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)
(Certification 374.037)

31 Mar 04

L-3 Communications Integrated Systems
10001 Jack Finney Blvd.
ATTN: Mr. Bryan Harrison
Greenville, TX 75402

Dear Mr. Harrison:

Military standard (MIL-STD)-188-182A conformance testing has been completed for the MD-1324A(c)/U Modem with the RT-1747D/ARC Airborne Radio. The system is certified as meeting the applicable requirements of MIL-STD-188-182A, "Interoperability Standard for 5-kHz UHF DAMA Terminal Waveform," 1 June 1999, to the extent detailed in the enclosed summary. The tested system components and associated software versions were:

Modem	MD-1324A/(c)U
Digital Signal Processor (DSP)	VSW-TURBO-DSP-12.27
Orderwire Encryption Board (OEB)	VSW-VM200-OEB-6.9
Airborne Radio	RT-1747D/ARC
Software Version	984-0392-004
Control Indicator (CI)	C-12480/U
Software Version	2.97
High Power Amplifier (HPA)	AM-7526/ARC
Low Noise Amplifier (LNA)	Miteq AU-2A-0150-8464

Testing was conducted at the Joint Interoperability Test Command (JITC) Ultrahigh Frequency (UHF) Satellite Communications (SATCOM) test facility using the JITC procedures contained in "MIL-STD-188-182/MIL-STD-188-182A Conformance Test Procedure," 19 March 2001. A summary of the test results is provided in the enclosed Conformance Certification Testing Summary.

Although the system is being certified compliant to MIL-STD-188-182A, an operational problem can exist if the transmit power is too high. The operator must ensure that the transmit Effective Isotropically Radiated Power (EIRP) level does not exceed 39.5 decibels (dB) referenced to 1 watt, relative to isotropically radiated power (dBWi), including cable loss and antenna gain, at a data rate of 2400 bits per second (bps) and a modulation rate of 3000 symbols per second (sps).

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.

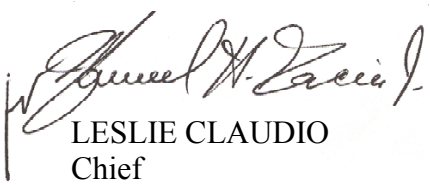
In accordance with the Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 6251.01A, "Ultrahigh Frequency Satellite Communications Demand Assigned Multiple Access Requirements," 21 April 2003, users are required to have terminals certified compliant to MIL-STD-188-181 series, -182 series, and -183 series. This certification declares that the MD-1324A(c)/U Modem with the RT-1747D/ARC Airborne Radio has met the MIL-STD-188-182A portion of the overall Joint Chiefs of Staff-mandated requirement.

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 terminal must be tested and certified for interoperability by JITC in accordance with CJCSI 6212.01C, "Interoperability and Supportability of Information Technology and National Security Systems," 20 November 2003.

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 Demand Assigned Multiple Access (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.

Sincerely,



LESLIE CLAUDIO
Chief
Networks and Transport Division

1 Enclosure:
Conformance Certification
Testing Summary

Distribution:
Joint Chiefs of Staff, Director for Command, Control, Communications, and Computer Systems (J6), Room 1E833, The Pentagon, Washington, DC 20318-6000
Joint Chiefs of Staff (J6C), ATTN: CDR Brigger, Room 1D560, The Pentagon, Washington, DC 20318-6000
Office of the Secretary of Defense, Director Operational Test and Evaluation, Room 3E318, The Pentagon, Washington, DC 20301-1700
Assistant Secretary of Defense (Command, Control, Communications, and Intelligence), ATTN: C3I, The Pentagon, Washington, DC 20301-8000
Defense Information Systems Agency (IN42), ATTN: Andy Pappas, 5600 Columbia Pike, Falls Church, VA 22041-2717

CONFORMANCE CERTIFICATION TESTING SUMMARY
(Certification 374.037)

1. CERTIFICATION TITLE. MIL-STD-188-182A Conformance Certification of the MD-1324A(c)/U Modem with the RT-1747D/ARC Airborne Radio.

2. PROPONENT. L-3 Communications Integrated Systems
10001 Jack Finney Blvd.
Greenville, TX 75402

3. PROGRAM MANAGER/USER POC. Mr. Bryan Harrison, (903) 408-8615
E-mail: bryan.harrison@L-3com.com

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

5. SYSTEM DESCRIPTION. The MD-1324A(c)/U Modem with the RT-1747D/ARC Airborne Radio is an Ultrahigh Frequency (UHF) Satellite Communications (SATCOM) system capable of both dedicated and Demand Assigned Multiple Access (DAMA) modes of operation for air platforms. The system provides internal Transmission Security (TRANSEC) for orderwire encryption in the DAMA mode. Communications Security (COMSEC) is provided by external COMSEC devices. The AM-7526/ARC High Power Amplifier (HPA) provides 150 Watts of output power and the Miteq AU-2A-0150-8464 Low Power Amplifier (LNA) provides 20 dB of receive gain for the system.

6. TEST NETWORK DESCRIPTION. The test networks varied for each military standard (MIL-STD) requirement being verified. Testers used various configurations of the 5-kHz/25-kHz DAMA Channel Controller, which is the Resource Controller (RC) subsystem of the Joint UHF Military Satellite Communications (MILSATCOM) Network Integrated (JMINI) Control System, and commercial off-the-shelf (COTS) test equipment to verify each MIL-STD requirement. Detailed test configurations and data collection information are in the appropriate sections of the JITC test procedures, "MIL-STD-188-182/MIL-STD-188-182A Conformance Test Procedure," 19 March 2001. Figure 1 shows the system configuration of the tested terminal.

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

Modem ..... MD-1324A/(c)U
  Digital Signal Processor (DSP) VSW-TURBO-DSP-12.27
  Orderwire Encryption Board (OEB) VSW-VM200-OEB-6.9
Airborne Radio RT-1747D/ARC
  Software Version 984-0392-004
Control Indicator (CI) C-12480/U

Software Version 2.97
High Power Amplifier (HPA) AM-7526/ARC
Low Noise Amplifier (LNA) ..... Miteq AU-2A-0150-8464

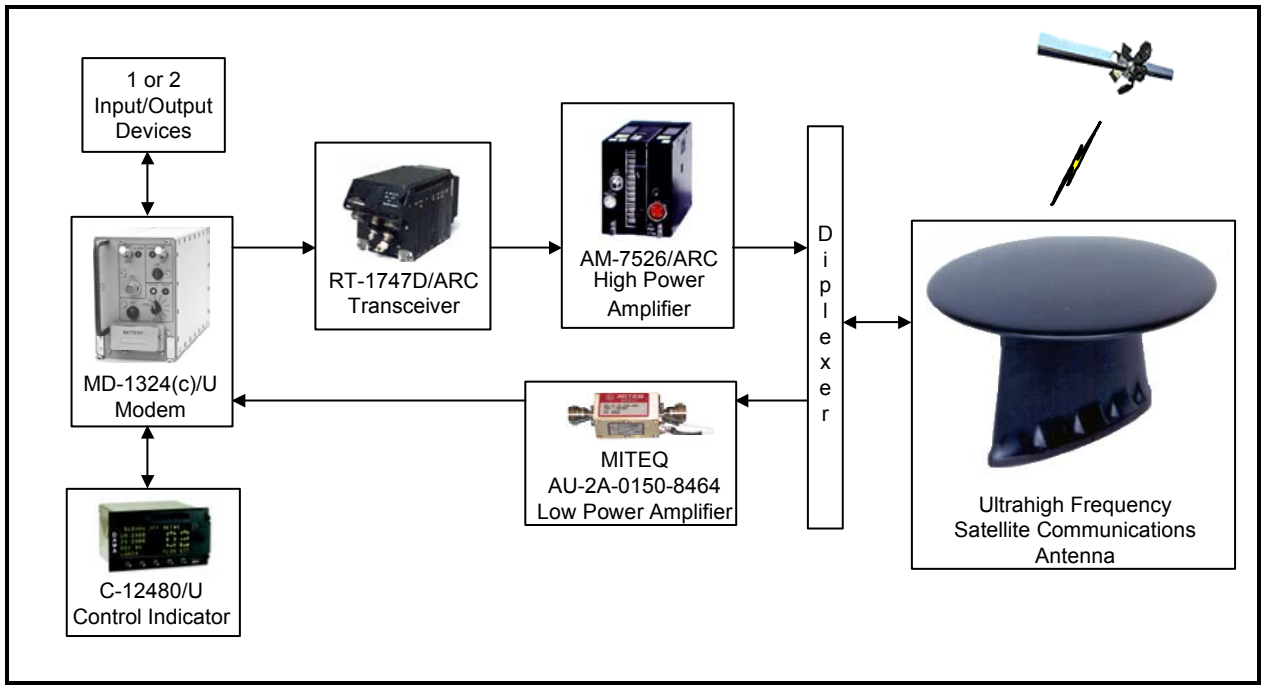


Figure 1. Tested System Configuration

8. MODES OF OPERATION. All MIL-STD-188-182A mandatory and implemented optional modes of operation and capabilities have been verified.

