DEFENSE INFORMATION SYSTEMS AGENCY

JOINT INTEROPERABILITY TEST COMMAND
FORT HUACHUCA, ARIZONA

MIL-STD-188-181/ MIL-STD-188-181A/ MIL-STD-188-181B CONFORMANCE TEST PROCEDURE

MAY 2001

MIL-STD-188-181/
MIL-STD-188-181A/
MIL-STD-188-181B
CONFORMANCE TEST PROCEDURE

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EXECUTIVE SUMMARY

Ultra High Frequency (UHF) Satellite Communications (SATCOM) provides military users with a long-haul data and voice communications capability. The demand for this service greatly exceeds the capacity of the system in its current single network per satellite channel mode. In an effort to provide the UHF capability to all users, the Chairman, Joint Chiefs of Staff Instruction (CJCSI) 6251.01 has directed that all terminals operating over non-processed UHF SATCOM transponders will be capable of employing Demand Assigned Multiple Access (DAMA) waveforms unless a waiver is granted. Therefore, DAMA Satellite Terminals which operate in the 5-kilohertz (kHz) and 25-kHz UHF range in dedicated mode are required to conform to Military Standard (MIL-STD) 188-181. MIL-STD-188-181 has been superseded by MIL-STD-188-181A which has been superseded by MIL-STD-188-181B. These newer versions of the MIL-STD provide for new data rates and waveforms to be used by the terminals.

This document provides the test procedures to determine the extent to which UHF SATCOM terminals comply with MIL-STD-188-181, -181A, or -181B as appropriate.

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SECTION I - INTRODUCTION

I-1 BACKGROUND. Ultra High Frequency (UHF) Satellite Communications (SATCOM) provides military users with a long-haul data and voice communications capability. The demand for this service greatly exceeds the capacity of the system in its current single network per satellite channel mode. In an effort to provide the UHF capability to all users, the Chairman, Joint Chiefs of Staff Instruction (CJCSI) 6251.01 has directed that all terminals operating over non-processed UHF SATCOM transponders will be capable of employing Demand Assigned Multiple Access (DAMA) waveforms unless a waiver is granted. Therefore, DAMA Satellite Terminals which operate in the 5-kilohertz (kHz) and 25-kHz UHF range in dedicated mode are required to conform to Military Standard (MIL-STD) 188-181. MIL-STD-188-181 has been superseded by MIL-STD-188-181A which has been superseded by MIL-STD-188-181B. These newer versions of the MIL-STD provide for new data rates and waveforms to be used by the terminals.

This document provides the test procedures to determine the extent to which UHF SATCOM terminals comply with MIL-STD-188-181, -181A, or -181B as appropriate.

I-2 PURPOSE. To determine if the terminal being tested meets the interoperability requirements specified in MIL-STD-188-181, -181A, or -181B as appropriate.

I-3 SCOPE.

I-3.1 Overview. These procedures consist of twelve subtests which determine the compliance with MIL-STD-188-181, MIL-STD-188-181A or MIL-STD-188-181B for satellite terminals operating on 5- or 25-kHz dedicated mode channels. Appendix C contains the detailed requirements which are cross-referenced between the MIL-STDs. Regression testing will be performed if hardware/software changes are made to the terminals during testing. The test is categorized as a formal conformance test which will be conducted in a laboratory environment and over-the-air at the Joint Interoperability Test Command (JITC), Fort Huachuca, Arizona. Test duration is approximately three weeks, assuming minimal re-tests are required.

I-3.2 Resources. JITC Government and contractor personnel will be utilized for the test. Commercial-off-the-shelf test equipment will be used in the conduct of the test. Appendix B provides a detailed list of these and other test resources required. The sponsor of the terminal is responsible for supplying two terminals with associated manuals, interface cables, and power supplies.

I-3.3 Limitations. None.

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SECTION II - TEST PROCEDURES

II-1 BIT ERROR PERFORMANCE, CARRIER DEGRADATION, FREQUENCY OFFSET, and DOPPLER

II-1.1 Objective. To determine if the terminal meets the Bit Error Rate (BER) and receive clock stability requirements under the test conditions defined in the MIL-STDs.

II-1.2 Criteria. Terminals compliant to MIL-STD-188-181 must meet requirements 3, 4, 21, 22, 27 through 32, 57 through 60, 69 through 71, and 73 of Appendix C. Terminals compliant to MIL-STD-188-181A must meet requirements 20 through 22, 29 through 32, 35, 66 through 70, 81 through 83, and 86 of Appendix C. Terminals compliant to MIL-STD-188-181B must meet requirements 20, 38 through 42, 45, 70, 104, 117 through 119, 122, and 136 of Appendix C.

II-1.3 Data Requirements

a. Criteria Related Data

(1) BER at desired receive level

(2) Synchronization at desired receive level minus 3 Decibels Referenced to 1 Milliwatt (dBm)

(3) Number of successful data acquisitions

(4) BER with Doppler

(5) Receive clock frequency

b. Supplemental Data

(1) Test configuration diagrams

(2) Software versions tested

c. Data on Problems/Anomalies Encountered. Any problems or anomalies will be recorded and researched to determine why they occurred. When appropriate, corrective action will be initiated and testing will be performed to validate corrective action.

II-1.4 Procedures

a. The equipment will be configured as depicted in Figure 1 for Phase-Shift Keying (PSK) modulation, Figure 2 for Continuous Phase Modulation (CPM), or

Figure 3 for Frequency Shift Keying (FSK) modulation. Bit Error Rate measurements will be performed at the required receive level, at the required level degraded by 3 decibels (dB), and with Doppler present. Receive clock frequencies will be recorded for each test condition. Detailed test procedures are contained in Appendix D.

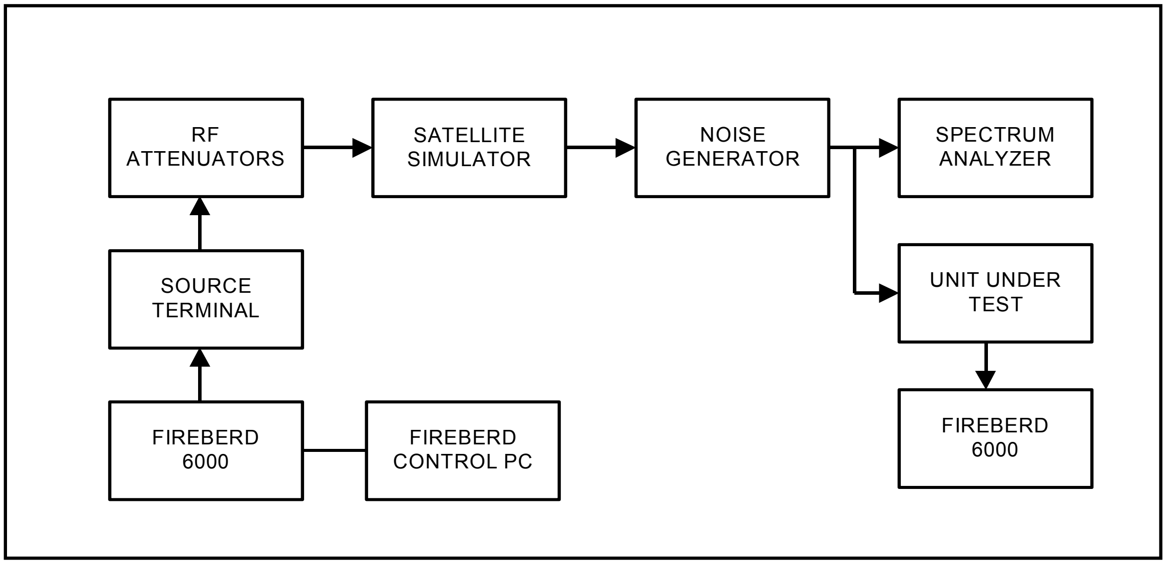

Figure 1. PSK BER Test Configuration

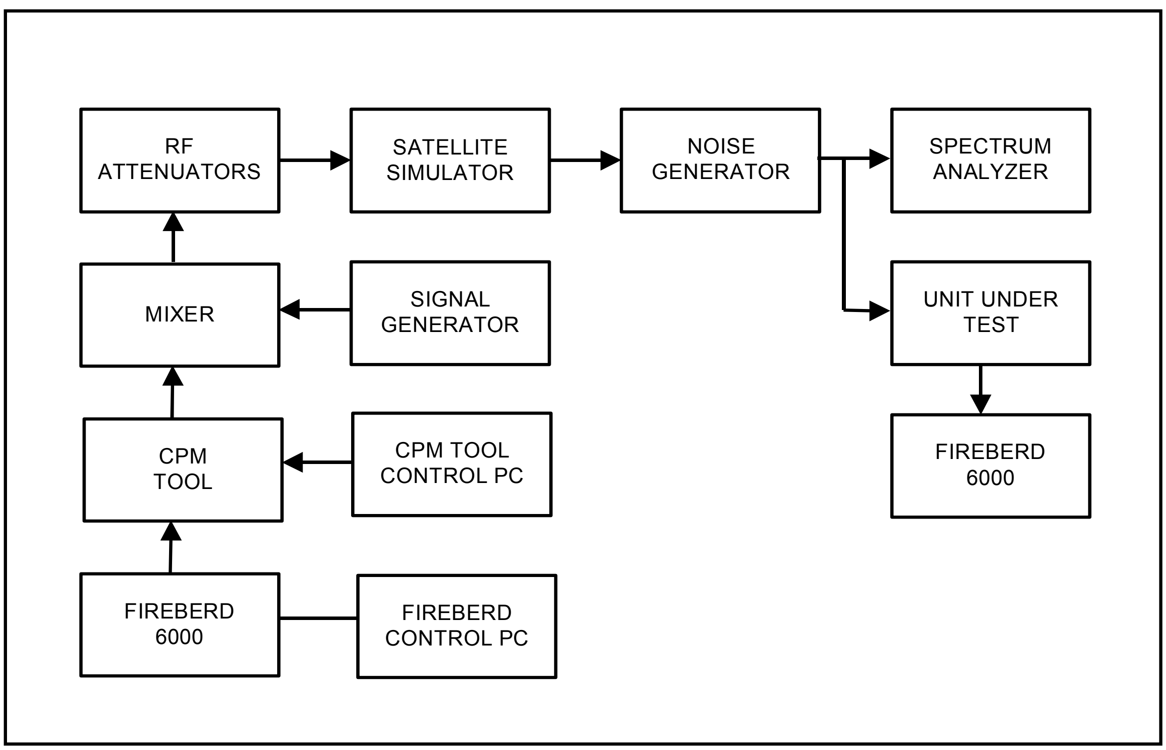

Figure 2. CPM BER Test Configuration

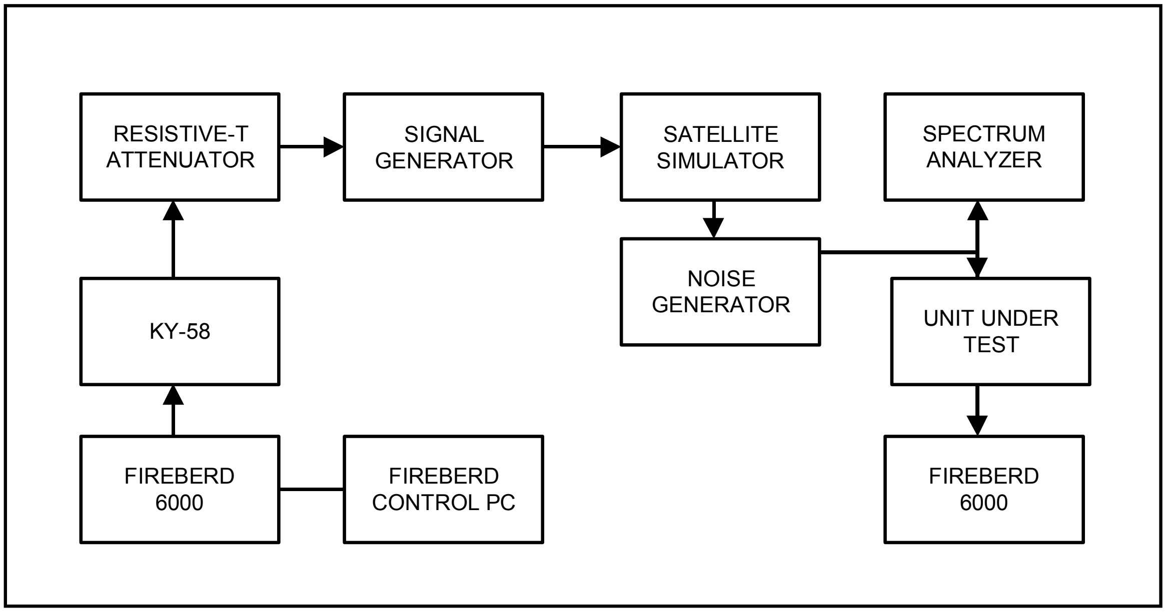

Figure 3. FSK BER Test Configuration

b. Data Collection. Data will be collected manually and will be entered on the data sheets provided in Appendix E.

II-1.5 Presentation of Results. Data obtained will be summarized and presented in narrative and tabular format.

II-1.6 Analysis and Discussion. The results will be reviewed against the criteria. When appropriate, additional testing will be performed to assist vendors in troubleshooting problems encountered. Testing will be performed to verify corrections to problems when provided by the vendor. Any failures to meet the criteria and their operational impact to the user will be discussed.

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II-2 CARRIER DROPOUT

II-2.1 Objective. To determine if the terminal meets the carrier dropout requirements under the test conditions defined in the MIL-STDs.

II-2.2 Criteria. Terminals compliant to MIL-STD-188-181 must meet requirements 3, 4, 32, 72, and 73 of Appendix C. Terminals compliant to MIL-STD-188-181A must meet requirements 33, 35, 84, and 86 of Appendix C. Terminals compliant to MIL-STD-188-181B must meet requirements 43, 45, 120 and 122 of Appendix C.

II-2.3 Data Requirements

a. **Criteria Related Data**

(1) Bit synchronization maintained after carrier dropout

(2) Receive clock frequency

b. **Supplemental Data**

(1) Test configuration diagrams

(2) Software versions tested

c. **Data on Problems/Anomalies Encountered.** Any problems or anomalies will be recorded and researched to determine why they occurred. When appropriate, corrective action will be initiated and testing will be performed to validate corrective action.

II-2.4 Procedures

a. The equipment will be configured as depicted in Figure 4 for PSK modulation or Figure 5 for CPM modulation. The receive signal will be interrupted for 230 milliseconds (ms) and returned. Bit synchronization at the receive terminal will be recorded. Detailed test procedures are contained in Appendix D.

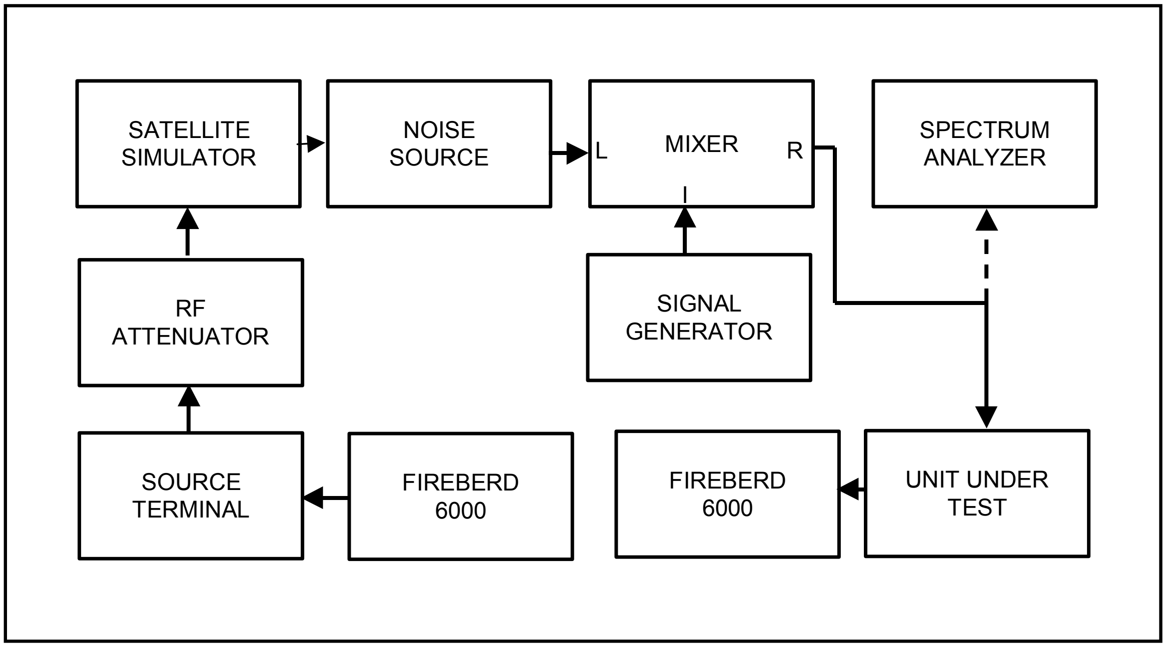

Figure 4. PSK Carrier Dropout Test Configuration

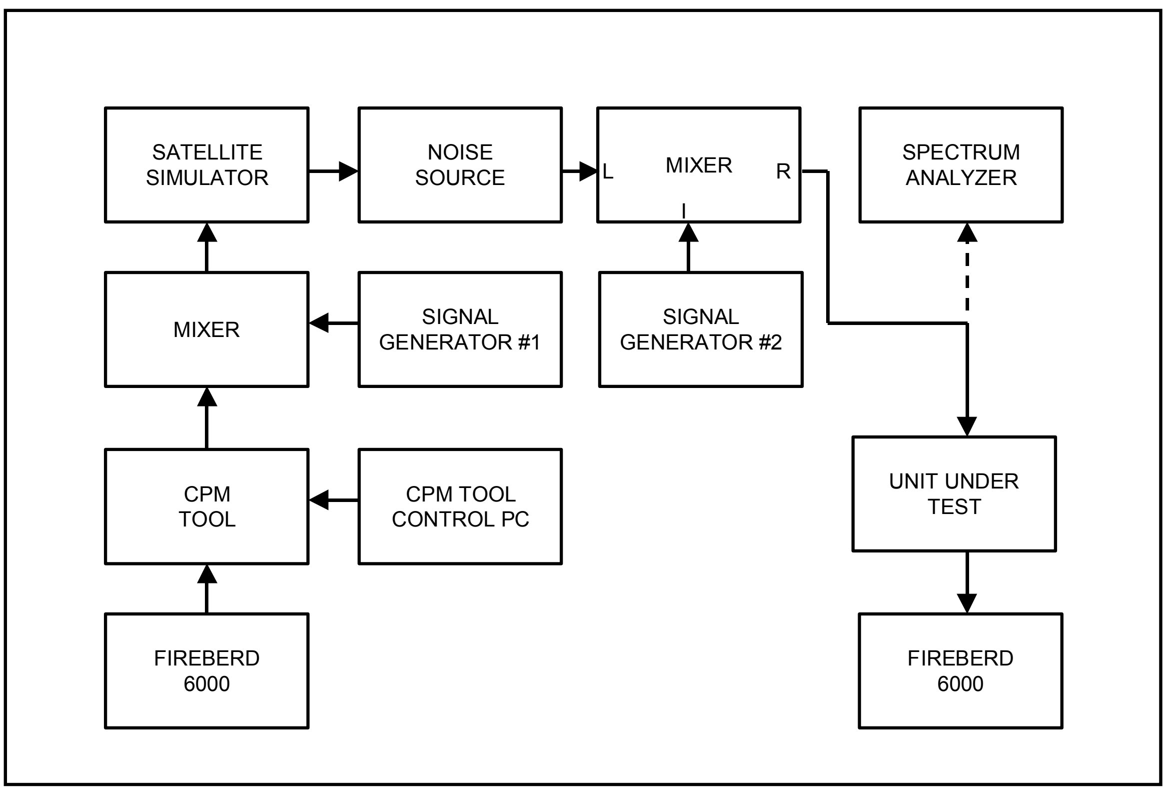

Figure 5. CPM Carrier Dropout Test Configuration

b. Data Collection. Data will be collected manually and will be entered on the data sheets provided in Appendix E.

II-2.5 Presentation of Results. Data obtained will be summarized and presented in narrative and tabular format.

II-2.6 Analysis and Discussion. The results will be reviewed against the criteria. When appropriate, additional testing will be performed to assist vendors in troubleshooting problems encountered. Testing will be performed to verify corrections to problems when provided by the vendor. Any failures to meet the criteria and their operational impact to the user will be discussed.

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II-3 ALTERNATE CARRIER ACQUISITION

II-3.1 Objective. To determine if the terminal meets the alternate carrier acquisition requirements under the test conditions defined in the MIL-STDs.

II-3.2 Criteria. Terminals compliant to MIL-STD-188-181 must meet requirements 3, 4, 32, and 73 of Appendix C. Terminals compliant to MIL-STD-188-181A must meet requirements 34, 35, 85, and 86 of Appendix C. Terminals compliant to MIL-STD-188-181B must meet requirements 44, 45, 121, and 122 of Appendix C.

II-3.3 Data Requirements

a. Criteria Related Data

(1) Terminal acquires second carrier

(2) Receive clock frequency

b. Supplemental Data

(1) Test configuration diagrams

(2) Software versions tested

c. Data on Problems/Anomalies Encountered. Any problems or anomalies will be recorded and researched to determine why they occurred. When appropriate, corrective action will be initiated and testing will be performed to validate corrective action.

II-3.4 Procedures

a. The equipment will be configured as depicted in Figure 6 for PSK or FSK modulation or Figure 7 for CPM modulation. The receive signal will be interrupted and a second carrier will start after 250 ms. Terminal acquisition of the second carrier will be recorded. Detailed test procedures are contained in Appendix D.

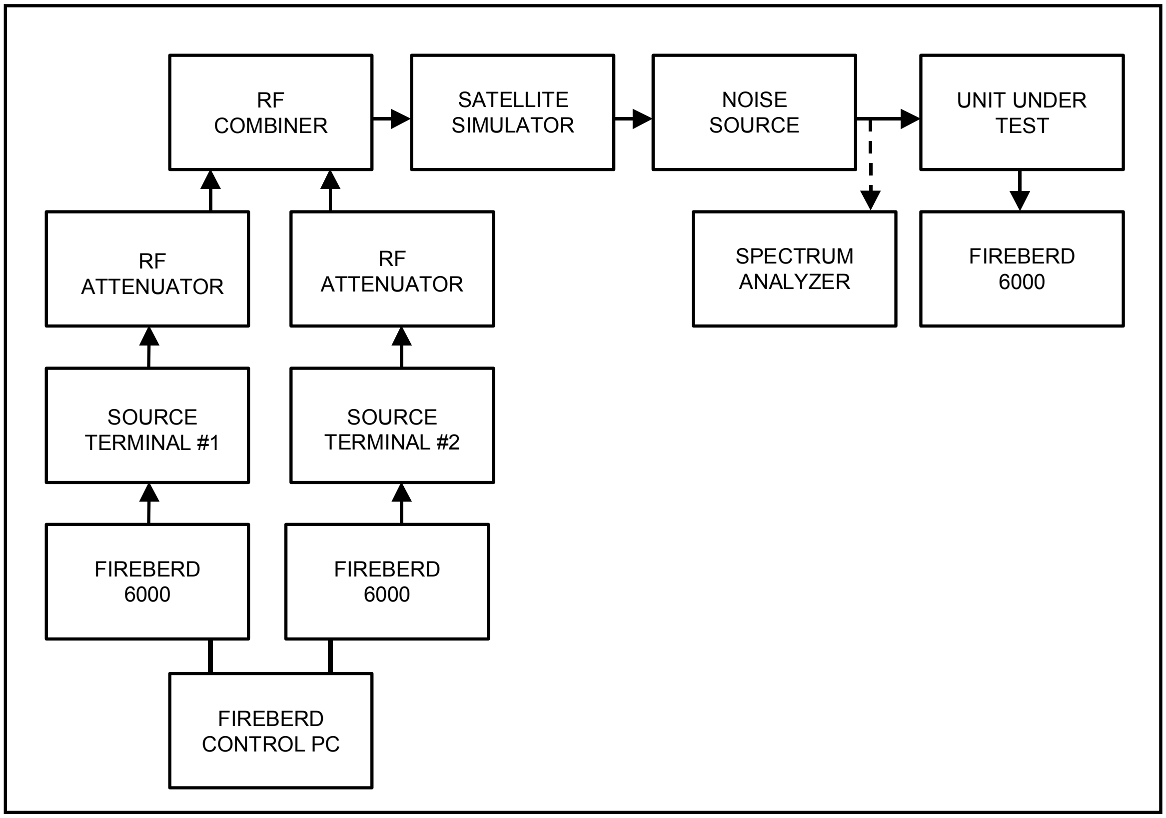

Figure 6. PSK/FSK Alternate Carrier Acquisition Test Configuration

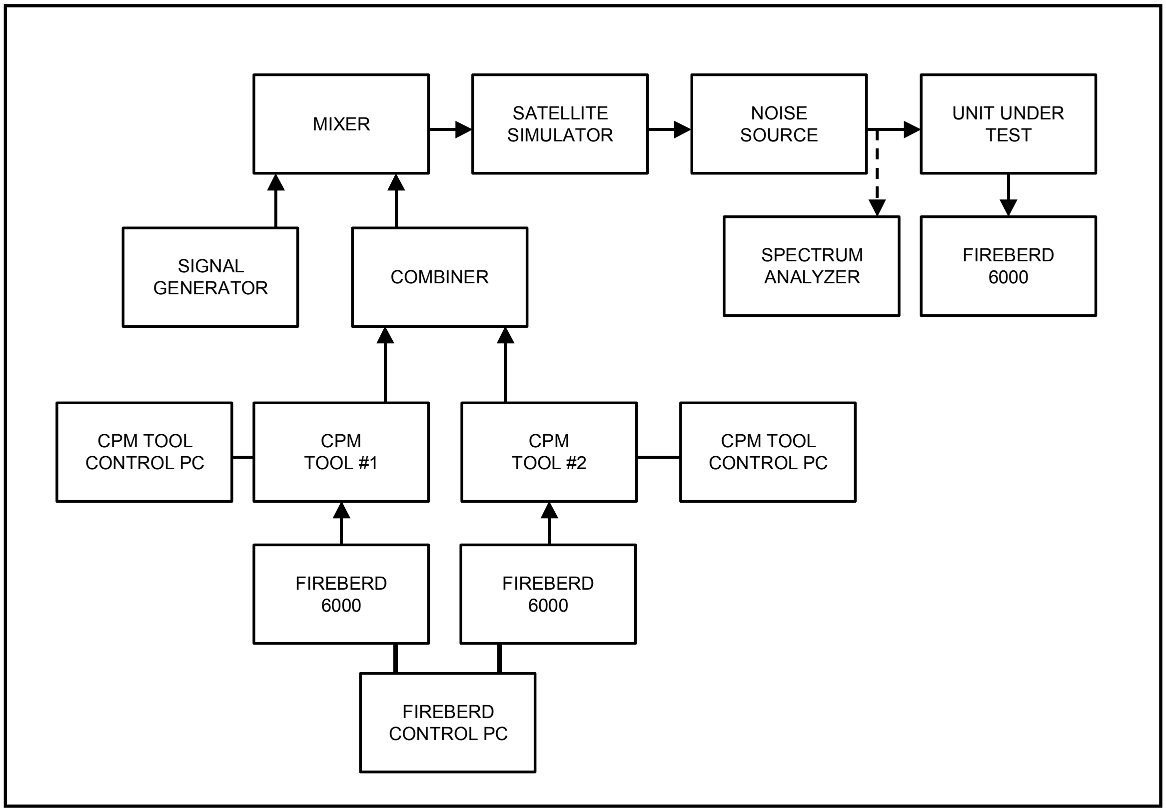

Figure 7. CPM Alternate Carrier Acquisition Test Configuration

b. Data Collection. Data will be collected manually and will be entered on the data sheets provided in Appendix E.

