MOBILE RADIO

LBI30790B
(DF9048)
(DF9044, IMTS)

MAINTENANCE MANUAL
FOR
VHF/UHF SYNTHESIZER 19D429781G1 AND G2

TABLE OF CONTENTS

ILLUSTRATIONS

GENERAL ELECTRIC

DESCRIPTION

The VHF/UHF Synthesizer is made up of eleven boards that plug into the A901 mother board to provide the RECEIVER Local oscillator signal and Radio Frequency drive to the transmitter Power Amplifier. The three major assemblies with their plug in boards are as follows:

- CHANNEL FREQUENCY SYNTHESIZER
  - Y903 Reference ICOM
  - A911 VCO and Filter
  - A912*/A920** Divide by "N" Counter
  - A913*/A919** Reference Counter
- RECEIVER PHASE LOCKED LOOP
  - Y902 Receiver ICOM
  - A906*/A907** Oscillator/Multiplier
  - A908*/A909** Receiver Mixer
  - A910 Receiver Phase Detector
  - A902*/A903** Receiver VCO
- TRANSMITTER PHASE LOCKED LOOP
  - Y901 Transmitter ICOM
  - A914*/A915** Oscillator/Multiplier
  - A916*/A917** Transmitter Mixer
  - A918 Transmitter Phase Detector
  - A904*/A905** Transmitter VCO & Amplifier

* UHF UNIT
** VHF UNIT

OPERATION

FREQUENCY GENERATION (Refer to Figure 1)

The RF Power Amplifier excitation and Receiver Mixer injection are derived from two phase lock loops (PLL's) which are referenced to a Channel Frequency Synthesizer. Programming of the Synthesizer determines channel selection. The PLL Voltage Controlled Oscillators (VCO's) are mixed down to the channel synthesizer frequency from an ICOM multiplied up to the appropriate frequency.

CHANNEL FREQUENCY SYNTHESIZER

Half channel reference pulses are derived by counting down a 9.6 MHz frequency that is generated by a MASTR® II ICOM. This ICOM is the master control for temperature compensation of two other crystal oscillators. An interface stage is provided to square up the output of the 9.6 MHz ICOM and drive the divide by 16 Reference counter. A divide by 16 first stage was selected to get the frequency well into the complimentary Metal Oxide Semiconductor (CMOS) range. The same counter type is used as the 15/16 counter in the VCO divide by N train. Another interface stage converts Transistor Transistor Logic (TTL) levels to 10 Volt CMOS levels. Two 4-bit CMOS counters are programmed to produce the half channel reference pulses of 10, 12.5 or 15 KHz. Each reference pulse is used to reset a ramp generator. The ramp is sampled by a diode bridge which is an AC switch controlled by the output pulses of the divide by N counter. The hold capacitor is connected to the gates of the on FET, which as a source follower, provides the error voltage for the 12-13 MHz voltage-controlled oscillator. To change channel spacing, fixed programming of the reference divider and the divide by "N" counter must be changed.

The VCO is counted down by a programmable counter (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 Low Power SCHOTTKY (LS) TTL package as a dual modulus 15/16 Prescaler. The countdown train is programmed by a straight binary progression with no gaps from minimum to maximum count.

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 near the proper frequency so that a phase lock may be obtained. This acquisition circuit also provides activity pulses that indicate an out-of-lock condition.

PHASE LOCK LOOPS (Refer to Figure 1)

There are two side step phase locked analog loops that produce the exciter output frequency and the receiver Local Oscilator injection frequency. Except for the Intermediate Frequency (IF) difference, both of these loops are the same. Each of these loops is locked to the channelization synthesizer and follows the channel steps on a one-to-one basis. Each of these loops has its own crystal controlled oscillator and multiplier train. The output of the multipliers are used to mix the high frequency VCO's down to the channel synthesizer's output frequency. Doubly balanced modulators are used as phase detectors to produce error voltages to the respective side step VCO's.

Acquisition circuits are also required in these side step loops to prevent false lock. These acquisition circuits also produce non-lock signals that when OR'd with the channel synthesizer activity output and mixer output are used to prevent the exciter from driving the RF Power Amplifier with incorrect channel frequency. ICOMS are used both in the Transmitter and Receiver side step loops. These ICOM's can be either 5 Parts Per Million or 2 Parts Per Million.

CIRCUIT ANALYSIS

VHF/UHF OSCILLATOR/MULTIPLIER

This module provides an amplifier with one (two for UHF) frequency multiplier stage. When this module is used in the receive loop it is driven by a 19A129393G11 MASTR® II ICOM. When this module is used in the transmit loop it is driven by a 19A130605G11 FM ICOM. In either case the ICOM is mounted external to the Oscillator/Multiplier Module. The RF signal from the ICOM is connected via P3-6 to the input tuned circuit of the amplifier stage.

VHF OSCILLATOR/MULTIPLIER A907/A915

The input circuit L52, C53 and C54 is tuned to the fourth harmonic of the ICOM frequency and drives gate 1 of Dual Gate FET Q51 amplifier. The tuned circuit L53 and C58 in the drain circuit of Q51 is coupled to the base of the frequency tripler Q52. The Q52 collector tuned circuit L56 and C64 is tuned to the twelfth harmonic of the ICOM frequency. The output tuned circuit L57 and C67 provides additional filtering. The output is connected to the mixer via P2-2. When this module is plugged into the Mother board A901, three metering points are made available at J2 (transmitter loop) or at J17 (Receiver loop).

UHF OSCILLATOR/MULTIPLIER A906/A914

The input circuit L2, C6 and C7 is tuned to the third harmonic of the ICOM frequency and drives gate 1 of Dual Gate FET Q1 amplifier. The tuned circuit L3 and C12 in the drain circuit of Q1 is coupled to the base of the first frequency trippler Q2. The Q2 collector tuned circuit L6 and C18 is tuned to the ninth harmonic of the ICOM frequency and is coupled to the base of the second frequency trippler Q3. In the collector of the second frequency tripler Q3, L8 and C25 are tuned to the twenty seventh harmonic of the ICOM frequency. The output is connected to the mixer via P2-2. When this module is plugged into the Mother board A901, four metering points are made available at J2 (transmitter loop) or at J17 (Receiver loop).

VHF/UHF RECEIVER MIXER BOARD A908*/A909**

This module provides a two stage buffer (Q1)-amplifier (Q2), a doubly balanced mixer (U1) and a low-pass filter on the output. The buffer-amplifier consists of two cascaded, common gate FET's whose primary function is VCO isolation. The input to the buffer-amplifier from the VCO is through P1-2 and the output feeds one input port of the balanced mixer. The other input port of the mixer is fed from the Oscillator/Multiplier chain via P2-2. The mixer output is fed through the 14 MHz low-pass filter to the Phase Detector Module via P3-3.

VHF/UHF RECEIVER/TRANSMITTER PHASE DETECTOR A910/A918

Signal inputs to the phase detector are a reference frequency, and mixer output representative of the VCO frequency. The phase detector U1 is an active doubly balanced mixer. The output of U1 is amplified by Q1 and Q2. This amplified output is used to correct a VCO to a phase lock. If a large frequency difference between the reference and VCO is detected by CR1 and CR2 the output of AR1-A will go low allowing AR1-B to discharge C9 with a negative going pulse. 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 lock range of the loop. When the VCO is within lock range, AR1-A output will go high, disabling pulse generator AR1-B, and current source Q3, resulting in a phase lock. The output of AR1-A is brought out to a connector through diode CR3 and is used as a transmitter RF hold off control (A918 only).

VHF/UHF RECEIVER VCO A902*/A903**

This module provides a voltage controlled oscillator and two buffer amplifiers. The oscillator is a common gate FET whose operating frequency, within the VHF/UHF band, is set by the resonant circuit formed primarily by L2-C5 (UHF) of L52-C55 (VHF) with C5 & L52 being the variable elements. Channel selection and frequency lock control is implimented by a voltage variable capacitor CR1/CR51. The output of the oscillator is connected to P2-2 and to a two stage common gate buffer-amplifier whose output is connected to P3. The signal at P2-2 is fed to the Mixer Board and P3 plugs into the receiver assembly, providing the receiver local oscillator injection signal.

VHF/UHF TRANSMITTER MIXER A916*/A917**

This module provides 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 input to the buffer-amplifier is through P1-2 and the output feeds one input port of the balanced mixer. The other input port of the mixer

is fed from the Oscillator/Multiplier chain via P2-2. The mixer output is fed through the 14 MHz low-pass filter to the Phase Detector via P3-3. This same output is fed to an amplifier stage Q3. The output of the 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 hysterisis has been designed into the switch to avoid switching jitter.

VHF/UHF TRANSMITTER VCO & AMPS A904*/A905**

This module provides a voltage controlled oscillator (Q1), two FET buffer-amplifiers (Q2 & Q3), and two power amplifiers (Q4 & Q5). The oscillator Q1 is a common gate FET whose operating frequency within the VHF/UHF band is set by the resonant circuit formed primarily by L2-C5 (UHF) or L52-C55 (VHF) with L52/C5 being the variable elements. Channel selection and frequency lock control is implemented by a voltage variable capacitor CR51/CR1. The output of the oscillator is connected to P2-2 and to the input of the four stage buffer-amplifier chain whose output is connected to J1. The signal at P2-2 is fed to the mixer module and J1 provides the drive for the associated Power Amplifier assembly.

REFERENCE COUNTER A913*/A919**

This module divides a fixed frequency from a 9.6 MHz Reference ICOM Y903 down to a frequency of either 12.5 KHz (UHF) or 15 KHz (VHF). This is used as a reference frequency in the Sample and Hold Phase Detector, which is also a part of this module. The output of the Reference ICOM Y903 is coupled thru C6 to the base of Buffer stage Q1. The collector of Q1 is tied to pin 2 of the PRESCALER Counter U1. The output of U1 is taken from U1-Q3 (fourth flip-flop) and level changed to interface with the two cascaded CMOS counters U2 and U3. U2 and U3 are programmable so that the interface output of 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 amplified and inverted through Q4 quickly discharges the 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 switche's (diode bridge) OFF time. Q5 and Q6 when pulsed on will change the charge of C11 when large changes of the VCO control voltage is required. Q5 and Q6 are controlled by the output of a frequency detect circuit.

VCO AND FILTER A911

This module 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 imductance in transformer T1 and the capacity of the three varactors CR1, CR2, and CR3. The oscillator will operate at any frequency from approximately 9 MHz to 18 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 serves to RF ground one 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 circuit (L3, L4, L5 and C7 thru C12) attenuate the harmonics so that there will be no interference by them in the circuits that the VCO drives. The resistors (R7, 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 A912*/A920**

This module is a divide by "N" counter used to divide the RF frequency of a voltage controlled oscillator (VCO) down to a predetermined step size (or Frequency) where it is compared with a reference frequency in a phase comparitor. The output of the phase comparitor 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 prescaler. 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 into all of the low speed counters (U5, U8 and U9) 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 tells U1 to count 15 one time and all of the remainder of the number count 16, thus the reduction of the division by one count or moved from the highest frequency channel to the next highest frequency channel. The output pulses of this module U (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 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, + 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 are 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 U2AQ and U2BQ will be changing in an orderly fashion. This change is detected by U3 (wired as an exclusive OR) and presented 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 and 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 the Mother board A901 for routine inspection. Test Kit 19A138366G1 (OPTION 2310) contains three different extender boards, and 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

When the Extender boards are needed, use the 19B233184G1 STRIPLINE EXTENDER ONLY where the "ASTERISKS" are shown in Figure 3. The 19B233184G1 STRIPLINE EXTENDER can be identified as a three pin extender with the two outside pins grounded and the center pin straight through. Refer to the Service Sheet on the Test Kit for further indentification. For all other connector extensions use the 19B233185G1 (3 Pin) and 19B233186G1 (4 Pin) Extender Boards as needed.

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

GENERAL ELECTRIC*
U.S.A.

