DESCRIPTION AND MAINTENANCE

138—174 MHz, 110-WATT MASTR® II TRANSMITTER

(WITH MODULAR POWER AMPLIFIER)

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ILLUSTRATIONS

DESCRIPTION

MASTR® II transmitters are crystal-controlled, phase modulated transmitters designed for one through eight-frequency operation in the 138 to 174 megahertz band. frequency band. The solid state transmitter utilizes both integrated circuits (ICs) and discrete components, and consists of the following assemblies:

- Exciter Board; with audio, modulator, amplifier and multiplier stages.
- Power Amplifier Assembly; with amplifiers, driver, PA, power control, low pass filter, and antenna switch.

Figure 1 is a block diagram of the 138-174 MHz MASTR II transmitter, showing the Exciter board and Power Amplifier Assembly.

The exciter uses nine transistors and one integrated circuit to drive the PA assembly. The exciter can be equipped with up to eight Integrated Circuit Oscillator Modules (ICOMs). The ICOM crystal frequency ranges from approximately 11.5 to 14.5 megahertz, and the crystal frequency is multiplied 12 times.

The PA assembly uses five RF power transistors to provide 110 Watts output power. The output power is adjustable over a range of 22 to 110 watts. A directional coupler, transistor and power control IC are used in the power control circuit.

MAINTENANCE

The PA assembly is insulated from vehicle ground to permit operation in positive or negative ground vehicles.

NOTE

In positive ground vehicles, A- is "hot" with respect to vehicle ground. Shorting the transmitter PA printed wiring board ground pattern to the radio case may cause one of the inline fuses to blow.

MOBILE DISASSEMBLY

To service the transmitter from the top:

1. Pull the locking handle down, then pry up the top cover at the front notch and lift off the cover.

To service the transmitter from the bottom:

1. Pull the locking handle down and pull the radio out of the mounting frame.

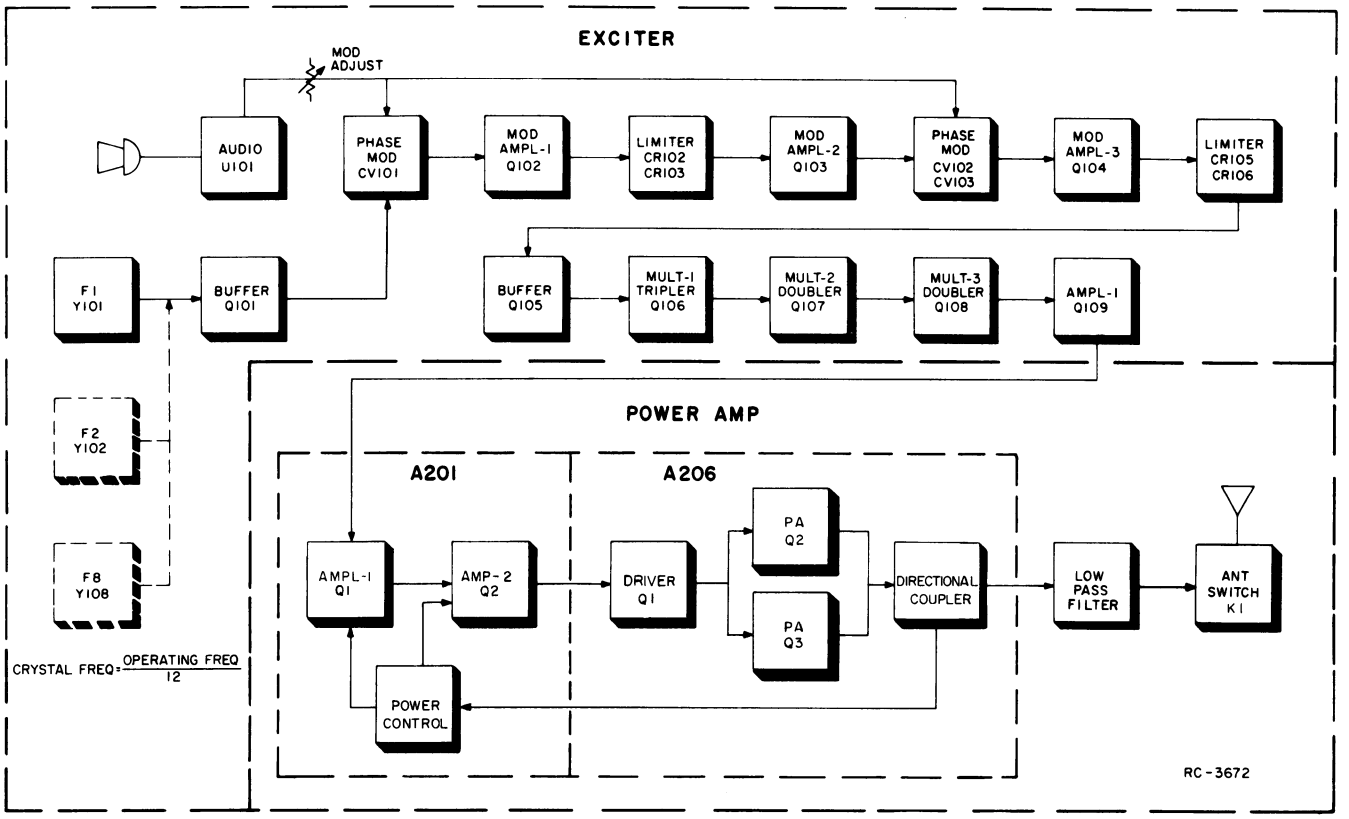

Figure 1 - Transmitter Block Diagram

2. Remove the top cover, then loosen the two bottom cover retaining screws and remove the bottom cover (See Figure 2).

3. To gain access to the bottom of the exciter board, remove the six screws (A) holding the exciter board and its bottom cover to the module mounting frame, and remove the bottom cover (See Figure 3).

