

**SPECIFICATION  
FOR  
PORTABLE RADIOS PROGRAM (PRP)  
PROCUREMENT CONTRACT**



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## DOCUMENT DESCRIPTION

For the purposes of this Specification, Form, Fit, and Function (FFF) interchangeability are defined by MIL-HBK-61A and MIL-STD-196E.

- MIL-HBK-61A (7 February, 2001)
  - o Fit: The ability of an item to physically interface or interconnect with or become an integral part of another item.
  - o Form: The shape, size, dimensions, mass, weight, and other physical parameters that uniquely characterize an item.
  - o Function: The action or actions that an item is designed to perform.
  - o Interchangeable item: A product which possesses such functional and physical attributes as to be equivalent in performance to another product of similar or identical purposes; and is capable of being exchanged for the other product without selection for fit or performance, and without alteration of the products themselves or of adjoining products, except for adjustment.
- MIL-STD-196E (17 February, 1998)
  - o Electrical interchangeability: The modified item's capability of operation must be equal to the basic or previous item without requiring any modifications.
  - o Mechanical interchangeability: The modified item must be capable of being physically installed and operated in the position previously occupied by the basic or previous item without requiring any major modifications. Switches, connectors, etc., shall be in the same location, within allowable tolerances. The center of gravity of the new item shall be the same as in the old item, within allowable tolerances.
  - o Functional interchangeability: The modified item must be capable of performing, without additional assistance, all the operational capabilities of the basic or previous item.
  - o Maintenance (repair) parts interchangeability: Maintenance (repair) parts interchangeability involves the installation and operation of a maintenance part in an item in lieu of a like item without the use of additional tools or modifications to the existing item or mounting facilities and with no appreciable effect on performance or ratings, either electrical or mechanical.

Part I of this document lists the salient characteristics of FFF for receiver/transmitter (R/T) units required under this contract action proposal. The salient characteristics listed are solely for the core R/T units without ancillary or supplemental items, unless otherwise indicated.

Part III of this document is a list of ancillary parts that come kitted with proposed CLINs described in the Statement of Work, Section 6-1 to 6-26. This table will correlate ancillary parts to R/T units described in Part I. An 'X' in the intersection of the ancillary item row and an R/T column indicates those R/T units with which an ancillary part must be compatible.

Appendix A provides a listing of all required waveforms and modes included in the specification in Part I of this document. This table will correlate any given waveform/mode to a corresponding radio described in Part I. An 'X' in the intersection of waveform/mode rows and radio columns indicates a required waveform/mode in that radio specification.

Appendix B provides a listing of service-common, previously fielded battery types with which items detailed in Part I of this specification must be interoperable.

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## **PART I: RADIO SPECIFICATIONS**

## 1. Multiband Handheld (MBHH) Requirements

This section discusses the minimum technical requirements for the Multiband Handheld unit. Technical requirements for other items are described in their respective sections.

### 1.1 MBHH Unit Description

The basic component defined by the requirements within this section is the standard handheld multiband Type 1 Encryption receiver/transmitter unit - hereafter referred to simply as a MBHH unit. The MBHH unit is a single-channel, handheld, software-defined radio whose requirements are defined within this section.

### 1.2 MBHH Unit Characteristics

#### 1.2.1 Frequency Range and Resolution

1.2.1.1 The MBHH unit minimum frequency range shall from 30 MHz to 511.9999 MHz.

1.2.1.2 The MBHH unit frequency resolution shall be no more than 100 Hz.

#### 1.2.2 Receive Characteristics

1.2.2.1 Receive sensitivity shall be at least -116 dBm for 12 dB SINAD (Signal + Noise +Distortion to Noise + Distortion) in FM mode.

1.2.2.2 Receive sensitivity shall be at least -103.5 dBm for 10 dB SINAD when modulated at 30%.

1.2.2.3 Adjacent channel rejection shall be at least 40 dB referenced to 12 dB SINAD for a 50 kHz channel.

#### 1.2.3 Transmit Characteristics

1.2.3.1 Provide at least 5 Watts of RF output power measured at the antenna.

1.2.3.2 Provide at least 3 levels of user selectable RF output power from 0.25 Watts to 5 Watts in FM mode.

1.2.3.3 Provide at least 2 levels of user selectable RF output power in AM mode.

1.2.3.4 Harmonic suppression shall be at least 40 dB.

1.2.3.5 Frequency stability shall be no more than  $\pm 2.0$  ppm annually.

### 1.2.4 Physical Characteristics

#### 1.2.4.1 Size and Weight

1.2.4.1.1 Maximum weight of each MBHH unit, antenna, and battery shall be no more than 1.23 kilograms (2.7 pounds).

1.2.4.1.2 Maximum physical volume of each MBHH unit without antenna, including the battery, shall be less than 895 cubic centimeters (55 cubic inches).

#### 1.2.4.2 Power

1.2.4.2.1 Shall provide capability to prevent radio damage caused by battery reverse polarity.

1.2.4.2.2 Shall display battery charge status information on the MBHH unit.

1.2.4.2.3 Shall provide for 10% transmit, 10% receive, and 80% squelch duty cycle operation for at least 8 hours.

1.2.4.2.4 Shall be operable with service-common, handheld radio batteries currently fielded, as detailed in Appendix B, Table 1.

#### 1.2.4.3 Connectors and Interfaces

Shall provide the following physical and software interfaces for the MBHH unit:

1.2.4.3.1 U-283/U type 6-pin audio keyfill connector or adapter

1.2.4.3.2 Antenna RF, TNC-F 50  $\Omega$

1.2.4.3.3 MIL-STD-188-114A

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1.2.4.3.4 RS-232

1.2.4.3.5 USB

#### **1.2.4.4 Environmental Specifications**

1.2.4.4.1 Shall be tested to MIL-STD-810F specifications as listed below:

1.2.4.4.1.1 Shock and Vibration: Ground Mobile Environment.

1.2.4.4.1.2 Immersion: Shall operate after immersion in 6.6 feet (2.0M) of water for 30 minutes.

1.2.4.4.1.3 Temperature: Shall operate between at least -30C and +60C.

1.2.4.4.1.4 Altitude: Shall operate at up to 25,000 feet in an unpressurized environment.

### **1.3 Waveforms**

#### **1.3.1 MBHH Unit Waveform Requirements**

1.3.1.1 Core waveform and mode requirements shall be as per Appendix A.

#### **1.3.2 Waveform and Mode Storage**

1.3.2.1 Shall store all provided waveforms and required operational parameters simultaneously.

#### **1.3.3 Waveform Selection**

1.3.3.1 Waveforms shall be user selectable.

1.3.3.2 Shall change between any waveform or mode in less than eight seconds.

### **1.4 Retransmission**

For retransmission, two MBHH units, operating the same waveform, are connected together via a retransmission cable. Information is exchanged bi-directionally, each unit retransmitting the voice/data it received from the other (i.e. both MBHH units receive and transmit voice/data).

#### **1.4.1 Retransmission Requirements**

1.4.1.1 Shall provide voice and data retransmission of SINCGARS ESIP waveforms.

1.4.1.2 Retransmission shall be user selectable when the MBHH unit is operating with a retransmission-capable waveform/mode.

1.4.1.3 Retransmission shall not require COMSEC keys to be loaded.

### **1.5 GPS**

#### **1.5.1 External GPS Interface Requirements**

1.5.1.1 Shall receive inputs from a commercial external GPS receiver, Precision Lightweight GPS Receiver (PLGR) or Defense Advanced GPS Receiver (DAGR) for time of day synchronization and position reporting operations.

1.5.1.2 Shall receive inputs from an external commercial GPS device.

1.5.1.3 Shall receive GPS position information and time-of-day automatically after set-up by operator.

#### **1.5.2 GPS Display**

1.5.2.1 Shall display location information including position, status, time, heading, velocity, altitude, Figure of Merit, Datum, and satellite information.

1.5.2.2 Shall display position information in Military Grid Reference System (MGRS) (WGS-84 based) format, Latitude/Longitude format, and Universal Transverse Mercator (UTM) format.

### **1.6 Computer Security**

#### **1.6.1 INFOSEC and Cryptographic Requirements**

1.6.1.1 Shall provide embedded NSA-approved programmable cryptographic chips/modules.

- 1.6.1.2 Shall provide the NSA and National Institute of Standards and Technology (NIST) approved cryptographic algorithms required by the waveforms listed in Appendix A.
- 1.6.1.3 Shall be NSA Type I certified for safeguarding information up to TOP SECRET.
- 1.6.1.4 Any power system or battery used to “hold up” data, keys, algorithms, or other radio data will be serviceable by the end user without special tools or equipment.

## **1.7 Keying Requirements**

For the purposes of this section, the term "keys" includes system keys, certificates, and Firefly vectors as well as user traffic keys.

### **1.7.1 Key Management**

- 1.7.1.1 Shall be compatible with the Army Key Management System (AKMS) and Electronic Key Management System (EKMS) key distribution and net management systems in accordance with the Defense Information Infrastructure/Common Operating Environment (DII) / (COE) Key Management Infrastructure.
- 1.7.1.2 Shall load unencrypted keys into the Cryptographic Subsystem via a single common fill device connector from PYQ-10, CYZ-10, KYK-13, and SKL devices.
- 1.7.1.3 Shall receive Over-The Air-Rekeying (OTAR).
- 1.7.1.4 Shall transmit OTAR.

### **1.7.2 Key Handling and Storage**

- 1.7.2.1 Shall support COMSEC key entry.
- 1.7.2.2 Shall store all necessary keys required to operate the core waveforms identified in Appendix A.
- 1.7.2.3 Shall display positive confirmation following each successful key load.
- 1.7.2.4 Shall notify the operator in the event of key load failure(s).
- 1.7.2.5 Shall provide key status information to the operator which includes the presence or absence of a key and key type.
- 1.7.2.6 Shall provide the operator the ability to associate keys to waveforms/channels.

### **1.7.3 Zeroization**

- 1.7.3.1 Shall provide tamper zeroization capability to zeroize all keys and erase all classified data.
- 1.7.3.2 Shall provide a front panel zeroize panic switch on all MBHH units. This switch shall require two discrete manual actions to zeroize all COMSEC keys.
- 1.7.3.3 Shall provide capability for plain text operation subsequent to zeroization.

## **1.8 Other Radio (MBHH) Requirements**

### **1.8.1 Speaker/Microphone**

- 1.8.1.1 Shall contain an internal microphone and speaker.
- 1.8.1.2 Shall provide speaker volume control.

### **1.8.2 Display**

- 1.8.2.1 Shall be readable in 10,000 foot-candle direct sunlight.
- 1.8.2.2 Shall be readable with Generation III Night Vision Goggles.

### **1.8.3 Presets, Scanning, and Cloning**

- 1.8.3.1 Shall provide at least 99 presets for waveforms/modes.
- 1.8.3.2 Shall provide capability to program presets using the display and keypad or by programming software installed on a personal computer. Presets shall include the following parameters:
  - 1.8.3.2.1 Channel name
  - 1.8.3.2.2 Preset name
  - 1.8.3.2.3 Transmit frequency

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1.8.3.2.4 Receive frequency

1.8.3.2.5 Power level

1.8.3.2.6 Mode of operation

1.8.3.3 Shall provide capability to scan at least five operator designated frequencies or presets.

1.8.3.4 Shall provide wireless cloning of preset parameters from one MBHH unit to another.

#### **1.8.4 Clock**

1.8.4.1 Shall set the time-of-day within 2 seconds of operator action.

1.8.4.2 Shall maintain frequency accuracy to at least 5 ppm.

#### **1.8.5 Human Machine Interface (HMI)**

1.8.5.1 Shall display the active preset for each channel.

1.8.5.2 Shall display the operational status of the selected channel.

1.8.5.3 Shall provide capability for day and night operations.

1.8.5.4 Shall provide capability to select a waveform from radio memory and load it on any channel.

#### **1.8.6 Identification and Marking**

1.8.6.1 Shall provide markings in accordance with contract requirements, MIL-STD-130N, or as defined by the SPAWAR PMW/A 170 Communications Program Office.

1.8.6.2 All controlled cryptographic items (CCI) shall be marked in accordance with NSA requirements.

1.8.6.3 Equipment shall be marked with safety and disposal information as required by federal regulation.

#### **1.8.7 Self Test**

##### **1.8.7.1 Shall provide built-in test capabilities for detecting the following errors:**

1.8.7.1.1 Incorrect or insufficient input line or battery power

1.8.7.1.2 Incorrect radio programming

1.8.7.1.3 Improper channel settings

1.8.7.1.4 Improperly installed VAA, Base Station, Repeater, MBHH unit, and battery connections.

#### **1.8.8 Interchangeability**

FFF Interchangeability is defined in MIL-STD-196E and MIL-HBK-61A as a condition which exists when two or more items possess such functional and physical characteristics as to be equivalent in performance and durability, and are capable of being exchanged one for the other without alteration of the items themselves, or of adjoining items.

1.8.8.1 Provide capability for interchangeability of MBHH units, Vehicle Adapter Amplifiers (VAAs), and accessories with other like-type MBHH units and accessories. Interchangeable elements are listed below.

1.8.8.1.1 MBHH units, to include AN/PRC-152(V)1(C) (NSN 5820-01-577-8278)

1.8.8.1.2 Vehicular Amplifier Adapters (VAA), to include Dual Multiband Handheld Vehicular Mount Radios (MBHHVR (D)) and AN/VRC-110 (NSN 5820-01-557-8450)

1.8.8.1.3 Shall be operable with service-common, handheld radio batteries currently fielded, as detailed in Appendix B, Table 1.

1.8.8.1.4 Battery chargers which support battery listed in paragraph 1.8.8.1.3.

1.8.8.1.5 Broadband antennas

1.8.8.1.6 Headset/handsets employing U-283 audio/keyfill connectors.

#### **1.8.9 Interoperability Certification**

1.8.9.1 Shall be compliant with the Software Communications Architecture (SCA) version 2.2, as demonstrated by SCA Certification letter from Joint Program Executive Office, Joint Tactical Radio System (JPEO JTRS).

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1.8.9.2 Shall be certified by the National Security Agency (NSA) Information Assurance Directorate that the encryption system will protect the confidentiality of voice and data up to and including TOP SECRET.

## **2. Multiband Handheld with Internal GPS (MBHH (GPS)) Requirements**

This section discusses the minimum technical requirements for the Multiband Handheld with internal GPS unit. Technical requirements for other items are described in their respective sections.

### **2.1 MBHH (GPS) Unit Description**

The basic component defined by the requirements within this section is the standard multiband handheld Type 1 Encryption receiver/transmitter unit with internal GPS - hereafter referred to simply as an MBHH (GPS) unit. The MBHH (GPS) unit is a single-channel, handheld, software-defined radio whose requirements are defined within this section.

### **2.2 MBHH (GPS) Unit Characteristics**

#### **2.2.1 Frequency Range and Resolution**

2.2.1.1 Shall be as listed in section 1.2.1.

#### **2.2.2 Receive Characteristics**

2.2.2.1 Shall be as listed in section 1.2.2.

2.2.2.2 Capable of receiving and processing GPS signals of frequency 1575.42 MHz,  $\pm 2$  MHz.

#### **2.2.3 Transmit Characteristics**

2.2.3.1 Shall be as listed in section 1.2.3

### **2.2.4 Physical Characteristics**

#### **2.2.4.1 Size and Weight**

2.2.4.1.1 Shall be as listed in section 1.2.4.1.

#### **2.2.4.2 Power**

2.2.4.2.1 Shall be as listed in section 1.2.4.2.

#### **2.2.4.3 Connectors and Interfaces**

Shall provide the following physical and software interfaces for the MBHH (GPS) unit:

2.2.4.3.1 Shall be as listed in section 1.2.4.3.

2.2.4.3.2 External GPS antenna. GPS antenna connector must provide power for use by an active GPS antenna.

#### **2.2.4.4 Environmental Specifications**

2.2.4.4.1 Shall be as listed in section 1.2.4.4.

### **2.3 Waveforms**

#### **2.3.1 MBHH (GPS) Unit Waveform Requirements**

2.3.1.1 Shall be as listed in section 1.3.1.

#### **2.3.2 Waveform and Mode Storage**

2.3.2.1 Shall be as listed in section 1.3.2.

#### **2.3.3 Waveform Selection**

2.3.3.1 Shall be as listed in section 1.3.3.

## **2.4 Retransmission**

For retransmission, two MBHH (GPS) units, operating the same waveform, are connected together via a retransmission cable. Information is exchanged bi-directionally, each unit retransmitting the voice/data it received from the other (i.e. both MBHH (GPS) units receive and transmit voice/data).

### **2.4.1 Retransmission Requirements**

2.4.1.1 Shall be as listed in section 1.4.1.

## **2.5 GPS**

### **2.5.1 External GPS Interface Requirements**

2.5.1.1 Shall be as listed in section 1.5.1.

### **2.5.2 GPS Display**

2.5.2.1 Shall be as listed in section 1.5.2.

### **2.5.3 Internal GPS Requirements**

2.5.3.1 Receive and process GPS signals.

2.5.3.2 Distribute timing and position data to the radio software for use in timing sensitive waveforms and for situational awareness purposes.

## **2.6 Computer Security**

### **2.6.1 INFOSEC and Cryptographic Requirements**

2.6.1.1 Shall be as listed in section 1.6.1.

## **2.7 Keying Requirements**

For the purposes of this section, the term "keys" includes system keys, certificates, and Firefly vectors as well as user traffic keys.

### **2.7.1 Key Management**

2.7.1.1 Shall be as listed in section 1.7.1.

### **2.7.2 Key Handling and Storage**

2.7.2.1 Shall be as listed in section 1.7.2.

### **2.7.3 Zeroization**

2.7.3.1 Shall be as listed in section 1.7.3.

## **2.8 Other Radio (MBHH (GPS)) Requirements**

### **2.8.1 Speaker/Microphone**

2.8.1.1 Shall be as listed in section 1.8.1.

### **2.8.2 Display**

2.8.2.1 Shall be as listed in section 1.8.2.

### **2.8.3 Presets, Scanning, and Cloning**

2.8.3.1 Shall be as listed in section 1.8.3.

### **2.8.4 Clock**

2.8.4.1 Shall be as listed in section 1.8.4.

### **2.8.5 Human Machine Interface (HMI)**

2.8.5.1 Shall be as listed in section 1.8.5.

### **2.8.6 Identification and Marking**

2.8.6.1 Shall be as listed in section 1.8.6.

### **2.8.7 Self Test**

#### **2.8.7.1 Shall provide built-in test capabilities for detecting the following errors:**

2.8.7.1.1 Shall be as listed in section 1.8.8.1.

### **2.8.8 Interchangeability**

FFF Interchangeability is defined in MIL-STD-196E and MIL-HBK-61A as a condition which exists when two or more items possess such functional and physical characteristics as to be equivalent in performance and durability, and are capable of being exchanged one for the other without alteration of the items themselves, or of adjoining items.

2.8.8.1 Provide capability for interchangeability of MBHH (GPS) units, Vehicle Adapter Amplifiers (VAAs), and accessories with other like-type MBHH (GPS) units and accessories. Interchangeable elements are listed below.

2.8.8.1.1 MBHH (GPS) units, to include AN/PRC-152(V)2(C) (NSN 5820-01-555-1119)

2.8.8.1.2 VAAs, to include Dual Multiband Handheld Vehicular Mount Radios (MBHHVR (D)) and AN/VRC-110 (NSN 5820-01-557-8450)

2.8.8.1.3 Shall be operable with service-common, handheld radio batteries currently fielded, as detailed in Appendix B, Table 1.

2.8.8.1.4 Battery chargers which support batteries listed in paragraph 1.8.8.1.3.

2.8.8.1.5 Broadband antennas

2.8.8.1.6 Headset/handsets employing U-283 audio/keyfill connectors.

### **2.8.9 Interoperability Certification**

2.8.9.1 Shall be certified by Joint Interoperability Test Command (JITC) to comply with MIL-STDs listed in Section 2.3.1.

2.8.9.2 Shall be compliant with the Software Communications Architecture (SCA) version 2.2, as demonstrated by SCA Certification letter from Joint Program Executive Office, Joint Tactical Radio System (JPEO JTRS).

2.8.9.3 Shall be certified by the National Security Agency (NSA) Information Assurance Directorate that the encryption system will protect the confidentiality of voice and data up to and including TOP SECRET.

### **3. Multiband Handheld Dive Capable (MBHH DIVE) Requirements**

This section discusses the minimum technical requirements for the Handheld Multiband Type 1 Encryption Dive Capable (no GPS) unit. Technical requirements for other items are described in their respective sections.

#### **3.1 MBHH DIVE Unit Description**

The basic component defined by the requirements within this section is the standard handheld multiband Type 1 Encryption dive capable receiver/transmitter unit without GPS - hereafter referred to simply as an MBHH DIVE unit. The MBHH DIVE unit is a single-channel, handheld, software-defined radio whose requirements are defined within this section.

#### **3.2 MBHH DIVE Unit Characteristics**

##### **3.2.1 Frequency Range and Resolution**

3.2.1.1 Shall be as listed in section 1.2.1.

##### **3.2.2 Receive Characteristics**

3.2.2.1 Shall be as listed in section 1.2.2.

##### **3.2.3 Transmit Characteristics**

3.2.3.1 Shall be as listed in section 1.2.3.

##### **3.2.4 Physical Characteristics**

###### **3.2.4.1 Size and Weight**

3.2.4.1.1 Shall be as listed in section 1.2.4.1.

###### **3.2.4.2 Power**

3.2.4.2.1 Shall be as listed in section 1.2.4.2.

###### **3.2.4.3 Connectors and Interfaces**

Shall provide the following physical and software interfaces for the MBHH DIVE unit:

3.2.4.3.1 Shall be as listed in section 1.2.4.3.

###### **3.2.4.4 Environmental Specifications**

3.2.4.4.1 Shall be tested to MIL-STD-810F specifications as listed below:

3.2.4.4.1.1 Shock and Vibration: Ground Mobile Environment

3.2.4.4.1.2 Immersion: Shall operate after 65.6 feet (20.0M) of water for 30 minutes.

3.2.4.4.1.3 Temperature: Shall operate between -30C and +60C

3.2.4.4.1.4 Altitude: Shall operate at up to 25,000 feet.

#### **3.3 Waveforms**

##### **3.3.1 MBHH DIVE Unit Waveform Requirements**

3.3.1.1 Shall be as listed in section 1.3.1.

##### **3.3.2 Waveform and Mode Storage**

3.3.2.1 Shall be as listed in section 1.3.2.

##### **3.3.3 Waveform Selection**

3.3.3.1 Shall be as listed in section 1.3.3.

### **3.4 Retransmission**

For retransmission, two MBHH DIVE units, operating the same waveform, are connected together via a retransmission cable. Information is exchanged bi-directionally, each unit retransmitting the voice/data it received from the other (i.e. both MBHH DIVE units receive and transmit voice/data).

#### **3.4.1 Retransmission Requirements**

3.4.1.1 Shall be as listed in section 1.4.1.

### **3.5 GPS**

#### **3.5.1 External GPS Interface Requirements**

3.5.1.1 Shall be as listed in section 1.5.1.

#### **3.5.2 GPS Display**

3.5.2.1 Shall be as listed in section 1.5.2.

### **3.6 Computer Security**

#### **3.6.1 INFOSEC and Cryptographic Requirements**

3.6.1.1 Shall be as listed in section 1.6.1.

### **3.7 Keying Requirements**

For the purposes of this section, the term "keys" includes system keys, certificates, and Firefly vectors as well as user traffic keys.

#### **3.7.1 Key Management**

3.7.1.1 Shall be as listed in section 1.7.1.

#### **3.7.2 Key Handling and Storage**

3.7.2.1 Shall be as listed in section 1.7.2.

#### **3.7.3 Zeroization**

3.7.3.1 Shall be as listed in section 1.7.3.

### **3.8 Other Radio (MBHH DIVE) Requirements**

#### **3.8.1 Speaker/Microphone**

3.8.1.1 Shall be as listed in section 1.8.1.

#### **3.8.2 Display**

3.8.2.1 Shall be as listed in section 1.8.2.

#### **3.8.3 Presets, Scanning, and Cloning**

3.8.3.1 Shall be as listed in section 1.8.3.

#### **3.8.4 Clock**

3.8.4.1 Shall be as listed in section 1.8.4.

#### **3.8.5 Human Machine Interface (HMI)**

3.8.5.1 Shall be as listed in section 1.8.5.

#### **3.8.6 Identification and Marking**

3.8.6.1 Shall be as listed in section 1.8.6.

### **3.8.7 Self Test**

#### **3.8.7.1 Shall provide built-in test capabilities for detecting the following errors:**

3.8.7.1.1 Shall be as listed in section 1.8.8.1.

### **3.8.8 Interchangeability**

FFF Interchangeability is defined in MIL-STD-196E and MIL-HBK-61A as a condition which exists when two or more items possess such functional and physical characteristics as to be equivalent in performance and durability, and are capable of being exchanged one for the other without alteration of the items themselves, or of adjoining items.

3.8.8.1 Provide capability for interchangeability of MBHH DIVE units, Vehicle Adapter Amplifiers (VAAs), and accessories with other like-type MBHH DIVE units and accessories. Interchangeable elements are listed below.

3.8.8.1.1 MBHH (DIVE) units, to include AN/PRC-152(V)3(C), Harris Part Number 12041-1600-01 (NSN assignment pending)

3.8.8.1.2 VAAs, to include Dual Multiband Handheld Vehicular Mount Radios (MBHHVR (D)) and AN/VRC-110 (NSN 5820-01-557-8450)

3.8.8.1.3 Shall be operable with service-common, handheld radio batteries currently fielded, as detailed in Appendix B, Table 1.

3.8.8.1.4 Battery chargers which support batteries listed in paragraph 1.8.8.1.3.

3.8.8.1.5 Broadband antennas

3.8.8.1.6 Headset/handsets employing U-283 audio/keyfill connectors.

### **3.8.9 Interoperability Certification**

3.8.9.1 Shall be compliant with the Software Communications Architecture (SCA) version 2.2, as demonstrated by SCA Certification letter from Joint Program Executive Office, Joint Tactical Radio System (JPEO JTRS).

