MAINTENANCE MANUAL
MDX VHF RF BOARD
19D904958G1 (136-153 MHz)
19D904958G2 (150-174 MHz)

TABLE OF CONTENTS

DESCRIPTION

The RF Board for the MDX mobile radio consists of the following circuits:

- A frequency synthesizer for generating the transmit carrier frequency and the receive circuit first mixer injection frequency.
- The transmit exciter, PA and power control circuits.
- The receive circuit front end, IF and FM detector.
- Voltage Regulators.

The RF Board is mounted in the bottom of the frame assembly. Refer to Combination Manual LBI-39015 for a mechanical layout of the radio. Figure 1 of this publication provides a block diagram of the transmit and receive circuits. Figure 2 provides a block diagram of the synthesizer.

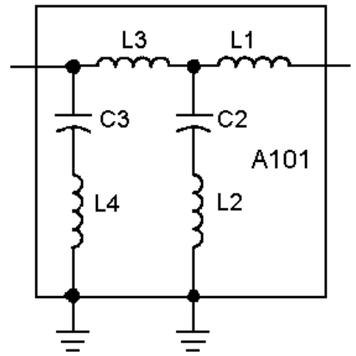
Transmit circuit adjustments for frequency, power and deviation are accessible from the topside of the board, as are IF alignment, second oscillator and audio level adjustments for the receive circuit. Chip components on the bottom of the board provide optimum RF performance, while being accessible for easy servicing by removing the "friction fit" bottom shields.

Selected use of sealed modules permit small board size as well as RF and mechanical protection for sensitive circuitry. Modules are not repairable and must be replaced if they are determined to be damaged.

ERICSSON

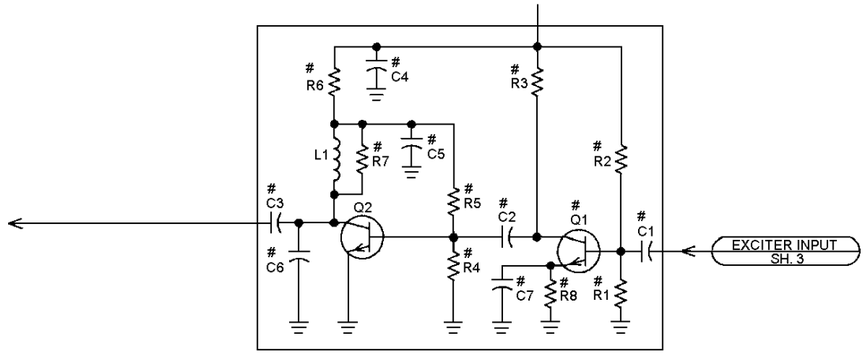
SCHEMATIC DIAGRAM

TX Filter A101



(19D901969, Sheet 1, Rev. 0)

Tx Exciter A102



(19D901969, Sheet 1, Rev. 0)

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CIRCUIT ANALYSIS

SYNTHESIZER CIRCUIT

The synthesizer generates all transmit and receive RF frequencies. The circuit uses a phase-locked **V**oltage **C**ontrolled **O**scillator (**VCO**) operating on the actual transmitter frequency (136-153 MHz or 150-174 MHz) during transmit and 45 MHz above the actual receiver frequency during receive. The synthesizer output signal is generated directly by VCO module U201 and buffered by transistor Q201 to a level of +8 dBm. This signal feeds the receiver mixer and is attenuated to 0 dBm by resistor R201 to feed the transmitter exciter module.

The synthesizer frequency is controlled by the microprocessor on the Audio/Logic Board. Frequency stability is maintained by a **T**emperature **C**ontrolled (**X**)crystal **O**scillator (**TCXO**) module. The oscillator is high stability 2.5 PPM (0.00025%) over the temperature range of -30°C to +60°C and determines the overall frequency stability of the radio.

The VCO output is also buffered by transistors Q203 and Q204 to feed divide by 128/129 dual modulus prescaler U205. The prescaler feeds the $\mathbf{F_{IN}}$ input of **P**hase-**L**ock-**L**oop (**PLL**) U206. Within U206, the prescaled signal is further divided down to 5 kHz or 6.25 kHz to be compared with a reference signal. This reference signal is derived from the 12.8 MHz down to the 5 kHz or 6.25 kHz reference frequency.

Divider circuits in U206 are programmed by three inputs from the Audio/Logic Board which are buffered and inverted by transistors Q208, Q209 and Q210. The **S ENABLE** pulse activates switch U202 to allow more rapid channel acquisition during channel changes.

A **LOCK DET** signal from the PLL goes to the microprocessor for processing to prevent transmission when the VCO is not on frequency and to provide an error message to the user. During receive, an unlocked synthesizer is indicated by **SYN LOCK** in the display. The microprocessor will continually try to reload the frequency information into the PLL until the synthesizer locks. During transmit, only a slower pulsed alert tone will be heard. Once unlocked in transmit, the synthesizer will not be reloaded. The transmitter PTT must be unkeyed and then rekeyed to attempt to relock.

Audio modulation from the Audio/Logic Board is applied to the VCO module through **DEVIATION ADJUST** potentiometer R226. **VCO TUNE** potentiometer R218 adjusts the operational frequency range of the VCO by varying a negative bias from diodes D202 and D203. Low frequency modulation is applied to the TCXO through **LOW FREQ. ADJUST** potentiometer R250.

TRANSMIT CIRCUIT

The transmit circuit consist of a fixed-tuned exciter module, a 10 Watt PA module, a **PIN** diode switch, a low pass filter, a directional coupler, a power control circuit and a transmit voltage switch.

Exciter Module

The Signal Flow Diagram shows the synthesizer driving the receiver mixer at +8 dBm and is attenuated by resistor R201 to 0 dBm for driving the exciter input. Exciter module A102 operates from a switched voltage supply. The exciter module bandwidth is sufficiently wide that both the 136-153 MHz and 150-174 MHz bands are allowed. No tuning is required. Both input and output ports operate at 50 ohms impedance. The exciter module provides typically 23 dB of gain and 200 mW of output power to drive the power amplifier module.

Power Amplifier Module

PA module U101 requires a drive of 200 mW from the exciter module to deliver up to 10 Watts power output. The module is mounted to the rear heat sink. The PA module output drives the 40-Watt PA board through connector J103. The power control circuit controls the PA module output power.

PIN Diode Switch, Low Pass Filter and Directional Coupler

The output from the 40-Watt PA Board feeds transmit **PIN** diode switch D104 through connector J102. When transmitting, switched 8 volts is applied through inductor L102, turning on **PIN** diodes D104 and D401. The DC path is completed through resistors R401 and R402 with the bias current set at about 40 mA. Diode D104 couples the PA Board power from J102 to low pass filter A101. Diode D401 provides an RF path to ground to protect the receiver input.

The low pass filter reduces the harmonic output from the transmit circuit and feeds directional coupler W101 and W102. The directional coupler provides a sample of transmit power for the power control circuit. The coupler output feeds antenna jack J101.

Power Control Circuit

The power control circuit samples the output power to the antenna to maintain a constant power level across the band. Also, a thermistor circuit senses the heat sink temperature to reduce the power level when the temperature is above 70°C. The power control circuit controls the supply voltage to one of the amplifier stages in PA module U101.

Directional coupler W101 and W102 provides a sample of transmit power for diode D101. Diode D101, resistor R106 and capacitor C104 produce a positive DC voltage proportional to the transmit circuit output power level. This DC level feeds the (-) input of amplifier U103-B. Power set potentiometer R111 and thermistor R118 determine the DC level to the (+) input of U103-B. Amplifier U103-B amplifies the difference between the (-) and (+) inputs, forcing the output power level to equal the power set level by varying the drive to transistors Q101 and Q102. Transistor Q101 supplies the control voltage to PA module U101. For example, if the output power level begins to drop below the power set level, the output of U103-B increases positively, causing Q102 to conduct less. The base of Q101 rises, increasing the control voltage to the PA module, which increases the output power level back to the desired set level.

Transistor Q104, capacitor C123 and resistor R105 improve the transient stability of the power control loop when the transmit circuit is keyed.

Transmit Switch

During transmit, the Audio/Logic Board microprocessor pulls the **DPTT** line low causing the output of amplifier U103-A to go loWatt. Transistor Q103 turns on to supply **SW 8V** to the exciter module, the power control circuit and the **PIN** diode switch. During receive, the output of U103-A supplies 12 volts to the receive circuit RF pre-amp **F**ield **E**ffect **T**ransistor (**FET**) Q401.

RECEIVE CIRCUIT

The dual conversion receive circuit consists of a front end section, a 45 MHz first IF and a 455 kHz second IF with an FM detector. All audio processing and squelch functions are accomplished on the Audio/Logic Board.

Front End Section

RF is coupled from antenna Jack J101 through the directional coupler and the low pass filter to **PIN** diode D401. When transmitting, **SW 8V** is applied through inductor L102, turning on **PIN** diodes D104 and D401, with the DC path completed through resistor R401. Diode D401 provides an RF path to ground for the receiver input while in transmit. In receive, D401 is off, allowing RF to pass by D401 unattenuated.

The RF pre-amplifier is a dual gate FET (3N201) with a 2-pole preselector filter and a 2-pole output filter. The input filter consists of inductors L402, L405 and associated capacitors. These components form a top coupled resonator filter. The input impedance level is 50 ohms while the output is loaded by the FET input impedance (approximately 1.89k ohms). Capacitor C408 is tuned for a flat bandpass response. The output matching circuitry is again a 2-pole filter. Resistor R408 provides a fixed loading impedance at the filter input. This inturn results in a 50 ohm impedance level at the loading port of filter Z402. Filter Z402 is a fixed tuned 3-pole bandpass filter covering the full radio bandwidth.

The mixer, Z403, is a doubly balanced diode mixer. This mixer is driven by a local oscillator signal of +7 dBm or greater to provide good inter-modulation performance, spurious performance and local oscillator isolation. The mixer conversion loss is typically about 6 dB.

45 MHz IF

First 45 MHz IF amplifier transistor Q501 is a junction FET operated in the common gate mode. This configuration offers a typical input impedance of 75 ohms. The output circuitry is tuned by inductor L504 and loaded to provide the proper source termination for the 4-pole crystal filter which follows.

The output of the crystal filter is matched by second IF amplifier transistor Q502. This port is also tuned by inductor L506 and loaded to provide the proper filter termination. Transistor Q502 is a dual gate FET operating at a bias current of about 10 milliamps. The output of Q502 is tuned by inductor L507 for maximum gain at 45 MHz and is loaded by the 2nd mixer in the U501 chip. This Q502 stage has a relatively high input and output impedance and needs high isolation within the active device. The dual gate FET provides the isolation required.

