

MILITARY SPECIFICATION

TRANSCEIVER, INTEGRATED TACTICAL VOICE SECURITY EQUIP-
MENT, TSEC/KY-67, BANCROFT, AND ANCILLARY EQUIPMENT

This amendment is issued for use with Military Specification MIL-T-49129(CR) dated 12 September 1977.

1. Page 3, Para 2.1.

Under SPECIFICATIONS, Military: Add "MIL-M-13231 Marking of Electronic Items."

2. Page 6, Para 2.1.

Change "CSESD-4" to read "CSESD-14".

3. Page 6, Para 2.1.

Under DRAWINGS, National Security Agency: Add "ON014681" and "ON143326."

4. Page 6, Para 2.1.

Drawings - Add: SC-DL-544225 Handset H-189.

5. Pages 9 thru 11, Para 3.5.

Delete para 3.5 in its entirety including all subparagraphs, and substitute:

3.5 Marking. (See 4.4)

3.5.1 General. Marking shall be in accordance with MIL-M-13231 except as otherwise specified for nameplates. Front panel marking shall be Group I as described in MIL-M-13231.

3.5.2 Nameplates for equipment and ancillaries. Nameplates for equipment and ancillaries shall conform to NSA-2, Type B, Class 1 or Class 2, color as specified for security classification nameplates, and the applicable drawings. The location of the nameplates on the ancillaries and equipment and method of fastening them to the ancillaries and equipment shall be in accordance with NSA-2.

3.5.3 Accounting numbers. The following equipments shall have accounting numbers:

TSEC/KY-67, Integrated Tactical Voice Security Equipment.
HYP-67/TSEC, Vehicular Amplifier-Power Adapter.

These equipments shall receive an accounting number as specified in NSA-2, Accounting Numbers. The accounting number shall be permanently marked on the nameplate and duplicated on the surface underneath the equipment nameplate using a marking technique in accordance with NSA-2, Group I.

3.5.4 Visibility. Whenever practicable, parts shall be so mounted that their identification markings will be readily visible with minimum disassembly of the equipment.

3.5.5. Modification Record.

3.5.5.1 Equipment. A modification record nameplate shall be mounted on each production equipment delivered by the contractor. The plate shall conform to NSA-2, Type A, Class 9, Figure 11 (Drawing ON014681-1). The plate shall reflect an accurate marked record of both the optional and mandatory modifications which have been incorporated into the equipment by the contractor.

3.5.5.2 Subassembly or element. When a subassembly or element is modified with an optional or mandatory modification which has been incorporated into the equipment by the contractor, it shall be identified with a modification plate per NSA-2, Type A, Class 2 (Drawing ON1463326) or mark in accordance with NSA-2, Group II or III.

3.5.6 Luminescent front panel connector and control marking. Luminescent paints shall be in accordance with MIL-L-3891. The use of radioactive material as an exciter for luminescent paint is prohibited.

6. Page 13, Para 3.10.8.1, Delete the words "and 3.18.2.3" from the third line.

7. Page 18, Para 3.18.1.5, Delete the text and replace with the following:

3.18.1.5 Desensitization. An RF signal which is 132 dB stronger than the desired signal and is removed by ± 10 percent in frequency from the desired RF signal, shall not degrade a 20dB signal plus noise plus distortion to noise plus distortion ratio (SINAD) signal by more than 6dB. An RF signal which is 57 dB stronger than the desired signal and is removed by ± 50 kHz in frequency from the desired signal shall not degrade a 20dB SINAD signal by more than 6 dB. The desired RF input shall be a 500 Hz frequency modulated RF signal in the plain text mode, with the mode switch set to the SQUELCH OFF position and with a deviation of 8 KHz \pm 0.5 KHz either side of the carrier set to a level which produces a 20dB SINAD signal on the demodulated 500 Hz tone. (see 4.16.1.5).

