TABLE OF CONTENTS

DESCRIPTION

The GE-MARC V™ synthesizer consists of ten boards that plug into a mother board to provide the receiver lst oscillator injection, as well as RF drive for the transmitter power amplifier. The synthesizer assembly provides four main functions. The four functions and their associated boards are as follows:

1. Channel Frequency Synthesizer
   - Reference ICOM
   - Voltage Controlled Oscillator and Filter
   - Divide by "N" Counter
   - Reference Counter
2. Phase Lock Loop
   - FM ICOM
   - Oscillator-Multiplier
   - Mixer
   - Phase Detector
   - Voltage Controlled Oscillator
3. Audio Shaping and Amplification
   - Audio Processor
4. Multiplication and Amplification
   - Doubler (to 800 MHz)
   - Amplifier (at 800 MHz)

A functional Block Diagram of the synthesizer is shown in Figure 2.

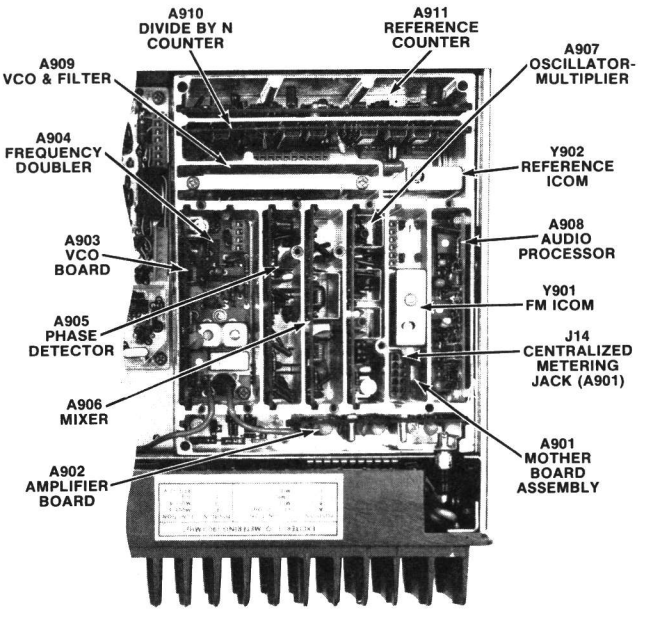


Figure 1 - Synthesizer Module Layout

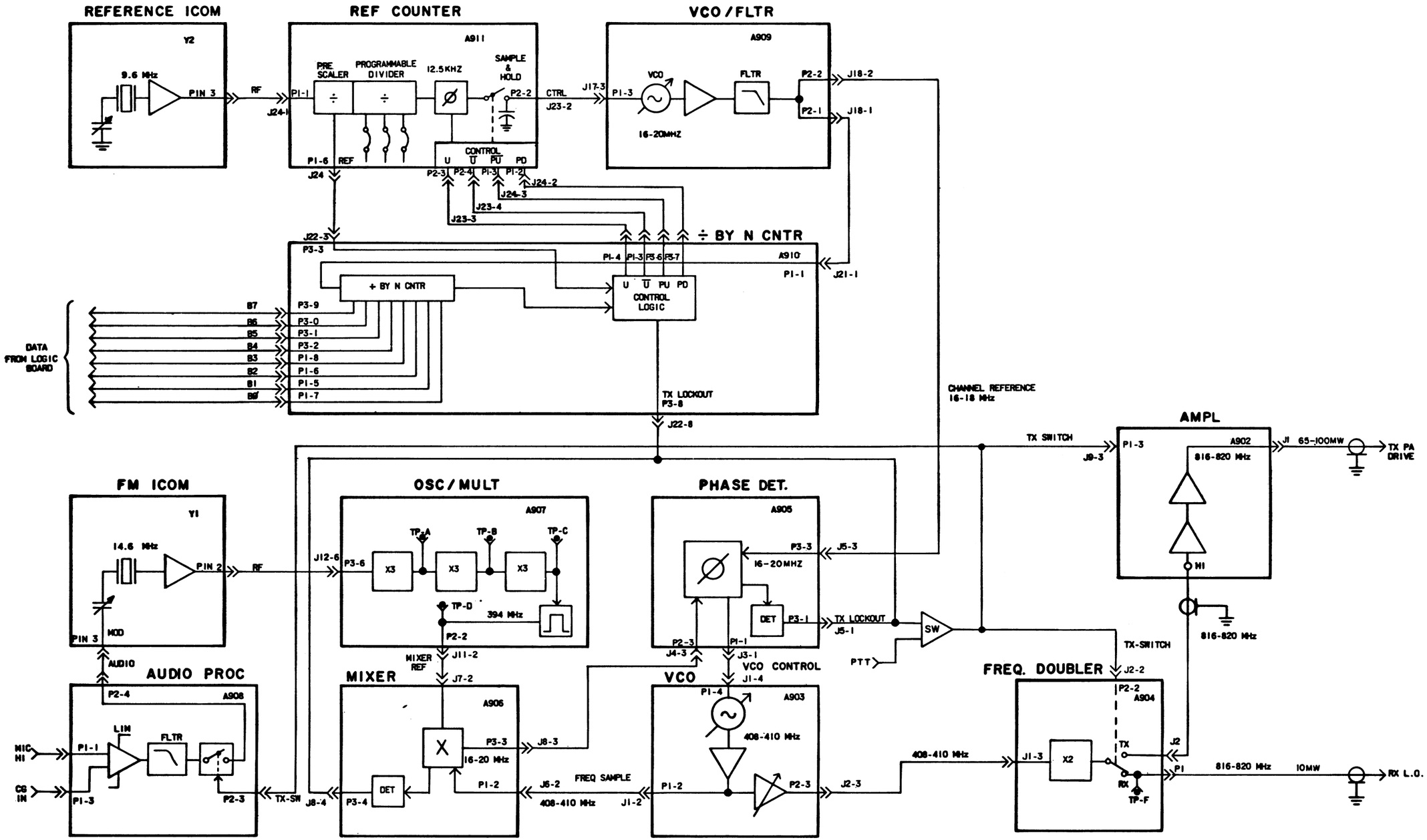


Figure 2 - Synthesizer Block Diagram

RC4172

OPERATION

Drive for the Power Amplifier and receiver mixer injection are derived from a single phase lock loop (PLL) which is referenced to a channel frequency synthesizer.

Programming of the synthesizer (from the logic board) determines the channel selection. The PLL Voltage Controlled Oscillator (VCO) output is mixed down to the channel synthesizer frequency from a reference ICOM that is multiplied up to the appropriate frequency.

CHANNEL SYNTHESIZER

Half-channel reference pulses are derived by counting down a 9.6 MHz frequency that is generated in a Reference ICOM. (The half-channel pulses are converted to full channel steps by the doubler.)

An interface stage is required to square up the output of the 9.6 MHz and drive the divide-by-16 low power Schottky counter. A divide-by-16 first stage was chosen to get the frequency well into the CMOS range, and also, the same type counter is used as the 15/16 counter in the VCO divide-by-N train.

Another interface stage converts TTL (transistor-to-transistor logic) levels to 10 volt CMOS levels and two more 4-bit counters are programmed to produce the half channel reference pulses of 12.5 kHz. Each pulse is used to reset a ramp generator and the ramp is sampled by a diode bridge. The hold capacitor is connected to the gates of an FET which acts as a source follower to provide the error voltage for the 16.0125 to 18.500 MHz pulse train.

The VCO is counted down by a divide-by-N train and the output pulses of this train are used to sample the reference ramp. This divide-by-N train uses the other LS TTL package as a dual modulus 15/16 scaler. The countdown train is a straight binary progression with no gaps from mimimum to maximum count. Eight programming leads are provided to interface with the logic board.

Since the loop bandwidth of the phase locked loop is less than 500 Hz, it is necessary to use an acquisition circuit to steer the VCO to the proper frequency where a lock can be obtained. This acquisition circuit also provides activity pulses that indicate an out-of-lock condition.

PHASE LOCK LOOP

The side-step-phase locked loop, followed by a frequency doubler on an amplifier produces the input drive for the Power Amplifier. The phase locked loop is locked to the channelization synthesizer and follows the channelization synthesizer output frequency on a one-to-one basis. This loop has its own crystal controlled oscillator which when multiplied up is used to mix the side step loops VCO down to the channel synthesizers output frequency. A doubly balanced modulator is used as a phase detector to produce an error voltage which is applied to the VCO.

An acquisition circuit is also required in the side-step loop to prevent false lock. The acquisition circuit produces a non-lock signal which, when OR'd with the channel synthesizer activity output is used to prevent the exciter from driving the Power Amplifier with an incorrect channel frequency.

An FM oscillator is used in the side-step loop to provide modulation for the transmitter.

CIRCUIT ANALYSIS

MOTHER BOARD A901

Mother board assembly A901 provides all interconnections for the plug-in synthesizer modules and ICOMs. The assembly also consists of a casting that provides shielding for the different modules and ICOMs.

Also included are centralized metering jack J14, logic board interface jack J19 and systems board interface jack J13.

Mounted on the board are additional filtering and regulator components, and a switching circuit (Q1 through Q3) switches the +10 volt DC supply to the amplifier board. The switching circuit is also disabled (and transmitter disabled) when an un-lock condition occurs in either the channel frequency synthesizer or the PLL.

PHASE LOCKED LOOP

AUDIO PROCESSOR A908

The transmitter audio processor contains audio circuitry consisting of two operational amplifiers, AR1-A and -B, a pre-emphasis circuit with amplitude limiting and a post limiter filter. A total gain of approximately 24 dB is provided by the audio processor (twenty dB by AR1-B and 4 dB by AR1-A).

Regulated +10 V is applied to a voltage divider consisting of R5 and R16. The +5 output from the voltage divider establishes the operating reference point for both operational amplifiers.

Audio from the microphone is applied to the audio processor at P1-1 (MIC HI) and coupled to the input of operational amplifier AR1-B. When the input signal to AR1B-6 is of a magnitude such that the amplifier

provides a nominal 20 dB gain. When the audio signal level at AR101B-7 exceeds 4 volts P-P, diodes CR101 and CR102 conduct on the positive and negative half cycles providing 100% negative feedback to reduce the amplifier gain to 1. This limits the audio amplitude at AR1B-7 to 5 volts P-P.

The amplified output of AR101-B is coupled through MOD ADJ control R3 to a second operational amplifier AR1-A. Audio MOD ADJ control (with tone) is set for a deviation of 4.75 kHz.

The tone input from P1-3 is applied to the audio processor through CG MOD ADJ R1. Tone is then applied to AR1A-2 where it is combined with the microphone audio.

A post limiter filter consisting of AR1-A, R12, R13, R14, C17 and C18 provides 12 dB per octave roll off. R13 and C5 provide an additional 6 dB per octave rolloff for a total of 18 dB.

SERVICE NOTE

R12 through R14 are 1% resistors. This tolerance must be maintained to assure proper operation of the post limiter filter. Use exact replacements as described in the Parts List.

The output of AR1-A is coupled through a temperature compensator and biasing network (RT1, R24 and R25) to amplifier Q1. The output of Q1 is applied to pin 9 of audio switching IC, U1.

A switched +10 volts at U1-3 turns the IC on to pass the transmit audio, and turns it off in the receive mode.

When the transmitter is not keyed, the +10 volts is removed from U1 and any audio or tone at U1-9 is shunted to ground. Where the transmitter is keyed, the 10 volts is applied to U1, turning it on. When turned on, U1 applies the transmit audio to the FM ICOM.

FM ICOM Y901

Audio from the audio processor applied to the FM ICOM varies the output frequency at an audio rate.

Modulation is accomplished with a hyperabrupt varicap (voltage variable capacitor) connected in series with the crystal feedback capacitors. The varicap impedance is the dominant impedance in the loop. This allows large swings of load capacity with modulation, therefore, large frequency shifts are achieved for the modulated input. Biasing for the modulation varicap is provided by zener diode VR2 and R1 connected across the 10-volt regulator input to the mother board. The 6.2 volts is applied to pin 6 of the FM ICOM.

The frequency modulated ICOM output is applied to the osc-mult board.

SERVICE NOTE

Proper ICOM operation is dependent on the closely-controlled input voltages from the 10 Volt regulator. Should the ICOMs shift off frequency, check the 10 Volt regulator module.

CAUTION

All ICOMs are individually compensated at the factory and cannot be repaired in the field. Any attempt to repair or change the ICOM frequency will void the warranty.

OSCILLATOR-MULTIPLIER A907

The oscillator-multiplier uses a dual-gate FET amplifier and two active multiplier stages to provide the reference signal for the PLL.

RF from the FM ICOM is connected through P3-6 to the 1st tuned circuit on the osc-mult board. The input circuit consists of L81, C6 and C7, and is tuned to the third harmonic (three times the FM ICOM output). The tuned circuit output is applied to the drain of high impedance FET amplifier Q1, and then applied to the base of 1st tripler Q2.

The collector circuit of Q2 is tuned by L83 to nine times the ICOM frequency, and is applied to the base of 2nd tripler, Q3. The collector circuit of Q3 is tuned by C25 to 27 times the ICOM frequency, and the output is applied to the mixer board through P2-2.

Four metering points are available at centralized metering jack J14 to permit tuning the osc-mult board. The amplifier, the two tripler stages and relative output power can be metered on positions "A" through "D" on GE Test Set 4EX3A11.

MIXER A906

Mixer A906 consists of a two stage buffer-amplifier (Q1 and Q2), a doubly balanced mixer (U1), a low-pass filter and an amplitude sensing switch circuit (Q3 and AR1).

The buffer-amplifier consists of two cascaded common gate FET's whose primary function is VCO isolation.

The VCO input to the buffer-amplifier is through P1-2. The output of amplifier Q2 feeds one input port of the balanced mixer. The other input port of the mixer is fed from the Oscillator/Multiplier chain through P2-2. The mixer output is fed through the 20 MHz

low-pass filter to the Phase Detector P3-3. This same output is fed to amplifier Q3. The output of amplifier Q3 is rectified, and applied to a transmitter Enable control AR1 which disables the transmitter if the level of the mixer output drops below a safe operating level. Approximately 4 dB of hysteresis has been designed into the switch to avoid switching jitter.

PHASE DETECTOR A905

Signal inputs to the phase detector are a reference frequency to which a VCO is to be locked, and a variable frequency (the VCO or a mixer output representative of the VCO). These two signals are applied to the inputs of the phase detector (U1), an active, doubly-balanced mixer.

The output of the phase detector is amplified by Q1 and Q2, and used to either correct a VCO to a phase lock, or, if a frequency differance between the reference and VCO is detected by CR1 and CR2, the output of AR1-A will go low and allow AR1-B to discharge C9 with a negative going pulse.

Capacitor C9 is part of the lead-lag filter on the VCO control line. C9 will then be charged by current source Q3 until the VCO frequency is within the natural locks range of the loop. When the VCO is within lock range, the output of AR1-A will go high, disabling pulse generator AR1-B and current source Q3, and a phase lock should result. The output of AR1-A is brought out to a connector through a diode and is used as a transmitter RF hold off control (RF Amp Switch).

VCO A903

Module A903 consists of a voltage-controlled oscillator (Q1) and two buffer amplifiers (Q2 and Q3).

The oscillator is a common gate FET whose operating frequency is set by a resonant circuit consisting of C3 and L2.

The oscillator has two outputs. One output is applied to the mixer board through P1-2, and the other is applied to buffer amplifiers Q2 and Q3. The amplifier output is coupled through P2-3 to the doubler board. Output level control R7 is set for 0.7 volt DC (refer to the Transmitter Alignment Procedure).

MULTIPLIER & AMPLIFIER

DOUBLER A904

The phase locked loop synthesizer output (approximately 400 MHz) is applied to the base of frequency doubler Q1. The output of Q1 is tuned to twice the input frequency by two helical resonators Z1 and Z2. The 800 MHz output is applied to RF switching relay K1.

In the receive mode, the RF signal is coupled through the normally-closed contacts of K1 to provide the 7 milliwatt, receiver 1st oscillator injection voltage. In the transmit mode, K1 is energized and the RF is applied through J2 to the transmit amplifier module.

