DEFENSE INFORMATION SYSTEMS AGENCY

JOINT INTEROPERABILITY TEST COMMAND
FORT HUACHUCA, ARIZONA

MILITARY STANDARD-188-203-1A
TADIL A
AND
STANDARDIZATION AGREEMENT 5511, ANNEX B, LINK 11
CONFORMANCE
TEST PROCEDURES

SEPTEMBER 2003

MILITARY STANDARD-188-203-1A
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STANDARDIZATION AGREEMENT 5511,
ANNEX B, LINK 11
CONFORMANCE TEST PROCEDURES

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INTRODUCTION

Military Standard (MIL-STD)-188-203-1A, Interoperability and Performance Standards for Tactical Digital Information Link (TADIL) A, and the North Atlantic Treaty Organization Standardization Agreement (STANAG) 5511, annex B, Tactical Data Exchange – Link 11, establish the minimum technical standards and design objectives that are necessary to ensure interoperability and performance requirements for communications equipment and subsystems used in Tactical Digital Information Link (TADIL) A (Link 11). The MIL-STD and STANAG conformance testing will establish overall system performance and maximum flexibility of system layout in order to satisfy diverse user requirements without the restrictions caused by interface and incompatibility issues. The requirements are listed in table B-1 of appendix B.

If test item performance does not meet a requirement, the failure and its potential operational impact will be discussed. Any required capabilities that are not implemented will also be discussed.

The Joint Interoperability Test Command will conduct standards conformance testing at Fort Huachuca, Arizona.

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SUBTEST 1. AUDIO IMPEDANCES AND ULTRA HIGH FREQUENCY (UHF) TRANSMITTER AUDIO INPUT LEVEL

1-1 Objective. To determine the extent of compliance to the requirements of Military Standard (MIL-STD)-188-203-1A, reference numbers 2, 3, and 25.

1-2 Criteria

a. Reference number 2. The audio input and output impedances of the radio equipment shall be 600 ohms balanced in accordance with the Channel Input/Output Impedances paragraph of MIL-STD-188-100 (See 4.4.3.1.4 – Due to cancellation of MIL-STD-188-100, MIL-STD-188-141B, paragraphs 5.3.6.2.2 and 5.4.5.2 conformance test procedures were used).

b. Reference number 3. The nominal transmitter audio input level shall be 0 decibels referenced to 1 milliwatt (dBm).

c. Reference number 25. A single audio input with the characteristics described in paragraph 5.3.1.1 and stated above in paragraph “a” and paragraph “b” shall be provided.

1-3 Test Procedures

a. Test Equipment Required

(1) Signal Generator

(2) Unit Under Test (UUT)

(3) 600-Ohm Resistor

(4) Audio Voltmeter

(5) Modulation Analyzer

(6) Attenuator

(7) Multimeter

(8) Impedance Analyzer

(9) Audio Generator

b. Test Configuration. Configure the equipment as shown in figures 1-1, 1-2, and 1-3.

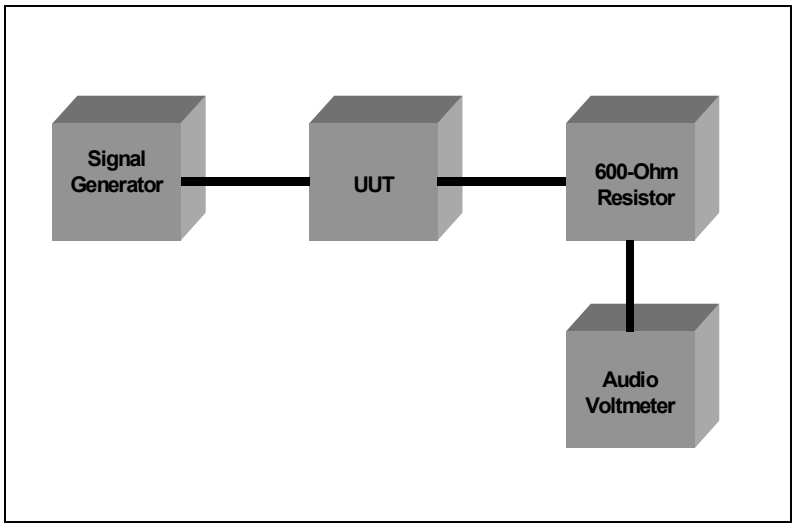

Figure 1-1. Audio Output Impedance Test Equipment Configuration

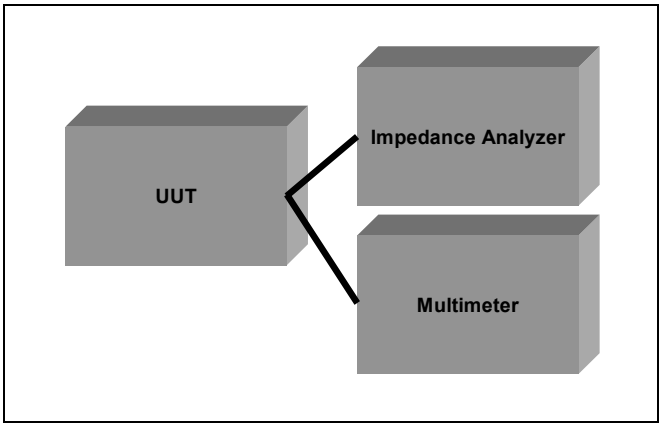

Figure 1-2. Audio Input Impedance Test Equipment Configuration

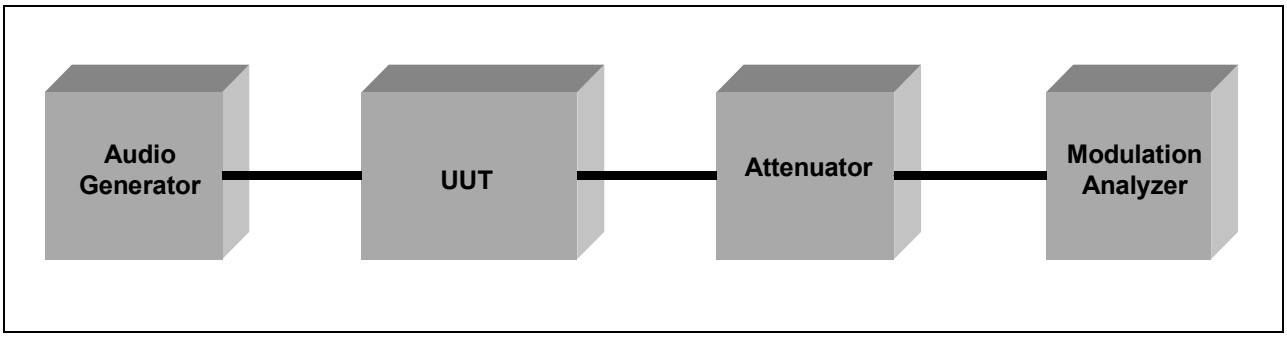

Figure 1-3. Ultra High Frequency Transmitter Audio Input Level Equipment Configuration

c. Test Conduct. The test procedures are listed in table 1-1.

Table 1-1. Audio Impedances (Input/Output) and UHF Transmitter Audio Input Level Test Procedures

Step	Action	Settings/Action	Result
The following procedures are for reference number 2.			
1	Set up equipment.	As shown in figure 1-2.	
2	Disconnect the impedance analyzer.		
3	Configure the UUT.	Turn UUT to the "On" position.	
4	Configure the multimeter.	Set to measure resistance.	
5	Measure the RF connector shield and the chassis ground.	Multimeter should display a zero or a value close to zero. Record values on data collection form.	
6	Measure the RF center conductor and the chassis ground.	Multimeter should display an extremely high impedance of > 1 MΩ. Record values on data collection form.	
7	Disconnect multimeter and connect impedance analyzer.		
8	Configure impedance analyzer.	Start Frequency: 300 Hz Stop Frequency: 3000 Hz Step: 100-Hz increments Single Sweep	
9	Configure UUT.	Frequency: 300 MHz	
10	Press start on impedance analyzer.	Start will begin sweep of frequency band.	
11	Measure value on impedance analyzer.	Impedance analyzer should show 600 ohms at the audio connector. Record reading or abnormalities on data collection form.	
The following procedures are for reference number 2.			
12	Set up equipment.	As shown in figure 1-1.	
13	Configure the signal generator.	Frequency: 225 MHz Level: – 90 dBm Rate: 1000 Hz	

Table 1-1. Audio Impedances (Input/Output) and UHF Transmitter Audio Input Level Test Procedures (continued)

Step	Action	Settings/Action	Result
14	Configure the UUT.	Frequency: 225 MHz Adjust receiver gain for rated output.	
15	Connect audio voltmeter across the receiver audio output terminals.	Record audio output voltage on data collection form.	
16	Connect a 600-ohm resistor across the audio output of the receiver.	Measure the audio output voltage and record results on data collection form. (The voltage should drop 6.02 dB.)	
The following procedure is for reference numbers 3 and 25.			
17	Connect the equipment.	As shown in figure 1-3.	
18	Configure the UUT.	Frequency: 225 MHz	
19	Configure audio generator.	Amplitude: 0 dBm Frequency: 1000 Hz	
20	Configure attenuator.	Use appropriate attenuation to provide a safe signal input to the test equipment used.	
21	Configure modulation analyzer.	Measure FM deviation. Record results on data collection form.	

Note: Sections that are not applicable to a particular step are shaded.
Legend:
MΩ – mega ohm
dB – decibels
dBm – decibels referenced to 1 milliwatt
FM – Frequency Modulation
Hz – hertz
MHz – megahertz
RF – Radio Frequency
UUT – Unit Under Test

1-4 Presentation of Results. The results will be shown in table 1-2 indicating the requirement and measured value or indications of capability.

Table 1-2. Audio Impedances (Input/Output) and UHF Transmitter Audio Input Level Test Results

Reference Number	MIL-STD Paragraph	Requirement	Result		Finding	
			Required Value	Measured Value	Met	Not Met
2	5.3.1.1.1	The audio input and output impedances of the radio equipment shall be 600 ohms balanced in accordance with the Channel Input/Output Impedances paragraph of MIL-STD-188-100 (See 4.4.3.1.4).	600 ohms, balanced.			

Table 1-2. Audio Impedances (Input/Output) and UHF Transmitter Audio Input Level Test Results (continued)

Reference Number	MIL-STD Paragraph	Requirement	Result		Finding	
			Required Value	Measured Value	Met	Not Met
3	5.3.1.1.2	The nominal transmitter audio input level shall be 0 dBm.	0 dBm			
25	5.3.3.3.1	A single audio input with the characteristics described in 5.3.1.1 (See reference numbers 1-3.) shall be provided.	See reference numbers 1 – 3.			

Legend:
dBm – decibel referenced to one milliwatt MIL-STD – Military Standard rms – root mean square

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SUBTEST 2. RADIO KEYLINE

2-1 Objective. To determine the extent of compliance to the requirements of MIL-STD-188-203-1A, reference numbers 5 and 25.

2-2 Criteria

a. Reference number 5. The transmit and receive states of the radio equipment shall be capable of being controlled by the simplex keyline method specified in MIL-STD-188-203-1A, paragraph 5.2.8.1.5.1, stated below:

Paragraph 5.2.8.1.5.1: Simplex method. A signal of + 6 volts direct current (Vdc) (+1.0, – 0.2 Vdc) on the centertap of either Data Terminal Set (DTS) audio output shall switch the radio to the transmit state. The application of 0 Vdc (+0.75, – 0.25 Vdc) on the centertap shall cause the radio to switch to the receive state. The minimum impedance to ground shall be 3000 ohms and current transients shall not exceed 30 milliamperes (mA).

b. Reference number 25. The centertap of the audio input shall be used for the keyline function.

2-3 Test Procedures

a. Test Equipment Required

(1) + 6 Vdc (Power Supply)

(2) UUT

(3) Dummy Load

b. Test Configuration. Configure the equipment as shown in figure 2-1.

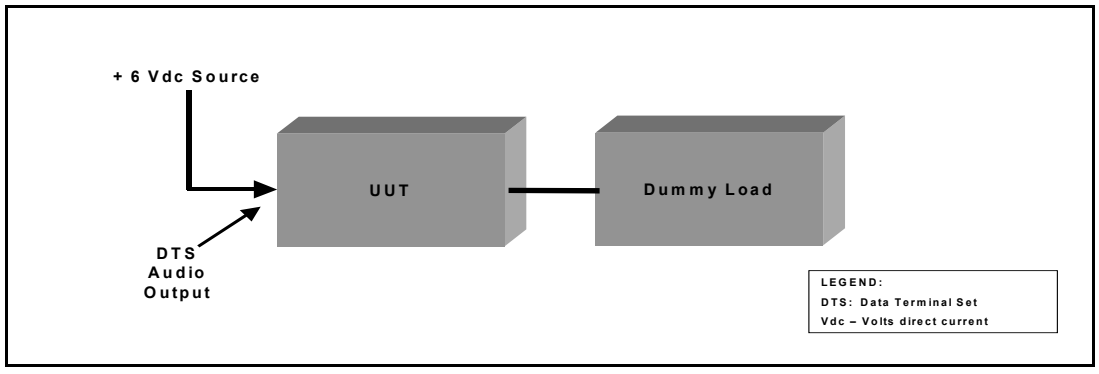

Figure 2-1. Radio Keyline Test Equipment Configuration

c. Test Conduct. The transmit and receive test procedures are listed in table 2-1.

Table 2-1. Radio Keyline Test Procedures

Step	Action	Settings/Action	Result
The following procedures refer to reference numbers 5 and 25.			
1	Set up equipment.	As shown in figure 2-1.	
2	Configure UUT.	Frequency: 225 MHz	
3	Connect + 6 Vdc to DTS audio output of UUT.	Verify that UUT switches to transmit state.	
4	Connect + 7 Vdc to DTS audio output of UUT.	Verify that UUT switches to transmit state.	
5	Connect + 5.8 Vdc to DTS audio output of UUT.	Verify that UUT switches to transmit state.	
6	Connect + 7.1 Vdc to DTS audio output of UUT.	Verify that UUT switches to receive state.	
7	Connect + 5.7 Vdc to DTS audio output of UUT.	Verify that UUT switches to receive state.	
8	Remove dc voltage from DTS audio output port.	Verify that UUT switches to receive state.	
9	Connect + 0.75 Vdc to DTS audio output of UUT.	Verify that UUT switches to receive state.	
10	Connect – 0.25 Vdc to DTS audio output of UUT.	Verify that UUT switches to receive state.	

Note: Sections that are not applicable to a particular step are shaded.
Legend:
dc – direct current MHz – megahertz V – volts
DTS – Data Terminal Set UUT – Unit Under Test

2-4 Presentation of Results. The results of both tests will be shown in table 2-3 indicating the requirement and measured value or indications of capability.

Table 2-2. Radio Keyline Test Results

Reference Number	MIL-STD Paragraph	Requirement	Result		Finding	
			Required Value	Measured Value	Met	Not Met
5	5.3.1.2	The transmit and receive states of the radio equipment shall be capable of being controlled by the simplex keyline method specified in 5.2.8.1.5.1.	+ 6 Vdc, 0 Vdc			
25	5.3.3.3.1	The centertap of the audio input shall be used for the keyline function.	Center tap provides keyline function.			

Legend:
MIL-STD – Military Standard

SUBTEST 3. SWITCHING TIME

3-1 Objective. To determine the extent of compliance to the requirements of MIL-STD-188-203-1A, reference number 6 and STANAG 5511, annex B, paragraph 7.3.e and 7.4.a reference numbers 35 and 37.

3-2 Criteria

a. Reference number 6. Transmit-to-receive switching occurs at the end of the transmission, that is, the picket stop code or address code. When switching from the transmit to receive state, the transmitter radio frequency (RF) output shall be reduced to the quiescent noise level of 0.1 microvolt (μV) or less in a 6-kilohertz (kHz) bandwidth centered on the nominal carrier frequency, and the receiver shall be capable of maximum receive sensitivity within 23 milliseconds (ms) or less after reset of the radio set keyline.

b. Reference number 35. The transmitted output level shall be within 1 dB of its steady-state output within 7 ms of the receipt of a keying signal.

c. Reference number 37. The receiver output shall be within 1 dB of its steady-state value within 12 ms after application of the RF signal. The output level shall be constant, within ± 3 dB for inputs from 5 μV to 50 millivolts (mV) (hard).

3-3 Test Procedures

a. Test Equipment Required

(1) Signal Generator

(2) UUT

(3) Attenuator (2)

(4) Oscilloscope (2)

(5) Audio Breakout Box

(6) Audio Analyzer

(7) Audio Generator

b. Test Configuration. Configure the equipment as shown in figures 3-1, 3-2, 3-3, and 3-4.

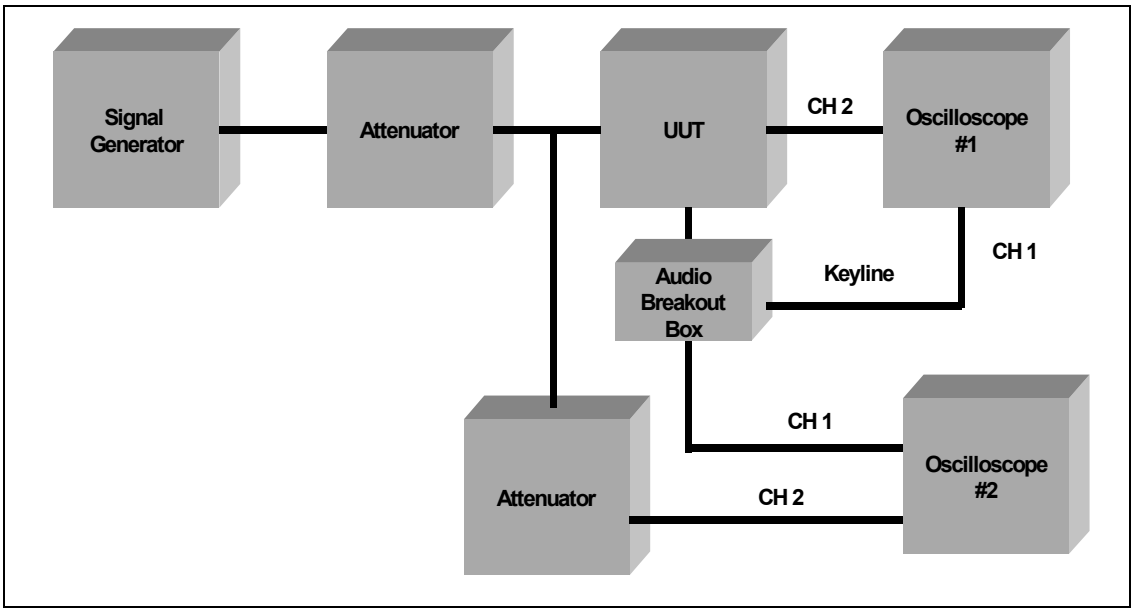

Figure 3-1. Switching Time Test Equipment Configuration

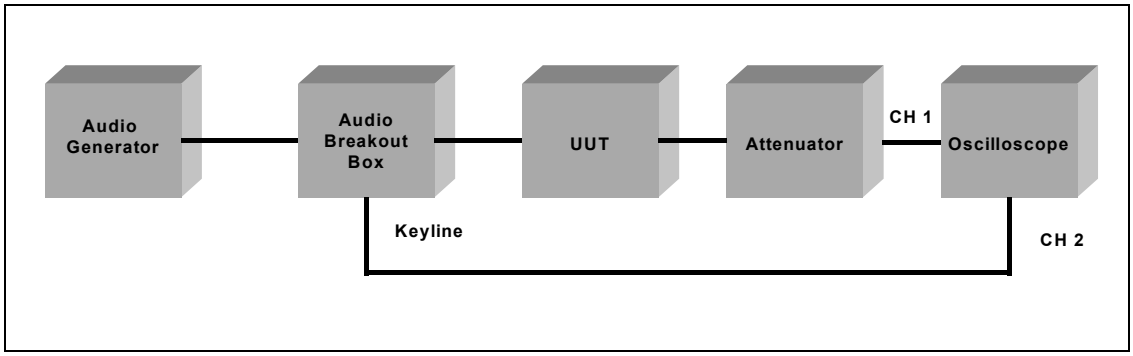

Figure 3-2. Output Level (Transmitter) Test Equipment Configuration

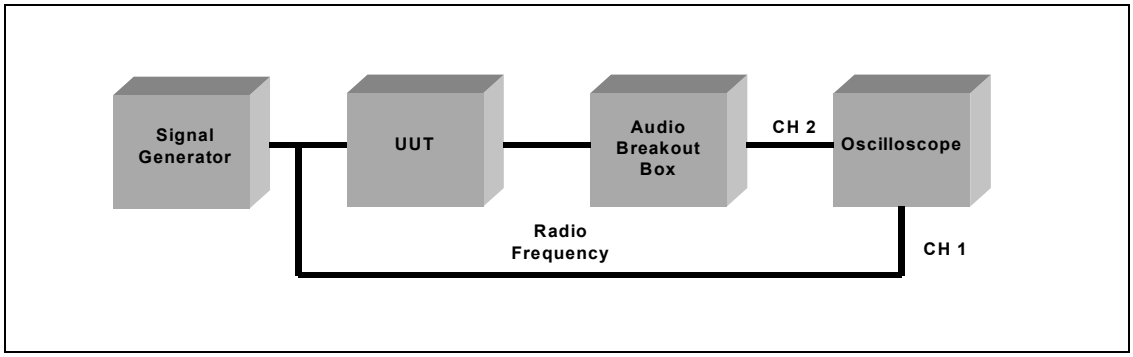

Figure 3-3. Output Level (Receiver) Test Equipment Configuration (Part 1)

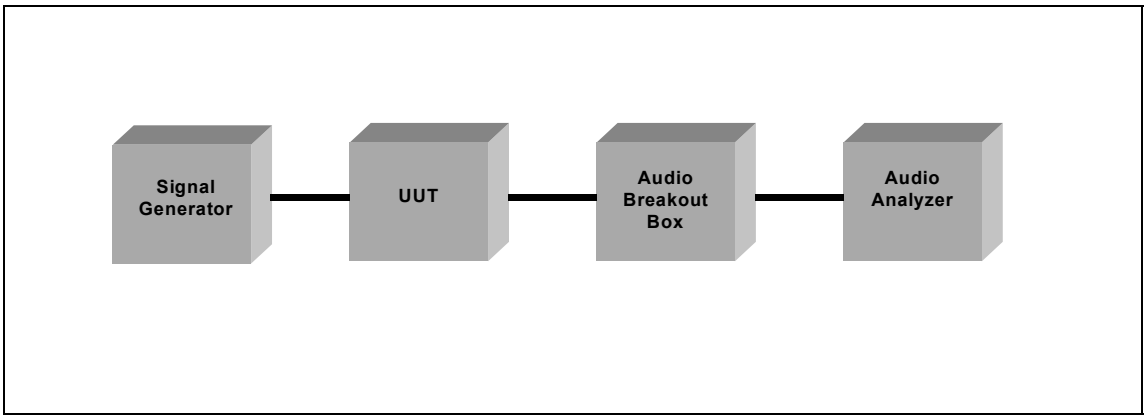

Figure 3-4. Output Level (Receiver) Test Equipment Configuration (Part 2)

c. Test Conduct. The test procedures are listed in table 3-1.

Table 3-1. Switching Time Test Procedures

Step	Action	Settings/Action	Result
The following procedures refer to reference number 6.			
1	Connect the equipment.	As shown in figure 3-1.	
2	Configure UUT.	Frequency: 225 MHz Low power	
3	Configure attenuators.	Use appropriate attenuation to provide a 0 dBm input to the oscilloscopes and signal generator.	
4	Configure the signal generator.	Frequency: 225 MHz Amplitude: Set amplitude level to give a – 90 dBm signal into the UUT (after attenuator). FM rate: 1 kHz	
5	Configure oscilloscopes.	Set oscilloscopes to trigger when UUT is keyed.	
6	Configure audio breakout box.	Refer to manufacturer's specifications for correct audio pinout.	
7	Key the UUT.		
8	Unkey the UUT.	Observe oscilloscope 1.	
9	Set markers on oscilloscope.	Use vertical markers to measure the time from when the radio is unkeyed until the receive audio reaches steady-state value.	
10	Measure how long it takes to reach maximum receive sensitivity.	Record results on data collection form.	
11	Key the UUT.		
12	Unkey the UUT.	Observe oscilloscope 2.	