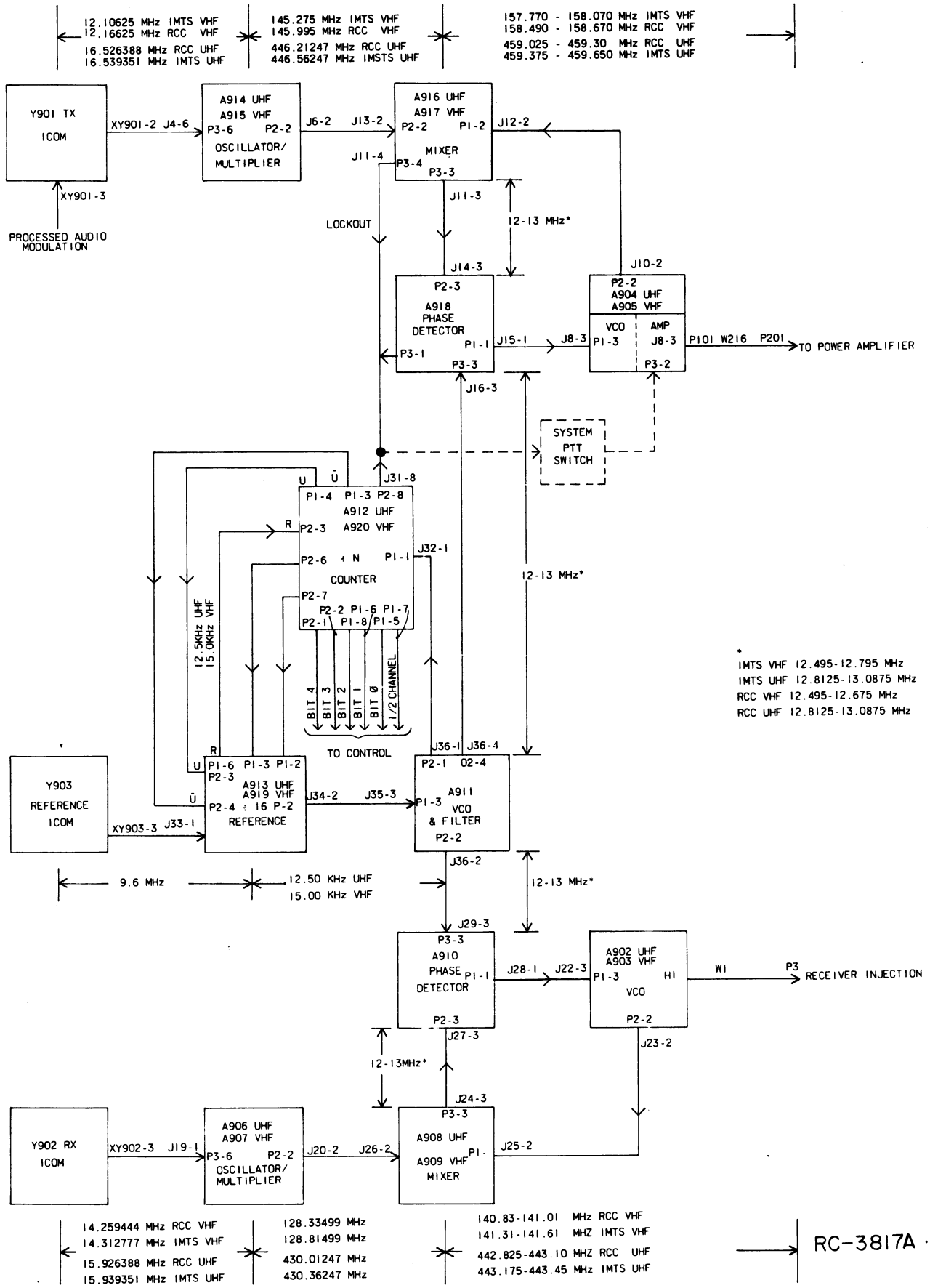


Figure 1 - Block Diagram of Synthesizer

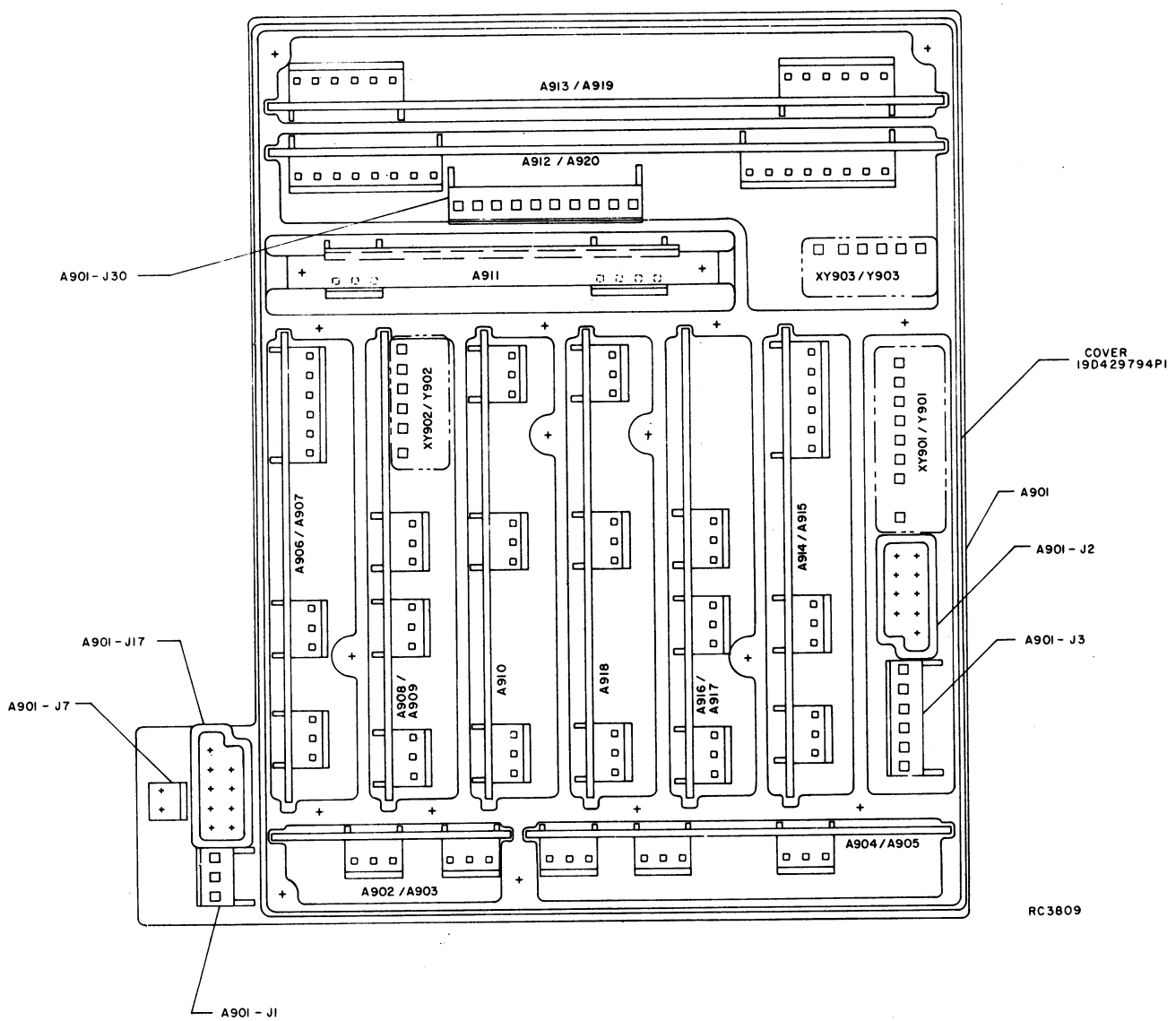


Figure 2 - Mother Board A901 Plug-In Board Lay-Out

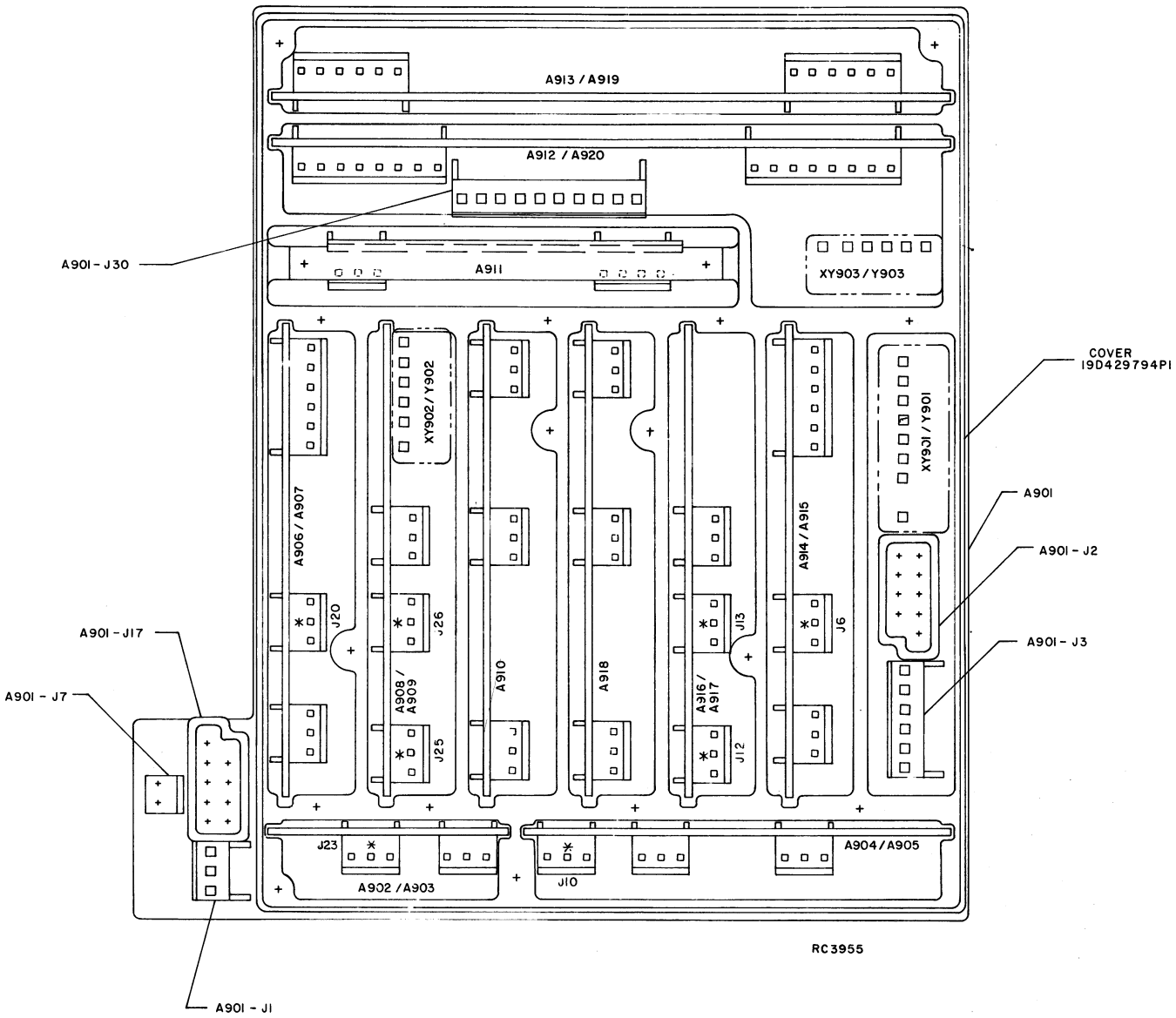
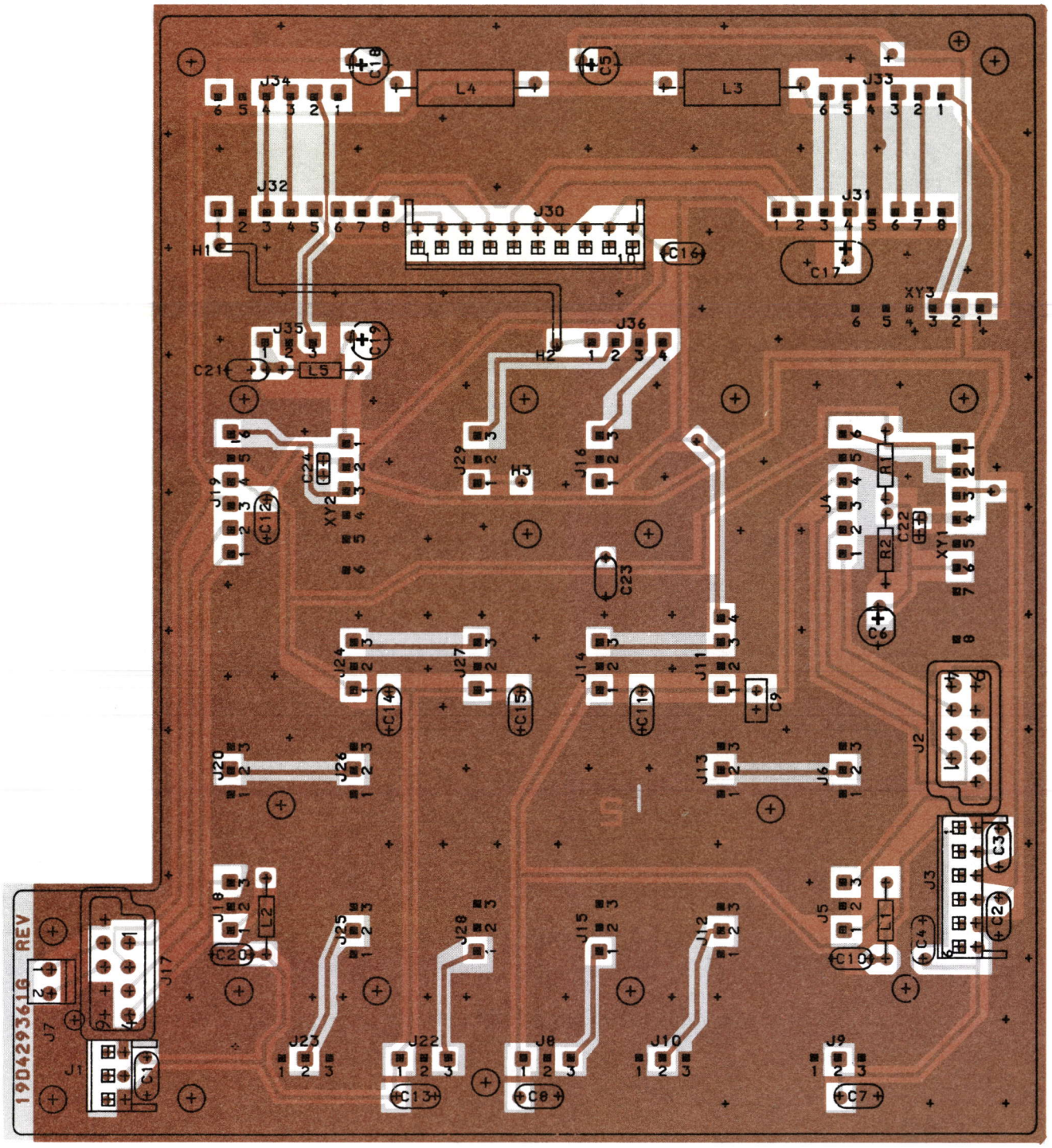


Figure 3 - Stripline Extender Location

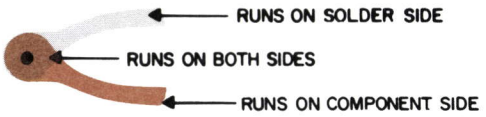


CONNECTIONS CHART		
FROM	TO	WIRE
H1	H2	T22-BL

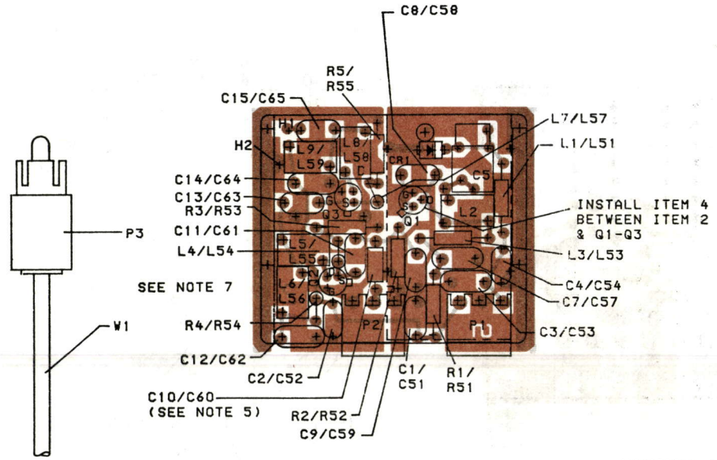
(19D429782, Rev. 1)
(19A138132, Sh. 1, Rev. 1)
(19A138132, Sh. 2, Rev. 2)

OUTLINE DIAGRAM

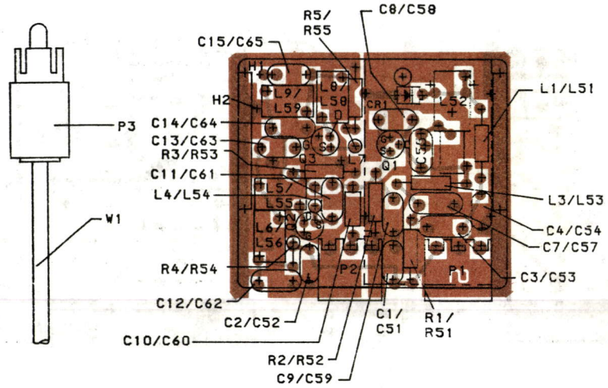
MOTHER BOARD A901



RECEIVER VCO A902/A903



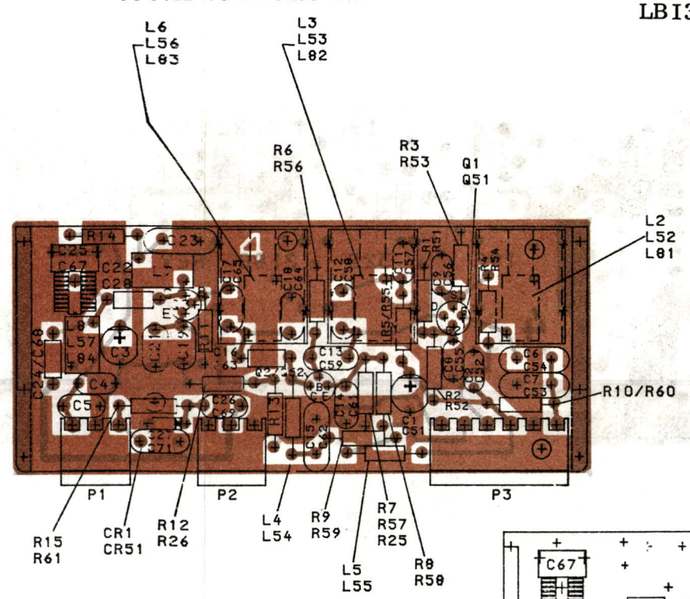
FOR GROUP 1



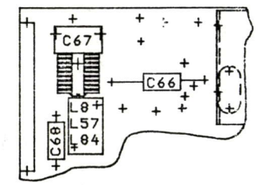
FOR GROUP 2

(19C328645, Rev. 2)
(19A138125, Sh. 1, Rev. 2)
(19A138125, Sh. 2, Rev. 2)

OSCILLATOR/MULTIPLIER A906/A907/A914/A915



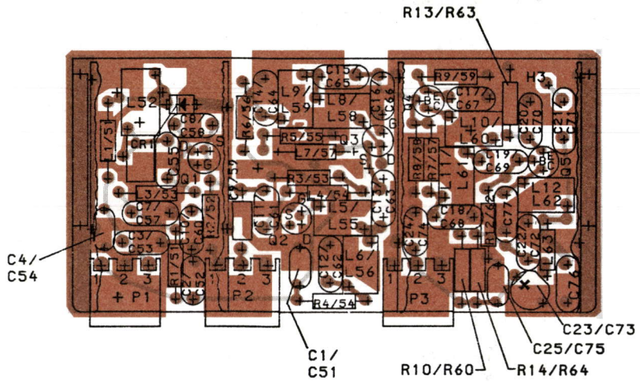
FOR PL19C328218G1/G3



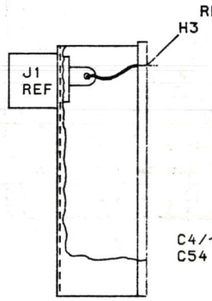
FOR PL19C328218G2

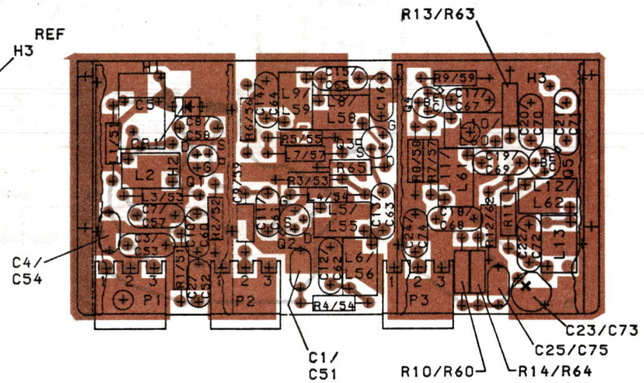
(19C328615, Rev. 4)
(19A138129, Sh. 1, Rev. 4)
(19A138129, Sh. 2, Rev. 4)

