DEFENSE INFORMATION SYSTEMS AGENCY
JOINT INTEROPERABILITY TEST COMMAND
2001 BRAINARD ROAD
FORT HUACHUCA, ARIZONA 85613-7051

IN REPLY
REFER TO Networks and Transport Division (JTE) **5 Apr 04**

MEMORANDUM FOR DISTRIBUTION

SUBJECT: MIL-STD-188-181B Conformance Certification of the AN/USC-42A(V)2(C) Miniaturized Demand Assigned Multiple Access (Mini-DAMA) Terminal (Certification 369.283)

References:
(a) DOD Directive 4630.5, "Interoperability and Supportability of Information Technology (IT) and National Security Systems (NSS)," 11 Jan 2002

(b) CJCSI 6212.01C, "Interoperability and Supportability of Information Technology and National Security Systems," 20 November 2003

1. References (a) and (b) establish the Defense Information Systems Agency (DISA), Joint Interoperability Test Command (JITC), as the responsible organization for interoperability test certification. Additional references are provided in enclosure 1.

2. JITC has completed a technical analysis of the Titan Corporation White Paper, "Software Changes to the AN/USC-42A(V)2(C) Mini-DAMA Terminal," 29 September 2003, and has determined that the software modifications implemented in the terminal do not affect Ultrahigh Frequency (UHF) Dedicated Satellite Communications (SATCOM) functionality. Military standard (MIL-STD)-188-181B conformance testing and certification was previously completed on the AN/USC-42(V)1(C), AN/USC-42(V)2(C), and AN/USC-42A(V)2(C) Mini-DAMA terminals on 29 September 2003 (Certification 337.283). Subsequent to this certification, software changes documented in the Titan Corporation White Paper were implemented only in the AN/USC-42A(V)2(C) terminal version to provide automatic message processing during MIL-STD-188-182 operation for a user who has a specialized requirement related to message processing.

3. The AN/USC-42A(V)2(C) Mini-DAMA Terminal is certified as conforming to the requirements of MIL-STD-188-181B (reference (c)) to the extent detailed in the Conformance Certification Testing Summary (enclosure 2). The certified terminal components and associated software versions are:

JITC Memo, Networks and Transport Division (JTE), MIL-STD-188-181B Conformance Certification of the AN/USC-42A(V)2(C) Miniaturized Demand Assigned Multiple Access (Mini-DAMA) Terminal (Certification 369.283)

Miniaturized Demand Assigned Multiple Access Terminal ..... AN/USC-42A(V)2(C)
Modem ..... MD-1293A(V)2(C)(P)/USC-42(V)
System Software Build Version 8.35d
Red Communications Signal Processor (CSP) Version 8.36
Black Communications Signal Processor (CSP) Version 8.07
Black Input/Output (I/O) Version 8.18
Transmission Security (TRANSEC) Version 5.05
Digital Signal Processor (DSP) Version 8.35
High Power Amplifier ..... AM-7543/USC-42(V)

4. Although the system is being certified compliant to MIL-STD-188-181B, an operational problem can exist if the transmit power is too high. The operator must ensure the transmit Effective Isotropically Radiated Power (EIRP) level does not exceed the previously certified levels listed in table 1 when operating in narrowband mode, including cable loss and antenna gain.

Table 1. Maximum Narrowband EIRP

INPUT/OUTPUT DATA RATE (bps)	MODULATION TYPE	CODING TYPE	MAXIMUM EIRP (dBWi)
*75	SBPSK	None	33.8
*300	SBPSK	C: K=7, r=1/2	33.6
*300	SBPSK	None	33.5
*600	SBPSK	C: K=7, r=1/2	30.5
*600	SBPSK	None	33.6
*1200	SBPSK	C: K=7, r=1/2	20.3
1200	SBPSK	None	30.1
*2400	SOQPSK	C: K=7, r=1/2	25.9
2400	SBPSK	None	20.3
*4800	SOQPSK	PC: K=7, r=3/4	23.2
4800	CPM	None	21.2
*4800	CPM	RS: e=6 [60, 48]	22.9
*6000	CPM	RS: e=5 [60, 50]	22.9
*6000	CPM	None	22.6
*7200	CPM	RS: e=3 [60, 54]	22.8
*7200	CPM	None	22.7

Table 1. Maximum Narrowband EIRP (continued)

INPUT/OUTPUT DATA RATE (bps)	MODULATION TYPE	CODING TYPE	MAXIMUM EIRP (dBWi)
*8000	CPM	RS: e=5 [60, 50]	20.8
*8000	CPM	None	22.8
9600	CPM	None	20.6

*Optional Data Rate
bps = bits per second
C = Convolutional Encoding
CPM = Continuous Phase Modulation
dBWi = decibel (dB) referenced to 1 watt, relative to isotropically radiated power
e = Error Correction Capability
EIRP = Effective Istropically Radiated Power
K = Encoder Constraint Length
PC = Punctured Convolutional Encoding
r = Coding Rate
RS = Shortened Reed Solomon (63,k) Encoding
SBPSK = Shaped Binary Phase-Shift Keying
SOQPSK = Shaped Offset Quadrature Phase-Shift Keying

5. When operating in wideband mode, the operator must ensure the EIRP level does not exceed the previously certified levels listed in the table 2, including cable loss and antenna gain.

Table 2. Maximum Wideband EIRP

INPUT/OUTPUT DATA RATE (bps)	MODULATION TYPE	CODING TYPE	MAXIMUM EIRP (dBWi)
*9600	SBPSK	C: K=7, r=1/2	20.3
*9600	SBPSK	None	19.8
*9600	CPM	None	35.5
*16000	SBPSK	None	25.7
*16000	SOQPSK	C: K=7, r=1/2	35.1
*19200	SOQPSK	C: K=7, r=1/2	28.0
19200	CPM	None	34.0
*28800	CPM	RS: e=6 [120, 108]	33.9
*28800	CPM	None	34.4
*32000	CPM	RS: e=10 [126, 105]	31.7
32000	CPM	None	33.8
*38400	CPM	RS: e=12 [125, 100]	29.3
38400	CPM	None	31.6

Table 2. Maximum Wideband EIRP (continued)

INPUT/OUTPUT DATA RATE (bps)	MODULATION TYPE	CODING TYPE	MAXIMUM EIRP (dBWi)
48000	CPM	None	29.5
*56000	CPM	None	30.7

*Optional Data Rate
bps = bits per second
C = Convolutional Encoding
CPM = Continuous Phase Modulation
dBWi = decibel (dB) referenced to 1 watt, relative to isotropically radiated power
e = Error Correction Capability
EIRP = Effective Isotropically Radiated Power
K = Encoder Constraint Length
r = Coding Rate
RS = Shortened Reed Solomon (127,k) Encoding
SBPSK = Shaped Binary Phase-Shift Keying
SOQPSK = Shaped Offset Quadrature Phase-Shift Keying

6. Higher transmit EIRP levels will result in out-of-band emissions that exceed the limits set by the MIL-STD, and may cause friendly jamming in adjacent channels.

