# MAINTENANCE MANUAL

# 66—88 MHz EXCITER BOARD 19D424395G1, G2

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## DESCRIPTION

The exciter uses eight transistors, a crystal module and two integrated circuits to drive the PA assembly. The crystal module determines the (F1) transmitting frequency in single frequency applications. In addition, the exciter also provides temperature compensation voltage to all crystal modules.

In multi-frequency transmitters, the crystal modules for additional frequencies are located on the multi-frequency board.

The crystal frequency ranges from 11.0 to 14.67 megahertz, and is multiplied six times (divided by 2 and multiplied by 12 for a multiplication factor of six). Two exciter board groups are used. The Group 1 exciter board operates over a frequency range of 66.78 MHz (crystal frequencies are 11-13 MHz). Group 2 exciter boards operate over a frequency range of 77-88 MHz (crystal frequencies are 12.84-14.66 MHz).

Audio, supply voltages and control functions are connected from the system-audio-squelch (SAS) board to the exciter board through P902.

Centralized metering jack J103 is provided for use with GE Test Set Model 4EX3A11 or Test Kit 4EX8K12. The Test Set meters the multipliers, amplifier, relative power out and the regulated 10-volt line.

## CIRCUIT ANALYSIS

### OSCILLATOR CIRCUIT

A Colpitts oscillator consisting of Q102, a plug-in crystal module and associated components provides the fundamental operating frequency for the transmitter. The crystal module in the base circuit of Q102 is temperature compensated to maintain frequency stability within ±5 PPM over an ambient temperature range of -30°C to +60°C. Compensation voltage is applied from compensator circuit Q101. The output of the oscillator is taken from the collector of Q102, buffered by Q103 and applied to frequency divider U102.

SERVICE NOTE

Y1 and C2 are not field replaceable items. C2 is factory selected to complement the temperature/frequency characteristics of each individual crystal. Should it become necessary to replace either Y1 or C2, the entire crystal module must be replaced.

In single frequency radios, the F1 keying lead is connected directly to A- by a DA jumper connected between H12 and H31 on the SAS board. This assures F1 oscillator operation each time the PTT switch is pressed. When the PTT switch is operated, +10 Volts is present on the transmitter oscillator lead at P902-1 and 8 Volts on the emitter of Q102. R104 and R105 form a voltage divider network to establish the base voltage for Q102.

In multi-frequency radios the jumper connected between H12 and H31 on the SAS board is removed to allow F1 frequency selection via the frequency selector switch on the control unit.

When frequencies F2 thru F4 are selected the oscillator frequency from the multi-frequency board is supplied to J102-1 on the exciter through cable W2601.

### COMPENSATOR CIRCUITS

The crystal modules are temperature compensated at both ends of the temperature range to provide instant frequency compensation. The temperature compensator consists of Q101, VR102, RT101, RT102 and associated components. Zener diode VR102 provides a constant +8.5 Volt reference voltage for compensator Q101.

The cold end compensation circuit does not operate at temperatures above -10°C (+14°F). When the temperature drops below -10°C, the circuit is activated. As the temperature decreases, the resistance of RT101 decreases and the compensation voltage increases.

An increase in compensation voltage decreases the capacitance of the varactor in the oscillator, thereby increasing the output frequency of the crystal module.

The hot end compensation circuit does not operate at temperatures below +50°C (122°F). When the temperature rises above +50°C, the circuit is activated. As the temperature increases, the resistance of RT102 decreases and the compensation voltage decreases. The decrease in compensation voltage increases the capacity of the varactor, decreasing the output frequency of the crystal module.

Listed below are typical minimum and maximum voltage readings to be expected at pin 4 of the crystal modules. Voltages should be measured using a high impedance meter.

| TEMPERATURE RANGE | OUTPUT VOLTAGE | |
|---|---|---|
| | MINIMUM | MAXIMUM |
| -30°C | 4.9 Volts | 6.0 Volts |
| -10° to 50°C | 3.7 Volts | 4.3 Volts |
| +75°C | 3.3 Volts | 3.8 Volts |

AUDIO IC

The transmitter audio circuitry is contained in audio IC U101. A simplified drawing of the audio IC is shown in Figure 1.

Audio from the microphone at pin 12 is coupled through pre-emphasis capacitor C1 to the base of Q1 in the operational amplifier-limiter circuit. Collector voltage for the transistorized microphone pre-amplifier is supplied from the 10-volt regulator on the SAS board through R979 and R980 to J901A-14.

