MAINTENANCE MANUAL
800 MHz REAR COVER ASSEMBLY
19C337097G8, G12

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DESCRIPTION

Rear Cover Assemblies 19C337097G8 and G12 consists of the 800 MHz RF Board, a die-cast aluminum case and the associated hardware. The RF Board assembly includes soldered-in modules, integrated circuits and surface-mounted components. This double-sided printed-wire board is surrounded by a die-cast aluminum casting and mounted in the rear cover case. This arrangement provides excellent RF shielding between the various circuits and the outside environment.

CIRCUIT ANALYSIS

The RF Board is electrically connected to the Control Board by two (2) single-in-line connectors. Power supplies delivered to the RF Board from the Control Board located in the Front Cover Assembly include the 7.5 Vdc (nominal) battery power supply and a regulated 5.4 Vdc supply.

Logic inputs from the Control Board include serial synthesizer loading data, a band-switch line used by the VCO, and a switched 5.4 Vdc source to enable the transmitter and disable the receiver circuits. Other inputs to the board include the RF signal when in receive mode and both the transmit modulating audio and the transmitter power level set line when in transmit mode.

The RF Board also has several outputs. These outputs to the Control Board include the demodulated audio when the radio is receiving and a synthesizer lock status line which is active in both transmit and receive modes. During transmitter operation RF power appears at the top antenna jack or the UDC jack if an appropriate adapter is inserted.

ANTENNA SWITCH AND LOW-PASS FILTER

The antenna switch located at the top of the RF Board selects the top-mounted antenna or a UDC antenna option. A spring-loaded contact in the switch normally connects the Low-Pass Filter to the top mounted antenna. When a UDC accessory (or an RF test plug) that utilizes the UDC antenna jack is connected to the radio, the RF is routed to and from the UDC antenna jack instead of the top jack. Connecting an accessory to the UDC jack pushes the small gold plated center pin inside the unit and thus switches the filter from the top antenna jack to the UDC antenna jack.

PARTS LIST

SYMBOL	PART NUMBER	DESCRIPTION
R204	19B801251P105	Metal film: 1 ohms ±5%, 1/10 w.
R205	19B801251P562	Metal film: 5.6 ohms ±5%, 1/10 w.
R207	19B800607P121	Metal film: 120 ohms ±5%, 1/8 w.
R208	19B801251P102	Metal film: 1K ohms ±5%, 1/10 w.
R301	19B801251P272	Metal film: 2.7K ohms ±5%, 1/10 w.
		— — — — SWITCHES — — — —
SW1A	19B235072P1	Spring, Antenna Switch.
SW1B	19B235071P1	Spring, Antenna Switch.
SW1C	19C337027P1	Housing, Antenna Switch.
		— — INTEGRATED CIRCUITS —
U1	RYTUA90107/1	Module: 806-870 MHz PA, MOS FET.
U2	19A149809P1	Module: Antenna T/R Switch; sim to MDOO3.
U3	19B800902P4	Digital: Synthesizer, CMOS Serial Input.
U4	19B801351P17	Module: Reference Oscillator, 13.2 MHz 1.5 PPM..
U5	19A149810P1	Module: Low-Pass Filter; sim to LP915A1.
U7	19A705706P3	Module: 800 MHz Mixer; sim to TSM-211.
U8	19A705985P1	Prescaler: /128, /129; sim to MB 501SL.
U10	19C851857G1	Module: RF Amplifier.
U11	19C336876G1	Module: 45.0125 MHz IF Amplifier.
U14	19B801642G1	Module: Receiver Back-End.
		— — — — CRYSTALS — — — —
Y2	19C852149G1	Module: 800 MHz VCO.
Y3	19A705376P7	Crystal, Fixed: 45.4675 MHz ±10 PPM/°C.
		— RF BOARD MISCELLANEOUS
		(See Drawing 188D5111)
5	19A701748P1	Tape. (Bonds C58 to U3).
6	19A149008P1	Pad. (Supports Y3).
7	19A149009P1	Pad. (Supports Y3).
8	19A121175P46	Insulator, plate. (Used near Q4, U10 and U14).
9	19A705701P104	Screw, Machine: Torx, Pan Head; M2 x 4. (Secures RF Board to Eggcrate Casting).
10	19D903562P1	Eggcrate Casting.
11	19A705853P1	Screw, Thread Forming. (Secures SW1).
12	19A705701P206	Screw, Machine: Torx, Pan Head; M2.5 x 6. (Secures PA Module and Support).
13	19B234990P1	Support, PA Module.
18	19B235901P1	Groom Clip.

SYMBOL	PART NUMBER	DESCRIPTION
		REAR COVER ASSEMBLY MISCELLANEOUS
		(See Drawing 19C337097)
2	19A115983P16	O-Ring, Rubber; .370" ID. (Used under Antenna Insert).
3	19B801618P1	Insert, Antenna.
4	19B235133P1	Connector, UDC RF.
7	19A705701P114	Screw, Machine: Torx, Pan Head; M2 x 14. (Secures RF Board to Rear Cover).
13	19B801598G2	Cover, Rear. (See separate Parts List for breakdown).
15	19A701267P2	Pad.
17	19B235911P1	Pad. (Used in G8 near C58).
18	19B235911P2	Pad. (Used in G8 on U4).
20	19B235901P1	Clip, Ground.
22	19A121175P49	Insulator. (Used in G8 on Y2).

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Low-Pass Filter U5 is a printed LC module which rejects unwanted harmonics. This module has a maximum passband insertion loss of 0.5 dB and a rejection of more than 30 dB in the stopband. It is a three-section elliptic network and has input and output impedances of 50 ohms.

TRANSMIT/RECEIVE SWITCH

Transmit/Receive Switch module U2 switches Low-Pass Filter U5 between the transmitter's output and the receiver's input during transmit and receive modes respectively. Pin diodes inside U2 are biased by the TX 5.4 V line to route the RF properly.

During transmitter operation, with TX 5.4 V high, RF enters the module at pin 7 and passes to the Low-Pass Filter via antenna pin 5.

In receive mode, with TX 5.4 V low, RF from the Low-Pass Filter enters the module from antenna pin 5 and is routed to the receiver's front-end via U2 pin 2.

TRANSMITTER

The 806 - 870 MHz transmitter utilizes two (2) soldered-in integrated modules to amplify VCO power: the Exciter and Power Amplifier. A third module, the Power Controller, regulates the RF output power by sampling the power output of the PA and controlling the gain of the Exciter and PA modules accordingly.

Four (4) conditions must be met to enable a transmission. The synthesizer must be loaded with proper frequency data from the Control Board, the TX 5.4 V line on J101 pin 5 must be high, and a dc voltage corresponding to the programmed RF power level must be present on the POWER SET line, J101 pin 1. The modulating signal must also be present on the TX AUDIO line, J102 pin 1.

VCO Transmitter Buffer Q6

When transmitting, the VCO's output pin 3 is in the 800 MHz range at approximately 0 dBm. This signal is applied to VCO Transmitter Buffer Q6 by a resistive attenuator network and a matching network formed by C12, C45 and R1O1. Diode D1 provides temperature compensation for Q6.

Transistor Q6 is supplied with dc power from the TX 5.4 V line during transmitter operation. This common-emitter buffer provides constant VCO output loading and amplifies the power before it is applied to the Exciter module.

Exciter Module U9

Exciter module U9 provides approximately 23 dB of gain at full RF output power. Circuitry in this two-stage module includes an integrated circuit RF amplifier and an FET output stage. Injection is applied to pin 13 via attenuator/matching network R26 - R28. The module's output is coupled to the Power Amplifier for further amplification.

Transistor Q4 on the RF Board supplies 7.5 Vdc (±20%) battery power to the Exciter and PA modules from the 7.5 V BATT line, J102 pin 2. This pass transistor is controlled by the Power Controller module. The Power Controller increases Q4's base current (and thus its collector voltage) to increase the gain of the Exciter and PA modules. Collector voltage levels are approximately 3.5 Vdc in the low-power mode and 5.5 Vdc in the high-power mode. The dc supply is decoupled by capacitors C29, C32 and C103. C100 slows the turn-on time of the transmitter circuit.

Power Amplifier Module U1

Power Amplifier module U1 is a three-stage device physically mounted to the side "eggcrate" casting for heat dissipation. This module provides 16 dB of gain (minimum) for the transmitter when the radio is in high-power transmit mode. Injection from the Exciter at approximately 20 dBm is applied to pin 1 and the RF output appears on pin 5.

The 7.5 V BATT line supplies the PA module with 7.5 Vdc (±20%) at U1 pins 3 and 4. Capacitors C28, C30, C33 and C34 provide decoupling. Capacitors C29 and C32 decouple the power controlled source from Q4 and deliver it to U1 pin 2.