7. In accordance with reference (d), users are required to have terminals certified compliant to MIL-STD-188-181 series, -182 series, and -183 series. Technical analysis of the Titan Corporation White Paper was performed to ensure that the terminal was still in compliance to the MIL-STD. This certification memorandum declares the MIL-STD-188-181B portion of the overall Joint Chief of Staff-mandated requirement has been met for the AN/USC-42A(V)2(C) Mini-DAMA Terminal.

8. Previous testing has demonstrated that even though a product conforms to standards, there is still a potential for incompatibility between UHF terminals that implement operational requirements differently. Therefore, prior to an initial operational capability assessment, terminal users must define the specific terminal operational requirements. Additionally, the terminals must be tested and certified for interoperability by JITC in accordance with reference (b).

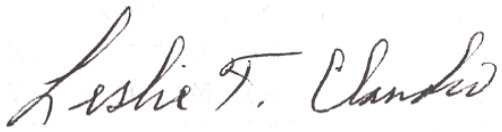
9. JITC distributes test documentation via the JITC Electronic Report Distribution (ERD) system which uses unclassified (NIPRNET) e-mail. More comprehensive information is available via the JITC System Tracking Program (STP). The STP is accessible by .mil/.gov users on the NIPRNET at https://stp.fhu.disa.mil. Test reports, lessons learned, and related testing documents and references are on the JITC Joint Interoperability Tool (JIT) at http://jit.fhu.disa.mil (NIPRNET) or http://199.208.204.125 (SIPRNET). JITC also provides a DAMA Certification Register on the JITC public website under "Product Registers." The DAMA Certification Register can be

JITC Memo, Networks and Transport Division (JTE), MIL-STD-188-181B Conformance Certification of the AN/USC-42A(V)2(C) Miniaturized Demand Assigned Multiple Access (Mini-DAMA) Terminal (Certification 369.283)

reached directly at http://jitc.fhu.disa.mil/reg/dama1.html. The UHF SATCOM DAMA Test Facility homepage can be reached directly at http://jitc.fhu.disa.mil/reg/uhfdama.htm.

10. The testing agent point of contact is Norma Vega, DSN 879-1741, Commercial (520) 538-1741, e-mail vegan@fhu.disa.mil.

FOR THE COMMANDER:



2 Enclosures:
1 Additional References
2 Conformance Certification Testing Summary

LESLIE CLAUDIO
Chief
Networks and Transport Division

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Commanding Officer, SPAWAR Systems Center San Diego, ATTN: Mr. Charles Gooding, Code 2623, San Diego, CA 92152-5001

ADDITIONAL REFERENCES

(c) MIL-STD-188-181B, "Interoperability Standard for Single-Access 5-kHz and 25-kHz UHF Satellite Communications Channels," 16 October 2001

(d) Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 6251.01A, "Ultrahigh Frequency (UHF) Satellite Communications Demand Assigned Multiple Access Requirements," 21 April 2003

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CONFORMANCE CERTIFICATION TESTING SUMMARY
(Certification 369.283)

1. CERTIFICATION TITLE. MIL-STD-188-181B Conformance Certification of the AN/USC-42A(V)2(C) Miniaturized Demand Assigned Multiple Access (Mini-DAMA) Terminal.

2. PROPONENT. Commanding Officer
SPAWAR Systems Center San Diego
PMW 179-CG
San Diego, CA 92152-5001

3. PROGRAM MANAGER/USER POC. Mr. Charles Gooding, (619) 524-7982
E-mail: charles.gooding@navy.mil

4. TESTERS. Joint Interoperability Test Command (JITC):
Mr. Larry Metz, (520) 538-5215
Mr. Dan Bear, (520) 538-4214
Ms. Norma Vega, (520) 538-1741

5. SYSTEM DESCRIPTION. The AN/USC-42A(V)2(C) Mini-DAMA Terminal provides full-duplex capabilities in both dedicated and DAMA modes of operation. The terminal has eight input/output (I/O) ports which can be independently configured and can be selected for half or full-duplex operations. The terminal provides internal transmission security (TRANSEC) for orderwire encryption in the DAMA mode, and optional embedded Communications Security (COMSEC) for user communications encryption in all modes. The terminal uses an external 100-Watt amplifier, and has one audio Input/Output port that is used for Frequency Shift Keying (FSK) operation in the Dedicated SATCOM mode. There are three versions of the Mini-DAMA Terminal. All are identical in size and appearance, and the software and hardware components are interchangeable between them. The AN/USC-42(V)1(C) is a single Radio Frequency (RF) channel version that uses a modem power supply that differs slightly from the others. The AN/USC-42(V)2(C) and AN/USC-42A(V)2(C) terminals are dual and single RF channel versions respectively. All three configurations specifically address ship, shore, submarine and aircraft Ultrahigh Frequency (UHF) Dedicated and DAMA SATCOM requirements for the United States Navy.

6. TEST NETWORK DESCRIPTION. Not Applicable. This certification is being issued on the basis of a JITC technical review of the Titan Corporation white paper, “Software Changes to the AN/USC-42A(V)2(C) Mini-DAMA Terminal,” 29 September 2003. Figure 1 shows the configuration of the previously certified system.