Converter/IF/Detector U501

Pins 1 and 2 of U501 connect to an internally biased oscillator transistor. The external circuitry of this oscillator transistor includes crystal Y501 and forms and oscillator circuit operating at 45.455 MHz. The frequency of this third mode oscillator is adjusted by inductor L508. The oscillator drives the internal balanced mixer. The 45 MHz IF signal is translated to 455 kHz and appears at Pin 3 of U501. This IF signal is filtered by 6-pole ceramic filter Z503 and drives the internal 455 kHz amplifier and limiter. The limited 455 kHz in turn drives an internal quadrature detector. The phase shift network needed by the quadrature is provided by inductor L509. The audio output port is Pin 9 on U501. Inductor L509 is adjusted for maximum audio output level. The audio signal at Pin 9 is filtered by resistor R512 and capacitor C519 to reduce IF feed through. Buffer amplifier transistor Q503, drives audio potentiometer R513. This provides a VOL/SQ HI signal where the amplitude may be set for proper system operation using R513.

Power Distribution

Unswitched 13.8 Volts (**A+**) is supplied to the RF Board through connector J704 and feeds power control transistor Q101and PA module U101.

Switched 13.6 Volts (**SW A+**) is supplied to the RF Board through connectors J704 and J705 and feeds regulators U102, U207 and U502. Regulator U102 supplies 8 Volts to the transmit switch, synthesizer and 5-Volt regulator U203. Regulator U503 supplies the Audio/Logic board through connector J702. Regulator U207 supplies 8.5 Volts to the synthesizer. Regulator U507 supplies 8 Volts to the receive circuit.

SERVICE NOTES

TRANSMIT CIRCUIT

Most transmit circuit problems can be isolated by checking the TX power gains shown in Figure 1. The 40-Watt PA board may be bypassed by placing a jumper cable between connectors J103 and J102 on the RF Board. PA module U101 is capable of producing 10 Watts output.

Transmit Circuit DC Measurements

1. First ensure that Delayed **P**ush-**T**o-**T**alk (**DPTT**) is low when the microphone PTT is keyed loWatt.
2. Check for approximately 8 volts at L105 feeding the Exciter Module. If not present, troubleshoot the TX switch circuitry, Q103 and U103.
3. Check for approximately 7 volts across resistors R401 and R402. If not present, check PIN diodes D104 and D401 and the conduction path from R401 to the TX switch Q103.
4. Check for an adjustable voltage on Pin 2 of PA module U101. At maximum power, with Power Set Adjustment R111 fully clockwise, Pin 2 should be at 12 volts. If not present, check the power control circuitry: U103, Q101, Q102 and Q104.
5. Check for 13.6 volts on Pin 3 of PA module U101 and ensure a good mechanical and electrical ground from the PA module to the bracket and casting.

RECEIVE CIRCUIT

To isolate a receive circuit problem, refer to the following chart.

RECEIVE CIRCUIT SYMPTOMS AND CHECKS

SYMPTOMS	CHECKS
No Audio	1. U502 regulator 2. The level and frequency of the first mixer injection frequency 3. The level and frequency of the second mixer injection frequency 4. Quadrature detector circuit 5. Quadrature detector coil tuning
Poor SINAD	1. Consult Figure 1 - TX and RX Block Diagram for RX stage gains and troubleshoot 2. Input cable 3. PIN Diode switch is shorted
Distorted Audio	1. Both mixer injection frequencies 2. Quadrature detector coil tuning 3. Crystal filter source and load tuning 4. Z503: 455 kHz ceramic filter

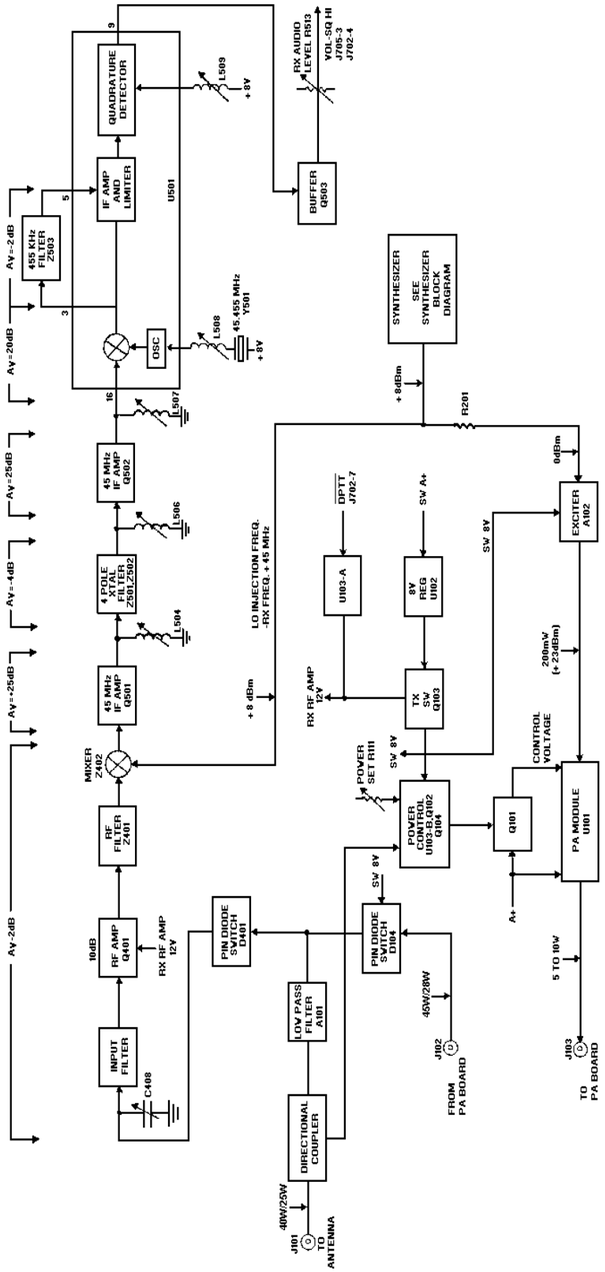


Figure 1 - Block Diagram

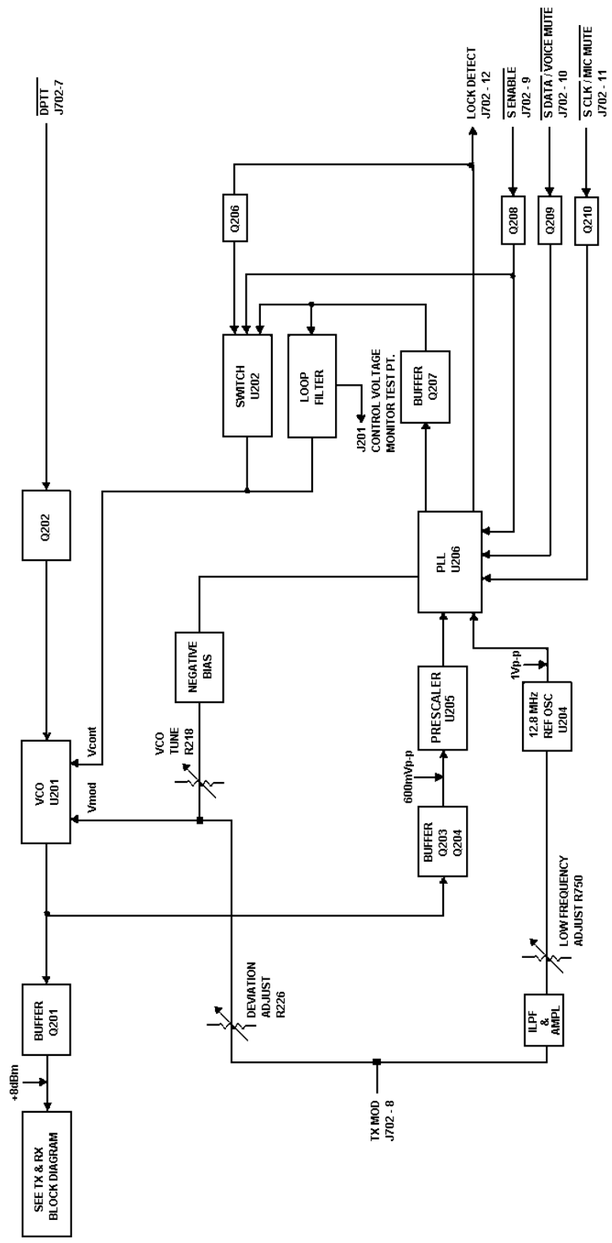


Figure 2 - Synthesizer Block Diagram

SYNTHESIZER

Synthesizer troubleshooting consists of first checking for the proper DC levels, then determining if the proper waveforms are present and checking individual modules.

DC Analysis

An 8.5 Vdc is supplied by regulator U207 and serves as the biasing voltage for transistor circuits Q203, Q204 and Q206 through Q210. Resistor R207 decouples the 8.3 volts for use in the VCO module U201. The 10 milliamp current drain of this module results in approximately 6.5 volts DC on Pin 4. Transistor Q201 also draws approximately 25 milliamps, resulting in a collector voltage of 3.5 volts DC at the junction of resistor R204 and capacitor C202. Lack of VCO RF output will modify this voltage.

Regulator U203 uses the 8 volts from transmit regulator U102 to generate 5 volts for U204 and U205.

Waveforms

Waveforms associated with the synthesizer were measured with a 10 megohm, 30 pF probe. Use DC coupling (see Figures 3-8).

Module Isolation

Reference Oscillator U204:

Look for a wave form similar to the reference on Pin 2 (see Figure 3). If wave form is not present the oscillator module is probably defective.

VCO U201:

Connect a DC power supply to Pin 3. With 2.5 volts DC on Pin 3, the output of U201, Pin 5, should be approximately 190 MHz for high split. With 6.5 volts DC on Pin 3, the output should be approximately 220 MHz. For low split the frequencies should be 181 and 198 MHz respectively.

Power output of the VCO can be measured by connecting a coax directly to the module, between Pin 5 and ground. The output should be approximately 0 dBm with C203 still connected in the circuit. In receive, a negative bias should exist on Pin 1. If not present, check transistor Q202 and capacitor C206 before removing the VCO.

Prescaler U205:

Connect Pin 3 of the VCO to 4.5 volts DC. With the radio in receive, monitor the frequencies of the VCO at the connection of capacitor C201 and resistor R201. DC short Pin 1 of U205 to ground to cause divide 129. Tie Pin 1 to Pin 7 (5 volts) to cause divide by 128 to occur. Check Pin 3 to verify that this occurs. Improper division may indicate a defective prescaler.

Bilateral Switch U202:

The bilateral switch is used to short around parts of the loop filter during channel scan. A shorted gate (to ground or adjacent gate) may be isolated by comparing voltages through the loop filter to those of a functioning radio . Defective gates might be suspected when the radio does not change frequency quickly enough.

Phase-Lock-Filter U206:

There are no other specific checks which aid in evaluation of U206. Usually, it is suspected only if all other checks are OK. Before changing, inspect chip components for mechanical damage and check resistances through the loop filter.

Transistor Q201:

After checking for proper DC operation, measure the gain from the VCO, Pin 5 to R201/C202. The gain should be approximately 10 dB.

