MOBILE RADIO

MAINTENANCE MANUAL
800 MHz, 15 WATT TRANSMITTER/RECEIVER BOARD (SIMPLEX)
19D900742G10

GE MARC V•E CLASSIC II

TABLE OF CONTENTS

DESCRIPTION

The transmitter/receiver board contains the fixed tuned power amplifier module, power control circuit and the 800 MHz receiver. Component parts for the exciter are located on the synthesizer/interconnect board and the transmitter/receiver board. The frequency synthesizer and frequency injection chain including a frequency tripler are located on the synthesizer/interconnect board. The transmitter/receiver board is mounted on the bottom side of the "H" frame chassis.

The exciter provides approximately 250 milliwatts of modulated RF power to the PA module which provides 15 watts power output. Figure 1 is a block diagram of the GE-MARC V•E radio showing both the transmitter and receiver.

TRANSMITTER

EXCITER

The synthesized frequency output and the injection output from the interconnect/frequency synthesizer board are applied to the balanced mixer through J101 and J102. The mixer output signal is the sum of these two input signals and will fall within the range of 408-410.5 MHz. The output of the balanced mixer is coupled through three tuned circuits (L101, L102, L103) to the base of amplifier Q101. Metering test point TP101 is used in tuning L101, L102 and L103. The typical DC reading is 5.6 volts.

CIRCUIT ANALYSIS

Following amplifier Q101 is frequency doubler Q102. The output of 102 (816-821 MHz) is filtered by L107, L108, and L109, and are tuned to the operating frequency. The filter output is applied to the base of amplifier Q103.

The collector output of Q103 is applied to a power splitter consisting of L111 and C116, and L112 and C121. The portion of the RF signal Vcoupled through L111 and C116 is applied to the base of amplifier Q104. The output of Q104 is coupled to the receiver and used as the 1st oscillator injection frequency. The signal coupled through L112 and C121 is applied to the base of exciter amplifier Q105. The collector tank of Q105 is tuned by C125 and C127.

Following Q105 is amplifier Q106. The output of Q106 is tuned by C133 and C134.

Variable capacitors C125, C127, C133 and C134 are tuned for a maximum DC voltage reading at TP103. The typical DC reading at TP103 is 1.6 volts. Part of the RF signal at W102 is rectified by "sniffer" diode D101 to provide the voltage reading at TP103.

W102 is a 50 ohm stripline on the printed circuit board that matches the exciter output to the PA input impedance.

POWER AMPLIFIER

Power amplifier U102 is a three stage amplifier that amplifies the 250 milliwatt exciter output to provide a 15 watt output. The output of U102 is coupled through 50 ohm stripline W104 to low pass filter A102. The filter output is applied to antenna relay K601.

RF POWER CONTROL CIRCUIT

The output power adjust circuit allows the RF output power to be set to rated output power. The power adjustment

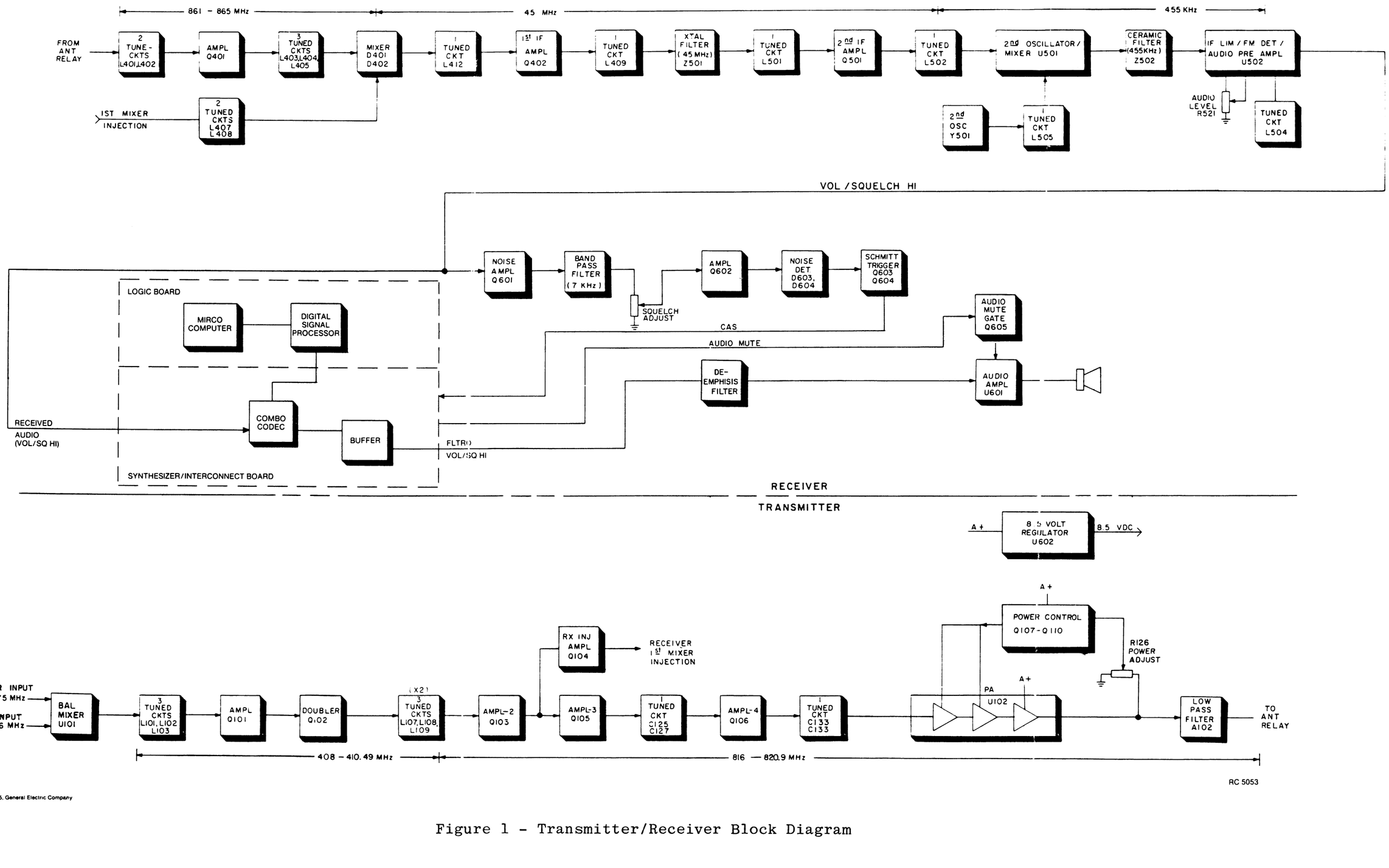

Figure 1 - Transmitter/Receiver Block Diagram

is attained by controlling the DC collector voltage to the pre-driver and driver stages in U102 through pass transistor Q110. The pass transistor is controlled by a feedback loop consisting of Q107 through Q109. The power is set by potentiometer R126.

Any change in output power is sensed by the power control circuit. For example: if the output power increases, more RF is rectified by D102, increasing the base voltage of Q107. This causes Q107 to conduct more, reducing its collector voltage (and base voltage to Q108).

Reducing the base voltage applied to Q107 causes it to conduct less, raising the base voltage of PNP transistor Q109. With Q109 conducting less, there is less base voltage applied to pass transistor Q110 resulting in less collector voltage being applied to the pre-driver and driver stages in U102. This reduces the output power of the PA module in proportion to the increase in output power detected at the base of Q107. TP104 is used to check the DC control voltage being applied to the power amplifier; typically this voltage is 9.0 VDC.

RECEIVER

GE MARC V•F 800 MHz receivers are dual conversion, superheterodyne FM receivers designed for operation in the 861-865 MHz frequency range. A regulated 8.5 volts is used for all receiver stages except for the audio PA IC, which operates from the A+ supply.

The receiver uses intermediate frequencies of 45.0125 MHz and 455 kHz. Adjacent channel selectivity is obtained by using two bandpass filters: a 45 MHz crystal filter and a 455 kHz ceramic filter.

