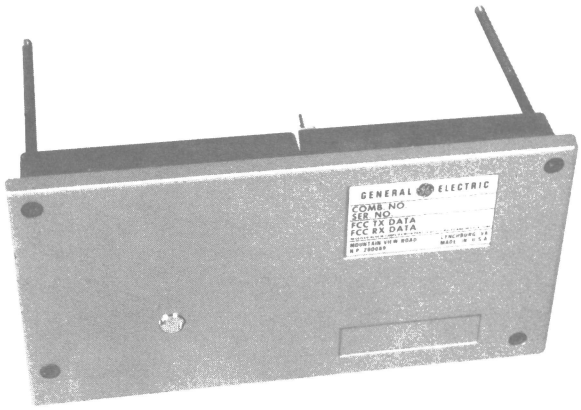
MOBILE RADIO

Porta-Mobile II™

406-512 MHz TRANSMITTER TYPE KT-131-A/B/C



SPECIFICATIONS *

Type Numbers	KT-131-A	KT-131-B	KT-131-C
POWER OUTPUT	Adjustable from 5 to 18 Watts	Adjustable from 5 to 25 Watts	1 Watt
CURRENT DRAIN (less options)	6.5 Amperes (at 18 watts)	7 Amperes (at 25 Watts)	700 Milliamps (at 1 Watt)
MODULATION DEVIATION	0 to ±5 kHz		
SPURIOUS			
RADIATED	-57 dB	-57 dB	-43 dB
CONDUCTED	-57 dB	-57 dB	-43 dB
AUDIO RESPONSE	Within +1 and -3 dB of a 6-dB/octave pre-emphasis from 300 to 3000 Hz except for an additional 6-dB/octave roll-off from 2500 to 3000 Hz per EIA.		
AUDIO DISTORTION	Less than 8%		
CRYSTAL MULTIPLICATION	24		
RF LOAD IMPEDANCE	50 ohms		
MODULATION SENSITIVITY	0.5 to 1.5 millivolts		
MAXIMUM FREQUENCY SPACING			
406-420 MHz	0.4% of highest frequency with no degradation--5.5 MHz with less than 1 dB degradation		
450-512 MHz	0.4% of highest frequency with no degradation--3.5 MHz with less than 1 dB degradation		

*These specifications are intended primarily for the use of the serviceman. Refer to the appropriate Specification Sheet for the complete specifications.

KT-131-A/B/C

GENERAL ELECTRIC

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ILLUSTRATIONS

WARNING

Although the highest DC voltage in Porta•Mobile II™ Equipment is supplied by a portable or vehicular battery, high currents may be drawn under short circuit conditions. These currents can possibly heat metal objects such as tools, rings, watchbands, etc., enough to cause burns. Be careful when working near energized circuits!

High-level RF energy in the transmitter Power Amplifier assembly can cause RF burns upon contact. Keep away from these circuits when the transmitter is energized!

DESCRIPTION

Porta•Mobile II transmitter types KT-131-A, KT-131-B and KT-131-C are crystal controlled, phase modulated transmitters for one-through twelve-frequency operation in the 406-420 and 450-512 MHz bands. The transmitters are single unit construction in the rear cover for the Porta•Mobile II case assembly and utilize both discrete components and integrated circuit modules.

Each transmitter consists of exciter board 19D417887 and power amplifier 19D423036. The exciter board consists of audio module A101, oscillator modules A104 through A115, compensator module A102, modulator module A103, optional compressor module A116 and exciter module types 4EF41A10, 4EF41A11 and 4EF41A12.

The application of each transmitter type is shown in the following chart:

Transmitter Type No.	Exciter No.	Exciter Module Type No.	PA No.	Frequency Range	Number Frequencies	Power Output
KT-131-A	19D417887G1	4EF41A10	19D423036G1	406-420 MHz	12	18 Watts
		4EF41A11	19D423036G2	450-470 MHz	12	18 Watts
	19D417887G2	4EF41A12	19D423036G3	470-512 MHz	12	16 Watts
KT-131-B	19D417887G1	4EF41A10	19D423036G4	406-420 MHz	12	25 Watts
		4EF41A11	19D423036G5	450-470 MHz	12	25 Watts
	19D417887G2	4EF41A12	19D423036G6	470-512 MHz	12	20 Watts
KT-131-C	19D417887G1	4EF41A11	19D423036G7	450-470 MHz	12	1 Watt
	19D417887G2	4EF41A12	19D423036G7	470-512 MHz	12	1 Watt

Operating voltages for the transmitter are provided by a 10-Volt battery pack, a 7.5 Volt regulator circuit and a 5.4 Volt regulator circuit. The 10 Volts from the battery pack is applied directly to the power amplifier circuit and also the 7.5 Volt regulator circuit and power amplifier circuit through POWER OFF-ON switch S701 on the case assembly. The 7.5 Volt regulator is part of the receiver audio amplifier and is interfaced by the system board to the transmitter. A keyed 7.5 volts is connected to the power adjust circuit in the power amplifier, and the modulator module and 5.4 volt regulator circuit on the transmitter exciter board. The 5.4 volt regulator circuit provides voltage for the audio module, compensator module and the optional compressor module.

References to symbol numbers mentioned in the following text are found on the Schematic Diagrams, Outline Diagrams and Parts Lists (see Table of Contents). The typical, simplified circuit diagrams used in the text are representative of the circuit in the IC modules. A block diagram of the transmitter is shown in Figure 1.

CIRCUIT ANALYSIS

OSCILLATOR MODULE (A104 through A115)

Oscillator Model 4EG27A11 consists of a crystal-controlled Colpitts oscillator and a Channel Guard tone modulator. The entire oscillator is contained in a metal can with the transmitter operating frequency printed on the top. The crystal frequency ranges from 16.9 to 21.3 MHz, and the crystal frequency is multiplied 24 times.

The oscillator frequency is temperature compensated to provide instant frequency compensation, with a frequency stability of ±.0002% from 0°C to +55°C and ±.0005% from -30°C to +60°C. The temperature compensation network is contained in Compensator module A102.

A typical oscillator circuit is shown in Figure 2.

In single-frequency transmitters, a jumper from Hole 39 to Hole 78 on the System Board connects the continuous 5.4 Volt supply voltage to the oscillator module. Oscillator output is applied to Compensator A102.

In multi-frequency transmitters, the single-frequency supply jumper on the system board is removed, and the proper frequency is selected by connecting 5.4 Volts to the oscillator module through frequency selector switch S704 on the control unit. For multi-frequency modifications refer to the Table of Contents in LBI30100.

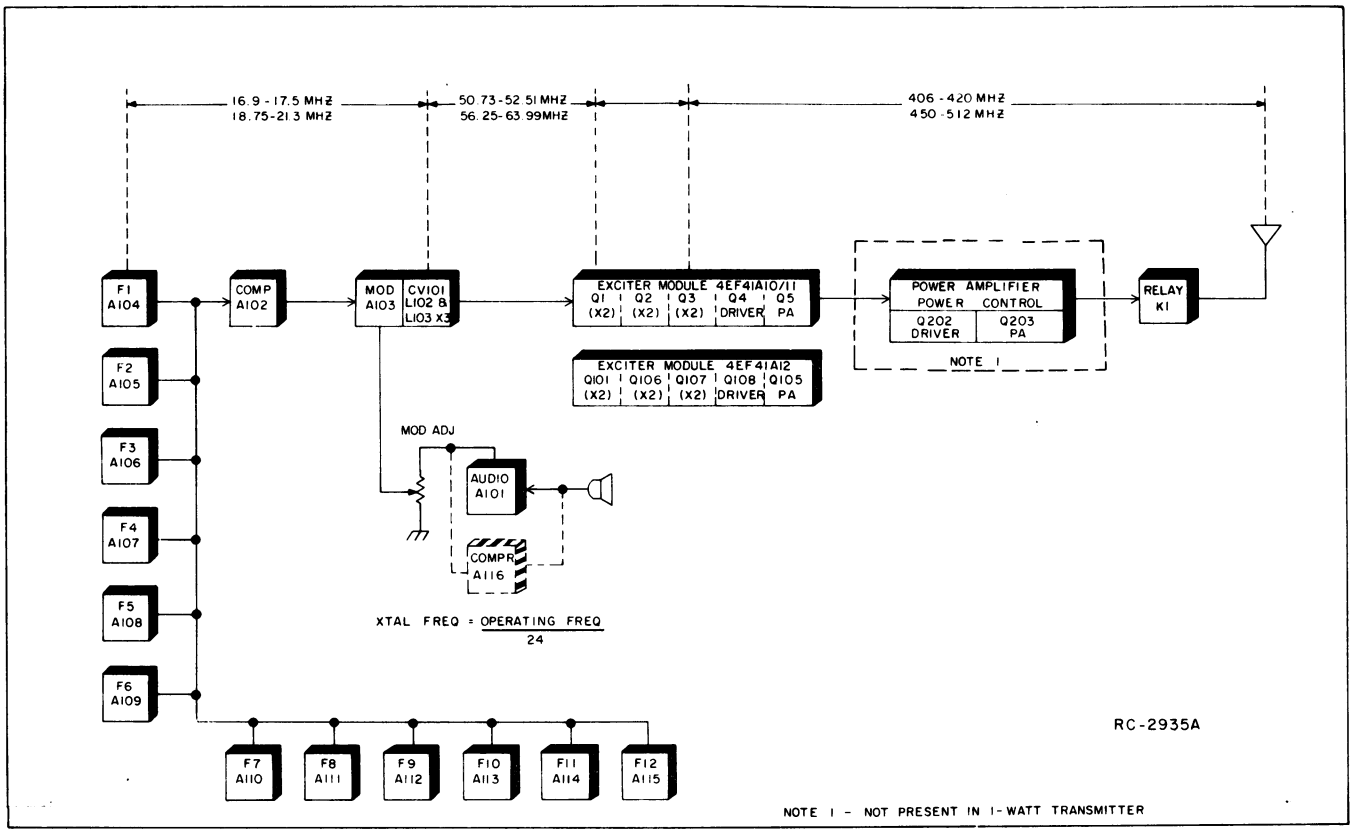

Figure 1 - Block Diagram

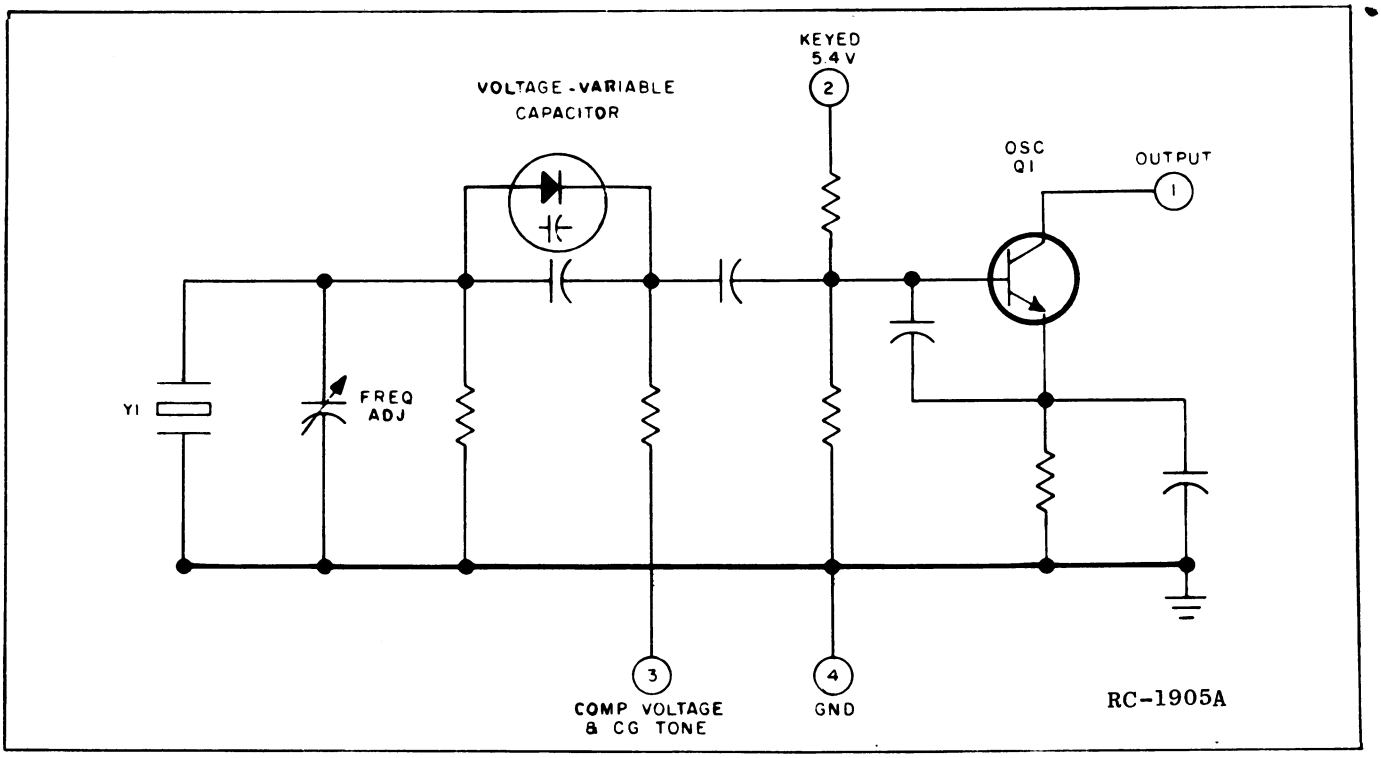

Figure 2 - Typical Oscillator Circuit

For Channel Guard applications, tone from the Channel Guard encoder is applied to the oscillator module. The tone is applied through Pin 3 to the voltage-variable capacitor on the oscillator module, which frequency modulates the oscillator output.