NOTE

Outline and schematic diagrams for the modules are shown in the Service Section. The modules are not serviceable; schematics and outlines are given as a troubleshooting aid.

Power Controller Module A2

Power Controller module A2 regulates RF output power according to the programmed power level. The RF from the PA module enters A2 at pin 1 and exits via pin 6. Inside the module a microstrip directional-coupler samples the RF power. This signal is then rectified, filtered, and compared to the POWER SET line from the Control Board; an error signal is produced which controls the stage gains of the Exciter and PA modules. This feedback method of power control maintains constant RF output power as set by the digital-to-analog converter circuit on the Control Board.

The POWER SET dc level at J101 pin 1 is decoupled by R45 and C3 and applied to the Power Controller at pin 12. The dc voltage levels are approximately 1.8 Vdc in the low-power mode and 2.9 Vdc in the high-power mode. Operating power for this module is supplied from the TX 5.4 V line when the radio is transmitting.

RECEIVER

The 851 - 870 MHz dual-conversion superheterodyne receiver utilizes low-side injection at the first mixer. High-IF signal is 45.0125 MHz. Second mixer high-side injection from a crystal oscillator produces the low-IF signal of 455 kHz. A front-end preselector is employed. This arrangement produces excellent sensitivity, selectivity and image rejection.

Preselector Circuit

The receiver's preselector circuit consists of two (2) non-tunable dielectric-resonator filters and RF Amplifier module U10.

Both filters are identical and have insertion losses of less than 2.2 dB in the 851 - 871 MHz passband with a minimum stopband attenuation of 35 dB. The filters have input and output impedances of 50 ohms.

When the radio is receiving, RF from the T/R Switch enters FLA1 at pin 1 and is applied to the RF Amplifier module via pin 2. RF Amplifier module U10 provides 10 dB of gain and its output is applied to the second filter via pin 4. Second filter FLA2 passes the amplified RF to the mixer. Supply power for U10 is applied to U10 pin 5 through R35. This 7.5 Vdc (nominal) source is directly from the battery supply.

VCO Receiver Buffer Q2

The VCO's output on pin 3 is applied to Receiver Buffer Q2 via a resistive attenuator network and C47. This common-emitter buffer stage provides constant VCO output loading and amplifies the signal from the VCO to supply First Mixer U7 with low-side injection. Transistor Q2 is supplied with dc power from the 7.5 V BATT line via R32. Diode D2 provides temperature compensation for the stage.

First Mixer U7, High-IF Amp U11 Crystal Filter FLB1 And Buffer Q1

The amplified received RF signal (851 - 870 MHz) from the preselector circuit is applied pin 1 of First Mixer U7. Buffered VCO injection (806 - 825 MHz) from Q2 is applied U7 pin 8. The converted signal appears on pins 3 and 4. C107 and L102 couple the converted signal to the High-IF Amplifier module. These components form a series-tuned circuit which is resonant at the intermediate frequency.

High-IF Amplifier module U11 is a single transistor common-base non-tunable transistor amplifier circuit tuned to 45.0125 MHz. The IF input is U11 pin 2. This module has input and output impedances of 50 ohms and provides 17 dB of gain. The amplified signal is then applied to FLB1.

Crystal Filter FLB1 has a 3 dB bandwidth of ±7.5 kHz at the intermediate frequency. The signal from the High-IF Amp is applied to pin 2. The LC filter network (L6, C21//C22) at the output (FLB1 pin 1) is tuned to the intermediate frequency.

The High-IF Buffer circuit, made-up of Q1 and associated components, is a common-base non-tunable amplifier stage. This stage buffers and matches the FLB1's output to the input of the back-end circuit.

Back-End Circuit

The back-end circuit performs second conversion and demodulation of the IF signal. Capacitor C17 couples the 45.0125 MHz IF signal from Q1 to U14 pin 4. Module U14 houses a 16-pin IC and two (2) series-connected 455 kHz bandpass filters. In addition to the second local oscillator and mixer, this IC also contains the limiter, discriminator and the first (and only) stage of audio amplification on the RF Board.

The second LO frequency is set to 45.4675 MHz by crystal Y3. L13 provides fine tuning frequency adjustment for this crystal. Inductor L14 is the quadrature detector adjustment. Demodulated audio (and data) appears on U14 pin 2 and is routed to the Control Board by J101 pin 4.

SYNTHESIZER

The microprocessor-controlled phased-locked loop (PLL) frequency synthesizer produces exciter drive for the transmitter and first mixer injection for the receiver. Primary components of the circuit include a stable 1.5 ppm reference oscillator, the voltage-controlled oscillator (VCO), a dual-modulus prescaler chip and a serially-loaded synthesizer chip. A PLL filter module integrates the analog error signal from the synthesizer chip before it is passed to the VCO.

Reference Oscillator Module U4

Module U4 produces a 13.2 MHz crystal reference frequency for the synthesizer chip. Capacitor C8 couples this reference signal to the synthesizer chip for phase comparison to the divided VCO. During a transmission, TX AUDIO (the audio or data signal) is ac coupled to U4 pin 3 via C11 to FM the 13.2 MHz signal. Resistors R42 and R43 provide the necessary attenuation of the audio from J102 pin 1. This modulating signal is also coupled to the VCO.

Regulated and decoupled power from A1 pin 9 is applied to pin 1 by R4 and R7.

The Reference Oscillator has a small opening on the top which provides access to an internal frequency adjustment. This oscillator is highly stable and is factory adjusted. It should not normally need realignment in the field.

Voltage-Controlled Oscillator Module

The VCO module (Y2 or Y4) is the largest and most complex module on the RF Board. It generates the transmitter's drive and receiver's first LO injection. RF output on pin 3 is applied to the prescaler stage and the TX and RX buffers. The output frequency is controlled by the loop-filter tuning voltage on pin 1.

During receive operation, the VCO is locked at 45.0125 MHz less than the receive frequency.

During transmit operation, the VCO is locked to the radio's RF output frequency. The modulating signal is applied to pin 2 of the VCO. Potentiometer R5 sets the modulation level into the VCO from the TX AUDIO line.

Transistor Q5 inverts the BAND SWITCH logic level from J102 pin 3. This inverted and decoupled signal is applied to the VCO's band switch input on pin 5. BAND SWITCH (J102 pin 3) is low for radio frequencies of 806 - 825 MHz and high for frequencies of 851 - 870 MHz.

Prescaler Stage Q3 And U8

VCO drive is coupled to buffer Q3 by R100 and C48. This common-emitter stage prevents the prescaler IC from loading of the VCO. Capacitor C52 couples the buffered signal to the prescaler IC and C24 decouples the supply.

Dual-modulus Prescaler U8 divides the VCO signal by 128 or 129 according to the logic level on modulus control input (MC, pin 6); the chip divides-by 128 when MC is high. Prescaler modulus is controlled by the synthesizer chip.

Synthesizer Chip U3

Integrated circuit U3 contains the reference frequency divider, variable frequency dividers and phase detectors for the synthesizer circuitry. This IC has an analog and a digital phase detector. The analog detector is incorporated in the main PLL and the digital detector's output indicates lock status to the Control Board. The reference and variable frequency dividers are serially loaded by the clocked serial lines from the I/O Microcontroller on the Control Board. U3 controls the dividing factor of the prescaler by its modulus control output on pin 8.

Serial data from the microprocessor is shifted into U3 by the DATA line, J102 pin 10. Clocking is provided on the CLOCK line, J102 pin 11, and the data is latched with the ENABLE pulse on J102 pin 9. When U3 pin 13 (LE) goes high, data is transferred from U3's internal shift registers to its dividers; low inhibits the internal transfers. The frequency tuning error signal from the analog detector appears on AN OUT, U3 pin 17.

The lock-detect output on pin 9 is sent to the Control Board via J102 pin 8. The microprocessor checks this output to prevent transmission when the VCO is not locked. During an unlocked condition, LOCK is low or pulsing.

Voltage Regulator / Loop Filter A1

Module A1 has two functions. It provides regulated 6.0 Vdc supplies to the VCO, Reference Oscillator, Synthesizer chip, Prescaler IC and back-end circuits. This module also provides active filtering of the analog error signal from the Synthesizer chip before it is applied to the VCO.

Transistor Q201 supplies a 6.0 Vdc reference voltage to A1 pin 7. This is accomplished by biasing the base to 5.4 Vdc and pulling the emitter to 6.0 Vdc using R203. This source is decoupled by C202. A linear regulator circuit in A1 samples the 6.0 Vdc source at pin 7. Using the battery power source at pin 11, this regulator supplies a well-regulated and filtered 6.0 Vdc power supply to the synthesizer and receiver circuits. A1 pin 9 supplies the synthesizer circuits with 6.0 Vdc. A1 pin 10 supplies the back-end circuits with 6.0 Vdc.