9. TESTING LIMITATIONS. Details of specific requirements that could not be verified are listed below.

a. Requirement 287, paragraph 5.4.4.4, "The terminal's modulated output, including additive noise, shall introduce no greater than a 0.2 dB degradation in a receiver's performance, if the receiver uses matched-filter demodulation and expects the incoming signal to have 50-percent sinusoidally shaped modulation, as illustrated on figure 12 [of the MIL-STD]."

1) Not Tested. A characterized, matched-filter demodulator that expects and is optimally tuned to receive a 50-percent sinusoidally shaped, modulated signal was not available to perform this test.

2) Impact. Minor. Test results for the other MIL-STD performance requirements (Adjacent Channel Emissions [ACE] and decoder gain) indicate the likelihood of the terminal also meeting this requirement, even though it was not directly tested. Since no

performance problems were discovered while testing the other requirements, there is a high probability that this requirement is met, as well.

b. Requirement 291, paragraph 5.5.1(4), "Hardware implementation of the terminal shall include provisions for future implementation of Over the Air Rekeying (OTAR) for the orderwire."

1) Not Tested. Testing could not be performed because OTAR of the Transmission Security (TRANSEC) Key for Forward Orderwire (FOW) messages has not been implemented in the Channel Controller.

2) Impact. None. Since the Channel Controller will not support OTAR of the TRANSEC Key for FOW messages, OTAR is not being used in this mode of operations.

10. REQUIRED STANDARDS AND CONFORMANCE. The required standard is MIL-STD-188-182A, "Interoperability Standard for 5-kHz UHF DAMA Terminal Waveform," 1 June 1999. Table 1 delineates all the MIL-STD requirements and indicates the status as "Met," "Not Met," "Not Tested," or "Not Applicable." Sufficient testing has been performed to determine the MD-1324A(c)/U Modem with the RT-1747D/ARC Airborne Radio meets the mandatory requirements set forth in MIL-STD-188-182A. The following provides details and impacts to some of the noted requirements.

Requirement 286, paragraph 5.4.4.3, "In a nominal 5-kHz bandwidth whose center frequency is displaced by Δf from a terminal transmitter's carrier frequency, the Effective Isotropically Radiated Power (EIRP) shall be as specified in table XX [of the MIL-STD]."

1) Met with Comment. As tested, the maximum EIRP allowable to still meet the high-power Adjacent Channel Emissions (ACE) requirement is 39.5 decibels (dB) referenced to 1 watt, relative to isotropically radiated power (dBWi) at a data rate of 2400 bits per second (bps) and modulation rate of 3000 symbols per second (sps).

2) Impact. Minor. If the terminal is operated at an EIRP level greater than 39.5 dBWi, for a data rate of 2400 bps and a modulation rate of 3000 sps, ACE will potentially cause friendly jamming and transmission disruption. An EIRP level of 39.5 dBWi, including cable loss and antenna gain, is normally 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.

Table 1. MIL-STD-188-182A Requirements Matrix for the MD-1324A(c)/U Modem with the RT-1747D/ARC Airborne Radio

JITC REQ #	MIL-STD Paragraph	REQUIREMENT DESCRIPTION	STATUS
1	4.2.2.2	The decoder performance gain **shall** be at least that of the Viterbi decoder.	**Met**
2	4.2.3.2	The modulation rates **shall** be 600, 800, 1200, 2400 and 3000 symbols per second (sps), as specified in table III [of the MIL-STD].	**Met**
3	4.3(1)	The transmit terminal power received at the satellite **shall** be at least -169 decibels relative to 1 watt (dBW).	**Not Testable (Note)**
Note: This requirement is not directly testable.			
4	4.3(2)	The terminal receiver system **shall** be designed to provide error-free reception of the FOW burst for at least 99 of 100 FOW bursts, with a confidence of 98 percent.	**Met**
5	4.3.1(1)	The terminal **shall** control uplink carrier frequency so the signal's carrier frequency at the satellite output is within 400-Hz of the allocated downlink channel frequency.	**Met**
6	4.3.1(2)	The terminal receiver system **shall** accommodate these amounts of uplink frequency offset.	**Met**
7	4.3.2(1)	If a terminal can transmit and receive RF signals concurrently, then in the ROW:Login message and ROW:Status Report message the terminal **shall** identify itself as full duplex capable.	**Met**
8	4.3.2(2)	If a terminal cannot concurrently receive and transmit RF signals, it **shall** identify itself as half-duplex-capable.	**Met**
9	4.4(1)	Communications options available for circuit services **shall** be as specified in table IV [of the MIL-STD].	**Met**
10	4.4(2)	Communications options available for message services **shall** be as specified in table V [of the MIL-STD].	**Met**
11	5.1	The terminals **shall** synchronize and maintain synchronization with the frame.	**Met**
12	5.1c	Transmissions **shall** occur only during authorized time-slots.	**Met**
13	5.1.1	The terminal **shall** process and interpret the FOW fields as described below.	**Met**
14	5.1.1c	Since this field employs FEC code rate 1, the terminal **shall** be able to identify the burst type when the field is received with up to 3-bit errors in the 12 bits.	**Met**
15	5.1.1f	With this information in the FOW bursts, and information in the directed messages, the terminal **shall** determine the position of the time-slots in the next frame.	**Met**
16	5.1.1h(1)	The terminal **shall** interpret all system messages, comply with all applicable system messages, and ignore all system messages which are undefined at the time of terminal construction.	**Met**
17	5.1.1h(2)	FOW system message fields **shall** be interpreted as defined in appendix A.	**Met**
18	5.1.1j(1)	All FOW requests, notifications, and assignments **shall** take effect during the frame following the one in which they are received.	**Met**
19	5.1.1j(2)	FOW directed message **shall** be interpreted as defined in appendix B.	**Met**
20	5.1.1j(3)	Terminals **shall** not fault on reception of any directed FOW message type that was not completely defined at the terminals' time of construction.	**Met**
21	5.1.2.1	ROW ranging bursts **shall** be comprised of six fields, as shown on figure 3 [of the MIL-STD].	**Met**
22	5.1.2.1a	This field **shall** be as defined in 5.1.1a for 800-sps modulation.	**Met**

JITC REQ #	MIL-STD Paragraph	REQUIREMENT DESCRIPTION	STATUS
23	5.1.2.1b	This field **shall** be as defined in 5.1.1 b.	**Met**
24	5.1.2.1c	This field **shall** be the Start-of-Slot bit sequence as defined in 5.1.1 c.	**Met**
25	5.1.2.1d	This field **shall** identify the transmitting terminal's login address.	**Met**
26	5.1.2.1e	This field **shall** contain bits for error detection, as defined in 5.4.3.1.	**Met**
27	5.1.2.1f	This field **shall** contain bits of value zero for flushing the FEC encoder.	**Met**
28	5.1.2.2(1)	The ROW message burst **shall** be constructed in accordance with figure 4 [of the MIL-STD].	**Met**
29	5.1.2.2(2)	ROW messages **shall** be as specified in appendix C.	**Met**
30	5.1.2.2a	This field **shall** be as defined in 5.1.1a for 2400-sps modulation.	**Met**
31	5.1.2.2b	This field **shall** be as defined in 5.1.1 b.	**Met**
32	5.1.2.2c	The field **shall** be the Start-of-Slot bit sequence, as defined in 5.1.1 c.	**Met**
33	5.1.2.2d	This field **shall** identify the transmitting terminal's login address.	**Met**
34	5.1.2.2e	This field **shall** contain the ROW message being transmitted to the PCC.	**Met**
35	5.1.2.2d	This field **shall** contain bits for error detection, as defined in 5.4.3.1.	**Met**
36	5.1.2.2e	This field **shall** contain bits of value zero for flushing the FEC encoder.	**Met**
37	5.1.3	Network communications **shall** be conducted in an assigned time-slot within the frame's communications segment.	**Met**
38	5.1.3.1	The circuit-service burst **shall** consist of six fields, as illustrated on figure 5 [of the MIL-STD].	**Met**
39	5.1.3.1a	This field **shall** consist of a variable number of bits based on the modulation rate, as defined in 5.1.1 a.	**Met**
40	5.1.3.1b	This field **shall** be as defined in 5.1.1 b.	**Met**
41	5.1.3.1c(1)	The End-of-Service burst type defined in table VIII [of the MIL-STD] **shall** be used on any COM burst for which the terminal is attempting to tear down the service, as described in 5.4.2.5.6.	**Met**
42	5.1.3.1c(2)	The Start-of-Slot burst type defined in table VIII [of the MIL-STD] **shall** be used on all other bursts.	**Met**
43	5.1.3.1d	This field **shall** contain user baseband data.	**Met**
44	5.1.3.1f	This field **shall** contain bits of value zero for flushing the FEC encoder.	**Met**
45	5.1.3.2	The communications message-service burst **shall** be constructed as shown on figure 6 [of the MIL-STD]	**Met**
46	5.1.3.2a	This field **shall** consist of a variable number of bits based on modulation rate, as defined in 5.1.1 a.	**Met**
47	5.1.3.2b	This field **shall** be as defined in 5.1.1 b.	**Met**
48	5.1.3.2c(1)	The End-of-Service burst type defined in table VIII [of the MIL-STD] **shall** be used on any COM burst for which the terminal is attempting to tear down the service, as described in 5.4.2.5.6.	**Met**
49	5.1.3.2c(2)	The Start-of-Service burst type defined in table VIII [of the MIL-STD] **shall** be used on all other bursts.	**Met**
50	5.1.3.2d	This field **shall** contain an integer number of data blocks as defined in table V [of the MIL-STD].	**Met**
51	5.1.3.2e	This field **shall** identify the number of unused (fill) bytes in the last message packet.	**Met**
52	5.1.3.2f	This field **shall** contain bits for error detection, as defined in 5.4.3.1.	**Met**
53	5.1.3.2g	This field **shall** contain bits of value zero for flushing the FEC encoder.	**Met**
54	5.1.4(1)	Data fields **shall** be transmitted in the sequence defined by figures 3, 4, 5, and 6 [of the MIL-STD].	**Met**
55	5.1.4(2)	For each field, the MSB (the left-most bit) **shall** be transmitted first.	**Met**
56	5.1.4.1(1)	The first bit entering the terminal from the I/O device **shall** be the MSB (the left-most bit) appearing in the Packet field (for message service) or User Data Field (for circuit service)...	**Met**