II-3.5 Presentation of Results. Data obtained will be summarized and presented in narrative and tabular format.

II-3.6 Analysis and Discussion. The results will be reviewed against the criteria. When appropriate, additional testing will be performed to assist vendors in troubleshooting problems encountered. Testing will be performed to verify corrections to problems when provided by the vendor. Any failures to meet the criteria and their operational impact to the user will be discussed.

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II-4 ADJACENT CHANNEL EMISSIONS AND SPECTRAL CONTAINMENT

II-4.1 Objective. To determine if the terminal meets the Adjacent Channel Emissions (ACE) and spectral containment requirements of the MIL-STDs.

II-4.2 Criteria. Terminals compliant to MIL-STD-188-181 must meet requirements 3, 4, 13 through 16, 35, and 49 through 52 of Appendix C. Terminals compliant to MIL-STD-188-181A must meet requirements 12 through 15, 60, and 61 of Appendix C. Terminals compliant to MIL-STD-188-181B must meet requirements 12 through 16, 100, and 101 of Appendix C.

II-4.3 Data Requirements

a. Criteria Related Data

(1) ACE measurements

(2) Spectral containment measurements

(3) Calculated maximum Effective Isotropically Radiated Power (EIRP)

b. Supplemental Data

(1) Test configuration diagrams

(2) Software versions tested

c. Data on Problems/Anomalies Encountered. Any problems or anomalies will be recorded and researched to determine why they occurred. When appropriate, corrective action will be initiated and testing will be performed to validate corrective action.

II-4.4 Procedures

a. The equipment will be configured as depicted in Figure 8. Adjacent Channel Emissions and Spectral Containment measurements from the spectrum analyzer will be recorded. Detailed test procedures are contained in Appendix D.

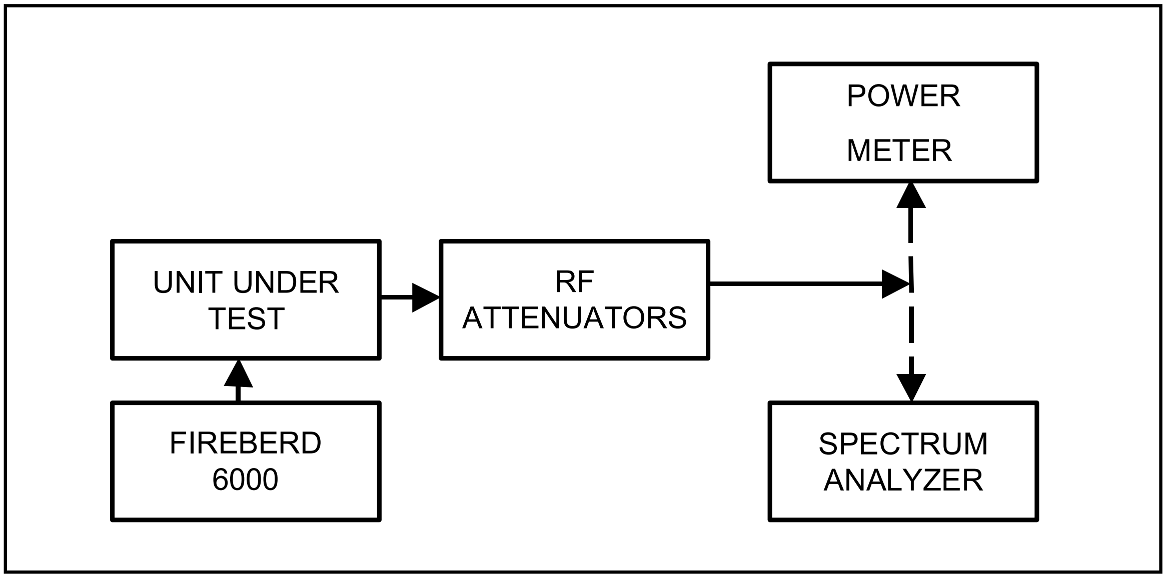

Figure 8. ACE and Spectral Containment Test Configuration

b. Data Collection. Data will be collected manually and will be entered on the data sheets provided in Appendix E.

II-4.5 Presentation of Results. Data obtained will be summarized and presented in narrative and tabular format.

II-4.6 Analysis and Discussion. The results will be reviewed against the criteria. When appropriate, additional testing will be performed to assist vendors in troubleshooting problems encountered. Testing will be performed to verify corrections to problems when provided by the vendor. Any failures to meet the criteria and their operational impact to the user will be discussed.

II-5 ADJACENT CHANNEL INTERFERENCE SUSCEPTIBILITY

II-5.1 Objective. To determine if the terminal meets the Adjacent Channel Interference (ACI) susceptibility requirements of the MIL-STDs.

II-5.2 Criteria. Terminals compliant to MIL-STD-188-181 meet requirements 3, 4, 18, 19, 54 and 55 of Appendix C. Terminals compliant to MIL-STD-188-181A meet requirements 17, 18, 63, and 64 of Appendix C. Terminals compliant to MIL-STD-188-181B must meet requirements 21 and 105 of Appendix C.

II-5.3 Data Requirements

a. Criteria Related Data. BER with ACI present.

b. Supplemental Data

(1) Test configuration diagrams

(2) Software versions tested

c. Data on Problems/Anomalies Encountered. Any problems or anomalies will be recorded and researched to determine why they occurred. When appropriate, corrective action will be initiated and testing will be performed to validate corrective action.

II-5.4 Test Procedure

a. The equipment will be configured as depicted in Figure 9 for PSK modulation, Figure 10 for CPM modulation, or Figure 11 for FSK modulation. BER measurements in the presence of ACI will be recorded. Detailed test procedures are contained in Appendix D.

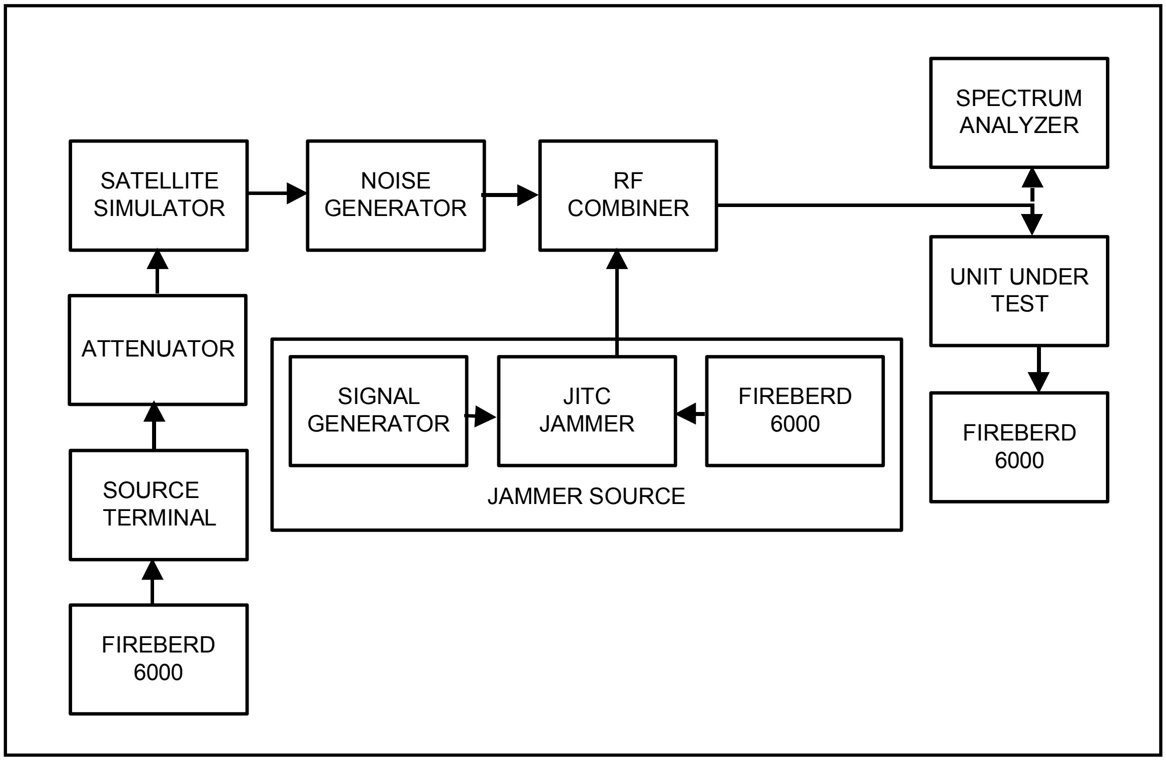

Figure 9. PSK ACI Test Configuration

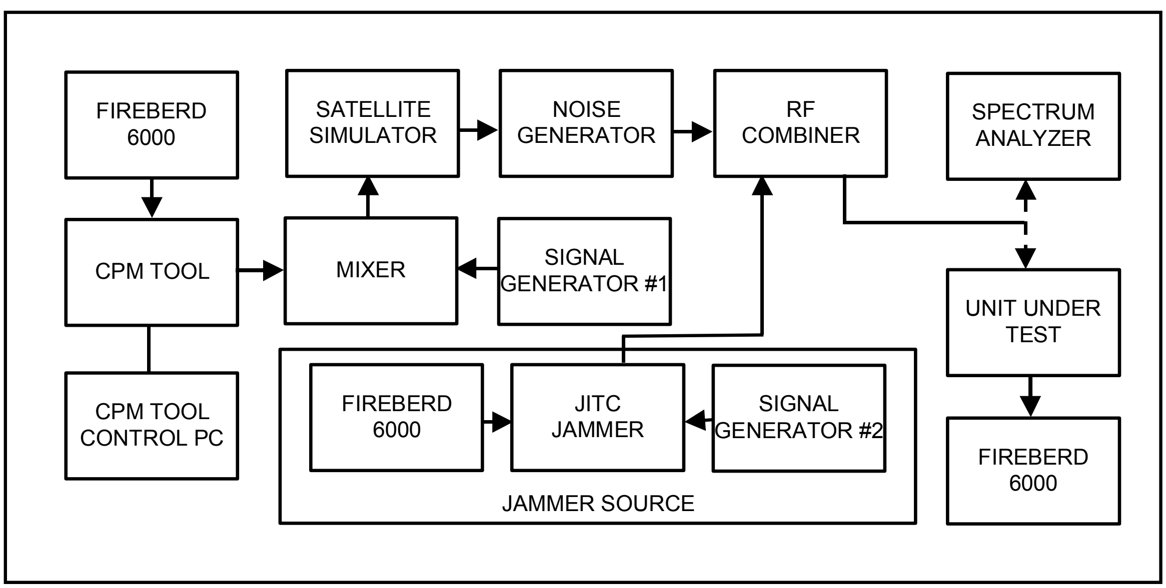

Figure 10. CPM ACI Test Configuration

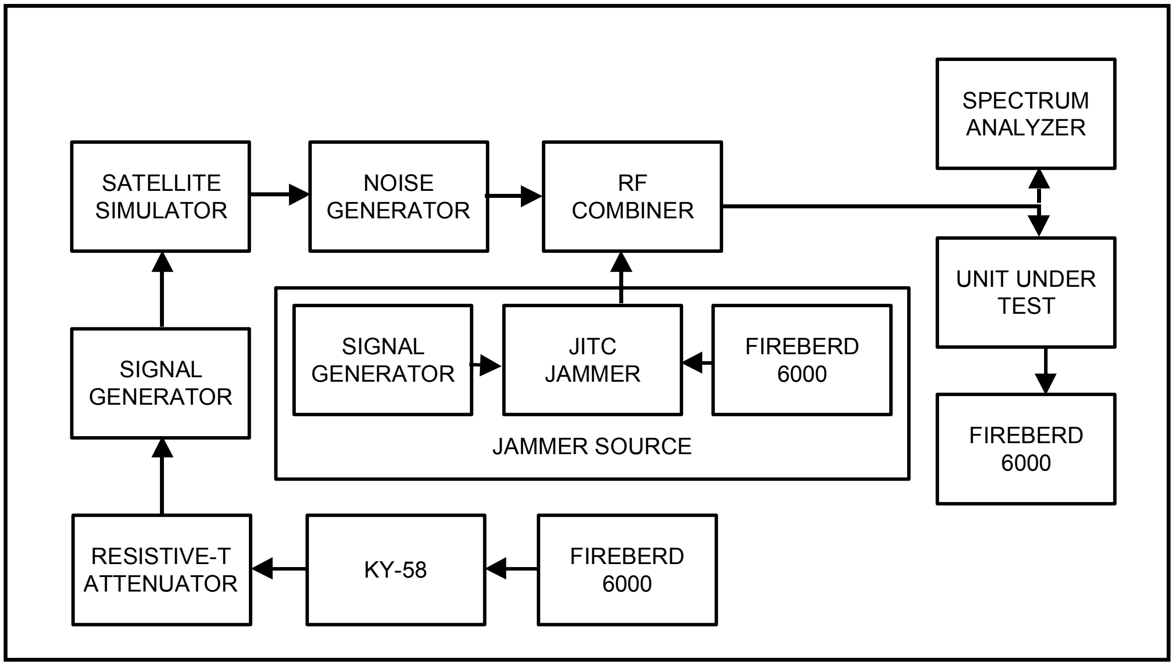

Figure 11. FSK ACI Test Configuration

b. Data Collection. Data will be collected manually and will be entered on the data sheets provided in Appendix E.

II-5.5 Presentation of Results. Data obtained will be summarized and presented in narrative and tabular format.

II-5.6 Analysis and Discussion. The results will be reviewed against the criteria. When appropriate, additional testing will be performed to assist vendors in troubleshooting problems encountered. Testing will be performed to verify corrections to problems when provided by the vendor. Any failures to meet the criteria and their operational impact to the user will be discussed.

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II-6 TRANSMIT TURN-ON, PREAMBLE, START of DATA TIMING SHIFT, and DATA PATTERN

II-6.1 Objective. To determine if the terminal meets the transmit turn-on, preamble, data timing and differential encoding requirements of the MIL-STDs.

II-6.2 Criteria. Terminals compliant to MIL-STD-188-181 must meet requirements 3 through 5, 12, 25, 26, 43, 44, 48, 61, 66 through 68, 80, and 81 of Appendix C. Terminals compliant to MIL-STD-188-181A must meet requirements 3, 11, 27, 28, 45 through 47, 59, 71, 78 through 80, and 93 of Appendix C. Terminals compliant to MIL-STD-188-181B must meet requirements 3, 11, 26 through 37, 54 through 56, 99, 107, 113 through 116, 129, and 137 through 147 of Appendix C.

II-6.3 Data Requirements

a. Criteria Related Data

(1) Transmit turn-on time

(2) Preamble timing

(3) Data timing shift

(4) Data pattern

b. Supplemental Data

(1) Test configuration diagrams

(2) Software versions tested

c. Data on Problems/Anomalies Encountered. Any problems or anomalies will be recorded and researched to determine why they occurred. When appropriate, corrective action will be initiated and testing will be performed to validate corrective action.

II-6.4 Test Procedure

a. The equipment will be configured as depicted in Figure 12. Transmit turn-on time, preamble measurements and data patterns will be recorded. Detailed test procedures are contained in Appendix D.

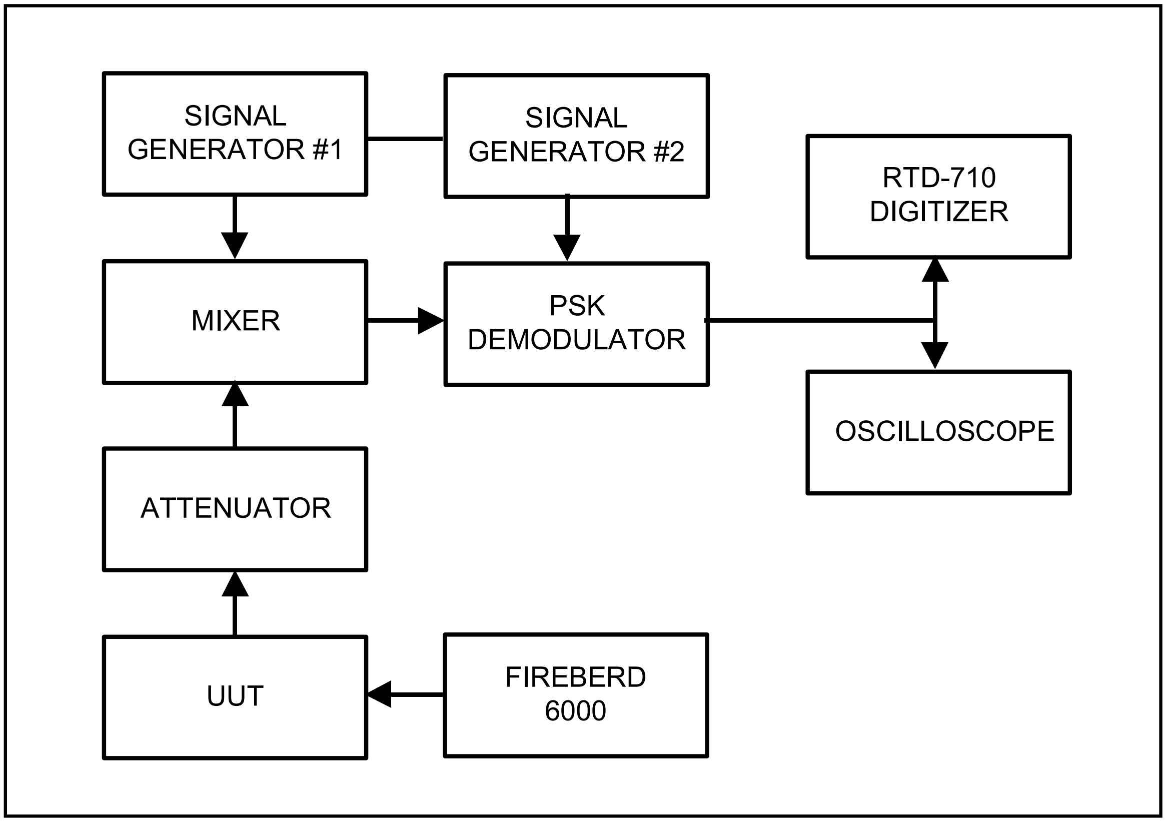

Figure 12. PSK Data Pattern Test Configuration

b. Data Collection. Data will be collected manually and will be entered on the data sheets provided in Appendix E.

II-6.5 Presentation of Results. Data obtained will be summarized and presented in narrative and tabular format.

II-6.6 Analysis and Discussion. The results will be reviewed against the criteria. When appropriate, additional testing will be performed to assist vendors in troubleshooting problems encountered. Testing will be performed to verify corrections to problems when provided by the vendor. Any failures to meet the criteria and their operational impact to the user will be discussed.

II-7 UNSHAPED BPSK INTEROPERABILITY

II-7.1 Objective. To determine if the terminal is interoperable with unshaped BPSK modulation.

II-7.2 Criteria. Terminals compliant to MIL-STD-188-181 must meet requirements 3, 4, 23 and 24 of Appendix C. Terminals compliant to MIL-STD-188-181A must meet requirements 23 and 24 of Appendix C. Terminals compliant to MIL-STD-188-181B must meet requirement 24 of Appendix C.

II-7.3 Data Requirements

a. Criteria Related Data. Terminal synchronizes to unshaped BPSK.

b. Supplemental Data

(1) Test configuration diagrams

(2) Software versions tested

c. Data on Problems/Anomalies Encountered. Any problems or anomalies will be recorded and researched to determine why they occurred. When appropriate, corrective action will be initiated and testing will be performed to validate corrective action.

II-7.4 Test Procedures

a. The equipment will be configured as depicted in Figure 13. Unshaped BPSK will be transmitted to the terminal and data synchronization will be recorded. Detailed test procedures are contained in Appendix D.

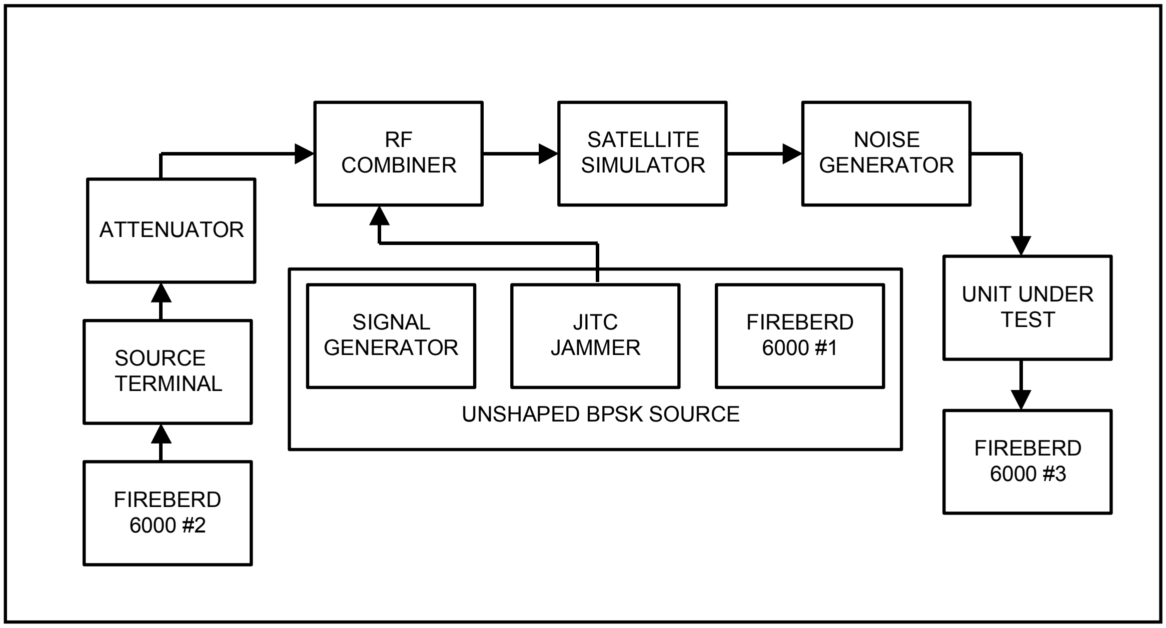

Figure 13. Unshaped BPSK Interoperability Test Configuration

b. Data Collection. Data will be collected manually and will be entered on the data sheets provided in Appendix E.

II-7.5 Presentation of Results. Data obtained will be summarized and presented in narrative and tabular format.

II-7.6 Analysis and Discussion. The results will be reviewed against the criteria. When appropriate, additional testing will be performed to assist vendors in troubleshooting problems encountered. Testing will be performed to verify corrections to problems when provided by the vendor. Any failures to meet the criteria and their operational impact to the user will be discussed.

II-8 DIFFERENTIAL ENCODING, FSK MODULATION AND PHASE NOISE

II-8.1 Objective. To determine if the terminal meets the differential encoding, FSK modulation and phase noise requirements of the MIL-STDs.

II-8.2 Criteria. Terminals compliant to MIL-STD-188-181 must meet requirements 3, 4, 6, 34, 43, 44, 61 through 65, 80, and 81 of Appendix C. Terminals compliant to MIL-STD-188-181A must meet requirements 4, 37, 45 through 47, 71, 72, 74 through 77, and 93 of Appendix C. Terminals compliant to MIL-STD-188-181B must meet requirements 4, 18, 19, 54 through 56, 103, 107 through 112, and 129 of Appendix C.

II-8.3 Data Requirements

a. Criteria Related Data

(1) Tones transmitted when signal is encoded

(2) FSK frequency shift

(3) Phase noise measurements

b. Supplemental Data

(1) Test configuration diagrams

(2) Software versions tested

c. Data on Problems/Anomalies Encountered. Any problems or anomalies will be recorded and researched to determine why they occurred. When appropriate, corrective action will be initiated and testing will be performed to validate corrective action.

II-8.4 Test Procedure

a. The equipment will be configured as depicted in Figure 14. Using the spectrum analyzer, differential encoding tones, the FSK frequency shift, and phase noise measurements will be recorded. Detailed test procedures are contained in Appendix D.

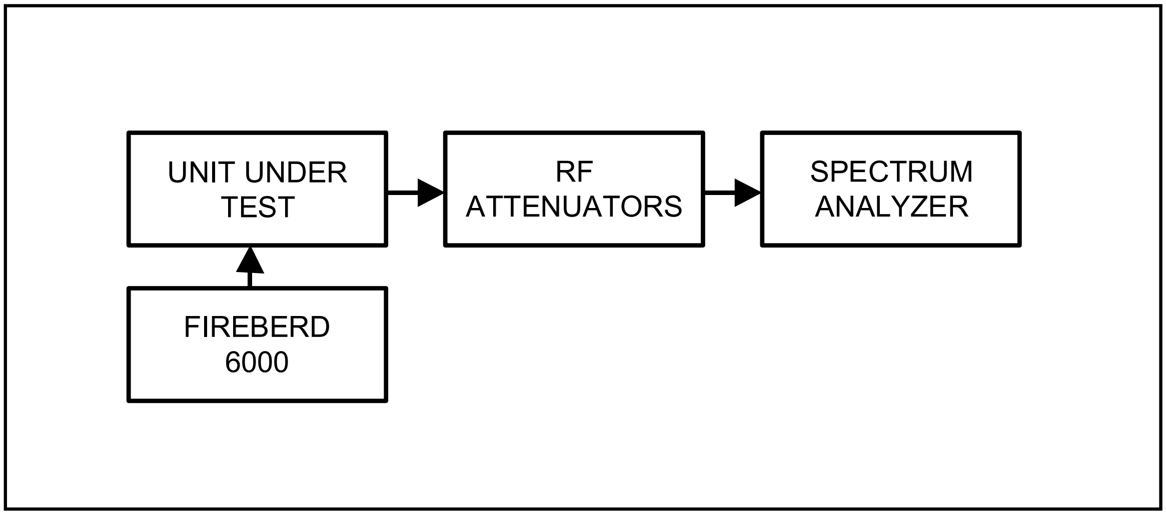

Figure 14. Modulation Test Configuration

b. Data Collection. Data will be collected manually and will be entered on the data sheets provided in Appendix E.

II-8.5 Presentation of Results. Data obtained will be summarized and presented in narrative and tabular format.

II-8.6 Analysis and Discussion. The results will be reviewed against the criteria. When appropriate, additional testing will be performed to assist vendors in troubleshooting problems encountered. Testing will be performed to verify corrections to problems when provided by the vendor. Any failures to meet the criteria and their operational impact to the user will be discussed.

II-9 TRANSMIT AND RECEIVE FREQUENCY TUNING RANGE AND ACCURACY

II-9.1 Objective. To determine if the terminal meets the transmit and receive tuning requirements of the MIL-STDs.

II-9.2 Criteria. Terminals compliant to MIL-STD-188-181 must meet requirements 3, 4, 17, 20, 33, 53, 56, and 74 of Appendix C. Terminals compliant to MIL-STD-188-181A must meet requirements 16, 19, 36, 62, 65, and 87 of Appendix C. Terminals compliant to MIL-STD-188-181B must meet requirements 17, 22, 46, 102, 106, and 123 of Appendix C.

II-9.3 Data Requirements

a. Criteria Related Data

(1) Transmit frequency accuracy

(2) Receive frequency accuracy

b. Supplemental Data

(1) Test configuration diagrams

(2) Software versions tested

c. Data on Problems/Anomalies Encountered. Any problems or anomalies will be recorded and researched to determine why they occurred. When appropriate, corrective action will be initiated and testing will be performed to validate corrective action.