STATION DISASSEMBLY

For a more complete mechanical parts breakdown refer to the station manual. To service the transmitter exciter from the front:

1. Turn the two latching knobs (A) counterclockwise to unlatch the Radio Panel Front Door. Refer to Figure 4.

2. Swing the Radio Panel Front Door down as shown.

3. Remove covers.

To service the transmitter Power Amplifier from the rear:

1. Remove the top two screws (B) on the Intermittent or Continuous Duty Power Amplifier. Refer to Figure 5.

2. Swing the Power Amplifier down as shown. Remove the top cover of the Power Amplifier.

NOTE

If the heat sink blower option is present, this blower must be removed before the Power Amplifier can be lowered.

EXCITER DISASSEMBLY

To remove the exciter board from the radio:

1. Unplug the exciter/PA cable (B). (Figure 2).

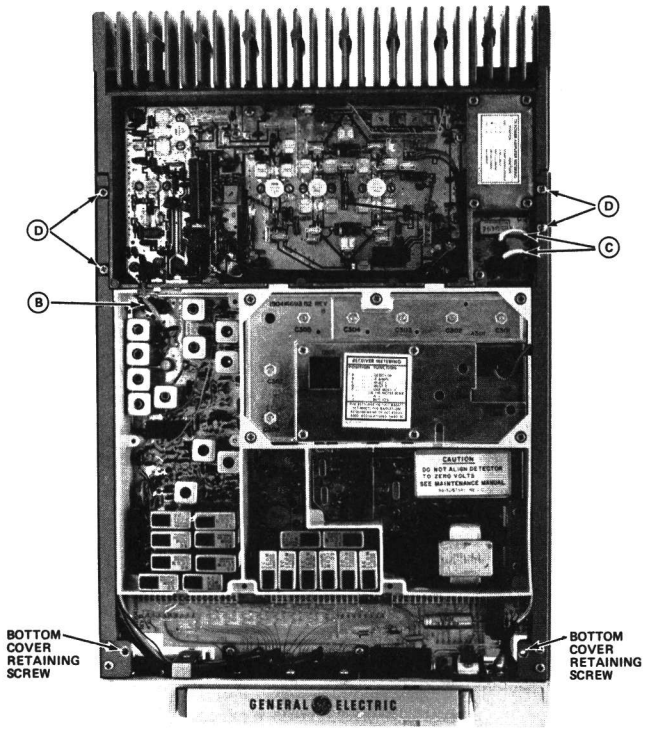

Figure 2 - Disassembly Procedure
Top View

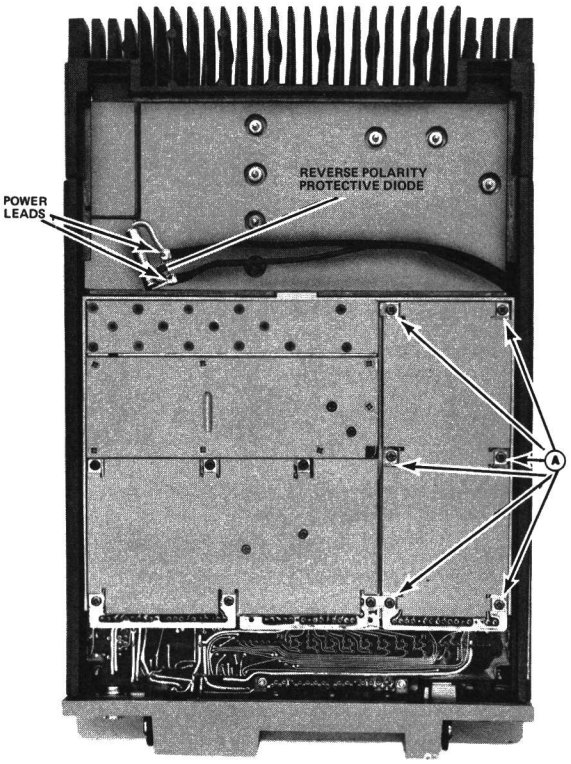

Figure 3 - Disassembly Procedure
Bottom View

2. Remove the six screws (A) holding the exciter board and its bottom cover to the module mounting frame. (Figure 3)

3. Press straight down on the plug-in exciter from the top to avoid bending the pins when unplugging the board from the system board jack.

PA DISASSEMBLY

PA Assembly

To remove the PA assembly: (See Figure 2).

1. Remove the PA top cover and unplug the exciter/PA cable (B), the antenna, receiver and PTT cables (C).

2. Remove the four side-rail screws (D), and unsolder the power cables from the bottom of the PA assembly if desired.

PA Driver Module (A201)

To remove PA Driver module: (See PA assembly Outline Diagram).

1. Remove the PA top cover and unplug the Exciter/PA cable.

2. Unsolder power feed cables W207/W220 from A201-E1 and W206/W221 from A201-G1.

CAUTION

Extreme care must be taken to prevent damage to the printed circuit runs of the PA module when removing W30.

3. Carefully unsolder and remove straps and cables W30, W203, W211 and leads of W210 between the PA Driver module and the PA module. Remove the excess solder from the ground connections with a de-soldering tool such as a SOLDAPULLT®; then lift the connections from the PA Driver module with a scribe or X-acto® knife.