JITC REQ #	MIL-STD Paragraph	REQUIREMENT DESCRIPTION	STATUS
57	5.1.4.1(2)	...and **shall** be the first bit transmitted from the Packet or User Data field.	**Met**
58	5.1.5	Each terminal **shall** ensure that its transmissions always fall within its allocated time-slots, as depicted in figure 7 [of the MIL-STD].	**Met**
59	5.1.5b(1)	Terminal design **shall** prohibit the use of the Contention Ranging time-slots except when (1) performing initial ranging (prior to login), or (2) its uplink timing error becomes excessive.	**Met**
60	5.1.5b(2)	If active ranging is used, the terminal design **shall** maintain uplink timing within 12.604-ms for a period of at least 4.6 hours following a successful range.	**Met**
61	5.2(1)	Terminal timing **shall** be aligned with the PCC timing.	**Met**
62	5.2(2)	Prior to logging into the network, each terminal **shall** perform downlink and uplink acquisition to align its frame timing with that of the PCC.	**Met**
63	5.2(3)	Thereafter, each terminal **shall** track the downlink and perform ranging (active or passive) to maintain uplink timing.	**Met**
64	5.2.1	Prior to initiation of any network transmission, the terminal **shall** perform downlink acquisition.	**Met**
65	5.2.1a	Initial frame acquisition **shall** involve (1) acquisition of downlink symbol timing by acquiring the FOW slot preamble, (2) acquisition of downlink slot timing by detecting the FOW SOM sequence, and (3) acquisition of frame timing by detecting the unique start-of-frame burst type indicator.	**Met**
66	5.2.1b	If the terminal achieves initial frame acquisition, the terminal **shall** attempt to interpret the FOW by proceeding with error correction decoding, decryption, and CRC validation.	**Met**
67	5.2.1c(1)	The terminal **shall** terminate uplink transmission upon loss of the downlink synchronization (loss of the FOW).	**Met**
68	5.2.1c(2)	If no FOW burst is received for 200 consecutive frames, the terminal **shall** assume that login and service request information at the PCC is lost.	**Met**
69	5.2.1c(3)	If downlink acquisition is recovered within 200 frames, the terminal **shall** not log in or retransmit service requests previously acknowledged by the PCC.	**Met**
70	5.2.2(1)	Prior to network log in, a terminal **shall** perform uplink acquisition.	**Met**
71	5.2.2(2)	Terminals that use active ranging **shall** range in the Contention Ranging time-slots.	**Met**
72	5.2.2.1(1)	Terminals that perform active ranging **shall** set the Ranging Flag field of the ROW:Login message to Active.	**Met**
73	5.2.2.1(2)	To perform active ranging, a terminal **shall** transmit a short burst, as specified in 5.1.2.1 and on figure 3 [of the MIL-STD]...	**Met**
74	5.2.2.1(3)	...and **shall** measure the round-trip propagation time to the satellite	**Met**
75	5.2.2.1.1	If initial ranging is unsuccessful, subsequent ranging attempts **shall** occur in the contention-ranging time slots of frames determined by the algorithm defined in 5.2.2.1.2.	**Met**
76	5.2.2.1.2(1)	Following an unsuccessful attempt to range in a contention-ranging time slot, the terminal **shall** select a frame and slot for further contention-ranging attempts.	**Met**
77	5.2.2.1.2(2)	The contention ranging time slot in which to retransmit **shall** be selected using an algorithm that uses two levels of randomization.	**Met**
78	5.2.2.1.2(3)	The contention-ranging time slot selection process **shall** be as defined in 5.2.2.1.2 a and b.	**Met**
79	5.2.2.1.3	If active ranging is used, the terminal **shall** range using the time slot defined by the FOW:Ranging Assignment message.	**Met**

JITC REQ #	MIL-STD Paragraph	REQUIREMENT DESCRIPTION	STATUS
80	5.2.2.1.3(2)	Terminal ranging in assigned versus contention ranging time slots **shall** be as follows:	**Met**
81	5.2.2.1.3a(1)	If a terminal performs active ranging and does not receive a FOW:Ranging Assignment message within 4.5 hours since the time it most recently ranged successfully, or if the ranging in an assigned ROW time-slot is unsuccessful, the terminal **shall** request an assignment to range.	**Met**
82	5.2.2.1.3a(2)	The request **shall** be sent in the contention portion of the ROW, using a ROW:Assign Ranging message.	**Met**
83	5.2.2.1.3b(1)	If an active ranging terminal does not successfully range prior to its uplink timing error exceeding ±12.604-ms, the terminal **shall** inhibit transmissions (other than ranging) until ranging is successfully performed.	**Met**
84	5.2.2.1.3b(2)	If a terminal performs active ranging and its uplink timing error becomes excessive (that is, no longer within ±12.604-ms), the terminal **shall** range in the contention-ranging time slot, as defined in 5.2.2.1.2.	**Met**
85	5.2.2.2(1)	Terminals that perform passive ranging **shall** set the Ranging Flag field of the ROW:Login Message to Passive.	**Met**
86	5.2.2.2(2)	The terminal **shall** then transmit a ranging burst, as specified in 5.1.2.1, in the assigned time slot.	**Not Applicable (Note)**
Note: The terminal, when logged in as a passive ranging terminal, cannot request an active ranging slot. In order to actively range, the operator must log out and log in as an active ranging terminal.			
87	5.3(1)	The terminal **shall** report link quality to the PCC at login using a ROW:Login message or, when requested, using a ROW:Status Report message.	**Met**
88	5.3(2)	The terminal **shall** report the carrier-power to noise-spectral-density ratio (C/N_0) of the received FOW: a. to within ±2 dB-Hz if reported within 5 minutes of downlink acquisition and the actual C/N_0 is between 32.1 and 49.2 dB-Hz, b. to within $\pm$1 dB-Hz if reported more than 5 minutes after downlink acquisition and the actual C/N_0 is between 32.1 and 49.2 dB-Hz, c. as a value greater than 47 dB-Hz if the actual C/N_0 is greater than 49.2 dB-Hz, d. as a value less than 34.5 dB-Hz if the actual C/N_0 is less than 32.1 dB-Hz.	**Met**
89	5.4.1.1.1	The terminal **shall** provide circuit service at data I/O rates of 75-, 300-, 600-, 1200-, and 2400-bps and at the digital voice rate of 2400-bps, as indicated in table XIII [of the MIL-STD].	**Met**
90	5.4.1.1.2(1)	Messages **shall** be less than or equal to 114,688 bits which is equivalent to 512 blocks of 224 bits each.	**Met**
91	5.4.1.1.2(2)	Cryptographic equipment preambles and pad bits **shall** be included in the 114,688-bit maximum.	**Met**
92	5.4.1.1.2(3)	For asynchronous baseband equipment, start, stop, and parity bits, if not encrypted, **shall** be stripped by the transmitting terminal and reinserted by the receiving terminal.	**Met**
93	5.4.1.2	Multiple-channel network operations **shall** take place on the channels listed in appendix D.	**Met**
94	5.4.1.2.1(1)	A terminal operating on a TDMA channel **shall** change to a new TDMA channel only when directed by the PCC.	**Met**
95	5.4.1.2.1(2)	The direction to change channels **shall** be by the FOW:Terminal Channel Assignment message.	**Met**
96	5.4.1.2.1(3)	The terminal **shall** change to the channel identified in the FOW.	**Met**
97	5.4.1.2.1(4)	The terminal **shall** determine, based on the Channel field and appendix D, whether the assigned channel is 5- or 25-kHz.	**Met**

