Annex A

Draft System Requirements Specification the LRF HHTI-LR System

1 Scope

1.1 Identification

This System Requirements Specification (SRS) details the technical and performance requirements for a Laser Range Finder - Hand Held Thermal Imager - Long Range (LRF HHTI-LR) System for use by the Canadian Army and Royal Canadian Navy.

1.2 System Overview

The main component of the LRF HHTI-LR System is the LRF HHTI-LR. The LRF HHTI-LR is a hand-held binocular device with a Laser Range Finder, cooled Thermal Channel and Secondary Channel for day and low light conditions. It is used by soldiers and sailors to enable the timely detection, recognition and identification of objects of interest under varying conditions of light and visibility. The LRF HHTI-LR System provides a capability for the accurate geolocation of targets, and the onwards transmission of target data to other systems. Imagery produced by the LRF HHTI-LR System can be saved and transferred for analysis. The LRF HHTI-LR System will be used by the Canadian Army in the combat arms leader, sniper, reconnaissance and other similar roles. It will be used by the Royal Canadian Navy to enhance general situational awareness, by boarding parties, and for security surveillance when in port.

The LRF HHTI-LR is supported by a number of other components that are required to provide the full functionality of the system. Other equipment components include batteries, a tripod, various accessories to interface The LRF HHTI-LR to other systems and external power sources, pouches for carriage in the field, and containers for storage and logistic transport.

The LRF HHTI-LR System also includes a bespoke software application that provides the functionality that supports the interface between the LRF HHTI-LR and the Integrated Soldier System.

1.3 Document Overview

This document specifies the requirements for each component that together comprise the LRF HHTI-LR System.

Section 1 describes the scope of the document, and provides a high level system overview of the LRF HHTI-LR System.

Section 2 identifies that documents that are referenced in this SRS for the LRF HHTI-LR System.

Section 3 describes the conceptual configuration of the LRF HHTI-LR System based on a typical equipment breakdown structure of a system that could meet the requirements specified in this document. It should be noted that the requirements of the LRF HHTI-LR System could be satisfied by a system with a different equipment breakdown structure.

Section 4 specifies the requirements associated with the LRF HHTI-LR, the primary component of the system.

Section 5 specifies the requirements of all the other components of the LRF HHTI-LR System that together with The LRF HHTI-LR provide the full functionality of the system.

Section 6 specifies requirements that may be applicable to more than one component of the LRF HHTI-LR System.

This document is unclassified, and does not contain Controlled Goods. There are no restrictions related to its use.

2 Referenced Documents

2.1 Canadian Armed Forces (CAF) / Department of National (DND) Defence Documents

A. D-02-002-001/SG-001 - Identification Marking of Canadian Military Property

2.2 United States Department of Defense (DoD) Documents

B. MIL-STD-461G - Interface Standard: Requirements for the Control of Electromagnetic Interference Characteristics of Subsystems and Equipment

C. MIL-STD-810H - Test Method Standard: Environmental Engineering Considerations and Laboratory Tests

D. MIL-STD-1275E - Interface Standard: Characteristics of 28 Volt DC Input Power to Utilization Equipment in Military Vehicles

E. MIL-STD-1472H - Design Criteria Standard: Human Engineering

F. MIL-STD-1474E - Design Criteria Standard: Noise Limits

G. MIL-STD-1913 - Military Standard: Dimensioning of Accessory Mounting Rail for Small Arms Weapons

H. MIL-PRF-32271A - Performance Specification: Battery, Non-Rechargeable, Lithium, General Specification for

I. MIL-PRF-32271/15 - Performance Specification Sheet: Battery, non-rechargeable, lithium

J. MIL-PRF-35383 - Performance Specification: Batteries, Rechargeable, Sealed, General Specification for

K. MIL-PRF-32383/1 - Performance Specification Sheet: Battery, Rechargeable, Sealed, Lithium Ion, BB-2545/U

L. MIL-PRF-32383/2 - Performance Specification Sheet: Battery, Rechargeable, Sealed, Lithium Ion, BB-2580/U

M. MIL-PRF-62122E - Performance Specification: Cable Assembly, Inter-vehicle Power: Plug, Receptacle, and Adapter

N. NWPAN-WP-01112013 **-** Nett Warrior Interconnect Architecture White Paper, Version 6

2.3 NATO Standardization Agreements and Standards

O. STANAG 4370 Environmental Testing

P. AECTP-230 (Edition 1) - Climatic Conditions

Q. AECTP 300 (Edition D, Version 1) Climatic Environmental Tests

R. AECTP 400 (Edition D, Version 1) Mechanical Environmental Tests

S. STANAG-4347 LAND (Edition 1) - Definition of Nominal Static Range Performance for Thermal Imaging Systems

T. Standard AAITP-08 NATO Unique Identification of Items

2.4 European Union Documents

U. The Low Voltage Directive (LVD) (2014/35/EU)

2.5 Industry Standards and Other References

V. ANSI Z136.1-2014 - American National Standard For Safe Use Of Lasers

W. IEEE 802.3-2018 - IEEE Standard for Ethernet

X. IEEE 802.11-2020 - IEEE Standard For Information Technology--Telecommunications And Information Exchange Between Systems - Local And Metropolitan Area Networks--Specific Requirements - Part 11: Wireless LAN Medium Access Control (MAC) And Physical Layer (PHY) Specifications

Y. IEEE 802.11 - Standards for Wireless Local Area Networks

Z. IEEE 802.15 - Standards for Wireless Personal Area Networks

AA. Bluetooth v4.1 Specification

AB. WGS-84 - World Geodetic System - 1984

3 Conceptual Configuration

3.1 Aim

The conceptual configuration presents an assumed equipment breakdown structure for the LRF HHTI-LR System. It also includes the identification of LRF HHTI-LR System specific software applications that may be installed on external devices that are required to satisfy external interface requirements. It is understood that a compliant system may meet all the mandatory requirements of this specification with a different equipment breakdown structure.

3.2 Identification of Components

3.2.1 Hardware

The assumed Equipment Breakdown Structure for the LRF HHTI-LR System comprises the following components:

- Laser Range Finder - Hand-held Thermal Imager - Long Range (LRF HHTI-LR) (see Section 4)
- Field Kit Storage and Transport Case (see Section 5.1)
- Support Kit Storage and Transport Case (see Section 5.2)
- Field Pouch (see Section 5.4)
- Tripod Pouch (see Section 5.5)
- Accessories Pouch (see Section 5.6)
- Rechargeable Batteries (see Section 5.7)
- Non-rechargeable Batteries (see Section 5.8)
- Battery Charger (see Section 5.9)
- Tripod (see Section 5.10)
- Defense Advanced GPS Receiver (DAGR) Interface Cable (see Section 5.11)
- Integrated Soldier System (ISS) Interface Cable (see Section 5.12)

- LRF-LRF HHTI-LR / ISS Battle Management System Interface Application (LIBI App) (see section 5.13)
- Ruggedized Tactical Laptop (RTL) Interface Cable (see Section 5.14)
- Ethernet Interface Cable (see Section 5.15)
- Ruggedized Flash Drive (see Section 5.16)
- DC Power Cable Assembly (See Section 5.17)
- AC Power Cable Assembly (See Section 5.18)
- Lens Cleaning Kit (See Section 5.19)
- User Manual (See Section 5.20)
- Quick Reference Guide (See Section 5.21)

3.2.2 Software

The LRF HHTI-LR is considered to be a "black box" component of the LRF HHTI-LR System. The requirements related to LRF HHTI-LR software are specified as part of the general performance requirements. (see Section 4)

The LRF HHTI-LR System includes the following bespoke (developmental) software that is required to implement the functionality for the interface between the HHTI_LR and the ISS, and will be installed on the ISS End User Device (EUD) and on the ISS Commander's Tablet:

- LRF-LRF HHTI-LR / ISS BMS Interface Application (see Section 5.13)

3.3 Identification of Interfaces

The LRF HHTI-LR System requires the following interfaces to achieve full system functionality:

- Defense Advanced GPS Receiver Interface (see Section 4.4.2)
- Integrated Soldier System Interface (see Section 4.4.3)
- Ruggedized Tactical Laptop Interface (see Section 4.4.4)
- Ruggedized Flash Drive Interface (see Section 4.4.5)
- Land Warrior Battery Interface (see Section 4.4.6)
- Generic Interfaces - Ethernet Connectivity (see Section 4.4.7)
- Generic Interfaces - Bluetooth Connectivity (see Section 4.4.8)
- Generic Interfaces - Wireless Connectivity (see Section 4.4.9)
- Military Vehicle 12/24 V DC Electrical System Interface (see Section 4.4.10)
- AC Power Interface (see Section 4.4.11)
- Tripod Interface (see Section 4.4.12)

4 LRF HHTI-LR Requirements

4.1 Required States and Modes

4.1.1 Operational Mode

The operational mode is the normal mode of operation of the LRF HHTI-LR. The operational mode is entered once all start-up routines are complete.

The LRF HHTI-LR must have an Operational Mode, in which full functionality is available in response to user input.

The LRF HHTI-LR must enter the Operational Mode within five minutes of turning it on at a temperature of 20 degrees Celsius, starting with the LRF HHTI-LR at ambient temperature.

The LRF HHTI-LR must enter the Operational Mode within five minutes of turning it on at a temperature of 49 degrees Celsius, starting with the LRF HHTI-LR at ambient temperature.

The LRF HHTI-LR must enter the Operational Mode within five minutes of turning it on at a temperature of minus 32 degrees Celsius, starting with the LRF HHTI-LR at ambient temperature.

The LRF HHTI-LR should enter the Operational Mode in less than five minutes of turning it on at a temperature of 20 degrees Celsius, starting with the LRF HHTI-LR at ambient temperature. < rated >

The LRF HHTI-LR should enter the Operational Mode in less than five minutes of turning it on at a nominal temperature of 49 degrees Celsius, starting with the LRF HHTI-LR at ambient temperature. < rated >

The LRF HHTI-LR should enter the Operational Mode in less than five minutes of turning it on at a nominal temperature of minus 32 degrees Celsius, starting with the LRF HHTI-LR at ambient temperature. < rated >

4.1.2 Standby Mode

The Standby Mode allows the LRF HHTI-LR to conserve power when not being actively used by the operator.

The LRF HHTI-LR must have a Standby Mode.

The LRF HHTI-LR must transition from the Operational Mode to the Standby Mode in response to user input.

The LRF HHTI-LR must transition from the Standby Mode to the Operational Mode in response to user input.

The LRF HHTI-LR must transition to a fully functional state in the Operational Mode from the Standby Mode within 30 seconds of the user input.

4.1.3 Emergency Mode

The Emergency Mode allows the operator to transition the LRF HHTI-LR from the Field Carriage Mode, as described in Section 6.1.3, to The Emergency Mode where it can be used as quickly as possible. In the Emergency Mode, start-up routines may be skipped, and full performance may not be available to the user.

The LRF HHTI-LR must have an Emergency Mode.

The LRF HHTI-LR must transition from the Field Carriage Mode to the Emergency Mode in response to user input.

When in the Emergency Mode, the LRF HHTI-LR must provide the user with display functionality using the Secondary Channel within thirty-seconds of initiating start-up at a nominal temperature of 20 degrees Celsius.

4.2 System Maturity Requirements

4.2.1 Application

System maturity requirements are applicable to the LRF HHTI-LR, with the exception of those parts of the LRF HHTI-LR that are replaceable as a first level maintenance task and that do not

require the seal of the LRF HHTI-LR to be broken, such eye-cups, lens covers, shoulder strap and hand straps.

4.2.2 Intent

It is Canada's intent to procure a Military Off-the-Shelf LRF HHTI-LR that is proven and in-service with another military force. Canada will not require any changes to the hardware components that comprise the LRF HHTI-LR. However, due to language and interface requirements, a Canada-specific version of some LRF HHTI-LR software modules may be required.

4.2.3 System Maturity

At the time of bid submission, a minimum of one hundred LRF HHTI-LR must be in operational service with:

- the armed forces of a NATO country OR
- the armed forces of a member of the Five Eyes (FVEY) alliance OR
- the armed forces of a country from which Canada has procured hand held thermal imagers for the Canadian Army in the past

4.3 Capability Requirements

4.3.1 Geolocation of User and Targets

4.3.1.1 Geolocation of User

The LRF HHTI-LR must have an Internal GPS receiver.

The Internal GPS must have a localization accuracy (CEP 50) of 5 metres or less under open skies.

The LRF HHTI-LR must determine the geolocation of the user from geolocation data sourced from the internal GPS receiver.

The LRF HHTI-LR must determine the geolocation of the user from geolocation data sourced from an external GPS receiver that is interfaced to the LRF HHTI-LR.

