MAINTENANCE MANUAL
FOR
RF BOARD
19D902123G3

TABLE OF CONTENTS

DESCRIPTION

RF Board 19D902123G3 is used in MVS, TMX-8310B, TMX-8510B and TMX-8825 800 MHz mobile combinations. The RF Board 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 stages.
- 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 the appropriate Combination Manual for a mechanical layout of the radio.

The transmitter and receiver adjustments are accessible from the top of the board. 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 permits small board size as well as RF and mechanical protection for sensitive circuitry. Modules are not repairable and must be replaced if damaged.

CIRCUIT ANALYSIS

SYNTHESIZER CIRCUIT

The synthesizer generates all transmit and receive RF frequencies. A block diagram of the frequency synthesizer circuit is shown in Figure 1. The synthesizer uses a phase-locked VCO operating on the actual transmitter frequency of 806 to 825 MHz. In the direct (talk around) mode, the VCO is band shifted to operate at 851 to 870 MHz. The synthesizer's output signal is generated directly by VCO module U201 and buffered by transistors Q201 and Q205 to a level of +8 dBm (6 mW). This signal feeds the receiver mixer directly and is attenuated to +3 dBm by resistor R201 to feed the transmitter exciter module.

The synthesizer frequency is controlled by the microprocessor on Logic Board A1. Frequency stability is maintained by temperature compensated crystal controlled oscillator (TCXO) module U204 operating at 12.8 MHz. The oscillator has a stability of ±2.5 PPM (0.00025%) over the temperature range of -30° C to 75° C and determines the overall frequency stability of the radio.

The buffered VCO output from Q201 is further buffered by transistor Q204 to feed divide by 128/129 dual modulus prescaler U205. The prescaler feeds the F_{in} input of the PLL U206. Within U206, the prescaler signal is further divided down to 12.5 kHz to be compared with a reference signal. This reference signal is derived from the 12.8 MHz TCXO module U204. U206 divides the 12.8 MHz signal down to the 12.5 kHz reference frequency.

Divider circuits in U206 are programmed by three inputs from Logic Board A1, 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.

When the radio is used in the direct (talk around) mode, the VCO is bandswitched to transmit in the 851 to 870 MHz range. The **BANDSWITCH** line from the microprocessor is normally at a logical high and switches low during transmit in direct mode. Transistor Q203 buffers and inverts this signal to feed the VCO and Q202. Transistor Q202 provides the 8 volt supply voltage to the receiver RF preamplifier which is switched off when the **BANDSWITCH** line becomes active (logical low) during transmit in direct mode.

Audio modulation from Audio Board A3 is applied to the VCO module through **DEVIATION ADJUST** potentiometer R226 and buffer transistor Q211.

The synthesizer output drives the receiver mixer at +8 dBm, and is attenuated to +3 dBm for driving the exciter input.

TRANSMITTER CIRCUIT

The transmitter consists of a fixed tuned, 200 milliwatt 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 (see Figure 2).

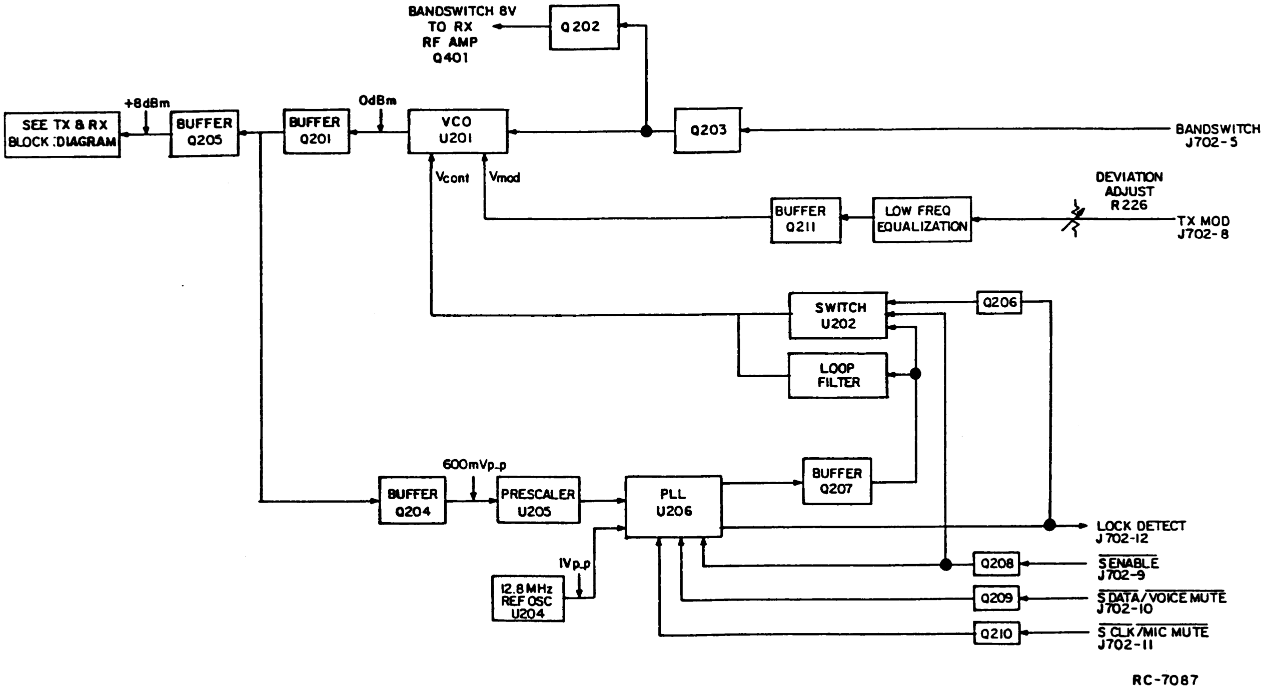

Figure 1 - Synthesizer Block Diagram

Exciter Module

Exciter Module A102 operates from a switched 8 volt supply. The exciter module bandwidth is sufficiently wide that both the 806 to 825 MHz and 851 to 870 MHz bands are allowed. No tuning is required. Both input and output ports operate at 50 ohms impedance. The exciter module provides typically 20 dB of gain and 200 milliwatts 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 output. The module is mounted to the rear heatsink. Input and output impedances are 50 ohms. The module output appears at J103 with a coax jumper either feeding J102 for a 10 watt radio or feeding a 25 watt PA Board.

The PA module output power is controlled by varying the DC voltage to the module's first stage. Refer to the power control circuit analysis below.

PIN Diode Switch, Low Pass Filter and Directional Coupler

The transmitter output feeds J102 to feed PIN diode switch D104. In transmit, **SWITCHED 8V** is applied through resistors R123 and R124 and inductor L102, turning on PIN diodes D104 and D401. The DC path is completed through the coax jumper between J104 and J401 and through inductor L404. PIN diode D104 couples the transmitter power from J102 to the low pass filter. PIN diode D401 provides an RF path to ground to protect the receiver input.

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

Power Control Circuit

The power control circuit samples the output power to maintain a constant power level across the band. Also, thermistors sense the heatsink temperature to throttle the power level down above +60°C. This circuit controls the supply voltage to the first amplifier stage in PA module U101.

The directional coupler (W101 and W102) provides a sample of transmitter power to diode D101. Diode D101, capacitors C102 and C103, resistors R125 and R106 and capacitor C104 produce a DC voltage proportional to the transmitter output power level. This DC voltage feeds U103 through the jumper on J105.

The DC level from the directional coupler feeds the (-) input of amplifier U103-B. Power set potentiometer R111 determines 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.

Thermistors R118 and R129, buffered by transistors Q106 and Q107, reduce the DC level to the (+) input of U103-B above 60°C. Transistor Q104, capacitor C123, and resistor R105 improve the transient stability of the power control loop when the transmitter is keyed.

Transmit Switch

During transmit, Logic Board A1 microprocessor pulls the **DPTT** line low which is buffered by transistor Q105 before feeding U103-A. The output of U103-A goes low to turn on transistor Q103 which supplies **SWITCHED 8V** to the exciter module, the power control circuit, and the PIN diode switch.

RECEIVER CIRCUIT

The dual conversion receiver circuit consists of a front end section, a 45.0125 MHz first IF, and a 455 kHz second IF with a FM detector. All audio processing is accomplished on Audio Board A3. (see Figure 2.)

Front End Section

RF is coupled from antenna jack J101 through the directional coupler and the low pass filter to J104. J104 is jumpered to the receiver input at J401 feeding PIN diode D401. In transmit, **SW 8V** is applied through resistors R123 and R124 and through inductor L102, turning on PIN diodes D104 and D401. The DC path is completed through the coax jumper between J104 and J401 and through inductor L404. In transmit, PIN diode D401 provides a RF path to ground for the receiver input. In receive, D401 is off, allowing RF to pass by PIN diode D401 unattenuated.