The operational amplifier-limiter circuit consists of Q1, Q2, and Q3. Q3 provides limiting at high signal levels. The gain of the operational amplifier circuit is fixed by negative feedback through R19, R20 and the resistance in the network (Pin 9).

The output of Q3 is coupled through a de-emphasis network (R10 and C3) to an active post-limiter filter consisting of C4, C5, C6, R11, R12, R13, R15, R17 and Q4.

Following the post-limiter filter is Class A amplifier Q5. The output of Q5 is coupled through MOD ADJUST potentiometer R108, C115 and resistor R119 to the phase modulators.

SERVICE NOTE: If the DC voltages applied to the audio IC are correct and there is no audio output, replace U101.

For radios equipped with Channel Guard, the tone from the encoder is applied to the

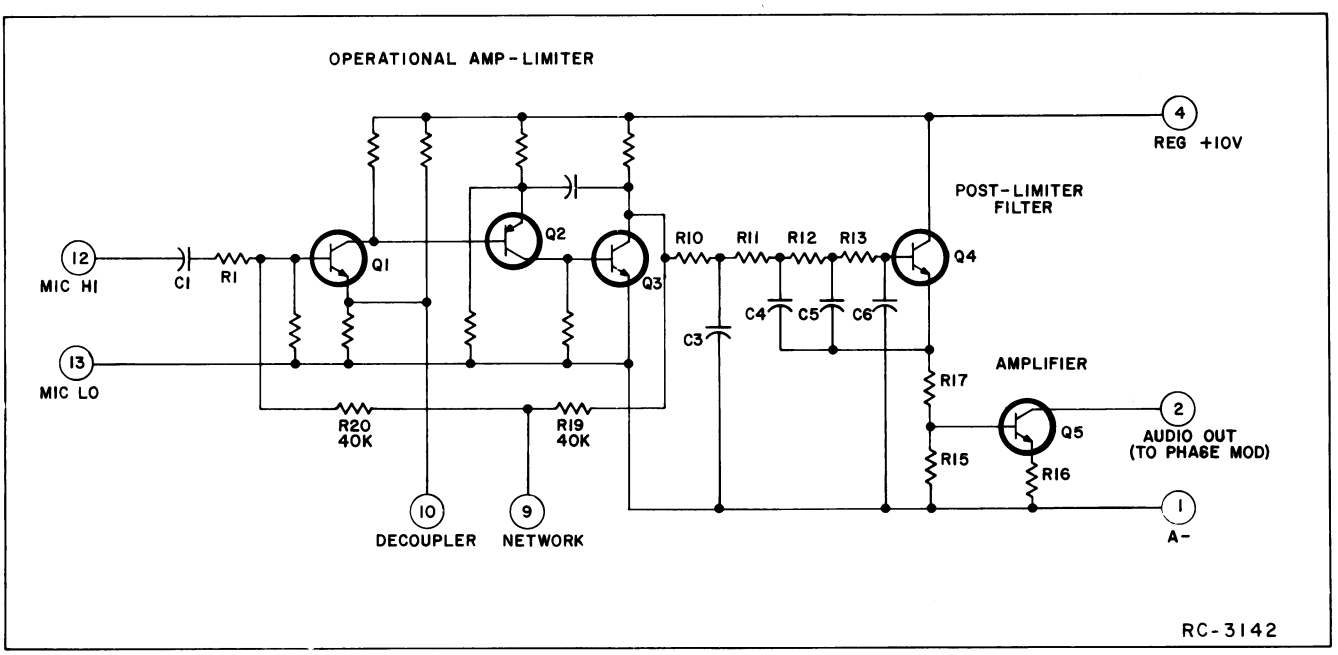


Figure 1 - Simplified Audio IC

phase modulators through P902-9, (CG HI) and resistors R117 and R121. Instructions for setting Channel Guard modulation are located in the Transmitter Alignment procedures.

FREQUENCY DIVIDER IC

The output at pin 3 of the selected crystal module is coupled through buffer amplifier Q103 to frequency divider U102. U102 divides the oscillator frequency by 2.