The AN OUT tuning voltage from the synthesizer chip is applied to A1 pin 6. An active filter stage in A1 integrates this error signal and the output is applied to the VCO via A1 pin 1. Pin 4 is driven by the ENABLE line. When high, the response time of the active filter circuit is decreased. This allows the synthesizer to quickly lock on frequency when new data is loaded into U3. Capacitor C58 is the primary integrating capacitor. Capacitors C55 and C57 provide further integration of the tuning error signal.

REAR COVER
19B801598G2

ISSUE 2

SYMBOL	PART NUMBER	DESCRIPTION
		— — — MISCELLANEOUS — — —
2	19B235075P2	Plate, Receptacle.
3	N327P9009Y6	Rivet.
4	19D902730P1	Gasket, Outer Seal.
5	19A705728P1	Screw, Machine: Torx T6 Oval Head; M2.6 x 14. (Secures Front and Rear Cover Assemblies).
6	19A705728P2	Screw, Machine: Torx T6 Oval Head; M2.6 x 23. (Secures Front and Rear Cover Assemblies).
7	19A701365P7	Washer. (Used with above Screws).
9	19C851743P2	Cover.

* COMPONENTS, ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

800 MHz REAR COVER ASSEMBLY
19C337097G8 EARLIER VCO
19C337097G12 LATER VCO
ISSUE 3

SYMBOL	PART NUMBER	DESCRIPTION
		RF BOARD 19D902395G1(Used in G8) **RF BOARD 19D902395G3 (Used in G8)** **RF BOARD 19D902395G5 (Used in G12)**
		— — — — — MODULES— — — — —
A1 *	19C852056G1	PLL Low-Pass Filter/Regulator Module.
A2	19C851922G1	Power Controller Module.
		— — — — CAPACITORS — — —
C2	19A702236P52	Ceramic: 120 pF, ±5%, 50 VDCW.
C3 and C4	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.
C6	19A702052P1	Ceramic: 220 pF ±10%, 50 VDCW.
C7	19A702052P8	Ceramic: 3300 pF ±10%, 50 VDCW.
C8	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.
C10	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.
C11	19A705205P6	Tantalum: 10 µF, 16 VDCW; sim to Sprague 293D. (Used in G1).
C11	19A705205P222	Tantalum: 1 µF, 50 VDCW. (Used in G3 and G5).
C12	19A702236P52	Ceramic: 120 pF, ±5%, 50 VDCW.
C13	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C14 and C15		19A702236P30Ceramic: 15 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C16 thru C18	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.
C19	19A705205P2	Tantalum: 1 µF, 16 VDCW; sim to Sprague 293D.
C20	19A700227P20	Ceramic: 5.6 pF ±5%, 100 VDCW.
C21	19A702236P25	Ceramic: 10 pF ±.5 pF, 50 VDCW, temp coef 0 ±30 PPM/°C.
C22	19A702236P52	Ceramic: 120 pF, ±5%, 50 VDCW.
C23 and C24	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.
C25	19A705205P2	Tantalum: 1 µF, 16 VDCW; sim to Sprague 293D.
C26	19A702052P3	Ceramic: 470 pF ±10%, 50 VDCW.
C28	19A705205P2	Tantalum: 1 µF, 16 VDCW; sim to Sprague 293D.
C29 and C30	19A705205P6	Tantalum: 10 µF, 16 VDCW; sim to Sprague 293D.
C32 thru C36	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C41	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.
C42	19A705205P13	Tantalum: 4.7 µF, 10 VDCW; sim to Sprague 293D.
C43	19A702236P52	Ceramic: 120 pF, ±5%, 50 VDCW.
C44	19A702236P25	Ceramic: 10 pF ±.5 pF, 50 VDCW, temp coef 0±+30 PPM/°C.
C45	19A702236P11	Ceramic: 2.7 pF ±0.25 pF, 50 VDCW, temp coef 0 ±30 PPM/°C.
C47	19A702236P52	Ceramic: 120 pF, ±5%, 50 VDCW.
C48	19A702236P25	Ceramic: 10 pF ±.5 pF, 50 VDCW, temp coef 0 ±30 PPM/°C.
C49	19A705205P2	Tantalum: 1 uF, 16 VDCW; sim to Sprague 293D.
C50 and C51	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C52	19A702236P25	Ceramic: 10 pF ±.5 pF, 50 VDCW, temp coef 0 ±30 PPM/°C.
C53 and C54	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C55	19A702052P3	Ceramic: 470 pF ±10%, 50 VDCW.
C56	19A705205P13	Tantalum: 4.7 µF, 10 VDCW; sim to Sprague 293D.
C57	19A703902P3	Metal: 0.047 uF ±10%, 50 VDCW.
C58	19A703902P4	Metal: 0.56 uF ±10%, 50 VDCW.
C59	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.
C60	19A702236P25	Ceramic: 10 pF ±.5 pF, 50 VDCW, temp coef 0 ±30 PPM/°C.
C100	19A705205P2	Tantalum: 1 µF, 16 VDCW; sim to Sprague 293D.
C101	19A702236P15	Ceramic: 3.9 pF ±.25 pF, 50 VDCW, temp coef 0 ±30 PPM/°C.
C103	19A705205P13	Tantalum: 4.7 µF, 10 VDCW; sim to Sprague 293D.
C104	19A702236P52	Ceramic: 120 pF, ±5%, 50 VDCW.
C104 *	19A702236P23	Ceramic: 8.2 pF, ±0.5%, 50 VDCW temp coef 0 ±60 PPM/°C. (Used in G5).
C105	19A705205P13	Tantalum: 4.7 µF, 10 VDCW; sim to Sprague 293D.
C106	19A702236P42	Ceramic: 47 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C107	19A702236P36	Ceramic: 27 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C108	19A702236P44	Ceramic: 56 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C109	19A705205P13	Tantalum: 4.7 µF, 10 VDCW; sim to Sprague 293D.
C201	19A702236P15	Ceramic: 3.9 pF ±.25 pF, 50 VDCW, temp coef 0 ±30 PPM/°C.
C202	19A705205P13	Tantalum: 4.7 µF, 10 VDCW; sim to Sprague 293D.
C203	19A702236P52	Ceramic: 120 pF, ±5%, 50 VDCW.
C204 and C205	19A702236P42	Ceramic: 47 pF ±5%, 50 VDCW, temp coef 0 +30 PPM/° C.
C207 thru C209	19A702236P42	Ceramic: 47 pF ±5%, 50 VDCW, temp coef 0 +30 PPM/°C.
C210	19A702236P19	Ceramic: 5.6 pF ±.5 pF, 50 VDCW, temp coef 0 ±30 PPM/°C.
C211	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C212	19A705205P2	Tantalum: 1 µF, 16 VDCW; sim to Sprague 293D.
		— — — — — DIODES — — — —
D1 and D2	19A700155P2	Silicon: 100 mA, 35 PIV; sim to BAT 18.
D201	19A700155P2	Silicon: 100 mA, 35 PIV; sim to BAT 18.
D202	19A702525P2	Silicon, PIN: sim to MMBV3401.
		— — — — — FILTERS — — — —
FLA1 and FLA2	19A704888P1	Bandpass Filter, 851-871 MHz; sim to: Murata DFC3R861P020BTD.
FLB1	19A705328P5	Monolithic Crystal: 45.0125 MHz; sim to Toyocom 45E2BU.
		— — — — — JACKS — — — —
J101	19A149614P1	Connector: 5 sockets; sim to DuPont 69755-005.
J102	19A149614P2	Connector: 11 sockets; sim to DuPont 69755-011.
		— — — — INDUCTORS — — —
L5	19A705470P1	Coil, fixed: 10 nH; sim to Toko 380NB-10nM.
L6	19A705470P14	Coil, fixed: 0.12 µH; sim to Toko 380NB-R12M.
L12	19A705470P1	Coil, fixed: 10 nH; sim to Toko 380NB-10nM.
L13	19A703591P2	IF: sim to Toko America 332PN-T1016Z
L14	19A703591P1	IF: sim to Toko America P5SVLC-A291EL.
L100 and L101	19A705470P	1Coil, fixed: 10 nH; sim to Toko 380NB-10nM.
L102	19A705470P21	Coil, fixed: 0.47 µH; sim to Toko 380NB-R47M.
L103	19A705470P17	Coil, fixed: 0.22 µH; sim to Toko 380NB-R22M.
L201	19A705470P1	Coil, fixed: 10 nH; sim to Toko 380NB-10nM.
L301 *	344A4540P100	Inductor, chip: 10 nH ±5%.
		— — — — TRANSISTORS — — —
Q1	19A703654P2	Silicon, NPN: sim to Motorola MMBR901.
Q2 and Q3	19A704708P2	Silicon, NPN: sim to NEC 2SC3356.
Q4	19A149542P1	Silicon, PNP: sim to Motorola MJD32C-1.
Q5	19A700076P2	Silicon, NPN: sim to MMBT3904, low profile.
Q6	19A704708P2	Silicon, NPN: sim to NEC 2SC3356.
Q201	19A700059P2	Silicon, PNP: sim to MMBT3906, low profile.
		— — — — RESISTORS — — —
R	119B801251P104	Metal film: 100K ohms ±5%, 1/10 w.
R2	19B801251P222	Metal film: 2.2K ohms ±5%, 1/10 w.
R3	19B801251P102	Metal film: 1K ohms ±5%, 1/10 w.
R4	19B801251P100	Metal film:10 ohms ±5%, 1/10 w.
R5	19B800779P10	Variable: 10K ohms ±25%, 100 VDCW, .3 watt.
R6	19B801251P273	Metal film: 27K ohms ±5%, 1/10 w.
R7	19B801251P100	Metal film: 10 ohms ±5%, 1/10 w.
R8	19B801251P510	Metal film: 51 ohms ±5%, 1/10 w.
R10	19B801251P821	Metal film: 820 ohms ±5%, 1/10 w.
R11 and R12	19B801251P100	Metal film: 10 ohms ±5%, 1/10 w.
R13	19B801251P183	Metal film: 18K ohms ±5%, 1/10 w.
R14	19B801251P103	Metal film: 10K ohms ±5%, 1/10 w.
R15	19B801251P223	Metal film: 22K ohms ±5%, 1/10 w.
R16	19B801251P391	Metal film: 390 ohms ±5%, 1/10 w.
R17	19B801251P182	Metal film: 1.8K ohms ±5%, 1/10 w.
R18	19B801251P222	Metal film: 2.2K ohms ±5%, 1/10 w.
R19 and R20	19B801251P100	Metal film: 10 ohms ±5%, 1/10 w.
R21	19B801251P152	Metal film: 1.5K ohms ±5%, 1/10 w.
R22	19B801251P331	Metal film: 330 ohms ±5%, 1/10 w.
R23 and R24	19B801251P103	Metal film: 10K ohms ±5%, 1/10 w.
R25	19B801251P222	Metal film: 2.2K ohms ±5%, 1/10 w.
R26 and R27	19B801251P271	Metal film: 270 ohms ±5%, 1/10 w.
R28	19B801251P180	Metal film: 18 ohms ±5%, 1/10 w.
R29	19B800607P1	Metal film: Jumper.
R30	19B801251P103	Metal film: 10K ohms ±5%, 1/10 w.
R31	19B801251P562	Metal film: 5.6K ohms ±5%, 1/10 w.
R33	19B801251P750	Metal film: 75 ohms ±5%, 1/10 w.
R34 and R35	19B801251P100	Metal film: 10 ohms ±5%, 1/10 w.
R36 thru R38	19B801251P102	Metal film: 1K ohms ±5%, 1/10 w.
R39	19B801251P100	Metal film: 10 ohms ±5%, 1/10 w.
R40	19B801251P390	Metal film: 39 ohms ±5%, 1/10 w.
R41	19B801251P100	Metal film: 10 ohms ±5%, 1/10 w.
R42	19B801251P333	Metal film: 33K ohms ±5%, 1/10 w.
R43	19B801251P472	Metal film: 4.7K ohms ±5%, 1/10 w. (Used in G1).
R43	19B801251P562	Metal film: 5.6K ohms ±5%, 1/10 w. (Used in G3 and G5).
R44	19B801251P223	Metal film: 22K ohms ±5%, 1/10 w.
R45	19B801251P102	Metal film: 1K ohms ±5%, 1/10 w.
R46	19B801251P100	Metal film: 10 ohms ±5%, 1/10 w.
R47	19B801251P333	Metal film: 33K ohms ±5%, 1/10 w.
R48	19B801251P682	Metal film: 6.8K ohms ±5%, 1/10 w.
R50	19B801251P390	Metal film: 39 ohms ±5%, 1/10 w.
R52	19B801251P152	Metal film: 1.5K ohms ±5%, 1/10 w.
R53	19B801251P750	Metal film: 75 ohms ±5%, 1/10 w.
R100	19B801251P102	Metal film: 1K ohms ±5%, 1/10 w.
R101	19B800607P1	Metal film: Jumper.
R102	19B801251P472	Metal film: 4.7K ohms ±5%, 1/10 w.

