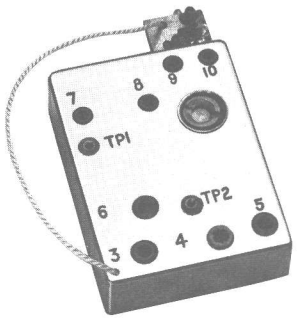
MOBILE RADIO

MASTR *Personal Series*
PROGRESS LINE

PE MODEL
406-470 MHz, 1 WATT TRANSMITTER TYPE KT-22-A



SPECIFICATIONS *

Type Number	KT-22-A
Power Output	1 Watt
Modulation Deviation	0 to ±5 kHz
Spurious	
Radiated	-43 dB
Conducted	-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 Factor	24
RF Load Impedance	50 ohms
Modulation Sensitivity	0.8 to 3 millivolts
Maximum Frequency Spacing	
406-420 MHz	0.4% of highest frequency with no degradation 0.8% of highest frequency with less than 1 dB degradation.
450-470 MHz	0.4% of highest frequency with no degradation 5.5 MHz with less than 1 dB degradation

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

GENERAL ELECTRIC

TABLE OF CONTENTS

ILLUSTRATIONS

WARNING

No one should be permitted to handle any portion of the equipment that is supplied with high voltage; or to connect any external apparatus to the units while the units are supplied with power. KEEP AWAY FROM LIVE CIRCUITS.

DESCRIPTION

Transmitter Type KT-22-A is a crystal controlled, phase modulated transmitter for one-through eight-frequency operation in the 406-470 MHz band. The transmitter utilizes both discrete components and Integrated Circuit Modules (IC-s).

The transmitter consists of the audio, voltage regulator, oscillator, compensator and modulator IC's, and plug-in Exciter/PA module all of the transmitter modules are mounted on System Board A704. Supply voltages for the transmitter are provided by the battery and Regulator. The different transmitter voltages are shown in the following chart:

Voltage	Used For:
Continuous 7.5 Volts	Regulator module
Keyed 7.5 Volts	Regulator 5.4-Volt keying, Exciter and PA modules.
Keyed 5.4 Volts	Compensator, Oscillator, Audio and Modulator modules, and 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 circuits in the IC modules. A block diagram of the transmitter is shown in Figure 1.

CIRCUIT ANALYSIS

REGULATOR A2

The Regulator module operates from the 7.5-Volt from the battery, and provides a continuous, regulated 5.4 Volts and a switched 5.4 Volts for operating the transmitter, receiver and tone options. A typical regulator circuit is shown in Figure 2.

Turning on the radio applies the battery voltage to Pin 2 of the Regulator, causing Q2 and then Q1 to conduct. When conducting, the continuous 5.4 Volts at the collector of Q1 is taken from Pin 4 and applied to the receiver Compensator and Oscillator module.

Regulation is provided by Q2 and Q3, which operates as a differential amplifier. If the output of Q1 starts to increase, Q3