TRANSMITTER VCO & AMPS A904/A905



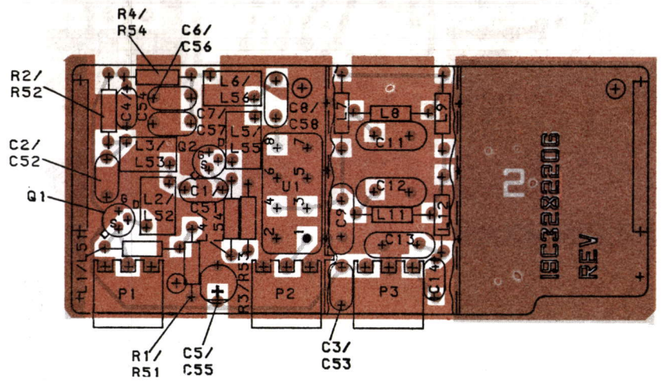
FOR PL19C328454G2





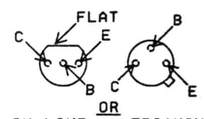
(19C328647, Rev. 5)
(19A138128, Sh. 1, Rev. 3)
(19A138128, Sh. 2, Rev. 3)

RECEIVER MIXER BOARD A908/A909



(19C328622, Rev. 1)
(19A138134, Sh. 1, Rev. 2)
(19A138134, Sh. 2, Rev. 1)

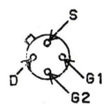
LEAD IDENTIFICATION
FOR Q4 & Q5



IN-LINE OR TRIANGULAR
TOP VIEW

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

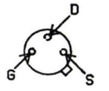
LEAD IDENTIFICATION
FOR Q1 & Q51



TOP VIEW

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

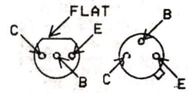
LEAD IDENTIFICATION
FOR Q1 AND Q2



TRIANGULAR
TOP VIEW

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

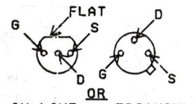
LEAD IDENTIFICATION
FOR Q2,Q52 & Q3



IN-LINE OR TRIANGULAR
TOP VIEW

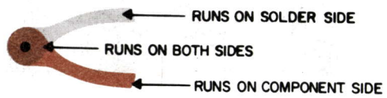
NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

LEAD IDENTIFICATION
FOR Q1-Q3



IN-LINE OR TRIANGULAR
TOP VIEW

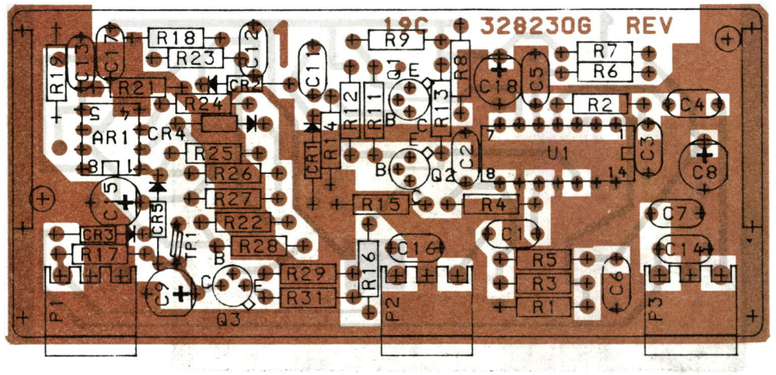
NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.



OUTLINE DIAGRAMS

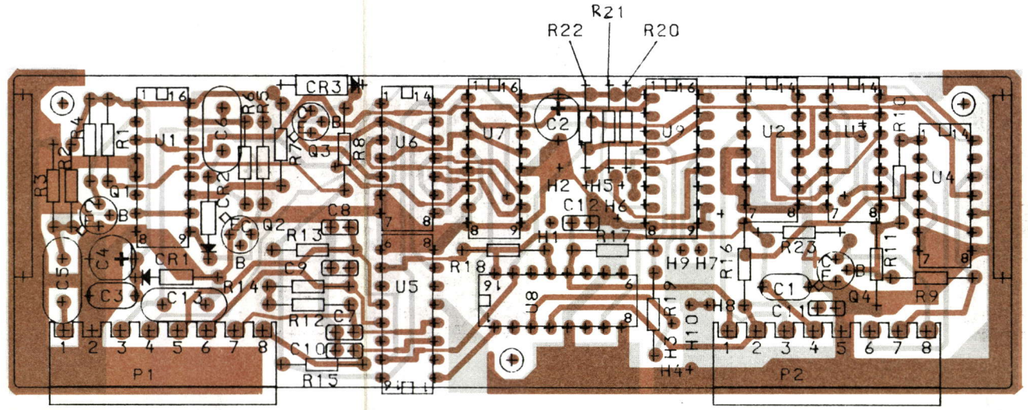
A902/A903, A904/A905, A906/A907
A914/A915 AND A908/A909

RECEIVER/TRANSMITTER PHASE DETECTOR A910/A918



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

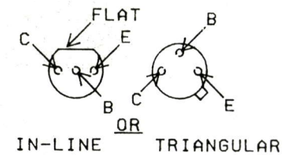
DIVIDE BY "N" COUNTER A912/A920



(19C328633, Rev. 0)
(19A138126, Sh. 1, Rev. 4)
(19A138126, Sh. 2, Rev. 4)

CONNECTIONS CHART				
GROUP 1		GROUP 2		WIRE
FROM:	TO:	FROM:	TO:	
H1	H2	H3	H4	DA
H3	H4	H9	H10	
H5	H6			
H7	H8			DA

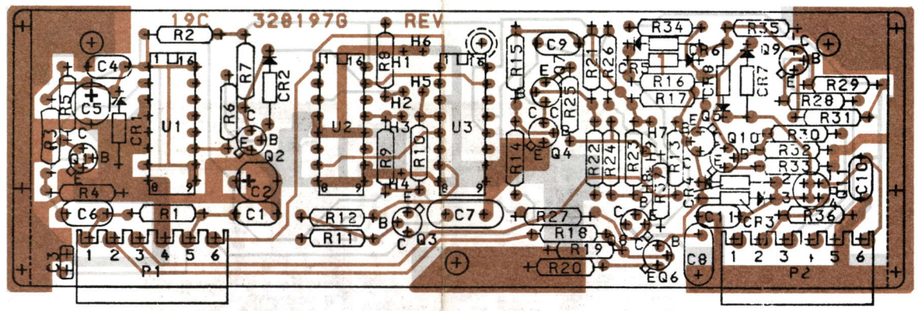
LEAD IDENTIFICATION
FOR Q1-Q4



TOP VIEW

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

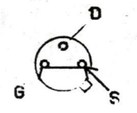
REFERENCE COUNTER A913/A919



(19C328628, Rev. 3)
(19A138127, Sh. 1, Rev. 1)
(19A138127, Sh. 2, Rev. 2)

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

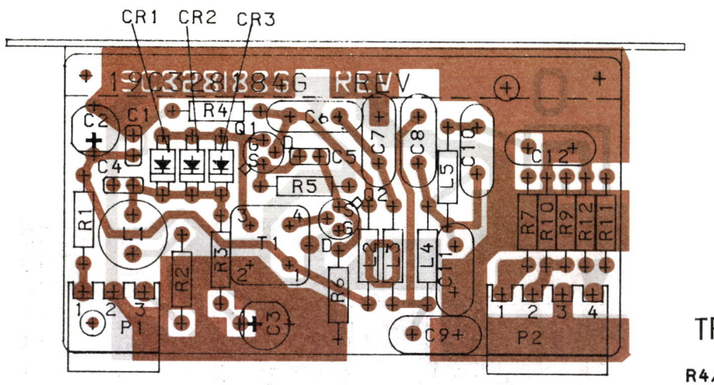
LEAD IDENTIFICATION
FOR Q1 AND Q2



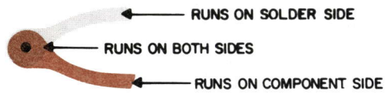
TOP VIEW

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

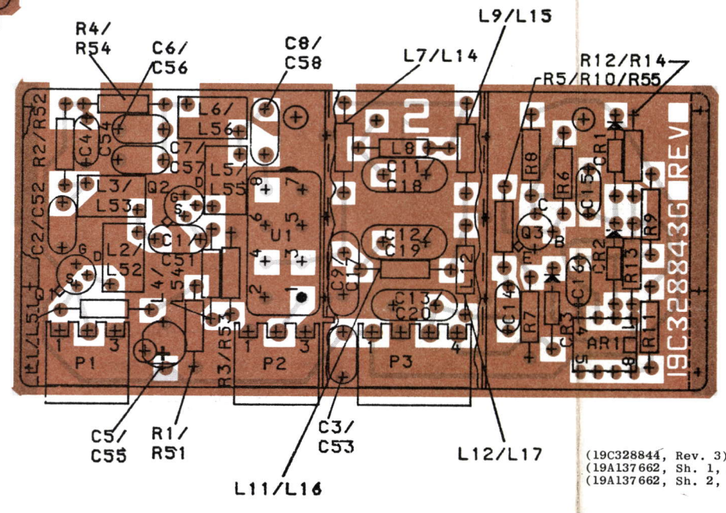
VCO AND FILTER A911

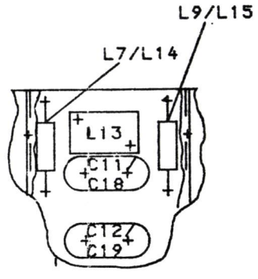


(19C328637, Rev. 0)
(19A137398, Sh. 1, Rev. 0)
(19A137398, Sh. 2, Rev. 0)



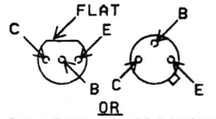
TRANSMITTER MIXER A916/A917





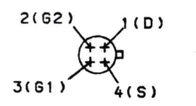
(19C328844, Rev. 3)
(19A137662, Sh. 1, Rev. 2)
(19A137662, Sh. 2, Rev. 1)

LEAD IDENTIFICATION
FOR Q1-Q10



TOP VIEW

LEAD IDENTIFICATION
FOR Q11

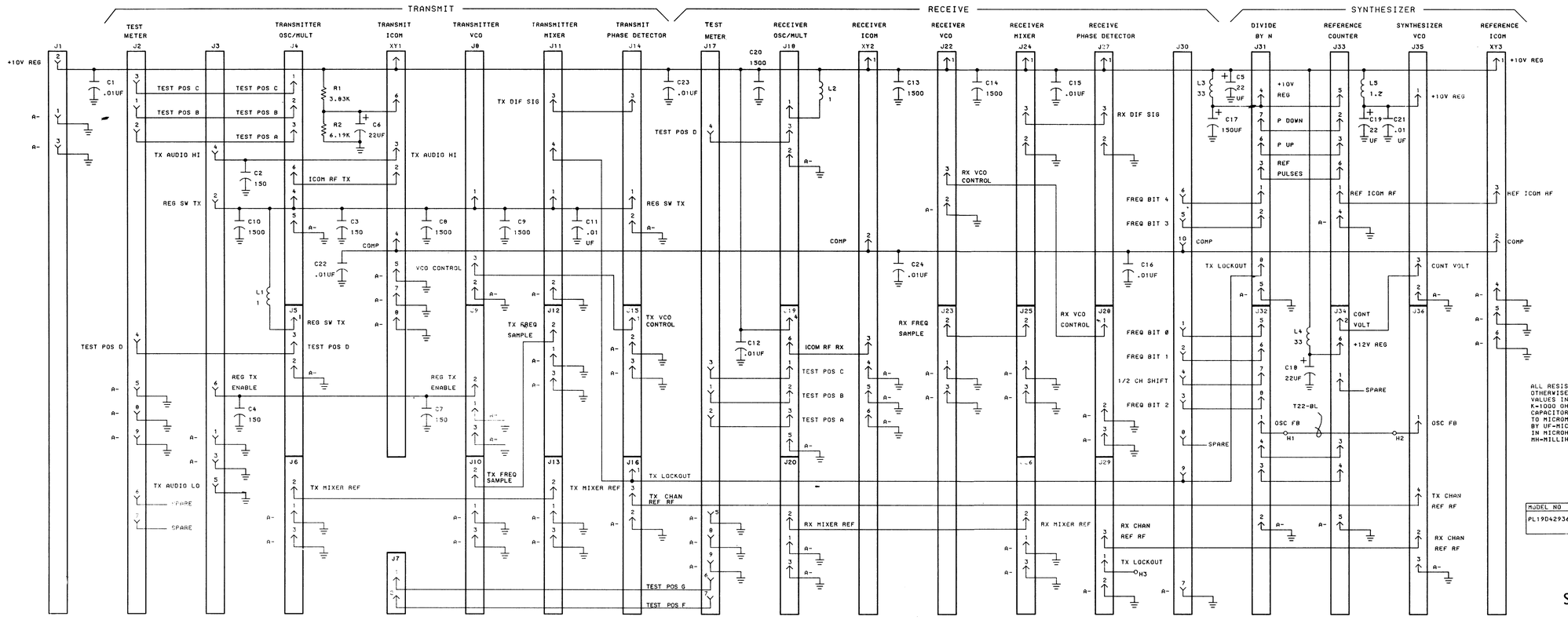


TOP VIEW

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

OUTLINE DIAGRAMS

A910/A918, A911, A912/A920,
A913/A919 AND A916/A917



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
PL19D429361G1	

(19R622361, Rev. 2)