NOTE

All oscillator modules are individually compensated at the factory and cannot be repaired in the field. Any attempt to remove the oscillator cover will void the warranty.

COMPENSATOR MODULE A102

Compensator module A102 contains a buffer-amplifier, and the temperature compensating network for the oscillator. A typical compensator circuit is shown in Figure 3.

RF from the oscillator at Pin 7 of the compensator module, is coupled through a DC-blocking capacitor to the base of buffer-amplifier Q1. This stage isolates the oscillator from the modulator. The output of Q1 connects from Pin 9 to Pin 1 of modulator module A103.

In the compensation network, the keyed 5.4 Volts at Pin 2 is applied to a thermistor-compensated voltage divider. The output at Pin 3 (2.35 Volts measured with a VTVM) is applied to Pin 3 and to the voltage-variable capacitor in the selected oscillator module. At temperatures below -10°C, the compensated voltage increases to maintain the proper voltage on the oscillator voltage-variable capacitor.

Service Note: An abnormally low VTVM reading (or no reading) at Pin 3 of the oscillator may indicate a short or leakage path in the oscillator. This can be checked by unsoldering Pin 3, raising it off the printed board and taking another reading. If this reading is normal the problem is in the oscillator module. If the reading remains low (or zero) the problem is in the Compensator.

AUDIO AMPLIFIER MODULE A101

Audio from the microphone is coupled to Pin 1 of Audio Amplifier Module A101 and then to the base of audio amplifier transistor Q1 (see Figure 4). In Type 90 encoder applications, the encode tone is applied to the amplifier at Pin 2.

The amplifier output is applied directly to the limiter stage (Q2). Following the limiter is a combined post-limiter filter and de-emphasis network. The filter output at Pin 8 is coupled through Mod Adjust potentiometer R103 to the modulator module A103.

MODULATOR MODULE A103

The phase modulator circuit consists of modulator module A103, voltage-variable capacitor CV101 and tuneable coil L102.

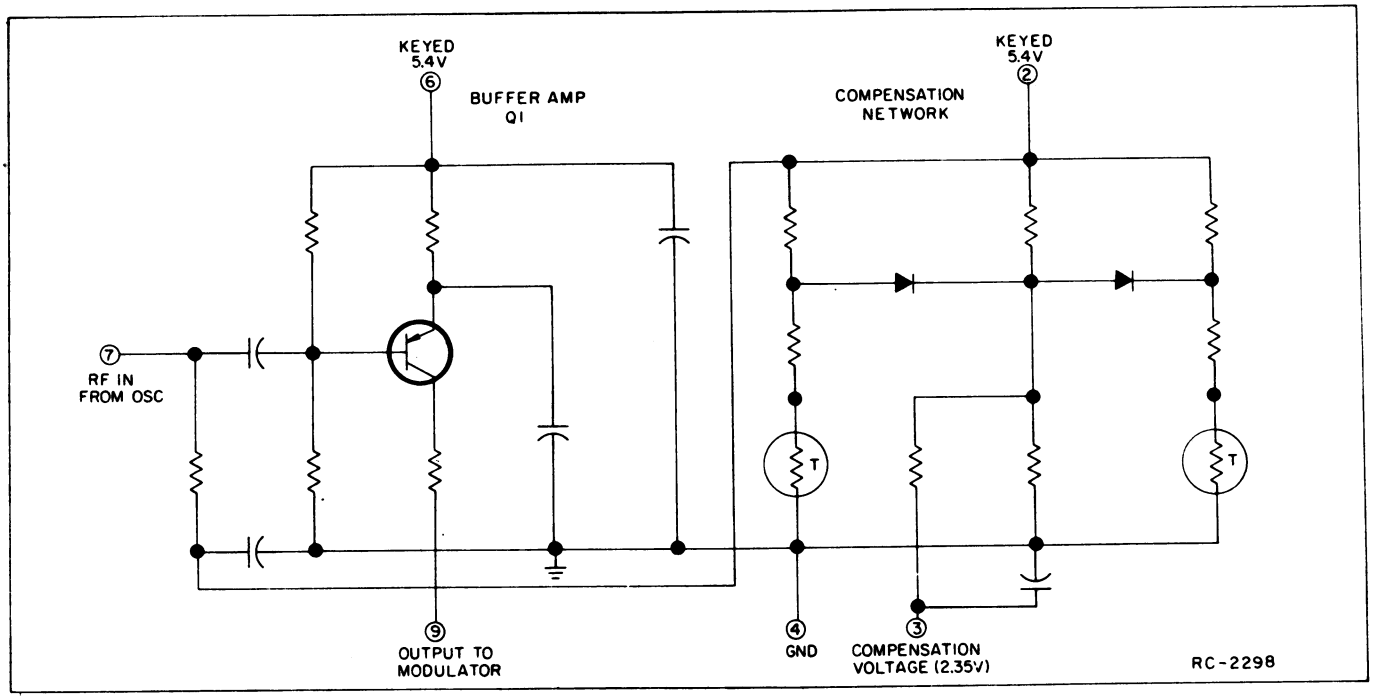

Figure 3 - Typical Compensator Circuit

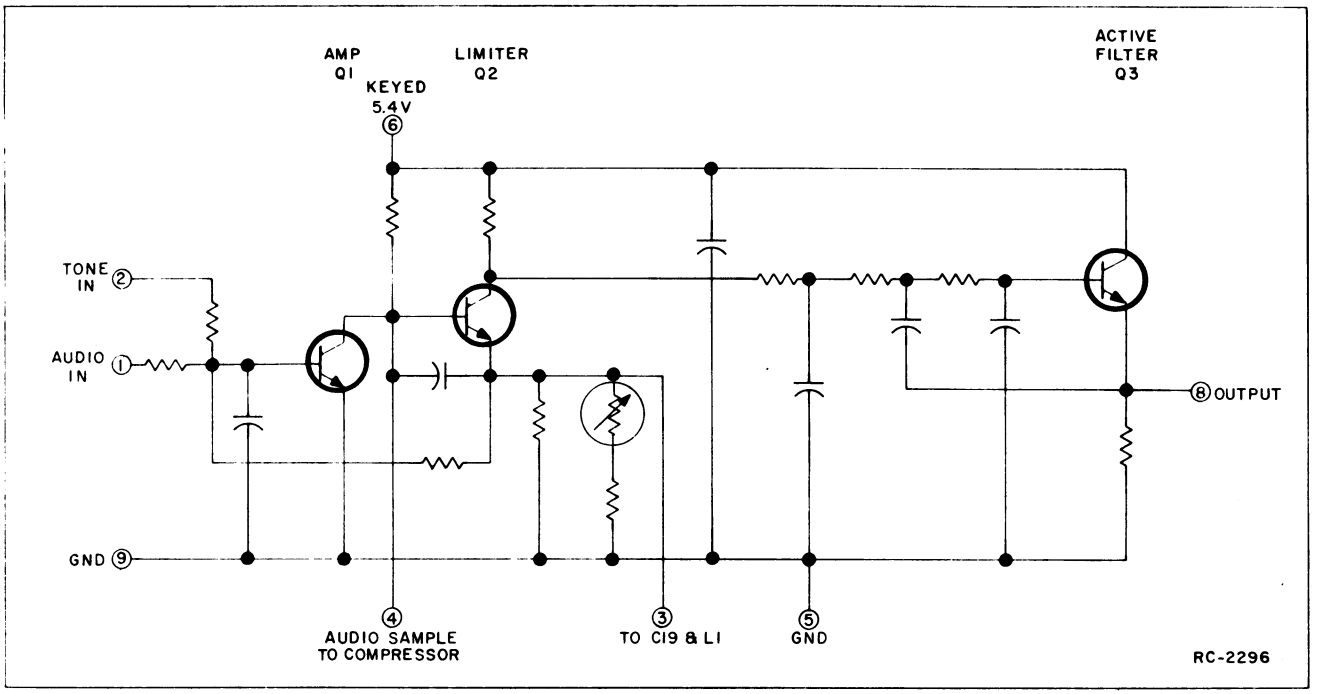

Figure 4 - Typical Audio Amplifier Circuit

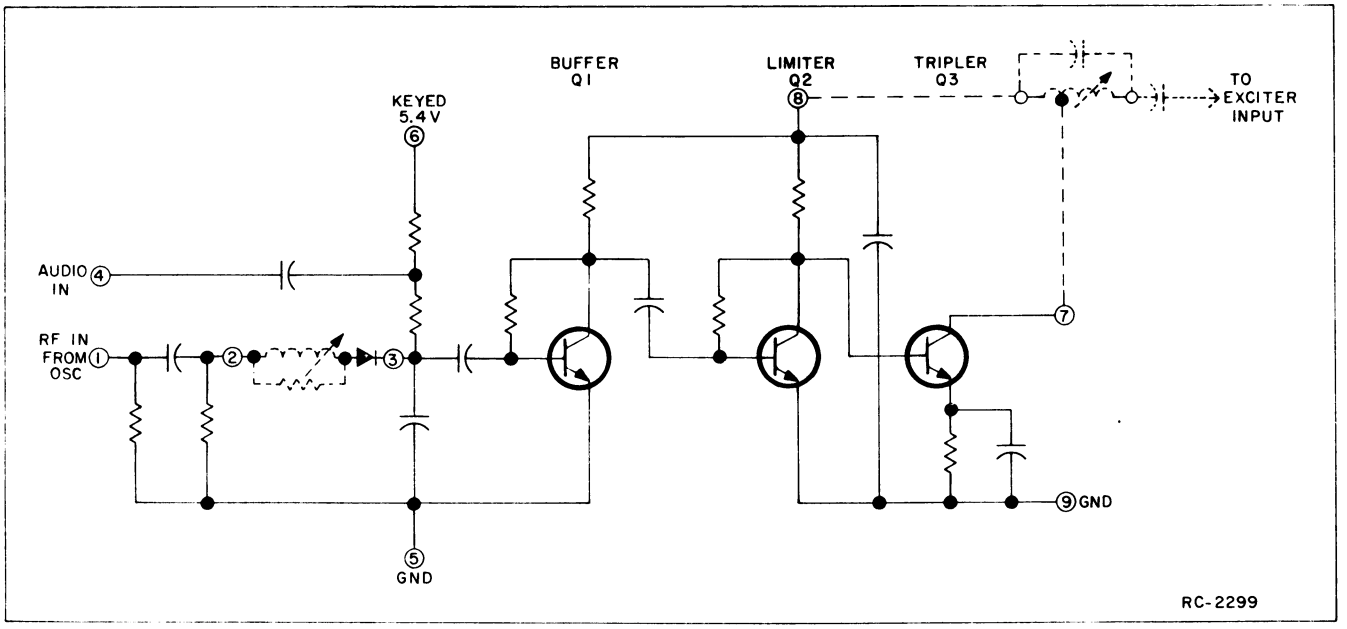

Figure 5 - Typical Phase Modulator Circuit

A typical modulator circuit is shown in Figure 5.

With CV101 in series with L102, the network is a series-resonate circuit when RF from the compensator is applied to Pin 1 of modulator module A103. Applying audio to Pin 4 of A103 varies the bias of CV1, resulting in a phase modulated output.

Buffer Q1 isolates the modulator from the loading effects of the following multiplier stage, and also provides some amplification. Following the buffer stage is tripler Q2. The output of Q2 is coupled through L103/L104 to the exciter module. L103/L104 is tuned to three times the crystal frequency.

EXCITER MODULES 4EF41A10 and 4EF41A11

Exciter Models 4EF41A10 (406-420 MHz) and 4EF41A11 (450-470 MHz) consists of three class C doubler stages, a class C driver stage and a class C power amplifier stage.

All of the stages are supplied by a type of constant-K, DC collector feed network.

Doubler Stages

The modulator output is coupled through T101 to the base of 1st doubler Q101. T101 is tuned to three times the crystal frequency. The modulator coils and the 1st doubler base circuit are metered at TP1. The 1st doubler collector circuit is metered at TP2.

The output of the 1st doubler is coupled through T102 (untuned) and T103 to the base of 2nd doubler Q102. T103 is tuned to six times the crystal frequency, and is metered at TP2.

An impedance-matching network couples the output of Q102 to the base of Q103. The network consists of C112, C113, L105/L121, C114/C136 and C115, and also provides some selectivity. L105/L121 is tuned to 12 times the crystal frequency.

Driver & PA

The following the third doubler is an impedance-matching network consisting of L107, C118, L108, C119 and C120/C140. The network matches the high impedance doubler output to the low impedance driver input. C119 is tuned to 24 times the crystal frequency.

The driver output is coupled through a similar impedance-matching network to the base of class C power amplifier Q105. The power amplifier output is applied to the input of the power amplifier board through a series-tuned matching network (L115, L122/L113, C128, L114 and C129).

EXCITER MODULE 4EF41A12

Exciter Models 4EF41A12 (470-512 MHz) consists of three class C doubler stages, a class C driver stage and a class C power amplifier stage.

All of the stages are supplied by a type of constant-K, DC collector feed network.

Doubler Stages

The modulator output is coupled through T101 to the base of 1st doubler Q101. T101 is tuned to three times the crystal frequency. The modulator coils and the 1st doubler base circuit are metered at TP1. The 1st doubler collector circuit is metered at TP2.

The output of the 1st doubler is coupled through T102 (untuned) and T103 to the base of 2nd doubler Q106. T103 is tuned to six times the crystal frequency, and is metered at TP2.

An impedance-matching network couples the output of Q106 to the base of Q107. The network consists of C112, C113, L105, C114, and C115, and also provides some selectivity. L105 is tuned to 12 times the crystal frequency.

Driver & PA

Following the third doubler is an impedance-matching network consisting of L107, C146, L108, C119 and C120. The network matches the high impedance doubler output to the low impedance driver input. C119 is tuned to 24 times the crystal frequency.