PA MODULE REPLACEMENT

To Install PA Module U101

1. Apply some silicone grease to the metal side of the replacement module.
2. Careful insert the four leads from the module into the four corresponding holes in the printed wire board. and slide the module into the shield. **DO NOT** solder the leads yet.
3. Slide the RF Board assembly back into the radio frame. Reinstall all hardware, harnesses, cables, etc. Replace all screws.
4. Install the two PA bracket screws before soldering the four module leads. Trim excess wire.

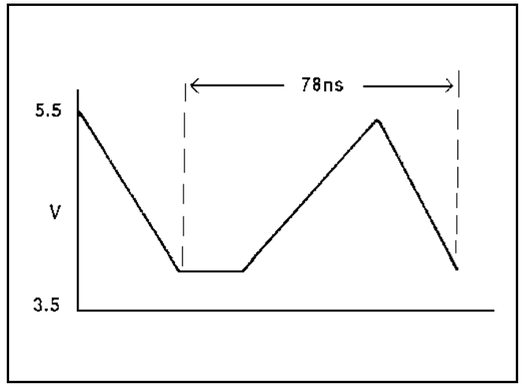


Figure 3 - Reference Oscillator (Input To U206, Pin 2)

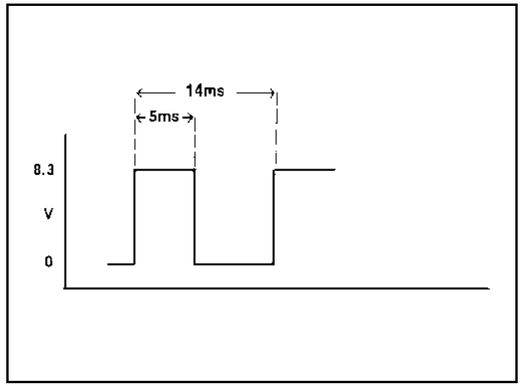


Figure 6 - S ENABLE (Input to U206, Pin 13).
(Radio in SCAN on a Single Channel)

Select a Channel in the center of the band.

Figure 4 - F_{IN} (Input to U206, Pin 10)

Clock pulses (32 appear as jitter on trailing edge of the wave form).

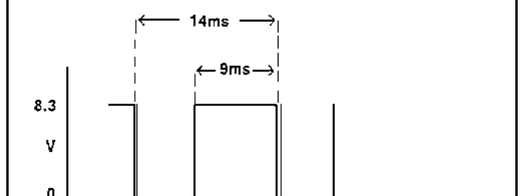


Figure 7 - S CLOCK (Input to U206, Pin 11).
(Radio in SCAN on a single channel)

The top of the ramp is approximately 0.8 Volts DC greater than the control voltage on PD out, Pin 17. A channel in the center of the band is shown.

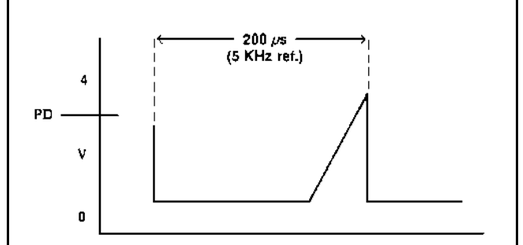


Figure 5 - Ramp (Generated in U206 And Appears On Pin 15)

When expanded, data can be seen to be changing as two different bit patterns are loaded.

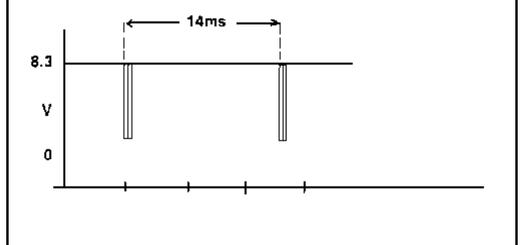


Figure 8 - S DATA (Input to U206, Pin 12).
(Radio in SCAN on a single channel)

RF BOARD
19D904958G1 (136-153 MHz)
19D904958G2 (150-174 MHz)
Issue 4

SYMBOL	PART NUMBER	DESCRIPTION
A101	19C851542G1	**TRANSMIT LOW PASS FILTER BOARD ASSEMBLY (136-153 MHz)**
	19C851542G2	**TRANSMIT LOW PASS FILTER BOARD ASSEMBLY (150-174 MHz)**
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C2	19A701624P18	Ceramic, disc: 27pF ±5%, 500 VDCW, temp coef 0±30 PPM (Used in G1).
C2	19A701624P14	Ceramic disc: 18pF ±5%, 500 VDCW, temp coef 0±30 PPM (Used in G2).
C3	19A701624P10	Ceramic, disc: 12pF ±5%, 500 VDCW, temp coef 0±30 PPM (Used in G1).
C3	19A701624P9	Ceramic, disc: 11pF ±5%, 500 VDCW, temp coef 0±30 PPM (Used in G2).
L1	19B800891P5	Coil, RF: .064µH; sim to Paul Smith SK-890-1.
L2	19B800890P1	Coil, RF: 9.5nH ±5%; sim to Paul Smith SK-896-1.
L3	19B800891P5	Coil, RF: .064µH; sim to Paul Smith SK-890-1.
L4	19B800891P2	Coil, RF Choke: sim to Paul Smith SK-890-1.
A102	19C851547G1	**TRANSMIT EXCITER BOARD ASSEMBLY**
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A702061P12	Ceramic: 8.2pF ±0.5 pF, 50 VDCW, temp coef 0±60 PPM (Used in G1).
C2	19A702061P99	Ceramic: 1000pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C (Used in G1).
C3	19A702061P37	Ceramic: 33pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C (Used in G1).
C4 and C5	19A702052P14	Ceramic: 0.01µF ±10%, 50 VDCW (Used in G1).
C6	19A702061P41	Ceramic: 39pF ±5%, 50 VDCW, temp coef 0±30 PPM (Used in G1).
C7	19A702061P69	Ceramic: 220pF ±5%, 50 VDCW, temp coef 030 PPM/°C (Used in G1).
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19B800891P1	Coil, RF Choke: sim to Paul Smith SK-890-1 (Used in G1).
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A704708P2	Silicon, NPN: sim to NEC 2SC3356 (Used in G1).
Q2	19A701940P1	Silicon, NPN: sim to MRF-559 (Used in G1).
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	19B800607P471	Metal film: 470 ohms ±5%, 1/8 Watt (Used in G1).
R2	19B800607P222	Metal film: 2.2K ohms ±5%, 1/8 Watt (Used in G1).
R3 and R4	19B800607P221	Metal film: 220 ohms ±5%, 1/8 Watt (Used in G1).
R5	19B800607P222	Metal film: 2.2K ohms ±5%, 1/8 Watt (Used in G1).
R6	19B800607P150	Metal film: 15 ohms ±5%, 1/8 Watt (Used in G1).
R7	19B800607P471	Metal film: 470 ohms ±5%, 1/8 Watt (Used in G1).
R8	19B800607P330	Metal film: 33 ohms ±5%, 1/8 Watt (Used in G1).
	19D904958G1	**MAIN ASSEMBLY (136-153 MHz)**
	19D904958G2	**MAIN ASSEMBLY (150-174 MHz)**
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C101	19A702061P99	Ceramic: 1000pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C102	19A702061P57	Ceramic: 82pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C103	19A702061P25	Ceramic: 18pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C (Used in G1).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	PART NUMBER	DESCRIPTION
C103	19A702061P29	Ceramic: 22pF ±5%, 50 VDCW, temp coef 0±30 PPM (Used in G2).
C104	19A702061P99	Ceramic: 1000pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C105	19A702052P14	Ceramic: 0.01µF ±10%, 50 VDCW.
C106	19A702061P73	Ceramic: 330pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C107	19A701534P8	Tantalum: 22F ±20%, 16 VDCW.
C108	19A703314P10	Electrolytic: 10F -10 +50%, 50 VDCW; sim to Panasonic LS Series.
C109 and C110	19A702052P14	Ceramic: 0.01F ±10%, 50 VDCW.
C111 and C112	19A703314P10	Electrolytic: 10µF -10 +50%, 50 VDCW; sim to Panasonic LS Series.
C113 and C114	19A702061P73	Ceramic: 330pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C115	19A703314P10	Electrolytic: 10µF -10 +50%, 50 VDCW; sim to Panasonic LS Series (Used in G2).
C116	19A702061P99	Ceramic: 1000pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C117	19A702052P22	Ceramic: 0.047µF ±10%, 50 VDCW.
C118	19A703314P10	Electrolytic: 10µF -10 +50%, 50 VDCW; sim to Panasonic LS Series.
C119	19A702061P73	Ceramic: 330pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C120	19A702061P99	Ceramic: 1000pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C121	19A702052P14	Ceramic: 0.01pF ±10%, 50 VDCW
C122	19A702061P99	Ceramic: 1000pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C123	19A702052P14	Ceramic: 0.01F ±10%, 50 VDCW.
C124 and C125	19A702061P99	Ceramic: 1000pF ±5%, 50 VDCW, temp coef 030 PPM/°C.
C126	19A702061P73	Ceramic: 330pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C133	19A702052P26	Ceramic: 0.1F ±10%, 50 VDCW
C134	19A7033314P10	Electrolytic: 10µF -10+50%, 50 VDCW; sim to Panasonic LS Series.
C201	19A702061P12	Ceramic: 8.2pF ±0.5 pF, 50 VDCW, temp coef 0±60 PPM.
C202	19A702061P99	Ceramic: 1000pF -±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C203	19A702061P12	Ceramic: 8.2pF ±0.5 pF, 50 VDCW, temp coef 0±60 PPM/°C.
C204	19A702052P26	Ceramic: 0.1µF ±10%, 50 VDCW
C205	19A701534P17	Tantalum: 47µF ±20%, 10 VDCW.
C206	19A702052P5	Ceramic: 1000pF ±10%, 50 VDCW.
C207	19A702061P77	Ceramic: 470pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C208	19A702052P26	Ceramic: 0.1µF ±10%, 50 VDCW
C210	19A702052P14	Ceramic: 0.01µF ±10%, 50 VDCW.
C211	19A702236P50	Ceramic: 100pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C212	19A702061P69	Ceramic: 220pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C213 and C214	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.
C216	19A702052P14	Ceramic: 0.01µF ±10%, 50 VDCW.
C219	19A702061P93	Ceramic: 2200pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C220	19A702052P14	Ceramic: 0.01µF ±10%, 50 VDCW.
C221	19A702061P61	Ceramic: 100pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C222	19A702061P99	Ceramic: 1000pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C223	19A702052P14	Ceramic: 0.01µF ±10%, 50 VDCW.
C224	19A702061P77	Ceramic: 470pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C225	19A702061P103	Ceramic: 4700pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C226	19A701534P17	Tantalum: 47µF ±20%, 10 VDCW.
C227	19A702052P14	Ceramic: 0.01µF ±10%, 50 VDCW.
C228	19A702061P9	Ceramic: 4.7pF ±0.5pF, 50 VDCW, temp coef 0±60 PPM/°C.

