Receptacle: gold plated, two positions shorting; sim to Berg 65474-003. (Groups 5 & 7).

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - - TRANSISTORS - - - - - - - - -
Q201	19A700059P2	Silicon, PNP.
Q204	19A700076P2	Silicon, NPN.
Q206 thru Q208	19A700076P2	Silicon, NPN.
Q209	19A700059P2	Silicon, PNP.
Q210 and Q211	19A700076P2	Silicon, NPN.
Q212	19A700059P2	Silicon, PNP.
Q213	19A700060P1	N-Type, field effect.
Q214 and Q215	19A700076P2	Silicon, NPN.
Q216	19A701808P2	Silicon, NPN; sim to MPS 6595.
Q217	19A700060P1	N-Type, field effect.
Q218	19A700076P2	Silicon, NPN.
Q219	19A701808P2	Silicon, NPN; sim to MPS 6595.
Q220 and Q221	19A700076P2	Silicon, NPN.
Q225	19A701808P2	Silicon, NPN; sim to MPS 6595.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R201	19B800607P390	Metal film: 39 ohms ±5%, 200 VDCW, 1/8 w.
R202	19B800607P331	Metal film: 330 ohms ±5%, 200 VDCW, 1/8 w.
R203	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R207	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R208	19A702931P437	Metal film: 237K ohms ±1%, 200 VDCW, 1/8 w.
R209	19B800607P823	Metal film: 82K ohms ±5%, 200 VDCW, 1/8 w.
R210	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R211	19B800607P273	Metal film: 27K ohms ±5%, 200 VDCW, 1/8 w.
R213	19B800607P273	Metal film: 27K ohms ±5%, 200 VDCW, 1/8 w.
R214	19B800607P223	Metal film: 22K ohms ±5%, 200 VDCW, 1/8 w.
R215	19B800607P152	Metal film: 1.5K ohms ±5%, 200 VDCW, 1/8 w.
R216	19B800607P104	Metal film: 100K ohms ±5%, 200 VDCW, 1/8 w.
R217	19B800607P273	Metal film: 27K ohms ±5%, 200 VDCW, 1/8 w.
R218	19A702931P350	Metal film: 32.4K ohms ±1%, 200 VDCW, 1/8 w.
R219	19B800607P472	Metal film: 4.7K ohms ±5%, 200 VDCW, 1/8 w.
R220 and R221	19B800607P330	Metal film: 33 ohms ±5%, 200 VDCW, 1/8 w.
R222	19B800607P472	Metal film: 4.7K ohms ±5%, 200 VDCW, 1/8 w.
R223	19B800607P394	Metal film: 390K ohms ±5%, 200 VDCW, 1/8 w.
R224	19B800607P183	Metal film: 18K ohms ±5%, 200 VDCW, 1/8 w.
R225	19A702931P310	Metal film: 12.4K ohms ±1%, 200 VDCW, 1/8 w.
R226	19A702931P369	Metal film: 51.1K ohms ±1%, 200 VDCW, 1/8 w.
R227	19B800607P822	Metal film: 8.2K ohms ±5%, 200 VDCW, 1/8 w.
R228	19B800607P560	Metal film: 56 ohms ±5%, 200 VDCW, 1/8 w.
R229	19B800607P183	Metal film: 18K ohms ±5%, 200 VDCW, 1/8 w.
R230	19A702931P212	Metal film: 1300 ohms ±1%, 200 VDCW, 1/8 w.
R231	19B800607P331	Metal film: 330 ohms ±5%, 200 VDCW, 1/8 w.
R232	19B800607P560	Metal film: 56 ohms ±5%, 200 VDCW, 1/8 w.
R233	19A702931P141	Metal film: 261 ohms ±1%, 200 VDCW, 1/8 w. (Groups 3 & 7).
R233	19B800607P151	Metal film: 150 ohms ±5%, 200 VDCW, 1/8 w. (Groups 1 & 5).
R234	19B800607P100	Metal film: 10 ohms ±5%, 200 VDCW, 1/8 w. (Groups 3 & 7).

SYMBOL	GE PART NO.	DESCRIPTION
R234	19B800607P390	Metal film: 39 ohms ±5%, 200 VDCW, 1/8 w. (Groups 1 & 5).
R235	19A702931P141	Metal film: 261 ohms ±1%, 200 VDCW, 1/8 w. (Groups 3 & 7).
R235	19B800607P151	Metal film: 150 ohms ±5%, 200 VDCW, 1/8 w. (Groups 1 & 5).
R236	19A702931P355	Metal film: 36.5K ohms ±1%, 200 VDCW, 1/8 w.
R237	19B800784P108	Variable: 10K ohms ±20%, 1/2 w.
R238	19B800607P104	Metal film: 100K ohms ±5%, 200 VDCW, 1/8 w.
R239	19A702931P278	Metal film: 6340 ohms ±1%, 200 VDCW, 1/8 w.
R240	19B800607P560	Metal film: 56 ohms ±5%, 200 VDCW, 1/8 w.
R241	19B800607P183	Metal film: 18K ohms ±5%, 200 VDCW, 1/8 w.
R242	19A702931P212	Metal film: 1300 ohms ±1%, 200 VDCW, 1/8 w.
R243	19A702931P141	Metal film: 261 ohms ±1%, 200 VDCW, 1/8 w.
R244	19B800607P220	Metal film: 22 ohms ±5%, 200 VDCW, 1/8 w.
R245	19B800607P331	Metal film: 330 ohms ±5%, 200 VDCW, 1/8 w.
R246	19B800607P104	Metal film: 100K ohms ±5%, 200 VDCW, 1/8 w.
R248	19A702931P310	Metal film: 12.4K ohms ±1%, 200 VDCW, 1/8 w.
R249	19B800607P821	Metal film: 820 ohms ±5%, 200 VDCW, 1/8 w.
R250	19A702931P255	Metal film: 3650 ohms ±1%, 200 VDCW, 1/8 w.
R251	19B800607P331	Metal film: 330 ohms ±5%, 200 VDCW, 1/8 w.
R252	19A702931P310	Metal film: 12.4K ohms ±1%, 200 VDCW, 1/8 w.
R253	19A702931P255	Metal film: 3650 ohms ±1%, 200 VDCW, 1/8 w.
R254	19B800607P151	Metal film: 150 ohms ±5%, 200 VDCW, 1/8 w.
R255 and R256	19B800607P101	Metal film: 100 ohms ±5%, 200 VDCW, 1/8 w.
R257	19B800607P222	Metal film: 2.2K ohms ±5%, 200 VDCW, 1/8 w.
		- - - - - - - - - - - TEST POINTS - - - - - - - - -
TP201		Part of printed board 19D900839P1.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - -
U201	19B800902P1	SYNTHESIZER: CMOS SERIAL INPUT.
U202	19A703091P1	DIVIDER.
U203	19J706579P2	Comparator. Sim to LM311.
U204	19A700029P44	Digital: BILATERAL SWITCH.
		AUDIO PROCESSOR
		- - - - - - - - - - - CAPACITORS - - - - - - - - -
C302	19A702061P65	Ceramic: 150 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C304	19A702061P65	Ceramic: 150 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C305	19A702250P212	Polyester: 0.68 uF ±5%, 50 VDCW.
C306	19A701534P7	Tantalum: 10 uF ±20%, 16 VDCW.
C307	19A702052P28	Ceramic: 0.022 uF ±10%, 50 VDCW.
C308	19A701534P7	Tantalum: 10 uF ±20%, 16 VDCW.
C309	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C310	19A701534P7	Tantalum: 10 uF ±20%, 16 VDCW.
C311	19A702250P211	Polyester: 0.47 uF ±5%, 50 VDCW.
C312	19A701534P7	Tantalum: 10 uF ±20%, 16 VDCW.
C313	T644ACP268J	Polyester: .0068 uF ±5%, 50 VDCW.
C314	19A702236P32	Ceramic: 18 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM
		- - - - - - - - - - - DIODES - - - - - - - - - -
D301 and D302	19A702015P1	Silicon; sim to IN458A.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - - JACKS - - - - - - - - - - -
J303	19A703248P1	Contact, electrical. (Groups 1 & 3).
	19A703248P11	Contact, electrical. (Groups 5 & 7).
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R301	19A702931P369	Metal film: 51.1K ohms ±1%, 200 VDCW, 1/8 w.
R302	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R303	19A702931P303	Metal film: 10.5K ohms ±1%, 200 VDCW, 1/8 w.
R304	19B800607P472	Metal film: 4.7K ohms ±5%, 200 VDCW, 1/8 w.
R305	19A702931P212	Metal film: 1300 ohms ±1%, 200 VDCW, 1/8 w.
R306	19B800607P272	Metal film: 2.7K ohms ±5%, 200 VDCW, 1/8 w.
R307	19B800607P273	Metal film: 27K ohms ±5%, 200 VDCW, 1/8 w.
R308	19A702931P278	Metal film: 6340 ohms ±1%, 200 VDCW, 1/8 w.
R309	19B800607P223	Metal film: 22K ohms ±5%, 200 VDCW, 1/8 w.
R310	19B800607P331	Metal film: 330 ohms ±5%, 200 VDCW, 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%, 200 VDCW, 1/8 w.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - -
U301	19A700086P4	Operation Amplifier, Dual OP AMP; sim to 4558 Type.
U302	19A700029P44	Digital: BILATERAL SWITCH.
		OSCILLATOR
		- - - - - - - - - - - CAPACITORS - - - - - - - - -
C350	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C351	19A701534P8	Tantalum: 22 uF ±20%, 16VDCW.
C352 and C353	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C354	19A702248P304	Ceramic: 39 pF ±5%, 50 VDCW, N470 ±60 PPM.
C355	19A702236P40	Ceramic: 39 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C356	19A702061P73	Ceramic: 330 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C357	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C358	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C359	19A702052P24	Ceramic: 0.068 uF ±10%, 50 VDCW.
C360	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C361 and C362	19A701534P9	Tantalum: 47 uF ±20%, 6.3 VDCW.
C363	19A703893P10	Electrolytic: 200 uF -10+50%, 10 VDCW.
C364	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
		- - - - - - - - - - - DIODES - - - - - - - - - -
D351	19A700085P3	Silicon, capacitive.
D352	19A700028P1	Silicon, fast recovery: fwd current 75 mA, 75 PIV; sim to Type 1N4148.
		- - - - - - - - - - - JACKS - - - - - - - - - - -
J351	19A700072P30	Printed wire: 4 contacts rated at 2.5 amps; sim to Molex 22-27-2041. (Groups 1 & 3).

