BENCH ALIGNMENT PROCEDURE FOR TRANSMITTER MODEL 4ET23A14

This Bench Alignment Procedure is provided for completely realigning the transmitter or for changing the frequency. Instructions are also given for modulation level adjustments.

The transmitter can be completely realigned using a 20,000 ohms-per-volt voltmeter which covers the 0 to 3 volt range. The voltage indications given in the following procedure are the values which should be read on such a meter. General Electric Test Set EX-1-C is an instrument designed for the many metering applications encountered.

If a meter equivalent to the one suggested is not available, others may be used; but the meter reading obtained must be corrected to account for the shunting effect produced on the circuit by the different metering resistances.

The following test equipment is recommended:

1. A 20,000 ohms-per-volt voltmeter such as the G-E Test Set Type EX-1-C.

2. An absorption wavemeter which will tune to 2, 6 and 12 times the crystal frequency.

3. A frequency measuring device such as Lampkin Type 105B or Gertsch Model FM-3.

4. A non-metallic screwdriver.

5. A 0-100 wattmeter.

Procedure

1. Be certain the oscillator crystal is correctly connected between XY101-4 and 6. The crystal frequency is 1/12th the channel frequency.

2. Connect a wattmeter or some other suitable load (50 ohms) to the antenna jack.

3. Set the TRANS-EXC switch (S101) on EXC. Rotate PA DRIVE control (R119) to its maximum counterclockwise position.

4. Rotate the ANT COUPLING control to its extreme counterclockwise position.

5. The oscillator may be operated by grounding the cathode. P101-3 is a convenient point for this.

5154

6. Turn the power on and allow 30 seconds for warm-up.

7. A voltage reading of approximately 1.5 volts between the MULT-1 jack J101 (green-negative) and ground when the transmitter is keyed indicates proper operation of the oscillator and modulator stages of the transmitter. Use the ground jack located on the power supply chassis.

8. With the meter lead connected to MULT-2 jack J102 (green-negative) key the transmitter and tune Z102 and Z105 for a maximum meter reading.

CAUTION

Do not key the transmitter for longer than 30 seconds in each minute until the third multiplier grid has been tuned.

9. Alternately tune Z108 and Z111 for a maximum meter reading at the MULT-3 jack J103 (green-negative).

NOTE

It is sometimes possible to tune the first or second group of multipliers to the wrong harmonic of the crystal. The coils will ordinarily be correctly tuned if the slugs are first screwed all the way in and then tuned for the first peak encountered.

10. Alternately peak Z114 and Z117 while metering at the PA grid jack J105 (green-negative). Fixed bias on the PA grid will appear as a small initial reading (0.5 to 1.0 volt) at J105, whether or not Z114 and Z117 are correctly tuned. The meter should read greater than 1.5 volts for proper tuning. A slight dip at the MULT-3 jack may be used as an indication of resonance of Z114 if both Z114 and Z117 are badly misaligned.

11. Connect the meter at the CATH PA jack J106 (red, positive) and key the transmitter. Tune the PA PLATE control (C136) for a minimum meter reading. Be sure that the ANT TUNING control is adjusted so that the lowest possible meter reading can be obtained.

Final tuning depends on whether the unit is used as a transmitter for 80-watts output or as an exciter to provide 10-20 watts driving power to a power amplifier. Follow the procedure outlined in the appropriate paragraph below.

TRANSMITTER OPERATION

A. Switch the TRANS-EXC switch to TRANS and retune the PA PLATE for a minimum meter reading.

B. Rotate the ANT COUPLING control slightly clockwise.

C. Tune the ANT TUNING control for maximum meter indication.

D. Key the transmitter and rotate the ANT COUPLING control clockwise for a CATH PA meter reading of 1.5 volts. Power output should measure 100 watts on a 0 to 100 wattmeter connected to the antenna jack.

E. Repeat Steps C and D and lock the ANT COUPLING control.

F. Check the frequency of the transmitter. Adjust the FREQ ADJ A control if necessary.

EXCITER OPERATION

A. With the meter lead connected to CATH PA jack J106 (red, positive), adjust ANT TUNING control (C139) for a maximum meter indication. If no peak is observed, adjust drive control (R119) or ANT COUPLING control slightly until ANT TUNING control may be adjusted for a peak.

B. With a 0-100 wattmeter connected to the antenna jack, rotate drive control to its maximum clockwise position. A reading of 10 to 20 watts should be obtained.

C. Adjust ANT COUPLING control until a maximum (25 watts) power output is obtained.

TWO-FREQUENCY OPERATION

The Model 4ET23A14 Transmitter contains wiring for two-frequency operation but is normally supplied as a single-frequency transmitter. To operate the Transmitter as a two-frequency unit, a means of external selection of the proper oscillator must be provided. When this mode of operation is incorporated, both V101 and V201 should give fairly equal drive to provide equal modulation. This can be checked by switching between Channel A and Channel B while metering at the MULT-1 jack (J101). In some cases it may be necessary to balance these drives by substituting another tube in either XV101 or XV201. Adjust FREQ ADJ A and FREQ ADJ B when necessary to set the two channels on frequency.

MODULATION LEVEL ADJUSTMENT

The modulation level control R186 was adjusted to the proper setting before shipment and should not normally require readjustment. This setting permits approximately 60 per cent modulation for the average voice level. The occasional audio peaks which would cause overmodulation are limited by the modulation limiter V109. The limiter instantaneously limits the slope of the audio wave, preventing overmodulation but preserving the intelligibility of the transmission.

Test Equipment

1. Audio Oscillator
2. Frequency Modulation Monitor
3. Output Meter or Vacuum Tube Voltmeter

Procedure

1. Connect the audio oscillator and the meter across pins 1 and 2 of the microphone receptacle on the power supply chassis. Pin 1 is the audio low.
2. Apply a 1.0 volt signal at 1000 cps across the microphone terminals.
3. Key the transmitter by grounding Pin 3 of the microphone jack.
4. Set the MOD control (R186) for a 13 to 15 KC swing (a 5 to 6 KC swing in narrow band systems) as indicated on the frequency modulation monitor.

COMMUNICATION PRODUCTS DEPARTMENT
GENERAL ELECTRIC COMPANY
LYNCHBURG, VIRGINIA

Printed in U.S.A.