SYMBOL	PART NUMBER	DESCRIPTION
C229	19A702061P61	Ceramic: 100pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C230	19A702052P26	Ceramic: 0.1µF ±10%, 50 VDCW
C231	19A703314P10	Electrolytic: 10µF -10+50%, 50 VDCW; sim to Panasonic LS Series.
C232	19A702052P14	Ceramic: 0.01µF ±10%, 50 VDCW.
C234	19A702052P14	Ceramic: 0.01µF ±10%, 50 VDCW.
C236	19A701534P8	Tantalum: 22µF ±20%, 16 VDCW.
C237	19A702052P14	Ceramic: 0.01µF ±10%, 50 VDCW.
C239	19A702061P9	Ceramic: 4.7pF ±0.5pF, 50 VDCW, temp coef 0±60 PPM/°C.
C241	19A702061P73	Ceramic: 330pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C242	19A702052P33	Ceramic: 0.1µF
C243	19A705205P12	Tantalum: 0.33µF ±20%, 25 VDCW.
C245	19A703314P10	Electrolytic: 10µF -10+50%, 50 VDCW; sim to Panasonic LS Series.
C246	19A702061P73	Ceramic: 330pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C247	19A702052P14	Ceramic: 0.01µF ±10%, 50 VDCW.
C248 and C249	19A702061P73	Ceramic: 330pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C250	19A702052P14	Ceramic: 0.01µF ±10%, 50 VDCW.
C251 and C252	19A703314P10	Electrolytic: 10µF -10+50%, 50 VDCW; sim to Panasonic LS Series.
C253	19A702052P14	Ceramic: 0.01µF ±10%, 50 VDCW.
C401	19A705108P25	Mica Chip: 33pF ±5%, 500 VDCW, temp coef 0 + 50 PPM/°C. (Used in G1).
C401	19A705108P19	Mica Chip: 18pF ±5%, 500 VDCW, temp coef 0 + 100 PPM/°C. (Used in G2).
C403	19A702061P37	Ceramic: 33pF±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C404	19A702236P17	Ceramic: 4.7pF ±0.5pF, 50 VDCW, temp coef 0±30 PPM/°C. (Used in G2).
C404	19A702236P11	Ceramic: 2.7pF ±0.25pF, 500 VDCW, temp coef 0±30 PPM/°C. (Used in G2).
C405	19A702236P19	Ceramic: 5.6pF ±5pF, 50 VDCW, temp coef 0±30 PPM/°C. (Used in G1).
C406	19A702061P61	Ceramic: 100pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C407	19A702061P8	Ceramic: 3.9 pF ±0.5 pF, 50 VDCW, temp coef 0±30 PPM/°C (Used in G1).
C407	19A702061P1	Ceramic: 1pF ±0.5pF, 50 VDCW, temp coef 0±250 PPM/°C (Used in G2).
C409	19A702052P14	Ceramic: 0.01µF ±10%, 50 VDCW.
C410	19A702236P13	Ceramic: 3.3pF ±0.25pF, 50 VDCW, temp coef 0±30 PPM/°C (Used in G1).
C410	19A702236P11	Ceramic: 1pF ±0.5pF, 50 VDCW (Used in G2).
C411	19A702236P13	Ceramic: 3.3pF ±0.25%, 50 VDCW, temp coef 0±30 PPM/°C.
C412	19A702061P21	Ceramic: 15pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C413	19A702061P99	Ceramic: 1000pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C414	19A702236P14	Ceramic: 3.6pF ±0.25pF, 50 VDCW, temp coef 0±30 PPM/°C.
C415	19A703314P10	Electrolytic: 10µF -10+50%, 50 VDCW; sim to Panasonic LS Series.
C416	19A702061P25	Ceramic: 18pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C (Used in G1).
C416	19A702061P17	Ceramic: 12pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C (Used in G2).
C417	19A702061P10	Ceramic: 5.6pF ±0.5 pF, 50 VDCW, temp coef 0±60 PPM/°C.
*C421	19A702061P77	Ceramic: 470pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.

SYMBOL	PART NUMBER	DESCRIPTION
C422	19A702236P13	Ceramic: 10pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C (Used in G1).
C502	19A702061P99	Ceramic: 1000pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C503	19A702052P14	Ceramic: 0.01µF ±10%, 50 VDCW.
C504	19A702061P12	Ceramic: 8.2 pF ±0.5 pF, 50 VDCW, temp coef 0±60 PPM/°C.
C505	19A702061P25	Ceramic: 18pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C506	19A701534P7	Tantalum: 10µF ±20%, 16 VDCW.
C507 thru C509	19A702052P14	Ceramic: 0.01µF ±10%, 50 VDCW.
C510	19A702061P6	Ceramic: 2.7pF 0.5 pF, 50 VDCW, temp coef 0±120 PPM/°C.
C512	19A702061P1	Ceramic: 1pF ±0.5 pF, 50 VDCW.
C513	19A702061P77	Ceramic: 470pF ±0.5 pF, 50 VDCW, temp coef 0±60 PPM/°C.
C514	19A702061P33	Ceramic: 27 pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C515 and C516	19A702061P29	Ceramic: 22 pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C517 and C518	19A702052P26	Ceramic: 0.1µF ±10%, 50 VDCW
C519	19A702052P5	Ceramic: 1000pF ±10%, 50 VDCW.
C520	19A702052P14	Ceramic: 0.01µF ±10%, 50 VDCW.
C521	19A703314P10	Electrolytic: 10µF -10+50%, 50 VDCW; sim to Panasonic LS Series.
C522	19A702052P26	Ceramic: 01µF ±10%, 50 VDCW
C523	19A702236P6	Ceramic: 1pF ±0.25 pF, 50 VDCW.
C524	19A703314P10	Electrolytic: 10µF -10+50%, 50 VDCW; sim to Panasonic LS Series.
C525	19A702061P99	Ceramic: 1000pF ±5%, 50 VDCW, temp coef 0±30 PPM/°C.
C526	19A703314P10	Electrolytic: 10µF -10+50%, 50 VDCW; sim to Panasonic LS Series.
		- - - - - - - - - - DIODES - - - - - - - - - -
D101	19A705377P1	Silicon, Hot Carrier: sim to MMB0201.
D104	344A3316P1	Silicon, PIN: sim to UM9401.
D106	19A702526P2	Silicon: Schottky Barrier; sim to BAT 17.
D202 and D203	19A702526P2	Silicon: Schottky Barrier; sim to BAT 17.
D401	344A3316P1	Silicon, PIN: sim to UM9401.
D501 and D502	19A700028P1	mA, 75 PIV; sim to 1N4148. Silicon: 75
		- - - - - - - - - - JACKS - - - - - - - - - -
J101 thru J103	19B801341P1	RF Jack.
J201	19A700072P1	Printed wire: 2 contacts rated @ 2.5 amps; sim to Molex 22-03-2021.
J501	19A700072P1	Printed wire: 2 contacts rated @ 2.5 amps; sim to Molex 22-03-2021.
J702	19A704779P11	Connector; sim to Molex 22-17-2122.
J704	19A700072P29	Printed wire: 3 contacts rated at 2.5 amps; sim to Molex 22-27-2031.
J705	19A700072P30	Printed wire: 4 contacts rated at 2.5 amps; sim to Molex 22-27-2041.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L102	19A700024P13	Coil, RF: 1.0µH ±10%.
L103 thru L105	19A704921P1	Coil.

SYMBOL	PART NUMBER	DESCRIPTION
L401	19B800891P4	Coil, RF Choke: sim to Paul Smith SK-890-1.
L402	19B800891P5	Coil, RF: .064µH; sim to Paul Smith SK-890-1. (Used in G1).
L402	19B800891P6	Coil, RF: .084µH; sim to Paul Smith SK-890-1. (Used in G2).
L404	19B209420P4	Coil, RF: 0.18µH ±5%, .12 ohms DC res max; sim to Jeffers 4416-4J. (Used in G1).
L404	19B209420P3	Coil, RF: 0.15µH ±5%, .10 ohms DC res max; sim to Jeffers 4416-3J. (Used in G2).
L405	19B800891P5	Coil, RF: .064µH; sim to Paul Smith SK-890-1. (Used in G1).
L405	19B800891P6	Coil, RF: .084µH; sim to Paul Smith SK-890-1. (Used in G2).
L407	19B209420P3	Coil, RF: 0.15µH, ±5%, .10 ohms DC res max; sim to Jeffers 4416-3J (Used in G1).
L407	19B209420P2	Coil, RF: 0.12H, ±5%, .10 ohms DC res max; sim to Jeffers 4416-3J (Used in G2).
L503	H343CLP10022	Coil, RF: 10H.
L504	19B801413P4	Coil, 39 MHz.
L505	19A700024P19	Coil, RF: 3.3 H ±10%.
L506 thru L508	19B801413P4	Coil, 39 MHz.
L509	19B801415P2	Transformer, 455 kHz: sim to AEPD 162B3277P17.
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q101	344A3225P1	Silicon, NPN (Included with Heatsink Assembly, Item 5).
Q102	19A703197P2	Silicon, PNP; sim to MMBT4403 low profile.
Q103	19A704972P1	Silicon, PNP, sim to Motorola 2N4918.
Q104	19A700076P2	Silicon, NPN: sim to MMBT3904, low profile.
Q201	19A704708P2	Silicon, NPN: sim to NEC 2SC3356.
Q202	19A700059P2	Silicon, PNP: sim to MMBT3906, low profile.
Q203 and Q204	19A704708P2	Silicon, NPN: sim to NEC 2SC3356.
Q206	19A700076P2	Silicon, NPN: sim to MMBT3904, low profile.
Q207	19A700059P2	Silicon, PNP: sim to MMBT3906, low profile.
Q208	19A700023P2	Silicon, NPN: sim to 2N3904.
Q209 and Q210	19A702084P2	Silicon, NPN: sim to MPS 2369.
Q211	19A700059P2	Silicon, PNP: sim to MMBT3906, low profile.
Q212	19A700076P2	Silicon, NPN: sim to MMBT3904, low profile.
Q501	19A702524P2	N-Type, field effect; sim to MMBFU310
Q502	19A116818P3	N-Channel, field effect; sim to Type 3N1877.
Q503	19A700023P2	Silicon, NPN: sim to 2N3904.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R101	19B800607P103	Metal film: 10K ohms ±5%, 1/8 Watt.
R102	19B800607P560	Metal film: 56 ohms ±5%, 1/8 Watt.
R103	19B800607P821	Metal film: 820 ohms ±5%, 1/8 Watt.
R104	19B800607P223	Metal film: 22K ohms ±5%, 1/8 Watt.
R105	19B800607P473	Metal film: 47K ohms ±5%, 1/8 Watt.
R106	19B800607P102	Metal film: 1K ohms ±5%, 1/8 Watt.
R107	19B800607P394	Metal film: 390K ohms ±5%, 1/8 Watt.
R108	19B800607P123	Metal film: 12K ohms ±5%, 1/8 Watt.
R109	19B800607P394	Metal film: 390K ohms ±5%, 1/8 Watt.
R110	19B800607P472	Metal film: 4.7K ohms ±5%, 1/8 Watt.
R111	19B800779P10	Variable: 10K ohms ±25%, 100 VDCW, 0.3 Watts.
R112	19B800607P103	Metal film: 10K ohms ±5%, 1/8 Watt.
R113	19B800607P102	Metal film: 1K ohms ±5%, 1/8 Watt.
R114	19B800607P103	Metal film: 10K ohms ±5%, 1/8 Watt.
R115	19B800607P562	Metal film: 5.6K ohms ±5%, 1/8 Watt.
R116	19B800607P183	Metal film: 18K ohms ±5%, 1/8 Watt.
R117	19B800607P221	Metal film: 220 ohms ±5%, 1/8 Watt.