8. Page 19, Para 3.18.1.7, Delete 3.18.1.7. Replace with "3.18.1.7 Offset. Receiver performance in the plain test mode shall not be degraded by more than 1 dB as the input signal frequency is offset by the transmitter frequency stability of ± 20 ppm"

9. Page 19, Para 3.18.1.9, Add: "The received signal shall be a composite of the 150Hz squelch tone and the 500Hz modulation of paragraph 3.18.1.1."

10. Page 19, Para 3.18.1.10, Delete the text and replace with the following: In the plain text mode, the squelch shall open in less than 100 milliseconds, turn off in less than 200 milliseconds, and shall have a turn around time (release of PTT to squelch turn on) of less than 175 milliseconds. The test signal input shall be the level necessary to produce a 20dB SINAD (see 4.16.1.10).

11. Page 19, Para 3.18.1.11, In paragraph 3.18.1.11 change ± 2 dB to ± 3 dB, change 3000Hz to 2500 Hz.

12. Page 20 Para 3.18.1.12, Delete the text and replace with the following:

3.18.1.12 Wideband Response: The attenuation measured relative to the peak, response shall be:

<u>Frequency</u>	<u>Response</u>
10 Hz to 10.24 kHz	3 dB max.
12.8 kHz	10 dB max.
14.9 kHz	20 dB max.
17.0 kHz	30 dB max.

13. Page 20, Para 3.18.1.13, Delete the entire paragraph and replace with the following:

Audio Output: "Receiver audio output shall be adjustable using the Volume control for .00142mW ± 4.5 dB at the minimum setting and 6mw minimum before clipping into a 1000 ohm load. The volume control shall provide approximate linear audio output."

14. Page 21, Para 3.18.2.4, delete sub paragraph (a) and replace with the following:

a. Plain text audio (no squelch tone)---8kHz $\pm 1\ 1/2$ kHz.

15. Page 21, Para 3.18.2.5, Delete the entire paragraph and replace with the following:

Frequency stability. The carrier frequency of the transmitter shall not vary more than ± 20 parts per million from the indicated channel frequency (+ 600 to 1520 Hz over the 30 - 76 MHz operating frequency range). (see 4.16.2.5)

16. Page 22, Para 3.18.2.6, Delete the paragraph and replace with the following:

Sidetone. Transmit sidetone shall include the alert and alarm tones and shall be at least 1dB but no more than 6dB lower than the received audio for the same volume control setting (see 4.16.2.6).

17. Page 22, Para 3.18.2.7, Change first sentence to read "Pre-mod filtering shall limit the spectrum of the transmitted RF signal such that 99% of the energy or the 18 dB point is within ± 12.5 kHz of the actual selected frequency".

18. Page 23, Para 3.18.3.5, Change "CSESD-4" to read "CSESD-14".

19. Page 25, Para 3.18.4.1.

Power Consumption: Change matrix entry for interface circuitry - STANDBY from 5 ma to 8 ma.

20. Page 25, Para 3.18.4.1, In the Display off mode, change 175mA to 185mA under Receive and Standby.

21. Page 25, Para 3.18.5.1, In the paragraph title change "supply" to "regulator". Change 12 ± 1.5 Vdc to 12.5 ± 1.5 Vdc.
22. Page 27, Para 3.18.6, Change second sentence to read: "The power amplifier shall be capable of increasing the RF output of the KY-67 from 2 watts to 10 watts ± 1 dB or 40 watts ± 1 dB into a 50 ohm load: the requirements of paragraph 3.18.2.7 shall apply."
23. Page 27, Para 3.18.7, Add a new paragraph as follows:
- 3.18.7 Sensitivity (Vehicular): Using a 500 Hz tone to frequency modulate an R.F. signal with a deviation of 8kHz to either side of the carrier, with the KY-67 in the plain text mode, the alert signal disabled, and the mode switch set to the SQ OFF position, an input level of 0.7 μ V at the antenna connector of the HYP-67 shall produce a signal plus noise plus distortion to noise plus distortion ratio of at least 10dB in the demodulated 500Hz signal at any frequency in the range of 30 to 75.975MHz. (see 4.16.7)
24. Page 27, Para 3.19. Size and Weight: Change "14.0" to "15.0."
25. Page 30, Para 4.3.1.