3.8.9.2 Shall be certified by the National Security Agency (NSA) Information Assurance Directorate that the encryption system will protect the confidentiality of voice and data up to and including TOP SECRET.

#### **4. Multiband Handheld Dive Capable with Internal GPS (MBHH DIVE (GPS)) Requirements**

This section discusses the minimum technical requirements for the Multiband Handheld Dive Capable with internal GPS unit. Technical requirements for other items are described in their respective sections.

##### **4.1 MBHH DIVE (GPS) Unit Description**

The basic component defined by the requirements within this section is the standard multiband handheld Type 1 Encryption Dive Capable receiver/transmitter unit with internal GPS - hereafter referred to simply as an MBHH DIVE (GPS) unit. The MBHH DIVE (GPS) unit is a single-channel, handheld, software-defined radio whose requirements are defined within this section.

##### **4.2 MBHH DIVE (GPS) Unit Characteristics**

###### **4.2.1 Frequency Range and Resolution**

4.2.1.1 Shall be as listed in section 1.2.1.

###### **4.2.2 Receive Characteristics**

4.2.2.1 Shall be as listed in section 1.2.2.

4.2.2.2 Capable of receiving and processing GPS signals of frequency 1575.42 MHz,  $\pm 2$  MHz.

###### **4.2.3 Transmit Characteristics**

4.2.3.1 Shall be as listed in section 1.2.3.

###### **4.2.4 Physical Characteristics**

###### **4.2.4.1 Size and Weight**

4.2.4.1.1 Maximum weight of each MBHH DIVE (GPS) unit, antenna, and battery shall be no more than 1.23 kilograms (2.7 pounds).

4.2.4.1.2 Maximum physical volume of each MBHH DIVE (GPS) unit without antenna, including the battery, shall be less than 688.3 cubic centimeters (42 cubic inches).

###### **4.2.4.2 Power**

4.2.4.2.1 Shall be as listed in section 1.2.4.2.

###### **4.2.4.3 Connectors and Interfaces**

Shall provide the following physical and software interfaces for the MBHH DIVE (GPS) unit:

4.2.4.3.1 Shall be as listed in section 1.2.4.3.

4.2.4.3.2 External GPS antenna. GPS antenna connector must provide power for use by an active GPS antenna.

###### **4.2.4.4 Environmental Specifications**

4.2.4.4.1 Shall be as listed in section 3.2.4.4.

##### **4.3 Waveforms**

###### **4.3.1 MBHH DIVE (GPS) Unit Waveform Requirements**

4.3.1.1 Shall be as listed in section 1.3.1.

###### **4.3.2 Waveform and Mode Storage**

4.3.2.1 Shall be as listed in section 1.3.2.

###### **4.3.3 Waveform Selection**

4.3.3.1 Shall be as listed in section 1.3.3.

#### **4.4 Retransmission**

For retransmission, two MBHH DIVE (GPS) units, operating the same waveform, are connected together via a retransmission cable. Information is exchanged bi-directionally, each unit retransmitting the voice/data it received from the other (i.e. both MBHH DIVE (GPS) units receive and transmit voice/data).

##### **4.4.1 Retransmission Requirements**

4.4.1.1 Shall be as listed in section 1.4.1.

#### **4.5 GPS**

##### **4.5.1 External GPS Interface Requirements**

4.5.1.1 Shall be as listed in section 1.5.1.

##### **4.5.2 GPS Display**

4.5.2.1 Shall be as listed in section 1.5.2.

##### **4.5.3 Internal GPS Requirements**

4.5.3.1 Receive and process GPS signals.

4.5.3.2 Distribute timing and position data to the radio software for use in timing sensitive waveforms and for situational awareness purposes.

#### **4.6 Computer Security**

##### **4.6.1 INFOSEC and Cryptographic Requirements**

4.6.1.1 Shall be as listed in section 1.6.1.

#### **4.7 Keying Requirements**

For the purposes of this section, the term "keys" includes system keys, certificates, and Firefly vectors as well as user traffic keys.

##### **4.7.1 Key Management**

4.7.1.1 Shall be as listed in section 1.7.1.

##### **4.7.2 Key Handling and Storage**

4.7.2.1 Shall be as listed in section 1.7.2.

##### **4.7.3 Zeroization**

4.7.3.1 Shall be as listed in section 1.7.3.

#### **4.8 Other Radio (MBHH DIVE (GPS)) Requirements**

##### **4.8.1 Speaker/Microphone**

4.8.1.1 Shall be as listed in section 1.8.1.

##### **4.8.2 Display**

4.8.2.1 Shall be as listed in section 1.8.2.

##### **4.8.3 Presets, Scanning, and Cloning**

4.8.3.1 Shall be as listed in section 1.8.3.

##### **4.8.4 Clock**

4.8.4.1 Shall be as listed in section 1.8.4.

#### **4.8.5 Human Machine Interface (HMI)**

4.8.5.1 Shall be as listed in section 1.8.5.

#### **4.8.6 Identification and Marking**

4.8.6.1 Shall be as listed in section 1.8.6.

#### **4.8.7 Self Test**

##### **4.8.7.1 Shall provide built-in test capabilities for detecting the following errors:**

4.8.7.1.1 Shall be as listed in section 1.8.8.1.

#### **4.8.8 Interchangeability**

FFF Interchangeability is defined in MIL-STD-196E and MIL-HBK-61A as a condition which exists when two or more items possess such functional and physical characteristics as to be equivalent in performance and durability, and are capable of being exchanged one for the other without alteration of the items themselves, or of adjoining items.

4.8.8.1 Provide capability for interchangeability of MBHH DIVE (GPS) units, Vehicle Adapter amplifiers (VAAs), and accessories with other like-type MBHH DIVE (GPS) units and accessories. Interchangeable elements are listed below.

4.8.8.1.1 MBHH DIVE (GPS) units, to include AN/PRC-152(V)4(C) (NSN 5820-01-575-5710)

4.8.8.1.2 VAAs, to include Dual Multiband Handheld Vehicular Mount Radios (MBHHVR (D)) and AN/VRC-110 (NSN 5820-01-557-8450)

4.8.8.1.3 Shall be operable with service-common, handheld radio batteries currently fielded, as detailed in Appendix B, Table 1.

4.8.8.1.4 Battery chargers which support batteries listed in paragraph 1.8.8.1.3.

4.8.8.1.5 Broadband antennas

4.8.8.1.6 Headset/handsets employing U-283 audio/keyfill connectors.

#### **4.8.9 Interoperability Certification**

4.8.9.1 Shall be compliant with the Software Communications Architecture (SCA) version 2.2, as demonstrated by SCA Certification letter from Joint Program Executive Office, Joint Tactical Radio System (JPEO JTRS).

4.8.9.2 Shall be certified by the National Security Agency (NSA) Information Assurance Directorate that the encryption system will protect the confidentiality of voice and data up to and including TOP SECRET.

## **5. Multiband Manpack Radio (MBMR) Requirements**

This section discusses the minimum technical requirements for all Multiband Manpack Radio units. Technical requirements for other items are described in their respective sections.

### **5.1 MBMR Unit Description**

The basic component defined by the requirements within this section is the standard multiband manpack receiver transmitter unit – hereafter referred to as an MBMR unit. The MBMR unit is a single-channel, manpack format, software defined radio whose requirements are defined within this section.

### **5.2 MBMR Unit Characteristics**

#### **5.2.1 Frequency Range and Resolution**

5.2.1.1 The MBMR unit minimum frequency range shall be from 30 MHz to 1999.950 MHz.

5.2.1.2 The MBMR unit frequency resolution shall be no more than 100 Hz.

#### **5.2.2 Receive Characteristics**

5.2.2.1 Receive sensitivity shall be at least -118 dBm at 10 dB SINAD in FM mode.

5.2.2.2 Receive sensitivity shall be at least -110 dBm at 10 dB SINAD when modulated at 70% in AM mode.

5.2.2.3 Adjacent channel rejection shall be as follows.

5.2.2.3.1 VHF: at least 60 dB referenced to 50 kHz channel.

5.2.2.3.2 UHF: at least 50 dB referenced to 50 kHz channel.

5.2.2.3.3 Hi-Band (225-1999.950 MHz): at least 40 dB on a 2.4 MHz channel and 60 dB on a 10 MHz channel.

5.2.2.4 Audio frequency response shall not vary more than  $\pm 2$  dB over 300 Hz to 3000 Hz as compared to a level of a 1 kHz tone in AM/FM modes.

#### **5.2.3 Transmit Characteristics**

5.2.3.1 Provide at least 10 Watts of RF output power measured at the antenna in VHF/UHF Line of Sight (30 MHz – 512 MHz) modes.

5.2.3.2 Provide at least 20 Watts of RF output power measured at the antenna in Satellite Communications modes.

5.2.3.3 Provide at least five Watts of RF output power in Hi-Band modes (average).

5.2.3.4 Provide at least three levels of user selectable RF output power in all operating modes.

5.2.3.5 Frequency stability shall be at least  $1 \times 10^{-6}$  over 30 days.

5.2.3.6 Harmonic suppression at 5 Watts RF output power shall be -50 dB or less.

5.2.3.7 Harmonic suppression at 10 Watts RF output power shall be -53 dB or less.

5.2.3.8 Harmonic suppression at 20 Watts RF output power shall be -56 dB or less.

#### **5.2.4 Physical Characteristics**

##### **5.2.4.1 Size and Weight**

5.2.4.1.1 Maximum weight of each MBMR shall be no more than 3.3 kg (7.3 lbs) without battery box, antenna, or other ancillary items installed..

5.2.4.1.2 Maximum physical volume of each MBMR shall be 2458 cubic centimeters (150 cubic inches) or less without battery box, antenna, or other ancillary items installed..

##### **5.2.4.2 Power**

5.2.4.2.1 Shall provide capability to prevent radio damage caused by battery reverse polarity.

5.2.4.2.2 Shall provide battery charge status information on the MBMR user interface.

5.2.4.2.3 Shall be operable with service-common, manpack radio batteries currently fielded, as detailed in Appendix B, Table 2.

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5.2.4.2.4 Shall provide for at least 14 hours of BB-5590 battery life in VULOS mode, 10 Watts RF output power with a 6:3:1 (Standby/Receive/Transmit) duty cycle.

5.2.4.2.5 Shall provide for at least 13 hours of BB-5590 battery life in SATCOM mode, 20 Watts RF output power with a 6:3:1 (Standby/Receive/Transmit) duty cycle.

### **5.2.4.3 Connectors and Interfaces**

Shall provide the following physical and software interfaces for the MBMR:

5.2.4.3.1 External GPS antenna.

5.2.4.3.2 RF Antenna.

5.2.4.3.3 U-238/U type audio/keyfill connector.

5.2.4.3.4 Battery connector.

5.2.4.3.5 USB 2.0 protocol interface.

5.2.4.3.6 Synchronous and asynchronous RS-232E serial interface.

5.2.4.3.7 Network data interface.

5.2.4.3.8 MIL-STD-188-114A interface.

### **5.2.4.4 Environmental Specifications**

5.2.4.4.1 Shall be tested to MIL-STD-810F specifications as listed below.

5.2.4.4.1.1 Shock and Vibration: Ground Mobile Environment, tactical

5.2.4.4.1.2 Temperature (Operating): -40C to +70C (IAW Method 501.4 Procedure II and Method 502.4 Procedure II)

5.2.4.4.1.3 Temperature (Storage): -40C to +85C (IAW Method 501.4 Procedure I and Method 502.4 Procedure I)

5.2.4.4.1.4 Immersion: 1 m (3.3 feet) of water.

5.2.4.4.1.5 Sand: No damage from sand in wind speeds of 5700 feet per minute (IAW Method 510.4 Procedure I and II)

5.2.4.4.1.6 Dust: No damage from fine dust in wind speeds of 1750 feet per minute (IAW Method 510.4 Procedure I and II)

5.2.4.4.1.7 Humidity: Operable in non-condensing relative humidity from 5% to 95% (IAW Method 507.4).

5.2.4.4.1.8 Rain: 1.8 inches of rain per hour and 40 MPH winds for 40 minutes (IAW Method 506.4 Procedures I and III).

5.2.4.4.1.9 Freezing/Icing: IAW Method 521.2.

## **5.3 Waveforms**

### **5.3.1 MBMR Unit Waveform Requirements**

5.3.1.1 Core waveform and mode requirements shall be as per Appendix A.

### **5.3.2 Waveform and Mode Storage**

5.3.2.1 Shall store all provided waveforms and required operational parameters simultaneously.

### **5.3.3 Waveform Selection**

5.3.3.1 Waveforms shall be user selectable.

5.3.3.2 Shall change between any waveform or mode in less than eight seconds.

## **5.4 Retransmission**

For retransmission, two MBMR units, operating the same waveform, are connected together via a retransmission cable. Information is exchanged bi-directionally, each unit retransmitting the voice/data it received from the other (i.e. both MBMR units receive and transmit voice/data).

#### **5.4.1 Retransmission Requirements**

- 5.4.1.1 Shall provide retransmission of SINCGARS FH or SC modes.
- 5.4.1.2 Retransmission shall be user selectable.
- 5.4.1.3 Retransmission shall not require any COMSEC keys to be loaded.

### **5.5 GPS**

#### **5.5.1 Internal GPS Requirement**

- 5.5.1.1 Shall provide an internal Ground-Based GPS Receiver Application Module (GB GRAM) with Selective Availability Anti-Spoofing Module (SAASM) to provide time of day synchronization and position reporting operations.
- 5.5.1.2 Shall receive GPS position and time of day information automatically after set-up by the operator.

#### **5.5.2 GPS Display**

- 5.5.2.1 Shall display location information including position, status, time, heading, velocity, altitude, Figure of Merit, Datum, and satellite information.
- 5.5.2.2 Shall display position information in Military Grid Reference System (WGS-84 based) format, Latitude/Longitude format, and Universal Transverse Mercator format.

### **5.6 Computer Security**

#### **5.6.1 INFOSEC and Cryptographic Requirements**

- 5.6.1.1 Shall provide embedded NSA approved programmable cryptographic chips/modules.
- 5.6.1.2 Shall provide the NSA and National Institute of Standards and Technology (NIST) approved cryptographic algorithms required by the waveforms listed in Appendix A.
- 5.6.1.3 Shall be NSA Type I certified.
- 5.6.1.4 Any power system or battery used to “hold up” data, keys, algorithms, or other radio data will be serviceable by the end user without special tools or equipment.

### **5.7 Keying Requirements**

For the purposes of this section, the term "keys" includes system keys, certificates, and Firefly vectors as well as user traffic keys.

#### **5.7.1 Key Management**

- 5.7.1.1 Shall be compatible with the Army Key Management System (AKMS) and Electronic Key Management System (EKMS) key distribution and net management systems in accordance with the Defense Information Infrastructure/Common Operating Environment (DII) / (COE) Key Management Infrastructure.
- 5.7.1.2 Shall load unencrypted keys into the Cryptographic Subsystem via a single common fill device connector from PYQ-10, CYZ-10, KYK-13, and SKL devices.
- 5.7.1.3 Shall receive Over-The Air-Rekeying (OTAR).
- 5.7.1.4 Shall transmit OTAR.

#### **5.7.2 Key Handling and Storage**

- 5.7.2.1 Shall support COMSEC key entry.
- 5.7.2.2 Shall store all necessary keys required to operate the core waveforms identified in Appendix A.
- 5.7.2.3 Shall display positive confirmation following each successful key load.
- 5.7.2.4 Shall notify the operator in the event of key load failure(s).
- 5.7.2.5 Shall provide key status information to the operator which includes the presence or absence of a key and key type.
- 5.7.2.6 Shall provide the operator the ability to associate keys to waveforms/channels.

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### **5.7.3 Zeroization**

- 5.7.3.1 Shall provide tamper zeroization capability to zeroize all keys and erase all classified data.
- 5.7.3.2 Shall provide a front panel zeroize panic switch on all MBMR units. This switch shall require two discrete manual actions to zeroize all COMSEC keys.
- 5.7.3.3 Shall provide capability for plain text operation subsequent to zeroization.

## **5.8 Other Radio (MBMR) Requirements**

### **5.8.1 Speaker/Microphone**

- 5.8.1.1 Shall be interoperable with the service common H-250/U handset.
- 5.8.1.2 Shall provide volume control when used with H-250/U handset.

### **5.8.2 Display**

- 5.8.2.1 Shall be readable with 10,000 foot-candle direct sunlight.
- 5.8.2.2 Shall be readable with Generation III Night Vision Goggles.

### **5.8.3 Presets, Scanning, and Cloning**

- 5.8.3.1 Shall provide at least 99 presets for waveforms/modes.
- 5.8.3.2 Shall provide capability to program presets using the display and keypad or by programming software installed on a personal computer. Presets shall include the following parameters:
  - 5.8.3.2.1 Channel name
  - 5.8.3.2.2 Preset name
  - 5.8.3.2.3 Transmit frequency
  - 5.8.3.2.4 Receive frequency
  - 5.8.3.2.5 Power level
  - 5.8.3.2.6 Mode of operation
- 5.8.3.3 Shall provide capability to scan at least 5 operator designated frequencies or presets.
- 5.8.3.4 Shall provide wireless cloning of preset parameters from one MBMR unit to another.

### **5.8.4 Clock**

- 5.8.4.1 Shall set the time-of-day within 2 seconds of operator action.

### **5.8.5 Human Machine Interface (HMI)**

- 5.8.5.1 Shall display the active preset for each channel.
- 5.8.5.2 Shall display the operational status of the selected channel.
- 5.8.5.3 Shall provide capability for day and night operations.
- 5.8.5.4 Shall provide capability to select a waveform from radio memory and load it on any channel.

### **5.8.6 Identification and Marking**

- 5.8.6.1 Shall provide markings in accordance with contract requirements, MIL-STD-130N, or as defined by the SPAWAR PMW/A 170 Communications Program Office.
- 5.8.6.2 All controlled cryptographic items (CCI) shall be marked in accordance with NSA requirements.
- 5.8.6.3 Equipment shall be marked with safety and disposal information as required by federal regulation.

### **5.8.7 Self Test**

#### **5.8.7.1 Shall provide built-in test capabilities for detecting the following errors:**

- 5.8.7.1.1 Incorrect or insufficient input line or battery power
- 5.8.7.1.2 Incorrect radio programming
- 5.8.7.1.3 Improper channel settings
- 5.8.7.1.4 Improperly installed VAA, Base Station, Repeater, and battery connections.

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### **5.8.8 Interchangeability**

FFF Interchangeability is defined in MIL-STD-196E and MIL-HBK-61A as a condition which exists when two or more items possess such functional and physical characteristics as to be equivalent in performance and durability, and are capable of being exchanged one for the other without alteration of the items themselves, or of adjoining items.

5.8.8.1 Provide capability for interchangeability of MBMR units, Vehicle Adapter amplifiers (VAAs), and accessories with other like-type MBMR units and accessories. Interchangeable elements are listed below.

5.8.8.1.1 MBMR units, to include AN/PRC-117G(V)1(C) (NSN 5820-01-554-8564).

5.8.8.1.2 VAAs, to include AN/VRC-114(V)1(NSN 5820-01-589-2203) and AN/VRC-114(V)2 (NSN 5820-01-591-1430).

5.8.8.1.3 Shall be operable with service-common, manpack radio batteries currently fielded, as detailed in Appendix B, Table 2.

5.8.8.1.4 Battery chargers which support batteries listed in paragraph 5.8.9.1.3.

5.8.8.1.5 Broadband antennas

5.8.8.1.6 Headset/handsets employing U-283 audio/keyfill connectors.

### **5.8.9 Interoperability Certification**

5.8.9.1 Shall be compliant with the Software Communications Architecture (SCA) version 2.2, as demonstrated by SCA Certification letter from Joint Program Executive Office, Joint Tactical Radio System (JPEO JTRS).

5.8.9.2 Shall be certified by the National Security Agency (NSA) Information Assurance Directorate that the encryption system will protect the confidentiality of voice and data up to and including TOP SECRET.

## **6. High Frequency Manpack Radio (HFMP) Requirements**

This section discusses the minimum technical requirements for all High Frequency Manpack (HFMP) Radio units. Technical requirements for other items are described in their respective sections.

### **6.1 HFMP Unit Description**

The basic component defined by the requirements within this section is the standard high frequency manpack receiver/transmitter unit. The HFMP is a single-channel, manpack format, software defined radio whose requirements are defined within this section.

### **6.2 HFMP Unit Characteristics**

#### **6.2.1 Frequency Range and Resolution**

6.2.1.1 Minimum frequency range shall be from 1.6 MHz to 29.99999 MHz in Single Sideband (SSB), Lower Sideband (LSB), and Amplitude Modulation Equivalent (AME) modes of operation.

6.2.1.2 Minimum frequency range shall be from 20 MHz to 59.99999 MHz in Frequency Modulation (FM) mode of operation

6.2.1.3 Frequency resolution shall be no more than 100 Hz under front panel control and no more than 10 Hz from remote control.

#### **6.2.2 Receive Characteristics**

6.2.2.1 Receive sensitivity shall be at least -113 dBm at 10 dB SINAD in SSB mode.

6.2.2.2 Receive sensitivity shall be at least -98 dBm at 10 dB SINAD in AME mode.

6.2.2.3 Receive sensitivity shall be at least -117 dBm at 10 dB SINAD in Continuous Wave (CW) mode.

6.2.2.4 Receive sensitivity shall be at least -107 dBm at 10 dB SINAD in FM mode.

6.2.2.5 Shall be capable of user-adjustable active squelch.

6.2.2.6 Audio system shall output a minimum 1.5 mV signal with 150 Ohm source impedance.

6.2.2.7 Receiver shall provide input overload protection to at least 32 V Root Mean Square (RMS) input.

6.2.2.8 Spurious response rejection shall be at least 70 dB at  $\pm 30\%$  from center frequency.

6.2.2.9 Image rejection shall be greater than 80 dB.

6.2.2.10 Shall have an input characteristic impedance of 50 Ohms.

#### **6.2.3 Transmit Characteristics**

6.2.3.1 Provide up to 20 Watts Peak Envelope Power (PEP)/Average in SSB/LSB/AME/CW modes, as measured at the antenna connector.

6.2.3.2 Provide up to 10 Watts Average in FM mode, as measured at the antenna connector.

6.2.3.3 Shall provide at least three user selectable power output levels.

6.2.3.4 Shall implement Low Probability of Intercept/Low Probability of Detection (LPI/LPD) power controls.

6.2.3.5 Frequency stability shall be no more than  $1.0 \times 10^{-6}$  over 30 days.

6.2.3.6 Shall be capable of accepting audio inputs at 1.5 mV into 150 Ohms or 0 dBm into 600 Ohms.

6.2.3.7 Shall have an output characteristic impedance of 50 Ohms.

6.2.3.8 Shall be capable of automatically tuning the radio transmitter to commonly used antennas, such as OE-505/U, AS-2259/U, and field-expedient wire antennas.

#### **6.2.4 Physical Characteristics**

##### **6.2.4.1 Size and Weight**

6.2.4.1.1 Maximum weight of each HFMP shall be no more than 4.5 kg (9.9 lb) without batteries.

6.2.4.1.2 Maximum physical volume of each HFMP shall be 8,150 cubic centimeters (497 cubic inches) including battery box.

#### **6.2.4.2 Power**

- 6.2.4.2.1 Shall provide battery charge status information on the HFMP user interface.
- 6.2.4.2.2 Shall be operable with service-common, manpack radio batteries currently fielded, as detailed in Appendix B, Table 2.
- 6.2.4.2.3 Shall provide for at least 8 hours of BB-5590 battery life in AME mode, 20 Watts RF output power with a 6:3:1 (Standby/Receive/Transmit) duty cycle.
- 6.2.4.2.4 Shall be capable of operating from any external Direct Current (DC) source from 21 VDC to 32 VDC.

#### **6.2.4.3 Connectors and Interfaces**

Shall provide the following physical and software interfaces for the HFMP:

- 6.2.4.3.1 Bayonet Neill Concelman (BNC) antenna connector for RF input and output.
- 6.2.4.3.2 Front panel connector for RS-232E or MIL-STD-188-114A interface for data input/output and remote control operation.
- 6.2.4.3.3 Front panel connector for control of external power amplifier, antenna coupler, Ethernet connectivity, and audio system interface.
- 6.2.4.3.4 Front panel U-238/U type six pin audio connector.
- 6.2.4.3.5 Front panel connector for external GPS system.
- 6.2.4.3.6 Front panel U-238/U type six pin fill connector.
- 6.2.4.3.7 External ground post connector.
- 6.2.4.3.8 Rear mating connector for Ethernet connectivity, remote control, power amplifier control, coupler control, and audio system interface.

#### **6.2.4.4 Environmental Specifications**

- 6.2.4.4.1 Shall be tested to MIL-STD-810F specifications as follows:
  - 6.2.4.4.1.1 Shock and vibration: Ground mobile environment, tactical.
  - 6.2.4.4.1.2 Temperature (Operating): -40C to +70C.
  - 6.2.4.4.1.3 Immersion: 0.9 m of water.

### **6.3 Waveforms**

#### **6.3.1 HFMP Unit Waveform Requirements**

- 6.3.1.1 Core waveform and mode requirements shall be as per Appendix A.

#### **6.3.2 Waveform and Mode Storage**

- 6.3.2.1 Shall store all provided waveforms and required operational parameters simultaneously.

#### **6.3.3 Waveform Selection**

- 6.3.3.1 Waveforms shall be user selectable.
- 6.3.3.2 Shall change between any waveform or mode in less than eight seconds.

### **6.4 GPS**

#### **6.4.1 External GPS Interface Requirements**

- 6.4.1.1 Shall receive inputs from a commercial external GPS receiver, Precision Lightweight GPS receiver (PLGR), or Defense Advanced GPS Receiver (DAGR) for time of day synchronization.
- 6.4.1.2 Shall receive GPS TOD information automatically after user setup.