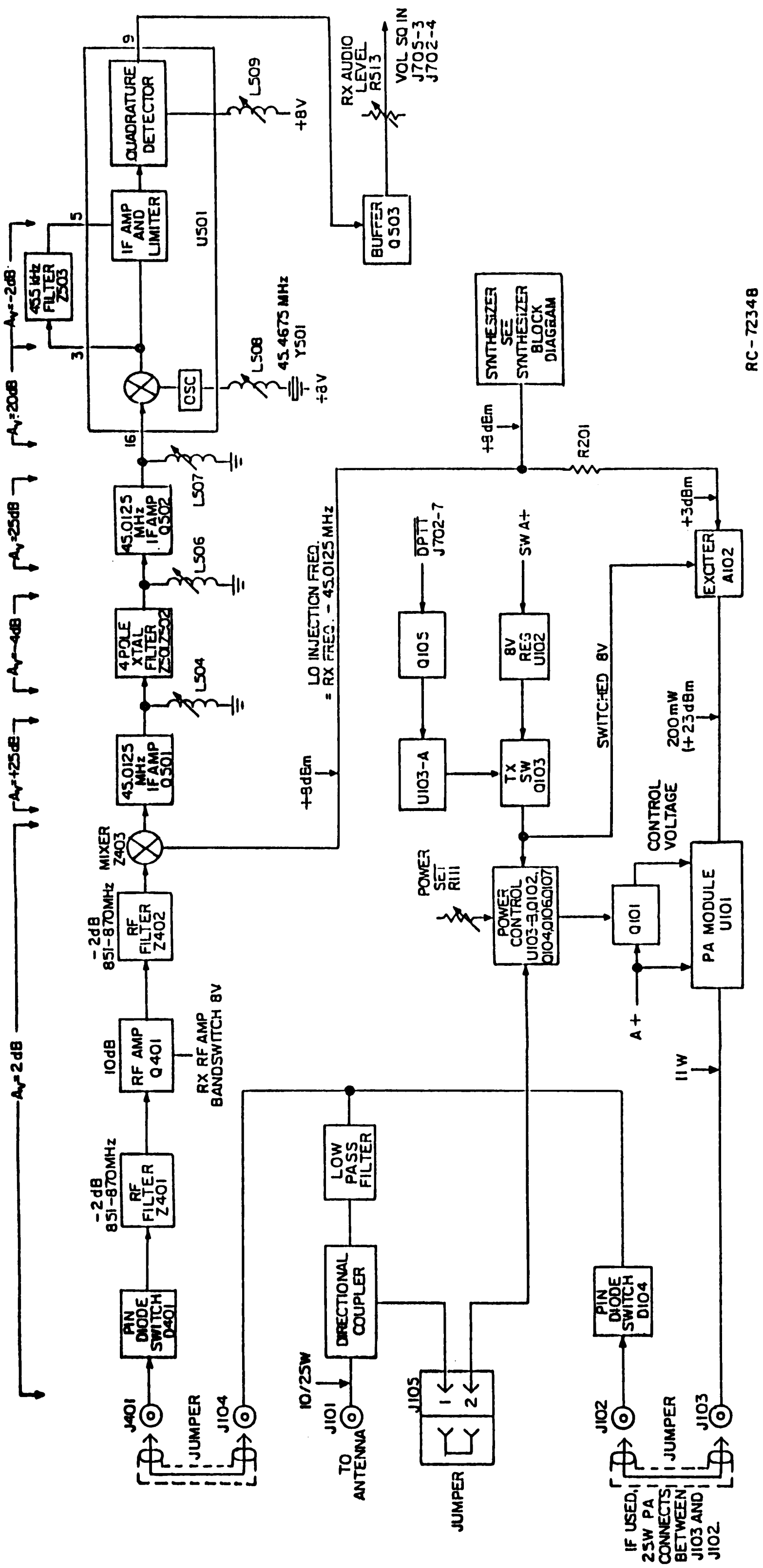

Figure 2 - Transmit and Receive Block Diagram

RF selectivity is provided by two filters Z401 and Z402 on the input and output of RF amplifier transistor Q401. The filters are fixed tuned, 3 pole dielectric resonators with a bandwidth greater than 20 MHz to cover the 851 to 870 MHz band. About 2 dB of passband ripple is typical for this filter pair. Approximately 50 ohm impedance levels exist at the input and output ports of the filters.

RF Amplifier transistor Q401 is a low noise bipolar transistor biased with DC feedback. The feedback allows stable operating point of about 10 milliamperes, while allowing direct emitter grounding. Input matching is obtained with stripline L402. The amplifier load is primarily filter Z402. Capacitors C404, C405, and C410, and stripline L403 provide a low Q match to the filter. Transistor Q202 supplies 8 volts to the RF amplifier which is switched off when the **BANDSWITCH** line goes low while transmitting in direct mode.

Mixer Z403 is a doubly balanced diode mixer. This mixer is driven by a local oscillator signal from the synthesizer at +8 dBm to provide good intermodulation performance, spurious performance, and local oscillator isolation. The mixer conversion loss is typically 6 dB.

45.0125 MHz IF

The RF Board uses an IF which is offset by 1/2 channel at 45.0125 MHz. First 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 four pole crystal filter which follows.

The output of the crystal filter is matched by second amplifier transistor Q502. This port is also tuned by inductor L506 and loaded to provide the proper source termination.

Transistor Q502 is a dual gate FET operating at a bias current of about 10 milliamperes. The output of Q502 is tuned by inductor L507 for maximum gain at 45.0125 MHz and is loaded by the second mixer in the U501 chip. This Q502 stage has a relatively high input and output impedance and has high isolation within the active device.

Converter/IF/Detector IC

IF Amplifier/Detector U501 is a MC3361 IC. Pins 1 and 2 connect to an internally biased oscillator transistor. Crystal Y501 and other external circuitry form a 45.4675 MHz third mode oscillator with the frequency adjusted by inductor L508. The oscillator drives the internal balanced mixer. The 45.0125 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 detector 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 feedthrough. Buffer amplifier Q503 drives audio potentiometer R513 to set the amplitude of the **VOL/SQ HI** signal for proper system operation.

POWER DISTRIBUTION

The 13.8 Vdc source voltage is supplied to the RF Board through connectors J704 and feeds power control transistor Q101, PA module U101, and 20V transient suppressor D105. Diode D105 provides reverse polarity protection and protection from noise spikes and other overvoltage transients appearing on the input power cable.

Switched 13.6 volts (**SW A+**) is supplied to the RF Board through J704 and J705 and feeds regulators U102, U207, and U502. Regulator U102 supplies 8 volts to the transmitter switch, synthesizer 5 volt regulator U203 and to Logic Board A1 through J702. Regulator U207 supplies 8.3 volts to the synthesizer. Regulator U502 supplies 8 volts to the receiver.

SERVICE CHECKS

TRANSMITTER CIRCUIT

Most transmitter circuit problems can be isolated by checking the TX power gains shown in Figure 2 - RX and TX Block Diagram.

Transmitter DC Measurements

1. First ensure that the DPTT is low when the microphone PTT is keyed low.

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 R123 and R124. If not present, check pin diodes D104 and

D401 and the conduction path from D401 to TX switch Q103.

4. Check for an adjustable voltage of 0 to 12 volts 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, Q104, Q106 and Q107.

5. Check for 13.6 volts on Pins 3 and 4 of PA module U101 and ensure a good mechanical and electrical ground from the PA module to the bracket and casting.

SYNTHESIZER CIRCUIT

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 8.3 Vdc is supplied by regulator U207 and serves as the biasing voltage for transistor circuits Q201, Q204, Q205, Q206, Q207, Q208, Q209 and Q210. Resistor R211 decouples the 8.3 volts for use in VCO module U201.

RECEIVER CIRCUIT

To isolate a receiver circuit problem, refer to the Receiver Circuit Symptoms and check chart as follows:

RECEIVER CIRCUIT SYMPTOMS AND CHECKS

SYMPTOMS	CHECKS
No Audio	1. U502 regulator 2. The level and frequency of the first mixer inejction 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 2 - RX and TX Block Diagram for RX stage gains and troubleshoot 2. Input cable 3. Pin Diode switch 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

The 10 milliampere current drain of this module results in approximately 8.1 volts DC on Pin 4.

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

Waveforms

Synthesizer waveforms in Figures 3 through 8 were measured with a 10 megohm, 30 pf probe. Use DC coupling.

Module Isolation

Reference Oscillator U204:

Look for a waveform similar to the reference on Pin 2 (refer to Figure 3). If the waveform is not present, the oscillator module is probably defective.

VCO U201:

Connect a DC power supply to Pin 3. With 2.5 Vdc on Pin 3, the output of U201 (Pin 5) should be approximately 803 MHz. With 6.5 Vdc on Pin 3, the output should be approximately 828 MHz. Either transmit in direct mode or force the **BANDSWIDTH** line to ground which will cause Pin 1 to go to 8 volts. The frequencies for 2.5 Vdc and 6.5 Vdc should be approximately 45 MHz higher.

Power output of the VCO can be measured by connecting a coax directly to the module, between Pin 5 and ground. The outputs should be approximately 0 dBm with C211 still connected in the circuit.

Prescaler U205:

Connect Pin 3 of the VCO to 4.5 Vdc. With the radio in receive, monitor the frequencies of the VCO at the connection of capacitor C201 and resistor R201. DC short Pin 7 of U205 to ground to cause divide by 129 to occur. The frequency output at Pin 5 should be the VCO frequency divided by 129. Tie Pin 7 to Pin 1 (5 volts) to cause divide by 128 to occur. Check Pin 5 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 (to

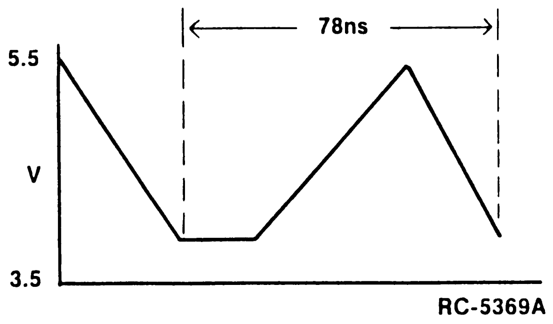

Figure 3 - Reference Oscillator (Input to U206, Pin 2)

Channel Frequency is 814.2 MHz (Channel 665)

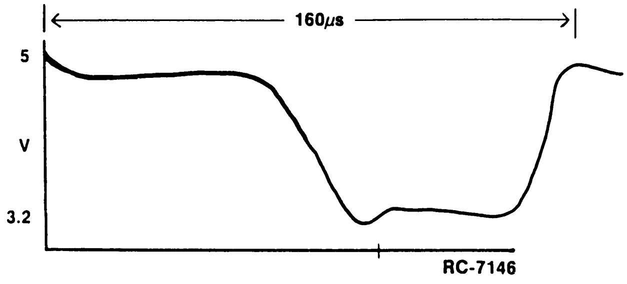

Figure 4 - F_{in} (Input To U206, Pin 10)

The top of the ramp is approximately 0.8 Volts greater than the control voltage on PD out, Pin 17. Channel Frequency is 815 MHz (Channel 730).

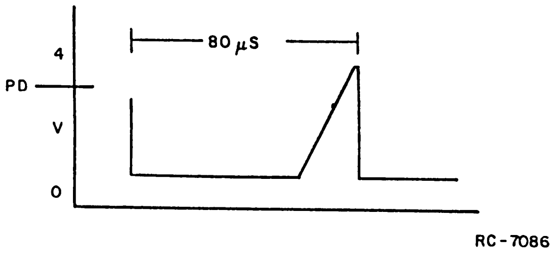

Figure 5 - **RAMP** (Generated in U206 and appears on Pin 15)

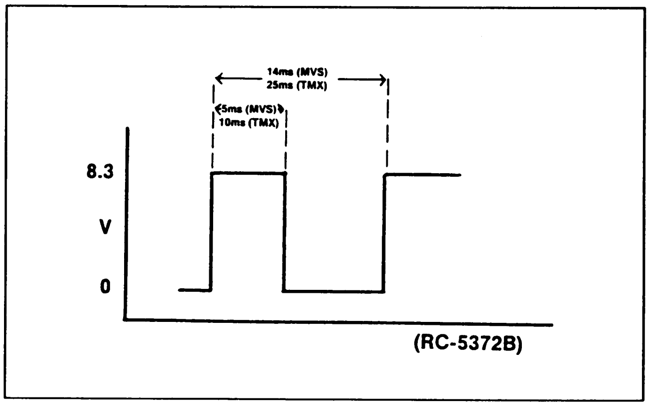

Figure 6 - **S ENABLE** (Input to U206, Pin 13) MVS Radio in SCAN on a single channel. TMX using Test Mode Function S 10.