SCHEMATIC DIAGRAM

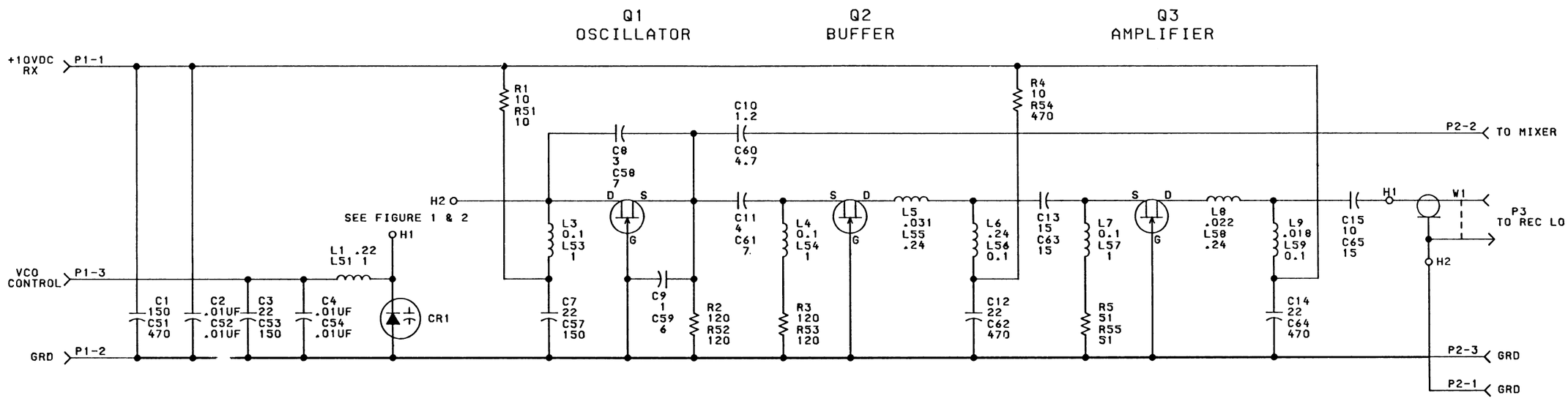
MOTHER BOARD A901

PARTS LIST

MOTHER BOARD
A901
19D429361G1
ISSUE 1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - -
C1	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C2 thru C4	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C5 and C6	19A134202P6	Tantalum: 22 µf ±20%, 15 VDCW.
C7	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C8 thru C10	19A116080P112	Polyester: 0.0015 µf ±10%, 50 VDCW.
C11 and C12	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C13 and C14	19A116080P112	Polyester: 0.0015 µf ±10%, 50 VDCW.
C15 and C16	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C17	19A134576P1	Tantalum: 150 µf ±10%, 15 VDCW; sim to Kemet T368D157K015AS.
C18 and C19	19A134202P6	Tantalum: 22 µf ±20%, 15 VDCW.
C20	19A116080P112	Polyester: 0.0015 µf ±10%, 50 VDCW.
C21	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C22	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
C23	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C24	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
		- - - - - - - - - JACKS AND RECEPTACLES - - - - - -
J1	19A116659P1	Connector, printed wiring: 3 contacts; sim to Molex 09-52-3032.
J2	19B219374G1	Connector: 9 contacts.
J3	19A116659P4	Connector, printed wiring: 6 contacts; sim to Molex 09-52-3062.
J4	19A116779P1	Contact, electrical: sim to Molex 08-50-0404. (Quantity 6).
J5 and J6	19A116779P1	Contact, electrical: sim to Molex 08-50-0404. (Quantity 3 each).
J7	19A116659P100	Connector, printed wiring: 2 contacts; sim to Molex 09-60-1021.
J8 thru J10	19A116779P1	Contact, electrical: sim to Molex 08-50-0404. (Quantity 3 each).
J11	19A116779P1	Contact, electrical: sim to Molex 08-50-0404. (Quantity 4).
J12 thru J16	19A116779P1	Contact, electrical: sim to Molex 08-50-0404. (Quantity 3 each).
J17	19B219374G1	Connector: 9 contacts.
J18	19A116779P1	Contact, electrical: sim to Molex 08-50-0404. (Quantity 3).
J19	19A116779P1	Contact, electrical: sim to Molex 08-50-0404. (Quantity 6).
J20	19A116779P1	Contact, electrical: sim to Molex 08-50-0404. (Quantity 3).
J22 thru J29	19A116779P1	Contact, electrical: sim to Molex 08-50-0404. (Quantity 3 each).
J30	19A116659P2	Connector, printed wiring: 10 contacts; sim to Molex 09-52-3102.
J31 and J32	19A116779P1	Contact, electrical: sim to Molex 08-50-0404. (Quantity 8 each).
J33 and J34	19A116779P1	Contact, electrical: sim to Molex 08-50-0404. (Quantity 6 each).
J35	19A116779P1	Contact, electrical: sim to Molex 08-50-0404. (Quantity 3).
J36	19A116779P1	Contact, electrical: sim to Molex 08-50-0404. (Quantity 4).
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1 and L2	19B209420P113	Coil, RF: 1.00 µh ±10%, 0.74 ohms DC res max; sim to Jeffers 4425-6.
L3 and L4	7488079P49	Choke, RF: 33.0 µh ±10%, 1.90 ohms DC res max; sim to Jeffers 4422-10.
L5	19B209420P114	Coil, RF: 1.20 µh ±10%, 0.13 ohms DC res max; sim to Jeffers 4436-1.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	19C314256P23831	Metal film: 3.8K ohms ±1%, 1/4 w.
R2	19C314256P26191	Metal film: 6.19K ohms ±1%, 1/4 w.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XY1	19A116779P1	Contact, electrical: sim to Molex 08-50-0404. (Quantity 8).
XY2 and XY3	19A116779P1	Contact, electrical: sim to Molex 08-50-0404. (Quantity 6 each).
		ASSOCIATED ASSEMBLIES
Y1	19A130605G20	Externally compensated. 5PPM, 12.166250 MHz, RCC.
	19A130605G21	Externally compensated. 5PPM, 12.106250 MHz, 1MTS.
	19A130605G22	Externally compensated. 5PPM, 16.526388 MHz, RCC.
	19A130605G23	Externally compensated. 5PPM, 16.539351 MHz, 1MTS.
	19A130605G24	Internally compensated. 2PPM, 12.166250 MHz, RCC.
	19A130605G25	Internally compensated. 2PPM, 12.106250 MHz, 1MTS.
	19A130605G26	Internally compensated. 2PPM, 16.526388 MHz, RCC.
	19A130605G27	Internally compensated. 2PPM, 16.539351 MHz, 1MTS.
Y2	19A137763G29	Externally compensated. 5PPM, 14.259444 MHz, RCC.
	19A137763G30	Externally compensated. 5PPM, 14.312777 MHz, 1MTS.
	19A137763G31	Externally compensated. 5PPM, 15.926388 MHz, RCC.
	19A137763G32	Externally compensated. 5PPM, 15.939351 MHz, 1MTS.
	19A137763G33	Internally compensated. 2PPM, 14.259444 MHz, RCC.
	19A137763G34	Internally compensated. 2PPM, 14.312777 MHz, 1MTS.
	19A137763G41	Internally compensated. 2PPM, 15.926388 MHz, RCC.
	19A137763G42	Internally compensated. 2PPM, 15.939351 MHz, 1MTS.
Y3	19A129393G44	Internally compensated. 5PPM, 9.6 MHz.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES



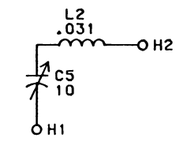


FIG.1
(FOR GROUP 1)

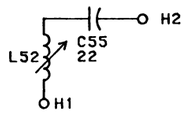


FIG.2
(FOR GROUP 2)

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
PL19C328456G1	A
PL19C328456G2	A

NOTE:
1. UHF (GR1) COMPONENTS ARE NUMBERED FROM 1 TO 49.
   VHF (GR2) COMPONENTS ARE NUMBERED FROM 51 TO 99.

PARTS LIST

RECEIVER VCO AND BUFFERS
A902 19C328456G1 UHF - REV A
A903 19C328456G2 VHF
ISSUE 2

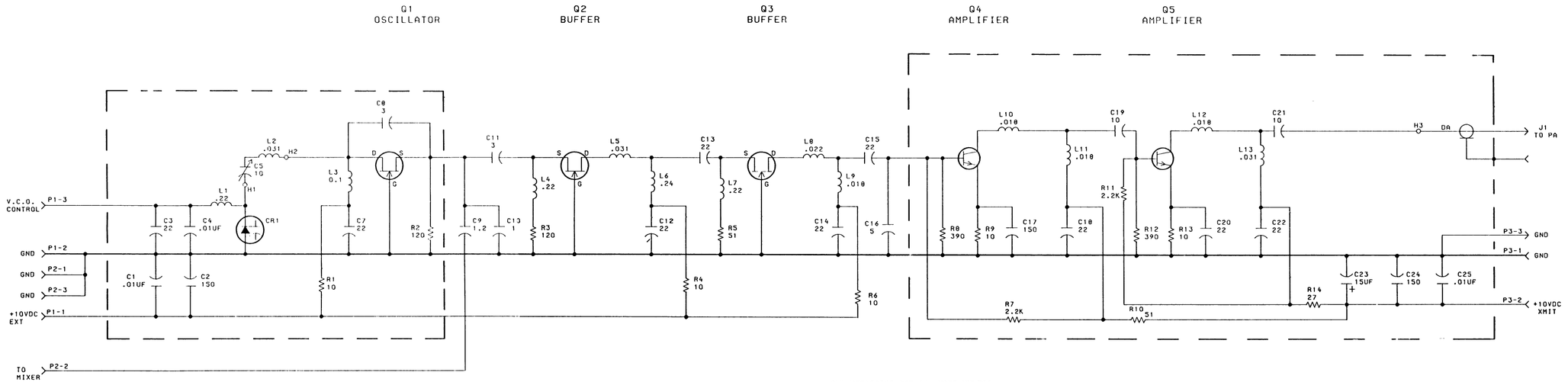
SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A116655P7	Ceramic disc: 150 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C2	19A116080P1	Polyester: 0.01 uF ±20%, 50 VDCW.
C3	19A116656P22J0	Ceramic disc: 22 pF ±5%, 500 VDCW, temp coef 0 PPM.
C4	19A116080P1	Polyester: 0.01 uF ±20%, 50 VDCW.
C5	19A134227P3	Variable: 1.5 to 14 pF, 100 VDCW.
C6	19A116656P15J0	Ceramic disc: 15 pF ±5%, 500 VDCW, temp coef 0 PPM.
C7	19A116656P22J0	Ceramic disc: 22 pF ±5%, 500 VDCW, temp coef 0 PPM.
C8	19A116656P3J7	Ceramic disc: 3 pF ±5%, 500 VDCW, temp. coef -750 PPM.
C9	19A134100P19	Ceramic disc: 1 pF ±0.1 pF, temp coef 0 ±250 PPM.
C10	19A700013P14	Phenolic: 1.20 pF ±5%, 500 VDCW.
C11	19A116656P4J0	Ceramic disc: 4 pF ±0.5 pF, 500 VDCW, temp coef 0 PPM.
C12	19A116656P22J0	Ceramic disc: 22 pF ±5%, 500 VDCW, temp coef 0 PPM.
C13	19A116656P15J0	Ceramic disc: 15 pF ±5%, 500 VDCW, temp coef 0 PPM.
C14	19A116656P22J0	Ceramic disc: 22 pF ±5%, 500 VDCW, temp coef 0 PPM.
C15	19A116656P10J0	Ceramic disc: 10 pF ±0.5 pF, 500 VDCW, temp coef 0 PPM.
C51	19A116655P13	Ceramic disc: 470 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C52	19A116080P1	Polyester: 0.01 uF ±20%, 50 VDCW.
C53	19A116655P7	Ceramic disc: 150 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C54	19A116080P1	Polyester: 0.01 uF ±20%, 50 VDCW.
C55	19A116656P22J7	Ceramic disc: 22 pF ±5%, 500 VDCW, temp coef -750 PPM.
C57	19A116655P7	Ceramic disc: 150 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C58	19A116656P7J0	Ceramic disc: 7 pF ±0.5 pF, 500 VDCW, temp coef 0 PPM.
C59	19A116656P6J0	Ceramic disc: 6 pF ±0.5 pF, 500 VDCW, temp coef 0 PPM.
C60	5491601P132	Phenolic: 4.7 pF ±5%, 500 VDCW.
C61	19A116656P7J0	Ceramic disc: 7 pF ±0.5 pF, 500 VDCW, temp coef 0 PPM.
C62	19A116655P13	Ceramic disc: 470 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C63	19A116656P15J0	Ceramic disc: 15 pF ±5%, 500 VDCW, temp coef 0 PPM.
C64	19A116655P13	Ceramic disc: 470 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C65	19A116656P15J0	Ceramic disc: 15 pF ±5%, 500 VDCW, temp coef 0 PPM.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1	19A134208P1	Silicon; sim to MV 109.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19B209420P105	Coil, RF: .22 uH ±10%, .14 ohms DC res max; sim to Jeffers 4416-5K.
L2	19J706085P3	Coil, choke: 0.031 uH ±5%; sim to Paul Smith LM-2.
L3 and L4	19B209420P101	Coil, RF: .10 uH ±10%, 0.8 ohms DC res max; sim to Jeffers 4416-1K.
L5	19J706085P3	Coil, choke: 0.031 uH ±5%; sim to Paul Smith LM-2.
L6	19J706085P12	Coil, choke: .230 uH ±5%; sim to Paul Smith LM-2.
L7	19B209420P101	Coil, RF: .10 uH ±10%, 0.8 ohms DC res max; sim to Jeffers 4416-1K.
L8	19J706085P1	Coil, choke: 0.822 uH ±30%; sim to Paul Smith LM-2.
L9	19J706085P7	Coil, choke: 0.018 uH ±30%; sim to Paul Smith LM2.
L51	19B209420P13	Coil, RF: 1.0 uH ±5%, 1.00 ohms DC res max; sim to Jeffers 4426-6J.
L52	19B209595P510	Coil, RF: variable; sim to Paul Smith SK-618-1.
L53 and L54	19B209420P13	Coil, RF: 1.0 uH ±5%, 1.00 ohms DC res max; sim to Jeffers 4426-6J.
L55	19J706085P12	Coil, choke: .230 uH ±5%; sim to Paul Smith LM-2.
L56	19J706085P8	Coil, RF: 0.110 uH ind., ±5%; sim to Paul Smith LM-2.
L57	19B209420P13	Coil, RF: 1.0 uH ±5%, 1.00 ohms DC res max; sim to Jeffers 4426-6J.
L58	19J706085P12	Coil, choke: .230 uH ±5%; sim to Paul Smith LM-2.
L59	19J706085P8	Coil, RF: 0.110 uH ind., ±5%; sim to Paul Smith LM-2.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1 and P2	19A700102P1	Printed wire: 3 contacts rated at 5 amps; sim to Molex 09-52-3031.
P3		(Part of W1).
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1 thru Q3	19A134402P1	N Type, field effect.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	19A700106P15	Composition: 10 ohms ±5%, 1/4 w.
R2 and R3	19A700106P41	Composition: 120 ohms ±5%, 1/4 w.
R4	19A700106P15	Composition: 10 ohms ±5%, 1/4 w.
R5	19A700106P32	Composition: 51 ohms ±5%, 1/4 w.
R51	19A700106P15	Composition: 10 ohms ±5%, 1/4 w.
R52 and R53	19A700106P41	Composition: 120 ohms ±5%, 1/4 w.
R54	19A700106P55	Composition: 470 ohms ±5%, 1/4 w.
R55	19A700106P32	Composition: 51 ohms ±5%, 1/4 w.
		- - - - - - - - - - CABLES - - - - - - - - - -
W1	5491689P90	Cable, RF: approx 5-1/8 inches long; 350 VRMS, 500 VDC operating voltage. (Includes P3).
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19A701332P1	Insulator disk. (Used with Q1-Q3).
	19B232889P1	Ground strap. (Located on each end of printed board).
	19B232897P1	Shield.
	4037072P5	Plug button.

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 - To increase power output, changed value of C11.
C11 was 3pf ± 0.5 pf 500 VDCW.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES



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
PL19CJ2845461	A

(19R622365, Rev. 6)

SCHEMATIC DIAGRAM

TRANSMITTER VCO AND AMPS
A904 UHF

PARTS LIST

TRANSMITTER VCO AND AMPLIFIERS UHF
A904
19C328454G1 - REV A
ISSUE 3

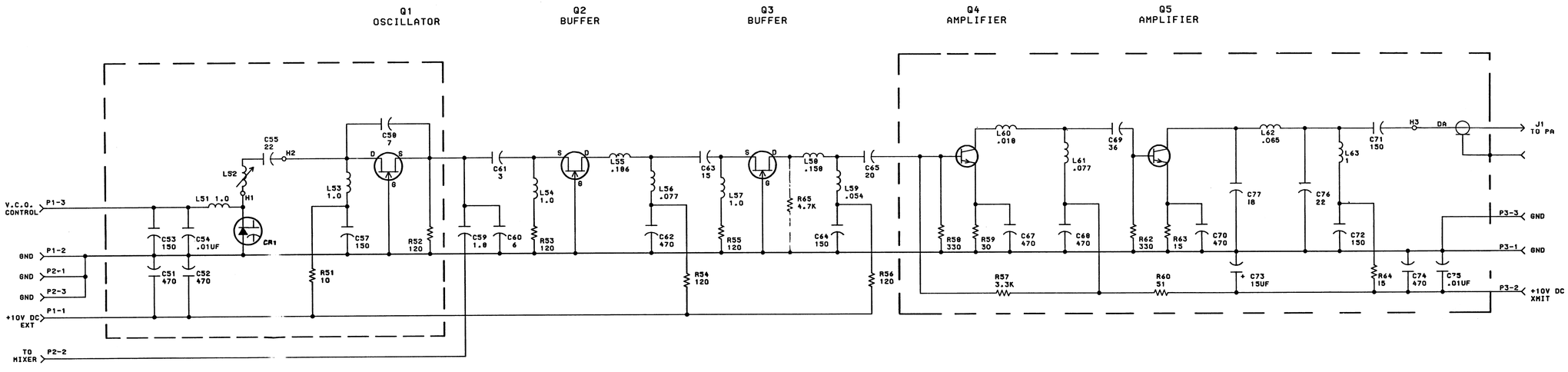
SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A116080P1	Polyester: 0.01 uF ±20%, 50 VDCW.
C2	19A116655P7	Ceramic disc: 150 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C3	19A116656P22J0	Ceramic disc: 22 pF ±5%, 500 VDCW, temp coef 0 PPM.
C4	19A116080P1	Polyester: 0.01 uF ±20%, 50 VDCW.
C5	19A134227P3	Variable: 1.5 to 14 pF, 100 VDCW.
C7	19A116656P22J0	Ceramic disc: 22 pF ±5%, 500 VDCW, temp coef 0 PPM.
C8	19A116656P3J7	Ceramic disc: 3 pF ±5%, 500 VDCW, temp. coef -750 PPM.
C9	19A700013P14	Phenolic: 1.20 pF ±5%, 500 VDCW.
C10	19A134100P19	Ceramic disc: 1 pF ±0.1 pF, temp coef 0 ±250 PPM.
C11	19A116656P3J0	Ceramic disc: 3 pF ±0.5 pF, 500 VDCW, temp coef 0 PPM.
C12 thru C15	19A116656P22J0	Ceramic disc: 22 pF ±5%, 500 VDCW, temp coef 0 PPM.
C16	19A116656P5J0	Ceramic disc: 5 pF ±0.5 pF, 500 VDCW, temp coef 0 PPM.
C17	19A116655P7	Ceramic disc: 150 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C18	19A116656P22J0	Ceramic disc: 22 pF ±5%, 500 VDCW, temp coef 0 PPM.
C19	19A116656P10J0	Ceramic disc: 10 pF ±0.5 pF, 500 VDCW, temp coef 0 PPM.
C20	19A116656P22J0	Ceramic disc: 22 pF ±5%, 500 VDCW, temp coef 0 PPM.
C21	19A116656P10J0	Ceramic disc: 10 pF ±0.5 pF, 500 VDCW, temp coef 0 PPM.
C22	19A116656P22J0	Ceramic disc: 22 pF ±5%, 500 VDCW, temp coef 0 PPM.
C23	19A134202P8	Tantalum: 15 uF ±20%, 20 VDCW.
C24	19A116655P7	Ceramic disc: 150 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C25	19A116080P1	Polyester: 0.01 uF ±20%, 50 VDCW.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1	19A134208P1	Silicon; sim to MV 109.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1	7104941P20	Jack, phono: coaxial. (Part of Shielf Assembly).
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19B209420P105	Coil, RF: .22 uH ±10%, .14 ohms DC res max; sim to Jeffers 4416-5K.
L2	19J706085P3	Coil, choke: 0.031 uH ±5%; sim to Paul Smith LM-2.
L3	19B209420P101	Coil, RF: .10 uH ±10%, 0.8 ohms DC res max; sim to Jeffers 4416-1K.
L4	19B209420P105	Coil, RF: .22 uH ±10%, .14 ohms DC res max; sim to Jeffers 4416-5K.
L5	19J706085P3	Coil, choke: 0.031 uH ±5%; sim to Paul Smith LM-2.
L6	19J706085P12	Coil, choke: .230 uH ±5%; sim to Paul Smith LM-2.
L7	19B209420P105	Coil, RF: .22 uH ±10%, .14 ohms DC res max; sim to Jeffers 4416-5K.
L8	19J706085P1	Coil, choke: 0.822 uH ±30%; sim to Paul Smith LM-2.
L9 thru L12	19J706085P7	Coil, choke: 0.018 uH ±30%; sim to Paul Smith LM2.
L13	19J706085P3	Coil, choke: 0.031 uH ±5%; sim to Paul Smith LM-2.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1 thru P3	19A700102P1	Printed wire: 3 contacts rated at 5 amps; sim to Molex 09-52-3031.
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q1 thru Q3	19A134402P1	N Type, field effect.
Q4 and Q5	19A116201P4	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	19A700106P15	Composition: 10 ohms ±5%, 1/4 w.
R2 and R3	19A700106P41	Composition: 120 ohms ±5%, 1/4 w.
R4	19A700106P15	Composition: 10 ohms ±5%, 1/4 w.
R5	19A700106P32	Composition: 51 ohms ±5%, 1/4 w.
R6	19A700106P15	Composition: 10 ohms ±5%, 1/4 w.
R7	19A700106P71	Composition: 2.2K ohms ±5%, 1/4 w.
R8	19A700106P53	Composition: 390 ohms ±5%, 1/4 w.
R9	19A700106P15	Composition: 10 ohms ±5%, 1/4 w.
R10	19A700106P32	Composition: 51 ohms ±5%, 1/4 w.
R11	19A700106P71	Composition: 2.2K ohms ±5%, 1/4 w.
R12	19A700106P53	Composition: 390 ohms ±5%, 1/4 w.
R13	19A700106P15	Composition: 10 ohms ±5%, 1/4 w.
R14	19A700106P25	Composition: 27 ohms ±5%, 1/4 w.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19A701332P1	Insulator disk. (Used with Q1-Q5).
	19B232889P1	Ground strap. (Located on each end of printed board).
	19B232915P1	Shield. (Located on P1 end of printed board).
	19B232916G1	Shield. (Located on P3 end of printed board - Includes J1).
	4037072P5	Plug button.