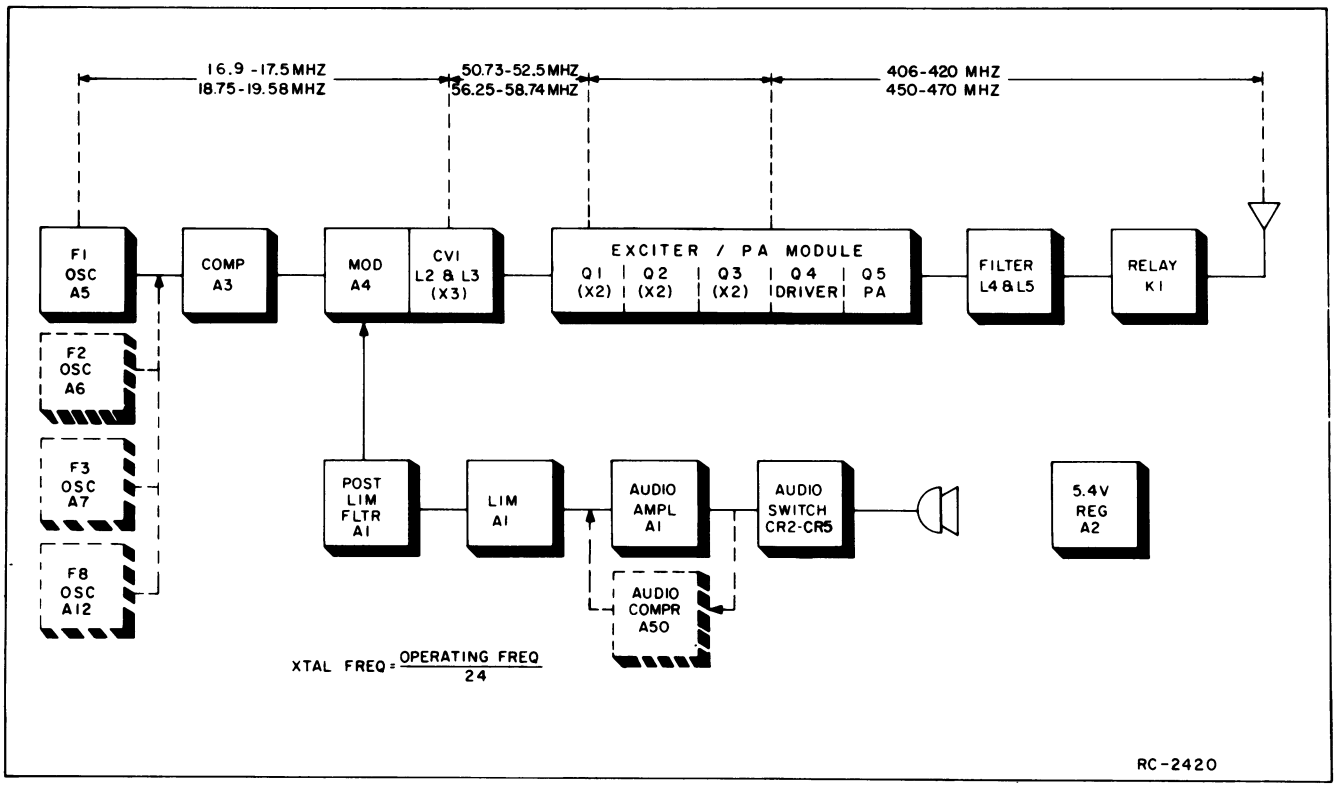


Figure 1 - Transmitter Block Diagram

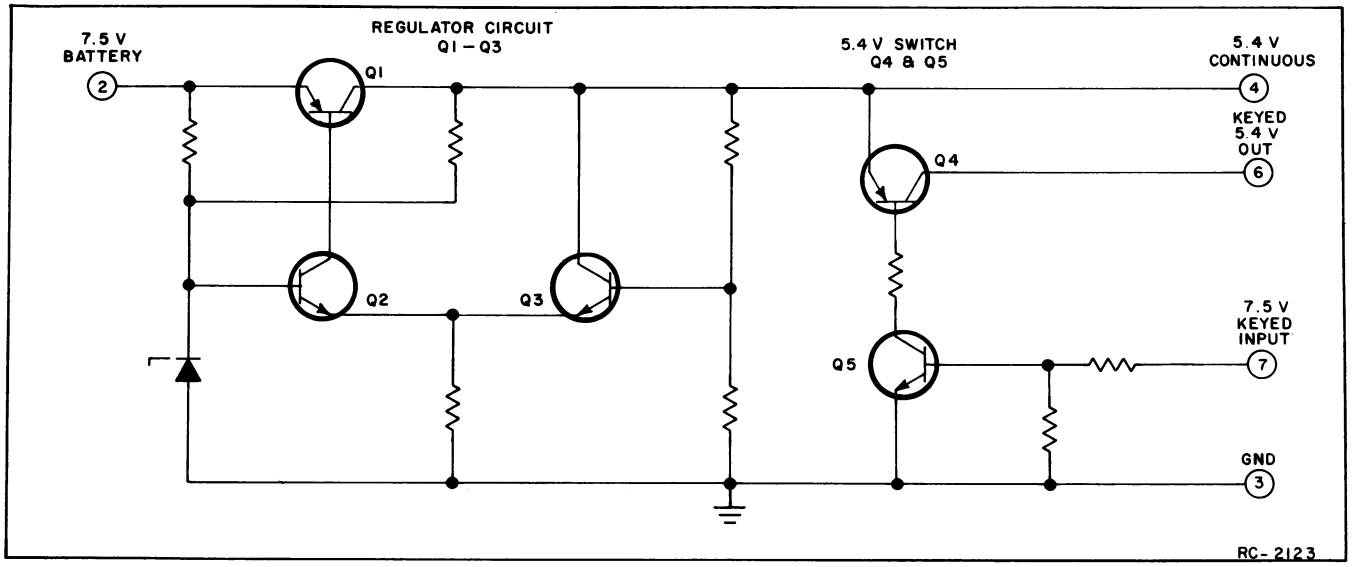


Figure 2 - Typical Regulator Circuit

conducts harder, causing Q2 to conduct less. This causes Q1 to conduct less, keeping its output at 5.4 Volts. If the output of Q1 starts to decrease, Q3 conducts less, causing Q2 to conduct harder. This causes Q1 to conduct harder, keeping the output constant.

Q4 and Q5 operate as a DC switch. Keying the transmitter applies the battery voltage to Pin 7 and to the base of Q5, turning it on. This turns on PNP transistor Q4, so that the regulated 5.4 Volts at Pin 6 is applied to the transmitter Compensator, Modulator, and audio module, and to the optional Compressor module and multi-frequency switch S1.

OSCILLATOR MODULE A5

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 19.6 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 A3.

A typical oscillator circuit is shown in Figure 3.

In single-frequency transmitters, a jumper from Hole 20 to Hole 21 on the System Board connects the keyed 5.4 Volt supply voltage to the oscillator module. Keying the transmitter applies the supply voltage to the oscillator, turning it on. The oscillator output is applied to Compensator A3.

In multi-frequency transmitters, additional Oscillator Modules are mounted on the board. The single-frequency supply jumper is removed, and the proper frequency is selected by connecting the keyed 5.4 Volts to the selected oscillator module through frequency selector switch S1 on the control unit.

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 A3

Compensator module A3 contains a buffer-amplifier, and the temperature compensating network for the oscillator. A typical Compensator circuit is shown in Figure 4.