* COMPONENTS, ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	PART NUMBER	DESCRIPTION
R105	19B800607P1	Metal film: Jumper.
R201	19B801251P104	Metal film: 100K ohms ±5%, 1/10 w.
R202	19B801251P153	Metal film: 15K ohms ±5%, 1/10 w.
R203	19B801251P472	Metal film: 4.7K ohms ±5%, 1/10 w.
R204	19B801251P181	Metal film: 180 ohms ±5%, 1/10 w. (Used in G1).
R204	19B801251P271	Metal film: 270 ohms ±5%, 1/10 w. (Used in G3 and G5).
R205	19B801251P181	Metal film: 180 ohms ±5%, 1/10 w. (Used in G1).
R205	19B801251P271	Metal film: 270 ohms ±5%, 1/10 w. (Used in G3 and G5).
R206	19B801251P330	Metal film: 33 ohms ±5%, 1/10 w. (Used in G1).
R206	19B801251P180	Metal film: 18 ohms ±5%, 1/10 w. (Used in G3 and G5).
R207	19B800607P121	Metal film: 120 ohms ±5%, 1/8 w.
R208	19B801251P102	Metal film: 1K ohms ±5%, 1/10 w.
R209 *	3R151P470J	Composition: 47 ohms ±5%, 1/8 w.
		— — — — SWITCHES — — — —
SW1A	19B235072P1	Spring, Antenna Switch.
SW1B	19B235071P1	Spring, Antenna Switch.
SW1C	19C337027P1	Housing, Antenna Switch.
		— — INTEGRATED CIRCUITS —
U1	19A705962P1	Module: 806-870 MHz PA; sim to M67706.
U2	19A149809P1	Module: Antenna T/R Switch; sim to MDOO3.
U3	19B800902P4	Digital: Synthesizer, CMOS Serial Input.
U4 *	19B235948G2	Module: Reference Oscillator, 13.2 MHz 1.5 PPM. (Used in G1).
U4	19B235948G1	Module: Reference Oscillator, 13.2 MHz ±1.5 PPM. (Used in G3 and G5).
U5	19A149810P1	Module: Low-Pass Filter; sim to LP915A1.
U7	19A705706P3	Module: 800 MHz Mixer; sim to TSM-211.
U8	19A705985P1	Prescaler: /128, /129; sim to MB 501SL.
U9	19C851848G1	Module: 806-870 MHz Exciter.
U10	19C851857G1	Module: RF Amplifier.
U11	19C336876G1	Module: 45.0125 MHz IF Amplifier.
U14	19B801642G1	Module: Receiver Back-End.
		— — — — CRYSTALS — — — —
Y2 *	19B235947G1	Module: 800 MHz VCO. (Used in G1 and G3).
Y3	19A705376P7	Crystal, Fixed: 45.4675 MHz ±10 PPM/°C.
Y4	19C852149G1	Module: 800 MHz VCO. (Used in G5).
		— RF BOARD MISCELLANEOUS
		(See Drawing 19D902395)
5	19A701748P1	Tape. (Bonds C58 to U3).
6	19A149008P1	Pad. (Supports Y3).
7	19A149009P1	Pad. (Supports Y3).

SYMBOL	PART NUMBER	DESCRIPTION
8	19A121175P46	Insulator, plate. (Used near Q4, U10 and U14).
9	19A705701P104	Screw, Machine: Torx, Pan Head; M2 x 4. (Secures RF Board to Eggcrate Casting).
10	19D903562P1	Eggcrate Casting. (Used in G1 and G3).
11	19A705853P1	Screw, Thread Forming. (Secures SW1).
12	19A705701P206	Screw, Machine: Torx, Pan Head; M2.5 x 6. (Secures PA Module and Support).
13	19B234990P1	Support, PA Module.
16	19D903562P1	Eggcrate Casting. (Used in G5).
		REAR COVER ASSEMBLY MISCELLANEOUS
		(See Drawing 19C337097)
2	19A115983P16	O-Ring, Rubber; .370" ID. (Used under Antenna Insert).
3	19B801618P1	Insert, Antenna.
4	19B235133P1	Connector, UDC RF.
7	19A705701P114	Screw, Machine: Torx, Pan Head; M2 x 14. (Secures RF Board to Rear Cover).
13	19B801598G2	Cover, Rear. (See separate Parts List for breakdown).
15	19A701267P2	Pad.
17	19B235911P1	Pad. (Used in G8 near C58).
18	19B235911P2	Pad. (Used in G8 on U4).
20	19B235901P1	Clip, Ground.
22	19A121175P49	Insulator. (Used in G8 on Y2).