SYMBOL	GE PART N
	19A704852P30
J352 and J353	19A703248P1 19A703248P11
L351	19A700024P2
L352	19B801161P3
L353	19A700024P2
L354	19B801161P6
L355	19A700024P2
Q351	19A700023P2
Q352	19A702524P2
R351	19A703813P1
R352	19A701250P3
R353	19A701250P1
R354	19A703813P1
R355	19A701250P2
R356	19A703813P2
R357	19B800607P1
R358	18B800607P1
R359	19B800607P6
R360	19B800607P8
R361	19B800607P1
R362	19B800607P1
R363	19B800607P4
R364	19A702931P1
R365	19B800607P2
R366	19B800784P1
R367	19A702931P3
R369	19B800607P2
XY351	19A702742P1
Y351	19A703049G1
C403 and C404	19A702052P1
C405	19A702061P5
C406	19A702052P1
C407	19A700235P2
C408	19A702052P2
C409	19A701534P7
C410	19A702236P2
C411	19A702236P3
C412	19A702052P2

SYMBOL	GE PART NO.	DESCRIPTION
C252 thru C254	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C255	19A702236P21	Ceramic: 6.8 pF ±5%, 50 VDCW, temp coef 0 ±60 PPM.
C256	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C257	19A703893P10	Electrolytic: 200 uF -10+50%, 10 VDCW.
C258	19A703893P9	Electrolytic: 100 uF -10+50%, 10 VDCW.
C259	19A702052P20	Ceramic: 0.033 uF ±10%, 50 VDCW.
C260	19A700219P18	Ceramic: 4.7 pF ±5%, 100 VDCW, temp coef 0 PPM.
C261	19A702236P28	Ceramic: 12 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C262	19A702236P25	Ceramic: 10 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C263	19A700219P16	Ceramic: 3.9 pF ±5%, 100 VDCW, temp coef 0 PPM.
C264	19A702061P81	Ceramic: 680 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
		- - - - - - - - - - - DIODES - - - - - - - - - -
D201	19A700053P2	Silicon, fast recovery (2 diodes in series); sim to BAV99.
D203	19A703561P2	Silicon, fast recovery (2 diodes in series).
D204 and D205	19A700053P2	Silicon, fast recovery (2 diodes in series); sim to BAV99.
D206 thru D209	19A700085P3	Silicon, capacitive.
D210	19A700047P2	Silicon.
D211 thru D213	19A700085P3	Silicon, capacitive.
D214	19A702526P2	Silicon. (Schottky Barrier); sim to BAT 17.
		- - - - - - - - - - - JACKS - - - - - - - - - - -
J201 thru J204	19A703248P1	Contact, electrical. (Groups 1 & 3).
	19A703248P11	Contact, electrical. (Groups 5 & 7).
		- - - - - - - - - - - COILS - - - - - - - - - - -
L201 and L202	19A700024P14	Coil, RF: 1.2 uH ±10%.
L203	19C851001P2	Coil, RF: sim to Paul Smith SK-901-1. (Used in Groups 1 & 5).
L203	19C851001P3	Coil, RF: sim to Paul Smith SK-901-1. (Used in Groups 3 & 7).
L204	19A700024P16	Coil, RF: 1.8 uH ±10%.
L205	19A700024P14	Coil, RF: 1.2 uH ±10%.
L206	19A700024P3	Coil, RF: 1.0 uH ±10%.
L207 and L208	19A700024P14	Coil, RF: 1.2 uH ±10%.
L209	19B800956P1	Coil, RF, variable: sim to Paul Smith SK919.
L210	19A700024P16	Coil, RF: 1.8 uH ±10%.
L211	19A700024P14	Coil, RF: 1.2 uH ±10%.
L212 and L213	19A700024P3	Coil, RF: 150 nH ±10%.
		- - - - - - - - - - - PLUGS - - - - - - - - - - -
P201	19A702104P1	Receptacle: 2 position, shorting, rated at 3 amps; sim to Berg 65474-002. (Groups 1 & 3).
	19A702104P2	Receptacle: gold plated, two positions shorting; sim to Berg 65474-003. (Groups 5 & 7).
P203 and P204	19A702104P1	Receptacle: 2 position, shorting, rated at 3 amps; sim to Berg 65474-002. (Groups 1 & 3).
	19A702104P2	Receptacle: gold plated, two positions shorting; sim to Berg 65474-003. (Groups 5 & 7).
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q201	19A700059P2	Silicon, PNP.
Q204	19A700076P2	Silicon, NPN.
Q206 thru Q208	19A700076P2	Silicon, NPN.
Q209	19A700059P2	Silicon, PNP.
Q210 and Q211	19A700076P2	Silicon, NPN.
Q212	19A700059P2	Silicon, PNP.
Q213	19A700060P1	N-Type, field effect.
Q214 and Q215	19A700076P2	Silicon, NPN.
Q216	19A701808P2	Silicon, NPN; sim to MPS 6595.
Q217	19A700060P1	N-Type, field effect.
Q218	19A700076P2	Silicon, NPN.
Q219	19A701808P2	Silicon, NPN; sim to MPS 6595.
Q220 and Q221	19A700076P2	Silicon, NPN.
Q225	19A701808P2	Silicon, NPN; sim to MPS 6595.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R201	19B800607P390	Metal film: 39 ohms ±5%, 200 VDCW, 1/8 w.
R202	19B800607P331	Metal film: 330 ohms ±5%, 200 VDCW, 1/8 w.
R203	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R207	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R208	19A702931P437	Metal film: 237K ohms ±1%, 200 VDCW, 1/8 w.
R209	19B800607P823	Metal film: 82K ohms ±5%, 200 VDCW, 1/8 w.
R210	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R211	19B800607P273	Metal film: 27K ohms ±5%, 200 VDCW, 1/8 w.
R213	19B800607P273	Metal film: 27K ohms ±5%, 200 VDCW, 1/8 w.
R214	19B800607P223	Metal film: 22K ohms ±5%, 200 VDCW, 1/8 w.
R215	19B800607P152	Metal film: 1.5K ohms ±5%, 200 VDCW, 1/8 w.
R216	19B800607P104	Metal film: 100K ohms ±5%, 200 VDCW, 1/8 w.
R217	19B800607P273	Metal film: 27K ohms ±5%, 200 VDCW, 1/8 w.
R218	19A702931P350	Metal film: 32.4K ohms ±1%, 200 VDCW, 1/8 w.
R219	19B800607P472	Metal film: 4.7K ohms ±5%, 200 VDCW, 1/8 w.
R220 and R221	19B800607P330	Metal film: 33 ohms ±5%, 200 VDCW, 1/8 w.
R222	19B800607P472	Metal film: 4.7K ohms ±5%, 200 VDCW, 1/8 w.
R223	19B800607P394	Metal film: 390K ohms ±5%, 200 VDCW, 1/8 w.
R224	19B800607P183	Metal film: 18K ohms ±5%, 200 VDCW, 1/8 w.
R225	19A702931P310	Metal film: 12.4K ohms ±1%, 200 VDCW, 1/8 w.