When the transmitter is not keyed, Q103 is saturated (turned on) with its collector voltage near zero. Keying the transmitter turns on one of the crystal modules and its output turns Q103 off and on once each cycle. As Q103 turns on during each cycle, the drop in collector voltage causes the flip-flop to change state. Assume the flip-flop was in the "0" state (the output at "Q" near A-). The first cycle of the oscillator output causes it to switch to the "1" state (output at "Q" approximately 5 Volts). The second cycle will cause the flip-flop to switch back to the "0" state. Therefore, it requires two oscillator cycles to switch the flip-flop through one complete cycle from "0" to "1" and back to "0".

If U102 was operating in to a pure resistive load, its output would be a square wave. However, the modulator circuit presents a tuned load to the IC, so that harmonics are filtered out and the waveform at the junction of C117 and C118 (modulator input) is essentially a sine wave at one-half the oscillator frequency. The output of the frequency divider is coupled through DC blocking capacitor C117 to the first modulator stage.

BUFFER & PHASE MODULATOR

The first phase modulator consists of varactor (voltage-variable capacitor) CR101 in series with tunable coil L101. This network appears as a series-resonant circuit to the RF output of the oscillator. An audio signal applied to the modulator circuit through blocking capacitor C115 varies the bias of CR101 and CR102 resulting in a phase modulated output. A voltage divider network (R110 and R113) provides the proper bias for varactors CR101 and CR102.

The output of the modulator is coupled through blocking capacitor C120 to the base of buffer Q104.

MULTIPLIERS & AMPLIFIER

Buffer Q104 is saturated when no RF signal is present. Applying an RF signal to Q104 generates a sawtooth waveform at its collector to drive class C tripler, Q105. The tripler stage is metered through R124. The output of Q105 is coupled through tuned circuits T101 and T102 to the base of doubler Q106. T101 and T102 are tuned to one-fourth of the operating frequency. The doubler stage is metered through R127.

The output of Q106 is coupled through tuned circuits T103 and T104 to the base of second doubler Q107. T103 and T104 are tuned to one-half the operating frequency. Q107 is metered through R132.

The output of Q107 is coupled through two tuned circuits (T105 and T106) to the base of amplifier Q108. These circuits are tuned to the transmitter operating frequency.

Q108 is a class C amplifier and is metered through R135. The amplifier collector circuit consists of T107, T108, and C147 through C152 and matches the amplifier output to the input of the power amplifier assembly. The exciter provides a minimum of 300 milliwatts of RF power to the power amplifier through J101 and cable W216. The relative power output is metered through a metering circuit consisting of C153, CR103, R136 and R137.

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

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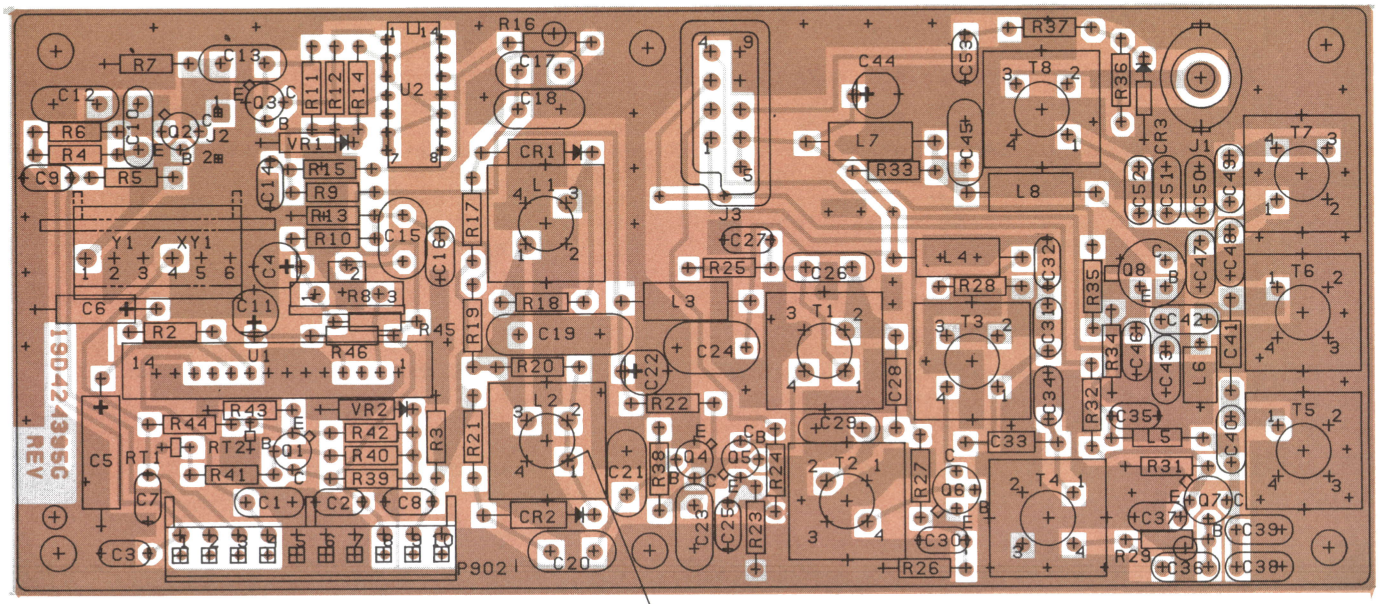
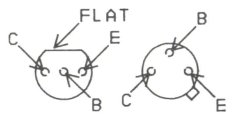
PARTIAL REFERENCE DESIGNATIONS ARE SHOWN.
FOR COMPLETE DESIGNATION, PREFIX WITH
100 SERIES. EXAMPLE: C1-C101, R1-R101, ETC.
EXCEPT P902.