SYMBOL	PART NUMBER	DESCRIPTION
R118	19A702931P326	Metal film: 18.2K ohms ±5%, 1/8 Watt.
R119 thru R121	19B800607P100	Metal film: 10 ohms ±5%, 1/8 Watt.
R122	19B800607P821	Metal film: 820 ohms ±5%, 1/8 Watt.
R123	19B800607P105	Metal film: 1M ohms ±5%, 1/8 Watt.
R124	19B800607P101	Metal film: 100 ohms ±5%, 1/8 Watt.
R125	19A702931P259	Metal film: 4020 ohms ±5%, 1/8 Watt.
R126	19A702931P201	Metal film: 1000 ohms ±5%, 1/8 Watt.
R127	19A702931P262	Metal film: 4320 ohms ±5%, 1/8 Watt.
R128	19B800607P472	Metal film: 4.7K ohms ±5%, 1/8 Watt.
R202	19B800607P330	Metal film: 33 ohms ±5%, 1/8 Watt.
R203	19B800607P120	Metal film: 12 ohms ±5%, 1/8 Watt.
R204	19B800607P221	Metal film: 220 ohms ±5%, 1/8 Watt.
R205	19B800607P152	Metal film: 1.5K ohms ±5%, 1/8 Watt.
R206	19B800607P102	Metal film: 1K ohms ±5%, 1/8 Watt.
R207	19B800607P181	Metal film: 180 ohms ±5%, 1/8 Watt.
R208	19B800607P683	Metal film: 68K ohms ±5%, 1/8 Watt.
R209	19B800607P223	Metal film: 22K ohms ±5%, 1/8 Watt.
R210	19B800607P221	Metal film: 220 ohms ±5%, 1/8 Watt.
R211	19B800607P271	Metal film: 270 ohms ±5%, 1/8 Watt.
R214	19B800607P221	Metal film: 220 ohms ±5%, 1/8 Watt.
R215 and R216	19B800607P153	Metal film: 15K ohms ±5%, 1/8 Watt.
R217	19B800607P151	Metal film: 150 ohms ±5%, 1/8 Watt. (G1).
R217	19B800607P101	Metal film: 100 ohms ±5%, 1/8 Watt. (G2).
R218	19B800779P16	Variable: 100K ohms ±25%, 100 VDCW, 0.3 Watts.
R219	19B800607P273	Metal film: 27K ohms ±5%, 1/8 Watt.
R221	19B800607P104	Metal film: 100K ohms ±5%, 1/8 Watt.
R222	19B800607P333	Metal film: 33K ohms ±5%, 1/8 Watt.
R224	19B800607P472	Metal film: 4.7K ohms ±5%, 1/8 Watt.
R226	19B800779P4	Variable: 1K ohms ±25%, 100 VDCW, 0.3 Watts.
R227	19B800607P473	Metal film: 47K ohms ±5%, 1/8 Watt.
R228	19B800607P223	Metal film: 22K ohms ±5%, 1/8 Watt.
R229	19B800607P183	Metal film: 18K ohms ±5%, 1/8 Watt.
R230	19B800607P332	Metal film: 3.3K ohms ±5%, 1/8 Watt.
R231	19B800607P472	Metal film: 4.7K ohms ±5%, 1/8 Watt.
R232	19B800607P103	Metal film: 10K ohms ±5%, 1/8 Watt.
R233	19B800607P332	Metal film: 3.3K ohms ±5%, 1/8 Watt.
R234	19B800607P472	Metal film: 4.7K ohms ±5%, 1/8 Watt.
R235	19B800607P393	Metal film: 39K ohms ±5%, 1/8 Watt.
R236	19B800607P471	Metal film: 470 ohms ±5%, 1/8 Watt.
R237 thru R239	19B800607P103	Metal film: 10K ohms ±5%, 1/8 Watt.
R240 thru R242	19B800607P154	Metal film: 150K ohms ±5%, 1/8 Watt.
R245	19B800607P223	Metal film: 22K ohms ±5%, 1/8 Watt.
R246	19B800607P102	Metal film: 1K ohms ±5%, 1/8 Watt.
R248	19B800607P1	Metal film: Jumper.
R249	19B800607P100	Metal film: 10 ohms ±5%, 1/8 Watt.
R250	19B800779P10	Variable: 10K ohms ±25%, 100 VDCW, 0.3 Watts.
R251	19B800607P100	Metal film: 10 ohms ±5%, 1/8 Watt.
R253	19B800607P100	Metal film: 10 ohms ±5%, 1/8 Watt.
R254	19B800607P100	Metal film: 10 ohms ±5%, 1/8 Watt.
R256	19B800607P103	Metal film: 10K ohms ±5%, 1/8 Watt.
R257	19B800607P271	Metal film: 270 ohms ±5%, 1/8 Watt.
R258	19B800607P153	Metal film: 15K ohms ±5%, 1/8 Watt.
R260	19B800607P103	Metal film: 10K ohms ±5%, 1/8 Watt.
R261	19B800607P473	Metal film: 47K ohms ±5%, 1/8 Watt.
R262	19B800607P823	Metal film: 82K ohms ±5%, 1/8 Watt.
R263	19B800607P223	Metal film: 22K ohms ±5%, 1/8 Watt.
R264	19B800607P102	Metal film: 1000 ohms ±5%, 1/8 Watt.

SYMBOL	PART NUMBER	DESCRIPTION
R266	19B800607P104	Metal film: 10K ohms ±5%, 1/8 Watt.
R401	19B800607P151	Metal film: 150 ohms ±5%, 1/8 Watt.
R404	19B800607P683	Metal film: 68K ohms ±5%, 1/8 Watt.
R405	19B800607P823	Metal film: 82K ohms ±5%, 1/8 Watt.
R406	19B800607P183	Metal film: 18K ohms ±5%, 1/8 Watt.
R407	19B800607P510	Metal film: 51 ohms ±5%, 1/8 Watt.
R408	19B800607P472	Metal film: 4.7K ohms ±5%, 1/8 Watt.
R409	19B800607P221	Metal film: 220 ohms ±5%, 1/8 Watt.
R501	19B800607P271	Metal film: 270 ohms ±5%, 1/8 Watt.
R502	19B800607P270	Metal film: 27 ohms ±5%, 1/8 Watt.
R503	19B800607P822	Metal film: 8.2K ohms ±5%, 1/8 Watt.
R504	19B800607P270	Metal film: 27 ohms ±5%, 1/8 Watt.
R505	19B800607P683	Metal film: 68K ohms ±5%, 1/8 Watt.
R506	19B800607P333	Metal film: 33K ohms ±5%, 1/8 Watt.
R507	19B800607P822	Metal film: 8.2K ohms ±5%, 1/8 Watt.
R509	19B800607P272	Metal film: 2.7K ohms ±5%, 1/8 Watt.
R510	19B800607P270	Metal film: 27 ohms ±5%, 1/8 Watt.
R511	19B800607P473	Metal film: 47K ohms ±5%, 1/8 Watt.
R512	19B800607P822	Metal film: 8.2K ohms ±5%, 1/8 Watt.
R513	19B800779P4	Variable: 1K ohms ±25%, 100 VDCW, 0.3 Watts.
R515	19B800607P821	Metal film: 820 ohms ±5%, 1/8 Watt.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - -
U101	19A705326P2	PA Module - 136-153 MHz (Used in G1).
U101	10A705326P1	PA Module - 150-174 MHz (Used in G2).
U102	19A134717P3	Voltage Regulator; sim to A7808U.
U103 and U104	19A701789P2	Linear: Dual Op Amp; sim to LM358.
U105	RYT1246003/4	8-Volt Regulator; sim to LM35.
U201	19D901958G1	VCO Board (Used in G1).
U201	19D901958G2	VCO Board. (Used in G2).
U202	19A700029P44	Digital: Bilateral Switch.
U203	19A704971P1	Linear: +5 Volt Regulator; sim to MC78L05ACP.
U204	19B801351P26	Crystal Oscillator, temperature compensated: 12.80 MHz. 5 PPM.
U205	19A704287P2	Prescaler: /128, /129; sim to MC12018.
U206	19B800902P4	Digital: Synthesizer, CMOS Serial Input.
U207	344A3820P1	Linear, Positive Voltage 8.5V Regulator .
U501	19A704619P1	Linear: Osc/Mixer/IF/Det/Amp; sim to MC3361AP.
U502	19A704073P2	Linear: 8 Volt Regulator; sim to MC78L08CP.
U503	344A3820P1	Linear, Positive Voltage 8.5V Regulator .
		- - - - - - - - - - CRYSTALS - - - - - - - - -
Y501	19A705376P5	Crystal, Fixed Frequency: 45.455 MHz 10 PPM.
		- - - - - - - - - - FILTER - - - - - - - - -
Z401	19A705327P1	Filter, VHF HB: 136-153 MHz. (Used in G1).
Z401	19A705327P2	Filter, VHF HB: 150-174 MHz. (Used in G2).
Z402	19A705327P2	Filter, LC, 150-174 MHz.
Z403	19B801025P1	Balanced Mixer (Double); sim to Mini-Circuits SBL-1.
Z501	19A705613G6	Monolithic Crystal: 45.000 MHz; sim to Toyocom 45E2B2.
Z502	PART OF Z501	Matched pair
Z503	19B801021P2	Bandpass filter: 455 KHz 1.5; sim to Murata CFW-455E.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
5	19B801378G3	Heat Sink Assembly. Includes Q101, U102 and the following hardware:
	19A705469P1	Insulator plate. (Used with Q101).
	19A700068P1	Insulator bushing. (Used with Q101).
	N402P5B6	Washer, Plain. (Qty. of 2 required).
	N404P11B6	Washer, Loc K. (Qty. of 2 required).
	N80P9005B6	Screw, Machine. (Qty. of 2 required).
6	19B801490P1	Ground Strap. (Near Q104)
7	19A702364P106	Machine screw: TORX Drive, No. M2 - 0.4 x 6.