II-9.4 Test Procedure

a. The equipment will be configured as depicted in Figure 15. Transmit and receive frequency accuracy will be recorded. Detailed test procedures are contained in Appendix D.

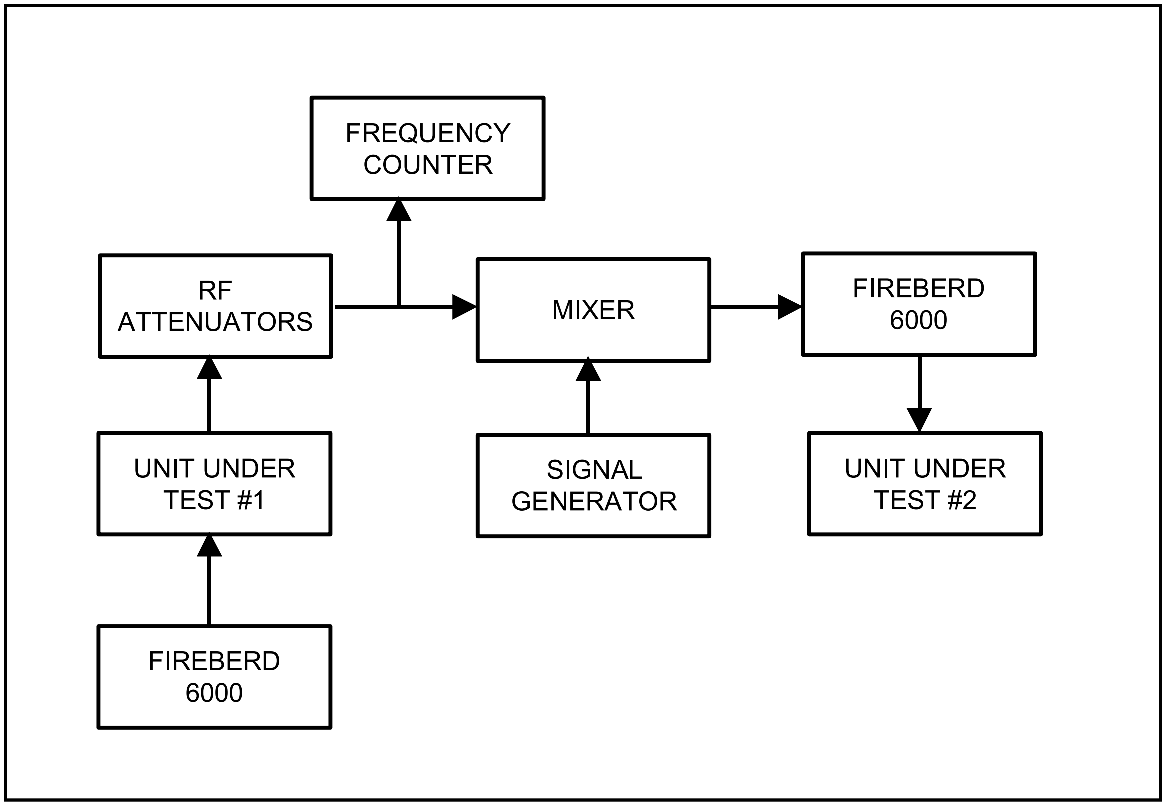

Figure 15. Frequency Accuracy Test Configuration

b. Data Collection. Data will be collected manually and will be entered on the data sheets provided in Appendix E.

II-9.5 Presentation of Results. Data obtained will be summarized and presented in narrative and tabular format.

II-9.6 Analysis and Discussion. The results will be reviewed against the criteria. When appropriate, additional testing will be performed to assist vendors in troubleshooting problems encountered. Testing will be performed to verify corrections to problems when provided by the vendor. Any failures to meet the criteria and their operational impact to the user will be discussed.

II-10 EFFECTIVE ISOTROPIC RADIATED POWER (EIRP) AND EIRP ACCURACY

II-10.1 Objective. To determine if the terminal meets power adjustability and stability requirements of the MIL-STDs.

II-10.2 Criteria. Terminals compliant to MIL-STD-188-181 must meet requirements 3, 4, 9 through 11, and 45 through 47 of Appendix C. Terminals compliant to MIL-STD-188-181A must meet requirements 8 through 10, and 56 through 58 of Appendix C. Terminals compliant to MIL-STD-188-181B must meet requirements 8 through 10, and 96 through 98 or Appendix C.

II-10.3 Data Requirements

a. Criteria Related Data

(1) EIRP accuracy

(2) EIRP adjustability

b. Supplemental Data

(1) Test configuration diagrams

(2) Software versions tested

c. Data on Problems/Anomalies Encountered. Any problems or anomalies will be recorded and researched to determine why they occurred. When appropriate, corrective action will be initiated and testing will be performed to validate corrective action.

II-10.4 Test Procedure

a. The equipment will be configured as depicted in Figure 16. Transmit power adjustability and accuracy will be recorded. Detailed test procedures are contained in Appendix D.

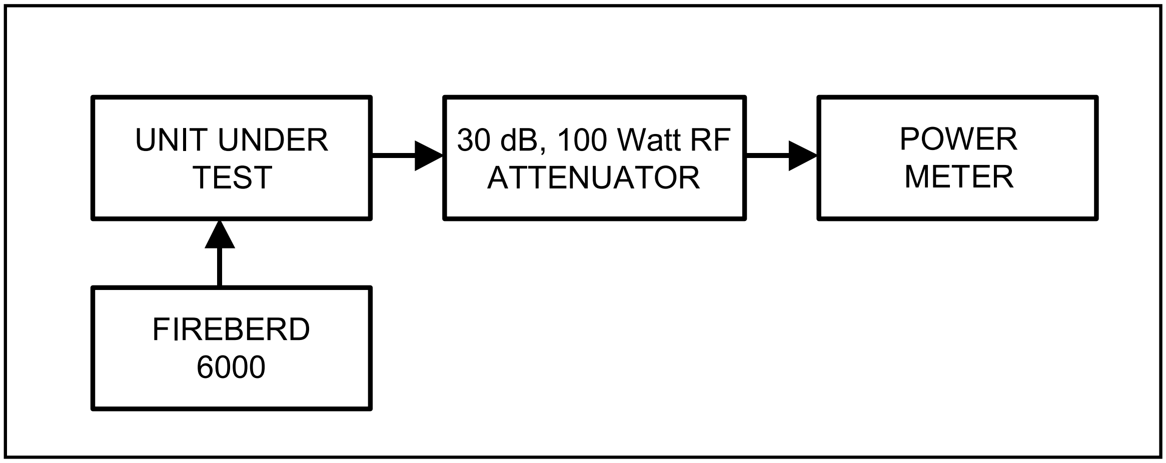

Figure 16. EIRP and EIRP Accuracy Test Configuration

b. Data Collection. Data will be collected manually and will be entered on the data sheets provided in Appendix E.

II-10.5 Presentation of Results. Data obtained will be summarized and presented in narrative and tabular format.

II-10.6 Analysis and Discussion. The results will be reviewed against the criteria. When appropriate, additional testing will be performed to assist vendors in troubleshooting problems encountered. Testing will be performed to verify corrections to problems when provided by the vendor. Any failures to meet the criteria and their operational impact to the user will be discussed.

II-11 COMSEC INTEROPERABILITY AND OVER-THE-AIR DEMONSTRATION

II-11.1 Objective. To determine if the UUT meets the Communications Security (COMSEC) interoperability requirements of the MIL-STDs and to demonstrate over-the-air communications.

II-11.2 Criteria. Terminals compliant to MIL-STD-188-181 must meet requirements 1 through 4, 7, 8, 36 through 42, and 75 through 79 of Appendix C. Terminals compliant to MIL-STD-188-181A must meet requirements 1, 2, 5, 6, 38 through 44, and 88 through 92 of Appendix C. Terminals compliant to MIL-STD-188-181B must meet requirements 1, 2, 5, 6, 47 through 53, and 124 through 128 of Appendix C.

II-11.3 Data Requirements

a. Criteria Related Data

(1) Interoperability with all mandatory COMSEC devices

(2) Interoperability with optional COMSEC devices if implemented

b. Supplemental Data

(1) Test configuration diagrams

(2) Software versions tested

c. Data on Problems/Anomalies Encountered. Any problems or anomalies will be recorded and researched to determine why they occurred. When appropriate, corrective action will be initiated and testing will be performed to validate corrective action.

II-11.4 Test Procedures

a. The equipment will be configured as depicted in Figure 17. Data and voice transmissions will be initiated and interoperability with the terminal will be recorded. Detailed test procedures are contained in Appendix D.

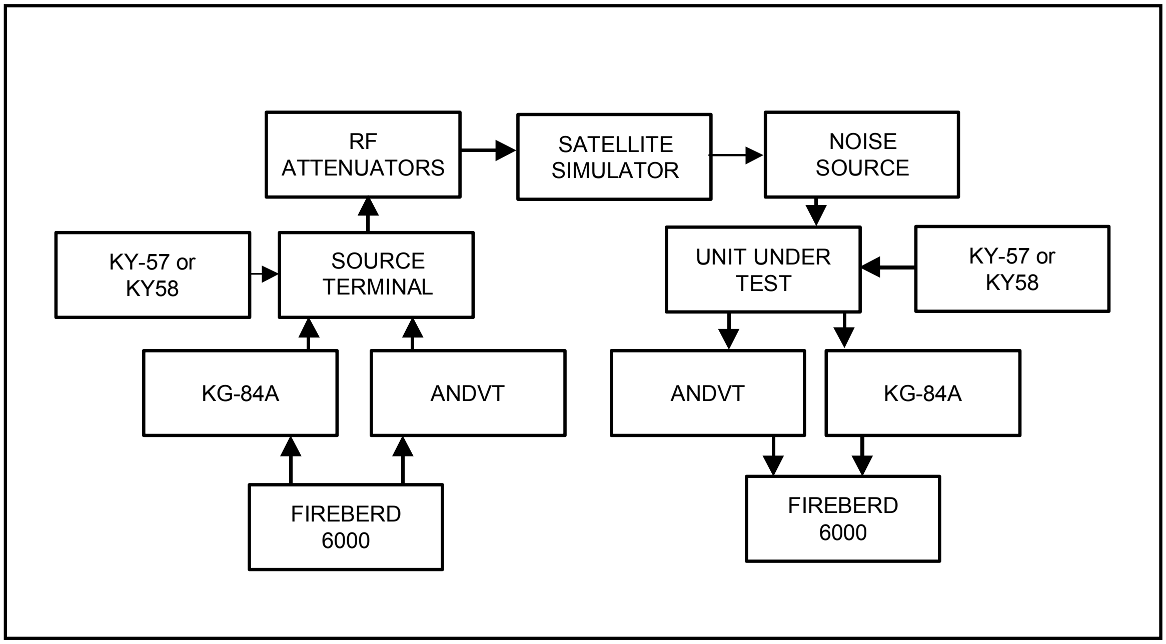

Figure 17. COMSEC Interoperability Test Configuration

b. Data Collection. Data will be collected manually and will be entered on the data sheets provided in Appendix E.

II-11.5 Presentation of Results. Data obtained will be summarized and presented in narrative and tabular format.

II-11.6 Analysis and Discussion. The results will be reviewed against the criteria. When appropriate, additional testing will be performed to assist vendors in troubleshooting problems encountered. Testing will be performed to verify corrections to problems when provided by the vendor. Any failures to meet the criteria and their operational impact to the user will be discussed.

II-12 FORWARD ERROR CORRECTION

II-12.1 Objective. To determine if the terminal meets the requirements of the MIL-STDs for Forward Error Correction (FEC) if it is implemented in the terminal.

II-12.2 Criteria. Terminals compliant to MIL-STD-188-181 have no requirements for this test. Terminals compliant to MIL-STD-188-181A must meet requirements 7, 26, 48 through 55, 73, and 94 of Appendix C. Terminals compliant to MIL-STD-188-181B must meet requirements 7, 57 through 69, 71 through 95, and 130 through 135 of Appendix C.

II-12.3 Data Requirements

a. Criteria Related Data. FEC data pattern.

b. Supplemental Data

(1) Test configuration diagrams

(2) Software versions tested

c. Data on Problems/Anomalies Encountered. Any problems or anomalies will be recorded and researched to determine why they occurred. When appropriate, corrective action will be initiated and testing will be performed to validate corrective action.

II-12.4 Test Procedure

a. The equipment will be configured as depicted in Figure 17. The output pattern of the terminal with FEC implemented will be recorded. Detailed test procedures are contained in Appendix D.

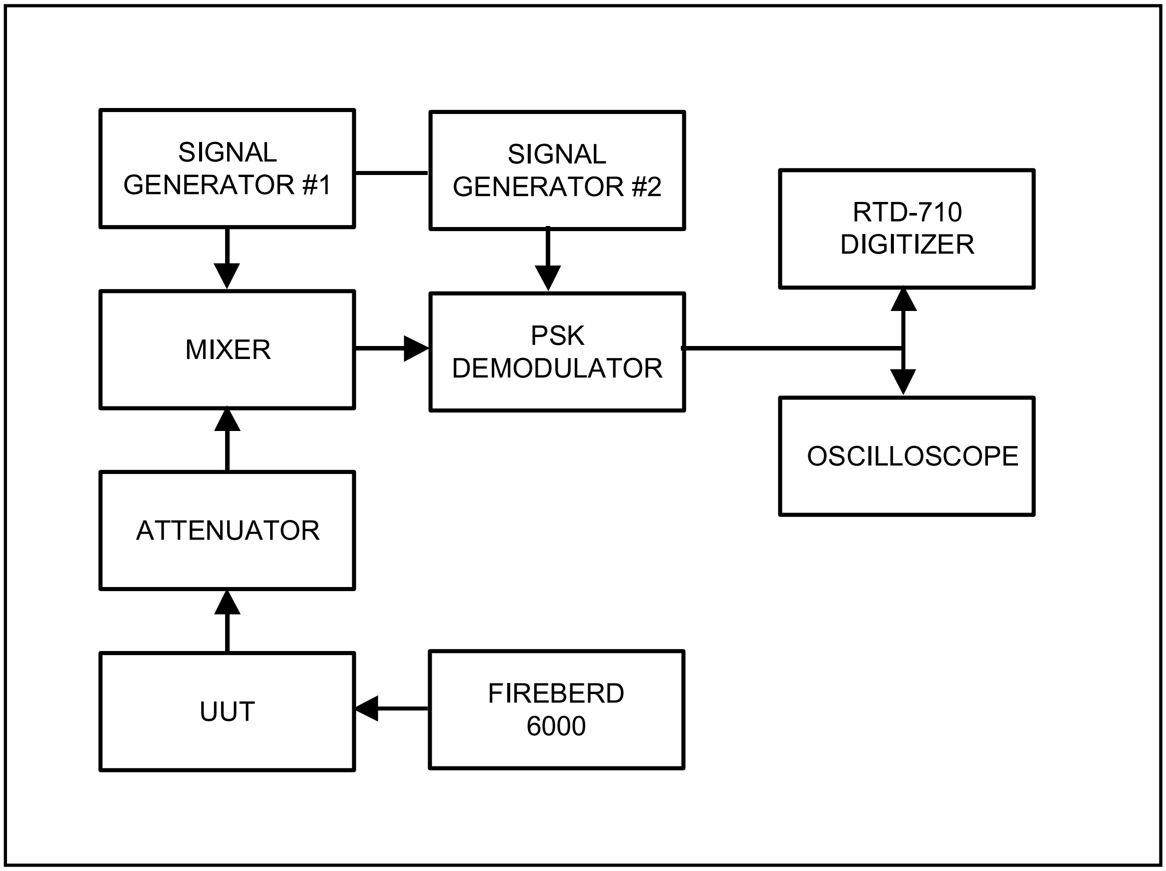

Figure 18. FEC Test Configuration

b. Data Collection. Data will be collected manually and will be entered on the data sheets provided in Appendix E.

II-12.5 Presentation of Results. Data obtained will be summarized and presented in narrative and tabular format.

II-12.6 Analysis and Discussion. The results will be reviewed against the criteria. When appropriate, additional testing will be performed to assist vendors in troubleshooting problems encountered. Testing will be performed to verify corrections to problems when provided by the vendor. Any failures to meet the criteria and their operational impact to the user will be discussed.

APPENDIX A

ABBREVIATIONS AND ACRONYMS

ACE	Adjacent Channel Emissions
ACI	Adjacent Channel Interference
ANDVT	Advanced Narrowband Digital Voice Terminal
BER	Bit Error Ratio, also Bit Error Rate
BERT	Bit Error Rate Tester
BPS, bps	Bits per Second
BPSK	Binary Phase-Shift Keying
CJCSI	Chairman Joint Chiefs of Staff Instruction
C/kT	Carrier-to-noise Power Density
COMSEC	COMmunications SECurity
CPM	Continuous Phase Modulation
CVSD	Continuously Variable Slope Delta
CW, or cw	Continuous Wave
DAMA	Demand Assigned Multiple Access
dB	Decibel(s)
dBm	Decibels Referenced to 1 Milliwatt
dBW	Decibels Referenced to 1 Watt
DC	Double Channel
DOD	Department of Defense
Eb, or E_b	Energy per Bit
Eb/No	Energy-per-bit to Noise-power Spectral-density Ratio
EIRP	Effective Isotropically Radiated Power
EOM	End of Message
FEC	Forward Error Correction
FLTSATCOM	Fleet Satellite Communications
FSK	Frequency-Shift Keying
G/T	Antenna Gain-to-noise Temperature in dB/K
Hz	Hertz
IAW	In Accordance With
I/O	Input/Output
JCS	Joint Chiefs of Staff
JITC	Joint Interoperability Test Command

kbps	Kilobit(s) per Second
kHz	Kilohertz
LEASAT	Leased Satellite
MARISAT	Maritime Satellite
MHz	Megahertz
MIL-STD	Military Standard
ms	Milliseconds
OQPSK	Offset Quadrature Phase-Shift Keying
OTAR	Over The Air Rekeying
PPM	Part(s) per Million
PSK	Phase-Shift Keying
QPSK	Quadrature Phase-Shift Keying
rf	Radio Frequency
RTS	Request to Send
SATCOM	Satellite Communications
SBPSK	Shaped Binary Phase-Shift Keying
S/N	Signal-to-Noise Ratio
SOQPSK	Shaped Offset Quadrature Phase-Shift Keying
STANAG	Standardization Agreement
UHF	Ultrahigh Frequency
μsec	Microsecond
UUT	Unit Under Test

APPENDIX B

TEST RESOURCES/EQUIPMENT DESCRIPTIONS

B-1 TEST SITES AND FACILITIES. This test will be conducted at the JITC, Fort Huachuca, Arizona.

B-2 EQUIPMENT. The following equipment will be utilized for this test. The responsible organization will provide the equipment at the test site as indicated.

Item	**Quantity**	**Responsible Organization**
Satellite Terminal	2	USER
Satellite Simulator	1	JITC
Spectrum Analyzer HP-8591E	1	JITC
Signal Generator	3	JITC
Noise Source	1	JITC
CPM Test Tool	2	JITC
Coaxial Attenuators	4	JITC
Signal Combiners	2	JITC
Signal Splitters	2	JITC
KG-84A	2	JITC
ANDVT	2	JITC
Automatic Data Controllers	2	JITC
FIREBERD 6000	3	JITC
Personal Computers	4	JITC
Antennas	4	JITC

B-3 PERSONNEL. The following minimum personnel will be required to support the test and will be provided by the organization indicated.

Personnel	**Quantity**	**Responsible Organization**
Test Director	1	JITC
Test Conductor	1	JITC
Terminal Operator (As needed)	1	User

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APPENDIX C

MIL-STD-188-181, -181A, -181B REQUIREMENTS MATRIX

181-REQ	181-PARA	181A REQ	181A PARA	181B REQ	181B PARA	REQUIREMENT DESCRIPTION	TEST
1	4.1 (1)	1	4.1 (1)	1	4.1 (1)	Optional capabilities that are implemented shall be ([181] in accordance with this MIL-STD.) ([181A] [181B] as specified in this standard.)	**11**
2	4.1 (2)	2	4.1 (2)	2	4.1 (2)	Interoperable access modes shall be single access on a satellite channel.	**11**
3	4.2.1a	N/A		N/A		Narrowband mode. Operation shall be limited to a 5-kHz bandwidth IAW sections 5.1 through 5.1.8.	**1-11**
4	4.2.1b	N/A		N/A		Wideband mode. Operation shall be limited to a 25-kHz bandwidth IAW sections 5.2 through 5.2.8.	**1-11**
5	4.2.2 (1)	3	4.2.2 (1)	3	4.2.2 (1)	For coherent demodulation ([181] (narrowband mode)), ([181A] (PSK)), ([181B] (PSK or CPM)), the terminal shall transmit a preamble ([181B] (see 5.1.4.1 and 5.2.4.1)) to allow demodulator synchronization before the communications security (COMSEC) preamble is transmitted.	**6**
6	4.2.2 (2)	4	4.2.2 (2)	4	4.2.2 (2)	A preamble shall not be used for FSK modulation in the wideband mode.	**8**
7	4.2.3	5	4.2.3	5	4.2.3	Hardware implementation of the terminals with imbedded COMSEC shall include provisions for future implementation of Over-the-Air Rekeying (OTAR).	**11**
8	4.2.4	6	4.2.4	6	4.2.4	The waveform shall interface with ([181] [181A] Maritime Satellite (MARISAT) (also known as Gapfiller)), ([181] [181A] [181B] Fleet Satellite Communications (FLTSATCOM)), ([181] [181A] Leased Satellite (LEASAT)), and ([181] [181A] [181B] UHF Follow-On (UFO) satellites).	**11**
N/A		7	4.2.5	7	4.2.5	If the terminal implements FEC, it shall be compliant with the FEC requirements of this standard.	**12**
9	5.1.1.1 (1)	8	5.1.1.1 (1)	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.	**10**
10	5.1.1.1 (2)	N/A		N/A		The terminal EIRP shall be incrementally or continuously adjustable from 10 dBW to its maximum with a precision of 1.5 dB or better.	**10**
N/A		9	5.1.1.1 (2)	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.	**10**
11	5.1.1.2	10	5.1.1.2	10	5.1.1.2	The terminal shall maintain EIRP accuracy of ([181] ±1 dB) ([181A] [181B] ±1.5 dB), assuming antenna gain and passive losses are fixed.	**10**
12	5.1.1.3	11	5.1.1.3	11	5.1.1.3	The transmitter turn-on time shall not exceed ([181] 875 μs.) ([181A] [181B] 50 ms.)	**6**
13	5.1.1.4	12	5.1.1.4	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 below (Table II).	**4**
14	5.1.1.4.1 (1)	13	5.1.1.4.1 (1)	13	5.1.1.4.1 (1)	The EIRP (relative to the transmitters total output EIRP) shall not exceed the values specified as "Relative EIRP" in Table II.	**4**

181-REQ	181-PARA	181A REQ	181A PARA	181B REQ	181B PARA	REQUIREMENT DESCRIPTION	TEST
15	5.1.1.4.1 (2)	14	5.1.1.4.1 (2)	14	5.1.1.4.1 (2)	These values shall apply when the transmitter carrier frequency is either unmodulated, or modulated as specified in Table **II**.	**4**
16	5.1.1.4.2	15	5.1.1.4.2	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**.	**4**
N/A		N/A		16	5.1.1.4.2 (2)	These values shall apply when the transmitter carrier frequency is either modulated or unmodulated.	**4**
17	5.1.1.5	16	5.1.1.5	17	5.1.1.5	The transmit frequency shall be tunable in 5-kHz increments over the frequency range of 291.000 to ([181] [181A] 318.000 MHz.) ([181B] 318.300 MHz.)	**9**
N/A		N/A		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.	**8**
N/A		N/A		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.	**8**
18	5.1.2.1 (1)	17	5.1.2.1 (1)	N/A		The terminal shall achieve a bit error ratio (BER) of $1x10^{-5}$ or better at the C/kT specified in Table **III**, when operating in the presence of adjacent channel interference (ACI), ([181A], at 5-kHz offset.)	**5**
N/A		N/A		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**, when it receives an uncoded bandlimited and hardlimited downlink desired signal having the characteristics of a representative 5-kHz UHF SATCOM transponder.	**1**
19	5.1.2.1 (2)	18	5.1.2.1 (2)	N/A		For test conditions, ACI power in the desired channel shall be ([181] 13 dB) ([181A] 15 dB) below the average power of the desired signal, ([181] and shall be 2400-bps random-BPSK-modulated.) ([181A] where the ACI signal is a 2400-bps random bit pattern that is 50-percent SBPSK-modulated.) *(Test parameter)*	**5**
N/A		N/A		21	5.1.2.1b	The BER performance shall not be degraded by more than 1 dB from the numbers in Table **III** 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.	**5**
20	5.1.2.2	19	5.1.2.2	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.	**9**
21	5.1.2.3 (1)	20	5.1.2.3 (1)	N/A		The BER measured at the output of the demodulator, for FEC code rate 1, shall not exceed $1x10^{-5}$ for a data rate of 2400 bps and a $(G/T)/(E_bN_o)$ of -34.7 dB/K (or –42.4 dB/K for aircraft and submarine installations), assuming a sky noise temperature of 200 K and assuming a 0 dB gain antenna for airborne platforms.	**1**
N/A		21	5.1.2.3 (2)	N/A		The required $(G/T)/(E_bN_o)$ for rate 3/4 and 1/2 codes shall be reduced by 3.0 and 4.25 dB, respectively.	**1**
22	5.1.2.3 (2)	22	5.1.2.3 (3)	N/A		When the performance of the independent components are combined analytically the calculated value of the system performance shall meet the requirements of this paragraph.	**1**

181-REQ	181-PARA	181A REQ	181A PARA	181B REQ	181B PARA	REQUIREMENT DESCRIPTION	TEST
N/A		N/A		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.	**No Test**
N/A		N/A		24	5.1.3	Modulation shall be as shown in Table III.	**7**
23	5.1.3 (1)	23	5.1.3 (1)	N/A		For code rate 1, the modulation shall be interoperable with BPSK and 50% SBPSK for data rates of 1.2 and 2.4 kbps, and if implemented, for data rates of 75, 300 and 600 bps.	**7**
24	5.1.3 (2)	24	5.1.3 (2)	N/A		If a 4.8 or ([181] 6.0) ([181A] 6.4) kbps rates is implemented, the modulation shall be interoperable with OQPSK and 50% SOQPSK.	**7**
N/A		25	5.1.3 (3)	25	5.1.3.1 (1)	The phase vector rotation caused by modulation shall not cause a frequency shift in the transmitted data.	**No Test**
N/A		N/A		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 ρ can be any value between 0 and 0.5, provided that requirements for adjacent channel emissions are met.	**6**
N/A		N/A		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.	**6**
N/A		26	5.1.3 (4)	N/A		If FEC coding is implemented, the modulation shall be as defined in Table IV.	**12**
25	5.1.4.1 (1)	27	5.1.4.1 (1)	N/A		The transmitting radio shall generate a preamble in accordance with Figure 1A for BPSK/SBPSK or Figure 1B for OQPSK/SOQPSK, if implemented.	**6**
N/A		N/A		28	5.1.4.1	The transmitting radio shall generate a preamble as specified by 5.1.4.1 and 5.1.4.2.	**6**
N/A		N/A		29	5.1.4.1.1 (1)	The preamble shall be as specified on Figure 2A for BPSK/ SBPSK and Figure 2B for OQPSK/SOQPSK, if applicable.	**6**
26	5.1.4.1 (2)	28	5.1.4.1 (2)	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% of a bit interval.	**6**
N/A		N/A		31	5.1.4.1.2 (1)	The CPM preamble shall be as shown on Figure 2C, and as specified in 5.1.4.1.2.1 to 5.1.4.1.2.3.	**6**
N/A		N/A		32	5.1.4.1.2 (2)	The preamble shall be binary single-h CPM [8/16] modulated and transmitted at the symbol rate.	**6**
N/A		N/A		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.	**6**
N/A		N/A		34	5.1.4.1.2.3 (2)	The following five fill bits shall be all zeros.	**6**
N/A		N/A		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.	**6**
N/A		N/A		36	5.1.4.1.2.4 (2)	The data traffic shall be modulated, coded, and interleaved, as specified in the header.	**6**
N/A		N/A		37	5.1.4.2 (1)	For CPM, the receiver shall determine data rate, modulation parameters, coding, and interleaving from the preamble.	**6**