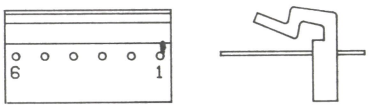

(19D424406, Rev. 1)
(19B227662, Sh. 1, Rev. 1)
(19B227662, Sh. 2, Rev. 1)

LEAD IDENTIFICATION
FOR Q1 THRU Q7

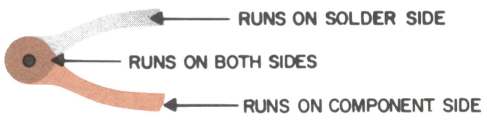



TOP VIEW

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

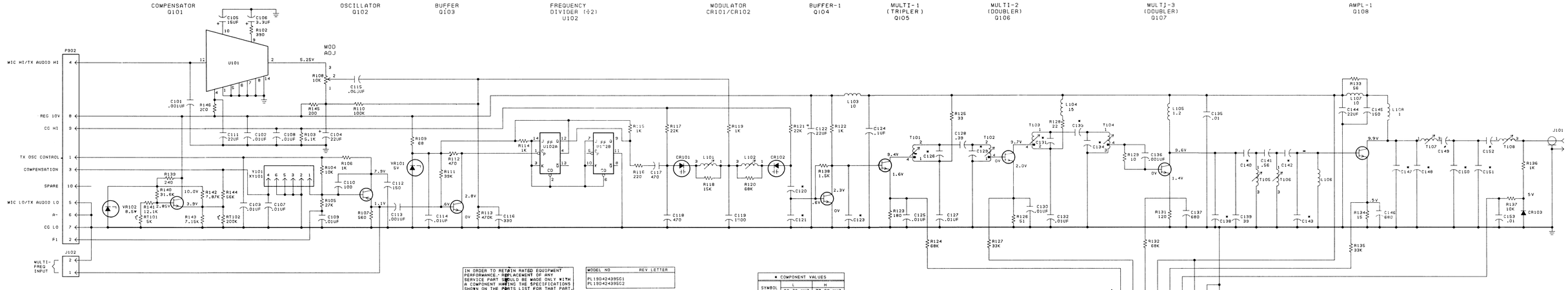



PIN ORIENTATION
FOR Y1 / XY1




# OUTLINE DIAGRAM

66—88 MHz EXCITER BOARD
19D424395G1, G2



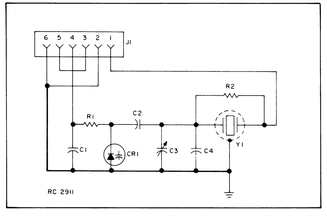

IN ORDER TO RETAIN RATED EQUIPMENT PERFORMANCE, REPLACEMENT OF ANY SERVICE PART SHOULD BE MADE ONLY WITH A COMPONENT HAVING THE SPECIFICATIONS SHOWN ON THE PARTS LIST FOR THAT PART.

| MODEL NO | REV LETTER |
|---|---|
| PL19D424395G1 | |
| PL19D424395G2 | |

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.