All receiver circuitry is mounted on the transmitter/receiver Tx/Rx) board. The receiver consists of:

- Receiver Front End and 1st Mixer
- 45.0125 MHz 1st IF circuitry
- 2nd Oscillator
- 455 kHz 2nd IF circuitry with FM Detector
- Audio PA Circuit
- Squelch Circuit

RECEIVER FRONT END

RF from the antenna is coupled through two helical resonators (L401 and L402) to the base of RF amplifier Q401. Q401 is a class A, common emitter amplifier that provides a gain of approximately 8 to 10 dB. The amplified output is coupled through three additional helicals to the 1st mixer. The five helicals provide the front end selectivity.

1ST MIXER

The 1st mixer is a dual balanced diode mixer that converts a signal in the 861-865 MHz range to the 45 MHz 1st IF frequency.

RF from the front end helicals is coupled through C404 to mixer diodes D401 and D402. The low side injection input from the exciter is coupled through two helicals (L407 and L408) to the mixer diodes. The injection input port is isolated from the RF input and IF output by a balancing transformer consisting of L413 tapped to ground.

The 1st mixer output is coupled through a tuned circuit (L412 and C405) that matches the mixer output to gate 1 of 1st IF amplifier Q402.

TP401 is used in tuning the discrete IF stages and the injection filter, L408 and L409.

1ST IF AMPLIFIER AND FILTER

IF Amplifier Q402 is a dual gate FET that provides good intermodulation and desensitization characteristics. The amplifier also acts as a buffer between the variable balanced mixer output impedance and the crystal filter.

The 45.0125 MHz output signal at the drain of Q402 is coupled through a tuned circuit (L409 and C408) that sets the impedance to crystal filter Z501.

Z501 is a 45.0125 MHz, four-pole crystal filter that provides a minimum of 30 dB adjacent channel rejection. The filter output is applied through a tuned circuit (L501, C501 and C526) that matches the output impedance of Z501 to the second IF amplifier.

2ND IF AMPL

2nd IF Amplifier Q501 is a dual-gate FET. The filter output is applied to Gate 1 of the amplifier, and the output is taken from the drain. The biasing on Gate 2 and the drain load determines the gain of the stage. The amplifier provides approximately 20 dB of IF gain. The output of Q501 is coupled through L502 which matches the amplifier output to the input of IC U501.

2ND OSC/MIXER AND IF AMPL

The 2nd oscillator, mixer and 3rd IF amplifier consists of U501 and associated circuitry. The oscillator operates at 45.455 MHz for high side injection (45.4675 MHz-offset IF). The oscillator crystal is Y501. The 45 MHz input frequency is mixed with the oscillator frequency to provide the 2nd IF frequency of 455 kHz. Diodes D501 and D502 limit the mixer output. L503 is tuned for the 2nd IF output of 455 kHz.

FILTER, LIMITER AND DETECTOR

The output of U501 is coupled through ceramic filter Z502 which provides the 455 kHz selectivity, and applied to U502. Test Point TP501 is used in aligning the receiver, and can be used to check the output of U501. The typical DC reading at TP501 is 2.7 volts.

U502 and associated circuitry consists of a 455 kHz limiter, a quadrature-type FM detector and an audio pre-amplifier. L504 is the quadrature detector coil. Audio Level Potentiometer R521 is used to set the audio output level to the audio amplifier.

AUDIO AND SQUELCH CIRCUITS

Audio

Audio from the audio pre-amplifier U502 is applied to the combo codec (U2514 on the Synthesizer/Interconnect board). The analog audio is converted to a serial format whereby a digital signal processor fiters the audio. The signal processor performs the busy tone notching, tone detection, alert tone generation and volume control.

After processing, the FLTRD VOL/SQ HI signal is derived from the combo codec and is buffered over to the T/R board. This same buffered signal is de-emphasized, amplified and sent over to the handset.

On the T/R board, the FLTRD VOL/SQ HI (buffered signal) is de-emphasized by R629 and C608 and amplified by U601. The audio amplifier IC (U601) drives the speaker at the desired audio level. The feedback loop containing R633, R634 and C610 determines the amplifier closed loop gain. R631 and C612 provide the high audio frequency roll-off above 6 kHz.

Squelch

The squelch circuit operates on the noise components contained in the FM detector output. The output of U502 is applied to frequency selective noise amplifier Q601 that has a resonant circuit (L601, R604 and C602) as the collector load. The output is noise in a band around 7 kHz.

This noise output is coupled through Squelch control R607 to expander amplifier Q602 which improves the level discrimination characteristics of the circuit. The output of Q602 is applied to a passive voltage doubler circuit (D603 and D604). This circuit has a high source impedance an operates as an average value rectifier.

Following the voltage doubler is a Schmidt Trigger (Q603 and Q604). The Schmidt Trigger provides the necessary hysteresis and a well-defined output signal for Rx mute gate Q605.

With no RF signal present, the detected noise at the voltage doubler output turns on Q603, turning off Q604. This causes Q605 to turn on, applying +1.7 volts to pin 2 of audio amplifier U601. This voltage turns off U601 and mutes the receiver.

When an RF signal is received, the noise at the output of Q601 decreases and drive to Q603 is removed. This turns off Q603 and allows Q604 to turn on. With Q604 turned on, Rx mute gate Q605 turns off. This turns on U601 so that audio is heard at the speaker.

The squelch sensitivity is adjusted by R607 in the base circuit of expander amplifier Q602.

GENERAL ELECTRIC COMPANY • MOBILE COMMUNICATIONS DIVISION
WORLD HEADQUARTERS • LYNCHBURG, VIRGINIA 24502 U.S.A.