181-REQ	181-PARA	181A REQ	181A PARA	181B REQ	181B PARA	REQUIREMENT DESCRIPTION	TEST
27	5.1.4.2	29	5.1.4.2	38	5.1.4.2 (2)	([181] [181A] Upon successful acquisition), ([181B] For uncoded PSK), the terminal shall output, as a minimum, all baseband data that immediately follows the preamble bit pattern.	**1**
N/A		N/A		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.	**1**
28	5.1.4.3	30	5.1.4.3	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.	**1**
29	5.1.4.4	N/A		N/A		The probability of achieving acquisition on the first attempt under the conditions of 5.1.4.1, 5.1.4.2, and 5.1.4.3 shall exceed 95%, with a confidence level of 90%.	**1**
N/A		31	5.1.4.4	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%.	**1**
30	5.1.4.5 (1)	N/A		N/A		The UHF terminal shall maintain bit synchronization for at least 10 sec when the $(G/T)/(E_b/N_o)$ is degraded by up to 3 dB from that specified in 5.1.2.3, with a confidence level of 90%.	**1**
31	5.1.4.5 (2)	N/A		N/A		The UHF terminal shall maintain receive timing stability for 1 second ±100 ms following loss of carrier.	**1**
N/A		32	5.1.4.5 (1)	42	5.1.4.5 (1)	The probability of maintaining bit synchronization for at least 10 seconds, when the $(G/T)/(E_b/N_o)$ is degraded by up to 3 dB from that specified in ([181A] 5.1.2.3) ([181B] 5.1.2.1), shall be 95% with a confidence level of 90%.	**1**
N/A		33	5.1.4.5 (2)	43	5.1.4.5 (2)	The terminal shall maintain bit synchronization if the carrier is interrupted (lost and returns within 230 ms).	**2**
N/A		34	5.1.4.5 (3)	44	5.1.4.5 (3)	If, after a 250-millisecond interruption another carrier is received, the terminal shall synchronize to and process the new carrier.	**3**
32	5.1.4.6	35	5.1.4.6	45	5.1.4.6	The terminal shall maintain the frequency of its receive clock output to data terminal equipment within ±1% of the clock frequency for the selected operating data rate under all conditions where bit synchronization can be maintained.	**1, 2, 3**
33	5.1.5 (1)	36	5.1.5 (1)	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.	**9**
34	5.1.5 (2)	37	5.1.5 (2)	N/A		The root-mean-square value of the phase noise shall not exceed 10 degrees over the specified frequency range in a bandwidth of 10 Hz to 15 kHz.	**8**
35	5.1.5 (3)	N/A		N/A		The spectral containment shall be 94% in a 5-kHz bandwidth at 2400 bps.	**4**
36	5.1.6 (1)	38	5.1.6 (1)	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.	**11**
37	5.1.6 (2)	39	5.1.6 (2)	48	5.1.6 (2)	It shall be interoperable with the CV-3591.	**11**
38	5.1.6 (3)	40	5.1.6 (3)	49	5.1.6 (3)	If 4800 bps voice is implemented, the voice digitizer shall comply with requirements of FED-STD-1016.	**11**

181-REQ	181-PARA	181A REQ	181A PARA	181B REQ	181B PARA	REQUIREMENT DESCRIPTION	TEST
39	5.1.7.1a	41	5.1.7.1a	50	5.1.7.1a	The COMSEC voice waveform shall be interoperable with the AN/USC-43 (ANDVT) waveform, used in application 3, IAW MIL-C-28883A, when transmitting and receiving.	**11**
40	5.1.7.1b	42	5.1.7.1b	51	5.1.7.1b	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.	**11**
41	5.1.7.2a	43	5.1.7.2a	52	5.1.7.2a	The COMSEC data waveforms shall be interoperable with the AN/USC-43 (ANDVT) used in application 3, as specified in MIL-C-28883A` when transmitting and receiving.	**11**
42	5.1.7.2b	44	5.1.7.2b	53	5.1.7.2b	The COMSEC waveforms shall be interoperable with the TSEC/KG-84A/C when transmitting and receiving as specified in NSA NO 82-2.	**11**
43	5.1.8 (1)	45	5.1.8 (1)	54	5.1.8 (1)	All baseband data following the preamble bit pattern shall be differentially encoded.	**6, 8**
44	5.1.8 (2)	46	5.1.8 (2)	55	5.1.8 (2)	For BPSK/SBPSK differential encoding shall be as defined.	**6, 8**
N/A		47	5.1.8 (3)	56	5.1.8 (3)	For QPSK/SOQPSK the differential coding shall be as defined.	**6, 8**
N/A		N/A		57	5.1.8.(4)	When optional FEC is used with PSK modulation, the FEC encoding shall precede the differential encoding in the processing of data to be transmitted.	**12**
N/A		48	5.1.9 (1)	58	5.1.9 (1)	If FEC coding is implemented, the terminal shall add a Start-0f-Message (SOM) data field to the preamble shown in Figures 1A or 1B (Figures 2A or 2B for 181B) preceding the baseband transmission.	**12**
N/A		49	5.1.9 (2)	59	5.1.9 (2)	For BPSK/SBPSK, the SOM shall be the 37-bit sequence, 1110001000011000111010011011101100101.	**12**
N/A		50	5.1.9 (3)	60	5.1.9 (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.	**12**
N/A		51	5.1.9 (4)	61	5.1.9 (4)	The SOM shall be transmitted in the order shown with the left-most bit transmitted first.	**12**
N/A		52	5.1.9 (5)	62	5.1.9 (5)	For OQPSK/SOQPSK modulation with FEC coding, the first FEC-encoded user data bit shall be sent on the I channel.	**12**
N/A		53	5.1.9 (6)	63	5.1.9 (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 ([181A] Figure 3.) ([181B] Figure 5.)	**12**
N/A		54	5.1.9 (7)	64	5.1.9 (7)	For rate 3/4 the output of the encoder shall be identical with the output described in ([181A] 5.1.9.2.) ([181B] 5.1.9.1.2.)	**12**
N/A		55	5.1.9.1	65	5.1.9.1.1	The encoder tap connections shall be as shown in ([181A] Figure 3.) ([181B] Figure 5.)	**12**
N/A		N/A		66	5.1.9.2 (1)	If FEC is implemented it shall be a Reed Solomon (RS) code that is derived from a (63,k) RS code.	**12**
N/A		N/A		67	5.1.9.2 (2)	The codes used shall be as defined in Table III and...	**12**
N/A		N/A		68	5.1.9.2 (3)	...shall be derived in accordance with 5.1.9.2.1.	**12**
N/A		N/A		69	5.1.9.2.1	The field generator polynomial shall be, $p(x)=x^6 + x + 1$ m=6.	**12**

181-REQ	181-PARA	181A REQ	181A PARA	181B REQ	181B PARA	REQUIREMENT DESCRIPTION	TEST
N/A		N/A		70	5.1.10	In the presence of a Doppler rate of change of 32 Hz per second, the BER requirements of 5.1.2.1a shall be met with an additional 1 dB allowed to the C/kT numbers in Table III.	**1**
N/A		N/A		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.	**12**
N/A		N/A		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.	**12**
N/A		N/A		73	5.1.11.1 (2)	The information bit stream shall be appended with N zero bits.	**12**
N/A		N/A		74	5.1.11.1 (3)	The value of N shall be between 0 and 47 and...	**12**
N/A		N/A		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.	**12**
N/A		N/A		76	5.1.11.1 (5)	The preamble or SOM bits shall not be counted as part of the input bits.	**12**
N/A		N/A		77	5.1.11.1 (6)	The EOM sequence shall follow the appended zeros.	**12**
N/A		N/A		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.	**12**
N/A		N/A		79	5.1.11.1 (8)	The left-most hexadecimal digit shall be transmitted first.	**12**
N/A		N/A		80	5.1.11.1 (9)	After the EOM sequence is transmitted, the transmitter shall be disabled.	**12**
N/A		N/A		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.	**12**
N/A		N/A		82	5.1.11.2 (2)	The information bit stream shall be appended with N bits of the pattern 1100.	**12**
N/A		N/A		83	5.1.11.2 (3)	The value of N shall be between 0 and 47 and...	**12**
N/A		N/A		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.	**12**
N/A		N/A		85	5.1.11.2 (5)	The preamble, SOM, and header bits shall not be counted as part of the input bits.	**12**
N/A		N/A		86	5.1.11.2 (6)	The EOM sequence shall follow the appended bits.	**12**

181-REQ	181-PARA	181A REQ	181A PARA	181B REQ	181B PARA	REQUIREMENT DESCRIPTION	TEST
N/A		N/A		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.	**12**
N/A		N/A		88	5.1.11.2 (8)	The left-most hexadecimal digit shall be transmitted first.	**12**
N/A		N/A		89	5.1.11.2 (9)	After the EOM sequence is transmitted, the transmitter shall be disabled.	**12**
N/A		N/A		90	5.1.11.3 (1)	For coded CPM the end of message bit sequence shall be generated and transmitted without FEC encoding.	**12**
N/A		N/A		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.	**12**
N/A		N/A		92	5.1.11.3 (3)	The EOM sequence shall follow the last interleaver block.	**12**
N/A		N/A		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.	**12**
N/A		N/A		94	5.1.11.3 (5)	The left-most hexadecimal digit shall be transmitted first.	**12**
N/A		N/A		95	5.1.11.3 (6)	After the EOM sequence is transmitted, the transmitter shall be disabled.	**12**
45	5.2.1.1 (1)	56	5.2.1.1 (1)	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.	**10**
46	5.2.1.1 (2)	N/A		N/A		The terminal EIRP shall be incrementally or continuously adjustable from 10 dBW up to its maximum with a precision of 1.5 dB or better.	**10**
N/A		57	5.2.1.1 (2)	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.	**10**
47	5.2.1.2	58	5.2.1.2	98	5.2.1.2	The terminal shall maintain EIRP accuracy of ([181] ±1 dB) ([181A] [181B] ±1.5 dB), assuming antenna gain and passive losses are fixed.	**10**
48	5.2.1.3	59	5.2.1.3	99	5.2.1.3	Transmitter turn-on time shall not exceed 50 milliseconds.	**6**
49	5.2.1.4 (1)	60	5.2.1.4 (1)	100	5.2.1.4 (1)	For FSK modulation, the total of all emissions outside the 25-kHz channel shall be less than 1% of total transmitted power.	**4**
50	5.2.1.4 (2)	N/A		N/A		For all PSK carrier modulations and bit rates used in a nominal 25-kHz bandwidth channel, with carrier EIRP levels less than +18 dBW, the EIRP (relative to the carrier EIRP) in a 25-kHz band whose center frequency is removed Δf (kHz) from the carrier frequency shall not exceed the values specified as "Relative EIRP" in Table IV.	**4**

181-REQ	181-PARA	181A REQ	181A PARA	181B REQ	181B PARA	REQUIREMENT DESCRIPTION	TEST
N/A		61	5.2.1.4 (2)	N/A		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 for a carrier level less than +18 dBw and Table VIb for a carrier level greater than or equal to +18 dBw.	**4**
N/A		N/A		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 for a carrier level less than +18 dBw and Table VIIb for a carrier level greater than or equal to +18 dBw.	**4**
51	5.2.1.4 (3)	N/A		N/A		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 IV.	**4**
52	5.2.1.4 (4)	N/A		N/A		Data rates higher than 38.4 kbps shall have adjacent channel emissions within the limits of Table IV.	**4**
53	5.2.1.5	62	5.2.1.5	102	5.2.1.5	Transmit frequency shall be tunable in 25-kHz increments over a frequency range of 291.000 to 318.000 MHz. ([181B] 318.300 MHz.)	**9**
N/A		N/A		103	5.2.1.6	Phase noise shall be as specified in 5.1.1.6.	**8**
54	5.2.2.1 (1)	63	5.2.2.1 (1)	N/A		The terminal shall achieve a BER of 1×10^{-5} or better, at the C/kT specified in ([181] Table V) ([181A [181B] Table VII), when operating in the presence of ACI at a 50 kHz offset.	**5**
55	5.2.2.1 (2)	64	5.2.2.1 (2)	N/A		For test conditions, ACI power in the desired channel shall be 20 dB below the average power of the desired signal, and shall be 19.2 kbps ([181] BPSK) ([181A] [181B] SBPSK). *(Test parameter)*	**5**
N/A		N/A		104	5.2.2.1a	The terminal shall achieve a BER of 1×10^{-5} or better at the C/kT specified in Table VIII, when it receives an uncoded (rate 1) bandlimited and hardlimited downlink desired signal having the characteristics of a representative 25-kHz UHF SATCOM transponder.	**1**
N/A		N/A		105	5.2.2.1b	The BER performance shall not be degraded by more than 1 dB from the numbers in Table VIII 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.	**5**
56	5.2.2.2	65	5.2.2.2	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.	**9**
57	5.2.2.3a (1)	66	5.2.2.3a (1)	N/A		The FSK BER measured at the output of the demodulator shall not exceed ([181] 1×10^{-3}) ([181A] 1×10^{-5}) for a data rate of 16 kbps and a $(G/T)/(E_b N_o)$ of ([181] –35 dB/K (or –45 dB/K for aircraft and submarine installations)) ([181A] –37.7 dB/K (or –43 dB/K for aircraft and submarine installations)), assuming a sky noise temperature of 200 K and assuming a 0 dB gain antenna for airborne platforms.	**1**
58	5.2.2.3a (2)	67	5.2.2.3a (2)	N/A		When the performance of the independent components are combined analytically the calculated value of the system performance shall meet the requirements of this paragraph.	**1**

181-REQ	181-PARA	181A REQ	181A PARA	181B REQ	181B PARA	REQUIREMENT DESCRIPTION	TEST
59	5.2.2.3b (1)	68	5.2.2.3b (1)	N/A		The PSK BER measured at the output of the demodulator, ([181A] for FEC rate 1,) shall not exceed 1x10^{-5} for a data rate of 19.2 kbps and a (G/T)/(E_bN_o) of ([181 –27 dB/K (or –33.4 dB/K for aircraft and submarine installations,) ([181A] –34.7 dB/K (or –42.4 dB/K for aircraft and submarine installations)), assuming a sky noise temperature of 200 K and assuming a 0 dB gain antenna for airborne platforms.	**1**
N/A		69	5.2.2.3b (2)	N/A		The required (G/T)/(E_bN_o) for rate 3/4 and 1/2 codes shall be reduced by 3.0 and 4.5 dB respectively.	**1**
60	5.2.2.3b (2)	70	5.2.2.3b (3)	N/A		When the performance of the independent components are combined analytically the calculated value of the system performance shall meet the requirements of this paragraph.	**1**
61	5.2.3 (1)	71	5.2.3 (1)	N/A		Modulation shall be as shown in ([181] Table V.) ([181A] Table VII.)	**6, 8**
N/A		N/A		107	5.2.3	Modulation shall be as shown in Table VIII, and as specified in 5.2.3.1.1 and 5.2.3.1.2.	**6, 8**
62	5.2.3 (2)	72	5.2.3 (2)	108	5.2.3.1	The FSK modulation characteristics shall be as specified in ([181] 5.2.3.1, 5.2.3.2, and 5.2.3.3.) ([181A] 5.2.3.1 and 5.2.3.2.) ([181B] 5.2.3.1.1 and 5.2.3.1.2.)	**8**
N/A		73	5.2.3 (3)	N/A		If FEC coding is implemented, the modulation shall be as defined in Table VIII.	**12**
63	5.2.3.1	N/A		N/A		System shall be interoperable with terminals that have a nominal deviation of ±5.6 kHz at a 16-kbps modulation rate.	**8**
N/A		74	5.2.3.1 (1)	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.	**8**
N/A		75	5.2.3.1 (2)	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 1 and -5.6 ±1.2 kHz for a binary 1.	**8**
64	5.2.3.2	76	5.2.3.2	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.	**8**
65	5.2.3.3	N/A		N/A		The transmitting terminal shall deviate the frequency positive (high) when the data is 0 and negative (low) when the data is 1.	**8**
N/A		77	5.2.3.3	112	5.2.3.2	The phase vector rotation caused by modulation shall not cause a frequency shift in the transmitted data.	**8**
N/A		N/A		113	5.2.3.3	OQPSK and SOQPSK modulation shall be as defined in 5.1.3.1.	**6**
N/A		N/A		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.	**6**
66	5.2.4.1 (1)	N/A		N/A		The transmitting radio shall generate a preamble in accordance with Figure 3 for PSK interoperable rates.	**6**
N/A		78	5.2.4.1 (1)	N/A		The transmitting radio shall generate a preamble as specified on Figure 1A for BPSK/SBPSK or Figure 1B for OQPSK/SOQPSK, if implemented.	**6**
N/A		N/A		115	5.2.4.1	The transmitting radio shall generate a preamble as specified in 5.1.4.1.	**6**
67	5.2.4.1 (2)	79	5.2.4.1 (2)	N/A		Baseband data shall follow the preamble pattern without a shift in data bit timing greater than 25% of a bit interval for PSK.	**6**

181-REQ	181-PARA	181A REQ	181A PARA	181B REQ	181B PARA	REQUIREMENT DESCRIPTION	TEST
68	5.2.4.2	80	5.2.4.2	N/A		Upon successful acquisition, the terminal shall output as a minimum all baseband data that immediately follows the preamble bit pattern.	**6**
N/A		N/A		116	5.2.4.2	The requirements stated in 5.1.4.2 shall apply.	**6**
69	5.2.4.3	81	5.2.4.3	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.	**1**
70	5.2.4.4	82	5.2.4.4	118	5.2.4.4	Probability of achieving acquisition on the first attempt under the conditions of ([181] 5.2.4.1-3) ([181A] [181B] 5.2.4.3) ([181A] [181B] and E_bN_o equal to or higher than the reference E_bN_o) shall exceed 95%, with a confidence level of 90% for PSK.	**1**
71	5.2.4.5 (1)	N/A		N/A		The UHF terminal shall maintain bit synchronization for at least 10 sec when the (G/T)/(Eb/No) is degraded by up to 3 dB from that which is specified in 5.2.2.3, with a confidence level of 90%.	**1**
N/A		83	5.2.4.5 (1)	119	5.2.4.5 (1)	The probability of maintaining bit synchronization for at least 10 sec when the (G/T)/(Eb/No) is degraded by up to 3 dB from that which is specified in 5.2.2.3, shall be 95% with a confidence level of 90%.	**1**
72	5.2.4.5 (2)	N/A		N/A		The UHF terminal shall maintain receive timing for 1 second ±100 ms following loss of carrier.	**2**
N/A		84	5.2.4.5 (2)	120	5.2.4.5 (2)	For PSK (or CPM in 181B) signals the terminal shall maintain bit synchronization if the carrier is interrupted (lost and returns within 230 ms).	**2**
N/A		85	5.2.4.5 (3)	121	5.2.4.5 (3)	For any signal (PSK or FSK) (or CPM in 181B), if, after a 250 ms interruption another carrier is received, the terminal shall synchronize to and process the new carrier.	**3**
73	5.2.4.6	86	5.2.4.6	122	5.2.4.6	The terminal shall maintain the frequency of its receive clock output to data terminal equipment within ±1% of the clock frequency for the selected operating data rate, under all conditions where bit synchronization can be maintained.	**1, 2, 3**
74	5.2.5	87	5.2.5	123	5.2.5	The frequency generation system shall provide long-term plus short-term frequency accuracy within ±1 ppm across the full range of specified environmental conditions.	**9**
75	5.2.6	88	5.2.6	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, ([181A] [181B] as specified in NSA No. CSESD-14.)	**11**
76	5.2.7	89	5.2.7	125	5.2.7	The COMSEC device shall be interoperable with the TSEC/KY-57 and TSEC/KY-58.	**11**
77	5.2.7.1	90	5.2.7.1	126	5.2.7.1	Secure voice at 16-kbps shall be interoperable with techniques used by the VINSON, ([181A] [181B] as specified in NSA NO. CSESD-14.)	**11**
78	5.2.7.2a	91	5.2.7.2a	127	5.2.7.2a	Mandatory: The COMSEC waveforms shall be interoperable with the TSEC/KY-57 and -58 VINSON waveform when transmitting and receiving, ([181A] [181B] as specified in NSA NO. 82-2.)	**11**
79	5.2.7.2b	92	5.2.7.2b	128	5.2.7.2b	Optional. The COMSEC waveforms shall be interoperable with the TSEC/KG-84A/C waveform when transmitting and receiving, ([181A] [181B] as specified in NSA NO. 82-2.)	**11**
80	5.2.8a	93	5.2.8	129	5.2.8	For PSK modulation at all bit rates, all baseband data following the preamble bit pattern shall be differentially encoded ([181A] [181B] as specified in 5.1.8.)	**6, 8**

181-REQ	181-PARA	181A REQ	181A PARA	181B REQ	181B PARA	REQUIREMENT DESCRIPTION	TEST
81	5.2.8b	N/A		N/A		Differential encoding shall be IAW 5.2.8.	**6, 8**
N/A		94	5.2.9	130	5.2.9	FEC coding, if implemented, shall be as defined in 5.1.9.	**12**
N/A		N/A		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.	**12**
N/A		N/A		132	5.2.9.1 (2)	The codes used shall be as defined in Table VIII, and...	**12**
N/A		N/A		133	5.2.9.1 (3)	...shall be derived in accordance with 5.1.9.1.1.	**12**
N/A		N/A		134	5.2.9.1.1	The field generator polynomial shall be, $p(x) = x^7 + x^3 + 1$ m=7.	**12**
N/A		N/A		135	5.2.9.2	Interleaving shall be as defined in 5.1.9.2.4.	**12**
N/A		N/A		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.	**1**
N/A		N/A		137	5.2.11	Postamble shall be as defined in 5.1.11.	**6**
N/A		N/A		138	E.3.1	The terminal shall be interoperable with the specific quaternary full-response multi-h CPM waveform described below.	**6**
N/A		N/A		139	E.3.3 (1)	The first data symbol is transmitted immediately after the preamble and shall use the h_1 modulation index.	**6**
N/A		N/A		140	E.3.3 (2)	Subsequent data symbols shall alternate modulation indices $\{h_1, h_2, h_1, h_2....\}$.	**6**
N/A		N/A		141	E.3.4 (1)	The demodulator shall use the 192 symbols of preamble pattern shown on Figure 2C in order to synchronize to the amplitude, phase and timing of the incoming data burst.	**6**
N/A		N/A		142	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.	**6**
N/A		N/A		143	E.3.4 (3)	Immediately following the six fill bits of the preamble sequence, data and clock shall be sent to the baseband interface.	**6**
N/A		N/A		144	E.3.4 (4)	The first data symbol shall be received immediately after the preamble and...	**6**
N/A		N/A		145	E.3.4 (5)	...shall use the h_1 modulation index.	**6**
N/A		N/A		146	E.3.4 (6)	The next data symbol shall use the h_2 modulation index.	**6**
N/A		N/A		147	E.3.4 (7)	Subsequent data symbols shall alternate modulation indices $\{h_1, h_2, h_1, h_2....\}$.	**6**

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APPENDIX D

DETAILED TEST PROCEDURES

D-1 BIT ERROR PERFORMANCE, CARRIER DEGRADATION, FREQUENCY OFFSET and DOPPLER

1. Configure the equipment as depicted in Figure 1.

2. Set the Unit Under Test (UUT) and the source terminal to the highest available narrowband Phase-Shift Keying (PSK) data rate, tune both to channel 129, and adjust the output power and attenuators of the source terminal to provide approximately –30 dBm input to the satellite simulator. Configure the satellite simulator to the following settings:

Uplink Frequency = 302.445 megahertz (MHz)
Downlink Frequency = 248.845 MHz
Time Delay = 250 ms
Input Attenuation = 35 dB
Signal Attenuation = 10 dB
Noise Attenuation = 63.5 dB
Output Attenuation = 50 dB
Noise Source = OFF
Bandwidth = 5 kHz
Baud Rate = N/A
Downlink Doppler = N/A

3. Disconnect the input to the UUT and connect it to the spectrum analyzer. Turn on the noise source and measure the noise floor level. Use the spectrum analyzer settings listed below and set the noise level to approximately –137 dBm. Record the measured noise level on the Bit Error Test Data sheet found in Appendix E.

Center Frequency = 248.845 MHz
Reference Level = –50 dBm
Attenuation = 0 dB
Span Width = 0 Hz
Resolution Bandwidth = 300 Hz.
Video Bandwidth = 1 Hz
Marker Noise on (References noise to 1 Hz bandwidth)

Table D-1. Desired Carrier Power Level For BER Test

DATA RATE (bps)	PSK Modulation Levels							CPM Levels (181B)	
	CODING RATE 1/2		CODING RATE 3/4		CODING RATE 1				
	181A	181B	181A	181B	181	181A	181B	Coded	Uncoded
75	–110.0	–109.9			–105.7	–105.7	–105.7		
300	–104.0	–103.9			–99.7	–99.7	–99.7		
600	–101.0	–100.9			–96.7	–96.7	–96.7		
1200	–98.0	–97.9			–93.7	–93.7	–93.7		
2400	–94.9	–94.9			–90.7	–90.7	–90.7		
4800			–90.7	–89.4	–87.7	–87.7	–86.4	–94.0	–92.0
6000					–86.6			–92.1	–90.1
6400						–86.4			
7200								–90.8	–89.3
8000								–89.6	–87.8
9600 Narrowband									–86.0
9600 Wideband	–88.9	–88.9		–88.9	–84.7	–82.8	–84.7		–89.3
16000	–86.7	–86.7		–86.7		–80.6	–82.5		
16000 FSK					–79.5	–79.5	–79.5		
19200	–85.9	–85.9				–79.8	–81.7		–86.3
28800								–85.4	–83.4
32000			–82.4		–79.4	–77.5		–84.5	–83.3
38400					–78.7	–76.8		–83.3	–80.7
48000									–79.7
56000									–75.5

4. Turn off the noise source and configure the Bit Error Rate Tester (BERT) connected to the source terminal to output an inverted "mark" signal that will cause the terminal to transmit Continuous Wave (CW). Set the output attenuation of the satellite simulator to 0 dB and change the spectrum analyzer to the settings listed below. Assert the RTS on the source terminal BERT, and using the attenuators in the noise generator, adjust the carrier level, measured at the spectrum analyzer, to the level specified in

Table D-1. Record the measured signal level on the Bit Error Test Data sheet found in Appendix E. Turn off the RTS on the source terminal BERT.

Span Width = 50 kHz
Resolution Bandwidth = Auto
Video Bandwidth = Auto
Marker Noise = Off
Marker = Peak

5. Reconnect the input to the UUT. Configure both the UUT and the source terminal BERTs for an externally supplied clock with a 2047 random bit pattern, turn the Noise Generator "on", and assert the request-to-send (RTS) switch of the source terminal BERT to on. Monitor the UUT BERT until data synchronization is obtained.