First Article Units. Paragraph 4.3.1 of MIL-T-49129 shall be changed to read as follows:

The contractor shall furnish the number of First Article Units in accordance with the following:

- 25 ea TSEC/KY-67 Transceiver
- 25 ea HYP-67/TSEC Vehicular Adapter
- 25 ea CY-7518/U Battery Box
- 25 ea H-189 Handset
- 25 ea AT-892 Antenna
- 5 ea MX-9733 Audio Adapter
- 5 ea CX-13016 Special Purpose Cable

26. Page 33, Para 4.5.1. Delete entire paragraph 4.5.1 and replace with the following:

"Group A Inspection. Each unit on contract or purchase order shall be inspected for conformance to the inspections specified in Table III."

27. Page 37, Para 4.5.3.1.4. Add the following new paragraph on the bottom of Page 37:

4.5.3.1.4 Sub-Group IV - For this sub-group, two units from the first production lot may be selected at random prior to final lot formation. The units shall be subjected to Group B tests as specified in Tables III and IV and successfully pass thru tests prior to being subjected to the tests specified in Table V. For subsequent Group C inspection, two units shall be selected every 8 months in the manner as specified above. These two sample units shall count toward the total required samples to be selected from A & B Quality Conformance Testing as specified in 4.5.1 and 4.5.2.

28. Page 42, Para 4.9. At the end of Paragraph 4.9a add the following:

The switch transient tests of CE03 and CE06 shall be performed on the following switches between the indicated positions.

<u>UNIT</u>	<u>SWITCH</u>	<u>POSITIONS</u>
KY-67	CHAN	4P - MC (Preset 4= 32.3 MHz and preset M = 53.0 MHz)
KY-67	POWER	ON-TD
KY-67	MODE	OPER-SQ OFF
HYP-67	POWER	LO-HI

The limits specified for the switch transient tests of CE03 and CE06 shall be modified as follows: CE06; Above 10 MHz increase 20 dB (60 dBuV/MHz). Below 10 MHz increase limits by 40 dB per decade to 100 dBuV/MHz at 1.0 MHz. Below 1.0 MHz a constant 100 dBuV/MHz. CE03; Change the breakpoint between the constant 50 dBuV/MHz and the 38 dB/decade slope from 2 MHz to 4 MHz.

29. Page 46, Para 4.13.5, to the end of the paragraph add the following:

"Each orientation shall be tested for a minimum of 30 seconds".

30. Page 46, Para 4.13.8. Change the first sentence to read: "The KY-67; including the HYP-67 vehicle adapter and mounting base MT-1029, as normally mounted in a vehicle shall be subjected to the test of Method 514.2, Procedure VIII, Curve W of MIL-STD-810". Delete the words "and 3.18.2.3" from the last line.

31. Page 49, Para 4.15.1. In paragraph 4.15.1, under Voltage Cycling, Change +17 VDC to +20 VDC and change +36 VDC to +30 VDC.

32. Page 51, Para 4.15.2. Failure Definition. Change last sentence of paragraph to read: "Failures occurring in the eight GFE Digital COMSEC Boards shall not be counted toward the calculation of the demonstrated MTBF, unless the failure is induced by contractor designed equipment".