The driver output is coupled through a similar impedance-matching network to the base of class C power amplifier Q105. The power amplifier output is applied to the input to the power amplifier board through a series-tuned matching network (L115, L124, C149, L114 and C150). Transistor Q105 is the final PA in (1) watt transmitter KT-131-C.

POWER AMPLIFIER BOARD 19D423036G1-G7

NOTE

Power Amplifier Board 19D423036G7, used with (1) watt transmitter KT-131-C, is equipped with a power cable between W201 and E3. This cable connects RF power from the exciter to the antenna through antenna relay K1.

Driver

RF power from the exciter is coupled through impedance matching network C202. C203/C226/C227, R217 and L201 to the base of driver transistor Q202 on power amplifier board 19D423036G1-G6. See Schematic Diagram. The collector voltage of Q202 is controlled by the power control circuit, limiting the drive to the base of PA transistor Q203 in reduced power operation.

PA

RF is coupled from the collector of Q202 through impedance matching network C209, C210, C235, L210, L211, C212, C214/C230/C231, C213/C228, C237 and L204 to the base of PA transistor Q203. The RF output at the collector of Q203 is coupled through matching network C229, C216/C232/C233, C221, L207, C225, low pass filter C222/C234, L208, C223/C236, L209, and C224/C238 and system relay K1 to the antenna.

Power Control Circuit

The Power Control Circuit maintains a constant current through PA transistor Q203/Q204 to control the transmitter power output when the supply voltage or load changes.

The voltage drop across metering resistor R204 is monitored by operational amplifier AR201. Initially, the negative and positive inputs to AR201, at Pins 2 and 3, are balanced by BIAS BAL ADJ R206 and PWR ADJ R211 for a nominal voltage output at Pin 6. If the current through PA transistor Q203 starts to increase the voltage drop across R204 will increase proportionally. The voltage on the negative input of AR201 will be smaller than the voltage on the positive input. The output on Pin 6 will be larger than nominal. The increased voltage on the base of pass transistor Q201 will cause Q201 to conduct less and reduce the collector voltage of driver transistor Q202. The reduced collector voltage on Q202 reduces the RF drive to Q203 proportionally, maintaining a constant current through Q203.

If the current through Q203 starts to fall, the voltage on the negative input of AR201 will increase and the voltage on Pin 6 will decrease. The decreased voltage on the base of Q201 will cause Q201 to conduct harder increasing the collector voltage on Q202. The drive to Q203 will increase proportionally maintaining constant current through Q203.

To maintain constant current through PA transistor Q203/Q204, a voltage regulator circuit regulates the supply voltage of PA driver transistor Q202. Initially, when the transmitter is keyed, 7.5 volts is applied to the base of transistor Q205 causing Q205 to conduct. Transistor Q205 conducting causes transistor Q206 to conduct. How hard Q206 conducts is regulated by transistor Q207.

If there is an increase in the voltage on the collector of Q201, transistor Q207 will conduct harder causing Q206 to conduct less increasing the base voltage of Q201. The increased voltage on the base of transistor Q201 causes Q201 to conduct less and reduce the collector voltage of PA driver transistor Q202. The reduced collector voltage on Q202 reduces the RF drive to Q203/Q204 proportionally, maintaining a constant current through Q202.

If there is a decrease in the voltage on the collector of Q201, transistor Q207 will conduct less causing Q206 to conduct harder, decreasing the base voltage of Q201. The decreased voltage on the base of Q201 causes Q201 to conduct harder increasing the collector voltage on Q202. The drive to Q203/Q204 will be increased proportionally maintaining constant current through Q203/Q204.

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

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MODULATION LEVEL ADJUSTMENT

The MOD ADJUST (R103) was adjusted to the proper setting before shipment and should not normally require readjustment. This setting permits approximately 75% modulation for the average voice level. The audio peaks which would cause over-modulation are clipped by the modulation limiter. The limiter, in conjunction with the de-emphasis network, instantaneously limits the slope of the audio wave to the modulator, thereby preventing overmodulation while preserving intelligibility.

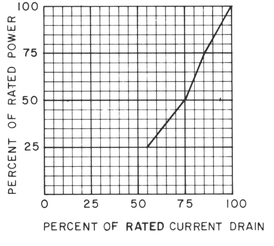
TEST EQUIPMENT

1. Audio Oscillator Model 4EX6A10
2. A deviation meter
3. An output meter or a VTVM
4. A Transmitter Test Cable 19D424148G1

PROCEDURE

1. Connect the equipment as shown in the Test Procedure on the back of this page.
2. Apply a 14 millivolt signal at 1000 Hz to Pin 2 of microphone jack J701.
3. With the signal applied, adjust Tuning Control 1 for zero modulation symmetry on the lowest channel frequency.
4. For transmitters without Channel Guard, set MOD ADJUST R108 for a 4.5-kilohertz swing with the deviation polarity which gives the highest reading as indicated on the frequency modulation monitor.
5. For transmitters with Channel Guard, check the Channel Guard modulation as shown in Step 2 of the transmitter Test Procedure. With Channel Guard tone applied, set the deviation as described in Step 4 above.
6. For multi-frequency transmitters, set the deviation as described in Step 4 on the channel producing the largest amount of deviation.

*If rated power output is not necessary to communicate, the power output may be reduced by the POWER ADJ control resulting in increased battery life. Refer to Percent of Rated Power V. Percent of Rated Current Drain Curve.



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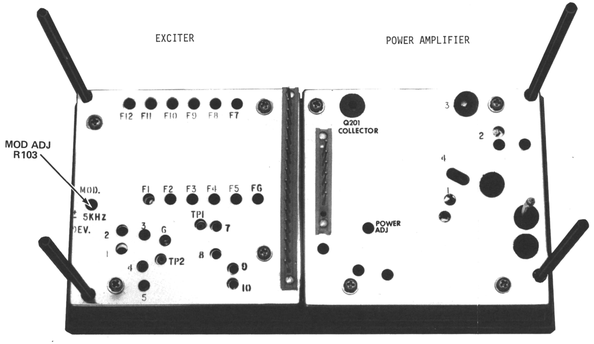

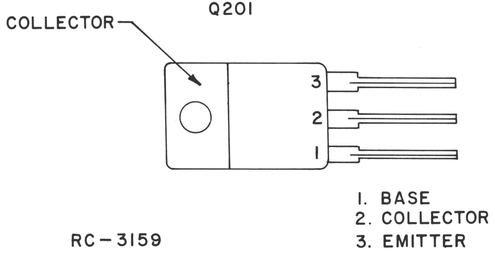

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TRANSMITTER ALIGNMENT

EQUIPMENT REQUIRED:

- GE Test Set Model 4EX3A11 (or 4EX8K11) or equivalent 20,000 ohms-per-volt meter.
- Transmitter Test Cable 19D421148G1 connected between the transmitter and system board.
- An ammeter capable of measuring one ampere connected in place of the BLACK lead of transmitter test cable 19D424148G1. This ammeter measures current to the exciter.
- An ammeter capable of measuring seven amperes, as part of, or connected in series with an external power supply.
- An ammeter capable of measuring five amperes connected in place of the RED lead of transmitter test cable 19D421148G1. This ammeter measures current to PA Transistor Q203 and is not necessary for the actual tuning of the transmitter.
- An RF wattmeter capable of measuring 18 watts for the KT-131-A, 25 watts for the KT-131-B or 1 watt for the KT-131-C.
- A Frequency Counter.

PRELIMINARY CHECKS AND ADJUSTMENTS

1. In multi-frequency transmitters, set the channel selector switch to the lowest channel frequency.
2. Set the slugs in Tuning Controls 1 thru 6 even with the top of the can (there is no slug in Tuning Control 4). When properly aligned, the slugs will be between the top of the can and the coil.
3. Set POWER ADJ R206 fully counterclockwise. (KT-131-A/B only)
4. Set capacitors 1, 2 & 3 on the power amplifier to approximately mid-range (KT-131-A/B only).
5. Connect the ammeter in series with the positive lead from the power supply and J703-8.
6. Set supply voltage at 10.0 Volts for transmitter KT-131-A or 13.6 Volts for transmitter KT-131-B.
7. Test Point meter reading made with the (+) meter lead to TP1 and TP2, and the (-) lead to system ground.
8. All adjustments made with the transmitter keyed.

ADJUSTMENT PROCEDURE (KT-131-A/B)

STEP	TUNING CONTROL	COMPONENT NO.	TYPICAL METER READING	PROCEDURE
			EXCITER	
1.	1, 2 and 3	L102, L103/ L104 & T101	Maximum (at TP1)	Adjust Tuning Controls 1, 2 and 3 for maximum meter reading at TP1. If no reading is obtained adjust Tuning Control 3 for maximum transmitter current, and then re-adjust 1, 2 and 3 for maximum meter reading at TP1.
2.	5	T103	Maximum (at TP2)	Adjust Tuning Control 5 for maximum meter reading at TP2.
3	6	L105	Maximum (at TP1)	Adjust Tuning Control 6 for maximum meter reading at TP1.
4.	1, 2, 3 and 5	L102, L103/ L104, T101 & L105	Maximum (at TP1)	Retune 1, 2, 3, 5, and 6 for maximum meter reading at TP1.
5.	6	L105	Maximum current	Tune 6 for maximum transmitter current.
6.	7 and 8	C119 & C125	Maximum Power Output	Adjust Tuning Controls 7 and 8 for maximum power output. If no power reading is obtained, tune 7 and 8 for maximum transmitter current.
7.	9 and 10	C129 & C128	Maximum Power Output	Tune 9 and 10 for maximum power output.
8.	6 thru 10	L105, C119, C125, C129 & C128	Maximum Power Output	Retune Tuning Controls 6 thru 10 until no further increase in power output is obtained.
			POWER AMPLIFIER	
9.	1, 3 and 2	C210, C229 & C225	Maximum Power Output	Tune 1, 3 and 2 in that order for maximum power output.
10.	2 and 3	C225 & C229	Optimized Power Output	Decrease power output slightly with 2 and peak power output with 3 until optimized.
11.	9 and 10	C129 & C128 (on Exciter)	Maximum Power Output	Retune 9 and 10 on the EXCITER until no further increase in power is obtained.
12.	POWER ADJ	R206	5-18 watts for KT-131-A, 5-25 watts for KT-131-B.	Set POWER ADJ R206 for the desired POWER OUTPUT*
13.	2 and 3	C225 & C229	Optimized Power Output	If necessary, repeat step 10.
14.	1	C210	Decreased Current	If the total current exceeds 5.5 amperes for KT-131-A or 5.9 amperes for KT-131-B, turn, only slightly, tuning control 1, in the direction which decreases the current, until the current decreases approximately 0.2 amperes.
15.	2	C225	Decreased Current	Repeat step 14 with tuning control 2.
16.				With no modulation, adjust F1 through 12 crystal trimmers for proper oscillator frequencies. Next, refer to the Modulation Adjustment. — NOTE — It is recommended that all frequency adjustments be made when the equipment is at a temperature of approximately 75°F. In no case should frequency adjustments be made when the equipment is outside the temperature range of 60°F to 90°F.

ADJUSTMENT PROCEDURE (KT-131-C)

STEP	TUNING CONTROL	COMPONENT NO.	TYPICAL METER READING	PROCEDURE
1.	1, 2 & 3	L102, L103/ L104 & T101	Maximum at TP1	Adjust tuning controls 1, 2 and 3 for maximum meter reading at TP1. If no reading is obtained at TP1, adjust tuning controls 1, 2 and 3 for maximum transmitter current, then readjust for maximum meter reading at TP1.
2.	5	T103	Maximum at TP2	Adjust tuning control 5 for maximum meter reading at TP2.
3.	6, 7 & 8	L105, C119 & C125	Maximum	Adjust tuning controls 6, 7 and 8 for maximum transmitter current.
4.	9 and 10	C128 & C129	Maximum	Adjust tuning controls 9 and 10 for maximum power output.
5.	2 thru 10	L103/L104, T101, T102, T103, L105, C119, C125, C129 & C128	Maximum	Adjust tuning controls 2 through 10 for maximum power output.
6.	9	C129	See Procedure	If current exceeds 700 ma (less options) readjust tuning control 9 for a null in total current drain.
7.	10, 9	C128 & C129	See Procedure	Readjust tuning control 10 for desired output power. NOTE: If minimum power output (1-Watt) cannot be attained, readjust tuning control 9 to increase power, then readjust tuning control 10 to peak power output.

ALIGNMENT PROCEDURE

406—512 MHz TRANSMITTER
TYPE KT-131 A/B

TEST PROCEDURES

These Test Procedures are designed to assist you in servicing a transmitter that is operating--but not properly. Problems encountered could be low power output, tone and voice deviation, defective audio sensitivity and modulator adjust control set too high. By following the sequence of test steps starting with Step 1, the defect can be quickly localized. Once a defect is pin pointed, refer to the "Service Check" and the additional corrective measures included in the Transmitter Troubleshooting Procedure. Before starting with the Transmitter Test Procedures, be sure the transmitter is tuned and aligned to the proper operating frequency.

TEST EQUIPMENT REQUIRED

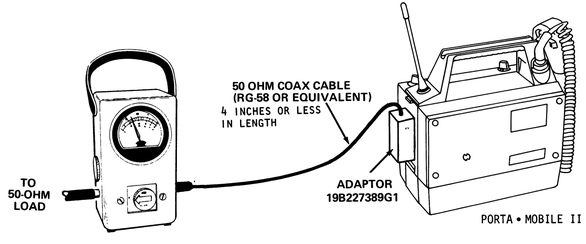
for test hookup shown:

1. Wattmeter similar to:
   Bird # 43
2. VTVM similar to:
   Triplett # 850
   Heath # 1M-21
3. Audio Generator similar to:
   GE Model 4EX6A10 or
   Heath # IG-72
4. Deviation Meter (with a .75 kHz scale) similar to:
   Measurements # 140
   Lampkin # 205A
5. Test Cable 19D424148G1

STEP 1
POWER MEASUREMENT

TEST PROCEDURE

A. Correct transmitter output to wattmeter as shown below. GE adaptor 19B227389G1 and 4 inches (or less) of 50 ohm coax cable is recommended for accurate power output readings.