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 - To increase power output . Changed value of C19.
C19 was 19A11665P8J0, 8pf ± 10.5 pf, 500 VDCW.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES



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
PL19C32845482	B

(19R622468, Rev. 3)

SCHEMATIC DIAGRAM

TRANSMITTER VCO AND AMPS
A905 VHF

PARTS LIST

TRANSMITTER VCO AND AMPLIFIERS
ASO5 19C328454G2 VHF
ISSUE 2

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C51 and C52	19A116655P13	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C53	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C54	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C55	19A116656P22J7	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef -750 PPM.
C57	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C58	19A116656P7J0	Ceramic disc: 7 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM.
C59	5491601P124	Phenolic: 1.8 pf ±5%, 500 VDCW.
C60	19A116656P6J0	Ceramic disc: 6 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM.
C61	19A116656P3J0	Ceramic disc: 3 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM.
C62	19A116655P13	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C63	19A116656P15J0	Ceramic disc: 15 pf ±5%, 500 VDCW, temp coef 0 PPM.
C64	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C65	19A116656P20J0	Ceramic disc: 20 pf ±5%, 500 VDCW, temp coef 0 PPM.
C67 and C68	19A116655P13	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C69	19A116656P36J1	Ceramic disc: 36 pf ±5%, 500 VDCW, temp coef -150 PPM.
C70	19A116655P13	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C71*	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
		In REV A & earlier:
	19A116656P33J0	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef 0 PPM.
C72	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C73	19A134202P8	Tantalum: 15 µf ±20%, 20 VDCW.
C74	19A116655P13	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C75	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C76*	19A116656P20J0	Ceramic disc: 20 pf ±5%, 500 VDCW, temp coef 0 PPM. Added by REV B.
C77*	19A116656P18J0	Ceramic disc: 18 pf ±5%, 500 VDCW, temp coef 0 PPM. Added by REV B.
C78*	5496218P244	Ceramic disc: 15 pf ±5%, 500 VDCW, temp coef -80 PPM. Added by REV A. Deleted by REV B.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1	19A134208P1	Silicon, capacitive: sim to MV109.
		- - - - - - - - JACKS AND RECEPTACLES - - - - -
J1	7104941P20	Jack, type, phen: sim to Cinch National Tel. (Part of Shield Assembly).

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L51	19A700024P13	Coil, RF: 1.00 µh ±10%, 1.00 ohms DC res max.
L52	19B209595P510	Coil, RF: variable; sim to Paul Smith SK-618-1.
L53 and L54	19A700024P13	Coil, RF: 1.00 µh ±10%, 1.00 ohms DC res max.
L55	19B209677P611	Coil, RF: 0.186 µh ind ±5%; sim to Paul Smith LM-2.
L56	19B209677P606	Coil, RF: 0.077 µh ind ±5%; sim to Paul Smith LM-2.
L57	19A700024P13	Coil, RF: 1.00 µh ±10%, 1.00 ohms DC res max.
L58	19B209677P611	Coil, RF: 0.186 µh ind ±5%; sim to Paul Smith LM-2.
L59	19B209677P604	Coil, RF: 0.054 µh ind ±5%; sim to Paul Smith LM-2.
L60	19B209677P601	Coil, RF: 0.018 µh ind ±5%; sim to Paul Smith LM-2.
L61	19B209677P606	Coil, RF: 0.077 µh ind ±5%; sim to Paul Smith LM-2.
L62	19B209677P605	Coil, RF: 0.065 µh ind ±5%; sim to Paul Smith LM-2.
L63*	19A700024P13	Coil, RF: 1.00 µh ±10%, 1.00 ohms DC res max.
		In REV A & earlier:
	19B209677P606	Coil, RF: 0.077 µh ind ±5%; sim to Paul Smith LM-2.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1 thru P3	19A700102P1	Connector, printed wiring: 3 contacts; sim to Molex 09-52-3031.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1 thru Q3	19A134402P1	N Type, field effect; sim to U310.
Q4 and Q5	19A116201P4	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R51	19A700106P15	Composition: 10 ohms ±5%, 1/4 w.
R52 thru R56	19A700106P41	Composition: 120 ohms ±5%, 1/4 w.
R57	19A700106P75	Composition: 3.3K ohms ±5%, 1/4 w.
R58	19A700106P51	Composition: 330 ohms ±5%, 1/4 w.
R59	3R152P300J	Composition: 30 ohms ±5%, 1/4 w.
R60	19A700106P32	Composition: 51 ohms ±5%, 1/4 w.
R61*	3R152P332J	Composition: 3.3K ohms ±5%, 1/4 w. Deleted by REV B.
R62	19A700106P51	Composition: 330 ohms ±5%, 1/4 w.
R63	19A700106P19	Composition: 15 ohms ±5%, 1/4 w.
R64	19A700106P19	Composition: 15 ohms ±5%, 1/4 w.
R65	19A700106P79	Composition: 4.7K ohms ±5%, 1/4 w.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - -
	19A116707P3	Insulator. (Used with Q1-Q5).
	19B232889P1	Ground strap. (Located on each end of printed board).
	19B232915P1	Shield. (Located on P1 end of printed board).
	19B232916G1	Shield. (Located on P3 end of printed board-includes J1).

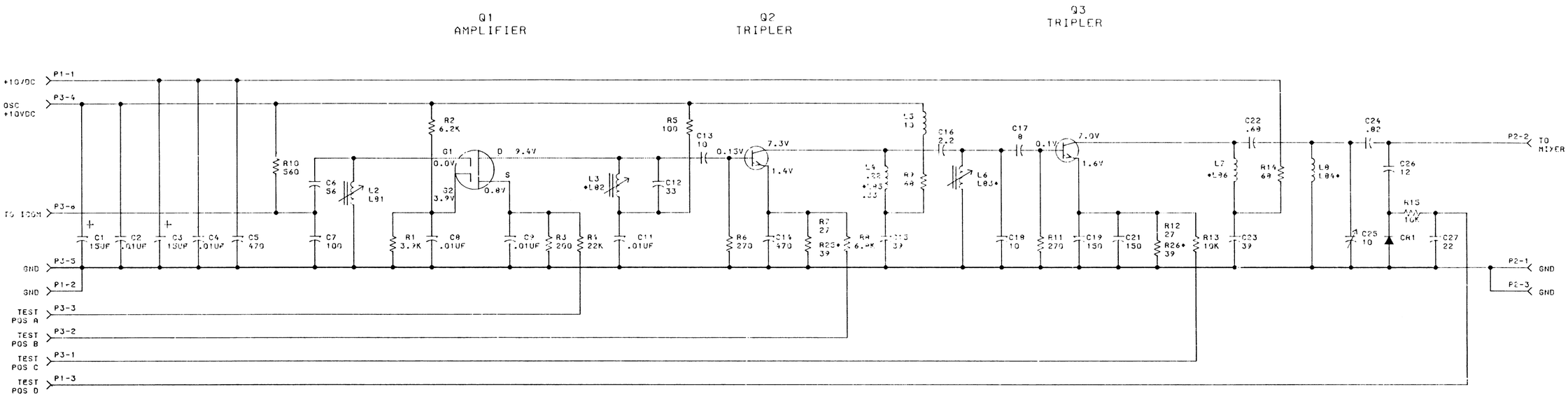
PRODUCTION CHANGES

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 - To reduce the amplitude of the 2nd Harmonic. Added C77*.

REV. B - To reduce harmonic output and improve transmitter performance. Changed C71 and L63. Added C76 and C77. Deleted R61.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES



* PRESENT IN GROUP 3 ONLY.

THIS ELEM DIAG APPLIES TO		
MODEL NO	REV LETTER	IDENTIFICATION
PL19C320218G1 PL19C320218G3	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 UHF A906/A914
19C328218G1

PARTS LIST

OSCILLATOR/MULTIPLIER
A906/A914
19C328218G1 - REV A
ISSUE 2

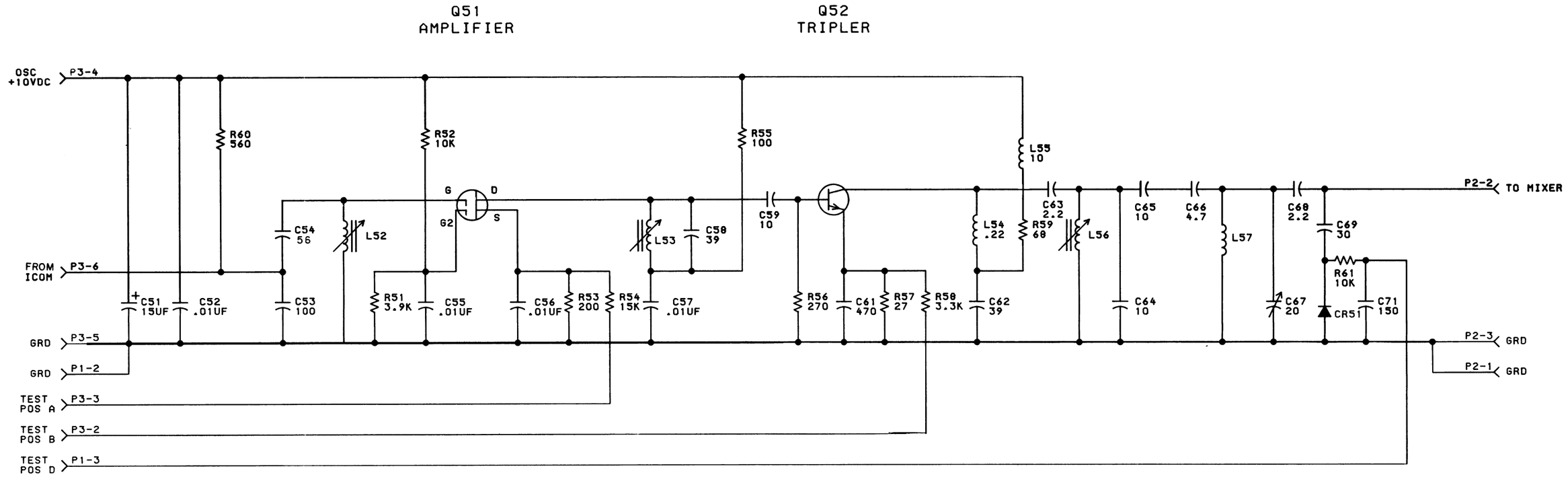
SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A134202P8	Tantalum: 15 uF ±20%, 20 VDCW.
C2	19A116080P1	Polyester: 0.01 uF ±20%, 50 VDCW.
C3	19A134202P8	Tantalum: 15 uF ±20%, 20 VDCW.
C4	19A116080P1	Polyester: 0.01 uF ±20%, 50 VDCW.
C5	19A116655P13	Ceramic disc: 470 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C6	19A700105P28	Mica: 56 pF ±5%, 500 VDCW.
C7	19A700105P34	Mica: 100 pF ±5%, 500 VDCW.
C8 and C9	19A116080P1	Polyester: 0.01 uF ±20%, 50 VDCW.
C11	19A116080P1	Polyester: 0.01 uF ±20%, 50 VDCW.
C12	19A116656P33J0	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 RMC Type JF Discap.
C15	19A700105P23	Mica: 39 pF ±5%, 500 VDCW.
C16	5491601P126	Phenolic: 2.2 pF ±5%, 500 VDCW.
C17	19A116656P8J0	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 RMC Type JF Discap.
C21	19A116655P7	Ceramic disc: 150 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C22	19A700013P11	Phenolic: 0.68 pF ±5%, 500 VDCW.
C23	19A700105P23	Mica: 39 pF ±5%, 500 VDCW.
C24	19A700013P12	Phenolic: 0.82 pF ±5%, 500 VDCW.
C25	19B209544P4	Variable: 1.56 to 4.86 pF, 250 VDCW, sim to EF 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.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1	19A116052P1	Silicon, hot carrier: Fwd drop .350 volts max.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L2 and L3	19B209595P511	Coil, RF: variable; sim to Paul Smith SK-618-1.
L4	19B209420P105	Coil, RF: .22 uH ±10%, .14 ohms DC res max; sim to Jeffers 4416-5K.
L5	19A700024P25	Coil, RF: 10.0 uH ±10%, 3.70 ohms DC res max.
L6	19B209595P506	Coil, RF: variable; sim to Paul Smith SK-618-1.
L7	19J706085P4	Coil, RF: 0.065 uH ind., ±5%; sim to Paul Smith LW-2.
L8	19J706085P7	Coil, choke: 0.018 uH ±30%; sim to Paul Smith LW2.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1 and P2	19A700102P1	Printed wire: 3 contacts rated at 5 amps; sim to Molex 09-52-3031.
P3	19A116659P6	Connector, printed wiring: 6 contacts rated @ 5 amps; sim to Molex 09-52-3061.
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A116818P1	N Channel, field effect.
Q2 and Q3	19A116201P3	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	19A700106P77	Composition: 3.9K ohms ±5%, 1/4 w.
R2	3R152P622J	Composition: 6200 ohms ±5%, 1/4 w.
R3	19A700106P46	Composition: 200 ohms ±5%, 1/4 w.
R4	19A700106P95	Composition: 22K ohms ±5%, 1/4 w.
R5	19A700106P39	Composition: 100 ohms ±5%, 1/4 w.
R6	19A700106P49	Composition: 270 ohms ±5%, 1/4 w
R7	19A700106P25	Composition: 27 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
R12	19A700106P25	Composition: 27 ohms ±5%, 1/4 w.
R13	19A700106P87	Composition: 10K ohms ±5%, 1/4 w.
R14	19A700106P35	Composition: 68 ohms ±5%, 1/4 w.
R15	19A700106P87	Composition: 10K ohms ±5%, 1/4 w.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19A701332P1	Insulator disk. (Used with Q1-Q3).
	19B232889P1	Ground strap. (Located on each end of printed board).
	19A137795P1	Shield.
	4037072P5	Plug button.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

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 - To increase power output, deleted C28, L4.
Added C22, L85, L86.