#### **6.4.2 GPS Display**

- 6.4.2.1 Shall display GPS status, position, and TOD information.

## 6.5 Computer Security

### 6.5.6.1 INFOSEC and Cryptographic Requirements

- 6.5.1.1 Shall provide embedded NSA approved cryptographic chips/modules.
- 6.5.1.2 Shall provide the NSA and National Institute of Standards and Technology (NIST) approved cryptographic algorithms required by the waveforms listed in Appendix A.
- 6.5.1.3 Shall be NSA Type I certified.
- 6.5.1.4 Any power system or battery used to “hold up” data, keys, algorithms, or other radio data will be serviceable by the end user without special tools or equipment.

## 6.6 Keying Requirements

For the purposes of this section, the term "keys" includes system keys, certificates, and Firefly vectors as well as user traffic keys.

### 6.6.1 Key Management

- 6.6.1.1 Shall be compatible with the Army Key Management System (AKMS) and Electronic Key Management System (EKMS) key distribution and net management systems in accordance with the Defense Information Infrastructure/Common Operating Environment (DII) / (COE) Key Management Infrastructure.
- 6.6.1.2 Shall load unencrypted keys into the Cryptographic Subsystem via a single common fill device connector from PYQ-10, CYZ-10, KYK-13, and SKL devices.
- 6.6.1.3 Shall receive Over-The Air-Rekeying (OTAR).
- 6.6.1.4 Shall transmit OTAR.

### 6.6.2 Key Handling and Storage

- 6.6.2.1 Shall support COMSEC key entry.
- 6.6.2.2 Shall store all necessary keys required to operate the core waveforms identified in Appendix A.
- 6.6.2.3 Shall display positive confirmation following each successful key load.
- 6.6.2.4 Shall notify the operator in the event of key load failure(s).
- 6.6.2.5 Shall provide key status information to the operator which includes the presence or absence of a key and key type.
- 6.6.2.6 Shall provide the operator the ability to associate keys to waveforms/channels.

### 6.6.3 Zeroization

- 6.6.3.1 Shall provide tamper zeroization capability to zeroize all keys and erase all classified data.
- 6.6.3.2 Shall provide a front panel zeroize panic switch on all MBMR units. This switch shall require two discrete manual actions to zeroize all COMSEC keys.
- 6.6.3.3 Shall provide capability for plain text operation subsequent to zeroization.

## 6.7 Other Radio Requirements

### 6.7.1 Speaker/Microphone

- 6.7.1.1 Shall be interoperable with service common H-250/U handset.
- 6.7.1.2 Shall provide volume control when used with H-250/U handset.

### 6.7.2 Display

- 6.7.2.1 Shall provide a backlit display readable in 10,000 foot-candle sunlight.
- 6.7.2.2 Shall be readable with Generation III Night Vision Goggles.
- 6.7.2.3 Shall provide the user with the ability to disable the back lighting.

### 6.7.3 Presets, Scanning, and Cloning

- 6.7.3.1 Shall provide at least 200 channel presets for use fixed frequency and channel hopping modes.

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6.7.3.2 Shall provide no less than 75 user-programmable system presets, storing channels, mode settings, addresses, network settings, encryption, voice/data settings.

6.7.3.3 Shall be capable of scanning of all channel presets in SSB mode.

#### **6.7.4 Human Machine Interface (HMI)**

6.7.4.1 Shall display the active preset for the selected channel.

6.7.4.2 Shall display the battery status.

6.7.4.3 Shall display the operational status for the selected channel.

6.7.4.4 Shall provide capability for day and night operations.

6.7.4.5 Shall provide the user the ability to modify and control all parameters of the radio.

#### **6.7.5 Identification and Marking**

6.7.5.1 Shall provide markings in accordance with contract requirements, MIL-STD-130N, or as defined by the SPAWAR PMW/A 170 Communications Program Office.

6.7.5.2 All controlled cryptographic items (CCI) shall be marked in accordance with NSA requirements.

6.7.5.3 Shall be marked with safety and disposal information as required by federal regulation.

6.7.5.4 Shall be coated in Chemical Agent Resistant Coating (CARC) Green 383.

#### **6.7.6 Self Test**

##### **6.7.6.1 Shall provide built-in test capabilities for detecting the following errors:**

6.7.6.1.1 Incorrect or insufficient line or battery power.

6.7.6.1.2 Incorrect radio programming.

6.7.6.1.3 Non-functional components of the HFMP.

6.7.6.1.4 Improperly installed or non-functional ancillary systems (amplifier, pre/post-selector, coupler, external KDU).

6.7.6.1.5 High Voltage Standing Wave Ratio (VSWR) conditions.

#### **6.7.7 Interchangeability**

FFF Interchangeability is defined in MIL-STD-196E and MIL-HBK-61A as a condition which exists when two or more items possess such functional and physical characteristics as to be equivalent in performance and durability, and are capable of being exchanged one for the other without alteration of the items themselves, or of adjoining items.

6.7.7.1 Provide capability for interchangeability of HFMP units, Vehicle Adapter amplifiers (VAAs), and accessories with other like-type HFMP units and accessories. Interchangeable elements are listed below.

6.7.7.1.1 HFMP units, to include the AN/PRC-150(P)(C) (NSN 5820-01-492-3628).

6.7.7.1.2 VAAs, to include AN/VRC-104 family of HF vehicular systems.

6.7.7.1.3 Shall be operable with service-common, manpack radio batteries currently fielded, as detailed in Appendix B, Table 2.

6.7.7.1.4 Battery chargers which support batteries listed in paragraph 6.7.7.1.3.

6.7.7.1.5 High Frequency and Very High Frequency antennas.

6.7.7.1.6 Headsets/handsets employing U-283 audio/keyfill connectors.

#### **6.7.8 Interoperability Certification**

6.7.8.1 Shall be certified by the National Security Agency (NSA) Information Assurance Directorate that the encryption system will protect the confidentiality of voice and data up to and including TOP SECRET.

## **7. HF Vehicular Mount Radio 20Watts (HFVR (20W)) Requirements**

This section discusses the minimum technical requirements for the High Frequency Vehicular Mount Radio (20 Watt) system. Technical requirements for other items are described in their respective sections.

### **7.1 HFVR (20W) Unit Description**

The basic component defined by the requirements within this section is the standard high-frequency, vehicular mounted, unamplified receiver transmitter system. The HFVR (20W) is a single-channel software defined radio whose characteristics are defined within this section. The core component of the HFVR (20W) is the High Frequency Manpack (HFMP) radio, described in Section 6. Many of the HFVR (20W) specifications will be referenced to the respective subsections of the HFMP specification.

### **7.2 HFVR (20W) Unit Characteristics**

#### **7.2.1 Frequency Range and Resolution**

7.2.1.1 Shall be as listed in Section 6.2.1.

#### **7.2.2 Receive Characteristics**

7.2.2.1 Shall be as listed in Section 6.2.2.

#### **7.2.3 Transmit Characteristics**

7.2.3.1 Shall be as listed in Section 6.2.3.

#### **7.2.4 Physical Characteristics**

##### **7.2.4.1 Size and Weight**

7.2.4.1.1 Maximum weight of each HFVR (20W) shall be no more than 11.3 lbs (without HFMP installed).

7.2.4.1.2 Maximum physical volume of each HFVR (20W) shall be 8,980 cubic centimeters (548 cubic inches).

##### **7.2.4.2 Power**

7.2.4.2.1 Shall be operable with input voltages from at least +21.5 VDC to at least +31 VDC.

7.2.4.2.2 Shall provide buffered output power to HFMP between to at least +25 VDC and at least +26 VDC.

##### **7.2.4.3 Connectors and Interfaces**

Shall provide the following physical and software interfaces for the HFVR (20W):

7.2.4.3.1 DC output connector mating with HFMP battery connector described in Section 6.2.4.3.

7.2.4.3.2 DC input connector to accept power supplied from vehicle power system or external power supply.

7.2.4.3.3 DC output connector to provide power to external speaker/amplifier.

7.2.4.3.4 Multipurpose connector to provide power to, and control of, external antenna coupler.

7.2.4.3.5 RS-485 and RS-232 control signal input connector to receive HFMP interface described in Section 6.2.4.3.3.

7.2.4.3.6 All HFMP physical and software interfaces listed in Sections 6.2.4.3.1, 6.2.4.3.2, and 6.2.4.3.4 through 6.2.4.3.7 will be accessible and exposed when installed as part of the HFVR (20W).

##### **7.2.4.4 Environmental Specifications**

7.2.4.4.1 Shall be as listed in Section 6.2.4.4

## **7.3 Waveforms**

### **7.3.1 Unit Waveform Requirements**

7.3.1.1 Shall be as listed in Section 6.3.1.1.

### **7.3.2 Waveform and Mode Storage**

7.3.2.1 Shall be as listed in Section 6.3.1.2.

### **7.3.3 Waveform Selection**

7.3.3.1 Shall be as listed in Section 6.3.1.3.

## **7.4 GPS**

### **7.4.1 External GPS Interface Requirements**

7.4.1.1 Shall be as listed in Section 6.4.1.

### **7.4.2 GPS Display**

7.4.2.1 Shall be as listed in Section 6.4.2.

## **7.5 Computer Security**

### **7.5.1 INFOSEC and Cryptographic Requirements**

7.5.1.1 Shall be as listed in Section 6.5.1.

## **7.6 Keying Requirements**

For the purposes of this section, the term "keys" includes system keys, certificates, and Firefly vectors as well as user traffic keys.

### **7.6.1 Key Management**

7.6.1.1 Shall be as listed in Section 6.6.1.

### **7.6.2 Key Handling and Storage**

7.6.2.1 Shall be as listed in Section 6.6.2.

### **7.6.3 Zeroization**

7.6.3.1 Shall be as listed in Section 6.6.3.

## **7.7 Other Radio Requirements**

### **7.7.1 Speaker/Microphone**

7.7.1.1 Shall be as listed in Section 6.7.1.

### **7.7.2 Display**

7.7.2.1 Shall be as listed in Section 6.7.2.

### **7.7.3 Presets, Scanning, and Cloning**

7.7.3.1 Shall be as listed in Section 6.7.3.

### **7.7.4 Human Machine Interface (HMI)**

7.7.4.1 Shall be as listed in Section 6.7.4.

### **7.7.5 Identification and Marking**

7.7.5.1 Shall be as listed in Section 6.7.5.

## **7.7.6 Self Test**

### **7.7.6.1 Shall provide built-in test capabilities for detecting the following errors:**

7.7.6.1.1 Shall be as listed in Section 6.7.6.

## **7.7.7 Interchangeability**

FFF Interchangeability is defined in MIL-STD-196E and MIL-HBK-61A as a condition which exists when two or more items possess such functional and physical characteristics as to be equivalent in performance and durability, and are capable of being exchanged one for the other without alteration of the items themselves, or of adjoining items.

7.7.7.1 Provide capability for interchangeability of HFVR (20W) units, Vehicle Adapter amplifiers (VAAs), and accessories with other like-type HFVR (20W) units and accessories. Interchangeable elements are listed below.

7.7.7.1.1 HFMP units, to include the AN/PRC-150(P)(C) (NSN 5820-01-492-3628).

7.7.7.1.2 HFVR (20W) VAA systems to include AN/VRC-104(V)2 (NSN 5985-01-549-7412).

7.7.7.1.3 High Frequency and Very High Frequency antennas.

7.7.7.1.4 Headsets/handsets employing U-283 audio/keyfill connectors

## **7.7.8 Interoperability Certification**

7.7.8.1 Shall be certified by the National Security Agency (NSA) Information Assurance Directorate that the encryption system will protect the confidentiality of voice and data up to and including TOP SECRET.

## **8. HF Vehicular Mount Radio 150Watts (HFVR (150W)) Requirements**

This section discusses the minimum technical requirements for the High Frequency Vehicular Mount Radio (150 Watt) system. Technical requirements for other items are described in their respective sections.

### **8.1 HFVR (150W) Unit Description**

The basic component defined by the requirements within this section is the standard high-frequency, vehicular mounted, unamplified receiver transmitter system. The HFVR (150W) is a single-channel software defined radio whose characteristics are defined within this section. The core component of the HFVR (150W) is the High Frequency Manpack (HFMP) radio, described in Section 6. Many of the HFVR (150W) specifications will be referenced to the respective subsections of the HFMP specification.

### **8.2 HFVR (150W) Unit Characteristics**

#### **8.2.1 Frequency Range and Resolution**

8.2.1.1 Shall be as listed in Section 6.2.1.

#### **8.2.2 Receive Characteristics**

8.2.2.1 Shall be as listed in Section 6.2.1.

#### **8.2.3 Transmit Characteristics**

8.2.3.1 Shall provide up to 150 Watts PEP/Average RF power measured at the antenna connector from at least 1.6 MHz to 29.99999 MHz.

8.2.3.2 Shall provide up to 150 Watts PEP/Average RF power measured at the antenna connector from at least 1.6 MHz to 29.99999 MHz.

8.2.3.3 Shall be as listed in Sections 6.2.3.4 through 6.2.3.7.

#### **8.2.4 Physical Characteristics**

##### **8.2.4.1 Size and Weight**

8.2.4.1.1 Maximum weight of each HFVR (150W) shall be 14.85 kg (without HFMP installed).

8.2.4.1.2 Maximum physical volume of each HFVR (150W) shall be 17,141 cubic centimeters (1,046 cubic inches).

##### **8.2.4.2 Power**

8.2.4.2.1 Shall be operable with input voltages between no more than +23 VDC to no less than +30 VDC.

8.2.4.2.2 Shall provide buffered output power to HFMP between no more than +25 VDC and no less than +26 VDC.

8.2.4.2.3 Shall provide buffered output power to external antenna coupler and cooling fan.

##### **8.2.4.3 Connectors and Interfaces**

Shall provide the following physical and software interfaces for the HFVR (150W):

8.2.4.3.1 BNC connector to provide RF input from HFMP (100 milliWatts nominal).

8.2.4.3.2 Accessory connector to receive control signals from HFMP.

8.2.4.3.3 Audio connector to receive/send audio signals to/from HFMP.

8.2.4.3.4 Audio connector support external handset.

8.2.4.3.5 Accessory connector to provide control/power signals to external antenna coupler.

8.2.4.3.6 Grounding terminal.

8.2.4.3.7 Type N connector to connect to external antenna coupler or antenna (1.6 MHz – 29.99999 MHz).

8.2.4.3.8 BNC connector to connect to antenna (30 MHz – 59.99999 MHz).

8.2.4.3.9 Power connector to drive external cooling fan.

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- 8.2.4.3.10 DC input connector to interface with vehicle power system or external power supply.
- 8.2.4.3.11 All HFMP physical and software interfaces listed in Sections 6.2.4.3.1, 6.2.4.3.2, and 6.2.4.3.4 through 6.2.4.3.7 will be accessible and exposed when installed as part of the HFVR (150W).

#### **8.2.4.4 Environmental Specifications**

- 8.2.4.4.1 Shall be tested to MIL-STD-810 specifications as follows:
  - 8.2.4.4.1.1 Shock and vibration: Ground mobile environment, tactical.
  - 8.2.4.4.1.2 Temperature (Operating): -40C to +70C.

### **8.3 Waveforms**

#### **8.3.1 HFVR (150W) Unit Waveform Requirements**

- 8.3.1.1 Shall be as listed in Section 6.3.1.

#### **8.3.2 Waveform and Mode Storage**

- 8.3.2.1 Shall be as listed in Section 6.3.2.

#### **8.3.3 Waveform Selection**

- 8.3.3.1 Shall be as listed in Section 6.3.3.

### **8.4 GPS**

#### **8.4.1 External GPS Interface Requirements**

- 8.4.1.1 Shall be as listed in Section 6.4.1.

#### **8.4.2 GPS Display**

- 8.4.2.1 Shall be as listed in Section 6.4.2.

### **8.5 Computer Security**

#### **8.5.1 INFOSEC and Cryptographic Requirements**

- 8.5.1.1 Shall be as listed in Section 6.5.1.

### **8.6 Keying Requirements**

For the purposes of this section, the term "keys" includes system keys, certificates, and Firefly vectors as well as user traffic keys.

#### **8.6.1 Key Management**

- 8.6.1.1 Shall be as listed in Section 6.6.1.

#### **8.6.2 Key Handling and Storage**

- 8.6.2.1 Shall be as listed in Section 6.6.2.

#### **8.6.3 Zeroization**

- 8.6.3.1 Shall be as listed in Section 6.6.3.

### **8.7 Other Radio Requirements**

#### **8.7.1 Speaker/Microphone**

- 8.7.1.1 Shall be as listed in Section 6.7.1.
- 8.7.1.2 Shall provide an external speaker (amplified) to monitor receive audio signals.

#### **8.7.2 Display**

- 8.7.2.1 Shall be as listed in Section 6.7.2.

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### **8.7.3 Presets, Scanning, and Cloning**

8.7.3.1 Shall be as listed in Section 6.7.3.

### **8.7.4 Human Machine Interface (HMI)**

8.7.4.1 Shall be as listed in Section 6.7.4.

### **8.7.5 Identification and Marking**

8.7.5.1 Shall be as listed in Section 6.7.5.

### **8.7.6 Self Test**

#### **8.7.6.1 Shall provide built-in test capabilities for detecting the following errors:**

8.7.6.1.1 Shall be as listed in Section 6.7.6.

### **8.7.7 Interchangeability**

FFF Interchangeability is defined in MIL-STD-196E and MIL-HBK-61A as a condition which exists when two or more items possess such functional and physical characteristics as to be equivalent in performance and durability, and are capable of being exchanged one for the other without alteration of the items themselves, or of adjoining items.

8.7.7.1 Provide capability for interchangeability of HFVR (150W) units, Vehicle Adapter amplifiers (VAAs), and accessories with other like-type HFVR (150W) units and accessories. Interchangeable elements are listed below.

8.7.7.1.1 HFMP units, to include the AN/PRC-150(P)(C) (NSN 5820-01-492-3628).

8.7.7.1.2 HFVR (150W) VAA systems to include AN/VRC-104(V)3 (NSN 5820-01-565-2986).

8.7.7.1.3 High Frequency and Very High Frequency antennas.

8.7.7.1.4 Headsets/handsets employing U-283 audio/keyfill connectors

### **8.7.8 Interoperability Certification**

8.7.8.1 Shall be certified by the National Security Agency (NSA) Information Assurance Directorate that the encryption system will protect the confidentiality of voice and data up to and including TOP SECRET.

## **9. HF Vehicular Mount Radio 400Watts (HFVR (400W)) Requirements**

This section discusses the minimum technical requirements for the High Frequency Vehicular Mount Radio (400 Watt) system. Technical requirements for other items are described in their respective sections.

### **9.1 HFVR (400W) Unit Description**

The basic component defined by the requirements within this section is the standard high-frequency, vehicular mounted, unamplified receiver transmitter system. The HFVR (400W) is a single-channel software defined radio whose characteristics are defined within this section. The core component of the HFVR (400W) is the High Frequency Manpack (HFMP) radio, described in Section 6. Many of the HFVR (400W) specifications will be referenced to the respective subsections of the HFMP specification.

### **9.2 HFVR (400W) Unit Characteristics**

#### **9.2.1 Frequency Range and Resolution**

9.2.1.1 Shall be from at least 1.6 MHz to 29.99999 MHz for all modes of operation

#### **9.2.2 Receive Characteristics**

9.2.2.1 Shall be as listed in Section 6.2.1.

#### **9.2.3 Transmit Characteristics**

9.2.3.1 Shall provide up to 400 Watts PEP/Average RF power measured at the antenna connector from 1.6 MHz to 29.99999 MHz.

9.2.3.2 Shall be as listed in Sections 6.2.3.4 through 6.2.3.7.

#### **9.2.4 Physical Characteristics**

##### **9.2.4.1 Size and Weight**

9.2.4.1.1 Maximum weight of each HFVR (400W) shall be 20.45 kg (without HFMP installed).

9.2.4.1.2 Maximum physical volume of each HFVR (400W) shall be 24,833 cubic centimeters (1,516 cubic inches).

##### **9.2.4.2 Power**

9.2.4.2.1 Shall be operable with input voltages from at least +23 VDC to +30 VDC.

9.2.4.2.2 Shall provide buffered output power to HFMP between at least +25 VDC to +26 VDC.

9.2.4.2.3 Shall provide buffered output power to external antenna coupler and cooling fan.

##### **9.2.4.3 Connectors and Interfaces**

Shall provide the following physical and software interfaces for the HFVR (400W):

9.2.4.3.1 BNC connector to provide RF input from HFMP (100 milliWatts nominal).

9.2.4.3.2 Accessory connector to receive control signals from HFMP.

9.2.4.3.3 Accessory connector to provide control/power signals to external antenna coupler.

9.2.4.3.4 Grounding terminal.

9.2.4.3.5 Type N connector to connect to external antenna coupler.

9.2.4.3.6 DC input connector to interface with vehicle power system or external power supply.

9.2.4.3.7 All HFMP physical and software interfaces listed in Sections 6.2.4.3.1, 6.2.4.3.2, and 6.2.4.3.4 through 6.2.4.3.7 will be accessible and exposed when installed as part of the HFVR (400W).

##### **9.2.4.4 Environmental Specifications**

9.2.4.4.1 Shall be tested to MIL-STD-810 specifications as follows:

9.2.4.4.1.1 Shock and vibration: Ground mobile environment, tactical.

9.2.4.4.1.2 Temperature (Operating): -40C to +70C.

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9.2.4.4.1.3 Leakage: 1 m of water.

## **9.3 Waveforms**

### **9.3.1 HFVR (400W) Unit Waveform Requirements**

9.3.1.1 Shall be as listed in Section 6.3.1.

### **9.3.2 Waveform and Mode Storage**

9.3.2.1 Shall be as listed in Section 6.3.2.

### **9.3.3 Waveform Selection**

9.3.3.1 Shall be as listed in Section 6.3.3.

## **9.4 GPS**

### **9.4.1 External GPS Interface Requirements**

9.4.1.1 Shall be as listed in Section 6.4.1.

### **9.4.2 GPS Display**

9.4.2.1 Shall be as listed in Section 6.4.2.

## **9.5 Computer Security**

### **9.5.1 INFOSEC and Cryptographic Requirements**

9.5.1.1 Shall be as listed in Section 6.5.1.

## **9.6 Keying Requirements**

For the purposes of this section, the term "keys" includes system keys, certificates, and Firefly vectors as well as user traffic keys.

### **9.6.1 Key Management**

9.6.1.1 Shall be as listed in Section 6.6.1.

### **9.6.2 Key Handling and Storage**

9.6.2.1 Shall be as listed in Section 6.6.2.

### **9.6.3 Zeroization**

9.6.3.1 Shall be as listed in Section 6.6.3.

## **9.7 Other Radio Requirements**

### **9.7.1 Speaker/Microphone**

9.7.1.1 Shall be as listed in Section 6.7.1.

9.7.1.2 Shall provide an external speaker (amplified) to monitor receive audio signals.

### **9.7.2 Display**

9.7.2.1 Shall be as listed in Section 6.7.2.

### **9.7.3 Presets, Scanning, and Cloning**

9.7.3.1 Shall be as listed in Section 6.7.3.

### **9.7.4 Human Machine Interface (HMI)**

9.7.4.1 Shall be as listed in Section 6.7.4.

### **9.7.5 Identification and Marking**

9.7.5.1 Shall be as listed in Section 6.7.5.

### **9.7.6 Self Test**

#### **9.7.6.1 Shall provide built-in test capabilities for detecting the following errors:**

9.7.6.1.1 Shall be as listed in Section 6.7.6.

### **9.7.7 Interchangeability**

FFF Interchangeability is defined in MIL-STD-196E and MIL-HBK-61A as a condition which exists when two or more items possess such functional and physical characteristics as to be equivalent in performance and durability, and are capable of being exchanged one for the other without alteration of the items themselves, or of adjoining items.

9.7.7.1 Provide capability for interchangeability of HFVR (400W) units, Vehicle Adapter amplifiers (VAAs), and accessories with other like-type HFVR (400W) units and accessories. Interchangeable elements are listed below.

9.7.7.1.1 HFMP units, to include the AN/PRC-150(P)(C) (NSN 5820-01-492-3628).

9.7.7.1.2 HFVR (400W) VAA systems to include AN/VRC-104(V)4 (NSN 5820-01-512-2461).

9.7.7.1.3 High Frequency and Very High Frequency antennas.

9.7.7.1.4 Headsets/handsets employing U-283 audio/keyfill connectors

### **9.7.8 Interoperability Certification**

9.7.8.1 Shall be certified by the National Security Agency (NSA) Information Assurance Directorate that the encryption system will protect the confidentiality of voice and data up to and including TOP SECRET.

## **10. Single Multiband Manpack Vehicular Mount Radio (MBMVR (S)) Requirements**

This section discusses the minimum technical requirements for the Single Multiband Manpack Vehicular Mount Radio system. Technical requirements for other items are described in their respective sections.

### **10.1 MBMVR (S) Unit Description**

The basic component defined by the requirements within this section is the standard multiband, vehicle mounted, amplified receiver/transmitter system. The MBMVR (S) is a single-channel software defined radio whose characteristics are defined within this section. The core component of the MBMVR (S) is the Multiband Manpack Radio (MBMR) radio, described in Section 5. Many of the MBMVR (S) specifications will be referenced to the respective subsections of the MBMR specification.

### **10.2 MBMVR (S) Unit Characteristics**

#### **10.2.1 Frequency Range and Resolution**

10.2.1.1 Shall be as listed in Section 5.2.1.

#### **10.2.2 Receive Characteristics**

10.2.2.1 Receive sensitivity shall be as listed in Sections 5.2.2.1 and 5.2.2.2.

10.2.2.2 Adjacent channel rejection shall be at least 60 dB referenced to 10 dB SINAD at twice the channel bandwidth for all bands and modes.