B. Key transmitter and check wattmeter for desired power output..

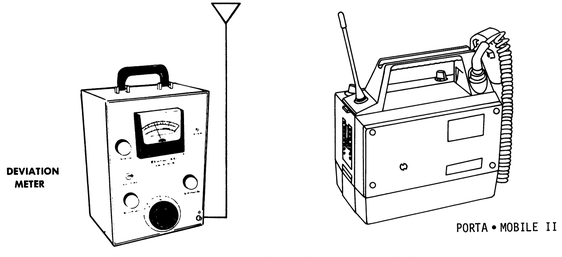
SERVICE CHECK

Refer to Service Hints on Transmitter Troubleshooting Procedure.

STEP 2
TONE DEVIATION WITH CHANNEL GUARD

TEST PROCEDURE

A. Set up Deviation Meter and monitor output of transmitter as shown below:



B. Remove the back cover and connect Test Cable 19D424148G1 between the back cover and system board.

C. Set MOD ADJUST R103 fully counterclockwise.

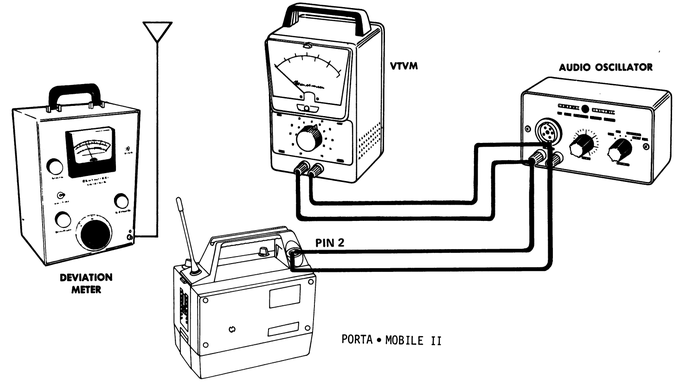
D. Key transmitter and check for approximately 0.75-kHz deviation. If reading is low or high, refer to the Channel Guard Troubleshooting Procedure (see Table of Contents).

NOTES--The Tone Deviation Test Procedures should be repeated every time the Tone Frequency is changed.

STEP 3
VOICE DEVIATION AND SYMMETRY

TEST PROCEDURE

A. Connect test equipment to transmitter as shown below:



B. Remove the back cover and connect Test Cable 19D424148G1 between the back cover and system board.

C. Set the generator output to .48 Volts and frequency to 1 kHz.

D. Key the transmitter and adjust Deviation Meter to carrier frequency.

E. Deviation reading should be ±4.5 kHz. If the deviation is not 4.5 kHz, set the deviation as directed on the Transmitter Alignment Procedure (see Table of Contents).

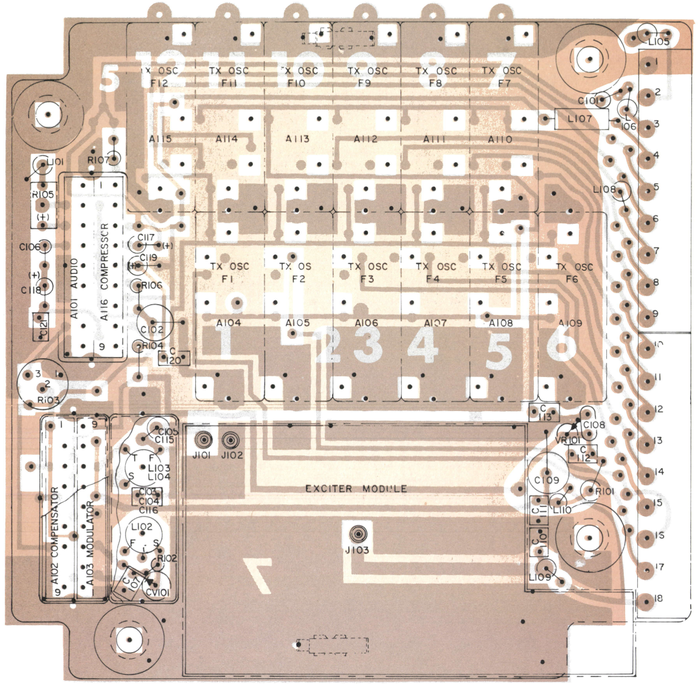
NOTES --These transmitters are adjusted for 4.5 kHz deviation at the factory. The factory adjustment will prevent the transmitter from deviating more than 5.0 kHz under the worst conditions of frequency, voltage and temperature.

If the deviation reading plus (+) or minus (-) differs by more than 0.5 kHz:

E. Refer to the Modulation Adjustment on the Transmitter Alignment Procedure.

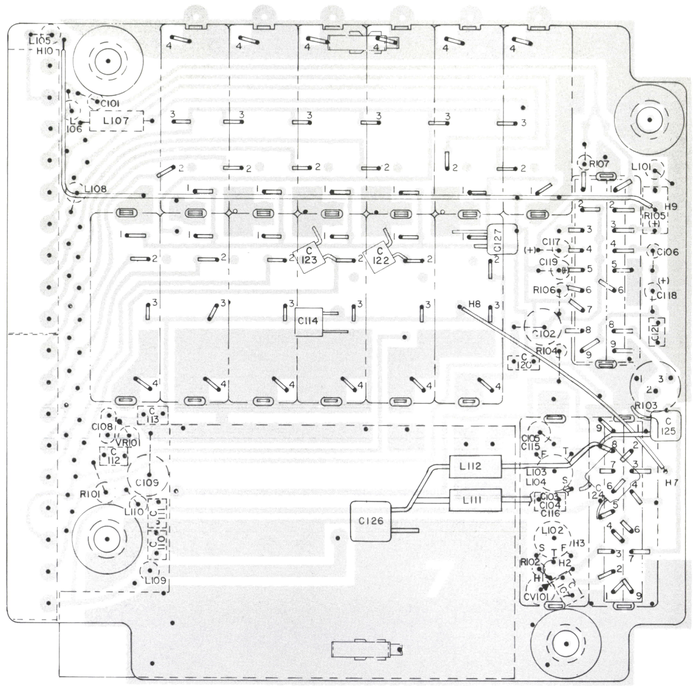
F. Check Audio Sensitivity by reducing generator output until deviation falls to 3 kHz. Voltage should be LESS than 14 millivolts.

COMPONENT SIDE



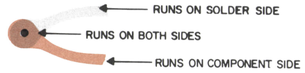
(19D417680, Sh. 2, Rev. 7)
(19D417680, Sh. 3, Rev. 5)

SOLDER SIDE



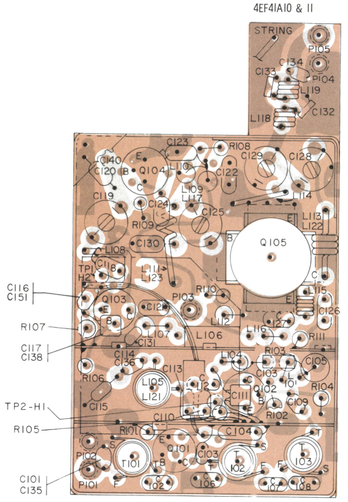
(19D417680, Sh. 2, Rev. 7)

(19D424006, Rev. 6)



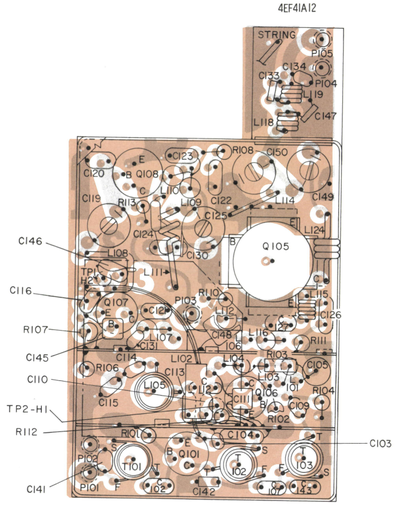
EXCITER MODULES

4EF41A10 & 11

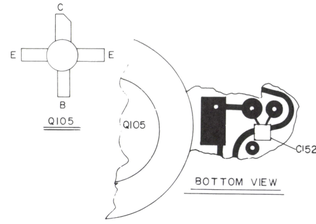


(19C320437, Rev. 2)
(19C320138, Sh. 1, Rev. 3)
(19C320138, Sh. 2, Rev. 3)

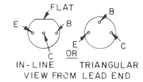
4EF41A12



(19C320878, Rev. 1)
(19C320138, Sh. 1, Rev. 3)
(19C320138, Sh. 2, Rev. 3)



LEAD IDENTIFICATION FOR Q101 THRU Q104



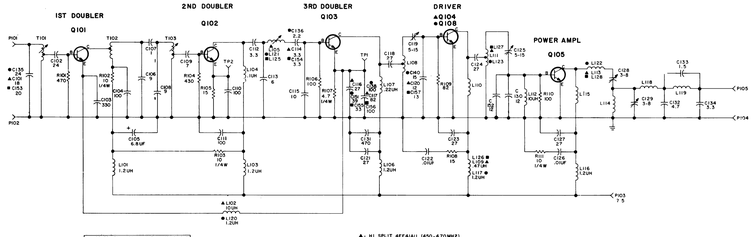
LEAD IDENTIFICATION FOR Q101 & Q106-Q108

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

OUTLINE DIAGRAM

406—512 MHz EXCITER BOARD

4EF41A10 & 11



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.

ALL RESISTORS ARE 1/10 WATT UNLESS OTHERWISE SPECIFIED AND INDICATED VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES LESS THAN 1 ARE INDICATED CAPACITOR VALUES IN MICROFARADS UNLESS FOLLOWED BY MMF=MICROMICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY NH=NANOHENRYS OR MH=MILLIHENRYS.

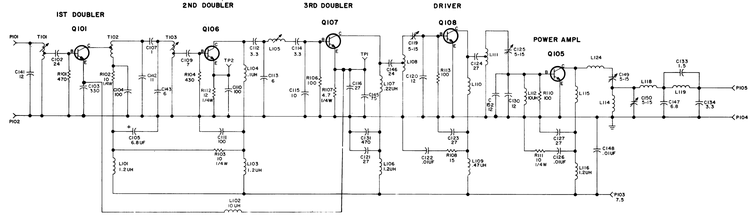
SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION 6 FOR CHANGES THAT DEAL WITH THIS UNIT. EACH CHANGE IS IDENTIFIED UNDER EACH REVISION LETTER.

THIS ELEM DIAG APPLIES TO	
MODEL NO	REV LETTER
4EF41A10	C
4EF41A11	C

▲- HI SPLIT 4EF41A11 (450-470MHZ)
●- LO SPLIT 4EF41A10 (406-420MHZ)
■- MID SPLIT 4EF41A13 (420-450MHZ)

(190416544, Rev. 12)

4EF41A12



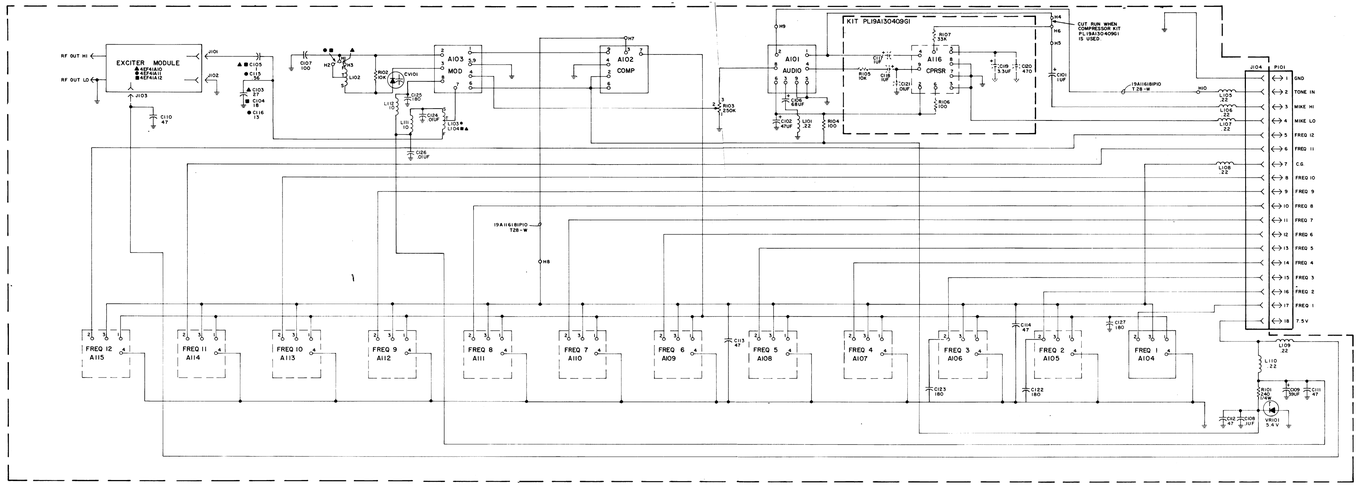
IN ORDER TO RETAIN RATED EQUIPMENT PERFORMANCE, REPLACEMENT OF ANY SERVICE PART SHOULD BE MADE ONLY WITH A COMPONENT HAVING THE SPECIFICATIONS SHOWN ON THE PARTS LIST FOR THAT PART.