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
PL19C32821862	

(19D429797, Rev. 2)

SCHEMATIC DIAGRAM

OSCILLATOR/MULTIPLIER VHF A907/A915
19C328218G2

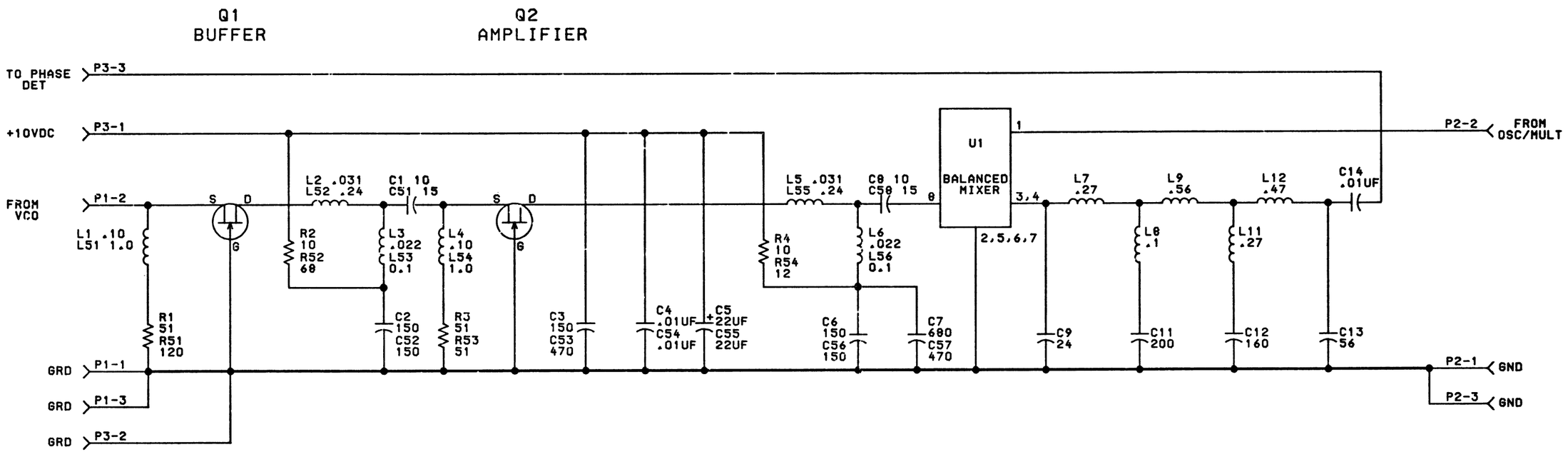
Issue 1

PARTS LIST

OSCILLATOR/MULTIPLIER
A907/A915
19C328218G2
ISSUE 1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C51	19A134202P8	Tantalum: 15 µf ±20%, 20 VDCW.
C52	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C53	7489162P27	Silver mica: 100 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C54	7489162P21	Silver mica: 56 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C55 thru C57	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C58	19A116656P39J0	Ceramic disc: 39 pf ±5%, 500 VDCW, temp coef 0 PPM.
C59	19A116656P10J0	Ceramic disc: 10 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM.
C61	19A116655P13	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C62	7489162P17	Silver mica: 39 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C63	5491601P126	Phenolic: 2.2 pf ±5%, 500 VDCW.
C64 and C65	19A116656P10J0	Ceramic disc: 10 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM.
C66	5491601P132	Phenolic: 4.7 pf ±5%, 500 VDCW.
C67	19B209544P6	Variable, air: 2.28-14.13 pf, 250 VDCW; sim to E.F. Johnson 187-0309-105.
C68	5491601P126	Phenolic: 2.2 pf ±5%, 500 VDCW.
C69	19A116656P30J0	Ceramic disc: 30 pf ±5%, 500 VDCW, temp coef 0 PPM.
C71	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR51	19A116052P1	Silicon, hot carrier: Fwd. drop .350 volts max.
		- - - - - - - - - - INDUCTORS - - - - - - - - -
L52 and L53	19B209595P511	Coil, RF: variable; sim to Paul Smith SK-618-1.
L54	19B209420P105	Coil, RF: 0.22 µh ±10%, 0.14 ohms DC res max; sim to Jeffers 4416-5.
L55	19B209420P125	Coil, RF: 10.0 µh ±10%, 3.10 ohms DC res max; sim to Jeffers 4446-4.
L56	19B209595P507	Coil, RF: variable; sim to Paul Smith SK-618-1.
L57	19B209677P607	Coil, RF: 0.099 µh ind ±5%; sim to Paul Smith LM-2.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1 and P2	19A116659P5	Connector, printed wiring: 3 contacts; sim to Molex 09-52-3031.
P3	19A116659P6	Connector, printed wiring: 6 contacts; sim to Molex 09-52-3061.
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q51	19A116818P1	N Channel, field effect; sim to 3N187.
Q52	19A116201P3	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - -
R51	3R152P392J	Composition: 3.9K ohms ±5%, 1/4 w.
R52	3R152P103J	Composition: 10K ohms ±5%, 1/4 w.
R53	3R152P201J	Composition: 200 ohms ±5%, 1/4 w.
R54	3R152P153J	Composition: 15K ohms ±5%, 1/4 w.
R55	3R152P101J	Composition: 100 ohms ±5%, 1/4 w.
R56	3R152P271J	Composition: 270 ohms ±5%, 1/4 w.
R57	3R152P270J	Composition: 27 ohms ±5%, 1/4 w.
R58	3R152P332J	Composition: 3.3K ohms ±5%, 1/4 w.
R59	3R152P680J	Composition: 68 ohms ±5%, 1/4 w.
R60	3R152P561J	Composition: 560 ohms ±5%, 1/4 w.
R61	3R152P103J	Composition: 10K ohms ±5%, 1/4 w.
		- - - - - - - - - - MISCELLANEOUS - - - - - - -
	19A116707P3	Insulator. (Used with Q51 & Q52).
	19B232889P1	Ground strap. (Located on each end of printed board).
	19A137795P1	Shield.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES



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 (G1) COMPONENTS ARE NUMBERED FROM 1 TO 49
   VHF (G2) COMPONENTS ARE NUMBERED FROM 51 TO 99

MODEL NO	REV LETTER
PL19C32022G1	
PL19C32022G2	

(19D429802, Rev. 2)

SCHEMATIC DIAGRAM

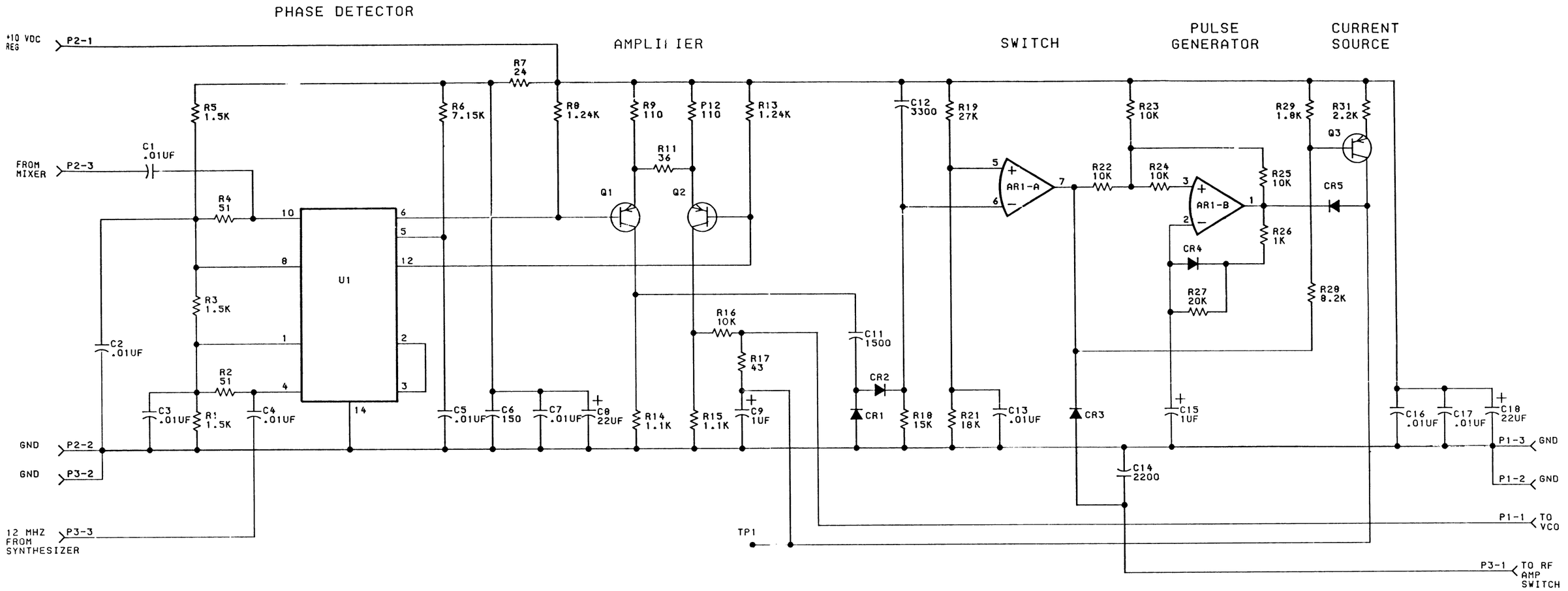
RECEIVER MIXER BOARD A908/A909

PARTS LIST

RECEIVER MIXER
A908 19C328220G1 UHF
A909 19C328220G2 VHF
ISSUE 1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A116656P10J0	Ceramic disc: 10 pf ±0.5 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 and C7	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C8	19A116656P10J0	Ceramic disc: 10 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM.
C9	7489162P12	Silver mica: 24 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C11	7489162P34	Silver mica: 200 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C12	7489162P32	Silver mica: 160 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C13	7489162P21	Silver mica: 56 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C14	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C51	19A116656P15J0	Ceramic disc: 15 pf ±5%, 500 VDCW, temp coef 0 PPM.
C52	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C53	19A116655P13	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C54	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C55	19A134202P6	Tantalum: 22 µf ±20%, 15 VDCW.
C56	19A116655P7	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C57	19A116655P13	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C58	19A116656P15J0	Ceramic disc: 15 pf ±5%, 500 VDCW, temp coef 0 PPM.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19B209420P101	Coil, RF: 0.10 µh ±10%, 0.08 ohms DC res max; sim to Jeffers 4416-1.
L2	19B209677P602	Coil, RF: 0.022 µh ind ±5%; sim to Paul Smith LM-2.
L3	19B209677P603	Coil, RF: 0.031 µh ind ±5%; sim to Paul Smith LM-2.
L4	19B209420P101	Coil, RF: 0.10 µh ±10%, 0.08 ohms DC res max; sim to Jeffers 4416-1.
L5	19B209677P602	Coil, RF: 0.022 µh ind ±5%; sim to Paul Smith LM-2.
L6	19B209677P603	Coil, RF: 0.031 µh ind ±5%; sim to Paul Smith LM-2.
L7	19B209420P106	Coil, RF: 0.27 µh ±10%, 0.16 ohms DC res max; sim to Jeffers 4416-6.
L8	19B209420P101	Coil, RF: 0.10 µh ±10%, 0.08 ohms DC res max; sim to Jeffers 4416-1.
L9	19B209420P110	Coil, RF: 0.56 µh ±10%, 0.40 ohms DC res max; sim to Jeffers 4426-3.
L11	19B209420P106	Coil, RF: 0.27 µh ±10%, 0.16 ohms DC res max; sim to Jeffers 4416-6.
L12	19B209420P109	Coil, RF: 0.47 µh ±10%, 0.34 ohms DC res max; sim to Jeffers 4426-2.
L51	19B209420P113	Coil, RF: 1.00 µh ±10%, 0.74 ohms DC res max; sim to Jeffers 4426-6.
L52	19B209677P612	Coil, RF: 0.240 µh ind ±5%; sim to Paul Smith LM-2.
L53	19B209677P608	Coil, RF: 0.110 µh ind ±5%; sim to Paul Smith LM-2.
L54	19B209420P113	Coil, RF: 1.00 µh ±10%, 0.74 ohms DC res max; sim to Jeffers 4426-6.
L55	19B209677P612	Coil, RF: 0.240 µh ind ±5%; sim to Paul Smith LM-2.
L56	19B209677P608	Coil, RF: 0.110 µh ind ±5%; sim to Paul Smith LM-2.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1 thru P3	19A116659P5	Connector, printed wiring: 3 contacts; sim to Molex 09-52-3031.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1 and Q2	19A134402P1	N Type, field effect; sim to U310.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P510J	Composition: 51 ohms ±5%, 1/4 w.
R2	3R152P100J	Composition: 10 ohms ±5%, 1/4 w.
R3	3R152P510J	Composition: 51 ohms ±5%, 1/4 w.
R4	3R152P100J	Composition: 10 ohms ±5%, 1/4 w.
R51	3R152P121J	Composition: 120 ohms ±5%, 1/4 w.
R52	3R152P680J	Composition: 68 ohms ±5%, 1/4 w.
R53	3R152P510J	Composition: 51 ohms ±5%, 1/4 w.
R54	3R152P120J	Composition: 12 ohms ±5%, 1/4 w.
		- - - - - - - - - INTEGRATED CIRCUITS - - - - - -
U1	19B209680P1	Balanced Mixer.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B232889P1	Ground strap. (Located on each end of printed board).
	19A116707P3	Insulator. (Used with Q1 & Q2).
	19B232897P1	Shield.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES



THIS ELEM DIAG APPLIES TO	
MODEL NO	REV LETTER
PL19C328230 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

RECEIVER/TRANSMITTER PHASE DETECTOR A910/A918

PARTS LIST

PHASE DETECTOR
A910/A918
19C328230G1 - REV D
ISSUE 3

SYMBOL	GE PART NO.	DESCRIPTION
AR1	19A134511P2	Integrated circuit, linear: Dual OP AMP; sim to LM258N, 8 Pin Minidip Package.
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1 thru C5	19A116080P1	Polyester: 0.01 uF ±20%, 50 VDCW.
C6	19A116655P7	Ceramic disc: 150 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C7	19A116080P1	Polyester: 0.01 uF ±20%, 50 VDCW.
C8	19A134202P6	Tantalum: 22 uF ±20%, 15 VDCW.
C9	19A134202P114	Tantalum: 1 uF ±10%, 35 VDCW.
C11	19A700005P2	Polyester: 1500 pF ±10%, 50 VDCW.
C12	19A700005P4	Polyester: 3300 pF ±10%, 50 VDCW.
C13	19A116080P1	Polyester: 0.01 uF ±20%, 50 VDCW.
C14	19A116080P13	Polyester: .0022 uF ±20%, 50 VDCW.
C15	19A134202P114	Tantalum: 1 uF ±10%, 35 VDCW.
C16 and C17	19A116080P1	Polyester: 0.01 uF ±20%, 50 VDCW.
C18	19A134202P6	Tantalum: 22 uF ±20%, 15 VDCW.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1 thru CR5	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
		- - - - - - - - - - - PLUGS - - - - - - - - - - -
P1 thru P3	19A700102P1	Printed wire: 3 contacts rated at 5 amps; sim to Molex 09-52-3031.
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q1 and Q2	19A116223P1	Silicon, PNP; sim to Type 2N3640.
Q3	19A115852P1	Silicon, PNP; sim to Type 2N3906.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	19A700106P67	Composition: 1.5K ohms ±5%, 1/4 w.
R2	19A700106P32	Composition: 51 ohms ±5%, 1/4 w.
R3	19A700106P67	Composition: 1.5K ohms ±5%, 1/4 w.
R4	19A700106P32	Composition: 51 ohms ±5%, 1/4 w.
R5	19A700106P67	Composition: 1.5K ohms ±5%, 1/4 w.
R6	19A701250P283	Metal film: 7.15K ohms ±1%, 250 VDCW, 1/4 w.
R7	3R152P240J	Composition: 24 ohms ±5%, 1/4 w.
R8	19A701250P210	Metal film: 1240 ohms ±1%, 250 VDCW, 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: 1240 ohms ±1%, 250 VDCW, 1/4 w.
R14 and R15	3R152P112J	Composition: 1.1K ohms ±5%, 1/4 w.
R16	19A700106P87	Composition: 10K ohms ±5%, 1/4 w.
R17	3R152P430J	Composition: 43 ohms ±5%, 1/4 w.
R18	19A700106P91	Composition: 15K ohms ±5%, 1/4 w.
R19	19A700106P97	Composition: 27K ohms ±5%, 1/4 w.
R21	19A700019P52	Deposited carbon: 18K ohms ±5%, 1/4 w.
R22 thru R25	19A700106P87	Composition: 10K ohms ±5%, 1/4 w.
R26	19A700106P63	Composition: 1K ohms ±5%, 1/4 w.
R27	3R152P203J	Composition: 20K ohms ±5%, 1/4 w.
R28	19A700106P85	Composition: 8.2K ohms ±5%, 1/4 w.
R29	19A700106P69	Composition: 1.8K ohms ±5%, 1/4 w.
R31	19A700106P71	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 uA796C.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B232889P1	Ground strap. (Located on each end of printed board).
	4037072P5	Plug button.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

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.