JITC REQ #	MIL-STD Paragraph	REQUIREMENT DESCRIPTION	STATUS
98	5.4.1.2.1(5)	If the assigned channel is 5-kHz, the DAMA waveform **shall** be as specified in this standard.	**Met**
99	5.4.1.2.1(6)	If the assigned channel is 25-kHz, the DAMA waveform **shall** be as specified in MIL-STD-188-183.	**Met (Note)**
Note: Testing was limited to achieving downlink and uplink synchronization on a 25-kHz DAMA channel, and establishing communications. Compliance to MIL-STD-188-183 is addressed during separate MIL-STD-188-183 testing.			
100	5.4.1.2.1(7)	The terminal **shall** attempt to achieve downlink and uplink synchronization in the new channel.	**Met**
101	5.4.1.2.1(8)	If the terminal cannot achieve downlink and uplink synchronization on the assigned channel within 90 seconds, the terminal **shall** return to the previous channel of operation.	**Met**
102	5.4.1.2.1(9)	If the terminal is switching from a 5-kHz DAMA channel to another 5-kHz channel, the terminal **shall** retain all pending service requests it held in queue and...	**Met**
103	5.4.1.2.1(10)	...**shall** not send a ROW:Login on the new channel.	**Met**
104	5.4.1.2.1(11)	If the terminal is switching from a 5-kHz DAMA channel to a 25-kHz DAMA channel, the terminal **shall** clear (delete) all pending service requests held in its queue.	**Met**
105	5.4.1.2.1(12)	After a terminal has achieved downlink and uplink acquisition on a newly assigned TDMA channel (5- or 25-kHz), it **shall** not return to the previous channel or change to any other channel unless directed by the PCC.	**Met**
106	5.4.1.2.2(1)	While operating on a TDMA channel, the terminal **shall** change to a DASA channel only when directed by the PCC.	**Met**
107	5.4.1.2.2(2)	Operation on the assigned DASA channel **shall** be as specified in 5.4.2.4.2.	**Met (Note)**
Note: Testing was limited to establishing communications on the dedicated channel. Compliance to MIL-STD-188-181 is addressed during separate MIL-STD-188-181 conformance testing.			
108	5.4.2.1.1	Preassigned circuit service management **shall** be as follows:	**Met**
109	5.4.2.1.1d	A terminal **shall** respond to FOW messages while participating on a preassigned circuit.	**Met**
110	5.4.2.1.2	Terminals **shall** originate each service request at one of five levels of precedence.	**Met**
111	5.4.2.1.3.1	No service request whose precedence exceeds the terminal access restriction **shall** be transmitted by the terminal, unless the destination address is zero (numeric value). See 5.4.2.5.1.2.	**Met**
112	5.4.2.1.3.2	A terminal **shall** not transmit a service request if the precedence is less than the system access restriction.	**Met**
113	5.4.2.1.3.3	When the FOW system service restriction is specified as being on, a terminal **shall** not originate requests for 2400-bps circuit services on 5-kHz DAMA channels.	**Met**
114	5.4.2.1.4	A terminal **shall** not transmit except as permitted in this standard and authorized by the PCC.	**Met**
115	5.4.2.1.5.1(1)	A terminal **shall** prohibit any type of transmission other than ranging and login until it receives a positive login acknowledgment.	**Met**
116	5.4.2.1.5.1(2)	The terminal **shall** report its link quality in the ROW:Login message.	**Met**
117	5.4.2.1.5.1(3)	The terminal **shall** identify in the ROW:Login message whether or not it is capable of channel reassignment to (1) a single-access channel, as specified in MIL-STD-188-181, within one frame (8.96 seconds); (2) another 5-kHz TDMA channel, as specified in this standard, within 90 seconds; and (3) a 25-kHz TDMA channel, as specified in MIL-STD-188-183, within 90 seconds.	**Met**

JITC REQ #	MIL-STD Paragraph	REQUIREMENT DESCRIPTION	STATUS
118	5.4.2.1.5.1(4)	A terminal **shall** select a random time to transmit a ROW:Login message in the contention portion of the ROW.	**Met**
119	5.4.2.1.5.1(5)	The random time **shall** be selected in accordance with 5.4.2.1.7.4.1.	**Met**
120	5.4.2.1.5.1(6)	A terminal that has logged in and received a positive login acknowledgement **shall** ignore any subsequent FOW:Login Response messages.	**Met**
121	5.4.2.1.5.1(7)	If the terminal does not receive a Login response in the FOW, within the time specified in 5.4.2.1.7.4.2, it **shall** retransmit the message using the ROW acknowledgment/ retry protocol defined in 5.4.2.1.7.4.2.	**Met**
122	5.4.2.1.5.2.1(1)	The terminal **shall** acknowledge specific FOW messages as required in table X [of the MIL-STD].	**Met**
123	5.4.2.1.5.2.1(2)	ROW messages responding to these FOW messages **shall** be transmitted within assigned-ROW time slots.	**Met**
124	5.4.2.1.5.2.2(1)	If no acknowledgment is received within four frames, the terminal **shall** use the acknowledgment/retry protocol specified in 5.4.2.1.7.4.2 to retransmit the ROW message.	**Met**
125	5.4.2.1.5.2.2(2)	If no acknowledgment is received within four frames after retransmission, the terminal **shall** terminate the orderwire message retransmission attempt.	**Met**
126	5.4.2.1.6.1(1)	Whenever possible, a terminal **shall** logout by transmitting a ROW:Logout message in a contention ROW time-slot.	**Met**
127	5.4.2.1.6.1(2)	The terminal **shall** follow the protocol specified in 5.4.2.1.7.4.	**Met**
128	5.4.2.1.6.1(3)	If a logout response is not received, the terminal **shall** terminate the logout protocol and consider itself logged out of the network.	**Met**
129	5.4.2.1.6.2	A terminal is logged out, and **shall** not participate in the network, whenever a FOW:Logout Response message is received.	**Met**
130	5.4.2.1.6.4b	On receipt of the teardown, the terminal **shall** inform the operator that the service has been torn down by the PCC.	**Met**
131	5.4.2.1.7.2	Time slot position **shall** be determined by the terminal.	**Met**
132	5.4.2.1.7.3	The terminal receiving the first ROW assignment in the FOW **shall** transmit during the first assigned time slot available in the ROW segment (following the contention ranging time-slots), the second in the next, and so on.	**Met**
133	5.4.2.1.7.4(1)	A terminal **shall** identify the beginning of contention time slots in the ROW segment.	**Met**
134	5.4.2.1.7.4(2)	These contention message time slots **shall** immediately follow the assigned time slots.	**Met**
135	5.4.2.1.7.4.1	The contention time slot within the ROW segment **shall** be selected at random, based on a uniform distribution over the contention time slots within the ROW segment.	**Met**
136	5.4.2.1.7.4.2(1)	Further retries **shall** not be automatic (will require operator intervention).	**Met**
137	5.4.2.1.7.4.2(2)	Terminals transmitting a contention-ROW message **shall** expect to receive a FOW response.	**Met**
138	5.4.2.1.7.4.2(3)	The contention time slot in which to retransmit the ROW message **shall** be selected using an algorithm that uses two levels of randomization.	**Met**
139	5.4.2.1.7.4.2(4)	The contention ROW time-slot selection process **shall** be as follows:	**Met**
140	5.4.2.1.7.5a	Within a contention-ROW message, the terminal **shall** use the Retry Flag field to indicate if the transmission is a first attempt or a retry.	**Met**