4. Unsolder thermistor (RT201) leads.

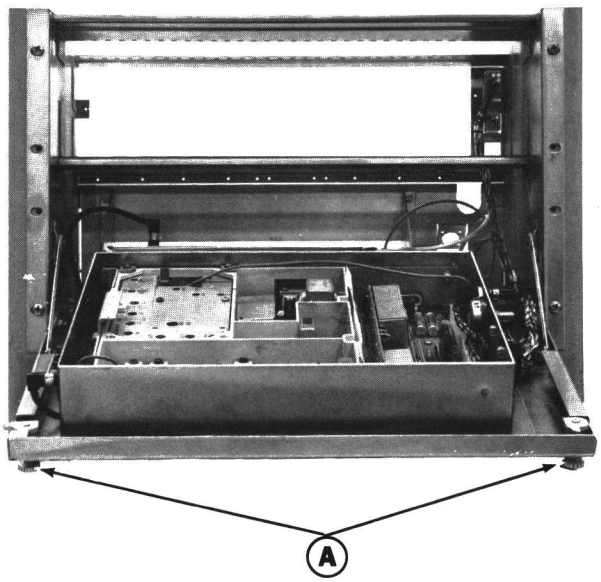

Figure 4 - Access to Exciter
Front View

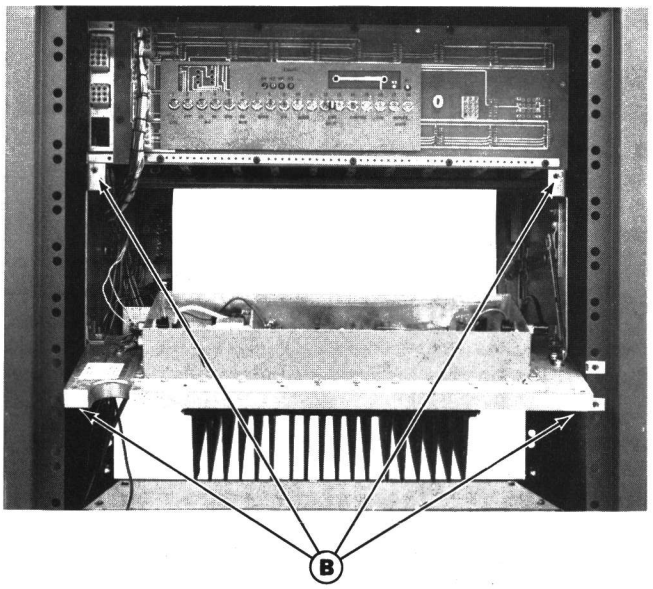

Figure 5 - Access to Power Amplifier
Rear View

5. Remove Q215 retaining screw, nut and washer from heat sink assembly.

6. Remove A201-Q1 and A201-Q2 transistor mounting screws (2 each), and nuts and washers on bottom of the PA assembly.

7. Remove the four PA Driver board mounting screws (including the one securing W204) and lift the board out.

PA Module (A206)

To remove PA module: (See PA assembly Outline Diagram).

1. Remove the PA top cover.

2. Unsolder power feed cables W207/W220 from A201-E1 and W206/W221 from A201-G1.

CAUTION

Extreme care must be taken to prevent damage to the printed circuit runs on the PA module and the Low Pass Filter module when unsoldering W30 and W31.

3. Carefully unsolder and remove strap W30 between the PA Driver module and the PA module. Remove the excess solder from the ground connections with a desoldering tool such as a SOLDA-PULLT®; then lift the connections from the PA Driver module with a scribe or X-acto® knife.

4. Carefully unsolder and remove strap W31 between the PA module and the Low Pass Filter module.

5. Unsolder leads of W210 from L18, L19 and L20 on PA Module A206.

6. Remove A206-Q1 through Q3 transistor mounting screws (2 each), and nuts and washers on bottom of the PA assembly.

7. Remove the four PA board mounting screws, and lift the board out.

To remove Low Pass Filter/Antenna Switch module:

1. Remove the PA top cover.

2. Remove antenna and receiver plugs, and disconnect PTT cables.

3. Carefully unsolder and remove strap W31 between the PA module and the Low Pass Filter module.

4. Remove the five mounting screws, lift off the filter casting, and lift the board out.

PA TRANSISTOR REPLACEMENT

WARNING

The RF Power Transistors used in the transmitter contain Beryllium Oxide, a TOXIC substance. If the ceramic or other encapsulation is opened, crushed, broken or abraded, the dust may be hazardous if inhaled. Use care in replacing transistors of this type.

To remove RF PA transistors:

1. With a 50-Watt soldering iron and a de-soldering tool such as the SOLDA-PULLT®, remove the excess solder from the leads. Use a scribe or X-acto® knife to hold the leads away from the printed circuit board until the solder cools.

2. Turn the PA Assembly over.

3. Hold the nuts on the bottom of the heat sink with a 3/16-inch nutdriver and remove the two retaining screws. Lift out the transistor and remove the old solder from the printed circuit board with a de-soldering tool such as a SOLDA-PULLT®.

   Special care should be taken to prevent damage to the printed circuit board runs because part of the matching network is included in the base and collector runs.

To replace RF PA transistors:

1. Trim the new transistor leads (if required) to the lead length of the removed transistor. The collector lead is identified by the smaller center lead (See Figure 6). The letter "C" on top of each transistor also identifies the collector.