The LRF HHTI-LR geolocation data of the user must include grid coordinates and elevation above sea level.

When connected to a Defense Advanced GPS Receiver (DAGR), the LRF HHTI-LR must use geolocation data received from the DAGR in preference to any other geolocation data that may be available.

4.3.1.2 Geolocation of Targets

The LRF HHTI-LR must measure the azimuth of the target determined by the axis defined by the reticle with a one sigma accuracy of six NATO mils or better.

The LRF HHTI-LR must measure the angle of sight between horizontal and the target determined by the axis defined by the reticle with a one sigma accuracy of five NATO mils or better.

4.3.1.3 Laser Range Finder

The LRF HHTI-LR must have a Laser Range Finder (LRF).

The LRF HHTI-LR LRF must be rated as a Class 1 Laser at the output aperture, determined in accordance with ANSI Z136.1 - 2014.

The LRF HHTI-LR must, using the LRF, measure the range to a target in response to user input.

The LRF HHTI-LR must, using the LRF, measure ranges with a one sigma accuracy of two metres for ranges between 50 metres and up to 11,000 metres under good environmental transmission conditions.

The LRF HHTI-LR should, using the LRF, measure ranges with a one sigma accuracy of two metres for ranges between 50 metres and up to 12,000 m under good environmental transmission conditions.

The LRF HHTI-LR should, using the LRF, be perceived by the users to measure ranges to a static 2.4 metres by 2.4 metres target with a one sigma accuracy of two metres for ranges between 50 metres and up to 5,000 metres or more under good transmission conditions. < rated >

The LRF HHTI-LR LRF should have a range gating function to prevent the display of an anomalous range resulting from an intervening crest or other feature between the user and target.

The LRF HHTI-LR must calculate the geolocation of the target at a distance of five kilometres with an accuracy (CEP 50) of 25 metres or less under open skies.

The LRF HHTI-LR geolocation data of the target must include grid coordinates and elevation.

The LRF HHTI-LR must store the last five target locations obtained by the LRF in onboard memory for recall by the user and for exporting to other devices.

The LRF HHTI-LR LRF must have a rate of fire of at least six laser range measurements per minute.

4.3.2 Thermal Channel

4.3.2.1 General

The LRF HHTI-LR must include a Thermal Channel.

The LRF HHTI-LR Thermal Channel must operate in the 3 micrometre to 5 micrometre Medium Wave Infrared spectral band.

The LRF HHTI-LR Thermal Channel must be aligned with the LRF within one NATO mil.

4.3.2.2 Detection, Recognition and Identification (DRI)

The terms Detection, Recognition, and Identification are used as defined in NATO AAP-6 NATO Glossary of Terms and Definitions (English and French)

Detection: The discovery by any means of the presence of a person, object or phenomenon of potential military significance.

Recognition: The determination of the nature or a detected person, object or phenomenon, and possibly its class or type. This may include the determination of an individual within a particular class or type.

Identification: The process of attaining an accurate characterization of a detected entity by any act or means so that high confidence real-time decisions, including weapons engagement, can be made.

4.3.2.2.1 Nominal Static Range Performance - Determined in accordance with STANAG 4347

The Thermal Channel of the LRF HHTI-LR must have a nominal static detection range of at least 11.0 kilometres, determined in accordance with STANAG 4347.

The Thermal Channel of the LRF HHTI-LR should have a nominal static detection range of at least 12.0 kilometres, determined in accordance with STANAG 4347.

The Thermal Channel of the LRF HHTI-LR must have a nominal static recognition range of at least 4.0 kilometres, determined in accordance with STANAG 4347.

The Thermal Channel of the LRF HHTI-LR should have a nominal static recognition range of at least 4.5 kilometres, determined in accordance with STANAG 4347.

The Thermal Channel of the LRF HHTI-LR must have a nominal static identification range of at least 2.0 kilometres, determined in accordance with STANAG 4347.

The Thermal Channel of the LRF HHTI-LR should have a nominal static identification range of at least 2.5 kilometres, determined in accordance with STANAG 4347.

4.3.2.2.2 Static Range Performance - Vehicle Sized Targets - Quality Engineering Test Establishment (QETE) Testing

The Thermal Channel of the LRF HHTI-LR must have a static detection range for vehicle sized targets of at least 11.0 kilometres, determined in accordance with QETE DRI performance test methodologies.

The Thermal Channel of the LRF HHTI-LR should have a static detection range for vehicle sized targets of at least 12.0 kilometres, determined in accordance with QETE DRI performance test methodologies.

The Thermal Channel of the LRF HHTI-LR must have a static recognition range for vehicle sized targets of at least 4.0 kilometres, determined in accordance with QETE DRI performance test methodologies.

The Thermal Channel of the LRF HHTI-LR should have a static recognition range for vehicle sized targets of at least 4.5 kilometres, determined in accordance with QETE DRI performance test methodologies.

The Thermal Channel of the LRF HHTI-LR must have a static identification range for vehicle sized targets of at least 2.0 kilometres, determined in accordance with QETE DRI performance test methodologies.

The Thermal Channel of the LRF HHTI-LR should have a static identification range for vehicle sized targets of at least 2.5 kilometres, determined in accordance with QETE DRI performance test methodologies.

4.3.2.2.3 Static Range Performance - Person Sized Targets - QETE Testing

The Thermal Channel of the LRF HHTI-LR must have a static detection range for person sized targets of at least 5.0 kilometres, determined in accordance with QETE DRI performance test methodologies.

The Thermal Channel of the LRF HHTI-LR should have a static detection range for person sized targets of at least 6.0 kilometres, determined in accordance with QETE DRI performance test methodologies. < rated >

The Thermal Channel of the LRF HHTI-LR must have a static recognition range for person sized targets of at least 2.0 kilometres, determined in accordance with QETE DRI performance test methodologies.

The Thermal Channel of the LRF HHTI-LR should have a static recognition range for person sized targets of at least 2.5 kilometres, determined in accordance with QETE DRI performance test methodologies. < rated >

The Thermal Channel of the LRF HHTI-LR must have a static identification range for person sized targets of at least 1.0 kilometres, determined in accordance with QETE DRI performance test methodologies.

The Thermal Channel of the LRF HHTI-LR should have a static identification range for person sized targets of at least 1.2 kilometres, determined in accordance with QETE DRI performance test methodologies. < rated >

4.3.2.2.4 Static Range Performance - Vehicle Sized Targets - User Acceptance Performance Evaluation

The Thermal Channel of the LRF HHTI-LR should be perceived by the users to have a static detection range for vehicle sized targets of at least 11.0 kilometres, determined under field conditions with good transmission conditions. < rated >

The Thermal Channel of the LRF HHTI-LR should be perceived by the users to have a static recognition range for vehicle sized targets of at least 4.0 kilometres, determined under field conditions with good transmission conditions. < rated >

The Thermal Channel of the LRF HHTI-LR should be perceived by the users to have a static identification range for vehicle sized targets of at least 2.0 kilometres, determined under field conditions with good transmission conditions. < rated >

4.3.2.2.5 Static Range Performance - Person Sized Targets - User Acceptance Performance Evaluation

The Thermal Channel of the LRF HHTI-LR should be perceived by the users to have a static detection range for person sized targets of at least 5.0 kilometres, determined under field conditions with good transmission conditions. < rated >

The Thermal Channel of the LRF HHTI-LR should be perceived by the users to have a static recognition range for person sized targets of at least 2.0 kilometres, determined under field conditions with good transmission conditions. < rated >

The Thermal Channel of the LRF HHTI-LR should be perceived by the users to have a static identification range for person sized targets of at least 1.0 kilometres, determined under field conditions with good transmission conditions. < rated >

4.3.2.3 Focus

The LRF HHTI-LR must adjust the focus within a range from 50 metres to infinity in response to input from the user.

The LRF HHTI-LR should adjust the focus within a range from 20 metres to infinity in response to input from the user.

4.3.2.4 Field of View

The LRF HHTI-LR must have a Wide Field of View (WFV) setting.

The LRF HHTI-LR WFV must be equal to or greater than 6.88 degrees in the horizontal direction.

The LRF HHTI-LR WFV should be at least 11.46 degrees in the horizontal direction.

The LRF HHTI-LR must have a Narrow Field of View (NFV) setting.

The LRF HHTI-LR NFV must be optimized to balance the achievement of recognition and identification requirements with providing a field of view that provides the user with maximum situational awareness.

The LRF HHTI-LR must change from the WFV to the NFV in less than one-second in response to user input.

The LRF HHTI-LR must change from the NFV to the WFV in less than one-second in response to user input.

When changing from the WFV to the NFV, the centre of the reticle must be in the same position relative to its position on the display.

When changing from the NFV to the WFV, the centre of the reticle must be in the same position relative to its position on the display.

When changing from the WFV to the NFV, the centre of the reticle must maintain the same azimuth and angle of sight to within one NATO mil.

When changing from the NFV to the WFV, the centre of the reticle must maintain the same azimuth and angle of sight to within one NATO mil.

4.3.2.5 External Magnifying Lens

The LRF HHTI-LR should accept an external objective lens added by a user under field conditions to provide greater magnification.

4.3.3 Thermal Channel Image Processing and Enhancement

4.3.3.1 Refresh Rate

The LRF HHTI-LR Thermal Channel must have a frame refresh rate of 48 hertz or greater.

4.3.3.2 Magnification

The LRF HHTI-LR must digitally magnify the original image by a factor of two in response to user input.

The LRF HHTI-LR must digitally magnify the original image by a factor of four in response to user input.

The LRF HHTI-LR must digitally magnify the original image with a variable and continuous zoom in a range from a factor of one to a factor of four in response to user input.

4.3.3.3 Image Polarity

The LRF HHTI-LR must display the thermal image using white-hot / black-cold image polarity.

The LRF HHTI-LR must display the thermal image using black-hot / white-cold image polarity.

The LRF HHTI-LR must toggle between white-hot / black cold image polarity and black-hot / white-cold image polarity and vice-versa in response to user input.

4.3.3.4 Contrast and Gain Settings

The LRF HHTI-LR must have automatic gain control (AGC) mode.

In AGC mode, the LRF HHTI-LR must adjust the contrast and brightness in response to user input on a sliding scale emphasizing the background or emphasizing small targets.

The LRF HHTI-LR must have manual gain control (MGC).

The LRF HHTI-LR must toggle between AGC mode and MGC mode and vice-versa in response to user input.

In MGC mode, the LRF HHTI-LR must adjust the contrast in response to user input.

In MGC mode, the LRF HHTI-LR must adjust the brightness of the image in response to user input.

4.3.3.5 Solar Clutters and Glints

The LRF HHTI-LR should suppress solar clutters caused by scattering of solar radiation due to environmental conditions (such as rain or fog).

The LRF HHTI-LR should suppress solar glints caused by the reflection of the solar radiation from objects in the field of view.

4.3.3.6 Thermal Pulses in Field of View

The LRF HHTI-LR must regain full display functionality within five-seconds of exposure to sudden thermal pulses such as muzzle flashes and explosions.

4.3.4 Secondary Channel

There are three main performance goals of the Secondary Channel:

- to provide the user with increased situational awareness by presenting a field of view where the contents are better intuitively understood than presented using just a Thermal Channel
- to enhance the performance of the LRF HHTI-LR in terms of DRI over and above the capability provided by the Thermal Channel alone
- to allow the user to aim the LRF HHTI-LR before using the Laser Range Finder during daytime, low light or other conditions where the Secondary Channel provides a superior situational awareness compared to the Thermal Channel (see also 4.3.10 - Optional Features)

While the performance levels for DRI associated with the Thermal Channel are quantitative, the performance objectives of the Secondary Channel are much more subjective. Secondary Channel performance will be evaluated quantitatively where possible, but with an emphasis on qualitative evaluation.

The Secondary Channel may be a single channel, or consist of two or more channels that together satisfy the requirements.

4.3.4.1 General

The LRF HHTI-LR must have a Secondary Channel.

The LRF HHTI-LR Secondary Channel must be aligned with the LRF within one NATO mil.

4.3.4.2 Fields of View

The Secondary Channel must have a WFV.

The Secondary Channel WFV must be at least 6.75 degrees in the horizontal direction.

The Secondary Channel must have a NFV.

4.3.4.3 Detection, Recognition and Identification

The Secondary Channel must be optimized for recognition and identification of targets in daytime and low-light conditions.

The Secondary Channel NFV must have a detection range in good daytime conditions that is at least 70% of the detection range using the Thermal Channel NFV.