R226	19A702931P369	Metal film: 51.1K ohms ±1%, 200 VDCW, 1/8 w.
R227	19B800607P822	Metal film: 8.2K ohms ±5%, 200 VDCW, 1/8 w.
R228	19B800607P560	Metal film: 56 ohms ±5%, 200 VDCW, 1/8 w.
R229	19B800607P183	Metal film: 18K ohms ±5%, 200 VDCW, 1/8 w.
R230	19A702931P212	Metal film: 1300 ohms ±1%, 200 VDCW, 1/8 w.
R231	19B800607P331	Metal film: 330 ohms ±5%, 200 VDCW, 1/8 w.
R232	19B800607P560	Metal film: 56 ohms ±5%, 200 VDCW, 1/8 w.
R233	19A702931P141	Metal film: 261 ohms ±1%, 200 VDCW, 1/8 w. (Groups 3 & 7).
R233	19B800607P151	Metal film: 150 ohms ±5%, 200 VDCW, 1/8 w. (Groups 1 & 5).
R234	19B800607P100	Metal film: 10 ohms ±5%, 200 VDCW, 1/8 w. (Groups 3 & 7).
R234	19B800607P390	Metal film: 39 ohms ±5%, 200 VDCW, 1/8 w. (Groups 1 & 5).
R235	19A702931P141	Metal film: 261 ohms ±1%, 200 VDCW, 1/8 w. (Groups 3 & 7).
R235	19B800607P151	Metal film: 150 ohms ±5%, 200 VDCW, 1/8 w. (Groups 1 & 5).
R236	19A702931P355	Metal film: 36.5K ohms ±1%, 200 VDCW, 1/8 w.
R237	19B800784P108	Variable: 10K ohms ±20%, 1/2 w.
R238	19B800607P104	Metal film: 100K ohms ±5%, 200 VDCW, 1/8 w.
R239	19A702931P278	Metal film: 6340 ohms ±1%, 200 VDCW, 1/8 w.
R240	19B800607P560	Metal film: 56 ohms ±5%, 200 VDCW, 1/8 w.
R241	19B800607P183	Metal film: 18K ohms ±5%, 200 VDCW, 1/8 w.
R242	19A702931P212	Metal film: 1300 ohms ±1%, 200 VDCW, 1/8 w.
R243	19A702931P141	Metal film: 261 ohms ±1%, 200 VDCW, 1/8 w.
R244	19B800607P220	Metal film: 22 ohms ±5%, 200 VDCW, 1/8 w.
R245	19B800607P331	Metal film: 330 ohms ±5%, 200 VDCW, 1/8 w.
R246	19B800607P104	Metal film: 100K ohms ±5%, 200 VDCW, 1/8 w.
R248	19A702931P310	Metal film: 12.4K ohms ±1%, 200 VDCW, 1/8 w.
R249	19B800607P821	Metal film: 820 ohms ±5%, 200 VDCW, 1/8 w.
R250	19A702931P255	Metal film: 3650 ohms ±1%, 200 VDCW, 1/8 w.
R251	19B800607P331	Metal film: 330 ohms ±5%, 200 VDCW, 1/8 w.
R252	19A702931P310	Metal film: 12.4K ohms ±1%, 200 VDCW, 1/8 w.
R253	19A702931P255	Metal film: 3650 ohms ±1%, 200 VDCW, 1/8 w.
R254	19B800607P151	Metal film: 150 ohms ±5%, 200 VDCW, 1/8 w.
R255 and R256	19B800607P101	Metal film: 100 ohms ±5%, 200 VDCW, 1/8 w.
R257	19B800607P222	Metal film: 2.2K ohms ±5%, 200 VDCW, 1/8 w.
		- - - - - - - - - - TEST POINTS - - - - - - - - -
TP201		Part of printed board 19D900839P1.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - -
U201	19B800902P1	SYNTHESIZER: CMOS SERIAL INPUT.
U202	19A703091P1	DIVIDER.
U203	19J706579P2	Comparator. Sim to LM311.
U204	19A700029P44	Digital: BILATERAL SWITCH.
		AUDIO PROCESSOR
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C302	19A702061P65	Ceramic: 150 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C304	19A702061P65	Ceramic: 150 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C305	19A702250P212	Polyester: 0.68 uF ±5%, 50 VDCW.
C306	19A701534P7	Tantalum: 10 uF ±20%, 16 VDCW.
C307	19A702052P28	Ceramic: 0.022 uF ±10%, 50 VDCW.
C308	19A701534P7	Tantalum: 10 uF ±20%, 16 VDCW.
C309	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C310	19A701534P7	Tantalum: 10 uF ±20%, 16 VDCW.
C311	19A702250P211	Polyester: 0.47 uF ±5%, 50 VDCW.
C312	19A701534P7	Tantalum: 10 uF ±20%, 16 VDCW.
C313	T644ACP268J	Polyester: .0068 uF ±5%, 50 VDCW.
C314	19A702236P32	Ceramic: 18 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM
		- - - - - - - - - - - DIODES - - - - - - - - - -
D301 and D302	19A702015P1	Silicon; sim to IN458A.

SYMBOL	GE PART NO.	DESCRIPTION
R455	19B800607P220	Metal film: 22 ohms ±5%, 200 VDCW, 1/8 w.
		- - - - - - - - - - TEST POINTS - - - - - - - - -
TP401		Part of printed board 19D900839P1.
		- - - - - - - - - - - NETWORKS - - - - - - - - -
Z401	19A702068G1	Crystal, filter: 4 pole, 2 coupled-dual cystals. (Includes Z402).
Z402		(Part of Z401).
Z403		Part of printed board 19D900839P1
		IF
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C501	19A702236P21	Ceramic: 6.8 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: 0.033 uF ±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: 0.033 uF ±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	T644ACP333K	Polyester: 0.033 uF ±10%, 50 VDCW.
C519	T644ACP215K	Polyester: .0015 uF ±10%, 50 VDCW.
C520 and C521	T644ACP310K	Polyester: .010 uF ±10%, 50 VDCW.
C522 thru C524	19A702052P20	Ceramic: 0.033 uF ±10%, 50 VDCW.
		- - - - - - - - - - - - COILS - - - - - - - - - -
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	19A701250P238	Metal film: 2.4K ohms ±1%, 1/4 w.
R503	19A702931P141	Metal film: 261 ohms ±1%, 200 VDCW, 1/8 w.
R504	19B800607P223	Metal film: 22K ohms ±5%, 200 VDCW.
R505	19B800607P472	Metal film: 4.7K ohms ±5%, 200 VDCW, 1/8 w.
R507	19B800607P223	Metal film: 22K ohms ±5%, 200 VDCW, 1/8 w.
R508	19B800607P472	Metal film: 4.7K ohms ±5%, 200 VDCW, 1/8 w.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - -
U501	19A700044P1	Linear, IF Amplifier & Detector; sim to ULN2111A.
U502	19A700091P1	Linear, IF Amplifier & Detector; sim to CA3089E.
		- - - - - - - - - - - NETWORKS - - - - - - - - -
Z501	19A702068G1	Crystal, filter: 4 pole, 2 coupled-dual crystals. (Includes Z502).
Z502		Part of Z501.
Z503	19A702068G2	Crystal, filter: 2 pole.