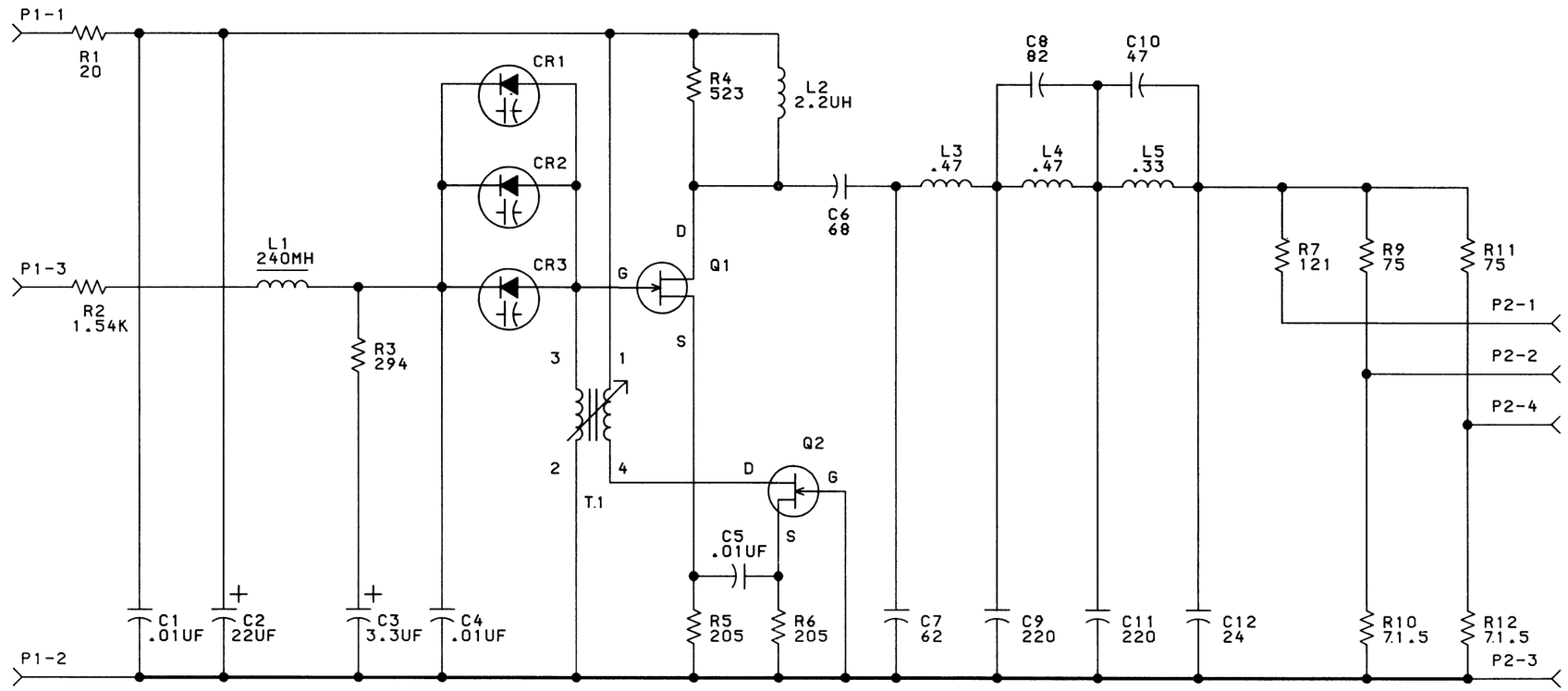
REV. A - To improve operation at +70°C. Changed R16.

REV. B - To improve frequency lock, Changed Q1, Q2, R21.

REV. C - To change VCO voltage; Changed R19.

REV. D - To improve frequency lock; Changed R21.

VCO FILTER



MODEL NO	REV LETTER
PL19C328183	

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.

(19C328636, Rev. 1)

SCHEMATIC DIAGRAM

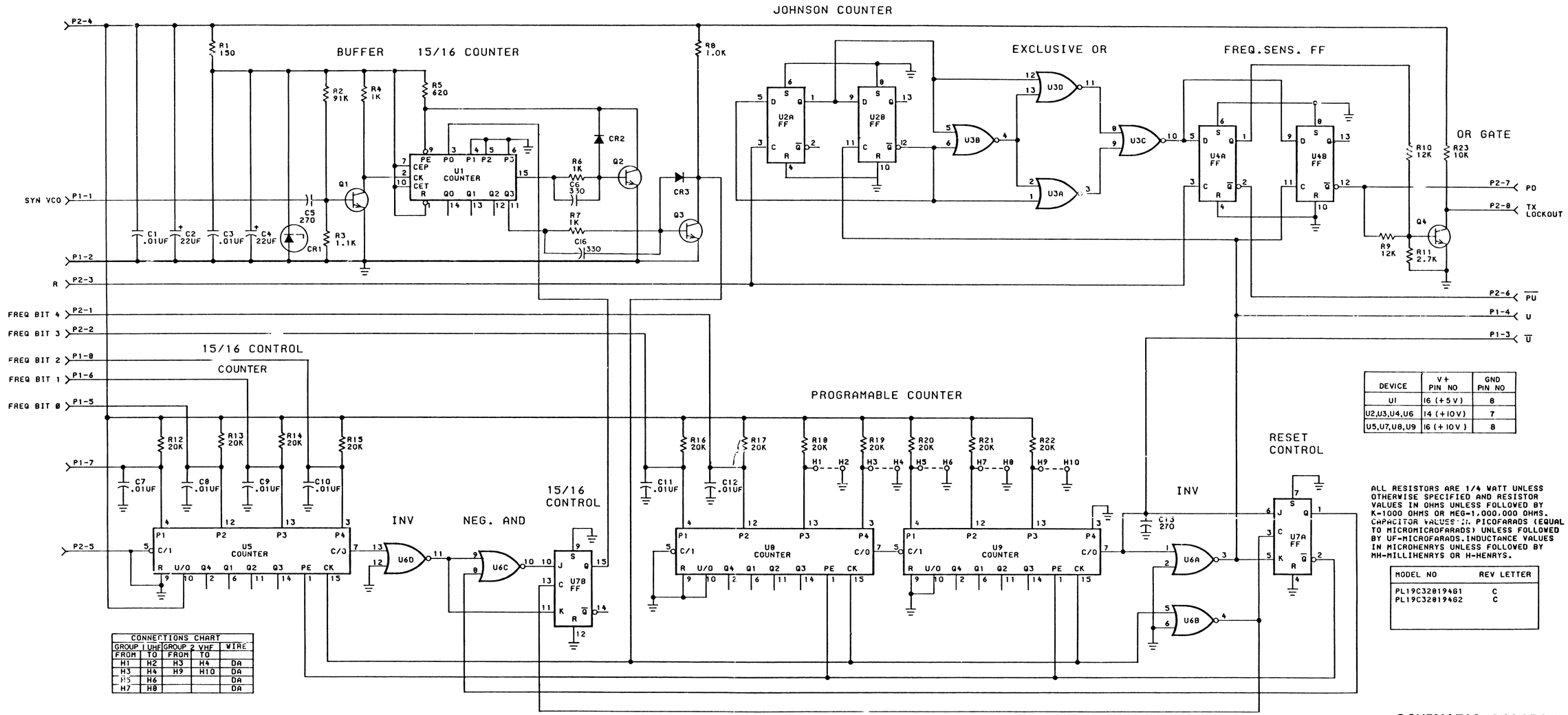
VCO AND FILTER A911

PARTS LIST

VCO/FILTER
A911
19C328183G1
ISSUE 1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - 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 and C5	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
C6	7489162P23	Silver mica: 68 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C7	7489162P22	Silver mica: 62 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C8	7489162P23	Silver mica: 68 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C9	7489162P35	Silver mica: 220 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C10	7489162P19	Silver mica: 47 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C11	7489162P35	Silver mica: 220 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C12	7489162P12	Silver mica: 24 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1 thru CR3	19A134208P1	Silicon, capacitive; sim to MV109.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	5491736P2	Choke: 240 mh ±10% at (1 KHz, 0.5 v), 270 ohms DC res max; sim to Aladdin 33-161.
L2	19B209420P117	Coil, RF: 2.20 µh ±10%, 0.38 ohms DC res max; sim to Jeffers 4436-4.
L3 and L4	19B209420P109	Coil, RF: 0.47 µh ±10%, 0.34 ohms DC res max; sim to Jeffers 4426-2.
L5	19B209420P7	Coil, RF: 0.33 µh ±5%, 0.22 ohms DC res max; sim to Jeffers 4416-7.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1	19A116659P5	Connector, printed wiring: 3 contacts; sim to Molex 09-52-3031.
P2	19A116659P7	Connector, printed wiring: 4 contacts; sim to Molex 09-52-3041.
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q1 and Q2	19A134402P1	N Type, field effect.
		- - - - - - - - - - RESISTORS - - - - - - - - -
R1	3R152P200J	Composition: 20 ohms ±5%, 1/4 w.
R2	19C314256P21541	Metal film: 1.5K ohms ±1%, 1/4 w.
R3	19C314256P22940	Metal film: 294 ohms ±1%, 1/4 w.
R4	19C314256P25230	Metal film: 523 ohms ±1%, 1/4 w.
R5 and R6	19C314256P22050	Metal film: 205 ohms ±1%, 1/4 w.
R7	19C314256P21210	Metal film: 121 ohms ±1%, 1/4 w.
R9	19C314256P27509	Metal film: 750.9 ohms ±1%, 1/4 w.
R10	19C314256P27159	Metal film: 715.9 ohms ±1%, 1/4 w.
R11	19C314256P27509	Metal film: 750.9 ohms ±1%, 1/4 w.
R12	19C314256P27159	Metal film: 715.9 ohms ±1%, 1/4 w.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T1	19C328732G1	Transformer. Includes:
	5495352P25	Tuning slug.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19C328642P1	Support. (Secures printed board).
	19B200525P77	Rivet, tubular. (Secures printed board to support).
	19A116707P3	Insulator. (Used with Q1 & Q2).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES



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

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MODEL NO	REV LETTER
PL19C32819461	C
PL19C32819462	C

CONNECTIONS CHART				
GROUP 1 UHF		GROUP 2 VHF		WIRE
FROM	TO	FROM	TO	
H1	H2	H3	H4	DA
H3	H4	H9	H10	DA
H5	H6			DA
H7	H8			DA

(19R622363, Rev. 6)

SCHEMATIC DIAGRAM

DIVIDE BY "N" COUNTER A912/A920

Issue 2

PARTS LIST

DIVIDE BY "N" COUNTER

A912 19C328194G1 UHF - REV C
A920 19C328194G2 VHF - REV C
ISSUE 2

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A116080P1	Polyester: 0.01 uF ±20%, 50 VDCW.
C2	19A134202P6	Tantalum: 22 uF ±20%, 15 VDCW.
C3	19A116080P1	Polyester: 0.01 uF ±20%, 50 VDCW.
C4	19A134202P6	Tantalum: 22 uF ±20%, 15 VDCW.
C5 and C6	19A700105P46	Mica: 270 pF ±5%, 500 VDCW.
C7 thru C12	19A116192P1	Ceramic: 0.01 uF ±20%, 50 VDCW; sim to Erie 8121 Special.
C13	19A700105P46	Mica: 270 pF ±5%, 500 VDCW.
C16	19A116192P7	Ceramic: 330 pF ±10%, 50 VDCW; sim to Erie 8101-A050-W5R-331K.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1	4036887P56	Zener: 500 mW, 5.0 v. nominal.
CR2 and CR3	19A116052P2	Silicon, fast recovery; sim to Hewlett Packard 5082-2811.
		- - - - - - - - - - - PLUGS - - - - - - - - - - -
P1 and P2	19A116659P77	Connector, printed wiring: 8 contacts rated at 5 amps; sim to Molex 09-52-3081.
		- - - - - - - - - - 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	19A700106P43	Composition: 150 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 and R10	19A700106P89	Composition: 12K ohms ±5%, 1/4 w.
R11	19A700106P73	Composition: 2.7K ohms ±5%, 1/4 w.
R12 thru R22	3R152P203J	Composition: 20K ohms ±5%, 1/4 w.
R23	19A700106P87	Composition: 10K ohms ±5%, 1/4 w.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - -
U1	19A700037P368	Digital, SYNCHRONOUS 4 BIT COUNTER (With Direct Clear): Identification No. 74LS161.
U2	19A134097P11	Digital: DUAL "D" FLIP-FLOP WITH SET/RESET.
U3	19A134097P2	Digital: QUAD 2-INPUT NOR GATE.
U4	19A134097P11	Digital: DUAL "D" FLIP-FLOP WITH SET/RESET.
U5	19A134097P208	Digital, Binary Up/Down Counter: Identification No. 4516.
U6	19A134097P2	Digital: QUAD 2-INPUT NOR GATE.
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.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B232889P1	Ground strap. (Located on each end of printed board).
	4037072P5	Plug button.

PRODUCTION CHANGES

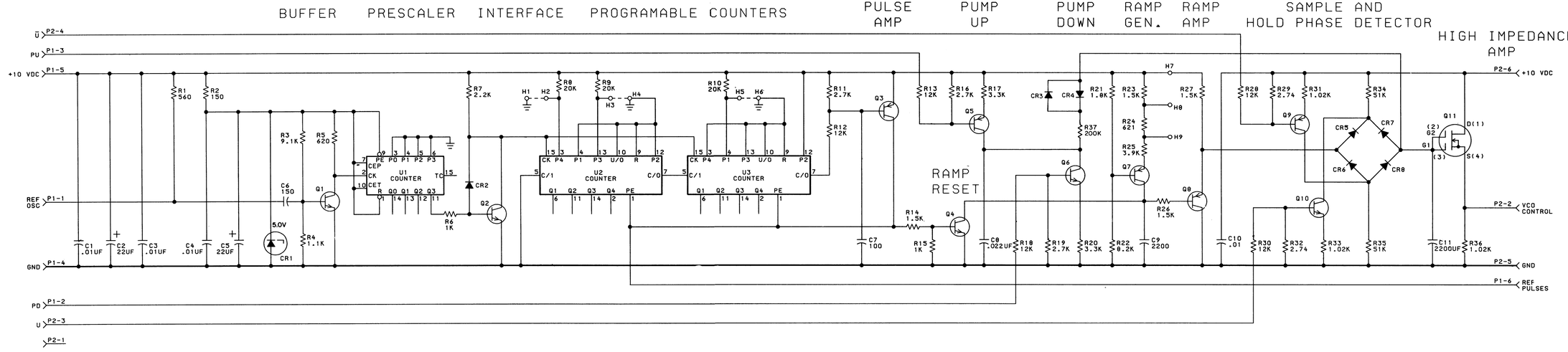
Changes in the equipment to improve performance or to simplify circuits are identified by a "Revision Letter," which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for descriptions of parts affected by these revisions.

REV. A - To reduce level of unwanted pulses from programmable counter; Changed C13.

REV. B - To increase switching speed; Changed C6 and added C16.