JITC REQ #	MIL-STD Paragraph	REQUIREMENT DESCRIPTION	STATUS
141	5.4.2.1.7.5b	Within an assigned-ROW message, the terminal **shall** use the Retry Flag field to indicate if the last contention-ROW transmission was successful.	**Met**
142	5.4.2.1.7.5(1)	The terminal **shall** maintain an internal retransmission flag to indicate if the contention-ROW message most recently transmitted was acknowledged.	**Met**
143	5.4.2.1.7.5(2)	The terminal **shall** set the internal retransmission flag binary 1 if a response to a retransmitted contention ROW is not received within four frames.	**Met**
144	5.4.2.1.7.5(3)	The terminal **shall** set the internal retransmission flag to binary 0 if (1) it receives a response to a contention ROW, (2) it detects a change in the ROW back off number received in the FOW, or (3) 30 minutes has elapsed since the internal retransmission flag was set to binary 1.	**Met**
145	5.4.2.1.7.5(4)	In any assigned ROW message, the terminal **shall** set the Retransmission Flag field to the vale of the internal retransmission flag.	**Met**
146	5.4.2.2.1(1)	To originate a circuit service, the terminal **shall** transmit a ROW:Circuit Setup message.	**Met**
147	5.4.2.2.1(2)	If a response is received, the terminal **shall** abort the ROW acknowledgment/retry protocol.	**Met**
148	5.4.2.2.3(1)	Sufficient buffering in the terminal **shall** be provided to accommodate at least 1 hour for voice and 24 hours for data with continuous operation (bursts in each frame) at an I/O device rate of 2400-bps.	**Met**
149	5.4.2.2.3(2)	Terminal clock accuracy **shall** be 1 X 10^{-6} or better.	**Met**
150	5.4.2.2.4	The size of the data field in each transmission burst, with the possible exception of the last two bursts, **shall** be N bits as shown in table XIV [of the MIL-STD].	**Met**
151	5.4.2.2.4.1(1)	All bursts **shall** start at the beginning of the time slot.	**Met**
152	5.4.2.2.4.1(2)	In all but the last two bursts the number of user baseband data bits in the User Data field **shall** be N.	**Met**
153	5.4.2.2.4.1(3)	The receiving terminal **shall** correctly interpret the CBK if no more than 2-bit positions of the 8-bit CBK are received in error.	**Met**
154	5.4.2.2.4.1a(1)	All fixed-voice bursts, except the first and last of a transmission, **shall** use the Normal Burst (Data or Fixed-Voice) format shown on figure 8 [of the MIL-STD].	**Met**
155	5.4.2.2.4.1a(2)	The first burst **shall** use the First Burst (Data or Fixed-Voice) burst format shown on figure 8 [of the MIL-STD], unless an entire transmission has N or fewer data bits.	**Met**
156	5.4.2.2.4.1a(3)	When the entire transmission has no more than N data bits, then the Last Burst (Fixed-Voice) format shown on figure 8 [of the MIL-STD] **shall** be used in the first and only burst of the transmission.	**Met**
157	5.4.2.2.4.1a(4)	The last burst for fixed-voice **shall** always use the Last Burst (Fixed-Voice) format shown on figure 8 [of the MIL-STD].	**Met**
158	5.4.2.2.4.1a(5)	Unused bits in the Data subfield **shall** be filled with the repeating 4-bit sequence 1001.	**Met**
159	5.4.2.2.4.1b(1)	All bursts except the first, second from last, and last burst of data transmissions **shall** use the Normal Burst (Data or Fixed-Voice) format shown on figure 8 [of the MIL-STD].	**Met**
160	5.4.2.2.4.1b(2)	The first burst **shall** use the First Burst (Data or Fixed-Voice) format shown on figure 8, unless an entire transmission has fewer than N data bits.	**Met**
161	5.4.2.2.4.1b(3)	If the entire transmission has N-80 or fewer data bits, only the Last Burst (Data) format shown on figure 8 **shall** be used.	**Met**

JITC REQ #	MIL-STD Paragraph	REQUIREMENT DESCRIPTION	STATUS
162	5.4.2.2.4.1b(4)	When the entire transmission has fewer than N data bits but more than N-80 data bits, then the Second From Last Burst (Data) format **shall** be used for the first burst of the transmission and...	**Met**
163	5.4.2.2.4.1b(5)	...the Last burst (Data) format **shall** be used for the last burst of the transmission.	**Met**
164	5.4.2.2.4.1b(6)	The Second From Last Burst (Data) format shown on figure 8 [of the MIL-STD] **shall** be used only if the remaining number of data bits is too small to fill a Normal Burst (Data or Fixed-Voice) format (fewer than N bits) and too large to fit into the Last Burst (Data) format (greater than N-80 bits).	**Met**
165	5.4.2.2.4.1b(7)	The 80-bit Fill subfield **shall** contain the repeating 4-bit sequence 1001.	**Met**
166	5.4.2.2.4.1b(8)	The Data subfield **shall** contain N-80 bits.	**Met**
167	5.4.2.2.4.1b(9)	Unused bits in the Data plus Fill subfields **shall** be filled with the repeating 4-bit sequence 1001.	**Met**
168	5.4.2.2.4.1b(10)	The Last Burst Count subfield **shall** contain a count of the number of non-fill data bits in the burst.	**Met**
169	5.4.2.2.4.1b(11)	The count **shall** consist of a 16-bit binary number repeated 5 times to fill the 80-bit Last Burst Count subfield.	**Met**
170	5.4.2.2.4.1b(12)	Each time the 16-bit number is repeated, the most significant bit **shall** be transmitted first.	**Met**
171	5.4.2.2.4.1b(13)	The receiving terminal **shall** correctly interpret the Last Burst Count subfield if no more than 2 of the 16-bit binary numbers are received in error.	**Met**
172	5.4.2.2.4.2(1)	All transmission bursts other than the first and the last **shall** use the Normal Burst format shown on figure 9 [of the MIL-STD] and end within the allocated guard time at the end of the time slot.	**Met**
173	5.4.2.2.4.2(2)	In all but the first and last bursts, the size of the User Data field **shall** be N as given in table XIV [of the MIL-STD] for 2400-bps.	**Met**
174	5.4.2.2.4.2(3)	The receiving terminal **shall** correctly interpret the CBK if no more than two bit positions of the 8-bit CBK are received in error.	**Met**
175	5.4.2.2.4.2a(1)	Unless an entire transmission can be sent within a single burst, the First Burst format, as shown on figure 9 [of the MIL-STD], **shall** be used for the first burst.	**Met**
176	5.4.2.2.4.2a(2)	If the entire transmission can be sent within a single burst, one of the two Last Burst formats shown on figure 9 [of the MIL-STD] **shall** be used.	**Met**
177	5.4.2.2.4.2a(3)	If pre-fill bits are used, they **shall** be repeated hexadecimal 99 bytes, and there should be as little pre-fill as possible.	**Met**
178	5.4.2.2.4.2a(4)	The first burst User Data field **shall** have an integer number of voice blocks.	**Met**
179	5.4.2.2.4.2a(5)	Transmission **shall** begin at any delay point of the time slot sufficient to transmit the integer number of voice blocks and end at the end of the time slot.	**Met**
180	5.4.2.2.4.2a(6)	The last (55th) voice block **shall** contain 384 coded voice bits followed by 64 fill bits having the pattern 10011001..., resulting in a full voice block having 448 over-the-air bits.	**Met**
181	5.4.2.2.4.2b(1)	The last burst of a subframed voice transmission that finishes with fewer than 96 bits from the end of the time-slot **shall** post-fill with sufficient hexadecimal 99 bytes and use the Last Burst format Type B that includes the CBK field.	**Met**