GENERAL ELECTRIC*
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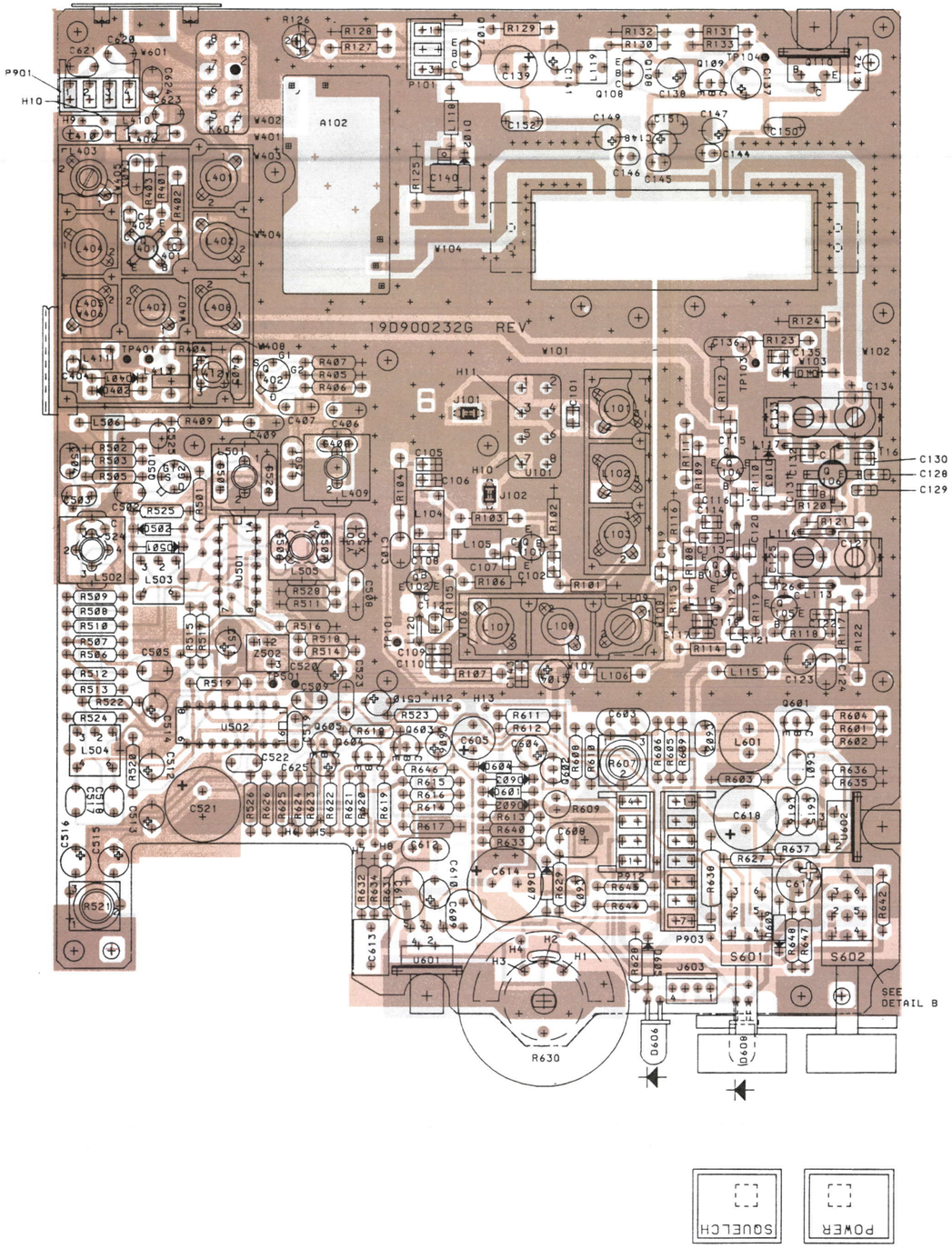
19D900232G REV
A102
P901
H10
H9
C621
C620
W601
K601
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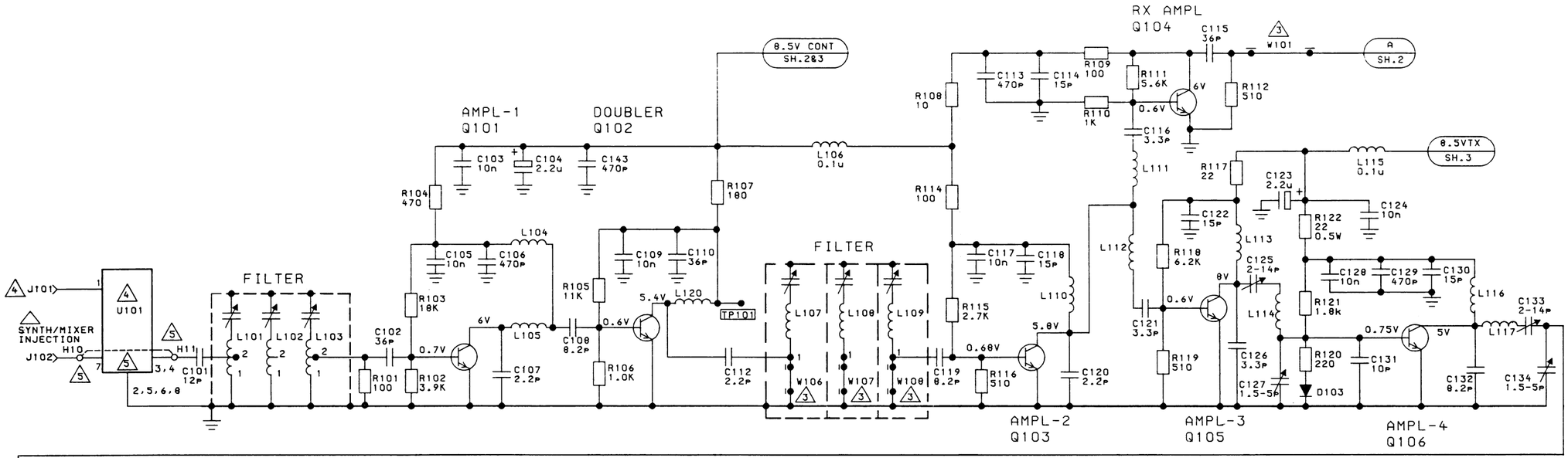
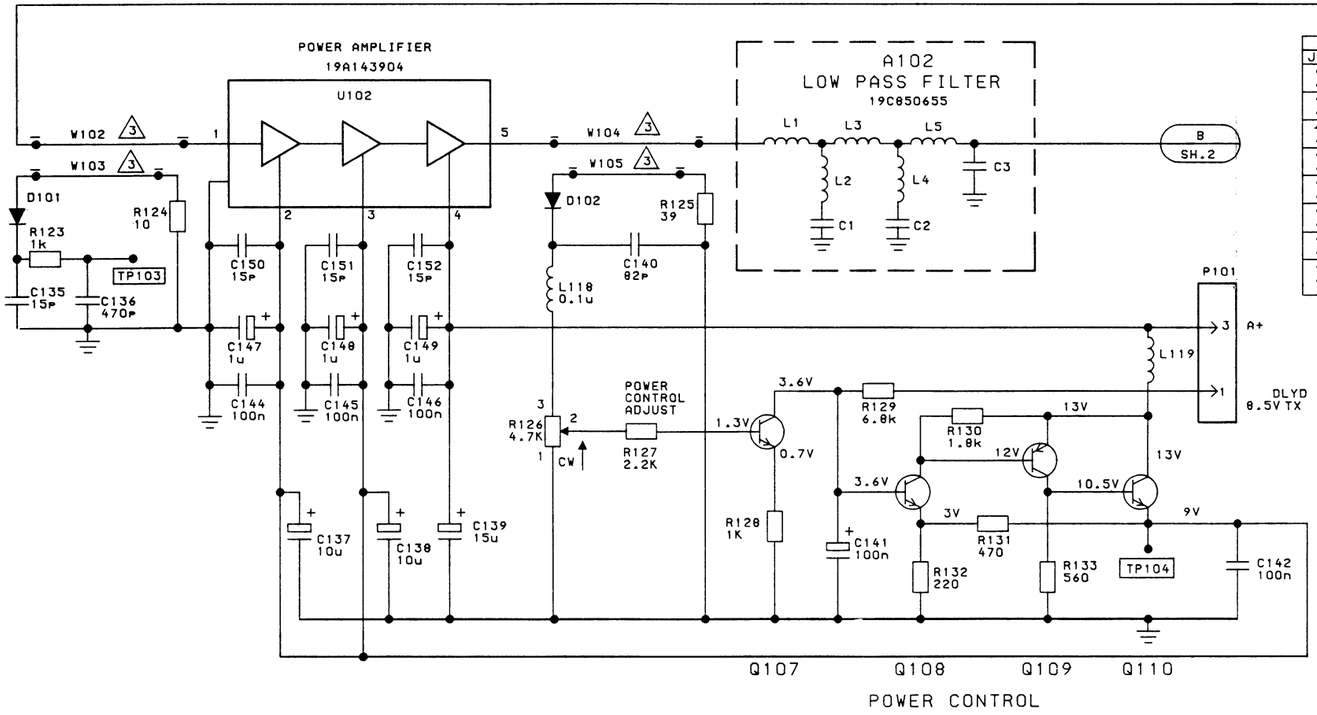




△INPUT FREQUENCIES

J102 (MHZ)	J101 (MHZ)	MODE	RX IF (MHZ)	FREQ RANGE (MHZ)	FREQ SOURCE	FREQ PLAN
41.6 TO 44.0875	366.40625	RX	45.0	861.0125-865.9875	19D900241 G1,G2	USA-1
	366.40625	TX	-	816.0125-820.9875		
41.6 TO 44.0875	366.400	RX	45.0125	861.0125-865.9875	19D900241 G3,G4	USA-1
	366.40625	TX	-	816.0125-820.9875		
41.6 TO 44.0875	368.400	RX	45.0125	865.0125-869.9875	19D900241 G5,G6	AUSTRALIA
	368.40625	TX	-	820.0125-824.9875		
41.65 TO 44.1375	363.850	RX	45.0125	856.0125-860.9875	19D900241 G7,G8	USA-2
	363.85625	TX	-	811.0125-815.9875		
41.625 TO 44.1125	366.375	RX	45.0125	861.0125-865.9875	19D900241 G9,G10	USA-1
	366.38125	TX	-	816.0125-820.9875		
41.6 TO 44.0875	361.400	RX	45.0125	851.0125-855.9875	19D900241 G11,G12	USA-3
	361.40625	TX	-	806.0125-810.9875		
41.65 TO 44.1375	363.84375	RX	45.0125	856.0000-860.9750	19D900241 G13,G14	MEXICO
	363.850	TX	-	811.0000-815.9750		
403.0 TO 412.5	NONE		45.0	851-870 RX	19D900227G1	1 FREQ 800
			45.0125	806-825 TX	19D900227G2	

