ADJUSTMENT, OPERATION AND MAINTENANCE OF 152-174 MC SIMULTANEOUS DUPLEX MOBILE TELEPHONE COMBINATIONS

The General Electric Simultaneous Duplex Mobile Telephone Combinations are designed to operate in conjunction with an MTS base station and a central office terminal to provide telephone service for mobile subscribers.

Three basic combinations are available: manual, dial and identified dial operation. The equipment index at the front of this instruction book indicates the Control Unit and Supervisory Signaling Unit for each type of combition. The remaining items of equipment are common for all three types of combinations.

After the mobile combination has been installed (as described in the Installation Manual) a few checks and system adjustments are required before placing the Transmitter-Receiver in service. DO NOT TRY TO TOUCH-UP THE ALIGNMENT CONTROLS OF THE UNITS as each unit has been factory aligned to the specified operating frequency before shipment.

ADJUSTMENT

Equipment Required

1. A tuning tool and screwdriver.
2. A wattmeter and 50-ohm load.
3. A 20,000 ohms-per-volt DC meter which covers the 0-3 volt range.
4. A frequency meter.
5. An audio oscillator.
6. An audio voltmeter.
7. A frequency deviation monitor.
8. An insulated clip lead.
9. A signal generator with calibrated output.

General

1. Remove the unit from the case and remove the cover from the Supervisory Signaling Unit.

   CAUTION: The decoders are very delicate instruments and are vulnerable to damage when improperly handled.

2. Connect the 50-ohm load and wattmeter to the duplexer antenna jack.

3. Apply power to the combination (ON-OFF-STBY switch to ON position).

4. Using the 0-3 volt DC meter, measure the voltage at the following power supply test jacks (meter reading X multiplier = corrected meter reading).

Test Point	Multiplier	Meter Reading	Corrected Meter Reading
FIL (J503) to GND (J502)	6	Adjust to 2.27 volts	13.6 volts
Lo B+ (J504) to GND (J502)	100	1.9 volts to 2.2 volts	190 volts to 220 volts
Hi B+ (J501) to GND (J502)	200	2.05 volts to 2.27 volts	410 volts to 455 volts

Transmitter Adjustment

Be sure the 50-ohm load is connected, the crystals are in their proper sockets and the combination has been on at least 5 minutes.

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

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

3. 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.

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

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

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

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

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

8. 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.

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

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

11. Key the transmitter and adjust the ANT COUPLING control counter-clockwise until the power output reads 20 watts. Do not exceed CATH PA meter reading of 1.2 volts.

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

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

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

15. Repeat Steps 10 and 11.

16. Key the transmitter and measure the transmitter power output. The output should be 18 to 22 watts.

17. After a 7-minute warmup, check each transmitter frequency and adjust associated FREQ ADJ control (if necessary) to set the channel on frequency.

Modulation Adjustment

1. Remove the microphone cartridge from the handset and connect an audio oscillator and an audio voltmeter across the handset terminals.

2. Set the MIKE control (R205) to the maximum clockwise position.

3. With the audio oscillator set for 1.0 volt signal at 1000 cps, adjust the MOD control for 5-KC deviation.

4. Reduce the audio oscillator signal to 0.3 volt and adjust the MIKE control for 3-KC deviation.

5. Replace the microphone cartridge and verify that occasional voice peaks produce a deviation of 4.0-KC ±1/2 KC. If not, touch up the MIKE control.

Supervisory Signaling Unit Adjustment (Type 2116 and 2117)

1. Lift the handset and push the call initiate button on the control unit. On combinations using the Type 2117 Supervisory Unit, observe the code wheel for proper pulsing and return to its original position.

2. Disable the 1100-cps oscillator by shorting out R66 in the base circuit of Q55. Hold the dial off-normal and adjust R72 for 2.2 KC deviation.

3. Disable the 1700-cps oscillator by shorting out R63 in the base circuit of Q54. Hold the dial off-normal and adjust R68 for 1.5 KC deviation

4. Hang handset back on hook. On combination using Type 2117 Supervisory Unit, observe code wheel for proper pulsing and return to its normal position.

Receiver Adjustment

Be sure that the antenna is connected and the crystals are in their proper sockets.

1. Connect the probes of the meter between the DISC jack and GND. Check each receiver frequency with an on-frequency signal. If the discriminator reading is more than ±0.2 volt (as read on a 20,000 ohms-per-volt meter) or 1.0 volt (on a VTVM), adjust the associated oscillator trimmer for a zero discriminator reading.

2. Measure the receiver sensitivity. The 12 db SINAD method is recommended. If the receiver is equipped with the Busy Circuit Option 5830, adjust Busy Circuit Relay K1 to pick up at 0.1 microvolt less than the receiver sensitivity.

3. Connect the audio voltmeter at the AUDIO MONITOR jack J307.

4. With the handset on the hook and no signal input to the receiver, set the ADJ LEVEL control (R332) for 1.5 volts AC as measured at J307.

FINAL CHECKS

A. Supervisory Signaling Unit Type 2115

1. Connect the external antenna and select the desired channel.

2. Come off hook and push the handset transmit button to signal the operator. Request the operator to place a call to the unit; then hang up.

3. When the call is returned, observe the code wheel pulsing and check that the audible sounder alarm operates.

B. Supervisory Signaling Unit Type 2116

1. Connect the external antenna and select the desired channel.

2. Set the code wheel for the desired number (a test number or the assigned number).

3. Come off hook and press the initiate button on the control unit. This keys the transmitter and transmits the connect signal (1100 cps and 1700 cps transmitted for one second).

4. Listen for the dial tone, then dial land line for test. Request the called party to return the call; then hang up. The transmitter should key and transmit a 1300 cps and 1700 cps disconnect signal for one second.

5. When the call is returned, observe the code wheel pulsing and check that the audible sounder alarm operates.

6. Answer the phone and wait at least 10 seconds to allow the answer delay circuit to operate, then depress the hookswitch. The transmitter should transmit the disconnect signal for one second. Release the hookswitch (while the disconnect signal is being transmitted) and listen in the earpiece to be certain that the teminal disconnects.

C. Supervisory Signaling Unit Type 2117

1. Connect the external antenna and select the desired channel.

2. Set the code wheel for the desired number (a test number or the assigned number).

3. Come off hook and press the initiate button on the control unit. This keys the transmitter and transmits the connect signal (1100 cps, pulsed by the code wheel, and a steady 1700 cps signal.

4. Listen for dial tone, then dial a land line for test. Request the called party to return the call; then hang up. The transmitter should key and transmit the disconnect signal (a 1300 cps tone, pulsed by the code wheel, and a steady 1700 cps tone).

5. When the call is returned, observe the code wheel pulsing and check that the audible sounder alarm operates.

6. Answer the phone and wait at least 10-seconds to allow the answer delay circuit to operate, then depress the hookswitch. The transmitter should key and transmit the disconnect signal (a 1300 cps tone, pulsed by the code wheel, and a steady 1700 cps tone). Release the hookswitch while the disconnect signal is being transmitted and listen in the earpiece to be certain that the terminal actually disconnects.

D. Channel Reverting Check

1. Move the reverting switch to the ON position.

2. Connect an ohmmeter from the cathode of the primary channel oscillator to ground. This connection may be made at the back of the power supply connector J506 (for example, if Channel A is the primary channel, connect the ohmmeter from J506-K2 to ground). When the handset is "on hook", the oscillator cathode should be grounded regardless of the position of the channel selector switches.

3. Select a channel other than the primary channel by depressing the desired channel button. When the handset is lifted off hook, the

ohmmeter should indicate an open circuit.

4. Initiate a call on any channel except the primary channel and request the called party to place a call to your unit; then hang up. The ohmmeter should indicate an open circuit until the disconnect has been completed. After one second the unit should revert to the primary channel and the ohmmeter should indicate continuity.

5. When the call is returned, lift the handset. The ohmmeter should indicate continuity regardless of the position of the channel selector switches.

OPERATION

The transmitter and receiver adjustments must be completed before the combination is placed in operation. Power is applied to the combination by turning the ON-OFF-STBY switch on the control unit to the ON or STBY position. Calls will be received when the control switch is in the STBY position; however, the switch must be in the ON position to answer or to place a call.

The earpiece level control on the back of the control unit allows the operator to adjust the earpiece volume. In two-frequency or multi-frequency combinations the transmitter and receiver should normally operate on the primary frequency (usually Channel A). The alternate channels may be selected by removing the handset from the holder and depressing the desired channel selector button. The equipment will automatically revert to the primary channel (when the revert switch is in the ON position) when the handset is replaced in the holder.

MAINTENANCE

To insure good electrical continuity and high operating efficiency, routine checks should be made of all mechanical and electical connections and parts. Battery and equipment connections to the voltage source should be periodically checked for tightness. The vehicle generator and regualtor should be checked regularly to keep the system within safe and economical limits. Refer to the unit description and maintenance instructions in this manual for regular maintenance information suggested for the care of the individual units.

COMMUNICATION PRODUCTS DEPARTMENT
GENERAL ELECTRIC COMPANY
LYNCHBURG, VIRGINIA

Printed in U.S.A.