SYMBOL	GE PART NO.	DESCRIPTION
		SYSTEM/AUDIO/SQUELCH
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C601 thru C603	19A702052P6	Ceramic: 1500 pF ±10%, 50 VDCW.
C604	19A702052P22	Ceramic: 0.047 uF ±10%, 50 VDCW.
C605	19A702250P113	Polyester: .1 uF ±10%, 50 VDCW.
C606 thru C609	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C610	19A702052P10	Ceramic: 4700 pF ±10%, 50 VDCW.
C611	19A702052P22	Ceramic: 0.047 uF ±10%, 50 VDCW.
C612	19A702052P20	Ceramic: 0.033 uF ±10%, 50 VDCW.
C613	19A701225P3	Electrolytic: 220 uF, -10+50%, 25 VDCW.
C614 and C615	19A701534P7	Tantalum: 10 uF ±20%, 16 VDCW.
C616 thru C618	19A702052P22	Ceramic: 0.047 uF ±10%, 50 VDCW.
C619	19A701534P3	Tantalum: 0.47 uF ±20%, 35 VDCW.
C620	19A702052P22	Ceramic: 0.047 uF ±10%, 50 VDCW.
C621	19A702061P77	Ceramic: 470 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C651 and C652	19A702250P113	Polyester: .1 uF ±10%, 50 VDCW.
C656	19A701225P1	Electrolytic: 15 uF -10 +75%, 25 VDCW; sim to Sprague 501D156-G025BB1C.
C658 thru C678	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C680 and C681	19A702055P1	Electrolytic: 470 uF +100-10%, 18 VDCW.
C682 thru C684	19A702061P77	Ceramic: 470 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
		- - - - - - - - - - - DIODES - - - - - - - - - -
D601	19A703561P2	Silicon, fast recovery (2 diodes in series).
D602	19A700053P2	Silicon, fast recovery (2 diodes in series); sim to BAV99.
D603	19A703561P2	Silicon, fast recovery (2 diodes in series).
D604	19A700053P2	Silicon, fast recovery (2 diodes in series).
D605	19A700028P1	Silicon, fast recovery: fwd current 75 mA, 75 PIV; sim to Type 1N4148.
D606 thru D608	19A700053P2	Silicon, fast recovery (2 dioes in series).
		- - - - - - - - - - - JACKS - - - - - - - - - - -
J601	19C850591G4	Connector. Includes:
	19A701246G2	Shell
	19A701254P1	Connector
	19A701254P2	Connector
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. (Groups 1 & 3).
	19A704852P47	Printed wire: 21 contacts rated @ 2 1/2 amps; sim to Molex 22-29-2211. (Groups 5 & 7).
J604	19B801421P1	Cable, flat: 6 contacts, sim to UL Style 2651.
J605	19A703248P1	Contact, electrical. (Groups 1 & 3).
	19A703248P11	Contact, electrical. (Groups 5 & 7).

SYMBOL	GE PART NO.	DESCRIPTION
J607 thru J613	19A703248P1	Contact, electrical. (Groups 1 & 3).
	19A703248P11	Contact, electrical. (Groups 5 & 7).
		- - - - - - - - - - - PLUGS - - - - - - - - - - -
P605	19A702104P1	Receptacle: 2 position, shorting, rated at 3 amps; sim to Berg 65474-002. (Groups 1 & 3).
	19A702104P2	Receptacle: gold plated, two positions shorting; sim to Berg 65474-003. (Groups 5 & 7).
P607 thru P612	19A702104P1	Receptacle: 2 position, shorting, rated at 3 amps; sim to Berg 65474-002. (Groups 1 & 3).
	19A702104P2	Receptacle: gold plated, two positions shorting; sim to Berg 65474-003. (Groups 5 & 7).
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q601 thru Q604	19A700023P2	Silicon, NPN; sim to Type 2N3904.
Q605	19A700076P2	Silicon, NPN.
Q606	19A700023P2	Silicon, NPN: sim to 2N3904.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R601	19A701250P318	Metal film: 15K ohms ±1%, 1/4 w.
R602	19A701250P273	Metal film: 5.6K ohms ±1%, 1/4 w.
R603	19A701250P393	Metal film: 90.9K ohms ±1%, 250 VDCW, 1/4 w.
R604	19B800607P472	Metal film: 4.7K ohms ±5%, 200 VDCW, 1/8 w.
R605	19B800607P822	Metal film: 8.2K ohms ±5%, 200 VDCW, 1/8 w.
R606	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R607	19B800607P104	Metal film: 100K ohms ±5%, 200 VDCW, 1/8 w.
R608	19B800607P334	Metal film: 330K ohms ±5%, 200 VDCW, 1/8 w.
R609	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R610	19B800607P104	Metal film: 100K ohms ±5%, 200 VDCW, 1/8 w.
R611	19B800607P223	Metal film: 22K ohms ±5%, 200 VDCW, 1/8 w.
R612	19B800607P104	Metal film: 100K ohms ±5%, 200 VDCW, 1/8 w.
R613	19B800607P223	Metal film: 22K ohms ±5%, 200 VDCW, 1/8 w.
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	19B800607P823	Metal film: 82K ohms ±5%, 200 VDCW, 1/8 w.
R619	19B800607P104	Metal film: 100K ohms ±5%, 200 VDCW, 1/8 w.
R620	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R621	19B800607P681	Metal film: 680 ohms ±5%, 200 VDCW, 1/8 w.
R622	19B800607P330	Metal film: 33 ohms ±5%, 200 VDCW, 1/8 w.
R623	19B800607P390	Metal film: 39 ohms ±5%, 200 VDCW, 1/8 w.
R624	19B800607P152	Metal film: 1.5K ohms ±5%, 200 VDCW, 1/8 w.
R625 and R626	H212CRP947C	Deposited carbon: 4.7 ohms ±5%, 1/4 w.
R627	19B800607P184	Metal film: 180K ohms ±5%, 200 VDCW, 1/8 w.
R628	19B800607P822	Metal film: 8.2K ohms ±5%, 200 VDCW, 1/8 w.
R629	19B800784P111	Variable, conductive: 100K ohms ±20%, 0.33 w max.
R630	19B800607P102	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 w.
R631 and R632	19B800607P104	Metal film: 100K ohms ±5%, 200 VDCW, 1/8 w.
R633	19B800607P102	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 w.
R651 and R652	19B800607P561	Metal film: 560 ohms ±5%, 200 VDCW, 1/8 w.
R653 thru R658	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.

SYMBOL	GE PART NO.	DESCRIPTIO
R659	19B800607P472	Metal film: 4.7K ohms ±5%, 2
R660	19B800607P223	Metal film: 22K ohms ±5%, 20
R661	19B800607P103	Metal film: 10K ohms ±5%, 20
R662	19A702931P369	Metal film: 51.1K ohms ±1%,
R663 and R664	19B800607P103	Metal film: 10K ohms ±5%, 20
R665	19A702931P437	Metal film: 237K ohms ±1%, 2
R666	19B800784P108	Variable: 10K ohms ±20%, 1/2
		- - - - - - - - INTEGRATED CI
U601 and U602	19A701830P1	Linear, Audio AMPLIFIER; sim
U603 and U604	19A701789P1	Linear, Low Power OP AMP; sim
U605	19A700029P44	Digital: BILATERAL SWITCH.
		REGULATOR/MICROCOMPU
		- - - - - - - - - - CAPACITOR
C701 thru C703	19A702052P5	Ceramic: 1000 pF ±10%, 50 V
C704	19A702052P14	Ceramic: 0.01 uF ±10%, 50 V
C705	19A702052P5	Ceramic: 1000 pF ±10%, 50 V
C706	19A703893P10	Electrolytic: 200 uF -10+50
C708	19A702052P20	Ceramic: 0.033 uF ±10%, 50
C710	19A702052P5	Ceramic: 1000 pF ±10%, 50 V
C711	19A701534P8	Tantalum: 22 uF ±20%, 16 VD
C712	19A702052P20	Ceramic: 0.033 uF ±10%, 50
C713	19A701534P4	Tantalum: 1 uF ±20%, 35 VDC
C714	19A701534P3	Tantalum: 0.47 uF ±20%, 35
C715	19A702236P30	Ceramic: 15 pF ±5%, 50 VDCW
C716	19A701534P4	Tantalum: 1 uF ±20%, 35 VDC
C717	19A702052P14	Ceramic: 0.01 uF ±10%, 50 V
C718	19A702052P22	Ceramic: 0.047 uF ±10%, 50
C719	19A702052P5	Ceramic: 1000 pF ±10%, 50 V
C720	19A702052P20	Ceramic: 0.033 uF ±10%, 50
C721	19A702236P25	Ceramic: 10 pF ±0.5 pF, 50 ±30 PPM.
C722	19A702052P20	Ceramic: 0.033 uF ±10%, 50
C723	19A701534P4	Tantalum: 1 uF ±20%, 35 VD
C724	19A702052P24	Ceramic: 0.068 uF ±10%, 50
C725	19A702052P5	Ceramic: 1000 pF ±10%, 50
C726	19A702052P24	Ceramic: 0.068 uF ±10%, 50
C727	19A702052P10	Ceramic: 4700 pF ±10%, 50
C728	19A700233P5	Ceramic: 470 pF ±20%, 50 V
		- - - - - - - - - - - DIODE
D701	19A700025P2	Silicon, zener: 400 mW max
D702 and D703	19A700028P1	Silicon, fast recovery: fw PIV; sim to Type 1N4148.
D711	19A700047P2	Silicon, 100 mW, continuous DO-15.
D712	19A700053P2	Silicon, fast recovery (2 d
D713	162B3011P0002	Diode, optoelectronic: red Packard 5082-4655.
D714	19A700025P3	Silicon, zener: 400 mW ma
D715	19A700025P8	Silicon, zener: 400 mW ma