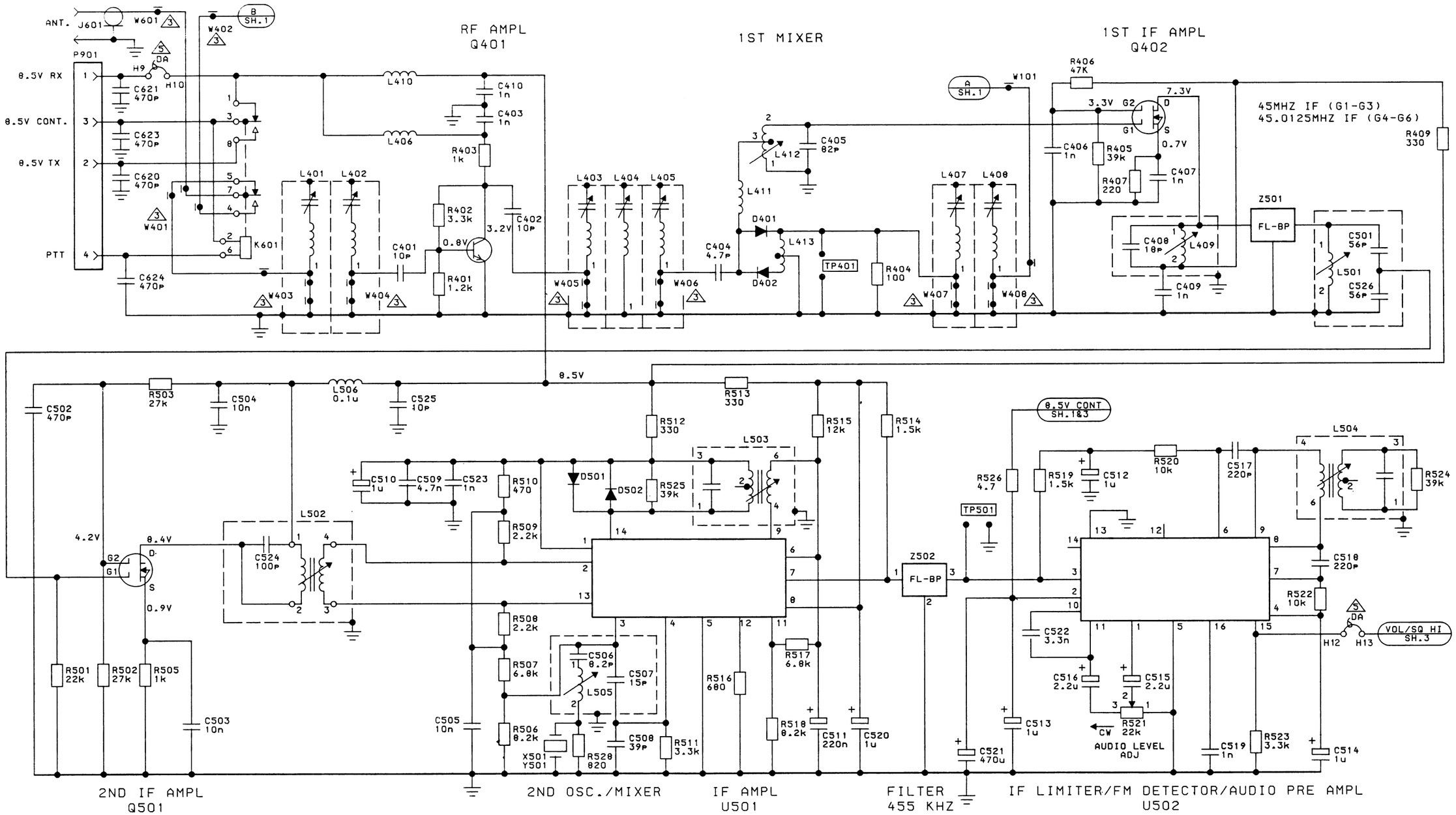
TRANSMITTER
VOLTAGE READINGS

VOLTAGE READINGS ARE TYPICAL READINGS MEASURED TO SYSTEM NEGATIVE WITH A 20,000 OHMS-PER-VOLT DC VOLTMETER.READING TAKEN WITH TRANSMITTER KEYED.

SCHEMATIC DIAGRAM

TRANSMITTER/RECEIVER BOARD
(15 Watt Simplex)

(19D900348, Sh. 1, Rev. 11)



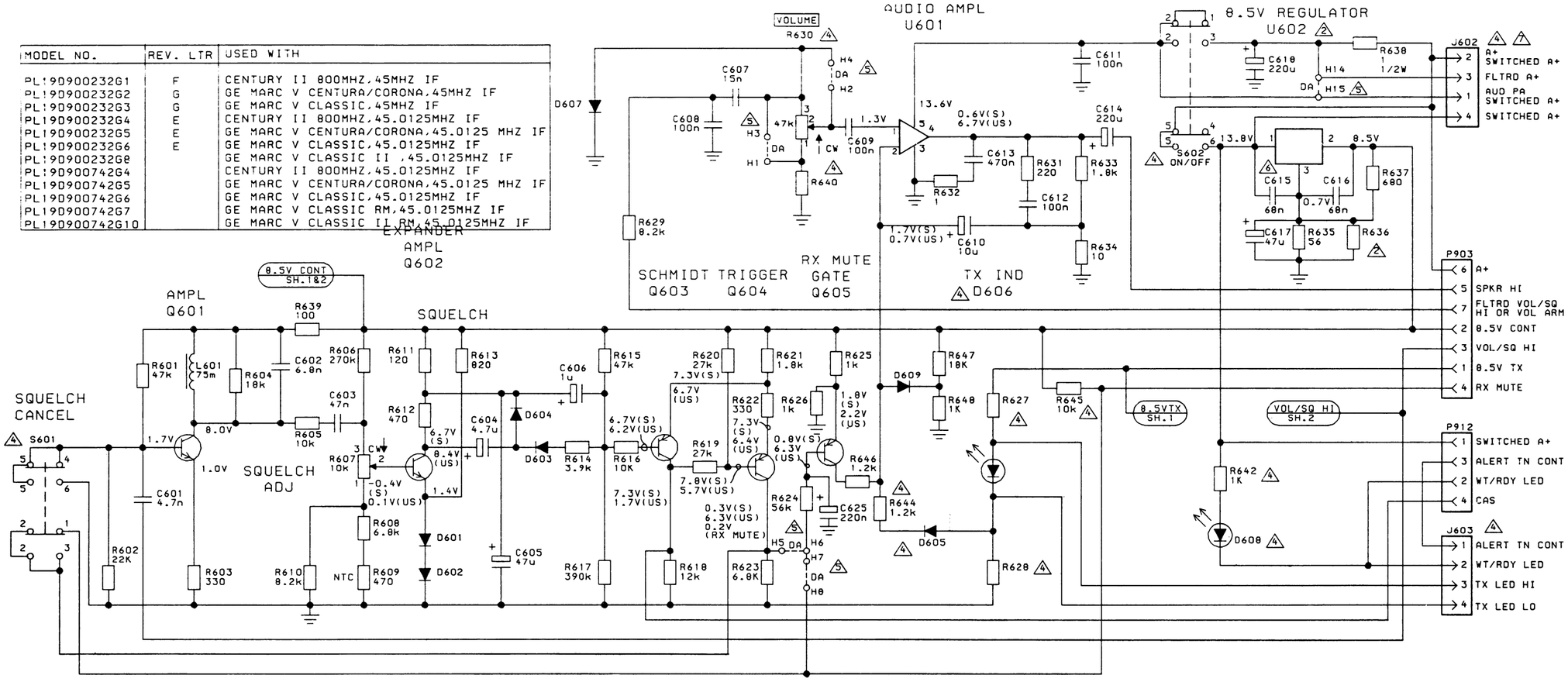
(19D900348, Sh. 2, Rev. 4)

SCHEMATIC DIAGRAM

TRANSMITTER/RECEIVER BOARD
(15 Watt Simplex)