When environmental conditions are favourable for the use of the Secondary Channel, the Secondary Channel (either alone or used with the Thermal Channel) must provide a higher probability of recognition and identification over and above the performance that is achieved using the Thermal Channel alone.

The Secondary Channel must detect reflections from Laser Aiming Devices that operate at wavelengths between 0.4 micrometres and 0.9 micrometres.

The Secondary Channel must be perceived by the users to provide an increased level of performance in terms of recognition and identification of targets over and above the capability provided by the Thermal Channel alone in various scenarios when environmental conditions are favourable to the Secondary Channel.

4.3.4.4 Image Processing

The Secondary Channel must indicate detected reflections from Laser Aiming Devices on the image to be displayed.

4.3.5 Image Processing - All Channels

The LRF HHTI-LR must stabilize the image to be displayed electronically to reduce blur caused by shaking or vibration.

4.3.5.1 Automatic Target Detection and Recognition

The LRF HHTI-LR should have an automatic target detection and recognition (ATDR) mode.

When in ATDR mode, the LRF HHTI-LR should automatically detect vehicles. < rated >

When in ATDR mode, the LRF HHTI-LR should automatically recognize vehicles. < rated >

When in ATDR mode, the LRF HHTI-LR should automatically detect people. < rated >

When in ATDR mode, the LRF HHTI-LR should automatically recognize people. < rated >

When in ATDR mode, the LRF HHTI-LR should provide a visual cue on the display on detection or recognition of a person or vehicle. < rated >

The LRF HHTI-LR should toggle the ATDR mode on and off in response to user input.

4.3.6 Display Functionality

4.3.6.1 Display Characteristics

The LRF HHTI-LR must have an integral display for direct viewing by the user.

The LRF HHTI-LR must display the processed image from the Thermal Channel on the display using the full screen in response to user input.

The LRF HHTI-LR must display the processed image from the Secondary Channel on the display using the full screen in response to user input.

The LRF HHTI-LR must have a split screen display.

The LRF HHTI-LR must display the processed image from the Thermal Channel on one half of the display and the processed image from the Secondary Channel on the other half of the display in response to user input.

The LRF HHTI-LR must have a binocular display for the user to view the display with both eyes simultaneously.

The LRF HHTI-LR must have a colour display.

4.3.6.2 Reticle Overlay

4.3.6.2.1 Wide Field of View Reticle

The LRF HHTI-LR must electronically generate a Wide Field of View (WFV) viewing reticle when the WFV is being used.

The WFV viewing reticle must indicate the line of sight of the LRF.

The WFV viewing reticle must be centred in the display.

The WFV viewing reticle must be in the form of a mil dot pattern in azimuth and angle of sight.

The WFV viewing reticle mil dot pattern must be calibrated using the NATO mils system.

The calibration of the WFV viewing reticle mil dot pattern must be indicated on the display to the user, in terms of mils between dots or hash marks.

4.3.6.2.2 Narrow Field of View Reticles

The LRF HHTI-LR must electronically generate a Narrow Field of View (NFV) viewing reticle when the NFV is being used.

The NFV viewing reticle must indicate the line of sight of the LRF.

The NFV viewing reticle must be centred in the display.

The NFV viewing reticle must be in the form of a mil dot pattern in azimuth and angle of sight.

The NFV viewing reticle mil dot pattern must be calibrated using the NATO mils system.

The calibration of the NFV viewing reticle mil dot pattern must be indicated on the display to the user, in terms of NATO mils between dots or hash marks.

The LRF HHTI-LR must electronically generate a NFV human scale reticle to assist the user in determining the range to a person-sized target based on person height.

The NFV human scale reticle must not obscure the NFV viewing reticle.

The LRF HHTI-LR must electronically generate a NFV vehicle scale reticle to assist the user in determining the range to a vehicle-sized target based on vehicle length.

The NFV vehicle scale reticle must not obscure the NFV viewing reticle.

4.3.6.2.3 Laser Range Finder Reticle

The LRF HHTI-LR must electronically generate a LRF reticle when the LRF in response to user input.

When the LRF reticle is displayed, the LRF HHTI-LR must suppress the display of all other reticles.

The LRF HHTI-LR must restore the reticles associated with the field of view in use after the LRF is fired.

The LRF HHTI-LR must restore the reticles associated with the field of view in use in response to user input.

The LRF reticle must indicate the line of sight of the LRF.

The LRF reticle must be centred in the display.

The LRF reticle must be in the form of aiming cross hairs.

The following requirements are under review pending the determination of a feasible approach for boresighting the LRF reticle to the LRF under field conditions.

The LRF HHTI-LR must adjust the position of the LRF reticle to a position in the display in response to user input. < TBC >

The LRF HHTI-LR must save the position of the adjusted LRF reticle in response to user input, as a means to bore sight the LRF reticle to the LRF under field conditions. < TBC >

The LRF HHTI-LR must return the position of the LRF reticle to factory settings in response to user input. < TBC >

4.3.6.2.4 Reticle User Options

The LRF HHTI-LR must toggle the displayed reticle off and on in response to user input.

The LRF HHTI-LR must toggle the polarity of the displayed reticle, from white to black and vice-versa, in response to user input.

The displayed reticle must be adjustable for brightness in response to user input.

4.3.6.3 Text and Icon Overlay

4.3.6.3.1 Language

The LRF HHTI-LR must display all text in the language configured by the user, as specified in Section 4.5.1 User Language.

4.3.6.3.2 System Status

The LRF HHTI-LR display must indicate the state of charge of the internal battery.

The LRF HHTI-LR display must indicate whether or not the internal batteries are charging.

The LRF HHTI-LR display must indicate whether or not Bluetooth Connectivity is activated.

The LRF HHTI-LR display must indicate whether or not Wireless Connectivity is activated.

The LRF HHTI-LR display must indicate whether or not Ethernet Connectivity is activated.

4.3.6.3.3 System Configuration

The LRF HHTI-LR display must indicate the magnification level of the original image, i.e. 2x, 4x etc.

4.3.6.3.4 Geolocation of User

The LRF HHTI-LR must display the geolocation grid coordinates of the user using the configured grid system, as specified in Section 4.5.2 Grid System.

The LRF HHTI-LR must display the geolocation elevation of the user using the configured distance and elevation notation, as specified in Section 4.5.4 Distance and Elevation Notation.

The LRF HHTI-LR must stop the display of the geolocation of the user in response to user input.

The LRF HHTI-LR must restore the display of the geolocation of the user in response to user input.

4.3.6.3.5 Geolocation of Observed Targets

The LRF HHTI-LR must continuously display the azimuth of the reticle, using the configured directional notation, as specified in Section 4.5.3 Directional Notation.

The LRF HHTI-LR must continuously display the angle of sight of the reticle, using the configured directional notation, as specified in Section 4.5.3 Directional Notation.

4.3.6.3.6 Geolocation of LRF Targets

Geolocation data of LRF targets consists of range, azimuth and angle of sight of the target relative to the user, and grid coordinates and elevation of the target.

The LRF HHTI-LR must display the geolocation data of the LRF target immediately after the target is subject to the laser pulse.

The LRF HHTI-LR must display the range of the LRF target, using the configured distance and elevation notation, as specified in Section 4.5.4 Distance and Elevation Notation.

The LRF HHTI-LR must display the geolocation grid coordinates of the LRF target using the configured grid system, as specified in Section 4.5.2 Grid System.

The LRF HHTI-LR must display the geolocation elevation of the LRF target, using the configured distance and elevation notation, as specified in Section 4.5.4 Distance and Elevation Notation.

The LRF HHTI-LR must display the azimuth of the LRF target, as determined by the centre of the LRF reticle, using the configured directional notation, as specified in Section 4.5.3 Directional Notation.

The LRF HHTI-LR must display the angle of sight of the LRF target, as determined by the centre of the LRF reticle, using the configured directional notation, as specified in Section 4.5.3 Directional Notation.

The LRF HHTI-LR must stop the display of geolocation data of the LRF target in response to user input.

The LRF HHTI-LR must display the geolocation data for the five most recent LRF targets in response to user input.

The LRF HHTI-LR must stop the display of the geolocation data for all but the most recent LRF target in response to user input.

4.3.7 Saving and Storage of Images and Video

The LRF HHTI-LR must save a still image of the display, including all overlaid data, icons and reticles, to an image file in response to user input.

The LRF HHTI-LR must save the image metadata embedded in the image file.

The image metadata must include all of the following data: date and time in NATO date/time group format, geolocation grid coordinates of user geolocation elevation of user, azimuth of reticle and angle of sight of reticle.

If the still image of the display includes test overlay of geolocation data of a target following the user of the LRF, the metadata must also include all of the following geolocation of target data: range, geolocation grid coordinates, geolocation elevation, azimuth and angle of sight.

LRF HHTI-LR image file formats must be compliant with the ATAK plug-in for image file sharing. < TBD - preferred formats? >

The LRF HHTI-LR must save a video of the display, including all overlaid data, icons and reticles, to a video file in response to user input.

The LRF HHTI-LR must save the video metadata embedded in the video file.

The video metadata must include all of the following data: date and time in NATO date/time group format, geolocation grid coordinates of user, geolocation elevation of user, azimuth and angle of sight of reticle at start of video, azimuth and angle of sight of reticle at end of video.

LRF HHTI-LR video file formats must be compliant with the ATAK plug-in for video file sharing. < TBD - preferred formats? >

The LRF HHTI-LR must select image and video files selected by the user in response to user input to download to an external device.

4.3.8 Video Streaming of Display Content

The LRF HHTI-LR must provide a real-time digital video stream to an external device in response to user input.

The LRF HHTI-LR must provide a real time digital video stream that does not change the performance of the LRF HHTI-LR.

The LRF HHTI-LR real-time video stream must be in a format that is compatible with ATAK plug-in that support streaming video. < TBD - preferred format? >

4.3.9 Remote Control

The LRF HHTI-LR must be remotely controllable by a third party device.

When remotely controlled by a third party device, full functionality of the LRF HHTI-LR must be available to the user through the third party device.

4.3.10 Picatinny Rail

The LRF HHTI-LR must have a Picatinny Rail.

The Picatinny Rail must be mounted on top of the LRF HHTI-LR.

The Picatinny Rail must be aligned in azimuth and angle of sight with the LRF within a tolerance of one NATO mil.

The Picatinny Rail must comply with MIL-STD-1913 Dimensioning of Accessory Mounting Rail for Small Arms Weapons.

4.3.11 Power Sources

The normal power source for the LRF HHTI-LR will be Internal Batteries. To provide the user with options for power management, especially during operations in the cold, the user may choose to power the LRF HHTI-LR from an external power source.

4.3.11.1 Internal Batteries

4.3.11.1.1 Rechargeable Battery Power Source

The LRF HHTI-LR must operate using power from Rechargeable Batteries that are housed within the LRF HHTI-LR.

The LRF HHTI-LR must operate for a minimum of four hours of continuous operation in the Operational Mode using power only from the installed Rechargeable Batteries, with no battery change, and with no recharging of the batteries.

4.3.11.1.2 Internal Recharging Capability

The LRF HHTI-LR must recharge the Internal Batteries if they are Rechargeable Batteries and the LRF HHTI-LR is connected to an exterior power source.

The LRF HHTI-LR must not recharge the Internal Batteries if they are Non-Rechargeable Batteries and the LRF HHTI-LR is connected to an exterior power source.

4.3.11.1.3 Non-Rechargeable Battery Power Source

The LRF HHTI-LR must operate using power from Non-Rechargeable Batteries that are housed within the LRF HHTI-LR.

The LRF HHTI-LR must operate for a minimum of four hours in the Operational Mode at minus 32 degrees Celsius using power only from installed Non-Rechargeable Batteries, with no battery change.

4.3.11.1.4 Battery Housing and Internal Connection

The LRF HHTI-LR battery housing must allow the user to change batteries without using tools.

The LRF HHTI-LR battery housing must allow the user to change batteries under conditions of total darkness.

The LRF HHTI-LR must include protection against batteries that are installed incorrectly by the user.

The LRF HHTI-LR must determine the state of charge of the Internal Batteries.

4.3.11.2 External Power Sources

4.3.11.2.1 External Power Sources - Common Requirements

When connected to an external power source, the LRF HHTI-LR must not draw current from Internal Batteries.

4.3.11.2.2 Land Warrior Battery Power Source

The LRF HHTI-LR must operate using power from a rechargeable Land Warrior Battery, NSN 6140-01-542-4380.

The LRF HHTI-LR must operate using power from a non-rechargeable Land Warrior Battery, NSN 6135-01-583-8973.

Requirements related to the LRF HHTI-LR / Land Warrior Battery Interface are specified in Section 4.4.6 Land Warrior Battery (LWB) Interface.