10.2.2.3 Audio frequency response shall be as listed in Section 5.2.2.6.

#### **10.2.3 Transmit Characteristics**

10.2.3.1 Shall provide up to at least 50 Watts of RF output power measured at the antenna in all modes from 30 MHz – 511.99999 MHz.

10.2.3.2 Shall provide up to at least 20 Watts of RF output power measured at the antenna in all modes from 512 MHz – 1999.950 MHz.

10.2.3.3 Power selection shall be as listed in Section 5.2.3.4

10.2.3.4 Frequency stability shall be  $\pm 1.0$  ppm over the operating temperature range and  $\pm 0.5$  ppm per year.

10.2.3.5 Harmonic suppression for 2<sup>nd</sup> and 3<sup>rd</sup> order harmonics shall be at least 53 dB in the 30 MHz – 511.99999 MHz band.

10.2.3.6 Harmonic suppression for 2<sup>nd</sup> and 3<sup>rd</sup> order harmonics shall be at least 50 dB in the 512 MHz – 1999.950 MHz band.

10.2.3.7 Harmonic suppression for 2<sup>nd</sup> and 3<sup>rd</sup> order harmonics shall be at least 56 dB in SATCOM modes.

#### **10.2.4 Physical Characteristics**

##### **10.2.4.1 Size and Weight**

10.2.4.1.1 Maximum weight of each MBMVR (S) shall be 14.3 kg without MBMR installed.

10.2.4.1.2 Maximum physical volume of each MBMVR (S) shall be 23,008 cubic centimeters (1,404 cubic inches).

##### **10.2.4.2 Power**

10.2.4.2.1 Shall be operable with input voltages from at least +20 VDC to +32 VDC, MIL-STD-1275B compliant.

10.2.4.2.2 Shall provide buffered output power to MBMR.

10.2.4.2.3 Shall provide buffered output power to external accessories.

##### **10.2.4.3 Connectors and Interfaces**

Shall provide the following physical and software interfaces for the MBMVR (S):

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- 10.2.4.3.1 Type N connector to accept RF input from MBMR (512 MHz to 2 GHz).
- 10.2.4.3.2 BNC connector to accept RF input from MBMR (30 MHz to 512 MHz).
- 10.2.4.3.3 BNC connector to connect to SATCOM antenna.
- 10.2.4.3.4 BNC connector to connect to VHF antenna (30 MHz – 224.99999 MHz).
- 10.2.4.3.5 BNC connector to Wide Band antenna (512 MHz – 2 GHz).
- 10.2.4.3.6 BNC connector to connect to UHF antenna (225 MHz – 511.99999 MHz).
- 10.2.4.3.7 Black auxiliary Input/output (I/O) connector to provide access to MBMR Black Auxiliary I/O port when mounted.
- 10.2.4.3.8 Red auxiliary I/O connector to provide access to MBMR Red Auxiliary I/O port when mounted.
- 10.2.4.3.9 Black data I/O connector to provide communications between amplifier and MBMR.
- 10.2.4.3.10 Red data I/O connector to provide communications between amplifier and MBMR.
- 10.2.4.3.11 Amplifier control cable connector for use with external, optional power amplifier.
- 10.2.4.3.12 DC power input connector to accept power from vehicle power systems or external power supply.
- 10.2.4.3.13 DC power connector to provide operating power to mounted MBMR.
- 10.2.4.3.14 DC power connector to provide operating power to external accessories.
- 10.2.4.3.15 Audio connector to route audio signals to/from MBMR.
- 10.2.4.3.16 Audio connector to route audio signals to/from external speaker or intercom system.
- 10.2.4.3.17 All MBMR physical and software interfaces listed in Sections 5.2.4.3.1 - 5.2.4.3.3, and 5.2.4.3.5 through 5.2.4.3.8 will be accessible and exposed when installed as part of the MBMVR (S).

#### **10.2.4.4 Environmental Specifications**

- 10.2.4.4.1 Shall be as listed in Section 5.2.4.4

### **10.3 Waveforms**

#### **10.3.1 Unit Waveform Requirements**

- 10.3.1.1 Shall be as listed in Section 5.3.1.

#### **10.3.2 Waveform and Mode Storage**

- 10.3.2.1 Shall be as listed in Section 5.3.2.

#### **10.3.3 Waveform Selection**

- 10.3.3.1 Shall be as listed in Section 5.3.3.

### **10.4 Retransmission**

For retransmission, two MBMVR (S) units, operating the same waveform, are connected together via a retransmission cable. Information is exchanged bi-directionally, each unit retransmitting the voice/data it received from the other (i.e. both MBMVR (S) units receive and transmit voice/data).

#### **10.4.1 Retransmission Requirements**

- 10.4.1.1 Shall be as listed in Section 5.4.1.

### **10.5 GPS**

#### **10.5.1 External GPS Interface Requirements**

- 10.5.1.1 Shall be as listed in Section 5.5.1.

#### **10.5.2 Internal GPS Requirements**

- 10.5.2.1 Shall be as listed in Section 5.5.2.

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### **10.5.3 GPS Display**

10.5.3.1 Shall be as listed in Section 5.5.3.

## **10.6 Computer Security**

### **10.6.1 INFOSEC and Cryptographic Requirements**

10.6.1.1 Shall be as listed in Section 5.6.1.

### **10.7 Keying Requirements**

For the purposes of this section, the term "keys" includes system keys, certificates, and Firefly vectors as well as user traffic keys.

#### **10.7.1 Key Management**

10.7.1.1 Shall be as listed in Section 5.7.1.

#### **10.7.2 Key Handling and Storage**

10.7.2.1 Shall be as listed in Section 5.7.2.

#### **10.7.3 Zeroization**

10.7.3.1 Shall be as listed in Section 5.7.3.

## **10.8 Other Radio Requirements**

### **10.8.1 Speaker/Microphone**

10.8.1.1 Shall be as listed in Section 5.8.1.

10.8.1.2 Shall be interoperable with service common vehicular intercom systems.

### **10.8.2 Display**

10.8.2.1 Shall be as listed in Section 5.8.2.

### **10.8.3 Presets, Scanning, and Cloning**

10.8.3.1 Shall be as listed in Section 5.8.3.

### **10.8.4 Clock**

10.8.4.1 Shall be as listed in Section 5.8.4.

### **10.8.5 Human Machine Interface (HMI)**

10.8.5.1 Shall be as listed in Section 5.8.5.

### **10.8.6 Identification and Marking**

10.8.6.1 Shall be as listed in Section 5.8.6.

10.8.6.2 Shall be coated with CARC green 383 per Federal Standard 595B.

### **10.8.7 Self Test**

#### **10.8.7.1 Shall provide built-in test capabilities for detecting the following errors:**

10.8.7.1.1 Shall be as listed in Section 5.8.8.1.

### **10.8.8 Interchangeability**

FFF Interchangeability is defined in MIL-STD-196E and MIL-HBK-61A as a condition which exists when two or more items possess such functional and physical characteristics as to be equivalent in performance and durability, and are capable of being exchanged one for the other without alteration of the items themselves, or of adjoining items.

10.8.8.1 Provide capability for interchangeability of MBVR (S) units, Vehicle Adapter amplifiers (VAAs), and accessories with other like-type MBVR (S) units and accessories. Interchangeable elements are listed below.

10.8.8.1.1 MBMR units, to include AN/PRC-117G(V)1(C) (NSN 5820-01-554-8564).

10.8.8.1.2 MBVR (S) VAA systems to include AN/VRC-114(V)1(NSN 5820-01-589-2203).

10.8.8.1.3 Very High Frequency, UHF antennas, broadband antennas, and wide band antennas.

10.8.8.1.4 Headsets/handsets employing U-283 audio/keyfill connectors

#### **10.8.9 Interoperability Certification**

10.8.9.1 Shall be compliant with the Software Communications Architecture (SCA) version 2.2, as demonstrated by SCA Certification letter from Joint Program Executive Office, Joint Tactical Radio System (JPEO JTRS).

10.8.9.2 Shall be certified by the National Security Agency (NSA) Information Assurance Directorate that the encryption system will protect the confidentiality of voice and data up to and including TOP SECRET.

## **11. Dual Multiband Manpack Vehicular Mount Radio (MBMVR (D)) Requirements**

This section discusses the minimum technical requirements for the Dual Multiband Manpack Vehicular Mount Radio system. Technical requirements for other items are described in their respective sections.

### **11.1 MBMVR (D) Unit Description**

The basic component defined by the requirements within this section is the standard multiband, vehicle mounted, amplified, dual receiver/transmitter system. The MBMVR (D) is two single-channel software defined radios whose characteristics are defined within this section. The core component of the MBMVR (D) is a pair of Multiband Manpack Radio (MBMR) radios, described in Section 5. Many of the MBMVR (D) specifications will be referenced to the respective subsections of the MBMR specification.

### **11.2 MBMVR (D) Unit Characteristics**

#### **11.2.1 Frequency Range and Resolution**

11.2.1.1 Shall be as listed in Section 5.2.1.

11.2.1.2 Shall be capable of operating on two distinct frequencies simultaneously.

#### **11.2.2 Receive Characteristics**

11.2.2.1 Shall be as listed in Section 10.2.2.

11.2.2.2 Shall be capable of receiving on two distinct frequencies simultaneously.

#### **11.2.3 Transmit Characteristics**

11.2.3.1 Shall be as listed in Section 10.2.3.

11.2.3.2 Shall be capable of transmitting on two distinct frequencies simultaneously.

#### **11.2.4 Physical Characteristics**

##### **11.2.4.1 Size and Weight**

11.2.4.1.1 Maximum weight of each MBMVR (D) shall be 17.5 kg without MBMRs installed.

11.2.4.1.2 Maximum physical volume of each MBMVR (D) shall be 34,900 cubic centimeters (2,130 cubic inches).

##### **11.2.4.2 Power**

11.2.4.2.1 Shall be as listed in Section 10.2.4.2.

##### **11.2.4.3 Connectors and Interfaces**

Shall provide the following physical and software interfaces for the MBMVR (D):

11.2.4.3.1 Shall be as listed in Section 10.2.4.3, with double the quantity of physical connectors.

##### **11.2.4.4 Environmental Specifications**

11.2.4.4.1 Shall be as listed in Section 10.2.4.4.

### **11.3 Waveforms**

#### **11.3.1 Unit Waveform Requirements**

11.3.1.1 Shall be as listed in Section 5.3.1.

#### **11.3.2 Waveform and Mode Storage**

11.3.2.1 Shall be as listed in Section 5.3.2

#### **11.3.3 Waveform Selection**

11.3.3.1 Shall be as listed in Section 5.3.3.

## **11.4 Retransmission**

For retransmission, two MBMVR (D) units, operating the same waveform, are connected together via a retransmission cable. Information is exchanged bi-directionally, each unit retransmitting the voice/data it received from the other (i.e. both MBMVR (D) units receive and transmit voice/data).

### **11.4.1 Retransmission Requirements**

11.4.1.1 Shall be as listed in Section 5.4.1.

## **11.5 GPS**

### **11.5.1 External GPS Interface Requirements**

11.5.1.1 Shall be as listed in Section 5.5.1

### **11.5.2 GPS Display**

11.5.2.1 Shall be as listed in Section 5.5.2.

### **11.5.3 Internal GPS Requirements**

11.5.3.1 Shall be as listed in Section 5.5.3.

## **11.6 Computer Security**

### **11.6.1 INFOSEC and Cryptographic Requirements**

11.6.1.1 Shall be as listed in Section 5.6.1.

## **11.7 Keying Requirements**

For the purposes of this section, the term "keys" includes system keys, certificates, and Firefly vectors as well as user traffic keys.

### **11.7.1 Key Management**

11.7.1.1 Shall be as listed in Section 5.7.1.

### **11.7.2 Key Handling and Storage**

11.7.2.1 Shall be as listed in Section 5.7.2.

### **11.7.3 Zeroization**

11.7.3.1 Shall be as listed in Section 5.7.3.

## **11.8 Other Radio Requirements**

### **11.8.1 Speaker/Microphone**

11.8.1.1 Shall be as listed in Section 5.8.1.

11.8.1.2 Shall be interoperable with service common vehicular intercom systems.

11.8.1.3 Shall be capable of interfacing with two speaker/microphone or intercom systems simultaneously.

### **11.8.2 Display**

11.8.2.1 Shall be as listed in Section 5.8.2.

### **11.8.3 Presets, Scanning, and Cloning**

11.8.3.1 Shall be as listed in Section 5.8.3.

### **11.8.4 Clock**

11.8.4.1 Shall be as listed in Section 5.8.4.

### **11.8.5 Human Machine Interface (HMI)**

11.8.5.1 Shall be as listed in Section 5.8.5.

### **11.8.6 Identification and Marking**

11.8.6.1 Shall be as listed in Section 5.8.6.

11.8.6.2 Shall be coated with CARC green 383 per Federal Standard 595B.

### **11.8.7 Self Test**

#### **11.8.7.1 Shall provide built-in test capabilities for detecting the following errors:**

11.8.7.1.1 Shall be as listed in Section 5.8.8.1.

### **11.8.8 Interchangeability**

FFF Interchangeability is defined in MIL-STD-196E and MIL-HBK-61A as a condition which exists when two or more items possess such functional and physical characteristics as to be equivalent in performance and durability, and are capable of being exchanged one for the other without alteration of the items themselves, or of adjoining items.

11.8.8.1 Provide capability for interchangeability of MBVR (D) units, Vehicle Adapter amplifiers (VAAs), and accessories with other like-type MBVR (D) units and accessories. Interchangeable elements are listed below.

11.8.8.1.1 MBMR units, to include AN/PRC-117G(V)1(C) (NSN 5820-01-554-8564).

11.8.8.1.2 MBVR (D) VAA systems to include AN/VRC-114(V)2 (NSN 5820-01-591-1430).

11.8.8.1.3 Very High Frequency, UHF antennas, broadband antennas, and wide band antennas.

11.8.8.1.4 Headsets/handsets employing U-283 audio/keyfill connectors

### **11.8.9 Interoperability Certification**

11.8.9.1 Shall be compliant with the Software Communications Architecture (SCA) version 2.2, as demonstrated by SCA Certification letter from Joint Program Executive Office, Joint Tactical Radio System (JPEO JTRS).

11.8.9.2 Shall be certified by the National Security Agency (NSA) Information Assurance Directorate that the encryption system will protect the confidentiality of voice and data up to and including TOP SECRET.

## **12. Dual Multiband Manpack/Handheld Vehicular Mount Radio (MBMHHVR (D)) Requirements**

This section discusses the minimum technical requirements for the Dual Multiband Manpack/Handheld Vehicular Mount Radio system. Technical requirements for other items are described in their respective sections.

### **12.1 MBMHHVR (D) Unit Description**

The basic component defined by the requirements within this section is the standard multiband, vehicle mounted, amplified, dual receiver/transmitter system. The MBMHHVR (D) is two single-channel software defined radios with vehicular amplifier/adapters (VAAs) whose characteristics are defined within this section. The core component of the MBMHHVR (D) is one each of the Multiband Manpack Radio (MBMR) radio and the Multiband Handheld (MBHH) radio, described in Section 1 and 5, respectively. Further, the MBMR/VAA combination is identical to that used in the MBMVR (S) described in Section 10. Many of the MBMHHVR (D) specifications will be referenced to the respective subsections of the MBMR, MBHH, and/or MBMVR (S) specifications.

### **12.2 MBMHHVR (D) Unit Characteristics**

#### **12.2.1 Frequency Range and Resolution**

12.2.1.1 The portion using the MBHH and VAA shall be as listed in Section 1.2.1.

12.2.1.2 The portion using the MBMR and VAA shall be as listed in Section 10.2.1.

#### **12.2.2 Receive Characteristics**

12.2.2.1 The portion using the MBHH and VAA shall have receiver sensitivity of at least -113 dBm at 12 dB SINAD in FM mode.

12.2.2.2 The portion using the MBMR and VAA shall be as listed in Section 10.2.2

#### **12.2.3 Transmit Characteristics**

12.2.3.1 The portion using the MBHH and VAA shall have the following transmitter characteristics:

12.2.3.1.1 Provide up to at least 50 Watts Peak Envelope Power (PEP) measured at the antenna from 30 MHz to 90 MHz.

12.2.3.1.2 Provide up to at least 3.5Watts Peak Envelope Power (PEP) measured at the antenna from 90 MHz to 512 MHz.

12.2.3.1.3 RF power output shall be user selectable up to the limits in Sections 12.2.3.1.1 and 12.2.3.1.2.

12.2.3.1.4 Harmonic suppression shall be greater than 50 dB for 30 MHz - 90 MHz.

12.2.3.1.5 Harmonic suppression shall be greater than 40 dB for 90 MHz - 512 MHz.

12.2.3.1.6 Spurious suppression shall be greater than 80 dBc for 30 MHz - 90 MHz.

12.2.3.1.7 Spurious suppression shall be greater than 50 dBc for 90 MHz - 512 MHz.

12.2.3.2 The portion using the MBMR and VAA shall be as listed in Section 12.2.3.

#### **12.2.4 Physical Characteristics**

##### **12.2.4.1 Size and Weight**

12.2.4.1.1 Maximum weight of the system shall be no more than 78 pounds with manpack and handheld radios installed.

12.2.4.1.2 Maximum physical volume of the system shall be no more than 49,326 cubic centimeters (3010 cubic inches) with manpack and handheld radios installed.

##### **12.2.4.2 Power**

12.2.4.2.1 Shall be as listed in Section 10.2.4.

### **12.2.4.3 Connectors and Interfaces**

Shall provide the following physical and software interfaces for the MBMHHVR (D):

12.2.4.3.1 The portion using the MBHH and VAA shall be as listed in Section 1.2.4.3, and:

12.2.4.3.2.1 Audio interface cables for use with external amplifiers or intercom systems.

12.2.4.3.2.2 DC Power input connectors for use with vehicle power systems or power supplies.

12.2.4.3.2.3 RF connector to provide RF power to from antenna.

12.2.4.3.2.4 Interface connector to communicate with installed MBHH.

12.2.4.3.2 The portion using the MBMR and VAA shall be as listed in Section 10.2.4.3.

### **12.2.4.4 Environmental Specifications**

12.2.4.4.1 Shall be as listed in Section 5.2.4.4.

## **12.3 Waveforms**

### **12.3.1 Waveform Requirements**

12.3.1.1 The portion using the MBHH and VAA shall be as listed in Section 1.3.1.

12.3.1.2 The portion using the MBMR and VAA shall be as listed in Section 5.3.1.

### **12.3.2 Waveform and Mode Storage**

12.3.2.1 The portion using the MBHH and VAA shall be as listed in Section 1.3.2.

12.3.2.2 The portion using the MBMR and VAA shall be as listed in Section 5.3.2.

### **12.3.3 Waveform Selection**

12.3.3.1 The portion using the MBHH and VAA shall be as listed in Section 1.3.3.

12.3.3.2 The portion using the MBMR and VAA shall be as listed in Section 5.3.3.

## **12.4 Retransmission**

For retransmission, two MBMHHVR (D) units, operating the same waveform, are connected together via a retransmission cable. Information is exchanged bi-directionally, each unit retransmitting the voice/data it received from the other (i.e. both MBMHHVR (D) units receive and transmit voice/data).

### **12.4.1 Retransmission Requirements**

12.4.1.1 The portion using the MBHH and VAA shall be as listed in Section 1.4.1.

12.4.1.2 The portion using the MBMR and VAA shall be as listed in Section 5.4.1.

## **12.5 GPS**

### **12.5.1 External GPS Interface Requirements**

12.5.1.1 The portion using the MBHH and VAA shall be as listed in Section 1.5.1.

12.5.1.1 The portion using the MBHH and VAA shall be as listed in Section 5.5.1.

### **12.5.2 GPS Display**

12.5.2.1 The portion using the MBHH and VAA shall be as listed in Section 1.5.2.

12.5.2.1 The portion using the MBHH and VAA shall be as listed in Section 5.5.3.

### **12.5.3 Internal GPS Requirements**

12.5.3.1 The portion using the MBHH and VAA shall be as listed in Section 5.5.2.

## **12.6 Computer Security**

### **12.6.1 INFOSEC and Cryptographic Requirements**

12.6.1.1 Shall be as listed in Sections 1.6.1 and 5.6.1.

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## **12.7 Keying Requirements**

For the purposes of this section, the term "keys" includes system keys, certificates, and Firefly vectors as well as user traffic keys.

### **12.7.1 Key Management**

12.7.1.1 The portion using the MBHH and VAA shall be as listed in Section 1.7.1.

12.7.1.2 The portion using the MBMR and VAA shall be as listed in Section 5.7.1.

### **12.7.2 Key Handling and Storage**

12.7.2.1 The portion using the MBHH and VAA shall be as listed in Section 1.7.2.

12.7.2.2 The portion using the MBMR and VAA shall be as listed in Section 5.7.2.

### **12.7.3 Zeroization**

12.7.3.1 The portion using the MBHH and VAA shall be as listed in Section 1.7.3.

12.7.3.2 The portion using the MBMR and VAA shall be as listed in Section 5.7.3.

## **12.8 Other Radio Requirements**

### **12.8.1 Speaker/Microphone**

12.8.1.1 Shall be as listed in Section 5.8.1.

12.8.1.2 Shall be interoperable with service common vehicular intercom systems.

### **12.8.2 Display**

12.8.2.1 The portion using the MBHH and VAA shall be as listed in Section 1.8.2.

12.8.2.2 The portion using the MBMR and VAA shall be as listed in Section 5.8.2.

### **12.8.3 Presets, Scanning, and Cloning**

12.8.3.1 The portion using the MBHH and VAA shall be as listed in Section 1.8.3.

12.8.3.2 The portion using the MBMR and VAA shall be as listed in Section 5.8.3.

### **12.8.4 Clock**

12.8.4.1 The portion using the MBHH and VAA shall be as listed in Section 1.8.4.

12.8.4.2 The portion using the MBMR and VAA shall be as listed in Section 5.8.4.

### **12.8.5 Human Machine Interface (HMI)**

12.8.5.1 The portion using the MBHH and VAA shall be as listed in Section 1.8.5.

12.8.5.2 The portion using the MBMR and VAA shall be as listed in Section 5.8.5.

### **12.8.6 Identification and Marking**

12.8.6.1 The portion using the MBHH and VAA shall be as listed in Section 1.8.6.

12.8.6.2 The portion using the MBMR and VAA shall be as listed in Section 5.8.6.

### **12.8.7 Self-Test**

#### **12.8.7.1 Shall provide built-in test capabilities for detecting the following errors:**

12.8.7.1.1 The portion using the MBHH and VAA shall be as listed in Section 1.8.8.1.

12.8.7.1.2 The portion using the MBMR and VAA shall be as listed in Section 5.8.8.1.

### **12.8.8 Interchangeability**

FFF Interchangeability is defined in MIL-STD-196E and MIL-HBK-61A as a condition which exists when two or more items possess such functional and physical characteristics as to be equivalent in performance and durability, and are capable of being exchanged one for the other without alteration of the items themselves, or of adjoining items.

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12.8.8.1 Provide capability for interchangeability of MBMHHVR (D) units, Vehicle Adapter amplifiers (VAAs), and accessories with other like-type MBMHHVR (D) units and accessories. Interchangeable elements are listed below.

12.8.8.1.1 The portion using the MBHH and VAA shall be as listed in Sections 1.8.9.1 and 13.8.8.1.

12.8.8.1.2 The portion using the MBHH and VAA shall be as listed in Sections 5.8.9.1, 10.8.8.1, and

### **12.8.9 Interoperability Certification**

12.8.9.1 Shall be compliant with the Software Communications Architecture (SCA) version 2.2, as demonstrated by SCA Certification letter from Joint Program Executive Office, Joint Tactical Radio System (JPEO JTRS).

12.8.9.2 Shall be certified by the National Security Agency (NSA) Information Assurance Directorate that the encryption system will protect the confidentiality of voice and data up to and including TOP SECRET.

### **13. Dual Multiband Handheld Vehicular Mount Radio (MBHHVR (D)) Requirements**

This section discusses the minimum technical requirements for the Dual Multiband Handheld Vehicular Mount Radio system. Technical requirements for other items are described in their respective sections.

#### **13.1 MBMHVR (D) Unit Description**

The basic component defined by the requirements within this section is the standard multiband, vehicle mounted, amplified, dual receiver/transmitter system. The MBHHVR (D) is two single-channel software defined radios with vehicular amplifier/adapters (VAAs) whose characteristics are defined within this section. The core components of the MBHHVR (D) are two Multiband Handheld (MBHH) radios, described in Section 1. Many of the MBHHVR (D) specifications will be referenced to the respective subsections of the MBHH specifications.

#### **13.2 Unit Characteristics**

##### **13.2.1 Frequency Range and Resolution**

13.2.1.1 Shall be as listed in Section 1.2.1.

##### **13.2.2 Receive Characteristics**

13.2.2.1 Receive sensitivity shall be at least -112 dBm at 12 dB SINAD in FM mode.

13.2.2.2 Image rejection shall be greater than 80 dB for the first intermediate frequency (IF) image and greater than 60 dB for the second IF image.

13.2.2.3 IF rejection shall be greater than 70dB.

##### **13.2.3 Transmit Characteristics**

13.2.3.1 Provide up to at least 50 Watts of RF power output measured at the antenna from 30 MHz to 89.999 MHz.

13.2.3.2 Provide up to at least 3.5 Watts of RF power output measured at the antenna from 90 MHz to 512 MHz.

13.2.3.3 Provide at least three levels of user selectable RF output power over the ranges listed in Sections 13.2.3.1 and 13.2.3.2.

13.2.3.4 Harmonic suppression shall be greater than - 60 dBc from 30 MHz to 89.999 MHz and greater than -48 dBc from 90 MHz to 512 MHz.