JITC REQ #	MIL-STD Paragraph	REQUIREMENT DESCRIPTION	STATUS
182	5.4.2.2.4.2b(2)	The last burst of a subframed voice transmission that finishes 96 bits or more from the end of the time-slot **shall** use the Last Burst format Type A which includes the 96-bit Over Code subfield and then post-fill bits before the Over Code to fill the last interleaver block.	**Met**
183	5.4.2.2.4.2b(3)	The Over Code is used to signal the availability of the channel and **shall** be the hexadecimal value F134F134 repeated three times.	**Met**
184	5.4.2.2.4.2b(4)	Each time the Over Code is repeated, the most significant bit of F **shall** be transmitted first.	**Met**
185	5.4.2.2.4.2b(5)	The Over Code **shall** be appended to the transmit user data stream.	**Met**
186	5.4.2.2.4.2b(6)	The receiving terminal **shall** correctly interpret the Over Code subfield if any 32-bit F134F134 sequence of the 96-bit subfield is received without errors.	**Met**
187	5.4.2.2.4.2b(7)	Upon receipt of either a last burst CBK or Over Code, a receiving terminal **shall** be capable of initiating burst transmissions.	**Met**
188	5.4.2.2.4.2c(1)	When the entire transmission requires only a single burst, then one of the two last burst formats **shall** be used.	**Met**
189	5.4.2.2.4.2c(2)	If the burst will end with fewer than 96 bits from the end of the time-slot, then the Last Burst Type B format **shall** be used in the first and only burst of the transmission.	**Met**
190	5.4.2.2.4.2c(3)	When the entire transmission ends 96 bits or more from the end of the time-slot, then the Last Burst Type A format **shall** be used in the first and only burst of the transmission.	**Met**
191	5.4.2.2.4.2d	For subframed-voice service, the TDMA throughput delay **shall** not exceed the maximum TDMA throughput delay given in table XV [of the MIL-STD].	**Met**
192	5.4.2.2.5(1)	For interfacing with asynchronous I/O equipment, the transmitting terminal **shall** strip any start, stop or parity bits, if not encrypted,...	**Met**
193	5.4.2.2.5(2)	...and the receiving terminal **shall** put these bits back onto the data stream.	**Met**
194	5.4.2.2.5(3)	The CBK field **shall** be 11111000 for the first burst of the transmission, 00000000 for all but the first and last burst of the transmission, and 10101111 for the last burst.	**Met**
195	5.4.2.2.5(4)	The receiving terminal **shall** correctly interpret the CBK if no more than 2-bit positions of the 8-bit CBK are received in error.	**Met**
196	5.4.2.2.5(5)	When the entire transmission has no more than N-80 data bits, the last burst CBK format **shall** be used in the first and only burst of the transmission.	**Met**
197	5.4.2.2.5(6)	Unused bits in the data subfield **shall** be filled with the repeating 4-bit sequence 1001.	**Met**
198	5.4.2.2.5(7)	The Burst Count subfield **shall** contain a count of the number of non-fill data bits in the burst.	**Met**
199	5.4.2.2.5(8)	The count **shall** consist of a 16-bit binary number repeated 5 times to fill the 80-bit Burst Count subfield.	**Met**
200	5.4.2.2.5(9)	Each time the 16-bit number is repeated, the most significant bit **shall** be transmitted first.	**Met**
201	5.4.2.2.5(10)	The receiving terminal **shall** correctly interpret the Burst Count subfield if no more than 2 of the 16-bit binary numbers are received in error.	**Met**
202	5.4.2.2.6	When the teardown command is received, terminals **shall** cease transmission pertaining to that service in the frame following the one in which the teardown in received.	**Met**
203	5.4.2.3.1(1)	To originate a message service, the terminal **shall** transmit a ROW:Message Setup message.	**Met**

JITC REQ #	MIL-STD Paragraph	REQUIREMENT DESCRIPTION	STATUS
204	5.4.2.3.1(2)	If the terminal receives a response, the terminal **shall** abort the ROW acknowledgment/retry protocol.	**Met**
205	5.4.2.3.2(1)	Message information transmitted over the channel **shall** be arranged into packets.	**Met**
206	5.4.2.3.2(2)	A data block containing 224 message bits **shall** be the minimum packet size.	**Met**
207	5.4.2.3.2b	The terminal **shall** determine the time-slot size (number of building blocks required) for a message service from this information, as shown in table V [of the MIL-STD].	**Met**
208	5.4.2.3.2.2	When polled by the PCC with the FOW:Acknowledge Blocks message, the terminal **shall** respond with a ROW:Blocks Acknowledgment message.	**Met**
209	5.4.2.3.2.5(1)	The last packet **shall** use the unused-byte counter to identify the number of fill bytes that follow valid data bytes in the packet.	**Met**
210	5.4.2.3.2.5(2)	Each fill byte **shall** have the pattern 10011001.	**Met**
211	5.4.2.3.2.5(3)	These fill bytes **shall** be removed by the receiving terminal.	**Met**
212	5.4.2.3.2.6b	The receiving terminal **shall** send a ROW:Message Acknowledgment only after the terminal has successfully delivered the message to the terminal I/O device.	**Met**
213	5.4.2.3.2.6c	The source terminal **shall** not reuse the virtual port number in follow-on service requests until the service is torn down.	**Met**
214	5.4.2.3.3	The terminal **shall** implement the FOW:Message Teardown message in the frame following the one in which the teardown is received.	**Met**
215	5.4.2.4.1(1)	Terminals requesting DASA service **shall** identify capabilities for DASA channel operations as specified in 5.4.2.1.5.1.	**Met**
216	5.4.2.4.1(2)	Terminals that are operationally constrained from frequency changes **shall** identify that limitation using the ROW:Login message.	**Met**
217	5.4.2.4.1(3)	Those terminals that are not capable of automatic frequency change **shall** indicate this limitation in the ROW:Login message when they log into a network, and will not be directed to change channels via the FOW:Terminal Channel Assignment message.	**Met**
218	5.4.2.4.1(4)	Operation on the assigned channel **shall** be as specified in MIL-STD-188-181.	**Met (Note)**
Note: Testing was limited to establishing communications on the dedicated channel. Compliance to MIL-STD-188-181 is addressed during separate MIL-STD-188-181 conformance testing.			
219	5.4.2.4.2.1(1)	The terminal **shall** determine, based on the Channel field and appendix D [of the MIL-STD], whether the assigned channel is 5- or 25-kHz.	**Met**
220	5.4.2.4.2.1(2)	When a FOW:Terminal Channel Assignment message is sent, a time slot for an assigned-ROW message is reserved and the terminal guarding that node address **shall** respond with a ROW:Terminal Channel Assignment Response.	**Met**
221	5.4.2.4.2.1(3)	The terminal **shall** indicate in the ROW:Terminal Channel Assignment Response message whether it will accept or reject the DASA assignment.	**Met**
222	5.4.2.4.2.1(4)	Terminals that accept the DASA assignment **shall** switch to DASA operations within one frame period following the transmission of the ROW message.	**Met**
223	5.4.2.4.2.2	Terminals not moving to the DASA channel **shall** continue processing active DAMA services in which they are a participant and retain pending service requests.	**Met**
224	5.4.2.4.2.3(1)	Terminals **shall** return to the initial TDMA channel prior to, or immediately after, the assigned time.	**Met**

JITC REQ #	MIL-STD Paragraph	REQUIREMENT DESCRIPTION	STATUS
225	5.4.2.4.2.3(2)	Upon return to the initial TDMA channel, the terminal **shall** achieve downlink and uplink synchronization.	**Met**
226	5.4.2.4.2.3(3)	For early return to the TDMA channel the terminal **shall** send a ROW:Terminal Channel Return message in the contention-ROW-message time slot, if the selected contention-ROW message time slot occurs before the end of the assigned channel time.	**Met**
227	5.4.2.5.1(1)	Sixteen-bit addresses **shall** be used for identifying network nodes and subnets.	**Met**
228	5.4.2.5.1(2)	Each terminal **shall** receive FOW messages and process those messages directed to its terminal node address or to any other address in its guard list.	**Met**
229	5.4.2.5.1(3)	Each terminal **shall** maintain an address guard list.	**Met**
230	5.4.2.5.1(4)	This guard list **shall** contain the node and subnet addresses for which the terminal receives services.	**Met**
231	5.4.2.5.1.1	A terminal **shall** always use its unique terminal node address to identify itself in orderwire messages; that is, when logging into the network, requesting services, and in other orderwire messages.	**Met**
232	5.4.2.5.1.2	Terminals **shall** not use address zero for a login address or maintain address zero on their guard lists.	**Met**
233	5.4.2.5.1.3	A subnet address **shall** not be used for a terminal node address.	**Met**
234	5.4.2.5.2(1)	A terminal **shall** report the number of addresses on its guard list and a guard list CRC in the ROW:Login message.	**Met**
235	5.4.2.5.2(2)	Only node/subnet addresses **shall** be counted for the number of addresses to be reported in the Login message.	**Met**
236	5.4.2.5.2(3)	For purposes of guard list reporting and guard list CRC calculation, the terminal **shall** arrange the order of node/subnet addresses in its guard list in ascending order, and place binary 0 in all empty address fields at the bottom of the guard list.	**Met**
237	5.4.2.5.2a	When requested by the PCC in one or more FOW:Report Terminal Address messages, the terminal **shall** report its guard list of node and subnet addresses in ROW:Terminal Address Report messages.	**Met**
238	5.4.2.5.2b	When reporting guard list addresses in the ROW:Terminal Address Report message, the terminal **shall** fill with zeros any fields corresponding to empty locations on the terminal address guard list.	**Met**
239	5.4.2.5.2c(1)	The terminal **shall** update its address guard list when requested by the PCC in a FOW:Terminal Address Add or Delete message.	**Met**
240	5.4.2.5.2c(2)	The terminal **shall** respond to the FOW request with a ROW:Terminal Address Add or Delete Response message.	**Met**
241	5.4.2.5.2c(3)	The terminal **shall** always report that an address deletion was successful, whether or not the address was originally in the guard list.	**Met**
242	5.4.2.5.2c(4)	The terminal **shall** report a failure to add an address only if the address is not already on its guard list and the guard list is full.	**Met**
243	5.4.2.5.2c(5)	If the terminal is involved in a receive service directed to a deleted address, the terminal **shall** ignore any further communications associated with the service.	**Met**
244	5.4.2.5.3(1)	Terminals **shall** identify each service request by a unique service identification number (0-4) known as the terminal virtual port number.	**Met**
245	5.4.2.5.3(2)	The terminal **shall** not reuse a virtual port number until the initial request with the virtual port number is no longer valid (such as is the case with a rejected request, a received teardown, or a timeout).	**Met**
246	5.4.2.5.3(3)	The terminal **shall** not use virtual port numbers greater than those permitted.	**Met**