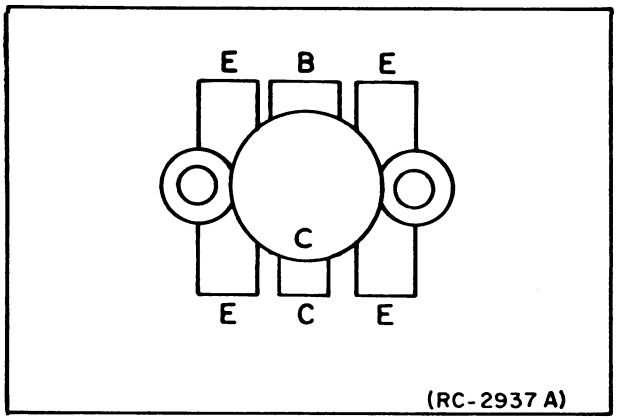

Figure 6 - Lead Identification

2. Apply a coat of silicone grease to the transistor surface and heat sink.

   Assemble all hardware loose and align the leads as shown on the Outline Diagram. Then hold the body of the transistor and replace the two retaining screws using moderate torque, 6 inch-pounds. A torque wrench must be used for this adjustment since transistor damage can result if too little or too much torque is used.

3. Solder the leads to the printed circuit pattern. Start at the inner edge of mounting hole and solder the remaining length of transistor lead to the board. Do not use excessive heat which causes the printed wire runs to lift up from the board. Check for shorts and solder bridges with an ohmmeter before applying power.

CAUTION

Failure to solder the transistor leads as directed may result in the generation of RF loops that could damage the transistor or may cause low power output.

DIRECTIONAL COUPLER ADJUSTMENT

The directional coupler adjustment (A206-R6, Forward Power and A206-R7, Reflected Power) controls are preset at the factory and normally do not require readjustment. Should it become necessary to replace A206-CR1, CR2 or the PA transistors, it may be desirable to reset A206-R6 and A206-R7. The following procedure applies.

1. Connect a 50 ohm directional wattmeter capable of measuring 150 Watts to the antenna jack. Terminate the wattmeter in a 50 ohm lead capable of dissipating 150 watts.

CAUTION

ADJUSTING DIRECTIONAL COUPLER POTENTIOMETERS A206-R6 and R7 may destroy them and require their replacement.

2. Turn power adjust potentiometer A201-R8 and forward power sensor potentiometer A206-R6 fully clockwise. Set reflected power sensor potentiometer A206-R7 fully counterclockwise.

3. Key transmitter on each channel and determine which channel produces the highest output.

4. With the channel producing the highest output selected, adjust forward power sensor A206-R6 to 10% above rated output power.

5. Set power adjust potentiometer for rated output power and unkey transmitter.

6. Terminate the wattmeter with two 50 ohm loads (or wattmeters) connected in parallel. Each load must be capable of dissipating 75 watts each.

7. Set reflected power sensor potentiometer A206-R7 fully clockwise.

8. Key transmitter on each channel and determine which channel produces the lowest output.

9. If PA provides 80% or more of rated power as indicated on the directional wattmeter on all channels, no further adjustment is required. If less than 80% of rated power is present on any channel, set the frequency selector to the channel with lowest output and adjust A206-R7 to provide 80% of rated output power.

10. Re-cement forward and reflected power potentiometers A206-R6 and R7 using RTV.

ANTENNA MATCHING UNIT ADJUSTMENT

The Antenna Matching Unit is used only in continuous duty duplex stations to optimize impedance matching between the power amplifier and the load. It consists of a Pi network (C2-C5 and L1) and a reverse directional coupler. RF from the low pass filter is applied to the Pi network through the reverse directional coupler and then to the duplexer load. The reverse directional coupler permits monitoring the reflected power.

1. Connect DC Voltmeter across TP1 and ground.

2. Tune C2 and C4 for minimum voltage as indicated on DC Voltmeter.

3. Spread or compress the coils of L1 to further reduce the DC voltage reading.

4. Repeat steps 2 and 3 as necessary to obtain an absolute minimum voltage reading.

NOTE

The residual voltage reading after tuning may vary from one transmitter to the next depending on output power level, operating frequency and the load

TROUBLESHOOTING

A Troubleshooting Procedure, including QUICK CHECKS, permits rapid fault location in the exciter and power amplifier.

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GENERAL ELECTRIC*
U.S.A.

CAUTION

Before bench testing the radio, be sure of the output voltage characteristics of your bench power supply.

To protect the transmitter power output transistors from possible instant destruction, the following input voltages must not be exceeded:

Transmitter unkeyed: 20 Volts
Transmitter keyed (50 ohm resistive load): 18 Volts
Transmitter keyed (no load or non-resistive load): 16 Volts

These voltages are specified at the normal vehicle battery terminals of the radio and take the voltage drop of standard cables into account. The voltage limits shown for a non-optimum load is for "worst case" conditions. For antenna mismatches likely to be encountered in practice, the actual limit will approach the 18 Volt figure.

Routine transmitter tests should be performed at EIA Standard Test Voltages (13.6 VDC for loads of 16 to 36 amperes). Input voltages must not exceed the limits shown, even for transient peaks of short duration.

Many commonly used bench power supplies cannot meet these requirements for load regulation and transient voltage suppression. Bench supplies which employ "brute force" regulation and filtering (such as Lapp Model 73) may be unable when operated in parallel with a 12-Volt automotive storage battery.

TEST EQUIPMENT

1. An audio oscillator (GE Model 4EX6A10)
2. A deviation monitor
3. A Multimeter and AC voltmeter
4. GE Test Set Models 4EX3A11 or 4EX8K12
5. Wattmeter, 50 ohm
6. Frequency Counter
7. Oscilloscope

MODULATION LEVEL ADJUSTMENT

MOD ADJUST Control R106 has been properly adjusted before shipment and should not normally require readjustment. This setting permits approximately 75% modulation for the average voice level.

NOTE

The Channel Guard Deviation Adjustment should be repeated each time the Tone Frequency is changed.