4.3.11.2.3 Military Vehicle 24 V DC Electrical System Power Source

The LRF HHTI-LR must operate using power from a military vehicle 24 V DC electrical system.

Requirements related to the LRF HHTI-LR / Military Vehicle 12/24 V Electrical System Interface are specified in Section 4.4.10 Military Vehicle 24 V DC Electrical System Interface.

4.3.11.2.4 AC Power Source

The LRF HHTI-LR must operate using power from North American 110/120 VAC 60 hertz power source.

The LRF HHTI-LR must operate using power from a European 220/240 VAC 50 hertz power source.

Requirements related to the AC Power Source Interface are specified in Section 4.4.11 AC Power Source Interface.

4.3.12 Optional Features

4.3.12.1 Laser Pointer

The Laser Pointer is used to identify targets to soldiers and sailors equipped with night vision devices that use image intensification technologies under low light conditions. There is no intent to use the Laser Pointer as a designator for smart munitions, or as an area illuminator.

Canada is examining the cost / benefit of having a Laser Pointer integral to the LRF HHTI-LR versus using a Laser Pointer mounted on the Picatinny Rail. Related requirements may become mandatory, or may be dropped from the specification.

The LRF HHTI-LR should have a Laser Pointer (LP).

IMPORTANT: The requirements that follow in this section apply only if the LRF HHTI-LR has a Laser Pointer.

The LRF HHTI-LR LP must emit in the wavelength range from 800 nanometres to 900 nanometres.

The LRF HHTI-LR LP must have a beam divergence that is 0.8 NATO mils or less.

The LRF HHTI-LR LP must produce a laser strike against a target with a reflectance of 0.2 or more that is visible in the LRF HHTI-LR Secondary Channel at a distance of 2.0 km under good atmospheric conditions.

The LRF HHTI-LR LP must produce a laser strike against a target with a reflectance of 0.2 or more that is visible to a soldier or sailor co-located with the LRF HHTI-LR using a < TBD > night vision device at a distance of 2.0 km under good atmospheric conditions.

The LRF HHTI-LR LP must be rated as a Class 3B Laser or less hazardous class at the output aperture, determined in accordance with ANSI Z136.1 - 2014.

If the LRF HHTI-LR LP is not a Class 1 laser in accordance with ANSI Z136.1 - 2014, it must include a removable filter that reduces the output of the laser such that it can be operated as a Class 1 Laser.

4.3.12.2 Image Fusion Mode

Canada is examining the cost / benefit of requiring the LRF HHTI-LR to have an image fusion mode. Related requirements may become mandatory, or may be dropped from the specification.

The LRF HHTI-LR should have an image fusion mode.

IMPORTANT: The requirements that follow in this section apply only if the LRF HHTI-LR has an image fusion mode.

When in image fusion mode, the LRF HHTI-LR must combine the images of the Thermal Channel and Secondary channel in a way that increases the probability of target detection, recognition and identification compared to the use of the Thermal Channel and Secondary Channel separately. < TBD better performance requirement is needed >

When in image fusion mode, the LRF HHTI-LR must combine the images of the Thermal Channel and Secondary Channel in a way that provides the user with an image that is more intuitive to interpret compared to the use of the Thermal Channel and Secondary Channel separately. < TBD better performance requirement is needed >

4.3.12.3 Fall of Shot Correction

Canada is examining the cost / benefit of requiring the LRF HHTI-LR to have a Fall of Shot Correction function. Related requirements may become mandatory, or may be dropped from the specification.

The LRF HHTI-LR should have a Fall of Shot Correction function.

IMPORTANT: The requirements that follow in this section apply only if the LRF HHTI-LR has a Fall of Shot Correction function.

< TBD - requirements to be developed >

4.4 External Interface Requirements

4.4.1 Interface Identification and Diagrams

< To be added. >

4.4.2 Defense Advanced GPS Receiver (DAGR) Interface

4.4.2.1 DAGR Description

The AN/PSN-13A Defense Advanced GPS Receiver (DAGR), NSN 5825-01-526-4783, is a hand-held GPS receiver in-service with the Canadian Army.

The DAGR has fixed interface characteristics. The DAGR will not be modified to support the achievement of DAGR Interface requirements.

4.4.2.2 LRF HHTI-LR / DAGR Interface Functional Requirements

The LRF HHTI-LR must be compatible with the DAGR.

The LRF HHTI-LR must interface with the DAGR using the DAGR Interface Cable.

Requirements for the DAGR Interface Cable are specified in Section 5.11 DAGR Interface Cable.

When a DAGR is connected to the LRF HHTI-LR, the LRF HHTI-LR must continually update user geolocation data using geolocation data received from the DAGR.

When a DAGR is connected to the LRF HHTI-LR, the LRF HHTI-LR must update current time and date data using time and date data received from the DAGR. <TBC >

4.4.3 Integrated Soldier System (ISS) Interface

4.4.3.1 ISS Overview

The Integrated Soldier System (ISS) is a collection of soldier-worn devices that provides integrated functionality to the soldier related to tactical radio, situational awareness and battle planning. Devices are networked using a data and power distribution hub. Connected devices may include:

- Multichannel Handheld Radio
- Secure Radio
- End User Device (EUD) (Smartphone)
- Commander's Tablet
- DAGR
- Land Warrior Battery
- Auxiliary Power or second Land Warrior Battery
- LRF HHTI-LR

The ISS in a basic configuration is in-service with the CA. The ISS is being incrementally upgraded to take advantage of technological advances and to increase the level of integration between what have previously been independent devices.

At the time when it is anticipated that the LRF HHTI-LR enters service, both the Commander's Tablet and EUD will be Android devices that use the Android Team Awareness Kit (ATAK).

The ATAK compatible software resident on the ISS Commander's tablet or EUD to which the LRF HHTI-LR will interface is referred to as the ISS Battle Management Software (BMS). The software architecture of the ISS BMS has not yet been defined.

The devices that comprise the ISS are connected through the ISS Hub. The connectors on the ISS hub comply with NWPAN-WP-01112013 Version 6. The two in-service hubs are the Glenair STAR-PAN™ II Hub and the Glenair STAR-PAN™ VI Hub.

The exact ISS configuration to which the LRF HHTI-LR will interface is not yet in-service. The requirements listed in this section are therefore expected to evolve.

4.4.3.2 LRF HHTI-LR / ISS Interface - Intent

The intent of the LRF HHTI-LR / ISS Interface is to provide the following functionality:

- The ISS can provide user geolocation data to the LRF HHTI-LR, via the EUD, sourced from a connected radio.
- The ISS can provide user geolocation data to the LRF HHTI-LR, via the EUD, sourced from the connected AN/PSN-13A DAGR.
- Image and video files can be downloaded from the LRF HHTI-LR to the ISS BMS for viewing on the EUD or Commander's Tablet
- The content of the LRF HHTI-LR display can be streamed to the EUD or Commander's tablet in real-time
- The LRF HHTI-LR can be manipulated remotely by the user using an application on the EUD or Commander's tablet
- When a target is subject to the Laser Range Finder pulse functionality of the LRF HHTI-LR, target geolocation data can be passed to the ISS BMS to be further used in generating contract reports, fire missions, etc.

The functionality of the interface will be provided through an ATAK solution developed by the LRF HHTI-LR contractor, and may comprise bespoke or exiting ATAK plug-ins, or a combination thereof. The functionality of the app will be determined by this specification, and through the cooperative development of an ICD led by the LRF HHTI-LR contractor with the participation of the DND ISS ATAK team.

4.4.3.3 LRF HHTI-LR / ISS Interface Functional Requirements

The LRF HHTI-LR must be compatible with the ISS.

The LRF HHTI-LR must interface with the LRF HHTI-LR / ISS BMS Interface application (LIBI App) that is installed on the ISS EUD and on the ISS Commander's Tablet.

Requirements for the LRF HHTI-LR / ISS BMS Interface application (LIBI App) are specified in Section 5.13 LRF HHTI-LR / ISS BMS Interface Application (LIBI App)

The LRF HHTI-LR must interface with the ISS using the ISS Interface Cable.

Requirements for the ISS Interface Cable are specified in Section 5.12 ISS Interface Cable.

4.4.4 Ruggedized Tactical Laptop (RTL) Interface

4.4.4.1 RTL Description

The current in-service RTL is the CF33 Mk1 Panasonic Toughbook. It is expected that the CF33 Mk2 Panasonic Toughbook will start entering service in 2021. The CF33 uses the Windows 10 Pro (64 bit) operating system. The CF33 has the following characteristics:

- USB 3.0 (x 3) and USB 2.0 (x 1) ports
- Bluetooth v4.1 + EDR (Class 1)
- Intel Dual band Wireless – AC 8265 802.11a/b/g/n/ac
- SD card (SDXC) and Nano-SIM
- HDMI Type A port

The CF33 is used operationally in an unclassified domain.

The RTL has fixed interface characteristics. The RTL hardware will not be modified to support the achievement of RTL Interface requirements.

Additional COTS software applications that are required to satisfy the interface requirements may be added RTL application software baseline.

4.4.4.2 LRF HHTI-LR / RTL Interface Functional Requirements

The LRF HHTI-LR must be compatible with the RTL.

The LRF HHTI-LR must interface with the RTL using the RTL Interface Cable.

Requirements for the RTL Interface Cable are specified in Section 5.14 RTL Interface Cable.

The LRF HHTI-LR must download image files selected by the user from the LRF HHTI-LR to the RTL in response to user input.

The LRF HHTI-LR must download video files selected by the user from the LRF HHTI-LR to the RTL in response to user input.

The LRF HHTI-LR must stream live video output of the LRF HHTI-LR display for display on the RTL display.

4.4.5 Ruggedized Flash Drive (RFD) Interface

4.4.5.1 LRF HHTI-LR / RFD Interface Functional Requirements

The RFD is described in Section 5.16 Ruggedized Flash Drive (RFD).

The LRF HHTI-LR must be compatible with the RFD.

The LRF HHTI-LR must download image files selected by the user from the LRF HHTI-LR to the RFD in response to user input on the LRF HHTI-LR.

The LRF HHTI-LR must download video files selected by the user from the LRF HHTI-LR to the RFD in response to user input on the LRF HHTI-LR.

The LRF HHTI-LR must delete all files stored on the RFD in response to user input on the LRF HHTI-LR.

The LRF HHTI-LR must delete files selected by the user that are stored on the RFD in response to user input on the LRF HHTI-LR.

4.4.5.2 LRF HHTI-LR / RFD Interface Physical Requirements

The LRF HHTI-LR must physically connect to the RFD using a USB 3.0 compliant connection.

The LRF HHTI-LR must include all hardware components required to physically connect the LRF HHTI-LR to the RFD.

If a cable is required to connect the LRF HHTI-LR to the RFD, then the LRF HHTI-LR RFD Interface Cable must support the interface functionality described in 4.4.5.1 LRF HHTI-LR / RFD Interface Functional Requirements.

If a cable is required to connect the LRF HHTI-LR to the RFD, then the LRF HHTI-LR RFD Interface Cable must meet the cabling requirements specified in Section 6.2 Common Cable Requirements.

4.4.5.3 RFD / RTL Interface Functional Requirements

The RFD must download image files selected by the user from the RFD to the RTL in response to user input on the RTL.

The RFD must download video files selected by the user from the RFD to the RTL in response to user input on the RTL.

The RFD must delete all files stored on the RFD in response to user input on the RTL.

The RFD must delete files selected by the user that are stored on the RFD in response to user input on the RTL.

4.4.6 Land Warrior Battery (LWB) Interface

4.4.6.1 LWB Description

The ISS is powered by Land Warrior Batteries, in both rechargeable and non-rechargeable versions.

In order to provide power source flexibility and redundancy for users, as well as to minimize the proliferation of battery types in-service, users will be given the option of powering the LRF HHTI-LR directly from an LWB. This is especially important during cold weather operations when the LWB can be carried in a way that is kept warm using the body heat of the user.

The LWB has fixed interface characteristics. The LWB will not be modified to support the achievement of LRF HHTI-LR / LWB Interface requirements.

4.4.6.2 LRF HHTI-LR / LWB Interface Functional Requirements

The LRF HHTI-LR must be compatible with the LWB.

The LRF HHTI-LR must operate without damage and without degradation of performance when powered by an LWB.

4.4.6.3 LRF HHTI-LR / LWB Interface Physical Requirements

The LRF HHTI-LR must use the DC Power Cable Assembly to connect to an LWB.

4.4.7 Generic Interfaces - Ethernet Connectivity

4.4.7.1 Ethernet Connectivity Description

The CA is developing policies related to the use of Ethernet connectivity between devices in an operational environment. LRF HHTI-LR Ethernet connectivity provides flexibility for future use.