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.

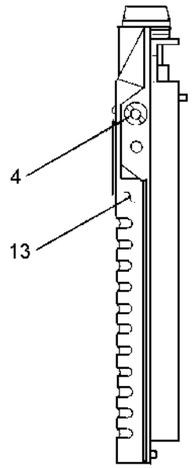
REV. A - REAR COVER ASSEMBLY 19C337097G8
RF BOARD 19D902395G1
To improve receive LO injection level, changed C210 from 3.9 pF (19A702236P15) to 5.6 pF (19A702236P19), and changed R31 from 10K ohms (19B801251P103) to 5.6K ohms (19B801251P562). Also removed R32 (19B801251P470) and added 47-ohm resistor R209 (C3R151-470J) from the junction of C41 and L12 to A1 pin 10. In addition, Voltage Regulator/ PLL Filter module A1 was changed from 19C336915G5 to 19C852056G1. This new module is pin-to-pin compatible with the previous module The bevelled edge of module 19C852056G1 designates pin 1.

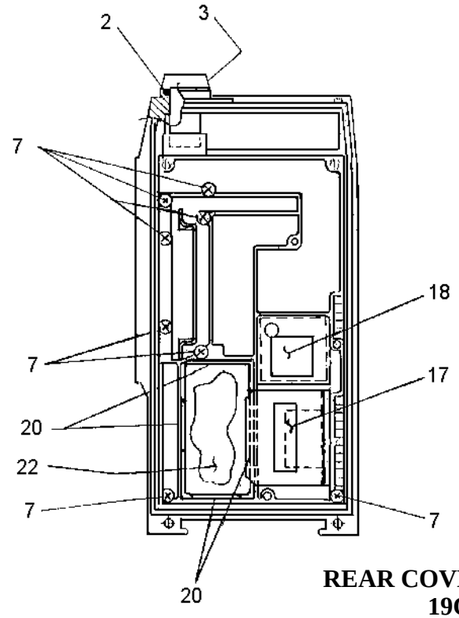
REV. B - REAR COVER ASSEMBLY 19C337097G8
RF BOARD 19D902395G1
To improve operation, Reference Oscillator module U4 was changed from 19B801351P17 to 19B235948G1, and VCO module Y2 was changed from 19A149922P1 to 19B235947G1.

REV. C - REAR COVER ASSEMBLY 19C337097G8
RF BOARD 19D902395G1
RF Board 19D902395G3 replaces RF Board 19D902395G1.

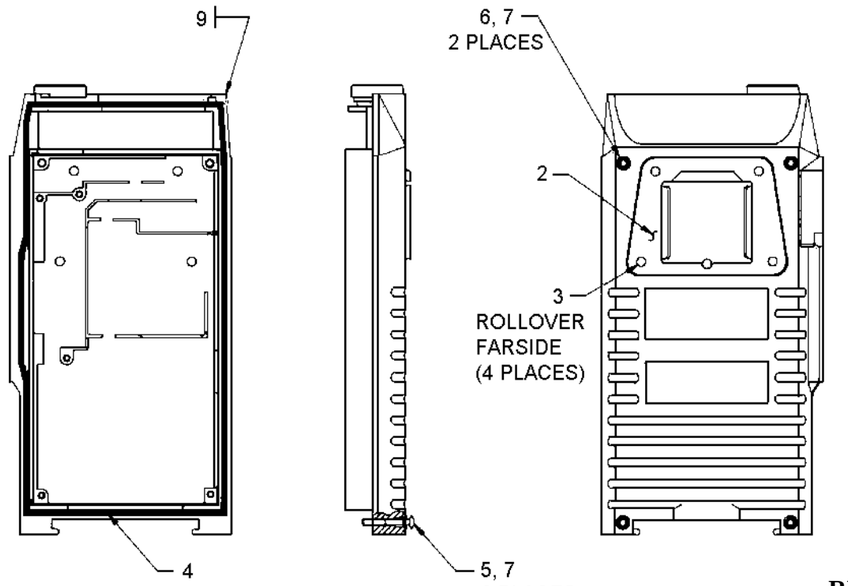
REV. D - REAR COVER ASSEMBLY 19C337097G8
RF BOARD 19D902395G1
To improve operation, the pi attenuation between module and PA module changed from 5 dB to 3 dB. R204 and R205 were 180 ohms (19B801251P181) and R206 was 33 ohms (19B801251P330). R209 added between junction of R32 and L12 and pin 10 of A1.

REV. A - REAR COVER ASSEMBLY 19C337097G12
RF BOARD 19D902395G5
To increase RF Power Out performance thereby improving Test Yield. The following changes were made: C104 from 19D702236P52 (120pF) to 19D702236P23 (8.2pF). Added: L301 344A4540P100.



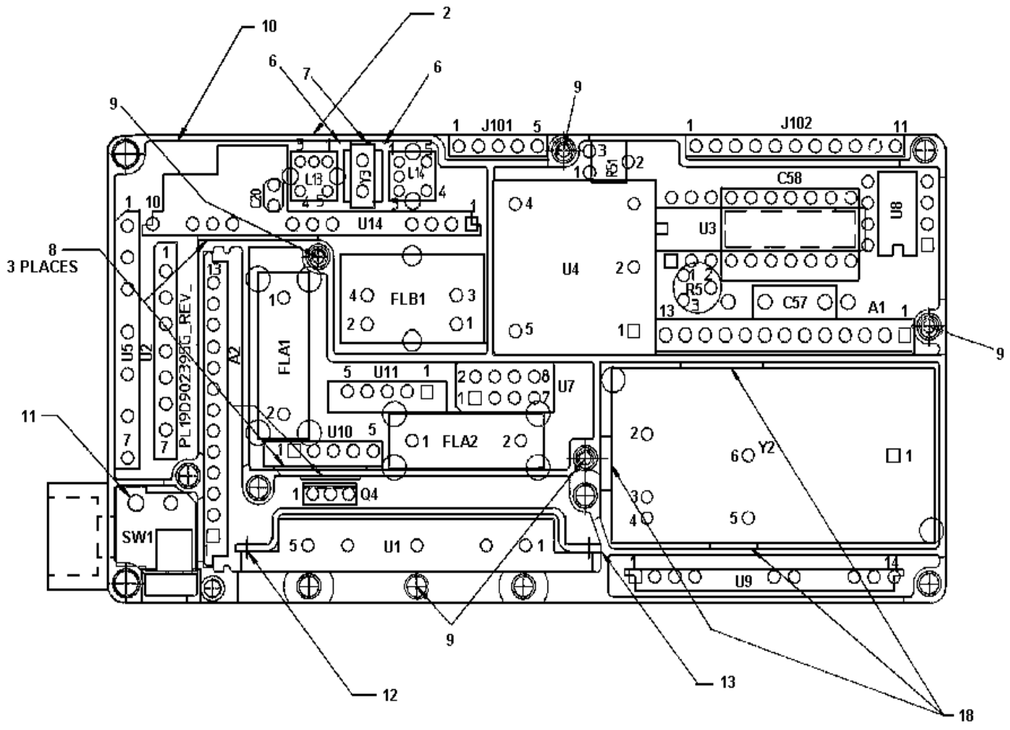


REAR COVER ASSEMBLY
19C337097G8, G12
(19C337097, Sh. 2, Rev. 0)

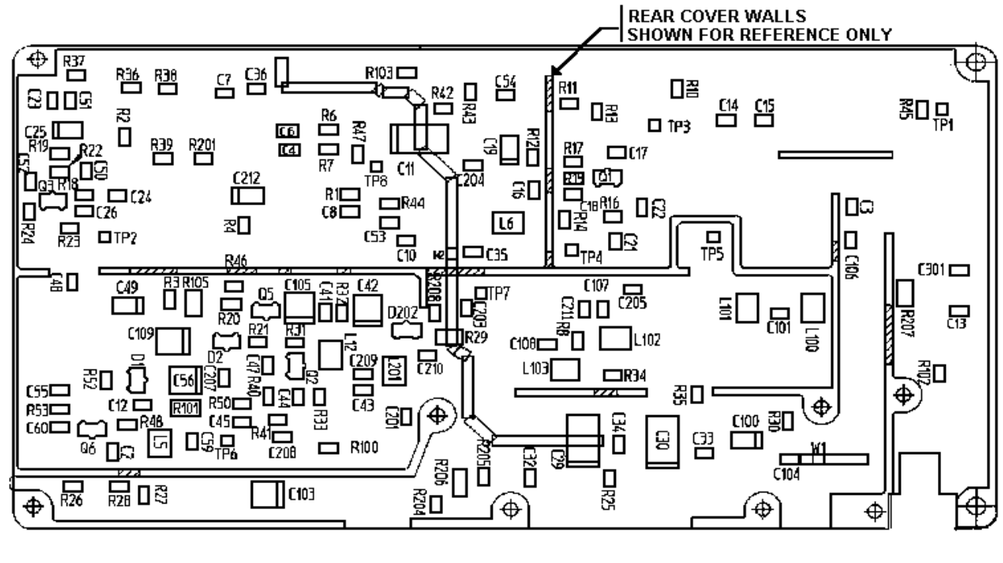


REAR COVER
19B801598G2
(19B801598, Sh. 1, Rev. 3)