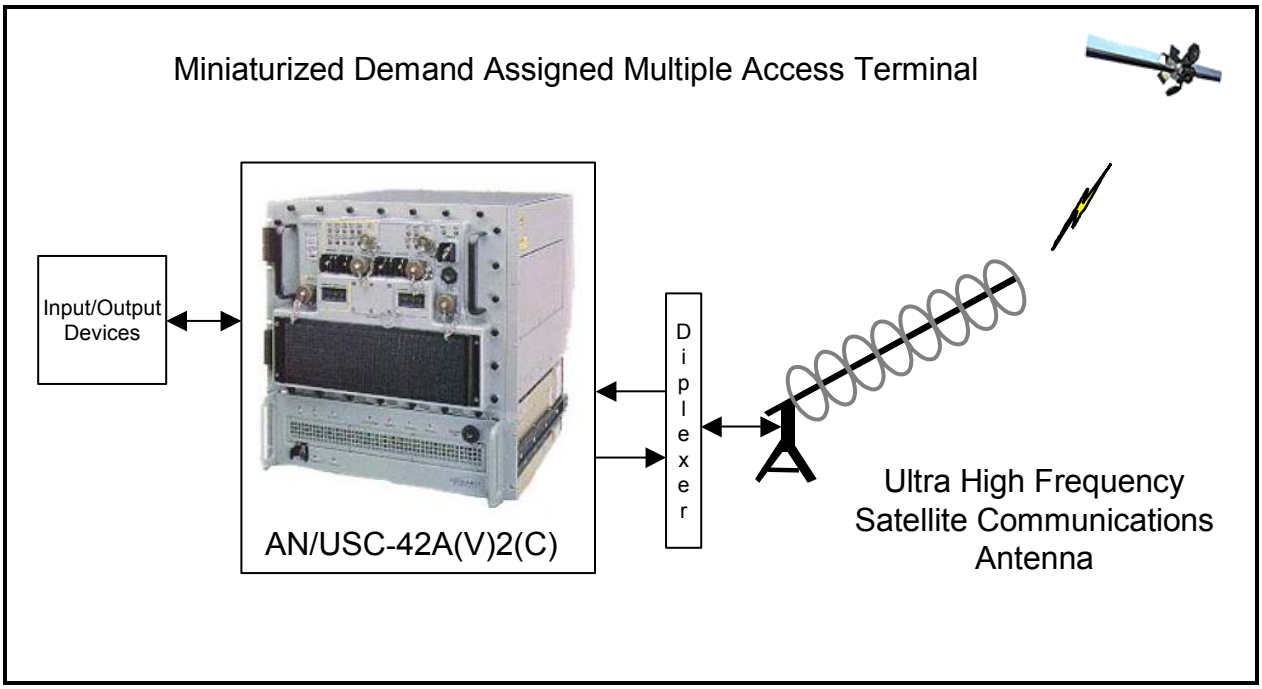

Figure 1. Tested System Configuration

7. SYSTEM CONFIGURATION. Terminal components and software versions include:

Miniaturized Demand Assigned Multiple Access Terminal ..... AN/USC-42A(V)2(C)
Modem ..... MD-1293A(V)2(C)(P)/USC-42(V)
System Software Build Version 8.35d
Red Communications Signal Processor (CSP) Version 8.36
Black Communications Signal Processor (CSP) Version 8.07
Black Input/Output (I/O) Version 8.18
Transmission Security (TRANSEC) Version 5.05
Digital Signal Processor (DSP) Version 8.35
High Power Amplifier ..... AM-7543/USC-42(V)

8. MODES OF OPERATION. All MIL-STD-188-181B mandatory and implemented optional data rates and functions have been verified.

9. TESTING LIMITATIONS. None.

10. REQUIRED STANDARDS AND CONFORMANCE. The required standard is MIL-STD-188-181B, “Interoperability Standard for Single-Access 5-kHz and 25-kHz UHF Satellite Communications Channels,” 16 October 2001. Table 3 delineates all the MIL-STD requirements and indicates the status as “Met,” “Previously Met,” “Not Met,” “Not Tested,” or “Not Applicable.” The requirements marked “Previously Met” are requirements determined not to have been affected by the software modifications

implemented in the terminal. Sufficient analysis of the Titan Corporation White Paper has been performed to determine that the AN/USC-42A(V)2(C) Mini-DAMA Terminal, has met the mandatory requirements set forth in MIL-STD-188-181B. The following provides details and impacts to some of the noted requirements:

a. Requirement 5, paragraph 4.2.3, "Hardware implementation of the terminals with embedded COMSEC shall include provisions for future implementation of Over-the-Air Rekeying (OTAR)."

(1) Not Applicable. OTAR capabilities of the AN/USC-42A(V)2(C) Mini-DAMA Terminal are provided when the terminal is configured with embedded COMSEC. This terminal configuration does not use embedded COMSEC; therefore, this requirement is not applicable.

(2) Impact. None.

b. Requirement 15, paragraph 5.1.1.4.2, "For carrier EIRP levels equal to or greater than +18 dBW, the maximum EIRP values shall not exceed the values specified table II [of the MIL-STD]."

(1) Met with Comment. As tested, the maximum Effective Isotropically Radiated Power (EIRP) levels allowable, including cable losses and antenna gain, to stay within the high-power Adjacent Channel Emission (ACE) limits are listed in table 1.

Table 1. Maximum Narrowband EIRP

INPUT/OUTPUT DATA RATE (bps)	MODULATION TYPE	CODING TYPE	MAXIMUM EIRP (dBWi)
*75	SBPSK	None	33.8
*300	SBPSK	C: K=7, r=1/2	33.6
*300	SBPSK	None	33.5
*600	SBPSK	C: K=7, r=1/2	30.5
*600	SBPSK	None	33.6
*1200	SBPSK	C: K=7, r=1/2	20.3
1200	SBPSK	None	30.1
*2400	SOQPSK	C: K=7, r=1/2	25.9
2400	SBPSK	None	20.3
*4800	SOQPSK	PC: K=7, r=3/4	23.2
4800	CPM	None	21.2
*4800	CPM	RS: e=6 [60, 48]	22.9
*6000	CPM	RS: e=5 [60, 50]	22.9
*6000	CPM	None	22.6
*7200	CPM	RS: e=3 [60, 54]	22.8
*7200	CPM	None	22.7

Table 1. Maximum Narrowband EIRP (continued)

INPUT/OUTPUT DATA RATE (bps)	MODULATION TYPE	CODING TYPE	MAXIMUM EIRP (dBWi)
*8000	CPM	RS: e=5 [60, 50]	20.8
*8000	CPM	None	22.8
9600	CPM	None	20.6

*Optional Data Rate
bps = bits per second
C = Convolutional Encoding
CPM = Continuous Phase Modulation
dBWi = decibel (dB) referenced to 1 watt, relative to isotropically radiated power
e = Error Correction Capability
EIRP = Effective Isotropically Radiated Power
K = Encoder Constraint Length
PC = Punctured Convolutional Encoding
r = Coding Rate
RS = Shortened Reed Solomon (63,k) Encoding
SBPSK = Shaped Binary Phase-Shift Keying
SOQPSK = Shaped Offset Quadrature Phase-Shift Keying

(2) Impact. Minor. If the terminal is operated at an EIRP level greater than those specified in the table, ACE will potentially cause friendly jamming and transmission disruption in adjacent channels. The EIRP level specified, including cable loss and antenna gain, is normally more than enough power to maintain adequate link quality.

c. Requirement 61, paragraph 5.2.1.4(2), "For PSK modulation in a nominal 25-kHz bandwidth whose center frequency is displaced by Δf from the terminal transmitter's carrier frequency, the EIRP shall not exceed the values specified in table VIa [of the MIL-STD] for a carrier level less than +18 dBW and table VIb [of the MIL-STD] for a carrier level greater than or equal to +18 dBW."

(1) Met with Comment. As tested, the maximum EIRP levels allowable, including cable losses and antenna gain, to still meet the high-power ACE requirement are specified in table 2.