A metering circuit (CR3, C11, R7 and R8) is provided for setting Level Control R7 on the VCO module. Metering is available at centralized metering jack J14 on the mother board.

AMPLIFIER A902

Amplifier A902 consists of two broadband power amplifier stages. Keying the transmitter causes the +10 volt supply (switched by A901-Q1 through Q3) and RF signal to be applied to the amplifier module. The 65 milliwatt output is connected through J1 to drive the 800 MHz power amplifier board.

CHANNEL FREQUENCY SYNTHESIZER

REFERENCE COUNTER A911

Reference counter A911 divides the 9.6 MHz reference ICOM down to a frequency of 12.5 kHz. This half-channel frequency is used as a reference frequency in the phase detector module.

The output of Reference ICOM Y902 is coupled thru C6 to the base of buffer stage Q1. The collector of Q1 is tied to pin 2 of the PRE-SCALER Counter U1. The output of U1 is taken from U1-Q3 (fourth flip-flop) and applied to interface stage Q2. Q2 matches the output of U1 to the two cascaded CMOS counters U2 and U3.

U2 and U3 are programmable so that the interface output of pulse amplifier Q3 will deliver the appropriate reference pulses to the phase detector.

Q7 is a programmable current generator that charges C9 to produce a linear ramp.

The reference pulses are amplified and inverted through Q4, and quickly discharge ramp capacitor C9 so that a linear saw tooth waveform is produced at the reference repetition rate.

This saw tooth waveform is presented to the AC input side of the diode bridge (CR5-CR8) that is normally reversed biased. The other AC port of the diode bridge is connected to a hold capacitor C11.

Current sources Q9 and Q10 are pulsed on by negative going pulse $\overline{U}$ and positive going pulse U that cause the diode bridge to conduct. During this short time period, the level of voltage of the ramp at that time charges or discharges C11 to that voltage. U and $\overline{U}$ are the result of a counted down VCO frequency to be corrected. Q11 is an FET source follower whose input impedance is extremely high so that C11 will not be discharged appreciably during the AC switch's (diode bridge) OFF time. When pulsed on Q5 and Q6 will change the charge of C11 when large changes of the VCO control voltage are required. Q5 and Q6 are controlled by the output of a frequency detect circuit.

VCO & FILTER A909

The VCO and Filter is a voltage controlled oscillator and a Low Pass filter to attenuate the harmonic output of the VCO. Q1 and Q2 are FET's connected as an oscillator. The tuned circuit of this oscillator consists of the inductance in transformer T1 and the capacity of the three varactors CR1, CR2, and CR3.

The oscillator will operate at any frequency from approximately 15 MHz to 20 MHz depending on the setting of the trimmer in T1 and the capacity of the varactors which is controlled by the amount of + DC voltage applied to them. The control voltage is filtered by L1, C4, R3 and C3. C4 also provides an RF ground to the cathode side of the varactors.

The output of the VCO is taken from the drain of Q1 through a down match L2 circuit (L2 and C6) to approximately a 50 ohm impedance. The low pass filter circuit (L3, L4, and L5 and C7 thru C12) attenuate the harmonics so that there will be no interference by them in the circuits that the VCO drives.

Resistors R7 and R7 thru R12 at the output of the filter are pads that protect the circuits that this VCO drives from interfering with each other and also keeps those circuits from interfering with the VCO.

DIVIDE BY "N" COUNTER

The divide by "N" counter is used to divide the RF frequency of a voltage controlled oscillator (VCO) down to a pre-determined step size (or frequency) where it is compared with a reference frequency in a phase detector. The output of the phase detector is then used to correct the VCO's frequency until the counted-down-frequency maintains a phase lock with the reference frequency.

By changing the divide number in the programmable counter, the VCO's output frequency can be made to change in steps as small as the reference frequency applied to the phase detector, or multiples of that reference. The frequency to be divided (or counted-down) is amplified, shaped, and level controlled by buffer Q1.

The collector of Q1 is DC coupled to a four bit binary up counter U1. U1 divides the incoming frequency by 16 most of the time and this 1/16 frequency is used by the remainder of the counter as a clock. U1 can also be made to divide by 15 on a controlled basis and therefore is called a 15/16 dual module pre-scaler. Q2, connected to the output of U1, inverts the negative going 15th count pulse and puts a positive-going load pulse into the pre-set enable.

At the next positive going edge of the clock input (pin 2), the code presented to P0, P1, P2 and P3 will be preset into the counter and the counter will progress from that state to its highest count (1111) where it will again load the number at the P0 thru P3 inputs. If only P0 is changed and zero's are loaded in P1, P2 and P3, the total count of U1 when P0 is zero will be 16.

When P0 is programmed for a one, then the total count of U1 will be 15 because the 0000 state has been skipped.

The "B" section of U7 controls the P0 input of U1 which in turn is controlled by counter U5. U5 in effect tells U1 how many times to count 15 and then the rest of the time to count 16 until U8 and U9 have run their preset number to zero. When U8 and U9 get to zero the output of U9 produces, through U7A, a pulse which sets all of the low speed counters (U5, U8 and U9) to the number that the input frequency at P1-1 is to be divided by + one count because of the additional count caused by U7A being in the Loop.

The clock used for all IC's except U1 is the output of the fourth flip-flop of U1 through U1-Q3, an interface between TTL and CMOS levels. The maximum divide number is when all "ones" are present at the programming inputs of U5, U8 and U9. The next highest number of divisions is all "ones" and a single zero at P1 of U5. This causes U1 to count 15 one time and all of the remainder of the number count 16. Therefore, the division is reduced by one count or moved from the highest frequency channel to the next highest frequency channel.

Output pulses (U) at P1-4 and $\overline{U}$ (P1-3) is a loop and will always have the same repetition rate as the reference frequency at the phase detector. This is because the VCO has been changed in frequency by the phase detector to make it true, therefore the VCO's frequency will be the reference frequency at the phase detector multiplied by the counter's programmed number, plus one reference frequency. In order to have an orderly linear binary progression of the divide number, U5 is an "up" counter while U8 and U9 act as a cascaded "down" counter.

U2, U3, and U4 make up a circuit that can detect a frequency error between the

counted down VCO (U) and the reference (R) at the phase detector. This circuit also delivers pulses, pump-up (PU) and pump-down (PD) to correct the VCO to within a cycle so that a phase lock can be achieved.

Once the phase lock is made, the PU and PD pulses will not be produced over the 360° phase difference that might exist during lock.

U2 is a JOHNSON counter that is clocked by both the U (unknown) frequency to be corrected and R (reference). When the lock is present, the outputs of U2A(Q) and U2B(Q) will be changing in an orderly fashion. This change is detected by U3 (wired as an exclusive OR) and is applied to U4A and U4B, where the result is again clocked by R and U.

The flip-flop of U4 will only have a change in output if the two frequencies are not the same. If the unknown (U) is higher in frequency than R, U4B($\overline{Q}$) will pulse high. If the unknown is lower in frequency than R, U4A($\overline{Q}$) will pulse low. As the difference frequency becomes less, a smaller number of pulses will be produced.

Q4 is used as an OR gate whose collector goes low when either PU or PD pulses occur. This output is used as the transmitter lockout control.

MAINTENANCE

The Synthesizer was designed for ease of servicing and minimum maintenance. All circuit modules can be unplugged from Mother board A901 for routine inspection. Test Kit 19A138366G1 (OPTION 2310) contains three different extender boards, an alignment tool, and an ICOM puller. This kit is recommended for servicing any of the modules out of the Mother board while maintaining circuit connections.

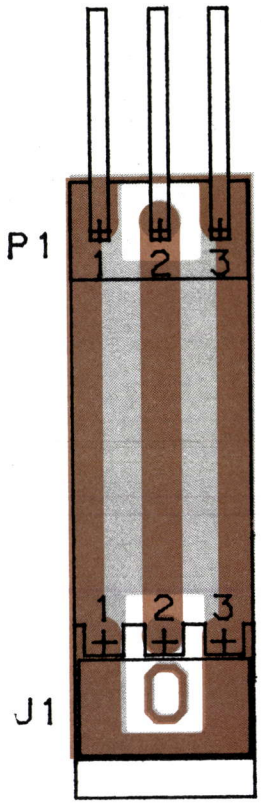
CAUTION

Do NOT use RF Stripline extender board 19B233184G1 except on RF jacks J6, J7 and J11; the two outside runs are connected together and the center run is the conductor. For all other extender board connections, use extenders 19B223185G1 (3 Pins) and 19B223186G1 (4 Pins) or combinations of these two boards as required. For identification of the extender boards, refer to the Test Kit Service Sheet as listed in the Table of Contents.

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

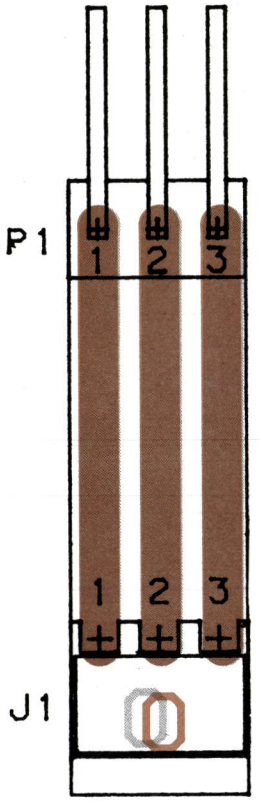
GENERAL ELECTRIC*
U.S.A.

RF STRIPLINE EXTENDER
19B233184G1



(19B233184, Rev. 2)
(19A138157, Sh. 1, Rev. 0)
(19A138157, Sh. 2, Rev. 0)

EXTENDER
19B233185G1



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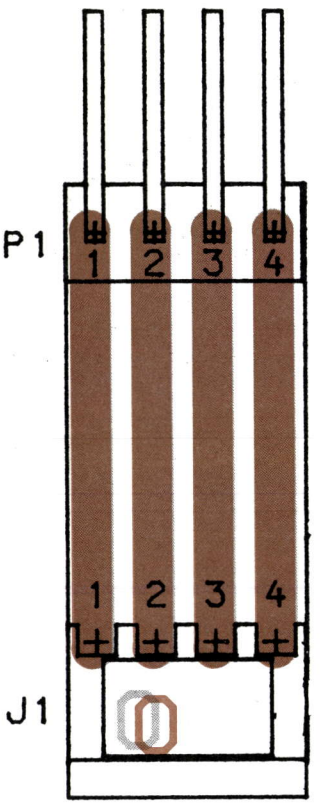

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(19A138361, Sh. 1, Rev. 0)
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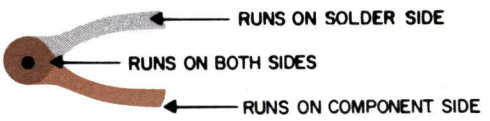
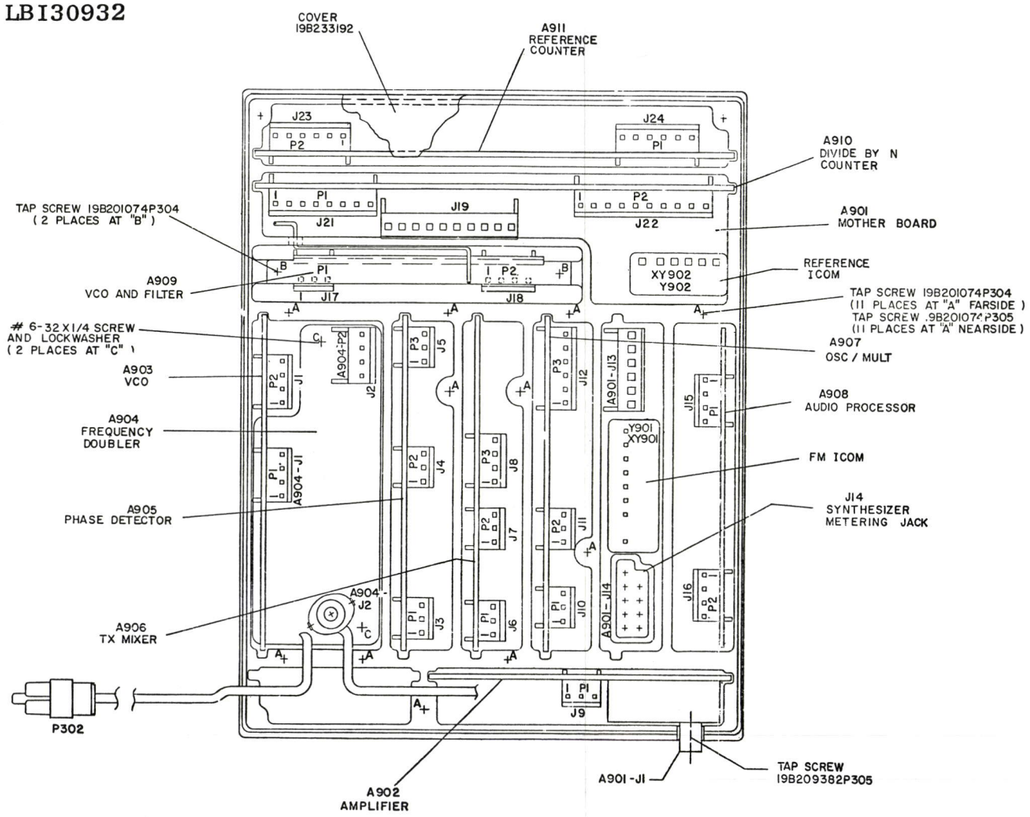


SERVICE SHEET

(PART OF TEST KIT 19A138366G1)



(19C331121, Rev. 1)

CONNECTIONS CHART		
FROM	TO	WIRE
H1	H2	T20-BL

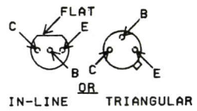


Figure 1

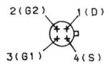


Figure 2

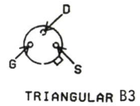


Figure 3

Figure 4

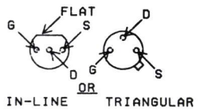
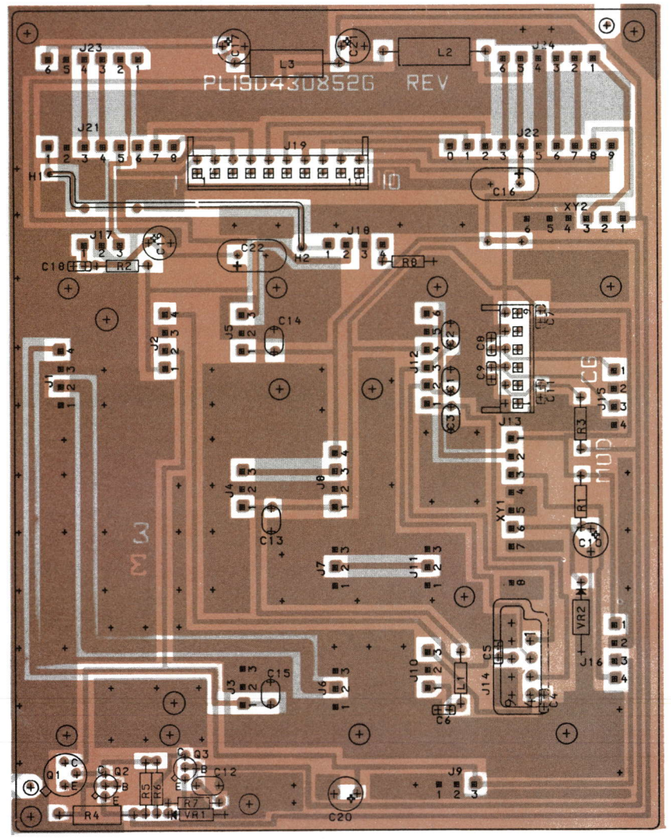


Figure 5

NOTES:

1. ALL VIEWS ARE FROM TOP.
2. LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

MOTHER BOARD A901

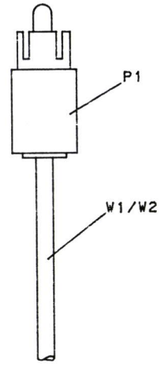


(19D430854, Rev. 3)
(19A143003, Sh. 1, Rev. 3)
(19A143003, Sh. 2, Rev. 3)