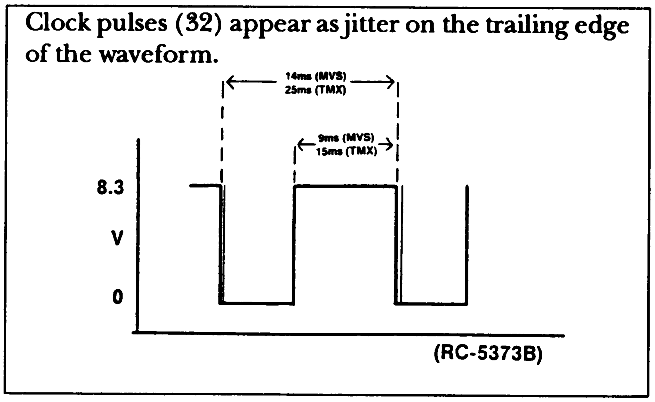
Clock pulses (32) appear as jitter on the trailing edge of the waveform.

Figure 7 - **S CLOCK** (Input to U206, Pin 11) MVS radio in SCAN on a single channel. TMX using Test Mode Function S 10.

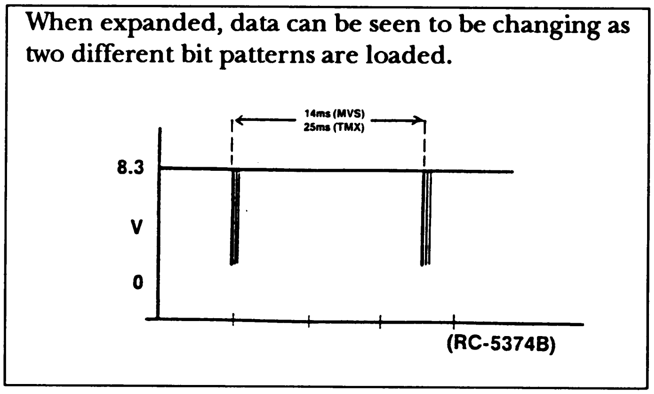
When expanded, data can be seen to be changing as two different bit patterns are loaded.

Figure 8 - **S DATA** (Input to U206, Pin 12) MVS Radio in SCAN on a Single Channel. TMX using Test Mode Function S 10.

ground or adjacent gate) 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-Loop 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 and Q205:

After checking for proper DC operation, measure the gain from VCO, Pin 5 to R201/C201. The gain should be approximately 8 dB.

PA MODULE REPLACEMENT

To Remove PA Module U101

1. Unsolder the five leads from U101, using either solder removal braid, or a mechanical de-soldering tool. These leads are fragile and can be bent very easily. **DO NOT** unsolder the shield that wraps around the module.

2. Remove the RF Board from the radio chassis assembly. Refer to the disassembly procedure provided in the Service Section. Carefully slide the module out of the shield and away from the board.

To Install PA Module U101

1. Apply some silicone grease to the metal side of the replacement module.

2. Carefully insert the five leads from the module into the five corresponding printed wire board holes 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.

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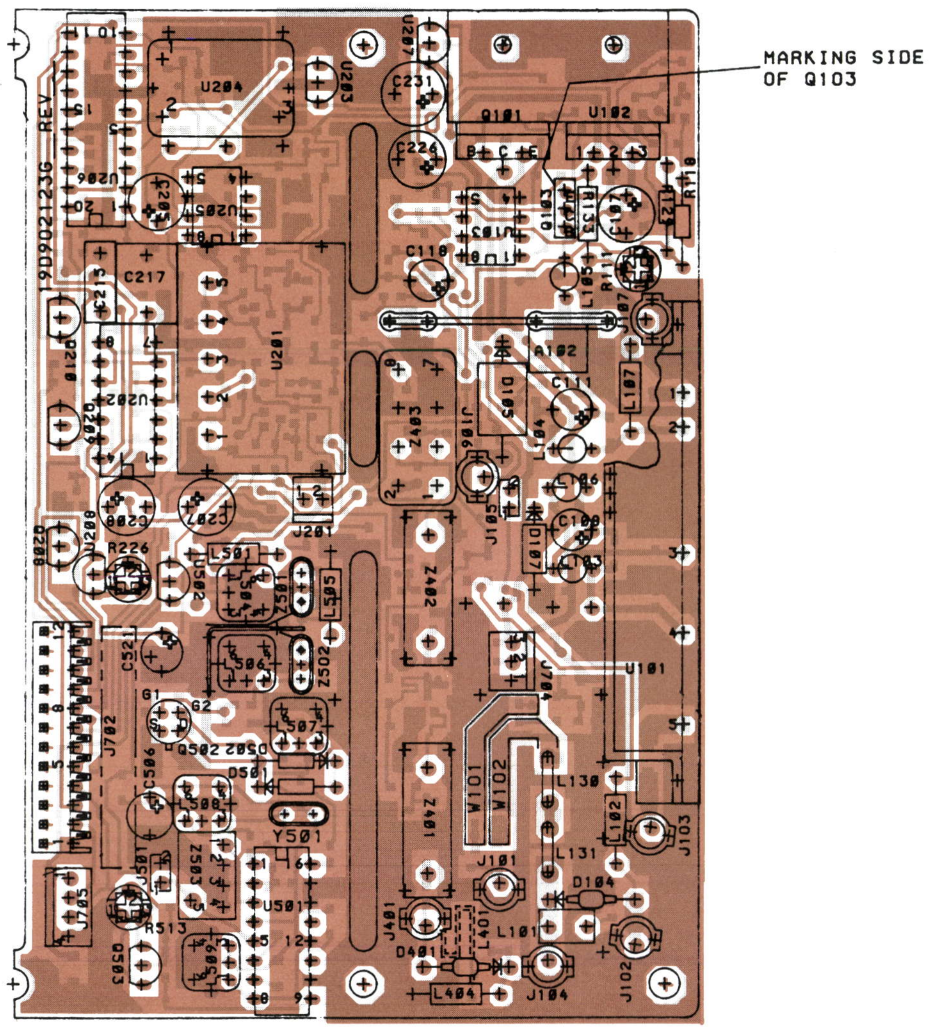
EXCITER A102



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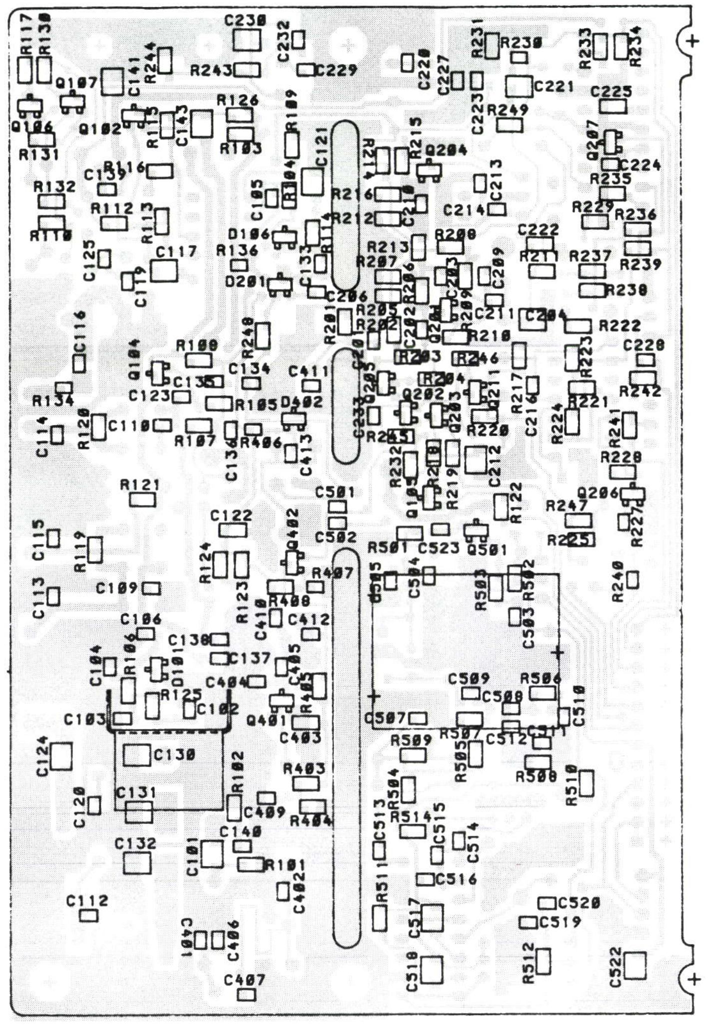
(19D902309, Sh. 1, Rev. 0)
(19D902309, Sh. 2, Rev. 0)



VIEW FROM BACKSIDE

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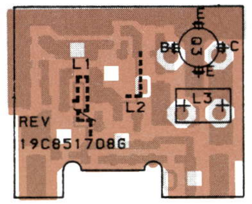

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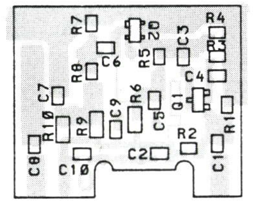

VIEW OF BACKSIDE

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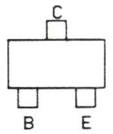
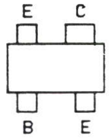
(19C851707, Sh. 2, Rev. 0)

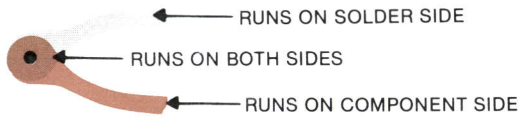


LEAD IDENTIFICATION
FOR Q1

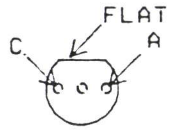
LEAD IDENTIFICATION
FOR Q3



LEAD IDENTIFICATION
FOR Q2



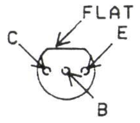
LEAD IDENTIFICATION
FOR D201



IN-LINE
TOP VIEW

NOTE: CASE SHAPE IS
DETERMINING FACTOR FOR
LEAD IDENTIFICATION.

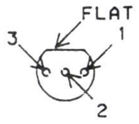
LEAD IDENTIFICATION
FOR Q208, Q209, Q210, & Q503



IN-LINE
TOP VIEW

NOTE: CASE SHAPE IS
DETERMINING FACTOR FOR
LEAD IDENTIFICATION.

LEAD IDENTIFICATION
FOR U203, U207 U208 &
U502

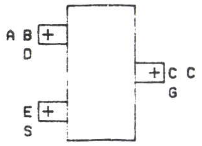


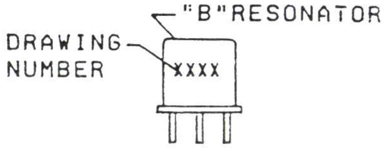
IN-LINE
TOP VIEW

NOTE: CASE SHAPE IS
DETERMINING FACTOR FOR
LEAD IDENTIFICATION.

