

## EMERGENCY POINT-TO-POINT RADIO EC AND ED SYSTEMS EC-C1 CONTROL TERMINAL MAINTENANCE

### 1. GENERAL

1.01 This section describes the maintenance methods for the EC-C1 control terminal. The keys, jacks, relays, buzzer, and electron tube should be tested and maintained in accordance with standard practices for equipment of this type. The current requirements for the relays are indicated on the circuit requirement table of SD-56393-01. The front panel can be removed, if necessary, by removing the three screws on each side of the panel which fasten it to the cabinet.

### 2. DESCRIPTION OF TESTS AND ADJUSTMENTS

#### POWER SUPPLIES

##### A. Voltages

2.01 The purpose of this test is to measure the ac and dc voltages of the power supplies.

##### 2.02 Apparatus

KS-14510, List 1 Volt-Ohm-Milliammeter or equivalent.

##### 2.03 Procedure

(1) Energize the control terminal by plugging a 117-volt ac power cord into the recessed receptacle on the front panel.

##### Ring Generator Voltage

(2) Connect the volt-ohm-milliammeter across the 2-W T and R binding posts with the meter adjusted to read on the 300-volt ac scale. The negative lead should be connected to the upper binding post.

(3) Operate the LINE CIRCUIT selector switch to position 2.

(4) Operate the RING key and note the meter reading.

Requirement: 75 to 90 volts ac.

##### Talking Battery Voltage

(5) Adjust the meter to read on the 60-volt dc scale.

(6) Turn the LINE CIRCUIT selector switch to position 4 and note the meter reading.

Requirement: 36 volts dc  $\pm 8$  volts.

##### Filament Voltage

(7) Remove the rear cover from the control terminal.

(8) Connect the volt-ohm-milliammeter between chassis ground and the midpoint of the F resistor with the meter adjusted to read on the 12-volt ac scale. Note the meter reading.

Requirement: 9 volts ac  $\pm 1$  volt.

##### Plate Voltage

(9) Connect the negative lead of the volt-ohm-milliammeter to chassis ground and the positive lead of the meter to lug one of the R1 rectifier with the meter adjusted to read on the 300-volt dc scale. Note the meter reading.

Requirement: 130 volts dc  $\pm 10$  volts.

(10) Remove the power cord, disconnect the test equipment, and replace the rear cover of the control terminal.

##### B. Electrolytic Capacitors

2.04 The purpose of this test is to check the electrolytic capacitors. The dielectric film of these capacitors will slowly deteriorate if there is no voltage across them. The capacitors films can generally be reformed by applying power to the control terminal for a period of 4 hours.

##### 2.05 Apparatus

###### 2B Noise Measuring Set

19C Oscillator or equivalent

13A Transmission Measuring Set or equivalent

##### 2.06 Procedure

(1) Energize the control terminal by plugging a 117-volt ac power cord into the recessed receptacle on the front panel of the control terminal.

(2) Operate the LINE CIRCUIT selector switch to position 4.

(3) Calibrate the noise set and connect it to the 2-W T and R binding posts with the noise set plug in the LINE jacks. Measure the noise (ac hum).

Requirement: 25 dbm F-1A weighting maximum.

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- (4) If this requirement is not met, repeat the test after the equipment has been turned on 4 hours. If the requirement is still not met, replace the electrolytic capacitors.
- (5) When the requirement is met, check the dc voltages as outlined in Part A.
- (6) If the voltages are below the lower limits, replace the electrolytic capacitors.
- (7) Remove the power cord and resistor and disconnect the test equipment.

### VOICE-FREQUENCY AMPLIFIER

#### C. Gain Adjustment

- 2.07 The purpose of this test is to adjust the gain of the voice-frequency amplifier.
- 2.08 Apparatus
  - 19C Oscillator or equivalent
  - 13A Transmission Measuring Set or equivalent
  - AN-3106A-20-27S Amphenol Connector
- 2.09 Procedure
  - (1) Energize the control terminal by plugging a 117-volt, 60-cycle ac power cord into the recessed receptacle on the front panel of the control terminal.
  - (2) Turn the TRSG attenuator to the 30-db step.
  - (3) Turn the LINE CIRCUIT selector switch to position 8.
  - (4) Connect the spare amphenol connector to the REC A connector of the control terminal.
  - (5) Connect a chassis ground to the K terminal of the amphenol connector to operate relay T which disconnects the balancing network.
  - (6) Connect the 19C oscillator output to the T and R TRSG IN binding posts.
  - (7) Connect the 13A transmission measuring set across the A and B terminals of the amphenol connector.
  - (8) Adjust the oscillator to produce an output of 0 dbm at 1000 cps as indicated on the oscillator output meter.
  - (9) Adjust the knurled disc on the front of the amplifier to produce a reading of -21 dbm on the transmission measuring set.
  - (10) The amplifier is now adjusted to a gain of 35 db. If this adjustment cannot be made, the plate or filament voltages may be low. They should be checked in accordance with Part A.

- (11) Remove the power cord from the control unit and disconnect the testing equipment.

### TRANSMISSION TESTS

#### D. VU Meter Circuit

- 2.10 The purpose of this test is to check the accuracy of the VU meter and its associated circuit elements.

#### 2.11 Apparatus

19C Oscillator  
600-ohm  $\pm 1$  Per Cent Resistor  
AN-3106A-20-27S Amphenol Connector

#### 2.12 Procedure

- (1) Energize the control terminal by plugging a 117-volt ac power cord into the recessed receptacle on the front panel of the control unit.
- (2) Operate the LINE CIRCUIT selector switch to position 8.
- (3) Plug the spare amphenol connector into the REC A connector on the control terminal.
- (4) Connect the 600-ohm resistor across the A and B terminals of the amphenol connector.
- (5) Connect a chassis ground to terminal K of the amphenol connector to operate relay T which disconnects the balancing network.
- (6) Turn the TRSG attenuator to the 30-db step.
- (7) Connect the 19C oscillator to the T and R TRSG IN binding posts.
- (8) Adjust the oscillator to produce an output of -1 dbm at 1000 cps as indicated on the oscillator output meter.
- (9) Operate the VU key to the TRSG position.
- (10) Operate the VU PAD key to the VOICE position.
- (11) Note the reading of the VU meter.  
Requirement: The meter should read  $0 \pm 1$  vu.
- (12) Operate the VU PAD key to the TONE position.
- (13) Turn the TRSG attenuator to the 18-db step.
- (14) Note the reading on the VU meter.  
Requirement: The meter should read  $0 \pm 1$  vu.
- (15) Remove the power cord and resistor from the control terminal and disconnect the testing equipment.

E. Loss Through Transmitting Leg of 4-wire Circuit

2.13 The purpose of this test is to check the loss in the transmitting leg of the 4-wire circuit.

2.14 Apparatus

19C Oscillator or equivalent  
13A Transmission Measuring Set or equivalent  
360B Plug  
AN-3106A-20-27S Amphenol Connector

2.15 Procedure

- (1) Energize the control terminal by plugging a 117-volt ac power cord into the recessed receptacle on the front panel of the control unit.
- (2) Operate the LINE CIRCUIT selector switch to position 8.
- (3) Turn the TRSG attenuator to the 0-db step.
- (4) Plug the spare amphenol connector into the REC A connector on the control terminal.
- (5) Connect a chassis ground to terminal K of the amphenol connector to operate T relay which disconnects the balancing network.
- (6) Connect the 19C oscillator to the 4-wire T and R TRSG IN binding posts and adjust the output to 0 dbm at 1000 cps as indicated on the oscillator output meter.
- (7) Replace the VF amplifier with the 360B plug.
- (8) Connect the 13A transmission measuring set to terminals A and B of the amphenol connector.
- (9) Note the reading on the 13A transmission measuring set.

Requirement: The meter should read  $-26 \pm 1$  dbm.

- (10) Remove the power cord from the control terminal and disconnect the testing equipment. Remove the amphenol connector and replace the 360B plug with the voice-frequency amplifier.

F. Loss Through Receiving Leg of 4-wire Circuit

2.16 The purpose of this test is to determine the loss in the receiving leg of the 4-wire circuit.

2.17 Apparatus

19C Oscillator or equivalent  
13A Transmission Measuring Set or equivalent  
3-ohm  $\pm 1$ -ohm Resistor  
AN-3106-20-27S Amphenol Connector

2.18 Procedure

- (1) Energize the control terminal by plugging a 117-volt ac power cord into the recessed receptacle on the front panel.
- (2) Operate the LINE CIRCUIT selector switch to position 8.
- (3) Turn the REC attenuator to the 0-db step.
- (4) Plug the spare amphenol connector into the REC A connector on the control terminal.
- (5) Connect a chassis ground to terminal K of the amphenol connector to operate T relay which disconnects the balancing network.
- (6) Connect the 19C oscillator to the 4-wire T and R REC-OUT binding posts and adjust the output to 0 dbm at 1000 cps as indicated on the oscillator output meter.
- (7) Connect the 3-ohm resistor across terminals N and J of the amphenol connector.
- (8) Connect the 13A transmission measuring set across the 3-ohm resistor.
- (9) Note the reading on the transmission measuring set.

Requirement: The meter should read  $-31.5 \pm 1$  dbm.

- (10) Remove the power cord resistor and amphenol connector from the control unit and disconnect the test equipment.

G. Monitor Output

2.19 The purpose of this test is to measure the output of the monitor circuit.

2.20 Apparatus

19C Oscillator or equivalent  
13A Transmission Measuring Set or equivalent  
600-ohm  $\pm 1$  Per Cent Resistor  
3-ohm  $\pm 1$  Per Cent Resistor  
AN-3106A-20-27S Amphenol Connector

2.21 Procedure

- (1) Energize the control terminal by plugging a 117-volt ac power cord into the recessed receptacle on the front panel of the control terminal.
- (2) Plug the spare amphenol connector into the REC A connector on the control terminal.
- (3) Connect the 600-ohm resistor across terminals A and B of the amphenol connector.
- (4) Connect the 3-ohm resistor across terminals J and N of the amphenol connector.
- (5) Operate the LINE CIRCUIT selector switch to position 6.

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- (6) Operate the VU key to the TRSG position.
- (7) Turn the TRSG attenuator to the 14-db step.
- (8) Operate the VU PAD key to the TONE position.
- (9) Turn the REC attenuator to the 40-db step.
- (10) Connect the 13A transmission measuring set to the sleeves of the A and B telephone jacks.
- (11) Connect the 19C oscillator to the 2-W T and R binding posts and adjust the level to produce a reading of 0 vu on the control terminal VU meter at 1000 cps.
- (12) Note the reading on the 13A transmission measuring set.

Requirement: The meter should read  $-16.5 \pm 2$  dbm.

- (13) Remove the power cord resistors and connector from the control terminal and disconnect the test equipment.

### 3. TROUBLE LOCATION

3.01 Trouble location in the signaling and control portion of the control terminal consists of checking the circuit components and making continuity checks with an ohmmeter. The copy of SD-56393-01 attached to the front cover can be used as a reference.

3.02 Trouble in the transmission path will be detected in the tests outlined in Parts D, E, F, and G. They can be isolated by referring to the losses of the individual components discussed in Section 403-801-100.