Table 2. Maximum Wideband EIRP

INPUT/OUTPUT DATA RATE (bps)	MODULATION TYPE	CODING TYPE	MAXIMUM EIRP (dBWi)
*9600	SBPSK	C: K=7, r=1/2	20.3
*9600	SBPSK	None	19.8
*9600	CPM	None	35.5
*16000	SBPSK	None	25.7
*16000	SOQPSK	C: K=7, r=1/2	35.1
*19200	SOQPSK	C: K=7, r=1/2	28.0
19200	CPM	None	34.0
*28800	CPM	RS: e=6 [120, 108]	33.9
*28800	CPM	None	34.4

Table 2. Maximum Wideband EIRP (continued)

INPUT/OUTPUT DATA RATE (bps)	MODULATION TYPE	CODING TYPE	MAXIMUM EIRP (dBWi)
*32000	CPM	RS: e=10 [126, 105]	31.7
32000	CPM	None	33.8
*38400	CPM	RS: e=12 [125, 100]	29.3
38400	CPM	None	31.6
48000	CPM	None	29.5
*56000	CPM	None	30.7

*Optional Data Rate
bps = bits per second
C = Convolutional Encoding
CPM = Continuous Phase Modulation
dBWi = decibel (dB) referenced to 1 watt, relative to isotropically radiated power
e = Error Correction Capability
EIRP = Effective Isotropically Radiated Power
K = Encoder Constraint Length
r = Coding Rate
RS = Shortened Reed Solomon (127,k) Encoding
SBPSK = Shaped Binary Phase-Shift Keying
SOQPSK = Shaped Offset Quadrature Phase-Shift Keying

(2) Impact. Minor. If the terminal is operated at an EIRP level greater than those specified in the table, ACE will potentially cause friendly jamming and transmission disruption in adjacent channels. The EIRP level specified, including cable loss and antenna gain, is normally more than enough power to maintain adequate link quality.

11. TEST AND ANALYSIS REPORT. JITC distributes test documentation via the JITC Electronic Report Distribution (ERD) system which uses unclassified (NIPRNET) e-mail. More comprehensive information is available via the JITC System Tracking Program (STP). The STP is accessible by .mil/.gov users on the NIPRNET at https://stp.fhu.disa.mil. Test reports, lessons learned, and related testing documents and references are on the JITC Joint Interoperability Tool (JIT) at http://jit.fhu.disa.mil (NIPRNET) or http://199.208.204.125 (SIPRNET). JITC also provides a DAMA Certification Register on the JITC public website under "Product Registers." The DAMA Certification Register can be reached directly at http://jitc.fhu.disa.mil/reg/dama1.html. The UHF SATCOM DAMA Test Facility homepage can be reached directly at http://jitc.fhu.disa.mil/reg/uhfdama.htm. The testing agent point of contact is Norma Vega, DSN 879-1741, Commercial (520) 538-1741, e-mail vegan@fhu.disa.mil.

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Table 3. MIL-STD-188-181B Requirements Matrix for the AN/USC-42A(V)2(C) Miniaturized Demand Assigned Multiple Access (Mini-DAMA) Terminal

JITC Req #	MIL-STD Paragraph	REQUIREMENT DESCRIPTION	STATUS
1	4.1(1)	Optional capabilities that are implemented **shall** be as specified in this standard.	**Previously Met**
2	4.1(2)	Interoperable access modes **shall** be single access on a satellite channel.	**Previously Met**
3	4.2.2(1)	For coherent demodulation (PSK or CPM), the terminal **shall** transmit a preamble (see 5.1.4.1 and 5.2.4.1) to allow demodulator synchronization before the communications security (COMSEC) synchronization preamble is transmitted.	**Previously Met**
4	4.2.2(2)	A preamble **shall** not be used for FSK modulation in the wideband mode.	**Previously Met**
5	4.2.3	Hardware implementation of the terminals with imbedded COMSEC **shall** include provisions for future implementation of Over-the-Air Rekeying (OTAR).	**Not Applicable (Note)**
Note: This terminal configuration does not embed COMSEC.			
6	4.2.4	The waveform **shall** interface with Fleet Satellite Communications (FLTSATCOM) and UHF Follow-On (UFO) satellites.	**Previously Met**
7	4.2.5	If the terminal implements FEC, it **shall** be compliant with the FEC requirements of this standard.	**Previously Met**
8	5.1.1.1(1)	The terminal **shall** be capable of providing EIRP of at least 16 dBW with respect to right-hand circular polarization.	**Previously Met**
9	5.1.1.1(2)	The terminal EIRP **shall** be incrementally or continuously adjustable between a minimum setting no greater than 10 dBW and the maximum EIRP, with a power setting resolution of 2 dB or better.	**Previously Met**
10	5.1.1.2	The terminal **shall** maintain EIRP accuracy of ±1.5 dB, assuming antenna gain and passive losses are fixed.	**Previously Met**
11a	5.1.1.3(1)	Transmitter turn-on time requirement is dependent upon whether operating in non-TDMA or TDMA mode as follows: (a) When performing non-TDMA transmissions, the transmitter turn-on time **shall** not exceed 50-ms. The transmitter turn-on time will be measured only for table III options that do not include Reed-Solomon coding due to interleaver-block delays introduced by the interleaving used with Reed-Solomon coding.	**Previously Met**
11b	5.1.1.3(2)	(b) When transmitting within a time slot (TDMA operation), the transmitter turn-on time **shall** not exceed 875 microseconds (μs).	**Previously Met (Note)**
Note: This requirement was previously met during MIL-STD-188-183 certification testing.			
12	5.1.1.4	In a nominal 5-kHz bandwidth whose center frequency is displaced by Δf from a terminal transmitter's carrier frequency, the EIRP **shall** be as specified in 5.1.1.4.1 and 5.1.1.4.2.	**Previously Met**
13	5.1.1.4.1(1)	The EIRP, relative to the transmitter's total output EIRP, **shall** not exceed the values specified in table II [of the MIL-STD].	**Previously Met**
14	5.1.1.4.1(2)	These values **shall** apply when the transmitter carrier frequency is either unmodulated or modulated.	**Previously Met**
15	5.1.1.4.2(1)	For carrier EIRP levels equal to or greater than +18 dBW, the maximum EIRP values **shall** not exceed the values specified as "Maximum EIRP" in table II [of the MIL-STD].	**Previously Met (Note)**
Note: The maximum terminal EIRP levels to meet these requirements are listed in table 1 of the Conformance Certification Testing Summary.			
16	5.1.1.4.2(2)	These values **shall** apply when the transmitter carrier frequency is either modulated or unmodulated.	**Previously Met**
17	5.1.1.5	The transmit frequency **shall** be tunable in 5-kHz increments over the frequency range of 291.000 to 318.300 MHz.	**Previously Met**