For proof of concept purposes, requirements for Ethernet connectivity will use the RTL described in section 4.4.4 Ruggedized Tactical Laptop (RTL) Interface operating on a Local Area Network.

4.4.7.2 Ethernet Connectivity Functional Requirements

The LRF HHTI-LR must support Ethernet connectivity.

The LRF HHTI-LR Ethernet connectivity must be compatible with devices that implement the IEEE 802.3 Ethernet Standard for devices operating at 10/100/1000 megabits per second.

The LRF HHTI-LR must interface with a Local Area Network using the Ethernet Interface Cable.

Requirements for the Ethernet Interface Cable are specified in Section 5.15 Ethernet Interface Cable.

4.4.7.3 Ethernet Connectivity Proof of Concept Requirements

The LRF HHTI-LR must connect to the RTL using Ethernet connectivity over a local area network.

The LRF HHTI-LR must stream live video output of the LRF HHTI-LR display for display on the RTL display using Ethernet connectivity in response to user input.

The LRF HHTI-LR must create an image file of the current display and immediately download the image file from the LRF HHTI-LR to the RTL using an Ethernet connection in response to user input.

Using Ethernet connectivity, the LRF HHTI-LR must download image files selected by the user from the LRF HHTI-LR to the RTL in response to user input.

Using Ethernet connectivity, the LRF HHTI-LR must download video files selected by the user from the LRF HHTI-LR to the RTL in response to user input.

4.4.8 Generic Interfaces - Bluetooth Connectivity

4.4.8.1 Bluetooth Connectivity Description

The CA is developing policies related to the use of Bluetooth connectivity between devices in an operational environment. LRF HHTI-LR Bluetooth connectivity provides flexibility for future use.

For proof of concept purposes, requirements for Bluetooth connectivity will use the RTL described in Section 4.4.4 Ruggedized Tactical Laptop (RTL) Interface.

4.4.8.2 Bluetooth Connectivity Functional Requirements

The LRF HHTI-LR must include Bluetooth connectivity.

The LRF HHTI-LR Bluetooth connectivity must be compatible with devices that implement Bluetooth Version 4.1, as described in the Bluetooth V4.1 Specification.

When the LRF HHTI-LR is turned on, Bluetooth connectivity must be fully deactivated as a default state in all modes.

The LRF HHTI-LR must activate Bluetooth connectivity in response to user input.

The LRF HHTI-LR must fully deactivate Bluetooth connectivity in response to user input.

4.4.8.3 Bluetooth Connectivity Proof of Concept Requirements

The LRF HHTI-LR must connect to the RTL using a Bluetooth connection.

The LRF HHTI-LR must create an image file of the current display and immediately download the image file from the LRF HHTI-LR to the RTL using a Bluetooth connection in response to user input.

Using a Bluetooth connection, the LRF HHTI-LR must download image files selected by the user from the LRF HHTI-LR to the RTL in response to user input.

Using a Bluetooth connection, the LRF HHTI-LR must download video files selected by the user from the LRF HHTI-LR to the RTL in response to user input.

4.4.9 Generic Interfaces - Wireless Connectivity

4.4.9.1 Wireless Connectivity Description

The CA is developing policies related to the use of wireless connectivity between devices in an operational environment. LRF HHTI-LR wireless connectivity provides flexibility for future use.

For proof of concept purposes, requirements for wireless connectivity will use the RTL described in Section 4.4.4 Ruggedized Tactical Laptop (RTL) Interface.

4.4.9.2 Wireless Connectivity Functional Requirements

The LRF HHTI-LR must include wireless connectivity.

The LRF HHTI-LR wireless connectivity must be compatible with devices that implement the IEEE 802.11ac protocol.

When the LRF HHTI-LR is turned on, Wireless connectivity must be fully deactivated as a default state in all modes.

The LRF HHTI-LR must activate wireless connectivity in response to user input.

The LRF HHTI-LR must fully deactivate wireless connectivity in response to user input.

4.4.9.3 Wireless Connectivity Proof of Concept Requirements

The LRF HHTI-LR must connect to the RTL using an ad hoc network wireless connection.

The LRF HHTI-LR must stream live video output of the LRF HHTI-LR display for display on the RTL display using wireless connectivity in response to user input.

The LRF HHTI-LR must create an image file of the current display and immediately download the image file from the LRF HHTI-LR to the RTL using a wireless connection in response to user input.

Using a wireless connection, the LRF HHTI-LR must download image files selected by the user from the LRF HHTI-LR to the RTL in response to user input.

Using a wireless connection, the LRF HHTI-LR must download video files selected by the user from the LRF HHTI-LR to the RTL in response to user input.

4.4.10 Military Vehicle 24 V DC Electrical System Interface

The LRF HHTI-LR must be compatible with a 24 V DC military vehicle electrical system that is compliant with MIL-STD-1275E, when powered through the DC Power Cable Assembly.

The LRF HHTI-LR must connect to a 24 V DC military vehicle electrical system using the DC Power Cable Assembly.

Requirements related to the DC Power Cable Assembly are specified in Section 5.17 DC Power Cable Assembly.

4.4.11 AC Power Source Interface

The LRF HHTI-LR must be compatible with a North American 110/120 VAC 60 hertz power source, when powered through the AC Power Cable Assembly.

The LRF HHTI-LR must connect to a North American 110/120 VAC 60 hertz power source using the AC Power Cable Assembly.

The LRF HHTI-LR must be compatible with a European 220/240 VAC 50 hertz power source, when powered through the AC Power Cable Assembly.

The LRF HHTI-LR must connect to a European 220/240 VAC 50 hertz power source using the AC Power Cable Assembly.

Requirements related to the AC Power Cable Assembly are specified in Section 5.18 AC Power Cable Assembly.

4.4.12 Tripod Interface

4.4.12.1 LRF HHTI-LR Tripod

The LRF HHTI-LR must include a physical interface for mounting the LRF HHTI-LR on the LRF HHTI-LR Tripod specified in Section 5.10 Tripod.

The LRF HHTI-LR must be compatible with the LRF HHTI-LR Tripod.

4.4.12.2 SAFRAN Vectronix SST3-1 Mini-tripod

The SAFRAN Vectronix SST3-1 Mini-tripod 664868, NSN 1290-01-455-9410, is in-service with the Canadian Army and is used as a tripod supporting the in-service SAFRAN Vector binoculars.

The LRF HHTI-LR must include a physical interface for mounting the LRF HHTI-LR on a SAFRAN Vectronix SST3-1 Mini-tripod.

The LRF HHTI-LR must be compatible with the Vectronix SST3-1 Mini-tripod.

4.5 Adaptation Requirements

4.5.1 User Language

The LRF HHTI-LR must display all textual information to the user in the English language in response to user input.

The LRF HHTI-LR must display all textual information to the user in the French language in response to user input.

The LRF HHTI-LR must automatically save the language of display of textual information selected by the user and display all textual information using the same language the next time the LRF HHTI-LR is turned on.

4.5.2 Grid System

The LRF HHTI-LR must be configurable to display geolocation data using different grids defined in accordance with the World Geodetic System 1984 (WGS-84) datum.

The LRF HHTI-LR must be configurable by the user to display geolocation data using the WGS-84 Universal Transverse Mercator (UTM) grid system.

The LRF HHTI-LR must be configurable by the user to display geolocation data using the WGS-84 Military Grid Reference System (MGRS) grid system.

The LRF HHTI-LR must be configurable by the user to display geolocation data using the WGS-84 Latitude and Longitude grid system.

The LRF HHTI-LR must use the grid system configured by the user for displaying user and target geolocation data.

The LRF HHTI-LR must save the grid system selected by the user and present geolocation data using the same grid system the next time the LRF HHTI-LR is turned on.

The LRF HHTI-LR must allow the user to enter a Grid North declination value.

4.5.3 Directional Notation

The LRF HHTI-LR must be configurable to display directional data (azimuth and angle of sight) in accordance with different directional notations.

The LRF HHTI-LR must be configurable by the user to display directional data using the NATO mils system, where a circle is divided into 6,400 mils.

The LRF HHTI-LR must be configurable by the user to display directional data using the degrees / minutes / seconds (DMS) system.

The LRF HHTI-LR must use the same directional notation selected by the user to display azimuth and angle of sight data.

The LRF HHTI-LR must save the directional notation system selected by the user and display directional data using the same directional notation system the next time the LRF HHTI-LR is turned on.

4.5.4 Distance and Elevation Notation

The LRF HHTI-LR must be configurable to display distance and elevation data in accordance with different distance notations.

The LRF HHTI-LR must be configurable to display distance and elevation data in metres.

The LRF HHTI-LR must be configurable to display distance and elevation data in feet.

The LRF HHTI-LR must save the last distance and elevation notation system selected by the user and display distance and elevation data using the same distance and elevation notation system the next time the LRF HHTI-LR is turned on.

4.6 Environment, Health and Safety Requirements

4.6.1 General Hazards

The LRF HHTI-LR, excluding the LRF HHTI-LR Internal Batteries, must not present any environmental, health or system safety hazards of a Catastrophic or Critical mishap severity.

The LRF HHTI-LR, excluding the LRF HHTI-LR Internal Batteries, must not present a Catastrophic or Critical hazard to the operator and surrounding environment even when so damaged that it allows the ingress of water or egress of internal substances.

Mitigation against general hazards involving Internal Batteries are implemented through specifications in Section 5.7 Rechargeable Batteries and Section 5.8 Non-Rechargeable Batteries.

Requirements related to the mitigation of battery hazards are embedded in the specifications for Internal Batteries in Section 4.3.11.1 Internal Batteries.

4.6.2 Thermal Contact Hazards

The LRF HHTI-LR must not expose operators during normal operation to surface temperatures greater than those identified in MIL-STD-1472H Section 5.7.5.9 Thermal contact hazards for prolonged contact.

4.6.3 Fire Retardance

TBD - Applicable?

4.6.4 Dangerous Material Hazards

The LRF HHTI-LR must not contain any Polychlorinated Biphenyls (PCBs), halocarbons or asbestos.

4.6.5 Handling Hazards

The LRF HHTI-LR must bear no sharp, raw, or rough edges that present a risk of cuts or abrasions to the operator.

4.7 Security and Privacy Requirements

4.7.1 Visibility

The LRF HHTI-LR must prevent emission of light from the eyepieces when the LRF HHTI-LR is operational.

The LRF HHTI-LR must not emit any light from external surfaces during operation.

4.7.2 Audibility

The LRF HHTI-LR must, when in the Operational Mode and after cool-down has been completed, be inaudible at a distance of 30 metres, tested in accordance with MIL-STD-1474E at the Level I aural non-detectability limits.

The LRF HHTI-LR must have no audible alarms.

The LRF HHTI-LR must have no audible indicators.

4.7.3 Deletion of Imagery Files and LRF Target Data

There may be situations where the user is forced to abandon the LRF HHTI-LR or where it may fall into enemy hands.

The LRF HHTI-LR must delete, without potential for recovery, all image files, all video files, all data related to LRF targets, and all other data that is generated during use of the LRF HHTI-LR in response to user input.

4.8 System Quality Factors

4.8.1 Reliability

The LRF HHTI-LR must have a mission Mean Time Between Critical Failures (MTBCF) of at least 1,200 hours when used in ambient air temperatures of 18 degrees Celsius to 28 degrees Celsius.

4.8.2 Maintainability

The LRF HHTI-LR Support and Maintenance Concept is described in < TBD >.

4.8.2.1 Modularity

The LRF HHTI-LR must be designed for the modular replacement of components.

4.8.2.2 Built-In Test Function

The LRF HHTI-LR must have a Built-In Test (BIT) function.

The BIT function must operate continuously while the LRF HHTI-LR is transitioning from the off state to the Operational State.

The BIT function must operate continuously while the LRF HHTI-LR is in the Operational Mode.

The BIT function must detect and display faults.

The fault information displayed by the BIT function must provide the user with information on the associated loss of functionality.

The fault information displayed by the BIT function must provide the user and maintainer with an indication of required maintenance actions.

4.8.2.3 User Maintenance

In accordance with the LRF HHTI-LR Support and Maintenance Concept, it is expected that user maintenance tasks will include activities such as:

- Changing Internal Batteries
- Cleaning of optical surfaces using the Lens Cleaning Kit
- Cleaning of exterior surfaces of the HHTI-LR

LRF HHTI-LR user maintenance tasks must not require Special Tools and Test Equipment (STTE), other than the Lens Cleaning Kit.

LRF HHTI-LR user maintenance tasks must be carried out by a user wearing Cold Wet Weather Gloves.