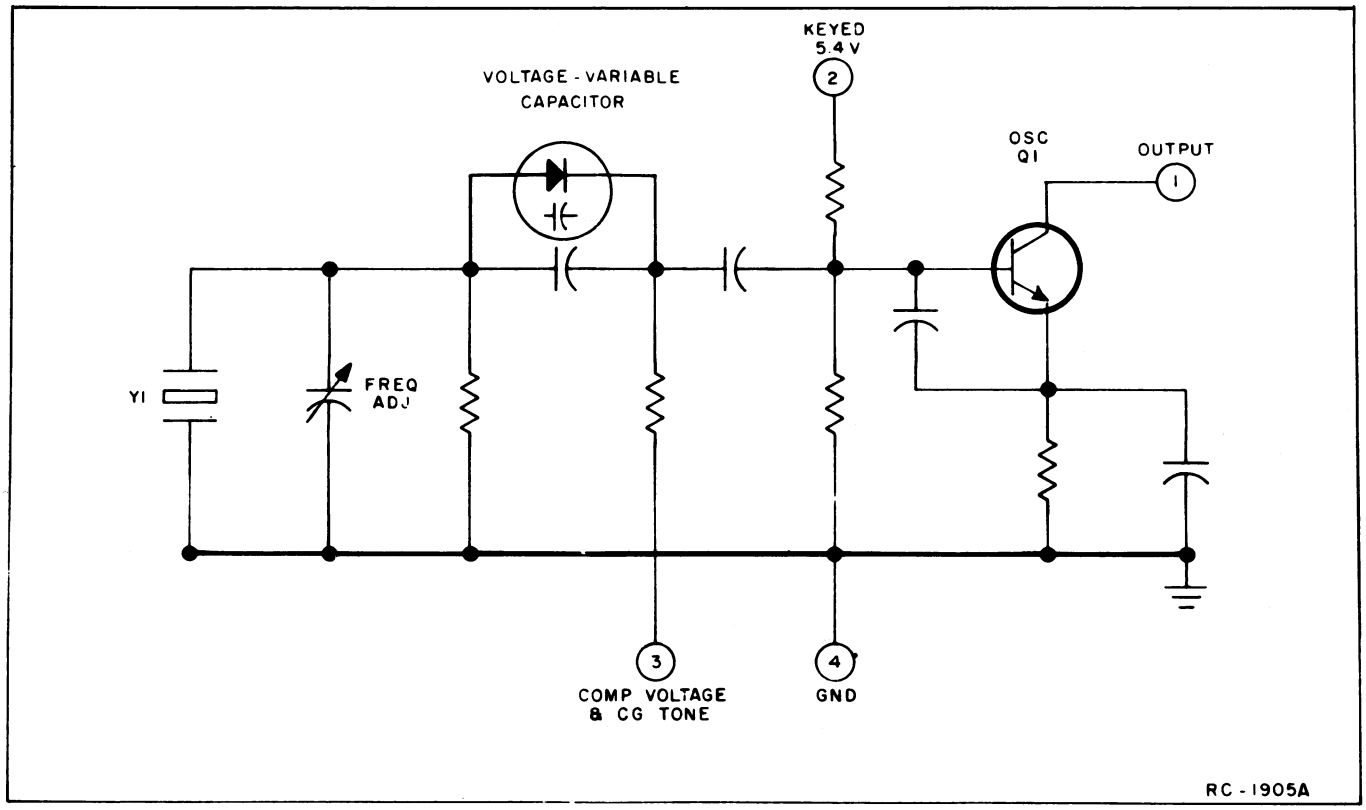


Figure 3 - Typical Oscillator Circuit

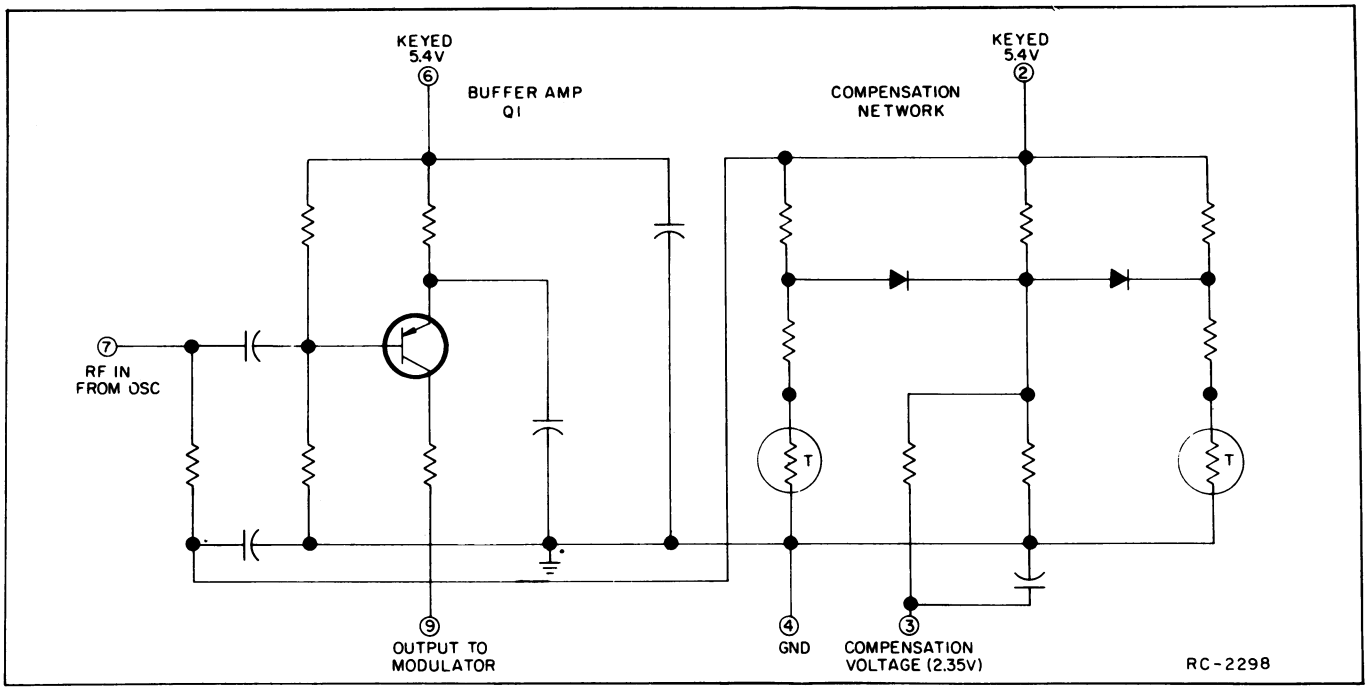


Figure 4 - Typical Compensator Circuit

RF from the oscillator at Pin 7 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 the modulator.

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 oscillator module. At temperatures below -10°C, the compensated voltage increases to maintain the proper voltage capacitor.

Service Note: An abnormally low VTVM reading (or no reading) at Pin 3 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 AND LIMITER A1

Audio from the microphone is coupled through the audio switching circuit to Pin 1 and then to the base of audio amplifier Q1 (see Figure 5). In Type 90 encoder applications, the encode tone is applied to the amplifier at Pin 2.

The amplifier output is applied directly to the transistorized 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 R8 to the Modulator module A4.

PHASE MODULATOR

The phase modulator circuit consists of Modulator A4, voltage-variable capacitor CV1 and tuneable coil L2. CV1 and L2 are mounted on System Board A704. A typical modulator circuit is shown in Figure 6.

With CV1 in series with L2, the network appears as a series-resonant circuit when RF from the oscillator is applied to Pin 1. Applying audio from Audio Limiter A1 to Pin 4 of Modulator A4 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 L3 (on the System Board) to the exciter module. L3 is tuned to three times the crystal frequency.