Table D-2. BER Testing Criteria

Test Level	Number of Bits $1x10^{-5}$ BER	Maximum # of Allowed Errors	Maximum BER
1	1,199,727	1	$8.33x10^{-7}$
2	2,030,800	6	$2.95x10^{-6}$
3	4,010,748	20	$4.98x10^{-6}$
4	9,022,556	60	$6.65x10^{-6}$
5	25,022,207	200	$7.99x10^{-6}$

Table D-3. BER Test Duration (Seconds)

Test Level	75 bps	300 bps	600 bps	1200 bps	2400 bps	4800 bps
1	15,996	3,999	2,000	1,000	500	250
2	27,077	6,769	3,385	1,692	846	423
3	53,477	13,369	6,685	3,342	1,671	836
4	120,301	30,075	15,038	7,519	3,759	1,880
5	333,629	83,407	41,704	20,852	10,426	5,213
Test Level	**6000 bps**	**6400 bps**	**7200 bps**	**8000 bps**	**9600 bps**	**16000 bps**
1	200	187	167	150	125	75
2	338	317	282	254	212	127
3	668	627	557	501	418	251
4	1,504	1,410	1,253	1,128	940	564
5	4,170	3,910	3,475	3,128	2,606	1,564
Test Level	**19200 bps**	**28800 bps**	**32000 bps**	**38400 bps**	**48000 bps**	**56000 bps**
1	62	42	37	31	25	21
2	106	71	643	53	42	376
3	209	139	125	104	84	72
4	470	313	282	235	188	161
5	1,303	869	782	652	521	447

6. Reset the UUT BERT, monitor the number of bit errors, and compare with Table D-2. If at any level the number of bit errors is less than or equal to the number of errors allowed for that test level at the end of the allotted time, then the test is

completed successfully. Table D-3 provides the allotted time at each test level for all data rates. If the number of bit errors exceed the specified number, then proceed to the next level. If the number of bit errors exceed 200 in 25,022,207 bits transmitted, then the test is not successful.

7. While the test is in progress, record the receive clock frequency from the UUT BERT on the Receive Clock Timing data sheet found in Appendix E. At the conclusion of the test duration, press the display hold on the UUT BERT and then toggle the source terminal BERT RTS switch to off. Record the test level and the number of bit errors where the errors are less than specified in Table D-2 on the Bit Error Test Data sheet found in Appendix E.

8. Assert the RTS switch at the source terminal BERT to on and monitor the UUT BERT. After the UUT acquires data synchronization, decrease the signal by 3 dB using the noise generator attenuator. Monitor the UUT BERT for a period of 441 seconds. The UUT should continue to output data and not lose data synchronization even though the BER may increase. Record whether the UUT maintains data synchronization on the Data Acquisition and Synchronization Data sheet found in Appendix E. While the test is in progress, record the receive clock output from the UUT BERT on the Receive Clock Timing data sheet found in Appendix E.

9. Set the receive signal back to the desired level indicated in Table D-1.

10. Set the downlink Doppler of the Satellite Simulator to "Fixed", the offset to +1.2 kHz, and turn on the downlink Doppler. Assert RTS on the source terminal BERT. If the UUT acquires the signal and outputs data then the signal acquisition was successful. Connect the control computer to the source terminal BERT using the HP buss cable and with the HP Vee program, execute the “Offset.vee” program. Set the BERT at the UUT to monitor clock losses if the terminal outputs clock to the BERT only when receiving data. Under "Error Analysis" on the front screen of the UUT BERT, set to "Alarms" and "Clock Loss". If the terminal outputs a constant clock while in the dedicated mode, set the BERT to monitor data losses. At the end of the test period, the "For Count" counter on the HP Vee and the BERT clock loss or data loss counters should match. If they do not, the difference between the two is the number of missed acquisitions. If the unit fails to acquire on any attempt in the first 89 iterations, then refer to Table D-4 for the number of attempts in the next test level. If the test reaches level 5 of Table D-4 and the number of failed acquisitions is greater than 10, then the test requirement is not met, and the test is terminated. While the test is in progress, record the receive clock output from the UUT BERT on the Receive Clock Timing data sheet found in Appendix E. Record the number of missed acquisitions on the Offset Acquisition Data sheet found in Appendix E.

Table D-4. Test Levels, Data Acquisition with Frequency Offset

Test Level	Test Trials	Maximum Allowed Misses
1	89	1
2	121	2
3	150	3
4	205	5
5	335	10

11. At the satellite simulator, change the Doppler offset to –1.2 kHz and repeat step 10.

Note: MIL-STD-188-181 and MIL-STD-188-181A terminals skip to step 14.

13. At the satellite simulator, set the Doppler to "Profile". Set "Offset 1" to +1.2 kHz and "Offset 2" to –1.2 kHz. Set the "Rate" for both to 32 Hz/sec and the "Dwell" for both to 1 second. Turn on the Doppler. Set the receive signal to the desired level from Table D-6 found in test number D-5. Assert the source terminal BERT RTS to on and observe that the UUT BERT obtains data synchronization. Record the test level and the number of bit errors where the errors are less than specified in Table D-2 on the Bit Error Test Data sheet in Appendix E. While the test is in progress, record the receive clock frequency from the UUT BERT on the Receive Clock Timing data sheet found in Appendix E.

14. Repeat steps 4 through 13 for all remaining narrowband PSK data rates supported by the terminal.

15. Repeat steps 1 through 13 for all wideband PSK data rates supported by the terminal with the following changes:

(a) Step 2. Change the source terminal and UUT to channel 25. Set the satellite simulator Uplink frequency to 299.350 MHz, downlink frequency to 258.350 MHz, and the bandwidth to 25 kHz.

(b) Step 3. Change the spectrum analyzer center frequency to 258.350 MHz.

(c) Step 4. Set the spectrum analyzer span width to 100 kHz.

Note: MIL-STD-188-181 and MIL-STD-188-181A terminals skip to step 20.

16. Configure the equipment as depicted in Figure 2.

17. Set the UUT and the CPM tool to the highest available narrowband CPM data rate, tune the UUT to channel 129, mix the CPM tool 70 MHz output up to 302.445

MHz, and adjust the output power and attenuators to provide approximately -30 dBm input to the satellite simulator. Configure the satellite simulator to the settings in step 2. Configure the noise and carrier levels in accordance with steps 3 and 4. Perform the test measurement according to steps 5 through 14.

Note: Set the carrier level of the CPM Tool by commanding the Modem Function of the CPM Tool to Test Key (MF3) causing CW to be transmitted.

18. Repeat step 17 for all remaining narrowband CPM rates supported by the terminal.

19. Repeat step 17 for all wideband CPM data rates supported by the terminal with the following changes:

(a) Step 2. Change the source terminal and UUT to channel 25. Set the satellite simulator Uplink frequency to 299.350 MHz, downlink frequency to 258.350 MHz, and the bandwidth to 25 kHz.

(b) Step 3. Change the spectrum analyzer center frequency to 258.350 MHz.

(c) Step 4. Set the spectrum analyzer span width to 100 kHz and the center frequency to 258.850 MHz.

20. Configure the equipment as depicted in Figure 3.

21. Configure the test setup using the wideband procedures in step 15.

22. Set the UUT for 16000 bps wideband FSK modulation and tune the UUT to channel 25. Set the source signal generator to the following:

Output frequency = 299.350 MHz
Output level = –30 dBm
Modulation = Ext FM AC Coupled
FM Deviation = 5.6 kHz

23. Set the source KY-58 BERT for an externally supplied clock and a 2047 random bit pattern. Assert RTS in the source signal generator BERT.

24. Adjust the T-attenuator until the modulation indicator on the source signal generator flashes between MOD LO and MOD HI. At this point the signal generator is properly adjusted for 5.6 kHz deviation. Set the RF to OFF on the signal generator.

25. Continue the wideband test procedures in step 15.

D-2 CARRIER DROPOUT

1. Configure the equipment as depicted in Figure 4.

2. Set the UUT and the source terminal to the highest available narrowband PSK data rate, tune both to channel 129, and adjust the output power and attenuators of the source terminal to provide approximately –30 dBm input to the satellite simulator. Configure the satellite simulator to the following settings:

Uplink Frequency = 302.445 MHz
Downlink Frequency = 248.845 MHz
Time Delay = 250 ms
Input Attenuation = 35 dB
Signal Attenuation = 10 dB
Noise Attenuation = 63.5 dB
Output Attenuation = 50 dB
Noise Source = OFF
Bandwidth = 5 kHz
Baud Rate = N/A
Downlink Doppler = N/A

3. Set the HP-83620A signal generator for a manual burst of 1 second[1] for MIL-STD-188-181 terminals or 230 milliseconds for MIL-STD-188-181A and MIL-STD-188-181B terminals. Connect a cable from the Z-axis connector on the rear of the signal generator to the mixer as indicated in figure 4. Set the center frequency to 200 MHz and the Span to 0 Hz. The positive voltage will bias the UHF mixer to an "on" state and allow the receive signal to pass to the UUT. When the signal generator output is in the down state of 0.0 volts, the diodes in the UHF mixer will be in an "off" state and block the receive signal. The "off" state is initiated by the single sweep button on the signal generation and the duration is controlled by the burst setting.

[1]Note: MIL-STD-188-181 terminal timing stability is 1 second ±100 ms.

4. Disconnect the input cable to the UUT and connect it to the spectrum analyzer. Turn on the noise source and measure the noise floor level. Use the spectrum analyzer settings listed below and set the noise level to approximately -137 dBm.

Center Frequency = 248.845 MHz
Reference Level = –50 dBm
Attenuation = 0 dB
Span Width = 0 Hz
Resolution Bandwidth = 300 Hz.
Video Bandwidth = 1 Hz
Marker Frequency = 248.845 MHz
Marker Noise on (References noise to 1 Hz bandwidth)

5. Turn off the noise source and configure the BERT connected to the source terminal to output an inverted "mark" signal that will cause the terminal to transmit CW.

Set the output attenuation of the satellite simulator to 0 dB and change the spectrum analyzer to the settings listed below. Assert the RTS on the source terminal BERT, and using the attenuators in the noise generator, adjust the carrier level, measured at the spectrum analyzer, to the level specified in Table D-1. Turn off the RTS on the source terminal BERT and connect the input cable to the UUT. Configure the BERT to a 2047 pattern.

Span Width = 50 kHz
Resolution Bandwidth = Auto
Video Bandwidth = Auto
Marker Noise = Off
Marker = Peak

6. Assert the source terminal BERT RTS switch to on and monitor the UUT BERT. After the UUT BERT obtains data synchronization, press the single sweep button on the signal generator. Monitor the UUT BERT for any pattern slippage and observe the receive data clock frequency. No pattern slips should occur, and the data clock frequency should vary by no more than 1%. Repeat the test nine times and record any pattern slippage on the Carrier Dropout data sheet located in Appendix E.

7. Repeat steps 4 through 6 for all remaining narrowband PSK data rates supported by the terminal.

8. Repeat steps 1 through 6 for all wideband PSK data rates supported by the terminal with the following changes:

(a) Step 2. Change the source terminal and UUT to channel 25. Set the satellite simulator Uplink frequency to 299.350 MHz, downlink frequency to 258.350 MHz, and the bandwidth to 25 kHz.

(b) Step 3. Change the spectrum analyzer center frequency to 258.350 MHz.

(c) Step 4. Set the spectrum analyzer span width to 100 kHz.

9. Configure the equipment as depicted in Figure 5.

10. Repeat the narrowband and wideband procedures listed in steps 2 through 8 for all CPM data rates supported by the UUT.

Note: Set the carrier level of the CPM Tool by commanding the Modem Function of the CPM Tool to Test Key (MF3) causing CW to be transmitted.

D-3 ALTERNATE CARRIER ACQUISITION

1. Configure the equipment as depicted in Figure 6.

2. Set the UUT and both source terminals to the highest available narrowband PSK data rate, tune all terminals to channel 129, and adjust the output power and attenuators of both source terminals to provide approximately –30 dBm input to the satellite simulator. Configure the satellite simulator to the following settings:

   Uplink Frequency = 302.445 MHz
   Downlink Frequency = 248.845 MHz
   Time Delay = 250 ms
   Input Attenuation = 35 dB
   Signal Attenuation = 10 dB
   Noise Attenuation = 63.5 dB
   Output Attenuation = 50 dB
   Noise Source = OFF
   Bandwidth = 5 kHz
   Baud Rate = N/A
   Downlink Doppler = N/A

3. Disconnect the input to the UUT and connect to the spectrum analyzer. Turn on the noise source and measure the noise floor level. Use the spectrum analyzer settings listed below and set the noise level to approximately –137 dBm.

   Center Frequency = 248.845 MHz
   Reference Level = –50 dBm
   Attenuation = 0 dB
   Span Width = 0 Hz
   Resolution Bandwidth = 300 Hz.
   Video Bandwidth = 1 Hz
   Marker Frequency = 248.845 MHz
   Marker Noise on (References noise to 1 Hz bandwidth)

4. Turn off the noise source and configure the BERT connected to one of the source terminals to output an inverted "mark" signal that will cause the terminal to transmit CW. Set the output attenuation of the satellite simulator to 0 dB and change spectrum analyzer to the settings listed below. Assert the RTS on the source terminal BERT, and using the attenuators in the noise generator, adjust the carrier level, measured at the spectrum analyzer, to the level specified in Table D-1.

   Span Width = 50 kHz
   Resolution Bandwidth = Auto
   Video Bandwidth = Auto
   Marker Noise = Off
   Marker = Peak

5. In the auxiliary menu on the source BERTs, select to option 11 and change the control to "RC=488, Print=None" then go to Option 39 and verify the HPIB

address. Load the HP Vee program on the computer. In the HP Vee program, go to I/O, then Instrument Manager. Change the last two numbers of the address to match the BERT addresses, then click OK. Change the spectrum analyzer to the settings listed below:

Span Width = 0 Hz
Resolution Bandwidth = 1 MHz
Video Bandwidth = 100 Hz
Sweep = 2 seconds
Sweep = Single

6. On the BERT control PC, start HP Vee executing the “250_mil.vee” program. Click on start and when the "Real Input" screen comes up, insert the time required to obtain a 250 ms delay as measured on the spectrum analyzer between the end of the first carrier transmit and the start of the second carrier transmit. Table D-5 contains approximate settings for the data rates.

Table D-5. HP-Vee Start Number.

Data Rate (bps)	Starting Number
300	7.357
600	6.3
1200	6.0
2400	5.65
4800	5.29
6000	5.285
7200	5.276
8000	5.275
9600	5.51
16000	5.3
19200	5.29
28800	5.26
32000	5.26
38400	5.24
48000	5.26
56000	5.25

7. Connect the input to the UUT and run the HP Vee program. Verify that the UUT synchronizes on the second carrier after the loss of the first carrier. Re-run the HP Vee program for five iterations and verify the UUT synchronizes on the second carrier each time. Record the results on the Data Acquisition and Synchronization data sheets found in Appendix E.

8. Repeat steps 2 through 7 for all remaining narrowband PSK data rates supported by the terminal.

9. Repeat steps 2 through 8 for all wideband PSK data rates supported by the terminal with the following changes:

(a) Step 2. Change the source terminal and UUT to channel 25. Set the satellite simulator Uplink frequency to 299.350 MHz, downlink frequency to 258.350 MHz, and the bandwidth to 25 kHz.

(b) Step 3. Change the spectrum analyzer center frequency to 258.350 MHz.

(c) Step 4. Set the spectrum analyzer span width to 100.

10. Configure the equipment as depicted in Figure 7.

11. Repeat the narrowband and wideband procedures listed in steps 2 through 10 for all CPM data rates supported by the UUT.

Note: Set the carrier level of the CPM Tool by commanding the Modem Function of the CPM Tool to Test Key (MF3) causing CW to be transmitted.

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D-4 ADJACENT CHANNEL EMISSIONS AND SPECTRAL CONTAINMENT

1. Configure the equipment as depicted in Figure 8.

2. Configure the UUT to the highest available narrowband PSK data rate, set the transmit frequency to 302.445 MHz and adjust the output power for maximum.

3. Adjust the attenuator setting such that the input signal to the spectrum analyzer will be approximately 0 dBm. Record the UUT power output on the Adjacent Channel Emissions and Spectral Containment data sheets found in Appendix E.

4. Measure and record the combined attenuation of the test set-up coax and the attenuator from the UUT's output port to the spectrum analyzer's input port. Record the combined attenuation on the Adjacent Channel Emissions and Spectral Containment data sheets found in Appendix E.

5. The HP 8591E spectrum analyzer automatically selects a majority of the required settings for these measurements. Use the following spectrum analyzer procedure to perform the High Power Adjacent Channel Emissions measurements:

(a) Select "FREQUENCY", and enter 302.445 MHz.

(b) Select "SPAN", and enter 100 kHz at the spectrum analyzer keypad.

(c) Configure the UUT BERT for an inverted "mark" signal. This will cause the UUT to transmit CW. Adjust the spectrum analyzer "AMPLITUDE" such that the peak of the CW signal is approximately 5 dB below the top scale.

(d) Re-configure the UUT BERT for an externally supplied clock and a 2047 random bit pattern.

(e) Select "SWEEP" and set for Single Sweep.

(f) Select "TRACE" then "MORE" and then set the "PEAK-VIDEO AVERAGE" detector to "PK".

(g) Select "MEAS/USER", then "POWER MENU", and then "ADJ CHAN POWER" to access the adjacent channel power measurement functions.

(h) Select "SETUP" then "CHANNEL BANDWIDTH" and enter 5 kHz from the keypad.

(i) Select "CHANNEL SPACING" and enter the value for channel spacing from the keypad. The initial channel spacing is 5 kHz.

(j) Press RTS on the UUT BERT and then press the SINGLE SWEEP" button on the spectrum. Allow the spectrum analyzer to run for 25 sweeps then press the RTS on the UUT BERT to unkey the radio.

(k) Record the Power dBm, Low dB, and High dB readings from the spectrum analyzer on the Adjacent Channel Emissions and Spectral Containment data sheets found in Appendix E.

(l) Repeat steps 5i through 5k for each channel spacing requirement for data rate being tested.

6. Repeat steps 3 through 5 for all remaining narrowband data rates supported by the terminal. For MIL-STD-188-181 terminals, channel spacing measurements are 5, 10, 15, 20, 25, and 30 kHz. For MIL-STD-188-181A and MIL-STD-188-181B terminals, channel spacing measurements for the PSK waveform are 5, 10, 15 and 20 kHz. For MIL-STD-188-181B terminals with CPM waveform is 10 and 20 kHz.

7. Perform the Low Power Adjacent Channel Emissions measurements by repeating steps 3 through 6. In step three set the terminal output power so that the measurement is >18 dBwi.

8. Transcribe all measurements from the Adjacent Channel Emissions data sheets to the Excell Spreadsheet provided. If the maximum output power of the terminal is <18 dBwi, then transcribe the measurements to both the Low and High power Excell Spreadsheets.

9. Repeat steps 2 through 7 for all wideband data rates with the following changes:

(a) Step 5h. Select "SETUP" then "CHANNEL BANDWIDTH" and enter 25 kHz from the keypad.

(b) Step 5i. Select "CHANNEL SPACING" and enter the value for channel spacing from the keypad. The initial channel spacing is 25 kHz for MIL-STD-188-181 and MIL-STD-188-181A terminals and 50 kHz for MIL-STD-188-181B terminals.

(c) Step 6. Repeat steps 3 through 5 for all remaining wideband data rates supported by the terminal. For MIL-STD-188-181 terminals, channel spacing measurements are 25, 50, 75, 100, 125, 150, 175, and 200 kHz. For MIL-STD-188-181A terminals, channel spacing measurements are 25, 50, 75, 100, and 125 kHz for all waveforms. For MIL-STD-188-181B terminals, channel spacing measurements are 50, 100, and 150 kHz for all waveforms.

10. Configure the UUT to transmit in the FSK mode with a data rate of 16000 bps. Set the transmit frequency to 299.350 MHz and the RF output to maximum.

11. Adjust the attenuator setting such that the input signal to the spectrum analyzer will be approximately 0 dBm.

12. Set the UUT BERT for an externally supplied clock and a 2047 bit pattern.

13. Use the HP 8591E spectrum analyzer to measure the bandwidth for 99% spectral containment. Use the following spectrum analyzer procedure to perform the Spectral Containment measurements

(a) Select "FREQUENCY", and enter 299.350 MHz.

(b) Select "SPAN", and enter 100 kHz at the spectrum analyzer keypad.

(c) Configure the UUT BERT for an inverted "mark" signal. This will cause the UUT to transmit CW. Adjust the spectrum analyzer "AMPLITUDE" such that the peak of the CW signal is approximately 5 dB below the top scale.

(d) Re-configure the UUT BERT for an externally supplied clock and a 2047 random bit pattern.

(e) Select "SWEEP" and set for Single Sweep.

(f) Select "TRACE" then "MORE" and then set the "PEAK-VIDEO AVERAGE" detector to "PK".

(g) Press "MEAS/USER" and "Power Menu" to access the "OCCUPIED BANDWIDTH" function.

(h) Press "SETUP" then "CHANNEL SPACING" and enter 25 kHz at the keypad to set the channel spacing.

(i) Press "PREVIOUS MENU" and "OCC BW % POWER" and enter "99" at the keypad (99 and then the "Hz ΦV Φs ENTER" key).

(j) Press "Previous Menu," and then press "Occupied Bandwidth." Put the UUT in the transmit mode by pressing RTS on the BERT.

(k) Count 25 sweeps. After 25 sweeps, visually note the magnitude of "OBW" on the spectrum analyzer front screen and record.

(l) Record the UUT Occupied Bandwidth Reading on the Adjacent Channel Emissions and Spectral Containment data sheets found in Appendix E.

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D-5 ADJACENT CHANNEL INTERFERENCE SUSCEPTIBILITY

1. Configure the equipment as depicted in Figure 9.

2. Set the UUT and the source terminal to the highest available narrowband PSK data rate, tune both to channel 129, and adjust the output power and attenuators of the source terminal to provide approximately –30 dBm input to the satellite simulator. Configure the satellite simulator to the following:

> Uplink Frequency = 302.445 MHz
> Downlink Frequency = 248.845 MHz
> Time Delay = 250 ms
> Input Attenuation = 35 dB
> Signal Attenuation = 10 dB
> Noise Attenuation = 63.5 dB
> Output Attenuation = 50 dB
> Noise Source = OFF
> Bandwidth = 5 kHz
> Baud Rate = N/A
> Downlink Doppler = N/A

3. Disconnect the input to the UUT and connect to the spectrum analyzer. Turn on the noise source and measure the noise floor level. Set the noise level to approximately –137 dBm. Use the following spectrum analyzer settings:

> Center Frequency = 248.845 MHz
> Reference Level = –50 dBm
> Attenuation = 0 dB
> Span Width = 0 Hz
> Resolution Bandwidth = 300 Hz.
> Video Bandwidth = 1 Hz
> Marker Frequency = 248.845 MHz
> Marker Noise on (References noise to 1 Hz bandwidth)

4. Turn off the noise source and configure the BERT connected to the source terminal to output an inverted "mark" signal that will cause the terminal to transmit CW. Set the output attenuation of the satellite simulator to 0 dB. Using the attenuators in the noise generator, adjust the carrier level, measured at the spectrum analyzer, to the level specified in Table D-6. The spectrum analyzer should be set to:

> Span Width = 50 kHz
> Center Frequency = 248.845 MHz
> Video Bandwidth = Auto
> Resolution Bandwidth = Auto
> Marker Noise = Off
> Marker = Peak

5. Turn off the source terminal BERT and set the jammer BERT to a 2047 pattern and an internal synthesizer clock of 2400 bps. Set the output frequency of the jammer signal generator to 248.850 MHz for testing MIL-STD-188-181 and

MIL-STD-188-181A terminals, or 248.855 for testing MIL-STD-188-181B terminals. Turn on the RF signal at the signal generator connected to the JITC Jammer and perform an ACE measurement on the output (refer to test D-4 for ACE measurements). Adjust the signal generator attenuation until the ACE measurement is 13 dB below the desired carrier level for MIL-STD-188-181 terminals at the 5 kHz offset, 15 dB below the desired carrier level for MIL-STD-188-181A terminals at the 5 kHz offset, or 15 dB below the desired carrier level for MIL-STD-188-181B terminals at the 10 kHz offset.

Table D-6. Desired Carrier Power Level For ACI Test

DATA RATE (bps)	PSK Modulation Levels							CPM Levels (181B)	
	CODING RATE 1/2		CODING RATE 3/4		CODING RATE 1				
	181A	181B	181A	181B	181	181A	181B	Coded	Uncoded
75		–108.7			–104.7	–104.7	–104.7		
300		–102.9			–98.7	–98.7	–98.7		
600		–99.9			–95.7	–95.7	–95.7		
1200		–96.9			–92.7	–92.7	–92.7		
2400		–93.9			–89.7	–89.7	–89.7		
4800				–89.4	–86.7	–85.2	–85.4	–93.0	–91.0
6000					–85.7			–91.1	–89.1
6400						–89.7			
7200								–89.8	–88.3
8000								–88.6	–86.8
9600 Narrowband									–85.0
9600 Wideband		–87.9		–88.9	–83.7	–83.7	–84.7		–89.3
16000		–85.7		–86.7		–81.5	–82.5		
16000 FSK					–78.5	–78.5	–78.5		
19200		–84.9				–80.7	–81.7		–85.3
28800								–84.4	–82.4
32000					–78.5	–78.5		–83.5	–82.3
38400					–77.7	–77.7		–82.3	–79.7
48000									–78.7
56000									–74.5

6. Reconnect the input to the UUT. Configure both the UUT and the source terminal BERTs for an externally supplied clock with a 2047 random bit pattern, turn the Noise Generator "on", and toggle the RTS switch of the source terminal BERT to on. Monitor the UUT BERT until data synchronization is obtained. Turn on the jammer modulation.

7. Reset the UUT BERT and record the number of bit errors for the test level depicted in Table D-2. Refer to Table D-3 for the test duration required for each data rate and test level. If at any test level the number of errors is less than or equal to the maximum number allowed, the test has been successfully completed. If the number of bit errors at level 5 exceeds the maximum allowed, the test criterion has not been met.

8. Repeat steps 4 through 7 for all narrowband PSK data rates supported by the terminal.

9. Perform the ACI tests for all wideband PSK data rates supported by the terminal by repeating steps 2 through 7 with the following changes:

(a) Step 2. Change the source terminal and UUT to channel 25. Set the satellite simulator Uplink frequency to 299.350 MHz, downlink frequency to 258.350 MHz, and the bandwidth to 25 kHz.

(b) Step 4. Set the spectrum analyzer span width to 100 kHz and the center frequency to 258.400 MHz.

(c) Step 5. Set the jammer frequency to 258.400 MHz and the jammer BERT synthesizer to 19200 bps and adjust the jammer level so that the ACE measured in channel 25 is 20 dBm below the desired signal level at the 50 kHz offset.

Note: MIL-STD-188-181 and MIL-STD-188-181A terminals skip to step 14.

10. Configure the equipment as depicted in Figure 10.

11. Set the UUT and the CPM tool to the highest available narrowband CPM data rate, tune the UUT to channel 129, mix the CPM tool 70 MHz output up to 302.445 MHz, and adjust the output power and attenuators to provide approximately -30 dBm input to the satellite simulator. Configure the satellite simulator to the settings in step 2. Configure the noise and carrier levels in accordance with steps 3 and 4. Perform the test measurement according to steps 5 through 7. The following changes apply to the CPM test:

(a) Step 4. Set the carrier level of the CPM Tool commanding the Modem Function (MF3) of the CPM Tool to Test Key causing CW to be transmitted.

(b) Step 5. Adjust the signal generator until the ACE measurement is 20 dB below the desired carrier level at the 10 kHz offset.