LEAD IDENTIFICATION FOR
(SOT) TRANSISTORS AND DIODES

(TOP VIEW)





Z501 AND Z502 ARE A MATCHED
PAIR OF CRYSTAL FILTERS
WHICH MUST BE ORIENTATED WITH
"B" RESONATOR AS SHOWN.
"B" RESONATOR IS INDENTIFIED
BY DOT ON CAN

RC-7242A

MADE FROM 19D902123 SH.1, REV.4

CAUTION

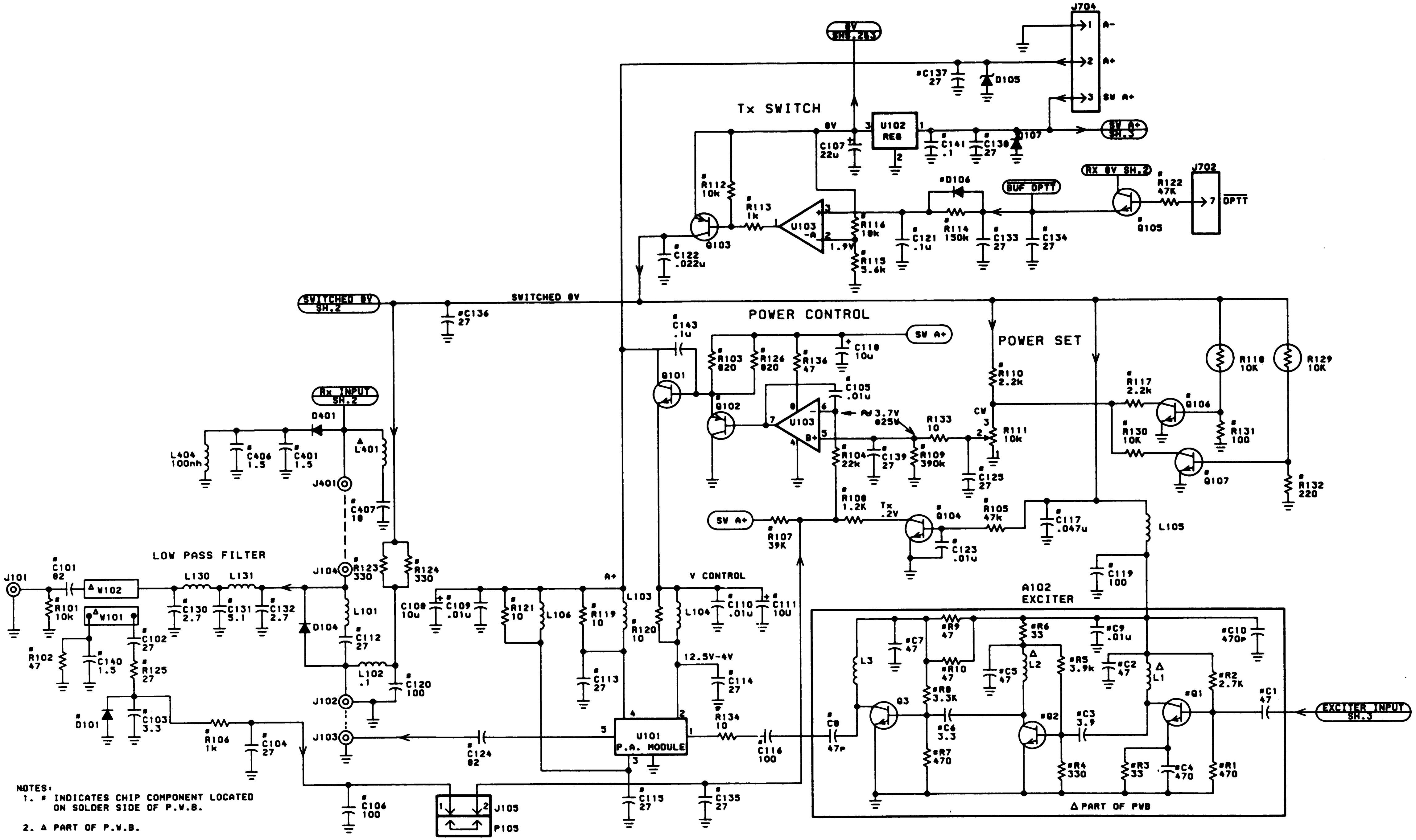
OBSERVE PRECAUTIONS
FOR HANDLING

ELECTROSTATIC
SENSITIVE
DEVICES

THE FOLLOWING ITEMS ARE MOS DEVICES REQUIRING
SPECIAL CARE U202, U206.
Z501 AND Z502 ARE A MATCHED PAIR OF CRYSTAL FILTERS
WHICH MUST BE ORIENTATED WITH "B" RESONATOR AS SHOWN.
"B" RESONATOR IS INDENTIFIED BY DOT ON CAN.

RF BOARD
19D902123G3

RF BOARD



NOTES:
1. # INDICATES CHIP COMPONENT LOCATED ON SOLDER SIDE OF P.W.B.

2. Δ PART OF P.W.B.

3. ALL RESISTORS ARE 1/4 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 MICROMICROFARADS) UNLESS FOLLOWED BY u=MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH-MILLIHENRYS, NH-NANOHENRYS OR H-HENRYS.

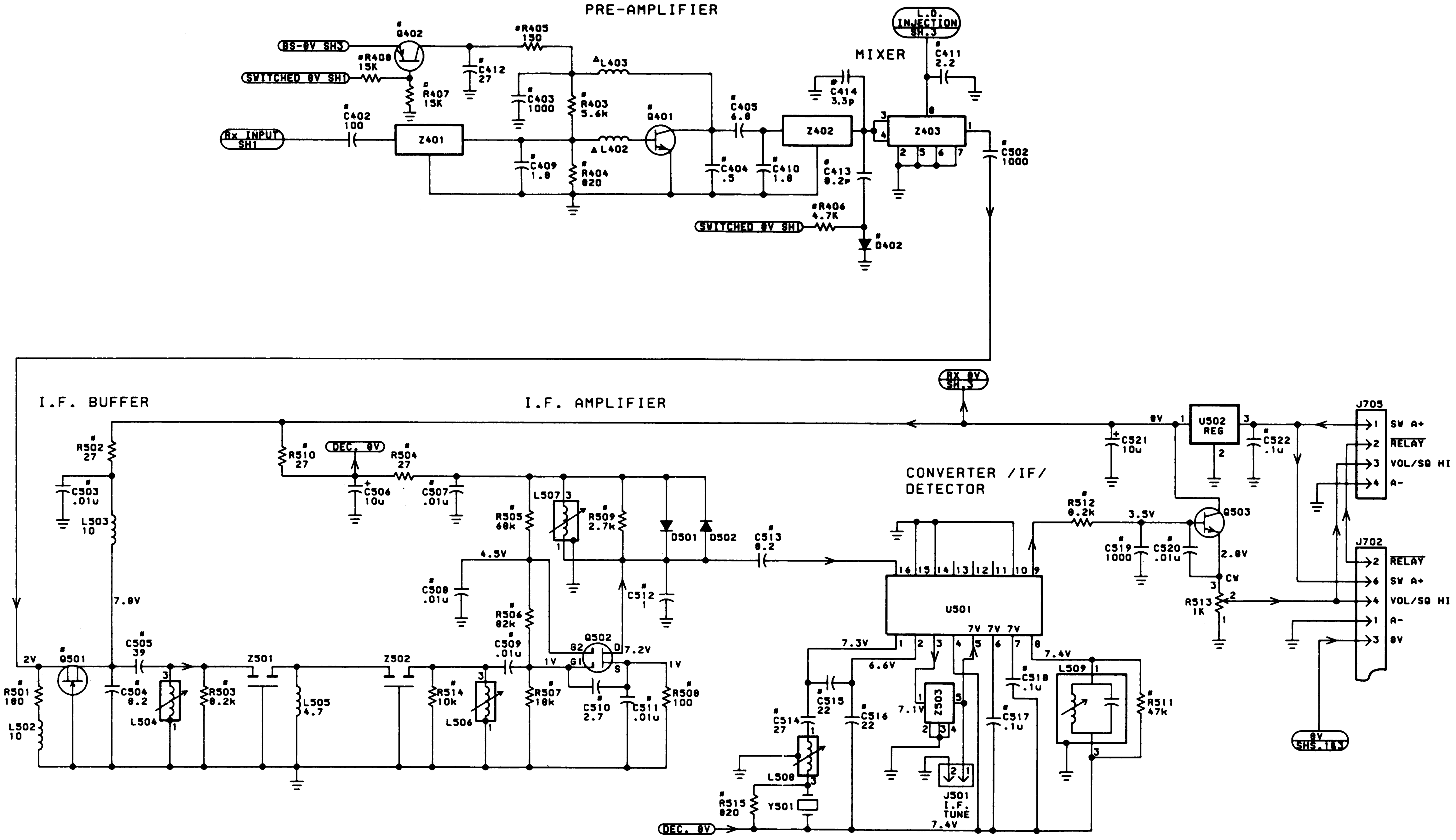
MODEL NO.	REV. LETTER
19D902123G3	B
19D902123G2	A

(19D902191, Sh. 1, Rev. 6)