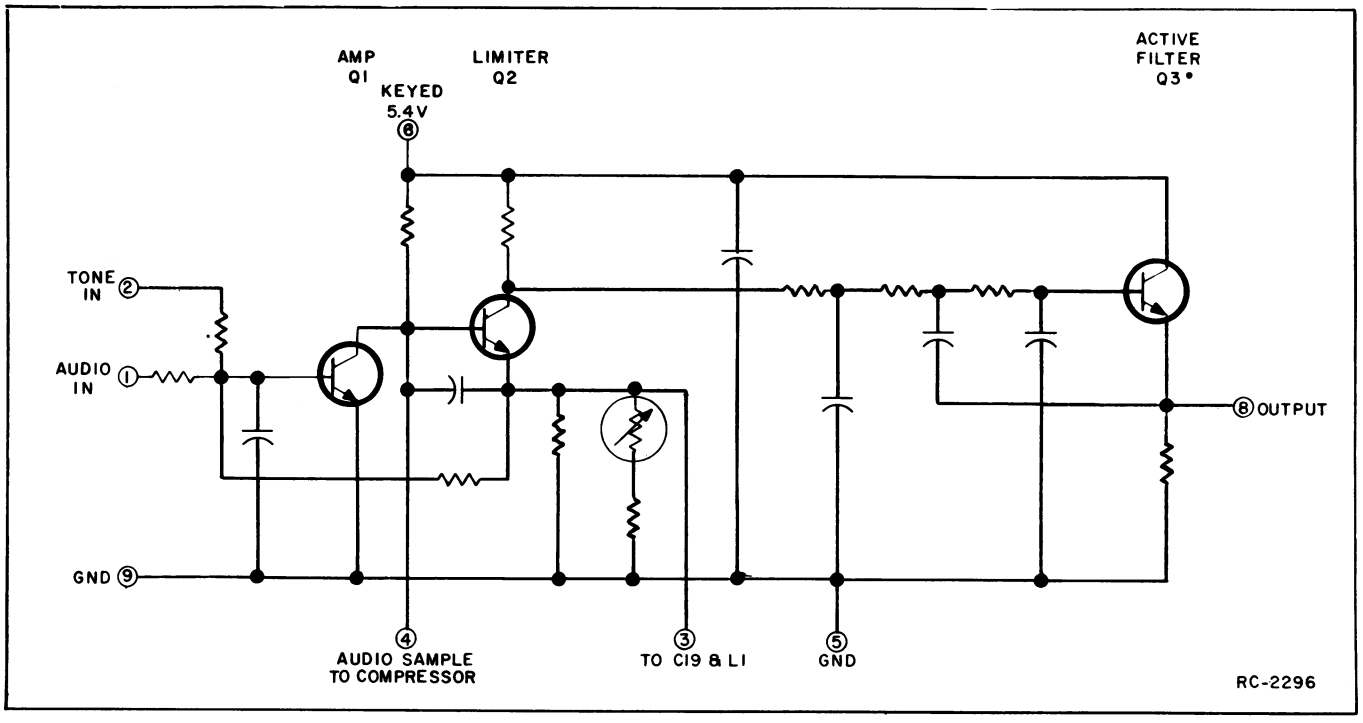


Figure 5 - Typical Audio Amplifier & Limiter Circuit

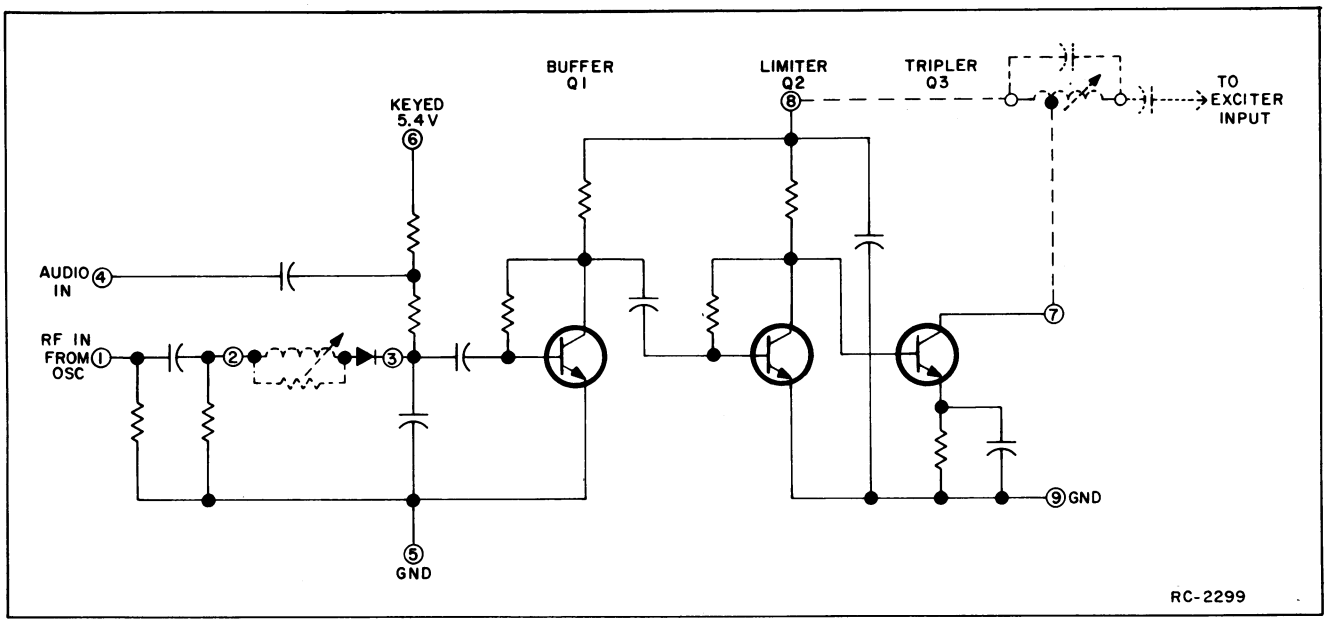


Figure 6 - Typical Phase Modulator Circuit

EXCITER/PA MODULE

Exciter /PA 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.

3rd doubler Q103, driver Q104 and PA transistor Q105 are tuned by measuring the total current drain of the radio. An ammeter with a one ampere full scale meter is used in series with the radio's 7.5-Volt supply. GE Test Regulator Model 4EX18A10 and Test Set Model 4EX3A11 may by used in place of the ammeter.

Driver & PA

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 low-pass filter through a series-tuned matching network (L115, L122/L113, C128, L114 and C129).

Low-Pass Filter

Low-pass filter L118, L119, C132, C133 and C134 provides for the suppression of harmonics. The filter output is applied to the antenna through system switching relay K1 mounted on the Systems Board.