LRF HHTI-LR user maintenance tasks must be carried out by a user with bare hands.

4.8.2.4 First Level Maintenance

In accordance with the LRF HHTI-LR Support and Maintenance Concept, first level maintenance tasks will include user maintenance task plus:

- servicing and cleaning
- preliminary diagnosis of faults
- corrective maintenance tasks of a minor nature
- replacement of broken eyecups, straps, and lens covers

The term “minor nature” infers short duration and relatively simple repairs. Level one maintenance tasks are generally performed without Special Tools and Test Equipment (STTE) and require no special facilities.

LRF HHTI-LR first level maintenance tasks must not require Special Tools and Test Equipment (STTE), other than the Lens Cleaning Kit.

LRF HHTI-LR first level maintenance tasks must be feasible under field conditions.

LRF HHTI-LR software must be updateable as a first level maintenance activity.

4.9 Design and Construction Constraints

4.9.1 Physical Characteristics

4.9.1.1 Mass

The LRF HHTI-LR, including Internal Batteries, must have a mass of less than 2.75 kilograms.

The LRF HHTI-LR, including Internal Batteries, should have a mass of less than 2.5 kilograms. < rated >

4.9.1.2 Colour and Finish

The LRF HHTI-LR must have an external colour of NATO Coyote Brown.

The LRF HHTI-LR must have a finish that is dull or flat without shine.

4.9.1.3 Moisture Seal

The LRF HHTI-LR must be sealed to prevent infiltration of moisture.

The LRF HHTI-LR must have a means of purging the interior of the device with an inert gas to remove all moisture.

4.9.1.4 Lens Covers

The LRF HHTI-LR must have Lens Covers that protect the objective optical surfaces when the LRF HHTI-LR is not in use.

When the Lens Covers are removed from the objective optical surfaces when the LRF HHTI-LR is in use, the Lens Covers must remain attached to the LRF HHTI-LR.

The lens covers must be replaceable as a first level maintenance task.

4.9.1.5 Eye Cups

The LRF HHTI-LR must have Eye Cups.

The Eye Cups must prevent the emission of display light through the ocular lenses when the user is looking at the display and the user is in contact with the Eye Cups.

The Eye Cups must prevent the emission of display light through the ocular lenses when the LRF HHTI-LR is operating, but the user is not in contact with the Eye Cups.

The Eye Cups must be compatible with a user wearing ballistic eyewear, NSN 8465-20-001-4355 .

The Eye Cups must be compatible with a user wearing the C5 AirBoss Low Burden Mask, NSNs 4240-20-011-8190, -8191, -8192, -8193 and 4240-20-012-6039, -6040, -6041, -6042.

The Eye Cups must have a feel and texture that is soft, flexible and comfortable to the user.

The Eye Cups must be soft and flexible when the LRF HHTI-LR is used at temperatures down to minus 32 degrees Celsius.

4.9.1.6 Connector Covers

The LRF HHTI-LR must have Connector Covers that protect receptacles for power and data interfaces.

When the Connector Covers are removed from the LRF HHTI-LR to allow connection of a power or data interface cable, the Connector Covers must remain attached to the LRF HHTI-LR.

The Connector Covers must be replaceable as a first level maintenance task.

4.9.1.7 Shoulder Strap

The LRF HHTI-LR must have an adjustable Shoulder Strap.

The Shoulder Strap must be configured so that the user can carry the LRF HHTI-LR with the Shoulder Strap around the user's neck.

The Shoulder Strap must be configured so that the user can carry the LRF HHTI-LR with the Shoulder Strap hung on the user's shoulder and the LRF HHTI-LR resting against the same side of the body.

The Shoulder Strap must be configured so that the user can carry the LRF HHTI-LR with the Shoulder Strap on one shoulder and the LRF HHTI-LR resting on the other side of the body.

The Shoulder Strap must be at least 1.5 centimetres in width.

The Shoulder Strap must be padded in the section of the Shoulder Strap that is resting on the part of the user's body that is bearing the weight of the LRF HHTI-LR.

The Shoulder Strap must be comfortable to the user when carrying the LRF HHTI-LR using the Shoulder Strap over a distance of five kilometres.

The Shoulder Strap must be replaceable as a first level maintenance task.

4.9.1.8 Hand Straps

The LRF HHTI-LR must have one or more Hand Straps.

The Hand Straps must assist the user to hold the LRF HHTI-LR when in operational use.

The Hand Straps must be strong enough so that the LRF HHTI-LR can be carried using one Hand Strap.

4.10 Human Factors Engineering Requirements

4.10.1 Compatibility with Diversity of Users

4.10.1.1 Eyesight

The LRF HHTI-LR must be compatible with differences in eyesight found in the 5th to 95th percentile of male sailors and combat arms soldiers serving in the Canadian Forces.

The LRF HHTI-LR must be compatible with differences in eyesight found in the 5th to 95th percentile of female sailors and combat arms soldiers serving in the Canadian Forces.

4.10.1.2 Hand Size

The LRF HHTI-LR must be compatible with differences in hand size found in the 5th to 95th percentile of male sailors and combat arms soldiers serving in the Canadian Forces.

The LRF HHTI-LR must be compatible with differences in hand size found in the 5th to 95th percentile of female sailors and combat arms soldiers serving in the Canadian Forces.

4.10.2 Compatibility with Clothing and Equipment

4.10.2.1 Gloves

The LRF HHTI-LR must be compatible with a user wearing Cold Wet Weather Gloves, NSN 8415-21-920-9019.

Assembly of the LRF HHTI-LR into a configuration where the LRF HHTI-LR is mounted on the Tripod and interfaced to an external power source must be compatible with a user wearing Cold Wet Weather Gloves and without the use of special tools.

The LRF HHTI-LR must be acceptable to users wearing Cold Wet Weather Gloves in operational conditions.

4.10.2.2 CM735 Ballistic Helmet

The LRF HHTI-LR must be compatible with a user wearing a CM735 Ballistic Helmet, NSN 8470-21-912-7719.

The LRF HHTI-LR must be acceptable to users wearing a CM735 Ballistic Helmet in operational conditions.

4.10.2.3 Ballistic Eyewear

The LRF HHTI-LR must be compatible with a user wearing Ballistic Eyewear, NSN 8465-20-001-4355.

The LRF HHTI-LR must be acceptable to users wearing Ballistic Eyewear in operational conditions.

4.10.2.4 C5 AirBoss Low Burden Mask

The LRF HHTI-LR must be compatible with a user wearing a C5 AirBoss Low Burden Mask (CBRN mask), NSNs 4240-20-011-8190, -8191, -8192, -8193 and 4240-20-012-6039, -6040, -6041, -6042.

The LRF HHTI-LR must be acceptable to soldiers wearing a C5 AirBoss Low Burden Mask in operational conditions.

4.10.2.5 Operational Clothing and Equipment

The LRF HHTI-LR must be acceptable to soldiers wearing operational clothing and equipped with the Modular Load Carrying System and the Integrated Soldier System in operational conditions.

4.10.2.6 Chemical, Biological, Radiological and Nuclear (CBRN) Individual Protection Equipment

The LRF HHTI-LR must be acceptable to users wearing full CRBN individual protective equipment in operational conditions.

4.10.3 Compatibility with Use under Conditions of Darkness

The LRF HHTI-LR must have external controls whose arrangement, size and shape can be identified and manipulated by the user using only the sense of touch.

The LRF HHTI-LR must have external controls whose arrangement, size and shape can be identified and manipulated by the user using only the sense of touch while wearing Cold Wet Weather Gloves.

During conditions of total darkness, assembly of the LRF HHTI-LR into a configuration where the LRF HHTI-LR is mounted on the Tripod and interfaced to an external power source must be compatible with a user wearing Cold Wet Weather Gloves and without the use of special tools.

4.10.4 Functionality and Ease of Use

4.10.4.1 Primary Functions

The functionality and ease of use of the LRF HHTI-LR related to the adaptation of the system to fit user and mission attributes at the start of a mission must be acceptable to users under operational conditions.

The functionality and ease of use of the LRF HHTI-LR related to the detection, recognition and identification of targets using the Thermal Channel must be acceptable to users under operational conditions.

The functionality and ease of use of the LRF HHTI-LR related to the detection, recognition and identification of targets using the Secondary Channel must be acceptable to users under operational conditions.

The functionality and ease of use of the LRF HHTI-LR related to the geolocation of targets using the Laser Range Finder must be acceptable to users under operational conditions.

The functionality and ease of use of the LRF HHTI-LR related to the display of data on the display must be acceptable to users under operational conditions.

The functionality and ease of use of the LRF HHTI-LR related to the saving and storage of images and videos must be acceptable to users under operational conditions.

4.10.4.2 External Interfaces

The functionality and ease of use of the LRF HHTI-LR related to establishing an interface with a DAGR must be acceptable to users under operational conditions.

The functionality and ease of use of the LRF HHTI-LR related to establishing an interface with the ISS must be acceptable to users under operational conditions.

The functionality and ease of use of the LRF HHTI-LR related to using the LIBI App installed on the ISS EUD and Commander's Tablet must be acceptable to users under operational conditions.

The functionality and ease of use of the LRF HHTI-LR related to establishing and exercising the interface with a Ruggedized Tactical Laptop and must be acceptable to users under operational conditions.

The functionality and ease of use of the LRF HHTI-LR related to establishing and exercising an interface with a Ruggedized Flash Drive must be acceptable to users under operational conditions.

The functionality and ease of use of the LRF HHTI-LR related to establishing and exercising an Ethernet interface with an external device must be acceptable to users under operational conditions.

The functionality and ease of use of the LRF HHTI-LR related to establishing and exercising a Wireless interface with an external device must be acceptable to users under operational conditions.

The functionality and ease of use of the LRF HHTI-LR related to establishing and exercising a Bluetooth interface with an external device must be acceptable to users under operational conditions.

4.10.4.3 External Power Sources

The functionality and ease of use of the LRF HHTI-LR related to sourcing power from a Land Warrior Battery must be acceptable to users under operational conditions.

The functionality and ease of use of the LRF HHTI-LR related to sourcing power from an Integrated Soldier System hub must be acceptable to users under operational conditions.

The functionality and ease of use of the LRF HHTI-LR related to sourcing power from a military vehicle 24 V electrical system must be acceptable to users under operational conditions.

The functionality and ease of use of the LRF HHTI-LR related to sourcing power from an AC Power Source must be acceptable to users under operational conditions.

4.10.4.4 Menu Structures and Commands

The functionality and ease of use of the LRF HHTI-LR related to navigation through English language menu structures and commands must be acceptable to users under operational conditions.

The functionality and ease of use of the LRF HHTI-LR related to navigation through French language menu structures and commands must be acceptable to users under operational conditions.

4.10.4.5 Simplicity

The functionality and ease of use of the LRF HHTI-LR must allow a new user, who has used other laser range finders and night vision devices, to be instructed on the primary functions of the LRF HHTI-LR and be able to use the primary functions, referencing the Quick Reference Guide as necessary, after no more than one hour of instruction.

4.10.5 Human Machine Interface

When used in the Operational mode, the LRF HHTI-LR physical controls (including buttons, knobs, toggle switches, joy sticks or other controls) used in the human machine interface must be accessible by the user without the necessity of moving a hand in a way that affects the stability of the device.

The LRF HHTI-LR must have physical controls that are positioned such that their manipulation does not interfere with continuous surveillance by the user when the LRF HHTI-LR is being held in two hands.

The LRF HHTI-LR must have an external, easily accessible, non-menu-driven physical control for switching between the Thermal Channel and the Secondary Channel.

The LRF HHTI-LR must have an external, easily accessible, non-menu-driven physical control for adjusting magnification.

The LRF HHTI-LR must have an external, easily accessible, non-menu-driven physical control for changing field of view.

The LRF HHTI-LR must have an external, easily accessible, non-menu-driven physical control for calibration of geolocation functionality, if calibration is required.

The LRF HHTI-LR must have an external, easily accessible, non-menu-driven physical control for reversing image polarity.

The LRF HHTI-LR should have an external, easily accessible, non-menu-driven physical control for firing the laser when using the Laser Range Finder.

The LRF HHTI-LR must prevent accidental firing of the Laser Range Finder.

4.11 Product Marking, Serialization and Nameplates

The LRF HHTI-LR must have nameplates or product markings in accordance with D-02-002-001/SG-001 Identification Marking of Canadian Military Property.

The LRF HHTI-LR must be assigned a Unique Item Identifier (UII) in accordance with NATO Standard AAITP-08.

The LRF HHTI-LR nameplate or product marking must include the UII in human-readable form.