TRANSISTOR LEAD IDENTIFICATION

(Figure reference in box)

TRANSISTOR	MOTHER BOARD A901		VCO A903		PHASE DET. A905	TX MIXER A906	OSC/MULT A907	AUDIO PROC A908	VCO FILTER A909	÷N A910	REF. COUNTER A911
Q1	1		5		1	3	4	1	5	1	1
Q2	1		5		1	3	1		5	1	1
Q3	1		5		1	1	1			1	1
Q4-10										1	1
Q11											2
Q51							4				
Q52							1				



FREQUENCY DOUBLER A904

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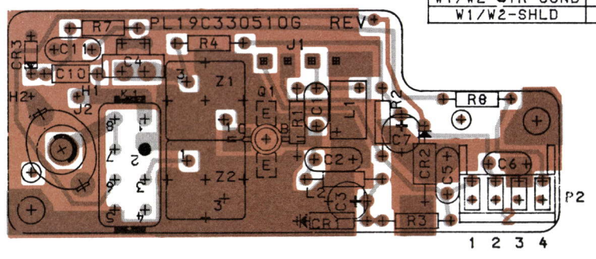
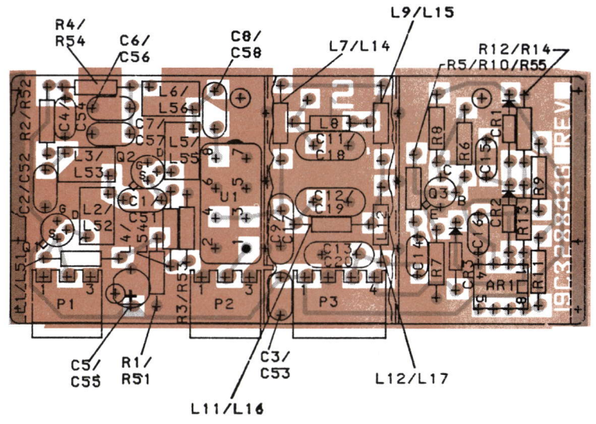
W1/W2-SHLD	H2

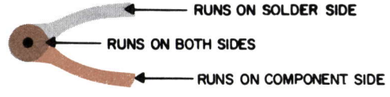


(19C330512, Rev. 2)
(19A142939, Sh. 1, Rev. 2)
(19A142939, Sh. 2, Rev. 2)

TRANSMITTER MIXER A906



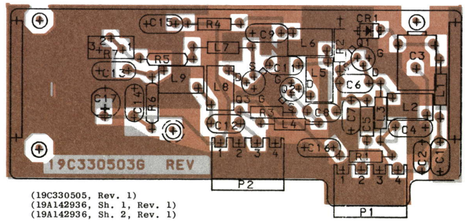
(19C328844, Rev. 3)
(19A137662, Sh. 1, Rev. 2)
(19A137662, Sh. 2, Rev. 1)



OUTLINE DIAGRAMS

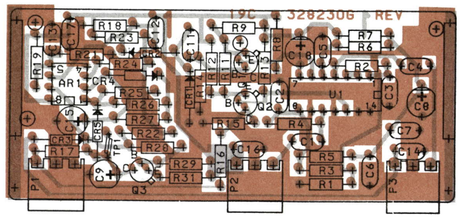
GE-MARC V SYNTHESIZER

VCO A903



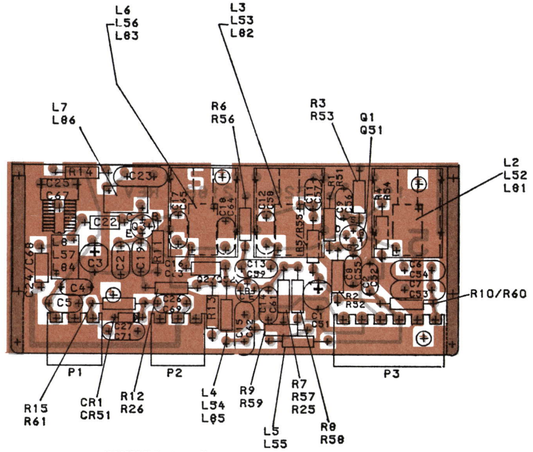
(19C330505, Rev. 1)
(19A142936, Sh. 1, Rev. 1)
(19A142936, Sh. 2, Rev. 1)

PHASE DETECTOR A905



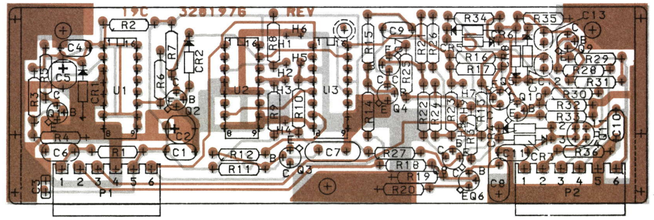
(19C328620, Rev. 1)
(19A138137, Sh. 1, Rev. 1)
(19A138137, Sh. 2, Rev. 1)

OSC/MULT A907



(19C328615, Rev. 6)
(19A138129, Sh. 1, Rev. 5)
(19A138129, Sh. 2, Rev. 5)

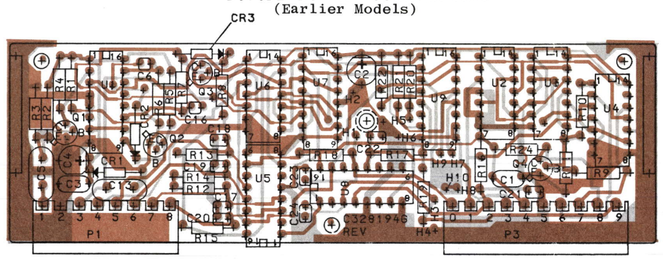
REFERENCE COUNTER A911



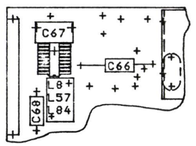
(19C328628, Rev. 5)
(19A138127, Sh. 1, Rev. 5)
(19A138127, Sh. 2, Rev. 6)

CONNECTIONS CHART			
GROUP 1,3(UHF)		GROUP 2(VHF)	WIRE
FROM:	TO:	FROM:	TO:	
H1	H2	H3	H4	DA
H3	H4	H5	H6	DA
H7	H8	H7	H9	DA

DIVIDE BY "N" COUNTER A910
(Earlier Models)



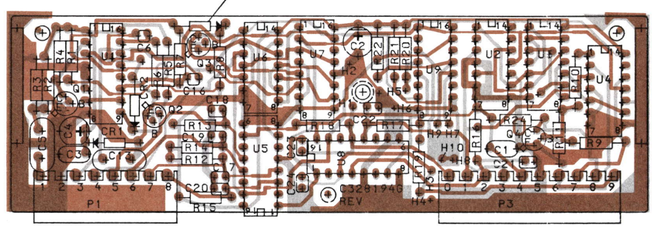
(19C330691, Rev. 4)
(19A143219, Sh. 1, Rev. 3)
(19A143219, Sh. 2, Rev. 4)



CONNECTIONS CHART		
GROUP 3 & 4 GE MARC V SYNTH.		
FROM:	TO:	WIRE
H7	H8	DA

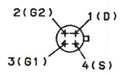
FOR PL19C328218G2

DIVIDE BY "N" COUNTER A910
(Later Models)



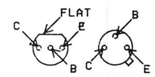
(19C330691, Rev. 4)
(19A144330, Sh. 1, Rev. 0)
(19A144330, Sh. 2, Rev. 0)

LEAD IDENTIFICATION FOR Q11



TOP VIEW

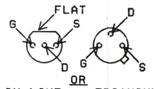
LEAD IDENTIFICATION FOR Q1-Q10



IN-LINE OR TRIANGULAR
TOP VIEW

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

LEAD IDENTIFICATION FOR Q1 THRU Q3



IN-LINE OR TRIANGULAR
TOP VIEW

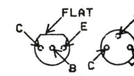
NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

LEAD IDENTIFICATION FOR Q1 & Q51

TOP VIEW

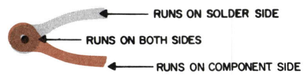
NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

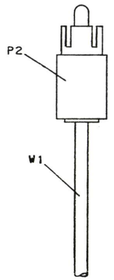
LEAD IDENTIFICATION FOR Q2,Q52 & Q3



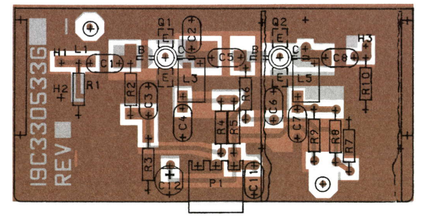
IN-LINE OR TRIANGULAR
TOP VIEW

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



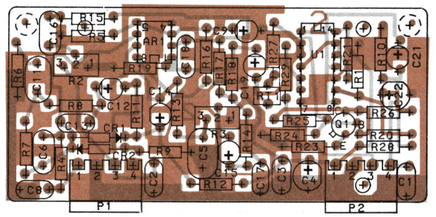


TX AMPLIFIER A902



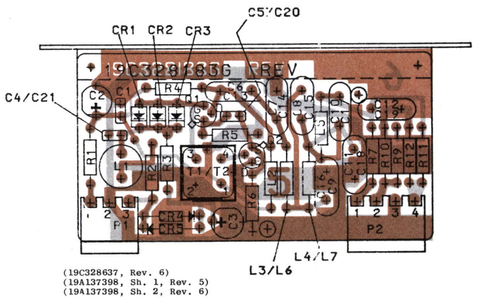
(19C330535, Rev. 0)
(19A142971, Sh. 1, Rev. 1)
(19A142971, Sh. 2, Rev. 1)

AUDIO PROCESSOR A908



(19C330517, Rev. 2)
(19A142952, Sh. 1, Rev. 2)
(19A142952, Sh. 2, Rev. 2)

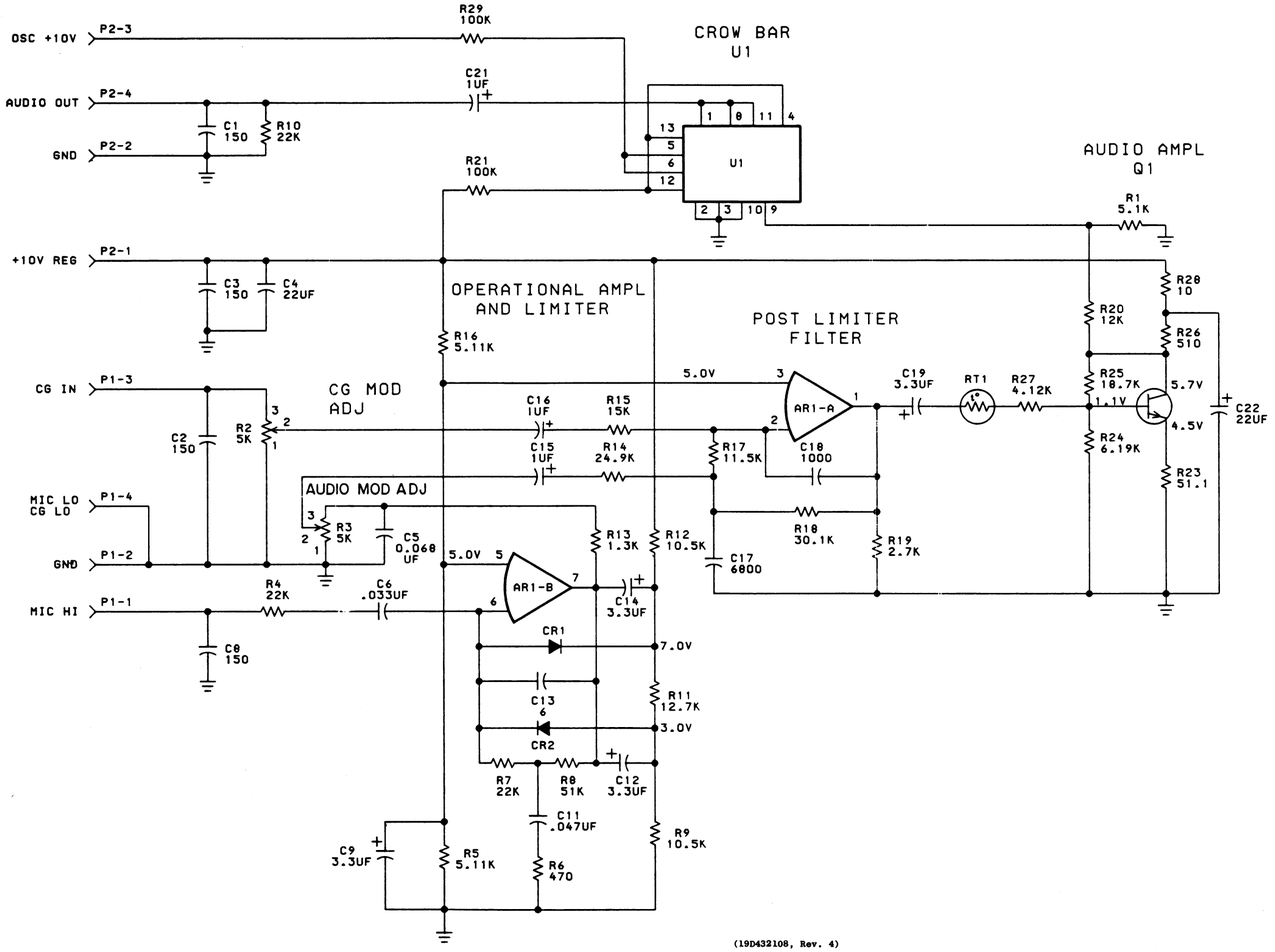
VCO/FILTER A909



(19C328637, Rev. 6)
(19A137398, Sh. 1, Rev. 5)
(19A137398, Sh. 2, Rev. 6)

OUTLINE DIAGRAMS

GE MARC V SYNTHESIZER A902 - A911



(19D432108, Rev. 4)

ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF=MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH=MILLIHENRYS OR H=HENRYS.

VOLTAGE READINGS

VOLTAGE READINGS ARE TYPICAL READINGS MADE WITH THE TRANSMITTER KEYED, AND MEASURED WITH A 20,000 OHMS-PER-VOLT METER WITH REFERENCE TO A- AND NOT CHASSIS GROUND. AN RF CHOKE (25-50 MICROHENRYS) IS USED IN THE HOT METER LEAD TO AVOID DETUNING RF CIRCUITS.

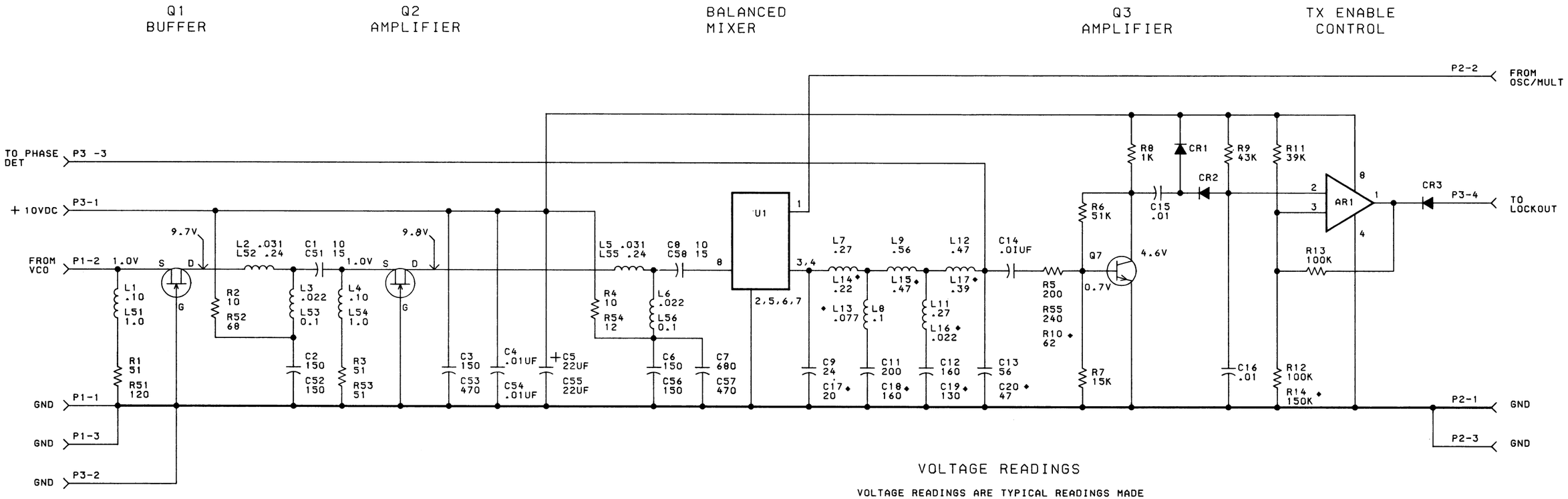
POWER AND GND CONNECTIONS

DEVICE	V+(10V) PIN NO.	GND PIN NO.
AR1	8	4
U1	14	7

MODEL NO.	REV. LETTER	IDENTIFICATION
PL19C330515G1	A	MARC V SYNTH

SCHEMATIC DIAGRAM

AUDIO PROCESSOR A908



VOLTAGE READINGS

VOLTAGE READINGS ARE TYPICAL READINGS MADE WITH THE TRANSMITTER KEYED, AND MEASURED WITH A 20,000 OHMS-PER-VOLT METER WITH REFERENCE TO A- AND NOT CHASSIS GROUND. AN RF CHOKE (25-50 MICROHENRYS) IS USED IN THE HOT METER LEAD TO AVOID DETUNING RF CIRCUITS.

ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K-1000 OHMS OR MEG-1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF-MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH-MILLIHENRYS OR H-HENRYS.

NOTE:
1. UHF (GR1) COMPONENTS ARE NUMBERED FROM 1 TO 49. VHF (GR2) COMPONENTS ARE NUMBERED FROM 51 TO 99. GE MARC V (GR3) COMPONENTS ARE NUMBERED FROM 1 TO 49. WHERE MULTIPLE DESIGNATIONS ARE GIVEN "◆" DENOTES GR3 COMPONENTS.

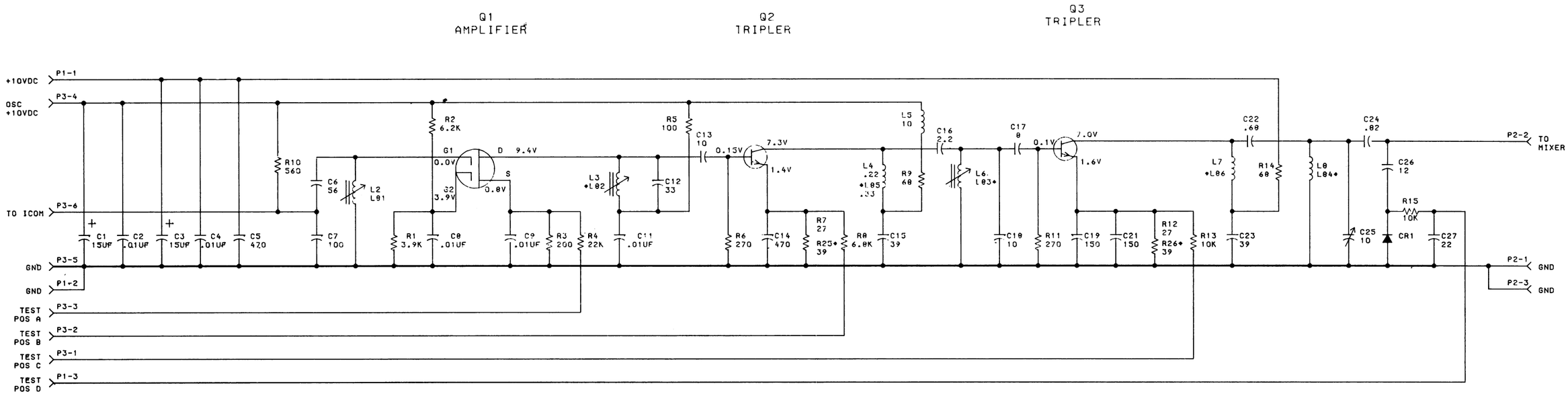
THIS ELEM DIAG APPLIES TO		IDENTIFICATION
MODEL NO	REV LETTER	
PL19C320843 G1	A	UHF COMMON CARRIER
PL19C320843 G2		VHF COMMON CARRIER
PL19C320843 G3		GE MARC V

(19D430127, Rev. 6)

SCHEMATIC DIAGRAM

TRANSMITTER MIXER BOARD A906

Issue 1



• PRESENT IN GROUP 3 ONLY.

THIS ELEM DIAG APPLIES TO		
MODEL NO	REV LETTER	IDENTIFICATION
PL19C32821BG1 PL19C32821BG3	A A	UHF COMM. CARR. GE-MARC V

ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF=MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH=MILLIHENRYS OR H=HENRYS.

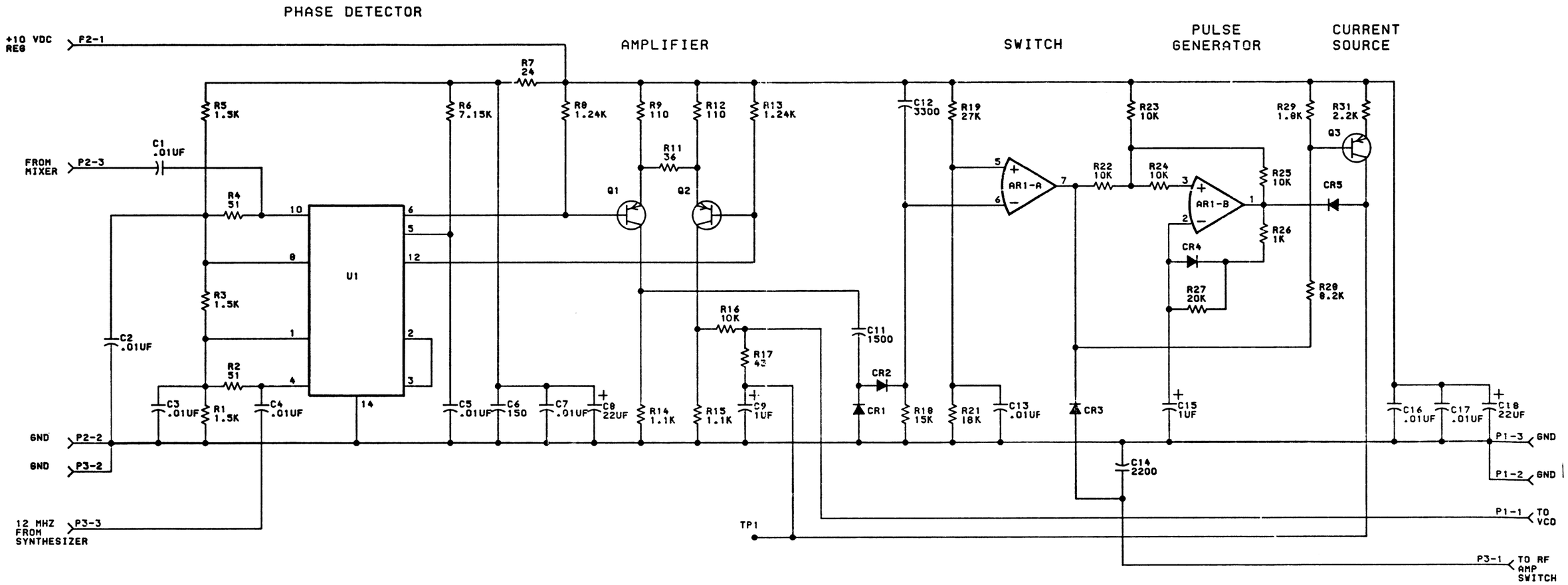
VOLTAGE READINGS

VOLTAGE READINGS ARE TYPICAL READINGS MADE WITH THE TRANSMITTER KEYED, AND MEASURED WITH A 20,000 OHMS-PER-VOLT METER WITH REFERENCE TO A- AND NOT CHASSIS GROUND. AN RF CHOKE (25-50 MICROHENRYS) IS USED IN THE HOT METER LEAD TO AVOID DETUNING RF CIRCUITS.

(19R622360, Rev. 8)

SCHEMATIC DIAGRAM

OSCILLATOR/MULTIPLIER A907



THIS ELEM DIAG APPLIES TO	
MODEL NO	REV LETTER
PLI9C328230 G1	D

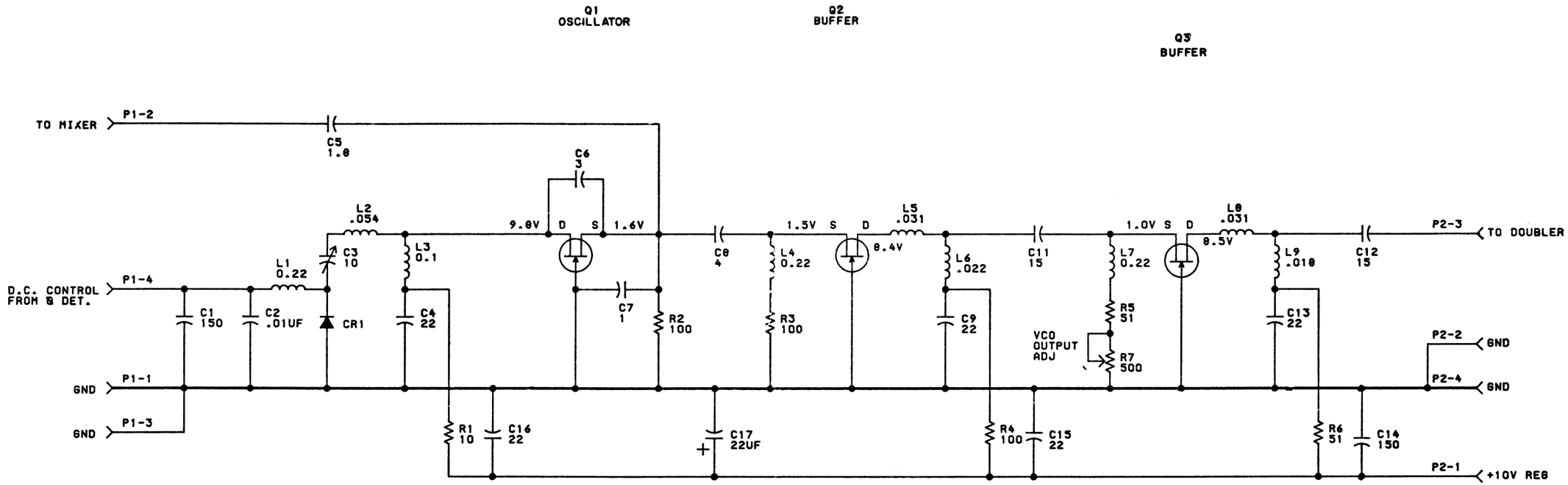
ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF=MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH=MILLIHENRYS OR H=HENRYS.

DEVICE	V + (10V) PIN NO	GND PIN NO
AR1	8	4

(19D429787, Rev. 5)

SCHEMATIC DIAGRAM

PHASE DETECTOR A905



MODEL NO.	REV. LETTER
PL19C33050361	

ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K-1000 OHMS OR MEG-1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF-MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH-MILLIHENRYS OR H-HENRYS.

VOLTAGE READINGS

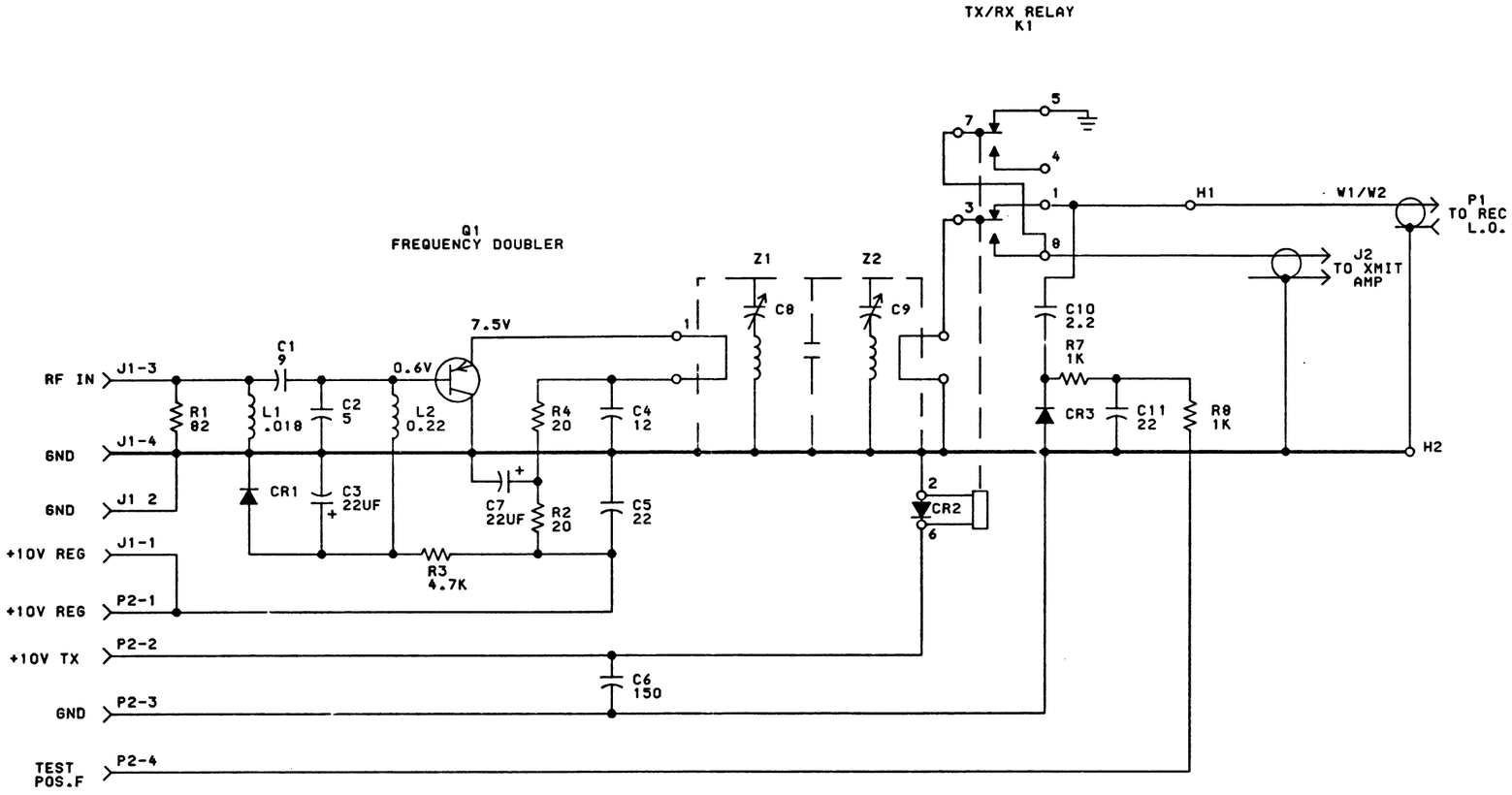
VOLTAGE READINGS ARE TYPICAL READINGS MADE WITH THE TRANSMITTER KEYED, AND MEASURED WITH A 20,000 OHMS-PER-VOLT METER WITH REFERENCE TO A- AND NOT CHASSIS GROUND. AN RF CHOKE (25-50 MICROHENRYS) IS USED IN THE HOT METER LEAD TO AVOID DETUNING RF CIRCUITS.

(19D432099, Rev. 1)

SCHEMATIC DIAGRAM

VCO A903

16 Issue 1



MODEL NO.	REV. LETTER	IDENTIFICATION
PL19C33051OG1	A	MOBILE
PL19C33051OG2	A	STATION

ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K-1000 OHMS OR MEG-1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF-MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH-MILLIHENRYS OR H-HENRYS.