An RF adaptor cable is available for connecting the transmitter RF output to a wattmeter. Connecting the RF adaptor cable to J702 opens a set of contacts on the antenna strip line assembly. This disconnects the antenna and connects the transmitter output to J702-3. Connection to chassis ground is made at J702-4.

MODULATION LEVEL ADJUSTMENT

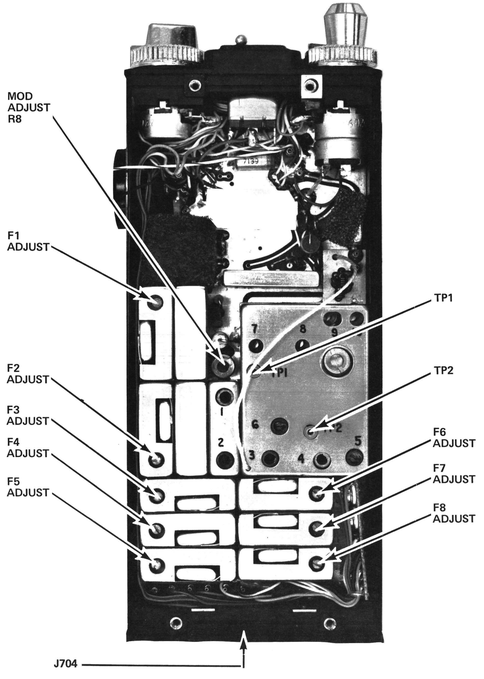
The MOD ADJUST (R8) was adjusted to the proper setting before shipment and should not normally require readjustment. This setting permits approximately 75% modulation for the average voice level. The audio peaks which would cause overmodulation are clipped by the modulation limiter. The limiter, in conjunction 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. Test Adaptor Model 4EX12A10

PROCEDURE

1. Connect the equipment as shown in the Test Procedure on the back of this page.
2. Apply a 140 millivolt signal at 1000 Hz to the Test Adaptor. If the Test Adaptor is not used, apply a 14 millivolt signal to Pin 4 (Mike Hi) and Pin 1 of Accessory 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 R8 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.



TRANSMITTER ALIGNMENT

EQUIPMENT REQUIRED:

- GE Test Set Model 4EX3A10 (or 4EX8K11) or equivalent 20,000 ohm-per-volt meter.
- GE Test Regulator Model 4EX18A10, or an ammeter capable of measuring one ampere.
- A 50-ohm, terminating wattmeter connected to external antenna jack J702 thru RF adaptor cable 19C317633G1 (Option 4466).
- 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. If using Test Set 4EX3A10 and Test Regulator 4EX18A10, connect the Test Set to the metering jack on the Test Regulator. Then connect the Regulator output to J704 on the radio, and set the Regulator for 6 Volts. Switch the Test Set range to the Test 1 position. Place the test selector switch on position "I" to check the supply voltage (read on the 1-volt scale as 10-volts full scale). Switch to position "G" for current drain readings (read on the 1-volt scale as 1 ampere full scale).
4. Test Point meter reading made with the (+) meter lead to TP1 and TP2, and the (-) lead to system ground.
5. All adjustments made with the transmitter keyed.

ADJUSTMENT PROCEDURE

STEP	TUNING CONTROL	TYPICAL METER READING	PROCEDURE
1.	1, 2, and 3	Maximum (at TP1)	Adjust Tuning Controls 1, 2 and 3 for maximum meter reading at TP1. If no reading is obtained, adjust Tuning Controls 1, 2 and 3 for maximum transmitter current, and then re-adjust 1, 2 and 3 for maximum meter reading at TP1.
2.	5	Maximum (at TP2)	Adjust Tuning Control 5 for maximum meter reading at TP2.
3.	6, 7 and 8	Maximum mA	Adjust Tuning Controls 6, 7 and 8 for maximum transmitter current.
4.	9 and 10	Maximum Power Output	Adjust Tuning Controls 9 and 10 for maximum power output.
5.	2 thru 10	Maximum Power Output	Re-adjust Tuning Controls 2 thru 10 until no further increase in power output is obtained.
6.			Apply 7.5 Volts and check for a power output of one watt (minimum).
7.			With no modulation, adjust the F1 (and F2 thru F8) crystal trimmer for proper oscillator frequency. 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.

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

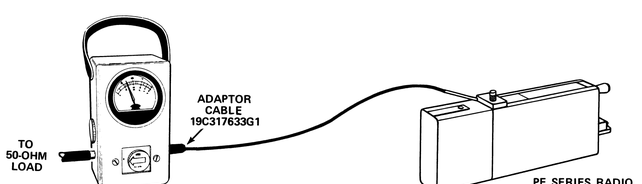
for test hookup shown:

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. GE Test Adaptor Model 4EX12A10.

STEP 1
POWER MEASUREMENT

TEST PROCEDURE

A. Connect transmitter output to wattmeter as shown below. GE adaptor cable 19C317633G1 is recommended for accurate power output readings.



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

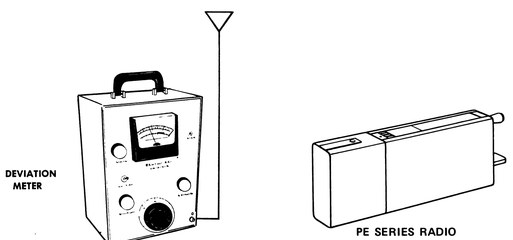
SERVICE CHECK

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. Set MOD ADJUST R8 fully counterclockwise.

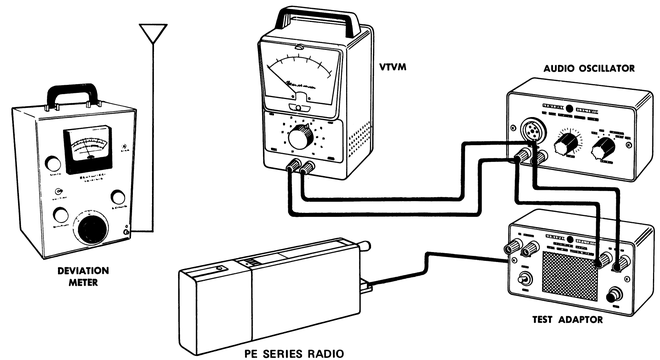
C. Key transmitter and check for approximately 0.75-kHz deviation. If reading is low or high, refer to the Channel Guard Troubleshooting Procedure (see Table of Contents)

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. Set the generator output to 140 millivolts RMS and frequency to 1 kHz. If the Test Adaptor is not used, set the generator output for 14 millivolts.