SYMBOL	PART NUMBER	DESCRIPTION
7	19B801578P1	SHIELD. (Used with Q502).
9	19B801566P2	SHIELD (Near Q501).
13	19B801566P17	SHIELD.

PRODUCTION CHANGES

Changes in the equipment to improve or to simplify circuits are identified by a "Revision Letter", which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for descriptions of parts affected by these revisions.

REV. A - RF BOARD 19D904958G2

To reduce synthesizer kick changed R235 (19B800607P183) to 39k ohms. To reduce loading of TCXO, removed C254.

REV. B - RF BOARD 19D904958G2

Correct failure rate of Q401, C421 was 180pF (19A702061P67).

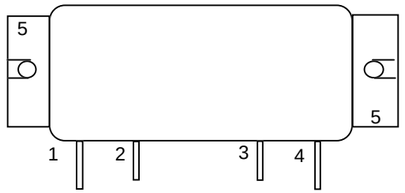
REV. A - RF BOARD 19D904958G1
REV. C - RF BOARD 19D904958G2

To fix erratic data modulation moved C236 from component side to solder side of board (- to C208 and + to ground).

REV. B- RF BOARD 19D904958G1
REV. D - RF BOARD 19D904958G2

To improve receiver spurious response due to 2nd IF image, R501 was 180 ohms (19B800607P181) and deleted L502 (H343CLP10022). L503 relocated to solder side of board. Shields added to Q502 and to solder side of board.

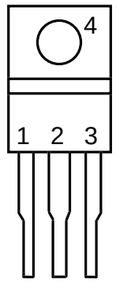
PA MODULE U101
19A705326P1 (136-153 MHz)
19A705326P2 (150-174 MHz)



PINS:

1 - P IN
2 - VCC (FIRST STAGE)
3 - VCC (OUTPUT STAGE)
4 - P OUT
5 - FIN - GROUND

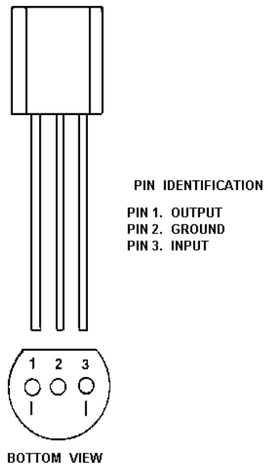
DUAL OPERATIONAL AMPLIFIER U103, U104



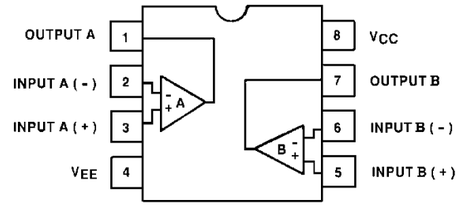
PINS:

1. INPUT
2. COMMON
3. OUTPUT
4. TAB COMMON

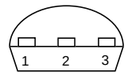
VOLTAGE REGULATOR U203
19A704971P1 (MC78L05ACP)

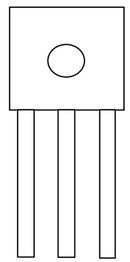


VOLTAGE REGULATOR U102
19A134717P3 (μA7808U)



8-VOLT REGULATOR U105
RYT1246003/4 (LM35)

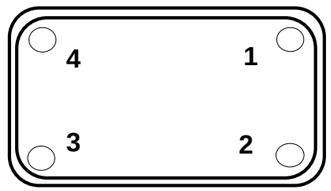




PINS:

1 - VCC
2 - VOUT
3 - GND

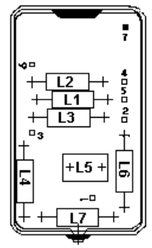
TEMPERATURE COMPENSATED CRYSTAL OSCILLATOR U204
19B801351P26 (12.8 MHz)

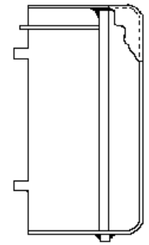


PIN CONNECTIONS

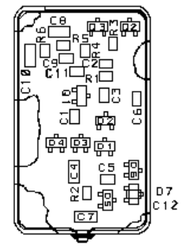
1. COMMON AND CASE
2. OUTPUT
3. +Vcc
4. MODULATION

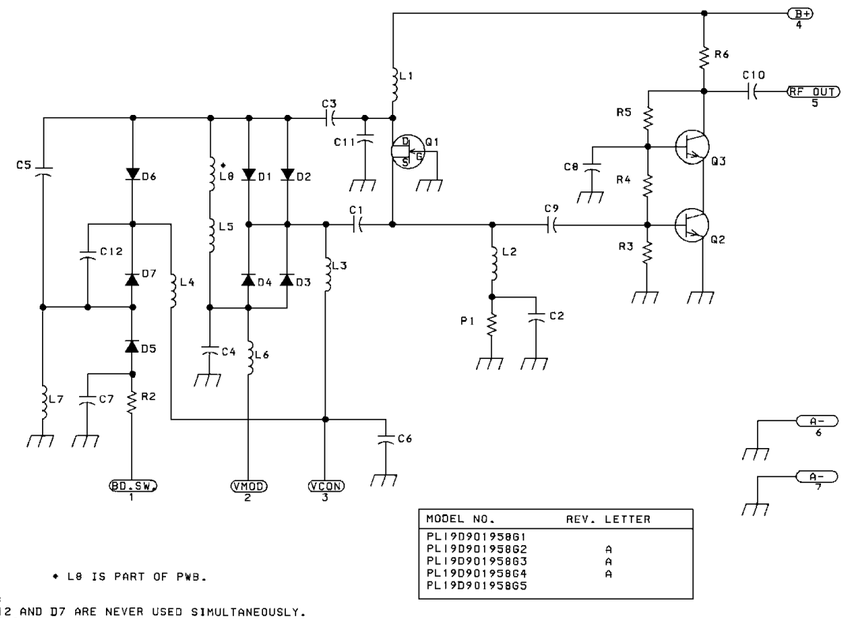
VOLTAGE CONTROLLED OSCILLATOR U201
19D901958G1 (136-153 MHz)
19D901958G2 (150-174 MHz)





(19D901958, Rev. 4)





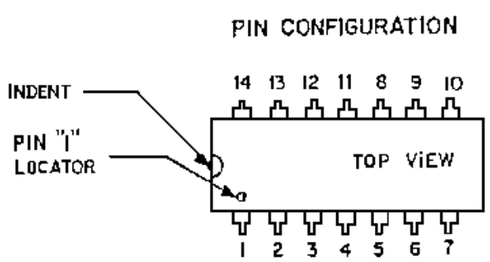
MODEL NO.	REV. LETTER
PL19D901958G1	
PL19D901958G2	A
PL19D901958G3	A
PL19D901958G4	A
PL19D901958G5	

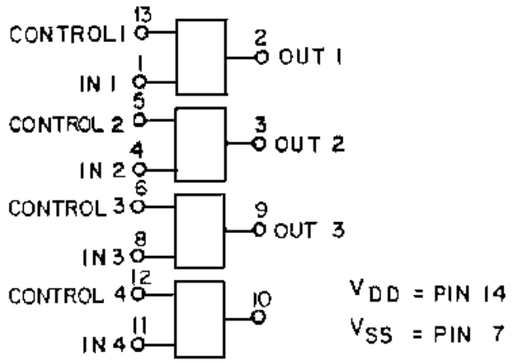
◆ L8 IS PART OF PWB.

NOTES:
1. C12 AND D7 ARE NEVER USED SIMULTANEOUSLY. D7 IS USED IN GROUPS 1,3,4,5; C12 IS USED IN GROUP 2.

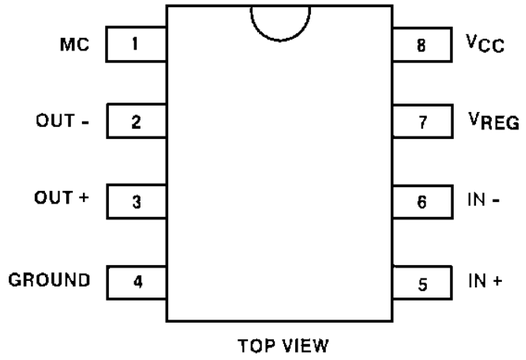
(19C851614, Rev. 3)

QUAD BILATERAL SWITCH U202
19A700029P44

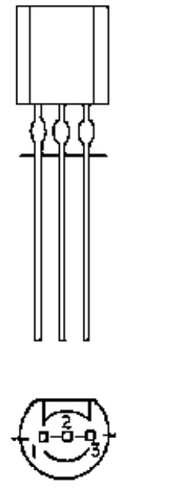




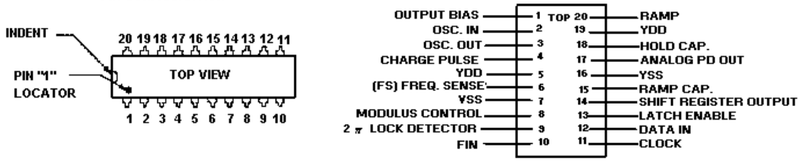
PRESCALER U205
1919A704287P2 (MC12018)