The LRF HHTI-LR nameplate or product marking must include the UII Mark in machine readable data carrier form in accordance with NATO Standard AAITP-08.

5 LRF HHTI-LR System - Other Component Requirements

5.1 Field Kit Storage and Transport Case

The Field Kit Storage and Transport Case is used to store and transport the components of the LRF HHTI-LR System that are carried within the Field Pouch. The Field Kit Storage and Transport Case will also be used for transportation of the LRF HHTI-LR (within the Field Pouch) between maintenance and supply organization, and for return of the LRF HHTI-LR to the OEM for repair and overhaul purposes.

Batteries may be stored in the Field Kit Storage and Transport Case, but not within the LRF HHTI-LR or within the Field Pouch themselves.

The LRF HHTI-LR System must include a Field Storage and Transport Case.

The Field Kit Storage and Transport Case must be configured to store a Field Pouch that is loaded with the components of the LRF HHTI-LR System that are normally carried within the Field Pouch.

Components of the LRF HHTI-LR System that are normally carried within the Field Pouch are identified in Section 5.4 Field Pouch.

The Field Kit Storage and Transport Case must be configured to store Rechargeable Batteries that support 24 hours of continuous use of the LRF HHTI-LR.

The Field Kit Storage and Transport Case must be configured to store two Land Warrior Batteries.

The configuration of the Field Kit Storage and Transport Case to store batteries must not create any hazards related to long term battery storage.

With a fully loaded Field Pouch and full complement of batteries, the Field Kit Storage and Transport Case should have a mass of less than < TBD > kilograms.

5.2 Support Kit Storage and Transport Case

The Support Kit Storage and Transport Case is used to store and transport the components of the LRF HHTI-LR System that are carried within the Tripod Pouch and Accessories Pouch. Batteries may be stored in the Support Kit Storage and Transport Cases but not within pouches themselves.

The LRF HHTI-LR System must include a Support Kit Storage and Transport Case.

The Support Kit Storage and Transport Case must be configured to store a Tripod Pouch that is loaded with the components of the LRF HHTI-LR System that are normally carried within the Tripod Pouch.

Components of the LRF HHTI-LR System that are normally carried within the Tripod Pouch are identified in Section 5.5 Tripod Pouch.

The Support Kit Storage and Transport Case must be configured to store an Accessories Pouch that is loaded with the components of the LRF HHTI-LR System that are normally carried within the Accessories Pouch.

Components of the LRF HHTI-LR System that are normally carried within the Accessories Pouch are identified in Section 5.6 Accessories Pouch.

The Support Kit Storage and Transport Case must be configured to store Rechargeable Batteries that support 24 hours of continuous use of the LRF HHTI-LR.

The Support Kit Storage and Transport Case must be configured to store two Land Warrior Batteries.

The configuration of the Support Kit Storage and Transport Case to store batteries must not create any hazards related to long term battery storage.

When fully loaded with LRF HHTI-LR System components, the Storage and Transport Case should have a mass of less than < TBD > kilograms.

5.3 Storage and Transport Cases - Common Requirements

The requirements specified in this section are applicable to both the Field Storage and Transport Case and the Support Kit Storage and Transport Case.

The Storage and Transport Cases must have a rigid exoskeleton.

The Storage and Transport Case must be stable and secure against sliding and collapse when stacked with other Storage and Transport Cases.

The Storage and Transport Cases must have a gasket that provides a sealed environment when the lid is closed.

The Storage and Transport Cases must include a depressurization valve.

The Storage and Transport Cases must include a means for the user to secure the contents of the case with a padlock.

The Storage and Transport Cases must have two handholds that facilitate one-person, two-handed lifting, carrying and stacking actions when fully loaded with LRF HHTI-LR System components.

The Storage and Transport Cases must have one handhold that facilitates one-person, one-handed carrying (suitcase style) when fully loaded with LRF HHTI-LR System components.

The Storage and Transport Cases should minimize volume and mass to facilitate handling by one person.

The Storage and Transport Cases must have an exterior colour of black or coyote brown.

The Storage and Transport Cases must have a finish that is dull or flat without shine.

5.4 Field Pouch

5.4.1 Field Pouch Functional Requirements

The LRF HHTI-LR System must include a Field Pouch.

The Field Pouch must be of semi-rigid construction.

The Field Pouch must have compartments to carry all of the following LRF HHTI-LR System Components:

- HHTI-LR
- Lens Cleaning Kit
- Ruggedized Flash Drive
- RFD Interface Cable (if applicable to design)
- User Guide
- User Manual
- Rechargeable Batteries for twenty hours of continuous operation of the HHTI-LR
- Land Warrior Battery
- Any adapters that may be required to mount the LRF HHTI-LR on a SAFRAN Vectronix SST3-1 Tripod

The Field Pouch must be compartmentalized to facilitate rapid access to components that may be required by the user.

The Field Pouch must have a means of attaching to the Modular Load Carrying System (MLCS) that is compliant with requirements specified in Appendix < TBD > MLCS Technical Data Package (TDP).

The Field Pouch must have a means of attaching the Tripod Pouch such that the Tripod Pouch is held below the LRF HHTI-LR Field Pouch when carried.

The Field Pouch must have a means of attaching the Tripod Pouch that conforms to the attachment methods specified in the MLCS TDP.

5.4.2 Field Pouch Shoulder Strap

The Field Pouch must include an adjustable Field Pouch Shoulder Strap.

The Field Pouch Shoulder Strap must be configurable so that the user can carry the LRF HHTI-LR with the Shoulder Strap around the user's neck.

The Field Pouch Shoulder Strap must be configurable so that the user can carry the LRF HHTI-LR with the Shoulder Strap hung on the user's shoulder and the LRF HHTI-LR resting against the same side of the body.

The Field Pouch Shoulder Strap must be configurable so that the user can carry the LRF HHTI-LR with the Shoulder Strap on one shoulder and the LRF HHTI-LR carried resting on the other side of the body.

The Shoulder Strap must be at least 1.5 centimetres in width.

The Shoulder Strap must be padded in the section of the Shoulder Strap that is resting on the part of the user's body that is bearing the weight of the LRF HHTI-LR.

The Shoulder Strap must be comfortable to the user when carrying the LRF HHTI-LR using the Shoulder Strap over a distance of five kilometres.

5.4.3 Field Pouch Technical Non-Functional Requirements

The Field Pouch (including the Field Pouch Shoulder Strap) must comply with requirements specified in Appendix < TBD > ISS Generic Pouch Technical Data Package (TDP).

5.5 Tripod Pouch

The LRF HHTI-LR System must include a Tripod Pouch.

The Tripod Pouch must be large enough to carry the Tripod in a collapsed state.

The Tripod Pouch must have separate compartments for the Tripod and for any adapters or other items that are necessary to mount the LRF HHTI-LR and SAFRAN Vector Binoculars on the Tripod.

The Tripod Pouch must have a means of attaching to the Modular Load Carrying System (MLCS) that is compliant with requirements specified in Appendix < TBD > MLCS Technical Data Package (TDP).

The Tripod Pouch must have a means of attachment to the Field Pouch such that the Tripod Pouch is held below the Field Pouch when carried.

The Tripod Pouch must have a means of attachment to the Field Pouch that conforms to the attachment methods specified in the MLCS TDP.

The Tripod Pouch must comply with requirements as specified in Appendix < TBD > ISS Generic Pouch TDP.

5.6 Accessories Pouch

The LRF HHTI-LR System must include an Accessories Pouch.

The Accessories Pouch must carry all of the following LRF HHTI-LR System components:

- Battery Charger and Battery Charger Cables
- Military Vehicle 24 V DC Power Cable Assembly
- DAGR Interface Cable
- ISS Interface Cable
- RTL Interface Cable
- Ethernet Interface Cable

The Accessories Pouch must be compartmentalized to facilitate rapid access to components that may be required by the user.

The Accessories Pouch must have a means of attaching to the Modular Load Carrying System (MLCS) that is compliant with requirements specified in Appendix < TBD > MLCS Technical Data Package (TDP).

The Accessories Pouch must comply with requirements specified Appendix < TBD > ISS Generic Pouch TDP.

5.7 Rechargeable Batteries

The LRF HHTI-LR System must include Rechargeable Batteries.

The Rechargeable Batteries must be lithium-ion batteries.

The Rechargeable Batteries must be used internally within the LRF HHTI-LR.

The Rechargeable Batteries must be compatible with the LRF HHTI-LR.

The Rechargeable Batteries must be compatible with the LRF HHTI-LR System Battery Recharger.

The Rechargeable Batteries must comply with MIL-PRF-35383 Performance Specification - Batteries, Rechargeable, Sealed, General Specification for.

The Rechargeable Batteries should be in-service with the CAF.

The Rechargeable Batteries should be in-service with one or more NATO countries or members of the Five Eyes (FVEY) alliance.

The Rechargeable Batteries should have a NATO Stock Number.

The Rechargeable Batteries should be used in more than ten thousand instances of one or more military products that are in-service with one or more NATO countries or member of the Five Eyes (FVEY) alliance.

Requirements related to powering of the LRF HHTI-LR by Rechargeable Batteries are specified in Section 4.3.11.1.1 Rechargeable Battery Power Source.

5.8 Non-Rechargeable Batteries

The LRF HHTI-LR System must include Non-Rechargeable Batteries.

The Non-Rechargeable Batteries must be lithium batteries.

The Non-Rechargeable Batteries must be used internally within the LRF HHTI-LR.

The Non-Rechargeable Batteries must be compatible with the LRF HHTI-LR.

The Non-Rechargeable Batteries must comply with MIL-PRF-32271A Performance Specification - Batteries, Non-Rechargeable, Lithium, General Specification for.

The Non-Rechargeable Batteries must have a shelf life of at least ten years.

The Non-Rechargeable Batteries should be in-service with the CAF.

The Non-Rechargeable Batteries should be in-service with one or more NATO countries or members of the Five Eyes (FVEY) alliance.

The Non-Rechargeable Batteries should have a NATO Stock Number.

The Non-Rechargeable Batteries should be used in more than ten thousand instances of one or more military products that are in-service with one or more NATO countries or member of the Five Eyes (FVEY) alliance.

Requirements related to powering of the LRF HHTI-LR by Non-Rechargeable Batteries are specified in Section 4.3.11.1.3 Non-Rechargeable Battery Power Source.

5.9 Battery Charger

The Battery Chargers will be used within a sheltered area, not open to rain or snow.

If the Rechargeable Batteries are of a type that is already in-service in the Canadian Army, and a suitable Battery Charger is also already in-service, then the Battery Charger may be reclassified as GFE.

5.9.1 Battery Charger Requirements

The LRF HHTI-LR System must include a Battery Charger.

The Battery Charger must recharge one or more sets of Rechargeable Batteries simultaneously.

The Battery Charger must be certified by an organization accredited by the Standards Council of Canada and bear either the CSA mark or a ULC mark.

The Battery Charger must comply with the European Low Voltage Directive 2014/35/EU and bear the CE mark or equivalent.

5.9.2 Battery Charger 110/120 VAC Power Source

The Battery Charger must be powered by 110/120 VAC (60 hertz).

The Battery Charger must include a power cable that connects the Battery Charger to a standard North American NEMA 5-15R receptacle.

The Battery Charger must recharge one or more sets of Rechargeable Batteries in four hours or less when powered by 110/120 VAC (60 hertz).

The 110 VAC power cable and any integral power converters must be certified by an organization accredited by the Standards Council of Canada and bear either the CSA mark or an ULC mark.

5.9.3 Battery Charger 220/240 VAC Power Source

The Battery Charger must be powered by 220/240 VAC (50 hertz).

The Battery Charger must include a power cable that connects the Battery Charger to a European 220/240 VAC receptacle using a Europlug.

The Battery Charger must recharge two or more sets of Rechargeable Batteries in four hours or less when powered by 220/240 VAC (50 hertz).

The 220/240 VAC power cable and any integral power converters must comply with the European Low Voltage Directive 2014/35/EU and bear the CE mark or equivalent.

5.9.4 Battery Charger 24 V DC Power Source

The Battery Charger must be powered by a military vehicle 24 V DC power source.

The Battery Charger must use the DC Power Cable Assembly to connect to a military vehicle 24 V DC power source.

Requirements related to the DC Power Cable Assembly are specified in Section 5.17 DC Power Cable Assembly.

The Battery Charger must recharge two or more sets of Rechargeable Batteries in four hours or less when powered by a military vehicle 24 V DC power source.