RF BOARD

19D902123G3

SHEET 1 of 3



RF BOARD

19D902123G3

SHEET 2 of 3

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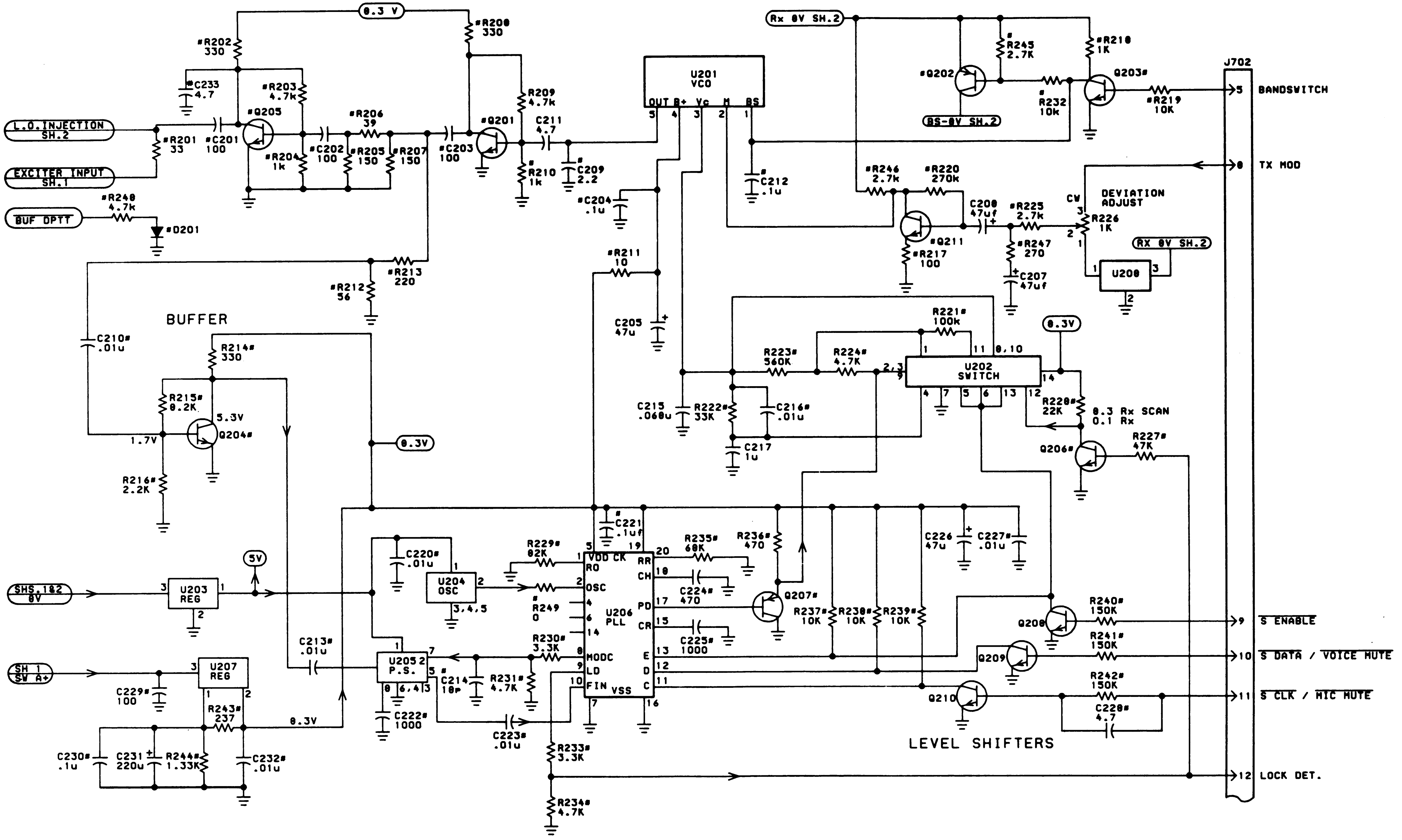
RF BOARD



(19D902191, Sh. 3, Rev. 4)