13.2.3.5 Frequency stability shall be as listed in Section 1.2.3.5.

##### **13.2.4 Physical Characteristics**

###### **13.2.4.1 Size and Weight**

13.2.4.1.1 Maximum weight of the system shall be no more than 84 lbs. without MBHH units installed.

13.2.4.1.2 Maximum physical volume of the system shall be 44,800 cubic centimeters (2,750 cubic inches).

###### **13.2.4.2 Power**

13.2.4.2.1 Shall be operable with input voltages from at least +20 VDC to +32 VDC, MIL-STD-1275B compliant.

13.2.4.2.2 Shall provide buffered output power to MBHs when installed.

13.2.4.2.3 Shall provide buffered output power to external accessories.

###### **13.2.4.3 Connectors and Interfaces**

Shall provide the following physical and software interfaces:

13.2.4.3.1 Power input connectors to accept DC power input from vehicle power system or external power supply.

13.2.4.3.2 Two auxiliary connectors to provide access to MBHH data interfaces listed in Sections 1.2.4.3.3, 1.2.4.3.6, and 1.2.4.3.7.

13.2.4.3.3 Two auxiliary connectors to interface with installed MBHH units.

13.2.4.3.4 Two power output connectors to provide power to installed MBHH units.

13.2.4.3.5 Two power output connectors to provide power to external accessories.

13.2.4.3.6 Two BNC connectors to interface with installed MBHH units.

13.2.4.3.7 BNC connector to interface with UHF antenna (90 MHz to 512 MHz).

13.2.4.3.8 BNC connector to interface with VHF antenna (30 MHz to 89.999 MHz).

#### **13.2.4.4 Environmental Specifications**

13.2.4.4.1 Shall be as listed in Section 1.2.4.4.

### **13.3 Waveforms**

#### **13.3.1 Unit Waveform Requirements**

13.3.1.1 Shall be as listed in Section 1.3.1.

#### **13.3.2 Waveform and Mode Storage**

13.3.2.1 Shall be as listed in Section 1.3.2

#### **13.3.3 Waveform Selection**

13.3.3.1 Shall be as listed in Section 1.3.3

### **13.4 Retransmission**

For retransmission, two MBHHVR (D) units, operating the same waveform, are connected together via a retransmission cable. Information is exchanged bi-directionally, each unit retransmitting the voice/data it received from the other (i.e. both MBHHVR (D) units receive and transmit voice/data).

#### **13.4.1 Retransmission Requirements**

13.4.1.1 Shall be as listed in Section 1.4.1.

### **13.5 GPS**

#### **13.5.1 External GPS Interface Requirements**

13.5.1.1 Shall be as listed in Section 1.5.1.

#### **13.5.2 GPS Display**

13.5.2.1 Shall be as listed in Section 1.5.2.

### **13.6 Computer Security**

#### **13.6.1 INFOSEC and Cryptographic Requirements**

13.6.1.1 Shall be as listed in Section 1.6.1.

### **13.7 Keying Requirements**

For the purposes of this section, the term "keys" includes system keys, certificates, and Firefly vectors as well as user traffic keys.

#### **13.7.1 Key Management**

13.7.1.1 Shall be as listed in Section 1.7.1.

#### **13.7.2 Key Handling and Storage**

13.7.2.1 Shall be as listed in Section 1.7.2.

### **13.7.3 Zeroization**

13.7.3.1 Shall be as listed in Section 1.7.3.

## **13.8 Other Radio Requirements**

### **13.8.1 Speaker/Microphone**

13.8.1.1 Shall be as listed in Section 1.8.1.

13.8.1.2 Shall be interoperable with service common vehicular intercom systems.

13.8.1.3 Shall be capable of interfacing with two speaker/microphone or intercom systems simultaneously.

### **13.8.2 Display**

13.8.2.1 Shall be as listed in Section 1.8.2.

13.8.2.2 Shall provide visual indication of battery charge status of all installed MBHH units.

### **13.8.3 Presets, Scanning, and Cloning**

13.8.3.1 Shall be as listed in Section 1.8.3.

### **13.8.4 Clock**

13.8.4.1 Shall be as listed in Section 1.8.4.

### **13.8.5 Human Machine Interface (HMI)**

13.8.5.1 Shall be as listed in Section 1.8.5.

### **13.8.6 Identification and Marking**

13.8.6.1 Shall be as listed in Section 1.8.6.

### **13.8.7 Self Test**

#### **13.8.7.1 Shall provide built-in test capabilities for detecting the following errors:**

13.8.7.1.1 Shall be as listed in Section 1.8.8.1.

### **13.8.8 Interchangeability**

FFF Interchangeability is defined in MIL-STD-196E and MIL-HBK-61A as a condition which exists when two or more items possess such functional and physical characteristics as to be equivalent in performance and durability, and are capable of being exchanged one for the other without alteration of the items themselves, or of adjoining items.

13.8.8.1 Provide capability for interchangeability of MBHHVR (D) units, Vehicle Adapter amplifiers (VAAs), and accessories with other like-type MBHHVR (D) units and accessories. Interchangeable elements are listed below.

13.8.8.1.1 MBHH units, to include AN/PRC-152(V)1(C) (NSN 5820-01-577-8278).

13.8.8.1.2 MBHHVR (D) VAA systems to include AN/VRC-110 (NSN 5820-01-557-8450).

13.8.8.1.3 Very High Frequency, UHF antennas, broadband antennas, and wide band antennas.

13.8.8.1.4 Headsets/handsets employing U-283 audio/keyfill connectors

### **13.8.9 Interoperability Certification**

13.8.9.1 Shall be compliant with the Software Communications Architecture (SCA) version 2.2, as demonstrated by SCA Certification letter from Joint Program Executive Office, Joint Tactical Radio System (JPEO JTRS).

13.8.9.2 Shall be certified by the National Security Agency (NSA) Information Assurance Directorate that the encryption system will protect the confidentiality of voice and data up to and including TOP SECRET.

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## **14. Multiband Manpack Radio NSW (MBMR (NSW)) Requirements**

This section discusses the minimum technical requirements for all Multiband Manpack Radio units. Technical requirements for other items are described in their respective sections.

### **14.1 MBMR (NSW) Unit Description**

The basic component defined by the requirements within this section is the standard multiband manpack receiver transmitter unit – hereafter referred to as an MBMR (NSW) unit. The MBMR (NSW) unit is a single-channel, manpack format, software defined radio whose requirements are defined within this section. The MBMR is almost identical to the Multiband Manpack Radio (MBMR) radio, described in Section 5, therefore many of the MBMR (NSW) specifications will be referenced to the respective subsections of the MBMR specification.

### **14.2 MBMR (NSW) Unit Characteristics**

#### **14.2.1 Frequency Range and Resolution**

14.2.1.1 Shall be as listed in Section 5.2.1.

#### **14.2.2 Receive Characteristics**

14.2.2.1 Shall be as listed in Section 5.2.2.

#### **14.2.3 Transmit Characteristics**

14.2.3.1 Shall be as listed in Section 5.2.3.

#### **14.2.4 Physical Characteristics**

##### **14.2.4.1 Size and Weight**

14.2.4.1.1 Shall be as listed in Section 5.2.4.1.

##### **14.2.4.2 Power**

14.2.4.2.1 Shall be as listed in Section 5.2.4.2.

##### **14.2.4.3 Connectors and Interfaces**

Shall provide the following physical and software interfaces for the MBMR (NSW):

14.2.4.3.1 Shall be as listed in Section 5.2.4.3.

##### **14.2.4.4 Environmental Specifications**

14.2.4.4.1 Shall be as listed in Section 5.2.4.4.

### **14.3 Waveforms**

#### **14.3.1 Unit Waveform Requirements**

14.3.1.1 Core waveform and mode requirements shall be as per Appendix A.

#### **14.3.2 Waveform and Mode Storage**

14.3.2.1 Shall be as listed in Section 5.3.2.

#### **14.3.3 Waveform Selection**

14.3.3.1 Shall be as listed in Section 5.3.3.

### **14.4 Retransmission**

For retransmission, two MBMR (NSW) units, operating the same waveform, are connected together via a retransmission cable. Information is exchanged bi-directionally, each unit retransmitting the voice/data it received from the other (i.e. both MBMR (NSW) units receive and transmit voice/data).

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#### **14.4.1 Retransmission Requirements**

14.4.1.1 Shall be as listed in Section 5.4.1.

### **14.5 GPS**

#### **14.5.1 External GPS Interface Requirements**

14.5.1.1 Shall be as listed in Section 5.5.1.

#### **14.5.2 Internal GPS Requirements**

14.5.2.1 Shall be as listed in Section 5.5.2.

#### **14.5.3 GPS Display**

14.5.3.1 Shall be as listed in Section 5.5.3.

### **14.6 Computer Security**

#### **14.6.1 INFOSEC and Cryptographic Requirements**

14.6.1.1 Shall be as listed in Section 5.6.1.

### **14.7 Keying Requirements**

For the purposes of this section, the term "keys" includes system keys, certificates, and Firefly vectors as well as user traffic keys.

#### **14.7.1 Key Management**

14.7.1.1 Shall be as listed in Section 5.7.1.

#### **14.7.2 Key Handling and Storage**

14.7.2.1 Shall be as listed in Section 5.7.2.

#### **14.7.3 Zeroization**

14.7.3.1 Shall be as listed in Section 5.7.3.

### **14.8 Other Radio Requirements**

#### **14.8.1 Speaker/Microphone**

14.8.1.1 Shall be as listed in Section 5.8.1.

#### **14.8.2 Display**

14.8.2.1 Shall be as listed in Section 5.8.2.

#### **14.8.3 Presets, Scanning, and Cloning**

14.8.3.1 Shall be as listed in Section 5.8.3.

#### **14.8.4 Clock**

14.8.4.1 Shall be as listed in Section 5.8.4.

#### **14.8.5 Human Machine Interface (HMI)**

14.8.5.1 Shall be as listed in Section 5.8.5.

#### **14.8.6 Identification and Marking**

14.8.6.1 Shall be as listed in Section 5.8.6.

### **14.8.7 Self Test**

#### **14.8.7.1 Shall provide built-in test capabilities for detecting the following errors:**

14.8.7.1.1 Shall be as listed in Section 5.8.8.1

### **14.8.8 Interchangeability**

FFF Interchangeability is defined in MIL-STD-196E and MIL-HBK-61A as a condition which exists when two or more items possess such functional and physical characteristics as to be equivalent in performance and durability, and are capable of being exchanged one for the other without alteration of the items themselves, or of adjoining items.

14.8.8.1 Provide capability for interchangeability of MBMR (NSW) units, Vehicle Adapter amplifiers (VAAs), and accessories with other like-type MBMR (NSW) units and accessories. Interchangeable elements are listed below.

14.8.8.1.1 Shall be as listed in section 5.8.8.1.

### **14.8.9 Interoperability Certification**

14.8.9.1 Shall be compliant with the Software Communications Architecture (SCA) version 2.2, as demonstrated by SCA Certification letter from Joint Program Executive Office, Joint Tactical Radio System (JPEO JTRS).

14.8.9.2 Shall be certified by the National Security Agency (NSA) Information Assurance Directorate that the encryption system will protect the confidentiality of voice and data up to and including TOP SECRET.

## **15. Multiband Handheld Radio NSW (GPS) (MBHH NSW (GPS)) Requirements**

This section discusses the minimum technical requirements for the Multiband Handheld with internal GPS unit with unique Naval Special Warfare (NSW) requirements. Technical requirements for other items are described in their respective sections.

### **15.1 MBHH (GPS) Unit Description**

The basic component defined by the requirements within this section is the standard multiband handheld Type 1 Encryption receiver/transmitter unit with internal GPS - hereafter referred to simply as an MBHH NSW (GPS) unit. The MBHH NSW (GPS) unit is a single-channel, handheld, software-defined radio whose requirements are defined within this section. The MBHH NSW (GPS) is almost identical to the Multiband Handheld Radio with GPS (MBHH (GPS)) described in Sections 1 and 2, therefore many of the MBHH NSW (GPS) specifications will be referenced to the respective subsections of the MBHH (GPS) specification.

### **15.2 MBHH NSW (GPS) Unit Characteristics**

#### **15.2.1 Frequency Range and Resolution**

15.2.1.1 Shall be as listed in Section 1.2.1.

#### **15.2.2 Receive Characteristics**

15.2.2.1 Shall be as listed in Section 2.2.2.

#### **15.2.3 Transmit Characteristics**

15.2.3.1 Shall be as listed in Section 1.2.3.

#### **15.2.4 Physical Characteristics**

##### **15.2.4.1 Size and Weight**

15.2.4.1.1 Shall be as listed in Section 2.2.4.1.

##### **15.2.4.2 Power**

15.2.4.2.1 Shall be as listed in Section 1.2.4.2.

##### **15.2.4.3 Connectors and Interfaces**

Shall provide the following physical and software interfaces for the MBHH (GPS):

15.2.4.3.1 Shall be as listed in Section 2.2.4.3

##### **15.2.4.4 Environmental Specifications**

15.2.4.4.1 Shall be as listed in Section 1.2.4.4

### **15.3 Waveforms**

#### **15.3.1 Waveform Requirements**

15.3.1.1 Core waveform and mode requirements shall be as per Appendix A.

#### **15.3.2 Waveform and Mode Storage**

15.3.2.1 Shall be as listed in Section 1.3.2.

#### **15.3.3 Waveform Selection**

15.3.3.1 Shall be as listed in Section 1.3.3.

## **15.4 Retransmission**

For retransmission, two MBHH NSW (GPS) units, operating the same waveform, are connected together via a retransmission cable. Information is exchanged bi-directionally, each unit retransmitting the voice/data it received from the other (i.e. both MBHH NSW (GPS) units receive and transmit voice/data).

### **15.4.1 Retransmission Requirements**

15.4.1.1 Shall be as listed in Section 1.4.1.

## **15.5 GPS**

### **15.5.1 External GPS Interface Requirements**

15.5.1.1 Shall be as listed in Section 1.5.1.

### **15.5.2 GPS Display**

15.5.2.1 Shall be as listed in Section 1.5.2.

### **15.5.3 Internal GPS Requirements**

15.5.3.1 Shall be as listed in Section 2.5.3.

## **15.6 Computer Security**

### **15.6.1 INFOSEC and Cryptographic Requirements**

15.6.1.1 Shall be as listed in Section 1.6.1.

## **15.7 Keying Requirements**

For the purposes of this section, the term "keys" includes system keys, certificates, and Firefly vectors as well as user traffic keys.

### **15.7.1 Key Management**

15.7.1.1 Shall be as listed in Section 1.7.1.

### **15.7.2 Key Handling and Storage**

15.7.2.1 Shall be as listed in Section 1.7.2.

### **15.7.3 Zeroization**

15.7.3.1 Shall be as listed in Section 1.7.3.

## **15.8 Other Radio Requirements**

### **15.8.1 Speaker/Microphone**

15.8.1.1 Shall be as listed in Section 1.8.1.

### **15.8.2 Display**

15.8.2.1 Shall be as listed in Section 1.8.2.

### **15.8.3 Presets, Scanning, and Cloning**

15.8.3.1 Shall be as listed in Section 1.8.3.

### **15.8.4 Clock**

15.8.4.1 Shall be as listed in Section 1.8.4.

### **15.8.5 Human Machine Interface (HMI)**

15.8.5.1 Shall be as listed in Section 1.8.5.

### **15.8.6 Identification and Marking**

15.8.6.1 Shall be as listed in Section 1.8.6.

### **15.8.7 Self Test**

#### **15.8.7.1 Shall provide built-in test capabilities for detecting the following errors:**

15.8.7.1.1 Shall be as listed in Section 1.8.8.1.

### **15.8.8 Interchangeability**

FFF Interchangeability is defined in MIL-STD-196E and MIL-HBK-61A as a condition which exists when two or more items possess such functional and physical characteristics as to be equivalent in performance and durability, and are capable of being exchanged one for the other without alteration of the items themselves, or of adjoining items.

15.8.8.1 Provide capability for interchangeability of MBHH NSW (GPS) units, Vehicle Adapter amplifiers (VAAs), and accessories with other like-type MBHH NSW (GPS) units and accessories. Interchangeable elements are listed below.

15.8.8.1.1 Shall be as listed in Section 2.8.8.1.

### **15.8.9 Interoperability Certification**

15.8.9.1 Shall be compliant with the Software Communications Architecture (SCA) version 2.2, as demonstrated by SCA Certification letter from Joint Program Executive Office, Joint Tactical Radio System (JPEO JTRS).

15.8.9.2 Shall be certified by the National Security Agency (NSA) Information Assurance Directorate that the encryption system will protect the confidentiality of voice and data up to and including TOP SECRET.

## **16. Multiband Handheld Radio NSW Dive Capable (GPS) (MBHH DIVE NSW (GPS)) Requirements**

This section discusses the minimum technical requirements for the Multiband Handheld dive-capable with internal GPS unit with unique Naval Special Warfare (NSW) requirements. Technical requirements for other items are described in their respective sections.

### **16.1 MBHH DIVE NSW (GPS) Unit Description**

The basic component defined by the requirements within this section is the dive capable, multiband handheld Type 1 Encryption receiver/transmitter unit with internal GPS - hereafter referred to simply as an MBHH DIVE NSW (GPS) unit. The MBHH DIVE NSW (GPS) unit is a single-channel, handheld, software-defined radio whose requirements are defined within this section. The MBHH DIVE NSW (GPS) is almost identical to the Multiband Handheld Radio Dive Capable with GPS (MBHH DIVE (GPS)) described in Sections 1 and 4, therefore many of the MBHH DIVE NSW (GPS) specifications will be referenced to the respective subsections of the MBHH (GPS) specification.

### **16.2 MBHH DIVE NSW (GPS) Unit Characteristics**

#### **16.2.1 Frequency Range and Resolution**

16.2.1.1 Shall be as listed in Section 1.2.1.

#### **16.2.2 Receive Characteristics**

16.2.2.1 Shall be as listed in Section 4.2.2.

#### **16.2.3 Transmit Characteristics**

16.2.3.1 Shall be as listed in Section 1.2.3.

#### **16.2.4 Physical Characteristics**

##### **16.2.4.1 Size and Weight**

16.2.4.1.1 Shall be as listed in Section 4.2.4.1.

##### **16.2.4.2 Power**

16.2.4.2.1 Shall be as listed in Section 1.2.4.2.

##### **16.2.4.3 Connectors and Interfaces**

Shall provide the following physical and software interfaces for the MBHH DIVE NSW (GPS):

16.2.4.3.1 Shall be as listed in Section 4.2.4.3

##### **16.2.4.4 Environmental Specifications**

16.2.4.4.1 Shall be as listed in Section 3.2.4.4.

### **16.3 Waveforms**

#### **16.3.1 Waveform Requirements**

16.3.1.1 Core waveform and mode requirements shall be as per Appendix A.

#### **16.3.2 Waveform and Mode Storage**

16.3.2.1 Shall be as listed in Section 1.3.2.

#### **16.3.3 Waveform Selection**

16.3.3.1 Shall be as listed in Section 1.3.3.

## **16.4 Retransmission**

For retransmission, two MBHH DIVE NSW (GPS) units, operating the same waveform, are connected together via a retransmission cable. Information is exchanged bi-directionally, each unit retransmitting the voice/data it received from the other (i.e. both MBHH DIVE NSW (GPS) units receive and transmit voice/data).

### **16.4.1 Retransmission Requirements**

16.4.1.1 Shall be as listed in Section 1.4.1.

## **16.5 GPS**

### **16.5.1 External GPS Interface Requirements**

16.5.1.1 Shall be as listed in Section 1.5.1.

### **16.5.2 GPS Display**

16.5.2.1 Shall be as listed in Section 1.5.2.

### **16.5.3 Internal GPS Requirements**

16.5.3.1 Shall be as listed in Section 4.5.3.

## **16.6 Computer Security**

### **16.6.1 INFOSEC and Cryptographic Requirements**

16.6.1.1 Shall be as listed in Section 1.6.1.

## **16.7 Keying Requirements**

For the purposes of this section, the term "keys" includes system keys, certificates, and Firefly vectors as well as user traffic keys.

### **16.7.1 Key Management**

16.7.1.1 Shall be as listed in Section 1.7.1.

### **16.7.2 Key Handling and Storage**

16.7.2.1 Shall be as listed in Section 1.7.2.

### **16.7.3 Zeroization**

16.7.3.1 Shall be as listed in Section 1.7.3.

## **16.8 Other Radio Requirements**

### **16.8.1 Speaker/Microphone**

16.8.1.1 Shall be as listed in Section 1.8.1.

### **16.8.2 Display**

16.8.2.1 Shall be as listed in Section 1.8.2.

### **16.8.3 Presets, Scanning, and Cloning**

16.8.3.1 Shall be as listed in Section 1.8.3.

### **16.8.4 Clock**

16.8.4.1 Shall be as listed in Section 1.8.4.

### **16.8.5 Human Machine Interface (HMI)**

16.8.5.1 Shall be as listed in Section 1.8.5.

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### **16.8.6 Identification and Marking**

16.8.6.1 Shall be as listed in Section 1.8.6.

### **16.8.7 Self Test**

#### **16.8.7.1 Shall provide built-in test capabilities for detecting the following errors:**

16.8.7.1.1 Shall be as listed in Section 1.8.8.1.

### **16.8.8 Interchangeability**

FFF Interchangeability is defined in MIL-STD-196E and MIL-HBK-61A as a condition which exists when two or more items possess such functional and physical characteristics as to be equivalent in performance and durability, and are capable of being exchanged one for the other without alteration of the items themselves, or of adjoining items.

16.8.8.1 Provide capability for interchangeability of MBHH DIVE NSW (GPS) units, Vehicle Adapter amplifiers (VAAs), and accessories with other like-type MBHH DIVE NSW (GPS) units and accessories. Interchangeable elements are listed below.

16.8.8.1.1 Shall be as listed in section 4.8.8.1

### **16.8.9 Interoperability Certification**

16.8.9.1 Shall be compliant with the Software Communications Architecture (SCA) version 2.2, as demonstrated by SCA Certification letter from Joint Program Executive Office, Joint Tactical Radio System (JPEO JTRS).

16.8.9.2 Shall be certified by the National Security Agency (NSA) Information Assurance Directorate that the encryption system will protect the confidentiality of voice and data up to and including TOP SECRET.

## 17. Suite 'B' Multiband Handheld Radio (SBMBHH) Requirements

This section discusses the minimum technical requirements for the Suite 'B' Multiband Handheld unit. Technical requirements for other items are described in their respective sections.

### 17.1 SBMBHH Unit Description

The basic component defined by the requirements within this section is the standard handheld multiband, Suite 'B' encryption receiver/transmitter unit – hereafter referred to simply as a SBMBHH unit. The SBMBHH unit is a single-channel, handheld, software defined radio whose requirements are defined within this section.

### 17.2 SBMBHH Unit Characteristics

#### 17.2.1 Frequency Range and Resolution

17.2.1.1 The SBMBHH unit minimum frequency range shall be from 30 MHz to 511.9999 MHz, and additionally will include high band capacity in the ranges of 512 MHz – 520 MHz and 762 MHz – 870 MHz.

17.2.1.2 The SBMBHH unit frequency resolution shall be no more than 10 Hz.

#### 17.2.2 Receive Characteristics

17.2.2.1 Receive sensitivity shall be at least -116 dBm for all modes of operation.

#### 17.2.3 Transmit Characteristics

17.2.3.1 Provide at least 5 Watts of RF output power measured at the antenna.

17.2.3.2 Provide user selectivity of RF power output power from at least 0.25 Watts to 5 Watts.

17.2.3.3 User selectable RF power output levels shall be in at least 1 dBm steps across the range detailed in section 17.2.3.2.

17.2.3.4 Frequency stability shall be no more than  $\pm 2.5$  ppm.

#### 17.2.4 Physical Characteristics

##### 17.2.4.1 Size and Weight

17.2.4.1.1 Maximum weight of each SBMBHH unit and battery shall be no more than 1.1 kg (2.7 lbs).

17.2.4.1.2 Maximum physical volume of each SBMBHH unit including the battery shall be less than 1192 cubic centimeters (73 cubic inches).

##### 17.2.4.2 Power

17.2.4.2.1 Shall provide capability to prevent radio damage caused by battery reverse polarity.

17.2.4.2.2 Shall display battery charge status information on the SBMBHH unit.

17.2.4.2.3 Shall provide for 10% transmit (5 Watts), 10% receive, and 80% idle (squelched) duty cycle operation for at least 8 hours.

##### 17.2.4.3 Connectors and Interfaces

Shall provide the following physical and software interfaces for the SBMBHH:

17.2.4.3.1 Shall be as listed in Section 1.2.4.3.

##### 17.2.4.4 Environmental Specifications

17.2.4.4.1 Shall operate from -20C to +60C.

17.2.4.4.2 Shall be suitable for use in ground mobile environment.

17.2.4.4.3 Shall operate after immersion in 2 meters (6.6 feet) of water for 30 minutes.

17.2.4.4.4 Shall operate up to an unpressurized altitude of 4,545 meters (15,000 feet).

17.2.4.4.5 Shall operate after an air drop from 12,192 meters (40,000 feet).

17.2.4.4.6 Shall be tested to MIL-STD-810F specifications as listed below:

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- 17.2.4.4.6.1 Low Pressure: Per section 500.4, Procedure I, II, III.
- 17.2.4.4.6.2 High Temperature: Per section 501.4, Procedure I, II.
- 17.2.4.4.6.3 Low Temperature: Per section 502.4, Procedure I, II.
- 17.2.4.4.6.4 Temperature Shock: Per section 503.4, Procedure I.
- 17.2.4.4.6.5 Solar Radiation: Per section 505.4, Procedure I/Category A1.
- 17.2.4.4.6.6 Rain: Per section 506.4, Procedure I.
- 17.2.4.4.6.7 Humidity: Per section 507.4.
- 17.2.4.4.6.8 Salt Fog: Per section 509.4.
- 17.2.4.4.6.9 Sand and Dust: Per section 510.4, Procedure I, II.
- 17.2.4.4.6.10 Immersion: Per section 512.4, Procedure I.
- 17.2.4.4.6.11 Vibration: Per section 514.5, Procedure I/Category 20, II/Category 5.
- 17.2.4.4.6.12 Shock: Per section 516.5, Procedure I, IV, V.