JITC Req #	MIL-STD Paragraph	REQUIREMENT DESCRIPTION	STATUS
18	5.1.1.6(1)	The phase noise power spectral density at 10 Hz offset from the carrier **shall** not exceed -46 dBc/Hz.	**Previously Met**
19	5.1.1.6(2)	The single side-band root-mean-square value of the phase noise **shall** not exceed 2.5 degrees over the bandwidth of 10-Hz to 100-kHz.	**Previously Met**
20	5.1.2.1a	The terminal **shall** achieve a bit error ratio (BER) of $1x10^{-5}$ or better at the C/kT specified in table III [of the MIL-STD], when it receives a bandlimited and hardlimited downlink desired signal having the characteristics of a representative 5-kHz UHF SATCOM transponder.	**Previously Met**
21	5.1.2.1b	The BER performance **shall** not be degraded by more than 1 dB from the numbers in table III [of the MIL-STD] in the presence of ACI that is: (1) 15 dB or more below the average power of the desired PSK signal. (2) 20 dB or more below the average power of the desired CPM signal.	**Previously Met**
22	5.1.2.2	The receive frequency **shall** be tunable in 5-kHz increments over a frequency range of 243.000 to 270.000 MHz.	**Previously Met**
23	5.1.2.3	The G/T performance of the terminals, assuming a sky noise temperature of 290 K, **shall** be equal to or greater than the values shown in table IV [of the MIL-STD].	**Not Testable (Note)**
Note: This requirement is not directly testable.			
24	5.1.3	Modulation **shall** be as shown in table III [of the MIL-STD].	**Previously Met**
25	5.1.3.1(1)	The phase vector rotation caused by modulation **shall** not cause a frequency shift in the transmitted data.	**Previously Met**
26	5.1.3.1(2)	The modulation for OQPSK/SOQPSK, if implemented, **shall** be interoperable with the SOQPSK signal described below, where the shaping factor α can be any value between 0 and 0.5, provided that requirements for adjacent channel emissions are met.	**Previously Met**
27	5.1.3.2	The multi-*h* CPM modulation signal **shall** be interoperable with the CPM waveform that is generated in accordance with appendix E [of the MIL-STD].	**Previously Met**
28	5.1.4.1	The transmitting radio **shall** generate a preamble as specified by 5.1.4.1.1 and 5.1.4.1.2.	**Previously Met**
29	5.1.4.1.1(1)	The preamble **shall** be as specified on figure 2A [of the MIL-STD] for BPSK/ SBPSK and figure 2B [of the MIL-STD] for OQPSK/SOQPSK, if applicable.	**Previously Met**
30	5.1.4.1.1(2)	Baseband data **shall** follow the preamble bit pattern without a shift in data bit timing greater than 25 percent of a bit interval.	**Previously Met**
31	5.1.4.1.2(1)	The CPM preamble **shall** be as shown on figure 2C [of the MIL-STD], and as specified in 5.1.4.1.2.1 to 5.1.4.1.2.3.	**Previously Met**
32	5.1.4.1.2(2)	The preamble **shall** be binary single-*h* CPM [8/16] (equivalent to MSK) modulated and transmitted at the symbol rate.	**Previously Met**
33	5.1.4.1.2.3(1)	The first fill bit **shall** be determined such that there is even parity (even number of 1s) on the entire header field.	**Previously Met**
34	5.1.4.1.2.3(2)	The following five fill bits **shall** be all zeros.	**Previously Met**
35	5.1.4.1.2.4(1)	Data traffic **shall** be transmitted immediately following the preamble without a shift in timing and at the same symbol rate as the preamble.	**Previously Met**
36	5.1.4.1.2.4(2)	The data traffic **shall** be modulated, coded, and interleaved, as specified in the header.	**Previously Met**
37	5.1.4.2(1)	For CPM, the receiver **shall** determine data rate, modulation parameters, coding, and interleaving from the preamble.	**Previously Met**
38	5.1.4.2(2)	For uncoded PSK, the terminal **shall** output, as a minimum, all baseband data that immediately follows the preamble bit pattern.	**Previously Met**
39	5.1.4.2(3)	For coded PSK and all CPM waveforms, the terminal **shall** output only the baseband data that immediately follows the preamble bit pattern.	**Previously Met**

JITC Req #	MIL-STD Paragraph	REQUIREMENT DESCRIPTION	STATUS
40	5.1.4.3	The terminal **shall** achieve acquisition and demodulate the signal for carrier frequency uncertainties up to ±1.2-kHz at the receive antenna.	**Previously Met**
41	5.1.4.4	The probability of achieving acquisition on the first attempt under the conditions described in 5.1.4.3 and E_b/N_o equal to or higher than the reference E_b/N_o **shall** exceed 95% with a confidence level of 90%.	**Previously Met**
42	5.1.4.5(1)	The probability of maintaining bit synchronization for at least 10 seconds, when the *C/kT* is degraded by up to 3 dB from that which is specified in 5.1.2.1, **shall** be 95 percent with a confidence level of 90 percent.	**Previously Met**
43	5.1.4.5(2)	The terminal **shall** maintain bit synchronization if the carrier is lost and returns within 230 milliseconds (ms).	**Previously Met**
44	5.1.4.5(3)	The terminal **shall** synchronize to and process a new carrier if the original carrier is lost and does not return and the new carrier is detected within a time that is based on the baseband data rate as follows: a. For baseband data rates ≥1200 bps, within 250-ms of the time of loss of the original carrier. b. For baseband data rates <1200 bps within 550-ms of the time of loss of the original carrier.	**Previously Met**
45	5.1.4.6	The terminal **shall** maintain the frequency of its receive clock output to data terminal equipment within ±1 percent of the clock frequency for the selected operating data rate under all conditions where bit synchronization can be maintained.	**Previously Met**
46	5.1.5	The frequency generation system **shall** provide long-term plus short-term frequency accuracy within ±1 part per million (ppm) across the full range of environmental conditions outlined in the terminal specification.	**Previously Met**
47	5.1.6(1)	For 2400 bps voice, the voice digitization **shall** be interoperable with equipment that meets the requirements of Standardization Agreement (STANAG) 4198.	**Previously Met**
48	5.1.6(2)	It **shall** be interoperable with the CV-3591.	**Previously Met**
49	5.1.6(3)	If 4800 bps voice is implemented, the voice digitizer **shall** comply with requirements of FED-STD-1016.	**Not Applicable (Note)**
Note: Optional requirement not implemented in the terminal.			
50	5.1.7.1a	[Voice] The COMSEC waveform **shall** be interoperable with the AN/USC-43 (ANDVT) waveform, used in application 3, as specified in MIL-C-28883, when transmitting and receiving.	**Previously Met**
51	5.1.7.1b	[Voice] Secure voice at 4800 bps **shall** be interoperable with the digitization techniques specified in FED-STD-1016, and the encryption techniques used by the TSEC/KG-84A/C, as specified in NSA NO. 82-2.	**Not Applicable (Note)**
Note: Optional requirement not implemented in the terminal.			
52	5.1.7.2a	[Data] The COMSEC waveforms **shall** be interoperable with the AN/USC-43 (ANDVT) waveform used in application 3, as specified in MIL-C-28883, when transmitting and receiving.	**Previously Met**
53	5.1.7.2b	[Data] The COMSEC waveforms **shall** be interoperable with the TSEC/KG-84A/C when transmitting and receiving as specified in NSA NO 82-2.	**Previously Met**
54	5.1.8(1)	All baseband data following the preamble bit pattern **shall** be differentially encoded for BPSK/SBPSK and OQPSK/ SOQPSK modulation.	**Previously Met**
55	5.1.8(2)	For BPSK/SBPSK with or without FEC, and for OQPSK/SOQPSK with FEC, the differential encoding **shall** be as follows: [defined in paragraph 5.1.8 of the MIL-STD].	**Previously Met**