SYMBOL	GE PART NO.	DESCRIPTION
R659	19B800607P472	Metal film: 4.7K ohms ±5%, 200 VDCW, 1/8 w.
R660	19B800607P223	Metal film: 22K ohms ±5%, 200 VDCW, 1/8 w.
R661	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R662	19A702931P369	Metal film: 51.1K ohms ±1%, 200 VDCW, 1/8 w.
R663 and R664	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R665	19A702931P437	Metal film: 237K ohms ±1%, 200 VDCW, 1/8 w.
R666	19B800784P108	Variable: 10K ohms ±20%, 1/2 w.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - -
U601 and U602	19A701830P1	Linear, Audio AMPLIFIER; sim to TDA 2003.
U603 and U604	19A701789P1	Linear, Low Power OP AMP; sim to LM324N.
U605	19A700029P44	Digital: BILATERAL SWITCH.
		REGULATOR/MICROCOMPUTER SYSTEM
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C701 thru C703	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C704	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C705	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C706	19A703893P10	Electrolytic: 200 uF -10+50%, 10 VDCW.
C708	19A702052P20	Ceramic: 0.033 uF ±10%, 50 VDCW.
C710	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C711	19A701534P8	Tantalum: 22 uF ±20%, 16 VDCW.
C712	19A702052P20	Ceramic: 0.033 uF ±10%, 50 VDCW.
C713	19A701534P4	Tantalum: 1 uF ±20%, 35 VDCW.
C714	19A701534P3	Tantalum: 0.47 uF ±20%, 35 VDCW.
C715	19A702236P30	Ceramic: 15 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM
C716	19A701534P4	Tantalum: 1 uF ±20%, 35 VDCW.
C717	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C718	19A702052P22	Ceramic: 0.047 uF ±10%, 50 VDCW.
C719	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C720	19A702052P20	Ceramic: 0.033 uF ±10%, 50 VDCW.
C721	19A702236P25	Ceramic: 10 pF ±0.5 pF, 50 VDCW, temp coef 0 ±30 PPM.
C722	19A702052P20	Ceramic: 0.033 uF ±10%, 50 VDCW.
C723	19A701534P4	Tantalum: 1 uF ±20%, 35 VDCW.
C724	19A702052P24	Ceramic: 0.068 uF ±10%, 50 VDCW.
C725	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C726	19A702052P24	Ceramic: 0.068 uF ±10%, 50 VDCW.
C727	19A702052P10	Ceramic: 4700 pF ±10%, 50 VDCW.
C728	19A700233P5	Ceramic: 470 pF ±20%, 50 VDCW.
		- - - - - - - - - - - DIODES - - - - - - - - - -
D701	19A700025P2	Silicon, zener: 400 mW max; sim to BZX55-C2V7.
D702 and D703	19A700028P1	Silicon, fast recovery: fwd current 75 mA, 75 PIV; sim to Type 1N4148.
D711	19A700047P2	Silicon, 100 mW, continuous dissipation; sim to DO-15.
D712	19A700053P2	Silicon, fast recovery (2 diodes in series).
D713	162B3011P0002	Diode, optoelectronic: red; sim to Hewlett Packard 5082-4655.
D714	19A700025P3	Silicon, zener: 400 mW max; sim to BZX55-C3V3.
D715	19A700025P8	Silicon, zener: 400 mW max; sim to BZX55-C3V8.
D716 thru D719	19A700053P2	Silicon, fast recovery (2 diodes in series); sim to BAV99.
D720	19A700047P2	Silicon, 100 mW, continuous dissipation; sim to DO-15.
		- - - - - - - - - - - JACKS - - - - - - - - - - -
J701 thru J707	19A703248P1	Contact, electrical. (Groups 1 & 3).
	19A703248P11	Contact, electrical. (Groups 5 & 7).
J711	19A703248P4	Contact, electrical. (Groups 1 & 3).
	19A703248P14	Contact, electrical. (Groups 5 & 7).
J712	19A703248P1	Contact, electrical. (Groups 1 & 3).
	19A703248P11	Contact, electrical. (Groups 5 & 7).
		- - - - - - - - - - - - COILS - - - - - - - - - -
L711	19A700000P25	Coil, RF: 15 uH ±10%; sim to Jeffers 4421-9K.
		- - - - - - - - - - - PLUGS - - - - - - - - - - -
P701 thru P706	19A702104P1	Receptacle: 2 position, shorting, rated at 3 amps; sim to Berg 65474-002. (Groups 1 & 3).
	19A702104P2	Receptacle: gold plated, two positions shorting; sim to Berg 65474-003. (Groups 5 & 7).
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q701	19A700023P2	Silicon, NPN; sim to Type 2N3904.
Q703	19A700076P2	Silicon, NPN.
Q704	19A702503P2	Silicon, NPN.
Q705	19A116375P1	Silicon, PNP.
Q711 thru Q721	19A700023P2	Silicon, NPN; sim to Type 2N3904.
Q722	19A700076P2	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R701	19B800607P152	Metal film: 1.5K ohms ±5%, 200 VDCW, 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%, 200 VDCW, 1/8 w.
R707	19B800607P152	Metal film: 1.5K ohms ±5%, 200 VDCW, 1/8 w.
R708	19B800607P223	Metal film: 22K ohms ±5%, 200 VDCW, 1/8 w.
R709	19B800607P101	Metal film: 100 ohms ±5%, 200 VDCW, 1/8 w.
R710	19B800607P331	Metal film: 330 ohms ±5%, 200 VDCW, 1/8 w.
R711 thru R713	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R714	19B800607P101	Metal film: 100 ohms ±5%, 200 VDCW, 1/8 w.
R715	19A702931P369	Metal film: 51.1K ohms ±1%, 200 VDCW, 1/8 w.
R716	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R717	19A702931P369	Metal film: 51.1K ohms ±1%, 200 VDCW, 1/8 w.
R718	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R719	19B800607P822	Metal film: 8.2K ohms ±5%, 200 VDCW, 1/8 w.
R720	19B800607P104	Metal film: 100K ohms ±5%, 200 VDCW, 1/8 w.
R721	19B800607P223	Metal film: 22K ohms ±5%, 200 VDCW, 1/8 w.
R722	19B800607P471	Metal film: 470 ohms ±5%, 200 VDCW, 1/8 w.
R723 thru R732	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R733	19A702931P369	Metal film: 51.1K ohms ±1%, 200 VDCW, 1/8 w.
R734 and R735	19B800607P471	Metal film: 470 ohms ±5%, 200 VDCW, 1/8 w.
R736 and R737	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R738	19B800607P223	Metal film: 22K ohms ±5%, 200 VDCW, 1/8 w.
R739	19B800607P222	Metal film: 2.2K ohms ±5%, 200 VDCW, 1/8 w.
R740	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R741	19B800607P102	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 w.
R742	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R743	19B800607P104	Metal film: 100K ohms ±5%, 200 VDCW, 1/8 w.
R744	19A702931P437	Metal film: 237K ohms ±1%, 200 VDCW, 1/8 w.
R745	19B800607P822	Metal film: 8.2K ohms ±5%, 200 VDCW, 1/8 w.
R746 thru R752	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R753	19B800607P102	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 w.
R754	19B800607P272	Metal film: 2.7K ohms ±5%, 200 VDCW, 1/8 w.
R755	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R756	19B800607P273	Metal film: 27K ohms ±5%, 200 VDCW, 1/8 w.
R757	19B800607P222	Metal film: 2.2K ohms ±5%, 200 VDCW, 1/8 w.
R758	19B800607P223	Metal film: 22K ohms ±5%, 200 VDCW, 1/8 w.
R759	19B800607P101	Metal film: 100 ohms ±5%, 200 VDCW, 1/8 w.
R760 thru R767	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R768	19B800607P153	Metal film: 15K ohms ±5%, 200 VDCW, 1/8 w.
R769	19B800607P471	Metal film: 470 ohms ±5%, 200 VDCW, 1/8 w.
R770 and R771	19B800607P102	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 w.
R772	H212CRP382C	Deposited carbon: 82K ohms ±5%, 1/4 w.
R773	H212CRP310C	Deposited carbon: 10K ohms ±5%, 1/4 w.
R774 thru R777	19B800607P101	Metal film: 100 ohms ±5%, 200 VDCW, 1/8 w.
R780	19B800607P101	Metal film: 100 ohms ±5%, 200 VDCW, 1/8 w.
		- - - - - - - - - - TEST POINTS - - - - - - - - -
TP701		Part of printed board 19D900839P1.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - -
U701	19A702939P2	Linear: SIM TO TI TL431CLP.
U702	19A134717P1	4K PROGRAMMED MEMORY.
U703	19A116968P3	Linear, timer: DUAL IN-LINE 14 Pin Dip Package; sim to Signetics SA556N.
U704	19A700029P229	Digital: HEX 3-STATE BUFFER.
U705	19A703244P22	Microcomputer. (HMOS, 8 BIT).
U706	19A703072P2	Digital: sim to XICOR X2212DI.
U707	19A116180P33	Digital: HEX INVERTER BUFFER/DRIVER (OPEN COLLECTOR).
		- - - - - - - - - - - SOCKETS - - - - - - - - - -
XU705	19A700156P5	Integrated circuit.
XU706	19A700156P11	Integrated circuit.
		- - - - - - - - - - CRYSTALS - - - - - - - - - -
Y701	19A702511G3	Quartz: 6.000000 MHz.
	19A702511G12	Quartz: 6.002680 (Option T1).
	19A702511G19	Quartz: 5.997320 (Option T2).
	19A702511G20	Quartz: 6.00680 (Option T3).
	19A702511G21	Quartz: 5.997320 (Option T4).
A601	19C851003P1	Printed Wire Board. (Backplane).
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1 thru C7		Includes:
	19B800701P1	Tuning screw.
	19A701800P1	Stop nut.
C220	19A134227P4	Variable: 1.5 to 14 pF, 100 VDCW.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19D900133P1	Casting, front end. (Groups 1 & 5).
	19D900133P7	Casting, front end. (Groups 3 & 7).
	19D900299P1	Front end spacer.
	19B800647G1	Shield, IF.
	19C850719P1	IF Cover.
	19B800655P1	Gasket. (J601).
	19D900777P1	Bottom cover, casting.
	7141225P2	Hex nut: No. 4-40. (Secures C220).
	N404P11C6	Lockwasher, internal: No. 4. (Secures C220).
	19B801103P2	Spring, trimmer. (Used with C220).
	19A703087P1	Nut, trimmer. (Used with C220).
	19B800583P1	Heat sink. (Used with U601, U602, U701, & U702).
	19A701332P4	Insulator, washer: nylon. (Used with Q103).
	19A701289P1	Retaining ring: 3/16 inches; sim to National Lockwasher WA 510. (Located on J601 terminals).
	19A700068P1	Insulator, bushing. (Used with U601, U602, U701 & U702).
	19A700115P3	Insulator, plate. (Used with U601, U602, U603 & U604).
	19A701887P1	Heat sink. (Q103).
	19A701900P2	Compression clip. (Used with Q103).
	19A701516P1	Insulator, plate. (Used with Y701).
	19A701538P2	Gasket. (Used with L509).
		ASSOCIATED PARTS
	19B800716P2	Tuning tool.
	19B800908P2	Oscillator cover.
	19C850860P3	Synthesizer top cover.
	19C850949G1	PA cover.
	19B800686G4	Radio bottom cover. (Includes 19B800587P2 gasket)
	19C850708G3	Radio top cover. (Includes 19B800500P5 gasket)
		ELECTRICALLY ERASABLE PROM
	19A703072P2	Digital. (STATIC RAM EE Personality PROM - Not Programmed); sim to XICOR X2212D. (Integrated circuit only).
	19C851006G1	2nd EE PROM for 32 channel radios (not programmed). (Group 3 - Gold Contacts).
		- - - - - - - - - - - PLUGS - - - - - - - - - - -
P1	19A702517P1	Contact, electrical. (Quantity 18).
		FUSE MOUNTING ASSEMBLY 19B216021G2 25 AMP 19B216021G3 30 AMP 19B216021G6 20 AMP
		- - - - - - - - - - - FUSES - - - - - - - - - - -
F2	1R11P6	Quick blowing: 25 amps, 250 v; sim to Bussmann NON25.