| * COMPONENT VALUES | | |
|---|---|---|
| SYMBOL | H | |
| | 66-78 MHZ | 77-88 MHZ |
| C120 | 680 | 510 |
| C121 | 330 | 220 |
| C123 | 150 | 120 |
| C128 | 33 | 20 |
| C129 | 33 | 20 |
| C133 | 33 | 24 |
| C134 | 1.0 | .82 |
| C135 | 33 | 24 |
| C138 | 43 | 18 |
| C140 | 22 | 18 |
| C142 | 56 | 15 |
| C143 | 51 | 36 |
| C147 | 43 | 20 |
| C148 | 43 | 24 |
| C149 | 43 | 20 |
| C150 | 43 | 33 |
| C151 | 47 | 15 |
| C152 | 22 | 18 |

(19B622280, Rev. 2)




CRYSTAL MODULE (TYPICAL)

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

66—88 MHz EXCITER BOARD
19D424395G1, G2

Issue 1

## PARTS LIST

LBI30557A

EXCITER BOARD
19D424395G1 66-78 MHz
19D424395G2 77-88 MHz

| SYMBOL | GE PART NO. | DESCRIPTION |
|---|---|---|
| | | - - - - - - - - - - CAPACITORS - - - - - - - - - - |
| C101 | 19A116655P19 | Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. |
| C102 and C103 | 19A116080P1 | Polyester: 0.01 µf ±20%, 50 VDCW. |
| C104 | 19A134202P6 | Tantalum: 22 µf ±20%, 15 VDCW. |
| C105 | 549620?P14 | Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague Type 150D. |
| C106 | 549620?P9 | Tantalum: 3.3 µf ±20%, 15 VDCW; sim to Sprague Type 150D. |
| C107 thru C109 | 19A116080P1 | Polyester: 0.01 µf ±20%, 50 VDCW. |
| C110 | 19A116656P100J? | Ceramic disc: 100 pf ±5%, 500 VDCW, temp coef -150 PPM. |
| C111 | 19A134202P6 | Tantalum: 22 µf ±20%, 15 VDCW. |
| C112 | 7489162P31 | Silver mica: 150 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. |
| C113 | 19A116655P20 | Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap. |
| C114 | 19A116080P1 | Polyester: 0.01 µf ±20%, 50 VDCW. |
| C115 | 19A116080P106 | Polyester: 0.068 µf ±10%, 50 VDCW. |
| C116 | 549648?P105 | Ceramic disc: 330 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. |
| C117 and C118 | 7489162P43 | Silver mica: 470 pf ±5%, 300 VDCW; sim to Electro Motive Type DM-15. |
| C119 | 7147203P14 | Silver mica: 1800 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20. |
| C120L | 7489162P47 | Silver mica: 680 pf ±5%, 300 VDCW; sim to Electro Motive Type DM-15. |
| C120H | 7489162P44 | Silver mica: 510 pf ±5%, 300 VDCW; sim to Electro Motive Type DM-15. |
| C121L | 7489162P39 | Silver mica: 330 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. |
| C121H | 7489162P37 | Silver mica: 270 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. |
| C122 | 19A134202P6 | Tantalum: 22 µf ±20%, 15 VDCW. |
| C123L | 7489162P31 | Silver mica: 150 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. |
| C123H | 7489162P29 | Silver mica: 120 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. |
| C124 | 19A116080P107 | Polyester: 0.1 µf ±10%, 50 VDCW. |
| C125 | 19A116080P1 | Polyester: 0.01 µf ±20%, 50 VDCW. |
| C126L | 19A116656P33J1 | Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -150 PPM. |
| C126H | 19A116656P20J0 | Ceramic disc: 20 pf ±5%, 500 VDCW, temp coef 0 PPM. |
| C127 | 19A116080P1 | Polyester: 0.01 µf ±20%, 50 VDCW. |
| C128 | 5491601P111 | Phenolic: 0.39 pf ±5%, 500 VDCW. |
| C129L | 19A116656P33J1 | Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -150 PPM. |
| C129H | 19A116656P20J0 | Ceramic disc: 20 pf ±5%, 500 VDCW, temp coef 0 PPM. |
| C130 | 19A116080P1 | Polyester: 0.01 µf ±20%, 50 VDCW. |
| C131L | 19A116656P33J1 | Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -150 PPM. |