JITC Req #	MIL-STD Paragraph	REQUIREMENT DESCRIPTION	STATUS
56	5.1.8(3)	For OQPSK/SOQPSK without FEC the differential coding **shall** be as follows: [defined in paragraph 5.1.8 of the MIL-STD].	**Previously Met**
57	5.1.8(4)	When optional FEC is used with PSK modulation, the differential encoding **shall** precede the FEC in the processing of data to be transmitted.	**Previously Met**
58	5.1.9.1(1)	If FEC coding is implemented, the terminal **shall** add a Start-0f-Message (SOM) data field to the preamble shown in figures 2A or 2B [of the MIL-STD] preceding the baseband transmission.	**Previously Met**
59	5.1.9.1(2)	For BPSK/SBPSK, the SOM **shall** be the 37-bit sequence, 1110001000011000111101001101110110010 1.	**Previously Met**
60	5.1.9.1(3)	For OQPSK/SOQPSK, the 42-bit SOM **shall** be a 21-bit sequence in each I and Q channel, where the I channel sequence is 000000101110100111001 and the Q channel sequence, offset one-half symbol later, is 001101100001000010101.	**Previously Met**
61	5.1.9.1(4)	The SOM **shall** be transmitted in the order shown with the left-most bit transmitted first.	**Previously Met**
62	5.1.9.1(5)	For OQPSK/SOQPSK modulation with FEC coding, the first FEC-encoded user data bit **shall** be sent on the I channel.	**Previously Met**
63	5.1.9.1(6)	The output of the FEC encoder **shall** be identical to the output of the rate 1/2 constraint length 7 convolutional encoder shown on figure 5 [of the MIL-STD].	**Previously Met**
64	5.1.9.1(7)	For rate 3/4 the output of the encoder **shall** be identical with the output described in 5.1.9.1.2.	**Previously Met**
65	5.1.9.1.1	The encoder tap connections **shall** be as shown in figure 5 [of the MIL-STD].	**Previously Met**
66	5.1.9.2(1)	If FEC is implemented [for CPM] it **shall** be a Reed Solomon (RS) code that is derived from a (63,k) RS code.	**Previously Met**
67	5.1.9.2(2)	The codes used **shall** be as defined in table III [of the MIL-STD] and...	**Previously Met**
68	5.1.9.2(3)	...**shall** be derived in accordance with 5.1.9.2.1.	**Previously Met**
69	5.1.9.2.1	The field generator polynomial **shall** be, $p(x)=x^6 + x + 1$ (Data Encoding)	**Previously Met**
70	5.1.10	The terminal **shall** comply with the BER requirements of 5.1.2.1a, under the Doppler rate of change conditions defined below, with no more than an additional 1 dB degradation allowed to the *C/kT* numbers in table III [of the MIL-STD]. a. 32 Hz per second, for modulation rates ≥600 sps, and b. 5 Hz per second, for modulation rates <600 sps.	**Previously Met**
71	5.1.11	To enable quick end-of-burst detection, an End of Message (EOM) bit sequence **shall** be used for all CPM and FEC coded PSK waveforms.	**Previously Met**
72	5.1.11.1(1)	For FEC-encoded PSK the end of message bit sequence **shall** be encoded in the same manner as the information bit stream.	**Previously Met**
73	5.1.11.1(2)	The information bit stream **shall** be appended with *N* zero bits.	**Previously Met**
74	5.1.11.1(3)	The value of *N* **shall** be between 0 and 47 and...	**Previously Met**
75	5.1.11.1(4)	...**shall** be selected such that the total number of information bits (input bits + appended zero bits) is divisible by 48 without a remainder.	**Previously Met**
76	5.1.11.1(5)	The preamble or SOM bits **shall** not be counted as part of the input bits.	**Previously Met**
77	5.1.11.1(6)	The EOM sequence **shall** follow the appended zeros.	**Previously Met**
78	5.1.11.1(7)	The EOM sequence **shall** be a 144-bit sequence defined by repetition of the 48-bit sequence equivalent to hexadecimal F740 141F EC1B transmitted three times.	**Previously Met**

JITC Req #	MIL-STD Paragraph	REQUIREMENT DESCRIPTION	STATUS
79	5.1.11.1(8)	The left-most hexadecimal digit **shall** be transmitted first.	**Previously Met**
80	5.1.11.1(9)	After the EOM sequence is transmitted, the transmitter **shall** be disabled.	**Previously Met**
81	5.1.11.2(1)	For uncoded CPM the end of message bit sequence **shall** be modulated in the same manner as the information bit stream.	**Previously Met**
82	5.1.11.2(2)	The information bit stream **shall** be appended with *N* bits of the pattern 1100.	**Previously Met**
83	5.1.11.2(3)	The value of *N* **shall** be between 0 and 47 and...	**Previously Met**
84	5.1.11.2(4)	...**shall** be selected such that the total number of information bits (input bits + appended bits is divisible by 48 without a remainder.	**Previously Met**
85	5.1.11.2(5)	The preamble, SOM, and header bits **shall** not be counted as part of the input bits.	**Previously Met**
86	5.1.11.2(6)	The EOM sequence **shall** follow the appended bits.	**Previously Met**
87	5.1.11.2(7)	The EOM sequence **shall** be a 144-bit sequence defined by repetition of the 48-bit sequence equivalent to hexadecimal F740 141F EC1B transmitted three times.	**Previously Met**
88	5.1.11.2(8)	The left-most hexadecimal digit **shall** be transmitted first.	**Previously Met**
89	5.1.11.2(9)	After the EOM sequence is transmitted, the transmitter **shall** be disabled.	**Previously Met**
90	5.1.11.3(1)	For coded CPM the end of message bit sequence **shall** be generated and transmitted without FEC encoding.	**Previously Met**
91	5.1.11.3(2)	The information bit stream **shall** be appended with a sufficient number of bits of pattern 1100 which, when encoded, will fill the last interleaver block.	**Previously Met**
92	5.1.11.3(3)	The EOM sequence **shall** follow the last interleaver block.	**Previously Met**
93	5.1.11.3(4)	The EOM sequence **shall** be a 144-bit sequence defined by repetition of the 48-bit sequence equivalent to hexadecimal F740 141F EC1B transmitted three times.	**Previously Met**
94	5.1.11.3(5)	The left-most hexadecimal digit **shall** be transmitted first.	**Previously Met**
95	5.1.11.3(6)	After the EOM sequence is transmitted, the transmitter **shall** be disabled.	**Previously Met**
96	5.2.1.1(1)	The terminal **shall** be capable of providing EIRP of at least 16 dBW with respect to right-hand circular polarization.	**Previously Met**
97	5.2.1.1(2)	The terminal EIRP **shall** be incrementally or continuously adjustable between a minimum setting no greater than 10 dBW and the maximum EIRP, with a power setting resolution of 2 dB or better.	**Previously Met**
98	5.2.1.2	The terminal **shall** maintain an EIRP accuracy of ±1.5 dB, assuming antenna gain and passive losses are fixed.	**Previously Met**
99a	5.2.1.3(1)	When performing non-TDMA transmissions, the transmitter turn-on time **shall** not exceed 50-ms. The transmitter turn-on time will be measured only for table VIII [of the MIL-STD] options that do not include Reed-Solomon coding due to interleaver-block delays introduced by the interleaving used with Reed-Solomon coding.	**Previously Met**
99b	5.2.1.3(2)	When transmitting within a time slot (TDMA operation), the transmitter turn-on time **shall** not exceed 875 microseconds (μs).	**Previously Met (Note)**
Note: This requirement was previously met during MIL-STD-188-183 certification testing.			
100	5.2.1.4(1)	For FSK modulation, the total of all emissions outside to the 3 dB bandwidth of the 25-kHz channel (i.e., 30-kHz) **shall** be less than 1 percent of the total transmitted power.	**Previously Met**