Issue 1

MODEL NO.	REV. LTR	USED WITH
PL19D900232G1	F	CENTURY II 800MHZ,45MHZ IF
PL19D900232G2	G	GE MARC V CENTURA/CORONA,45MHZ IF
PL19D900232G3	G	GE MARC V CLASSIC,45MHZ IF
PL19D900232G4	E	CENTURY II 800MHZ,45.0125MHZ IF
PL19D900232G5	E	GE MARC V CENTURA/CORONA,45.0125 MHZ IF
PL19D900232G6	E	GE MARC V CLASSIC,45.0125MHZ IF
PL19D900232G8		GE MARC V CLASSIC II ,45.0125MHZ IF
PL19D900742G4		CENTURY II 800MHZ,45.0125MHZ IF
PL19D900742G5		GE MARC V CENTURA/CORONA,45.0125 MHZ IF
PL19D900742G6		GE MARC V CLASSIC,45.0125MHZ IF
PL19D900742G7		GE MARC V CLASSIC RM,45.0125MHZ IF
PL19D900742G10		GE MARC V CLASSIC II RM,45.0125MHZ IF



NOTES:

2. VALUE OF R636 DEPENDS ON COLOR CODE ON U602.

U602 COLOR CODE	R636 VALUE Ω
BROWN	OMIT R636
RED	270
ORANGE	100
YELLOW	47
GREEN	22
BLUE	6.8

3. PART OF PRINTED CIRCUIT BOARD.

4. COMPONENT VALUES

	G1 & G4 800MHZ 1 FREQ	G2 & G5 GE MARC V CENTURA/CORONA	G3 & G6 GE MARC V CLASSIC	G8 GE MARC V CLASSIC II
D605		OMIT	OMIT	OMIT
D606		D606	OMIT	OMIT
OMIT		D608	OMIT	OMIT
OMIT		J101	J101	J101
OMIT		OMIT	J602	OMIT
OMIT		OMIT	J603	OMIT
R627A	220	R627A 220	R627B 150	R627B 150
R628A	150	R628A 150	R628B 180	R628B 180
R630		R630	OMIT	OMIT
R640A	10	R640B 2.2K	R640C 47K	R640C 47K
OMIT		R642	OMIT	OMIT
S601		OMIT	OMIT	OMIT
S602		S602	OMIT	OMIT
OMIT		U101	U101	U101
R644		OMIT	OMIT	OMIT
OMIT		R645	R645	R645

5. DA JUMPER PRESENT H5 TO H6 IN G1 & G4 ONLY.
DA JUMPER PRESENT H7 TO H8 IN G2,G3,G5,G6 & G8 ONLY.
DA JUMPER PRESENT H10 TO H11 IN G1 & G4 ONLY.
DA JUMPER PRESENT H1 TO H3,H2 TO H4 IN G3,G6 & G8 ONLY.
DA JUMPER PRESENT H9 TO H10,H12 TO H13 IN G1-G6 & G8 ONLY.
DA JUMPER PRESENT H14 TO H15 IN G8 ONLY.
ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED.
RESISTOR VALUES IN Ω UNLESS FOLLOWED BY MULTIPLIER k OR M.
CAPACITOR VALUES IN F UNLESS FOLLOWED BY MULTIPLIER u,n OR p.
INDUCTANCE VALUES IN H UNLESS FOLLOWED BY MULTIPLIER m OR u.

7. FOR TRUNK MOUNT RADIO, J602-2 IS SWITCHED A+ INPUT FROM CONTROL UNIT.

RECEIVER VOLTAGE READINGS

VOLTAGE READINGS ARE TYPICAL READINGS MEASURED TO SYSTEM NEGATIVE WITH A 20,000 OHMS-PER-VOLT DC VOLTMETER UNDER THE FOLLOWING CONDITIONS:

1. NO SIGNAL INPUT
2. VOLUME CONTROL (R630) SET TO MINIMUM
3. SQUELCH CANCEL (S601) SWITCHED OFF
4. UNSQUELCHED (US)-SQUELCH ADJUST (R607) SET TO MINIMUM (CW)
5. SQUELCHED (S)-SQUELCH ADJUST (R607) SET TO MAXIMUM (CCW)

6. C615 PRESENT IN GP.1 & GP.4.

SCHEMATIC DIAGRAM

TRANSMITTER/RECEIVER BOARD (15 Watt Simplex)

(19D900348, Sh. 3, Rev. 16)