12. Repeat step 11 for all remaining narrowband CPM data rates supported by the terminal.

13. Repeat step 11 for all wideband CPM data rates supported by the terminal with the following changes:

(a) Step 1. Change the CPM Tool and UUT to channel 25. Set the satellite simulator Uplink frequency to 299.350 MHz and the downlink frequency to 258.350 MHz and the bandwidth to 25 kHz.

(b) Step 4. Set the spectrum analyzer span width to 100 kHz and the center frequency to 258.400 MHz.

(c) Step 5. Set the jammer frequency to 258.400 MHz and the jammer BERT synthesizer to 19200 bps and adjust the jammer level so that the ACE measured in channel 25 is 20 dBm below the desired signal level at the 50 kHz offset.

14. Configure the equipment as depicted in Figure 11.

15. Set the source signal generator as follows:

Output frequency = 299.350 MHz
Output level = –9 dBm
Modulation = Ext FM AC Coupled
FM Deviation = 5.6 kHz

16. Set the source BERT for an externally supplied clock and a 2047 random bit pattern. The KY-58 generates the data clock.

17. Adjust the T-attenuator until the modulation indicator on the source signal generator flashes between MOD LO and MOD HI. At this point the signal generator is properly adjusted for 5.6 kHz deviation.

18. Perform the wideband ACI tests for FSK at 16000 bps using the procedures in step 9.

D-6 TRANSMIT TURN-ON, PREAMBLE, START of DATA TIMING SHIFT, and DATA PATTERN

1. Configure the equipment as depicted in Figure 12.

2. Configure the UUT to transmit at 1200 bps, differential encoding off. Set the transmit frequency to 304.500 MHz. Configure signal generator #1 to a frequency of 234.500 MHz.

3. Configure the RTD 710A as follows.

(a) CH 1 INPUT
CH 1 = DATA INPUT
VERT MODE = CHANNEL 1
COUPLING = DC
RANGE = 800 MV

(b) CH 2 INPUT
CH 2 = NONE
COUPLING = GND

(c) TRIGGER
TRIGGER SOURCE = EXTERNAL

(d) TIME BASE
SAMPLE INTERVAL = 70 Φsecs (75 bps data) or,
SAMPLE INTERVAL = 3 Φsecs (1200 bps data) or,
SAMPLE INTERVAL = 2 Φsecs (2400 bps data) or,
SAMPLE INTERVAL = 500 nsecs (9600 bps data)

(e) RECORDING
RECORD LENGTH = 262144
RECORD LOCATION = 1
RECORD MODE = NORMAL

(f) CONTROL
DISPLAY LOCATION = 1

4. Use a BNC "T" connector to couple the "Q" output of the PSK detector to both the TEK 465 analog oscilloscope and the RTD 710A. Set signal generator #2 to 70 MHz.

5. Program the BERT for a "USER" bit pattern of "1111 0001 1100 1010".

(a) Select "PROGRAM" on the BERT "DATA" Switch (far left block of selections).

(b) Select "AUXILIARY" on the BERT "MENU" switch (located to right of the number pad).

(c) Depress "FWD" softkey until Number 33 "PATTERN" is displayed in the left hand window.

(d) Using the 1 & 0 key in conjunction with the INSERT & DELETE softkeys, build the desired pattern.

6. Key the BERT and adjust the signal generator connected to the PSK demodulator until the signals are in phase. This will be indicated by a nearly perfect square wave presentation on the oscilloscope display. Arm the RTD 710A, unkey and immediately re-key the BERT again. The RTD 710A will capture the transmit signal from the UUT.

7. Record the transmitter key time.

8. Record the length of the CW burst and the repeating bit pattern.

9. Measure and record the time delay between the end of the repeating bit pattern and the beginning of the BERT user bit pattern.

10. Verify that the user bit pattern is identical to the BERT user bit pattern if the differential coding can be turned off. If the UUT is tested in the differentially encoded mode, either of two output patterns could result. If the initial state of the encoder is 1, the pattern will be "0101 1110 1000 1100." If the initial state is 0, the pattern will be "1010 0001 0111 0011."

11. Repeat steps 13 through 16 with these differences:

    (a) UUT data rate set to 2400 bps.

    (b) The sample interval on the RTD 710A set to 2 Φsecs.

12. Repeat steps 13 through 16 for any optional PSK data rates.

13. For QPSK data rates, (Steps to be determined).

D-7 UNSHAPED BPSK INTEROPERABILITY

1. Configure the equipment as depicted in Figure 13.

2. Configure the UUT to receive at a PSK data rate of 1200 bps and at a frequency of 248.845 MHz (Channel 129). Configure the satellite simulator to the following settings:

Uplink Frequency = 302.445 megahertz (MHz)
Downlink Frequency = 248.845 MHz
Time Delay = 250 ms
Input Attenuation = 35 dB
Signal Attenuation = 10 dB
Noise Attenuation = 63.5 dB
Output Attenuation = 50 dB
Noise Source = OFF
Bandwidth = 5 kHz
Baud Rate = N/A
Downlink Doppler = N/A

3. Disconnect the input to the UUT and connect it to the spectrum analyzer. Turn on the noise source and measure the noise floor level. Use the spectrum analyzer settings listed below and set the noise level to approximately –137 dBm.

Center Frequency = 248.845 MHz
Reference Level = –50 dBm
Attenuation = 0 dB
Span Width = 0 Hz
Resolution Bandwidth = 300 Hz.
Video Bandwidth = 1 Hz
Marker Noise on (References noise to 1 Hz bandwidth)

4. Turn off the noise source and configure the Bit Error Rate Tester (BERT) connected to the source terminal to output an inverted "mark" signal that will cause the terminal to transmit Continuous Wave (CW). Set the output attenuation of the satellite simulator to 0 dB and change the spectrum analyzer to the settings listed below. Assert the RTS on the source terminal BERT, and using the attenuators in the noise generator, adjust the carrier level, measured at the spectrum analyzer, to the level specified in Table D-1. Turn off the RTS on the source terminal BERT.

Span Width = 50 kHz
Resolution Bandwidth = Auto
Video Bandwidth = Auto
Marker Noise = Off
Marker = Peak

5. Set up BERT #1 (and BERT #2 if required) to output a 2047 data pattern.

6. Configure the Signal Generator to output an RF carrier at –30 dBm to the JITC modulator at 302.445 MHz.

7. If the UUT requires a MIL-STD preamble to achieve acquisition, use a MIL-STD compliant SATCOM terminal configured to transmit 1200 bps data on transmit frequency 302.445 (Channel 129) to generate the necessary preamble with BERT #2.

8. Start the data transmission by keying the SATCOM terminal with BERT #2. When BERT #3, connected to the UUT output, acquires synchronization, turn on the Signal Generator RF output and deassert the RTS at BERT #2. This should result in a momentary loss of synchronization by the BERT connected to the UUT but a very quick resynchronization on the unshaped BPSK data originating in the JITC modulator and its associated BERT.

9. Monitor synchronization for a minimum of 125 seconds.

10. Repeat the test for a terminal data rate of 2400 bps.

11. If the UUT does not require a MIL-STD preamble, then start the test data transmission directly from BERT #1.

D-8 DIFFERENTIAL ENCODING, FSK MODULATION AND PHASE NOISE

1. Configure the test equipment as shown in Figure 14.

2. Set the terminal to transmit at a PSK data rate of 1200 bps at a frequency of 306.250 MHz. Set the center frequency of the spectrum analyzer to 306.250 MHz and the frequency span to 100 kHz. Set the RF output of the UUT and adjust the attenuator for approximately a 0 dBm signal at the spectrum analyzer input.

3. Set the BERT for an externally supplied clock and a data pattern of SPACE. Start the test by asserting the BERT RTS.

4. Center the signal on the spectrum analyzer display using the marker function. Reduce the frequency span to 2 kHz, and ensure that the resolution bandwidth (RBW) and the video bandwidth (VBW) are set to 30 Hz.

5. Verify that the transmitted spectrum consists of a CW tone centered at 306.250 MHz.

6. Set the pattern to MARK on the BERT.

7. Using the spectrum analyzer, verify that the transmitted spectrum consists of two sets of 3 tones. One set will be below 306.250 MHz, and one set will be above 306.250 MHz. Refer to the data sheet for the frequency offsets from 306.250 MHz. Use the marker functions to measure the delta frequency between the center frequency and each tone. The "single sweep" function may aid in this measurement. Record the tones measured.

8. Repeat steps 2 through 7 for all BPSK rates supported by the terminal.

9. Set the terminal to transmit in FSK mode with no modulation. Set the UUT transmit frequency to 306.500 MHz and the spectrum analyzer frequency to the same frequency.

10. Set the BERT for an internally supplied 16000 bps clock and a data pattern of 1:7 (under Auxiliary/User Pattern). Turn on the transmission by setting the BERT RTS toggle switch to ON.

11. Verify that the transmitted spectrum is shifted above the transmit frequency.

12. Set the BERT to invert the 1:7 pattern. Turn on the transmission by setting the BERT RTS toggle switch to ON.

13. Verify that the transmitted spectrum is below the transmit frequency.

14. Configure the terminal to transmit at a PSK data rate of 1200 bps. Set the terminal power and adjust the attenuator(s) for a 10 dBm input signal at the spectrum analyzer.

15. Configure the BERT for an externally supplied clock and a data pattern of "SPACE" (inverted MARK). Turn on the transmission by setting the BERT RTS toggle switch to ON.

16. Measure and record the phase noise spectral density over the 10 Hz to 15 kHz carrier offset range with the HP 8560E Spectrum Analyzer. The spectrum analyzer's phase noise utility procedures to be employed for this measurement are:

(a) Press [Frequency], and enter the center frequency of the input signal. Use the spectrum analyzer marker functions to exactly center the frequency.

(b) Press [Amplitude], and adjust the reference level to bring the signal to within 5 to 10 dB of the top of the display.

(c) Press [Module], "User Keys" and "Phase Noise."

(d) Press "Config" to access the configuration menu of softkeys.

(e) Press "Minimum Offset," and set the minimum offset frequency to 10 Hz, then press "Maximum Offset," and set the maximum offset to 100 kHz.

(f) Press "More 1 of 2" (bottom softkey on the spectrum analyzer display).

(g) Press "Smooth Trace" and select "48 PTS 8% AVG."

(h) Press "Main Menu."

(i) Key the RTS line on the BERT.

(j) Press "Measure Log Plot" to activate the measurement. The measurement will take several seconds to complete. The softkey menu will reappear on the right-hand side of the screen when the measurement is complete.

(k) Following measurement, press "More 1 of 2."

(l) Press "RMS Noise," "Number of Points," and select "All Points."

(m) Press "Lower Limits," enter 10 Hz, then press "Upper Limits," and enter 15 kHz.

(n) Press "Execute," and record integrated phase noise value. This will take several seconds to complete.

17. Repeat steps (14) through (16) with a transmit frequency of 304.500 MHz.

18. Repeat steps (14) through (16) with a transmit frequency of 318.000 MHz.

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D-9 TRANSMIT AND RECEIVE FREQUENCY TUNING RANGE AND ACCURACY

1. Configure the equipment as depicted in Figure 15.

Note: Use Vendor provided software for automated testing if available.

2. Configure UUT #1 to transmit in Dedicated SATCOM mode at a PSK data rate of 1200 bps. Configure UUT #2 to receive at a PSK data rate of 1200 bps.

3. Set the BERT for an externally supplied clock and a 2047 data pattern.

4. It must be shown that the UUT is able to tune 5400 5 kHz channels, but it may be impractical to test all 5400 channels individually. A statistical sampling may be done as follows:

(a) Using the data sheets for this test, tune UUT #1 to the first transmit frequency and UUT #2 to the first receive frequency.

(b) Assert RTS at the BERT at UUT #1. Verify the transmit frequency from the frequency counter. Verify that the BERT at UUT #2 synchronizes. Record on the data sheet whether the transmit and receive frequencies are correct.

(c) Repeat step 2 for all frequencies on the data sheet.

(d) If two UUTs are not available for testing, the test will have to be performed in two phases. Test the transmit frequencies using the frequency counter. For the receive frequencies, use the AN/PSC-5 as the source terminal and verify the receive BERT synchronizes.

(e) If any single frequency should prove to be non-tunable, then the requirement is not met. In the re-test effort all 5400 channels between 291 and 319 MHz will be individually tested.

5. Measure the following transmit frequencies to an accuracy of 1 part-per-million and record the result: 291.000, 297.750, 304.500, 311.250, and 318.000 MHz.

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D-10 EFFECTIVE ISOTROPIC RADIATED POWER (EIRP) AND EIRP ACCURACY

1. Configure the test equipment and UUT as shown in Figure 16.

2. Measure and record the system attenuation between the output of the UUT and the input to the power meter. The 30 dB attenuator will provide the conversion factor from dBm to dBw. Subtract 30 dB from the measurement. The system attenuation must be known to ±0.1 dB.

3. Set the terminal transmit frequency to 291.000 MHz. Configure the terminal to transmit at a PSK data rate of 1200 bps.

4. Set the BERT for an externally supplied clock and a data pattern of SPACE (inverted MARK). Set the transmit frequency to 291.000 MHz and the RF output to 10 dBwi using the terminal power output control.

5. Key the transmitter and measure the output with the power meter. This measurement is the actual dBwi reading (measurement –30 dB = dBw). Add the cable calibration from Step 2.

6. Alternately switch the UUT transmitter off/on and increment the frequency in 2 MHz steps from 291.0 to 318.0 MHz. Repeat Step 5 for each frequency setting and record the transmitter power output.

7. If the UUT uses an incremental power adjustment, measure/ correlate power output with the terminal's power conditioning controls over the required range, including the maximum power output setting. If the UUT uses a continuous power adjustment, measure and record power at 10 dBwi and maximum power. Record the power readings.

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D-11 COMSEC INTEROPERABILITY AND OVER THE AIR DEMONSTRATION

1. Configure the source terminal and UUT as depicted in Figure 17. If the UUT embeds COMSEC, external COMSEC must be used at the source terminal. If the UUT does not embed COMSEC, the AN/PSC-5 embedded COMSEC can be used at the source terminal to demonstrate interoperability.

2. Connect the ANDVT or enable ANDVT encryption at both the UUT and the source terminal. Transmit data and voice between the two terminals and record whether the terminals are interoperable.

3. Connect the KY-57 or KY-58 or enable VINSON encryption at both the UUT and the source terminal. Transmit data and voice between the two terminals and record whether the terminals are interoperable.

4. Connect the KG-84A or enable KG-84A encryption at both the UUT and the source terminal. Transmit data and voice between the two terminals and record whether the terminals are interoperable.

5. Satellite resources will not be available to demonstrate operation on all possible channels or on every UHF satellite. The demonstrations are performed over the satellites and satellite channel types (5, 25, or 500 kHz) that are available to the testing agency at the time of the demonstration. The satellite and channels used for the actual demonstration will be listed in the data log.

6. The COMSEC may be embedded in both the UUT and the other terminal used for the test. The other terminal must be either in the Department of Defense inventory or be MIL-STD-188-181 certified. If a 5-kHz channel is available, demonstrate ANDVT and KG-84A operation over the air. If a 25-kHz channel is available, demonstrate KY-57 or KY-58 operation over the air.

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D-12 FORWARD ERROR CORRECTION

1. Configure the equipment as depicted in Figure 18.

2. Configure the UUT to transmit in dedicated SATCOM BPSK mode at 1200 bps, differential encoding off. Set the transmit frequency to 308.050 MHz. Configure the signal generator connected to the mixer to a frequency of 308.120 MHz.

3. Configure the RTD 710A as follows.

   (a) <u>CH 1 INPUT</u>
   CH 1 = DATA INPUT
   VERT MODE = DUAL
   COUPLING = DC
   RANGE = 800 MV

   (b) <u>CH 2 INPUT</u>
   CH 2 = NONE
   COUPLING = GND

   (c) <u>TRIGGER</u>
   TRIGGER SOURCE = EXTERNAL

   (d) <u>TIME BASE</u>
   SAMPLE INTERVAL = 3 Φsecs (1200 bps data) or,
   SAMPLE INTERVAL = 2 Φsecs (2400 bps data) or,
   SAMPLE INTERVAL = 500 nsecs (9600 bps data)

   (e) <u>RECORDING</u>
   RECORD LENGTH = 262144
   RECORD LOCATION = 1
   RECORD MODE = NORMAL

   (f) <u>CONTROL</u>
   DISPLAY LOCATION = 1

4. Use a BNC "T" connector to couple the "Q" output of the PSK detector to both the TEK 465 analog oscilloscope and the RTD 710A. Set the TEK 465 input coupling to DC. Set the signal generator connected to the PSK demodulator to 70 MHz.

5. Program the BERT for a "PROGRAM" bit pattern as follows:

   1111 0001 1100 1010

   (a) Select "PROGRAM" on the BERT "DATA" Switch (far left block of selections).

   (b) Select "AUXILIARY" on the BERT "MENU" switch (located to right of the number pad).

   (c) Depress "FWD" softkey until Number 33 "PATTERN" is displayed in the left hand window.

   (d) Using the 1 & 0 key in conjunction with the INSERT & DELETE softkeys, build the desired pattern.

6. Key the BERT and adjust the signal generator connected to the PSK demodulator until the signals are in phase. This will be indicated by a nearly perfect square wave presentation on the oscilloscope display. Arm the RTD 710A, and immediately key the BERT again. The RTD 710A will capture the transmit signal from the UUT.

7. Verify and record that the SOM pattern following the repeating bit pattern consists of the 37-bit sequence:

1110 0010 0001 0001 1110 1001 1011 1011 0010 1

8. Verify and record that the output user bit pattern matches one of the patterns defined in this paragraph. If the differential coding can be turned off, the 1/2 rate coding output pattern of the terminal will be:

1101 1001 1001 0101, 1101 1000 0100 1010 0011 0100 0101 0101

Note: The pattern will then continue repeating from the fifth to eighth set of bits.

9. If the UUT is tested in the differentially encoded mode, either of two output patterns could result.

For an input pattern of:

0101 1110 1000 1100

The output pattern will be:

0011 1000 1010 0001, 1011 0101 0000 1000 1110 0011 1010

Note: The pattern after the comma will then continue repeating.

For an input pattern of:

1010 0001 0111 0011

The output pattern will be:

1110 0001 1110 1110, 0100 1010 1111 0111 0001 1100 0101 1110

Note: The pattern will then continue repeating from the fifth to eighth set of bits.

10. Repeat steps 6 through 9 for all BPSK/SBPSK data rates supported by the terminal. Record whether the SOM and output data are correct.

11. For OQPSK/SOQPSK, replace the RTD-710 with the CPM test tool. Details of operation of the CPM test tool will be provided once it is received.

12. Configure the UUT to transmit in QPSK mode at 4800 bps, differential encoding off. Set the transmit frequency to 308.050 MHz.

13. Key the BERT. Verify and record that the SOM pattern following the repeating bit pattern consists of the 42-bit sequence:

0000 0101 0001 1100 1010 1001 1000 0010 1110 0100 11

14. (Pattern for 1/2 and 3/4 FEC to be provided. Will be recorded that the patterns match.)

15. Repeat steps for all QPSK data rates supported by the terminal.

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APPENDIX E. DATA COLLECTION SHEETS

E-1 BIT ERROR PERFORMANCE, CARRIER DEGRADATION, FREQUENCY OFFSET and DOPPLER

Bit Error Test Data - Narrowband Data Rates

Data Rate/Waveform	Test Level (From Table D-1)	Number of Observed Errors	
	Measured	Level	Errors
75 bps SBPSK Coded			
75 bps SBPSK			
300 bps SBPSK Coded			
300 bps SBPSK			
600 bps SBPSK Coded			
600 bps SBPSK			
1200 bps SBPSK Coded			
1200 bps SBPSK			
2400 bps SBPSK			
2400 bps SOQPSK Coded			
4800 bps SOQPSK			
4800 bps SOQPSK Coded			
4800 bps CPM			
4800 bps CPM Coded			
6400 bps SOQPSK			
6000 bps CPM Coded			
6000 bps CPM			
7200 bps CPM Coded			
7200 bps CPM			
8000 bps CPM Coded			
8000 bps CPM			
9600 bps CPM			
Noise Level	–137.0		

E-1 BIT ERROR PERFORMANCE, CARRIER DEGRADATION, FREQUENCY OFFSET and DOPPLER (Continued)

Bit Error Test Data - Wideband Data Rates

Data Rate/Waveform	Test Level (From Table D-1)		Number of Observed Errors	
	Measured		Level	Errors
9600 bps SBPSK				
9600 bps SBPSK Coded				
9600 bps CPM				
16000 bps SBPSK				
16000 bps SOQPSK Coded				
16000 bps FSK				
19200 bps SBPSK				
19200 bps SOQPSK Coded				
19200 bps CPM				
28800 bps CPM Coded				
28800 bps CPM				
32000 bps SOQPSK				
32000 bps SOQPSK Coded				
32000 bps CPM Coded				
32000 bps CPM				
38400 bps SOQPSK				
38400 bps CPM Coded				
38400 bps CPM				
48000 bps CPM				
56000 bps CPM				
Noise Level	–137.0			

E-1 BIT ERROR PERFORMANCE, CARRIER DEGRADATION, FREQUENCY OFFSET and DOPPLER (Continued)

Narrowband Offset Acquisition Data Collection

Data Rate (bps)	+1200 Hz Offset			–1200 Hz Offset		
	# Trials	# Misses	Pass Fail	# Trials	# Misses	Pass Fail
75 SBPSK Coded						
75 SBPSK						
300 SBPSK Coded						
300 SBPSK						
600 SBPSK Coded						
600 SBPSK						
1200 SBPSK Coded						
1200 SBPSK						
2400 SBPSK						
2400 SOQPSK Coded						
4800 SOQPSK						
4800 SOQPSK Coded						
4800 CPM						
4800 CPM Coded						
6400 SOQPSK						
6000 CPM						
6000 CPM Coded						
7200 CPM						
7200 CPM Coded						
8000 CPM						
8000 CPM Coded						
9600 CPM						

E-1 BIT ERROR PERFORMANCE, CARRIER DEGRADATION, FREQUENCY OFFSET and DOPPLER (Continued)

Wideband Offset Acquisition Data Collection

Data Rate (bps)	+1200 Hz Offset			–1200 Hz Offset		
	# Trials	# Misses	Pass Fail	# Trials	# Misses	Pass Fail
9600 BPSK						
9600 BPSK Coded						
9600 CPM						
16000 SBPSK						
16000 SOQPSK Coded						
16000 FSK						
19200 SBPSK						
19200 SOQPSK Coded						
19200 CPM						
28800 CPM						
28800 CPM Coded						
32000 SOQPSK						
32000 SOQPSK Coded						
32000 CPM						
32000 CPM Coded						
38400 SOQPSK						
38400 CPM						
38400 CPM Coded						
48000 CPM						
56000 CPM						

E-1 BIT ERROR PERFORMANCE, CARRIER DEGRADATION, FREQUENCY OFFSET and DOPPLER (Continued)

Narrowband Receive Clock Timing

Test Case (bps)	BER	3 dB Signal Degradation	Local Osc +1200 Hz	Local Osc –1200 Hz	32 Hz Doppler	MIL-STD Req (Hz)
75 SBPSK Coded						±.75
75 SBPSK						±.75
300 SBPSK Coded						±3
300 SBPSK						±3
600 SBPSK Coded						±6
600 SBPSK						±6
1200 SBPSK Coded						±12
1200 SBPSK						±12
2400 SBPSK						±24
2400 SOQPSK Coded						±24
4800 SOQPSK						±48
4800 SOQPSK Coded						±48
4800 CPM						±48
4800 CPM Coded						±48
6400 SOQPSK						±64
6000 CPM						±60
6000 CPM Coded						±60
7200 CPM						±72
7200 CPM Coded						±72
8000 CPM						±80
8000 CPM Coded						±80
9600 CPM						±96

E-1 BIT ERROR PERFORMANCE, CARRIER DEGRADATION, FREQUENCY OFFSET and DOPPLER (Continued)

Wideband Receive Clock Timing

Test Case (bps)	BER	3 dB Signal Degradation	Local Osc +1200 Hz	Local Osc –1200 Hz	32 Hz Doppler	MIL-STD Req (Hz)
9600 BPSK						±96
9600 BPSK Coded						±96
9600 CPM						±96
16000 SBPSK						±160
16000 SOQPSK Coded						±160
16000 FSK						±160
19200 SBPSK						±192
19200 SOQPSK Coded						±192
19200 CPM						±192
28800 CPM						±288
28800 CPM Coded						±288
32000 SOQPSK						±320
32000 SOQPSK Coded						±320
32000 CPM						±320
32000 CPM Coded						±320
38400 SOQPSK						±384
38400 CPM						±384
38400 CPM Coded						±384
48000 CPM						±480
56000 CPM						±560

E-1 BIT ERROR PERFORMANCE, CARRIER DEGRADATION, FREQUENCY OFFSET and DOPPLER (Continued)

Data Acquisition and Synchronization

Test Case	75 bps SBPSK Coded	75 bps SBPSK	300 bps SBPSK Coded	300 bps SBPSK	600 bps SBPSK Coded
Achieve and Maintain Acquisition with Local Oscillator +1200 Hz	Yes No	Yes No	Yes No	Yes No	Yes No
Achieve and Maintain Acquisition with Local Oscillator –1200 Hz	Yes No	Yes No	Yes No	Yes No	Yes No
Maintain Acquisition with 3 dB Signal Degradation	Yes No	Yes No	Yes No	Yes No	Yes No
Test Case	**600 bps SBPSK**	**1200 bps SBPSK Coded**	**1200 bps SBPSK**	**2400 bps SBPSK**	**2400 bps SOQPSK Coded**
Achieve and Maintain Acquisition w/Local Osc +1200 Hz	Yes No	Yes No	Yes No	Yes No	Yes No
Achieve and Maintain Acquisition w/Local Osc –1200 Hz	Yes No	Yes No	Yes No	Yes No	Yes No
Maintain Acquisition with 3 dB Signal Degradation	Yes No	Yes No	Yes No	Yes No	Yes No
Test Case	**4800 bps SOQPSK**	**4800 bps SOQPSK Coded**	**4800 bps CPM**	**4800 bps CPM Coded**	**6400 bps S0QPSK**
Achieve and Maintain Acquisition w/Local Osc +1200 Hz	Yes No	Yes No	Yes No	Yes No	Yes No
Achieve and Maintain Acquisition w/Local Osc –1200 Hz	Yes No	Yes No	Yes No	Yes No	Yes No
Maintain Acquisition with 3 dB Signal Degradation	Yes No	Yes No	Yes No	Yes No	Yes No

E-1 BIT ERROR PERFORMANCE, CARRIER DEGRADATION, FREQUENCY OFFSET and DOPPLER (Continued)

Data Acquisition and Synchronization (Continued)

Test Case	6000 bps CPM Coded	6000 bps CPM	7200 bps CPM Coded	7200 bps CPM	8000 bps CPM Coded
Achieve and Maintain Acquisition w/Local Osc +1200 Hz	Yes No	Yes No	Yes No	Yes No	Yes No
Achieve and Maintain Acquisition w/Local Osc –1200 Hz	Yes No	Yes No	Yes No	Yes No	Yes No
Maintain Acquisition with 3 dB Signal Degradation	Yes No	Yes No	Yes No	Yes No	Yes No
Test Case	**8000 bps CPM**	**9600 bps CPM (NB)**	**9600 bps SBPSK**	**9600 bps SBPSK Coded**	**9600 bps CPM (WB)**
Achieve and Maintain Acquisition w/Local Osc +1200 Hz	Yes No	Yes No	Yes No	Yes No	Yes No
Achieve and Maintain Acquisition w/Local Osc –1200 Hz	Yes No	Yes No	Yes No	Yes No	Yes No
Maintain Acquisition with 3 dB Signal Degradation	Yes No	Yes No	Yes No	Yes No	Yes No
Test Case	**16000 bps FSK**	**16000 bps SBPSK**	**16000 bps SOQPSK Coded**	**19200 bps SBPSK**	**19200 bps SOQPSK Coded**
Achieve and Maintain Acquisition w/Local Osc +1200 Hz	Yes No	Yes No	Yes No	Yes No	Yes No
Achieve and Maintain Acquisition w/Local Osc –1200 Hz	Yes No	Yes No	Yes No	Yes No	Yes No
Maintain Acquisition with 3 dB Signal Degradation	Yes No	Yes No	Yes No	Yes No	Yes No