NOTE
1. RELAY K1 SHOWN IN DEENERGIZED POSITION (RECEIVE).
2. W1 IS USED IN MOBILE APPLICATIONS. W2 IS USED IN STATION APPLICATIONS

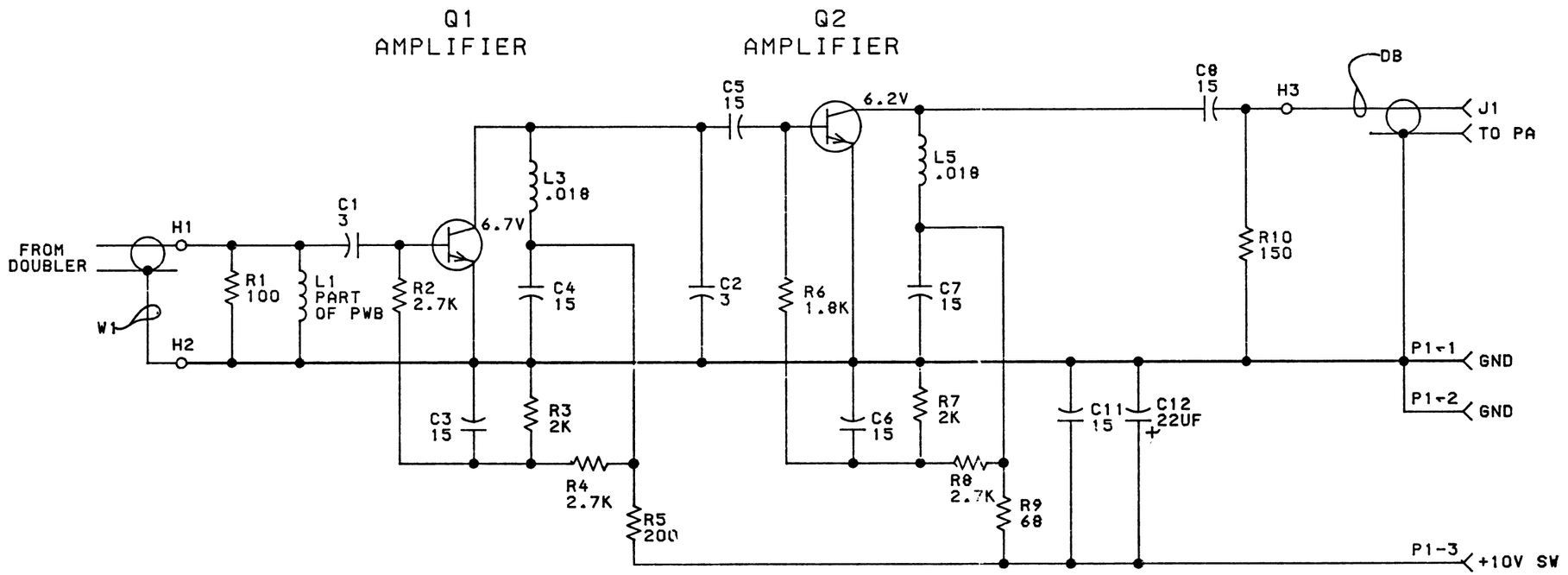
VOLTAGE READINGS

VOLTAGE READINGS ARE TYPICAL READINGS MADE WITH THE TRANSMITTER KEYED, AND MEASURED WITH A 20,000 OHMS-PER-VOLT METER WITH REFERENCE TO A- AND NOT CHASSIS GROUND. AN RF CHOKE (25-50 MICROHENRYS) IS USED IN THE HOT METER LEAD TO AVOID DETUNING RF CIRCUITS.

(19D432104, Rev. 3)

SCHEMATIC DIAGRAM

FREQUENCY DOUBLER A904



MODEL NO.	REV. LETTER	IDENTIFICATION
PL19C330533G1	B	GE MARC V SYNTH

ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF=MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH=MILLIHENRYS OR H=HENRYS.

(19C330676, Rev. 6)

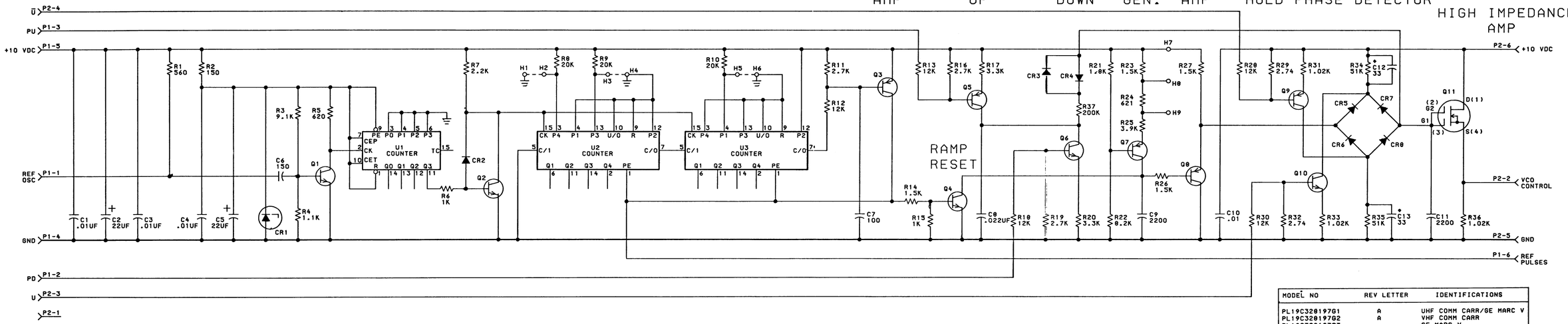
VOLTAGE READINGS

VOLTAGE READINGS ARE TYPICAL READINGS MADE WITH THE TRANSMITTER KEYED, AND MEASURED WITH A 20,000 OHMS-PER-VOLT METER WITH REFERENCE TO A- AND NOT CHASSIS GROUND. AN RF CHOKE (25-50 MICROHENRYS) IS USED IN THE HOT METER LEAD TO AVOID DETUNING RF CIRCUITS.

SCHEMATIC DIAGRAM

AMPLIFIER A902

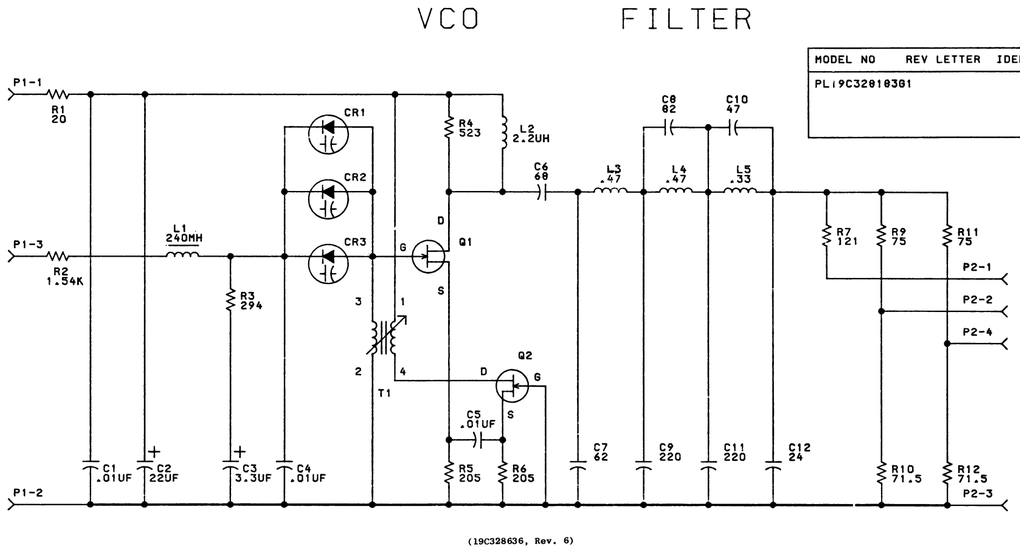
REFERENCE COUNTER A911



MODEL NO	REV LETTER	IDENTIFICATIONS
PL19C32819761	A	UHF COMM CARR/GE MARC V
PL19C32819762	A	VHF COMM CARR
PL19C32819763		GE MARC V

(19R622362, Rev. 8)

VCO AND FILTER A909



MODEL NO	REV LETTER	IDENTIFICATION
PL19C32818381		RCC

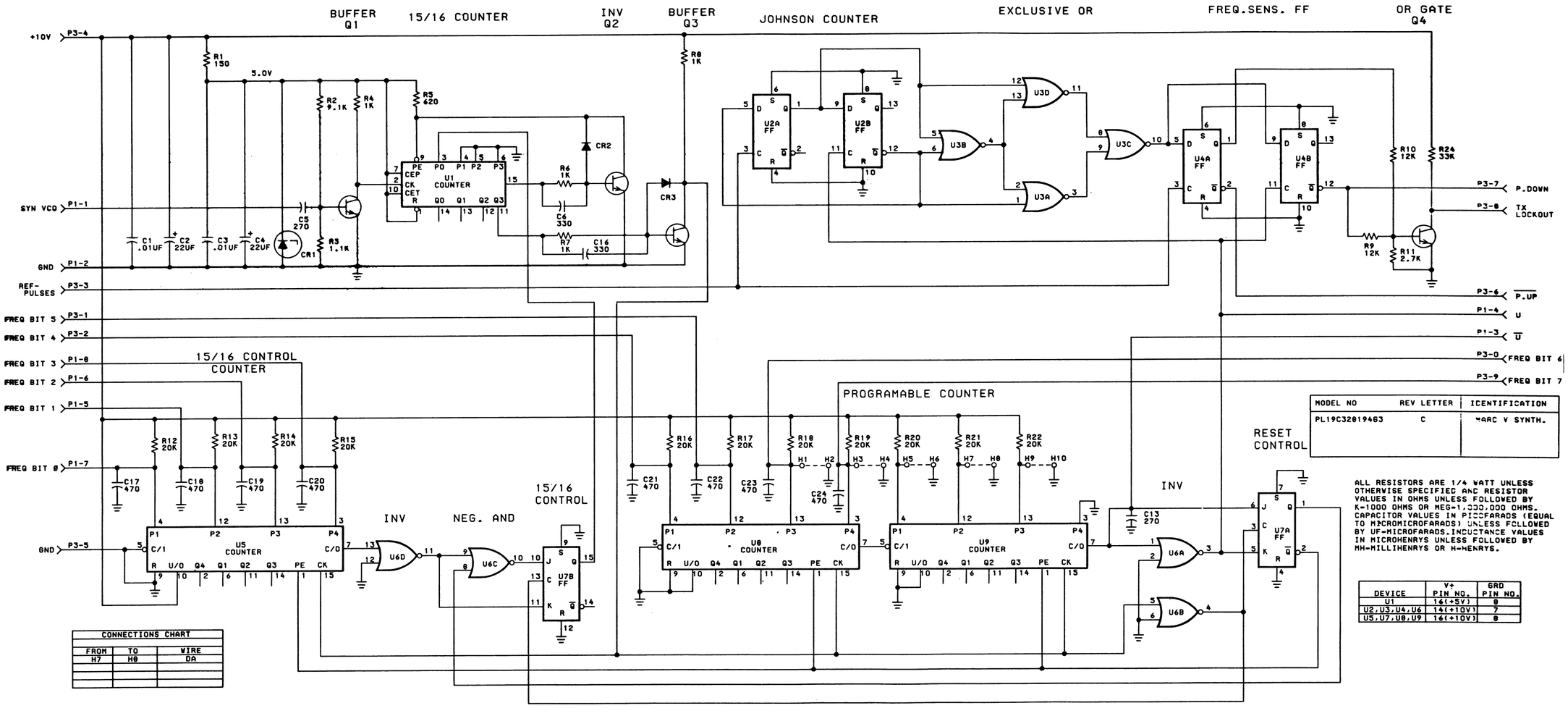
(19C328636, Rev. 6)

DEVICE	V+ PIN NO.	GND PIN NO.
U1	16 (+5V)	8
U2,U3	16 (+10V)	8

*C12 AND C13 USED ON GP3 ONLY.

CONNECTIONS CHART				
GROUP 1&3(UHF)		GROUP 2(VHF)		
FROM	TO	FROM	TO	WIRE
H1	H2	H3	H4	DA
H3	H4	H5	H6	DA
H7	H8	H7	H9	DA

ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K-1000 OHMS OR MEG-1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF-MICROFARADS.INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH-MILLIHENRYS OR H-HENRYS.



MODEL NO	REV LETTER	ICENTIFICATION
PL19C32019463	C	MARC V SYNTH.

ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF=MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH=MILLIHENRYS OR H=HENRYS.

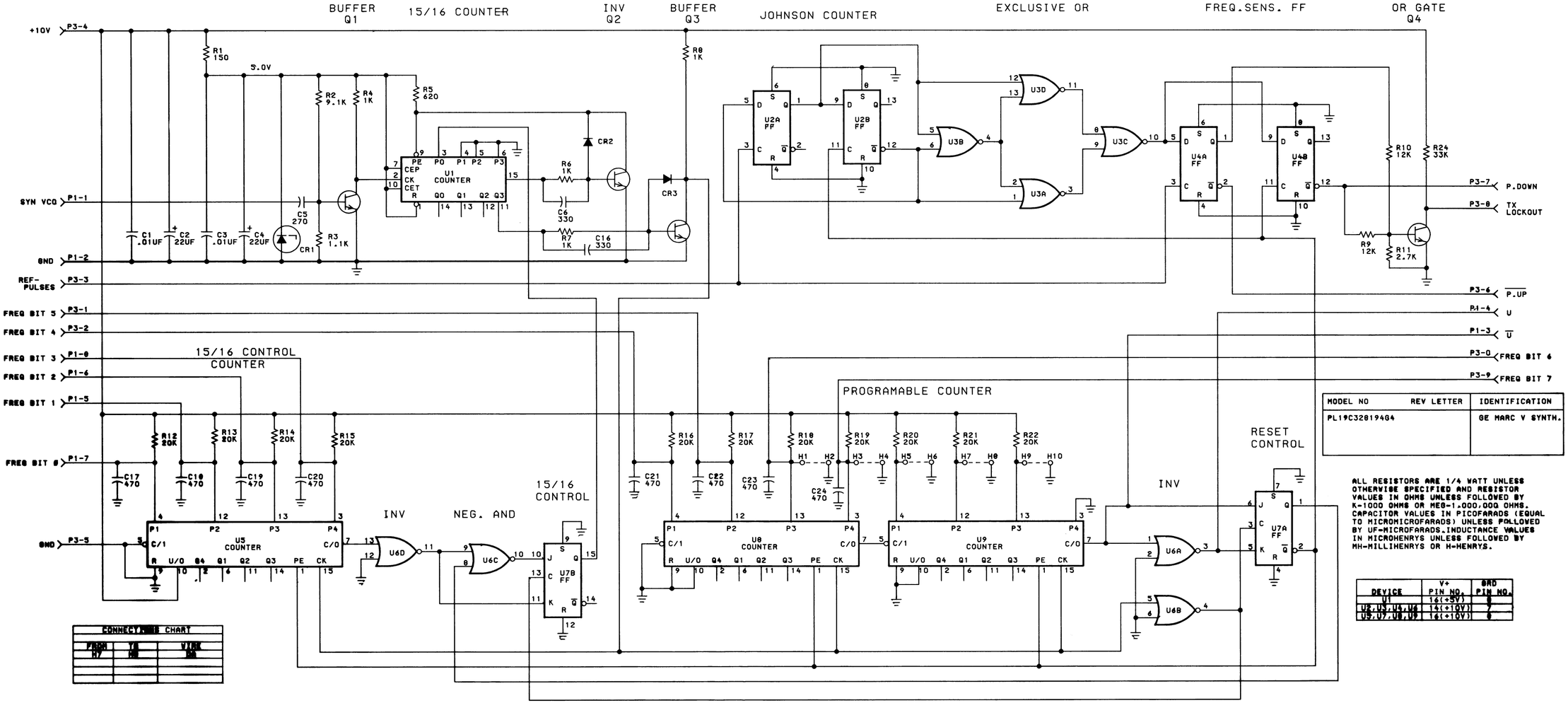
DEVICE	V+ PIN NO.	GRD PIN NO.
U1	16(+5V)	8
U2,U3,U4,U6	14(+10V)	7
U5,U7,U8,U9	16(+10V)	8

CONNECTIONS CHART		
FROM	TO	WIRE
H7	H8	DA

SCHEMATIC DIAGRAM

(19R622460, Rev. 7)

DIVIDE BY "N" COUNTER A910
(EARLIER MODELS)



MODEL NO	REV LETTER	IDENTIFICATION
PL19C32819G4		GE MARC V SYNTH.

ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF=MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH=MILLIHENRYS OR H=HENRYS.

DEVICE	V+ PIN NO.	GND PIN NO.
U1	16(+5V)	8
U2,U3,U4,U6	14(+10V)	7
U5,U7,U8,U9	16(+10V)	8

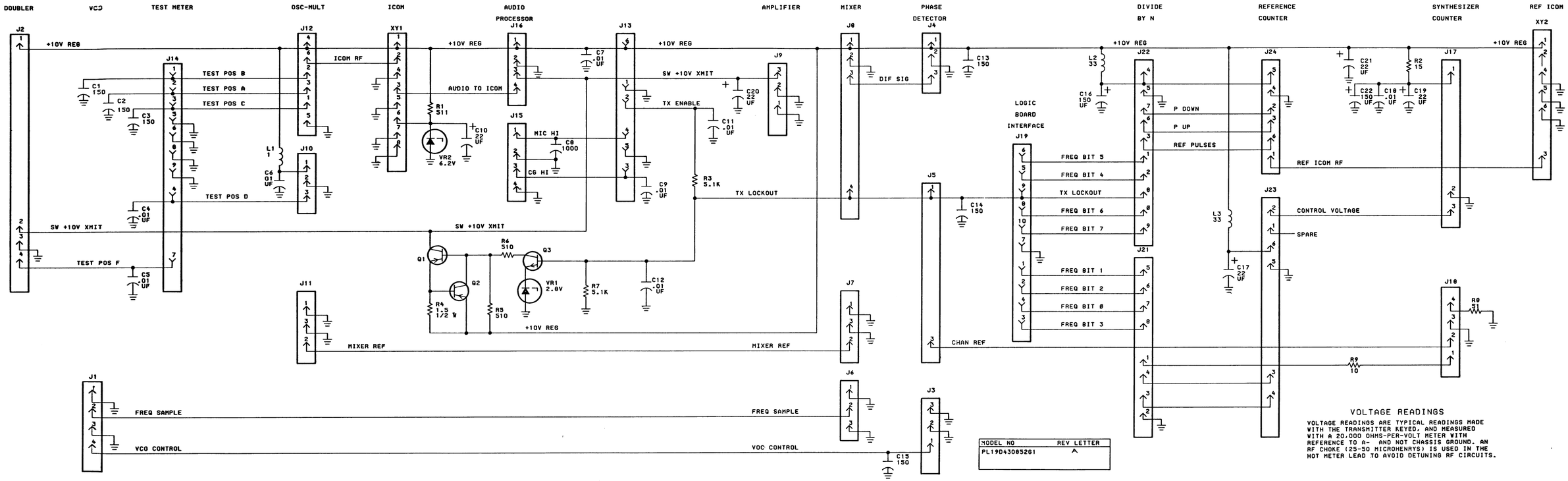
CONNECTOR PIN CHART

FROM	TO	WIRE

(19R622495, Rev. 0)

SCHEMATIC DIAGRAM

DIVIDE BY "N" COUNTER A910
(LATER MODELS)



(19R622457, Rev. 3)

SCHEMATIC DIAGRAM

MOTHER BOARD A901

PARTS LIST

GE MARC V SYNTHESIZER
19D432005G1 MOBILE
19D432005G2 STATION
19D432005G3 MOBILE
19D432005G4 STATION
ISSUE 3

SYMBOL	GE PART NO.	DESCRIPTION
A901		MOTHER BOARD 19D430825G1 REV A
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1 thru C3	19A700233P2	Ceramic disc: 150 pf ±20%, 50 VDCW.
C4 thru C7	19A116192P1	Ceramic: 0.01 pf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
C8	19A116192P13	Ceramic: 1000 pf ±10%, 50 VDCW; sim to Erie 8121-101-X5R.
C9	19A116192P1	Ceramic: 0.01 pf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
C10	19A701534P8	Tantalum: 22 µf ±20%, 16 VDCW.
C11	19A116193P1	Ceramic: 0.01 pf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
C12	19A134771P13	Polyester: 0.01 µf ±20%, 50 VDCW.
C13 thru C15	19A700233P2	Ceramic disc: 150 pf ±20%, 50 VDCW.
C16	19A134576P1	Tantalum: 150 µf ±10%, 15 VDCW; sim to Kemet T368D157K015A5.
C17	19A701534P8	Tantalum: 22 µf ±20%, 16 VDCW.
C18	19A116193P1	Ceramic: 0.01 pf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
C19 thru C21	19A701534P8	Tantalum: 22 µf ±20%, 16 VDCW.
C22	19A134576P1	Tantalum: 150 µf ±10%, 15 VDCW; sim to Kemet T368D157K015A5.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - -
J1	19A701785P1	Contact, electrical.
J2	19A701785P4	Contact, electrical.
J3 thru J12	19A701785P1	Contact, electrical.
J13	19A116659P4	Connector, printed wiring: 6 contacts; sim to Molex 09-62-3062.
J14	19A213974G1	Connector: 9 contacts.
J15 thru J18	19A701785P1	Contact, electrical.
J19	19A116659P2	Connector, printed wiring: 10 contacts; sim to Molex 09-62-3102.
J21 thru J24	19A701785P1	Contact, electrical.
		- - - - - - - - INDUCTORS - - - - - - - -
L1	19A700004P13	Coil, RF: 1.0 µh ±10%, 1.00 ohms DC res max.
L2 and L3	748807P49	Choke, RF: 33.0 µh ±10%, 1.90 ohms DC res max; sim to Jeffers 4422-5K.
		- - - - - - - - TRANSISTORS - - - - - - - -
Q1	19A115563P2	Silicon, PNP; sim to 2N2904A.
Q2	19A115852P1	Silicon, PNP; sim to Type 2N3906.
Q3	19A115910P1	Silicon, NPN; sim to Type 2N3904.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	GE PART NO.	DESCRIPTION
R1	19C314125P25110	Metal film: 511 ohms ±1%, 1/4 w.
R2	19A700108P19	Composition: 15 ohms ±5%, 1/4 w.
R3	3R152P512J	Composition: 5.1K ohms ±5%, 1/4 w.
R4	714716P17	Composition: 1.5 ohms ±5%, 1/2 w.
R5 and R6	3R152P511J	Composition: 510 ohms ±5%, 1/4 w.
R7	3R152P512J	Composition: 5.1K ohms ±5%, 1/4 w.
R8	19A700108P32	Composition: 51 ohms ±5%, 1/4 w.
R9	19A700108P15	Composition: 10 ohms ±5%, 1/4 w.
VR1	4036887P2	Zener: 500 mW, 2.8 v. nominal.
VR2	19B200076P1	Zener: 400 mW, 6.2 v.
		- - - - - - - - SOCKETS - - - - - - - -
A1 and A2	19A701785P1	Contact, electrical: sim to Molex 08-50-0404.
A902		AMPLIFIER BOARD 19C130053G1 REV B
		- - - - - - - - CAPACITORS - - - - - - - -
C1 and C2	19A116656P3J1	Ceramic disc: 3 pf ±0.5 pf, 500 VDCW, temp coef -150 PPM.
C3 thru C5	19A116656P15J0	Ceramic disc: 15 pf ±5%, 500 VDCW, temp coef 0 PPM.
C11	19A116656P15J0	Ceramic disc: 15 pf ±5%, 500 VDCW, temp coef 0 PPM.
C12	19A134720P6	Tantalum: 22 µf ±20%, 15 VDCW.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - -
J1	7104941P20	Jack; sim to National Tel. (Part of Shield assembly).
		- - - - - - - - INDUCTORS - - - - - - - -
L1		(Part of printed board 19C130534P1).
L3	19B209677P601	Coil, RF: 0.018 µh ind., 5%; sim to Paul Smith LM-2.
L5	19B209677P601	Coil, RF: 0.018 µh ind., 5%; sim to Paul Smith LM-2.
		- - - - - - - - PLUGS - - - - - - - -
P1	19A700102P1	Connector, printed wiring: 3 contacts; sim to Molex 09-62-3031.
P2		(Part of W1).
		- - - - - - - - TRANSISTORS - - - - - - - -
Q1	19J706012P1	Silicon; NPN.
Q2*	19A134430P1	Silicon, NPN; sim to CTC Type UHE.
	19A134430P2	Earlier than KEV A: Silicon, NPN; sim to CTC Type CD3603.
		- - - - - - - - RESISTORS - - - - - - - -
R1	19A700108P39	Composition: 100 ohms ±5%, 1/4 w.
R2	19A700108P73	Composition: 2.7K ohms ±5%, 1/4 w.
R3	3R152P202J	Composition: 2K ohms ±5%, 1/4 w.
R4	19A700108P73	Composition: 2.7K ohms ±5%, 1/4 w.

SYMBOL	GE PART NO.	DESCRIPTION
R5	19A700108P46	Composition: 200 ohms ±5%, 1/4 w.
R6	19A700108P69	Composition: 1.8K ohms ±5%, 1/4 w.
R7	3R152P202J	Composition: 2K ohms ±5%, 1/4 w.
R8	19A700108P73	Composition: 2.7K ohms ±5%, 1/4 w.
R9	19A700108P35	Composition: 68 ohms ±5%, 1/4 w.
R10	19A700108P43	Composition: 150 ohms ±5%, 1/4 w.
		- - - - - - - - CABLES - - - - - - - -
*1	5491689P137	Cable, RF: approx 4 inches long. Includes P2.
A903		VOLTAGE CONTROLLED OSCILLATOR BOARD 19C130503G1
		- - - - - - - - VOLTAGE REGULATORS - - - - - - -
VR1	4036887P2	Zener: 500 mW, 2.8 v. nominal.
VR2	19B200076P1	Zener: 400 mW, 6.2 v.
		- - - - - - - - CAPACITORS - - - - - - - -
C1	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C2	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C3	19B209544P5	Variable: 2.04 to 9.9 pf, 250 VDCW; sim to E.F. Johnson Type T 187-0306-105.
C4	19A116655P22J0	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef 0 PPM.
C5	5491401P24	Phenolic: 1.8 pf ±10%, 500 VDCW.
C6	19A116655P3J7	Ceramic disc: 3 pf ±0.5 pf, 500 VDCW, temp coef -750 PPM.
C7	19A134106P19	Ceramic disc: 1 pf ±0.1 pf, 100 VDCW, temp coef 01250 PPM/°C.
C8	19A116656P4J0	Ceramic disc: 4 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM.
C9	19A116656P22J0	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef 0 PPM.
C11	19A116656P15J0	Ceramic disc: 15 pf ±5%, 500 VDCW, temp coef 0 PPM.
C13	19A116656P22J0	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef 0 PPM.
C14	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C15 and C16	19A116656P22J0	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef 0 PPM.
C17	19A134720P6	Tantalum: 22 µf ±20%, 15 VDCW.
		- - - - - - - - INDUCTORS - - - - - - - -
CR1	19A134208P1	Silicon; sim to MV 109.
		- - - - - - - - INDUCTORS - - - - - - - -
L1	19B209420P105	Coil, RF: 0.22 µh ±10%, 0.14 ohms DC res max; sim to Jeffers 4615-5.
L2	19B209677P404	Coil, RF: 0.054 µh ind., ±5%; sim to Paul Smith LM-2.
L3	19B209420P101	Coil, RF: 0.10 µh ±10%, 0.08 ohms DC res max; sim to Jeffers 4615-1.
L4	19B209420P105	Coil, RF: 0.22 µh ±10%, 0.14 ohms DC res max; sim to Jeffers 4615-5.
L5	19B209677P603	Coil, RF: 0.031 µh ind., ±5%; sim to Paul Smith LM-2.
L6	19B209677P602	Coil, RF: 0.022 µh ind., ±5%; sim to Paul Smith LM-2.
L7	19B209420P105	Coil, RF: 0.22 µh ±10%, 0.14 ohms DC res max; sim to Jeffers 4615-5.
L8	19B209677P603	Coil, RF: 0.031 µh ind., ±5%; sim to Paul Smith LM-2.
L9	19B209677P601	Coil, RF: 0.018 µh ind., ±5%; sim to Paul Smith LM-2.
		- - - - - - - - PLUGS - - - - - - - -
P1 and P2	19A116659P7	Connector, printed wiring: 4 contacts; sim to Molex 09-62-3041.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - TRANSISTORS - - - - - - - -
Q1 thru Q3	19A134402P1	N Type, field effect.
		- - - - - - - - RESISTORS - - - - - - - -
R1	19A700108P15	Composition: 10 ohms ±5%, 1/4 w.
R2 thru R4	19A700108P39	Composition: 100 ohms ±5%, 1/4 w.
R5 and R6	19A700108P32	Composition: 51 ohms ±5%, 1/4 w.
R7	19A134384P4	Variable, cermet: 500 ohms ±10%, temp coef 01100 PPM/°C.
A904A and A904B		FREQUENCY DOUBLER BOARD A904A 19C130531G1 MOBILE A904B 19C130531G2 STATION
		- - - - - - - - CAPACITORS - - - - - - - -
C1	19A116656P9J0	Ceramic disc: 9 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM.
C2	19A116656P5J0	Ceramic disc: 5 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM.
C3	19A134202P6	Tantalum: 22 µf ±20%, 15 VDCW.
C4	19A700015P6	Metallized teflon: 10 pf ±5%, 250 VDCW.
C5	19A116655P22J0	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef 0 PPM.
C6	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C7	19A134202P14	Tantalum: 22 µf ±20%, 15 VDCW.
C10	5491601P126	Phenolic: 2.2 pf ±5%, 500 VDCW.
C11	19A116655P22J0	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef 0 PPM.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1	19A115775P1	Silicon, fast recovery, 225 mA, 50 PIV.
CR2	403782P1	Silicon, 1000 mA, 400 PIV.
CR3	19A116052P2	Silicon, hot carrier: Fwd. drop .410 volts max.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - -
J1	19A701785P1	Contact, electrical. (Quantity 4).
J2	19A130924G1	Connector, receptacle: coaxial, jack type; sim to Cinch 1481163.
		- - - - - - - - RELAYS - - - - - - - -
K1	19A700061P1	Hermetic sealed: 180-341 ohms coil res, 8-16.3 VDC; sim to GE 35AV1760A2, CP Clare HFR-1201558, or Potter-Brumfield MCM6180.
		- - - - - - - - INDUCTORS - - - - - - - -
L1	19B209677P401	Coil, RF: 0.018 µh ind., ±5%; sim to Paul Smith LM-2.
L2	19B209420P105	Coil, RF: 0.22 µh ±10%, 0.14 ohms DC res max; sim to Jeffers 4615-5.
		- - - - - - - - PLUGS - - - - - - - -
P1		(Part of W1 & W2).
P2	19A116659P15	Connector, printed wiring: 4 contacts; sim to Molex 09-62-3041.
		- - - - - - - - TRANSISTORS - - - - - - - -
Q1	19A134430P3	Silicon, NPN; sim to CTC Type UHE.
		- - - - - - - - RESISTORS - - - - - - - -
R1	19A700108P32	Composition: 82 ohms ±5%, 1/4 w.