ALL RESISTORS ARE 1/10 WATT UNLESS OTHERWISE SPECIFIED AND INDICATED VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES LESS THAN 1 ARE INDICATED CAPACITOR VALUES IN MICROFARADS UNLESS FOLLOWED BY MMF=MICROMICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY NH=NANOHENRYS OR MH=MILLIHENRYS.

SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION 6 FOR CHANGES THAT DEAL WITH THIS UNIT. EACH CHANGE IS IDENTIFIED UNDER EACH REVISION LETTER.

THIS ELEM DIAG APPLIES TO	
MODEL NO	REV LETTER
4EF41A12	C

(190417123, Rev. 5)



NOTES
1. ▲ USED IN LL SPLIT 406-420 MHZ
2. ● USED IN LO SPLIT 450-470 MHZ
3. ■ USED IN MID-HI SPLIT 470-512 MHZ

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.

SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION 6 FOR CHANGES THAT DEAL WITH THIS UNIT. EACH CHANGE IS IDENTIFIED UNDER EACH REVISION LETTER.

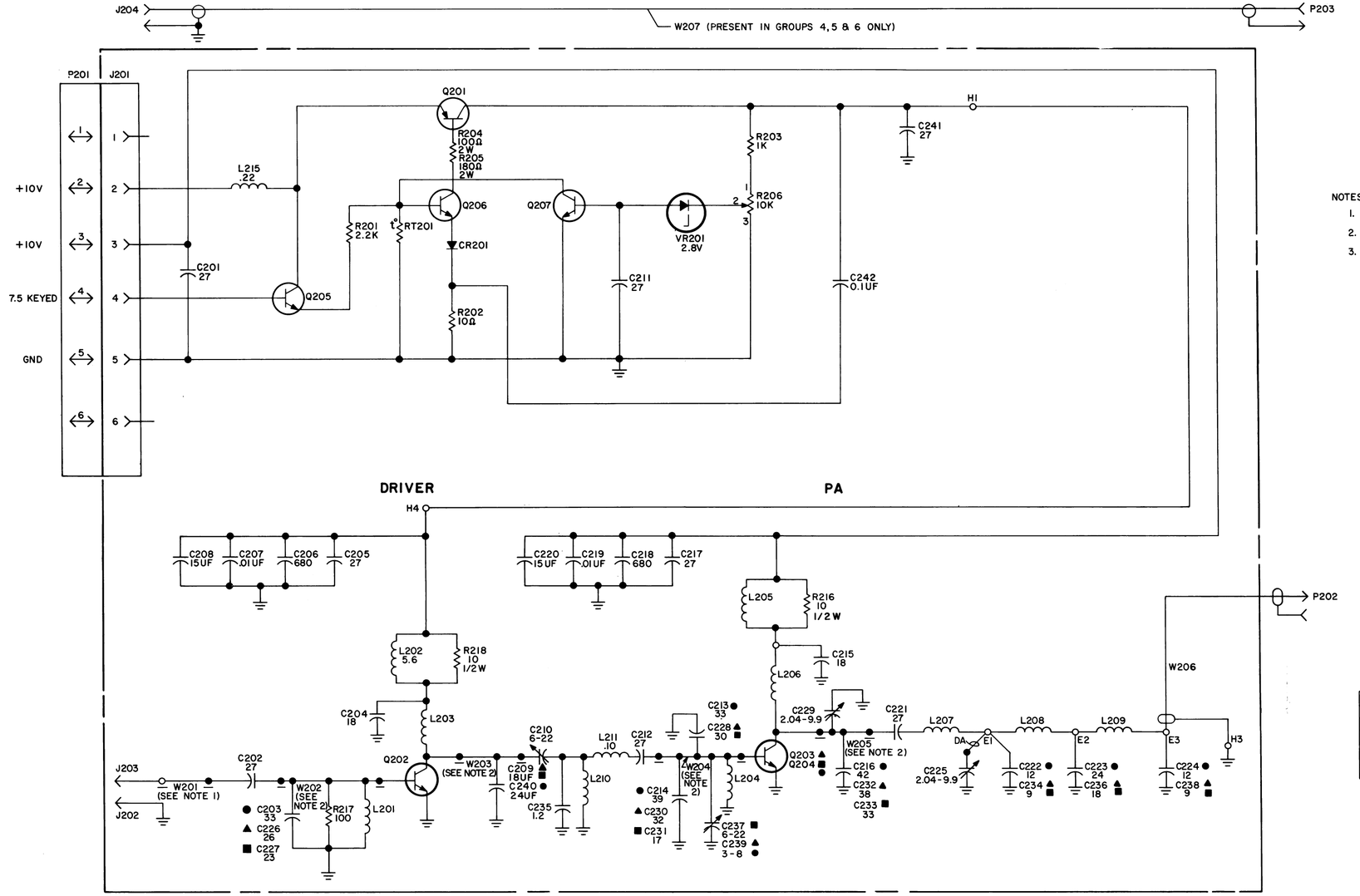
THIS ELEM DIAG APPLIES TO	
MODEL NO	REV LETTER
PL19A178875-1	C
PL19A178875-2	C
PL19A130409G1	B

ALL RESISTORS ARE 1/8 WATT UNLESS OTHERWISE SPECIFIED AND INDICATED VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES LESS THAN 1 ARE INDICATED IN MICROFARADS UNLESS FOLLOWED BY MMF=MICROMICROFARADS. INDUCTANCE VALUES ARE IN MICROHENRYS UNLESS FOLLOWED BY NH=NANOHENRYS OR MH=MILLIHENRYS.

(19R62122, Rev. 9)

SCHEMATIC DIAGRAM

406—512 MHz EXCITER BOARD



NOTES:

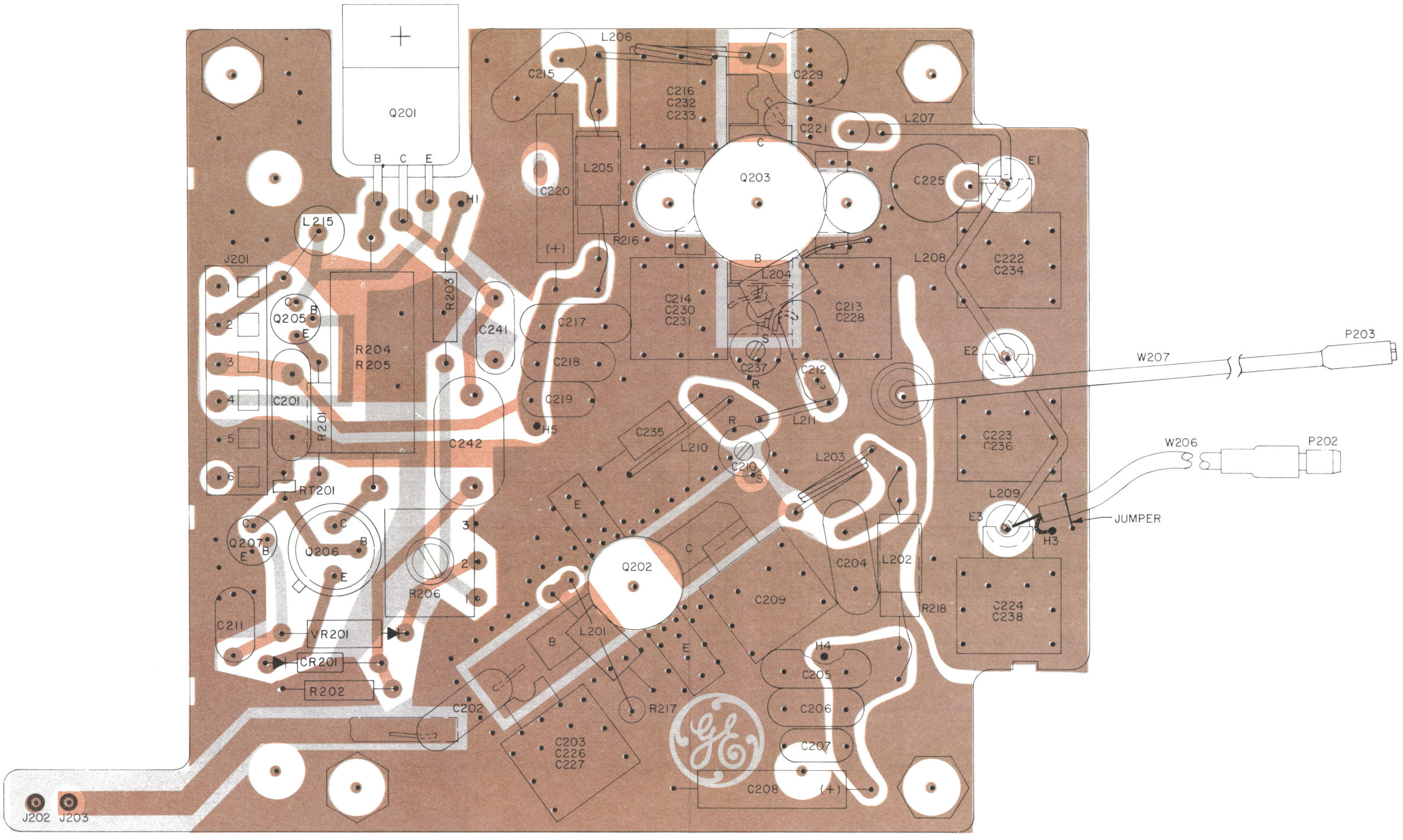
1. 50 OHM MICROSTRIP PART OF P.W.B.
2. PART OF P.W.B.
3. ● 406-420 MHZ
   ▲ 450-470 MHZ
   ■ 470-512 MHZ

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
PLI9D423036G1	B
PLI9D423036G2	B
PLI9D423036G3	B
PLI9D423036G4	B
PLI9D423036G5	B
PLI9D423036G6	B

POWER AMPLIFIER

19D423036



(19D434033, Rev. 3)
(19D430931, Sheet 2, Rev. 0)
(19D430931, Sheet 3, Rev. 0)