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

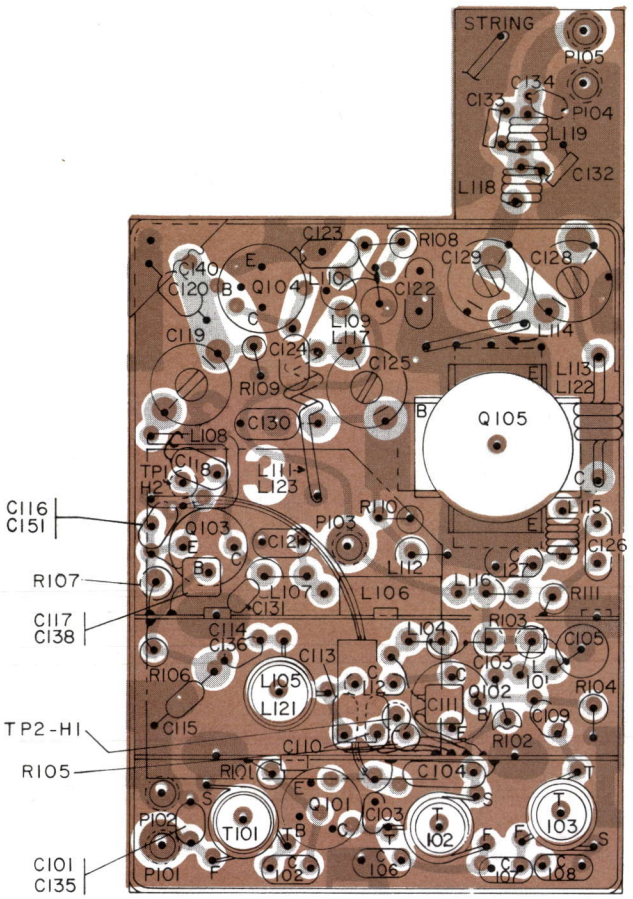
D. Deviation reading should be ±4.5 kHz. If the deviation is not 4.5 kHz, set the deviation as directed on the Transmitter Alignment Procedure (see Table of Contents).

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.

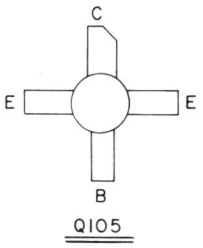
If the deviation reading plus (+) or minus (-) differs by more than 0.5 kHz:

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.

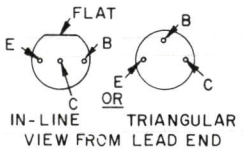


(19C320437, Rev. 2)
(19C320138, Sh. 1, Rev. 3)
(19C320138, Sh. 2, Rev. 3)



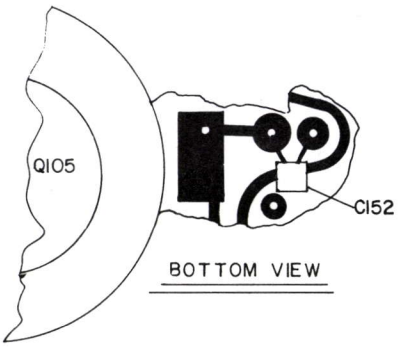
Q105

LEAD IDENTIFICATION
FOR Q101 THRU Q104

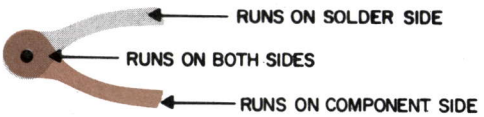


IN-LINE TRIANGULAR
VIEW FROM LEAD END

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

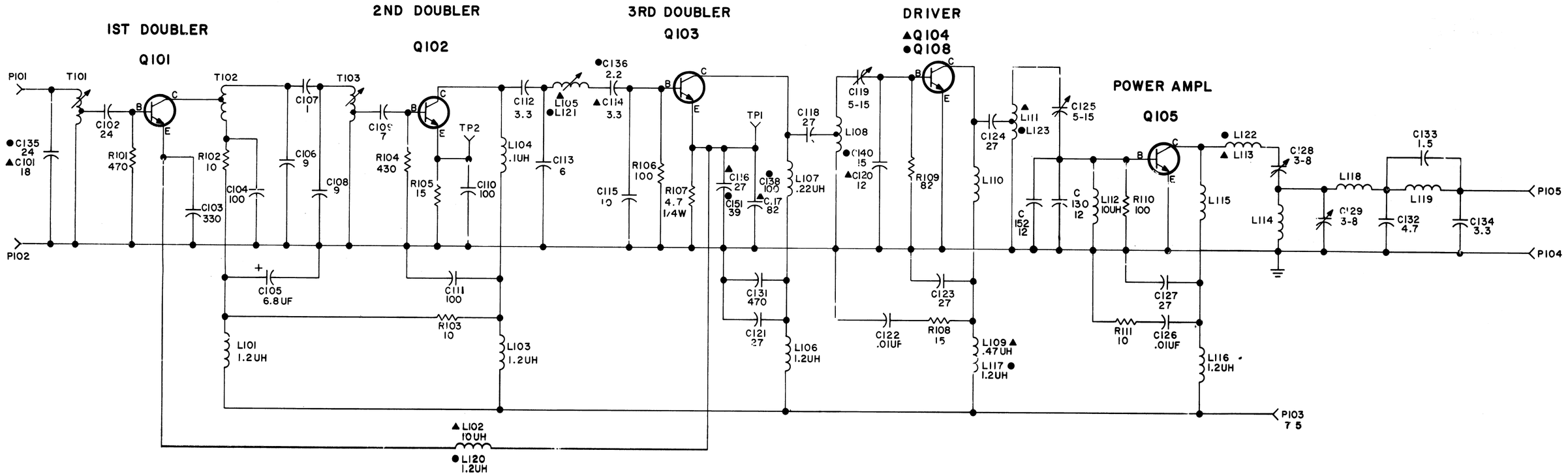


BOTTOM VIEW



OUTLINE DIAGRAM

406—470 MHz TRANSMITTER
EXCITER/PA ASSEMBLY



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 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.

SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER.