MOBILE SET UP

1. Connect the audio oscillator and the AC meter across audio input terminals J10 (Green-Hi) and J11 (Black-Lo) on GE Test Set, and connect red Test Set plug to the red System metering plug. Connect black plug to Exciter metering jack. If not using GE Test Set, connect audio oscillator and meter across P902-6 (Mike High) through a 0.5 microfarad (or larger) DC blocking capacitor, and P902-5 (Mike-Low) on the System Board.
2. Adjust the audio oscillator for 1-Volt RMS at 1000 Hz.

STATION SET UP

1. Connect the audio oscillator and the meter across audio input terminals J10 (Green-Hi) and J11 (Black-Lo) on GE Test Set, and connect red Test Set plug to the red System metering plug. Connect black plug to Exciter Metering jack. Set the Pre-amp levels as outlined in the Combination Manual.
2. Set the audio generator frequency to 1 kHz.
   A. In all station combinations except Local Control Intermittent Duty combinations, set the audio generator output to 30 millivolts RMS.
   B. In Local Control Intermittent Duty station combinations, set the audio generator output to 1.0 volts RMS.

DEVIATION ADJUSTMENT (MOBILE AND STATION)

For transmitters without Channel Guard, set MOD ADJUST R105 for a 4.5 kHz swing using the deviation polarity that provides the highest reading as indicated on the frequency modulation monitor.

NOTE

If the deviation reading plus (+) or minus (-) differs more than 0.5 kHz, recheck Step 1 as shown in the Transmitter Alignment Chart.

For transmitters with Channel Guard, set CHANNEL Guard MOD ADJUST R105 for zero tone deviation. Next with the 1-Volt signal at 1000 Hz applied, set MOD ADJUST R105 for 3.75 kHz deviation. Then remove the signal from the audio oscillator and set Channel Guard MOD ADJUST R105 for 0.75 kHz tone deviation.

For multi-frequency transmitters, set the deviation as described in Steps 3 or 4 on the channel producing the largest amount of deviation.

PA POWER INPUT

For FCC purposes, the PA power input can be determined by measuring the PA supply voltage and PA current, and using the following formula:

$$P_I = \text{PA voltage} \times \text{PA current}$$

where:

P_I is the power input in Watts,

PA voltage is measured with Test Set Model 4EX3A11 in Position G on the 15-Volt range (read as 15 Volts full scale), and with the polarity switch in the (-) position. With Test Set Model 4EX8K12, use the B+ position and the 1-Volt range (read as 15 Volts full scale), with the HIGH SENSITIVITY button pressed and the polarity switch in the (-) position.

PA current is measured with the Test Set in Position G in the Test 1 position, and with the HIGH SENSITIVITY button pressed (30 amperes full scale).

Example:

P_I = 12.5 Volts x 20.0 amperes = 250 Watts

ICOM FREQUENCY ADJUSTMENT

First, check the frequency to determine if any adjustment is required. The frequency should be set with a frequency meter or counter with an absolute accuracy that is 5 to 10 times better than the tolerance to be maintained, and with the entire radio as near as possible to an ambient temperature of 26.5° C (79.8° F).

MASTR II ICOMs should be reset only when the frequency shows deviation in excess of the following limits:

A. ±0.5 PPM, when the radio is at 26.5° C (79.8° F).

B. ±2 PPM at any other temperature within the range of -5° C to +55° C (23° F to +131° F).

C. The specification limit (±2 PPM or ±5 PPM) at any temperature within the ranges of -40° C to +5° C (-40° F to +23° F) or +55° C to +70° C (+131° F to +158° F).

If an adjustment is required, use one of the following procedures:

If the radio is at an ambient temperature of 26.5° C (79.8° F), set the oscillator for the correct operating frequency.

If the radio is not at an ambient temperature of 26.5° C, setting errors can be minimized as follows:

A. To hold the setting error to ±0.6 PPM (which is considered reasonable for 5 PPM ICOMS):
   1. Maintain the radio at 26.5° C (±5° C) and set the oscillator to desired frequency, or-
   2. Maintain the radio at 26.5° C (±10° C) and offset the oscillator, as a function of actual temperature, by the amount shown in Figure 7.

B. To hold setting error to ±0.35 PPM (which is considered reasonable for 2 PPM ICOMS): maintain unit at 26.5° C (±5° C) and offset the oscillator as a function of actual temperature, by the amount shown in Figure 7.

For example: Assume the ambient temperature of the radio is 18.5° C (65.4° F). At that temperature, the curve shows a correction factor of 0.3 PPM. (At 138 MHz, 1 PPM is 138 Hz. At 174 MHz, 1 PPM is 174 Hz).

With an operating frequency of 150 MHz, set the oscillator for a reading of 45 Hz (0.3 x 150 Hz) higher than the licensed operating frequency. If a negative correction factor is obtained (at temperatures above 26.5° C), set the oscillator for the indicated PPM lower than the licensed operating frequency.

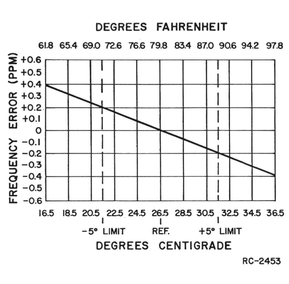
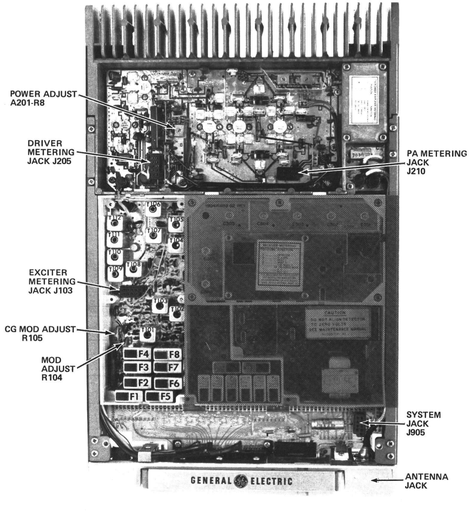