RUNS ON SOLDER SIDE
RUNS ON BOTH SIDES
RUNS ON COMPONENT SIDE

OUTLINE & SCHEMATIC DIAGRAM

406—512 MHz POWER AMPLIFIER

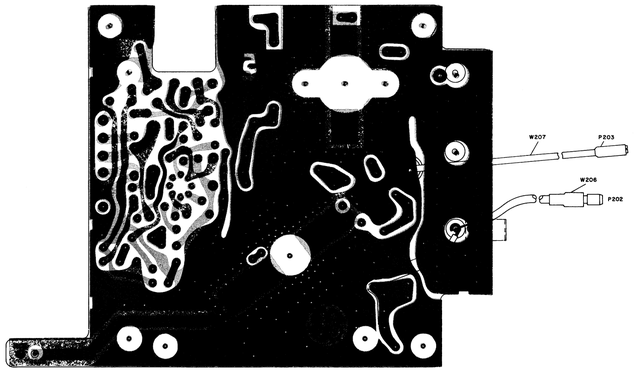
PARTS LIST

LBI30086D

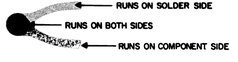
TRANSMITTER
KT-131-A/B

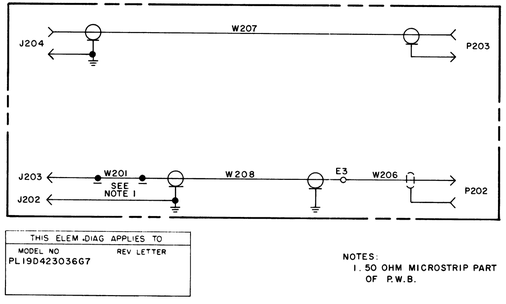
SYMBOL	GE PART NO.	DESCRIPTION
		EXCITER BOARD 19D417887G1 406-470 MHz 19D417887G2 470-512 MHz
A101	19C320062G1	Audio Transmitter.
A102	19C320060G1	Oscillator Compensator.
A103	19C320084G1	Modulator.
		---------- CAPACITORS ----------
C101	5491674P1	Tantalum: 1.0 µf ±40% -20%, 10 VDCW; sim to Sprague Type 162D.
C102	5491674P42	Tantalum: 47 µf ±20%, 6 VDCW; sim to Sprague Type 162D.
C105	19A700013P13	Phenolic: 1.0 pf ±5%, 500 VDCW.
C106	19C307102P19	Tantalum: 68 µf ±20%, 4 VDCW.
C107	19A700227P65	Ceramic: 100 pf ±5%, 100 VDCW; temp coef -1500 PPM/°C.
C108	19A116080P101	Polyester: 0.01 µf ±10%, 50 VDCW.
C109	5491674P30	Tantalum: 39 µf ±20%, 10 VDCW; sim to Sprague Type 162D.
C110 thru C114	19A700221P53	Ceramic: 47 pf ±5%, 100 VDCW; temp coef -80 PPM.
C115	19A700013P10	Phenolic: 0.56 pf ±5%, 500 VDCW.
C116	19A700221P32	Ceramic: 13 pf ±5%, 100 VDCW; temp coef -80 PPM.
C122* and C123*	19A700229P73	Ceramic: 180 pf ±10%, 100 VDCW; temp coef -3300 PPM/°C. Added by REV B.
C124*	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL. Added by REV C.
C125*	19A116114P1007	Ceramic: 180 pf ±5%, 100 VDCW; temp coef -3300 PPM. Added by REV C.
C126*	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL. Added by REV C.
C127*	19A116114P1007	Ceramic: 180 pf ±5%, 100 VDCW; temp coef -3300 PPM. Added by REV C.
		-------- DIODES AND RECTIFIERS --------
CR101	5495769P9	Diode, silicon: variable capacitance, 33 pf nominal.
		-------- JACKS AND RECEPTACLES --------
J101 thru J103		Connector. (Part of printed board 19B226575G1).
J104	19A130856G2	Connector, printed wiring: 9 contacts; sim to Molex 09-52-3093. (Quantity 2).
		---------- INDUCTORS ----------
L101	19B209420P105	Coil, RF: 0.22 µh ±10%, 0.14 ohms DC res max; sim to Jeffers 4416-0K.
L102	19A127798G2	Coil. Includes:
	19B209436P1	Tuning slug.
L103	19B219527G3	Coil. Includes:
	19B209436P1	Tuning slug.
L104	19B219527G1	Coil. Includes:
	19B209436P1	Tuning slug.
L105 thru L110	19B209420P105	Coil, RF: 0.22 µh ±10%, 0.14 ohms DC res max; sim to Jeffers 4416-0K.
L111* and L112*	19A700024P25	Coil, RF: 10 µh ±10%, 3.70 ohms DC res max. Added by REV C.
		---------- RESISTORS ----------
R101	3B152P241J	Composition: 240 ohms ±5%, 1/4 w.
R102	3B151P103J	Composition: 10K ohms ±5%, 1/8 w.
R103	19A116412P4	Variable, cermet: 250K ohms ±10%, 0.16 w; sim to Helipot Model 62 PF.
R104	3B151P101K	Composition: 100 ohms ±10%, 1/8 w.
		-------- VOLTAGE REGULATORS --------
VR101	4036887P5	Zener: 500 mW, 5.4 v. nominal.
		EXCITER MODULE 4EP41A10 19D416545G2 406-420 MHz 4EP41A13 19D416545G4 420-450 MHz 4EP41A11 19D416545G1 450-470 MHz 4EP41A12 19D416545G3 470-512 MHz
		---------- CAPACITORS ----------
C101	19A700221P38	Ceramic: 18 pf ±5%, 100 VDCW; temp coef -80 PPM.
C102	19A700221P42	Ceramic: 24 pf ±5%, 100 VDCW; temp coef -80 PPM.
C103	19A116192P7	Ceramic: 330 pf ±10%, 50 VDCW; sim to Erie 8101-A050-X5R.
C104	19A700227P64	Ceramic: 100 pf ±10%, 100 VDCW; temp coef -1500 PPM/°C.
C105	5491674P39	Tantalum: 6.8 µf ±20%, 15 VDCW; sim to Sprague Type 162D.
C106	19A116114P2030	Ceramic: 9 pf ±5%, 100 VDCW; temp coef -80 PPM.
C107	19A700219P1	Ceramic: 1 pf ±10%, 100 VDCW; temp coef 0 PPM.
C108	19A116114P2030	Ceramic: 9 pf ±5%, 100 VDCW; temp coef -80 PPM.
C109	19A116114P24	Ceramic: 7 pf ±5%, 100 VDCW; temp coef 0 PPM.
C110 and C111	19A700227P64	Ceramic: 100 pf ±10%, 100 VDCW; temp coef -1500 PPM/°C.
C112	19A700219P14	Ceramic: 3.3 pf ±5%, 100 VDCW; temp coef 0 PPM.
C113	19A116114P20	Ceramic: 6 pf ±5%, 100 VDCW; temp coef 0 PPM.
C114	19A700219P14	Ceramic: 3.3 pf ±5%, 100 VDCW; temp coef 0 PPM.
C115	19A700221P26	Ceramic: 10 pf ±5%, 100 VDCW; temp coef -80 PPM.
C116	19A700221P44	Ceramic: 27 pf ±5%, 100 VDCW; temp coef -80 PPM.
C117	19A700221P62	Ceramic: 82 pf ±5%, 100 VDCW; temp coef -80 PPM.
C118	19A700221P44	Ceramic: 27 pf ±5%, 100 VDCW; temp coef -80 PPM.
C119	19A116149P2	Variable: 4.5 to 15 pf, 63 VDCW, temp coef -75 PPM.
C120	19A700221P30	Ceramic: 12 pf ±5%, 100 VDCW; temp coef -80 PPM.
C121	19A700221P44	Ceramic: 27 pf ±5%, 100 VDCW; temp coef -80 PPM.
C122	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
C123 and C124	19A700221P44	Ceramic: 27 pf ±5%, 100 VDCW; temp coef -80 PPM.
C125	19A116149P2	Variable, ceramic: 4.5 to 15 pf, 63 VDCW, temp coef -75 PPM.
C126	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
C127	19A700221P44	Ceramic: 27 pf ±5%, 100 VDCW; temp coef -80 PPM.
C128 and C129	19A116149P1	Variable: 3 to 8 pf, 63 VDCW, temp coef -75 PPM.
C130	19A700221P30	Ceramic: 12 pf ±5%, 100 VDCW; temp coef -80 PPM.
C131	19A116192P2	Ceramic: 470 pf ±20%, 50 VDCW; sim to Erie 8111-M050-W5R.
C132	19A700219P18	Ceramic: 4.7 pf ±5%, 100 VDCW; temp coef 0 PPM.
C133	19A700219P6	Ceramic: 1.5 pf ±5%, 100 VDCW; temp coef 0 PPM.
C134	19A700219P14	Ceramic: 3.3 pf ±5%, 100 VDCW; temp coef 0 PPM.
C135	19A700221P42	Ceramic: 24 pf ±5%, 100 VDCW; temp coef -80 PPM.
C136	19A700219P10	Ceramic: 2.2 pf ±5%, 100 VDCW; temp coef 0 PPM.
C138	19A700227P64	Ceramic: 100 pf ±10%, 100 VDCW; temp coef -1500 PPM/°C.
C140	19A700221P33	Ceramic: 15 pf ±5%, 100 VDCW; temp coef -80 PPM.
C141	19A700221P30	Ceramic: 12 pf ±5%, 100 VDCW; temp coef -80 PPM.
C142	19A700221P27	Ceramic: 11 pf ±10%, 100 VDCW; temp coef -80 PPM.
C143	19A116114P2020	Ceramic: 6 pf ±5%, 100 VDCW; temp coef -80 PPM.
C145	19A700221P60	Ceramic: 75 pf ±5%, 100 VDCW; temp coef -80 PPM.
C146	19A700221P42	Ceramic: 24 pf ±5%, 100 VDCW; temp coef -80 PPM.
C147	19A700219P22	Ceramic: 6.8 pf ±5%, 100 VDCW; temp coef 0 PPM.
C148	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
C149 and C150	19A116149P2	Variable: 4.5 to 15 pf, 63 VDCW, temp coef -75 PPM.
C151	19A700225P50	Ceramic: 39 pf ±5%, 100 VDCW; temp coef -470 PPM.
C152	19A700221P30	Ceramic: 12 pf ±5%, 100 VDCW; temp coef -80 PPM.
C153	19A700221P39	Ceramic: 20 pf ±5%, 100 VDCW; temp coef -80 PPM.
C154	19A700221P13	Ceramic: 3.3 pf ±5%, 100 VDCW; temp coef -80 PPM.
C155	19A700219P47	Ceramic: 33 pf ±5%, 100 VDCW; temp coef 0 PPM.
C156	19A700227P64	Ceramic: 100 pf ±10%, 100 VDCW; temp coef -1500 PPM.
C157	19A700221P32	Ceramic: 13 pf ±5%, 100 VDCW; temp coef -80 PPM.
		---------- INDUCTORS ----------
L101	19B209420P114	Coil, RF: 1.20 µh ±10%, 0.18 ohms DC res max; sim to Jeffers 4436-1K.
L102	19A700024P25	Coil, RF: 10.0 µh ±10%, 3.70 ohms DC res max.
L103	19B209420P114	Coil, RF: 1.20 µh ±10%, 0.18 ohms DC res max; sim to Jeffers 4436-1K.
L104	19B209420P101	Coil, RF: 0.10 µh ±10%, 0.08 ohms DC res max; sim to Jeffers 4416-1K.
L105	19B219528G1	Coil. Includes:
	19A127805P1	Tuning slug.
L106	19B209420P114	Coil, RF: 1.20 µh ±10%, 0.18 ohms DC res max; sim to Jeffers 4436-1.
L107	19B209420P105	Coil, RF: 0.22 µh ±10%, 0.14 ohms DC res max; sim to Jeffers 4416-0K.
L108	19B219524P1	Coil.
L109	19A700024P9	Coil, RF: 0.47 µh ±10%, 0.35 ohms DC res max.
L110	19A129251P1	Coil.
L111	19B219525P1	Coil.
L112	19A700024P25	Coil, RF: 10.0 µh ±10%, 3.70 ohms DC res max.
L113	19A129230G1	Coil.
L114	19A129250P1	Coil.
L115	19A129252P1	Coil.
L116 and L117	19B209420P114	Coil, RF: 1.20 µh ±10%, 0.18 ohms DC res max; sim to Jeffers 4436-1K.
L118 and L119	19A129247P1	Coil.
L120	19B209420P114	Coil, RF: 1.20 µh ±10%, 0.18 ohms DC res max; sim to Jeffers 4436-1K.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES



(19D429161, Rev. 0)
(19D417675, Sh. 2, Rev. 5)
(19D417675, Sh. 3, Rev. 5)





THIS ELEM DIAG APPLIES TO	
MODEL NO	REV LETTER
PL19D423036G7	

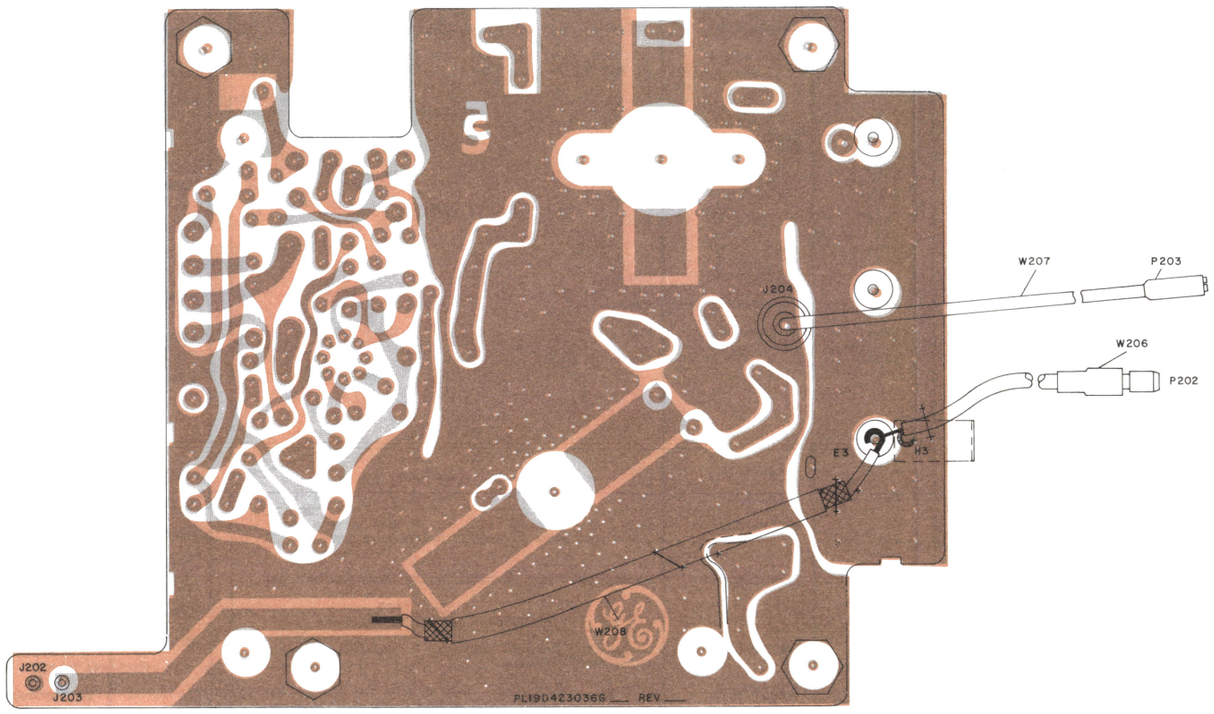
NOTES:
1. 50 OHM MICROSTRIP PART OF P.W.B.

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.

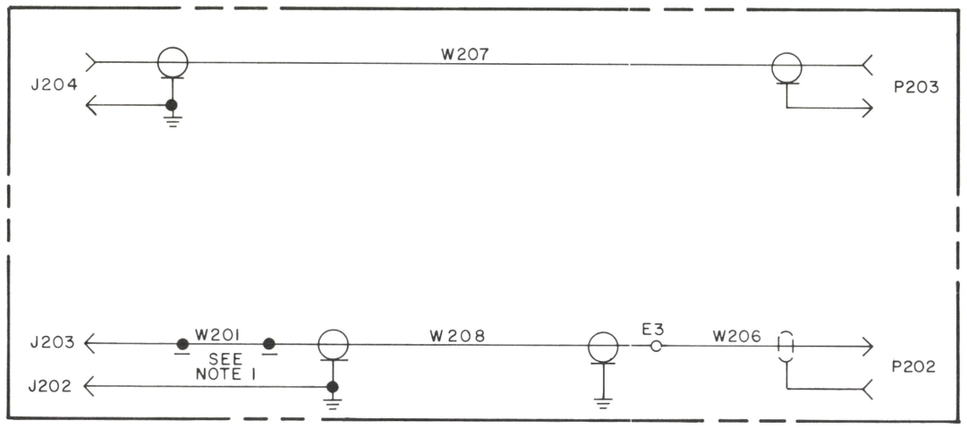
(19E232187, Rev. 0)

OUTLINE & SCHEMATIC DIAGRAM

POWER AMPLIFIER 19D423036G7



(19D429161, Rev. 0)
(19D417675, Sh. 2, Rev. 5)
(19D417675, Sh. 3, Rev. 5)

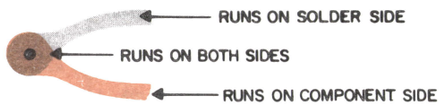


THIS ELEM. DIAG APPLIES TO	
MODEL NO	REV LETTER
PL19D42303667	

NOTES:
1. 50 OHM MICROSTRIP PART OF P.W.B.