RF BOARD

19D902123G3

SHEET 3 of 3

PARTS LIST

RF BOARD
19D902123G3
ISSUE 2

SYMBOL	GE PART NO.	DESCRIPTION
A102		EXCITER BOARD 19C851708G1
		- - - - - - - - - - - CAPACITORS - - - - - - - - - -
C1 and C2	19A702061P45	Ceramic: 47 pF + or -5%, 50 VDCW, temp coef 0 + or -30 PPM.
C3	19A702061P8	Ceramic: 3.9 pF + or - 0.5 pF, 50 VDCW, temp coef 0 + or - 120 PPM.
C4	19A702061P77	Ceramic: 470 pF + or - 5%, 50 VDCW, temp coef 0 + or - 30 PPM.
C5	19A702061P45	Ceramic: 47 pF + or -5%, 50 VDCW, temp coef 0 + or -30 PPM.
C6	19A702061P7	Ceramic: 3.3 pF + or - 0.5 pF, 50 VDCW, temp coef 0 + or - 120 PPM.
C7 and C8	19A702061P45	Ceramic: 47 pF + or -5%, 50 VDCW, temp coef 0 + or -30 PPM.
C9	19A702052P14	Ceramic: 0.01 uF + or - 10%, 50 VDCW.
C10	19A702061P45	Ceramic: 47 pF + or -5%, 50 VDCW, temp coef 0 + or -30 PPM.
		- - - - - - - - - - - INDUCTORS - - - - - - - - - -
L1 and L2		Part of Printed Wire Board 19C851707P1.
L3	19B800891P2	Coil, RF Choke: sim to Paul Smith SK-890-1.
		- - - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A704708P2	Silicon, NPN: sim to NEC 2SC3356.
Q2	19A705436P1	Silicon, NPN: sim to Motorola MRF0211L.
Q3	19A701940P3	Silicon, NPN: sim to SRF-5116.
		- - - - - - - - - - - RESISTORS - - - - - - - - - -
R1	19B801251P471	Metal film: 470 ohms + or -5%, 1/10 w.
R2	19B801251P272	Metal film: 2.7K ohms + or -5%, 1/10 w.
R3	19B801251P330	Metal film: 33 ohms + or -5%, 1/10 w.
R4	19B801251P331	Metal film: 330 ohms + or -5%, 1/10 w.
R5	19B801251P392	Metal film: 3.9K ohms + or -5%, 1/10 w.
R6	19B800607P330	Metal film: 33 ohms + or - 5%, 200 VDCW, 1/8 w.
R7	19B801251P471	Metal film: 470 ohms + or -5%, 1/10 w.
R8	19B801251P332	Metal film: 3.3K ohms + or -5%, 1/10 w.
R9 and R10	19B800607P470	Metal film: 47 ohms + or - 5%, 200 VDCW, 1/8 w.
		- - - - - - - - - - - CAPACITORS - - - - - - - - - -
C101	19A705108P35	Mica: 82 pF + or -5%, 500 VDCW, temp coef 0 +50 PPM/'C.
C102	19A702061P33	Ceramic: 27 pF + or -5%, 50 VDCW, temp coef 0 + or -30 PPM/`C.
C103	19A702061P7	Ceramic: 3.3 pF + or - 0.5 pF, 50 VDCW, temp coef 0 + or - 120 PPM.
C104	19A702061P33	Ceramic: 27 pF + or -5%, 50 VDCW, temp coef 0 + or -30 PPM/`C.
C105	19A702052P14	Ceramic: 0.01 uF + or - 10%, 50 VDCW.
C106	19A702061P61	Ceramic: 100 pF + or - 5%, 50 VDCW, temp coef 0 + or - 30 PPM.
C107	19A701534P8	Tantalum: 22 uF + or -20%, 16 VDCW.
C108	19A703314P10	Electrolytic: 10 uF -10+50%, 50 VDCW; sim to Panasonic LS Series.
C109 and C110	19A702052P14	Ceramic: 0.01 uF + or - 10%, 50 VDCW.
C111	19A703314P10	Electrolytic: 10 uF -10+50%, 50 VDCW; sim to Panasonic LS Series.
C112 thru C115	19A702061P33	Ceramic: 27 pF + or -5%, 50 VDCW, temp coef 0 + or -30 PPM/`C.
C116	19A702061P61	Ceramic: 100 pF + or - 5%, 50 VDCW, temp coef 0 + or - 30 PPM.
C117	19A702052P22	Ceramic: 0.047 uF + or - 10%, 50 VDCW.
C118	19A703314P10	Electrolytic: 10 uF -10+50%, 50 VDCW; sim to Panasonic LS Series.
C119 and C120	19A702061P61	Ceramic: 100 pF + or - 5%, 50 VDCW, temp coef 0 + or - 30 PPM.
C121	19A702052P26	Ceramic: 0.1 uF + or - 10%, 50 VDCW.
C122	19A702052P28	Ceramic: 0.022 uF + or -10%, 50 VDCW.
C123	19A702052P14	Ceramic: 0.01 uF + or - 10%, 50 VDCW.
C124	19A705108P35	Mica: 82 pF + or -5%, 500 VDCW, temp coef 0 +50 PPM/'C.
C125	19A702061P33	Ceramic: 27 pF + or -5%, 50 VDCW, temp coef 0 + or -30 PPM/`C.
C130	19A705108P207	Mica: 2.7 pF + or -5%, 500 VDCW, temp coef 0 +200 PPM/'C.
C131	19A705108P6	Mica: 5.1 pF + or -.25 pF, 500 VDCW.
C132	19A705108P207	Mica: 2.7 pF + or -5%, 500 VDCW, temp coef 0 +200 PPM/'C.
C133 thru C139	19A702061P33	Ceramic: 27 pF + or -5%, 50 VDCW, temp coef 0 + or -30 PPM/`C.
C140	19A702061P3	Ceramic: 1.5 pF + or - 0.5 pF, 50 VDCW, temp coef 0 + or - 250 PPM.
C141	19A702052P26	Ceramic: 0.1 uF + or - 10%, 50 VDCW.
C143	19A702052P26	Ceramic: 0.1 uF + or - 10%, 50 VDCW.
C201 thru C203	19A702061P61	Ceramic: 100 pF + or - 5%, 50 VDCW, temp coef 0 + or - 30 PPM.
C204	19A702052P26	Ceramic: 0.1 uF + or - 10%, 50 VDCW.
C205	19A701534P17	Tantalum: 47 uF + or -20%, 10 VDCW.
C207 and C208	19A701534P17	Tantalum: 47 uF + or -20%, 10 VDCW.
C209	19A702061P5	Ceramic: 2.2 pF + or - 0.5 pF, 50 VDCW, temp coef 0 + or - 120 PPM.
C210	19A702052P14	Ceramic: 0.01 uF + or - 10%, 50 VDCW.
C211	19A702061P9	Ceramic: 4.7 pF + or - 0.5 pF, 50 VDCW, temp coef 0 + or - 60 PPM.
C212	19A702052P26	Ceramic: 0.1 uF + or - 10%, 50 VDCW.
C213	19A702052P14	Ceramic: 0.01 uF + or - 10%, 50 VDCW.
C214	19A702061P25	Ceramic: 18 pF + or -5%, 50 VDCW, temp coef 0 + or -30 PPM/`C.
C215	19A700004P1	Metallized polyester: 0.068 uF + or - 10%, 63 VDCW.
C216	19A702052P14	Ceramic: 0.01 uF + or - 10%, 50 VDCW.
C217	19A700004P11	Metallized Polyester: 1.0 uF + or - 10%, 63 VDCW.
C220	19A702052P14	Ceramic: 0.01 uF + or - 10%, 50 VDCW.
C221	19A702052P26	Ceramic: 0.1 uF + or - 10%, 50 VDCW.
C222	19A702061P99	Ceramic: 1000 pF + or -5%, 50 VDCW, temp coef 0 + or -30 PPM/`C.
C223	19A702052P14	Ceramic: 0.01 uF + or - 10%, 50 VDCW.
C224	19A702061P77	Ceramic: 470 pF + or - 5%, 50 VDCW, temp coef 0 + or - 30 PPM.
C225	19A702061P99	Ceramic: 1000 pF + or -5%, 50 VDCW, temp coef 0 + or -30 PPM/`C.
C226	19A701534P17	Tantalum: 47 uF + or -20%, 10 VDCW.
C227	19A702052P14	Ceramic: 0.01 uF + or - 10%, 50 VDCW.
C228	19A702061P9	Ceramic: 4.7 pF + or - 0.5 pF, 50 VDCW, temp coef 0 + or - 60 PPM.
C229	19A702061P61	Ceramic: 100 pF + or - 5%, 50 VDCW, temp coef 0 + or - 30 PPM.
C230	19A702052P26	Ceramic: 0.1 uF + or - 10%, 50 VDCW.
C231	19A703314P2	Tantalum: 220 uF, -10+50%, 10 VDCW.
C232	19A702052P14	Ceramic: 0.01 uF + or - 10%, 50 VDCW.
C233	19A702061P9	Ceramic: 4.7 pF + or - 0.5 pF, 50 VDCW, temp coef 0 + or - 60 PPM.
C401	19A702236P8	Ceramic: 1.5 pF + or -.25 pF, 50 VDCW.
C402	19A702061P61	Ceramic: 100 pF + or - 5%, 50 VDCW, temp coef 0 + or - 30 PPM.
C403	19A702061P99	Ceramic: 1000 pF + or -5%, 50 VDCW, temp coef 0 + or -30 PPM/`C.
C404	19A702236P1	Ceramic: 0.5 pF + or -.1 pF, 50 VDCW, temp coef 0 + or -30 PPM.
C405	19A702236P21	Ceramic: 6.8 pF + or -0.5 pF, 50 VDCW, temp coef 0 + or -60 PPM.
C406	19A702236P8	Ceramic: 1.5 pF + or -.25 pF, 50 VDCW.
C407	19A702061P25	Ceramic: 18 pF + or -5%, 50 VDCW, temp coef 0 + or -30 PPM/`C.
C409 and C410	19A702236P9	Ceramic: 1.8 pF + or -0.25 pF, 50 VDCW, temp coef 0 + or -30 PPM.
C411	19A702236P10	Ceramic: 2.2 pF + or -2.5 pF, 50 VDCW, temp coef 0 + or -30 PPM/`C.
C412	19A702061P33	Ceramic: 27 pF + or -5%, 50 VDCW, temp coef 0 + or -30 PPM/`C.
C413	19A702061P12	Ceramic: 8.2 pF + or - 0.5 pF, 50 VDCW, temp coef 0 + or - 60 PPM.
C414	19A702061P7	Ceramic: 3.3 pF + or - 0.5 pF, 50 VDCW, temp coef 0 + or - 120 PPM.
C502	19A702061P99	Ceramic: 1000 pF + or -5%, 50 VDCW, temp coef 0 + or -30 PPM/`C.
C503	19A702052P14	Ceramic: 0.01 uF + or - 10%, 50 VDCW.
C504	19A702061P12	Ceramic: 8.2 pF + or - 0.5 pF, 50 VDCW, temp coef 0 + or - 60 PPM.
C505	19A702061P41	Ceramic: 39 pF + or - 5%, 50 VDCW, temp coef 0 + or - 30 PPM.
C506	19A701534P7	Tantalum: 10 uF + or -20%, 16 VDCW.
C507 thru C509	19A702052P14	Ceramic: 0.01 uF + or - 10%, 50 VDCW.
C510	19A702061P6	Ceramic: 2.7 pF + or - 0.5 pF, 50 VDCW, temp coef 0 + or - 120 PPM.
C511	19A702052P14	Ceramic: 0.01 uF + or - 10%, 50 VDCW.
C512	19A702061P1	Ceramic: 1 pF + or -0.5 pF, 50 VDCW.
C513	19A702061P12	Ceramic: 8.2 pF + or - 0.5 pF, 50 VDCW, temp coef 0 + or - 60 PPM.
C514	19A702061P33	Ceramic: 27 pF + or -5%, 50 VDCW, temp coef 0 + or -30 PPM/`C.
C515 and C516	19A702061P29	Ceramic: 22 pF + or - 5%, 50 VDCW, temp coef 0 + or - 30 PPM.
C517 and C518	19A702052P26	Ceramic: 0.1 uF + or - 10%, 50 VDCW.
C519	19A702052P5	Ceramic: 1000 pF + or -10%, 50 VDCW.
C520	19A702052P14	Ceramic: 0.01 uF + or - 10%, 50 VDCW.
C521	19A703314P10	Electrolytic: 10 uF -10+50%, 50 VDCW; sim to Panasonic LS Series.
C522	19A702052P26	Ceramic: 0.1 uF + or - 10%, 50 VDCW.
		- - - - - - - - - - - - DIODES - - - - - - - - - -
D101	19A705377P1	Silicon, Hot Carrier: sim to Motorolla MMB0201.
D104	19J706892P2	Silicon, pin; sim to Unitrode UM9401.
D105	19A703588P3	Zener, transient suppressor: sim to 1N6278A.
D106	19A134587P2	Silicon: 2 diodes, Common Cathode; sim to BAV 70.
D107	T324ADP1041	Rectifier, silicon; general purpose.
D201	19A702525P2	Silicon.
D401	19J706892P2	Silicon, pin; sim to Unitrode UM9401.
D402	19A702525P2	Silicon.
D501 and D502	19A700028P1	Silicon: 75 mA, 75 PIV; sim to 1N4148.
		- - - - - - - - - - - - JACKS - - - - - - - - - - - -
J101 thru J104	19B801341P1	RF Jack.
J105	19A700072P1	Printed wire: 2 contacts rated @ 2.5 amps; sim to Molex 22-03-2021.
J401	19B801341P1	RF Jack.
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 - - - - - - - - - -
L101	19B800891P2	Coil, RF Choke: sim to Paul Smith SK-890-1.
L102	19A700024P1	Coil, RF: 100 nH + or -10%, 0.08 ohms DC res max, 100 v.
L103 thru L106	19A704921P1	Coil.
L130 and L131	19A703775P6	Coil.
L401 thru L403		Part of Printed Wire Board 19D902309P1.
L404	19A700024P1	Coil, RF: 100 nH + or -10%, 0.08 ohms DC res max, 100 v.
L502 and L503	H343CLP10022	Coil, Fixed: 10 uH + or - 10%.
L504	19B801413P4	Coil, 39 MHz.
L505	19B209420P21	Coil, RF: 4.7 uH + or - 5%, 1.20 ohms DC res max; sim to Jeffers 4436-8J.
L506 thru L508	19B801413P4	Coil, 39 MHz.
L509	19B801415P2	Transformer, 455 KHz.: sim to AEPD 162B3277P17.
		- - - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q101		Part of Heat Sink Assembly 19B801378G3.
Q102	19A703197P2	Silicon, PNP; sim to MMBT4403 Low Profile Pkg.
Q103	19A704972P1	Silicon, PNP: sim to Motorola 2N4918.
Q104 thru Q107	19A700076P2	Silicon, NPN: sim to MMBT3904, low profile.
Q201	19A704708P2	Silicon, NPN: sim to NEC 2SC3356.
Q202	19A700059P2	Silicon, PNP.
Q203	19A700076P2	Silicon, NPN: sim to MMBT3904, low profile.
Q204 and Q205	19A704708P2	Silicon, NPN: sim to NEC 2SC3356.