PARTS LIST

800 MHz TRANSMIT/RECEIVE ASSEMBLY,
15 WATT SIMPLEX
19D900742G10

ISSUE 1

SYMBOL	GE PART NO.	DESCRIPTION
A2		TRANSMIT/RECEIVE BOARD 19D900232G8
A102		LOW PASS FILTER BOARD 19C850655G2
		- - - - - - - - - - INDUCTORS - - - - - - - - -
L3	19A701782P1	Coil.
L5	19A701782P1	Coil.
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C101	19A700219P30	Ceramic: 12 pF ±5%, 100 VDCW, temp coef 0 PPM.
C102	19A700219P48	Ceramic: 36 pF ±5%, 100 VDCW, temp coef 0 PPM.
C103	19A700234P7	Polyester: 0.01 uF ±10%, 50 VDCW.
C104	19A701534P5	Tantalum: 2.2 uF, ±20%, 35 VDCW.
C105	19A116192P1	Ceramic: 0.01 uF ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
C106	19A116192P2	Ceramic: 470 pF ±20%, 50 VDCW; sim to Erie 811-A050-W5R-471M.
C107	19A700219P10	Ceramic: 2.2 pF ±5%, 100 VDCW, temp coef 0 PPM.
C108	19A700219P24	Ceramic: 8.2 pF ±5%, 100 VDCW, temp coef 0 PPM.
C109	19A116192P1	Ceramic: 0.01 uF ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
C110	19A700219P48	Ceramic: 36 pF ±5%, 100 VDCW, temp coef 0 PPM.
C112	19A700219P10	Ceramic: 2.2 pF ±5%, 100 VDCW, temp coef 0 PPM.
C113	19A116192P2	Ceramic: 470 pF ±20%, 50 VDCW; sim to Erie 811-A050-W5R-471M.
C114	19A700219P33	Ceramic: 15 pF ±5%, 100 VDCW, temp coef 0 PPM.
C115	19A700219P48	Ceramic: 36 pF ±5%, 100 VDCW, temp coef 0 PPM.
C116	19A700219P14	Ceramic: 3.3 pF ±5%, 100 VDCW, temp coef 0 PPM.
C117	19A116192P1	Ceramic: 0.01 uF ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
C118	19A700219P33	Ceramic: 15 pF ±5%, 100 VDCW, temp coef 0 PPM.
C119	19A700219P24	Ceramic: 8.2 pF ±5%, 100 VDCW, temp coef 0 PPM.
C120	19A700219P10	Ceramic: 2.2 pF ±5%, 100 VDCW, temp coef 0 PPM.
C121	19A700219P14	Ceramic: 3.3 pF ±5%, 100 VDCW, temp coef 0 PPM.
C122	19A700219P33	Ceramic: 15 pF ±5%, 100 VDCW, temp coef 0 PPM.
C123	19A701534P5	Tantalum: 2.2 uF, ±20%, 35 VDCW.
C124	19A700234P7	Polyester: 0.01 uF ±10%, 50 VDCW.
C125	19A700008P2	Variable: 2.28 to 14.13 pF; sim to EF Johnson 187-0109-005.
C126	19A700219P14	Ceramic: 3.3 pF ±5%, 100 VDCW, temp coef 0 PPM.
C127	19A700008P3	Variable, air: 1.56 to 4.86 pF; sim to EF Johnson 187-0103-005.
C128	19A116192P1	Ceramic: 0.01 uF ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
C129	19A116192P2	Ceramic: 470 pF ±20%, 50 VDCW; sim to Erie 811-A050-W5R-471M.
C130	19A700219P33	Ceramic: 15 pF ±5%, 100 VDCW, temp coef 0 PPM.
C131	19A700219P26	Ceramic: 10 pF ±5%, 100 VDCW, temp coef 0 PPM.
C132	19A700219P24	Ceramic: 8.2 pF ±5%, 100 VDCW, temp coef 0 PPM.
C133	19A700008P2	Variable: 2.28 to 14.13 pF; sim to EF Johnson 187-0109-005.
C134	19A700008P3	Variable, air: 1.56 to 4.86 pF; sim to EF Johnson 187-0103-005.
C135	19A700219P33	Ceramic: 15 pF ±5%, 100 VDCW, temp coef 0 PPM.
C136	19A116655P14	Ceramic disc: 470 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C137 and C138	19A701534P7	Tantalum: 10 uF ±20%, 16 VDCW.
C139	19A701225P1	Electrolytic: 15 uF -10 +75%, 25 VDCW; sim to Sprague 501D156-G025BB1C.
C140	19A700006P32	Mica: 82 pF ±5%, 100 VDCW; sim to Underwood 3HS0020.
C141	19A701534P1	Tantalum: 0.1 uF ±20%, 35 VDCW.
C142	19A700004P2	Metallized polyester: 0.1 uF ±10%, 63 VDCW.
C143	19A116192P2	Ceramic: 470 pF ±20%, 50 VDCW; sim to Erie 811-A050-W5R-471M.
C144 thru C146	19A143565P8	Ceramic: 0.1 uF ±10%, 50 VDCW.
C147 thru C149	19A701534P4	Tantalum: 1 uF ±20%, 35 VDCW.
C150 thru C152	19A116656P15J0	Ceramic disc: 15 pF ±5%, 500 VDCW, temp coef 0 PPM.
C401 and C402	19A700219P26	Ceramic: 10 pF ±5%, 100 VDCW, temp coef 0 PPM.
C403	19A700233P7	Ceramic: 1000 pF ±20%, 50 VDCW.
C404	19A700219P18	Ceramic: 4.7 pF ±5%, 100 VDCW, temp coef 0 PPM.
C405	19A700235P24	Ceramic: 82 pF ±5%, 50 VDCW.
C406 and C407	19A700233P7	Ceramic: 1000 pF ±20%, 50 VDCW.
C408	19A700235P16	Ceramic: 18 pF ±5%, 50 VDCW.
C409 and C410	19A700233P7	Ceramic: 1000 pF ±20%, 50 VDCW.
C501	19A700235P22	Ceramic: 56 pF ±5%, 50 VDCW.
C502	19A700233P5	Ceramic: 470 pF ±20%, 50 VDCW.
C503 thru C505	19A700234P7	Polyester: 0.01 uF ±10%, 50 VDCW.
C506	19A700235P12	Ceramic: 8.2 pF ±0.25 pF, 50 VDCW.
C507	19A700235P15	Ceramic: 15 pF ±5%, 50 VDCW.
C508	19A700235P20	Ceramic: 39 pF ±5%, 50 VDCW.
C509	19A700234P5	Polyester: 4700 pF ±10%, 50 VDCW.
C510	19A701534P4	Tantalum: 1 uF ±20%, 35 VDCW.
C511	19A701534P2	Tantalum: 0.22 uF ±20%, 35 VDCW.
C512 thru C514	19A701534P4	Tantalum: 1 uF ±20%, 35 VDCW.
C515 and C516	19A701534P5	Tantalum: 2.2 uF, ±20%, 35 VDCW.
C517 and C518	19A700233P3	Ceramic: 220 pF ±10%, 50 VDCW.
C519	19A700233P7	Ceramic: 1000 pF ±20%, 50 VDCW.
C520	19A701534P4	Tantalum: 1 uF ±20%, 35 VDCW.
C521	19A134730P3	Electrolytic: 470 uF +100 -10%, 16 VDCW.
C522	19A700234P4	Polyester: 3300 pF ±10%, 50 VDCW.
C523	19A700233P7	Ceramic: 1000 pF ±20%, 50 VDCW.
C524	19A700002P25	Ceramic disc: 100 pF ±5%, 50 VDCW; temp coef -150 +60 PPM.
C525	19A700235P13	Ceramic: 10 pF ±5%, 50 VDCW.
C526	19A700235P22	Ceramic: 56 pF ±5%, 50 VDCW.
C601	19A700234P5	Polyester: 4700 pF ±10%, 50 VDCW.
C602	19A700234P6	Polyester: 6800 pF ±10%, 50 VDCW.
C603	19A700234P11	Polyester: 0.047 uF ±10%, 50 VDCW.
C604	19A701534P6	Tantalum: 4.7 uF ±20%, 35 VDCW.
C605	19A134730P1	Electrolytic: 47 uF +100 -10%, 16 VDCW.
C606	19A701534P4	Tantalum: 1 uF ±20%, 35 VDCW.
C607	19A700234P8	Polyester: .015 uF ±10%, 50 VDCW; sim to NISSEI AMXV or AMZV.
C608 and C607	19A700234P13	Polyester: 0.1 uF ±10%, 50 VDCW.
C610	19A701534P7	Tantalum: 10 uF ±20%, 16 VDCW.
C611	19A700234P13	Polyester: 0.1 uF ±10%, 50 VDCW.
C612	19A702250P113	Polyester: 0.1 uF ±10%, 50 VDCW.
C613	19A700004P6	Metallized Polyester: 0.47 ±10%, 63 VDCW.
C614	19A134730P2	Electrolytic: 220 uF +100 -10%, 25 VDCW.
C615 and C616	19A700234P12	Polyester: 0.068 uF ±10%, 50 VDCW.
C617	19A134730P1	Electrolytic: 47 uF +100 -10%, 16 VDCW.
C618	19A134730P2	Electrolytic: 220 uF +100 -10%, 25 VDCW.
C620 and C621	19A700233P5	Ceramic: 470 pF ±20%, 50 VDCW.
C623 and C624	19A700233P5	Ceramic: 470 pF ±20%, 50 VDCW.
C625	19A701534P2	Tantalum: 0.22 uF ±20%, 35 VDCW.
		- - - - - - - - - - DIODES - - - - - - - - - -
D101	19A116052P1	Silicon, hot carrier: Fwd drop .350 volts max.
D102	19A116052P2	Silicon, hot carrier: Fwd. drop .410 volts max.
D103	19A115100P2	Silicon; sim to Type 1N459A.
D401	19A116052P4	Silicon, hot carrier: Fwd. drop .350 volts max. (Includes D402).
D402		(Part of D401).
D501 and D502	19A700028P1	Silicon, fast recovery: fwd current 75 mA, 75 PIV; sim to Type 1N4148.
D601 thru D604	19A700028P1	Silicon, fast recovery: fwd current 75 mA, 75 PIV; sim to Type 1N4148.
D607	19A700028P1	Silicon, fast recovery: fwd current 75 mA, 75 PIV; sim to Type 1N4148.
D609	19A700028P1	Silicon, fast recovery: fwd current 75 mA, 75 PIV; sim to Type 1N4148.
		- - - - - - - - - JACKS AND RECEPTACLES - - - - - -
J101 and J102	19A701883P4	Contact, electrical; sim to AMP 86444-1. (Strip Form).
J602	19A116659P103	Connector, printed wiring: 4 contacts rated at 5 amps; sim to Molex 09-60-1041.
J603	19A700072P30	Connector, printed wiring: 4 contacts rated at 2.5 amps; sim to Molex 22-27-2041.
		- - - - - - - - - - RELAYS - - - - - - - - - -
K601	19A700061P1	Hermetic sealed: 180 to 341 ohms coil res, 8-16.3 VDC; sim to GE 3SAV1760A2, CP Clare HFW-1201558, or Potter-Brumfiled HCW6160.
		- - - - - - - - - - INDUCTORS - - - - - - - - -
L101 thru L103	19J706154P10	RF Coil: sim to Paul Smith SK802-1.
L104	19J706085P4	Coil, RF: 0.065 uH ind., ±5%; sim to Paul Smith LM-2.
L105	19J706085P8	Coil, RF: 0.110 uH ind., ±5%; sim to Paul Smith LM-2.
L106	19B209420P101	Coil, RF: .10 uH ±10%, 0.8 ohms DC res max; sim to Jeffers 4416-1K.
L107 thru L109	19B233593P4	Coil, RF: sim to Paul Smith SK-832-1.
L110	19A701524P1	Coil.
L111	19A701524P5	Coil.
L112	19A701524P2	Coil.
L113	19A701524P3	Coil.
L114	19A701524P1	Coil.
L115	19B209420P101	Coil, RF: .10 uH ±10%, 0.8 ohms DC res max; sim to Jeffers 4416-1K.
L116	19A701524P4	Coil.
L117	19A701524P1	Coil.
L118	19B209420P101	Coil, RF: .10 uH ±10%, 0.8 ohms DC res max; sim to Jeffers 4416-1K.
L119	19A138298P1	Coil.
L120	19A702028P2	Coil.
L401 and L402	19B233593P2	Coil, RF: sim to Paul Smith SK-832-1.
L403	19B233593P1	Coil, RF: sim to Paul Smith SK-832-1.
L404	19B233593P2	Coil, RF: sim to Paul Smith SK-832-1.
L405	19B233593P1	Coil, RF: sim to Paul Smith SK-832-1.
L406	19A138400G1	Coil.
L407 and L408	19B233593P3	Coil, RF: sim to Paul Smith SK-832-1.
L409	19A134729P4	Coil, RF: sim to Paul Smith SK-832-1.
L410	19A138400G1	Coil.
L411	19A136535P1	Coil.
L412	19J706083P23	Coil, RF: variable.
L413	19A701768G1	Coil.
L501	19A134729P4	Coil, RF: sim to Paul Smith SK-832-1.
L502	19B800691P1	Coil, RF: single pole, wire size No. 24 AWG.
L503 and L504	19A134747P1	Transformer, IF: 455 KHz.
L505	19J706029P4	Coil, RF: variable; sim to Paul Smith EF223.
L506	19A700024P1	Coil, RF: 100 nH ±10%, 0.08 ohms DC res max, 100 v.
L601	19A134741P1	Reactor, (Audio Freq): 75 nH ±10%.
		- - - - - - - - - - - - PLUGS - - - - - - - - - -
P101	19A116659P1	Connector, printed wiring: 3 contacts rated at 5 amps; sim to Molex 09-52-3032.
P901	19A116659P15	Connector, printed wiring: 4 contacts rated at 5 amps; sim to Molex 09-52-3042.
P903	19A116659P83	Connector, printed wiring: 7 contacts rated at 5 amps; sim to Molex 09-52-3072 SPECIAL.
P912	19A116659P15	Connector, printed wiring: 4 contacts rated at 5 amps; sim to Molex 09-52-3042.
		- - - - - - - - - - - - TRANSISTORS - - - - - - - -
Q101 thru Q105	19A134336P1	Silicon, NPN.
Q106	19A134697P1	Silicon, NPN.
Q107 and Q108	19A700023P2	Silicon, NPN; sim to Type 2N3904.
Q109	19A700022P1	Silicon, PNP; sim to Type 2N3906.
Q110	19A116742P1	Silicon, NPN.
Q401	19A134336P1	Silicon, NPN.
Q402	19A116818P1	N Channel, field effect.
Q501	19A116818P1	N Channel, field effect.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	GE PART NO.	DESCRIPTION
Q601 and Q602	19A116774P3	Silicon, NPN; sim to Type 2N5210.
Q603 thru Q605	19A134749P1	Silicon, PNP; sim to Type 2N5087.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R101	19A700106P39	Composition: 100 ohms ±5%, 1/4 w.
R102	19A700106P77	Composition: 3.9K ohms ±5%, 1/4 w.
R103	19A700106P93	Composition: 18K ohms ±5%, 1/4 w.
R104	19A700106P55	Composition: 470 ohms ±5%, 1/4 w.
R105	3R152P113J	Composition: 11K ohms ±5%, 1/4 w.
R106	19A700106P63	Composition: 1K ohms ±5%, 1/4 w.
R107	19A700106P45	Composition: 180 ohms ±5%, 1/4 w.
R108	19A700106P15	Composition: 10 ohms ±5%, 1/4 w.
R109	19A700106P39	Composition: 100 ohms ±5%, 1/4 w.
R110	19A700106P63	Composition: 1K ohms ±5%, 1/4 w.
R111	19A700106P81	Composition: 5.6K ohms ±5%, 1/4 w.
R112	3R152P511J	Composition: 510 ohms ±5%, 1/4 w.
R114	19A700106P39	Composition: 100 ohms ±5%, 1/4 w.
R115	19A700106P73	Composition: 2.7K ohms ±5%, 1/4 w.
R116	3R152P511J	Composition: 510 ohms ±5%, 1/4 w.
R117	19A700106P23	Composition: 22 ohms ±5%, 1/4 w.
R118	3R152P622J	Composition: 6200 ohms ±5%, 1/4 w.
R119	3R152P511J	Composition: 510 ohms ±5%, 1/4 w.
R120	19A700106P47	Composition: 220 ohms ±5%, 1/4 w.
R121	19A700106P69	Composition: 1.8K ohms ±5%, 1/4 w.
R122	19A700113P23	Composition: 22 ohms ±5%, 1/2 w.
R123	19A700106P63	Composition: 1K ohms ±5%, 1/4 w.
R124	19A700106P15	Composition: 10 ohms ±5%, 1/4 w.
R125	19A700106P29	Composition: 39 ohms ±5%, 1/4 w.
R126	19A700016P3	Variable, cermet: 4.7K ohms ±10%, 1/2 w.
R127	19A700106P71	Composition: 2.2K ohms ±5%, 1/4 w.
R128	19A700106P63	Composition: 1K ohms ±5%, 1/4 w.
R129	19A700106P83	Composition: 6.8K ohms ±5%, 1/4 w.
R130	19A700106P69	Composition: 1.8K ohms ±5%, 1/4 w.
R131	19A700106P55	Composition: 470 ohms ±5%, 1/4 w.
R132	19A700106P47	Composition: 220 ohms ±5%, 1/4 w.
R133	19A700106P57	Composition: 560 ohms ±5%, 1/4 w.
R401	19A700106P65	Composition: 1.2K ohms ±5%, 1/4 w.
R402	19A700106P75	Composition: 3.3K ohms ±5%, 1/4 w.
R403	19A700106P63	Composition: 1K ohms ±5%, 1/4 w.
R404	19A700106P39	Composition: 100 ohms ±5%, 1/4 w.
R405	19A700019P56	Deposited carbon: 39K ohms ±5%, 1/4 w.
R406	19A700019P57	Deposited carbon: 47K ohms ±5%, 1/4 w.
R407	19A700019P29	Deposited carbon: 220 ohms ±5%, 1/4 w.
R409	19A700019P31	Deposited carbon: 330 ohms ±5%, 1/4 w.
R501	19A700019P53	Deposited carbon: 22K ohms ±5%, 1/4 w.
R502 and R503	19A700019P54	Deposited carbon: 27K ohms ±5%, 1/4 w.
R505	19A700019P37	Deposited carbon: 1K ohms ±5%, 1/4 w.
R506	19A700019P48	Deposited carbon: 8.2K ohms ±5%, 1/4 w.
R507	19A700019P47	Deposited carbon: 6.8K ohms ±5%, 1/4 w.
R508 and R509	19A700019P41	Deposited carbon: 2.2K ohms ±5%, 1/4 w.