PTION

250 v; sim to Bussmann

250 v; sim to Bussmann

LANEOUS - - - - - - - - - -

.

. 8-32 x 3/8. (Secures

PARTS LIST

136-174 MHz PRE-AMPLIFIER
19C850696G1
19C850696G3 (GOLD CONTACTS)
ISSUE 5

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C2	19A702061P9	Ceramic: 4.7 pF ±0.5 pF, 50 VDCW, temp coef 0 ±60 PPM.
C3 thru C9	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C10	19A701534P7	Tantalum: 10 uF ±20%, 16 VDCW.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19A700024P13	Coil, RF: 1.0 uH ±10%.
L2	19A700024P2	Coil, RF: 120 nH ±10%.
		- - - - - - - - - - - PLUGS - - - - - - - - - - -
P1	19A700041P82	Printed wiring: 8 circuits; sim to Molex 22-01-2085. (Group 1).
	19A704779P82	Printed wiring: 8 circuits. (Group 3 - Gold Contacts).
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A116818P3	N-Channel field effect; sim to 3N187. (MOS DUAL GATE).
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	19B800607P330	Metal film: 33 ohms ±5%, 200 VDCW, 1/8 w.
R2	19B800607P682	Metal film: 6.8K ohms ±5%, 200 VDCW, 1/8 w.
R3	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R4	19B800607P102	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 w.
R5	19B800607P330	Metal film: 33 ohms ±5%, 200 VDCW, 1/8 w.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19A701502P3	Bumper, plastic.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