COMPONENT SIDE

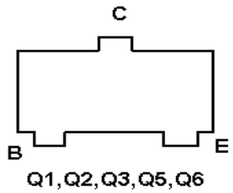


SOLDER SIDE

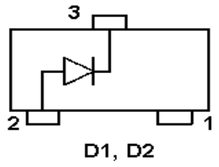


CAUTION
OBSERVE PRECAUTIONS FOR HANDLING
ELECTROSTATIC SENSITIVE DEVICES

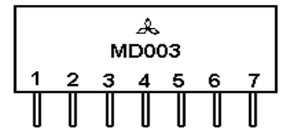
PIN ASSIGNMENTS



Q1,Q2,Q3,Q5,Q6



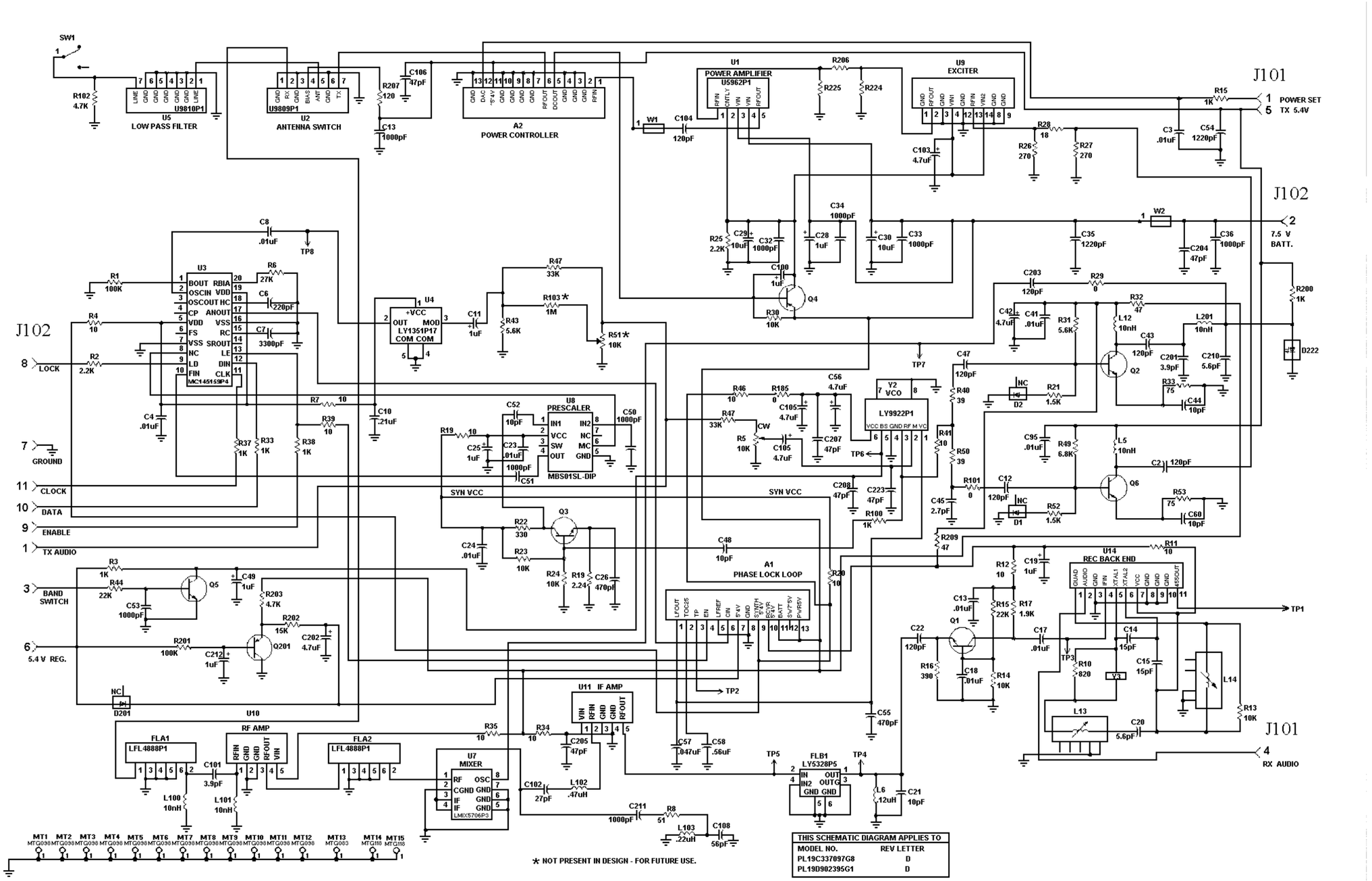
D1, D2



PIN ASSIGNMENT FOR U2

RF BOARD
19D902395G1, G3, G5

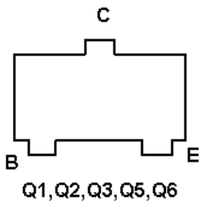
(19D902395, Sh. 1, Rev. 6)



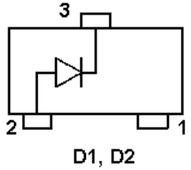
RF BOARD
19D902395G1, G3, G5

(19D902397, Sh. 1, Rev. 3)

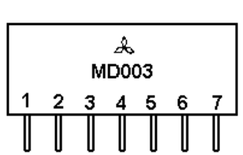
CHIP IDENTIFICATION
TOP VIEW



Q1,Q2,Q3,Q5,Q6



D1, D2

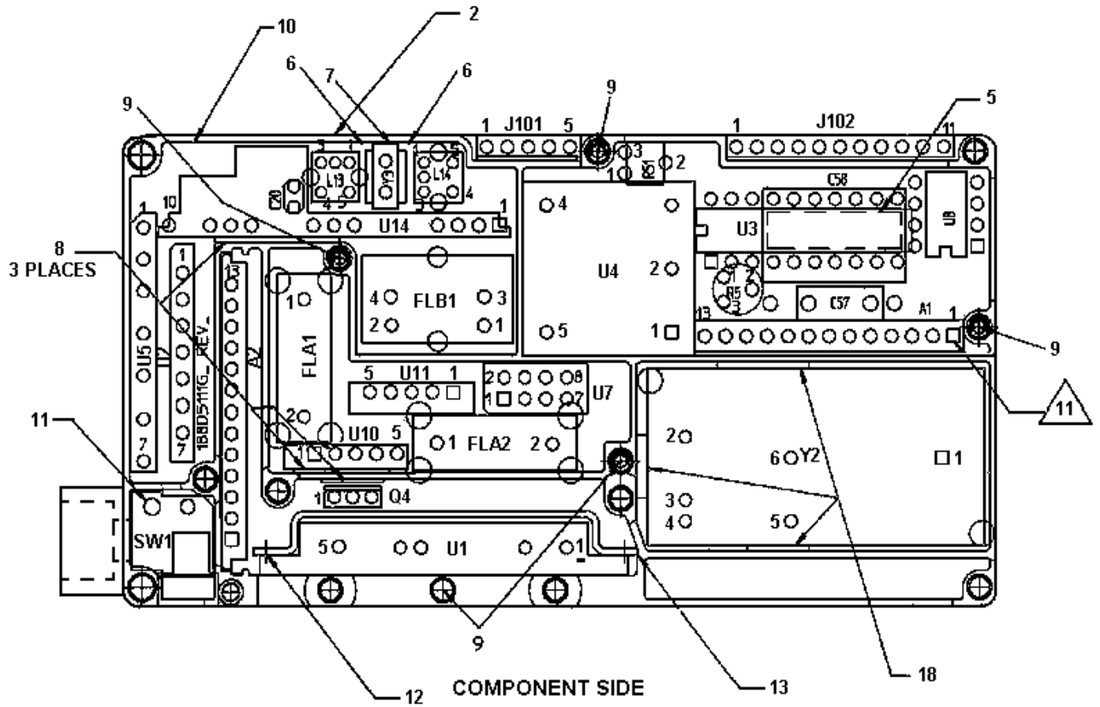


PIN ASSIGNMENT FOR U2

NOTES:

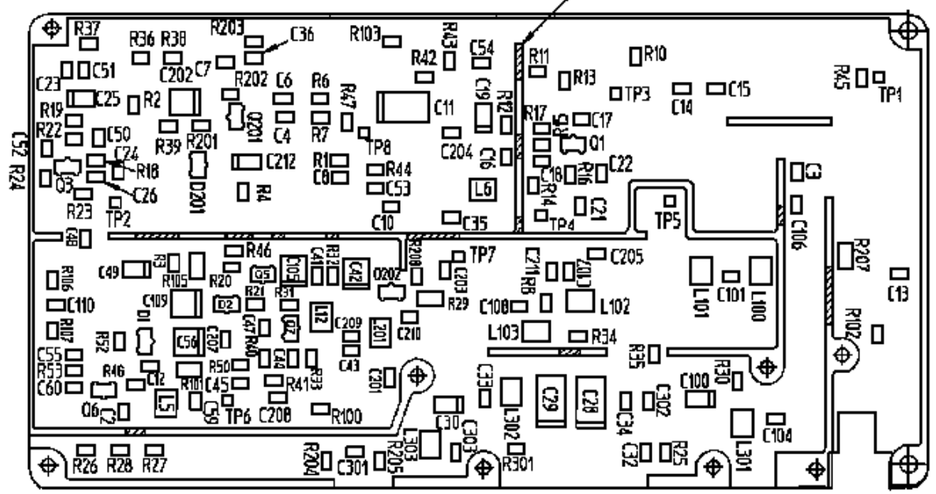
5. THE FOLLOWING DEVICES ARE ELECTROSTATIC SENSITIVE DEVICES REQUIRING SPECIAL CARE AND HANDLING: U3 & U8

CAUTION
OBSERVE PRECAUTIONS
FOR HANDLING
ELECTROSTATIC
SENSITIVE
DEVICES



COMPONENT SIDE

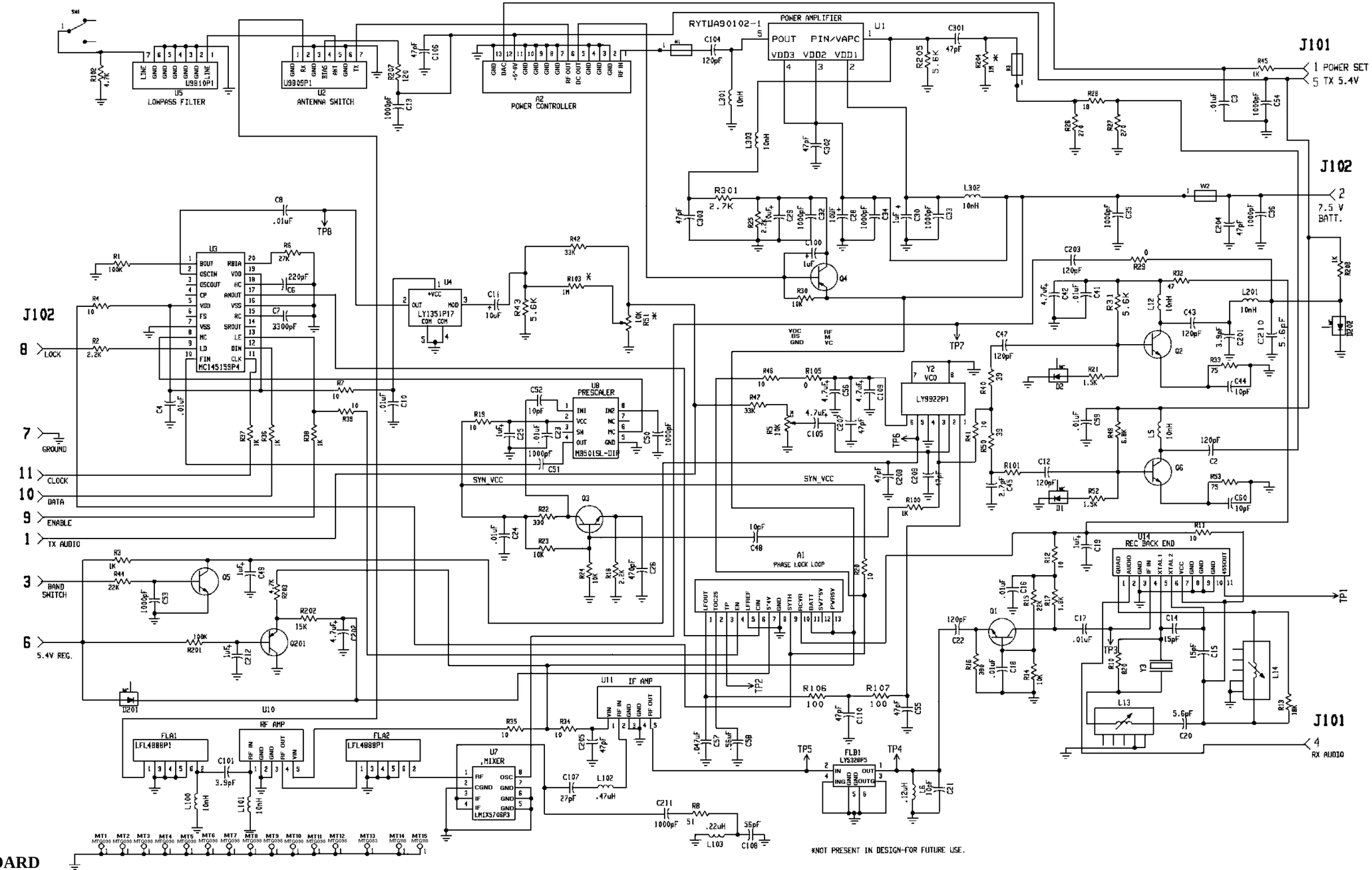
REAR COVER WALLS SHOWN
FOR REFERENCE ONLY



VIEWED FROM SOLDER SIDE

RF BOARD
188D5111G1

(188D5111, Rev. 1)



RF BOARD
188D5111G1

(188D5109, Rev. 0)