JITC Req #	MIL-STD Paragraph	REQUIREMENT DESCRIPTION	STATUS
101	5.2.1.4(2)	For modulations other than FSK at 16000 bps, in a nominal 25-kHz bandwidth whose center frequency is displaced by Δf from the terminal transmitter's carrier frequency, the EIRP **shall** not exceed the values specified in table VIIa [of the MIL-STD] for a carrier level less than +18 dBW and table VIIb [of the MIL-STD] for a carrier level greater than or equal to +18 dBW.	**Previously Met (Note)**
Note: The maximum terminal EIRP levels to meet these requirements are listed in table 2 of the Conformance Certification Testing Summary.			
102	5.2.1.5	Transmit frequency **shall** be tunable in 25-kHz increments over a frequency range of 291.000 to 318.300 MHz.	**Previously Met**
103	5.2.1.6	Phase noise **shall** be as specified in 5.1.1.6.	**Previously Met**
104	5.2.2.1a	The terminal **shall** achieve a bit error ratio (BER) of 1 x 10-5 or better at the *C*/*kT* specified in table VIII [of the MIL-STD], when it receives a bandlimited and hardlimited downlink desired signal having the characteristics of a representative 25-kHz UHF SATCOM transponder.	**Previously Met**
105	5.2.2.1b	The BER performance **shall** not be degraded by more than 1 dB from the numbers in table VIII [of the MIL-STD] in the presence of adjacent channel interference that is: (1) 15 dB or more below the average power of the desired PSK signal, and (2) 20 dB or more below the average power of the desired CPM signal.	**Previously Met**
106	5.2.2.2	The receive frequency **shall** be tunable in 25-kHz increments over a frequency range of 243.000 to 270.000 MHz.	**Previously Met**
107	5.2.3	Modulation **shall** be as shown in table VIII [of the MIL-STD], and as specified in 5.2.3.1 and 5.2.3.4.	**Previously Met**
108	5.2.3.1	The FSK modulation characteristics **shall** be specified in 5.2.3.1.1 and 5.2.3.1.2.	**Previously Met**
109	5.2.3.1.1(1)	The deviation of the modulated signal **shall** be 5.6-kHz ±1-kHz for a binary 0 and -5.6-kHz ±1-kHz for a binary 1.	**Previously Met**
110	5.2.3.1.1(2)	The demodulator **shall** be interoperable with modulated signals that have deviations of 5.6-kHz ±1.2-kHz for a binary 0 and -5.6- ±1.2-kHz for a binary 1.	**Previously Met**
111	5.2.3.1.2	A binary 1 **shall** be indicated by a voltage that is negative with respect to the reference point, and a binary 0 by a voltage that is positive with respect to the reference point.	**Previously Met**
112	5.2.3.2	The phase vector rotation caused by modulation **shall** not cause a frequency shift in the transmitted data.	**Previously Met**
113	5.2.3.3	OQPSK and SOQPSK modulation **shall** be as defined in 5.1.3.1.	**Previously Met**
114	5.2.3.4	The multi-*h* CPM modulation signal **shall** be interoperable with the CPM waveform that is generated in accordance with appendix E [of the MIL-STD].	**Previously Met**
115	5.2.4.1	The transmitting radio **shall** generate a preamble as specified in 5.1.4.1.	**Previously Met**
116	5.2.4.2	The requirements stated in 5.1.4.2 **shall** apply.	**Previously Met**
117	5.2.4.3	The terminal **shall** achieve acquisition and demodulate the signal for carrier frequency uncertainties up to ±1.2-kHz from the desired channel center frequency.	**Previously Met**
118	5.2.4.4	The probability of achieving acquisition on the first attempt under the conditions of 5.2.4.3 and *Eb/N0* equal to or higher than the reference *Eb*/*N0* **shall** exceed 95 percent, with a confidence level of 90 percent.	**Previously Met**
119	5.2.4.5(1)	The probability of maintaining bit synchronization for at least 10 seconds when the *C*/*kT* is degraded by up to 3 dB from that which is specified in 5.2.2.1, **shall** be 95 percent with a confidence level of 90 percent.	**Previously Met**