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

▲- HI SPLIT 4EF41A11 (450-470MHZ)

●- LO SPLIT 4EF41A10 (406-420 MHZ)

(19D416844, Rev. 9)

SCHEMATIC DIAGRAM

406—470 MHz TRANSMITTER EXCITER/PA ASSEMBLY

PARTS LIST

LBI-4382C

EXCITER/PA MODULE
4EF41A10 (406-420 MHz)
4EF41A11 (450-470 MHz)
19D416545G1, G2

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C101	19A116114P2038	Ceramic: 18 pf ±5%, 100 VDCW; temp coef -80 PPM.
C102	19A116114P2042	Ceramic: 24 pf ±5%, 100 VDCW; temp coef -80 PPM.
C103	19A116192P7	Ceramic: 330 pf ±20%, 50 VDCW; sim to Erie 8101-050-W5R.
C104	19A116114P8064	Ceramic: 100 pf ±10%, 100 VDCW; temp coef -1500 PPM.
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	19A116114P1	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	19A116114P8064	Ceramic: 100 pf ±10%, 100 VDCW; temp coef -1500 PPM.
C112	19A116114P12	Ceramic: 3.3 pf ±5%, 100 VDCW; temp coef 0 PPM.
C113	19A116114P20	Ceramic: 6 pf ±5%, 100 VDCW; temp coef 0 PPM.
C114	19A116114P12	Ceramic: 3.3 pf ±5%, 100 VDCW; temp coef 0 PPM.
C115	19A116114P2032	Ceramic: 10 pf ±5%, 100 VDCW; temp coef -80 PPM.
C116	19A116114P2044	Ceramic: 27 pf ±5%, 100 VDCW; temp coef -80 PPM.
C117	19A116114P2062	Ceramic: 82 pf ±5%, 100 VDCW; temp coef -80 PPM.
C118	19A116114P2044	Ceramic: 27 pf ±5%, 100 VDCW; temp coef -80 PPM.
C119*	19A116149P2	Variable: 4.5 to 15 pf, 63 VDCW, temp coef -750 PPM.
		Earlier than REV A:
	19A116710P4	Variable, ceramic: 5 to 15 pf, 50 VDCW; sim to Erie Style 511-000.
C120	19A116114P2033	Ceramic: 12 pf ±5%, 100 VDCW; temp coef -80 PPM.
C121	19A116114P2044	Ceramic: 27 pf ±5%, 100 VDCW; temp coef -80 PPM.
C122	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121-050-W5R.
C123 and C124	19A116114P2044	Ceramic: 27 pf ±5%, 100 VDCW; temp coef -80 PPM.
C125*	19A116149P2	Variable: 4.5 to 15 pf, 63 VDCW, temp coef -750 PPM.
		Earlier than REV A:
	19A116710P4	Variable, ceramic: 5 to 15 pf, 50 VDCW; sim to Erie Style 511-000.
C126	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121-050-W5R.
C127	19A116114P2044	Ceramic: 27 pf ±5%, 100 VDCW; temp coef -80 PPM.
C128* and C129*	19A116149P1	Variable: 3 to 8 pf, 63 VDCW, temp coef -750 PPM.
		Earlier than REV A:
	19A116710P3	Variable, ceramic: 3 to 9 pf, 50 VDCW; sim to Erie Style 511-000.
C130	19A116114P2033	Ceramic: 12 pf ±5%, 100 VDCW; temp coef -80 PPM.
C131	19A116192P2	Ceramic: 470 pf ±20%, 50 VDCW; sim to Erie 8111-050-W5R.
C132	19A116114P16	Ceramic: 4.7 pf ±5%, 100 VDCW; temp coef 0 PPM.
C133	19A116114P4	Ceramic: 1.5 pf ±5%, 100 VDCW; temp coef 0 PPM.
C134	19A116114P12	Ceramic: 3.3 pf ±5%, 100 VDCW; temp coef 0 PPM.
C135	19A116114P2042	Ceramic: 24 pf ±5%, 100 VDCW; temp coef -80 PPM.
C136	19A116114P8	Ceramic: 2.2 pf ±5%, 100 VDCW; temp coef 0 PPM.
C138	19A116114P8064	Ceramic: 100 pf ±10%, 100 VDCW; temp coef -1500 PPM.
C140	19A116114P2036	Ceramic: 15 pf ±5%, 100 VDCW; temp coef -80 PPM.
C151	19A116114P6050	Ceramic: 39 pf ±5%, 100 VDCW; temp coef -470 PPM.
C152*	19A116114P2033	Ceramic: 12 pf ±5%, 100 VDCW; temp coef -80 PPM. Added by REV B.
		- - - - - - - - - - INDUCTORS - - - - - - - - -
L101	19B209420P114	Coil, RF: 1.20 µh ±10%, 0.18 ohms DC res max; sim to Jeffers 4436-1.
L102	19B209420P125	Coil, RF: 10.0 µh ±10%, 3.10 ohms DC res max; sim to Jeffers 4446-4.
L103	19B209420P114	Coil, RF: 1.20 µh ±10%, 0.18 ohms DC res max; sim to Jeffers 4436-1.
L104	19B209420P101	Coil, RF: 0.10 µh ±10%, 0.08 ohms DC res max; sim to Jeffers 4416-1.
L105	19B219526G1	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 4416-5.
L108	19B219524P1	Coil.
L109	19B209420P109	Coil, RF: 0.47 µh ±10%, 0.34 ohms DC res max; sim to Jeffers 4426-2.
L110	19A129251P1	Coil.
L111	19B219525P1	Coil.
L112	19B209420P125	Coil, RF: 10.0 µh ±10%, 3.10 ohms DC res max; sim to Jeffers 4446-4.
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 4436-1.
L118 and L119	19A129247P1	Coil.
L120	19B209420P114	Coil, RF: 1.20 µh ±10%, 0.18 ohms DC res max; sim to Jeffers 4436-1.
L121	19B219526G2	Coil. Includes:
	19B209436P1	Tuning slug.
L122	19A129230G2	Coil.
L123	19B219566P1	Coil.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P101 thru P105	19A115834P4	Contact, electrical: sim to AMP 2-332070-9.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q101 thru Q103	19A116201P3	Silicon, NPN.
Q104*	19A116201P3	Silicon, NPN.
		In REV A and earlier:
	19A116201P2	Silicon, NPN.
Q105*	19A129165P2	Silicon, NPN.
		In REV A and earlier:
	19A129165P1	Silicon, NPN.
Q108	19A116201P3	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R101	3R151P471K	Composition: 470 ohms ±10%, 1/8 w.
R102 and R103	3R151P100K	Composition: 10 ohms ±10%, 1/8 w.
R104	3R151P431J	Composition: 430 ohms ±5%, 1/8 w.
R105	3R151P150K	Composition: 15 ohms ±10%, 1/8 w.
R106	3R151P101K	Composition: 100 ohms ±10%, 1/8 w.
R107	19A116670P16	Composition: 4.7 ohms ±5%, 1/4 w.
R108	3R151P150K	Composition: 15 ohms ±10%, 1/8 w.
R109	3R151P820K	Composition: 82 ohms ±10%, 1/8 w.
R110	3R151P101K	Composition: 100 ohms ±10%, 1/8 w.
R111	3R151P100K	Composition: 10 ohms ±10%, 1/8 w.
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T101	19B219527G2	Coil.
T102	19B219523G2	Coil.
T103	19B219523G1	Coil.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	4035306P11	Washer: 1/8 dia. (Used with Q101-Q104).