Q206	19A700076P2	Silicon, NPN: sim to MMBT3904, low profile.
Q207	19A700059P2	Silicon, PNP.
Q208	19A700023P2	Silicon: NPN; sim to 2N3904.
Q209 and Q210	19A702084P2	Silicon, NPN: sim to MPS 2369.
Q211	19A700076P2	Silicon, NPN: sim to MMBT3904, low profile.
Q401	19A704708P2	Silicon, NPN: sim to NEC 2SC3356.
Q402	19A700059P2	Silicon, PNP.
Q501	19A702524P2	N-Type, field effect; sim to MMBFU310.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	GE PART NO.	DESCRIPTION
Q502	19A116818P3	N Channel, field effect; sim to Type 3N1877.
Q503	19A700023P2	Silicon: NPN; sim to 2N3904.
		- - - - - - - - - - - RESISTORS - - - - - - - - - - -
R101	19B800607P103	Metal film: 10K ohms + or - 5%, 200 VDCW, 1/8 w.
R102	19B800607P470	Metal film: 47 ohms + or - 5%, 200 VDCW, 1/8 w.
R103	19B800607P821	Metal film: 820 ohms + or - 5%, 200 VDCW, 1/8 w.
R104	19B800607P223	Metal film: 22K ohms + or - 5%, 200 VDCW, 1/8 w.
R105	19B800607P473	Metal film: 47K ohms + or - 5%, 200 VDCW, 1/8 w.
R106	19B800607P102	Metal film: 1K ohms + or - 5%, 200 VDCW, 1/8 w.
R107	19B800607P393	Metal film: 39K ohms + or - 5%, 200 VDCW, 1/8 w.
R108	19B800607P122	Metal film: 1.2K ohms + or -5%, 200 VDCW, 1/8 w.
R109	19B800607P394	Metal film: 390K ohms + or - 5%, 200 VDCW, 1/8 w.
R110	19B800607P222	Metal film: 2.2K ohms + or - 5%, 200 VDCW, 1/8 w.
R111	19B800779P10	Variable: 10K ohms + or -25%, 100 VDCW, .3 watt.
R112	19B800607P103	Metal film: 10K ohms + or - 5%, 200 VDCW, 1/8 w.
R113	19B800607P102	Metal film: 1K ohms + or - 5%, 200 VDCW, 1/8 w.
R114	19B800607P154	Metal film: 150K ohms + or -5%, 200 VDCW, 1/8 w.
R115	19B800607P562	Metal film: 5.6K ohms + or - 5%, 200 VDCW, 1/8 w.
R116	19B800607P183	Metal film: 18K ohms + or - 5%, 200 VDCW, 1/8 w.
R117	19B800607P222	Metal film: 2.2K ohms + or - 5%, 200 VDCW, 1/8 w.
R118	19A701864P4	Thermal 10K ohms + or -10%, sim to Midwest Components 2H-103.
R119 thru R121	19B800607P100	Metal film: 10 ohms + or -5%, 200 VDCW, 1/8 w.
R122	19B800607P473	Metal film: 47K ohms + or - 5%, 200 VDCW, 1/8 w.
R123 and R124	19B800607P331	Metal film: 330 ohms + or - 5%, 200 VDCW, 1/8 w.
R125	19B800607P270	Metal film: 27 ohms + or - 5%, 200 VDCW, 1/8 w.
R126	19B800607P821	Metal film: 820 ohms + or - 5%, 200 VDCW, 1/8 w.
R129	19A701864P4	Thermal 10K ohms + or -10%, sim to Midwest Components 2H-103.
R130	19B800607P103	Metal film: 10K ohms + or - 5%, 200 VDCW, 1/8 w.
R131	19B800607P101	Metal film: 100 ohms + or - 5%, 200 VDCW, 1/8 w.
R132	19B800607P221	Metal film: 220 ohms + or - 5%, 200 VDCW, 1/8 w.
R133	19A700106P15	Composition: 10 ohms + or - 5%, 1/4 w.
R134	19B801251P100	Metal film: 10 ohms + or - 5%, 1/10 w.
R136	19B801251P470	Metal film: 47 ohms + or -5%, 1/10 w.
R201	19B800607P330	Metal film: 33 ohms + or - 5%, 200 VDCW, 1/8 w.
R202	19B800607P331	Metal film: 330 ohms + or - 5%, 200 VDCW, 1/8 w.
R203	19B800607P472	Metal film: 4.7K ohms + or - 5%, 200 VDCW, 1/8 w.
R204	19B800607P102	Metal film: 1K ohms + or - 5%, 200 VDCW, 1/8 w.
R205	19B800607P151	Metal film: 150 ohms + or - 5%, 200 VDCW, 1/8 w.
R206	19B800607P390	Metal film: 39 ohms + or - 5%, 200 VDCW, 1/8 w.
R207	19B800607P151	Metal film: 150 ohms + or - 5%, 200 VDCW, 1/8 w.
R208	19B800607P331	Metal film: 330 ohms + or - 5%, 200 VDCW, 1/8 w.
R209	19B800607P472	Metal film: 4.7K ohms + or - 5%, 200 VDCW, 1/8 w.
R210	19B800607P102	Metal film: 1K ohms + or - 5%, 200 VDCW, 1/8 w.
R211	19B800607P100	Metal film: 10 ohms + or -5%, 200 VDCW, 1/8 w.
R212	19B800607P560	Metal film: 56 ohms + or - 5%, 200 VDCW, 1/8 w.
R213	19B800607P221	Metal film: 220 ohms + or - 5%, 200 VDCW, 1/8 w.
R214	19B800607P331	Metal film: 330 ohms + or - 5%, 200 VDCW, 1/8 w.
R215	19B800607P822	Metal film: 8.2K ohms + or - 5%, 200 VDCW, 1/8 w.
R216	19B800607P222	Metal film: 2.2K ohms + or - 5%, 200 VDCW, 1/8 w.
R217	19B800607P101	Metal film: 100 ohms + or - 5%, 200 VDCW, 1/8 w.
R218	19B800607P102	Metal film: 1K ohms + or - 5%, 200 VDCW, 1/8 w.
R219	19B800607P103	Metal film: 10K ohms + or - 5%, 200 VDCW, 1/8 w.
R220	19B800607P274	Metal film: 270K ohms + or - 5%, 200 VDCW, 1/8 w.
R221	19B800607P104	Metal film: 100K ohms + or - 5%, 200 VDCW, 1/8 w.
R222	19B800607P333	Metal film: 33K ohms + or - 5%, 200 VDCW, 1/8 w.
R223	19B800607P564	Metal film: 560K ohms + or - 5%, 200 VDCW, 1/8 w.
R224	19B800607P472	Metal film: 4.7K ohms + or - 5%, 200 VDCW, 1/8 w.
R225	19B800607P272	Metal film: 2.7K ohms + or - 5%, 200 VDCW, 1/8 w.
R226	19B800779P4	Variable: 1K ohms + or -25%, 100VDCW, .3 w.
R227	19B801251P473	Metal film: 47K ohms + or -5%, 1/10 w.
R228	19B800607P223	Metal film: 22K ohms + or - 5%, 200 VDCW, 1/8 w.
R229	19B800607P823	Metal film: 82K ohms + or -5%, 200 VDCW, 1/8 w.
R230	19B800607P332	Metal film: 3.3K ohms + or - 5%, 200 VDCW, 1/8 w.
R231	19B800607P472	Metal film: 4.7K ohms + or - 5%, 200 VDCW, 1/8 w.
R232	19B800607P103	Metal film: 10K ohms + or - 5%, 200 VDCW, 1/8 w.
R233	19B800607P332	Metal film: 3.3K ohms + or - 5%, 200 VDCW, 1/8 w.
R234	19B800607P472	Metal film: 4.7K ohms + or - 5%, 200 VDCW, 1/8 w.
R235	19B800607P683	Metal film: 68K ohms + or - 5%, 200 VDCW, 1/8 w.
R236	19B800607P471	Metal film: 470 ohms + or - 5%, 200 VDCW, 1/8 w.
R237 thru R239	19B800607P103	Metal film: 10K ohms + or - 5%, 200 VDCW, 1/8 w.
R240	19B801251P154	Metal film: 150K ohms + or -5%, 1/10 w.
R241 and R242	19B800607P154	Metal film: 150K ohms + or -5%, 200 VDCW, 1/8 w.
R243	19A702931P137	Metal film: 237 ohms + or -1%, 200 VDCW, 1/8 w.
R244	19A702931P213	Metal film: 1330 ohms + or -1%, 200 VDCW, 1/8 w.
R245 and R246	19B800607P272	Metal film: 2.7K ohms + or - 5%, 200 VDCW, 1/8 w.
R247	19B800607P271	Metal film: 270 ohms + or - 5%, 200 VDCW, 1/8 w.
R248	19B800607P472	Metal film: 4.7K ohms + or - 5%, 200 VDCW, 1/8 w.
R249	19B800607P1	Metal Film: 0 ohms (50 Milli-ohms Max), 1/8 w.
R403	19B800607P562	Metal film: 5.6K ohms + or - 5%, 200 VDCW, 1/8 w.
R404	19B800607P821	Metal film: 820 ohms + or - 5%, 200 VDCW, 1/8 w.
R405	19B800607P151	Metal film: 150 ohms + or - 5%, 200 VDCW, 1/8 w.
R406	19B801251P472	Metal film: 4.7K ohms + or -5%, 1/10 w.
R408	19B800607P153	Metal film: 15K ohms + or - 5%, 200 VDCW, 1/8 w.
R501	19B800607P181	Metal film: 180 ohms + or - 5%, 200 VDCW, 1/8 w.
R502	19B800607P270	Metal film: 27 ohms + or - 5%, 200 VDCW, 1/8 w.
R503	19B800607P822	Metal film: 8.2K ohms + or - 5%, 200 VDCW, 1/8 w.
R504	19B800607P270	Metal film: 27 ohms + or - 5%, 200 VDCW, 1/8 w.
R505	19B800607P683	Metal film: 68K ohms + or - 5%, 200 VDCW, 1/8 w.
R506	19B800607P823	Metal film: 82K ohms + or -5%, 200 VDCW, 1/8 w.
R507	19B800607P183	Metal film: 18K ohms + or - 5%, 200 VDCW, 1/8 w.
R508	19B800607P101	Metal film: 100 ohms + or - 5%, 200 VDCW, 1/8 w.
R509	19B800607P272	Metal film: 2.7K ohms + or - 5%, 200 VDCW, 1/8 w.
R510	19B800607P270	Metal film: 27 ohms + or - 5%, 200 VDCW, 1/8 w.
R511	19B800607P473	Metal film: 47K ohms + or - 5%, 200 VDCW, 1/8 w.
R512	19B800607P822	Metal film: 8.2K ohms + or - 5%, 200 VDCW, 1/8 w.
R513	19B800779P4	Variable: 1K ohms + or -25%, 100VDCW, .3 w.
R514	19B800607P103	Metal film: 10K ohms + or - 5%, 200 VDCW, 1/8 w.
R515	19B800607P821	Metal film: 820 ohms + or - 5%, 200 VDCW, 1/8 w.
		- - - - - - - - - INTEGRATED CIRCUITS - - - - - - -
U101	19A705645P1	Power Amplifier Module. (Not included with RF Board 19D902123G3).
U102		Part of Heat Sink Assembly 19B801378G3.
U103	19A701789P2	Linear: Dual Op Amp; sim to LM358.
U201	19A704902P1	VCO: DUAL BAND: 806-825 MHz, 851-870 MHz; sim to: ALPS URAA.
U202	19A700029P44	Digital: BILATERAL SWITCH.
U203	19A704971P1	Linear: Positive 5 Volt Regulator; sim to Motorola MC78L05ACP.
U204	19B801351P3	Crystal Oscillator; 12.80 MHz + or -3 PPM.
U205	19A704740P1	Digital: Divider; sim to Mitsubishi M54475P.
U206	19B800902P4	Digital: Synthesizer, CMOS Serial Input.
U207	19A701999P4	Linear, (Positive Voltage Regulator): sim to LM317LZ.
U208	19A704971P1	Linear: Positive 5 Volt Regulator; sim to Motorola MC78L05ACP.
U501	19A704619P1	Linear: Osc/Mixer/IF/Det/Amp; sim to MC3361AP.
U502	19A704073P2	Linear: 8 Volt Regulator; sim to MC78L08CP.
		- - - - - - - - - - - - - CABLES - - - - - - - - - - -
W101 and W102		Part of Printed Wire Board 19D902309P1.
		- - - - - - - - - - - - - CRYSTALS - - - - - - - - - -
Y501	19A705376P7	Crystal unit, fixed frequency: 44.545 MHz.
		- - - - - - - - - - - - - FILTER - - - - - - - - - - -
Z401 and Z402	19A704888P1	Bandpass Filter, 851-871 MHz; sim to: Murata DFC3R861P020BTD.
Z403	19B801025P2	Balanced Mixer. sim to Mini-Circuits SBL-1X.
Z501	19A705328P2	Crystal filter Monolithic: sim to Toyocom 45E2B2.
Z502		Part of Z501.
Z503	19B801021P2	Bandpass filter: 455 kHz + or -1.5; sim to Murata CFW-455E.
		HEAT SINK ASSEMBLY **19B801378G3**
		- - - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q101	19A116742P2	Silicon, NPN.
		- - - - - - - INTEGRATED CIRCUITS - - - - - - -
U102	19A134717P3	Linear: POSITIVE VOLTAGE REGULATOR; sim to uA 7808U.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	19A705469P1	Insulator plate. (Part of 19B801378G3 Heat Sink Assembly - Item 3).
	N402P5B6	Washer: narrow, steel. (Part of 19B801378G3 Heat Sink Assembly - Item 4).
	N404P11B6	Lockwasher; internal: No. 4. (Part of 19B801378G3 Heat Sink Assembly - Item 5).
	N80P9005B6	Machine screw: pan head, steel. (Part of 19B801378G3 Heat Sink Assembly - Item 6).
	19A700068P1	Insulator, bushing. (Part of 19B801378G3 Heat Sink Assembly - Item 7).
	19B801377G3	Heat Sink. (Part of 19B801378G3 Heat Sink Assembly - Item 11).
	19B801490P1	Ground Strap. (Part of PWB 19D902309P1 - Item 6).
	19A702364P106	Machine screw: TORX Drive, No. M2 - 0.4 x 6. (Part of PWB 19D902309P1 - Item 7).
	19B801566P1	Shield. (Part of PWB 19D902309P1 - Item 9).