## **17.3 Waveforms**

### **17.3.1 SBMBHH Unit Waveform Requirements**

17.3.1.1 Core waveform and mode requirements shall be as per Appendix A.

### **17.3.2 Waveform and Mode Storage**

17.3.2.1 Shall store all provided waveforms and required operational parameters simultaneously.

### **17.3.3 Waveform Selection**

17.3.3.1 Waveforms shall be user selectable.

17.3.3.2 Shall change between any waveform or mode in less than eight seconds.

## **17.4 GPS**

### **17.4.1 External GPS Interface Requirements**

17.4.1.1 Shall be as listed in Section 1.5.1.

### **17.4.2 GPS Display**

17.4.2.1 Shall be as listed in Section 1.5.2.

### **17.4.3 Internal GPS Requirements**

17.4.3.1 Shall be as listed in Section 2.5.3.

## **17.5 Computer Security**

### **17.5.1 INFOSEC and Cryptographic Requirements**

17.5.1.1 Shall provide embedded NSA-approved programmable cryptographic chips/modules.

17.5.1.2 Shall provide the NSA and National Institute of Standards and Technology (NIST) approved cryptographic algorithms required by the waveforms listed Appendix A.

17.5.1.3 Shall be NSA SUITE B certified for safeguarding information.

17.5.1.4 Any power system or battery used to “hold up” data, keys, algorithms, or other volatile radio data will be serviceable by the end user without special tools or equipment.

## **17.6 Keying Requirements**

For the purposes of this section, the term "keys" includes system keys, certificates, and Firefly vectors as well as user traffic keys.

### **17.6.1 Key Management**

17.6.1.1 Shall be as listed in Section 1.7.1.

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17.6.1.2 Additionally, shall load unencrypted keys into the Cryptographic Subsystem via a single common fill device connector from Key Variable Loader 3000+ (KVL 3000+).

### **17.6.2 Key Handling and Storage**

17.6.2.1 Shall be as listed in Section 1.7.2

### **17.6.3 Zeroization**

17.6.3.1 Shall be as listed in Section 1.7.3.

## **17.7 Other Radio Requirements**

### **17.7.1 Speaker/Microphone**

17.7.1.1 Shall be as listed in Section 1.8.1.

### **17.7.2 Display**

17.7.2.1 Shall be as listed in Section 1.8.2.

### **17.7.3 Presets, Scanning, and Cloning**

17.7.3.1 Shall be as listed in Section 1.8.3.

### **17.7.4 Clock**

17.7.4.1 Shall be as listed in Section 1.8.4.

### **17.7.5 Human Machine Interface (HMI)**

17.7.5.1 Shall be as listed in Section 1.8.5.

### **17.7.6 Identification and Marking**

17.7.6.1 Shall be as listed in Section 1.8.6.

### **17.7.7 Self-Test**

#### **17.7.7.1 Shall provide built-in test capabilities for detecting the following errors:**

17.7.7.1.1 Shall be as listed in Section 1.8.7.

### **17.7.8 Interchangeability**

FFF Interchangeability is defined in MIL-STD-196E and MIL-HBK-61A as a condition which exists when two or more items possess such functional and physical characteristics as to be equivalent in performance and durability, and are capable of being exchanged one for the other without alteration of the items themselves, or of adjoining items.

17.7.8.1 Provide capability for interchangeability of SBMBHH units, Vehicle Adapter amplifiers (VAAs), and accessories with other like-type SBMBHH units and accessories. Interchangeable elements are listed below.

17.7.8.1.1 SBMBHH units to include RF-310M-HH units.

17.7.8.1.2 VAA units, to include Dual Multiband Handheld Vehicular Mount Radios (MBHHVR(D)) and NA/VRC-110 (NSN 5820-01-557-8450).

17.7.8.1.3 Shall be operable with service-common, handheld radio batteries currently fielded, as detailed in Appendix B, Table 1.

17.7.8.1.4 Battery Chargers which support the battery type listed in paragraph 17.7.8.1.3.

17.7.8.1.5 Broadband antennas.

17.7.8.1.6 Headsets/handsets employing the U-283 audio/keyfill connector.

## **18. High-Capacity Line of Sight Radio (HCLOS) Requirements**

This section discusses the minimum technical requirements for the High-Capacity Line of Sight Radio unit. Technical requirements for other items are described in their respective sections.

### **18.1 HCLOS Unit Description**

The basic component defined by the requirements within this section is a high-speed, broadband Ethernet, point to point radio unit – hereafter referred to simply as a HCLOS unit..

### **18.2 HCLOS Unit Characteristics**

#### **18.2.1 Frequency Range and Resolution**

18.2.1.1 The HCLOS frequency range shall be from 4.4 GHz to 5.0 GHz.

18.2.1.2 Shall provide channel spacing of no less than 1 MHz.

18.2.1.3 Shall provide channel width of at least 40MHz in point to point mode.

#### **18.2.2 Receive Characteristics**

18.2.2.1 Receive sensitivity shall be at least -82 dBm at 6 Mbps with a bit error rate of  $1 \times 10^{-9}$ .

#### **18.2.3 Transmit Characteristics**

18.2.3.1 Provide at least 17 dBm of RF power out measured at the antenna.

#### **18.2.4 Network Characteristics**

18.2.4.1 Shall have an Ethernet rate not less than 80Mbps in point to point mode.

18.2.4.2 Shall have an un-coded burst data rate of up to 108 Mbps in point to point mode.

#### **18.2.4 Physical Characteristics**

##### **18.2.4.1 Size and Weight**

18.2.4.1.1 Maximum weight of each HCLOS unit shall be no more than 3 kg (6.5 pounds).

18.2.4.1.2 Maximum physical volume of each HCLOS unit shall be less than 4,700 cubic centimeters (288 cubic inches).

##### **18.2.4.2 Power**

18.2.4.2.1 Shall operate from +48 VDC provided by Power over Ethernet (PoE) injection.

##### **18.2.4.3 Connectors and Interfaces**

Shall provide the following physical and software interfaces for the HCLOS:

18.2.4.3.1 Ethernet cable (RJ-45 connector).

18.2.4.3.2 N-type RF Cable connector.

##### **18.2.4.4 Environmental Specifications**

18.2.4.4.1 Shall operate from -40C to +60C.

## **18.3 Computer Security**

### **18.3.1 INFOSEC and Cryptographic Requirements**

18.3.1.1 Shall provide up to 256 bit Advanced Encryption Standard (AES) embedded network encryption (FIPS 197 standard).

## **18.4 Keying Requirements**

For the purposes of this section, the term "keys" includes system keys, certificates, and Firefly vectors as well as user traffic keys.

### **18.4.1 Key Management**

18.4.1.1 Keys and certificates shall be loaded from a PC to the HCLOS, using standard internet file transfer protocols.

## **18.5 Other Radio Requirements**

### **18.5.1 Human Machine Interface (HMI)**

18.5.1.1 User configuration, management, administration, and operation of the HCLOS shall be through Hypertext Transfer Protocol (HTTP) web browser, HTTP Secure (HTTPS) web browser, Simple Network Management Protocol (SNMP) browser, Telnet, and Secure Shell (SSH).

### **18.5.2 Identification and Marking**

18.5.2.1 Shall be as listed in Section 1.8.6.

### **18.5.3 Interchangeability**

FFF Interchangeability is defined in MIL-STD-196E and MIL-HBK-61A as a condition which exists when two or more items possess such functional and physical characteristics as to be equivalent in performance and durability, and are capable of being exchanged one for the other without alteration of the items themselves, or of adjoining items.

18.5.3.1 Provide capability for interchangeability of HCLOS units, antennas, power systems, and accessories with other like-type HCLOS units and accessories. Interchangeable elements are listed below.

18.5.3.1.1 HCLOS units to include RF-7800W-OU440 units (NSN 5895-01-564-4042).

18.5.3.1.2 Antenna units, to include the following fielded antennas:

18.5.3.1.2.1 RF-7800W-AT001 (NSN 5985-01-570-2801).

18.5.3.1.2.2 RF-7800W-AT002 (NSN 5985-01-564-4152).

18.5.3.1.2.3 RF-7800W-AT003 (NSN 5985-01-570-2802).

18.5.3.1.2.4 RF-7800W-AT005 (NSN 5985-01-564-4150).

18.5.3.1.2.5 RF-7800W-AT006 (NSN 5985-01-570-2803).

18.5.3.1.3 PoE injection systems, to include RF-7800W-IU100 (NSN 5895-01-581-3992).

## **19. VHF Handheld Radio with Internal GPS (VHHR GPS) Requirements**

This section discusses the minimum technical requirements for the VHF Handheld Radio with internal GPS unit, suitable for sale/export to organizations other than Department of Defense agencies. Technical requirements for other items are described in their respective sections.

### **19.1 VHHR GPS Unit Description**

The basic component defined by the requirements within this section is the standard VHF handheld, NSA TYPE III Encryption receiver/transmitter unit with internal GPS - hereafter referred to simply as an VHHR GPS unit. The VHHR GPS unit is a single-channel, handheld, software-defined radio whose requirements are defined within this section.

### **19.2 VHHR (GPS) Unit Characteristics**

#### **19.2.1 Frequency Range and Resolution**

19.2.1.1 The VHHR GPS unit minimum frequency range shall be from 30 MHz to 107.99999 MHz.

19.2.1.2 The VHHR GPS unit frequency resolution shall be no more than 10 Hz in fixed frequency modes, and no more than 25 kHz in frequency hopping modes.

#### **19.2.2 Receive Characteristics**

19.2.2.1 Receive sensitivity shall be at least -116 dBm for 12 dB SINAD in FM mode.

19.2.2.2 Intermediate Frequency rejection shall be greater than 60 dB.

19.2.2.3 Shall be capable of receiving and processing GPS signals of frequency 1575.42 MHz,  $\pm 2$  MHz.

#### **19.2.3 Transmit Characteristics**

19.2.3.1 Provide at least 5 Watts of RF power output measured at the antenna.

19.2.3.2 Provide at least 3 levels of user selectable RF output power between 250 milliWatts and the maximum power output of the radio.

#### **19.2.4 Physical Characteristics**

##### **19.2.4.1 Size and Weight**

19.2.4.1.1 Maximum weight of each VHHR GPS, with battery installed, shall be no more than 1.1 kg (2.42 pounds).

19.2.4.1.2 Maximum physical volume of each VHRR GPS, with battery installed, shall be no more than 855 cubic centimeters (53 cubic inches).

##### **19.2.4.2 Power**

19.2.4.2.1 Shall provide capability to prevent radio damage caused by battery reverse polarity.

19.2.4.2.2 Shall display battery charge status information on the VHHR GPS unit.

19.2.4.2.3 Shall provide for 10% transmit, 10% receive, and 80% squelch duty cycle operation for at least 12 hours.

19.2.4.2.4 Shall be operable with service-common handheld radio batteries currently fielded, as detailed in Appendix B, Table 1.

##### **19.2.4.3 Connectors and Interfaces**

Shall provide the following physical and software interfaces for the VHHR GPS unit:

19.2.4.3.1 Shall be as listed in section 1.2.4.3.

19.2.4.3.2 External GPS antenna. GPS antenna connector must provide power for use by an active GPS antenna.

##### **19.2.4.4 Environmental Specifications**

19.2.4.4.1 Shall be tested to MIL-STD-810 specifications listed below:

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- 19.2.4.4.1.1 Temperature: Shall operate between at least -20C and +60C (with battery).
- 19.2.4.4.1.2 Immersion: Shall operate after immersion in 2 meters (6.6 feet) of water for 30 minutes.
- 19.2.4.4.1.3 Altitude: Shall operate up to at least 15,000 feet above sea level for one hour.

## **19.3 Waveforms**

### **19.3.1 MBHH (GPS) Unit Waveform Requirements**

19.3.1.1 Core waveform and mode requirements shall be as per Appendix A.

### **19.3.2 Waveform and Mode Storage**

19.3.2.1 Shall store all provided waveforms and required operational parameters simultaneously.

### **19.3.3 Waveform Selection**

19.3.3.1 Waveforms shall be user selectable.

## **19.4 Repeater Operation**

For repeater operation, one VHHR GPS unit, operating the same waveform, are connected together via a retransmission cable. Information is exchanged bi-directionally, each unit retransmitting the voice/data it received from the other (i.e. both VHHR GPS units receive and transmit voice/data).

### **19.4.1 Retransmission Requirements**

19.4.1.1 Shall provide voice and data retransmission in both black digital and red analog modes for all modes of operation.

## **19.5 GPS**

### **19.5.1 External GPS Interface Requirements**

19.5.1.1 Shall be as listed in section 1.5.1.

### **19.5.2 GPS Display**

19.5.2.1 Shall be as listed in section 1.5.2.

### **19.5.3 Internal GPS Requirements**

19.5.3.1 Receive and process GPS signals.

19.5.3.2 Distribute timing and position data to the radio software for use in timing sensitive waveforms and for situational awareness purposes.

## **19.6 Computer Security**

### **19.6.1 INFOSEC and Cryptographic Requirements**

19.6.1.1 Shall provide embedded programmable cryptographic chips/modules.

19.6.1.2 Shall provide NSA TYPE III encryption capability.

19.6.1.3 Any power system or battery used "hold up" data, keys, algorithms, or other radio data will be serviceable by the end user without special tools or equipment.

## **19.7 Keying Requirements**

For the purposes of this section, the term "keys" includes system keys, certificates, and Firefly vectors as well as user traffic keys.

### **19.7.1 Key Management**

19.7.1.1 Shall load unencrypted keys into the Cryptographic Subsystem via a manual keypad entry from the front panel or by using an external programming application.

### **19.7.2 Key Handling and Storage**

19.7.2.1 Shall support COMSEC key entry.

19.7.2.2 Shall store all necessary keys required to operate the core waveforms identified in Appendix A.

19.7.2.3 Shall display positive confirmation following each successful key load.

19.7.2.4 Shall notify the operator in the event of key load failure(s).

19.7.2.5 Shall provide key status information to the operator which includes the presence or absence of a key and key type.

19.7.2.6 Shall provide the operator the ability to associate keys to waveforms/channels.

## **19.8 Other Radio (MBHH (GPS)) Requirements**

### **19.8.1 Speaker/Microphone**

19.8.1.1 Shall contain an internal speaker/microphone.

19.8.1.2 Shall provide speaker volume control.

### **19.8.2 Display**

19.8.2.1 Shall be readable in 10,000 foot-candle direct sunlight.

### **19.8.3 Presets, Scanning, and Cloning**

19.8.3.1 Shall provide at least 25 programmable presets for waveforms/modes.

19.8.3.2 Shall provide capability to program presets using the display and keypad or by programming software installed on a personal computer.

19.8.3.3 Shall provide capability to scan at least 25 operator designated frequencies or presets.

19.8.3.4 Shall provide wireless cloning of preset parameters from one VHHR GPS unit to another.

### **19.8.4 Clock**

19.8.4.1 Shall be as listed in section 1.8.4.

### **19.8.5 Human Machine Interface (HMI)**

19.8.5.1 Shall be as listed in section 1.8.5.

### **19.8.6 Identification and Marking**

19.8.6.1 Shall be as listed in section 1.8.6.

### **19.8.7 Self-Test**

#### **19.8.7.1 Shall provide built-in test capabilities for detecting the following errors:**

19.8.7.1.1 Shall be as listed in section 1.8.8.1.

### **19.8.8 Interchangeability**

FFF Interchangeability is defined in MIL-STD-196E and MIL-HBK-61A as a condition which exists when two or more items possess such functional and physical characteristics as to be equivalent in performance and durability, and are capable of being exchanged one for the other without alteration of the items themselves, or of adjoining items.

19.8.8.1 Provide capability for interchangeability of VHHR GPS units, Vehicle Adapter Amplifiers (VAAs), and accessories with other like-type VHHR GPS units and accessories. Interchangeable elements are listed below.

19.8.8.1.1 VHHR GPS units, to include RF-5800V-HH104 (NSN5820-01-560-7816)

19.8.8.1.2 VAAs, to include RF-5800V-V500 VHF Vehicular Communication Systems (NSN 5996-01-560-7423)

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19.8.8.1.3 Shall be operable with service-common, handheld radio batteries currently fielded, as detailed in Appendix B, Table 1.

19.8.8.1.4 Battery chargers which support batteries listed in paragraph 1.8.8.1.3.

19.8.8.1.5 Broadband antennas

19.8.8.1.6 Headset/handsets employing U-283 audio/keyfill connectors.

## **20. High Frequency Manpack Radio TYPE III (HFMP (T3)) Requirements**

This section discusses the minimum technical requirements for all High Frequency Manpack with NSA TYPE III encryption (HFMP (T3)) Radio units. Technical requirements for other items are described in their respective sections.

### **20.1 HFMP (T3) Unit Description**

The basic component defined by the requirements within this section is the standard high frequency manpack receiver/transmitter unit. The HFMP (T3) is a single-channel, manpack format, software defined radio whose requirements are defined within this section.

### **20.2 HFMP (T3) Unit Characteristics**

#### **20.2.1 Frequency Range and Resolution**

20.2.1.1 Minimum frequency range shall be from 1.6 MHz to 59.99999.

20.2.1.2 Frequency resolution shall be no more than 100 Hz.

#### **20.2.2 Receive Characteristics**

20.2.2.1 Receive sensitivity shall be at least -113 dBm for 10 dB SINAD in SSB mode.

20.2.2.2 Shall be capable of user-adjustable active squelch.

20.2.2.3 Audio system shall output a minimum 1.5 mV signal with 150 Ohm source impedance.

20.2.2.4 Receiver shall provide input overload protection to at least 32 V Root Mean Square (RMS) input.

20.2.2.5 Image and Intermediate Frequency rejection shall be greater than 80 dB.

20.2.2.6 Shall have an input characteristic impedance of 50 Ohms.

#### **20.2.3 Transmit Characteristics**

20.2.3.1 Provide up to 20 Watts Peak Envelope Power (PEP)/Average in SSB/LSB/AME/CW modes, as measured at the antenna connector.

20.2.3.2 Provide up to 10 Watts Average in FM mode, as measured at the antenna connector.

20.2.3.3 Shall provide at least three user selectable power output levels.

20.2.3.4 Shall be capable of accepting audio inputs at 1.5 mV into 150 Ohms or 0 dBm into 600 Ohms.

20.2.3.5 Shall have an output characteristic impedance of 50 Ohms.

20.2.3.6 Shall be capable of automatically tuning the radio transmitter to commonly used antennas, such as OE-505/U, AS-2259/U, and field-expedient wire antennas.

#### **20.2.4 Physical Characteristics**

##### **20.2.4.1 Size and Weight**

20.2.4.1.1 Maximum weight of each HFMP (T3) shall be no more than 4.5 kg (9.9 lb) without batteries.

20.2.4.1.2 Maximum physical volume of each HFMP (T3) shall be 8,150 cubic centimeters (497 cubic inches) including battery box.

##### **20.2.4.2 Power**

20.2.4.2.1 Shall provide battery charge status information on the HFMP (T3) user interface.

20.2.4.2.2 Shall be operable with service-common, manpack radio batteries currently fielded, as detailed in Appendix B, Table 2.

20.2.4.2.3 Shall be capable of operating from any external Direct Current (DC) source from 23 VDC to 32 VDC.

##### **20.2.4.3 Connectors and Interfaces**

Shall provide the following physical and software interfaces for the HFMP (T3):

20.2.4.3.1 Bayonet Neill Concelman (BNC) antenna connector for RF input and output.

- 20.2.4.3.2 Front panel connector for RS-232E or MIL-STD-188-114A interface for data input/output and remote control operation.
- 20.2.4.3.3 Front panel connector for control of external power amplifier, antenna coupler, Ethernet connectivity, and audio system interface.
- 20.2.4.3.4 Front panel U-238/U type six pin audio connector.
- 20.2.4.3.5 Front panel connector for external GPS system.
- 20.2.4.3.6 Front panel U-238/U type six pin fill connector.
- 20.2.4.3.7 External ground post connector.
- 20.2.4.3.8 Rear mating connector for Ethernet connectivity, remote control, power amplifier control, coupler control, and audio system interface.

#### **20.2.4.4 Environmental Specifications**

- 20.2.4.4.1 Shall operate from -40C to +70C.
- 20.2.4.4.2 Shall operate after immersion in 0.9 meter (35.4 inches) of water.

### **20.3 Waveforms**

#### **20.3.1 HFMP (T3) Unit Waveform Requirements**

- 20.3.1.1 Core waveform and mode requirements shall be as per Appendix A.

#### **20.3.2 Waveform and Mode Storage**

- 20.3.2.1 Shall store all provided waveforms and required operational parameters simultaneously.

#### **20.3.3 Waveform Selection**

- 20.3.3.1 Waveforms shall be user selectable.
- 20.3.3.2 Shall change between any waveform or mode in less than eight seconds.

### **20.4 GPS**

#### **20.4.1 External GPS Interface Requirements**

- 20.4.1.1 Shall receive inputs from a commercial external GPS receiver, Precision Lightweight GPS receiver (PLGR), or Defense Advanced GPS Receiver (DAGR) for time of day synchronization.
- 20.4.1.2 Shall receive GPS TOD information automatically after user setup.

#### **20.4.2 GPS Display**

- 20.4.2.1 Shall display GPS status, position, and TOD information.

### **20.5 Computer Security**

#### **20.5.20.1 INFOSEC and Cryptographic Requirements**

- 20.5.1.1 Shall provide embedded cryptographic chips/modules.
- 20.5.1.2 Shall provide NSA TYPE III digital security.
- 20.5.1.3 Any power system or battery used to “hold up” data, keys, algorithms, or other radio data will be serviceable by the end user without special tools or equipment.

### **20.6 Keying Requirements**

For the purposes of this section, the term "keys" includes system keys, certificates, and Firefly vectors as well as user traffic keys.

#### **20.6.1 Key Management**

- 20.6.1.1 Shall load unencrypted keys into the Cryptographic Subsystem via a manual keypad entry from the front panel or by using an external programming application.

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## **20.6.2 Key Handling and Storage**

20.6.2.1 Shall support COMSEC key entry.

20.6.2.2 Shall store all necessary keys required to operate the core waveforms identified in Appendix A.

20.6.2.3 Shall display positive confirmation following each successful key load.

20.6.2.4 Shall notify the operator in the event of key load failure(s).

20.6.2.5 Shall provide key status information to the operator which includes the presence or absence of a key and key type.

20.6.2.6 Shall provide the operator the ability to associate keys to waveforms/channels.

## **20.6.3 Zeroization**

20.6.3.1 Shall provide tamper zeroization capability to zeroize all keys and erase all classified data.

20.6.3.2 Shall provide a front panel zeroize panic switch on all MBMR units. This switch shall require two discrete manual actions to zeroize all COMSEC keys.

20.6.3.3 Shall provide capability for plain text operation subsequent to zeroization.

## **20.7 Other Radio Requirements**

### **20.7.1 Speaker/Microphone**

20.7.1.1 Shall be interoperable with service common H-250/U handset.

20.7.1.2 Shall provide volume control when used with H-250/U handset.

### **20.7.2 Display**

20.7.2.1 Shall provide the user with the ability to disable the back lighting.

### **20.7.3 Presets, Scanning, and Cloning**

20.7.3.1 Shall provide at least 200 channel presets for use fixed frequency and channel hopping modes.

20.7.3.2 Shall provide no less than 75 user-programmable system presets, storing channels, mode settings, addresses, network settings, encryption, voice/data settings.

20.7.3.3 Shall be capable of scanning of all channel presets.

### **20.7.4 Human Machine Interface (HMI)**

20.7.4.1 Shall display the active preset for the selected channel.

20.7.4.2 Shall display the battery status.

20.7.4.3 Shall display the operational status for the selected channel.

20.7.4.4 Shall provide capability for day and night operations.

20.7.4.5 Shall provide the user the ability to modify and control all parameters of the radio.

### **20.7.5 Identification and Marking**

20.7.5.1 Shall provide markings in accordance with contract requirements, MIL-STD-130N, or as defined by the SPAWAR PMW/A 170 Communications Program Office.

20.7.5.2 All controlled cryptographic items (CCI) shall be marked in accordance with NSA requirements.

20.7.5.3 Shall be marked with safety and disposal information as required by federal regulation.

### **20.7.6 Self-Test**

#### **20.7.6.1 Shall provide built-in test capabilities for detecting the following errors:**

20.7.6.1.1 Incorrect or insufficient line or battery power.

20.7.6.1.2 Incorrect radio programming.

20.7.6.1.3 Non-functional components of the HFMP (T3).

20.7.6.1.4 Improperly installed or non-functional ancillary systems (amplifier, pre/post-selector, coupler, external KDU).

20.7.6.1.5 High Voltage Standing Wave Ratio (VSWR) conditions.

### 20.7.7 Interchangeability

FFF Interchangeability is defined in MIL-STD-196E and MIL-HBK-61A as a condition which exists when two or more items possess such functional and physical characteristics as to be equivalent in performance and durability, and are capable of being exchanged one for the other without alteration of the items themselves, or of adjoining items.

20.7.7.1 Provide capability for interchangeability of HFMP (T3) units, Vehicle Adapter amplifiers (VAAs), and accessories with other like-type HFMP (T3) units and accessories. Interchangeable elements are listed below.

20.7.7.1.1 HFMP (T3) units, to include the RF-5800H-MP025 (NSN 5820-01-540-7353).

20.7.7.1.2 VAAs, to include AN/VRC-104 family of HF vehicular systems.

20.7.7.1.3 Shall be operable with service-common, manpack radio batteries currently fielded, as detailed in Appendix B, Table 2.

20.7.7.1.4 Battery chargers which support batteries listed in paragraph 20.7.7.1.3.

20.7.7.1.5 High Frequency and Very High Frequency antennas.

20.7.7.1.6 Headsets/handsets employing U-283 audio/keyfill connectors.

## **21. High Frequency Manpack Radio with internal GPS Type III (HFMP GPS (T3)) Requirements**

This section discusses the minimum technical requirements for all High Frequency Manpack with internal GPS and NSA TYPE III encryption (HFMP GPS (T3)) Radio units. Technical requirements for other items are described in their respective sections.