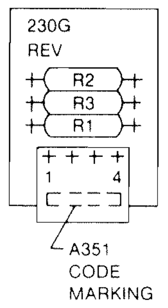
PARTS LIST

2PPM OSCILLATOR KIT
19C851230G1
19C851230G2 (GOLD CONTACTS)
ISSUE 2

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - - PLUGS - - - - - - - - - - -
P1	19A700041P78	Printed wire, 4 contacts rated @ 2 1/2 amps; sim to Molex 22-15-2046. (Group 1).
	19A704779P78	Printed wire, 4 contacts rated @ 2 1/2 amps. (Group 2 - Gold Contacts).
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1A	19A701250P353	Metal film: 34.8K ohms ±1%, 250 VDCW, 1/4 w.
R1B	19A701250P357	Metal film: 38.3K ohms ±1%, 250 VDCW, 1/4 w.
R1C	19A701250P360	Metal film: 41.2K ohms ±1%, 250 VDCW, 1/4 w.
R1D	19A701250P344	Metal film: 28K ohms ±1%, 250 VDCW, 1/4 w.
R1E	19A701250P346	Metal film: 29.4K ohms ±1%, 250 VDCW, 1/4 w.
R1F	19A701250P349	Metal film: 31.6K ohms ±1%, 250 VDCW, 1/4 w.
R1G	19A701250P351	Metal film: 33.2K ohms ±1%, 250 VDCW, 1/4 w.
R1H	19A701250P358	Metal film: 2.7 ohms ±5%, 1/4 w.
R1J	19A701250P359	Metal film: 40.2K ohms ±1%, 250 VDCW, 1/4 w.
R1K	19A701250P361	Metal film: 42.2K ohms ±1%, 250 VDCW, 1/4 w.
R1L	19A701250P347	Metal film: 30.1K ohms ±1%, 250 VDCW, 1/4 w.
R1M	19A701250P365	Metal film: 46.4K ohms ±1%, 250 VDCW, 1/4 w.
R2A	19A701250P288	Metal film: 8060 ohms ±1%, 250 VDCW, 1/4 w.
R2B	19A701250P285	Metal film: 7.5K ohms ±1%, 250 VDCW, 1/4 w.
R2C	19A701250P286	Metal film: 7680 ohms ±1%, 250 VDCW, 1/4 w.
R2D	19A701250P273	Metal film: 5.6K ohms ±1%, 250 VDCW, 1/4 w.
R3A	19A701250P188	Metal film: 806 ohms ±1%, 250 VDCW, 1/4 w.
R3B	19A701250P190	Metal film: 845 ohms ±1%, 250 VDCW, 1/4 w.
R3C	19A701250P192	Metal film: 887 ohms ±1%, 250 VDCW, 1/4 w.
R3D	19A701250P193	Metal film: 909 ohms ±1%, 250 VDCW, 1/4.
R3E	19A701250P194	Metal film: 931 ohms ±1%, 250 VDCW, 1/4 w.
R3F	19A701250P191	Metal film: 866 ohms ±1%, 250 VDCW, 1/4 w.
R3G	19A701250P184	Metal film: 732 ohms ±1%, 250 VDCW, 1/4 w.
R3H	19A701250P185	Metal film: 750 ohms ±1%, 250 VDCW, 1/4 w.
R3J	19A701250P186	Metal film: 768 ohms ±1%, 250 VDCW, 1/4 w.
R3K	19A701250P187	Metal film: 787 ohms ±1%, 250 VDCW, 1/4 w.
R3L	19A701250P196	Metal film: 1150 ohms ±1%, 250 VDCW, 1/4 w.
R3M	19A701250P201	Metal film: 1K ohms ±1%, 250 VDCW, 1/4 w.
R3N	19A701250P203	Metal film: 1050 ohms ±1%, 250 VDCW, 1/4 w.
R3P	19A701250P204	Metal film: 1070 ohms ±1%, 250 VDCW, 1/4 w.
R3Q	19A701250P207	Metal film: 1150 ohms ±1%, 250 VDCW, 1/4 w.
R3R	19A701250P182	Metal film: 698 ohms ±1%, 250 VDCW, 1/4 w.
R3S	19A701250P179	Metal film: 649 ohms ±1%, 250 VDCW, 1/4 w.
R3T	19A701250P217	Metal film: 1.47K ohms ±1%, 250 VDCW, 1/4 w.
		- - - - - - - - - - CRYSTALS - - - - - - - - - -
Y351	19A703049G6	Crystal unit, quartz, 13.200 MHz.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

A351 BOARD LAYOUT



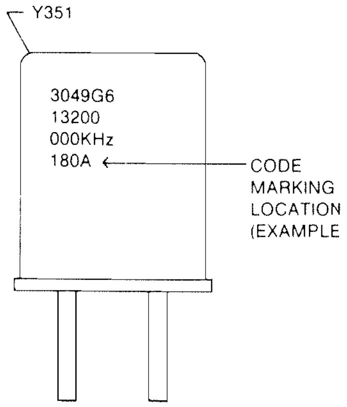


TABLE 1
(19C851230)
RESISTOR IDENTIFICATION FOR 2 PPM OSCILLATOR KIT

A351 BOARD CODE MARKING	Y351 CRYSTAL MARKING	R1/VALUE		R2/VALUE		R3/VALUE	
090B	090B-099B	L	30.1K	D	5.62K	T	1.47K
110B	110B-119B	D	28.0K	B	7.50K	Q	1.15K
120A	120A-129A	E	29.4K	B	7.50K	P	1.07K
120B	120B-129B	D	28.0K	B	7.50K	Q	1.15K
130A	130A-139A	F	31.6K	B	7.50K	N	1.05K
130B	130B-139B	E	29.4K	B	7.50K	P	1.07K
140A	140A-149A	G	33.2K	A	8.06K	M	1K
140B	140B-149B	F	31.6K	A	8.06K	M	1K
150A	150A-159A	A	34.8K	A	8.06K	L	976
150B	150B-159B	G	33.2K	A	8.06K	D	909
160A	160A-169A	B	38.3K	A	8.06K	F	866
160B	160B-169B	A	34.8K	A	8.06K	D	909
170A	170A-179A	C	41.2K	A	8.06K	C	887
170B	170B-179B	A	34.8K	A	8.06K	E	931
180A	180A-189A	B	38.3K	A	8.06K	A	806
180B	180B-189B	B	38.3K	A	8.06K	B	845
190A	190A-199A	H	39.2K	A	8.06K	K	787
190B	190B-199B	J	40.2K	A	8.06K	J	768
200A	200A-209A	J	40.2K	A	8.06K	J	768
200B	200B-209B	K	42.2K	C	7.68K	J	768
210A	210A-219A	K	42.2K	C	7.68K	H	750
210B	210B-219B	D	42.2K	C	7.68K	H	750
220A	220A-229A	K	42.2K	C	7.68K	G	732
220B	220B-229B	K	42.2K	C	7.68K	R	698
230B	230B-239B	M	46.4K	C	7.68K	S	649

Resistors R1 thru R3 shall be selected from Table to agree with the code marked on Crystal Y351

RC-5087

SYMBOL	GE PART NO.	DESCRIPTION
F3	1R11P7	Quick blowing: 30 amps, 250 v; sim to Bussmann NON30.
F4	1R11P5	Quick blowing: 20 amps, 250 v; sim to Bussmann NON20.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19D413045P1	Base.
	19D413046P1	Cover.
	19B205950P1	Fuse clip. (Quantity 2).
	19A115942P1	Insert, threaded.
	N117P15006C6	Tap screw, phillips: No. 8-32 x 3/8. (Secures fuse clips).

PARTS LIST

136-174 MHz PRE-AMPLIFIER
19C850696G1
19C850696G3 (GOLD CONTACTS)
ISSUE 5

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C2	19A702061P9	Ceramic: 4.7 pF ±0.5 pF, 50 VDCW, temp coef 0 ±60 PPM.
C3 thru C9	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C10	19A701534P7	Tantalum: 10 uF ±20%, 16 VDCW.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19A700024P13	Coil, RF: 1.0 uH ±10%.
L2	19A700024P2	Coil, RF: 120 nH ±10%.
		- - - - - - - - - - - PLUGS - - - - - - - - - - -
P1	19A700041P82	Printed wiring: 8 circuits; sim to Molex 22-01-2085. (Group 1).
	19A704779P82	Printed wiring: 8 circuits. (Group 3 - Gold Contacts).
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A116818P3	N-Channel field effect; sim to 3N187. (MOS DUAL GATE).
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	19B800607P330	Metal film: 33 ohms ±5%, 200 VDCW, 1/8 w.
R2	19B800607P682	Metal film: 6.8K ohms ±5%, 200 VDCW, 1/8 w.
R3	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R4	19B800607P102	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 w.
R5	19B800607P330	Metal film: 33 ohms ±5%, 200 VDCW, 1/8 w.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19A701502P3	Bumper, plastic.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

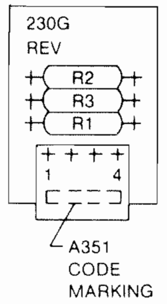
PARTS LIST

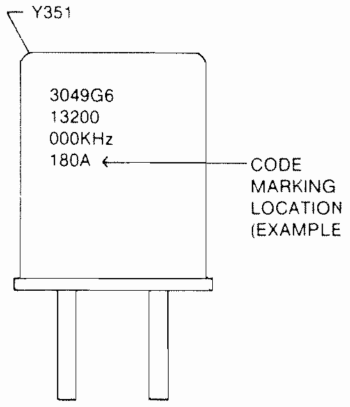
2PPM OSCILLATOR KIT
19C851230G1
19C851230G2 (GOLD CONTACTS)
ISSUE 2