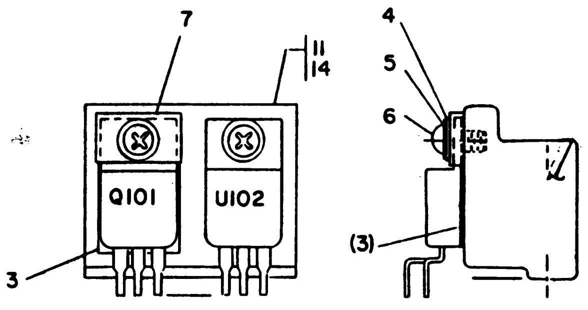
PRODUCTION CHANGES

Changes in the equipment to improve performance 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 the descriptions of parts affected by these revisions.

REV. A - RF BOARD 19D902123G3

REV. B - RF BOARD 19D902123G3

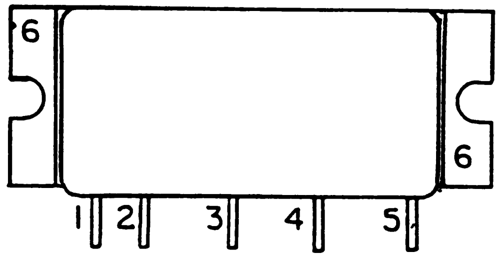
Incorporated into initial shipment.



RC-7333

MADE FROM 19B801378 SH.2 REV. 4

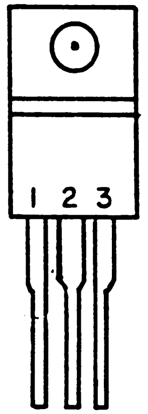
POWER AMPLIFIER U101
19A705645P1



1. P_{in}
2. V_{CC1} - 1ST STAGE
3. V_{CC} - 2ND STAGE
4. V_{CC} - OUTPUT STAGE
5. P_{out}
6. FIN-GROUND

RC-7346

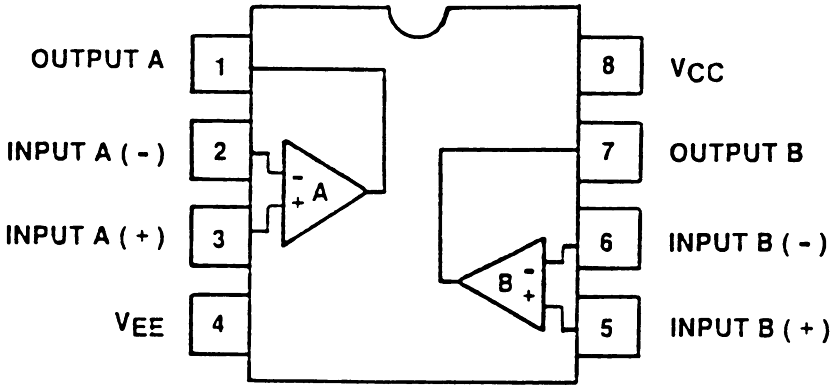
VOLTAGE REGULATOR U102
19A134717P3



1. INPUT
2. OUTPUT
3. COMMON

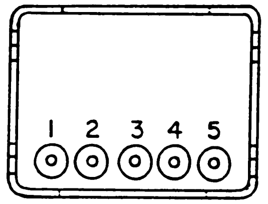
RC-8044A

OPERATIONAL AMPLIFIER U103
19A701789P2



RC-5750

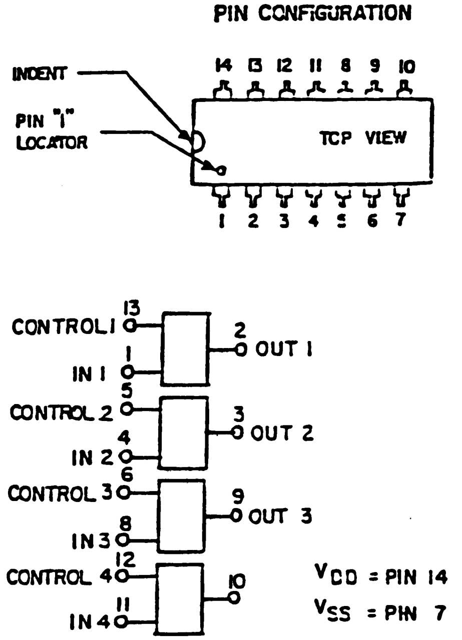
VCO U201
19A704902P1



PIN	FUNCTION
1	SWITCH
2	MOD
3	CONTROL
4	Vcc
5	OUTPUT

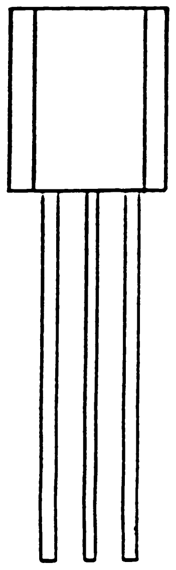
RC-8008

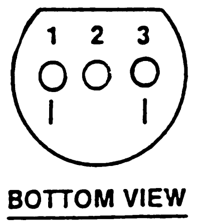
BILATERAL SWITCH U202
19A700029P44



RC-5842

VOLTAGE REGULATOR U203
19A704971P1



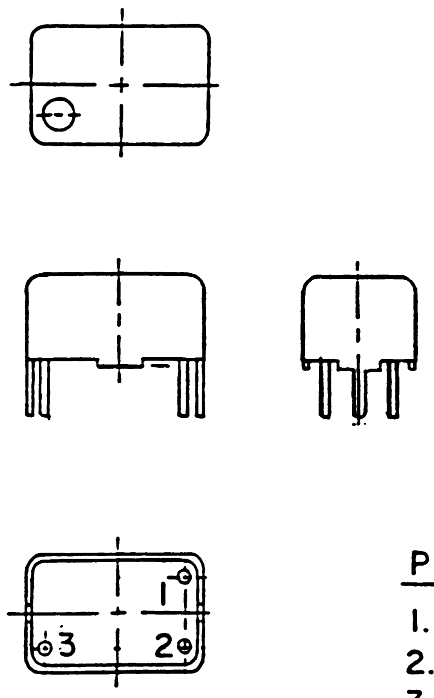


PIN INDENTIFICATION

PIN 1. OUTPUT
PIN 2. GROUND
PIN 3. INPUT

RC-5854B

CRYSTAL OSCILLATOR U204
19B801351P7

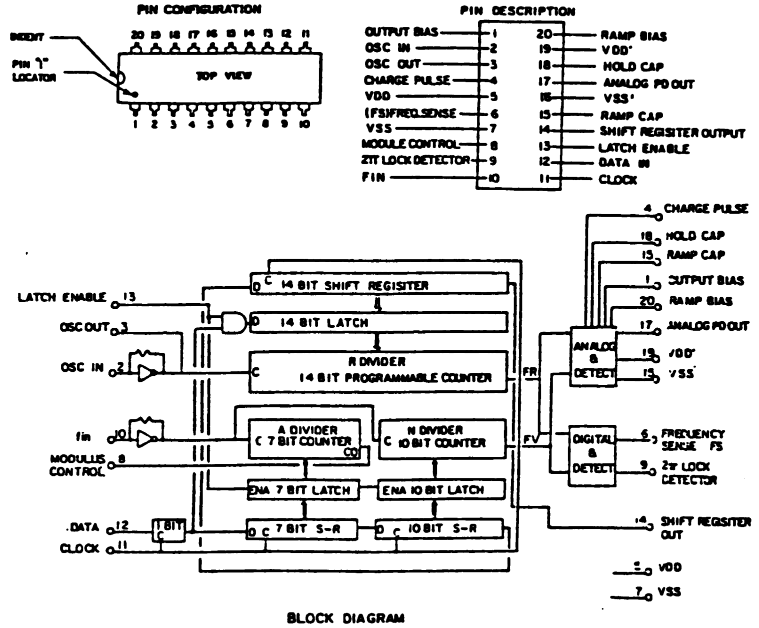


PIN CONNECTIONS

1. COMMON AND CASE
2. OUTPUT
3. + V_{CC}

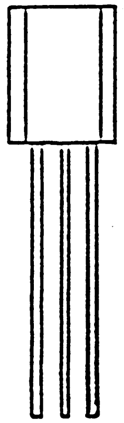
RC-7286B

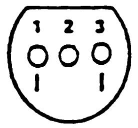
SYNTHESIZER U206
19B800902P4



RC-5843

VOLTAGE REGULATOR U207
19A701999P4





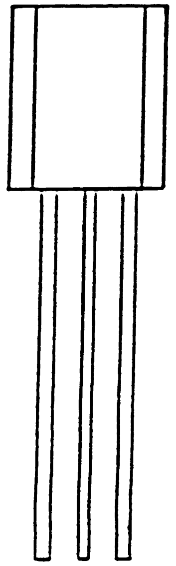
BOTTOM VIEW

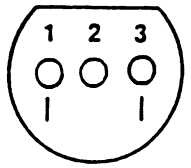
PIN INDENTIFICATION

PIN 1 ADJUST
PIN 2 OUTPUT
PIN 3 INPUT

RC-5846B

VOLTAGE REGULATOR U208
19A704971P1





BOTTOM VIEW

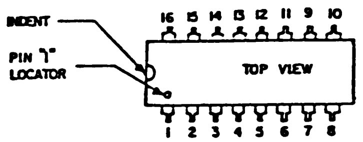
PIN INDENTIFICATION

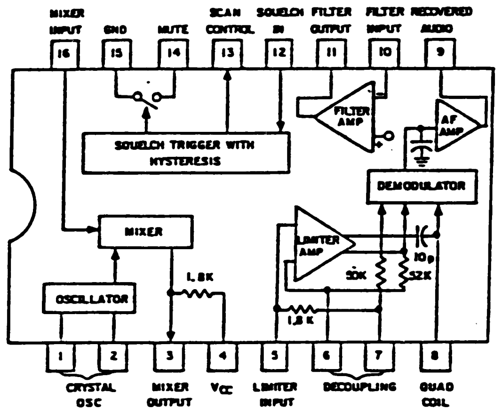
PIN 1. OUTPUT
PIN 2. GROUND
PIN 3. INPUT

RC-5854B

IF AMPLIFIER/DETECTOR U501
19A704619P1

PIN CONFIGURATION

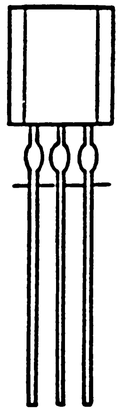


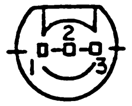


BLOCK DIAGRAM

RC-7105A

VOLTAGE REGULATOR U502
19A704073P2





BOTTOM VIEW

PIN 1 - OUTPUT
PIN 2 - GROUND
PIN 3 - INPUT

RC-5289A