SYMBOL	GE PART NO.	DESCRIPTION
R2	3R152P200J	Composition: 20 ohms ±5%, 1/4 w.
R3	19A700104P79	Composition: 4.7K ohms ±5%, 1/4 w.
R4	3R152P200J	Composition: 20 ohms ±5%, 1/4 w.
R7 and R8	19A700104P43	Composition: 1K ohms ±5%, 1/4 w.
		- - - - - - - - CABLES - - - - - - - -
W1	5491689P138	Cable, RF: approx 7-3/4 inches long. (Includes P1).
W2	5491689P140	Cable, RF: approx 7-3/4 inches long. (Includes P1).
		- - - - - - - - NETWORKS - - - - - - - -
Z1 and Z3	19D424303G2	Helical, Resonator.
A905		PHASE DETECTOR BOARD 19C232903G1 REV D
AR1	19A134511P2	Integrated circuit, linear: Dual OP AMP; sim to LM358, 8 Pin Minidip Package.
		- - - - - - - - CAPACITORS - - - - - - - -
C1 thru C3	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C4	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C7	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C8	19A134202P6	Tantalum: 22 µf ±20%, 15 VDCW.
C9	19A134202P114	Tantalum: 1 µf ±10%, 35 VDCW.
C11	19A700005P2	Polyester: 1500 pf ±10%, 50 VDCW.
C12	19A700005P4	Polyester: 3300 pf ±10%, 50 VDCW.
C13	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C14	19A116080P13	Polyester: 0.0022 µf ±20%, 50 VDCW.
C15	19A134202P114	Tantalum: 1 µf ±10%, 35 VDCW.
C16 and C17	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C18	19A134202P6	Tantalum: 22 µf ±20%, 15 VDCW.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1 thru CR5	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
		- - - - - - - - PLUGS - - - - - - - -
P1 thru P3	19A700102P1	Connector, printed wiring: 3 contacts; sim to Molex 09-62-3031.
		- - - - - - - - TRANSISTORS - - - - - - - -
Q1* and Q2*	19A116223P1	Silicon, PNP; sim to Type 2N3640.
	19A115852P1	In KEV A & earlier: Silicon, PNP; sim to Type 2N3906.
Q3	19A115852P1	Silicon, PNP; sim to Type 2N3906.
		- - - - - - - - RESISTORS - - - - - - - -
R1	19A700108P67	Composition: 1.5K ohms ±5%, 1/4 w.
R2	19A700108P32	Composition: 51 ohms ±5%, 1/4 w.
R3	19A700108P67	Composition: 1.5K ohms ±5%, 1/4 w.
R4	19A700108P32	Composition: 51 ohms ±5%, 1/4 w.
R5	19A700108P67	Composition: 1.5K ohms ±5%, 1/4 w.
R6	19A701250P283	Metal film: 7.15K ohms ±1%, 250 VDC*, 1/4 w.

SYMBOL	GE PART NO.	DESCRIPTION
R7	3R152P240J	Composition: 24 ohms ±5%, 1/4 w.
R8	19A701250P210	Metal film: 1.2K ohms ±1%, 250 VDC*, 1/4 w.
R9	3R152P111J	Composition: 110 ohms ±5%, 1/4 w.
R11	3R152P360J	Composition: 36 ohms ±5%, 1/4 w.
R12	3R152P111J	Composition: 110 ohms ±5%, 1/4 w.
R13	19A701250P210	Metal film: 1.2K ohms ±1%, 250 VDC*, 1/4 w.
R14 and R15	3R152P122J	Composition: 1.1K ohms ±5%, 1/4 w.
R16*	19A700104P87	Composition: 10K ohms ±5%, 1/4 w. Earlier than KEV A:
	19A700108P91	Composition: 15K ohms ±5%, 1/4 w.
R17	3R152P430J	Composition: 43 ohms ±5%, 1/4 w.
R18	19A700108P91	Composition: 15K ohms ±5%, 1/4 w.
R19*	19A700108P97	Composition: 27K ohms ±5%, 1/4 w. In REV B & earlier:
	3R152P303J	Composition: 30K ohms ±5%, 1/4 w.
R21*	19A700108P32	Deposited carbon: 51K ohms ±5%, 250 VDC*, 1/4 w. In REV A & earlier:
	3R152P133J	Composition: 13K ohms ±5%, 1/4 w.
R22 thru R25	19A700108P97	Composition: 10K ohms ±5%, 1/4 w.
R26	19A700108P43	Composition: 1K ohms ±5%, 1/4 w.
R27	3R152P203J	Composition: 20K ohms ±5%, 1/4 w.
R28	19A700108P85	Composition: 8.2K ohms ±5%, 1/4 w.
R29	19A700108P49	Composition: 1.8K ohms ±5%, 1/4 w.
R31	19A700108P71	Composition: 2.2K ohms ±5%, 1/4 w.
		- - - - - - - - TEST POINTS - - - - - - - -
TP1	19B211379P1	Spring (Test Point).
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - -
U1	19A116787P2	Linear, Balanced Modulator-Demodulator: sim to MC1596G or Fairchild µA796C.
A906		TRANSMITTER MIXER BOARD 19C232884G3
AR1	19A134511P2	Integrated circuit, linear: Dual OP AMP; sim to LM358, 8 Pin Minidip Package.
		- - - - - - - - CAPACITORS - - - - - - - -
C1	19A116656P10J0	Ceramic disc: 10 pf ±5.0 pf, 500 VDCW, temp coef 0 PPM.
C2 and C3	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C4	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C5	19A134202P6	Tantalum: 22 µf ±20%, 15 VDCW.
C6	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C7	19A116655P17	Ceramic disc: 680 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C8	19A116656P10J0	Ceramic disc: 10 pf ±5.0 pf, 500 VDCW, temp coef 0 PPM.
C14 thru C16	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C17	19A700105P16	Mica: 20 pf ±5%, 500 VDCW.
C18	748916P32	Silver Mica: 160 pf ±5%, 300 VDC; sim to Electro Motive Type DM-15.
C19	19A700105P37	Mica: 130 pf ±5%, 500 VDCW.
C20	19A700105P26	Mica: 47 pf ±5%, 500 VDCW.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1 thru CR3	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
		- - - - - - - - INDUCTORS - - - - - - - -
L1	19B209420P101	Coil, RF: 0.10 µh ±10%, 0.08 ohms DC res max; sim to Jeffers 4615-1K.
L2	19B209677P603	Coil, RF: 0.031 µh ±5%; sim to Paul Smith LM-2.
L4	19B209420P101	Coil, RF: 0.10 µh ±10%, 0.08 ohms DC res max; sim to Jeffers 4615-1K.
L5	19B209677P603	Coil, RF: 0.031 µh ±5%; sim to Paul Smith LM-2.
L6	19B209677P602	Coil, RF: 0.022 µh ±5%; sim to Paul Smith LM-2.
L13	19B209677P606	Coil, RF: 0.077 µh ±5%; sim to Paul Smith LM-2.
L14	19B209420P5	Coil, RF: 0.22 µh ±5%, 0.14 ohms DC res max; sim to Jeffers 4615-5K.
L15	19B209420P9	Coil, RF: 0.47 µh ±5%, 0.34 ohms DC res max; sim to Jeffers 4626-5K.
L16	19B209420P5	Coil, RF: 0.22 µh ±5%, 0.14 ohms DC res max; sim to Jeffers 4615-5K.
L17	19B209420P8	Coil, RF: 0.39 µh ±5%, 0.30 ohms DC res max; sim to Jeffers 4626-1K.
		- - - - - - - - PLUGS - - - - - - - -
P1 and P2	19A700102P1	Connector, printed wiring: 3 contacts; sim to Molex 09-62-3031.
P3	19A116659P7	Connector, printed wiring: 4 contacts; sim to Molex 09-62-3041.
		- - - - - - - - TRANSISTORS - - - - - - - -
Q1 and Q2	19A134402P1	N Type, field effect.
Q3	19A115910P1	Silicon, NPN; sim to Type 2N3904.
		- - - - - - - - RESISTORS - - - - - - - -
R1	19A700108P32	Composition: 51 ohms ±5%, 1/4 w.
R2	19A700108P15	Composition: 10 ohms ±5%, 1/4 w.
R3	19A700108P32	Composition: 51 ohms ±5%, 1/4 w.
R4	19A700108P15	Composition: 10 ohms ±5%, 1/4 w.
R6	3R152P513J	Composition: 51K ohms ±5%, 1/4 w.
R7	19A700104P91	Composition: 15K ohms ±5%, 1/4 w.
R8	19A700108P63	Composition: 1K ohms ±5%, 1/4 w.
R9	3R152P433J	Composition: 43K ohms ±5%, 1/4 w.
R10	3R152P620J	Composition: 62 ohms ±5%, 1/4 w.
R11	19A700100P101	Composition: 39K ohms ±5%, 1/4 w.
R13	19A700108P111	Composition: 100K ohms ±5%, 1/4 w.
R14	3R152P154J	Composition: 150K ohms ±5%, 1/4 w.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - -
U1	19B209486P1	Balanced Mixer.
A907		OSCILLATOR MULTIPLIER 19C232828G3
		- - - - - - - - CAPACITORS - - - - - - - -
C1	19A134202P8	Tantalum: 15 µf ±20%, 20 VDCW.
C2	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C3	19A134202P8	Tantalum: 15 µf ±20%, 20 VDCW.
C4	19A116080P91	Polyester: 0.01 µf ±20%, 50 VDCW.
C5	19A116655P13	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C6	19A700105P28	Mica: 36 pf ±5%, 500 VDCW.

SYMBOL	GE PART NO.	DESCRIPTION
C7	19A700105P34	Mica: 100 pf ±5%, 500 VDCW.
C8 thru C9	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C11	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C12	19A116656P330	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef 0 PPM.
C13	19A116656P10J0	Ceramic disc: 10 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM.
C14	19A116655P13	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to EMC Type JF Discap.
C15	19A700105P23	Mica: 39 pf ±5%, 500 VDCW.
C16	5491601P126	Phenolic: 2.2 pf ±5%, 500 VDCW.
C17	19A116656P82J0	Ceramic disc: 8 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM.
C18	19A116656P10J0	Ceramic disc: 10 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM.
C19	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to EMC Type JF Discap.
C21	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to EMC Type JF Discap.
C22*	19A700013P11	Phenolic: 0.68 pf ±5%, 500 VDCW. Added by REV A.
C23	19A700105P23	Mica: 39 pf ±5%, 500 VDCW.
C24	19A700013P12	Phenolic: 0.82 pf ±5%, 500 VDCW.
C25	19B209544P4	Variable, air: 1.56-4.86 pf, 250 VDCW; sim to E.F. Johnson 187-0303-105.
C26	19A116656P12J0	Ceramic disc: 12 pf ±5%, 500 VDCW, temp coef 0 PPM.
C27	19A116656P22J0	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef 0 PPM.
C28*	19A700013P7	Phenolic: 0.33 pf ±5%, 500 VDCW. Deleted by REV A.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - - - -
CR1	19A116052P1	Silicon, hot carrier: Fwd. drop .350 volts max.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L4*	19B209430P105	Coil, RF: 0.22 µh ±10%, 0.14 ohms DC res max; sim to Jeffers 4416-5K. Deleted by REV A.
L5	19A700024P25	Coil, RF: 10.0 µh ±10%, 3.70 ohms DC res max.
L7*	19B209677P606	Coil, RF: 0.054 µh ±5%; sim to Paul Smith LM-2. Deleted by REV A.
L8& thru L12	19B209595P513	Coil, RF: variable; sim to Paul Smith SK-618-1.
L8& and L82		Earlier than REV A:
L83	19B209595P507	Coil, RF: variable; sim to Paul Smith SK-618-1.
L84	19B209677P602	Coil, RF: 0.022 µh ±5%; sim to Paul Smith LM-2.
L85*	19B209429P107	Coil, RF: 0.33 µh ±10%, 0.22 ohms DC res max; sim to Jeffers 4416-7K. Added by REV A.
L86*	19B209677P606	Coil, RF: 0.077 µh ±5%; sim to Paul Smith LM-2. Added by REV A.
		- - - - - - - - PLUGS - - - - - - - - - -
P1 and P2	19A700103P1	Connector, printed wiring: 3 contacts; sim to Molex 09-62-3031.
P3	19A116655P6	Connector, printed wiring: 6 contacts; sim to Molex 09-52-3061.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A116818P1	N Channel, field effect; sim to 3N187.
Q2 and Q3	19A116201P3	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	19A700106P77	Composition: 3.9K ohms ±5%, 1/4 w.
R2	3R152F622J	Composition: 6.2K ohms ±5%, 1/4 w.

SYMBOL	GE PART NO.	DESCRIPTION
R3	19A700106P46	Composition: 200 ohms ±5%, 1/4 w.
R4	19A700106P95	Composition: 22K ohms ±5%, 1/4 w.
R5	19A700106P35	Composition: 100 ohms ±5%, 1/4 w.
R6	19A700106P49	Composition: 270 ohms ±5%, 1/4 w.
R8	19A700106P83	Composition: 6.8K ohms ±5%, 1/4 w.
R9	19A700106P35	Composition: 68 ohms ±5%, 1/4 w.
R10	19A700106P57	Composition: 560 ohms ±5%, 1/4 w.
R11	19A700106P49	Composition: 270 ohms ±5%, 1/4 w.
R13	19A700106P97	Composition: 10K ohms ±5%, 1/4 w.
R14	19A700106P33	Composition: 68 ohms ±5%, 1/4 w.
R15	19A700106P87	Composition: 10K ohms ±5%, 1/4 w.
R16 and R26	19A700106P39	Composition: 39 ohms ±5%, 1/4 w.
A808		AUDIO PROCESSOR 19C330031G1
AR1	19A116734P2	Integrated circuit, linear; sim to MC1458P1 High Slew Rate OP AMP.
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1 thru C3	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to EMC Type JF Discap.
C4	19A134202P6	Tantalum: 22 µf ±20%, 15 VDCW.
C5	19A116080P206	Polyester: 0.068 µf ±5%, 50 VDCW.
C6	19A116080P204	Polyester: 0.033 µf ±5%, 50 VDCW.
C8	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to EMC Type JF Discap.
C9	19A134202P5	Tantalum: 3.3 µf ±20%, 15 VDCW.
C11	19A116080P205	Polyester: 0.047 µf ±5%, 50 VDCW.
C12	19A134202P5	Tantalum: 3.3 µf ±20%, 15 VDCW.
C13	19A116656P6J0	Ceramic disc: 6 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM.
C14	19A134202P5	Tantalum: 3.3 µf ±20%, 15 VDCW.
C15	19A134202P14	Tantalum: 1 µf ±20%, 35 VDCW.
C16*	19A134202P14	Tantalum: 1 µf ±20%, 35 VDCW.
		Earlier than REV A:
	19A116080P204	Polyester: 0.033 µf ±5%, 50 VDCW.
C17	19A116080P216	Polyester: 0.0068 µf ±5%, 50 VDCW.
C18	19A116655P20	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to EMC Type JF Discap.
C19	19A134202P5	Tantalum: 3.3 µf ±20%, 15 VDCW.
C21	19A134202P14	Tantalum: 1 µf ±20%, 35 VDCW.
C22	19A134202P6	Tantalum: 22 µf ±20%, 15 VDCW.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - - - -
CR1 and CR2	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1 and P2	19A116658P7	Connector, printed wiring: 4 contacts; sim to Molex 09-52-3041.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A115910P1	Silicon, NPN; sim to Type 2N3904.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P512J	Composition: 5.1K ohms ±5%, 1/4 w.
R2 and R3	19A134594P6	Variable, cermet: 5K ohms ±10%, 0.5 w.