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

| SYMBOL | GE PART NO. | DESCRIPTION |
|---|---|---|
| C131H | 19A116656P24J0 | Ceramic disc: 24 pf ±5%, 500 VDCW, temp coef 0 PPM. |
| C132 | 19A116080P1 | Polyester: 0.01 µf ±20%, 50 VDCW. |
| C133L | 5491601P120 | Phenolic: 1.0 pf ±5%, 500 VDCW. |
| C133H | 5491601P119 | Phenolic: 0.82 pf ±5%, 500 VDCW. |
| C134L | 19A116656P33J1 | Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -150 PPM. |
| C134H | 19A116656P24J0 | Ceramic disc: 24 pf ±5%, 500 VDCW, temp coef 0 PPM. |
| C135 | 19A116080P1 | Polyester: 0.01 µf ±20%, 50 VDCW. |
| C136 | 19A116655P20 | Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap. |
| C137 | 19A116655P18 | Ceramic disc: 680 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap. |
| C138L | 19A116656M33J2 | Ceramic disc: 43 pf ±5%, 500 VDCW, temp coef -220 PPM. |
| C138H | 19A116656P18J0 | Ceramic disc: 18 pf ±5%, 500 VDCW, temp coef 0 PPM. |
| C139L | 19A116656P39J2 | Ceramic disc: 39 pf ±5%, 500 VDCW, temp coef -220 PPM. |
| C140L | 19A116656P22J0 | Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef 0 PPM. |
| C140H | 19A116656P18J0 | Ceramic disc: 18 pf ±5%, 500 VDCW, temp coef 0 PPM. |
| C141 | 5491601P115 | Phenolic: 0.56 pf ±5%, 500 VDCW. |
| C142L | 19A116656P20J0 | Ceramic disc: 20 pf ±5%, 500 VDCW, temp coef 0 PPM. |
| C142H | 19A116656P15J0 | Ceramic disc: 15 pf ±5%, 500 VDCW, temp coef 0 PPM. |
| C143L | 19A116656P51J2 | Ceramic disc: 51 pf ±5%, 500 VDCW, temp coef -220 PPM. |
| C143H | 19A116656P36J2 | Ceramic disc: 36 pf ±5%, 500 VDCW, temp coef -220 PPM. |
| C144 | 19A134202P6 | Tantalum: 22 µf ±20%, 15 VDCW. |
| C145 | 7489162P31 | Silver mica: 150 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. |
| C146 | 19A116655P18 | Ceramic disc: 680 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap. |
| C147L | 19A116656P43J2 | Ceramic disc: 43 pf ±5%, 500 VDCW, temp coef -220 PPM. |
| C147H | 19A116656P20J0 | Ceramic disc: 20 pf ±5%, 500 VDCW, temp coef 0 PPM. |
| C148L | 19A116656P43J2 | Ceramic disc: 43 pf ±5%, 500 VDCW, temp coef -220 PPM. |
| C148H | 19A116656P24J0 | Ceramic disc: 24 pf ±5%, 500 VDCW, temp coef 0 PPM. |
| C149L | 19A116656P33J1 | Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -150 PPM. |
| C149H | 19A116656P20J0 | Ceramic disc: 20 pf ±5%, 500 VDCW, temp coef 0 PPM. |
| C150L | 19A116656P43J2 | Ceramic disc: 43 pf ±5%, 500 VDCW, temp coef -220 PPM. |
| C150H | 19A116656P33J1 | Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -150 PPM. |
| C151L | 19A116656P47J2 | Ceramic disc: 47 pf ±5%, 500 VDCW, temp coef -220 PPM. |
| C151H | 19A116656P15J0 | Ceramic disc: 15 pf ±5%, 500 VDCW, temp coef 0 PPM. |
| C152L | 19A116656P22J0 | Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef 0 PPM. |
| C152H | 19A116656P18J0 | Ceramic disc: 18 pf ±5%, 500 VDCW, temp coef 0 PPM. |
| C153 | 19A116080P1 | Polyester: 0.01 µf ±20%, 50 VDCW. |
| CR101 and CR102 | 5495768?P12 | - - - - - - - - DIODES AND RECTIFIERS - - - - - - - - Diode, silicon. |
| CR103 | 19A115250P1 | Silicon, fast recovery, 225 mA, 50 PIV. |