Figure 7 - Frequency Characteristics Vs. Temperature



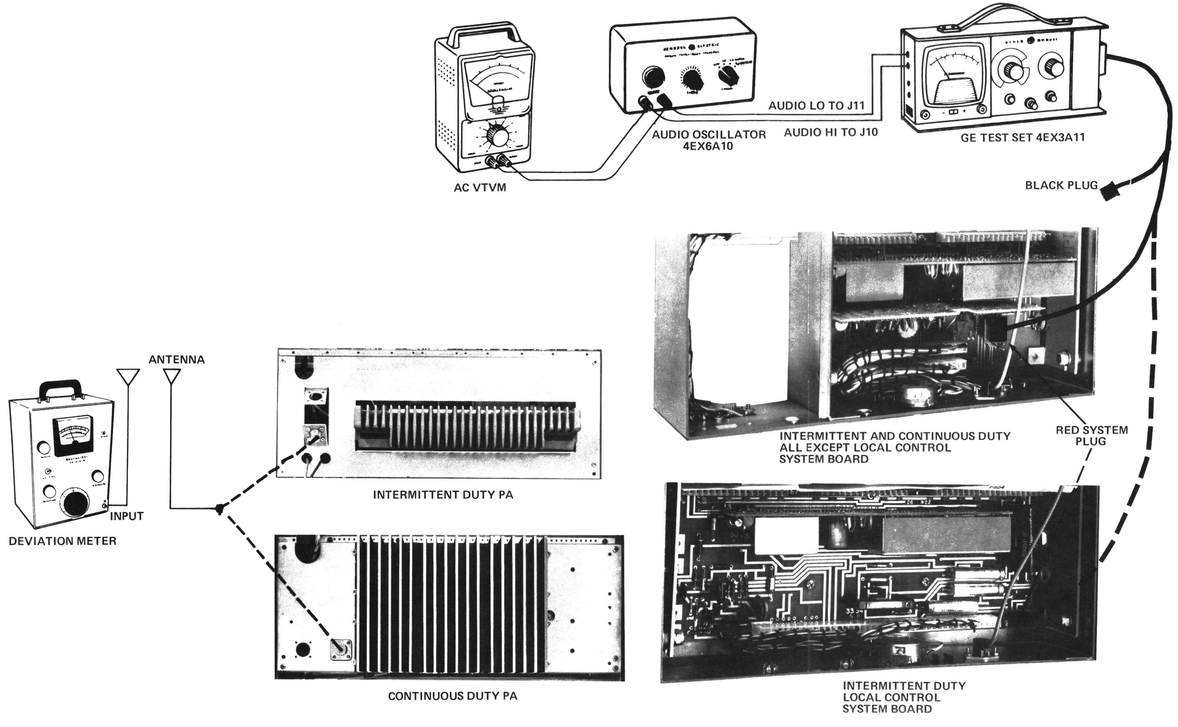
TRANSMITTER ALIGNMENT

PRELIMINARY CHECKS AND ADJUSTMENTS

1. Place ICOMs on Exciter Board (crystal frequency = operating frequency ÷ 12).
2. For a large change in frequency or a badly mis-aligned transmitter, pre-set all slugs to top of coil form. NOTE: If Exciter 19D416859 is provided, pre-set T104 and T105 only, to bottom of coil form.
3. For multi-frequency transmitters with a frequency spacing less than .900 MHz for frequencies between 138-155 MHz or less than 1.00 MHz for frequencies between 150.8-174 MHz tune the transmitter on the lowest frequency.

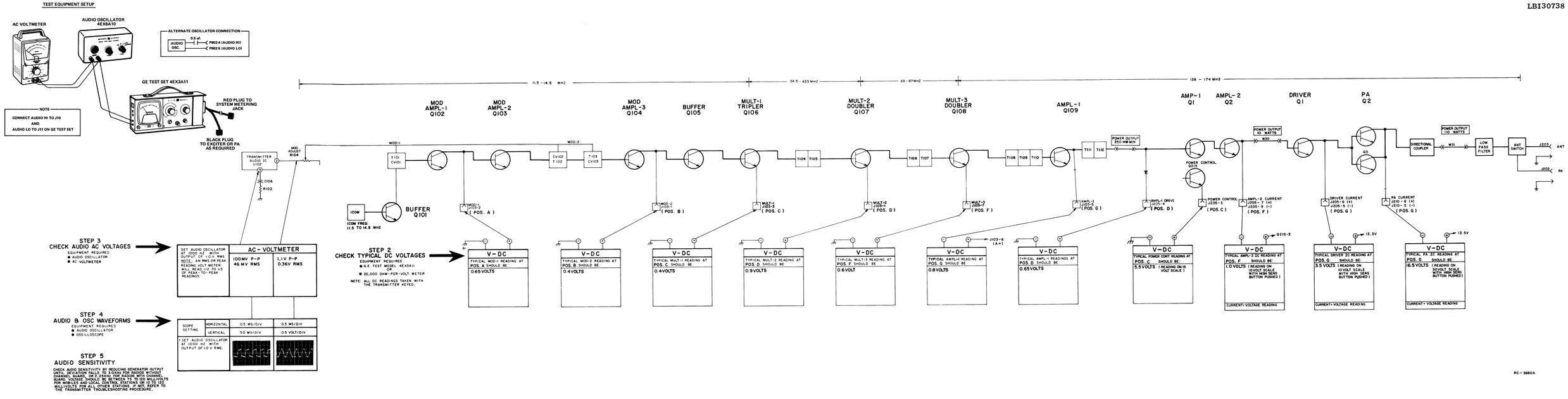
   For multi-frequency transmitters with a frequency spacing up to 1.8 MHz for frequencies between 138-155 MHz or 2.0 MHz for frequencies between 150.8-174 MHz, tune the transmitter using a center frequency tune-up ICOM. These limits can be extended to 2.75 MHz and 3.0 MHz respectively with 1 dB degradation in power output.
4. Connect the red plug on the GE Test set to the System Board metering jack, and the black plug to the Exciter metering jack. Set the polarity to +, and set the range to the Test 1 position (1-Volt position for 4EX8K12) for all adjustments. NOTE: With the Test Set connected to the PA metering jack (J205), the voltage reading at position "G" with the HIGH SENSITIVITY button pressed may be converted to driver collector current by reading the current as 10 amperes full scale. The voltage reading at position "G" (Test set connected to PA metering jack J210) with the HIGH SENSITIVITY button pressed may be converted to PA collector current by reading the current as 30 amperes full scale.
5. Connect 50 ohm Wattmeter to antenna jack.
6. All adjustments are made with the transmitter keyed. Unkey the transmitter between steps to avoid unnecessary heating.