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 - Exciter/PA 4EF41A10 & 11
To incorporate a new trimmer capacitor.
Changed C119, C125, C128 and C129.

REV. B - To improve margin of power output.
Changed Q104 and Q105. Added C152.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

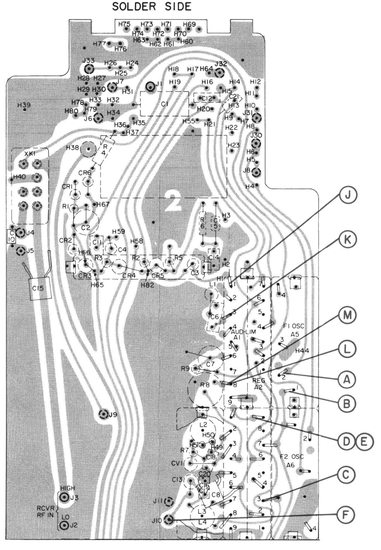
STEP 1 - QUICK CHECKS

SYMPTOM	QUICKCHECK
No power output	1. Check the current drain. 2. If the current is more than 500 milliamps, check the stripline switch, antenna relay, low-pass filter and for a shorted C10. 3. If the current drain is less than 500 milliamperes, detune the transmitter tuning controls from 10 to 1 in that order to determine which tuning control doesn't cause a decrease in current. Then check the associated stage following that control.
Low Power output	1. Low battery voltage (refer to Battery Checks in operation section of the manual). 2. Check the transmitter alignment.
Distorted or no audio with normal RF output.	1. Check voltage readings at (J), (K), (L) and (M). 2. Improper setting of Mod Adjust R8. 3. Check Mod coil L2. 4. Shorted C3 or C6 on Audio Board. 5. Bad microphone.
No reading at TP1	Check voltage readings at (A), (B), (D), (E) and (F).

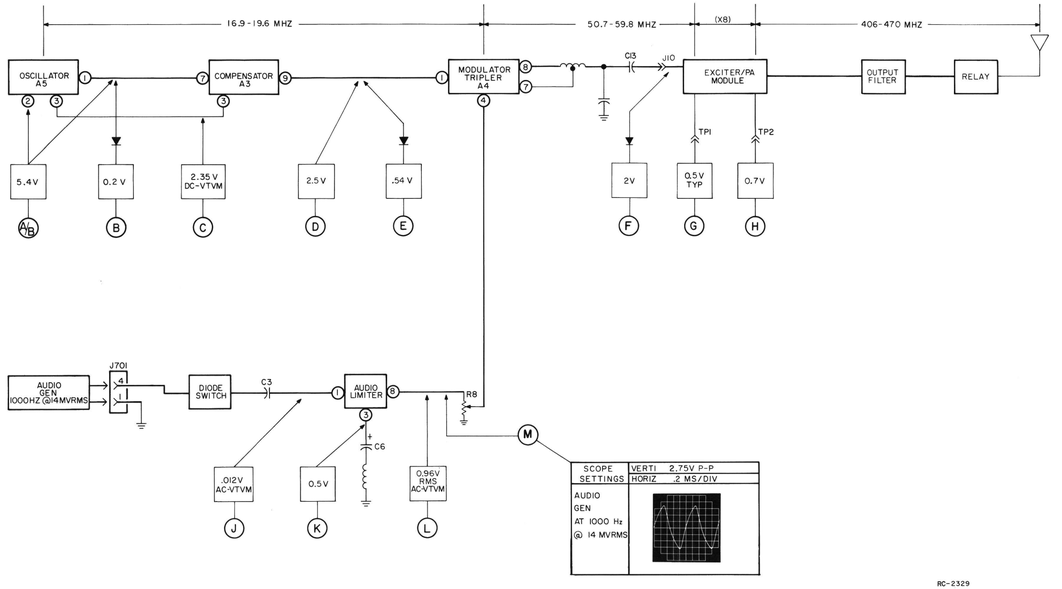
STEP 2 - TYPICAL VOLTAGE READINGS

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-2331)
(19D417209, Rev. 0)
(19D416614, Sh. 2, Rev. 0)



RC-2329

TROUBLESHOOTING PROCEDURE

406—470 MHz TRANSMITTER
TYPE KT-22-A

ORDERING SERVICE PARTS

Each component appearing on the schematic diagram is identified by a symbol number, to simplify locating it in the parts list. Each component is listed by symbol number, followed by its description and GE Part Number.

Service parts may be obtained from Authorized GE Communication Equipment Service Stations or through any GE Radio Communication Equipment Sales Office. When ordering a part, be sure to give:

1. GE Part Number for component
2. Description of part
3. Model number of equipment
4. Revision letter stamped on unit.

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance.

Should further information be desired, or should particular problems arise which are not covered sufficiently for the purchaser's purposes, contact the nearest Radio Communication Equipment Sales Office of the General Electric Company.

MAINTENANCE MANUAL

LBI-4657

DF-3156

MOBILE RADIO DEPARTMENT
GENERAL ELECTRIC COMPANY • LYNCHBURG, VIRGINIA 24502

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