| SYMBOL | GE PART NO. | DESCRIPTION |
|---|---|---|
| | | - - - - - - - - - JACKS AND RECEPTACLES - - - - - - |
| J101 | 19A130924G1 | Connector, receptacle: coaxial, jack type; sim to Cinch 14B11613. |
| J102 | 19A116779P1 | Contact, electrical: sim to Molex 08-50-0404. (Quantity 2). |
| J103 | 19B219374G1 | Connector: 9 contacts. |
| | | - - - - - - - - - - INDUCTORS - - - - - - - - - - |
| L103L | 19C321810G2 | Coil. Includes: |
| | 19B209674P1 | Tuning slug. |
| L103H | 19C321810G3 | Coil. Includes: |
| | 19B209674P1 | Tuning slug. |
| L102L | 19C321810G2 | Coil. Includes: |
| | 19B209674P1 | Tuning slug. |
| L102H | 19C321810G3 | Coil. Includes: |
| | 19B209674P1 | Tuning slug. |
| L103 | 7488079P16 | Choke, RF: 10.0 µh ±10%, 0.60 ohms DC res max; sim to Jeffers 4421-7R. |
| L104 | 7488079P18 | Choke, RF: 15.0 µh ±10%, 1.20 ohms DC res max; sim to Jeffers 4421-9K. |
| L105 | 19B209420P114 | Coil, RF: 1.20 µh ±10%, 0.18 ohms DC res max; sim to Jeffers 4434-1K. |
| L106 | 19A129773G1 | Coil. |
| L107 | 7488079P16 | Choke, RF: 10.0 µh ±10%, 0.60 ohms DC res max; sim to Jeffers 4421-7R. |
| L108 | 7488079P6 | Choke, RF: 1.00 µh ±10%, 0.30 ohms DC res max; sim to Jeffers 4411-8K. |
| | | - - - - - - - - - - PLUGS - - - - - - - - - - |
| P902 | 19A116659P2 | Connector, printed wiring: 10 contacts; sim to Molex 09-52-3102. |
| | | - - - - - - - - - TRANSISTORS - - - - - - - - - |
| Q101 | 19A116774P1 | Silicon, NPN; sim to Type 2N5210. |
| Q102 | 19A115852P1 | Silicon, PnP; sim to Type 2N3906. |
| Q103 thru Q105 | 19A115910P1 | Silicon, NPN; sim to Type 2N3904. |
| Q106 and Q107 | 19A115528P1 | Silicon, NPN. |
| Q108 | 19A116868P1 | Silicon, NPN; sim to Type 2N4427. |
| | | - - - - - - - - - - RESISTORS - - - - - - - - - - |
| R102 | 3R152P391K | Composition: 390 ohms ±10%, 1/4 w. |
| R103 | 3R152P512J | Composition: 5.1K ohms ±5%, 1/4 w. |
| R104 | 3R152P103J | Composition: 10K ohms ±5%, 1/4 w. |
| R105 | 3R152P273J | Composition: 27K ohms ±5%, 1/4 w. |
| R106 | 3R152P102J | Composition: 1K ohms ±5%, 1/4 w. |
| R107 | 3R152P561J | Composition: 560 ohms ±5%, 1/4 w. |
| R108 | 19B209358P106 | Variable, carbon film: approx 300 to 10,000 ohms ±10%, 0.25 w; sim to CTS Type X-201. |
| R109 | 3R152P683J | Composition: 68 ohms ±5%, 1/4 w. |
| R110 | 3R152P104J | Composition: 100K ohms ±5%, 1/4 w. |
| R111 | 3R152P393J | Composition: 39K ohms ±5%, 1/4 w. |
| R112 | 3R152P471J | Composition: 470 ohms ±5%, 1/4 w. |
| R113 | 3R152P474J | Composition: 470K ohms ±5%, 1/4 w. |
| R114 and R115 | 3R152P102J | Composition: 1K ohms ±5%, 1/4 w. |
| R116 | 3R152P221J | Composition: 220 ohms ±5%, 1/4 w. |
| R117 | 3R152P223J | Composition: 22K ohms ±5%, 1/4 w. |
| R118 | 3R152P153J | Composition: 15K ohms ±5%, 1/4 w. |
| R119 | 3R152P102J | Composition: 1K ohms ±5%, 1/4 w. |