E-1 BIT ERROR PERFORMANCE, CARRIER DEGRADATION, FREQUENCY OFFSET and DOPPLER (Continued)

Data Acquisition and Synchronization (Continued)

Test Case	19200 bps CPM	28800 bps CPM Coded	28800 bps CPM	32000 bps SOQPSK	32000 bps SOQPSK Coded
Achieve and Maintain Acquisition w/Local Osc +1200 Hz	Yes No	Yes No	Yes No	Yes No	Yes No
Achieve and Maintain Acquisition w/Local Osc –1200 Hz	Yes No	Yes No	Yes No	Yes No	Yes No
Maintain Acquisition with 3 dB Signal Degradation	Yes No	Yes No	Yes No	Yes No	Yes No
Test Case	**32000 bps CPM Coded**	**32000 bps CPM**	**38400 bps SOQPSK**	**38400 bps CPM Coded**	**38400 bps CPM**
Achieve and Maintain Acquisition w/Local Osc +1200 Hz	Yes No	Yes No	Yes No	Yes No	Yes No
Achieve and Maintain Acquisition w/Local Osc –1200 Hz	Yes No	Yes No	Yes No	Yes No	Yes No
Maintain Acquisition with 3 dB Signal Degradation	Yes No	Yes No	Yes No	Yes No	Yes No
Test Case	**48000 bps CPM**	**56000 bps CPM**			
Achieve and Maintain Acquisition w/Local Osc +1200 Hz	Yes No	Yes No			
Achieve and Maintain Acquisition w/Local Osc –1200 Hz	Yes No	Yes No			
Maintain Acquisition with 3 dB Signal Degradation	Yes No	Yes No			

E-1 BIT ERROR PERFORMANCE, CARRIER DEGRADATION, FREQUENCY OFFSET and DOPPLER (Continued)

Doppler Bit Error Test Data - Narrowband Data Rates

Data Rate/Waveform	Test Level (From Table D-6)		Number of Observed Errors	
	Measured		Level	Errors
75 bps SBPSK Coded				
75 bps SBPSK				
300 bps SBPSK Coded				
300 bps SBPSK				
600 bps SBPSK Coded				
600 bps SBPSK				
1200 bps SBPSK Coded				
1200 bps SBPSK				
2400 bps SBPSK				
2400 bps SOQPSK Coded				
4800 bps SOQPSK				
4800 bps SOQPSK Coded				
4800 bps CPM				
4800 bps CPM Coded				
6400 bps SOQPSK				
6000 bps CPM Coded				
6000 bps CPM				
7200 bps CPM Coded				
7200 bps CPM				
8000 bps CPM Coded				
8000 bps CPM				
9600 bps CPM				
Noise Level	–137.0			

E-1 BIT ERROR PERFORMANCE, CARRIER DEGRADATION, FREQUENCY OFFSET and DOPPLER (Continued)

Doppler Bit Error Test Data - Wideband Data Rates

Data Rate/Waveform	Test Level (From Table D-6)		Number of Observed Errors	
	Measured		Level	Errors
9600 bps SBPSK				
9600 bps SBPSK Coded				
9600 bps CPM				
16000 bps SBPSK				
16000 bps SOQPSK Coded				
16000 bps FSK				
19200 bps SBPSK				
19200 bps SOQPSK Coded				
19200 bps CPM				
28800 bps CPM Coded				
28800 bps CPM				
32000 bps SOQPSK				
32000 bps SOQPSK Coded				
32000 bps CPM Coded				
32000 bps CPM				
38400 bps SOQPSK				
38400 bps CPM Coded				
38400 bps CPM				
48000 bps CPM				
56000 bps CPM				
Noise Level	–137.0			

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E-2 CARRIER DROPOUT

Test Case	**75 bps SBPSK Coded**	**75 bps SBPSK**	**300 bps SBPSK Coded**	**300 bps SBPSK**	**600 bps SBPSK Coded**
Maintain Acquisition with 230 msec Loss of Carrier	Yes No	Yes No	Yes No	Yes No	Yes No
Test Case	**600 bps SBPSK**	**1200 bps SBPSK Coded**	**1200 bps SBPSK**	**2400 bps SBPSK**	**2400 bps SOQPSK Coded**
Maintain Acquisition with 230 msec Loss of Carrier	Yes No	Yes No	Yes No	Yes No	Yes No
Test Case	**4800 bps SOQPSK**	**4800 bps SOQPSK Coded**	**4800 bps CPM**	**4800bps CPM Coded**	**6400 S0QPSK**
Maintain Acquisition with 230 msec Loss of Carrier	Yes No	Yes No	Yes No	Yes No	Yes No
Test Case	**6000 bps CPM Coded**	**6000 bps CPM**	**7200 bps CPM Coded**	**7200 bps CPM**	**8000 bps CPM**
Maintain Acquisition with 230 msec Loss of Carrier	Yes No	Yes No	Yes No	Yes No	Yes No
Test Case	**8000 bps CPM Coded**	**9600 bps CPM (NB)**	**9600 bps SBPSK**	**9600 bps SBPSK Coded**	**9600 bps CPM (WB)**
Maintain Acquisition with 230 msec Loss of Carrier	Yes No	Yes No	Yes No	Yes No	Yes No
Test Case	**16000 bps FSK**	**16000 bps SBPSK**	**16000 bps SOQPSK Coded**	**19200 bps SBPSK**	**19200 bps SOQPSK Coded**
Maintain Acquisition with 230 msec Loss of Carrier	Yes No	Yes No	Yes No	Yes No	Yes No
Test Case	**19200 bps CPM**	**28800 bps CPM Coded**	**28800 bps CPM**	**32000 bps SOQPSK**	**32000 bps SOQPSK Coded**
Maintain Acquisition with 230 msec Loss of Carrier	Yes No	Yes No	Yes No	Yes No	Yes No
Test Case	**32000 bps CPM Coded**	**32000 bps CPM**	**38400 bps SOQPSK**	**38400 bps CPM Coded**	**38400 bps CPM**
Maintain Acquisition with 230 msec Loss of Carrier	Yes No	Yes No	Yes No	Yes No	Yes No

E-2 CARRIER DROPOUT (Continued)

Test Case	48000 bps CPM	56000 bps CPM
Maintain Acquisition with 230 msec Loss of Carrier	Yes No	Yes No

E-3 ALTERNATE CARRIER ACQUISITION

Data Acquisition and Synchronization Data

Test Case	**75 bps SBPSK Coded**	**75 bps SBPSK**	**300 bps SBPSK Coded**	**300 bps SBPSK**	**600 bps SBPSK Coded**
Synchronize to New Carrier after 250 msec Interruption	Yes No	Yes No	Yes No	Yes No	Yes No
Test Case	**600 bps SBPSK**	**1200 bps SBPSK Coded**	**1200 bps SBPSK**	**2400 bps SBPSK**	**2400 bps SOQPSK Coded**
Synchronize to New Carrier after 250 msec Interruption	Yes No	Yes No	Yes No	Yes No	Yes No
Test Case	**4800 bps SOQPSK**	**4800 bps SOQPSK Coded**	**4800 bps CPM**	**4800bps CPM Coded**	**6400 S0QPSK**
Synchronize to New Carrier after 250 msec Interruption	Yes No	Yes No	Yes No	Yes No	Yes No
Test Case	**6000 bps CPM Coded**	**6000 bps CPM**	**7200 bps CPM Coded**	**7200 bps CPM**	**8000 bps CPM**
Synchronize to New Carrier after 250 msec Interruption	Yes No	Yes No	Yes No	Yes No	Yes No
Test Case	**8000 bps CPM Coded**	**9600 bps CPM (NB)**	**9600 bps SBPSK**	**9600 bps SBPSK Coded**	**9600 bps CPM (WB)**
Synchronize to New Carrier after 250 msec Interruption	Yes No	Yes No	Yes No	Yes No	Yes No
Test Case	**16000 bps FSK**	**16000 bps SBPSK**	**16000 bps SOQPSK Coded**	**19200 bps SBPSK**	**19200 bps SOQPSK Coded**
Synchronize to New Carrier after 250 msec Interruption	Yes No	Yes No	Yes No	Yes No	Yes No
Test Case	**19200 bps CPM**	**28800 bps CPM Coded**	**28800 bps CPM**	**32000 bps SOQPSK**	**32000 bps SOQPSK Coded**
Synchronize to New Carrier after 250 msec Interruption	Yes No	Yes No	Yes No	Yes No	Yes No
Test Case	**32000 bps CPM Coded**	**32000 bps CPM**	**38400 bps SOQPSK**	**38400 bps CPM Coded**	**38400 bps CPM**
Synchronize to New Carrier after 250 msec Interruption	Yes No	Yes No	Yes No	Yes No	Yes No

E-3 ALTERNATE CARRIER ACQUISITION (Continued)

Test Case	48000 bps CPM	56000 bps CPM
Synchronize to New Carrier after 250 msec Interruption	Yes No	Yes No

E-4 ADJACENT CHANNEL EMISSIONS AND SPECTRAL CONTAINMENT

Narrowband ACE Data, EIRP < 18 dBwi

Offset Channel (kHz)	75 bps SBPSK			75 bps SBPSK Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
±5						
±10						
±15						
±20						
±25[1]						
±30[1]						

[1]Note: MIL-STD-188-181 Terminals only.

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

Narrowband ACE Data, EIRP < 18 dBwi

Offset Channel (kHz)	300 bps SBPSK			300 bps SBPSK Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
±5						
±10						
±15						
±20						
±25[1]						
±30[1]						

[1]Note: MIL-STD-188-181 Terminals only.

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

E-4 ADJACENT CHANNEL EMISSIONS AND SPECTRAL CONTAINMENT (Continued)

Narrowband ACE Data, EIRP < 18 dBwi

Offset Channel (kHz)	600 bps SBPSK			600 bps SBPSK Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
±5						
±10						
±15						
±20						
±25[1]						
±30[1]						

[1]Note: MIL-STD-188-181 Terminals only.

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

Narrowband ACE Data, EIRP < 18 dBwi

Offset Channel (kHz)	1200 bps SBPSK			1200 bps SBPSK Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
±5						
±10						
±15						
±20						
±25[1]						
±30[1]						

[1]Note: MIL-STD-188-181 Terminals only.

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

E-4 ADJACENT CHANNEL EMISSIONS AND SPECTRAL CONTAINMENT (Continued)

Narrowband ACE Data, EIRP < 18 dBwi

Offset Channel (kHz)	2400 bps SBPSK			2400 bps SOQPSK Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
±5						
±10						
±15						
±20						
±25[1]						
±30[1]						

[1]Note: MIL-STD-188-181 Terminals only.

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

Narrowband ACE Data, EIRP < 18 dBwi

Offset Channel (kHz)	4800 bps SOQPSK			4800 bps SOQPSK Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
±5						
±10						
±15						
±20						
±25[1]						
±30[1]						

[1]Note: MIL-STD-188-181 Terminals only.

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

E-4 ADJACENT CHANNEL EMISSIONS AND SPECTRAL CONTAINMENT (Continued)

Narrowband ACE Data, EIRP < 18 dBwi

Offset Channel (kHz)	4800 bps CPM			4800 bps CPM Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
±10						
±20						

Supplemental Data

UUT Power Output: ________ dBm
System Attenuation: ________ dB
Total Power Out: ________ dBm
Radiated Power Out: ________ dBwi

UUT Power Output: ________ dBm
System Attenuation: ________ dB
Total Power Out: ________ dBm
Radiated Power Out: ________ dBwi

Narrowband ACE Data, EIRP < 18 dBwi

Offset Channel (kHz)	6000 bps CPM			6000 bps CPM Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
±10						
±20						

Supplemental Data

UUT Power Output: ________ dBm
System Attenuation: ________ dB
Total Power Out: ________ dBm
Radiated Power Out: ________ dBwi

UUT Power Output: ________ dBm
System Attenuation: ________ dB
Total Power Out: ________ dBm
Radiated Power Out: ________ dBwi

E-4 ADJACENT CHANNEL EMISSIONS AND SPECTRAL CONTAINMENT (Continued)

Narrowband ACE Data, EIRP < 18 dBwi

Offset Channel (kHz)	6400 bps SOQPSK		
	Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband
±5			
±10			
±15			
±20			

Supplemental Data

UUT Power Output: ________ dBm
System Attenuation: ________ dB
Total Power Out: ________ dBm
Radiated Power Out: ________ dBwi

Narrowband ACE Data, EIRP < 18 dBwi

Offset Channel (kHz)	7200 bps CPM			7200 bps CPM Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
±10						
±20						

Supplemental Data

UUT Power Output: ________ dBm
System Attenuation: ________ dB
Total Power Out: ________ dBm
Radiated Power Out: ________ dBwi

UUT Power Output: ________ dBm
System Attenuation: ________ dB
Total Power Out: ________ dBm
Radiated Power Out: ________ dBwi

E-4 ADJACENT CHANNEL EMISSIONS AND SPECTRAL CONTAINMENT (Continued)

Narrowband ACE Data, EIRP < 18 dBwi

Offset Channel (kHz)	8000 bps CPM			8000 bps CPM Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
±10						
±20						

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

Narrowband ACE Data, EIRP < 18 dBwi

Offset Channel (kHz)	9600 bps CPM		
	Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband
±10			
±20			

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

E-4 ADJACENT CHANNEL EMISSIONS AND SPECTRAL CONTAINMENT (Continued)

Narrowband ACE Data, EIRP ≥ 18 dBwi

Offset Channel (kHz)	75 bps SBPSK			75 bps SBPSK Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
±5						
±10						
±15						
±20						
±25[1]						
±30[1]						

[1]Note: MIL-STD-188-181 Terminals only.

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

Narrowband ACE Data, EIRP ≥ 18 dBwi

Offset Channel (kHz)	300 bps SBPSK			300 bps SBPSK Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
±5						
±10						
±15						
±20						
±25[1]						
±30[1]						

[1]Note: MIL-STD-188-181 Terminals only.

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

E-4 ADJACENT CHANNEL EMISSIONS AND SPECTRAL CONTAINMENT (Continued)

Narrowband ACE Data, EIRP ≥ 18 dBwi

Offset Channel (kHz)	600 bps SBPSK			600 bps SBPSK Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
±5						
±10						
±15						
±20						
±25[1]						
±30[1]						

[1]Note: MIL-STD-188-181 Terminals only.

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

Narrowband ACE Data, EIRP ≥ 18 dBwi

Offset Channel (kHz)	1200 bps SBPSK			1200 bps SBPSK Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
±5						
±10						
±15						
±20						
±25[1]						
±30[1]						

[1]Note: MIL-STD-188-181 Terminals only.

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

E-4 ADJACENT CHANNEL EMISSIONS AND SPECTRAL CONTAINMENT (Continued)

Narrowband ACE Data, EIRP ≥ 18 dBwi

Offset Channel (kHz)	2400 bps SBPSK			2400 bps SBPSK Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
±5						
±10						
±15						
±20						
±25[1]						
±30[1]						

[1]Note: MIL-STD-188-181 Terminals only.

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

Narrowband ACE Data, EIRP ≥ 18 dBwi

Offset Channel (kHz)	4800 bps SOQPSK			4800 bps SOQPSK Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
±5						
±10						
±15						
±20						
±25[1]						
±30[1]						

[1]Note: MIL-STD-188-181 Terminals only.

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

E-4 ADJACENT CHANNEL EMISSIONS AND SPECTRAL CONTAINMENT (Continued)

Narrowband ACE Data, EIRP ≥ 18 dBwi

Offset Channel (kHz)	4800 bps CPM			4800 bps CPM Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
±10						
±20						

Supplemental Data

UUT Power Output: ________ dBm
System Attenuation: ________ dB
Total Power Out: ________ dBm
Radiated Power Out: ________ dBwi

UUT Power Output: ________ dBm
System Attenuation: ________ dB
Total Power Out: ________ dBm
Radiated Power Out: ________ dBwi

Narrowband ACE Data, EIRP ≥ 18 dBwi

Offset Channel (kHz)	6000 bps CPM			6000 bps CPM Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
±10						
±20						

Supplemental Data

UUT Power Output: ________ dBm
System Attenuation: ________ dB
Total Power Out: ________ dBm
Radiated Power Out: ________ dBwi

UUT Power Output: ________ dBm
System Attenuation: ________ dB
Total Power Out: ________ dBm
Radiated Power Out: ________ dBwi

E-4 ADJACENT CHANNEL EMISSIONS AND SPECTRAL CONTAINMENT (Continued)

Narrowband ACE Data, EIRP ≥ 18 dBwi

Offset Channel (kHz)	6400 bps SOQPSK		
	Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband
±5			
±10			
±15			
±20			

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

Narrowband ACE Data, EIRP ≥ 18 dBwi

Offset Channel (kHz)	7200 bps CPM			7200 bps CPM Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
±10						
±20						

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

E-4 ADJACENT CHANNEL EMISSIONS AND SPECTRAL CONTAINMENT (Continued)

Narrowband ACE Data, EIRP ≥ 18 dBwi

Offset Channel (kHz)	8000 bps CPM			8000 bps CPM Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
±10						
±20						

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

Narrowband ACE Data, EIRP ≥ 18 dBwi

Offset Channel (kHz)	9600 bps CPM		
	Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband
±10			
±20			

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

E-4 ADJACENT CHANNEL EMISSIONS AND SPECTRAL CONTAINMENT (Continued)

Wideband ACE Data, EIRP < 18 dBwi

Offset Channel (kHz)	9600 bps SBPSK			9600 bps SBPSK Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
± 25[1,A]						
± 50[1,A,B]						
± 75[1,A]						
± 100[1,A,B]						
± 125[1,A]						
± 150[1,B]						
± 200[1]						

[1]Note: MIL-STD-188-181 Terminals.
[A]Note: MIL-STD-188-181A Terminals.
[B]Note: MIL-STD-188-181B Terminals.

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

Wideband ACE Data, EIRP < 18 dBwi

Offset Channel (kHz)	9600 bps CPM		
	Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband
±50			
±100			
±150			

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

E-4 ADJACENT CHANNEL EMISSIONS AND SPECTRAL CONTAINMENT (Continued)

Wideband ACE Data, EIRP < 18 dBwi

Offset Channel (kHz)	16000 bps SBPSK			16000 bps SOQPSK Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
± 25[1,A]						
± 50[1,A,B]						
± 75[1,A]						
± 100[1,A,B]						
± 125[1,A]						
± 150[1,B]						
± 200[1]						

[1]Note: MIL-STD-188-181 Terminals.
[A]Note: MIL-STD-188-181A Terminals.
[B]Note: MIL-STD-188-181B Terminals.

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

E-4 ADJACENT CHANNEL EMISSIONS AND SPECTRAL CONTAINMENT (Continued)

Wideband ACE Data, EIRP < 18 dBwi

Offset Channel (kHz)	19200 bps SBPSK			19200 bps SOQPSK		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
± 25[1,A]						
± 50[1,A,B]						
± 75[1,A]						
± 100[1,A,B]						
± 125[1,A]						
± 150[1,B]						
± 200[1]						

[1]Note: MIL-STD-188-181 Terminals.
[A]Note: MIL-STD-188-181A Terminals.
[B]Note: MIL-STD-188-181B Terminals.

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

E-4 ADJACENT CHANNEL EMISSIONS AND SPECTRAL CONTAINMENT (Continued)

Wideband ACE Data, EIRP < 18 dBwi

Offset Channel (kHz)	19200 bps CPM			19200 bps CPM Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
±50						
±100						
±150						

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

Wideband ACE Data, EIRP < 18 dBwi

Offset Channel (kHz)	19200 bps CPM		
	Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband
±50			
±100			
±150			

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

E-4 ADJACENT CHANNEL EMISSIONS AND SPECTRAL CONTAINMENT (Continued)

Wideband ACE Data, EIRP < 18 dBwi

Offset Channel (kHz)	28800 bps CPM			28800 bps CPM Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
±50						
±100						
±150						

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

Wideband ACE Data, EIRP < 18 dBwi

Offset Channel (kHz)	32000 bps SOQPSK			32000 bps SOQPSK Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
± 25[1,A]						
± 50[1,A,B]						
± 75[1,A]						
± 100[1,A,B]						
± 125[1,A]						
± 150[1,B]						
± 200[1]						

[1]Note: MIL-STD-188-181 Terminals.
[A]Note: MIL-STD-188-181A Terminals.
[B]Note: MIL-STD-188-181B Terminals.

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

E-4 ADJACENT CHANNEL EMISSIONS AND SPECTRAL CONTAINMENT (Continued)

Wideband ACE Data, EIRP < 18 dBwi

Offset Channel (kHz)	32000 bps CPM			32000 bps CPM Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
±50						
±100						
±150						

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

Wideband ACE Data, EIRP < 18 dBwi

Offset Channel (kHz)	38.4 bps SOQPSK		
	Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband
± 25[1,A]			
± 50[1,A,B]			
± 75[1,A]			
± 100[1,A,B]			
± 125[1,A]			
± 150[1,B]			
± 200[1]			

[1]Note: MIL-STD-188-181 Terminals.
[A]Note: MIL-STD-188-181A Terminals.
[B]Note: MIL-STD-188-181B Terminals.

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

E-4 ADJACENT CHANNEL EMISSIONS AND SPECTRAL CONTAINMENT (Continued)

Wideband ACE Data, EIRP < 18 dBwi

Offset Channel (kHz)	38400 bps CPM			38400 bps CPM Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
±50						
±100						
±150						

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

Wideband ACE Data, EIRP < 18 dBwi

Offset Channel (kHz)	48000 bps CPM			56000 bps CPM		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
±50						
±100						
±150						

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

E-4 ADJACENT CHANNEL EMISSIONS AND SPECTRAL CONTAINMENT (Continued)

Wideband ACE Data, EIRP ≥ 18 dBwi

Offset Channel (kHz)	9600 bps SBPSK			9600 bps SBPSK Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
± 25[1,A]						
± 50[1,A,B]						
± 75[1,A]						
± 100[1,A,B]						
± 125[1,A]						
± 150[1,B]						
± 200[1]						

[1]Note: MIL-STD-188-181 Terminals.
[A]Note: MIL-STD-188-181A Terminals.
[B]Note: MIL-STD-188-181B Terminals.

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

Wideband ACE Data, EIRP ≥ 18 dBwi

Offset Channel (kHz)	9600 bps CPM		
	Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband
±50			
±100			
±150			

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

E-4 ADJACENT CHANNEL EMISSIONS AND SPECTRAL CONTAINMENT (Continued)

Wideband ACE Data, EIRP ≥ 18 dBwi

Offset Channel (kHz)	16000 bps SBPSK			16000 bps SOQPSK Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
± 25[1,A]						
± 50[1,A,B]						
± 75[1,A]						
± 100[1,A,B]						
± 125[1,A]						
± 150[1,B]						
± 200[1]						

[1]Note: MIL-STD-188-181 Terminals.
[A]Note: MIL-STD-188-181A Terminals.
[B]Note: MIL-STD-188-181B Terminals.

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

E-4 ADJACENT CHANNEL EMISSIONS AND SPECTRAL CONTAINMENT (Continued)

Wideband ACE Data, EIRP ≥ 18 dBwi

Offset Channel (kHz)	19200 bps SBPSK			19200 bps SOQPSK		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
± 25[1,A]						
± 50[1,A,B]						
± 75[1,A]						
± 100[1,A,B]						
± 125[1,A]						
± 150[1,B]						
± 200[1]						

[1]Note: MIL-STD-188-181 Terminals.
[A]Note: MIL-STD-188-181A Terminals.
[B]Note: MIL-STD-188-181B Terminals.

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

E-4 ADJACENT CHANNEL EMISSIONS AND SPECTRAL CONTAINMENT (Continued)

Wideband ACE Data, EIRP ≥ 18 dBwi

Offset Channel (kHz)	19200 bps CPM			19200 bps CPM Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
±50						
±100						
±150						

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

Wideband ACE Data, EIRP ≥ 18 dBwi

Offset Channel (kHz)	19200 bps CPM		
	Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband
±50			
±100			
±150			

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

E-4 ADJACENT CHANNEL EMISSIONS AND SPECTRAL CONTAINMENT (Continued)

Wideband ACE Data, EIRP ≥ 18 dBwi

Offset Channel (kHz)	28800 bps CPM			28800 bps CPM Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
±50						
±100						
±150						

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

Wideband ACE Data, EIRP ≥ 18 dBwi

Offset Channel (kHz)	32000 bps SOQPSK			32000 bps SOQPSK Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
± 25[1,A]						
± 50[1,A,B]						
± 75[1,A]						
± 100[1,A,B]						
± 125[1,A]						
± 150[1,B]						
± 200[1]						

[1]Note: MIL-STD-188-181 Terminals.
[A]Note: MIL-STD-188-181A Terminals.
[B]Note: MIL-STD-188-181B Terminals.

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

E-4 ADJACENT CHANNEL EMISSIONS AND SPECTRAL CONTAINMENT (Continued)

Wideband ACE Data, EIRP ≥ 18 dBwi

Offset Channel (kHz)	32000 bps CPM			32000 bps CPM Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
±50						
±100						
±150						

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

Wideband ACE Data, EIRP ≥ 18 dBwi

Offset Channel (kHz)	38400 bps SOQPSK		
	Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband
± 25[1,A]			
± 50[1,A,B]			
± 75[1,A]			
± 100[1,A,B]			
± 125[1,A]			
± 150[1,B]			
± 200[1]			

[1]Note: MIL-STD-188-181 Terminals.
[A]Note: MIL-STD-188-181A Terminals.
[B]Note: MIL-STD-188-181B Terminals.

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

E-4 ADJACENT CHANNEL EMISSIONS AND SPECTRAL CONTAINMENT (Continued)

Wideband ACE Data, EIRP ≥ 18 dBwi

Offset Channel (kHz)	38400 bps CPM			38400 bps CPM Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
±50						
±100						
±150						

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

Wideband ACE Data, EIRP ≥ 18 dBwi

Offset Channel (kHz)	48000 bps CPM			56000 bps CPM Coded		
	Po	Offset Channel		Po	Offset Channel	
	dBm	Lower Sideband	Upper Sideband	dBm	Lower Sideband	Upper Sideband
±50						
±100						
±150						

Supplemental Data

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

UUT Power Output: _________ dBm
System Attenuation: _________ dB
Total Power Out: _________ dBm
Radiated Power Out: _________ dBwi

FSK Spectral Containment. Record the spectral containment percentage reading directly from the HP 8591E.