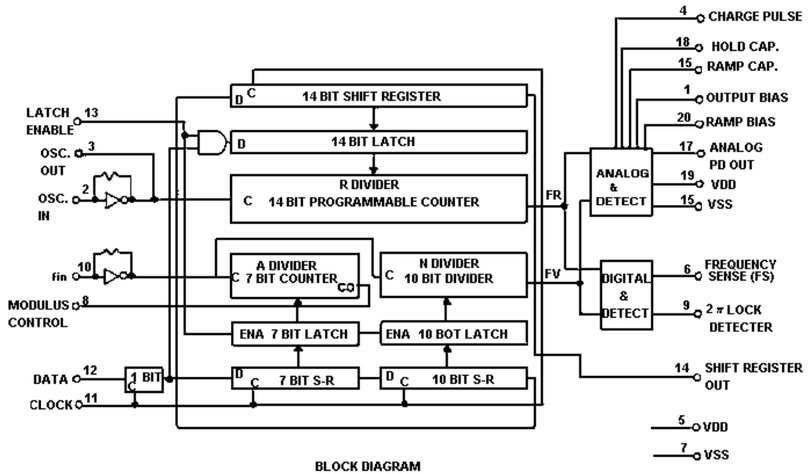


VOLTAGE REGULATOR U502
19A704073P2



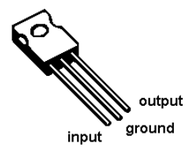
SYNTHESIZER U206
19B800902P4

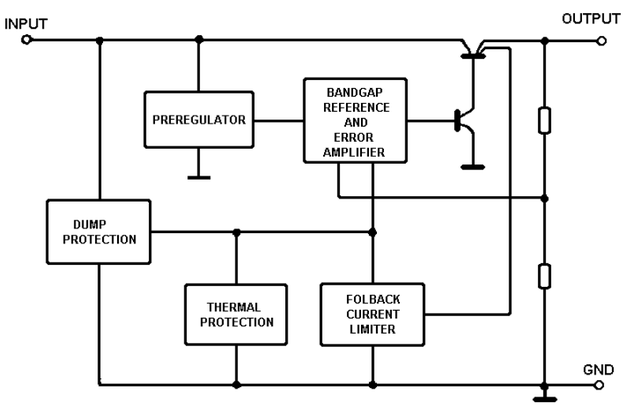




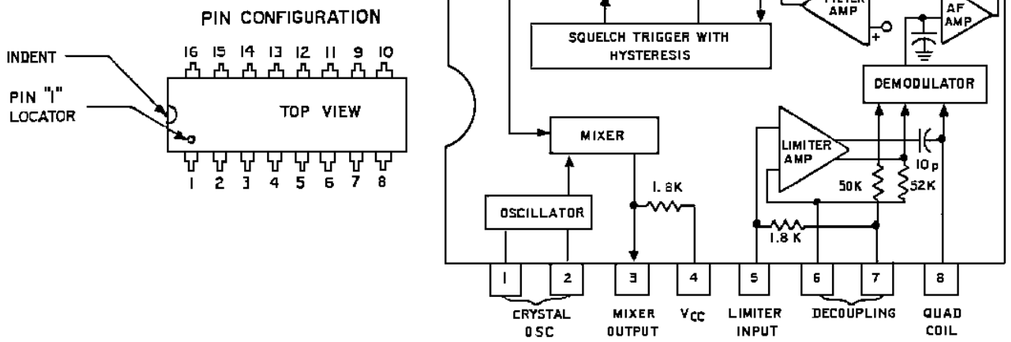
BLOCK DIAGRAM

VOLTAGE REGULATOR U207, U503
344A3820P1





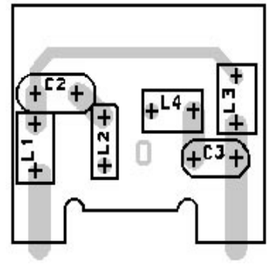
OSC/MIXER/IF AMPLIFIER/DETECTOR U501
19A704619P1



BLOCK DIAGRAM

TRANSMIT FILTER BOARD A101
19C851542G1

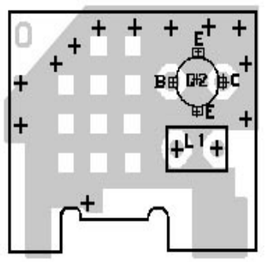
COMPONENT SIDE



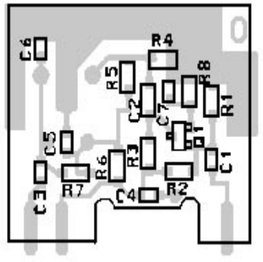
(19C851543, Rev. 0)
(19A705062, Component Side, Rev. 0)

TRANSMIT EXCITER A102
19C851547G1

COMPONENT SIDE



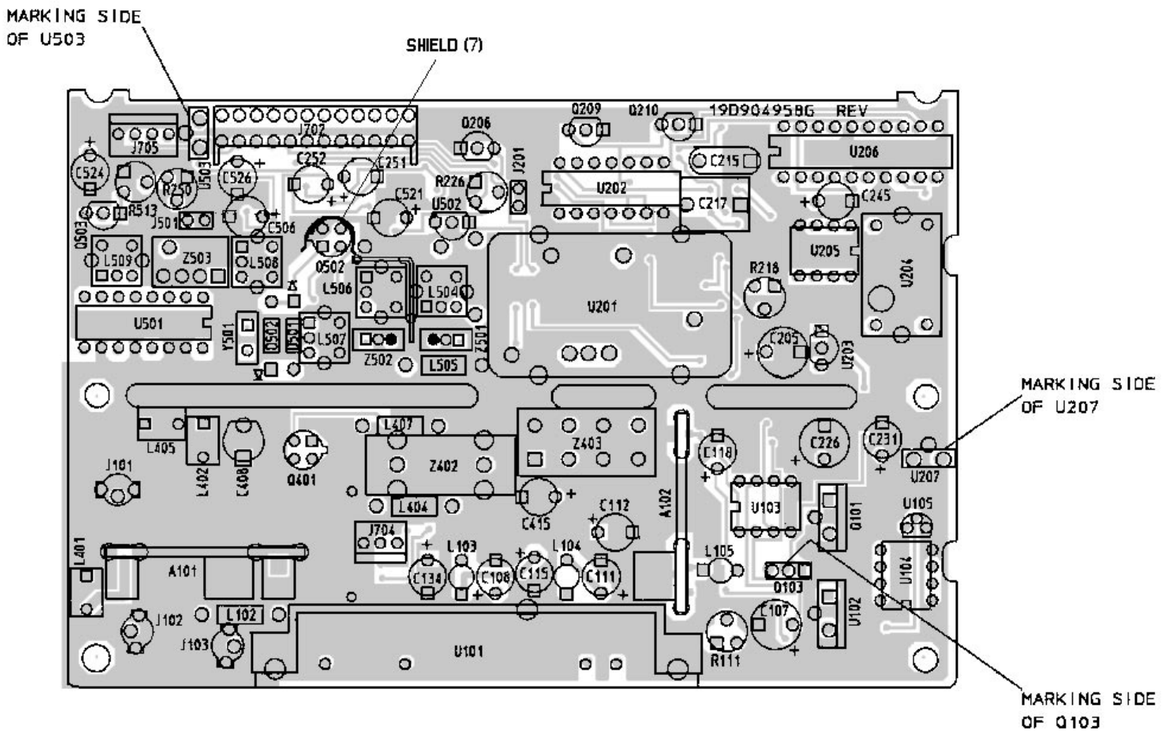
SOLDER SIDE



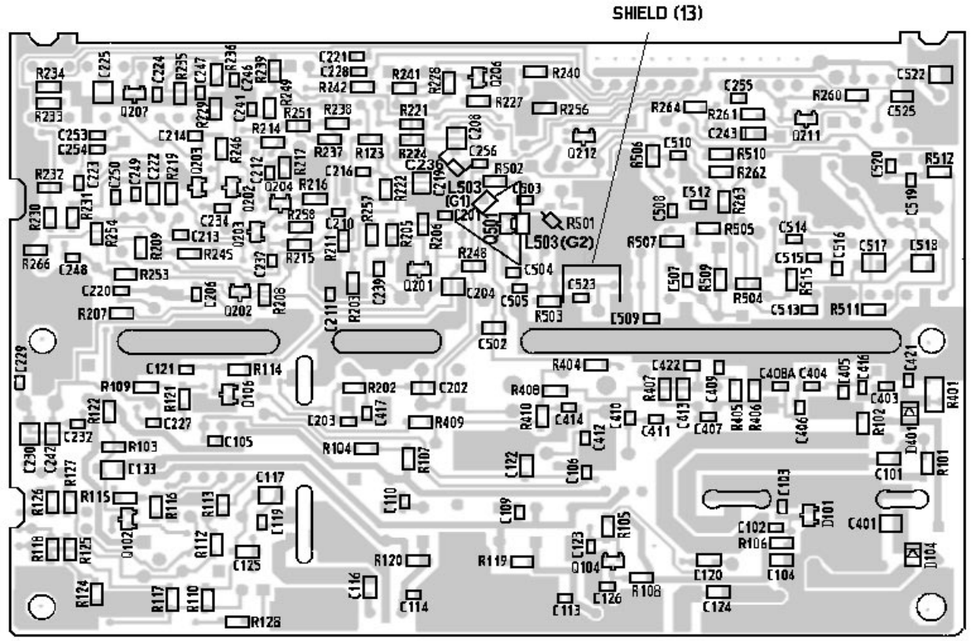
(19C851547, Rev. 0)
(19A705065, Component Side, Rev. 0)
(19A705065, Solder Side, Rev. 0)

RF Board

COMPONENT SIDE



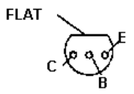
SOLDER SIDE



(19D904958, Rev. 0)
(19D904960,Component Side, Rev. 1)
(19D904960, Solder Side, Rev. 1)

CAUTION
OBSERVE PRECAUTIONS FOR HANDLING
ELECTROSTATIC SENSITIVE DEVICES

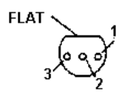
LEAD IDENTIFICATION FOR Q208,Q209, Q210 AND Q503



IN-LINE
TOP VIEW

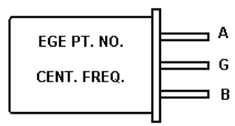
NOTE: CASE SHAPE IS DETERMINING FACTOR FOR LEAD IDENTIFICATION

LEAD IDENTIFICATION FOR U203 AND U502



IN-LINE
TOP VIEW

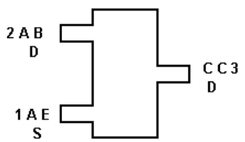
NOTE: CASE SHAPE IS DETERMINING FACTOR FOR LEAD IDENTIFICATION



VIEW "A"

LEAD IDENTIFICATION FOR (SOT) TRANSISTORS AND DIODES

(TOP VIEW)