JITC Req #	MIL-STD Paragraph	REQUIREMENT DESCRIPTION	STATUS
120	5.2.4.5(2)	For PSK or CPM signals, the terminal **shall** maintain bit synchronization if the carrier is lost for up to 230-ms.	**Previously Met**
121	5.2.4.5(3)	For any signal (PSK, CPM, or FSK), the terminal **shall** synchronize to and process a new carrier if the original carrier is lost and does not return and a new carrier is detected within 250-ms of the time of loss of original carrier signal.	**Previously Met**
122	5.2.4.6	The terminal **shall** maintain the frequency of its receive clock output to data terminal equipment within ±1 percent of the clock frequency for the selected operating data rate, under all conditions where bit synchronization can be maintained.	**Previously Met**
123	5.2.5	The frequency generation system **shall** provide long-term plus short-term frequency accuracy within ±1.0 ppm across the full range of environmental conditions outlined in the terminal specification.	**Previously Met**
124	5.2.6	Secure voice at 16-kbps **shall** be interoperable with continuously variable slope delta (CVSD) digitization techniques used by the VINSON encryption device, as specified in NSA NO. CSESD-14.	**Previously Met**
125	5.2.7	The COMSEC device **shall** be interoperable with the TSEC/KY-57 and TSEC/KY-58.	**Previously Met**
126	5.2.7.1	Secure voice at 16-kbps **shall** be interoperable with techniques used by the VINSON, as specified in NSA NO. CSESD-14.	**Previously Met**
127	5.2.7.2a	Mandatory: The COMSEC waveforms **shall** be interoperable with the TSEC/KY-57/58 VINSON waveform when transmitting and receiving, as specified in NSA NO. CSESD-14.	**Previously Met**
128	5.2.7.2b	Optional. The COMSEC waveforms **shall** be interoperable with the TSEC/KG-84A/C waveform when transmitting and receiving, as specified in NSA NO. 82-2.	**Previously Met**
129	5.2.8	For PSK modulation at all bit rates, all baseband data following the preamble bit pattern **shall** be differentially encoded as specified in 5.1.8.	**Previously Met**
130	5.2.9	FEC coding, if implemented, **shall** be as defined in 5.1.9.	**Previously Met**
131	5.2.9.1(1)	If FEC is implemented, it **shall** be a Reed Solomon (RS) code that is derived from a (127,k) RS code.	**Previously Met**
132	5.2.9.1(2)	The codes used **shall** be as defined in table VIII [of the MIL-STD], and...	**Previously Met**
133	5.2.9.1(3)	...**shall** be derived in accordance with 5.1.9.1.1.	**Previously Met**
134	5.2.9.1.1	The field generator polynomial **shall** be, $p(x) = x^7 + x^3 + 1$ (Data Encoding)	**Previously Met**
135	5.2.9.2	Interleaving **shall** be as defined in 5.1.9.2.4, except that there are seven bits per symbol.	**Previously Met**
136	5.2.10	In the presence of a Doppler rate of change of 32 Hz per second, the BER requirements of 5.2.2.1a **shall** be met with an additional 1 dB allowed to the *C/kT* numbers in table VIII [of the MIL-STD].	**Previously Met**
137	5.2.11	Postamble **shall** be as defined in 5.1.11.	**Previously Met**
138	E.3.1	The terminal **shall** be interoperable with the specific quaternary full-response multi-*h* CPM waveform described below.	**Previously Met**
139	E.3.3(1)	The first data symbol is transmitted immediately after the preamble and **shall** use the h_1 modulation index.	**Previously Met**
140	E.3.3(2)	The next data symbol **shall** use the h_2 modulation index.	**Previously Met**
141	E.3.3(3)	Subsequent data symbols **shall** alternate modulation indices $\{h_1, h_2, h_1, h_2...\}$.	**Previously Met**
142	E.3.4(1)	The demodulator **shall** use the 192 symbols of preamble pattern shown on figure 2C [of the MIL-STD] in order to synchronize to the amplitude, phase and timing of the incoming data burst.	**Previously Met**

JITC Req #	MIL-STD Paragraph	REQUIREMENT DESCRIPTION	STATUS
143	E.3.4(2)	The Frame timing and modulation parameters **shall** be determined by correctly demodulating the start of message and header of the preamble.	**Previously Met**
144	E.3.4(3)	Immediately following the six fill bits of the preamble sequence, data and clock **shall** be sent to the baseband interface.	**Previously Met**
145	E.3.4(4)	The first data symbol **shall** be received immediately after the preamble and...	**Previously Met**
146	E.3.4(5)	...**shall** use the h_1 modulation index.	**Previously Met**
147	E.3.4(6)	The next data symbol **shall** use the h_2 modulation index.	**Previously Met**
148	E.3.4(7)	Subsequent data symbols **shall** alternate modulation indices {h_1, h_2, h_1, h_2...}.	**Previously Met**

Legend:

ACI – Adjacent Channel Interference
AM – Amplitude Modulation
ANDVT – Advanced Narrowband Digital Voice Terminal

BER – Bit Error Ratio
bps – Bits Per Second
BPSK – Binary Phase-Shift Keying

C – Total Receive Carrier Power
CELP – Code-Excited Linear Prediction
C/kT– Carrier to-Noise Power Density
COMSEC – Communications Security
CPM – Continuous Phase Modulation
CVSD – Continuously Variable Slope Delta

dB – Decibel
dBW – Decibels Relative to 1 Watt
DCS – Defense Communications System
DISA – Defense Information Systems Agency
DoD – Department of Defense
DoDD – DoD Directive
DoDISS – DoD Index of Specifications and Standards

Eb – Energy Per Bit
E_b/N_o – Energy Per Bit to Noise Power Spectral Density Ratio
EIRP – Effective Isotropically Radiated Power
EOM – End Of Message

F – Frequency
FDMA – Frequency-Division Multiple Access
FEC – Forward Error Correction
FED-STD – Federal Standard
FLTSATCOM – Fleet Satellite Communications
FM – Frequency Modulation
FSK – Frequency-Shift Keying

GHz – Gigahertz
GPEE – General-Purpose Encryption Equipment
G/T – Antenna Gain-to-Noise Temperature In dB/K

h – Modulation Indices
Hz – Hertz

I – In-Phase
I/O – Input/Output

JCS – Joint Chiefs Of Staff

k – Boltzman's Constant
K – Kelvin
kbps – Kilobits Per Second
kHz – Kilohertz

LEASAT – Leased Satellite
LSB – Least Significant Bit

M –Power Margin
MARISAT – Maritime Satellite
MELP – Mixed Excitation Linear Prediction
MHz – Megahertz
MIL-STD – Military Standard
MJCS – JCS Memorandum
ms – Millisecond
MSB – Most Significant Bit

N – Integer Number
NATO – North Atlantic Treaty Organization
NSA – National Security Agency
N_0 – Noise Power Spectral Density
NMCS – National Military Command System

OTAR – Over-the-Air Rekeying
OQPSK – Offset Quadrature Phase-Shift Keying

ppm – Part Per Million
PSK – Phase-Shift Keying

Q – Quadrature

R – Link Data Rate
Req – Requirement
RF – Radio Frequency

SATCOM – Satellite Communications
SBPSK – Shaped Binary Phase-Shift Keying
SHF – Super High Frequency
SOM – Start Of Message
SOQPSK – Shaped Offset Quadrature Phase-Shift Keying
sps – Symbols Per Second
STANAG – Standardization Agreement

T – Bit Period
TDMA – Time Division Multiple Access

UFO – UHF Follow-On Satellites
UHF – Ultrahigh Frequency
UK – United Kingdom

μs – Microsecond

W – Watt

Δf – Change in Frequency