JITC REQ #	MIL-STD Paragraph	REQUIREMENT DESCRIPTION	STATUS
247	5.4.2.5.3a(1)	The terminal **shall** be capable of processing any assigned services in the sequence established by the PCC, independently of the services requested by the terminal.	**Met**
248	5.4.2.5.3a(2)	Before transmission of a service request, the terminal **shall** validate the service request against terminal access restrictions, system access restrictions, and system service restrictions.	**Met**
249	5.4.2.5.3b(1)	The terminal **shall** be capable of processing at least two active subnet message services as the service destination during a single frame while participating in one other active service of any type (as either the source or the destination).	**Met**
250	5.4.2.5.3b(2)	The terminal **shall** process multiple assignments in the following manner:	**Met**
251	5.4.2.5.3b(3)	(1) If the terminal is assigned multiple services that it cannot process simultaneously (for example, both a point-to-point service and a subnet circuit service), it **shall** process the service with the highest precedence;	**Met**
252	5.4.2.5.3b(4)	(2) If the terminal is assigned multiple services at the same precedence level, it **shall** process the first service assigned and continue to process the service until preempted, completed, or the operator intervenes.	**Met**
253	5.4.2.5.4.1(1)	If a FOW:Participant Status Data Base message addressed to the terminal is not received, and the terminal has determined that the PCC has stopped sending FOW:Participant Status Data Base messages after the transition, the terminal **shall** consider that it is logged out.	**Met**
254	5.4.2.5.4.1(2)	If an FOW:Participant Status Data Base message that reports the terminal's status is received, and the number of indicated demand-assigned services for which the terminal is the service source (either active or queued) does not agree with the number in the terminal's data base, the terminal **shall** send an ROW:Circuit Setup or ROW:Message Setup message to the PCC for each demand-assigned service that should be active or queued.	**Met**
255	5.4.2.5.4.2	When a FOW system message indicates a single-access channel mode countdown is in progress, the terminal **shall** comply with the FOW-system message countdown and cease transmission on that channel in the frame identified by the countdown message.	**Met**
256	5.4.2.5.5(1)	Terminals **shall** respond to a FOW:Report Status message from the PCC by transmitting a ROW:Status Report message in the assigned-ROW time slot.	**Met**
257	5.4.2.5.5(2)	Contention time slot status reporting **shall** not be used by operator-initiated action to report: (1) a change in link quality unless the link quality has changed by more than 2 dB from the most recently reported value, or (2) a change in the Retransmission Flag field.	**Met**
258	5.4.2.5.6	Terminals **shall** request teardown of circuit or message service under the conditions specified in this paragraph.	**Met**
259	5.4.2.5.6.1	Terminal teardown requests for all services **shall** be as specified in this paragraph.	**Met**
260	5.4.2.5.6.1a	Terminals **shall** automatically request teardown of: (1) Any circuit service the terminal originated but will not process upon initial assignment, (2) Any message service the terminal originated but will not process, (3) Any point-to-point service for which the terminal is the source or destination and which it will not process.	**Met**

JITC REQ #	MIL-STD Paragraph	REQUIREMENT DESCRIPTION	STATUS
261	5.4.2.5.6.1b	Terminals **shall** not request teardown of: (1) Any preassigned service, (2) Any service the terminal did not originate and the conditions of 5.4.2.5.6.1a, (3) do not apply.	**Met**
262	5.4.2.5.6.2.1(1)	The source terminal requesting the service teardown **shall** transmit the Preamble, SOM sequence, and End-of-Service Burst Type fields in each assigned-communications time slot.	**Met**
263	5.4.2.5.6.2.1(2)	The source terminal **shall** transmit an ROW:Circuit Teardown message in the contention portion of the ROW segment if, after the fourth frame following the time the terminal transmitted the first End-of-Service bit sequence in the Burst Type field, an FOW:Teardown message has not been received.	**Met**
264	5.4.2.5.6.2.1(3)	The terminal **shall** continue to transmit the preamble and SOM fields and the End-of-Service bit sequence in the Burst Type field in each assigned-COM time slot until a FOW:Teardown message is received.	**Met**
265	5.4.2.5.6.2.1(4)	If the terminal requesting a teardown is a point-to-point service destination terminal, then it **shall** follow the protocol defined in 5.4.2.5.6.2.2.	**Met**
266	5.4.2.5.6.2.2(1)	The source terminal requesting teardown **shall** transmit a ROW:Teardown message.	**Met**
267	5.4.2.5.6.2.1.2(2)	If the terminal requesting teardown receives no response after the retry protocol has been performed, the terminal **shall** assume the service has been torn down…	**Met**
268	5.4.2.5.6.2.1.2(3)	… and the virtual port **shall** be available for use.	**Met**
269	5.4.3.1(1)	A long code (16 bits) **shall** be used on FOW transmissions, on message-service data blocks, and as a check of guard-list consistency.	**Met**
270	5.4.3.1(2)	A short code (8 bits) **shall** be used on the ROW-message and ROW-ranging transmissions.	**Met**
271	5.4.3.1(3)	Only bursts received correctly, as determined by the CRC, **shall** be used by the terminal for FOW and ROW-ranging transmissions.	**Met**
272	5.4.3.1(4)	The generator polynomials for the long and short codes, respectively, **shall** be as given below (see page 71 [of the MIL-STD]).	**Met**
273	5.4.3.1(5)	The transmitted CRC **shall** be equivalent to that obtained by performing the following steps (see page 71 [of the MIL-STD]).	**Met**
274	5.4.3.1(6)	The CRC bits **shall** be transmitted MSB (higher order term) first.	**Met**
275	5.4.3.2	For rate 1/2 coding the output of the encoder **shall** be identical with the output or the rate 1/2, constraint length 7 convolutional encoder shown on figure 11 [of the MIL-STD] and described below.	**Met**
276	5.4.3.2.1	Higher rate 3/4 and 7/8 codes **shall** be derived from the rate 1/2 code using the puncture pattern shown in table XVII [of the MIL-STD].	**Met**
277	5.4.3.3(1)	The block interleaving structure **shall** consist of two independently constructed blocks of 112 bits used in sequence.	**Met**
278	5.4.3.3(2)	The interleaving process **shall** be equivalent to writing input bits into the 112-bit blocks sequentially as shown in the input order columns of tables XVIII and XIX [of the MIL-STD] and read out in the order dictated by the output order columns of the tables [of the MIL-STD].	**Met**
279	5.4.3.3(3)	Deinterleaving **shall** reverse this operation.	**Met**
280	5.4.3.3(4)	Interleaver boundaries **shall** start at the beginning of the User Data field within each burst for circuit services (see figure 5 [of the MIL-STD]);..	**Met**
281	5.4.3.3(5)	…they **shall** start at the beginning of the data block within each packet for message service (see figure 6 [of the MIL-STD]); with the first interleaved bit of the burst in the first position defined by the block of table XVIII [of the MIL-STD].	**Met**