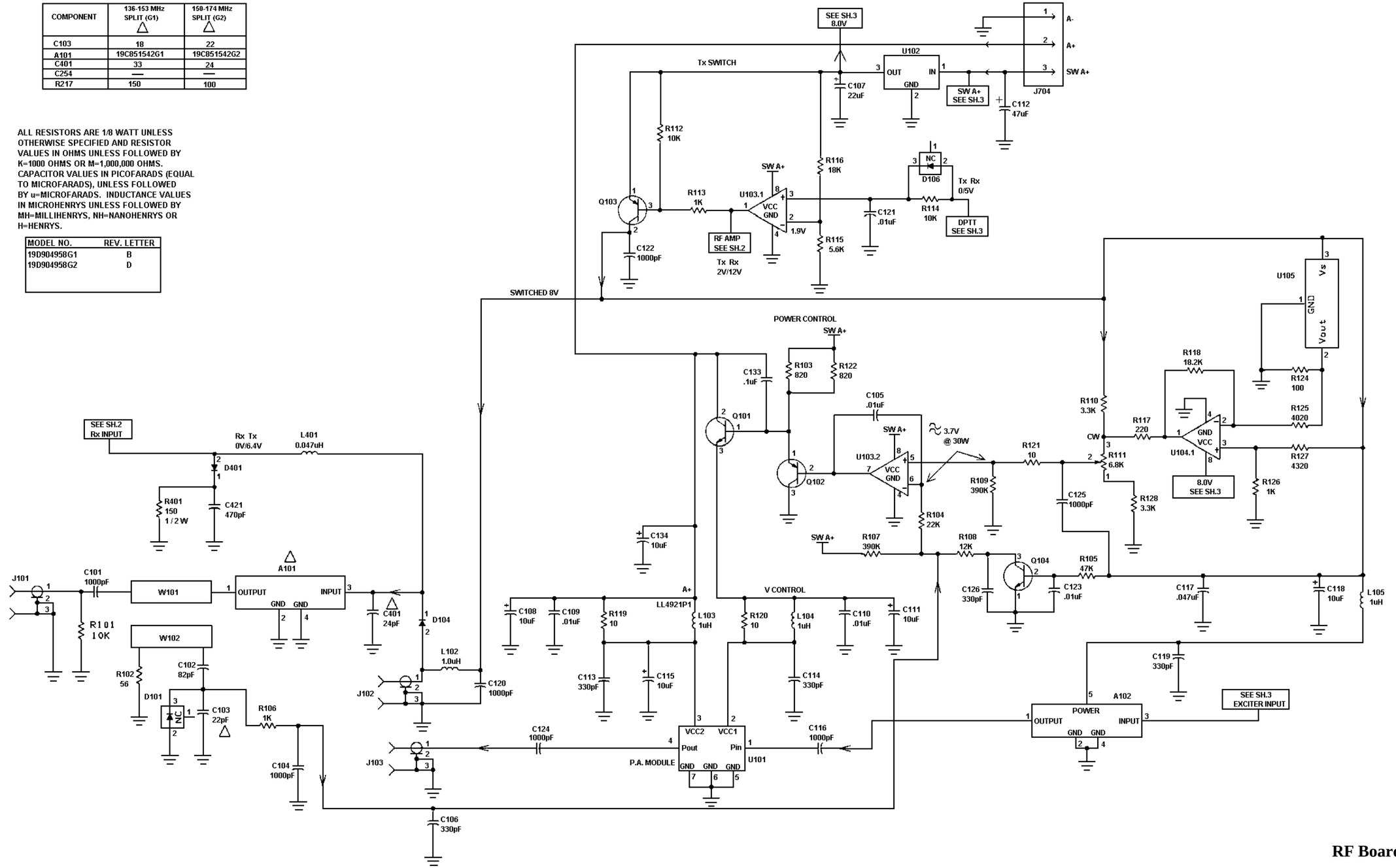


RF Board
19D904958G1 & G2

COMPONENT	136-153 MHz SPLIT (G1) △	150-174 MHz SPLIT (G2) △
C103	18	22
A101	19C851542G1	19C851542G2
C401	33	24
C254	—	—
R217	150	100

ALL RESISTORS ARE 1/8 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR M=1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROFARADS), UNLESS FOLLOWED BY u=MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH=MILLIHENRYS, NH=NANOHENRYS OR H=HENRYS.

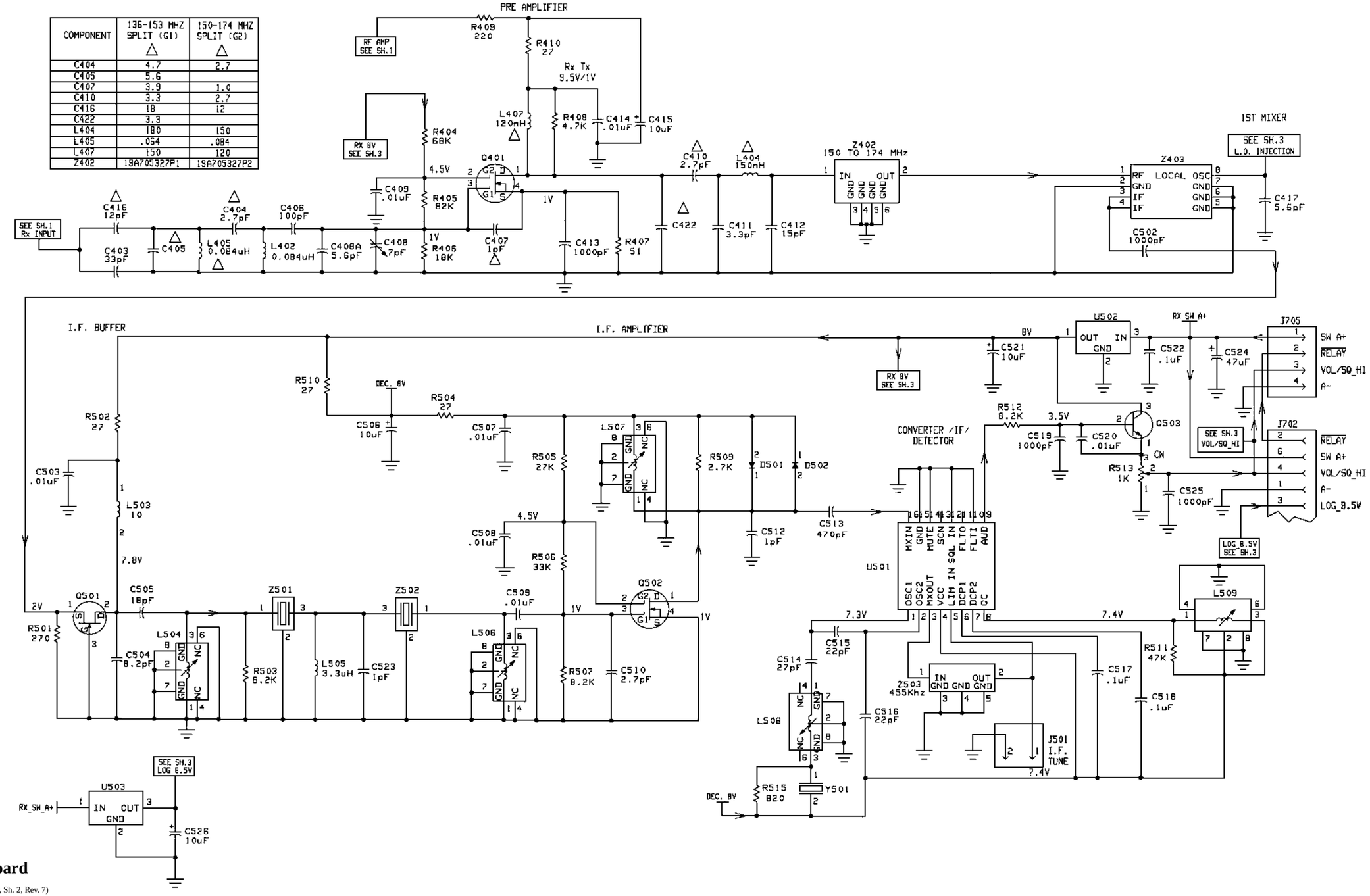
MODEL NO.	REV. LETTER
19D904958G1	B
19D904958G2	D



RF Board

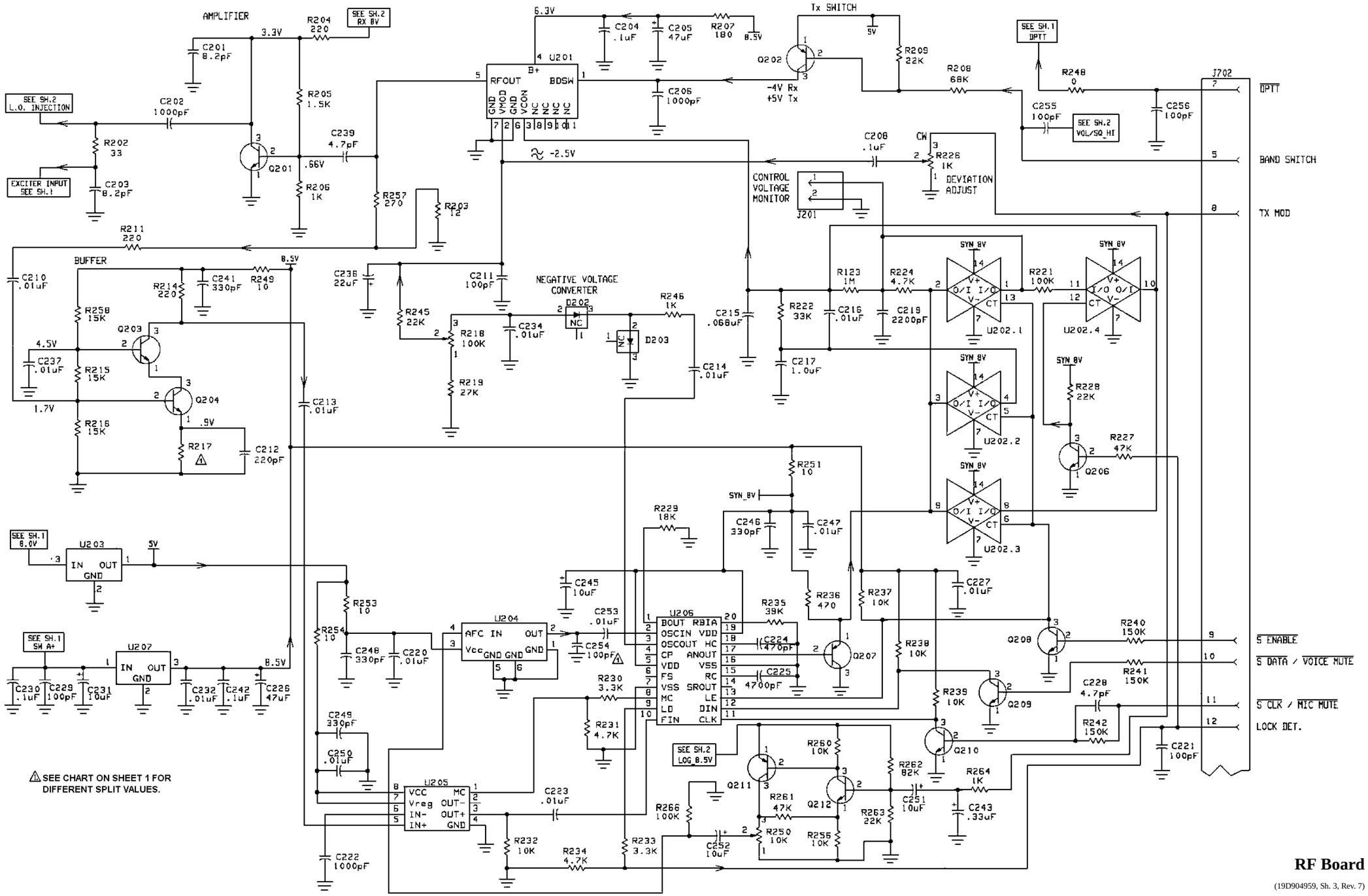
(19D904959, Sh. 1, Rev. 7)

COMPONENT	136-153 MHZ SPLIT (G1) △	150-174 MHZ SPLIT (G2) △
C404	4.7	2.7
C405	5.6	
C407	3.9	1.0
C410	3.3	2.7
C416	18	12
C422	3.3	
L404	180	150
L405	.064	.084
L407	150	120
Z402	19A705327P1	19A705327P2



RF Board

(19D904959, Sh. 2, Rev. 7)



RF Board

(19D904959, Sh. 3, Rev. 7)