STEP	METER POSITION: GE TEST SET	METER POSITION: INTERNAL METERING	TUNING CONTROL	METER READING	PROCEDURE
1.	A (MOD-1)	1 (MOD-1)	T101	Maximum	Tune T101 for maximum meter reading on the lowest frequency.
2.	B (MOD-2)	2 (MOD-2)	T102 & T103	Maximum	Tune T102 and then T103 for the maximum meter reading on the lowest frequency.
3.	C (MULT-1)	3 (MULT-1)	T104	Minimum	Tune T104 for a dip in meter reading.
4.	D (MULT-2)	4 (MULT-2)	T105, T104 & T106	See Procedure	Tune T105 for maximum meter reading and re-adjust T104 for maximum meter reading. Then tune T106 for a dip in meter reading.
5.	F (MULT-3)	5 (MULT-3)	T107, T106, T108 & T109	See Procedure	Tune T107 for maximum meter reading and re-adjust T106 for maximum meter reading. Then tune T108 for a dip in meter reading and T109 for maximum meter reading.
6.	G (AMPL-1)	6 (AMPL-1)	T110, T108 & T109	Maximum	Tune T110 for maximum meter reading, and then re-adjust T108 and T109 for maximum meter reading.
7.	D (AMPL-1 DRIVE on PA)	8 (AMPL-1 DRIVE on PA)	T11 & T112	Maximum	Move the black metering plug to the Power Amplifier metering jack (J205) and tune T111 and then T112 for maximum meter reading.
8.	G (AMPL-1)	6 (AMPL-1 on EXCITER)	T108, T109 & T110	Maximum	Move the black metering plug back to the Exciter metering jack and re-adjust T108, T109 and T110 for maximum meter reading.
9.	D (AMPL-1 DRIVE on PA)	8 (AMPL-1 DRIVE on PA)	T111 & T112	Maximum	Move the black metering plug back to the Power Amplifier metering jack (J205) and re-adjust T111 and T112 for maximum meter reading. T111 may have a broad peak.
10.			A201-R8		Set Power Adjust potentiometer A201-R8 on the driver board for the desired power output.
ADDITIONAL STEPS FOR TRANSMITTERS USING CENTER FREQUENCY TUNE-UP ICOM					
11.	D (MULT-2)	4 (MOD-2 on EXCITER)	T105	See Procedure	Move the black metering plug to the exciter metering jack and re-adjust T105 for equal drive on the highest and lowest frequency.
12.	G (AMPL-1)	6 (AMPL-1 on EXCITER)	T110 & T108	Maximum	Re-adjust T110 and then T108 for maximum meter reading on the lowest frequency.



STEP 1 - QUICK CHECKS

METER POSITION GE TEST SET	PROBABLE DEFECTIVE STAGE		
	HIGH METER READING	LOW METER READING	ZERO METER READING
EXCITER			
A (MOD-1)	Q102, 10-Volt Regulator	Q102, CV101, T101, 10-Volt Regulator	ICOM, Q101, Q102, CR101, 10-Volt regulator or Channel Selector switch ground.
B (MOD-2)	Q104, 10-Volt regulator	Q103, T102, T103, CV102, CV103, Q104	Q103, T102, CV102, T103, CV103, CR104, Q104
C (MULT-1)	Q105, Q106 T104	Q105, Q106	Q105, Q106, T104
D (MULT-2)	Q107, T106	T104, T105, Q107	T104, T105, Q107, T106
F (MULT-3)	Q108, T108	T106, T107, Q108	T106, T107, Q108, T108
G (AMPL-1)	Q109, C157	T108, T109, T110, Q109	T108, T109, T110, Q109, L106
POWER AMPLIFIER			
"D" (J205) (AMPL-1 DRIVE)		Low Output from Exciter	No output from Exciter, A201-CR1
"C" (J205) (AMPL-1 POWER CONTROL VOLTAGE)	Q215	Q215	No Exciter output, Q215, A201-Q1, A201-Q2, A201-CR1
"G" (J205) (DRIVER CURRENT)	A206-Q1	A206-Q1 Low Output from A201-Q1, Q2	A201-Q1, Q2; A206-Q1 Check Pos. G & C
"G" (J210) (PA CURRENT)	A206-Q1, Q2	A201-Q1, Q2 A206-Q1, Q2, Q3	Q215, A201-Q1, Q2 A206-Q1, Q2, Q3


TEST EQUIPMENT SETUP
AC VOLTMETER
AUDIO OSCILLATOR 4EX8A10
ALTERNATE OSCILLATOR CONNECTION
AUDIO OSC.
0.5 uf
P902-4 (AUDIO HI)
P902-5 (AUDIO LO)
GE TEST SET 4EX3A11
RED PLUG TO SYSTEM METERING JACK
BLACK PLUG TO EXCITER OR PA AS REQUIRED
NOTE
CONNECT AUDIO HI TO J10
AND
AUDIO LO TO J11 ON GE TEST SET
11.5 - 14.5 MHZ
34.5 - 43.5 MHZ
69 - 87 MHZ
138 - 174 MHZ
MOD AMPL-1 Q102
MOD AMPL-2 Q103
MOD AMPL-3 Q104
BUFFER Q105
MULT-1 TRIPLER Q106
MULT-2 DOUBLER Q107
MULT-3 DOUBLER Q108
AMPL-1 Q109
AMP-1 Q1
AMPL-2 Q2
DRIVER Q1
PA Q2
TRANSMITTER AUDIO IC U100
MOD ADJUST R104
C106
R102
MOD-1
MOD-2
T101 CV101
CV102 T102
T103 CV103
T104 T105
T106 T107
T108 T109 T110
T111 T112
POWER OUTPUT 250 MW MIN
POWER CONTROL Q210
POWER OUTPUT 10 WATTS W30
POWER OUTPUT 110 WATTS
Q3
DIRECTIONAL COUPLER
W31
LOW PASS FILTER
ANT SWITCH
J203 ANT
J202 RX
1COM
BUFFER Q101
1COM FREQ: 11.5 TO 14.5 MHZ
MOD-1 J103-3 (POS. A)
MOD-2 J103-1 (POS. B)
MULT-1 J103-5 (POS. C)
MULT-2 J103-4 (POS. D)
MULT-3 J103-7 (POS. F)
AMPL-1 J103-6 (A+) (POS. G)
AMPL-1 DRIVE J205-8 (POS. D)
POWER CONTROL J205-3 (POS. C)
AMPL-2 CURRENT J205-7 (+) J205-9 (-) (POS. F)
DRIVER CURRENT J205-6 (+) J205-5 (-) (POS. G)
PA CURRENT J210-6 (+) J210-5 (-) (POS. G)
STEP 3
CHECK AUDIO AC VOLTAGES
EQUIPMENT REQUIRED
● AUDIO OSCILLATOR
● AC VOLTMETER
SET AUDIO OSCILLATOR AT 1000 HZ WITH OUTPUT OF 1.0 V RMS. NOTE: IN RMS OR PEAK READING VOLT METER WILL READ 1/2 TO 1/3 OF PEAK-TO-PEAK READINGS.
AC - VOLTMETER
100 MV P-P 46 MV RMS
1.1 V P-P 0.36V RMS
STEP 4
AUDIO & OSC WAVEFORMS
EQUIPMENT REQUIRED
● AUDIO OSCILLATOR
● OSSILLOSCOPE
SCOPE SETTING
HORIZONTAL
VERTICAL
0.5 MS/DIV
50 MV/DIV
0.5 MS/DIV
0.5 VOLT/DIV
SET AUDIO OSCILLATOR AT 1000 HZ WITH OUTPUT OF 1.0 V RMS.
STEP 5
AUDIO SENSITIVITY
CHECK AUDIO SENSITIVITY BY REDUCING GENERATOR OUTPUT UNTIL DEVIATION FALLS TO 3.0 KHZ FOR RADIOS WITHOUT SQUELCH OR UNTIL SQUELCH OPENS FOR RADIOS WITH SQUELCH. VOLTAGE SHOULD BE BETWEEN 75 TO 100 MILLIVOLTS FOR MOBILES AND LOCAL CONTROL STATIONS OR 10 TO 100 MILLIVOLTS FOR ALL OTHER STATIONS. IF NOT, REFER TO THE TRANSMITTER TROUBLESHOOTING PROCEDURE.
STEP 2
CHECK TYPICAL DC VOLTAGES
EQUIPMENT REQUIRED
● G.E. TEST MODEL 4EX3A11
OR
● 20,000 OHM-PER-VOLT METER
NOTE: ALL DC READINGS TAKEN WITH THE TRANSMITTER KEYED.
V-DC
TYPICAL MOD-1 READING AT POS. A SHOULD BE: 0.65 VOLTS
TYPICAL MOD-2 READING AT POS. B SHOULD BE: 0.4 VOLTS
TYPICAL MULT-1 READING AT POS. C SHOULD BE: 0.4 VOLTS
TYPICAL MULT-2 READING AT POS. D SHOULD BE: 0.9 VOLTS
TYPICAL MULT-3 READING AT POS. F SHOULD BE: 0.6 VOLT
TYPICAL AMPL-1 READING AT POS. G SHOULD BE: 0.8 VOLTS
TYPICAL AMPL-2 READINGS AT POS. D SHOULD BE: 0.65 VOLTS
TYPICAL POWER CONT READING AT POS. C SHOULD BE: 5.5 VOLTS (READING ON 15 VOLT SCALE)
TYPICAL AMPL-2 IC READING AT POS. F SHOULD BE: 1.0 VOLTS (READING ON 10 VOLT SCALE WITH HIGH SENS BUTTON PUSHED)
CURRENT + VOLTAGE READING
0215-E
TYPICAL DRIVER IC READING AT POS. G SHOULD BE: 3.5 VOLTS (READING ON 10 VOLT SCALE WITH HIGH SENS BUTTON PUSHED)
12.5V
TYPICAL PA IC READING AT POS. G SHOULD BE: 16.5 VOLTS (READING ON 30 VOLT SCALE WITH HIGH SENS BUTTON PUSHED)
RC-3680A