JITC REQ #	MIL-STD Paragraph	REQUIREMENT DESCRIPTION	STATUS
282	5.4.3.3(6)	For the coding rates for which the number of bits out of the encoder are not sufficient to fill the last interleaver block, fill bits **shall** be added resulting in a full interleaver block having 112 over-the-air bits.	**Met**
283	5.4.3.3(7)	The fill bits **shall** have the pattern 10011001.	**Met**
284	5.4.4.1	The modulation for all transmissions **shall** be 50% SOQPSK.	**Met**
285	5.4.4.2	The modulation rates **shall** be 600-, 800-, 1200-, 2400-, and 3000-sps, as specified in table III [of the MIL-STD].	**Met**
286	5.4.4.3	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 table XX [of the MIL-STD].	**Met (Note)**
Note: As tested, the maximum EIRP allowable to meet this requirement is 39.5 dBWi for a data rate of 2400-bps and a modulation rate of 3000-sps.			
287	5.4.4.4	The terminal's modulated output, including additive noise, **shall** introduce no greater than a 0.2 dB degradation in a receiver's performance, if the receiver uses matched-filter demodulation and expects the incoming signal to have 50-percent sinusoidally shaped modulation, as illustrated in figure 12 [of the MIL-STD].	**Not Tested (Note)**
Note: Due to the lack of a characterized, matched-filter demodulator, this requirement could not be tested.			
288	5.5.1(1)	All orderwires **shall** be encrypted for normal transmission;…	**Met**
289	5.5.1(2)	…however, an orderwire encryption/decryption bypass **shall** be provided.	**Met**
290	5.5.1(3)	Orderwire encryption/decryption **shall** be performed using the COMSEC/TRANSEC Integrated Circuit (CTIC) or an alternate NSA-approved device that is cryptographically and functionally compatible with the CTIC implementing KGV-11 as specified in NSA specifications 88-4 and 87-01.	**Met**
291	5.5.1(4)	Hardware implementation of the terminal **shall** include provisions for future implementation of Over the Air Rekeying (OTAR) for the orderwire.	**Not Tested (Note)**
Note: OTAR Forward Orderwire (FOW) messages have not been implemented in the Channel Controller Therefore, testing could not be performed.			
292	5.5.1(5)	Input to the encryption/decryption process **shall** be a cryptographic key and an initialization vector called the Time Slot Number (TSN).	**Not Testable**
Note: General statement/definition. Not testable.			
293	5.5.1.1(1)	The terminal **shall** have storage for up to eight COMSEC keys.	**Met**
294	5.5.1.1(2)	Each COMSEC key **shall** be loaded into a specific location in the terminal's key storage memory, numbered from 0 to 7.	**Met**
295	5.5.1.1(3)	The new COMSEC key **shall** take effect in the frame after the fourth FOW:Time Slot Change Countdown message.	**Met**
296	5.5.1.1(4)	When a terminal enters the network, it **shall** try all loaded COMSEC keys until it correctly decrypts the FOW (determined by a correct CRC).	**Met**
297	5.5.1.1(5)	If the terminal enters the network during the Time Slot Countdown, it will have missed the Next Key Indicator and **shall** determine the next key using the trial process for all stored COMSEC keys (until obtaining the correct CRC).	**Met**
298	5.5.1.2(1)	A 39-bit TSN **shall** be used as the cryptographic initialization vector for the CTIC.	**Met**
299	5.5.1.2(2)	This TSN **shall** have four fields, as shown in figure 13 [of the MIL-STD] and as described below.	**Met**
300	5.5.1.2a	The Net Number **shall** be 127 (1111111).	**Met**
301	5.5.1.2c(1)	It **shall** be coded from 0 through 1023 for the first through 1,024th building block in the frame.	**Met**
302	5.5.1.2c(2)	The Frame Offset field **shall** be zero for the FOW.	**Not Applicable (Note)**
Note: Controller requirement not applicable to the terminal.			

JITC REQ #	MIL-STD Paragraph	REQUIREMENT DESCRIPTION	STATUS
303	5.5.1.2d(1)	This is a 2-bit field **shall** start at a value of zero for all encryptions and decryptions.	**Met**
304	5.5.1.2d(2)	The TSN for encryption of the orderwire **shall** be generated using the Frame Number and Frame Offset of the time slot within which the orderwire is scheduled.	**Met**
305	5.5.1.2d(3)	The TSN for decryption of the orderwires **shall** be generated using the Frame Number and Frame Offset of the time slot within which the orderwire was scheduled.	**Met**
306	5.5.1.4	Decryption of the FOW **shall** result in an output identical to that obtained from the following sequence: (see page 81 [of the MIL-STD])	**Met**
307	5.5.1.5	Encryption of the ROW **shall** result in an output identical to that obtained from the following processing sequence: (see page 81 [of the MIL-STD])	**Met**
308	5.5.1.5c	The TSN **shall** be generated as defined in 5.5.1.2 using the same frame number transmitted by the PCC in the FOW of that frame.	**Met**
309	5.5.1.7(1)	When a terminal receives a FOW:Zeroize message (FOW 31), it **shall** compare the Address 1 and Address 2 fields.	**Met**
310	5.5.1.7(2)	If the values of these two fields are identical and match the terminal's node address, the terminal **shall** zeroize the eight locations in its key storage memory.	**Met**
311	5.5.1.7(3)	If the two fields are not identical, the terminal **shall** ignore the FOW.	**Met**
312	5.5.2(1)	The terminal originating a service request **shall** indicate whether or not the user data is to be encrypted.	**Met**
313	5.5.2(2)	Terminals **shall** transmit user data in plain text only if authorized by the terminal operator.	**Met**
314	5.5.2.1	Secure voice at 2400-bps **shall** be interoperable with the digitization and encryption techniques used in the Advanced Narrowband Digital Voice Terminal (ANDVT), application 3 (see 6.7.1 for current version of MIL-C-28883, and see 6.7.2 for discussion of other possible voice digitization techniques).	**Met (Note)**
Note: This requirement was met using external COMSEC equipment.			
315	5.5.2.2(1)	Data encryption **shall** be interoperable with KYV-5 and KG-84A/C encryption devices as specified in NSA No. 82-28.	**Met (Note)**
Note: This requirement was met using external COMSEC equipment.			
316	5.5.2.2(2)	Terminals that embed COMSEC devices **shall** support all data rates specified in this MIL-STD for communication over the DAMA channel.	**Met (Note)**
Note: This requirement was met using external COMSEC equipment.			
317	Appendix A, A.1	Each terminal **shall** be capable of receiving and interpreting each of the message fields defined in this appendix.	**Met**
318	Appendix B, B.1	Each terminal **shall** be capable of receiving and interpreting each of the messages defined in this appendix except for those defined in Tables BIII, B-XIII, B-XV, B-XVII, B-XVIII, B-XXI, and B-XXIII through BXXVI [of the MIL-STD] which are used by controllers.	**Met**
319	Appendix B, table B-XXXII [of the MIL-STD]	[FOW:Zeroize message, Address 2 Field] If this field does not match Address 1 field, the terminal **shall** ignore the command.	**Met**
320	Appendix C, C.1	Each terminal **shall** be capable of transmitting each of the messages defined in this appendix except for those defined in tables C-3, C-4, C-12, C-13 through C-18 and C-20 [of the MIL-STD] which are used by controllers.	**Met**
321	Appendix D, D.1	Each frequency switching capable terminal **shall** be able to interpret the Channel field of the FOW:Terminal Channel Assignment message and automatically switch to the frequency as specified in this appendix.	**Met**

JITC REQ #	MIL-STD Paragraph	REQUIREMENT DESCRIPTION	STATUS

Legend:

A – Signal Amplitude
ACC – Alternate Channel Controller
$a_i(t)$ – In-phase Data Modulation Signal
$a_q(t)$ – Quadrature Data Modulation Signal
$a_m, \ldots, a_0$ – Data Bits, 0 or 1
ANDVT – Advanced Narrowband Digital Voice Terminal
ASCII – American Standard Code of Information Interchange

BER – Bit Error Ratio
bps – Bit Per Second

C2 – Command and Control
CBK – Circuit Burst Kind
CC – Channel Controller
C/N_0 – Carrier-Power To Noise-Spectral-Density Ratio
COM – Communications
COMSEC – Communications Security
CRC – Cyclic Redundancy Check
CRS – Contention Ranging Slots
CTIC – COMSEC/TRANSEC Integrated Circuit
CW – Continuous Wave

DAMA – Demand Assigned Multiple Access
DASA – Demand Assigned Single Access
dB – Decibel
dB-Hz – Decibel-Hertz
DBW – Decibels Relative to 1 Watt
DISA – Defense Information Systems Agency
$D(x)$ – Data for which CRC is Generated
DO – Design Objective
DoD – Department of Defense
DoDD – DoD Directive
DoDISS – DoD Index of Specifications and Standards

E_b/N_o – Energy Per Bit to Noise Power Spectral Density Ratio
EIRP – Effective Isotropically Radiated Power

FEC – Forward Error Correction
FED-STD – Federal Standard
FIFO – First In, First Out
FOW – Forward Orderwire
FSCS – Fleet Satellite Communications System

GPEE – General-Purpose Encryption Equipment
G/T – Antenna Gain-to-Noise Temperature In dB/K
$G(x)$ – Generating Polynomial for CRC

Hz – Hertz

I – In-Phase
I/O – Input/Output

JCS – Joint Chiefs Of Staff
JIEO – Joint Interoperability and Engineering Organization

k – Constraint Length
kHz – Kilohertz

LSB – Least Significant Bit

MELP – Mixed Excitation Linear Prediction
MIL-STD – Military Standard
ms – Millisecond
MSB – Most Significant Bit

N – Integer Number
NSA – National Security Agency

OTAR – Over-the-Air Rekeying

PCC – Primary Channel Controller

Q – Quadrature

Req – Requirement
RF – Radio Frequency
ROW – Return Orderwire

SATCOM – Satellite Communications
SOM – Start-of-Message
SOQPSK – Shaped Offset Quadrature Phase-Shift Keying
$s(t)$ – Transmit Signal
sps – Symbols Per Second

T – Symbol Period
TDMA – Time-Division Multiple Access
TRANSEC – Transmission Security
TSN – Time Slot Number

UHF – Ultrahigh Frequency

W – Watt

ω_0 – Radian Frequency, 2π x Frequency in Hertz
x – Unit Delay
$\Phi(t)$ – Phase