### **21.1 HFMP GPS (T3) Unit Description**

The basic component defined by the requirements within this section is the standard high frequency manpack receiver/transmitter unit. The HFMP GPS (T3) is a single-channel, manpack format, software defined radio whose requirements are defined within this section.

### **21.2 HFMP GPS (T3) Unit Characteristics**

#### **21.2.1 Frequency Range and Resolution**

21.2.1.1 Shall be as listed in Section 20.2.1.

#### **21.2.2 Receive Characteristics**

21.2.2.1 Shall be as listed in Section 20.2.2.

#### **21.2.3 Transmit Characteristics**

21.2.3.1 Shall be as listed in Section 20.2.3.

#### **21.2.4 Physical Characteristics**

##### **21.2.4.1 Size and Weight**

21.2.4.1.1 Shall be as listed in Section 20.2.4.1

##### **21.2.4.2 Power**

21.2.4.2.1 Shall be as listed in Section 20.2.4.2.

##### **21.2.4.3 Connectors and Interfaces**

Shall provide the following physical and software interfaces for the HFMP GPS (T3):

21.2.4.3.1 Shall be as listed in Section 20.2.4.3.

##### **21.2.4.4 Environmental Specifications**

21.2.4.4.1 Shall be as listed in Section 20.2.4.4.

### **21.3 Waveforms**

#### **21.3.1 HFMP GPS (T3) Unit Waveform Requirements**

21.3.1.1 Shall be as listed in Section 20.3.1.

#### **21.3.2 Waveform and Mode Storage**

21.3.2.1 Shall be as listed in Section 20.3.2.

#### **21.3.3 Waveform Selection**

21.3.3.1 Shall be as listed in Section 20.3.3.

### **21.4 GPS**

#### **21.4.1 External GPS Interface Requirements**

21.4.1.1 Shall be as listed in Section 20.4.1.

### **21.4.2 Internal GPS Interface Requirements**

21.4.2.1 Shall receive and process GPS signals.

21.4.2.2 Shall distribute timing and position data to the radio software for use in timing sensitive waveforms and for situational awareness purposes

### **21.4.3 GPS Display**

21.4.3.1 Shall display GPS status, position, and TOD information.

## **21.5 Computer Security**

### **21.5.1 INFOSEC and Cryptographic Requirements**

21.5.1.1 Shall be as listed in Section 20.5.1.

### **21.6 Keying Requirements**

For the purposes of this section, the term "keys" includes system keys, certificates, and Firefly vectors as well as user traffic keys.

#### **21.6.1 Key Management**

21.6.1.1 Shall be as listed in Section 20.6.1.

#### **21.6.2 Key Handling and Storage**

21.6.2.1 Shall be as listed in Section 20.6.2.

#### **21.6.3 Zeroization**

21.6.3.1 Shall be as listed in Section 20.6.3.

## **21.7 Other Radio Requirements**

### **21.7.1 Speaker/Microphone**

21.7.1.1 Shall be as listed in Section 20.7.1.

### **21.7.2 Display**

21.7.2.1 Shall be as listed in Section 20.7.2.

### **21.7.3 Presets, Scanning, and Cloning**

21.7.3.1 Shall be as listed in Section 20.7.3.

### **21.7.4 Human Machine Interface (HMI)**

21.7.4.1 Shall be as listed in Section 20.7.4.

### **21.7.5 Identification and Marking**

21.7.5.1 Shall be as listed in Section 20.7.5.

### **21.7.6 Self-Test**

#### **21.7.6.1 Shall provide built-in test capabilities for detecting the following errors:**

21.7.6.1.1 Shall be as listed in Section 20.7.6.1.

### 21.7.7 Interchangeability

FFF Interchangeability is defined in MIL-STD-196E and MIL-HBK-61A as a condition which exists when two or more items possess such functional and physical characteristics as to be equivalent in performance and durability, and are capable of being exchanged one for the other without alteration of the items themselves, or of adjoining items.

21.7.7.1 Provide capability for interchangeability of HFMP GPS (T3) units, Vehicle Adapter amplifiers (VAAs), and accessories with other like-type HFMP GPS (T3) units and accessories. Interchangeable elements are listed below.

21.7.7.1.1 HFMP GPS (T3) units, to include the RF-5800H-MP026 (NSN 5820-01-499-9131).

21.7.7.1.2 VAAs, to include AN/VRC-104 family of HF vehicular systems.

21.7.7.1.3 Shall be operable with service-common, manpack radio batteries currently fielded, as detailed in Appendix B, Table 2.

21.7.7.1.4 Battery chargers which support batteries listed in paragraph 21.7.7.1.3.

21.7.7.1.5 High Frequency and Very High Frequency antennas.

21.7.7.1.6 Headsets/handsets employing U-283 audio/keyfill connectors.

## **22. High Frequency Manpack Radio with internal GPS Type III/DATOTEK (HFMP (T3/D)) Requirements**

This section discusses the minimum technical requirements for all High Frequency Manpack with internal GPS and NSA TYPE III and DATOTEK encryption (HFMP (T3/D)) Radio units. Technical requirements for other items are described in their respective sections.

### **22.1 HFMP (T3/D) Unit Description**

The basic component defined by the requirements within this section is the standard high frequency manpack receiver/transmitter unit. The HFMP (T3/D) is a single-channel, manpack format, software defined radio whose requirements are defined within this section.

### **22.2 HFMP (T3/D) Unit Characteristics**

#### **22.2.1 Frequency Range and Resolution**

22.2.1.1 Shall be as listed in Section 20.2.1.

#### **22.2.2 Receive Characteristics**

22.2.2.1 Shall be as listed in Section 20.2.2.

#### **22.2.3 Transmit Characteristics**

22.2.3.1 Shall be as listed in Section 20.2.3.

#### **22.2.4 Physical Characteristics**

##### **22.2.4.1 Size and Weight**

22.2.4.1.1 Shall be as listed in Section 20.2.4.1

##### **22.2.4.2 Power**

22.2.4.2.1 Shall be as listed in Section 20.2.4.2.

##### **22.2.4.3 Connectors and Interfaces**

Shall provide the following physical and software interfaces for the HFMP (T3/D):

22.2.4.3.1 Shall be as listed in Section 20.2.4.3.

##### **22.2.4.4 Environmental Specifications**

22.2.4.4.1 Shall be as listed in Section 20.2.4.4.

### **22.3 Waveforms**

#### **22.3.1 HFMP (T3/D) Unit Waveform Requirements**

22.3.1.1 Shall be as listed in Section 20.3.1.

#### **22.3.2 Waveform and Mode Storage**

22.3.2.1 Shall be as listed in Section 20.3.2.

#### **22.3.3 Waveform Selection**

22.3.3.1 Shall be as listed in Section 20.3.3.

### **22.4 GPS**

#### **22.4.1 External GPS Interface Requirements**

22.4.1.1 Shall be as listed in Section 20.4.1.

## **22.4.2 Internal GPS Interface Requirements**

22.4.2.1 Shall be as listed in Section 21.4.2.

## **22.4.3 GPS Display**

22.4.3.1 Shall display GPS status, position, and TOD information.

## **22.5 Computer Security**

### **22.5.1 INFOSEC and Cryptographic Requirements**

22.5.1.1 Shall be as listed in Section 20.5.1.

22.5.1.2 Additionally, shall provide for DATOTEK digital security.

### **22.6 Keying Requirements**

For the purposes of this section, the term "keys" includes system keys, certificates, and Firefly vectors as well as user traffic keys.

#### **22.6.1 Key Management**

22.6.1.1 Shall be as listed in Section 20.6.1.

#### **22.6.2 Key Handling and Storage**

22.6.2.1 Shall be as listed in Section 20.6.2.

#### **22.6.3 Zeroization**

22.6.3.1 Shall be as listed in Section 20.6.3.

## **22.7 Other Radio Requirements**

### **22.7.1 Speaker/Microphone**

22.7.1.1 Shall be as listed in Section 20.7.1.

### **22.7.2 Display**

22.7.2.1 Shall be as listed in Section 20.7.2.

### **22.7.3 Presets, Scanning, and Cloning**

22.7.3.1 Shall be as listed in Section 20.7.3.

### **22.7.4 Human Machine Interface (HMI)**

22.7.4.1 Shall be as listed in Section 20.7.4.

### **22.7.5 Identification and Marking**

22.7.5.1 Shall be as listed in Section 20.7.5.

### **22.7.6 Self-Test**

#### **22.7.6.1 Shall provide built-in test capabilities for detecting the following errors:**

22.7.6.1.1 Shall be as listed in Section 20.7.6.1.

### **22.7.7 Interchangeability**

FFF Interchangeability is defined in MIL-STD-196E and MIL-HBK-61A as a condition which exists when two or more items possess such functional and physical characteristics as to be equivalent in performance and durability, and are capable of being exchanged one for the other without alteration of the items themselves, or of adjoining items.

22.7.7.1 Provide capability for interchangeability of HFMP (T3/D) units, Vehicle Adapter amplifiers (VAAs), and accessories with other like-type HFMP (T3/D) units and accessories. Interchangeable elements are listed below.

22.7.7.1.1 HFMP (T3/D) units, to include the RF-5800H-MP036.

22.7.7.1.2 VAAs, to include AN/VRC-104 family of HF vehicular systems.

22.7.7.1.3 Shall be operable with service-common, manpack radio batteries currently fielded, as detailed in Appendix B, Table 2.

22.7.7.1.4 Battery chargers which support batteries listed in paragraph 22.7.7.1.3.

22.7.7.1.5 High Frequency and Very High Frequency antennas.

22.7.7.1.6 Headsets/handsets employing U-283 audio/keyfill connectors.

## **23. High Frequency Manpack Radio with internal GPS Type III/DATOTEK (HFMP GPS (T3/A)) Requirements**

This section discusses the minimum technical requirements for all High Frequency Manpack with internal GPS and NSA TYPE III and AES encryption (HFMP GPS (T3/A)) Radio units. Technical requirements for other items are described in their respective sections.

### **23.1 HFMP GPS (T3/A) Unit Description**

The basic component defined by the requirements within this section is the standard high frequency manpack receiver/transmitter unit. The HFMP GPS (T3/A) is a single-channel, manpack format, software defined radio whose requirements are defined within this section.

### **23.2 HFMP GPS (T3/A) Unit Characteristics**

#### **23.2.1 Frequency Range and Resolution**

23.2.1.1 Shall be as listed in Section 20.2.1.

#### **23.2.2 Receive Characteristics**

23.2.2.1 Shall be as listed in Section 20.2.2.

#### **23.2.3 Transmit Characteristics**

23.2.3.1 Shall be as listed in Section 20.2.3.

#### **23.2.4 Physical Characteristics**

##### **23.2.4.1 Size and Weight**

23.2.4.1.1 Shall be as listed in Section 20.2.4.1

##### **23.2.4.2 Power**

23.2.4.2.1 Shall be as listed in Section 20.2.4.2.

##### **23.2.4.3 Connectors and Interfaces**

Shall provide the following physical and software interfaces for the HFMP GPS (T3/A):

23.2.4.3.1 Shall be as listed in Section 20.2.4.3.

##### **23.2.4.4 Environmental Specifications**

23.2.4.4.1 Shall be as listed in Section 20.2.4.4.

### **23.3 Waveforms**

#### **23.3.1 HFMP GPS (T3/A) Unit Waveform Requirements**

23.3.1.1 Shall be as listed in Section 20.3.1.

#### **23.3.2 Waveform and Mode Storage**

23.3.2.1 Shall be as listed in Section 20.3.2.

#### **23.3.3 Waveform Selection**

23.3.3.1 Shall be as listed in Section 20.3.3.

### **23.4 GPS**

#### **23.4.1 External GPS Interface Requirements**

23.4.1.1 Shall be as listed in Section 20.4.1.

### **23.4.2 Internal GPS Interface Requirements**

23.4.2.1 Shall be as listed in Section 21.4.2.

### **23.4.3 GPS Display**

23.4.3.1 Shall display GPS status, position, and TOD information.

## **23.5 Computer Security**

### **23.5.1 INFOSEC and Cryptographic Requirements**

23.5.1.1 Shall be as listed in Section 20.5.1.

23.5.1.2 Additionally, shall provide for AES digital security.

### **23.6 Keying Requirements**

For the purposes of this section, the term "keys" includes system keys, certificates, and Firefly vectors as well as user traffic keys.

#### **23.6.1 Key Management**

23.6.1.1 Shall be as listed in Section 20.6.1.

#### **23.6.2 Key Handling and Storage**

23.6.2.1 Shall be as listed in Section 20.6.2.

#### **23.6.3 Zeroization**

23.6.3.1 Shall be as listed in Section 20.6.3.

## **23.7 Other Radio Requirements**

### **23.7.1 Speaker/Microphone**

23.7.1.1 Shall be as listed in Section 20.7.1.

### **23.7.2 Display**

23.7.2.1 Shall be as listed in Section 20.7.2.

### **23.7.3 Presets, Scanning, and Cloning**

23.7.3.1 Shall be as listed in Section 20.7.3.

### **23.7.4 Human Machine Interface (HMI)**

23.7.4.1 Shall be as listed in Section 20.7.4.

### **23.7.5 Identification and Marking**

23.7.5.1 Shall be as listed in Section 20.7.5.

### **23.7.6 Self-Test**

#### **23.7.6.1 Shall provide built-in test capabilities for detecting the following errors:**

23.7.6.1.1 Shall be as listed in Section 20.7.6.1.

### 23.7.7 Interchangeability

FFF Interchangeability is defined in MIL-STD-196E and MIL-HBK-61A as a condition which exists when two or more items possess such functional and physical characteristics as to be equivalent in performance and durability, and are capable of being exchanged one for the other without alteration of the items themselves, or of adjoining items.

23.7.7.1 Provide capability for interchangeability of HFMP GPS (T3/A) units, Vehicle Adapter amplifiers (VAAs), and accessories with other like-type HFMP GPS (T3/A) units and accessories. Interchangeable elements are listed below.

23.7.7.1.1 HFMP GPS (T3/A) units, to include the RF-5800H-MP066.

23.7.7.1.2 VAAs, to include AN/VRC-104 family of HF vehicular systems.

23.7.7.1.3 Shall be operable with service-common, manpack radio batteries currently fielded, as detailed in Appendix B, Table 2.

23.7.7.1.4 Battery chargers which support batteries listed in paragraph 23.7.7.1.3.

23.7.7.1.5 High Frequency and Very High Frequency antennas.

23.7.7.1.6 Headsets/handsets employing U-283 audio/keyfill connectors.

## **24. VHF Dismounted Communication System with GPS (VDCS (GPS)) Requirements**

This section discusses the minimum technical requirements for a VHF band dismounted radio system with internal GPS receiver. Technical requirements for other items are described in their respective sections.

### **24.1 VDCS (GPS) Unit Description**

The basic component defined by the requirements within this section is the standard a very high frequency handheld receiver/transmitter unit. The VDCS (GPS) is a single-channel, handheld format, software defined radio whose requirements are defined within this section.

### **24.2 VDCS (GPS) Unit Characteristics**

#### **24.2.1 Frequency Range and Resolution**

24.2.1.1 Shall be as listed in Section 19.2.1.

#### **24.2.2 Receive Characteristics**

24.2.2.1 Shall be as listed in Section 19.2.2.

#### **24.2.3 Transmit Characteristics**

24.2.3.1 Shall be as listed in Section 19.2.3.

#### **24.2.4 Physical Characteristics**

##### **24.2.4.1 Size and Weight**

24.2.4.1.1 Shall be as listed in Section 19.2.4.1

##### **24.2.4.2 Power**

24.2.4.2.1 Shall be as listed in Section 19.2.4.2.

##### **24.2.4.3 Connectors and Interfaces**

Shall provide the following physical and software interfaces for the VDCS (GPS):

24.2.4.3.1 Shall be as listed in Section 19.2.4.3.

##### **24.2.4.4 Environmental Specifications**

24.2.4.4.1 Shall be as listed in Section 19.2.4.4.

### **24.3 Waveforms**

#### **24.3.1 VDCS (GPS) Unit Waveform Requirements**

24.3.1.1 Shall be as listed in Section 19.3.1.

#### **24.3.2 Waveform and Mode Storage**

24.3.2.1 Shall be as listed in Section 19.3.2.

#### **24.3.3 Waveform Selection**

24.3.3.1 Shall be as listed in Section 19.3.3.

### **24.4 GPS**

#### **24.4.1 External GPS Interface Requirements**

24.4.1.1 Shall be as listed in Section 19.4.1.

#### **24.4.2 Internal GPS Interface Requirements**

24.4.2.1 Shall be as listed in Section 19.4.2.

#### **24.4.3 GPS Display**

24.4.3.1 Shall display GPS status, position, and TOD information.

### **24.5 Computer Security**

#### **24.5.1 INFOSEC and Cryptographic Requirements**

24.5.1.1 Shall be as listed in Section 19.5.1.

#### **24.6 Keying Requirements**

For the purposes of this section, the term "keys" includes system keys, certificates, and Firefly vectors as well as user traffic keys.

##### **24.6.1 Key Management**

24.6.1.1 Shall be as listed in Section 19.6.1.

##### **24.6.2 Key Handling and Storage**

24.6.2.1 Shall be as listed in Section 19.6.2.

##### **24.6.3 Zeroization**

24.6.3.1 Shall be as listed in Section 19.6.3.

### **24.7 Other Radio Requirements**

#### **24.7.1 Speaker/Microphone**

24.7.1.1 Shall be as listed in Section 19.7.1.

#### **24.7.2 Display**

24.7.2.1 Shall be as listed in Section 19.7.2.

#### **24.7.3 Presets, Scanning, and Cloning**

24.7.3.1 Shall be as listed in Section 19.7.3.

#### **24.7.4 Human Machine Interface (HMI)**

24.7.4.1 Shall be as listed in Section 19.7.4.

#### **24.7.5 Identification and Marking**

24.7.5.1 Shall be as listed in Section 19.7.5.

#### **24.7.6 Self-Test**

##### **24.7.6.1 Shall provide built-in test capabilities for detecting the following errors:**

24.7.6.1.1 Shall be as listed in Section 19.7.6.1.

### **24.7.7 Interchangeability**

FFF Interchangeability is defined in MIL-STD-196E and MIL-HBK-61A as a condition which exists when two or more items possess such functional and physical characteristics as to be equivalent in performance and durability, and are capable of being exchanged one for the other without alteration of the items themselves, or of adjoining items.

24.7.7.1 Provide capability for interchangeability of VDCS (GPS) units, Vehicle Adapter amplifiers (VAAs), and accessories with other like-type VDCS (GPS) units and accessories. Interchangeable elements are listed below.

24.7.7.1.1 Shall be as listed in Section 19.8.8.1.

## **25. VHF Vehicular Communication System with GPS (VVCS (GPS)) Requirements**

This section discusses the minimum technical requirements for a VHF band, vehicular-mounted, amplified radio system with internal GPS receiver. Technical requirements for other items are described in their respective sections.

### **25.1 VVCS (GPS) Unit Description**

The basic component defined by the requirements within this section is the standard a very high frequency manpack receiver/transmitter unit. The VVCS (GPS) is a single-channel, vehicular-mount format, software defined radio whose requirements are defined within this section.

### **25.2 VVCS (GPS) Unit Characteristics**

#### **25.2.1 Frequency Range and Resolution**

25.2.1.1 The VVCS (GPS) unit minimum frequency range shall be from 30 MHz to 89.99999 MHz.

25.2.1.2 The VVCS (GPS) unit frequency resolution shall be no more than 10 Hz in fixed frequency modes, and no more than 25 kHz in frequency hopping modes.

#### **25.2.2 Receive Characteristics**

25.2.2.1 Receive sensitivity shall be at least -112 dBm for 12 dB SINAD.

25.2.2.2 Intermediate Frequency rejection shall be at least 60 dB.

#### **25.2.3 Transmit Characteristics**

25.2.3.1 Provide at least 50 Watts of RF output power measured at the antenna.

25.2.3.2 Provide at least 3 levels of user selectable RF output power.

25.2.3.3 Harmonic suppression shall be at least 47 dBc.

25.2.3.4 Spurious suppression shall be at least 50 dBc

#### **25.2.4 Physical Characteristics**

##### **25.2.4.1 Size and Weight**

25.2.4.1.1 Maximum weight of each VVCS (GPS) unit shall be 18.1 kg (40 pounds).

25.2.4.1.2 Maximum physical volume of each VVCS (GPS) unit shall be 16,536 cubic centimeters (1010 cubic inches).

##### **25.2.4.2 Power**

25.2.4.2.1 Shall be operable with input voltages from at least +21.5 VDC to at least +31 VDC.

##### **25.2.4.3 Connectors and Interfaces**

Shall provide the following physical and software interfaces for the VVCS (GPS):

25.2.4.3.1 Shall be as listed in Section 19.2.4.3.

##### **25.2.4.4 Environmental Specifications**

25.2.4.4.1 Shall be tested to MIL-STD-810 specifications as listed below:

25.2.4.4.1.1 Temperature: Shall operate between at least -30C to +60C.

25.2.4.4.1.2 Humidity: Shall operate in up to 90% relative humidity.

25.2.4.4.1.3 Shock/Vibration: Ground/mobile environment.

### **25.3 Waveforms**

#### **25.3.1 VVCS (GPS) Unit Waveform Requirements**

25.3.1.1 Shall be as listed in Section 19.3.1.

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### **25.3.2 Waveform and Mode Storage**

25.3.2.1 Shall be as listed in Section 19.3.2.

### **25.3.3 Waveform Selection**

25.3.3.1 Shall be as listed in Section 19.3.3.

## **25.4 GPS**

### **25.4.1 External GPS Interface Requirements**

25.4.1.1 Shall be as listed in Section 19.4.1.

### **25.4.2 Internal GPS Interface Requirements**

25.4.2.1 Shall be as listed in Section 19.4.2.

### **25.4.3 GPS Display**

25.4.3.1 Shall display GPS status, position, and TOD information.

## **25.5 Computer Security**

### **25.5.1 INFOSEC and Cryptographic Requirements**

25.5.1.1 Shall be as listed in Section 19.5.1.

## **25.6 Keying Requirements**

For the purposes of this section, the term "keys" includes system keys, certificates, and Firefly vectors as well as user traffic keys.

### **25.6.1 Key Management**

25.6.1.1 Shall be as listed in Section 19.6.1.

### **25.6.2 Key Handling and Storage**

25.6.2.1 Shall be as listed in Section 19.6.2.

### **25.6.3 Zeroization**

25.6.3.1 Shall be as listed in Section 19.6.3.

## **25.7 Other Radio Requirements**

### **25.7.1 Speaker/Microphone**

25.7.1.1 Shall be as listed in Section 19.7.1.

### **25.7.2 Display**

25.7.2.1 Shall be as listed in Section 19.7.2.

### **25.7.3 Presets, Scanning, and Cloning**

25.7.3.1 Shall be as listed in Section 19.7.3.

### **25.7.4 Human Machine Interface (HMI)**

25.7.4.1 Shall be as listed in Section 19.7.4.

### **25.7.5 Identification and Marking**

25.7.5.1 Shall be as listed in Section 19.7.5.

## **25.7.6 Self-Test**

### **25.7.6.1 Shall provide built-in test capabilities for detecting the following errors:**

25.7.6.1.1 Shall be as listed in Section 19.7.6.1.

## **25.7.7 Interchangeability**

FFF Interchangeability is defined in MIL-STD-196E and MIL-HBK-61A as a condition which exists when two or more items possess such functional and physical characteristics as to be equivalent in performance and durability, and are capable of being exchanged one for the other without alteration of the items themselves, or of adjoining items.

25.7.7.1 Provide capability for interchangeability of VVCS (GPS) units, Vehicle Adapter amplifiers (VAAs), and accessories with other like-type VVCS (GPS) units and accessories. Interchangeable elements are listed below.

25.7.7.1.1 Shall be as listed in Section 19.8.8.1.

## 26. Secure Personal Radio (SPR) Requirements

This section discusses the minimum technical requirements for the Secure Personal Radio unit. Technical requirements for other items are described in their respective sections.

### 26.1 SPR Unit Description

The basic component defined by the requirements within this section is the standard Secure Personal Radio, AES Encryption receiver/transmitter unit with internal GPS - hereafter referred to simply as an SPR unit. The SPR unit is a single-channel, handheld, software-defined radio whose requirements are defined within this section.

### 26.2 VHHR (GPS) Unit Characteristics

#### 26.2.1 Frequency Range and Resolution

26.2.1.1 The SPR unit minimum frequency range shall be from 350 MHz to 450 MHz.

26.2.1.2 The SPR unit minimum channel spacing shall be 25 kHz.

#### 26.2.2 Receive Characteristics

26.2.2.1 Shall be capable of simultaneous receipt of no less than three transmitting SPR units.

26.2.2.2 Shall be capable of receiving transmissions from SPR units up to 1 km away.

26.2.2.3 Shall be capable of receiving and processing GPS signals of frequency 1575.42 MHz,  $\pm 2$  MHz.

#### 26.2.3 Transmit Characteristics

26.2.3.1 Provide at least 2 Watts of RF power output measured at the antenna.

26.2.3.2 Provide at least 3 levels of user selectable RF output power between 250 milliWatts and the maximum power output of the radio.

26.2.3.3 Frequency stability shall be no more than  $\pm 2$  ppm.

#### 26.2.4 Physical Characteristics

##### 26.2.4.1 Size and Weight

26.2.4.1.1 Maximum weight of each SPR, without battery installed, shall be no more than 300 g (10.6 ounces).

26.2.4.1.2 Maximum physical volume of each SPR, without battery installed, shall be no more than 480 cubic centimeters (30 cubic inches).

##### 26.2.4.2 Power

26.2.4.2.1 Shall provide capability to prevent radio damage caused by battery reverse polarity.

26.2.4.2.2 Shall be capable of operation for at least 8 hours on battery power.

##### 26.2.4.3 Connectors and Interfaces

Shall provide the following physical and software interfaces for the SPR unit:

26.2.4.3.1 9-pin bayonet connector for audio interface devices.