800 MHz REAR COVER ASSEMBLY
19C337097G12 LATER VCO

ISSUE 1

SYMBOL	PART NUMBER	DESCRIPTION
		188D5111G1
		— — — — — MODULES— — — —
A1	19C852056G1	PLL Low-Pass Filter/Regulator Module.
A2	19C851922G1	Power Controller Module.
		— — — — CAPACITORS — — — —
C2	19A702236P52	Ceramic: 120 pF, ±5%, 50 VDCW.
C3 and C4	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.
C6	19A702052P1	Ceramic: 220 pF ±10%, 50 VDCW.
C7	19A702052P8	Ceramic: 3300 pF ±10%, 50 VDCW.
C8	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.
C10	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.
C11	19A705205P222	Tantalum: 1 µF, 50 VDCW.
C12	19A702236P52	Ceramic: 120 pF, ±5%, 50 VDCW.
C13	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C14 and C15	19A702236P30	Ceramic: 15 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C16 thru C18	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.
C19	19A705205P2	Tantalum: 1 µF, 16 VDCW; sim to Sprague 293D.
C20	19A700227P20	Ceramic: 5.6 pF ±5%, 100 VDCW.
C21	19A702236P25	Ceramic: 10 pF ±.5 pF, 50 VDCW, temp coef 0 ±30 PPM/°C.
C22	19A702236P52	Ceramic: 120 pF, ±5%, 50 VDCW.
C23 and C24	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.
C25	19A705205P2	Tantalum: 1 µF, 16 VDCW; sim to Sprague 293D.
C26	19A702052P3	Ceramic: 470 pF ±10%, 50 VDCW.
C28 and C29	19A705205P6	Tantalum: 10 µF, 16 VDCW; sim to Sprague 293D.
C30	19A705205P2	Tantalum: 1 µF, 16 VDCW; sim to Sprague 293D.
C32 thru C36	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C41	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.
C42	19A705205P13	Tantalum: 4.7 µF, 10 VDCW; sim to Sprague 293D.
C43	19A702236P52	Ceramic: 120 pF, ±5%, 50 VDCW.
C44	19A702236P25	Ceramic: 10 pF ±.5 pF, 50 VDCW, temp coef 0±+30 PPM/°C.
C45	19A702236P11	Ceramic: 2.7 pF ±0.25 pF, 50 VDCW, temp coef 0 ±30 PPM/°C.
C47	19A702236P52	Ceramic: 120 pF, ±5%, 50 VDCW.
C48	19A702236P25	Ceramic: 10 pF ±.5 pF, 50 VDCW,
C49	19A705205P2	Tantalum: 1 uF, 16 VDCW; sim to Sprague 293D.
C50 and C51	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C52	19A702236P25	Ceramic: 10 pF ±.5 pF, 50 VDCW, temp coef 0 ±30 PPM/°C.
C53 and C54	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C55	19A702236P42	Ceramic: 47 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C..
C56	19A705205P13	Tantalum: 4.7 µF, 10 VDCW; sim to Sprague 293D.
C57	19A703902P3	Metal: 0.047 uF ±10%, 50 VDCW.
C58	19A703902P4	Metal: 0.56 uF ±10%, 50 VDCW.
C59	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.
C60	19A702236P25	Ceramic: 10 pF ±.5 pF, 50 VDCW, temp coef 0 ±30 PPM/°C.
C100	19A705205P2	Tantalum: 1 µF, 16 VDCW; sim to Sprague 293D.
C101	19A702236P15	Ceramic: 3.9 pF ±.25 pF, 50 VDCW, temp coef 0 ±30 PPM/°C.
C104	19A702236P23	Ceramic: 8.2 pF, ±0.5pF, 50 VDCW, temp coef 0 ±60 PPM/°C.
C105	19A705205P13	Tantalum: 4.7 µF, 10 VDCW; sim to Sprague 293D.
C106	19A702236P42	Ceramic: 47 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C107	19A702236P36	Ceramic: 27 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C108	19A702236P44	Ceramic: 56 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C109	19A705205P13	Tantalum: 4.7 µF, 10 VDCW; sim to Sprague 293D.
C110	19A702236P42	Ceramic: 47 pF ±5%, 50 VDCW, temp coef 0 +30 PPM/°C.
C201	19A702236P15	Ceramic: 3.9 pF ±.25 pF, 50 VDCW, temp coef 0 ±30 PPM/°C.
C202	19A705205P13	Tantalum: 4.7 µF, 10 VDCW; sim to Sprague 293D.
C203	19A702236P52	Ceramic: 120 pF, ±5%, 50 VDCW.
C204 and C205	19A702236P42	Ceramic: 47 pF ±5%, 50 VDCW, temp coef 0 +30 PPM/°C.
C207 thru C209	19A702236P42	Ceramic: 47 pF ±5%, 50 VDCW, temp coef 0 +30 PPM/°C.
C210	19A702236P19	Ceramic: 5.6 pF ±.5 pF, 50 VDCW, temp coef 0 ±30 PPM/°C.
C211	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C212	19A705205P2	Tantalum: 1 µF, 16 VDCW; sim to Sprague 293D.
C301 thru C303	19A702236P42	Ceramic: 47 pF ±5%, 50 VDCW, temp coef 0 +30 PPM/°C.
		— — — — DIODES — — — — —
D1 and D2	19A700155P2	Silicon: 100 mA, 35 PIV; sim to BAT 18.
		— — — — — FILTERS — — — —
FLA1 and FLA2	19A704888P1	Bandpass Filter, 851-870 MHz; sim to: Murata DFC3R861P020BTD.
FLB1	19A705328P5	Monolithic Crystal: 45.0125 MHz; sim to Toyocom 45E2BU.
		— — — — — JACKS — — — —
J101	19A149614P1	Connector: 5 sockets; sim to DuPont 69755-005.
J102	19A149614P2	Connector: 11 sockets; sim to DuPont 69755-011.
		— — — — INDUCTORS — — —
L5	19A705470P1	Coil, fixed: 10 nH; sim to Toko 380NB-10nM.
L6	19A705470P14	Coil, fixed: 0.12 µH; sim to Toko 380NB-R12M.
L12	19A705470P1	Coil, fixed: 10 nH; sim to Toko 380NB-10nM.
L13	19A703591P2	IF: sim to Toko America 332PN-T1016Z
L14	19A703591P1	IF: sim to Toko America P5SVLC-A291EL.
L100 and L101	19A705470P	1Coil, fixed: 10 nH; sim to Toko 380NB-10nM.
L102	19A705470P21	Coil, fixed: 0.47 µH; sim to Toko 380NB-R47M.
L103	19A705470P17	Coil, fixed: 0.22 µH; sim to Toko 380NB-R22M.
L201 and L301	19A705470P1	Coil, fixed: 10 nH; sim to Toko 380NB-10nM.
L302 and L303	19A705470P6	Coil, fixed: 27 nH; sim to Toko 380NB-27nM.
		— — — — TRANSISTORS — — —
Q1	19A703654P2	Silicon, NPN: sim to Motorola MMBR901.
Q2 and Q3	19A704708P2	Silicon, NPN: sim to NEC 2SC3356.
Q4	19A149542P1	Silicon, PNP: sim to Motorola MJD32C-1.
Q5	19A700076P2	Silicon, NPN: sim to MMBT3904, low profile.
Q6	19A704708P2	Silicon, NPN: sim to NEC 2SC3356.
Q201	19A700059P2	Silicon, PNP: sim to MMBT3906, low profile.
		— — — — RESISTORS — — —
R	119B801251P104	Metal film: 100K ohms ±5%, 1/10 w.
R2	19B801251P222	Metal film: 2.2K ohms ±5%, 1/10 w.
R3	19B801251P102	Metal film: 1K ohms ±5%, 1/10 w.
R4	19B801251P100	Metal film:10 ohms ±5%, 1/10 w.
R5	19B800779P10	Variable: 10K ohms ±25%, 100 VDCW, .3 watt.
R6	19B801251P273	Metal film: 27K ohms ±5%, 1/10 w.
R7	19B801251P100	Metal film: 10 ohms ±5%, 1/10 w.
R8	19B801251P510	Metal film: 51 ohms ±5%, 1/10 w.
R10	19B801251P821	Metal film: 820 ohms ±5%, 1/10 w.
R11 and R12	19B801251P100	Metal film: 10 ohms ±5%, 1/10 w.
R13	19B801251P183	Metal film: 18K ohms ±5%, 1/10 w.
R14	19B801251P103	Metal film: 10K ohms ±5%, 1/10 w.
R15	19B801251P223	Metal film: 22K ohms ±5%, 1/10 w.
R16	19B801251P391	Metal film: 390 ohms ±5%, 1/10 w.
R17	19B801251P182	Metal film: 1.8K ohms ±5%, 1/10 w.
R18	19B801251P222	Metal film: 2.2K ohms ±5%, 1/10 w.
R19 and R20	19B801251P100	Metal film: 10 ohms ±5%, 1/10 w.
R21	19B801251P152	Metal film: 1.5K ohms ±5%, 1/10 w.
R22	19B801251P331	Metal film: 330 ohms ±5%, 1/10 w.
R23 and R24	19B801251P103	Metal film: 10K ohms ±5%, 1/10 w.
R25	19B801251P222	Metal film: 2.2K ohms ±5%, 1/10 w.
R26 and R27	19B801251P271	Metal film: 270 ohms ±5%, 1/10 w.
R28	19B801251P180	Metal film: 18 ohms ±5%, 1/10 w.
R29	19B800607P1	Metal film: Jumper.
R30	19B801251P103	Metal film: 10K ohms ±5%, 1/10 w.
R31	19B801251P562	Metal film: 5.6K ohms ±5%, 1/10 w.
R32	19B801251P470	Metal film: 47 ohms ±5%, 1/10 w.
R33	19B801251P750	Metal film: 75 ohms ±5%, 1/10 w.
R34 and R35	19B801251P100	Metal film: 10 ohms ±5%, 1/10 w.
R36 thru R38	19B801251P102	Metal film: 1K ohms ±5%, 1/10 w.
R39	19B801251P100	Metal film: 10 ohms ±5%, 1/10 w.
R40	19B801251P390	Metal film: 39 ohms ±5%, 1/10 w.
R41	19B801251P100	Metal film: 10 ohms ±5%, 1/10 w.
R42	19B801251P333	Metal film: 33K ohms ±5%, 1/10 w.
R43	19B801251P562	Metal film: 5.6K ohms ±5%, 1/10 w.
R44	19B801251P223	Metal film: 22K ohms ±5%, 1/10 w.
R45	19B801251P102	Metal film: 1K ohms ±5%, 1/10 w.
R46	19B801251P100	Metal film: 10 ohms ±5%, 1/10 w.
R47	19B801251P333	Metal film: 33K ohms ±5%, 1/10 w.
R48	19B801251P682	Metal film: 6.8K ohms ±5%, 1/10 w.
R50	19B801251P390	Metal film: 39 ohms ±5%, 1/10 w.
R52	19B801251P152	Metal film: 1.5K ohms ±5%, 1/10 w.
R53	19B801251P750	Metal film: 75 ohms ±5%, 1/10 w.
R100	19B801251P102	Metal film: 1K ohms ±5%, 1/10 w.
R101	19B800607P1	Metal film: Jumper.
R102	19B801251P472	Metal film: 4.7K ohms ±5%, 1/10 w.
R105	19B800607P1	Metal film: Jumper.
R106 and R107	19B801251P101	Metal film: 100K ohms ±5%, 1/10 w.
R201	19B801251P104	Metal film: 100K ohms ±5%, 1/10 w.
R202	19B801251P153	Metal film: 15K ohms ±5%, 1/10 w.

* COMPONENTS, ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES