ADJUSTMENT, OPERATION, AND MAINTENANCE OF 152-174 MC SIMULTANEOUS DUPLEX MOBILE TELEPHONE COMBINATIONS FOR RURAL SUBSCRIBER SERVICE

The General Electric Simultaneous Duplex Telephone Combinations described in this manual are designed to operate in conjunction with an MTS base station and a central office terminal to provide telephone service for rural subscribers with access to 117-VAC, 50/60-cycle power.

Three basic combinations are available to provide manual, dial, or identified dial operation. The equipment index, located in the front of this manual, indicates the Control Unit Model Number and the Supervisory Signaling Unit Type Number for each combination. The remaining items on the equipment index are common for all three types of combinations.

After the equipment has been installed, a few checks and system adjustments are required before placing the combination in service.

ADJUSTMENT

Equipment Required

1. A tuning tool and screw driver.

2. A 20,000 ohm-per-volt meter which covers the 0 - 3-volt range, such as the G-E Test Set Type EX-1-C.

3. Access to a transmitter signal on the system frequency for receiver adjustment.

4. Equipment required for adjustment of Type 2116 and Type 2117 Supervisory Signaling Units.

   a. Frequency deviation monitor.

   b. An absorption wattmeter.

   c. Several insulated clip leads.

   d. An audio oscillator.

   e. An AC vacuum tube voltmeter.

Transmitter Adjustment

Connect the antenna or some other suitable load to the Antenna Jack (J111) for the following procedure. The Channel A or single-

frequency crystal should be inserted between pins 4 and 8 of crystal socket XY101. The Channel B crystal, for two-frequency operation, should be inserted between pins 2 and 6 of the crystal socket. (In three-frequency to five-frequency combinations the crystals, except for Channel A, are located in the Multi-Frequency Panel.

1. Place the TUNE-OPERATE switch in the TUNE position.

2. Rotate the ANT COUPLING control to its extreme clockwise position (uncoupled).

3. Turn the power on and allow 30 seconds for warmup.

CAUTION

Do not key the transmitter more than 30 seconds in each minute until the MULT-4 PLATE has been tuned.

4. Plug the positive meter probe into the CATH PA jack (J106) and the negative meter probe into the GND jack on the Power Supply chassis.

5. Key the transmitter and tune the PA PLATE tuning control for a minimum meter reading (dip).

6. Place the TUNE-OPERATE switch in the OPERATE position.

7. Key the transmitter, and quickly tune the MULT-4 PLATE AND PA GRID controls for minimum meter reading at the CATH PA jack.

8. Key the transmitter and alternately tune the PA PLATE and ANT TUNING controls for minimum CATH PA current.

9. Key the transmitter and peak the ANT TUNING control. If no indication of a peak can be obtained, increase the setting of the ANT COUPLING control slightly counterclockwise and then peak the ANT TUNING control. Do not overcouple, or a false setting may be obtained.

10. Key the transmitter and adjust the ANT COUPLING control for a meter reading of 1.0 volt at the CATH PA jack.

11. Key the transmitter and adjust the ANT TUNING control for maximum meter reading.

12. Key the transmitter and adjust the ANT COUPLING control for a meter reading of 1.2 volts.

13. Remove both meter probes and plug the negative probe into the PA GRID jack and the positive probe into the GND jack.

14. Key the transmitter and tune the MULT-4 PLATE and the PA GRID controls for maximum meter indication.

15. Remove both meter probes and plug the positive probe into the CATH PA jack and the negative probe into the GND jack.

16. Repeat Steps 11 and 12.

Receiver Adjustment

Be sure that the antenna has been connected and that the crystals are in the proper positions. For single-frequency or two-frequency combinations the crystals should be installed as shown on the elementary diagram. (In three-frequency to five-frequency combinations the crystals, except for Channel A, are located in the Multi-Frequency Panel. If a Multi-Frequency Panel is being added to an existing combination, a number 22 AWG wire should be connected between XY301-8 and the Multi-Frequency Input jack J306).

1. Plug the negative probe of the tuning meter into the LIM-1 jack and the positive probe into the GND jack (on the Power Supply chassis).

2. This step need only be followed if the receiver was not tuned to the customer's frequency at the factory. While receiving a weak (LIM-1 below limiting), unmodulated signal on the exact system, peak the bottom (C9) and then the top trimmer (C8) on antenna transformer T301. Once peaked, C9 and C8 should be tuned for maximum quieting. Depending upon the receiver's operating frequency, maximum quieting and maximum LIM-1 current may not occur together. In this situation, always tune for maximum quieting.

3. Remove the negative probe from the LIM-1 jack and insert it into the DISC jack.

4. While receiving a strong, unmodulated signal on the exact system frequency, note the meter reading. If the discriminator reading is more than ±0.2 volt (on a 20,000 ohm-per-volt meter) or 1.0 volt (on a VTVM) and the transmitter is known to be on frequency, adjust the OSC-1 trimmer (FA for Channel A, etc.) for a zero discriminator reading. (In narrow band receivers, allow a few minutes for the crystals to be heated to their operating temperature before zeroing the discriminator.)

5. Connect the meter at the AUDIO MONITOR jack (J307).

6. With no signal input to the receiver, set the ADJ LEVEL control (R332) for 1.5 volts AC as measured at J307. (Noise peaks may cause the Model 70 Selector, in the Supervisory Signaling Unit, to pulse if R332 is set too high).

Supervisory Signaling Unit Level Adjustment

The transmitter modulation deviation should be adjusted before the Supervisory Signaling Unit (Type 2116-G1 or Type 2117-G1) tone output levels are set.

Modulation Adjustment

1. Remove the microphone button from the handset and connect a 50-ohm resistor across the microphone terminals.

2. Connect an audio oscillator across the handset microphone terminals.

3. Set the MIKE output control (R205) in the maximum clockwise position.

4. With the audio oscillator set for 1.0 volt signal, at 1000 cps, adjust the MOD control (R186) for a 5 KC swing as indicated on a deviation monitor. If the audio oscillator will not provide a 1.0 volt signal, remove the 50-ohm load and adjust the audio oscillator for 1.0 volt before adjusting the MOD control.

5. The MIKE control is normally left in the maximum clockwise position; however, the level may be reduced for loud talkers or for high noise level locations.

Tone Level Adjustment

1. Terminate the antenna jack with an absorption wattmeter.

2. With handset off-hook, depress initiate button to initiate a call.

3. Connect the base of Q55 to positive battery, with a clip lead, to prevent operation of the 3-mode oscillator. Refer to Outline Diagram RC-833 (Type 2116-G1) or RC-836 (Type 2117-G1) for component location.

4. Connect TB1-5 to TB1-13 with a clip lead (or block the dial-off-normal) to key the transmitter and the 1700-cps oscillator.

5. Adjust R72 for 2.2-KC deviation as indicated on the frequency modulation monitor.

6. With a VTVM connected across TB1-10 and TB1-11 (of the Supervisory Signaling Unit), measure and record the output level of the 1700 cps oscillator from operating.

7. Remove clip lead from the base of Q55 and connect it to the base of Q54 to prevent the 1700 cps oscillator from operating.

8. Connect clip leads between TB1-13 and TB1-14 and between TB1-5 and TB1-13 (or block dial off-normal) to key transmitter and 1100 cps oscillator.

9. Adjust R68 until the output at TB1-10 and TB1-11 is approximately the same as recorded in Step 2.

10. Remove the clip lead from TB1-14 to key the 3-mode oscillator at 1500 cps and check the output at TB1-10 and TB1-11. To obtain the proper output signal from the 3-mode oscillator, switch between the 1100-cps signal and the 1500-cps signal and adjust R68 so that the output of each signal is as close as possible to the level of the 1700-cps signal.

OPERATION

The transmitter and receiver adjustments must be completed before the Combination is placed in operation. Power may be applied by placing the power switch S502 on the power transformer assembly in the ON position. The STBY and OFF positions of the key switch on the control unit will prevent the transmitter from being keyed. Once the combination has been turned off and the key removed, the code wheel in the Supervisory Signaling Unit will be made to identify once when the INITIATE button on the control unit is pressed. This will not key the transmitter, however.

In two-frequency or multi-frequency combinations the transmitter and receiver should normally operate on the primary frequency (CHAN A). The alternate channels may be selected by removing the handset from the holder and depressing the desired channel selector push button. The equipment will automaticlly revert to the primary channel when the handset is replaced in the holder.

MAINTENANCE

1. To insure good electrical continuity and high operating efficiency, routine checks should be made of all mechanical and electrical connections and parts.

2. Examine the contacts of the relays. Where relay contacts carry little or no current, the contacts do not clean themselves and an insulating coating is apt to form. Current carrying contacts are subject to pitting and should be burnished from time to time. When contacts become coated, remove the film with a suitable solvent, applied with a non-metallic brush such as a toothbrush. Dust and particles should be removed by a clean, dry non-metallic brush.

3. The antenna, antenna base and all contacts should be kept clean and free from dirt or corrosion. If the antenna or its base is covered with an insulating coat or is poorly grounded, loss of radiation and a weak signal will result.

Refer to the unit description and maintenance instructions for regular maintenance information suggested for the care of the individual units.

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