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.

(19B232187, Rev. 0)



OUTLINE & SCHEMATIC DIAGRAM

POWER AMPLIFIER 19D423036G7

Issue 2

SYMBOL	GE PART NO.	DESCRIPTION
L121	19B219526G2	Coil. Includes:
	19B209436P1	Tuning slug.
L122	19A129230G2	Coil.
L123	19B219566P1	Coil.
L124	19A129230G3	Coil.
L125	19B233201G1	Coil.
L126	19B209420P111	Coil, RF: 0.68 μh ±10%, 0.54 ohms DC res max; sim to Jeffers 4426-4K.
L127	19B233200P1	Coil.
L128	19A138390P1	Coil.
		- - - - - - - - - - - PLUGS - - - - - - - - - -
P101 thru P105	19A115834P4	Contact, electrical: sim to AMP 2-332070-9.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q101 thru Q104	19A116201P3	Silicon, NPN.
Q105	19B227818G5	Silicon, NPN.
Q106 thru Q108	19A116201P3	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R101	3B151P471K	Composition: 470 ohms ±10%, 1/8 w.
R102* and R103*	19A134564P4	Metal film: 10 ohms ±5%, 0.25 watt, temp coef 0 ±100 PPM/°C.
		In KEY B & earlier:
	3B151P100K	Composition: 10 ohms ±10%, 1/8 w.
R104	3B151P431J	Composition: 430 ohms ±5%, 1/8 w.
R105	3B151P150K	Composition: 15 ohms ±10%, 1/8 w.
R106	3B151P101K	Composition: 100 ohms ±10%, 1/8 w.
R107*	19A134564P2	Metal film: 4.7 ohms ±5%, 0.25 watt, temp coef 0 ±100 PPM/°C.
		In KEY B & earlier:
	19A116670P16	Composition: 4.7 ohms ±5%, 1/4 w.
R108	3B151P150K	Composition: 15 ohms ±10%, 1/8 w.
R109	3B151P820K	Composition: 82 ohms ±10%, 1/8 w.
R110	3B151P101K	Composition: 100 ohms ±10%, 1/8 w.
R111*	19A134564P4	Metal film: 10 ohms ±5%, 0.25 watt, temp coef 0 ±100 PPM/°C.
		In KEY B & earlier:
	3B151P100K	Composition: 10 ohms ±10%, 1/8 w.
R112*	19A134564P5	Metal film: 12 ohms ±5%, 0.25 watt, temp coef 0 ±100 PPM/°C.
		In KEY B & earlier:
	3B151P120K	Composition: 12 ohms ±10%, 1/8 w.
R113	3B151P101K	Composition: 100 ohms ±10%, 1/8 w.
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T101	19B219527G2	Coil.
T102	19B219523G2	Coil.
T103	19B219523G1	Coil.
		PA BOARD
		19D423036G1 406-420 MHz PORTABLE
		19D423036G2 450-470 MHz PORTABLE
		19D423036G3 470-512 MHz PORTABLE
		19D423036G4 406-420 MHz MOTORCYCLE
		19D423036G5 450-470 MHz MOTORCYCLE
		19D423036G6 470-512 MHz MOTORCYCLE
		19D423036G7 450-470 MHz TUG
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - - -
AR201*	19A116297P2	Linear with TO-99 Case, Operational amplier. Deleted by KEY B.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C201 and C202	19A116656P27G1	Ceramic disc: 27 pf ±0.25 pf, 500 VDCW, temp coef -150 PPM.
C203	19A116952P33	Metallized teflon: 33 pf ±2%, 250 VDCW; sim to Underwood Type JlRF.
C204	19A700105P14	Mica: 18 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C205	19A116656P27G1	Ceramic disc: 27 pf ±0.25 pf, 500 VDCW, temp coef -150 PPM.
C206	5494481P109	Ceramic disc: 680 pf ±20%, 1000 VDCW; sim to RMC Type JF Biscap.
C207	19A116080P1	Polyester: 0.01 μf ±20%, 50 VDCW.
C208	5496267P14	Tantalum: 15 μf ±20%, 20 VDCW; sim to Sprague Type 150D.
C209	19A116952P18	Metallized teflon: 18 pf ±0.5 pf, 250 VDCW; sim to Underwood Type JlRF.
C210	19A116149P3	Variable: 6 to 22 pf, 63 VDCW, temp coef -1500 PPM.
C211*	19A116656P27G1	Ceramic disc: 27 pf ±2%, 500 VDCW, temp coef -150 PPM.
		In KEY A & earlier:
	19A116655P19	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Biscap.
C212	19A116656P27G1	Ceramic disc: 27 pf ±2%, 500 VDCW, temp coef -150 PPM.
C213	19A116952P33	Metallized teflon: 33 pf ±2%, 250 VDCW; sim to Underwood Type JlRF.
C214	19A116952P39	Metallized teflon: 39 pf ±2%, 250 VDCW; sim to Underwood Type JlRF.
C215	19A700105P14	Mica: 18 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C216	19A116952P42	Metallized teflon: 42 pf ±2%, 250 VDCW; sim to Underwood Type JlRF.
C217	19A116656P27G1	Ceramic disc: 27 pf ±2%, 500 VDCW, temp coef -150 PPM.
C218	5494481P109	Ceramic disc: 680 pf ±20%, 1000 VDCW; sim to RMC Type JF Biscap.
C219	19A116080P1	Polyester: 0.01 μf ±20%, 50 VDCW.
C220	5496267P14	Tantalum: 15 μf ±20%, 20 VDCW; sim to Sprague Type 150D.
C221	19A116656P27G1	Ceramic disc: 27 pf ±2%, 500 VDCW, temp coef -150 PPM.
C222	19A116952P12	Metallized teflon: 12 pf ±0.5 pf, 250 VDCW; sim to Underwood Type JlRF.
C223	19A116952P24	Metallized teflon: 24 pf ±0.5 pf, 250 VDCW; sim to Underwood Type JlRF.
C224	19A116952P12	Metallized teflon: 12 pf ±0.5 pf, 250 VDCW; sim to Underwood Type JlRF.
C225	19A700008P2	Variable, air: 2.28-14.13 pf, 250 VDCW; sim to E.F. Johnson Type T 187-0109-005.
C226	19A116952P26	Metallized teflon: 26 pf ±2%, 250 VDCW; sim to Underwood Type JlRF.
C227	19A116952P23	Metallized teflon: 23 pf ±0.5 pf, 250 VDCW; sim to Underwood Type JlRF.
C228	19A116952P30	Metallized teflon: 30 pf ±2%, 250 VDCW; sim to Underwood Type JlRF.
C229	19A700008P2	Variable, air: 2.28-14.13 pf, 250 VDCW; sim to E. F. Johnson Type T 187-0109-005.
C230	19A116952P32	Metallized teflon: 32 pf ±2%, 250 VDCW; sim to Underwood Type JlRF.
C231	19A116952P17	Metallized teflon: 17 pf ±0.5 pf, 250 VDCW; sim to Underwood Type JlRF.
C232	19A116952P38	Metallized teflon: 38 pf ±2%, 250 VDCW; sim to Underwood Type JlRF.
C233	19A116952P33	Metallized teflon: 33 pf ±2%, 250 VDCW; sim to Underwood Type JlRF.
C234	19A116952P9	Metallized teflon: 9 pf ±0.5 pf, 250 VDCW; sim to Underwood Type JlRF.

SYMBOL	GE PART NO.	DESCRIPTION
C235	19A700013P14	Phenolic: 1.20 pf ±5%, 500 VDCW.
C236	19A116952P18	Metallized teflon: 18 pf ±0.5 pf, 250 VDCW; sim to Underwood Type JlRF.
C237	19A116149P3	Variable: 6 to 22 pf, 63 VDCW, temp coef -1500 PPM.
C238	19A116952P9	Metallized teflon: 9 pf, 0.5 pf, 250 VDCW; sim to Underwood Type JlRF.
C239	19A116149P1	Variable: 3 to 8 pf, 63 VDCW, temp coef -75 PPM.
C240	19A116952P24	Metallized teflon: 24 pf, 0.5 pf, 250 VDCW; sim to Underwood Type JlRF.
C241*	19A116656P27G1	Ceramic disc: 27 pf ±2%, 500 VDCW, temp coef -150 PPM. Added by KEY A.
C242*	19A116080P107	Polyester: 0.1 μf ±10%, 50 VDCW. Added by KEY B.
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR201	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
CR202*	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV. Deleted by KEY B.
		- - - - - - - - - - INDUCTORS - - - - - - - - -
L201 and L202	19A129773G2	Coil.
L203	19A130418P2	Coil.
L204 and L205	19A129773G2	Coil.
L206	19A130418P1	Coil.
L207	19A130422P1	Coil.
L208	19A130421P1	Coil.
L209		(Part of L208).
L210	19A130419P1	Coil.
L211	19A130420P1	Coil.
L212* thru L214*	19B209420P105	Coil, RF: 0.22 μh ±10%, 0.14 ohms DC res max; sim to Jeffers 4416-5K. Deleted by KEY B.
L215	19A700000P4	Choke, RF: 220 nH ±10%, 0.035 ohms DC res max.
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J201	19A130856G1	Connector, printed wiring: 6 contacts; sim to Molex 09-52-3063.
J202 and J203	19A116366P6	Contact, electrical: sim to Concord 10-891-2.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q201	19A116942P1	Silicon, PNP.
Q202	19B232644G5	Silicon, NPN.
Q203	19B232644G6	Silicon, NPN.
Q204	19B232644G7	Silicon, NPN.
Q205*	19A115910P1	Silicon, NPN; sim to Type 2N3904. Added by KEY B.
Q206*	19A115300P2	Silicon, NPN; sim to Type 2N3053. Added by KEY B.
Q207*	19A115910P1	Silicon, NPN; sim to Type 2N3904. Added by KEY B.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R201*	19A700106P71	Composition: 2.2 ohms ±5%, 1/4 w.
		In KEY A & earlier:
	19C314256P21003	Metal film: 100K ohms ±1%, 1/4 w.
R202*	19A700106P15	Composition: 10 ohms ±5%, 1/4 w.
		In KEY A & earlier:
	19C314256P27152	Metal film: 71.50K ohms ±1%, 1/4 w.

SYMBOL	GE PART NO.	DESCRIPTION
R203*	19A700106P63	Composition: 1K ohms ±5%, 1/4 w.
		In KEY A & earlier:
	3B152P820J	Composition: 82 ohms ±5%, 1/4 w.
R204*	19A700111P39	Composition: 100 ohms ±5%, 2 w. Deleted in G4-G6 by KEY B.
		In KEY A & earlier:
		Resistor. Includes:
	19A134225P1	Wirewound, manganin: wire size No. 22 AWG.
	4038593P5	Insulated sleeving.
R205*	19A700111P45	Composition: 180 ohms ±5%, 2 w. Deleted in G1-G3 by KEY B.
		In G4-G6 of KEY A & earlier:
	19C314256P21003	Metal film: 100K ohms ±1%, 1/4 w.
R206	19A116559P106	Variable, cermet: 10K ohms ±20%, .5 w; sim to CTS Series 360.
R207*	19C314256P23240	Metal film: 324 ohms ±1%, 1/4 w. Deleted by KEY B.
R208*	3B152P470J	Composition: 47 ohms ±5%, 1/4 w. Deleted by KEY B.
		Earlier than KEY A:
	3B152P101J	Composition: 100 ohms ±5%, 1/4 w.
R209*	3B152P112J	Composition: 1.1K ohms ±5%, 1/4 w. Deleted by KEY B.
R210*	19C314256P21002	Metal film: 10K ohms ±1%, 1/4 w. Deleted by KEY B.
R211*	19A116559P102	Variable, cermet: 5K ohms ±20%, .5 w; sim to CTS Series 360. Deleted by KEY B.
R212*	19C314256P27152	Metal film: 71.5K ohms ±1%, 1/4 w. Deleted by KEY B.
R213*	3B152P204J	Composition: 200K ohms ±5%, 1/4 w. Deleted by KEY B.
R214*	19C314256P28061	Metal film: 8.06K ohms ±1%, 1/4 w. Deleted by KEY B.
R216	19A700113P15	Composition: 10 ohms ±5%, 1/2 w.
R217	19A700106P39	Composition: 100 ohms ±5%, 1/4 w.
R218	19A700113P15	Composition: 10 ohms ±5%, 1/2 w.
R219* and R220*	19A700106P87	Composition: 10K ohms ±5%, 1/4 w. Deleted by KEY B.
		- - - - - - - - - - THERMISTORS - - - - - - - - -
RT201*	19C300048P7	Disc: 5K ohms ±10%; sim to NL Ind. 1D103.
		In KEY A & earlier:
	19C300048P6	Disc: 50K ohms ±10%; sim to NL Ind. 4D103.
		- - - - - - - - VOLTAGE REGULATORS - - - - - - - -
VR201*	4036887P2	Zener: 500 mW, 2.8 v. nominal.
		In KEY A & earlier:
	4036887P55	Zener: 500 mW, 11.25 v. nominal. Deleted by KEY B.
VR202*	4036887P1	Zener: 500 mW, 2.3 v. nominal. Deleted by KEY B.
VR203*	4036887P2	Zener: 500 mW, 2.8 v. nominal. Deleted by KEY B.
		- - - - - - - - - - CABLES - - - - - - - - - -
W201 thru W205		(Part of printed board 19A130386G1).
W206	19A130432G2	Cable assembly, RF: coaxial; sim to Bolitron/ Microwave 8100-0003. Includes (P202).
W207	19A130432G4	Cable assembly, RF: coaxial; sim to Bolitron/ Microwave 8120-0003. Include J204 and P203.
W208	19A13715ZG1	Cable, RF: approx 1 foot long.