SYMBOL	GE PART NO.	DESCRIPTION
R4	19A700106P95	Composition: 22K ohms ±5%, 1/4 w.
R5	19A710125P269	Metal film: 5.1K ohms ±1%, 250 VDCW, 1/4 w.
R6	19A700106P55	Composition: 470 ohms ±5%, 1/4 w.
R7	19A700106P95	Composition: 22K ohms ±5%, 1/4 w.
R8	3R152F513J	Composition: 51K ohms ±5%, 1/4 w.
R9	19A710250P303	Metal film: 10.5K ohms ±1%, 250 VDCW, 1/4 w.
R10	19A700106P95	Composition: 22K ohms ±5%, 1/4 w.
R11	19A710250P111	Metal film: 12.7K ohms ±1%, 250 VDCW, 1/4 w.
R12	19A710250P303	Metal film: 10.5K ohms ±1%, 250 VDCW, 1/4 w.
R13	3R152F132J	Composition: 1.3K ohms ±5%, 1/4 w.
R14	19A710250P339	Metal film: 24.9K ohms ±1%, 250 VDCW, 1/4 w.
R15	19A700106P91	Composition: 15K ohms ±5%, 1/4 w.
R16	19A710250P269	Metal film: 5.1K ohms ±1%, 250 VDCW, 1/4 w.
R17	19A710250P307	Metal film: 11.5K ohms ±1%, 250 VDCW, 1/4 w.
R18	19A710250P347	Metal film: 30.1K ohms ±1%, 250 VDCW, 1/4 w.
R19	19A710250P73	Composition: 2.7K ohms ±5%, 1/4 w.
R20	19A700106P89	Composition: 12K ohms ±5%, 1/4 w.
R21	19A700106P111	Composition: 100K ohms ±5%, 1/4 w.
R23	19A710250P69	Metal film: 511 ohms ±1%, 1/4 w.
R24	19A710250P277	Metal film: 6.19K ohms ±1%, 250 VDCW, 1/4 w.
R25	19A710250P237	Metal film: 18.7K ohms ±1%, 250 VDCW, 1/4 w.
R26	3R152F511J	Composition: 510 ohms ±5%, 1/4 w.
R27	19A710250P260	Metal film: 4.1K ohms ±1%, 250 VDCW, 1/4 w.
R28	19A700106P15	Composition: 10 ohms ±5%, 1/4 w.
R29	19A700106P111	Composition: 100K ohms ±5%, 1/4 w.
		- - - - - - - - THERMISTORS - - - - - - - -
RT1	5490828P54	Thermistor: 50 ohms ±10%, color code blue; sim to Carborundum Type B0807S-16.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - - -
U1	19A134097P52	Digital: Quad Bilateral Switch (Improved CD4016AE); Identification No. 4066.
A909		VCO & FILTER BOARD A909A 19C329189G2 - REV A A909B 19C329189G3 - REV A
		- - - - - - - - CAPACITORS - - - - - - - -
C1	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
C2	19A134202P6	Tantalum: 22 µf ±20%, 15 VDCW.
C3	19A134202P5	Tantalum: 3.3 µf ±20%, 15 VDCW.
C4	19A700105P38	Mica: 56 pf ±5%, 500 VDCW.
C14	19A700105P27	Mica: 51 pf ±5%, 500 VDCW.
C15	19A700105P30	Mica: 68 pf ±5%, 500 VDCW.
C16	19A700105P41	Mica: 180 pf ±5%, 500 VDCW.
C17	19A700105P23	Mica: 39 pf ±5%, 500 VDCW.
C18	19A700105P41	Mica: 180 pf ±5%, 500 VDCW.
C19	19A700105P16	Mica: 20 pf ±5%, 500 VDCW.
C20 and C21	19A116192P2	Ceramic: 470 pf ±20%, 50 VDCW; sim to Erie 8111-4050-W5R-471K.
CR2 and CR3	19A134208P1	Silicon, capacitive; sim to HV109.
CR4 and CR5	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	5491736P2	Choke: 240 mh ±10% at 11 KHz, 0.5 V), 270 ohms DC res max; sim to Aladdin 33-161.
L2	19A700024P17	Coil, RF: 2.2 µh ±10%, 0.40 ohms DC res max.
L6 and L7	19B209429P8	Coil, RF: 0.39 µh ±5%, 0.39 ohms DC res max.
L8	19B209430P7	Coil, RF: 0.33 µh ±5%, 0.22 ohms DC res max; sim to Jeffers 4416-7J.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1	19A700103P1	Connector, printed wiring: 3 contacts; sim to Molex 09-62-3031.
P2	19A116658P7	Connector, printed wiring: 4 contacts; sim to Molex 09-52-3141.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1 and Q2	19A134402P1	N Type, field effect.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P200J	Composition: 20 ohms ±5%, 1/4 w.
R2	19A710125P219	Metal film: 1.5K ohms ±1%, 250 VDCW, 1/4 w.
R3	19A710250P146	Metal film: 294 ohms ±1%, 1/4 w.
R4	19A710125P170	Metal film: 523 ohms ±1%, 1/4 w.
R5 and R6	19A710125P131	Metal film: 2.05 ohms ±1%, 1/4 w.
R7	19A710250P109	Metal film: 121 ohms ±1%, 1/4 w.
R9	19A710125P85	Metal film: 75.0 ohms ±1%, 1/4 w.
R10	19A710125P83	Metal film: 71.5 ohms ±1%, 1/4 w.
R11	19A710125P85	Metal film: 75.0 ohms ±1%, 1/4 w.
R12	19A710125P83	Metal film: 71.5 ohms ±1%, 1/4 w.
		- - - - - - - - TRANSFORMERS - - - - - - - -
T2	19C328733G2	Transformer. Includes:
	5493352P25	Tuning slug.
A910		DIVIDE BY N COUNTER BOARD 19C328189G3 19C328189G4
		- - - - - - - - CAPACITORS - - - - - - - -
C1	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C2	19A134202P6	Tantalum: 22 µf ±20%, 15 VDCW.
C3	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C4	19A134202P6	Tantalum: 22 µf ±20%, 15 VDCW.
C5	19A700105P46	Mica: 270 pf ±5%, 500 VDCW.
C6	19A116192P7	Ceramic: 330 pf ±10%, 50 VDCW; sim to Erie 8101-4050-W5R-331K.
C7* thru C12*	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL. Deleted by REV C.
C13	19A700105P46	Mica: 100 pf ±5%, 500 VDCW.
C14* thru C15*	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL. Deleted by REV C.
C16	19A116192P7	Ceramic: 330 pf ±10%, 50 VDCW; sim to Erie 8101-4050-W5R-331K. Added by REV C.
C17* thru C24*	19A116192P2	Ceramic: 470 pf ±20%, 50 VDCW; sim to Erie 8111-4050-W5R-471K. Added by REV C.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - - - -
CR1	403SS87P56	Diode, zener: 500 mW, 5.0 v. nominal.
CR2 and CR3	19A116053P2	Silicon, hot carrier: Fwd. drop .410 volts max.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1	19A116658P7	Connector, printed wiring: 4 contacts; sim to Molex 09-52-3041.
P3	19A116655P5	Connector, printed wiring: 10 contacts; sim to Molex 09-52-3101.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1 thru Q4	19A115910P1	Silicon, NPN; sim to Type 2N3904.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	19A700106P43	Composition: 150 ohms ±5%, 1/4 w.
R2	3R152P912J	Composition: 9.1K ohms ±5%, 1/4 w.
R3	3R152P112J	Composition: 1.1K ohms ±5%, 1/4 w.
R4*	19A700106P63	Composition: 1K ohms ±5%, 1/4 w.
		In REV A & earlier:
	3R152F621J	Composition: 620 ohms ±5%, 1/4 w.
R5	3R152F621J	Composition: 620 ohms ±5%, 1/4 w.
R6 thru R8	19A700106P63	Composition: 1K ohms ±5%, 1/4 w.
R9 and R10	19A700106P89	Composition: 12K ohms ±5%, 1/4 w.
R11	19A700106P73	Composition: 2.7K ohms ±5%, 1/4 w.
R12 thru R22	19A710125P203J	Composition: 20K ohms ±5%, 1/4 w.
R24	19A700106P99	Composition: 33K ohms ±5%, 1/4 w.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - - -
U1	19A134305P68	Digital, Synchronous 4 Bit Counter (With Direct Clear); Identification No. 74LS161.
U2	19A134097P11	Digital, Dual "D" Flip-Flop With Set/Reset; Identification No. 4013.
U3	19A134097P2	Digital, Quad 2-Input Nor Gate: Identification No. 4001.
U4	19A134097P11	Digital, Dual "D" Flip-Flop with Set/Reset: Identification No. 4013.
U5	19A134097P208	Digital, Binary Up/Down Counter: Identification No. 4516.
U6	19A134097P2	Digital, Quad 2-Input Nor Gate: Identification No. 4001.
U7	19A134097P23	Digital, Dual J-K Master-Slave Flip-Flop: Identification No. 4027.
U8 and U9	19A134097P208	Digital, Binary Up/Down Counter: Identification No. 4516.
A911		REFERENCE COUNTER BOARD 19C328197G1 19C328197G3
		- - - - - - - - CAPACITORS - - - - - - - -
C1	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C2	19A134202P6	Tantalum: 22 µf ±20%, 15 VDCW.
C3	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
C4	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C5	19A134202P6	Tantalum: 22 µf ±20%, 15 VDCW.
C6	19A116655P8	Ceramic disc: 150 pf ±10%, 1000 VDCW; sim to EMC Type JF Discap.
C7	19A700105P34	Mica: 100 pf ±5%, 500 VDCW.
C8	19A116080P103	Polyester: 0.022 µf ±10%, 50 VDCW.
C9	19A116080P113	Polyester: 0.0022 µf ±10%, 50 VDCW.
C10	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C11	19A116080P113	Polyester: 0.0022 µf ±10%, 50 VDCW.
C12 and C13	19A700022P19	Ceramic, disc: 33 pf ±5%, 50 VDCW.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - DIODES AND RECTIFIERS - - - - - - - -
CR1	403SS87P56	Diode, zener: 500 mW, 5.0 v. nominal.
CR2	19A116053P2	Silicon, hot carrier: Fwd. drop .410 volts max.
CR3 and CR4	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
CR5* thru CR8*	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
		Earlier than REV A:
	19A116053P2	Silicon, hot carrier: Fwd. drop .410 volts max.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1 and P2	19A116658P6	Connector, printed wiring: 6 contacts; sim to Molex 09-52-3061.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1 and Q2	19A115910P1	Silicon, NPN; sim to Type 2N3904.
Q3	19A115852P1	Silicon, PNP; sim to Type 2N3906.
Q4	19A115910P1	Silicon, NPN; sim to Type 2N3904.
Q5	19A115852P1	Silicon, PNP; sim to Type 2N3906.
Q6	19A115910P1	Silicon, NPN; sim to Type 2N3904.
Q7 thru Q9	19A115852P1	Silicon, PNP; sim to Type 2N3906.
Q10	19A115910P1	Silicon, NPN; sim to Type 2N3904.
Q11	19A116818P1	N Channel, field effect; sim to Type 3N187.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	19A700106P57	Composition: 560 ohms ±5%, 1/4 w.
R2	19A700106P43	Composition: 150 ohms ±5%, 1/4 w.
R3	3R152P912J	Composition: 9.1K ohms ±5%, 1/4 w.
R4	3R152P112J	Composition: 1.1K ohms ±5%, 1/4 w.
R5	3R152P621J	Composition: 620 ohms ±5%, 1/4 w.
R6 thru R8	19A700106P63	Composition: 1K ohms ±5%, 1/4 w.
R9	19A700106P71	Composition: 2.2K ohms ±5%, 1/4 w.
R10 thru R30	3R152P203J	Composition: 20K ohms ±5%, 1/4 w.
R11	19A700106P73	Composition: 2.7K ohms ±5%, 1/4 w.
R12 and R13	19A700106P89	Composition: 12K ohms ±5%, 1/4 w.
R14	19A700106P67	Composition: 1.5K ohms ±5%, 1/4 w.
R15	19A700106P63	Composition: 1K ohms ±5%, 1/4 w.
R16	19A700106P73	Composition: 2.7K ohms ±5%, 1/4 w.
R17	19A700106P75	Composition: 3.3K ohms ±5%, 1/4 w.
R18	19A700106P89	Composition: 12K ohms ±5%, 1/4 w.
R19	19A700106P73	Composition: 2.7K ohms ±5%, 1/4 w.
R20	19A700106P75	Composition: 3.3K ohms ±5%, 1/4 w.
R21	19A700106P69	Composition: 1.8K ohms ±5%, 1/4 w.
R22	19A700106P85	Composition: 8.2K ohms ±5%, 1/4 w.
R23	19A700106P27	Composition: 1.5K ohms ±5%, 1/4 w.
R24	3R152P621J	Composition: 620 ohms ±5%, 1/4 w.
R25	19A700106P77	Composition: 3.9K ohms ±5%, 1/4 w.
R26 and R27	19A700106P67	Composition: 1.5K ohms ±5%, 1/4 w.
R28	19A700106P89	Composition: 12K ohms ±5%, 1/4 w.

SYMBOL	GE PART NO.	DESCRIPTION
R29	19A710125P243	Metal film: 2.5K ohms ±1%, 250 VDCW, 1/4 w.
R30	19A700106P89	Composition: 12K ohms ±5%, 1/4 w.
R31	19A710125P202	Metal film: 1.02K ohms ±1%, 250 VDCW, 1/4 w.
R32	19A710125P243	Metal film: 2.5K ohms ±1%, 250 VDCW, 1/4 w.
R33	19A710125P202	Metal film: 1.02K ohms ±1%, 250 VDCW, 1/4 w.
R34 and R35	3R152F513J	Composition: 51K ohms ±5%, 1/4 w.
R36	19A710125P202	Metal film: 1.02K ohms ±1%, 250 VDCW, 1/4 w.
R37	3R152P204J	Composition: 200K ohms ±5%, 1/4 w.
		- - - - - - - - PLUGS - - - - - - - -
U1	19A134305P68	Digital, Synchronous 4 Bit Counter (With Direct Clear); Identification No. 74LS161.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - - -
U2 and U3	19A134097P208	Digital, Binary Up/Down Counter: Identification No. 4516.
U3		- - - - - - - - - - ICOMS - - - - - - - - - -
T901	19A130605G29	FM ICOM. 14.518287 MHz.
	19B233199Z2	Synthesizer Cover.
T902	19A137763G43	Reference ICOM. 5 PPM, 9.6 MHz.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B232889P1	Ground strap. (Used on A902, A903, A905-A907, A910 & A911).
	19A135378P206	Spacer, threaded. (Located on A901).
	19A701332P4	Insulator, washer: nylon. (Used with Q1 on A901).
	403707P5	Button plug. (Located on A905-A908, A910 & A911).
	19B227426G1	Can. (Used with Z1 & Z2 on A904A & A904B).
	19B232889P1	Shield. (Located on A906).
	19A137795P1	Shield. (Located on A907).
	19C328642P1	Support. (A909).
	19B800608P377	Rivet. (Secures A909 board to support).
	19A138079P1	Shield. (Located around T1 & T2 on A909).
	19B233199Z2	Cover.
	19A701332P1	Insulator, washer: nylon. (Used with Q1-Q3 on A900, Q1 & Q2 on A906, Q1-Q3 on A907, Q11 on A911).

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 descriptions of parts affected by these revisions.

REV. A - Reference Counter 19C328197G1, C2
To facilitate manufacturing. Changed diodes CR5 through CR8.

REV. A - Divide By "N" Counter 19C328189G3
Incorporated in initial shipment.

REV. B - To improve operation. Changed R4.

REV. C - To improve channel selection operating speed. Deleted C7-C12, C14 and C15. Added C17-C24.

REV. A - Phase Detector 19C328230G1
To improve operation at high end of temperature range. Changed R16.

- - - - - - - - INTEGRATED CIRCUITS - - - - - - - -

REV. B - To assure frequency lock when unit is first turned on. Changed Q1, Q2 and R21.

REV. C - To extend VCO voltage range to improve operation when used in RCC/IMTS Applications.

REV. D - To improve operation of Phase detector. Changed R21. R21 was: 19A700106P91 composition, 15K ohms 15%, 1/4 Watt.

- - - - - - - - - - ICOMS - - - - - - - - - -

REV. A - Oscillator/Multiplier 19C328218G1, C3
To increase power output. Deleted C28, L7 and L4 from Group 3 board. Added C82, L85 and L86 to Group 3 board. Changed L7.

REV. A - Transmit Amplifier Board 19C330533G1
To increase power output level. Changed Q1 and Q2.

- - - - - - - - - MISCELLANEOUS - - - - - - - - -

REV. B - To facilitate manufacturing. Changed Q1, R4 and R5.
Q1 was: 19A134402P1, N Type, Field Effect.
R4 was: 19A710105P15, composition 10 ohms ±5%, 1/4 Watt.
R5 was: 3R152P513J, composition 51K ohms ±5%, 1/4 Watt.

REV. A - Audio Processor 19C330315
To increase deviation of collect and group tones. Changed C16. (See also change to System board).

REV. A - Frequency Doubler 19C330310G1, C2
Incorporated into initial shipment.

REV. A - VCO and Filter Board 19C328183G2, C3
To add margin to receiver attack time. Added C84 and C85.

REV. A - Mother Board 19D430853G1
To improve operation. Added R9.