| SYMBOL | GE PART NO. | DESCRIPTION |
|---|---|---|
| R120 | 3R152P683J | Composition: 68K ohms ±5%, 1/4 w. |
| R121 | 3R152P223J | Composition: 22K ohms ±5%, 1/4 w. |
| R122 | 3R152P102J | Composition: 1K ohms ±5%, 1/4 w. |
| R123 | 3R152P181J | Composition: 180 ohms ±5%, 1/4 w. |
| R124 | 3R152P683J | Composition: 68K ohms ±5%, 1/4 w. |
| R125 | 3R152P330J | Composition: 33 ohms ±5%, 1/4 w. |
| R126 | 3R152P510J | Composition: 51 ohms ±5%, 1/4 w. |
| R127 | 3R152P333J | Composition: 33K ohms ±5%, 1/4 w. |
| R128 | 3R152P220J | Composition: 22 ohms ±5%, 1/4 w. |
| R129 | 3R152P100J | Composition: 10 ohms ±5%, 1/4 w. |
| R131 | 3R152P121J | Composition: 120 ohms ±5%, 1/4 w. |
| R132 | 3R152P683J | Composition: 68K ohms ±5%, 1/4 w. |
| R133 | 3R152P560J | Composition: 56 ohms ±5%, 1/4 w. |
| R134 | 3R152P150J | Composition: 15 ohms ±5%, 1/4 w. |
| R135 | 3R152P333J | Composition: 33K ohms ±5%, 1/4 w. |
| R136 | 3R152P102J | Composition: 1K ohms ±5%, 1/4 w. |
| R137 | 3R152P103J | Composition: 10K ohms ±5%, 1/4 w. |
| R138 | 3R152P152J | Composition: 1.5K ohms ±5%, 1/4 w. |
| R139 | 3R152P241J | Composition: 240 ohms ±5%, 1/4 w. |
| R140 | 19C314256P23162 | Metal film: 31.6K ohms ±1%, 1/4 w. |
| R141 | 19C314256P21212 | Metal film: 12.1K ohms 1%, 1/4 w. |
| R142 | 19C314256P27871 | Metal film: 7.87K ohms ±1%, 1/4 w. |
| R143 | 19C314256P2715 | Metal film: 7.15K ohms 1%, 1/4 w. |
| R144 | 3R152P563K | Composition: 56K ohms ±10%, 1/4 w. |
| R145 and R146 | 3R152P201J | Composition: 200 ohms ±5%, 1/4 w. |
| | | - - - - - - - - - THERMISTORS - - - - - - - - - |
| RT101 | 19C300048P7 | Disc: 5K ohms ±10%; sim to ML 1D103. |
| RT102 | 19C300048P5 | Disc: 200K ohms ±10%; sim to ML 4D051. |
| | | - - - - - - - - - TRANSFORMERS - - - - - - - |
| T101 and T102 | 19D416833G5 | Coil. Includes: |
| | 5493185P13 | Tuning slug. |
| T103 | 19C307170P301 | Coil,RF. variable; sim to Paul Smith Co. Sample 082874-M3-2. |
| T104 | 19C307170P302 | Coil,RF. variable; sim to Paul Smith Co. Sample 082874-M3-6. |
| T105 thru T108 | 19C307170P303 | Coil,RF. variable; sim to Paul Smith Co. Sample 071774-02-6. |
| | | - - - - - - - - INTEGRATED CIRCUITS - - - - - - - |
| U101 | 19D416543G2 | Transmitter, Audio. |
| U102 | 19A116842P1 | Digital, High Speed TTL: Dual J-K Master-Slave Flip Flop; sim to SN54H73N. |
| | | - - - - - - - VOLTAGE REGULATORS - - - - - - - |
| VR101 | 4036887P56 | Zener: 500 mW, 5.0 v. nominal. |
| VR102 | 4036887P9 | Zener: 500 mW, 8.5 v. nominal. |
| | | - - - - - - - - - SOCKETS - - - - - - - - - |
| XY101 | 19A116659P50 | Connector, printed wiring: 6 contacts; sim to Molex 09-65-1061. |
| | | - - - - - - - - - CRYSTAL MODULES - - - - - - - |
| | | NOTE: When reordering, give GE Part No. & specify exact operating frequency needed. Fx = Fo / 6 |
| Y101 | 19B226962G31 | Crystal module: 5 PPM, 66-78 MHz. |
| | 19B226962G32 | Crystal module: 5 PPM, 77-88 MHz. |
| | | - - - - - - - - - MISCELLANEOUS - - - - - - - - - |
| | 19A129424G2 | Can. (Used with L101, L102, T101-T106). |
| | 4036555P1 | Insulator, washer: nylon. (Used with Q108). |