SYMBOL	GE PART NO.	DESCRIPTION
R510	19A700019P33	Deposited carbon: 470 ohms ±5%, 1/4 w.
R511	19A700019P43	Deposited carbon: 3.3K ohms ±5%, 1/4 w.
R512 and R513	19A700019P31	Deposited carbon: 330 ohms ±5%, 1/4 w.
R514	19A700019P39	Deposited carbon: 1.5K ohms ±5%, 1/4 w.
R515	19A700019P50	Deposited carbon: 12K ohms ±5%, 1/4 w.
R516	19A700019P35	Deposited carbon: 680 ohms ±5%, 1/4 w.
R517	19A700019P47	Deposited carbon: 6.8K ohms ±5%, 1/4 w.
R518	19A700019P48	Deposited carbon: 8.2K ohms ±5%, 1/4 w.
R519	19A700019P39	Deposited carbon: 1.5K ohms ±5%, 1/4 w.
R520	19A700019P49	Deposited carbon: 10K ohms ±5%, 1/4 w.
R521	19B800784P209	Variable: 10K ohms ±20%, 1/2 w; sim to Murata Type RVG0911V328.
R522	19A700019P49	Deposited carbon: 10K ohms ±5%, 1/4 w.
R523	19A700019P43	Deposited carbon: 3.3K ohms ±5%, 1/4 w.
R524 and R525	19A700019P56	Deposited carbon: 39K ohms ±5%, 1/4 w.
R526	19A700019P9	Deposited carbon: 4.7 ohms ±5%, 1/4 w.
R528	19A700019P36	Deposited carbon: 820 ohms ±5%, 1/4 w.
R601	19A700019P57	Deposited carbon: 47K ohms ±5%, 1/4 w.
R602	19A700019P53	Deposited carbon: 22K ohms ±5%, 1/4 w.
R603	19A700019P31	Deposited carbon: 330 ohms ±5%, 1/4 w.
R604	19A700019P52	Deposited carbon: 18K ohms ±5%, 1/4 w.
R605	19A700019P49	Deposited carbon: 10K ohms ±5%, 1/4 w.
R606	19A700019P66	Deposited carbon: 0.27M ohms ±5%, 1/4 w.
R607	19B800784P208	Variable: 10K ohms ±20%, 1/2 w; sim to Murata Type RVG0911V328.
R608	19A700019P47	Deposited carbon: 6.8K ohms ±5%, 1/4 w.
R609	19A701828P2	Thermistor: 470 ohms ±20%; sim to Phillips 2322-642-61471.
R610	19A700019P48	Deposited carbon: 8.2K ohms ±5%, 1/4 w.
R611	19A700019P26	Deposited carbon: 120 ohms ±5%, 1/4 w.
R612	19A700019P33	Deposited carbon: 470 ohms ±5%, 1/4 w.
R613	19A700019P36	Deposited carbon: 820 ohms ±5%, 1/4 w.
R614	19A700019P44	Deposited carbon: 3.9K ohms ±5%, 1/4 w.
R615	19A700019P57	Deposited carbon: 47K ohms ±5%, 1/4 w.
R616	19A700019P49	Deposited carbon: 10K ohms ±5%, 1/4 w.
R617	19A700019P68	Deposited carbon: 0.39M ohms ±5%, 1/4 w.
R618	19A700019P50	Deposited carbon: 12K ohms ±5%, 1/4 w.
R619 and R620	19A700019P54	Deposited carbon: 27K ohms ±5%, 1/4 w.
R621	19A700019P40	Deposited carbon: 1.8K ohms ±5%, 1/4 w.
R622	19A700019P31	Deposited carbon: 330 ohms ±5%, 1/4 w.
R623	19A700019P47	Deposited carbon: 6.8K ohms ±5%, 1/4 w.
R624	19A700019P58	Deposited carbon: 56K ohms ±5%, 1/4 w.
R625 and R626	19A700019P37	Deposited carbon: 1K ohms ±5%, 1/4 w.
R627	19A700019P27	Deposited carbon: 150 ohms ±5%, 1/4 w.
R628	19A700019P28	Deposited carbon: 180 ohms ±5%, 1/4 w.
R629	19A700019P48	Deposited carbon: 8.2K ohms ±5%, 1/4 w.
R631	19A700019P29	Deposited carbon: 220 ohms ±5%, 1/4 w.
R632	19A700019P1	Deposited carbon: 1 ohms ±5%, 1/4 w.
R633	19A700019P40	Deposited carbon: 1.8K ohms ±5%, 1/4 w.
R634	19A700019P13	Deposited carbon: 10 ohms ±5%, 1/4 w.
R635	19A700019P22	Deposited carbon: 56 ohms ±5%, 1/4 w.
R636A	19A700019P30	Deposited carbon: 270 ohms ±5%, 1/4 w.