SYMBOL	GE PART NO.	DESCRIPTION
		ASSOCIATED ASSEMBLIES
		COMPRESSOR KIT 19A130409G1
A116	19C311907G2	Audio Compressor.
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C117 and C118	5491674P1	Tantalum: 1.0 µf +40-20%, 10 VDCW; sim to Sprague Type 162D.
C119	5491674P36	Tantalum: 3.3 µf ±20%, 10 VDCW; sim to Sprague Type 162D.
C120	19A116192P2	Ceramic: 470 pf ±20%, 50 VDCW; sim to Erie 811-A050-X5R-471K.
C121	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R105	3R151P103J	Composition: 10K ohms ±5%, 1/8 w.
R106	3R151P101J	Composition: 100 ohms ±5%, 1/8 w.
R107*	3R151P333J	Composition: 33K ohms ±5%, 1/8 w. In REV A & earlier;
	3R151P153J	Composition: 15K ohms ±5%, 1/8 w.
R108	3R151P433J	Composition: 43K ohms ±5%, 1/8 w.
R109*	3R151P623J	Composition: 62K ohms ±5%, 1/8 w. Added by REV A.
		CAPACITOR KIT 19A130378G1 406-420 MHz 19A130378G2 450-470 MHz
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C103	19A116114P2044	Ceramic: 27 pf ±5%, 100 VDCW; temp coef -80 PPM.
C104	19A116114P2038	Ceramic: 18 pf ±5%, 100 VDCW; temp coef -80 PPM.
		UHF HARDWARE KIT 19A130480G1
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R9	3R151P103J	Composition: 10K ohms ±5%, 1/8 w.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	19A130440G1	Can. (Exciter).
	19A130440G2	Can. (Power Amplifier).
	19B226409P3	Spacer. (Used to secure Exciter Board).
	N80P9003C6	Machine screw, phillips: No. 4-40 x 3/16. (Used to secure Exciter & Power Amplifier boards).
	N404P1LC6	Lockwasher, internal tooth: No. 4. (Used to secure Exciter & Power Amplifier boards).
	19A130519G1	Cap screw: No. 8-32 x 4. (Secures Power Amplifier to housing).
	4036979P3	Washer, non-metallic: .250 ID. (Secures Power Amplifier to housing).
	N193P15C6	Retaining ring, steel: external type. (Located on mounting screw for Power Amplifier).
	19A115834P4	Contact, electrical; sim to AMP 2-332070-9. (P303 & P304).
	19A143644G1	Pad. (Located between printed board & casting).
	19A115185P5	Retainer strap; sim to Panduit Corp. SST-1. (Ties all wires to harness).
	19A115060P30	Wire, solder: wire size No. 26. (Located at P303 & P304).
	4038593P4	Insulated sleeving. (Located at P303 & P304).

SYMBOL	GE PART NO.	DESCRIPTION
		ASSOCIATED PARTS
		- - - - - - - - OSCILLATOR MODULES - - - - - - - -
		NOTE: When reordering A104-A115, give GE Part Number and specify exact frequency needed.
		Crystal Freq. Fo 24
A104 thru A115	4EZ27A11	Oscillator Module.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P101	19A116659P72	Connector, printed wiring: 18 contacts. (Used in Exciter Board).
P201	19A116659P71	Connector, printed wiring: 6 contacts. (Used in PA Board).
		- - - - - - - - MISCELLANEOUS - - - - - - - -
	19C311491P3	Cam, vertical. (Used with A101-A103).
	19B216866G2	Can. (Located next to A102 & A103).
	19A129245P1	Nut: thd. size No. 8-32. (Used with Q105).
	4035306P11	Washer, fiber. (Used with Q101-Q104, Q106-Q108).
	19C320921G1	Back cover. KT-131-A.
	19D423486G1	Back cover. KT-131-B.
	19B226408P1	Nut: thd. size No. 8-32. (Used with Q202).
	19A116022P1	Insulator, bushing. (Used with Q201).
	19A116023P1	Insulator, plate. (Used with Q201).
	19B226409P2	Spacer. (Used to secure PA Board to cover).
	19A134509P1	Gasket. (Located on back cover).
	19A116781P7	Contact, electrical. (Grounds printed board to heat sink casting- Quantity 2).
	4030555P1	Insulator, washer: nylon. (Q206).
	19A130151P4	Gasket. (Used with J204).
	19A137154P1	Gasket. (Used with Q202).
	19C321058P1	Spring, contact. (Located at H3).

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 - 4EF41A10, 11 & 12
To incorporate a new trimmer capacitor. Changed C128, C129, C149 and C150.

REV. A - Compressor Kit 19A130409G1
To improve stability. Added R109.

REV. A - Exciter Board 19D417887G1 & G2
To improve performance. Added electrical contact, grounding the printed wire board to the heat sink casting.

REV. A - PA Board 19D423036G1-G6
To improve low voltage and temperature operation of current control. Changed R208 and added C241.

REV. B - Exciter Board 19D417887G1 & G2
To improve transmitter frequency stability.
Added C122 and C123.

REV. B - Compressor Kit 19A130409G1
To reduce residual deviation.
Changed R107.

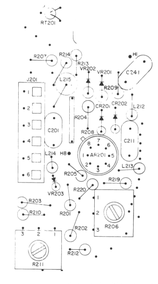
REV B - 4EF41A10, 11 & 12
To improve margin of power output.
Changed Q104 and Q105. Added C152.

REV. C - To provide flame-proff resitors.
Changed R102, R103, R111 and R107.
Changed R112 in 4EF41A12 only.

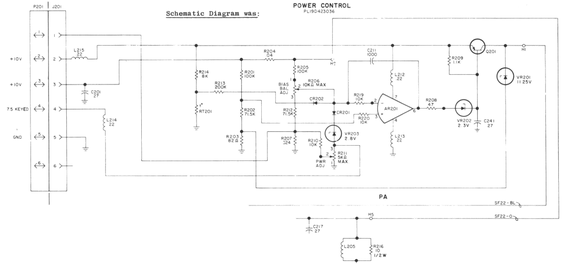
REV. C - Exciter Board 19D417887G1 & G2
To improve audio symmetry. Added L111, L112, C124 through C127.

REV. B - PA Board 19D423036G1-G5
To improve ability to set FR power output.
Deleted AR1, CR202, L212, L213, L214, R207, R208, R209, R210, R211, R212, R213, R214, R219, R220, VR202 and VR203.
Changed C211, R201, R202, R203, RT201 and VR201.
Added C242, Q205, Q206 and Q207.
Deleted R205 and changed R204 on 19D423036G1-G3.
Deleted R204 and changed R205 on 19D423036G4-G6.

Outline Diagram was:



Schematic Diagram was:



Alignment Procedure was:

*If rated power output is not necessary to communicate, the power output may be reduced by the CURRENT ADJ control resulting in increased battery life. Refer to Percent of Rated Power V. Percent of Rated Current Drain Curve.

3. Set BAL ADJ R206 fully counterclockwise. (KT-131-A/B only)
4. Set PWR ADJ R211 fully clockwise. (KT-131-A/B only)
5. Set capacitors 1, 2 & 3 on the power amplifier to approximately mid-range (KT-131-A/B only)
6. Connect the ammeter in series with the positive lead from the power supply and J703-6.
7. Set supply voltage at 13.6 Volts for transmitter KT-131-A or 13.6 Volts for transmitter KT-131-B.
8. Test Point meter reading made with the (+) meter lead to TP1 and TP2, and the (-) lead to system ground.
9. All adjustments made with the transmitter keyed.

12.	CURRENT ADJ	R211		Turn CURRENT ADJ R211 fully counterclockwise.
13.	BAL ADJ	R206	0.5 VDC	Carefully turn BAL ADJ R206 clockwise until the lowest positive voltage is read on the collector of Q201.
14.	CURRENT ADJ	R211	3-18 watts for KT-131-A, 5-25 watts for KT-131-B.	Set CURRENT ADJ R211 for the desired total current.*
15.	2 and 3	C223 & C229	Optimized Power Output	If necessary, repeat step 10.
16.	1	C210	decreased circuit	If the total current exceeds 5.5 amperes for KT-131-A or 5.9 amperes for KT-131-B, turn, only slightly, tuning control 1, in the direction which decreases the current, until the current decreases approximately 0.2 amperes.
17.	2	C225	decreased current	Repeat step 16 with tuning control 2.
18.				Increase the supply voltage to the highest voltage to be used with the transmitter. The total current increase should be less than 0.2 ampere. If the current increase is larger, repeat 12, 13, 14 and 15.

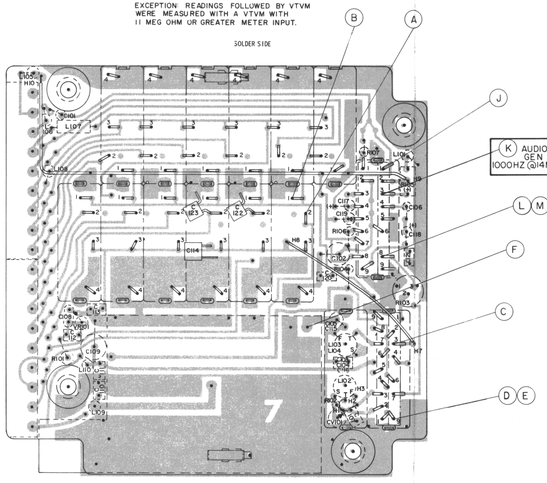
STEP 1- QUICK CHECKS

SYMPTOM	QUICKCHECK
No Power Output	1. Check the current drain. 2. If the current is approximately normal or higher, check the antenna relay, internal/external antenna switch, PA board coaxial cable output connector, or transmitter alignment. 3. If current is much lower than normal check, all of the above; check to see that transmitter is plugged properly to system (i.e. that all pins are in the proper holes). Check for proper voltages to exciter board and PA board.
Low Power Output	1. Low battery voltage (refer to Battery Checks in Maintenance Manual LBI-30083). 2. Check the transmitter alignment. 3. As heat sink temperature increases power out decreases. Check the heat sink for excessive heat. The thermal cutback feature will cut the transmitter off altogether if the heat sink temperature is greater than approximately 70°C.
Distorted or no audio with normal RF output	1. Check voltage readings at (J), (K), (L), and (M). 2. Improper setting of Mod Adjust R103. 3. Check Mod coil L103/L104. 4. Shorted C102 or C106. 5. Bad microphone.
No reading at TP1	Check voltage readings at (A), (B), (D), (E) and (F).

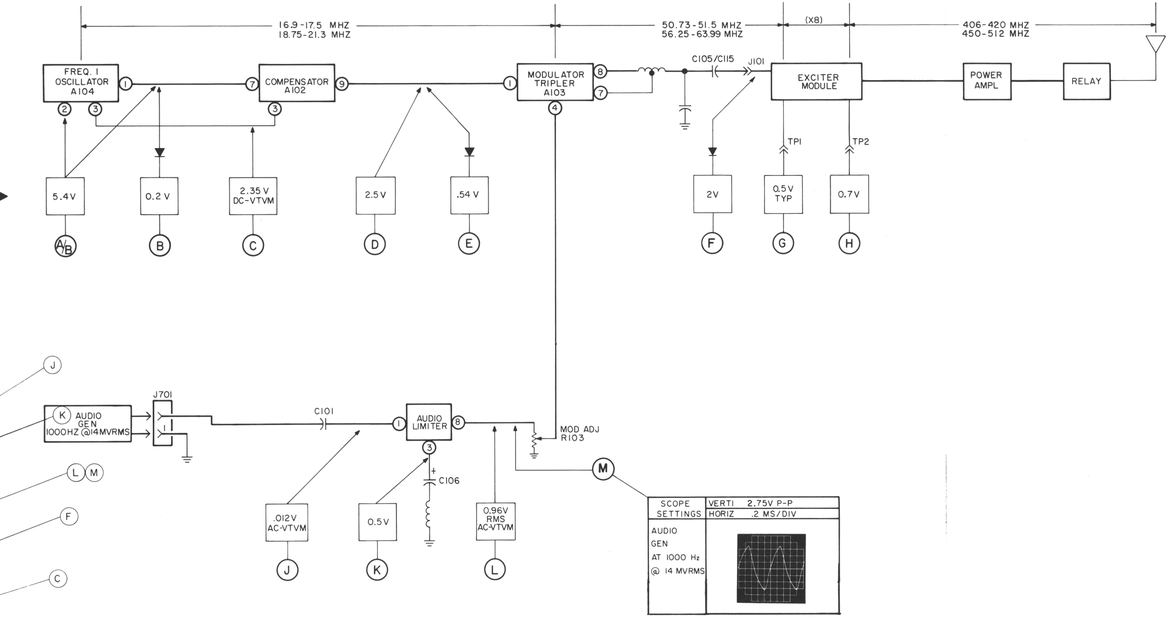
STEP 2 - TYPICAL VOLTAGE READINGS

DC READINGS MADE WITH GE TEST SET MODEL 4EX3A10 OR EQUIVALENT. READINGS SHOWN IN SERIES WITH A DIODE ARE RF READINGS TAKEN WITH RF PROBE 19C311370-G1 AND TEST SET MODEL 4EX3A10 ON 3 VOLT SCALE.

EXCEPTION READINGS FOLLOWED BY VTVM WERE MEASURED WITH A VTVM WITH 11 MEG OHM OR GREATER METER INPUT.



(RC-2944, Rev. 0)
(19D424006, Rev. 5)
(19D417689, Sh. 2, Rev. 7)



RC-2956

TROUBLESHOOTING PROCEDURE

406--512 MHz TRANSMITTER
TPYE KT-131 A/B