REV. C - To increase frequency range; Changed R4.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES



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	16 (+10V)	8

CONNECTIONS CHART

GROUP 1 UHF		GROUP 2 VHF		
FROM	TO	FROM	TO	WIRE
H1	H2	H3	H4	DA
H3	H4	H5	H6	DA
H7	H8	H7	H9	DA

MODEL NO	REV LETTER	IDENTIFICATIONS
PL19C32819761 PL19C32819762		UHF COMM CARR/GE MARC IV VHF COMM CARR

(19K622362, Rev. 5)

SCHEMATIC DIAGRAM

REFERENCE COUNTER A913/A919

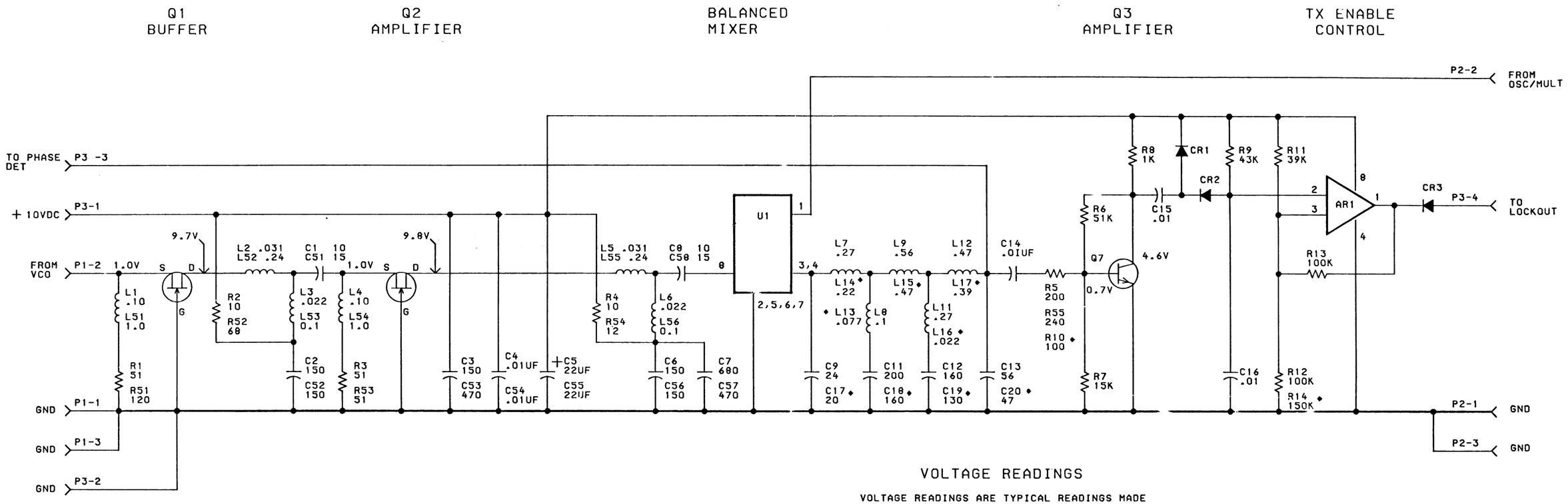
PARTS LIST

REFERENCE COUNTER

A913 19C328197G1 UHF
A919 19C328197G2 VHF
ISSUE 1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - 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 RMC Type JF Discap.
C7	7489162P27	Silver mica: 100 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C8	19A116080P104	Polyester: 0.033 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.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1	4036887P56	Diode, zener: 500 mW, 5.0 v. nominal.
CR2	19A116052P2	Silicon, hot carrier: Fwd. drop .410 volts max.
CR3 and CR4	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
CR5 thru CR8	19A116052P2	Silicon, hot carrier: Fwd. drop .410 volts max.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1 and P2	19A116659P6	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	3R152P561J	Composition: 560 ohms ±5%, 1/4 w.
R2	3R152P151J	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	3R152P102J	Composition: 1K ohms ±5%, 1/4 w.
R7	3R152P222J	Composition: 2.2K ohms ±5%, 1/4 w.
R8 thru R10	3R152P203J	Composition: 20K ohms ±5%, 1/4 w.
R11	3R152P272J	Composition: 2.7K ohms ±5%, 1/4 w.
R12 and R13	3R152P123J	Composition: 12K ohms ±5%, 1/4 w.
R14	3R152P152J	Composition: 1.5K ohms ±5%, 1/4 w.
R15	3R152P102J	Composition: 1K ohms ±5%, 1/4 w.
R16	3R152P272J	Composition: 2.7K ohms ±5%, 1/4 w.
R17	3R152P332J	Composition: 3.3K ohms ±5%, 1/4 w.
R18	3R152P123J	Composition: 12K ohms ±5%, 1/4 w.
R19	3R152P272J	Composition: 2.7K ohms ±5%, 1/4 w.
R20	3R152P332J	Composition: 3.3K ohms ±5%, 1/4 w.
R21	3R152P182J	Composition: 1.8K ohms ±5%, 1/4 w.
R22	3R152P822J	Composition: 8.2K ohms ±5%, 1/4 w.
R23	3R152P152J	Composition: 1.5K ohms ±5%, 1/4 w.
R24	3R152P621J	Composition: 620 ohms ±5%, 1/4 w.
R25	3R152P392J	Composition: 3.9K ohms ±5%, 1/4 w.
R26 and R27	3R152P152J	Composition: 1.5K ohms ±5%, 1/4 w.
R28	3R152P123J	Composition: 12K ohms ±5%, 1/4 w.
R29	19C314256P22741	Metal film: 2.5K ohms ±1%, 1/4 w.
R30	3R152P123J	Composition: 12K ohms ±5%, 1/4 w.
R31	19C314256P21021	Metal film: 1.02K ohms ±1%, 1/4 w.
R32	19C314256P22741	Metal film: 2.5K ohms ±1%, 1/4 w.
R33	19C314256P21021	Metal film: 1.02K ohms ±1%, 1/4 w.
R34 and R35	3R152P513J	Composition: 51K ohms ±5%, 1/4 w.
R36	19C314256P21021	Metal film: 1.02K ohms ±1%, 1/4 w.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - - -
U1	19A134305P68	Digital, Synchronous 4 Bit Counter (With Direct Clear): Identification No. 74S161.
U2 and U3	19A134097P208	Digital, Binary Up/Down Counter: Identification No. 4516.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19A116707P3	Insulator. (Used with Q11).
	19B232889P1	Ground strap. (Quantity 2- Located on each end of printed board).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES



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.

THIS ELEM DIAG APPLIES TO		IDENTIFICATION
MODEL NO	REV LETTER	
PL19C328043 G1	A	UHF COMMON CARRIER
PL19C328043 G2		VHF COMMON CARRIER
PL19C328043 G3	A	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.

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.

(19D430127, Rev. 7)

SCHEMATIC DIAGRAM

TRANSMITTER MIXER A916/A917

PARTS LIST

TRANSMITTER MIXER
A916 19C328843G1 UHF - REV A
A917 19C328843G2 VHF
19C328843G3 GE MARC V - REV A
ISSUE 3

SYMBOL	GE PART NO.	DESCRIPTION
AR1	19A134511P2	Integrated circuit, linear: Dual OP AMP; sim to LM253N, 8 Pin Minidip Package.
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A116656P10J0	Ceramic disc: 10 pF ±0.5 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 uF ±20%, 50 VDCW.
C5	19A134202P6	Tantalum: 22 uF ±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 ±0.5 pF, 500 VDCW, temp coef 0 PPM.
C9	19A700105P18	Mica: 24 pF ±5%, 500 VDCW.
C11	7489162P34	Silver mica: 200 pF ±5%, 500 VDCW; sim. to Sprague Type 118.
C12	7489162P32	Silver mica: 160 pF ±5%, 500 VDCW; sim. to Sprague Type 118.
C13	19A116105P28	Mica: 56 pF ±5%, 500 VDCW.
C14 thru C16	19A116080P1	Polyester: 0.01 uF ±20%, 50 VDCW.
C17	19A700105P16	Mica: 20 pF ±5%, 500 VDCW.
C18	7489162P32	Silver mica: 160 pF ±5%, 500 VDCW; sim. to Sprague Type 118.
C19	19A700105P37	Mica: 130 pF ±5%, 500 VDCW.
C20	19A700105P26	Mica: 47 pF ±5%, 500 VDCW.
C51	19A116656P15J0	Ceramic disc: 15 pF ±5%, 500 VDCW, temp coef 0 PPM.
C52	19A116655P7	Ceramic disc: 150 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C53	19A116655P13	Ceramic disc: 470 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C54	19A116080P1	Polyester: 0.01 uF ±20%, 50 VDCW.
C55	19A134202P6	Tantalum: 22 uF ±20%, 15 VDCW.
C56	19A116655P7	Ceramic disc: 150 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C57	19A116655P13	Ceramic disc: 470 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C58	19A116656P15J0	Ceramic disc: 15 pF ±5%, 500 VDCW, temp coef 0 PPM.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1 thru CR3	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19B209420P101	Coil, RF: .10 uH ±10%, 0.8 ohms DC res max; sim to Jeffers 4416-1K.
L2	19J706085P3	Coil, choke: 0.031 uH ±5%; sim to Paul Smith LM-2.
L3	19J706085P1	Coil, choke: 0.822 uH ±30%; sim to Paul Smith LM-2.
L4	19B209420P101	Coil, RF: .10 uH ±10%, 0.8 ohms DC res max; sim to Jeffers 4416-1K.
L5	19J706085P3	Coil, choke: 0.031 uH ±5%; sim to Paul Smith LM-2.
L6	19J706085P1	Coil, choke: 0.822 uH ±30%; sim to Paul Smith LM-2.
L7	19B209420P106	Coil, RF: .27 uH ±10%, .16 ohms DC res max; sim to Jeffers 4416-6K.
L8	19B209420P101	Coil, RF: .10 uH ±10%, 0.8 ohms DC res max; sim to Jeffers 4416-1K.
L9	19A700024P10	Coil, RF: 560 nH ±10%.
L11	19B209420P106	Coil, RF: .27 uH ±10%, .16 ohms DC res max; sim to Jeffers 4416-6K.
L12	19A700024P9	Coil, RF: 470 nH ±10%.
L13	19J706085P5	Coil, choke: 0.64MM Dia.
L14	19B209420P5	Coil, RF: .22 uH ±5%, .14 ohms DC res max; sim to Jeffers 4416-5J.
L15	19B209420P9	Coil, RF: .47 uH ±5%, .35 ohms DC res max; sim to Jeffers 4426-2J.
L16	19B209420P5	Coil, RF: .22 uH ±5%, .14 ohms DC res max; sim to Jeffers 4416-5J.
L17	19B209420P8	Coil, RF: .39 uH ±5%, .30 ohms DC res max; sim to Jeffers 4426-1J.
L51	19A700024P13	Coil, RF: 1.0 uH ±10%.
L52	19J706085P12	Coil, choke: .230 uH ±5%; sim to Paul Smith LM-2.
L53	19J706085P8	Coil, RF: 0.110 uH ind., ±5%; sim to Paul Smith LM-2.
L54	19A700024P13	Coil, RF: 1.0 uH ±10%.
L55	19J706085P12	Coil, choke: .230 uH ±5%; sim to Paul Smith LM-2.
L56	19J706085P8	Coil, RF: 0.110 uH ind., ±5%; sim to Paul Smith LM-2.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1 and P2	19A700102P1	Printed wire: 3 contacts rated at 5 amps; sim to Molex 09-52-3031.
P3	19A116659P7	Connector, printed wire: 4 contacts rated at 5 amps; sim to Molex 09-51-3041.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1 and Q2	19A134402P1	N Type, field effect.
Q3	19A115910P1	Silicon, NPN; sim to Type 2N3904.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	19A700106P32	Composition: 51 ohms ±5%, 1/4 w.
R2	19A700106P15	Composition: 10 ohms ±5%, 1/4 w.
R3	19A700106P32	Composition: 51 ohms ±5%, 1/4 w.
R4	19A700106P15	Composition: 10 ohms ±5%, 1/4 w.
R5*	19A700106P46	Composition: 200 ohms ±5%, 1/4 w.
		In G1 earlier than REV A.
	3R152P241J	Composition: 240 ohms ±5%, 1/4 w.
R6	3R152P513J	Composition: 51K ohms ±5%, 1/4 w.
R7	19A700106P91	Composition: 15K ohms ±5%, 1/4 w.
R8	19A700106P63	Composition: 1K ohms ±5%, 1/4 w.
R9	3R152P433J	Composition: 43K ohms ±5%, 1/4 w.
R10	19A700019P25	Deposited carbon: 100 ohms ±5%, 1/4 w.
R11	19A700106P101	Composition: 39K ohms ±5%, 1/4 w.
R12 and R13	19A700106P111	Composition: 100K ohms ±5%, 1/4 w.
R14	3R152P154J	Composition: 150K ohms ±5%, 1/4 w.
R51	19A700106P41	Composition: 120 ohms ±5%, 1/4 w.
R52	19A700106P35	Composition: 68 ohms ±5%, 1/4 w.
R53	19A700106P32	Composition: 51 ohms ±5%, 1/4 w.
R54	19A700106P17	Composition: 12 ohms ±5%, 1/4 w.
R55	3R152P241J	Composition: 240 ohms ±5%, 1/4 w.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - - -
U1	19B209680P1	Mixer, balanced.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19A701332P1	Insulator disk. (Used with Q1-Q2).
	19B232889P1	Ground strap. (Located on each end of printed board).
	19B232897P1	Shield.
	4037072P5	Plug button.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

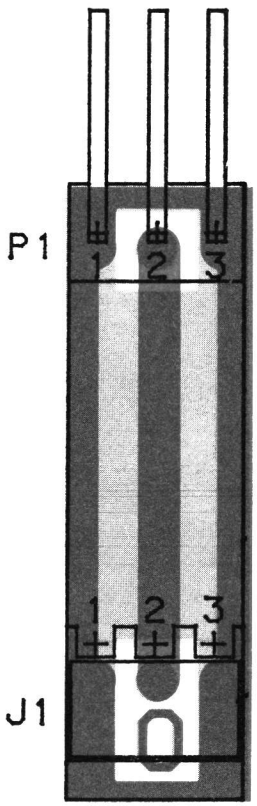
PRODUCTION CHANGES

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 - 19C328843G1
To increase the level to the lock-out detector. Changed R5 and added R55.

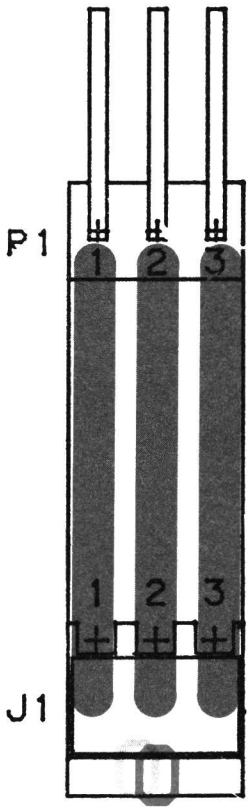
REV. A - 19C328843G3
To center the transmit lockout level; Changed R10.

STRIPLINE EXTENDER
19B233184G1



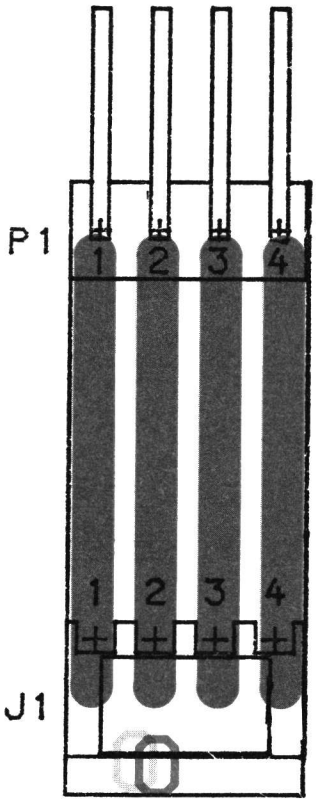
(19B233184, Rev. 1)
(19A138157, Sh. 1, Rev. 0)
(19A138157, Sh. 2, Rev. 0)

EXTENDER
19B233185G1

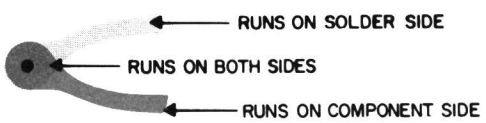


(19B233185, Rev. 1)
(19A138359, Sh. 1, Rev. 0)
(19A138359, Sh. 2, Rev. 0)

EXTENDER
19B233186G1



(19B233186, Rev. 1)
(19A138361, Sh. 1, Rev. 0)
(19A138361, Sh. 2, Rev. 0)



SERVICE SHEET

TEST KIT 19A138366G1
OPTION 2310

PARTS LIST

RCC SYNTHESIZER TEST KIT
OPTION 2310
19A138366G1

SYMBOL	GE PART NO.	DESCRIPTION
		EXTENDER BOARD 19B233184G1 19B233185G1
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - - -
J1	19A116659P5	Connector, printed wiring: 3 contacts; sim to Molex 09-52-3031.
		- - - - - - - - - - - - PLUGS - - - - - - - - - - -
P1	19B233187G1	Connector, printed wiring: 3 contacts; sim to Molex 09-66-1031.
		EXTENDER BOARD 19B233186G1
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - - -
J1	19A116659P7	Connector, printed wiring: 4 contacts; sim to Molex 09-52-3041.
		- - - - - - - - - - - - PLUGS - - - - - - - - - - -
P1	19B233187G2	Connector, printed wiring: 4 contacts; sim to Molex 09-66-1041.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B232513P1	ICOM Tool.
	19A134779P1	Alignment tool.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES