

PERFORMANCE REQUIREMENTS
BO-42NA BASE STATION
TRANSMIT-RECEIVE SET
GENERAL EQUIPMENT REQUIREMENTS
RADIO SYSTEMS

1. GENERAL

1.01 This section describes the requirements which the B0-42NA transmit-receive set used in the Public Air-Ground Telephone service shall meet before turnover to the telephone company.

1.02 It is expected that these tests will be made after installation is completed. If the wire line pairs from the control terminal have been connected to the equipment, they shall be disconnected for the duration of these tests.

1.03 Reference may be made to Section 800-630-180 covering general requirements and definitions for additional information to aid in the proper application of the requirements.

1.04 The tests shall be performed in the order prescribed.

1.05 The requirements are based on the use of the following test equipment or its equivalent:

KS-14510, List 1 Volt-ohm-milliammeter equipped with test leads terminated on one end in spade lugs for a No. 6 screw

Bird Termaline Wattmeter, Model 61, with 25-watt and 1-watt scales

Hewlett-Packard 202C Audio Oscillator

Hewlett-Packard 400D AV Vacuum Tube Voltmeter (VTVM)

Marconi FM Signal Generator, Model 1064B/2

Gertsch Frequency Meter, Model FM-7, with associated deviation meter DM-3 (equipped

with an 8-foot length of RG8 cable with one male-type UHF fitting and one male-type BNC fitting

Patch Cord, 6 feet long, equipped with a 150-type plug on one end and a banana-type plug on the other end

6- to 8-foot Length of RG8 cable equipped with male-type N fittings

2-foot Length of RG8 cable equipped with male-type N fittings (used to connect wattmeter to transmitter in top of cabinet)

48-volt DC Supply with 50-milliamperere capacity

2. REQUIREMENTS

2.01 All transmitter tests must be made with the rear cabinet door closed or with interlock defeated.

2.02 All connections of test equipment to the base station should be left in place until all tests are completed unless specific instructions indicate otherwise.

2.03 Receiver Tests

(a) *Sensitivity*

(1) Operate ac switch on power control panel to ON.

(2) Operate ac switch on receiver power supply to ON and allow to warm up for 10 minutes.

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- (3) Ascertain that the ac power switch on the transmitter power supply is OFF.
 - (4) Connect the Hewlett-Packard 400D ac voltmeter to the REC jack on the trunk terminating panel and terminate the meter in 600 ohms.
 - (5) Disconnect the RF cable from the receiver input jack J523 located on the receiver power supply and connect the Marconi 1064B/2 signal generator to jack J523 with a length of RG8 cable.
 - (6) Connect the TEST meter prod to the discriminator jack of the receiver.
 - (7) Operate the receiver AFC switch to OFF.
 - (8) Adjust output of signal generator to approximately 1000 microvolts.
 - (9) Tune signal generator to receiver operating frequency (zero discriminator reading).
 - (10) Remove TEST meter prod from discriminator jack.
 - (11) Reduce output of signal generator to zero. (Possibility of RF leakage may make it necessary to temporarily disconnect signal generator.)
 - (12) Rotate squelch control fully clockwise.
 - (13) Operate squelch disable switch momentarily.
 - (14) Adjust receiver volume control to produce 1 volt of noise as observed on ac VTVM.
 - (15) Operate AFC switch to ON.
 - (16) Observing noise voltage on ac VTVM, adjust output of signal generator until a 20-db decrease in noise voltage is obtained.
- Requirement:** No more than 2 microvolts (open circuit) shall be required for 20 db of noise quieting.
- If this requirement is not met, refer to the General Electric instruction book on receiver alignment.
- (17) Disconnect signal generator cable from the receiver jack J523 and reconnect cable previously removed.
 - (18) Connect signal generator cable to feed-through connector P2 on top of cabinet.
 - (19) Operate AFC switch to OFF position.
 - (20) Adjust output signal generator to approximately 1000 microvolts.
 - (21) Connect TEST meter prod to discriminator jack.
 - (22) Tune signal generator to receiver operating frequency (zero discriminator reading).
 - (23) Remove TEST meter prod from discriminator jack.
 - (24) Reduce signal generator output to zero. (Possibility of RF leakage may make it necessary to temporarily disconnect signal generator.)
 - (25) Operate squelch disable control momentarily.
 - (26) Operate AFC switch to ON position.
 - (27) Observing receiver output noise voltage on ac VTVM, adjust output of signal generator until a 20-db decrease in noise voltage is observed.
- Requirement:** The signal required to produce 20 db of noise quieting shall be no more than 1 db greater than that required in 2.03(a) (16).
- If this requirement is not met, refer to the General Electric instruction book for information on tuning the duplexer.
- (b) **Squelch Operation**

- (1) Connect KS-14510, List 1 meter to terminal 5 and ground of TB703 in audio filter box. Use RX10 scale.
- (2) Adjust output of signal generator to value determined in 2.03(a) (27).

- (3) Adjust squelch control fully counterclockwise and then advance clockwise to point where just unmutes receiver.
- (4) Reduce signal generator output to zero.
- (5) Observing ohmmeter, adjust signal generator output to value used in 2.03(b) (2).
- (6) Reduce signal generator output a zero.

Requirement: Ohmmeter shall indicate continuity of 1000 ohms or less with output as in 2.03(b) (5) and shall indicate open when signal generator output is reduced to zero.

If this requirement is not met, refer to the General Electric instruction book on receiver squelch adjustment.

- (7) Disconnect signal generator from feed-through connector P2 at top of cabinet.
- (8) Disconnect ac VTVM from REC jack on trunk terminating panel.
- (9) Disconnect ohmmeter from terminal 5 and groun of TB703.
- (10) Do not turn off ac power to receiver.

2.04 Transmitter Tests

(a) Power Output

- (1) Disconnect cable from jack J512 on transmitter power supply.
- (2) Disconnect cable from feed-through connector P2 at top of cabinet.
- (3) Connect a length of RG8 cable equipped with male N-type fittings between jack J512 and feed-through connector P2.
- (4) Connect RF wattmeter to output of connector P2 on top of cabinet.
- (5) Adjust wattmeter to indicate on 25-watt scale.
- (6) Close rear cabinet door if open.

- (7) Operate ac switch on transmitter power supply to ON position and allow transmitter to warm up for 10 minutes.
- (8) Operate remote-local switch on the trunk terminating panel to LOC-HP position.
- (9) Key transmitter by depressing the TRS key on the trunk terminating panel.
- (10) Observe power output on RF wattmeter.
- (11) Operate the SIG CHAN key on the trunk terminating panel while simultaneously operating TRS key.
- (12) Operate power output on RF wattmeter.

Requirement: Power output shall be at least 15 watts on each channel and shall differ by not more than 1 watt.

If this requirement is not met, refer to the General Electric instruction book on transmitter alignment.

- (13) Release TRS and SIG CHAN keys on transmitter trunk terminating panel.
 - (14) Operate the remote-local switch on the trunk terminating panel to LOC-LP position.
 - (15) Operate the POWER ADJ control on the rear of the transmitter to the full clockwise position.
 - (16) Operate TRS key and observe the wattmeter.
- Requirement:** Power output shall be at least 2 watts.
- (17) Release TRS key.
 - (18) Operate the POWER ADJ control to the full counterclockwise position.
 - (19) Adjust the wattmeter to indicate on the 1-watt scale.
 - (20) Operate the TRS key and observe wattmeter.

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Requirement: Power output shall be no greater than 0.2 watt.

- (21) Release TRS key.
- (22) Restore all interconnecting cables to normal leaving wattmeter connected to the output of the feed-through connector P2.
- (23) Operate remote-local switch to LOC-HP position.
- (24) Adjust the wattmeter to indicate on the 25-watt scale.
- (25) Repeat test outlined in 2.04(a) (9) through (12).

Requirement: Power output shall be not less than 1 db below level observed in 2.04(a) (12).

If this requirement is not met, refer to the General Electric instruction book for information on tuning the duplexer.

- (26) Release the TRS and SIG CHAN keys.

(b) Frequency Check

- (1) Connect the output of attenuator AT2 (located on meter panel) to the Gertsch frequency meter with length of RG8 cable equipped with male-type BNC and male-type UHF fittings.
- (2) Operate TRS key, adjust attenuator AT2 to produce input level required for proper operation of frequency meter, and measure frequency.
- (3) Operate the SIG CHAN key on the trunk terminating panel and again measure frequency.

Requirement: The carrier frequency on both channels shall be within ± 0.0001 per cent of assigned frequency.

If this requirement is not met, refer to the General Electric instruction book for information on adjusting the precision oscillator frequency.

- (4) Release the TRS and SIG CHAN keys.

(c) Modulation Sensitivity and Deviation Limiting Check

- (1) Disconnect cable from frequency meter and connect to deviation meter.
- (2) Connect the Hewlett-Packard 202C audio oscillator to the TRS jack on the trunk terminating panel with patch cord equipped with a 150-type plug on one end and a banana-type plug on the other end.
- (3) Connect the ac VTVM (without termination) to the output of the audio oscillator.
- (4) Adjust the output of the audio oscillator to 1 volt at 1000 cps.
- (5) Operate TRS key and adjust attenuator AT2 to produce input level required for proper operation of the deviation meter.
- (6) Reduce output of the audio oscillator until the deviation is 10 kc and observe the voltage required for this deviation.

Requirement: With 1 volt of audio at 1000 cps, the deviation shall be no greater than 15 kc +0 -5 per cent. The voltage necessary for 10-kc deviation shall be no greater than 0.18 volt.

If this requirement is not met, refer to the General Electric instruction book on transmitter modulation level adjustment.

- (7) Release TRS key.
- (8) Adjust output of audio oscillator to 1 volt at 1000 cps.
- (9) Operate the TRS and SIG CHAN keys and observe deviation.
- (10) Reduce output of the audio oscillator until the deviation is 3.3 kc and observe voltage required for this deviation.

Requirement: With 1 volt of audio at 1000 cps, the deviation shall be no greater than 5 kc +0 -5 per cent. The voltage required for 3.3-kc deviation shall be no greater than 0.18 volt.

If this requirement is not met, refer to the General Electric instruction book on transmitter modulation level adjustment.

- (11) Release TRS and SIG CHAN keys.

(d) **RF Indicator Check**

- (1) Connect the KS-14510, List 1 ohmmeter to terminal 6 and ground of TB703 located in the audio filter box. (Use RX10 scale on ohmmeter.)
- (2) Operate TRS key and observe the ohmmeter.
- (3) Reduce power output to 4 watts and observe meter.

Requirement: The ohmmeter shall indicate continuity of 1000 ohms or less when transmitter is keyed at full power and shall indicate open when transmitter is keyed at 4-watt output.

If this requirement is not met, refer to the General Electric instruction book for information on adjusting the high power indicator THRESHOLD control.

- (4) Release TRS key.
- (5) Operate the remote-local switch to LOC-LP position.
- (6) Adjust the wattmeter to indicate on the 1-watt scale.
- (7) Operate TRS key and rotate the POWER ADJ control on the rear of the transmitter until 0.5-watt output is obtained.
- (8) Release TRS key.
- (9) Connect a KS-14510, List 1 ohmmeter to terminal 4 and ground of TB703.
- (10) Operate TRS key and observe the ohmmeter.
- (11) Reduce power output of transmitter to 0.25 watt and observe ohmmeter.

Requirement: Ohmmeter shall indicate continuity of 1000 ohms or less when transmitter

is radiating 0.5 watt of power and shall indicate open when transmitter power is 0.25 watt.

If this requirement is not met, refer to the General Electric instruction book for information on adjusting the low power indicator THRESHOLD control.

- (12) Release TRS key.