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - - PLUGS - - - - - - - - - - -
P1	19A700041P78	Printed wire, 4 contacts rated @ 2 1/2 amps; sim to Molex 22-15-2046. (Group 1).
	19A704779P78	Printed wire, 4 contacts rated @ 2 1/2 amps. (Group 2 - Gold Contacts).
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1A	19A701250P353	Metal film: 34.8K ohms ±1%, 250 VDCW, 1/4 w.
R1B	19A701250P357	Metal film: 38.3K ohms ±1%, 250 VDCW, 1/4 w.
R1C	19A701250P360	Metal film: 41.2K ohms ±1%, 250 VDCW, 1/4 w.
R1D	19A701250P344	Metal film: 28K ohms ±1%, 250 VDCW, 1/4 w.
R1E	19A701250P346	Metal film: 29.4K ohms ±1%, 250 VDCW, 1/4 w.
R1F	19A701250P349	Metal film: 31.6K ohms ±1%, 250 VDCW, 1/4 w.
R1G	19A701250P351	Metal film: 33.2K ohms ±1%, 250 VDCW, 1/4 w.
R1H	19A701250P358	Metal film: 2.7 ohms ±5%, 1/4 w.
R1J	19A701250P359	Metal film: 40.2K ohms ±1%, 250 VDCW, 1/4 w.
R1K	19A701250P361	Metal film: 42.2K ohms ±1%, 250 VDCW, 1/4 w.
R1L	19A701250P347	Metal film: 30.1K ohms ±1%, 250 VDCW, 1/4 w.
R1M	19A701250P365	Metal film: 46.4K ohms ±1%, 250 VDCW, 1/4 w.
R2A	19A701250P288	Metal film: 8060 ohms ±1%, 250 VDCW, 1/4 w.
R2B	19A701250P285	Metal film: 7.5K ohms ±1%, 250 VDCW, 1/4 w.
R2C	19A701250P286	Metal film: 7680 ohms ±1%, 250 VDCW, 1/4 w.
R2D	19A701250P273	Metal film: 5.6K ohms ±1%, 250 VDCW, 1/4 w.
R3A	19A701250P188	Metal film: 806 ohms ±1%, 250 VDCW, 1/4 w.
R3B	19A701250P190	Metal film: 845 ohms ±1%, 250 VDCW, 1/4 w.
R3C	19A701250P192	Metal film: 887 ohms ±1%, 250 VDCW, 1/4 w.
R3D	19A701250P193	Metal film: 909 ohms ±1%, 250 VDCW, 1/4.
R3E	19A701250P194	Metal film: 931 ohms ±1%, 250 VDCW, 1/4 w.
R3F	19A701250P191	Metal film: 866 ohms ±1%, 250 VDCW, 1/4 w.
R3G	19A701250P184	Metal film: 732 ohms ±1%, 250 VDCW, 1/4 w.
R3H	19A701250P185	Metal film: 750 ohms ±1%, 250 VDCW, 1/4 w.
R3J	19A701250P186	Metal film: 768 ohms ±1%, 250 VDCW, 1/4 w.
R3K	19A701250P187	Metal film: 787 ohms ±1%, 250 VDCW, 1/4 w.
R3L	19A701250P196	Metal film: 1150 ohms ±1%, 250 VDCW, 1/4 w.
R3M	19A701250P201	Metal film: 1K ohms ±1%, 250 VDCW, 1/4 w.
R3N	19A701250P203	Metal film: 1050 ohms ±1%, 250 VDCW, 1/4 w.
R3P	19A701250P204	Metal film: 1070 ohms ±1%, 250 VDCW, 1/4 w.
R3Q	19A701250P207	Metal film: 1150 ohms ±1%, 250 VDCW, 1/4 w.
R3R	19A701250P182	Metal film: 698 ohms ±1%, 250 VDCW, 1/4 w.
R3S	19A701250P179	Metal film: 649 ohms ±1%, 250 VDCW, 1/4 w.
R3T	19A701250P217	Metal film: 1.47K ohms ±1%, 250 VDCW, 1/4 w.
		- - - - - - - - - - CRYSTALS - - - - - - - - - -
Y351	19A703049G6	Crystal unit, quartz, 13.200 MHz.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

A351 BOARD LAYOUT





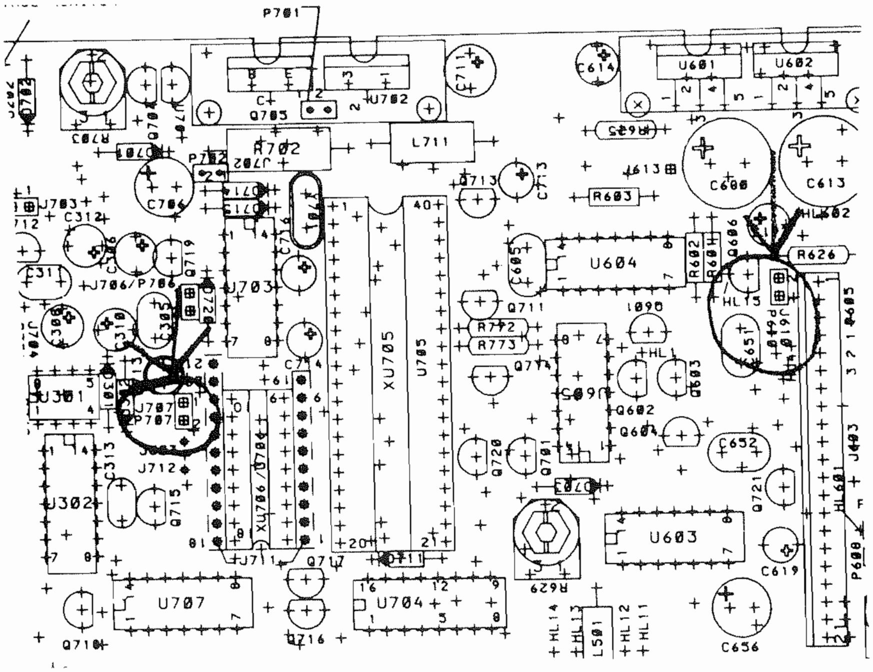
ADDENDUM NO 1 TO LBI-31517A
(PCN3)

This addendum describes revision Letter changes that are not yet included in this publication.

REV A - SYSTEM BOARD 19D901345G5,7
REV C - SYSTEM BOARD 19D901345G1,3

To facilitate manufacturing. Added P610. To prevent possible EEPROM data loss. Deleted C726 and added P707.

P610 is: 19A702104P1 for groups 1 and 3 of system board.
P610 is: 19A702104P2 for groups 5 and 7 of system board.
P707 is: 19A702104P1 for groups 1 and 3 of system board.
P707 is: 19A702104P2 for groups 5 and 7 of system board.



ADDENDUM NO 2 TO LBI-31517A
(PCN3)

This addendum identifies revision letter changes not previously incorporated in this publication.

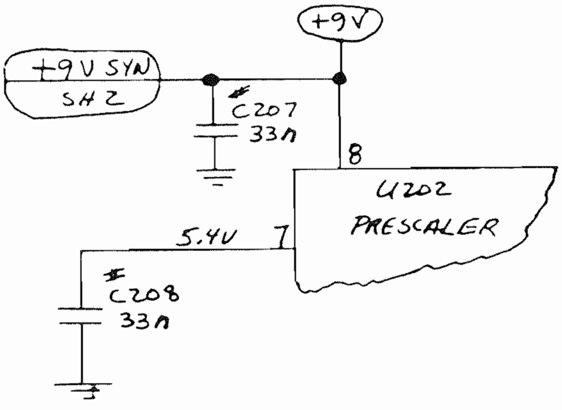
REV B - SYSTEM BOARD 19D901345G5,7
REV D - SYSTEM BOARD 19D901345G1,3

To improve prescaler operation, added D200 and R200, and deleted C208.

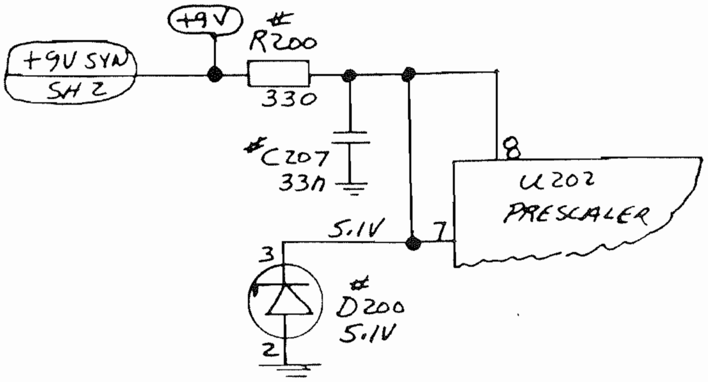
D200 is 19A700083P22 Zener diode, 5.1 V.
R200 is 19B800607P331 Chip resistor, 330 ohm.

Make the appropriate changes as follows:

From:



To:



ADDENDUM NO. 3 TO LBI-31517A
(PCN3)

This addendum incorporates into Maintenance Manual LBI-31517A a change in software for 136 to 176 MHz. Delta S System Board 19D901345.

Rev. E - System Board 19D901345G1 & G3
Rev. C - <u>System Board 19D901345G5 & G7</u>

To improve operation. Changed Microcomputer U705 from 19A703244P22 to 19A703244P23.