33. Page 52, Para 4.15.6. Delete the last sentence and replace with the following:

The following parameters shall be measured as a minimum:

Paragraph 4.16.1.1	Receive Sensitivity Test
4.16.1.13.1	Audio Output- Plain test
4.16.1.13.2	Audio Output-Cipher test
4.16.2.1	RF Power Output Test (KY)
4.16.2.2	Modulation Distortion Test
4.16.2.5	Frequency Stability Test
4.16.3.3	Alerts Test

Paragraph 4.16.6.3 Power Output (HYP)

Tests are performed at five (5) sets of frequencies: Set 1 (31.0, 38.0, 45.0, 57.0 and 75.0 MHz), Set 2 (33.0, 39.0, 49.0, 58.0 and 74.0 MHz), Set 3 (30.0, 35.500, 37.500, 40.975 and 75.975 MHz), Set 4 (33.975, 39.975, 47.975, 58.975 and 64.0 MHz), and Set 5 (33.500, 39.500, 45.0, 58.500 and 75.495 MHz). Tests initiate on Set 1 and shall proceed from set to set every three days.

34. Page 54, Para 4.16.1.5. Delete the text and replace with the following:

4.16.1.5. Desensitization Test (see 3.18.1.5)

a. Connect the equipment as shown in Figure 1. Set the HP-8640B to the signal level in dBm at the output of the 20dB attenuator necessary to produce a 20dB SINAD ratio in the KY-67 output for each of the following KY-67 frequencies: 30.0, 40.975, 41.0, 55.975, 56.0 and 75.975 MHz. Note the HP-8640B outputs for reference.

b. Connect the equipment as shown in Figure 2. Set the KY-67 and the HP-8640B to the listed KY-67 frequency. Set the HP-608 to the listed desensitization frequency. When performing the 132dB desensitization measurements, tune the bandpass filter to the desensitization frequency. When performing the 57 dB desensitization measurements, connect the HP-608 directly to the power hybrid. With the hybrid connected to the KY-67 BNC Connector, set the HP-8640B output to obtain a 20 dB SINAD ratio in the KY-67 audio output. Remove the Hybrid from the KY-67 BNC connector and connect it to the Boonton 91H 50 ohm probe. Increase the HP-608 output to obtain the desensitization level. Desensitization level = 20 dB SINAD reference level, in dBm + 132 dB or 57 dB. Remove the hybrid from the Boonton 91H 50 ohm probe and connect to the KY-67 connector. The SINAD ratio shall be no less than 14dB.

<u>KY-67 Frequency (MHz)</u>	<u>Desensitization Frequency (MHz)</u>
30.000	33.000
40.975	36.880
40.975	45.070
41.000	36.900
41.000	45.100
55.975	50.380
55.975	61.970
56.000	50.400
56.000	61.600
75.975	68.300

35. Page 55, Para 4.16.1.7. Delete all starting with "Each 25 KHz step from 30.00 to..." beginning in the sixth line and replace with the following: "30.00, 40.975, 41.00, 52.975, 53.00, 55.975, 56.00, and 75.975 MHz. Change the HP-8640B frequency + 20 ppm from the listed frequencies and record any change in SINAD (see 3.18.1.7)".

36. Page 56, Para 4.16.1.10, Delete the text and replace with the following:

4.16.1.10. Squelch Operating Time Test. Connect the test equipment as shown in Figure 4 except substitute a Tektronix 547 or equivalent oscilloscope for the distortion analyzer. Set HP-200CD No. 1 to 150 + 1Hz and No. 2 to 500 + 5 Hz. Adjust the outputs to produce 2.5 +5 kHz of 150 Hz deviation and 8 + 1.5 kHz of 500 Hz deviation. Set the KY-67 to 41.000 MHz, Pt and OPERATE MODE. Set the HP8640B frequency to 41.000 MHz and the output level to that necessary to produce a 20 dB SINAD ratio in the KY-67 audio output.

a. (Same as original except change the word "tone" to "time").

b. (Same as original).

c. Turn around time shall be measured by having the KY-67 transmitting into the 20 dB attenuator and releasing the PTT. The release of PTT shall trigger the scope. Turn around time is the time between release of PTT and start of the 500 Hz audio signal.

37. Page 57, Para 4.16.1.12. Change the list of frequencies to 10Hz, 100 Hz, 1.0 kHz, 10.24 kHz, 12.8 kHz, 14.9 kHz, and 17.0 kHz.

38. Page 58, Para 4.16.1.13.2. Interchange the last two sentences.

39. Page 58, Para 4.16.2.1. In subpara (a). In the first sentence change "Figure 6" to "Figure 7".

40. Page 60, Para 4.16.2.4. Delete following sentence: "Measure the deviation of the composit modulation and measure the distortion with the 150 Hz component removed by the high pass filter. Replace with following "Measure the deviation of the 500 Hz component of the modulation with the 150Hz removed. Delete the test frequency called out and replace with the following frequencies: 31, 38, 45, 57, and 75 MHz."

41. Page 60, Para 4.16.2.5. Paragraph 4.16.2.5, of MIL-T-49129 shall be changed from the nearest 100 Hz, to the nearest 10 Hz.

42. Page 60, Para 4.16.2.6.

SIDETONE Test: Change to read: "Connect the equipment as shown in Figure 5. Transmit a tone from KY-67, No. 1 to KY-67, No. 2 and measure the audio output in db of KY No. 2 (EUT), in PT & CT. Change the audio signal generator to KY-67 No. 2 and record the audio output in dB of No. 2 while transmitting PT and CT. Calculate the sidetone attenuation as the difference between the two outputs in PT and CT respectively".

43. Page 60, Para 4.16.2.7. At the end of the paragraph add the following:

"Repeat above for plain text with composit modulation."

44. Page 62, Para 4.16.3.4

Retransmission Delay Test: Change reference from "Figure 1" to "Figure 5", with the oscilloscope connected to A3J1 (Retransmit).

45. Page 62, 4.16.3.5.

Delete the entire paragraph and replace with - 4.16.3.5, Data Test: "Connect the equipment as shown in Figure 5 at 31.000MHz. The Audio Test Box (see 6.4) shall provide the voice, analog data and digital data audio connector programming. In addition, the Audio Test Box shall generate a one-zero-zero-zero digital pattern at an appropriate level which is clocked at the rate of the 16 kHz clock out of the KY-67." (see 3.18.3.5)

46. Page 62, Para 4.16.3.5.

Delete sub-paragraph (c) and replace with the following - C. "Place the Audio Test Boxes in the DD mode for both sets No. 1 and No. 2. Key set No. 1 and verify that a one-zero-zero-zero pattern is received at set No. 2 and that a 16 kHz clock is available at the proper pin of the audio connectors of both sets. Verify that the digital data signal is not inverted between the transmitting and receiving KY-67."

47. Page 63, Para 4.16.3.6.

Delete the fourth sentence and replace with - "The transmitter shall be modulated by a 500 Hertz tone and the output of the receiver shall be connected through a 300 Hz high pass filter to an HP-330B distortion meter.

48. Page 63, Para 4.16.4.1.

To the end of the paragraph add the following: "Measure current drain on each supply line with the KY-67 in receive mode with a receive signal input. Repeat entire procedure for both plain and cipher mode."

49. Page 64, Para 4.16.5.1.

Change " 12 ± 1.5 Vdc" to " 12.5 ± 1.5 Vdc". In the title change the word "supply" to "regulator."

50. Page 64, Para 4.16.5.2.

Delete the text and replace with the following: Connect the equipment as shown in Figure 1 except connect the HP-330B to pin S of 2P1 and connect a $150 \pm 1\%$ ohm load from 2P1-S to ground. Set the HP-8640B to $8 \pm .4$ kHz peak deviation at 500Hz. Set the HYP-67 AUDIO control to ICS. Measure the voltage at 2P1-S. Limit: 17.3 VRM's minimum. Turn the AUDIO control clockwise and verify that the speaker output is loud. (See 3.18.5.2).

51. Page 65, Para 4.16.5.3

Paragraph d, 1st sentence, delete the words "deviation meter and"--. On third and fourth line, change "headset" No. 1" to "handset No. 2".

52. Page 65, Para 4.16.5.3

In paragraph 4.16.5.3., in last sentence only change 500 to 200.

53. Page 65, Para 4.16.5.4

Delete the entire paragraph and replace with the following:

Transmit Audio Processing: "Apply +24V to the HYP-67 P1-B and P1-J and connect an audio signal generator to P1-N through a 1.5K ohm plus or minus 5% resistor. Measure the audio output at J5-B into a 15K ohm plus or minus 5% load. Check for compliance with 3.18.5.4 at the following frequencies: 50, 100, 200, 300, 1000, 2000, and 3000 Hz.

54. Page 66, Para 4.16.5.5

Delete this paragraph and replace with the following:

Vehicle antenna tuning test. "Connect the equipment as shown in Figure 6 and measure the tune signals to the AS-1729 at the antenna tune connector (J1 of HYP-67) at the following frequencies: 31.0, 35.0, 38.0, 46.0, 50.0, 55.0, 57.0, 64.0, 68.0 and 71.0 MHz. Tuning information shall be in accordance with the following: (see 3.18.5.5)

<u>Band</u>	<u>Frequency (MHz)</u>	<u>Voltage at pins</u>		
1	30-33	A to C	D to C	N to C
2	33-37	A to C	E to C	N to C
3	37-42	A to C	F to C	N to C
4	42-47.5	A to C	H to C	N to C
5	47.5-53	A to C	J to C	N to C
6	53-56	B to C	D to C	N to C
7	56-60	B to C	E to C	N to C
8	60-65	B to C	H to C	N to C
9	65-70.5	B to C	H to C	N to C
10	70.5-76	B to C	J to C	N to C

"As an alternate test method, connect a known good AS-1729 antenna base to the HYP-67 and observe that it is switched to the proper band at each frequency listed above".

55. Page 66, Para 4.16.6

Delete the entire paragraph except for the paragraph number and the title.

56. Page 67, Para 4.16.6.3

Create a new paragraph "4.16.6.3" as follows:

"4.16.6.3 - Power Output - Connect the equipment as shown in Figure 6. Set the output power selector switch to Hi (40W) and Med (10W) power. Key the transmitter via the handset and measure the power output at the following frequencies: 31.0, 35.0, 38.0, 42.0, 46.0, 49.0, 53.0, 57.0, 60.0, 64.0, 68.0, 71.0, and 75.0 MHz. Power output shall be $40W \pm 1dB$ and $10W \pm 1 dB$ into a 50 ohm load with input voltage between 30 and 25 VDC. Power output shall not be reduced by more than 4 dB between 20 and 25 VDC. Verify that neither a short circuit or open circuit condition damages the power amplifier. The performance of 4.16.2.7 shall also be met (see 3.18.6)."

57. Page 67, Para 4.16.7

Add a new paragraph as follows:

4.16.7 Sensitivity Test (Vehicular)

Connect the equipment as shown in Figure 1 except connect the 20dB pad to J3 of the HYP-67, and connect the distortion analyzer across a 150ohm $\pm 5\%$ 5 watt resistor connected from P1-S to P1-A of the HYP-67. Set the 8640B for 8KHz deviation at a 500 Hz rate. Set the output to -90dBm(-110dBm at the output of the pad). Measure the SINAD at the following frequencies: 30.000, 35.500, 40.975, 41.000, 47.500, 55.975, 56.000, 65.500, and 75.975MHz (see 3.18.7).

NOTE: Where the receiver sensitivity in the manpack mode is specified to be performed in MIL-T-49129 (EL) and MIL-T-49130 (Nuclear) and MIL-T-49131 (TEMPEST) the receiver sensitivity in the vehicular mode for track vehicles must also be performed.

58. Page 68, Para 4.18.2.1

Change 18 volts to 20 volts and change 36 volts to 30 volts.

59. Page 68, Para 4.18.2.2

Change 18 volts to 20 volts and change 36 volts to 30 volts.

60. Page 68, Para 4.18.2.2

Change "Figure 13" to "Figure 5".

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