(e) **Modulation Indicator Check**

- (1) Connect ohmmeter to terminal 3 and ground of TB703.
- (2) Operate TRS key and adjust output of audio oscillator to produce ± 7 kc deviation at 1000 cps.
- (3) Release TRS key and measure level of 1000-cps voltage.
- (4) Adjust audio oscillator at 600 cps to 0.7 of voltage measured in 2.04(e) (3). **NOTE VOLTAGE**
- (5) Operate TRS key and observe ohmmeter.

Requirement: The ohmmeter shall indicate continuity of 1000 ohms or less when transmitter is keyed with 600-cps modulation.

If this requirement is not met, refer to the General Electric instruction book for information on adjusting the talk channel modulation indicator control.

- (6) Release TRS key.
- (7) Operate remote-local switch to LOC-HP position.
- (8) Adjust the wattmeter to indicate on the 25-watt scale.
- (9) Adjust audio oscillator at 1500 cps to output level determined in 2.04(e) (4).
- (10) Operate TRS and SIG CHAN keys and observe ohmmeter connected to terminals 3 and ground of TB703.

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Requirement: The ohmmeter shall indicate continuity of 1000 ohms or less when transmitter is keyed with 1500-cps modulation.

- (11) Release TRS and SIG CHAN keys and disconnect ac VTVM and audio oscillator.

(f) **Converter Check**

- (1) Connect the ac VTVM to the REC jack on the trunk terminating panel. Terminate the meter in 600 ohms.
- (2) Apply -48 volts to terminal 1 and ground of TB703.
- (3) Operate squelch disable switch on the receiver and observe the receiver output noise on the voltmeter.
- (4) Operate remote-local switch to LOC-LP position.
- (5) Operate TRS key and observe noise quieting of the receiver as observed on the ac VTVM.

Requirement: Noise quieting shall be no greater than 25 db for transmitter power output of 0.5 watt.

If this requirement is not met, refer to the General Electric instruction book for information on adjusting converter output to receiver.

- (6) Release TRS key.
- (7) Operate remote-local switch to LOC-HP position.
- (8) Operate squelch disable switch on receiver.
- (9) Adjust converter attenuator to maximum attenuation (maximum counterclockwise rotation).
- (10) Operate TRS key and observe receiver noise quieting on the ac VTVM.

Requirement: Noise quieting shall be no greater than 20 db with maximum converter

output attenuation and maximum transmitter power output.

- (11) Readjust converter attenuator to produce 25 db of noise quieting.
- (12) Release TRS key.
- (13) Remove -48 volts from terminal 1 of TB703.

(g) **System Check**

- (1) Operate remote-local switch to REMOTE position.
- (2) Connect the audio oscillator to the TRS jack on the trunk terminating panel.
- (3) Connect the ac VTVM to the audio oscillator.
- (4) Adjust output of oscillator to 1500 cps at voltage value determined in 2.04(e) (4).
- (5) Apply +48 volts to terminal 2 of TB703 on audio and power line filter box.
- (6) Observe ohmmeter connected between terminals 3, 4, and 6, respectively, of TB703 and ground.

Requirement: Ohmmeter at terminal 6 shall show continuity of 1000 ohms or less. Terminals 3 and 4 shall show open.

- (7) Apply +48 volts to terminal 1 of TB703, maintaining +48 volts on terminal 2.
- (8) Observe ohmmeter connected between terminals 3, 4, and 6, respectively, of TB703 and ground.

Requirement: All ohmmeter readings shall show continuity of 1000 ohms or less.

- (9) Remove +48 volts from terminals 1 and 2 of TB703.
- (10) Apply -48 volts to terminal 2.
- (11) Observe ohmmeter.

Requirement: Ohmmeter connected between terminals 3 and 4, respectively, or TB703 and ground shall indicate continuity of 1000 ohms or less. Ohmmeter connected to terminal 6 shall show open.

- (12) Remove -48 volts from terminal 2.
- (13) Shut off all ac power and disconnect test apparatus from station.