Table 3-1. Switching Time Test Procedures (continued)

Step	Action	Settings/Action	Result
13	Set markers on oscilloscope.	Use vertical markers to measure the time from when the radio is unkeyed until the RF output falls to noise level of 0.1 µV or less in a 6-kHz bandwidth centered on the nominal carrier frequency.	
14	Measure time taken for RF output to reach 0.1 µV.	Record result on data collection form.	
The following procedure is for reference number 35.			
15	Set up equipment.	See figure 3-2.	
16	Configure UUT.	Frequency: 225 MHz Low Power	
17	Configure audio breakout box.	Refer to manufacturer's specifications for proper audio pinout.	
18	Configure attenuation.	Use appropriate attenuation to provide a safe signal input to the oscilloscope.	
19	Configure audio generator.	Amplitude: 0 dBm Frequency: 1000 Hz	
20	Configure oscilloscope.	CH1 (RF): 500 mV / div CH2 (Keyline): 2 V / div Horizontal: 2 ms / div	
21	Key the UUT.	Observe the results on the oscilloscope.	
22	Set markers.	Set marker A at the point where UUT is keyed. Set marker B at the point where the RF output is within 1 dB of its steady-state output.	
23	Measure the time difference between marker A and marker B.	Record results on data collection form.	
The following procedure is for reference number 37.			
24	Set up equipment.	See figure 3-3.	
25	Configure UUT.	Frequency: 225 MHz	
26	Configure oscilloscope.	Horizontal Scale: 50 mV / div Vertical Scale: 2.190 V Trigger: Single Sweep CH1 (RF): 50 mV / div CH2: 1 V / div	
27	Configure audio breakout box.	Refer to manufacturer's specifications for proper audio pinout.	
28	Select "Run" on the oscilloscope.		

Table 3-1. Switching Time Test Procedures (continued)

Step	Action	Settings/Action	Result
29	Configure signal generator.	Frequency: 225 MHz Amplitude: – 30 dB Rate: 400 Hz Waveform: Sine Deviation: 1 kHz	
30	Turn the RF output on the signal generator to on.	Oscilloscope should trigger.	
31	Set markers.	Set marker A at the beginning of RF. Set marker B at the point where the audio is within 1 dB of steady-state output.	
32	Record results on data collection form.	Measure the difference between marker A and marker B.	
33	Reconfigure equipment.	As shown in figure 3-4.	
34	Configure the signal generator.	Frequency: 225 MHz Rate: 1 kHz Amplitude: 5 µV	
35	Configure the UUT.	Frequency: 225 MHz	
36	Configure the audio breakout box.	Refer to manufacturer specifications for proper audio pinout.	
37	Configure the audio analyzer.	Under measurement, select ac level.	
38	Turn the RF and modulation of the signal generator to “On.”	Observe the audio analyzer.	
39	Record the level displayed on the audio analyzer (in dBm) on data collection form.		
40	Change the amplitude of the signal generator.	Change amplitude to 10 µV.	
41	Record the level displayed on the audio analyzer (in dBm) on data collection form.		
42	Change the amplitude of the signal generator.	Change amplitude to 20 µV.	
43	Record the level displayed on the audio analyzer (in dBm) on data collection form.		
44	Change the amplitude of the signal generator.	Change amplitude to 30 µV.	
45	Record the level displayed on the audio analyzer (in dBm) on data collection form.		
46	Change the amplitude of the signal generator.	Change amplitude to 40 µV.	
47	Record the level displayed on the audio analyzer (in dBm) on data collection form.		
48	Change the amplitude of the signal generator.	Change amplitude to 50 µV.	

Table 3-1. Switching Time Test Procedures (continued)

Step	Action	Settings/Action	Result
49	Record the level displayed on the audio analyzer (in dBm) on data collection form.		
50	Change the amplitude of the signal generator.	Change amplitude to 100 µV.	
51	Record the level displayed on the audio analyzer (in dBm) on data collection form.		
52	Change the amplitude of the signal generator.	Change amplitude to 200 µV.	
53	Record the level displayed on the audio analyzer (in dBm) on data collection form.		
54	Change the amplitude of the signal generator.	Change amplitude to 300 µV.	
55	Record the level displayed on the audio analyzer (in dBm) on data collection form.		
56	Change the amplitude of the signal generator.	Change amplitude to 400 µV.	
57	Record the level displayed on the audio analyzer (in dBm) on data collection form.		
58	Change the amplitude of the signal generator.	Change amplitude to 500 µV.	
59	Record the level displayed on the audio analyzer (in dBm) on data collection form.		
60	Change the amplitude of the signal generator.	Change amplitude to 1 mV.	
61	Record the level displayed on the audio analyzer (in dBm) on data collection form.		
62	Change the amplitude of the signal generator.	Change amplitude to 10 mV.	
63	Record the level displayed on the audio analyzer (in dBm) on data collection form.		
64	Change the amplitude of the signal generator.	Change amplitude to 20 mV.	
65	Record the level displayed on the audio analyzer (in dBm) on data collection form.		
66	Change the amplitude of the signal generator.	Change amplitude to 30 mV.	
67	Record the level displayed on the audio analyzer (in dBm) on data collection form.		
68	Change the amplitude of the signal generator.	Change amplitude to 40 mV.	

Table 3-1. Switching Time Test Procedures (continued)

Step	Action	Settings/Action	Result
69	Record the level displayed on the audio analyzer (in dBm) on data collection form.		
70	Change the amplitude of the signal generator.	Change amplitude to 50 mV.	
71	Record the level displayed on the audio analyzer (in dBm) on data collection form.		
72	Calculate results.	Measure all readings recorded in steps 38 through 70.	

Note: Sections that are not applicable to a particular step are shaded.
Legend:

µV – microvolts	div – division	ms – milliseconds
ac – alternating current	FM – Frequency Modulation	mV – millivolts
CH – Channel	Hz – hertz	RF – Radio Frequency
dB – decibels	kHz – kilohertz	UUT – Unit Under Test
dBm – decibels referenced to 1 milliwatt	MHz – megahertz	V – volts

3-4 Presentation of Results. The results will be shown in table 3-2 indicating the requirement and measured value or indications of capability.

Table 3-2. Switching Time Test Results

Reference Number	MIL-STD Paragraph	Requirement	Result		Finding	
			Required Value	Measured Value	Met	Not Met
6	5.1.2.3	Transmit-to-receive switching occurs at the end of the transmission, that is, the picket stop code or address code. When switching from the transmit to receive state, the transmitter RF output shall be reduced to the quiescent noise level of 0.1 microvolt (µV) or less in a 6-kHz bandwidth centered on the nominal carrier frequency, and the receiver shall be capable of maximum receive sensitivity within 23 milliseconds or less after reset of the radio set keyline.	RF output of 0.1 µV or less within 23 ms.			
			Maximum receive sensitivity with 23 ms.			

Table 3-2. Switching Time Test Results (continued)

Reference Number	STANAG 5511, Annex B, Paragraph	Requirement	Result		Finding	
			Required Value	Measured Value	Met	Not Met
35	7.3.e.	The transmitted output level shall be within 1 dB of its steady-state output within 7 ms of the receipt of a keying signal.	Within 7 ms.			
37	7.3.b	The receiver output shall be within 1 dB of its steady-state value within 12 ms after application of the radio frequency (RF) signal.	Within 12 ms.			
		The output level shall be constant, within ± 3 dB for inputs from 5 µV to 50 mV (hard).	Within ± 3 dB			

Legend:
µV – microvolt
dB – decibels
kHz – kilohertz
MIL-STD – Military Standard
ms – milliseconds
mV –millivolts
RF – Radio Frequency
STANAG – Standardization Agreement

SUBTEST 4. PHASE JITTER (STABILITY)

4-1 Objective. To determine the extent of compliance to the requirements of MIL-STD-188-203-1A, reference number 7.

4-2 Criteria. Reference number 7. The rms phase jitter shall not exceed 2.5 degrees and the probability of a shift greater than 30 degrees shall be less than or equal to 0.01 percent when measured at the signal output terminals of a transmitter or a receiver. Measurements shall be performed over a sufficient number of adjacent frame pairs to establish the specified probability with a confidence of at least 95 percent. Measured values shall be the average phase in an averaging time of 9.09 ms or 18.18 ms for frame lengths of 13.3 ms or 22 ms, respectively.

4-3 Test Procedures

a. Test Equipment Required

(1) Oscilloscope

(2) Signal Generator

(3) Phase Detector (MiniCircuits ZRPC-1 Mixer)

(4) Attenuator

(5) Low Pass Filter

(6) Audio Generator

(7) Frequency Counter

(8) UUT

b. Test Configuration. Configure the equipment as shown in figure 4-1.

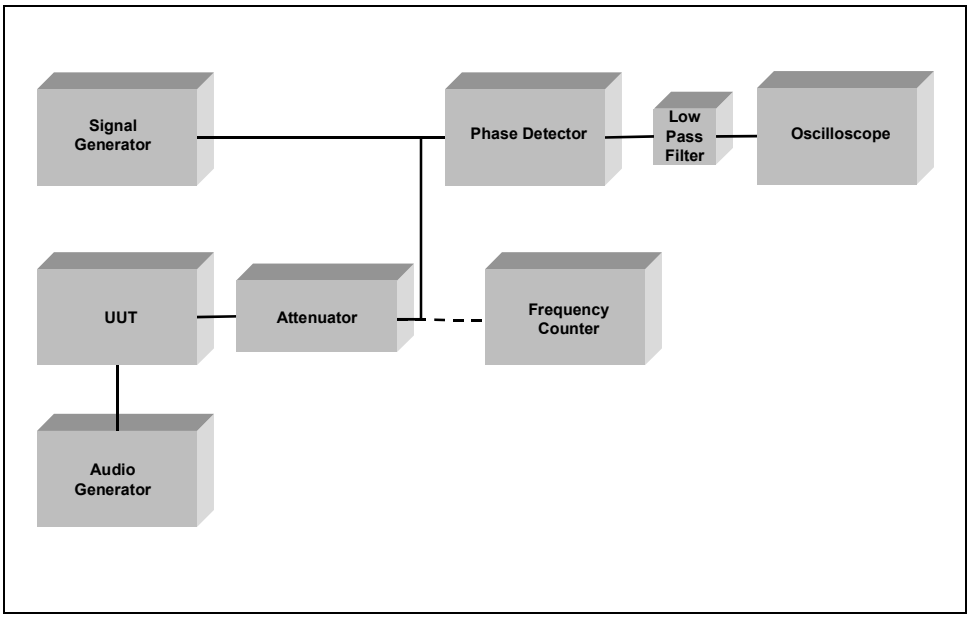

Figure 4-1. Phase Jitter (Stability) Configuration

c. Test Conduct. The test procedures are listed in table 4-1.

Table 4-1. Phase Jitter (Stability) Test Procedures

Step	Action	Settings/Action	Result
The following procedures refer to reference number 7.			
1	Connect the equipment.	As shown in figure 4-1.	
2	Set up UUT.	Mode: CW Frequency: UUT should transmit CW on 250 MHz.	
3	Measure and record the transmit frequency of the UUT.	Use the frequency counter.	
4	Adjust and record the frequency of the signal generator to match the frequency of the UUT. The signal generator must be stable to within 1 part in 10^9.	Use the frequency measured in step 3.	
5	Measure and record the frequency of the reference source (signal generator).	Use the frequency counter.	
6	Adjust the output level of both the UUT and the reference source. The UUT is to be connected to the RF port of the mixer while the reference source will be connected to the local oscillator port.	Set to 7 dBm and mix them together using the phase detector (MiniCircuits ZRPC-1 Mixer).	
7	Connect the output of the mixer to channel 1 of the oscilloscope.		

Table 4-1. Phase Jitter (Stability) Test Procedures (continued)

Step	Action	Settings/Action	Result
8	Set horizontal scale on the oscilloscope to 20 ms/div. Adjust the vertical scale so that the amplitude of the waveform fits within the oscilloscope display.	Toggle the RUN/STOP button on the oscilloscope to capture the waveform.	
9	Turn on the vertical delta markers on the oscilloscope. Position one vertical marker so that the maximum amplitude level of the waveform (0 degree reference point for cosine waveform) crosses the marker. Position the second marker 26.6 ms to the right of the first marker.	Measure and record the maximum amplitude (voltage) level of the waveform.	
10	Multiply the voltage level recorded in step 9 by 0.47579.	Record result.	
11	Subtract the value found in step 10 from the value found in step 9.	Record result.	
12	Position horizontal reference cursor #1 to the maximum amplitude level of the waveform.	Position horizontal reference cursor #2 so that it is below cursor #1. Adjust cursor #2 until the Δ between cursors 1 and 2 equals the value recorded in step 11.	
13	Verify that the phase difference between two successive 13.3 ms periods does not exceed 30 degrees by observing the captured waveform on the oscilloscope display.	To meet this specification, the captured waveform, from the maximum amplitude level (crossing the first vertical marker) to the next marker to the right (26.6 ms after the waveform reaches its maximum) must stay between the two horizontal cursors.	Record results on data collection form.
14	Capture new waveforms, repeating step 13 until the necessary number of measurements have been accomplished (See table 4.2). Stop test if more than two failures.		

Note 1. At 250 MHz, the difference between 250.000000 MHz and 250.00000627 MHz corresponds to a 30.0^0 phase difference over a 13.3 msec period. So, if the phase is changing more rapidly than 6.27 Hz in a 13.3 msec time, the value of $|f_2 - f_1|$ will be greater than 6.27.

Note 2. To meet the criteria of a 99.99 percent probability of not exceeding a phase change of 30° during any two successive 13.3 msec periods with a confidence of 95 percent, the following numbers of measurements with associated failures (that correspond to a phase measurement greater than 30 degrees) are listed in table 4-2.

Note 3. Sections that are not applicable to a particular step are shaded.

Legend:

Δ – Delta
CW – Continuous Wave
dBm – decibels referenced to 1 milliwatt
div – division
f_1 – initial frequency
f_2 – final frequency
MHz – megahertz
ms – millisecond
mV – millivolt
RF – Radio Frequency
UUT – Unit Under Test

4-4 Presentation of Results. The number of measurements with associated failures is shown in table 4-2. The test results will be shown in table 4-3 indicating the requirement and measured value or indications of capability.

Table 4-2. Numbers of Measurements with Associated Failures

Number of Measurements Required	Number of Failures
299	0
473	1
628	2

Table 4-3. Phase Jitter (Stability) Test Results

Reference Number	MIL-STD Paragraph	Requirement	Result		Finding	
			Required Value	Measured Value	Met	Not Met
7	5.1.2.4	The rms phase jitter shall not exceed 2.5 degrees and the probability of a shift greater than 30 degrees shall be less than or equal to 0.01 percent when measured at the signal output terminals of a transmitter or a receiver. Measurements shall be performed over a sufficient number of adjacent frame pairs to establish the specified probability with a confidence of at least 95 percent. Measured values shall be the average phase in an averaging time of 9.09 milliseconds of 18.18 milliseconds for frame lengths of 13.3 milliseconds or 22 milliseconds, respectively.	Probability of a shift greater than 30 degrees shall be less than or equal to 0.01 percent.			

Legend:
MIL-STD – Military Standard rms – root mean square

SUBTEST 5. SIDETONE

5-1 Objective. To determine the extent of compliance to the requirements of MIL-STD-188-203-1A, reference number 8.

5-2 Criteria. Reference number 8. During transmitter operation, a sidetone signal having the same characteristics as specified for normal received data shall be provided at the receiver audio output. For Ultra High Frequency (UHF) systems, the sidetone shall be provided at the receive audio.

5-3 Test Procedures

a. Test Equipment Required

(1) Audio Generator

(2) Audio Breakout Box

(3) UUT

(4) Audio Analyzer

(5) Dummy Load

b. Test Configuration**.** Configure the equipment as shown in figure 5-1.

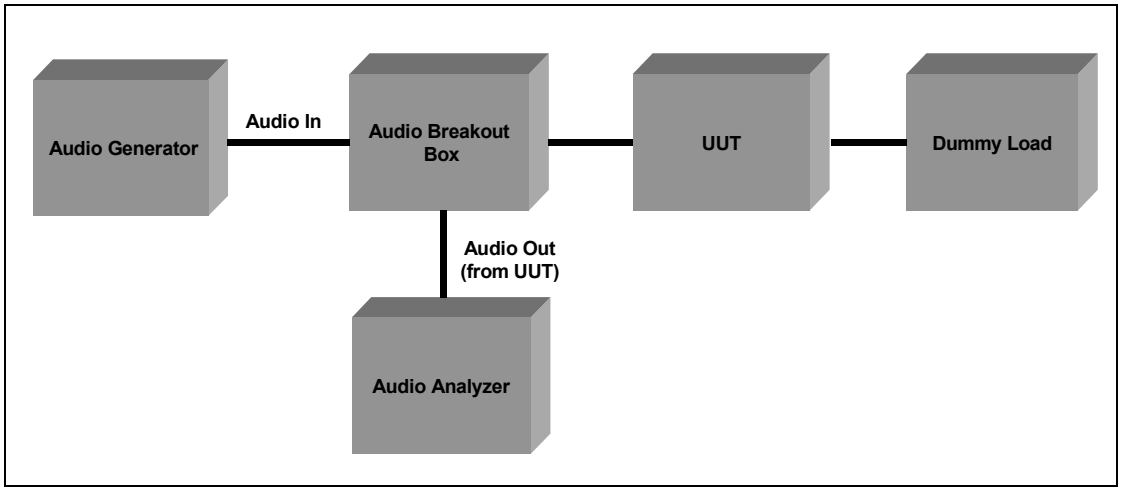

Figure 5-1. Sidetone Test Equipment Configuration

c. Test Conduct. The test procedures are listed in table 5-1.

Table 5-1. Sidetone Test Procedures

Step	Action	Settings/Action	Result
The following procedures refer to reference number 8.			
1	Connect the equipment.	As shown in figure 5-1.	
2	Configure audio generator.	Frequency: 1000 Hz Amplitude: 2.2 Vpp (0 dBm)	
3	Configure audio breakout box.	Refer to manufacturer's specifications for correct audio pinout.	
4	Configure UUT.	Frequency: 225 MHz Plain Text Low Power	
5	Configure audio analyzer.	Measurement: ac level	
6	Key the UUT.	Observe audio analyzer.	
7	Record result.	Ensure the side tone level (from the receive audio) has the same characteristics as nominal received data.	

Note: Sections that are not applicable to a particular step are shaded.
Legend:
ac – alternating current
dBm – decibels referenced to 1 milliwatt
Hz – hertz
MHz – megahertz
UUT – Unit Under Test
Vpp – Peak-to-Peak Voltage

5-4 Presentation of Results. The results will be shown table 5-2 indicating the requirement and measured value or indications of capability.

Table 5-2. Sidetone Test Results

Reference Number	MIL-STD Paragraph	Requirement	Result		Finding	
			Required Value	Measured Value	Met	Not Met
8	5.3.1.5	During transmitter operation, a sidetone signal having the same characteristics as specified for normal received data shall be provided at the receiver audio output. For UHF systems, the sidetone shall be provided at the receive audio.	1000 Hz, 0 dBm			

Legend:
dBm – decibels referenced to 1 milliwatt
Hz – hertz
MIL-STD – Military Standard
UHF – Ultra High Frequency

SUBTEST 6. FREQUENCY SELECTION TIME

6-1 Objective. To determine the extent of compliance to the requirements of MIL-STD-188-203-1A, reference number 9.

6-2 Criteria. Reference number 9. The time from the selection of new frequency channel to the time that the radio set is operative for either transmission or reception on the new channel shall not exceed 10 seconds. If the radio is operated with an external automatic antenna coupler or multi-coupler, the coupler tuning time should not exceed 60 seconds.

6-3 Test Procedures

a. Test Equipment Required

(1) Dummy Load

(2) UUT

(3) Signal Generator (2 each)

(4) Power Combiner

(5) Watt Meter

(6) Stop Watch

b. Test Configuration. Configure the equipment as shown in figures 6-1 and 6-2.

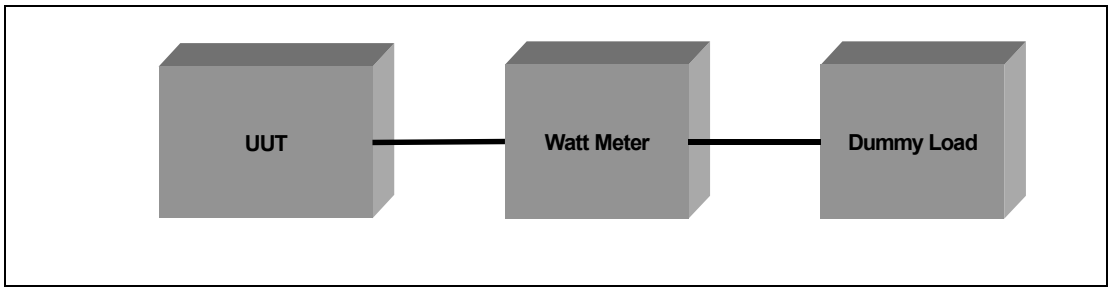

Figure 6-1. Frequency Selection Time (Transmit) Test Equipment Configuration

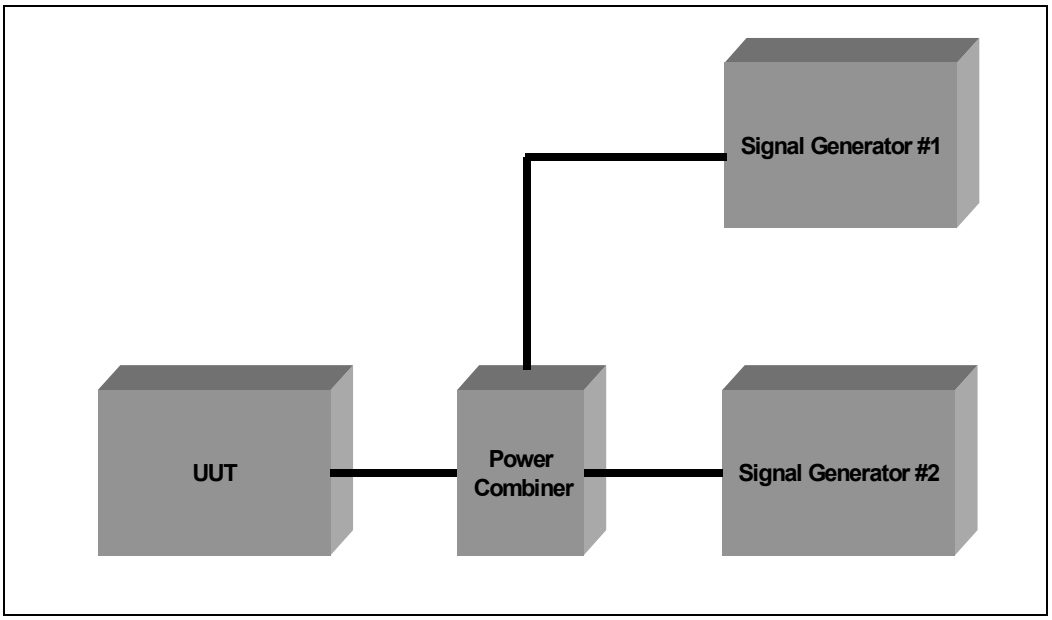

Figure 6-2. Frequency Selection Time (Receive) Test Equipment Configuration

c. Test Conduct. The test procedures are listed in table 6-1.

Table 6-1. Frequency Selection Time Test Procedures

Step	Action	Settings/Action	Result
The following procedures refer to reference number 9.			
1	Connect the equipment.	As shown in figure 6-1.	
2	Configure UUT.	Frequency: 224 MHz	
3	Key the UUT.	Ensure UUT is transmitting.	
4	Change frequency on UUT to 225 MHz.	Begin a stopwatch at the time the frequency is changed.	
5	Key the UUT.	Measure the time from when the frequency of the UUT was changed to 225 MHz until the transmitter reaches full output power.	
6	Connect the equipment.	As shown in figure 6-2.	
7	Configure UUT.	Frequency: 224 MHz	
8	Configure signal generator #1.	Frequency: 224 MHz Amplitude: – 90 dBm	
9	Configure signal generator #2.	Frequency: 225 MHz Amplitude: – 90 dBm	
10	Observe UUT.	Observe UUT to see if it is receiving.	
11	Change frequency on UUT to 225 MHz.	Begin a stopwatch at the time the frequency is changed.	

Table 6-1. Frequency Selection Time Test Procedures (continued)

Step	Action	Settings/Action	Result
12	Observe audio output of UUT.	Measure the time taken for the UUT to switch between receiving on 224 MHz to 225 MHz. The time to switch from 224 MHz to 225 MHz is the time from when the UUT stops receiving the 224 MHz signal until it begins receiving the 225-MHz signal.	
13	If the UUT is operated with an external automatic antenna coupler or multi-coupler, use a stopwatch to verify that the coupler tuning time does not exceed 60 seconds.		

Note: Sections that are not applicable to a particular step are shaded.
Legend:
dBm – decibels referenced 1 milliwatt MHz – megahertz UUT – Unit Under Test

6-4 Presentation of Results. The results will be shown in table 6-2 indicating the requirement and measured value or indications of capability.

Table 6-2. Frequency Selection Time Test Results

Reference Number	MIL-STD Paragraph	Requirement	Result		Finding	
			Required Value	Measured Value	Met	Not Met
9	5.3.1.6	The time from the selection of new frequency channel to the time that the radio set is operative for either transmission or reception on the new channel shall not exceed 10 seconds.	Less than 10 seconds			
		If the radio is operated with an external automatic antenna coupler or multi-coupler, the coupler tuning time should not exceed 60 seconds.	Less than 60 seconds			

Legend:
MIL-STD – Military Standard

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SUBTEST 7. DUTY CYCLE

7-1 Objective. To determine the extent of compliance to the requirements of MIL-STD-188-203-1A, reference number 10.

7-2 Criteria. Reference number 10. The radio equipment shall be capable of operating with a 100 percent transmit duty cycle. This duty cycle requirement shall apply under all applicable service conditions.

7-3 Test Procedures

a. Test Equipment Required

(1) UUT

(2) Watt Meter

(3) Dummy Load

b. Test Configuration. Configure the equipment as shown in figure 7-1.

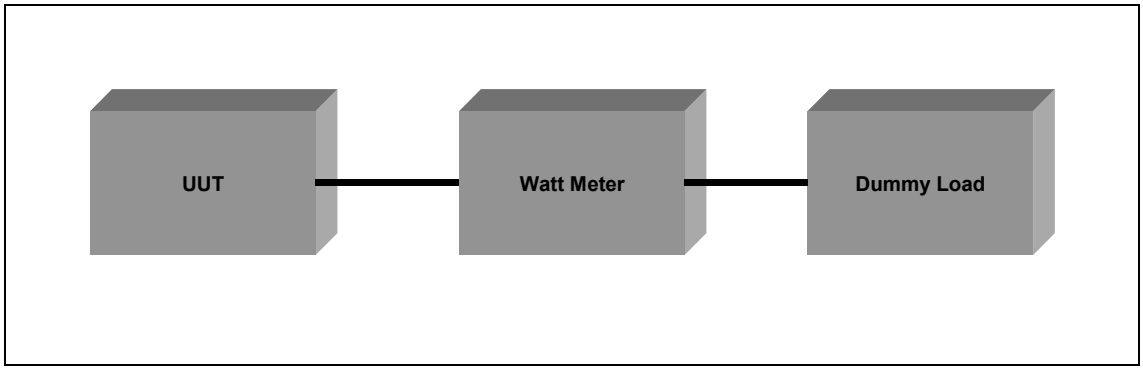

Figure 7-1. Duty Cycle Test Equipment Configuration

c. Test Conduct. The test procedures are listed in table 7-1.

Table 7-1. Duty Cycle Test Procedures

Step	Action	Settings/Action	Result
The following procedures refer to reference number 10.			
1	Research manufacturer's documentation to determine full-rated output power of UUT.		
2	Connect the equipment.	As shown in figure 7-1.	
3	Configure UUT.	Frequency: 225 MHz, High power	
4	Key the UUT.		
5	Observe the watt meter.	Ensure that the UUT is transmitting full rated output power per manufacturer's specifications.	
6	Leave the UUT keyed for one hour.		
7	At the end of one hour, ensure that the UUT is transmitting full rated output power.	Record the results in the data collection form.	

Note: Sections that are not applicable to a particular step are shaded.
Legend:
MHz – megahertz UUT – Unit Under Test

7-4 Presentation of Results. The results will be shown in table 7-2 indicating the requirement and measured value or indications of capability.

Table 7-2. Duty Cycle Test Results

Reference Number	MIL-STD Paragraph	Requirement	Result		Finding	
			Required Value	Measured Value	Met	Not Met
10	5.3.1.7	The radio equipment shall be capable of operating with a 100 percent transmit duty cycle. This duty cycle requirement shall apply under all applicable service conditions.	100 percent transmit duty cycle.			

Legend:
MIL-STD – Military Standard

SUBTEST 8. MAXIMUM AND DIFFERENTIAL TIME / ENVELOPE DELAYS

8-1 Objective. To determine the extent of compliance to the requirements of MIL-STD-188-203-1A, reference numbers 11, 12, and 14.

8-2 Criteria

a. Reference number 11. The maximum time delay measured between input and output of either the transmitter or receiver for any single frequency over the range of 500 hertz (Hz) to 3050 Hz shall be less than 3.5 ms (design objective (DO) of 2.5 ms).

b. Reference number 12. The differential time delay that results between any two audio tones within the frequency range of 815 Hz to 3050 Hz for either the transmitter or receiver shall not exceed 500 microseconds.

c. Reference number 14. The absolute envelope delay of amplitude modulation (AM) receivers over the frequency band from 300 Hz to 3000 Hz shall not exceed 2.5 ms.

8-3 Test Procedures

a. Test Equipment Required

(1) Audio Generator

(2) Attenuator

(3) UUT

(4) Oscilloscope

(5) Signal Generator

b. Test Configuration. Configure the equipment as shown in figures 8-1 and 8-2.

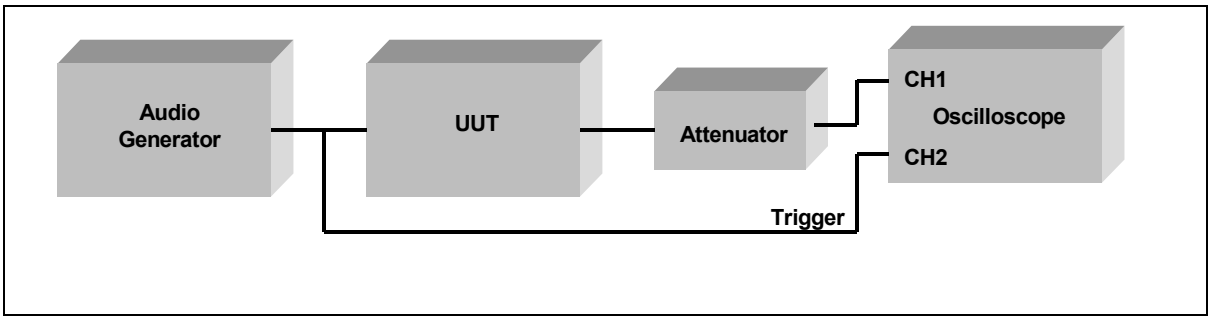

Figure 8-1. Equipment Configuration for Transmitter Time Delay

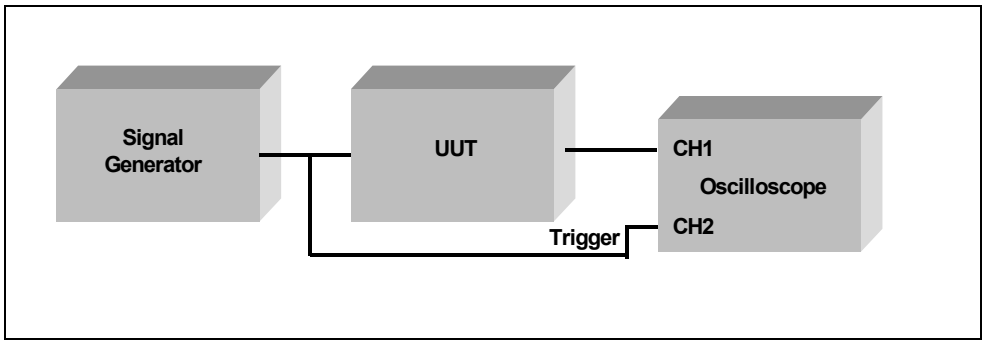

Figure 8-2. Equipment Configuration for Receiver Time Delay

c. Test Conduct. The test procedures are listed in table 8-1.

Table 8-1. Maximum and Differential Time / Envelope Delays Test Procedures

Step	Action	Settings/Action	Results
The following procedures refer to reference numbers 11, 12, and 14.			
1	Set up equipment for Transmitter Time Delay.	See figure 8-1.	
2	Tune UUT.	FM (AM for reference number 14). Frequency: 119 MHz	
3	Set up audio generator.	Frequency: 300 Hz Level: Drive transmitter to full rated PEP.	
4	Set up oscilloscope.	Set Horizontal Scale to 5 msec/div. Set Vertical Scale to 0.5 V/div. Set Trigger to single sweep, channel 2. Set level to trigger when AF output on audio generator is toggled ON/OFF.	
5	Set AF output ON audio generator to OFF position.		
6	Select RUN on oscilloscope.		
7	Key transmitter.		
8	Turn audio generator AF output ON.	Capture Transmitter Time Delay on oscilloscope.	

Table 8-1. Maximum and Differential Time / Envelope Delays Test Procedures (continued)

Step	Action	Settings/Action	Results
9	Measure Transmitter Time Delay.	The Transmitter Time Delay is measured by placing vertical marker #1 at the point where the AF output on the audio generator is turned on (measured on channel two), and vertical marker #2 at the point where the amplitude of the audio signal on channel one reaches 90 percent of its steady-state value. The time difference between the two vertical markers is the Transmitter Time Delay.	
10	Increase the frequency of the audio generator in 100 Hz steps until 3100 Hz is reached, while repeating steps 3 through 9.	Record results on data collection form.	
11	Set up equipment for Receiver Time Delay.	See figure 8-2.	
12	Set up signal generator.	Frequency: 119 MHz Rate: 300 Hz Level: -90 dBm	
13	Set up oscilloscope.	Set Horizontal Scale to 5 msec/div. Set Vertical Scale to 0.5 V/div. Set Trigger to single sweep, channel 2. Set level to trigger when RF output on signal generator is toggled ON/OFF.	
14	Set RF output on signal generator to OFF position.		
15	Select RUN on oscilloscope.		
16	Ensure UUT is in receive mode.		
17	Turn signal generator RF output ON.	Capture Receiver Time Delay on oscilloscope.	
18	Measure Receiver Time Delay.	The Receiver Time Delay is measured by placing vertical marker #1 at the point where the RF output on the signal generator is turned on (measured on channel two), and vertical marker #2 at the point where the amplitude of the RF signal on channel one reaches 90 percent of its steady-state value. The time difference between the two vertical markers is the Receiver Time Delay.	
19	Increase the FM rate of the signal generator in 100 Hz steps until 3100 Hz is reached, while repeating steps 12 through 18.	Record results on data collection form.	
20	Record the time delay differential over the passband for both the transmitter and receiver.	The time delay differential is the time difference between the fastest tone through the system and the slowest tone through the system.	

Table 8-1. Maximum and Differential Time / Envelope Delays Test Procedures (continued)

Step	Action	Settings/Action	Results
21	For AM receivers, measure the absolute envelope delay over the frequency band.		
22	Record the maximum time delay for any single frequency for both the transmitter and the receiver.		

Note: Sections that are not applicable to a particular step are shaded.
Legend:
AF – Audio Frequency
AM – Amplitude Modulation
dBm – decibels referenced to one milliwatt
div – division
FM – Frequency Modulation
Hz – hertz
kHz – kilohertz
MHz – Megahertz
msec – millisecond
PEP – Peak Envelope Power
RF – Radio Frequency
UUT – Unit Under Test
V – volt

8-4 Presentation of Results. The results will be shown in table 8-2 indicating the requirement and measured value or indications of capability.

Table 8-2. Maximum and Differential Time / Envelope Delays Test Results

Reference Number	MIL-STD Paragraph	Requirement	Result		Finding	
			Required Value	Measured Value	Met	Not Met
11	5.3.1.8.1	The maximum time delay measured between input and output of either the transmitter or receiver for any single frequency over the range of 500 Hz to 3050 Hz shall be less than 3.5 milliseconds (DO of 2.5 milliseconds).	Less than 3.5 ms.			
12	5.3.1.8.2	The differential time delay that results between any two audio tones within the frequency range of 815 Hz to 3050 Hz for either the transmitter or receiver shall not exceed 500 micro-seconds.	Not to exceed 500 µs.			
14	5.1.3.2	The absolute envelope delay of AM receivers over the frequency band from 300 Hz to 3000 Hz shall not exceed 2.5 ms.	Not to exceed 2.5 ms.			

Legend:
µs – microseconds
AM –Amplitude Modulation
DO – Design Objective
Hz – hertz
MIL-STD – Military Standard
ms – milliseconds

SUBTEST 9. RF TERMINATIONS

9-1 Objective. To determine the extent of compliance to the requirements of MIL-STD-188-203-1A, reference number 13.

9-2 Criteria. Reference number 13. The nominal impedance at the receiver RF input terminal shall be 50 ohms, unbalanced to ground. The transmitter RF output load impedance shall be a nominal 50 ohms, unbalanced to ground. The transmitter shall be protected against failures induced by a voltage standing wave ratio (VSWR) greater than 4:1.

9-3 Test Procedures

a. Test Equipment Required

(1) Standing Wave Ratio Meter

(2) UUT

(3) 50 Ohm Load

(4) Impedance Analyzer

(5) Multimeter

b. Test Configuration. Configure the equipment as shown in figures 9-1 and 9-2.

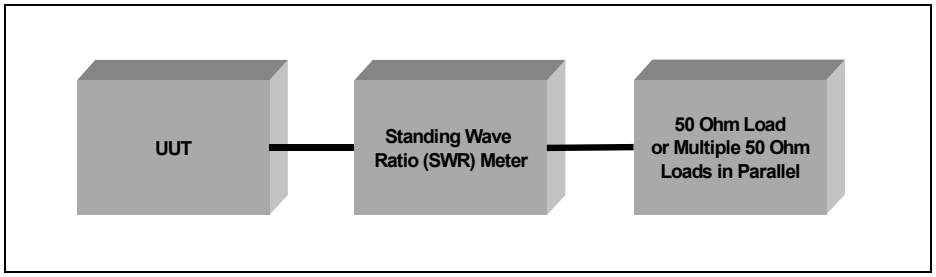

Figure 9-1. Configuration to Determine Power Output Impedance Configuration

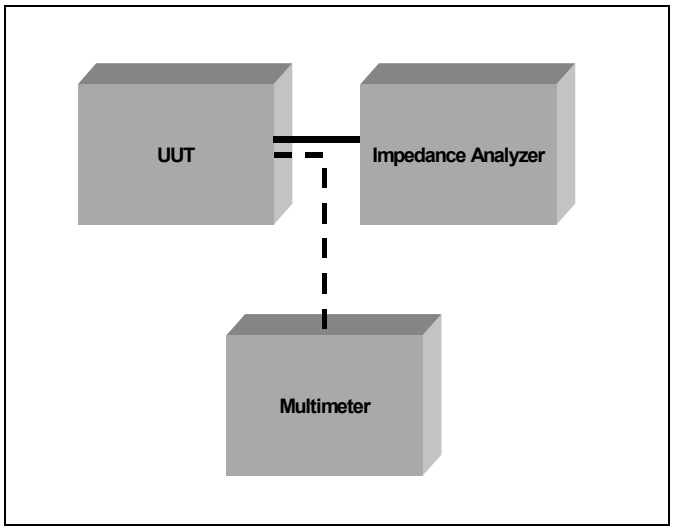

Figure 9-2. Input Impedance Test Equipment Configuration

c. Test Conduct. The test procedures are listed in table 9-1.

Table 9-1. RF Terminations Test Procedures

Step	Action	Settings/Action	Result
The following procedures refer to reference number 13.			
1	Set up equipment.	See figure 9-1.	
2	Tune the UUT to 225 MHz, USB.		
3	Transmit UUT.	Record measured VSWR.	
4	Unkey UUT. Add 50-ohm loads in parallel to increase the VSWR.	Record measured VSWR each time a 50-ohm load is added.	
5	Transmit UUT. Record transmit power.	Record measured VSWR. Note: A low VSWR into a 50-ohm load verifies that the transmission output load impedance is a nominal 50 ohms.	
6	Put short circuit at end of RF cable from UUT and transmit for 1 to 3 seconds.		
7	Put open circuit at end of cable and transmit for 1 to 3 seconds.	Verify that the transmitter will survive any VSWR at the antenna coupler.	
8	Set up equipment.	See figure 9-2.	
9	Set up impedance analyzer to sweep the operating band of the UUT in 1-MHz steps.		

Table 9-1. RF Terminations Test Procedures (continued)

Step	Action	Settings/Action	Result
10	Record the nominal RF input impedance.		
11	Use the multimeter to verify that the RF terminal(s) is/are unbalanced with respect to ground.	Check to see if center pin is isolated from ground and from shield.	

Note: Sections that are not applicable to a particular step are shaded.
Legend:
MHz – megahertz USB – Upper Sideband VSWR – Voltage Standing Wave Ratio
RF – Radio Frequency UUT – Unit Under Test

9-4 Presentation of Results. The results will be shown in table 9-2 indicating the requirement and measured value or indications of capability.

Table 9-2. RF Terminations Test Results

Reference Number	MIL-STD Paragraph	Requirement	Result		Finding	
			Required Value	Measured Value	Met	Not Met
13	5.3.1.9	The nominal impedance at the receiver RF input terminal shall be 50 ohms, unbalanced to ground. The transmitter RF output load impedance shall be a nominal 50 ohms, unbalanced to ground.	Input / output impedance: 50 ohms			
		The transmitter shall be protected against failures induced by a voltage standing wave ratio (VSWR) greater than 4:1.	Survive VSWR greater than 4:1.			

Note: Additional requirements for signal levels different from the levels stated in 5.1.3.7 for automatic level (or gain) control may be stated in applicable equipment specifications and may be implemented either externally, for example, in the form of an appliqué, or internally as an integral part of the receiver.
Legend:
MIL-STD – Military Standard RF – Radio Frequency VSWR – Voltage Standing Wave Ratio

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SUBTEST 10. UHF ACCURACY AND STABILITY AND CALIBRATION RESOLUTION

10-1 Objective. To determine the extent of compliance to the requirements of MIL-STD-188-203-1A, reference numbers 15 and 16 and STANAG 5511, annex B, reference numbers 30, 31, 34, and 42.

10-2 Criteria

a. Reference number 15. The UHF frequency coverage shall be as specified in reference number 1, as stated, Tactical Digital Information Link (TADIL) A data communications will be capable of operation in either the high frequency (HF) or UHF bands. In the UHF band, the radio equipment shall be capable of being tuned to any integral multiple of 25 kHz in the frequency range of 225.000 megahertz (MHz) through 399.975 MHz. The frequency readout shall be in terms of carrier frequency (f_c).

b. Reference number 16. The unmodulated transmitted carrier and receiver center frequencies shall be within ± 0.0005 percent of the selected f_c after a warm-up period of 5 minutes under any combination of specified service conditions.

c. Reference number 30. The setting accuracy and subsequent stability of the frequency standard clock shall be:

1) ± 1 part in 10^7 after a 30 minute warm-up period, and
2) ± 1 part in 10^8 for any period of 24 hours after a warm-up period of 4 hours under any combination of specified service conditions.

d. Reference number 31. An adjustment shall be provided to permit the equipment to be periodically calibrated or aligned to within ± 1 part in 10^9 of the designed frequency.

e. Reference number 34. After an initial warm-up period, not exceeding 5 minutes, the deviation from the selected carrier frequency in the absence of modulation shall not exceed ± 2.5 kHz.

f. Reference number 42. The accuracy of any selected f_c shall not vary more than ± 5 parts in 10^6 for a period of 6 months after a warm-up period of 30 minutes under any combination of specified service conditions. An adjustment control shall be provided to permit the equipment to be periodically calibrated or aligned to within one part in 10^7 of the designated frequency. Refer to manufacturer's specifications.

10-3 Test Procedures

a. Test Equipment Required

(1) UUT

(2) Attenuators (2)

(3) Frequency Counters (2)

(4) Modulation Analyzer

(5) Push to Talk Keyer

(6) Power Splitter

(7) 600-Ohm Load

b. Test Configuration. Configure the equipment as shown in figures 10-1 and 10-2.

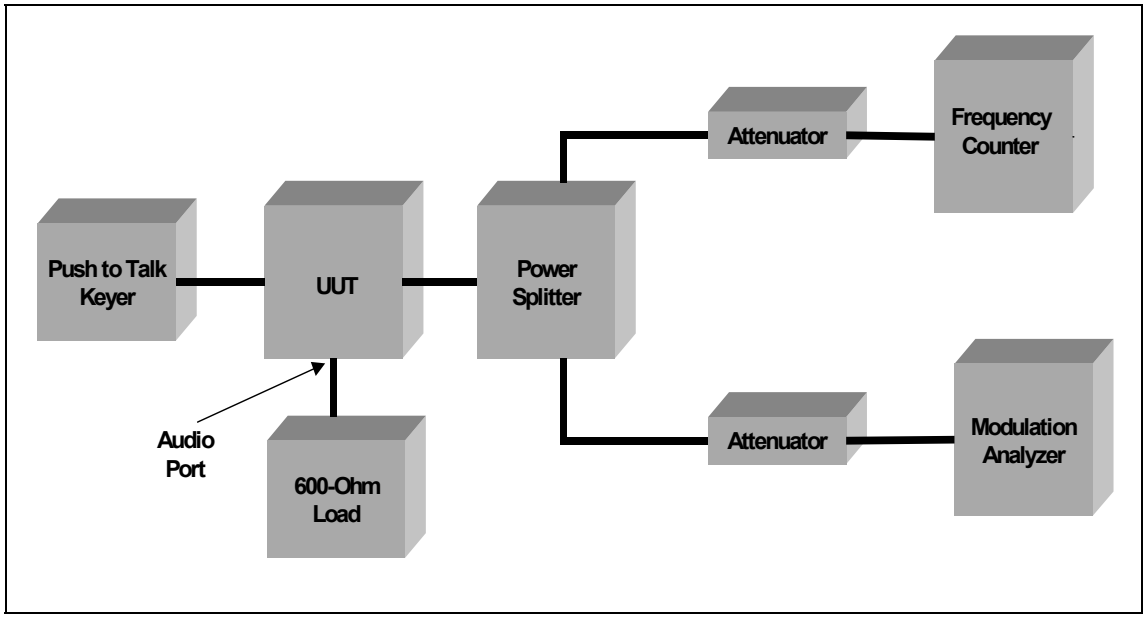

Figure 10-1. UHF Accuracy and Stability Test Equipment Configuration

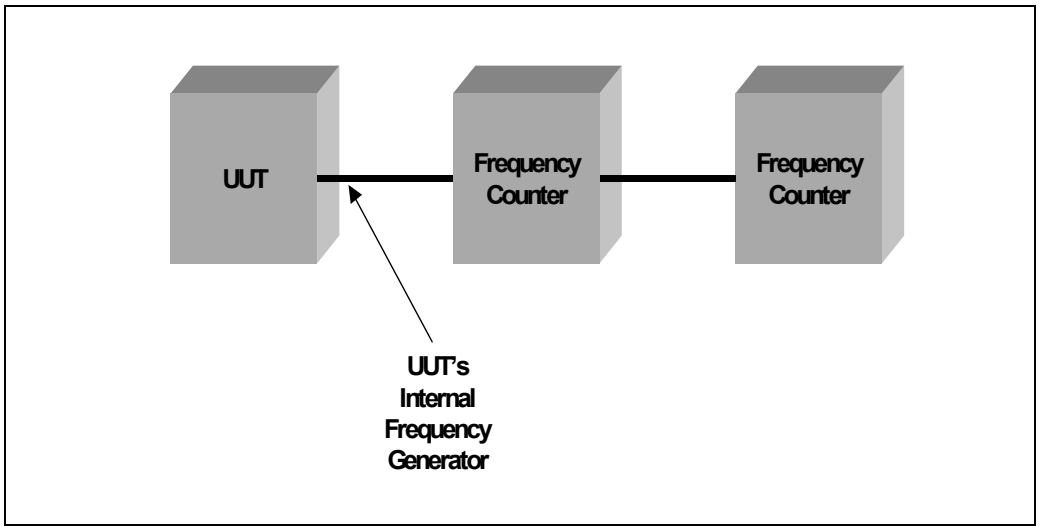

Figure 10-2. Internal Frequency Standard Accuracy and Stability Test Equipment Configuration

c. Test Conduct. Test procedures are listed in table 10-1.

Table 10-1. UHF Accuracy and Stability Test Procedures

Step	Action	Settings/Action	Measured Value
The following procedures are for reference number 34.			
1	Connect the equipment.	As shown in figure 10-1.	
2	Use appropriate attenuation.	To provide a 0-dBm input to the test equipment used.	
3	Configure UUT.	Frequency: 225 MHz Single Channel Low Power Squelch: ON Allow the UUT an initial warm-up time of 5 minutes.	
4	Configure the modulation analyzer.	Set the modulation analyzer to measure FM deviation.	
5	Configure frequency counter.	100 Count Average	
6	Ensure all equipment is powered on for 3 minutes to measure stability.		
7	Check the modulation analyzer.	Measure deviation. Record results on data collection form.	
The following procedures are for reference number 16.			
8	Unkey the UUT.	Change frequency to 250 MHz.	
9	Using the keyer, key the UUT.	Measure frequency shown on the frequency counter. Record the frequency on data collection form.	

Table 10-1. UHF Accuracy and Stability Test Procedures (continued)

Step	Action	Settings/Action	Measured Value
10	Unkey the UUT.	Change frequency to 300 MHz.	
11	Using the keyer, key the UUT.	Measure frequency accuracy of not more than ± 1500 Hz deviation from carrier frequency shown on the frequency counter. Record the frequency on data collection form.	
12	Unkey the UUT.	Change frequency to 325 MHz.	
13	Using the keyer, key the UUT.	Measure frequency accuracy of not more than ± 1625 Hz deviation from carrier frequency shown on the frequency counter. Record the frequency on data collection form.	
14	Unkey the UUT.	Change frequency to 350 MHz.	
15	Using the keyer, key the UUT.	Measure frequency accuracy of not more than ± 1750 Hz deviation from carrier frequency shown on the frequency counter. Record the frequency on data collection form.	
16	Unkey the UUT.	Change frequency to 375 MHz.	
17	Using the keyer, key the UUT.	Measure frequency accuracy of not more than ± 1875 Hz deviation from carrier frequency shown on the frequency counter. Record the frequency on data collection form.	
18	Check the modulation analyzer.	Measure deviation.	
19	Unkey the UUT.	Change frequency to 399 MHz.	
20	Using the keyer, key the UUT.	Measure frequency accuracy of not more than ± 1995 Hz deviation from carrier frequency shown on the frequency counter. Record the frequency on data collection form.	
21	Check the modulation analyzer.	Measure deviation.	
The following procedures are for reference numbers 31 and 42.			
22	Check to see if UUT has frequency adjustment control and that it will calibrate and align UUT to within ± 1 part in 10^9.	Refer to manufacturer's specifications.	
The following procedures are for reference number 30.			
23	Set up equipment.	As shown in figure 10-2.	
24	Allow UUT to warm-up for a period of 30 minutes.	Set UUT frequency to 300 MHz.	

Table 10-1. UHF Accuracy and Stability Test Procedures (continued)

Step	Action	Settings/Action	Measured Value
25	Measure the accuracy of the frequency standard clock.	Measure frequency accuracy of not more than ± 30-Hz deviation from carrier frequency shown on the frequency counter. Record the frequency on data collection form.	
26	Allow UUT to warm-up for an additional 3.5 hours.		
27	Measure the accuracy of the frequency standard clock.	Measure frequency accuracy of not more than ± 30-Hz deviation from carrier frequency shown on the frequency counter. Record the frequency on data collection form.	
28	Wait for 24 hours.		
29	Re-measure the accuracy of the frequency standard clock.	Compare and measure reading on frequency counter to value in step 27. Difference in value no more than ± 3 Hz.	
The following procedures are for reference number 15.			
30	Connect the equipment.	As shown in figure 10-1.	
31	Set UUT to 225.000 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
32	Set UUT to 225.025 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
33	Set UUT to 225.05 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
34	Set UUT to 225.075 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
35	Set UUT to 225.1 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
36	Set UUT to 238.6 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
37	Set UUT to 238.625 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
38	Set UUT to 238.65 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
39	Set UUT to 238.675 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
40	Set UUT to 238.7 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
41	Set UUT to 241.65 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
42	Set UUT to 241.675 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
43	Set UUT to 241.7 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
44	Set UUT to 241.725 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
45	Set UUT to 241.75 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
46	Set UUT to 250.8 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	

Table 10-1. UHF Accuracy and Stability Test Procedures (continued)

Step	Action	Settings/Action	Measured Value
47	Set UUT to 250.825 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
48	Set UUT to 250.85 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
49	Set UUT to 250.875 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
50	Set UUT to 250.9 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
51	Set UUT to 269.1 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
52	Set UUT to 269.125 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
53	Set UUT to 269.15 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
54	Set UUT to 269.175 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
55	Set UUT to 269.2 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
56	Set UUT to 275.2 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
57	Set UUT to 275.225 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
58	Set UUT to 275.25 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
59	Set UUT to 275.275 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
60	Set UUT to 275.3 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
61	Set UUT to 284.35 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
62	Set UUT to 284.375 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
63	Set UUT to 284.4 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
64	Set UUT to 284.425 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
65	Set UUT to 284.45 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
66	Set UUT to 293.5 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
67	Set UUT to 293.525 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
68	Set UUT to 293.55 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
69	Set UUT to 293.575 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
70	Set UUT to 293.6 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
71	Set UUT to 308.75 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	

Table 10-1. UHF Accuracy and Stability Test Procedures (continued)

Step	Action	Settings/Action	Measured Value
72	Set UUT to 308.775 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
73	Set UUT to 308.8 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
74	Set UUT to 308.825 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
75	Set UUT to 308.85 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
76	Set UUT to 319.425 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
77	Set UUT to 319.45 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
78	Set UUT to 319.475 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
79	Set UUT to 319.5 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
80	Set UUT to 319.525 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
81	Set UUT to 324.125 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
82	Set UUT to 324.15 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
83	Set UUT to 324.175 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
84	Set UUT to 324.2 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
85	Set UUT to 324.225 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
86	Set UUT to 331.625 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
87	Set UUT to 331.65 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
88	Set UUT to 331.675 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
89	Set UUT to 331.7 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
90	Set UUT to 331.725 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
91	Set UUT to 343.825 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
92	Set UUT to 343.85 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
93	Set UUT to 343.875 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
94	Set UUT to 343.9 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
95	Set UUT to 343.925 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
96	Set UUT to 354.5 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	

Table 10-1. UHF Accuracy and Stability Test Procedures (continued)

Step	Action	Settings/Action	Measured Value
97	Set UUT to 354.525 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
98	Set UUT to 354.55 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
99	Set UUT to 354.575 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
100	Set UUT to 354.6 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
101	Set UUT to 365.175 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
102	Set UUT to 365.2 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
103	Set UUT to 365.225 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
104	Set UUT to 365.25 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
105	Set UUT to 365.275 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
106	Set UUT to 372.8 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
107	Set UUT to 372.825 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
108	Set UUT to 372.85 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
109	Set UUT to 372.875 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
110	Set UUT to 372.9 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
111	Set UUT to 381.95 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
112	Set UUT to 381.975 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
113	Set UUT to 382.00 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
114	Set UUT to 382.025 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
115	Set UUT to 382.05 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
116	Set UUT to 387.1 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
117	Set UUT to 387.125 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
118	Set UUT to 387.15 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
119	Set UUT to 387.175 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
120	Set UUT to 387.2 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
121	Set UUT to 396.375 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	

Table 10-1. UHF Accuracy and Stability Test Procedures (continued)

Step	Action	Settings/Action	Measured Value
122	Set UUT to 396.4 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
123	Set UUT to 396.425 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
124	Set UUT to 396.45 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
125	Set UUT to 396.475 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
126	Set UUT to 399.875 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
127	Set UUT to 399.9 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
128	Set UUT to 399.925 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
129	Set UUT to 399.95 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	
130	Set UUT to 399.975 MHz.	Transmit UUT, record frequency measured with frequency counter on data collection form.	

Note: Sections that are not applicable to a particular step are shaded.
Legend:
FM – Frequency Modulation Hz – hertz kHz – kilohertz
MHz – megahertz UUT – Unit Under Test

10-4 Presentation of Results. The results will be shown in table 10-2 indicating the requirement and measured value or indications of capability.

Table 10-2. UHF Accuracy and Stability Test Results

Reference Number	MIL-STD Paragraph	Requirement	Result		Finding	
			Required Value	Measured Value	Met	Not Met
15	5.3.3.1.1	The UHF frequency coverage shall be as specified in 5.1.1. The frequency readout shall be in terms of f_c.				
16	5.3.3.1.2	The unmodulated transmitted carrier and receiver center frequencies shall be within ± 0.0005 percent of the selected f_c after a warm-up period of 5 minutes under any combination of specified service conditions.	Within ± 0.0005 percent.			

Table 10-2. UHF Accuracy and Stability Test Results (continued)

Reference Number	STANAG 5511, Annex B, Paragraph	Requirement	Result		Finding	
			Required Value	Measured Value	Met	Not Met
30	5.a	The setting accuracy and subsequent stability of the frequency standard clock shall be: 1. ± 1 part in 10^7 after 30 minute warm-up period, and 2. ± 1 part in 10^8 for any period of 24 hours after a warm-up period of 4 hours under any combination of specified service conditions.	± 1 part in 10^7.			
			± 1 part in 10^8.			
31	5.b	An adjustment shall be provided to permit the equipment to be periodically calibrated or aligned to within ± 1 part in 10^9 of the designed frequency.	Within ± 1 part in 10^9.			
34	7.3.d	After an initial warm-up period, not exceeding 5 minutes, the deviation from the selected carrier frequency in the absence of modulation shall not exceed ± 2.5 kHz.	Not to exceed ± 2.5 kHz.			
42	7.5	The accuracy of any selected carrier frequency shall not vary more than ± 5 parts in 10^6 for a period of 6 months after a warm-up period of 30 minutes under any combination of specified service conditions. An adjustment control shall be provided to permit the equipment to be periodically calibrated or aligned to within one part in 10^7 of the designated frequency. Refer to manufacturer's specifications.	± 5 parts in 10^6.			
			Within 1 part in 10^7.			

Legend:

f_c – Carrier Frequency
kHz – kilohertz
MIL-STD – Military Standard
STANAG – Standardization Agreement
UHF – Ultra High Frequency

SUBTEST 11. INTERMEDIATE FREQUENCY (IF) SELECTIVITY (TRANSMITTER AND RECEIVER)

11-1 Objective. To determine the extent of compliance to the requirements of MIL-STD-188-203-1A, reference number 17.

11-2 Criteria. Reference number 17. The 6 dB bandwidth shall be at least 50 kHz and the 60 dB bandwidth shall be no more than 200 kHz. The peak-to-peak ripple over 90 percent of the 6 dB bandwidth shall not exceed 3 dB.

11-3 Test Procedures

a. Test Equipment Required

(1) UUT

(2) Audio Generator

(3) Signal Generator

(4) Spectrum Analyzer

(5) Attenuator

(6) Audio Breakout Box

(7) Measuring Receiver

b. Test Configuration. Configure the equipment as shown in figures 11-1 and 11-2.

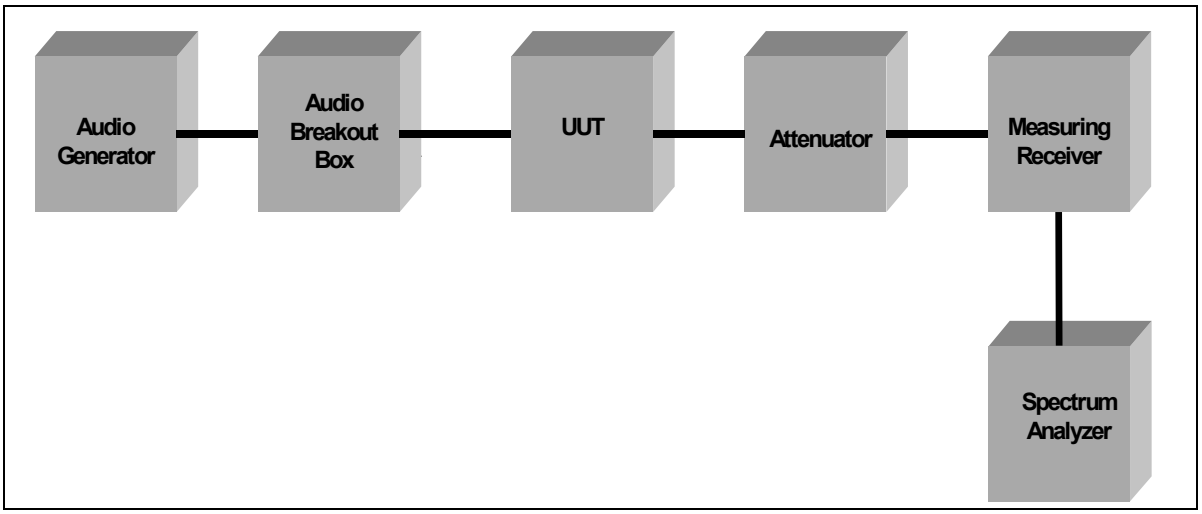

Figure 11-1. Intermediate Frequency (IF) Selectivity (Transmit) Test Equipment Configuration

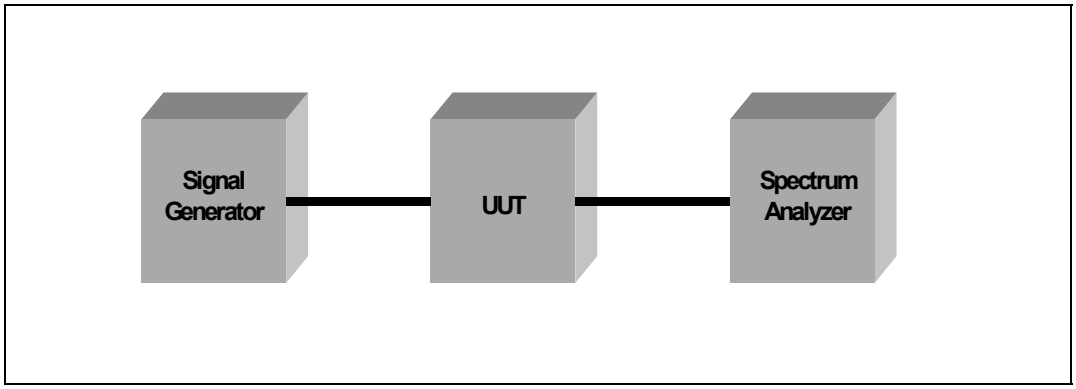

Figure 11-2. Intermediate Frequency (IF) Selectivity (Receive) Test Equipment Configuration

c. Test Conduct. Test procedures are listed in table 11-1.

Table 11-1. Intermediate Frequency (IF) Selectivity (Transmitter and Receiver) Test Procedures

Step	Action	Settings/Action	Measured Value
The following procedure is for reference number 17.			
1	Connect the equipment.	As shown in figure 11-1.	
2	Configure attenuator.	Use appropriate attenuation to provide a safe signal input to the test equipment used.	
3	Configure UUT.	Frequency: 225 MHz	
4	Configure audio generator.	Frequency: 300 Hz Amplitude: 0 dBm FM Rate: 300 Hz	
5	Configure spectrum analyzer.	Center Frequency: 100 kHz Span: 200 kHz Max Hold On	
6	Configure measuring receiver.	Measurement: FM	
7	Change frequency to 600 Hz on audio generator.	Observe spectrum analyzer. Record level of 600-Hz tone on data collection form.	
8	Change frequency to 1000 Hz on audio generator.	Observe spectrum analyzer. Record level of 1000-Hz tone on data collection form.	
9	Change frequency to 5 kHz on audio generator.	Observe spectrum analyzer. Record level of 5-kHz tone on data collection form.	
10	Change frequency to 10 kHz on audio generator.	Observe spectrum analyzer. Record level of 10-kHz tone on data collection form.	
11	Change frequency to 15 kHz on audio generator.	Observe spectrum analyzer. Record level of 15-kHz tone on data collection form.	
12	Change frequency to 20 kHz on audio generator.	Observe spectrum analyzer. Record level of 20-kHz tone on data collection form.	
13	Change frequency to 30 kHz on audio generator.	Observe spectrum analyzer. Record level of 30-kHz tone on data collection form.	
14	Change frequency to 40 kHz on audio generator.	Observe spectrum analyzer. Record level of 40-kHz tone on data collection form.	
15	Change frequency to 50 kHz on audio generator.	Observe spectrum analyzer. Record level of 50-kHz tone on data collection form.	
16	Change frequency to 60 kHz on audio generator.	Observe spectrum analyzer. Record level of 60-kHz tone on data collection form.	
17	Change frequency to 70 kHz on audio generator.	Observe spectrum analyzer. Record level of 70-kHz tone on data collection form.	
18	Change frequency to 80 kHz on audio generator.	Observe spectrum analyzer. Record level of 80-kHz tone on data collection form.	
19	Change frequency to 90 kHz on audio generator.	Observe spectrum analyzer. Record level of 90-kHz tone on data collection form.	
20	Change frequency to 100 kHz on audio generator.	Observe spectrum analyzer. Record level of 100-kHz tone on data collection form.	
21	Change frequency to 110 kHz on audio generator.	Observe spectrum analyzer. Record level of 110-kHz tone on data collection form.	
22	Change frequency to 120 kHz on audio generator.	Observe spectrum analyzer. Record level of 120-kHz tone on data collection form.	
23	Change frequency to 130 kHz on audio generator.	Observe spectrum analyzer. Record level of 130-kHz tone on data collection form.	
24	Change frequency to 140 kHz on audio generator.	Observe spectrum analyzer. Record level of 140-kHz tone on data collection form.	

Table 11-1. Intermediate Frequency (IF) Selectivity (Transmitter and Receiver) Test Procedures (continued)

Step	Action	Settings/Action	Measured Value
25	Change frequency to 150 kHz on audio generator.	Observe spectrum analyzer. Record level of 150-kHz tone on data collection form.	
26	Change frequency to 160 kHz on audio generator.	Observe spectrum analyzer. Record level of 160-kHz tone on data collection form.	
27	Change frequency to 170 kHz on audio generator.	Observe spectrum analyzer. Record level of 170-kHz tone on data collection form.	
28	Change frequency to 180 kHz on audio generator.	Observe spectrum analyzer. Record level of 180-kHz tone on data collection form.	
29	Change frequency to 190 kHz on audio generator.	Observe spectrum analyzer. Record level of 190-kHz tone on data collection form.	
30	Change frequency to 200 kHz on audio generator.	Observe spectrum analyzer. Record level of 200-kHz tone on data collection form.	
31	Set markers on highest and lowest peak.	Ensure that 6-dB bandwidth is at least 50 kHz and the 60-dB bandwidth less than 200 kHz. Ensure that the peak-to-peak ripple does not exceed 3 dB over 90 percent of the 6-dB bandwidth.	
32	Connect the equipment.	As shown in figure 11-2.	
33	Configure signal generator.	FM rate: 300 Hz Frequency: 225 MHz Amplitude: – 90 dBm	
34	Configure UUT.	Frequency: 225 MHz	
35	Configure spectrum analyzer.	Center frequency: 100 kHz Span: 200 kHz	
36	Change FM rate to 600 Hz on signal generator.	Observe spectrum analyzer. Record level of 600 Hz tone on data collection form.	
37	Change FM rate to 1000 Hz on signal generator.	Observe spectrum analyzer. Record level of 1000 Hz tone on data collection form.	
38	Change FM rate to 5 kHz on signal generator.	Observe spectrum analyzer. Record level of 5-kHz tone on data collection form.	
39	Change FM rate to 10 kHz on signal generator.	Observe spectrum analyzer. Record level of 10-kHz tone on data collection form.	
40	Change FM rate to 15 kHz on signal generator.	Observe spectrum analyzer. Record level of 15-kHz tone on data collection form.	
41	Change FM rate to 20 kHz on signal generator.	Observe spectrum analyzer. Record level of 20-kHz tone on data collection form.	
42	Change FM rate to 30 kHz on signal generator.	Observe spectrum analyzer. Record level of 30-kHz tone on data collection form.	
43	Change FM rate to 40 kHz on signal generator.	Observe spectrum analyzer. Record level of 40-kHz tone on data collection form.	
44	Change FM rate to 50 kHz on signal generator.	Observe spectrum analyzer. Record level of 50-kHz tone on data collection form.	
45	Change FM rate to 60 kHz on signal generator.	Observe spectrum analyzer. Record level of 60-kHz tone on data collection form.	
46	Change FM rate to 70 kHz on signal generator.	Observe spectrum analyzer. Record level of 70-kHz tone on data collection form.	
47	Change FM rate to 80 kHz on signal generator.	Observe spectrum analyzer. Record level of 80-kHz tone on data collection form.	
48	Change FM rate to 90 kHz on signal generator.	Observe spectrum analyzer. Record level of 90-kHz tone on data collection form.	

Table 11-1. Intermediate Frequency (IF) Selectivity (Transmitter and Receiver) Test Procedures (continued)

Step	Action	Settings/Action	Measured Value
49	Change FM rate to 100 kHz on signal generator.	Observe spectrum analyzer. Record level of 100-kHz tone on data collection form.	
50	Change FM rate to 110 kHz on signal generator.	Observe spectrum analyzer. Record level of 110-kHz tone on data collection form.	
51	Change FM rate to 120 kHz on signal generator.	Observe spectrum analyzer. Record level of 120-kHz tone on data collection form.	
52	Change FM rate to 130 kHz on signal generator.	Observe spectrum analyzer. Record level of 130-kHz tone on data collection form.	
53	Change FM rate to 140 kHz on signal generator.	Observe spectrum analyzer. Record level of 140-kHz tone on data collection form.	
54	Change FM rate to 150 kHz on signal generator.	Observe spectrum analyzer. Record level of 150-kHz tone on data collection form.	
55	Change FM rate to 160 kHz on signal generator.	Observe spectrum analyzer. Record level of 160-kHz tone on data collection form.	
56	Change FM rate to 170 kHz on signal generator.	Observe spectrum analyzer. Record level of 170-kHz tone on data collection form.	
57	Change FM rate to 180 kHz on signal generator.	Observe spectrum analyzer. Record level of 180-kHz tone on data collection form.	
58	Change FM rate to 190 kHz on signal generator.	Observe spectrum analyzer. Record level of 190-kHz tone on data collection form.	
59	Change FM rate to 200 kHz on signal generator.	Observe spectrum analyzer. Record level of 200-kHz tone on data collection form.	
60	Set markers on highest and lowest peak.	Ensure that peak-to-peak ripple over 90 percent of the 6-dB bandwidth does not exceed 3 dB. Ensure that 6-dB bandwidth is at least 50 kHz, and the 60-dB bandwidth is less than 200 kHz.	

Note: Sections that are not applicable to a particular step are shaded.
Legend:
dB – decibels
dBm – decibels referenced to 1 milliwatt
FM – Frequency Modulation
Hz – hertz
kHz – kilohertz
MHz – megahertz
UUT – Unit Under Test

11-4 Presentation of Results. The results will be shown in table 11-2 indicating the requirement and measured value or indications of capability.

Table 11-2. Intermediate Frequency (IF) Selectivity (Transmitter and Receiver) Test Results

Reference Number	MIL-STD Paragraph	Requirement	Result		Finding	
			Required Value	Measured Value	Met	Not Met
17	5.3.3.1.3	The 6-dB bandwidth shall be at least 50 kHz and the 60-dB bandwidth shall be no more than 200 kHz. The peak-to-peak ripple over 90 percent of the 6-dB bandwidth shall not exceed 3 dB.	50 kHz / 200 kHz			
			3 dB			

Legend:
dB – decibels kHz – kilohertz MIL-STD – Military Standard

SUBTEST 12. UHF RECEIVER SENSITIVITY

12-1 Objective. To determine the extent of compliance to the requirements of MIL-STD-188-203-1A, reference numbers 18 and 22.

12-2 Criteria

a. Reference number 18. The sensitivity of the receiver over the specified frequency range shall be such that an RF input test signal results in a minimum output Signal plus Noise to Noise (S+N/N) ratio of 20 dB as measured in a 3-kHz bandwidth. The RF input test signal shall have a level of – 99 dBm and shall be frequency modulated at a rate of 1 kHz with a peak deviation of ± 10 kHz.

b. Reference number 22. With a receive input signal of – 53 dBm modulated at ± 8 kHz peak deviation at a 1-kHz rate, the S+N/N ratio shall be 40 dB or greater as measured in a 3-kHz bandwidth.

NOTE: Peak deviation is defined as the absolute maximum frequency excursion of the outer spectral component from the assigned frequency.

12-3 Test Procedures

a. Test Equipment Required

(1) UUT

(2) Signal Generator

(3) Audio Breakout Box

(4) Audio Analyzer

b. Test Configuration. Configure the equipment as shown in figure 12-1.

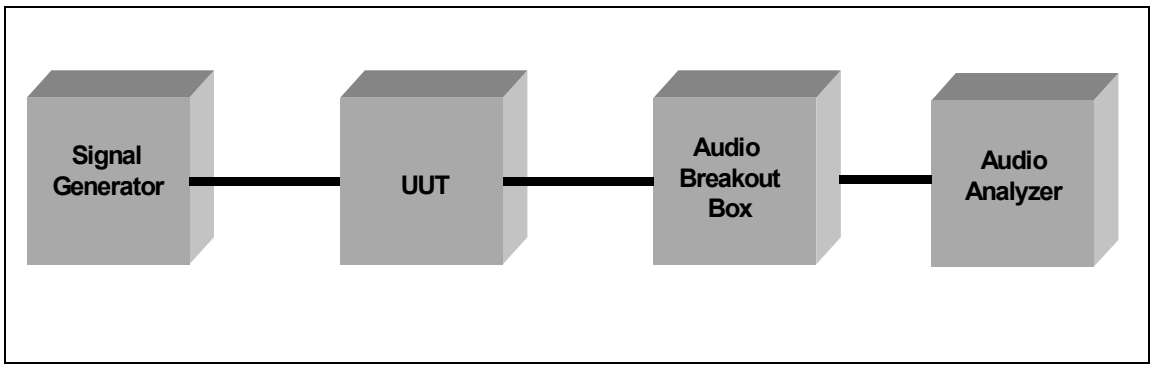

Figure 12-1. UHF Receiver Sensitivity Test Equipment Configuration

c. Test Conduct. Test procedures are listed in table 12-1.

Table 12-1. UHF Receiver Sensitivity Test Procedures

Step	Action	Settings/Action	Measured Value
The following procedure is for reference number 18.			
1	Connect the equipment.	As shown in figure 12-1.	
2	Configure UUT.	Frequency: 250 MHz	
3	Configure signal generator.	Frequency: 250 MHz Rate: 1 kHz Amplitude: – 99 dBm FM Deviation: 10 kHz	
4	Configure audio analyzer.	Measurement: S+N/N	
5	Configure audio breakout box.	Refer to manufacturer's specifications for proper audio pinout.	
6	Turn the RF and MOD of the signal generator on.	Observe S+N/N ratio on audio analyzer.	
7	Record results on data collection form.	Measure S+N/N ratio.	
8	Change frequency on UUT and signal generator to 300 MHz.	Observe S+N/N ratio on audio analyzer.	
9	Record results on data collection form.	Measure S+N/N ratio.	
10	Change frequency on UUT and signal generator to 325 MHz.	Observe S+N/N ratio on audio analyzer.	
11	Record results on data collection form.	Measure S+N/N ratio.	
12	Change frequency on UUT and signal generator to 350 MHz.	Observe S+N/N ratio on audio analyzer.	
13	Record results on data collection form.	Measure S+N/N ratio.	
The following procedure is for reference number 22.			
14	Configure signal generator.	Frequency: 250 MHz Rate: 1 kHz Amplitude: – 53 FM Deviation: ± 8 kHz	
15	Use audio analyzer to measure S+N/N ratio.	Record results on data collection form.	

Note: Sections that are not applicable to a particular step are shaded.

Legend:

dBm – decibels referenced to one milliwatt
FM – Frequency Modulation
kHz – kilohertz
MHz – megahertz
MOD – Modulation
RF – Radio Frequency
S+N/N – Signal Plus Noise to Noise
UUT – Unit Under Test

12-4 Presentation of Results. The results will be shown in table 12-2 indicating the requirement and measured value or indications of capability.

Table 12-2. UHF Receiver Sensitivity Test Results

Reference Number	MIL-STD Paragraph	Requirement	Result		Finding	
			Required Value	Measured Value	Met	Not Met
18	5.3.3.2.2	The sensitivity of the receiver over the specified frequency range shall be such that an RF input test signal results in a minimum output S+N/N ratio of 20 dB as measured in a 3-kHz bandwidth. The RF input test signal shall have a level of – 99 dBm and shall be FM modulated at a rate of 1 kHz with a peak deviation of ± 10 kHz.	At least 20 dB.			
22	5.3.3.2.6	With a receive input signal of – 53 dBm modulated at ± 8-kHz peak deviation at a 1-kHz rate, the S+N/N ratio shall be 40 dB or greater as measured in a 3-kHz bandwidth.	At least 40 dB.			

Legend:
dB – decibels
dBm – decibels referenced to one milliwatt
FM – Frequency Modulation
kHz – kilohertz
MIL-STD – Military Standard
RF – Radio Frequency
S+N/N – Signal plus Noise to Noise

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SUBTEST 13. UHF FREQUENCY RESPONSE

13-1 Objective. To determine the extent of compliance to the requirements of MIL-STD-188-203-1A, reference numbers 19 and 26.

13-2 Criteria

a. Reference number 19. With an RF input signal level of – 73 dBm with peak deviation of ± 20 kHz applied to the receiver input terminals, the attenuation of the audio output relative to the peak response between 450 Hz and 3050 Hz shall not exceed 2 dB. The attenuation of the audio output at 300 Hz, relative to the peak response between 450 Hz and 3050 Hz shall not exceed 3 dB.

b. Reference number 26. The attenuation of the RF output relative to the peak response between 450 Hz and 3050 Hz shall not exceed 2 dB. The attenuation of the RF output, at 300 Hz, relative to the peak response between 450 Hz and 3050 Hz shall not exceed 3 dB.

13-3 Test Procedures

a. Test Equipment Required

(1) UUT

(2) Audio Breakout Box

(3) Signal Generator

(4) Spectrum Analyzer

(5) Audio Generator

(6) Attenuator

(7) Modulation Analyzer

b. Test Configuration. Configure the equipment as shown in figures 13-1 and 13-2.

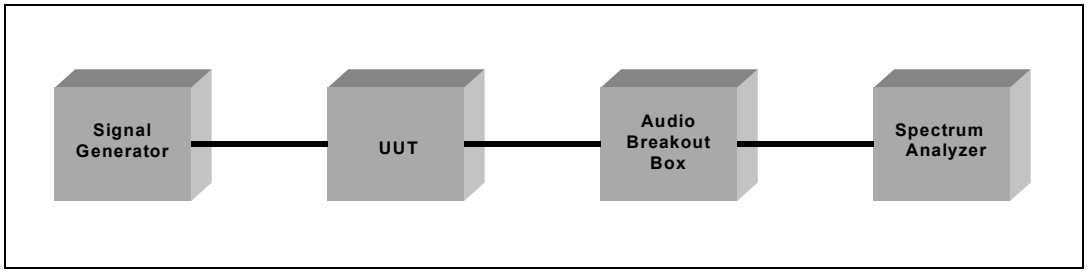

Figure 13-1. UHF Frequency Response (Receive) Test Equipment Configuration

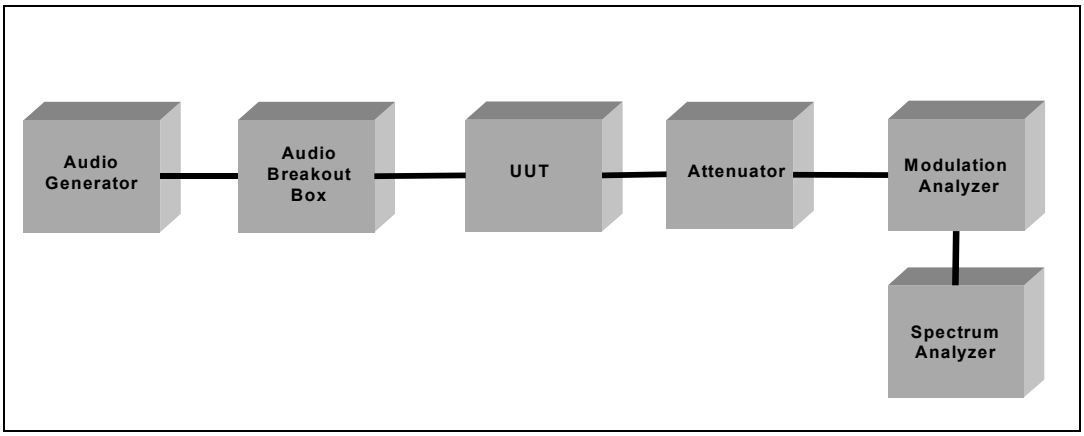

Figure 13-2. UHF Frequency Response (Transmit) Test Equipment Configuration

c. Test Conduct. Test procedures are listed in table 13-1.

Table 13-1. UHF Frequency Response Test Procedures

Step	Action	Settings/Action	Measured Value
The following procedures are for reference number 19.			
1	Connect the equipment.	As shown in figure 13-1.	
2	Configure signal generator.	Amplitude: – 73 dBm Peak Deviation: ± 20 kHz Frequency: 225 MHz Rate: 450 Hz	
3	Configure UUT.	Frequency: 225 MHz	
4	Configure audio breakout box.	Refer to manufacturer's specifications for proper audio pinout.	
5	Configure spectrum analyzer.	Center Frequency: 2 kHz Frequency Span: 4 kHz RF Coupling: dc Max Hold: On Amplitude: As required to provide full screen display.	
6	Turn on RF and modulation of signal generator.		
7	Step signal generator rate to 500 Hz.		
8	Step signal generator rate to 600 Hz.		
9	Step signal generator rate to 700 Hz.		
10	Step signal generator rate to 800 Hz.		

Table 13-1. UHF Frequency Response Test Procedures (continued)

Step	Action	Settings/Action	Measured Value
11	Step signal generator rate to 900 Hz.		
12	Step signal generator rate to 1000 Hz.		
13	Step signal generator rate to 1100 Hz.		
14	Step signal generator rate to 1200 Hz.		
15	Step signal generator rate to 1300 Hz.		
16	Step signal generator rate to 1400 Hz.		
17	Step signal generator rate to 1500 Hz.		
18	Step signal generator rate to 1600 Hz.		
19	Step signal generator rate to 1700 Hz.		
20	Step signal generator rate to 1800 Hz.		
21	Step signal generator rate to 1900 Hz.		
22	Step signal generator rate to 2000 Hz.		
23	Step signal generator rate to 2100 Hz.		
24	Step signal generator rate to 2200 Hz.		
25	Step signal generator rate to 2300 Hz.		
26	Step signal generator rate to 2400 Hz.		
27	Step signal generator rate to 2500 Hz.		
28	Step signal generator rate to 2600 Hz.		
29	Step signal generator rate to 2700 Hz.		
30	Step signal generator rate to 2800 Hz.		
31	Step signal generator rate to 2900 Hz.		
32	Step signal generator rate to 3000 Hz.		
33	Step signal generator rate to 3050 Hz.		
34	Select marker on spectrum analyzer.	Set marker 1 on the lowest audio tone.	
35	Select delta marker function.	With the second marker scroll along all of the audio tones. Record the level of the highest audio tone on data collection form.	

Table 13-1. UHF Frequency Response Test Procedures (continued)

Step	Action	Settings/Action	Measured Value
36	Record results on data collection form.	Measure the difference between the highest and lowest audio tone.	
37	Step signal generator rate to 300 Hz.	Place marker on the 300-Hz peak.	
38	Record results on data collection form.	Compare the 300-Hz audio peak to the highest audio tone found in step 36. Record results.	
The following procedures are for reference number 26.			
39	Connect the equipment.	As shown in figure 13-2.	
40	Configure audio generator.	Frequency: 450 Hz Amplitude: 0 dBm	
41	Use appropriate attenuation.	To provide a safe signal input to the test equipment used.	
42	Configure UUT.	Frequency: 225 MHz	
43	Configure audio break out box.	Refer to manufacturer's specifications for proper audio pinout.	
44	Configure spectrum analyzer.	Center Frequency: 2 kHz Frequency Span: 4 kHz RF Coupling: dc Amplitude: As required to provide full screen display.	
45	Set the modulation analyzer.		
46	Select max hold on the spectrum analyzer.		
47	Step audio generator to 500 Hz.		
48	Step audio generator to 600 Hz.		
49	Step audio generator to 700 Hz.		
50	Step audio generator to 800 Hz.		
51	Step audio generator to 900 Hz.		
52	Step audio generator to 1000 Hz.		
53	Step audio generator to 1100 Hz.		
54	Step audio generator to 1200 Hz.		
55	Step audio generator to 1300 Hz.		
56	Step audio generator to 1400 Hz.		

Table 13-1. UHF Frequency Response Test Procedures (continued)

Step	Action	Settings/Action	Measured Value
57	Step audio generator to 1500 Hz.		
58	Step audio generator to 1600 Hz.		
59	Step audio generator to 1700 Hz.		
60	Step audio generator to 1800 Hz.		
61	Step audio generator to 1900 Hz.		
62	Step audio generator to 2000 Hz.		
63	Step audio generator to 2100 Hz.		
64	Step audio generator to 2200 Hz.		
65	Step audio generator to 2300 Hz.		
66	Step audio generator to 2400 Hz.		
67	Step audio generator to 2500 Hz.		
68	Step audio generator to 2600 Hz.		
69	Step audio generator to 2700 Hz.		
70	Step audio generator to 2800 Hz.		
71	Step audio generator to 2900 Hz.		
72	Step audio generator to 3000 Hz.		
73	Step audio generator to 3050 Hz.		
74	Select marker on spectrum analyzer.	Set marker 1 on the lowest audio tone.	
75	Select delta marker function.	With the second marker scroll along all of the audio tones. Record the level of the highest audio tone on data collection form.	
76	Record results on data collection form.	Ensure the difference between the highest and lowest audio tone is within 2 dB.	
77	Step audio generator to 300 Hz.	Place marker on the 300-Hz peak.	
78	Record results on data collection form.	Compare the 300-Hz audio peak to the highest audio tone found in step 75. Record results on data collection form.	

Note: Sections that are not applicable to a particular step are shaded.
Legend:
dB – decibels
dBm – dB referred to 1 milliwatt
dc – direct current
Hz – hertz
kHz – kilohertz
MHz – megahertz
RF – Radio Frequency
UUT – Unit Under Test

13-4 Presentation of Results. The results will be shown in table 13-2 indicating the requirement and measured value or indications of capability.

Table 13-2. UHF Frequency Response Test Results

Reference Number	MIL-STD Paragraph	Requirement	Result		Finding	
			Required Value	Measured Value	Met	Not Met
19	5.3.3.2.3	With an RF input signal level of – 73 dBm with peak deviation of ± 20 kHz applied to the receiver input terminals, the attenuation of the audio output relative to the peak response between 450 Hz and 3050 Hz shall not exceed 2 dB.	Shall not exceed 2 dB.			
		The attenuation of the audio output at 300 Hz, relative to the peak response between 450 Hz and 3050 Hz shall not exceed 3 dB.	Shall not exceed 3 dB.			
26	5.3.3.3.2	The attenuation of the RF output relative to the peak response between 450 Hz and 3050 Hz shall not exceed 2 dB.	Shall not exceed 2 dB.			
		The attenuation of the RF output, at 300 Hz, relative to the peak response between 450 Hz and 3050 Hz shall not exceed 3 dB.	Shall not exceed 3 dB.			

Note: Sections that are not applicable to a particular step are shaded.
Legend:
dB – decibels
dBm – decibels referred to 1 milliwatt
Hz – hertz
kHz – kilohertz
MIL-STD – Military Standard
RF – Radio Frequency

SUBTEST 14. PROTECTION AND INPUT SIGNAL PROTECTION

14-1 Objective. To determine the extent of compliance to the requirements of MIL-STD–188-203-1A, reference number 20 and the STANAG 5511, annex B, paragraph 7.4.e., reference number 41.

14-2 Criteria

a. Reference number 20. A receiver protection circuit shall be activated by RF signal level. The receiver shall not be damaged by the continuous application of a +15 dBm (DO of +35 dBm) RF signal.

b. Reference number 41. The receiver shall be protected when the transmitter is at full power and the electrical isolation between the transmitter and receiver antenna terminals is as low as 26 dB. The protection circuit shall activate within 150 ms time interval used by the transmitter to go from the carrier “on” to the carrier “off” condition. Provision shall be made to override the protection circuitry to the extent required to monitor the transmitter at full power. The override feature shall provide the required receiver output when the electrical isolation between the transmitter antenna terminal and receiver antenna terminals is in the range 26 dB to 36 dB.

14-3 Test Procedures

a. Test Equipment Required

(1) Signal Generator

(2) 26 dB Attenuator

(3) UUT

(4) Audio Generator

a. Test Configuration. Configure the equipment as shown in figures 14-1 and 14-2.

Figure 14-1. Equipment Configuration for Receiver Protection Test

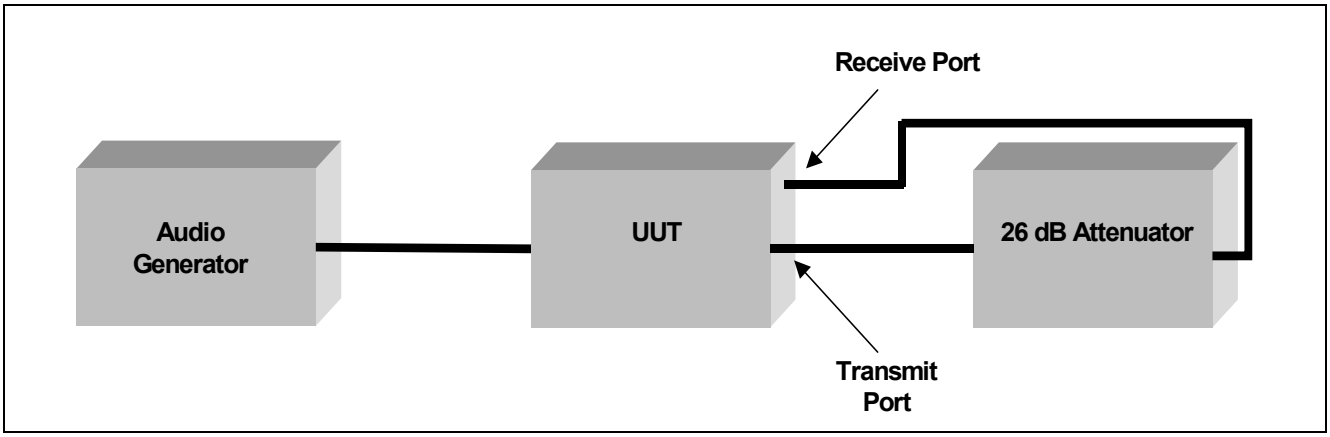

Figure 14-2. Equipment Configuration for Electrical Isolation Test

c. Test Conduct. This subtest should be the last test conducted. This subtest may damage the UUT if the UUT does not meet criteria given in reference numbers 20 and 41. Confirm the limits of the UUT with the manufacturer before testing. The procedures for this subtest are listed in table 14-1.

Table 14-1. Input Signal Protection Test Procedures

Step	Action	Settings/Action	Measured Value
The following procedures are for reference number 20.			
1	Analyze manufacturer's provided data and schematic drawings to ensure that the UUT is designed so that with primary power on or off, it will be capable of survival without damage with applied signals from this subtest.	If the UUT is not capable of survival without damage, stop the test.	

Table 14-1. Input Signal Protection Test Procedures (continued)

Step	Action	Settings/Action	Measured Value
2	Set up equipment.	As shown in figure 14-1.	
3	Tune the UUT to 225 MHz.		
4	Power off UUT.		
5	Set up signal generator.	Frequency: 225 MHz Level: Set so that the RF level into the receiver is + 15 dBm.	
6	Verify that the UUT can survive a + 15 dBm-input for a duration of 5 minutes. **Note:** If adverse operating conditions are observed for the UUT, stop test immediately.	Repeat Subtest 12.	
7	Power on UUT and repeat steps 5 and 6.		
The following procedures are for reference number 41.			
8	Set up equipment.	As shown in figure 14-2.	
9	Configure UUT.	Set to transmit full power on 225 MHz.	
10	Configure audio generator.	Frequency: 1000 Hz Amplitude: 0 dBm	
11	Key UUT for a period of 5 minutes.		
12	Verify that the UUT is able to survive under these conditions.	Repeat Subtest 13.	
13	Adjust attenuator for 26 dB.		
14	Key UUT for a period of 5 minutes.	Verify that the UUT is able to survive under these conditions. Record level at audio analyzer.	Record measurement on data collection form and test results matrix.
15	Increase dB level of step attenuator in 3-dB steps.	Record levels on audio analyzer for each 2-dB step until 36-dB is reached.	Record measurement on data collection form and test results matrix.

Note: Sections that are not applicable to a particular step are shaded.
Legend:
dB – decibels
dBm – decibels referenced to one milliwatt
Hz – hertz
MHz – megahertz
RF – Radio Frequency
UUT – Unit Under Test

14-4 Presentation of Results. The results will be shown in table 14-2 indicating the requirement and measured value or indications of capability.

Table 14-2. Input Signal Protection Test Results

Reference Number	MIL-STD Paragraph	Requirement	Result		Finding	
			Required Value	Measured Value	Met	Not Met
20	5.3.3.2.4	A receiver protection circuit shall be activated by RF signal level. The receiver shall not be damaged by the continuous application of a + 15-dBm (DO of +35 dBm) RF signal.	Not damaged by +15-dBm signal.			
41	7.4.e	The receiver shall be protected when the transmitter is at full power and the electrical isolation between the transmitter and receiver antenna terminals is as low as 26 dB. The protection circuit shall activate within 150-ms time interval used by the transmitter to go from the carrier "on" to the carrier "off" condition. Provision shall be made to override the protection circuitry to the extent required to monitor the transmitter at full power. The override feature shall provide the required receiver output when the electrical isolation between the transmitter antenna terminal and receiver antenna terminals is in the range 26 dB to 36 dB.	Protected with electrical isolation as low as 26 dB.			

Legend:
dB – decibels
dBm – decibels referenced to 1 milliwatt
DO – Design Objective
MIL-STD – Military Standard
ms – milliseconds
RF – Radio Frequency
STANAG – Standardization Agreement

SUBTEST 15. UHF IN-BAND INTERMODULATION

15-1 Objective. To determine the extent of compliance to the requirements of MIL-STD-188-203-1A, reference numbers 21 and 27 and the STANAG 5511, annex B, paragraphs 7.3.f. and 7.4.d., reference numbers 36 and 40.

15-2 Criteria

a. Reference number 21. With an input signal level of – 53 dBm modulated by any two equal level tones selected to produce audio outputs in the 450-Hz to 3050 Hz range, and each producing ± 10-kHz peak deviation, the intermodulation distortion products measured at the audio output shall be at least 35 dB (DO of 50 dB) below the output level of either audio tone.

b. Reference number 27. The in-band intermodulation distortion products produced by any two equal level audio tones within the bandpass specified in reference number 28, adjusted to produce a peak deviation of ± 20 kHz, shall be a minimum of 35 dB below the level of either tone. Measurements shall be performed on the demodulated transmitter output.

c. Reference number 36. (Transmitter) Intermodulation distortion shall be 30 dB below a two-tone test level (935 and 1045 Hz) for a frequency deviation of ± 20 kHz.

d. Reference number 40. (Receiver) Intermodulation distortion shall be 30 dB below a two-tone test level (935 and 1045 Hz) for a frequency deviation of ± 20 kHz.

15-3 Test Procedures

a. Test Equipment Required

(1) Spectrum Analyzer

(2) Signal Generator with Dual Audio Generator

(3) UUT

(4) Attenuator

(5) Modulation Analyzer

(6) Audio Breakout Box

(7) Audio Generator (2 each)

b. Test Configuration. Configure the equipment as shown in figures 15-1 and 15-2.

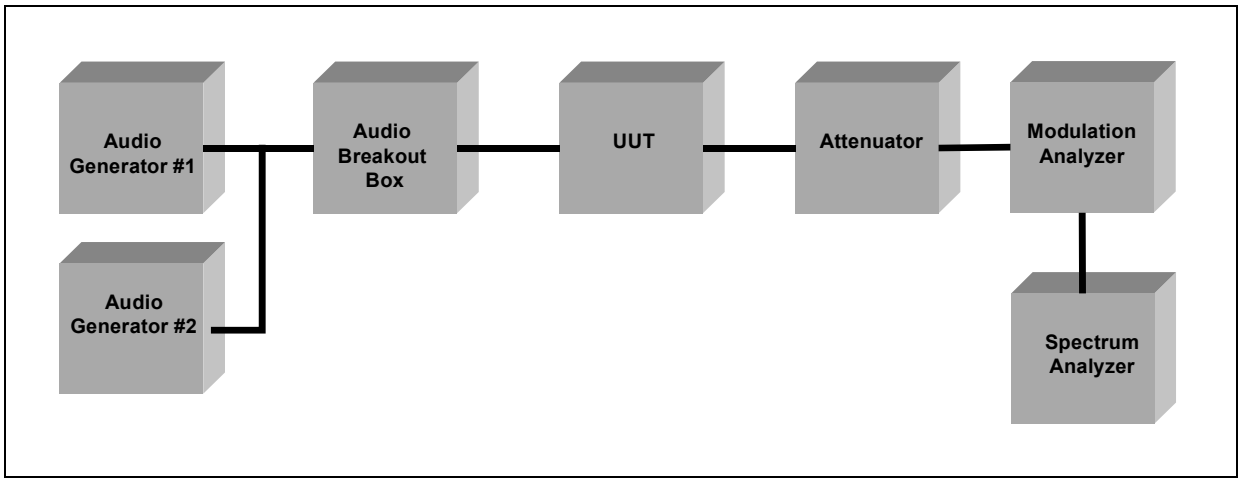

Figure 15-1. UHF In-Band Intermodulation (Transmit) Test Equipment Configuration

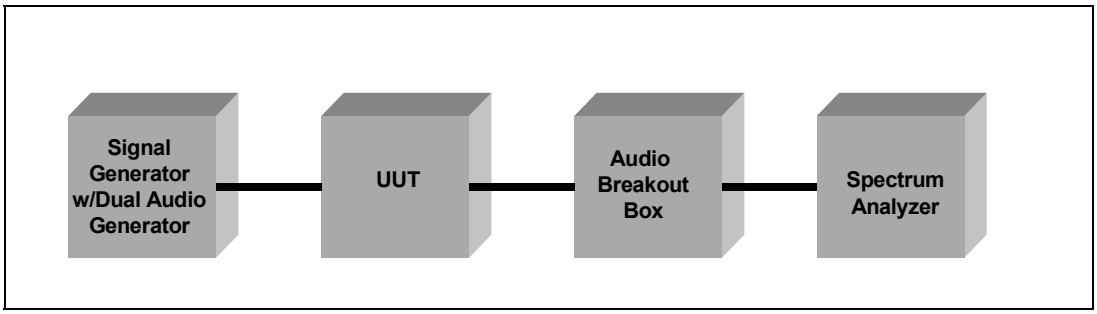

Figure 15-2. UHF In-Band Intermodulation (Receive) Test Equipment Configuration

c. Test Conduct. Test procedures are listed in table 15-1.

Table 15-1. UHF In-Band Intermodulation Test Procedures

Step	Action	Settings/Action	Measured Value
The following procedure is for reference numbers 27 and 36.			
1	Connect the equipment.	As shown in figure 15-1.	
2	Configure the attenuator.	Use appropriate attenuation to provide a safe signal input to the test equipment used.	
3	Configure the UUT.	Frequency: 225 MHz	
4	Configure the audio generators.	Tone 1: 935 Hz Tone 2: 1045 Hz Level: ± 20-kHz deviation. Waveform: Sine	
5	Configure the spectrum analyzer.	Center Frequency: 2 kHz Frequency Span: 4 kHz RF Coupling: dc Set reference level as required.	
6	Configure the audio breakout box.	Refer to manufacturer's specifications for proper audio pinout.	
7	Set up modulation analyzer.	FM Deviation.	
8	Measure peaks on spectrum.	Identify in-passband peaks other than frequencies 1 and 2 on the spectrum analyzer. Record the frequency and the difference (dB) between peak levels and two-tone levels for all peaks not less than 35 dB below the peak of either tone.	
The following procedure is for reference numbers 21 and 40.			
9	Connect the equipment.	As shown in figure 15-2.	
10	Configure the UUT.	Frequency: 225 MHz	
11	Configure the signal generator with dual audio generator.	Frequency: 225 MHz FM Deviation: ± 20 kHz Tone 1: 935 Hz Tone 2: 1045 Hz Amplitude: – 53 dBm	
12	Configure spectrum analyzer.	Center Frequency: 2 kHz Frequency Span: 4 kHz RF Coupling: dc BW / Average: 100 / On	
13	Configure the audio breakout box.	Refer to manufacturer's specifications for proper audio pinout.	
14	Turn on RF and modulation of signal generator.		
15	Measure peaks on spectrum and record on data collection form.	Identify in-passband peaks other than frequencies 1 and 2 on the spectrum analyzer. Record the frequency and the difference (dB) between peak levels and two-tone levels for all peaks not less than 35 dB below the peak of either tone.	

Note: Sections that are not applicable to a particular step are shaded.
Legend:
BW – Bandwidth
dB – decibels
dBm – decibels referenced to one milliwatt
dc – direct current
FM – Frequency Modulation
Hz – hertz
kHz – kilohertz
MHz – megahertz
RF – Radio Frequency
UUT – Unit Under Test

15-4 Presentation of Results. The results will be shown in table 15-2 indicating the requirement and measured value or indications of capability.

Table 15-2. UHF In-Band Intermodulation Test Results

Reference Number	MIL-STD Paragraph	Requirement	Result		Finding	
			Required Value	Measured Value	Met	Not Met
21	5.3.3.2.5	With an input signal level of – 53 dBm modulated by any two equal level tones selected to produce audio outputs in the 450-Hz to 3050-Hz range, and each producing ± 10-kHz peak deviation, the intermodulation distortion products measured at the audio output shall be at least 35 dB (DO of 50 dB) below the output level of either audio tone.	35 dB down			
27	5.3.3.3.3	The in-band intermodulation distortion products produced by any two equal level audio tones within the bandpass specified in 5.3.3.3.2 adjusted to produce a peak deviation of ± 20 kHz shall be a minimum of 35 dB below the level of either tone. Measurements shall be performed on the demodulated transmitter output.	35 dB down			
Reference Number	**STANAG 5511 Annex B, Paragraph**	**Requirement**	**Result**		**Finding**	
			Required Value	**Measured Value**	**Met**	**Not Met**
36	7.3.f.	From the audio input to the transmitter output the peak of any distortion or intermodulation products shall not be less than 30 dB below the peak of either tone of a standard two tone test signal when the transmitter is driven at rated PEP.	30 dB down			

Table 15-2. UHF In-Band Intermodulation Test Results (continued)

Reference Number	STANAG 5511 Annex B, Paragraph	Requirement	Result		Finding	
			Required Value	Measured Value	Met	Not Met
40	7.4.d.	Intermodulation distortion shall be 30 dB below a two-tone test level (935 and 1045 Hz) for a frequency deviation of ± 20 kHz.	30 dB down			

Legend:
dB – decibels
dBm – decibels referenced to one milliwatt
DO – Design Objective
Hz – hertz
kHz – kilohertz
MIL-STD – Military Standard
PEP – Peak Envelope Power
STANAG – Standardization Agreement

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SUBTEST 16. UHF RECEIVER OUTPUT LEVEL STABILITY

16-1 Objective. To determine the extent of compliance to the requirements of MIL-STD-188-203-1A, reference numbers 4, 23, and 24.

16-2 Criteria

a. Reference number 4. The nominal receiver audio output level shall be 0 dBm. The level of the output(s) shall be adjustable over the range of +3 dB to – 3 dB when terminated with a 600-ohm resistive load. At installation, the output(s) shall be adjusted to provide a nominal 0 dBm input(s) to the DTS. The audio output(s) shall be inhibited during periods of frequency tuning.

b. Reference number 23. The audio output shall be +2.25 dBm (1.0 Voltage root mean square [Vrms]) ± 3 dB across a 600-ohm resistive load for any receive input signal frequency modulated at a 1-kHz rate with peak deviation of ± 10 kHz and with any level between – 93 dBm and +1 dBm.

c. Reference number 24. With a – 53 dBm input signal modulated by a 1-kHz sine wave, and adjusted to produce a ± 20-kHz peak deviation, the audio output level shall be + 8.25 dBm (2.0 Vrms) ± 0.5 dB into a 600-ohm resistive load. The output shall be adjustable over the range of – 3 dB to +3 dB from the nominal.

16-3 Test Procedures

a. Test Equipment Required

(1) Signal Generator

(2) UUT

(3) Audio Analyzer

(3) Audio Breakout Box

b. Test Configuration. Configure the equipment as shown in figure 16-1.

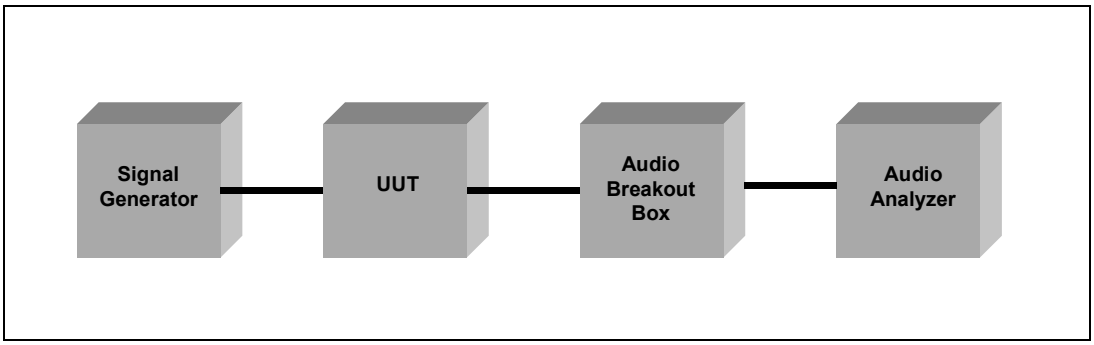

Figure 16-1. UHF Receiver Output Level Stability Test Equipment Configuration

c. Test Conduct. Test procedures are listed in table 16-1.

Table 16-1. UHF Receiver Output Level Stability Test Procedures

Step	Action	Settings/Action	Measured Value
The following procedures are for reference number 4, 23, and 24.			
1	Connect the equipment.	As shown in figure 16-1.	
2	Configure the signal generator.	Frequency: 225 MHz Amplitude: – 93 dBm Deviation: ± 20 kHz Rate: 1 kHz	
3	Configure the UUT.	Frequency: 225 MHz	
4	Configure the audio breakout box.	Refer to manufacturer's specifications for proper audio pinout.	
5	Configure the audio analyzer.	Measurements: ac level 600-ohm termination.	
6	Step the signal generator level to – 88 dBm.		
7	Record receiver output level on data collection form.		
8	Step the signal generator level to – 83 dBm.		
9	Record receiver output level on data collection form.		
10	Step the signal generator level to – 78 dBm.		
11	Record receiver output level on data collection form.		
12	Step the signal generator level to – 73 dBm.		
13	Record receiver output level on data collection form.		
14	Step the signal generator level to – 68 dBm.		
15	Record receiver output level on data collection form.		

Table 16-1. UHF Receiver Output Level Stability Test Procedures (continued)

Step	Action	Settings/Action	Measured Value
16	Step the signal generator level to – 63 dBm.		
17	Record receiver output level on data collection form.		
18	Step the signal generator level to – 58 dBm.		
19	Record receiver output level on data collection form.		
20	Step the signal generator level to – 53 dBm.		
21	Record receiver output level on data collection form.		
22	Step the signal generator level to – 48 dBm.		
23	Record receiver output level on data collection form.		
24	Step the signal generator level to – 43 dBm.		
25	Record receiver output level on data collection form.		
26	Step the signal generator level to – 38 dBm.		
27	Record receiver output level on data collection form.		
28	Step the signal generator level to – 33 dBm.		
29	Record receiver output level on data collection form.		
30	Step the signal generator level to – 28 dBm.		
31	Record receiver output level on data collection form.		
32	Step the signal generator level to – 23 dBm.		
33	Record receiver output level on data collection form.		

Table 16-1. UHF Receiver Output Level Stability Test Procedures (continued)

Step	Action	Settings/Action	Measured Value
34	Step the signal generator level to – 18 dBm.		
35	Record receiver output level on data collection form.		
36	Step the signal generator level to – 13 dBm.		
37	Record receiver output level on data collection form.		
38	Step the signal generator level to – 8 dBm.		
39	Record receiver output level on data collection form.		
40	Step the signal generator level to – 3 dBm.		
41	Record receiver output level on data collection form.		
42	Step the signal generator rate to 1 dBm.		
43	Record receiver output level on data collection form.		
44	Adjust audio output level from UUT to maximum and minimum levels.	Record maximum and minimum levels on data collection form.	
45	Change frequency of UUT to 224 MHz	Are the audio outputs of the UUT inhibited during periods of frequency tuning?	

Note: Sections that are not applicable to a particular step are shaded.
Legend:
ac – alternating current
dB – decibels
dBm – decibels referenced to one milliwatt
kHz – kilohertz
MHz – megahertz
UUT – Unit Under Test

16-4 Presentation of Results. The results will be shown in table 16-2 indicating the requirement and measured value or indications of capability.

Table 16-2. UHF Receiver Output Level Stability Test Results

Reference Number	MIL-STD Paragraph	Requirement	Result		Finding	
			Required Value	Measured Value	Met	Not Met
4	5.3.1.1.3	The nominal receiver audio output level shall be 0 dBm. The level of the output(s) shall be adjustable over the range of + 3 dB to – 3 dB when terminated with a 600-ohm resistive load. At installation, the output(s) shall be adjusted to provide a nominal 0-dBm input(s) to the DTS. The audio output(s) shall be inhibited during periods of frequency tuning.	0 dBm			
			No audio output during tuning.			
23	5.3.3.2.7	The audio output shall be + 2.25 dBm (1.0 Vrms) ± 3 dB across a 600-ohm resistive load for any receive input signal frequency modulated at a 1-kHz rate with peak deviation of ± 10 kHz and with any level between – 93 dBm and + 1 dBm.	+ 2.25 dBm ± 3 dB			
24	5.3.3.2.8	With a – 53-dBm input signal modulated by a 1-kHz sine wave, and adjusted to produce a ± 20 kHz peak deviation, the audio output level shall be + 8.25 dBm (2.0 Vrms) ± 0.5 dB into a 600-ohm resistive load. The output shall be adjustable over the range of – 3 dB to + 3 dB from the nominal.	+ 8.25 dBm ± 0.5 dB			
			– 3 dB to + 3 dB			

Legend:
dB – decibels
dBm – decibels referenced to one milliwatt
DTS – Data Terminal Set
kHz – kilohertz
Vrms – Voltage root mean square
MIL-STD – Military Standard

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SUBTEST 17. UHF FREQUENCY DEVIATION

17-1 Objective. To determine the extent of compliance to the requirements of MIL-STD-188-203-1A, reference number 28 and STANAG 5511, annex B, reference numbers 33 and 39.

17-2 Criteria

a. Reference number 28. A peak deviation of ± 20 kHz shall be obtained when a 1-kHz sine wave signal at a level of + 8.25 dBm (2.0 Vrms) is applied to the audio input.

b. Reference number 33. A signal of + 10 dBm at the audio input shall produce up to ± 20-kHz deviation of the output frequency.

c. Reference number 39. An input of ± 20-kHz deviation and 100 µV (hard) to the receiver shall produce a signal output of +10 dBm.

17-3 Test Procedures

a. Test Equipment Required

(1) UUT

(2) Attenuator

(3) Audio Generator

(4) Measuring Receiver

(5) Audio Breakout Box

(6) Signal Generator

(7) Audio Analyzer

b. Test Configuration. Configure the equipment as shown in figures 17-1 and 17-2.

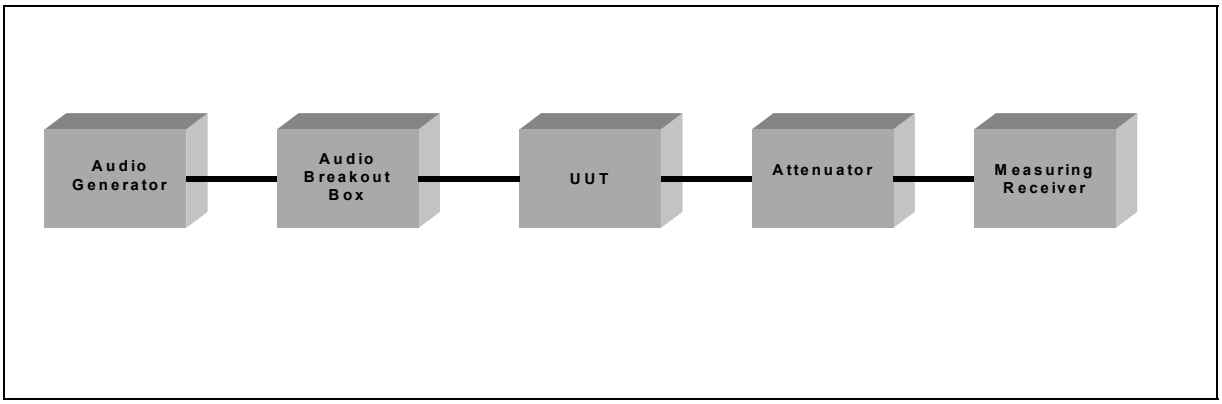

Figure 17-1. UHF Frequency Deviation (Transmit) Test Equipment Configuration

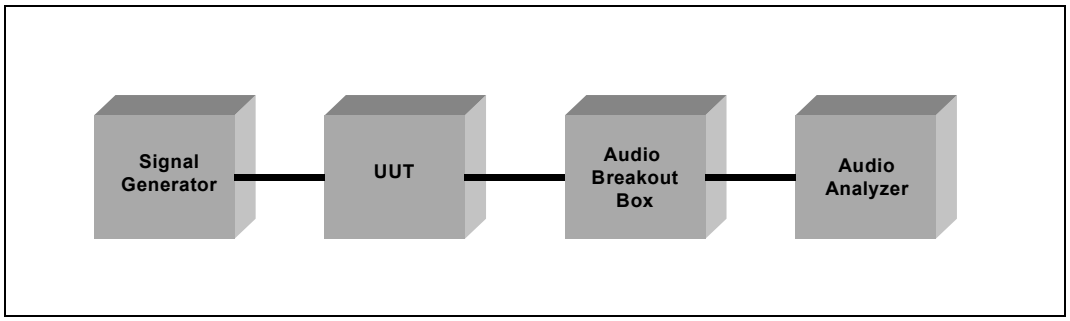

Figure 17-2. UHF Frequency Deviation (Receive) Test Equipment Configuration

c. Test Conduct. Test procedures are listed in table 17-1.

Table 17-1. UHF Frequency Deviation (Transmit) Test Procedures

Step	Action	Settings/Action	Measured Value
The following procedures are for reference numbers 28 and 33.			
1	Connect the equipment.	As shown in figure 17-1.	
2	Configure audio generator.	Frequency: 1 kHz Level: + 8.25 dBm	
3	Configure audio breakout box.	Refer to manufacturer's specifications for proper audio pinout.	
4	Configure UUT.	Frequency: 230 MHz	
5	Configure measuring receiver.	Select FM deviation under measurement.	
6	Use appropriate attenuation.	To provide a 0-dBm input to the test equipment used.	
7	Key the UUT with the audio breakout box.	Observe the measuring receiver deviation level.	

Table 17-1. UHF Frequency Deviation (Transmit) Test Procedures (continued)

Step	Action	Settings/Action	Measured Value
8	Measure peak deviation.	Record results on data collection form.	
9	Unkey the UUT.		
10	Change the level of the audio generator.	Change level to + 10 dBm.	
11	Key the UUT.	Observe the measuring receiver deviation.	
12	Measure peak deviation.	Record results on data collection form.	
The following procedures are for reference number 39.			
13	Set up equipment.	As shown in figure 17-2.	
14	Configure signal generator.	Frequency: 230 MHz Deviation: ± 20 kHz Amplitude: 100 µV	
15	Configure UUT.	Frequency: 230 MHz	
16	Configure audio breakout box.	Refer to manufacturer's specifications for proper audio pinout.	
17	Configure audio analyzer.	Set ac level (in dBm).	
18	Turn the RF and modulation of the signal generator to on.	Observe the audio analyzer.	
19	Record results on data collection form.	Measure output signal level.	

Note: Sections that are not applicable to a particular step are shaded.
Legend:
µV – microvolts
ac – alternating current
dBm – decibels referenced to one milliwatt
FM – Frequency Modulation
kHz – kilohertz
MHz – megahertz
RF – Radio Frequency
UUT – Unit Under Test

17-4 Presentation of Results. The results will be shown in table 17-2 indicating the requirement and measured value or indications of capability.

Table 17-2. UHF Frequency Deviation Test Results

Reference Number	MIL-STD Paragraph	Requirement	Result		Finding	
			Required Value	Measured Value	Met	Not Met
28	5.3.3.3.4	A peak deviation of ± 20 kHz shall be obtained when a 1-kHz sine wave signal at a level of + 8.25 dBm (2.0 Vrms) is applied to the audio input.	Peak deviation of ± 20 kHz.			
Reference Number	**STANAG 5511, Annex B, Paragraph**	**Requirement**	**Result**		**Finding**	
			Required Value	**Measured Value**	**Met**	**Not Met**
33	7.3.c.	A signal of + 10 dBm at the audio input shall produce up to ± 20-kHz deviation of the output frequency.	Up to ± 20-kHz deviation.			
39	7.4.c	An input of ± 20-kHz deviation and 100 µV (hard) to the receiver shall produce a signal output of +10 dBm.	Signal output of + 10 dBm.			

Note: This requirement does not preclude tuning in integral subdivisions of 25 kHz.

Legend:

µV – microvolts
dBm – decibels referenced to one milliwatt
kHz – kilohertz
MIL-STD – Military Standard
STANAG – Standardization Agreement
Vrms – Voltage root mean square

SUBTEST 18. UHF TRANSMITTER IN-BAND NOISE

18-1 Objective. To determine the extent of compliance to the requirements of MIL-STD-188-203-1A, reference number 29.

18-2 Criteria. Reference number 29. With the equipment operating in the transmit state at full rated RF power output and with the audio input terminated with a 600-ohm resistor, the audio output detected in a nominal 50-Hz audio bandwidth by a test receiver shall be at least 50 dB below the audio output detected when a carrier at the same RF power level deviated ± 20 kHz at a 1-kHz rate is applied to the test receiver RF input.

18-3 Test Procedures

a. Test Equipment Required

(1) UUT

(2) Attenuator

(3) 600-Ohm Load

(4) Measuring Receiver

(5) Audio Generator

(6) Audio Breakout Box

(7) Spectrum Analyzer

b. Test Configuration. Configure the equipment as shown in figures 18-1 and 18-2.

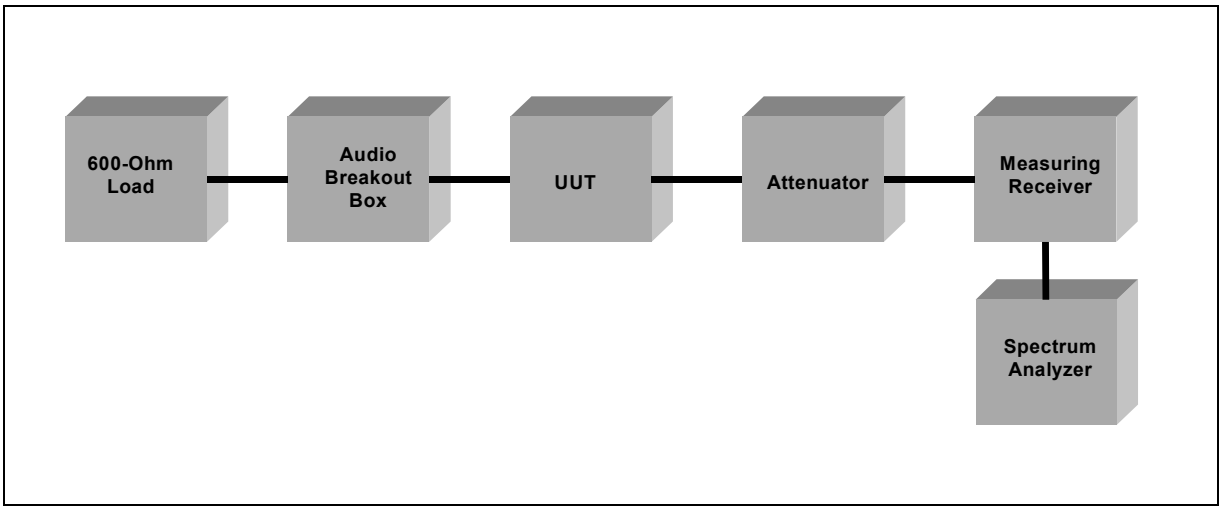

Figure 18-1. UHF Transmitter In-Band Noise Test Equipment Configuration (Audio Input Terminated)

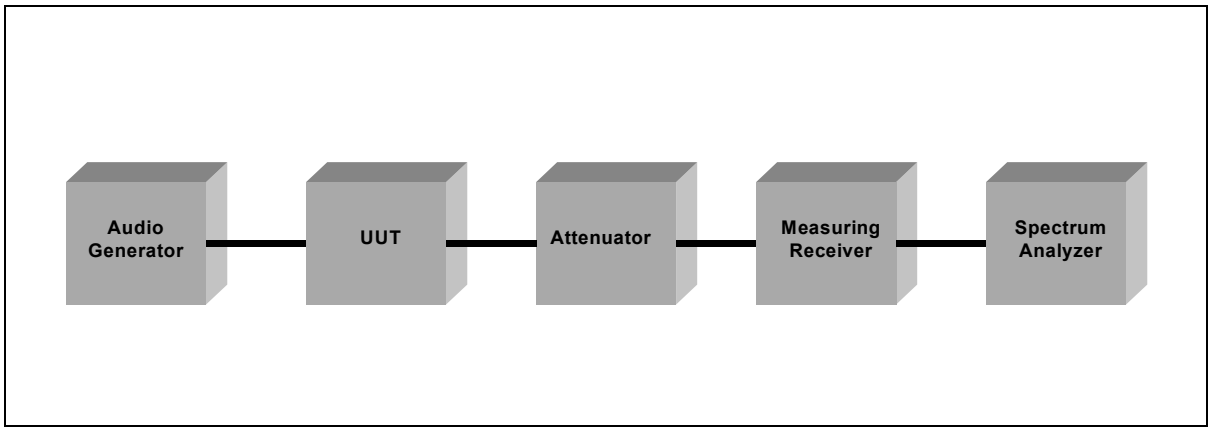

Figure 18-2. UHF Transmitter In-Band Noise Test Equipment Configuration

c. Test Conduct. Test procedures are listed in table 18-1.

Table 18-1. UHF Transmitter In-Band Noise Test Procedures

Step	Action	Settings/Action	Measured Value
The following procedures are for reference number 29.			
1	Connect the equipment.	As shown in figure 18-1.	
2	Configure measuring receiver.	Frequency: 225 MHz	
3	Use appropriate attenuation.	Use appropriate attenuation to provide a 0-dBm input to the measuring receiver.	

Table 18-1. UHF Transmitter In-Band Noise Test Procedures (continued)

Step	Action	Settings/Action	Measured Value
4	Configure spectrum analyzer.	Center frequency: 1 kHz Span: 500 Hz Resolution bandwidth: 50 Hz RF Coupling: dc	
5	Configure UUT.	Frequency: 225 MHz	
6	Key the UUT.	Observe the results on spectrum analyzer.	
7	Record results.	Measure noise level at 1000 Hz.	
8	Connect the equipment.	As shown in figure 18-2.	
9	Configure measuring receiver.	Frequency: 225 MHz	
10	Use appropriate attenuation.	Use appropriate attenuation to provide a 0-dBm input to the measuring receiver.	
11	Configure audio generator.	Frequency: 1000 Hz Amplitude: 0 dBm Adjust audio input level for deviation ± 20 kHz.	
12	Observe spectrum analyzer.	Measure level of 1000-Hz tone.	
13	Record level of 1000-Hz tone.	Record the difference between this measurement and the measurement made in step 7.	

Note: Sections that are not applicable to a particular step are shaded.
Legend:
dBm – decibels referenced to 1 milliwatt
dc – direct current
Hz – hertz
kHz – kilohertz
MHz – megahertz
RF – Radio Frequency
UUT – Unit Under Test

18-4 Presentation of Results. The results will be shown in table 18-2 indicating the requirement and measured value or indications of capability.

Table 18-2. UHF Transmitter In-Band Noise Test Results

Reference Number	MIL-STD Paragraph	Requirement	Result		Finding	
			Required Value	Measured Value	Met	Not Met
29	5.3.3.3.5	With the equipment operating in the transmit state at full rated RF power output and with the audio input terminated with a 600-ohm resistor, the audio output detected in a nominal 50-Hz audio bandwidth by a test receiver shall be at least 50 dB below the audio output detected when a carrier at the same RF power level deviated ± 20 kHz at a 1-kHz rate is applied to the test receiver RF input.	50 dB			

Note: This requirement does not preclude tuning in integral subdivisions of 25 kHz.
Legend:
dB – decibels
Hz – hertz
kHz – kilohertz
MIL-STD – Military Standard
RF – Radio Frequency

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SUBTEST 19. AUDIO BANDWIDTH

19-1 Objective. To determine the extent of compliance to the requirements of the STANAG 5511, appendix B, paragraphs 7.3.b and 7.4.b, reference numbers 32 and 38.

19-2 Criteria

a. Reference number 32. The audio frequency response between ± 1.5 dB limits shall be 300 Hz to 3500 Hz. (Transmit)

b. Reference number 38. The audio frequency response between ± 1.5 dB limits shall be 300 Hz to 3500 Hz. (Receive)

19-3 Test Procedures

a. Test Equipment Required

(1) Spectrum Analyzer

(2) Audio Generator

(3) Audio Breakout Box

(4) UUT

(5) Attenuator

(6) Modulation Analyzer

(7) Signal Generator

b. Test Configuration. Configure the equipment as shown in figures 19-1 and 19-2.

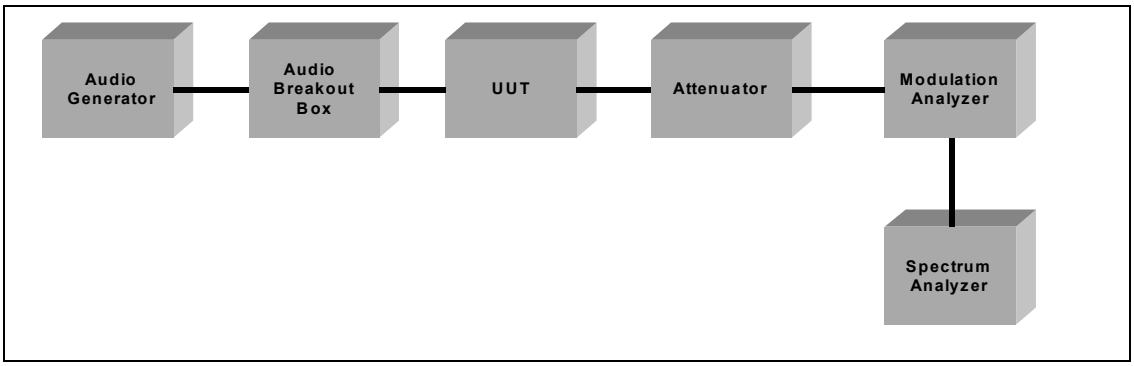

Figure 19-1. Audio Bandwidth (Transmit) Test Equipment Configuration

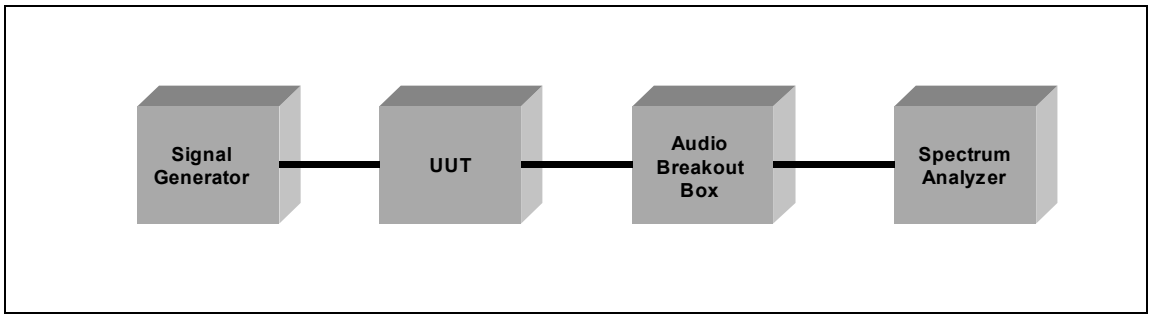

Figure 19-2. Audio Bandwidth (Receive) Test Equipment Configuration

c. Test conduct. The test procedures for frequency response are shown in table 19-1.

Table 19-1. Audio Bandwidth Test Procedures

Step	Action	Settings/Action	Results
The following procedure is for reference number 32.			
1	Set up equipment.	See figure 19-1.	
2	Configure audio generator.	Frequency: 300 Hz Amplitude: 0 dBm	
3	Configure audio breakout box.	Refer to manufacturer's specifications for proper audio pinout.	
4	Configure UUT.	Frequency: 300 MHz	
5	Configure attenuator.	Refer to manufacturer's specifications for proper audio pinout.	
6	Configure modulation analyzer.	Measurement: FM Deviation	
7	Configure spectrum analyzer.	Center frequency: 2 kHz RF Coupling: dc Span: 4 kHz	

Table 19-1. Audio Bandwidth Test Procedures (continued)

Step	Action	Settings/Action	Results
8	Key the UUT.	Select max hold on the spectrum analyzer.	
9	Step the audio generator to 400 Hz.	Pause for 2 seconds.	
10	Step the audio generator to 500 Hz.	Pause for 2 seconds.	
11	Step the audio generator to 600 Hz.	Pause for 2 seconds.	
12	Step the audio generator to 700 Hz.	Pause for 2 seconds.	
13	Step the audio generator to 800 Hz.	Pause for 2 seconds.	
14	Step the audio generator to 900 Hz.	Pause for 2 seconds.	
15	Step the audio generator to 1000 Hz.	Pause for 2 seconds.	
16	Step the audio generator to 1100 Hz.	Pause for 2 seconds.	
17	Step the audio generator to 1200 Hz.	Pause for 2 seconds.	
18	Step the audio generator to 1300 Hz.	Pause for 2 seconds.	
19	Step the audio generator to 1400 Hz.	Pause for 2 seconds.	
20	Step the audio generator to 1500 Hz.	Pause for 2 seconds.	
21	Step the audio generator to 1600 Hz.	Pause for 2 seconds.	
22	Step the audio generator to 1700 Hz.	Pause for 2 seconds.	
23	Step the audio generator to 1800 Hz.	Pause for 2 seconds.	
24	Step the audio generator to 1900 Hz.	Pause for 2 seconds.	
25	Step the audio generator to 2000 Hz.	Pause for 2 seconds.	
26	Step the audio generator to 2100 Hz.	Pause for 2 seconds.	
27	Step the audio generator to 2200 Hz.	Pause for 2 seconds.	
28	Step the audio generator to 2300 Hz.	Pause for 2 seconds.	
29	Step the audio generator to 2400 Hz.	Pause for 2 seconds.	
30	Step the audio generator to 2500 Hz.	Pause for 2 seconds.	
31	Step the audio generator to 2600 Hz.	Pause for 2 seconds.	
32	Step the audio generator to 2700 Hz.	Pause for 2 seconds.	
33	Step the audio generator to 2800 Hz.	Pause for 2 seconds.	
34	Step the audio generator to 2900 Hz.	Pause for 2 seconds.	
35	Step the audio generator to 3000 Hz.	Pause for 2 seconds.	
36	Step the audio generator to 3100 Hz.	Pause for 2 seconds.	
37	Step the audio generator to 3200 Hz.	Pause for 2 seconds.	
38	Step the audio generator to 3300 Hz.	Pause for 2 seconds.	
39	Step the audio generator to 3400 Hz.	Pause for 2 seconds.	
40	Step the audio generator to 3500 Hz.	Pause for 2 seconds.	
41	Select markers on the spectrum analyzer.	Set marker A at the peak of the highest audio tone. Set marker B at the peak of the lowest audio tone.	
42	Record results on data collection form.	Ensure that the difference between the markers is within ± 1.5 dB.	

Table 19-1. Audio Bandwidth Test Procedures (continued)

Step	Action	Settings/Action	Results
The following procedure is for reference number 38.			
43	Set up equipment.	See figure 19-2.	
44	Configure the signal generator.	Frequency: 300 MHz Amplitude: – 90 dBm Rate: 300 Hz	
45	Configure UUT.	Frequency: 300 MHz	
46	Configure spectrum analyzer.	Center frequency: 2 kHz RF Coupling: dc Span: 4 kHz	
47	Key the UUT.	Select max hold on the spectrum analyzer.	
48	Step the signal generator rate to 400 Hz.	Pause for 2 seconds.	
49	Step the signal generator rate to 500 Hz.	Pause for 2 seconds.	
50	Step the signal generator rate to 600 Hz.	Pause for 2 seconds.	
51	Step the signal generator rate to 700 Hz.	Pause for 2 seconds.	
52	Step the signal generator rate to 800 Hz.	Pause for 2 seconds.	
53	Step the signal generator rate to 900 Hz.	Pause for 2 seconds.	
54	Step the signal generator rate to 1000 Hz.	Pause for 2 seconds.	
55	Step the signal generator rate to 1100 Hz.	Pause for 2 seconds.	
56	Step the signal generator rate to 1200 Hz.	Pause for 2 seconds.	
57	Step the signal generator rate to 1300 Hz.	Pause for 2 seconds.	
58	Step the signal generator rate to 1400 Hz.	Pause for 2 seconds.	
59	Step the signal generator rate to 1500 Hz.	Pause for 2 seconds.	
60	Step the signal generator rate to 1600 Hz.	Pause for 2 seconds.	
61	Step the signal generator rate to 1700 Hz.	Pause for 2 seconds.	
62	Step the signal generator rate to 1800 Hz.	Pause for 2 seconds.	
63	Step the signal generator rate to 1900 Hz.	Pause for 2 seconds.	
64	Step the signal generator rate to 2000 Hz.	Pause for 2 seconds.	
65	Step the signal generator rate to 2100 Hz.	Pause for 2 seconds.	
66	Step the signal generator rate to 2200 Hz.	Pause for 2 seconds.	
67	Step the signal generator rate to 2300 Hz.	Pause for 2 seconds.	
68	Step the signal generator rate to 2400 Hz.	Pause for 2 seconds.	
69	Step the signal generator rate to 2500 Hz.	Pause for 2 seconds.	
70	Step the signal generator rate to 2600 Hz.	Pause for 2 seconds.	
71	Step the signal generator rate to 2700 Hz.	Pause for 2 seconds.	
72	Step the signal generator rate to 2800 Hz.	Pause for 2 seconds.	
73	Step the signal generator rate to 2900 Hz.	Pause for 2 seconds.	
74	Step the signal generator rate to 3000 Hz.	Pause for 2 seconds.	
75	Step the signal generator rate to 3100 Hz.	Pause for 2 seconds.	
76	Step the signal generator rate to 3200 Hz.	Pause for 2 seconds.	
77	Step the signal generator rate to 3300 Hz.	Pause for 2 seconds.	

Table 19-1. Audio Bandwidth Test Procedures (continued)

Step	Action	Settings/Action	Results
78	Step the signal generator rate to 3400 Hz.	Pause for 2 seconds.	
79	Step the signal generator rate to 3500 Hz.	Pause for 2 seconds.	
80	Select markers on the spectrum analyzer.	Set marker A at the peak of the highest audio tone. Set marker B at the peak of the lowest audio tone.	
81	Record results on data collection form.	Measure the difference between the markers.	

Note: Sections that are not applicable to a particular step are shaded.
Legend:
dB – decibels
dBm – decibels referenced to one milliwatt
dc – direct current
FM – Frequency Modulation
Hz – hertz
kHz – kilohertz
MHz – megahertz
mV – millivolts
RF – Radio Frequency
UUT – Unit Under Test

19-4 Presentation of Results. The results will be shown in table 19-2 including the requirement and measurement value or indications of capability.

Table 19-2. Audio Bandwidth Test Results

Reference Number	STANAG 5511, Annex B, Paragraph	Requirement	Result		Finding	
			Required Value	Measured Value	Met	Not Met
32	7.3.b	The audio frequency response between ± 1.5 dB limits shall be 300 Hz to 3500 Hz.	± 1.5 dB			
38	7.4.b	The audio frequency response between ± 1.5 dB limits shall be 300 Hz to 3500 Hz.	± 1.5 dB			

Legend:
dB – decibels
Hz – hertz
STANAG – Standardization Agreement

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APPENDIX A

ACRONYMS

µV	microvolts
AM	Amplitude Modulation
dB	decibels
dBm	decibels referenced to 1 milliwatt
DO	Design Objective
DTS	Data Terminal Set
f_c	carrier frequency
HF	High Frequency
Hz	hertz
IF	Intermediate Frequency
kHz	kilohertz
mA	milliamperes
MHz	megahertz
MIL-STD	Military Standard
ms	milliseconds
mV	millivolt
RF	Radio Frequency
rms	root mean square
S+N/N	Signal plus Noise to Noise
STANAG	Standardization Agreement
TADIL	Tactical Digital Information Link
UHF	Ultra High Frequency
UUT	Unit Under Test
Vdc	Volts direct current
Vrms	Voltage root mean square
VSWR	Voltage Standing Wave Radio

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APPENDIX B

MIL-STD-188-203-1A AND STANAG 5511, ANNEX B REQUIREMENTS MATRIX

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Table B-1. MIL-STD-188-203-1A and STANAG 5511, Annex B Requirements Matrix

Ref Number	MIL-STD Paragraph	Requirements	Subtest Number
1	5.1.1	General. TADIL A data communications will be capable of operation in either the high frequency (HF) or ultra-high frequency (UHF) bands. In the UHF band, the radio equipment shall be capable of being tuned to any integral multiple of 25 kilohertz (kHz) in the frequency range of 225.000 MHz through 399.975 MHz.	10
	5.3	DETAILED REQUIREMENTS.	
	5.3	TADIL A radio requirements. The TADIL A radio equipment shall support the TADIL A system as specified in 5.1 by performing the functions of amplification translation from audio to HF or UHF, and transmit and receive switching under the control of the DTS. Radio equipments used for TADIL A communications shall satisfy the requirements stated in the applicable MIL-STD-188 series documents.	
	5.3.1	GENERAL REQUIREMENTS.	
2	5.3.1.1.1	Audio impedances. The audio input and output impedances of the radio equipment shall be 600 ohms balanced in accordance with the Channel Input/Output Impedances paragraph of MIL-STD-188-100 (See 4.4.3.1.4).	1
3	5.3.1.1.2	Audio input level. The nominal transmitter audio input level shall be 0 dBm.	1
4	5.3.1.1.3	Audio output level. The nominal receiver audio output level shall be 0 dBm. The level of the output(s) shall be adjustable over the range of +3 dB to – 3 dB when terminated with a 600-ohm resistive load. At installation, the output(s) shall be adjusted to provide a nominal 0 dBm input(s) to the DTS. The audio output(s) shall be inhibited during periods of frequency tuning.	16
5	5.3.1.2	Radio keyline. The transmit and receive states of the radio equipment shall be capable of being controlled by the simplex keyline method specified in 5.2.8.1.5.1.	2
6	5.1.7.b	Switching time. Transmit-to-receive switching occurs at the end of the transmission, that is, the picket stop code or address code. When switching from the transmit to receive state, the transmitter RF output shall be reduced to the quiescent noise level of 0.1 microvolt (μV) or less in a 6-kHz bandwidth centered on the nominal carrier frequency, and the receiver shall be capable of maximum receive sensitivity within 23 milliseconds or less after reset of the radio set keyline.	3
7	5.3.1.4	Phase jitter (stability). The rms phase jitter shall not exceed 2.5 degrees and the probability of a shift greater than 30 degrees shall be less than or equal to 0.01 percent when measured at the signal output terminals of a transmitter or a receiver. Measurements shall be performed over a sufficient number of adjacent frame pairs to establish the specified probability with a confidence of at least 95 percent. Measured values shall be the average phase in an averaging time of 9.09 milliseconds or 18.18 milliseconds for frame lengths of 13.3 milliseconds or 22 milliseconds, respectively.	4

Table B-1. MIL-STD-188-203-1A and STANAG 5511, Annex B Requirements Matrix (continued)

Ref Number	MIL-STD Paragraph	Requirements	Subtest Number
8	5.3.1.5	Sidetone. During transmitter operation, a sidetone signal having the same characteristics as specified for normal received data shall be provided at the receiver audio output. For UHF systems, the sidetone shall be provided at the receive audio.	5
9	5.3.1.6	Frequency selection time. The time from the selection of new frequency channel to the time that the radio set is operative for either transmission or reception on the new channel shall not exceed 10 seconds. If the radio is operated with an external automatic antenna coupler or multi-coupler, the coupler tuning time should not exceed 60 seconds.	6
10	5.3.1.7	Duty cycle. The radio equipment shall be capable of operating with a 100-percent transmit duty cycle. This duty cycle requirement shall apply under all applicable service conditions.	7
11	5.3.1.8.1	Maximum time delay. The maximum time delay measured between input and output of either the transmitter or receiver for any single frequency over the range of 500 Hz to 3050 Hz shall be less than 3.5 milliseconds (DO of 2.5 milliseconds) (See figure 7).	8
12	5.3.1.8.2	Differential time delay. The differential time delay that results between any two audio tones within the frequency range of 815 Hz to 3050 Hz for either the transmitter or receiver shall not exceed 500 microseconds (See figure 7).	8
13	5.3.1.9	RF terminations. The nominal impedance at the receiver RF input terminal shall be 50 ohms unbalanced to ground. The transmitter RF output load impedance shall be a nominal 50 ohms, unbalanced to ground. The transmitter shall be protected against failures induced by a voltage standing wave ratio (VSWR) greater than 4:1.	9
14	5.1.3.2	Envelope delay. The absolute envelope delay of AM receivers over the frequency band from 300 Hz to 3000 Hz shall not exceed 2.5 ms.	8
	5.3.3	UHF radio requirements. The UHF radio set shall provide data transmission and reception in the UHF band of the RF spectrum. The interface with the DTS shall be with the USB audio channel.	
		UHF GENERAL REQUIREMENTS.	
15	5.3.3.1.1	UHF frequency coverage. The UHF frequency coverage shall be as specified in 5.1.1. The frequency readout shall be in terms of f_c.	10
16	5.3.3.1.2	UHF accuracy and stability. The unmodulated transmitted carrier and receiver center frequencies shall be within ± 0.0005 percent of the selected f_c after a warm-up period of 5 minutes under any combination of specified service conditions.	10
17	5.3.3.1.3	Intermediate frequency (IF) selectivity (transmitter and receiver). The 6 dB bandwidth shall be at least 50 kHz and the 60-dB bandwidth shall be no more than 200 kHz. The peak-to-peak ripple over 90 percent of the 6 dB bandwidth shall not exceed 3 dB.	11

Table B-1. MIL-STD-188-203-1A and STANAG 5511, Annex B Requirements Matrix (continued)

Ref Number	MIL-STD Paragraph	Requirements	Subtest Number
	5.3.3.2	UHF RECEIVER CHARACTERISTICS.	
	5.3.3.2.1	UHF audio output. A single audio output with the characteristics specified in 5.3.1.1 shall be provided.	
18	5.3.3.2.2	UHF receiver sensitivity. The sensitivity of the receiver over the specified frequency range shall be such that an RF input test signal results in a minimum output S+N/N ratio of 20 dB as measured in a 3-kHz bandwidth. The RF input test signal shall have a level of – 99 dBm and shall be FM modulated at a rate of 1 kHz with a peak deviation of ± 10 kHz. NOTE: Peak deviation is defined as the absolute maximum frequency excursion of the outer spectral component from the assigned frequency.	12
19	5.3.3.2.3	UHF frequency response. With an RF input signal level of – 73 dBm with peak deviation of ± 20 kHz applied to the receiver input terminals, the attenuation of the audio output relative to the peak response between 450 Hz and 3050 Hz shall not exceed 2 dB. The attenuation of the audio output at 300 Hz, relative to the peak response between 450 Hz and 3050 Hz shall not exceed 3 dB.	13
20	5.3.3.2.4	Input signal protection. A receiver protection circuit shall be activated by RF signal level. The receiver shall not be damaged by the continuous application of a +15 dBm (DO of +35 dBm) RF signal.	14
21	5.3.3.2.5	UHF in-band intermodulation. With an input signal level of – 53 dBm modulated by any two equal level tones selected to produce audio outputs in the 450 Hz to 3050 Hz range, and each producing ± 10-kHz peak deviation, the intermodulation distortion products measured at the audio output shall be at least 35 dB (DO of 50 dB) below the output level of either audio tone.	15
22	5.3.3.2.6	UHF S+N/N. With a receive input signal of – 53 dBm modulated at ± 8-kHz peak deviation at a 1-kHz rate, the S+N/N ratio shall be 40 dB or greater as measured in a 3-kHz bandwidth.	12
23	5.3.3.2.7	UHF receiver output level stability. The audio output shall be +2.25 dBm (1.0 Vrms) ± 3 dB across a 600-ohm resistive load for any receive input signal frequency modulated at a 1-kHz rate with peak deviation of ± 10-kHz and with any level between – 93 dBm and +1 dBm.	16
24	5.3.3.2.8	Output level and distortion. With a – 53 dBm input signal modulated by a 1-kHz sine wave, and adjusted to produce a ± 20-kHz peak deviation, the audio output level shall be + 8.25 dBm (2.0 Vrms) ± 0.5 dB into a 600-ohm resistive load. The output shall be adjustable over the range of – 3 dB to +3 dB from the nominal. This procedure will result in a 0-dBm output for a 2-tone or 16-tone TADIL A signal from a transmitter adjusted in accordance with 5.3.3.3.4.	16

Table B-1. MIL-STD-188-203-1A and STANAG 5511, Annex B Requirements Matrix (continued)

Ref Number	MIL-STD Paragraph	Requirements	Subtest Number
	5.3.3.3	UHF TRANSMITTER CHARACTERISTICS.	
25	5.3.3.3.1	UHF audio input. A single audio input with the characteristics described in 5.3.1.1 shall be provided. The center tap of the audio input shall be used for the keyline function.	1, 2
26	5.3.3.3.2	UHF overall frequency response. The attenuation of the RF output relative to the peak response between 450 Hz and 3050 Hz shall not exceed 2 dB. The attenuation of the RF output, at 300 Hz, relative to the peak response between 450 Hz and 3050 Hz shall not exceed 3 dB.	13
27	5.3.3.3.3	UHF intermodulation. The in-band intermodulation distortion products produced by any two equal level audio tones within the bandpass specified in 5.3.3.3.2 adjusted to produce a peak deviation of ± 20 kHz shall be a minimum of 35 dB below the level of either tone. Measurements shall be performed on the demodulated transmitter output.	15
28	5.3.3.3.4	UHF frequency deviation. A peak deviation of ± 20 kHz shall be obtained when a 1-kHz sine wave signal at a level of + 8.25 dBm (2.0 Vrms) is applied to the audio input.	17
29	5.3.3.3.5	UHF transmitter in-band noise. With the equipment operating in the transmit state at full rated RF power output and with the audio input terminated with a 600-ohm resistor, the audio output detected in a nominal 50-Hz audio bandwidth by a test receiver shall be at least 50 dB below the audio output detected when a carrier at the same RF power level deviated ± 20 kHz at a 1-kHz rate is applied to the test receiver RF input.	18
	3.d	"Switched-on" and "Switched-off" states for the transmitter shall be defined as follows: 1. Switched-on. When the transmitter output power reaches 90 percent of its final value. 2. Switched-off. When the transmitter output power is reduced to such a level that receiver performance is not perceptibly degraded.	
	4	LINK 11 TYPE OF TRANSMISSION FOR CLEW	
	4	The radio communications system shall be capable of accepting the information in the form described in the foregoing articles.	
	4.b.1	For ranges within line-of-sight. A single frequency between 225-400 MHz, selectable in 25-kHz steps, shall be used to provide omni-directional line-of-sight cover for operational ranges of the order of 20 miles between surface units and aircraft dependent upon aircraft height.	
	4.b.2	The composite multiplexed audio tones described in the foregoing articles shall frequency-modulate the radio frequency carrier with a deviation of ± 20 kHz.	

Table B-1. MIL-STD-188-203-1A and STANAG 5511, Annex B Requirements Matrix (continued)

Ref Number	STANAG 5511, Annex B Paragraph	Requirements	Subtest Number
	5	LINK 11 FREQUENCY SETTING ACCURACY AND STABILITY FOR CLEW.	
30	5.a	The setting accuracy and subsequent stability of the frequency standard clock shall be: 1. ± 1 part in 10^7 after 30 minute warm-up period, and 2. ± 1 part in 10^8 for any period of 24 hours after a warm-up period of 4 hours under any combination of specified service conditions.	10
31	5.b	An adjustment shall be provided to permit the equipment to be periodically calibrated or aligned to within ± 1 part in 10^9 of the designed frequency.	10
	7.3	UHF TRANSMITTER.	
	7.3.a	Audio input. The audio input shall be balanced and ungrounded with 600-ohms terminations. The rms level at the input shall be 0 dBm, with a peak to rms voltage level of 10.3 dB.	
32	7.3.b	Audio bandwidth. The audio frequency response between + 1.5 dB limits shall be 300 Hz to 3500 Hz.	19
33	7.3.c	Deviation. A signal of + 10 dBm at the audio input shall produce up to ± 20-kHz deviation of the output frequency.	17
34	7.3.d	Frequency stability. After an initial warm-up period, not exceeding 5 minutes, the deviation from the selected carrier frequency in the absence of modulation shall not exceed ± 2.5 kHz.	10
35	7.3.e	Radiated output level. The transmitted output level shall be within 1 dB of its steady-state output within 7 ms of the receipt of a keying signal.	3
36	7.3.f	Linearity. Intermodulation distortion shall be 30 dB below a two-tone test level (935 and 1045 Hz) for a frequency deviation of ± 20 kHz.	15
	7.4	UHF RECEIVER.	
37	7.4.a	Output level. The receiver output shall be within 1 dB of its steady-state value within 12 ms after application of the radio frequency (RF) signal. The output level shall be constant, within ± 3 dB for inputs from 5 µV to 50 mV (hard).	3
38	7.4.b	Audio bandwidth. The audio frequency response between ± 1.5 dB limits shall be 300 Hz to 3500 Hz.	19
39	7.4.c	An input of ± 20-kHz deviation and 100 µV (hard) to the receiver shall produce a signal output of +10 dBm.	17
40	7.4.d	Linearity. Intermodulation distortion shall be 30 dB below a two-tone test level (935 and 1045 Hz) for a frequency deviation of ± 20 kHz.	15

Table B-1. MIL-STD-188-203-1A and STANAG 5511, Annex B Requirements Matrix (continued)

Ref Number	STANAG 5511, Annex B Paragraph	Requirements	Subtest Number
41	7.4.e	Protection. The receiver shall be protected when the transmitter is at full power and the electrical isolation between the transmitter and receiver antenna terminals is as low as 26 dB. The protection circuit shall activate within 150-ms time interval used by the transmitter to go from the carrier "on" to the carrier "off" condition. Provision shall be made to override the protection circuitry to the extent required to monitor the transmitter at full power. The override feature shall provide the required receiver output when the electrical isolation between the transmitter antenna terminal and receiver antenna terminals is in the range 26 dB to 36 dB.	14
42	7.5	UHF accuracy and stability. The accuracy of any selected carrier frequency shall not vary more than ± 5 parts in 10^6 for a period of 6 months after a warm-up period of 30 minutes under any combination of specified service conditions. An adjustment control shall be provided to permit the equipment to be periodically calibrated or aligned to within one part in 10^7 of the designated frequency.	10

Note: Sections that are not applicable are shaded.

Legend:

µV – microvolts
AM – Amplitude Modulation
dB – decibel
dBm – db referred to one milliwatt
DO – Design Objective
DTS – Data Terminal Set
f_c – Carrier Frequency
FM – Frequency Modulation
HF – High Frequency
Hz – hertz
IF – Intermediate Frequency
kHz – kilohertz
MHz – megahertz
MIL-STD – Military Standard
ms – milliseconds
mV – millivolts
RF – Radio Frequency
rms – Root mean square
S+N/N – Signal Plus Noise to Noise
STANAG – Standardization Agreement
TADIL – Tactical Digital Information Link
UHF – Ultra High Frequency
USB – Upper Sideband
Vrms – Voltage root mean square
VSWR – Voltage Standing Wave Ratio

APPENDIX C

DATA COLLECTION FORMS

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MIL-STD-188-203-1A and STANAG 5511, Annex B CONFORMANCE TEST PROCEDURES Forms Control

CONTROL NUMBER:

DATE:
(DD/MM/YY)

Form Number	Serial Number	Equipment Nomenclature	Call Sign	Remarks

DATA ENTRY TECHNICIAN:	TEST DIRECTOR:
SIGNATURE:	SIGNATURE:

RADIO FREQUENCY TEST FACILITY

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MIL-STD-188-203-1A and STANAG 5511, Annex B CONFORMANCE TEST PROCEDURES Additional Remarks Form	CONTROL NUMBER: DATE: (DD/MM/YY)

Remarks

TEST TECHNICIAN:	
DATA ENTRY TECHNICIAN:	TEST DIRECTOR:

RADIO FREQUENCY TEST FACILITY

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MIL-STD-188-203-1A and STANAG 5511, Annex B CONFORMANCE TEST PROCEDURES Event Log Form

CONTROL NUMBER:

DATE:
(DD/MM/YY)

Time (Z)	Initials	Event

TEST TECHNICIAN:	
DATA ENTRY TECHNICIAN:	TEST DIRECTOR:

RADIO FREQUENCY TEST FACILITY

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MIL-STD-188-203-1A and STANAG 5511, Annex B CONFORMANCE TEST PROCEDURES Equipment Configuration Diagram Form	CONTROL NUMBER: DATE: (DD/MM/YY)

TEST TECHNICIAN:	
DATA ENTRY TECHNICIAN:	TEST DIRECTOR:

RADIO FREQUENCY TEST FACILITY

APPENDIX D

MIL-STD-188-203-1A AND STANAG 5511, ANNEX B
RESULTS MATRIX

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Table D-1. MIL-STD-188-203-1A and STANAG 5511, Annex B Results Matrix

MIL-STD Paragraph	Requirements	Subtest Number	Findings	
			Met	Not Met
5.1.1	General. TADIL A data communications will be capable of operation in either the high frequency (HF) or ultra-high frequency (UHF) bands. In the UHF band, the radio equipment shall be capable of being tuned to any integral multiple of 25 kilohertz (kHz) in the frequency range of 225.000 MHz through 399.975 MHz.	10		
5.3.1.1.1	Audio impedances. The audio input and output impedances of the radio equipment shall be 600 ohms balanced in accordance with the Channel Input/Output Impedances paragraph of MIL-STD-188-100 (See 4.4.3.1.4).	1		
5.3.1.1.2	Audio input level. The nominal transmitter audio input level shall be 0 dBm.	1		
5.3.1.1.3	Audio output level. The nominal receiver audio output level shall be 0 dBm. The level of the output(s) shall be adjustable over the range of +3 dB to – 3 dB when terminated with a 600-ohm resistive load. At installation, the output(s) shall be adjusted to provide a nominal 0 dBm input(s) to the DTS. The audio output(s) shall be inhibited during periods of frequency tuning.	16		
5.3.1.2	Radio keyline. The transmit and receive states of the radio equipment shall be capable of being controlled by the simplex keyline method specified in 5.2.8.1.5.1.	2		
5.1.7.b	Switching time. Transmit-to-receive switching occurs at the end of the transmission, that is, the picket stop code or address code. When switching from the transmit to receive state, the transmitter RF output shall be reduced to the quiescent noise level of 0.1 microvolt (μV) or less in a 6-kHz bandwidth centered on the nominal carrier frequency, and the receiver shall be capable of maximum receive sensitivity within 23 milliseconds or less after reset of the radio set keyline.	3		
5.3.1.4	Phase jitter (stability). The rms phase jitter shall not exceed 2.5 degrees and the probability of a shift greater than 30 degrees shall be less than or equal to 0.01 percent when measured at the signal output terminals of a transmitter or a receiver. Measurements shall be performed over a sufficient number of adjacent frame pairs to establish the specified probability with a confidence of at least 95 percent. Measured values shall be the average phase in an averaging time of 9.09 milliseconds or 18.18 milliseconds for frame lengths of 13.3 milliseconds or 22 milliseconds, respectively.	4		

Table D-1. MIL-STD-188-203-1A and STANAG 5511, Annex B Results Matrix (continued)

MIL-STD Paragraph	Requirements	Subtest Number	Findings	
			Met	Not Met
5.3.1.5	Sidetone. During transmitter operation, a sidetone signal having the same characteristics as specified for normal received data shall be provided at the receiver audio output. For UHF systems, the sidetone shall be provided at the receive audio.	5		
5.3.1.6	Frequency selection time. The time from the selection of new frequency channel to the time that the radio set is operative for either transmission or reception on the new channel shall not exceed 10 seconds. If the radio is operated with an external automatic antenna coupler or multi-coupler, the coupler tuning time should not exceed 60 seconds.	6		
5.3.1.7	Duty cycle. The radio equipment shall be capable of operating with a 100-percent transmit duty cycle. This duty cycle requirement shall apply under all applicable service conditions.	7		
5.3.1.8.1	Maximum time delay. The maximum time delay measured between input and output of either the transmitter or receiver for any single frequency over the range of 500 Hz to 3050 Hz shall be less than 3.5 milliseconds (DO of 2.5 milliseconds) (See figure 7).	8		
5.3.1.8.2	Differential time delay. The differential time delay that results between any two audio tones within the frequency range of 815 Hz to 3050 Hz for either the transmitter or receiver shall not exceed 500 microseconds (See figure 7).	8		
5.3.1.9	RF terminations. The nominal impedance at the receiver RF input terminal shall be 50 ohms unbalanced to ground. The transmitter RF output load impedance shall be a nominal 50 ohms, unbalanced to ground. The transmitter shall be protected against failures induced by a voltage standing wave ratio (VSWR) greater than 4:1.	9		
5.1.3.2	Envelope delay. The absolute envelope delay of AM receivers over the frequency band from 300 Hz to 3000 Hz shall not exceed 2.5 ms.	8		
5.3.3.1.1	UHF frequency coverage. The UHF frequency coverage shall be as specified in 5.1.1. The frequency readout shall be in terms of f_c.	10		
5.3.3.1.2	UHF accuracy and stability. The unmodulated transmitted carrier and receiver center frequencies shall be within ± 0.0005 percent of the selected f_c after a warm-up period of 5 minutes under any combination of specified service conditions.	10		
5.3.3.1.3	Intermediate frequency (IF) selectivity (transmitter and receiver). The 6 dB bandwidth shall be at least 50 kHz and the 60-dB bandwidth shall be no more than 200 kHz. The peak-to-peak ripple over 90 percent of the 6-dB bandwidth shall not exceed 3 dB.	11		

Table D-1. MIL-STD-188-203-1A and STANAG 5511, Annex B Results Matrix (continued)

MIL-STD Paragraph	Requirements	Subtest Number	Findings	
			Met	Not Met
5.3.3.2.1	UHF audio output. A single audio output with the characteristics specified in 5.3.1.1 shall be provided.	16		
5.3.3.2.2	UHF receiver sensitivity. The sensitivity of the receiver over the specified frequency range shall be such that an RF input test signal results in a minimum output S+N/N ratio of 20 dB as measured in a 3-kHz bandwidth. The RF input test signal shall have a level of – 99 dBm and shall be FM modulated at a rate of 1 kHz with a peak deviation of ± 10 kHz. NOTE: Peak deviation is defined as the absolute maximum frequency excursion of the outer spectral component from the assigned frequency.	12		
5.3.3.2.3	UHF frequency response. With an RF input signal level of – 73 dBm with peak deviation of ± 20 kHz applied to the receiver input terminals, the attenuation of the audio output relative to the peak response between 450 Hz and 3050 Hz shall not exceed 2 dB. The attenuation of the audio output at 300 Hz, relative to the peak response between 450 Hz and 3050 Hz shall not exceed 3 dB.	13		
5.3.3.2.4	Input signal protection. A receiver protection circuit shall be activated by RF signal level. The receiver shall not be damaged by the continuous application of a +15 dBm (DO of +35 dBm) RF signal.	14		
5.3.3.2.5	UHF in-band intermodulation. With an input signal level of – 53 dBm modulated by any two equal level tones selected to produce audio outputs in the 450 Hz to 3050 Hz range, and each producing ± 10-kHz peak deviation, the intermodulation distortion products measured at the audio output shall be at least 35 dB (DO of 50 dB) below the output level of either audio tone.	15		
5.3.3.2.6	UHF S+N/N. With a receive input signal of – 53 dBm modulated at ± 8-kHz peak deviation at a 1-kHz rate, the S+N/N ratio shall be 40 dB or greater as measured in a 3-kHz bandwidth.	12		
5.3.3.2.7	UHF receiver output level stability. The audio output shall be +2.25 dBm (1.0 Vrms) ± 3 dB across a 600-ohm resistive load for any receive input signal frequency modulated at a 1-kHz rate with peak deviation of ± 10 kHz and with any level between – 93 dBm and +1 dBm.	16		
5.3.3.2.8	Output level and distortion. With a – 53 dBm input signal modulated by a 1-kHz sine wave, and adjusted to produce a ± 20-kHz peak deviation, the audio output level shall be + 8.25 dBm (2.0 Vrms) ± 0.5 dB into a 600-ohm resistive load. The output shall be adjustable over the range of – 3 dB to +3 dB from the nominal. This procedure will result in a 0-dBm output for a 2-tone or 16-tone TADIL A signal from a transmitter adjusted in accordance with 5.3.3.3.4.	16		

Table D-1. MIL-STD-188-203-1A and STANAG 5511, Annex B Results Matrix (continued)

MIL-STD Paragraph	Requirements	Subtest Number	Findings	
			Met	Not Met
5.3.3.3.1	UHF audio input. A single audio input with the characteristics described in 5.3.1.1 shall be provided. The center tap of the audio input shall be used for the keyline function.	1, 2		
5.3.3.3.2	UHF overall frequency response. The attenuation of the RF output relative to the peak response between 450 Hz and 3050 Hz shall not exceed 2 dB. The attenuation of the RF output, at 300 Hz, relative to the peak response between 450 Hz and 3050 Hz shall not exceed 3 dB.	13		
5.3.3.3.3	UHF intermodulation. The in-band intermodulation distortion products produced by any two equal level audio tones within the bandpass specified in 5.3.3.3.2 adjusted to produce a peak deviation of ± 20 kHz shall be a minimum of 35 dB below the level of either tone. Measurements shall be performed on the demodulated transmitter output.	15		
5.3.3.3.4	UHF frequency deviation. A peak deviation of ± 20 kHz shall be obtained when a 1-kHz sine wave signal at a level of + 8.25 dBm (2.0 Vrms) is applied to the audio input.	17		
5.3.3.3.5	UHF transmitter in-band noise. With the equipment operating in the transmit state at full rated RF power output and with the audio input terminated with a 600-ohm resistor, the audio output detected in a nominal 50-Hz audio bandwidth by a test receiver shall be at least 50 dB below the audio output detected when a carrier at the same RF power level deviated ± 20 kHz at a 1-kHz rate is applied to the test receiver RF input.	18		
5.a	The setting accuracy and subsequent stability of the frequency standard clock shall be: 1. ± 1 part in 10^7 after 30 minute warm-up period, and 2. ± 1 part in 10^8 for any period of 24 hours after a warm-up period of 4 hours under any combination of specified service conditions.	10		
STANAG 5511, Annex B, Paragraph	**Requirements**	**Subtest Number**	**Findings**	
			Met	**Not Met**
5.b	An adjustment shall be provided to permit the equipment to be periodically calibrated or aligned to within ± 1 part in 10^9 of the designed frequency.	10		
7.3.b	Audio bandwidth. The audio frequency response between + 1.5 dB limits shall be 300 Hz to 3500 Hz.	21		

Table D-1. MIL-STD-188-203-1A and STANAG 5511, Annex B Results Matrix (continued)

STANAG 5511, Annex B, Paragraph	Requirements	Subtest Number	Findings	
			Met	Not Met
7.3.c	Deviation. A signal of + 10 dBm at the audio input shall produce up to ± 20-kHz deviation of the output frequency.	17		
7.3.d	Frequency stability. After an initial warm-up period, not exceeding 5 minutes, the deviation from the selected carrier frequency in the absence of modulation shall not exceed ± 2.5 kHz.	10		
7.3.e	Radiated output level. The transmitted output level shall be within 1 dB of its steady-state output within 7 ms of the receipt of a keying signal.	3		
7.3.f	Linearity. Intermodulation distortion shall be 30 dB below a two-tone test level (935 and 1045 Hz) for a frequency deviation of ± 20 kHz.	15		
7.4.a	Output level. The receiver output shall be within 1 dB of its steady-state value within 12 ms after application of the radio frequency (RF) signal. The output level shall be constant, within ± 3 dB for inputs from 5 µV to 50 mV (hard).	3		
7.4.b	Audio bandwidth. The audio frequency response between ± 1.5 dB limits shall be 300 Hz to 3500 Hz.	21		
7.4.c	An input of ± 20-kHz deviation and 100 µV (hard) to the receiver shall produce a signal output of +10 dBm.	17		
7.4.d	Linearity. Intermodulation distortion shall be 30 dB below a two-tone test level (935 and 1045 Hz) for a frequency deviation of ± 20 kHz.	15		
7.4.e	Protection. The receiver shall be protected when the transmitter is at full power and the electrical isolation between the transmitter and receiver antenna terminals is as low as 26 dB. The protection circuit shall activate within 150 ms time interval used by the transmitter to go from the carrier “on” to the carrier “off” condition. Provision shall be made to override the protection circuitry to the extent required to monitor the transmitter at full power. The override feature shall provide the required receiver output when the electrical isolation between the transmitter antenna terminal and receiver antenna terminals is in the range 26 dB to 36 dB.	14		

Table D-1. MIL-STD-188-203-1A and STANAG 5511, Annex B Results Matrix (continued)

STANAG 5511, Annex B, Paragraph	Requirements	Subtest Number	Findings	
			Met	Not Met
7.5	UHF accuracy and stability. The accuracy of any selected carrier frequency shall not vary more than ± 5 parts in 10^6 for a period of 6 months after a warm-up period of 30 minutes under any combination of specified service conditions. An adjustment control shall be provided to permit the equipment to be periodically calibrated or aligned to within one part in 10^7 of the designated frequency.	10		

Legend:

µV – microvolts	HF – high frequency	RF – Radio Frequency
AM – Amplitude Modulation	Hz – hertz	rms – root mean square
dB – decibel	IF – Intermediate Frequency	S+N/N – Signal plus Noise to Noise
dBm – dB referred to one milliwatt	kHz – kilohertz	STANAG – Standardization Agreement
DO – Design Objective	MHz – megahertz	TADIL – Tactical Digital Information Link
DTS – Data Terminal Set	MIL-STD – Military Standard	UHF – Ultra High Frequency
f_c – carrier frequency	ms – milliseconds	Vrms – Voltage root mean square
FM – Frequency Modulation	mV – millivolts	VSWR – Voltage Standing Wave Ratio

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APPENDIX E

REFERENCES

MILITARY STANDARD (MIL-STD)

E-1 MIL-STD-188-203-1A, “Interoperability and Performance Standards for Tactical Digital Information Link," dated 8 January 1988

NORTH ATLANTIC TREATY ORGANIZATION STANDARDIZATION AGREEMENT (STANAG)

E-2 STANAG 5511, Edition 6, Annex B “Tactical Data Exchange – Link 11 / Link 11B," undated