SYMBOL	GE PART NO.	DESCRIPTION
R636B	19A700019P25	Deposited carbon: 100 ohms ±5%, 1/4 w.
R636C	19A700019P21	Deposited carbon: 47 ohms ±5%, 1/4 w.
R636D	19A700019P17	Deposited carbon: 22 ohms ±5%, 1/4 w.
R636E	19A700019P11	Deposited carbon: 6.8 ohms ±5%, 1/4 w.
R637	19A700019P35	Deposited carbon: 680 ohms ±5%, 1/4 w.
R638	19A700018P1	Deposited carbon: 1 ohm ±5%, 1/3 w.
R639	19A700019P25	Deposited carbon: 100 ohms ±5%, 1/4 w.
R640	19A700019P57	Deposited carbon: 47K ohms ±5%, 1/4 w.
R645	19A700019P49	Deposited carbon: 10K ohms ±5%, 1/4 w.
R646	19A700019P38	Deposited carbon: 1.2K ohms ±5%, 1/4 w.
R647	19A700019P52	Deposited carbon: 18K ohms ±5%, 1/4 w.
R648	19A700019P37	Deposited carbon: 1K ohms ±5%, 1/4 w.
		- - - - - - - - - - TEST POINTS - - - - - - - -
TP101	19A700152P1	Contact.
TP103	19A700152P1	Contact.
TP104	19A700152P1	Contact.
TP401	19A700152P1	Contact. (Quantity 2).
TP501	19A700152P1	Contact. (Quantity 2).
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - -
U101	19B209680P1	Mixer, balanced.
U501	19A134759P1	Linear, Dual Differential Amplifier, 14 Pin Dip.
U502	19A134766P1	Linear, Outline For 16-Pin Dip case.
U601	19A134769P2	Linear: sim to TDA 2002.
U602	19A138414G1	Regulator: 8.5 V.
		- - - - - - - - - - CABLES - - - - - - - - - -
W101 thru W108		Microstrip inductor. (Part of printed board 19D901259P1).
W401 thru W408		Microstrip inductor. (Part of printed board 19D901259P1).
W601		(Part of printed board 19D901259P1).
		- - - - - - - - - - SOCKETS - - - - - - - - - -
X501	19A702742P1	Crystal socket. (Quantity 2).
		- - - - - - - - - - CRYSTALS - - - - - - - - - -
		NOTE: When reordering give GE Part Number and specify exact frequency needed.
Y501	19B233066G9	Crystal: freq range 45.4675 MHz.
		- - - - - - - - - - - - NETWORKS - - - - - - - -
Z501	19B209613P3	Filter, bandpass: 45.0.125 ref freq, 13 KHz bandwidth.
Z502	19A702171P1	Filter, bandpass: 455 ±1.5 kHz; sim to Murata CFU455D2.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - -
U101	19A143904P2	RF Amplifier.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - -
	19B800576P1	Shield. (Used with Q106).
	19B232901P1	Support. (Secures printed board - Quantity 3).
	19A700069P1	Can. (Used with L409 & L501).
	19A701544P1	Can. (Used with L502 & L505).
	19D429946P2	Casting. (Located at L401-L407).
	19B850619G1	Casting. (Located at L101-L103).
	19B233285P1	Ground spring. (Located at C404).

SYMBOL	GE PART NO.	DESCRIPTION
	19A701874P1	Tab. (Located under W102 & W104 solder side of board).
	19A138451P1	Tuning slug. (Used with L101-L103 & L107-L109).
	19A701886P1	Spring. (Used with L107-L109, L401-L407, L409, L412 & L501).
	19A701785P5	Contact, electrical. (Located at A102 - Quantity 6).
	19A702364P208	Machine screw, metric: 2.5-.45 x 10MM. (Secures Q110, U601 & U602).
	19A700034P3	Hex nut, metric: M2.5 x 0.45. (Secures Q110, U601 & U602).
	19A700032P3	Lockwasher, tooth, steel, metric: 2.5. (Secures Q110, U601 & U602).
	19A702381P508	Screw, thd. form: No. 3.5-0.6 x 8. (Secures printed board).
	19A138451P2	Spring. (Used with L401-L405, L407, & L408).
	19A702364P106	Machine screw: TORX®Drive, No. M2-0.4 x 6. (Quantity 18).
	19C850671P1	Ground strap.
	19A700115P3	Insulator, plate.
	19A700068P1	Insulator, bushing.