Bandwidth for 99% spectral containment EIRP < 18 dBwi = __________
Bandwidth for 99% spectral containment EIRP ≥ 18 = __________

E-5 ADJACENT CHANNEL INTERFERENCE SUSCEPTIBILITY

ACI Bit Error Test Data - Narrowband Data Rates

Data Rate/Waveform	Test Level (From Table D-6)		Number of Observed Errors	
	Measured		Level	Errors
75 bps SBPSK Coded				
75 bps SBPSK				
300 bps SBPSK Coded				
300 bps SBPSK				
600 bps SBPSK Coded				
600 bps SBPSK				
1200 bps SBPSK Coded				
1200 bps SBPSK				
2400 bps SBPSK				
2400 bps SOQPSK Coded				
4800 bps SOQPSK				
4800 bps SOQPSK Coded				
4800 bps CPM				
4800 bps CPM Coded				
6400 bps SOQPSK				
6000 bps CPM Coded				
6000 bps CPM				
7200 bps CPM Coded				
7200 bps CPM				
8000 bps CPM Coded				
8000 bps CPM				
9600 bps CPM				
Noise Level	–137.0			

E-5 ADJACENT CHANNEL INTERFERENCE SUSCEPTIBILITY (Continued)

ACI Bit Error Test Data - Wideband Data Rates

Data Rate/Waveform	Test Level (From Table D-6)		Number of Observed Errors	
	Measured		Level	Errors
9600 bps SBPSK				
9600 bps SBPSK Coded				
9600 bps CPM				
16000 bps SBPSK				
16000 bps SOQPSK Coded				
16000 bps FSK				
19200 bps SBPSK				
19200 bps SOQPSK Coded				
19200 bps CPM				
28800 bps CPM Coded				
28800 bps CPM				
32000 bps SOQPSK				
32000 bps SOQPSK Coded				
32000 bps CPM Coded				
32000 bps CPM				
38400 bps SOQPSK				
38400 bps CPM Coded				
38400 bps CPM				
48000 bps CPM				
56000 bps CPM				
Noise Level	–137.0			

E-6 BPSK TRANSMIT TURN-ON, PREAMBLE, START of DATA TIMING SHIFT, and DATA PATTERN

Transmitter Turn-on Time Data Collection

Transmit Frequency (MHz)	Measured Turn-on Time		Max = 875 µsec for 181 Max = 50 ms for 181A and 181B		
	75 bps SBPSK Coded	75 bps SBPSK	300 bps SBPSK Coded	300 bps SBPSK	600 bps SBPSK Coded
291.000					
304.500					
318.000					
	600 bps SBPSK	1200 bps SBPSK Coded	1200 bps SBPSK	2400 bps SBPSK	2400 bps SOQPSK Coded
291.000					
304.500					
318.000					
	4800 bps SOQPSK	4800 bps SOQPSK Coded	4800 bps CPM	4800bps CPM Coded	6400 S0QPSK
291.000					
304.500					
318.000					
	6000 bps CPM Coded	6000 bps CPM	7200 bps CPM Coded	7200 bps CPM	8000 bps CPM
291.000					
304.500					
318.000					
	8000 bps CPM Coded	8000 bps CPM	9600 bps CPM	9600 bps SBPSK	9600 bps SBPSK Coded
291.000					
304.500					
318.000					
	8000 bps CPM Coded	9600 bps CPM (NB)	9600 bps SBPSK	9600 bps SBPSK Coded	9600 bps CPM (WB)
291.000					
304.500					
318.000					

E-6 BPSK TRANSMIT TURN-ON, PREAMBLE, START of DATA TIMING SHIFT, and DATA PATTERN

	16000 bps FSK	16000 bps SBPSK	16000 bps SOQPSK Coded	19200 bps SBPSK	19200 bps SOQPSK Coded
291.000					
304.500					
318.000					
	19200 bps CPM	**28800 bps CPM Coded**	**28800 bps CPM**	**32000 bps SOQPSK**	**32000 bps SOQPSK Coded**
291.000					
304.500					
318.000					
	32000 bps CPM Coded	**32000 bps CPM**	**38400 bps SOQPSK**	**38400 bps CPM Coded**	**38400 bps CPM**
291.000					
304.500					
318.000					

	48000 bps CPM	56000 bps CPM
291.000		
304.500		
318.000		

E-6 BPSK TRANSMIT TURN-ON, PREAMBLE, START of DATA TIMING SHIFT, and DATA PATTERN (Continued)

Preamble Symbol Timing Data

		Cipher Text (If Embedded)	MIL-STD Req
75 bps SBPSK Coded			
CW (ms)			1866.67 ±133.33
Repeating Bit Pattern (ms)			4933.33 ±133.33
75 bps SBPSK			
CW (ms)			3733.33 ±266.67
Repeating Bit Pattern (ms)			9866.67 ±266.67
300 bps SBPSK Coded			
CW (ms)			466.67 ±33.33
Repeating Bit Pattern (ms)			600 ±33.33
300 bps SBPSK			
CW (ms)			933.33 ±66.67
Repeating Bit Pattern (ms)			1200 ±66.67
600 bps SBPSK Coded			
CW (ms)			233.33 ±16.67
Repeating Bit Pattern (ms)			300 ±16.67
600 bps SBPSK			
CW (ms)			466.67 ±33.33
Repeating Bit Pattern (ms)			600 ±33.33
1200 bps SBPSK Coded			
CW (ms)			116.67 ±8.33
Repeating Bit Pattern (ms)			150 ±8.33
1200 bps SBPSK			
CW (ms)			233 ±16.67
Repeating Bit Pattern (ms)			300 ±16.67

E-6 BPSK TRANSMIT TURN-ON, PREAMBLE, START of DATA TIMING SHIFT, and DATA PATTERN (Continued)

Preamble Symbol Timing Data (Continued)

		Cipher Text (If Embedded)	MIL-STD Req
2400 bps SBPSK			
CW (ms)			116.67 ±8.33
Repeating Bit Pattern (ms)			150 ±8.33
2400 bps SBPSK Coded			
CW (ms)			116.67 ±8.33
Repeating Bit Pattern (ms)			150 ±12.50
4800 bps SOQPSK			
CW (ms)			116.67 ±8.33
Repeating Bit Pattern (ms)			150 ±12.50
4800 bps SOQPSK Coded			
CW (ms)			87.50 ±6.25
Repeating Bit Pattern (ms)			112.50 ±9.38
6400 bps SOQPSK			
CW (ms)			87.50 ±6.25
Repeating Bit Pattern (ms)			112.50 ±9.38
9600 bps SBPSK			
CW (ms)			29.17 ±2.08
Repeating Bit Pattern (ms)			(181) 37.50 ±3.13 (181A) 37.50 ±2.08
9600 bps SBPSK Coded			
CW (ms)			14.58 ±1.04
Repeating Bit Pattern (ms)			18.75 ±1.04
16000 bps SBPSK			
CW (ms)			17.50 ±1.25
Repeating Bit Pattern (ms)			(181) 22.50 ±1.88 (181A) 22.50 ±1.25

E-6 BPSK TRANSMIT TURN-ON, PREAMBLE, START of DATA TIMING SHIFT, and DATA PATTERN (Continued)

Preamble Symbol Timing Data (Continued)

		Cipher Text (If Embedded)	MIL-STD Req
16000 SOQPSK Coded			
CW (ms)			17.50 ±1.25
Repeating Bit Pattern (ms)			22.50 ±1.88
19200 bps SBPSK			
CW (ms)			14.58 ±1.04
Repeating Bit Pattern (ms)			(181) 14.58 ±1.56 (181A) 14.58 ±1.04
19200 SOQPSK Coded			
CW (ms)			14.58 ±1.04
Repeating Bit Pattern (ms)			18.75 ±1.56
32000 SOQPSK			
CW (ms)			17.50 ±1.25
Repeating Bit Pattern (ms)			22.50 ±1.88
32000 SOQPSK Coded			
CW (ms)			13.13 ±0.94
Repeating Bit Pattern (ms)			16.88 ±1.41
38400 SOQPSK			
CW (ms)			14.58 ±1.04
Repeating Bit Pattern (ms)			18.75 ±1.56

E-6 BPSK TRANSMIT TURN-ON, PREAMBLE, START of DATA TIMING SHIFT, and DATA PATTERN (Continued)

Record the following for verification of the repeating bit pattern.

Correct Repeating Bit Pattern at 75 bps Coded?	________Yes ________No
Correct Repeating Bit Pattern at 75 bps ?	________Yes ________No
Correct Repeating Bit Pattern at 300 bps Coded?	________Yes ________No
Correct Repeating Bit Pattern at 300 bps ?	________Yes ________No
Correct Repeating Bit Pattern at 600 bps Coded?	________Yes ________No
Correct Repeating Bit Pattern at 600 bps ?	________Yes ________No
Correct Repeating Bit Pattern at 1200 bps Coded?	________Yes ________No
Correct Repeating Bit Pattern at 1200 bps ?	________Yes ________No
Correct Repeating Bit Pattern at 2400 bps ?	________Yes ________No
Correct Repeating Bit Pattern at 2400 bps Coded?	________Yes ________No
Correct Repeating Bit Pattern at 4800 bps ?	________Yes ________No
Correct Repeating Bit Pattern at 4800 bps Coded?	________Yes ________No
Correct Repeating Bit Pattern at 6400 bps ?	________Yes ________No
Correct Repeating Bit Pattern at 9600 bps ?	________Yes ________No
Correct Repeating Bit Pattern at 9600 bps Coded?	________Yes ________No
Correct Repeating Bit Pattern at 16000 bps ?	________Yes ________No
Correct Repeating Bit Pattern at 16000 bps Coded?	________Yes ________No
Correct Repeating Bit Pattern at 19200 bps ?	________Yes ________No
Correct Repeating Bit Pattern at 19200 bps Coded?	________Yes ________No
Correct Repeating Bit Pattern at 32000 bps ?	________Yes ________No
Correct Repeating Bit Pattern at 32000 bps Coded?	________Yes ________No
Correct Repeating Bit Pattern at 38400 bps ?	________Yes ________No

E-6 BPSK TRANSMIT TURN-ON, PREAMBLE, START of DATA TIMING SHIFT, and DATA PATTERN (Continued)

Baseband Data Timing Shift

Data Rate (bps)	Measurement (μsec)	MIL-STD Requirement (μsec)
75 Coded		1667
75		3333
300 Coded		417
300		833
600 Coded		208
600		417
1200 Coded		104
1200		208
2400		104
2400 Coded		104
4800		104
4800 Coded		78
6400		78
9600		26
9600 Coded		13
16000		16
16000 Coded		16
19200		13
32000		16
32000 Coded		12
384000		13

Data Collection, Baseband Data Pattern

SBPSK	Data Input Pattern	Data Output Pattern
Without Differential Encoding	1111 0001 1100 1010	
With Differential Encoding	1111 0001 1100 1010	

Data Collection, Baseband Data Pattern

SOQPSK	Data Input Pattern	Data Output Pattern
Without Differential Encoding	1111 0001 1100 1010	
With Differential Encoding	1111 0001 1100 1010	

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E-7 UNSHAPED BPSK INTEROPERABILITY

DATA RATE (bps)	SYNC (Yes or No)
75	
300	
600	
1200	
2400	
9600	
16000	
19200	

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E-8 DIFFERENTIAL ENCODING, FSK MODULATION AND PHASE NOISE

Differential Encoding Sideband Generation

Data Rate (bps)	Space		Mark	
	Expected sidebands Fo ±Hz	Measured sidebands Fo +Hz	Expected sidebands Fo 0Hz	Measured sidebands Fo -Hz
300	75, 150, 225		0	
600	150, 300, 450		0	
1200	300, 600, 900		0	
2400	600, 1200, 1800		0	
9600	2400, 4800, 7200		0	
16000	4000, 8000, 12000		0	
19200	4800, 9600, 14400		0	

Frequency Shift Keying Modulation

Data Collection

With the BERT using a 1:7 data pattern:

Enter the frequency shift +______ kHz.

With the BERT using an inverted 1:7 data pattern:

Enter the frequency shift –______ kHz.

Phase Noise Data Collection

	Frequency (MHz)		
	291.000	304.500	318.000
Phase Noise (Degrees)			

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E-9 TRANSMIT AND RECEIVE FREQUENCY TUNING RANGE AND ACCURACY

Data Collection. After observing the transmit and receive frequency tuning test, either retain the computer generated frequency print-outs or the frequency table. If the UUT failed to transmit on some frequencies, note those below.

E-9 TRANSMIT AND RECEIVE FREQUENCY TUNING RANGE AND ACCURACY (Continued)

Manual Test Frequency Table

Uplink Freq (MHz)	Tx OK √	Downlink Freq (MHz)	Rx OK √	Uplink Freq (MHz)	Tx OK √	Downlink Freq (MHz)	Rx OK √
41.0 MHz Frequency Separation							
291.000		250.000		297.665		256.665	
291.355		250.355		297.680		256.680	
291.710		250.710		298.020		257.020	
292.065		251.065		298.035		257.035	
292.355		251.355		298.375		257.375	
292.420		251.420		298.390		257.390	
292.710		251.710		298.730		257.730	
292.775		251.775		298.745		257.745	
292.900		251.900		299.085		258.085	
293.055		252.055		299.100		258.100	
293.065		252.065		299.440		258.440	
293.405		252.405		299.455		258.455	
293.420		252.420		299.795		258.795	
293.760		252.760		299.810		258.810	
293.775		252.775		300.150		259.150	
294.115		253.115		300.165		259.165	
294.130		253.130		300.505		259.505	
294.470		253.470		300.520		259.520	
294.485		253.485		300.860		259.860	
294.825		253.825		300.875		259.875	
294.840		253.840		301.220		260.220	
295.180		254.180		301.230		260.230	
295.195		254.195		301.570		260.570	
295.535		254.535		301.585		260.585	
295.550		254.550		301.925		260.925	
295.890		254.890		301.940		260.940	
295.905		254.905		302.280		261.280	
296.245		255.245		302.295		261.295	
296.260		255.260		302.635		261.635	
296.600		255.600		302.650		261.650	
296.615		255.615		302.990		261.990	
296.955		255.955		303.005		262.005	
296.970		255.970		303.345		262.345	
297.310		256.310		303.360		262.360	
297.325		256.325		303.700		262.700	
303.715		262.715		306.900		265.900	
304.060		263.060		306.905		265.905	
304.070		263.070		307.250		266.250	
304.410		263.410		307.415		266.415	
304.425		263.425		307.605		266.605	
304.610		263.610		307.670		266.670	

Uplink Freq (MHz)	Tx OK √	Downlink Freq (MHz)	Rx OK √	Uplink Freq (MHz)	Tx OK √	Downlink Freq (MHz)	Rx OK √
304.770		263.770		307.925		266.925	
304.780		263.780		307.960		266.960	
304.865		263.865		308.180		267.180	
305.120		264.120		308.315		267.315	
305.135		264.135		308.435		267.435	
305.375		264.375		308.670		267.670	
305.475		264.475		308.690		267.690	
305.490		264.490		308.945		267.945	
305.630		264.630		309.030		268.030	
305.830		264.830		309.200		268.200	
305.845		264.845		309.380		268.380	
305.885		264.885		309.455		268.455	
306.140		265.140		309.710		268.710	
306.185		265.185		309.740		268.740	
306.200		265.200		310.090		269.090	
306.395		265.395		310.445		269.445	
306.540		265.540		310.800		269.800	
306.650		265.650					
53.6 MHz Frequency Separation							
296.600		243.000		314.350		260.750	
296.955		243.355		314.705		261.105	
297.310		243.710		315.060		261.460	
297.665		244.065		315.415		261.815	
298.020		244.420		315.770		262.170	
298.375		244.775		316.125		262.525	
311.155		257.555		316.480		262.880	
311.510		257.910		316.835		263.235	
311.865		258.265		317.190		263.590	
312.930		259.330		317.545		263.945	
312.220		258.620		317.750		264.150	
312.575		258.975		317.855		264.255	
313.285		259.685		317.900		264.300	
313.640		260.040		318.000		264.400	
313.995		260.395					
33.6 MHz Frequency Separation							
291.000		257.400		296.610		263.010	
291.255		257.655		296.865		263.265	
291.510		257.910		297.120		263.520	
291.765		258.165		297.375		263.775	
292.900		259.300		297.630		264.030	
293.055		259.455		297.885		264.285	
293.405		259.805		298.140		264.540	
293.760		260.160		298.395		264.795	
293.805		260.205		298.650		265.050	
294.060		260.460		298.905		265.305	
294.315		260.715		295.845		262.245	
294.570		260.970		296.100		262.500	

Uplink Freq (MHz)	**Tx OK √**	**Downlink Freq (MHz)**	**Rx OK √**	**Uplink Freq (MHz)**	**Tx OK √**	**Downlink Freq (MHz)**	**Rx OK √**
294.825		261.225		299.415		265.815	
295.080		261.480		299.670		266.070	
295.335		261.735		299.925		266.325	
33.6 MHz Frequency Separation							
295.590		261.990		300.180		266.580	
292.020		258.420		300.435		266.835	
292.275		258.675		300.690		267.090	
292.530		258.930		300.945		267.345	
292.785		259.185		301.200		267.600	
293.040		259.440		301.455		267.855	
293.295		259.695		301.710		268.110	
71.3 MHz Frequency Separation							
316.100		243.000		317.510		244.410	
316.335		243.235		317.745		244.645	
316.570		243.470		317.980		244.880	
316.805		243.705		317.995		244.895	
317.040		243.940		318.000		244.900	
317.275		244.175					

E-9 TRANSMIT AND RECEIVE FREQUENCY TUNING RANGE AND ACCURACY (Continued)

Channel Number	Tx OK √	Rx OK √	Uplink Frequency (MHz)	Downlink Frequency (MHz)	Preset Channel	UFO Channel	Notes
0			None	None			
1			SHF	250.350			Fleet Broadcast
2			SHF	250.400			
3			SHF	250.450			
4			SHF	250.500			
5			SHF	250.550			
6			SHF	250.600			
7			SHF	250.650			
8			SHF	250.700			
9			292.850	251.850			Navy 25kHz Channels, 41 MHz Offset
10			292.950	251.950			
11			293.050	252.050			
12			293.150	252.150			
13			294.550	253.550			
14			294.650	253.650			
15			294.750	253.750			
16			294.850	253.850			
17			296.250	255.250			
18			296.350	255.350			
19			296.450	255.450			
20			296.550	255.550			
21			297.850	256.850			
22			297.950	256.950			
23			298.050	257.050			
24			298.150	257.150			
25			299.350	258.350			
26			299.450	258.450			
27			299.550	258.550			
28			299.650	258.650			
29			306.250	265.250			
30			306.350	265.350			
31			306.450	265.450			
32			306.550	265.550			
33			307.750	266.750			
34			307.850	266.850			
35			307.950	266.950			Navy 25kHz Channels, 41 MHz Offset
36			308.050	267.050			
37			309.150	268.150			
38			309.250	268.250			
39			309.350	268.350			
40			309.450	268.450			
41			310.650	269.650			
42			310.750	269.750			

Channel Number	Tx OK √	Rx OK √	Uplink Frequency (MHz)	Downlink Frequency (MHz)	Preset Channel	UFO Channel	Notes
43			310.850	269.850			
44			310.950	269.950			DOD 500 kHz Channels/ UFO 25kHz Channels
45			293.950	260.350			
46			293.975	260.375			
47			294.000	260.400			
48			294.025	260.425			
49			294.050	260.450			
50			294.075	260.475			
51			294.100	260.500			
52			294.125	260.525			
53			294.150	260.550			
54			294.175	260.575			
55			294.200	260.600			
56			294.225	260.625			
57			294.250	260.650			
58			294.275	260.675			
59			294.300	260.700			
60			294.325	260.725			
61			294.350	260.750			
62			294.375	260.775			
63			294.400	260.800			
64			294.425	260.825			
65			294.450	260.850			
66			295.050	261.450			
67			295.075	261.475			
68			295.100	261.500			
69			295.125	261.525			
70			295.150	261.550			
71			295.175	261.575			
72			295.200	261.600			DOD 500 kHz Channels/ UFO 25kHz Channels
73			295.225	261.625			
74			295.250	261.650			
75			295.275	261.675			
76			295.300	261.700			
77			295.325	261.725			
78			295.350	261.750			
79			295.375	261.775			
80			295.400	261.800			
81			295.425	261.825			
82			295.450	261.850			
83			295.475	261.875			
84			295.500	261.900			
85			295.525	261.925			
86			295.550	261.950			
87			295.650	262.050			
88			295.675	262.075			
89			295.700	262.100			

Channel Number	Tx OK √	Rx OK √	Uplink Frequency (MHz)	Downlink Frequency (MHz)	Preset Channel	UFO Channel	Notes
90			295.725	262.125			DOD 500 kHz Channels/ UFO 25kHz Channels
91			295.750	262.150			
92			295.775	262.175			
93			295.800	262.200			
94			295.825	262.225			
95			295.850	262.250			
96			295.875	262.275			
97			295.900	262.300			
98			295.925	262.325			
99			295.950	262.350			
100			295.975	262.375			
101			296.000	262.400			
102			296.025	262.425			
103			296.050	262.450			
104			296.075	262.475			
105			296.100	262.500			
106			296.125	262.525			
107			296.150	262.550			
108 109			297.150 297.175	263.550 263.575			
110			297.200	263.600			
111			297.225	263.625			
112			297.250	263.650			
113			297.275	263.675			
114			297.300	263.700			
115			297.325	263.725			
116			297.350	263.750			
117			297.375	263.775			
118			297.400	263.800			
119			297.425	263.825			
120			297.450	263.850			
121			297.475	263.875			
122			297.500	263.900			
123			297.525	263.925			
124			297.550	263.950			
125			297.575	263.975			
126			297.600	264.000			
127			297.625	264.025			
128			297.650	264.050			
129			302.445	248.845			Gapfiller 500 kHz Channels/ UFO 5kHz Channels
130			302.450	248.850			
131			302.455	248.855			
132			302.465	248.865			
133			302.475	248.875			
134			302.485	248.885			
135			302.495	248.895			
136			302.500	248.900			

Channel Number	Tx OK √	Rx OK √	Uplink Frequency (MHz)	Downlink Frequency (MHz)	Preset Channel	UFO Channel	Notes
137			302.505	248.905			
138			302.515	248.915			
139			302.525	248.925			
140			302.535	248.935			Gapfiller 500 kHz Channels/ UFO 5kHz Channels
141			302.545	248.945			
142			302.550	248.950			
143			302.555	248.955			
144			302.565	248.965			
145			302.575	248.975			
146			302.585	248.985			
147			302.595	248.995			
148			302.600	249.000			
149			302.605	249.005			
150			302.615	249.015			
151			302.625	249.025			
152			302.635	249.035			
153			302.645	249.045			
154			302.650	249.050			
155			302.655	249.055			
156			302.665	249.065			
157			302.675	249.075			
158			302.685	249.085			
159			302.695	249.095			
160			302.700	249.100			
161			302.705	249.105			
162			302.715	249.115			
163			302.725	249.125			
164			302.735	249.135			
165			302.745	249.145			
166			302.750	249.150			Gapfiller 500 kHz Channels/ UFO 5kHz Channels
167			302.755	249.155			
168			302.765	249.165			
169			302.775	249.175			
170			302.785	249.185			
171			302.795	249.195			
172			302.800	249.200			
173			302.805	249.205			
174			302.815	249.215			
175			302.825	249.225			
176			302.835	249.235			
177			302.845	249.245			
178			302.850	249.250			
179			302.855	249.255			
180			302.865	249.265			
181			302.875	249.275			
182			302.885	249.285			
183			302.895	249.295			

Channel Number	Tx OK √	Rx OK √	Uplink Frequency (MHz)	Downlink Frequency (MHz)	Preset Channel	UFO Channel	Notes
184			302.900	249.300			
185			302.905	249.305			
186			302.915	249.315			
187			302.925	249.325			Gapfiller 25kHz (UFO Channel N8 Uplink
188			302.935	249.335			
189			302.945	249.345			
190			302.950	249.350			
191			302.955	249.355			
192			307.750	254.150			
193			311.150	257.550			Gapfiller 25kHz
194			316.955	243.855			AFSAT/ LEASAT Non-Proc. 5 kHz Replace-ment Channels
195			316.960	243.860			
196			316.975	243.875			
197			317.000	243.900			
198			317.010	243.910			
199			317.015	243.915			
200			317.025	243.925			
201			317.035	243.935			
202			317.045	243.945			
203			317.055	243.955			
204			317.065	243.965			
205			317.075	243.975			
206			317.085	243.985			
207			317.090	243.990			
208			317.095	243.995			
209			317.100	244.000			
210			317.105	244.005			
211			317.110	244.010			
212			317.115	244.015			
213			317.125	244.025			
214			317.135	244.035			
215 216			317.145 317.155	244.045 244.055			
217			317.165	244.065			
218			317.175	244.075			
219			317.185	244.085			
220			317.190	244.090			
221			317.195	244.095			
222			317.200	244.100			
223			317.205	244.105			
224			317.210	244.110			
225			317.215	244.115			
226			317.225	244.125			AFSAT/ LEASAT Non-Proc.
227			317.235	244.135			
228			317.245	244.145			

Channel Number	Tx OK √	Rx OK √	Uplink Frequency (MHz)	Downlink Frequency (MHz)	Preset Channel	UFO Channel	Notes
229			317.255	244.155			5 kHz Replace-ment Channels
230			317.265	244.165			
231			317.275	244.175			
232			317.285	244.185			
233			317.290	244.190			
234			317.295	244.195			AFSAT/ LEASAT Non-Proc. 5 kHz Replace-ment Channels
235			317.300	244.200			
236			317.305	244.205			
237			317.310	244.210			
238			317.315	244.215			
239			317.325	244.225			
240							
241							
242							
243							
244							
245							
246							
247							
248							
249							
250							
251							
252							
253							
254							
255							

Transmit Frequency Tuning Accuracy			
Front Panel Frequency (MHz)	**Measured Frequency (MHz**	**Frequency Error (Hz)**	**Requirement Maximum Allowed (Hz)**
291.000			**±291.00**
297.750			**±297.75**
304.500			**±304.50**
311.250			**±311.25**
318.000			**±318.00**
(181B) 318.300			**±318.30**

E-10 EFFECTIVE ISOTROPIC RADIATED POWER (EIRP) AND EIRP ACCURACY

EIRP Setting Accuracy Data Collection

Frequency (MHz)	Power Setting (dBW) (or other power setting increment)							
	CAL	10	12	14	16	18	20	22
291.0								
293.0								
295.0								
297.0								
299.0								
301.0								
303.0								
305.0								
307.0								
309.0								
311.0								
313.0								
315.0								
317.0								
319.0								

EIRP Setting Accuracy Data

UUT Panel Power Setting	Highest or Lowest Measured Power at Frequency (MHz)		Δ dB From Requirement 181 Max = ± 1.5 dB 181A/B Max = ± 2.0	Requirement Met (Y/N)
dBW	dBW	MHz		
10				
12				
14				
16				
18				
20				
22				

Transmitter Power Output Accuracy As A Function Of Frequency

UUT Average Power Output (Watts)	Power Output Variation Over Frequency Range		Δ dB From Requirement 181 Max = ± 1.0 dB 181 A/B Max = ± 1.5 dB	Requirement Met (Y/N)
	Low dBW	High dBW		
10				
12				
14				
16				
18				
20				
22				

E-11 COMSEC INTEROPERABILITY AND OVER THE AIR DEMONSTRATION

Modes Demonstrated

Data Rate (bps)					
	1200	**2400**	**Optional**	**16 bps**	**Optional**
	KG-84A (Optional)	**AN/USC-43**		**KY-57/KY-58 VINSON**	
Data					
Voice	NA				
Mode(s) demonstrated over the air ______________________________					

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E-12 FORWARD ERROR CORRECTION

DATA RATE/WAVEFORM	SOM CORRECT	DATA PATTERN CORRECT
75 bps SBPSK Coded		
300 bps SBPSK Coded		
600 bps SBPSK Coded		
1200 bps SBPSK Coded		
2400 bps SOQPSK Coded		
4800 bps SOQPSK Coded		
9600 bps SBPSK Coded		
16000 bps SOQPSK Coded		
19200 bps SOQPSK Coded		
32000 bps SOQPSK Coded		

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