26.2.4.3.2 9-pin bayonet connector for key fill and data device connection. Data connector must support USB host and peripheral modes.

26.2.4.3.3 SMA-type UHF Antenna connector.

26.2.4.3.4 Shall support IEEE 802.15.4 wireless interface.

##### 26.2.4.4 Environmental Specifications

26.2.4.4.1 Shall be tested to MIL-STD-810 specifications listed below:

26.2.4.4.1.1 Temperature: Shall operate between at least  $-30^{\circ}\text{C}$  and  $+65^{\circ}\text{C}$ .

26.2.4.4.1.2 Immersion: Shall operate after immersion in 2 meters (6.6 feet) of water for 30 minutes.

## **26.3 Waveforms**

### **26.3.1 SPR Unit Waveform Requirements**

26.3.1.1 Core waveform and mode requirements shall be as per Appendix A.

### **26.3.2 Waveform and Mode Storage**

26.3.2.1 Shall store all provided waveforms and required operational parameters simultaneously.

## **26.4 Rebroadcast requirements**

26.4.1 Shall provide voice rebroadcast using a single SPR unit, with or without encryption.

## **26.5 GPS**

### **26.5.1 External GPS requirements**

26.5.1.1 Shall receive inputs from a commercial external GPS receiver, Precision Lightweight GPS Receiver (PLGR) or Defense Advanced GPS Receiver (DAGR) for time of day synchronization and position reporting operations.

26.5.1.2 Shall receive GPS position information and time-of-day automatically after set-up by operator.

26.5.1.3 Shall be capable of broadcasting automatic position reports based on external GPS data.

### **26.5.2 Internal GPS Requirements**

26.5.2.1 Receive and process GPS signals.

26.5.2.2 Distribute timing and position data to the radio software for use in timing sensitive waveforms and for situational awareness purposes.

26.5.2.3 Shall be capable of broadcasting automatic position reports based on internal GPS data.

## **26.6 Computer Security**

### **26.6.1 INFOSEC and Cryptographic Requirements**

26.6.1.1 Shall provide embedded cryptographic chips/modules.

26.6.1.2 Shall provide NSA TYPE III encryption capability.

26.6.1.3 Shall provide AES encryption capability.

26.6.1.4 Any power system or battery used "hold up" data, keys, algorithms, or other radio data will be serviceable by the end user without special tools or equipment.

## **26.7 Keying Requirements**

For the purposes of this section, the term "keys" includes system keys, certificates, and Firefly vectors as well as user traffic keys.

### **26.7.1 Key Management**

26.7.1.1 Shall load unencrypted keys into the Cryptographic Subsystem via an external programming application.

### **26.7.2 Key Handling and Storage**

26.7.2.1 Shall support COMSEC key entry.

26.7.2.2 Shall store all necessary keys required to operate the core waveforms identified in Appendix A.

26.7.2.3 Shall provide the operator the ability to associate keys to waveforms/channels.

## **26.8 Other Radio (MBHH (GPS)) Requirements**

### **26.8.1 Audio system**

26.8.1.1 Shall provide speaker volume control for attached audio devices.

### **26.8.2 Presets, Scanning, and Cloning**

26.8.2.1 Shall provide at least 14 programmable presets.

26.8.2.2 Shall provide capability to program presets using programming software installed on a personal computer.

### **26.8.3 Identification and Marking**

26.8.3.1 Shall provide markings in accordance with contract requirements, MIL-STD-130N, or as defined by the SPAWAR PMW/A 170 Communications Program Office.

26.8.3.2 Equipment shall be marked with safety and disposal information as required by federal regulation.

### **26.8.4 Interchangeability**

FFF Interchangeability is defined in MIL-STD-196E and MIL-HBK-61A as a condition which exists when two or more items possess such functional and physical characteristics as to be equivalent in performance and durability, and are capable of being exchanged one for the other without alteration of the items themselves, or of adjoining items.

26.8.4.1 Provide capability for interchangeability of SPR units, Vehicle Adapter Amplifiers (VAAs), and accessories with other like-type SPR units and accessories. Interchangeable elements are listed below.

26.8.4.1.1 SPR units, to include RF-5800S radios (NSN 5820-01-559-2590)

26.8.4.1.2 VAAs, to include RF-5800S-V001 SPR Vehicular Communication Systems.

26.8.4.1.3 Shall be operable with service-common, SPR radio batteries currently fielded, as detailed in Appendix B, Table 3.

26.8.4.1.4 Battery chargers which support batteries listed in paragraph 1.8.8.1.3.

26.8.4.1.5 UHF antennas

26.8.4.1.6 Headset/handsets employing 9-pin circular bayonet connectors.

## **PART II: KITED ANCILLARY LIST**

LINE	DESCRIPTION	FFF EQUIVALENT	1. MBHH	2. MBHH (GPS)	3. MBHH DIVE	4. MBHH DIVE (GPS)	5. MBRM	6. HFMP	7. HFVR (20W)	8. HFVR (150W)	9. HFVR (400W)	10. MBMVR (S)	11. MBMVR (D)	12. MBMHHVR (D)	13. MBHHVR (D)	14. MBMMR (NSW)	15. MBHH NSW (GPS)	16. MBHH DIVE NSW (GPS)	17. SBMBHH	18. HCLOS	19. VHHR GPS	20. HFMP (T3)	21. HFMCMP GPS (T3)	22. HFMP GPS (T3/D)	23. HFMP GPS (T3/A)	24. VDCS (GPS)	25. VVCS (GPS)	26. SPR		
1	MBHH	AN/PRC-152(V)1	X											X	X															
2	MBHH (GPS)	AN/PRC-152(V)2		X										X	X															
3	MBHH DIVE	AN/PRC-152(V)3			X									X	X															
4	MBHH DIVE (GPS)	AN/PRC-152(V)4				X								X	X															
5	MBMR	AN/PRC-117G					X					X	X	X																
6	HFMP	AN/PRC-150						X	X	X	X																			
7	HFVR (20W)	AN/VRC-104(V)2							X																					
8	HFVR (150W)	AN/VRC-104(V)3								X																				
9	HFVR (400W)	AN/VRC-104(V)4									X																			
10	MBMVR (S)	AN/VRC-114(V)1										X																		
11	MBMVR (D)	AN/VRC-114(V)2											X																	
12	MBMHHVR (D)	RF-300M-V255												X																
13	MBHHVR (D)	AN/VRC-110(V)1													X															
14	MBMR (NSW)	AN/PRC-117G (SOCOM)														X														
15	MBHH NSW (GPS)	AN/PRC-152(V)2 (SOCOM)															X													
16	MBHH DIVE NSW (GPS)	AN/PRC-152(V)4 (SOCOM)																X												
17	SBMBHH	RF-310M-HH001												X	X					X										
18	HCLOS	RF-7800W-OU440																		X										
19	VHHR GPS	RF-5800V-HH104																			X					X	X			
20	HFMP (T3)	RF-5800H-MP025							X	X	X											X								
21	HFMP GPS (T3)	RF-5800H-MP026							X	X	X												X							
22	HFMP GPS (T3/D)	RF-5800H-MP036							X	X	X													X						
23	HFMP GPS (T3/A)	RF-5800H-MP065							X	X	X														X					
24	VDCS GPS	RF-5800M-DS101																			X					X				
25	VVCS (GPS)	RF-5800M-VS521																			X						X			
26	SPR	RF-7800S-TR001																											X	
27	Ethernet Cable Assembly	12043-2760-A006					X					X	X	X		X														
28	Mission Fill Kit	12041-1040-01															X	X												
29	30-512 MHz Veh. Ant.	RF-390-AT006												X																
30	Antenna Diplexer	11138-1400-02													X															

LINE	DESCRIPTION	FFF EQUIVALENT	1. MBHH	2. MBHH (GPS)	3. MBHH DIVE	4. MBHH DIVE (GPS)	5. MBMR	6. HFMP	7. HVFR (20W)	8. HVFR (150W)	9. HVFR (400W)	10. MBMVR (S)	11. MBMVR (D)	12. MBMHVVR (D)	13. MBHHVR (D)	14. MBMMR (NSW)	15. MBHH NSW (GPS)	16. MBHH DIVE NSW (GPS)	17. SBMBHH	18. HCLOS	19. VHHR GPS	20. HFMP (T3)	21. HFMCPC GPS (T3)	22. HFMP GPS (T3/D)	23. HFMP GPS (T3/A)	24. VDCS (GPS)	25. VVCS (GPS)	26. SPR	
31	MBHH Battery	12041-2100-02	X	X	X	X								X	X		X	X	X										
32	400W HF Antenna Coupler	RF-382A-15								X	X																		
33	RG-213, N-N, 250 ft.	10181-9824-A025									X																		
34	Coupler Control Cable	10181-9823-A025									X																		
35	KDU Extension cable	10511-0704-012						X	X	X	X											X	X	X	X				
36	PPP Cable	10535-0775-A006						X	X	X	X											X	X	X	X				
37	Tactical Speaker	RF-5980-SA001									X																		
38	Speaker Cable, Audio	10535-0707-A009							X		X																		
39	HFMP (radio only)	RT-1694D(P)C/U						X	X	X	X																		
40	Tactical Chat S/W	RF-6551H						X	X													X	X	X	X				
41	Battery Box	10513-4800-02						X														X	X	X	X				
42	H-250/U Handset	10075-1399					X	X	X	X	X	X	X	X	X	X							X	X	X	X		X	
43	OE-505 HF Antenna	10372-0240-02						X														X	X	X	X				
44	Ground Stake	10303-1008-01						X														X	X	X	X				
45	Hold Up Battery	B41-0010-004						X																					
46	Radio Programming S/W	RF-6550H						X	X	X	X											X	X	X	X				
47	HF Antenna Adapter	10372-1260-01						X														X	X	X	X				
48	HFMP Operator Card	10515-0103-4100						X	X	X	X																		
49	HMMWV Ant. Mntg Kit	10181-5178-06									X																		
50	Amplifier Shock Mount	10497-0200-01									X																		
51	Coupler Shock Mount	RF-384VM-03									X	X																	
52	150W HF Power Amp.	RF-5833H-PA002									X																		
53	RG-213, N-N, 25 ft.	10181-9824-020									X																		
54	Coupler Control Cable	10181-9823-020									X																		
55	Locking Kit	10372-0874-01							X	X	X																		
56	MBMR	RT-1949(P)(C)/PRC					X																						
57	MBHH	RT-1916(P)(C)/U	X											X	X														
58	150W Antenna Coupler	RF-5382H-CU001							X																				
59	Coupler Shock Mount	RF-5384VM-01							X																				
60	Locking Kit	10497-0870-01								X																			

LINE	DESCRIPTION	FFF EQUIVALENT	1. MBHH	2. MBHH (GPS)	3. MBHH DIVE	4. MBHH DIVE (GPS)	5. MBMR	6. HFMP	7. HVFR (20W)	8. HVFR (150W)	9. HVFR (400W)	10. MBMVR (S)	11. MBMVR (D)	12. MBMHVVR (D)	13. MBHHVR (D)	14. MBMMR (NSW)	15. MBHH NSW (GPS)	16. MBHH DIVE NSW (GPS)	17. SBMBHH	18. HCLOS	19. VHHR GPS	20. HFMP (T3)	21. HFMCPC GPS (T3)	22. HFMP GPS (T3/D)	23. HFMP GPS (T3/A)	24. VDCS (GPS)	25. VVCS (GPS)	26. SPR	
61	KDU cable (20')	10511-0704-040																											
62	Audio Cable Assembly	10497-5036-01								X																			
63	150W HF VAA	RF-5800H-V002								X																			
64	Coupler Control Cable	12020-1460-A020								X																			
65	MBMVR(S)	RF-300M-V150										X																	
66	Speaker Power Cable	10535-0713-A009							X	X	X																		
67	Remote Control Kit	10553-0100-02															X												
68	PPP Data Cable	12043-2710-A006															X	X											
69	PPP Cable	12041-7180-A006															X	X											
70	Op. Manual for HF/VHF MP	10515-0117-4200						X	X	X	X											X	X	X	X				
71	400W HF Power Amplifier	RF-5834H-PA001									X																		
72	Installation Manual	10515-0123-4200								X	X																		
73	Sun Shield f/ RF-382A-15	10330-9250																											
74	Broadband Antenna	12011-2730-01	X	X	X	X								X	X		X	X	X										
75	MBHH Operating Manual	10515-0283-6000	X	X	X	X									X		X	X											
76	MBHH GPS Antenna	12041-6550-01		X		X											X	X											
77	MBHH Protective Cover	12001-6014-01			X	X											X	X											
78	MBMR Operating Manual	10515-0319-6000					X				X	X	X	X	X	X													
79	MBMR Pocket Guide	10515-0319-4100					X				X	X	X		X	X													
80	MBMR VHF/UHF Antenna	RF-3152-AT152					X				X	X	X		X	X													
81	MBMR UHF LOS Antenna	RF-3164-AT122					X				X	X	X		X	X													
82	MBMR VHF Antenna	RF-3150-AT152					X				X	X	X		X	X													
83	MBMR GPS Antenna	RF-3070-AT242					X				X	X	X		X	X													
84	MBMR Battery Box	12043-4800-01					X				X	X	X		X	X													
85	Antenna Storage Bag	10372-0349-01					X				X	X	X		X	X													
86	Antenna Reference Card	10515-6392					X				X	X	X		X	X													
87	Programming Cable, USB	12043-2750-A006					X				X	X	X		X	X													
88	Manpack Rucksack	RF-5930-CA002						X																					
89	HFMP CW Key	919-5004-03						X																					
90	HFMP CW Key Cable	10372-1230						X																					

LINE	DESCRIPTION	FFF EQUIVALENT	1. MBHH	2. MBHH (GPS)	3. MBHH DIVE	4. MBHH DIVE (GPS)	5. MBRM	6. HFMP	7. HFVR (20W)	8. HFVR (150W)	9. HFVR (400W)	10. MBMVR (S)	11. MBMVR (D)	12. MBMHVVR (D)	13. MBHHVR (D)	14. MBMMR (NSW)	15. MBHH NSW (GPS)	16. MBHH DIVE NSW (GPS)	17. SBMBHH	18. HCLOS	19. VHHR GPS	20. HFMP (T3)	21. HFMCPC GPS (T3)	22. HFMP GPS (T3/D)	23. HFMP GPS (T3/A)	24. VDCS (GPS)	25. VVCS (GPS)	26. SPR
91	HFMP Operator Card	10515-0117-4100						X														X	X	X	X			
92	N-to-BNC RF Cable, 15'	10369-7211-015						X																				
93	Speaker	10181-5180-01						X																				
94	HFVR (20W) Shock Mount	RF-5211VSM-052							X																			
95	Distribution Box Cable	12045-5700-A30							X																			
96	HFVR (20W) Power Cable	10181-9826-020							X																			
97	HFVR (20W) Installation Man	10515-0289-4200							X																			
98	PA Cable Assembly	10181-9862-020								X																		
99	Coaxial Cable Assembly	10497-5020-A08								X																		
100	VAA Operator Manual	10515-0122-4200								X																		
101	PA Cable Assembly	10535-0720-B17								X																		
102	Ground Cable	12045-4006-A16								X																		
103	Speaker Audio Cable	10535-0707-A020								X																		
104	Speaker Power Cable	10535-0713-A020								X																		
105	Shock Mount	10181-5074-03									X																	
106	Coaxial Cable Assembly	10181-9821-020									X																	
107	PA Cable Assembly	10181-9828-025									X																	
108	PA Control Cable Assy.	10535-0720-A020									X																	
109	Ancillary Kit	10225-9002-01									X																	
110	Shock Mount	RF-5211VSM									X																	
111	Ground Strap	7147-1167-3									X																	
112	Programming Application	RF-6650M										X	X	X	X	X												
113	MBMR Single VAA	RF-7800M-PA150										X	X	X														
114	MBMR VAA Ancillary Kit	12064-5005-01										X		X														
115	MBMR VAA Shock Mount	12050-3000-01										X																
116	MBMR Dual VAA Anc. Kit	12064-5005-02											X															
117	Shock Mount Interface	12053-6800-01											X	X	X													
118	Shock Mount	MT-6352/VRC											X	X														
119	MBHH Accessory Bag	12041-1595-01												X														
120	Coaxial Cable Assembly	12053-1420-A2												X														

LINE	DESCRIPTION	FFF EQUIVALENT	1. MBHH	2. MBHH (GPS)	3. MBHH DIVE	4. MBHH DIVE (GPS)	5. MBRM	6. HFMP	7. HVFR (20W)	8. HVFR (150W)	9. HVFR (400W)	10. MBMVR (S)	11. MBMVR (D)	12. MBMHVVR (D)	13. MBHHVR (D)	14. MBMMR (NSW)	15. MBHH NSW (GPS)	16. MBHH DIVE NSW (GPS)	17. SBMBHH	18. HCLOS	19. VHHR GPS	20. HFMP (T3)	21. HFMCPC GPS (T3)	22. HFMP GPS (T3/D)	23. HFMP GPS (T3/A)	24. VDCS (GPS)	25. VVCS (GPS)	26. SPR	
121	MBHH Veh. Adapter Unit	12053-0100-09												X															
122	MBHH VAA Antenna Adapte	12049-0500-01												X	X		X	X											
123	MBHH VAA	12053-0100-01													X														
124	VAA Ancillary Kit	12053-0110-01													X														
125	MBHH KDU Kit	10553-0200-02															X	X											
126	MBHH Operator Card	10515-0283-4010	X	X	X	X											X	X											
127	SBMBHH Manuals	10515-0360-6000																	X										
128	PoE Block w/ cables	12069-0024-01																			X								
129	HCLOS Data/PoE cable	12069-0020-02																			X								
130	HCLOS Antenna mount	12069-0023-01																			X								
131	RF Coax Cable, 16 in.	12069-0021-01																			X								
132	Link Budget Tool	12069-0902-01																			X								
133	RF Monitor Tool	12069-0903-01																			X								
134	HCLOS Publications CDROM	10515-0330-6000																			X								
135	VHF Whip Antenna	12011-2600-01																				X						X	
136	VHHR (GPS) Operator Card	10515-2600-01																			X								
137	VHHR (GPS) Pub CDROM	10518-2910-01																			X								X
138	Multiband Soldier Antenna	RF-3161-AT001																								X			
139	MBDCS (GPS) Operator Car	10515-0234-4100																								X			
140	Handset Radio Accessory Bag	12041-1595-01																								X			
141	Handheld Radio Holster	RF-5932-CA003																								X	X		
142	VVCS (GPS) CDROM	10518-2901-02																										X	
143	VVCS (GPS) Operator Card	10515-0234-4100																										X	
144	VVCS Shock mount	12050-3000-02																										X	
145	DC Power Cable	10570-0720-01																										X	
146	VVCS Installation Manual	10515-0328-4200																										X	
147	VVCS Vehicular Antenna	RF-390-AT001																										X	
148	Coaxial Cable Assembly, 25'	10369-7212-025																										X	
149	Univeral Antenna Mount	RF-292-01																										X	
150	MBHH Vehicular Amplifier	RF-5800M-V520													X														

LINE	DESCRIPTION	FFF EQUIVALENT	1. MBHH	2. MBHH (GPS)	3. MBHH DIVE	4. MBHH DIVE (GPS)	5. MBMR	6. HFMP	7. HVFR (20W)	8. HVFR (150W)	9. HVFR (400W)	10. MBMVR (S)	11. MBMVR (D)	12. MBMHVVR (D)	13. MBHHVR (D)	14. MBMMR (NSW)	15. MBHH NSW (GPS)	16. MBHH DIVE NSW (GPS)	17. SBMBHH	18. HCLOS	19. VHHR GPS	20. HFMP (T3)	21. HFMCPS GPS (T3)	22. HFMP GPS (T3/D)	23. HFMP GPS (T3/A)	24. VDCA (GPS)	25. VVCS (GPS)	26. SPR		
151	<b>VVCS Publication CDROM</b>	10518-2901-02																												X
152	<b>Flexible Whip Antenna</b>	12055-2700-01																												X
153	<b>SPR Rechargeable Battery</b>	12055-2100-01																												X
154	<b>SPR Operator Card</b>	10515-0345-4100																												X
155	<b>Hi-band Antenna</b>	RF-3165-AT122															X													
156	<b>VDCA (GPS) Pub Kit</b>	10515-0234-6000																								X				
157	<b>Operator Card</b>	10515-0300-4100																												X
158	<b>VHF PA</b>	RF-5800-V500																												X
159	<b>Ancillary Kit</b>	12065-0105-03																												X
160	<b>Ancillary Kit</b>	12050-3005-01																												X
161	<b>Installation Manual</b>	10515-0329-4200																												X
162	<b>VHF Blade Antenna</b>	12011-2700-01																												X
163	<b>VHF Whip Antenna</b>	RF-387-AT002																												X
164	<b>GPS Cable</b>	10511-0730-A025																												X

## **APPENDICES: SUPPLEMENTAL INFORMATION**

## **APPENDIX A - WAVEFORM AND MODE TABLE**

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited

WAVEFORM OR MODE	DEFINITION DOCUMENT	1. MBHH	2. MBHH (GPS)	3. MBHH DIVE	4. MBHH DIVE (GPS)	5. MBMR	6. HFMP	7. HVFR (20W)	8. HVFR (150W)	9. HVFR (400W)	10. MBMVR (S)	11. MBMVR (D)	12. MBMHVVR (D)	13. MBHHVR (D)	14. MBMVR (NSW)	15. MBHH NSW (GPS)	16. MBHH DIVE NSW (GPS)	17. SBMBHH	18. HCLOS	19. VHHR GPS	20. HFMP (C)	21. HFMCPS GPS (C)	22. HFMP GPS (CD)	23. HFMP GPS (CA)	24. VDCS (GPS)	25. VVCS (GPS)	26. SPR		
<b>SINCGARS</b>	MIL-STD-188-220	X	X	X	X	X					X	X	n/a	X	X	X	X												
	MIL-STD-241-1/2																												
<b>HAVEQUICK II</b>	MIL-STD-188-220	X	X	X	X	X					X	X	n/a	X	X	X	X												
	MIL-STD-188-243																												
	JIEO-9120A																												
<b>FSK VOICE/DATA</b>	N/A	X	X	X	X	X					X	X	n/a	X	X	X	X	X											
<b>ASK VOICE DATA</b>	N/A	X	X	X	X	X					X	X	n/a	X	X	X	X	X											
<b>DAMA Integrated Waveform</b>	MIL-STD-188-181C																												
	MIL-STD-188-182B					X					X	X	n/a		X														
	MIL-STD-188-183B																												
<b>VHF FM Military Tactical</b>	MIL-STD-188-242	X	X	X	X	X					X	X	n/a	X	X	X	X												
<b>FM Voice/Data</b>	N/A	X	X	X	X	X	X	X	X	X	X	X	n/a	X	X	X	X	X		X	X	X	X	X	X	X	X	X	
<b>AM Voice/Data</b>	N/A	X	X	X	X	X	X	X	X	X	X	X	n/a	X	X	X	X	X			X	X	X	X					
<b>COBRA</b>	N/A												n/a		X	X	X												
<b>LPI/LPD/LPE</b>	N/A						X	X	X	X			n/a								X	X	X	X					
<b>SCM</b>	N/A												n/a		X	X	X												
<b>Wideband Networking</b>	N/A					X					X	X	n/a		X														
<b>Single Sideband (SSB) with Automatic Link Establishment (ALE)</b>	MIL-STD-188-141B						X	X	X	X			n/a								X	X	X	X					
<b>Independent Sideband (SSB) with Automatic Link Establishment (ALE)</b>	MIL-STD-188-141B						X	X	X	X			n/a								X	X	X	X					
<b>HF Data</b>	STANAG 5066						X	X	X	X			n/a								X	X	X	X					
<b>Binary Phase Shift Keying</b>	N/A																			X									
<b>64 Quadrature Amplitude Modulation</b>	N/A																			X									
<b>Gaussian Minimum Shift Keying</b>	N/A																												X

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited

## **APPENDIX B – BATTERY SUPPORT MATRIX**

NOMENCLATURE	CAGE	DESCRIPTION	NSN
12041-2100-01	14304	BATTERY,STORAGE	6140015518898
12041-2100-02	005VU	BATTERY,STORAGE	6140015487566
RF-5911-PS001	14304	TRAY,BATTERY	6160015717464

Table 1 Service-common handheld radio batteries (fielded)

NOMENCLATURE	CAGE	DESCRIPTION	NSN
BA-5590/U	14304	BATTERY,NONRECHARGEABLE	6135015701980
BA-5590/U	80058	BATTERY,NONRECHARGEABLE	6135010363495
BA-5590A/U	80058	BATTERY,NONRECHARGEABLE	6135015233037
BA-5590B/U	80058	BATTERY,NONRECHARGEABLE	6135014389450
BA-5390/U	0UU59	BATTERY,NONRECHARGEABLE	6135014993516
BA-5390/U	80058	BATTERY,NONRECHARGEABLE	6135015010833
BA-5390A/U	80058	BATTERY,NONRECHARGEABLE	6135015176060
BB-390/A	80063	BATTERY,STORAGE	6140014198187
BB-390B/U	80063	BATTERY,STORAGE	6140014904317
BB-490/U	80058	BATTERY,STORAGE	6140013314013
BB-2590	7X634	BATTERY,STORAGE	6140014997304
BB-2590	80063	BATTERY,STORAGE	6140014904316
BB-2590/SKCP	3U9G6	BATTERY,STORAGE	6140015721852
BB-590-U	4U927	BATTERY,STORAGE	6140010633918

Table 2 Service-common manpack radio batteries (fielded)

NOMENCLATURE	CAGE	DESCRIPTION	NSN
12055-2100-01	14304	BATTERY, STORAGE	6140015592194
12055-2102-01	14304	CASE, BATTERY ASSEMBLY	6160015621427

Table 3 Service-common SPR radio batteries (fielded)