5.10 Tripod

The primary purpose of the Tripod is to provide a stable platform for using the LRF HHTI-LR where the weight of the LRF HHTI-LR is not borne by the user. In order to minimize the equipment carried in the field, the Tripod may also be used to provide a stable platform for other equipment such as the SAFRAN Vector Binocular < specs TBD > and other equipment that may be operated by users in a forward observer, reconnaissance or sniper role.

5.10.1 Tripod Physical Characteristics

The LRF HHTI-LR System must include a Tripod.

The Tripod must be adjustable in height such that the LRF HHTI-LR can be operated by a standing user with the tripod set-up on the same surface as the user.

The Tripod must be adjustable in height such that the LRF HHTI-LR can be operated by a kneeling user with the tripod set-up on the same surface as the user.

The Tripod must be adjustable in height such that the LRF HHTI-LR can be operated by a prone user with the tripod set-up on the same surface as the user.

The Tripod must be collapsible for the purposes of carrying the Tripod in the Tripod Pouch.

The Tripod must support a mounted mass of at least 4.0 kilograms < TBC > without damage to the Tripod.

The Tripod must have a mass of no more than 2.0 kilograms.

The Tripod must be non-magnetic.

5.10.2 LRF HHTI-LR / Tripod Interface

The Tripod must include a physical interface for mounting the LRF HHTI-LR on the Tripod.

The Tripod must be compatible with the LRF HHTI-LR.

The physical interface between the Tripod and the LRF HHTI-LR must have a quick connect and quick disconnect mechanism that does not require the use of tools to mount or remove the LRF HHTI-LR.

5.10.3 Tripod / SAFRAN Vector Binoculars Interface

The Tripod must include a physical interface for mounting a SAFRAN Vector Binoculars < specification TBD > on the Tripod.

The Tripod must be compatible with the SAFRAN Vector Binoculars < specification TBD > .

The physical interface between the Tripod and the SAFRAN Vector Binoculars must have a quick connect and quick disconnect mechanism that does not require the use of tools to mount or remove the Vector Binoculars.

5.10.4 Tripod Capability Requirements when LRF HHTI-LR is Mounted

The Tripod must be adjustable in azimuth such that the mounted LRF HHTI-LR can be traversed to any angle of azimuth without restriction.

The Tripod must be adjustable in angle of sight such that the mounted LRF HHTI-LR can be elevated or depressed from the horizontal to any setting in a range of minus 400 mils or greater in depression to 400 mils or greater in elevation.

5.11 DAGR Interface Cable

The LRF HHTI-LR System must include a DAGR Interface Cable to connect the LRF HHTI-LR to the DAGR.

The DAGR Interface Cable must be compatible with the LRF HHTI-LR.

The DAGR Interface Cable must be compatible with the DAGR.

The DAGR Interface Cable must support the interface functionality described in Section 4.4.2.2 LRF HHTI-LR / DAGR Interface Functional Requirements.

The DAGR Interface Cable must be compatible with the ISS Hub.

The DAGR Interface Cable must include an adaptor to connect the DAGR to a PAN port on the ISS Hub.

The DAGR Interface Cable must meet the cabling requirements specified in Section 6.2 Common Cable Requirements.

5.12 ISS Interface Cable

The LRF HHTI-LR System must include an ISS Interface Cable to connect the LRF HHTI-LR to a Personal Area Network (PAN) port on the ISS Hub.

The ISS Interface Cable must be compatible with the LRF HHTI-LR.

The ISS Interface Cable must be compatible with the ISS.

The ISS Interface Cable must connect to a PAN port on the ISS Hub using a connector compliant with NWPAN-WP-01112013.

The ISS Interface Cable must support the interface functionality described in Section 4.4.3.3 LRF HHTI-LR / ISS Interface Functional Requirements.

The ISS Interface Cable must meet the cabling requirements specified in Section 6.2 Common Cable Requirements.

5.13 LRF HHTI-LR / ISS BMS Interface Application (LIBI App)

5.13.1 General

The LRF HHTI-LR System must include an LRF HHTI-LR / ISS BMS Interface application (LIBI App) that is installed on the ISS EUD and on the ISS Commanders Tablet.

While the LIBI App is described as a software application, it is expected to take the form of one or more ATAK plug-ins. The desired form of the LIBI App may evolve in response to best practices as the migration of the ISS BMS to the ATAK environment progresses.

The LIBI App must operate in the ATAK environment.

The LIBI App must comply with the LRF HHTI-LR / ISS ICD (to be developed).

The LIBI App is a developmental item that will be integrated into an ATAK environment. The EUD and Commander's Tablet hardware on which the LIBI App will be installed will not be modified to support the achievement of LRF HHTI-LR / ISS interface requirements.

5.13.2 Management Functions

The LIBI App must manage the configuration of the LRF HHTI-LR / ISS Interface.

When the LIBI App is launched, the LIBI App must sense the presence of another active instance of the LIBI App that may be installed on another device connected to the ISS Hub, and synchronize the interface configuration parameters to be the same as those on the other device.

The LIBI App must sense when an LRF HHTI-LR is connected to the ISS Hub.

The LIBI App must display the status of connection to an LRF HHTI-LR.

The LIBI App must manage the port of the ISS Hub to which the LRF HHTI-LR is connected.

When an LIBI App makes a change to the configuration of the interface, and more than one LIBI App is active on devices connected to the ISS Hub, the LIBI App must synchronize the interface configuration parameters on the other device to match the change in interface configuration.

5.13.3 User Geolocation Data

The ISS BMS maintains user geolocation data sourced from either a connected DAGR or connected radio.

The LIBI App must provide current user geolocation data to the LRF HHTI-LR.

5.13.4 Viewing Image Files

The LIBI App must open an image file stored in the LRF HHTI-LR and display the image on the EUD or Commander's Tablet in response to user input.

The LIBI App must open an image file stored in the ISS-BMS and display the image on the EUD or Commander's Tablet in response to user input.

The LIBI App must overlay the NATO date/time group from the open image file metadata when displaying an image in response to user input.

The LIBI App must stop overlaying the NATO date/time group from the open image file metadata in response to user input.

The LIBI App must zoom the open image in response to user input.

The LIBI App must pan the open image in response to user input.

The LIBI App must scroll the open image in response to user input.

The LIBI App must close the open image in response to user input.

5.13.5 Viewing Video Files

The LIBI App must open a video file stored in the LRF HHTI-LR and display the opening frame of the video on the EUD or Commander's Tablet in response to user input.

The LIBI App must open a video file stored in the ISS-BMS and display the opening frame of the video on the EUD or Commander's Tablet in response to user input.

The LIBI App must overlay the NATO Date-Time Group from the video file metadata when displaying a video in response to user input.

The LIBI App must stop overlaying the NATO Date Time Group form the video file metadata in response to user input.

The LIBI App must play the open video file in response to user input.

The LIBI App must fast forward the open video file in response to user input.

The LIBI App must rewind the open video file in response to user input.

The LIBI App must display the length of the open video file in minutes and seconds.

The LIBI App must display the elapsed time of the current video frame of the open video file.

The LIBI App must advance the open video file to a desired elapsed time point in response to user input.

The LIBI App must stop the open video file in response to user input.

The LIBI App must close the open video file in response to user input.

5.13.6 Image and Video File Management

The LIBI App must select an image file stored in the LRF HHTI-LR in response to user input.

The LIBI App must select an image file stored in the ISS BMS in response to user input.

The LIBI App must select a video file stored in the LRF HHTI-LR in response to user input.

The LIBI App must select video files stored in the ISS BMS in response to user input.

The LIBI App must display the metadata of a selected image file in response to user input.

The LIBI App must stop the display the metadata of a selected image file in response to user input.

The LIBI App must select multiple image files stored in the LRF HHTI-LR in response to user input.

The LIBI App must select multiple video files stored in the LRF HHTI-LR in response to user input.

The LIBI App must copy the selected files from the LRF HHTI-LR to the ISS BMS in response to user input.

The LIBI App must select multiple image files stored in the ISS BMS in response to user input.

The LIBI App must select multiple video files stored in the ISS BMS in response to user input.

The LIBI App must delete the selected files in response to user input.

5.13.7 Remote Display

The LRF HHTI-LR must stream video of all content displayed on the LRF HHTI-LR display to the LIBI App in response to user input.

The LRF HHTI-LR must stop streaming video of all content displayed on the LRF HHTI-LR display to the LIBI App in response to user input.

The LIBI App must display the video stream from the LRF HHTI-LR on the ISS EUD or Commander's Tablet display in response to user input.

The LIBI App must stop displaying the video stream from the LRF HHTI-LR on the ISS EUD or Commander's Tablet display in response to user input.

5.13.8 Remote Control

The LIBI App must replicate all human-machine interface functions of the LRF HHTI-LR such that the LRF HHTI-LR can be remotely controlled using the LIBI App.

5.13.9 Lased Target Geolocation Data

The LRF HHTI-LR must send target geolocation data to the LIBI App when a target is subject to an LRF pulse from the LRF HHTI-LR.

The LIBI App must store target geolocation data sent from the LRF HHTI-LR to the ISS BMS.

The LIBI App must select target geolocation data stored on the LRF HHTI-LR in response to user input.

The LIBI App must download selected target geolocation data stored on the LRF HHTI-LR to the ISS BMS in response to user input.

The LIBI App must select target geolocation data stored on the ISS BMS in response to user input.

The LIBI App must delete selected target geolocation data stored on the ISS BMS in response to user input.

5.14 RTL Interface Cable

The LRF HHTI-LR System must include a RTL Interface Cable to connect the LRF HHTI-LR to the RTL.

The RTL Interface Cable must be compatible with the LRF HHTI-LR.

The RTL Interface Cable must be compatible with the RTL.

The RTL Interface Cable must be at least two metres in length.

The RTL Interface Cable must support the interface functionality described in Section 4.4.4.2 LRF HHTI-LR RTL Interface Functional Requirements.

The RTL Interface Cable must meet the cabling requirements specified Section 6.2 Common Cable Requirements.

5.15 Ethernet Interface Cable

The LRF HHTI-LR System must include an Ethernet Interface Cable to connect the LRF HHTI-LR to an Ethernet based Local Area Network.

The Ethernet Interface Cable must be compatible with a Local Area Network that complies with IEEE 802.3 Ethernet Standard for devices operating at 10/100/1000 megabits per second.

The Ethernet Interface Cable must include a plug to connect to a Local Area Network using an RJ-45 socket.

The Ethernet Interface Cable must be at least two metres in length.

The Ethernet Interface Cable must support the interface functionality described in Section 4.4.7.2 Ethernet Connectivity Functional Requirements.

The Ethernet Interface Cable must meet the cabling requirements specified in Section 6.2 Common Cable Requirements.

5.16 Ruggedized Flash Drive (RFD)

5.16.1 RFD Description

The RFD is an unencrypted ruggedized flash drive (also referred to as a "ruggedized USB Stick") used in the field by dismounted soldiers to transfer image, video and other data files between various devices in the operational unclassified domain. At this time, there is no standardized RFD in-service with the Canadian Army. In the context of operations using LRF HHTI-LR, it is intended that image and video files would be downloaded onto the RFD, and then delivered to a Command Post (CP). In the CP, the files would be downloaded to an RTL or other compatible device for further analysis.

Should the CA adopt a standard RFD, these requirements may evolve such that the RFD is no longer integral to the LRF HHTI-LR, but is simply an external system to which the LRF HHTI-LR must interface.

5.16.2 RFD Requirements

The LRF HHTI-LR must include an RFD.

The RFD must be compatible with the LRF HHTI-LR.

The RFD must be compatible with the Ruggedized Tactical Laptop (RTL).

The RFD must be external to the LRF HHTI-LR.

The RFD must be a USB 3.0 - compatible device.

The RFD must have a USB Type C male connector.

The RFD must have a storage capacity of 128 GB or more.

The RFD must have a read speed of 150 MB/sec or faster.

The RFD must meet all environmental requirements applicable to the LRF HHTI-LR System, unless otherwise exempted.

5.17 DC Power Cable Assembly

The LRF HHTI-LR System must include a DC Power cable assembly.

The DC Power Cable Assembly must include power converters and adapters necessary to power the LRF HHTI-LR.

The DC Power Cable Assembly must include power converters and adapters necessary to power the Battery Charger.

The DC Power Cable Assembly must be compatible with the LRF HHTI-LR.

The DC Power Cable Assembly must be compatible with the Battery Charger.

The DC Power Cable Assembly must be compatible with a military vehicle 24 V DC electrical system that is compliant with MIL-STD-1275E.

The DC Power Cable Assembly must be compatible with a standard NATO slave receptacle on a vehicle that complies with MIL-PRF-62122E.

The DC Power Cable Assembly must be compatible with a rechargeable Land Warrior Battery, NSN 6140-01-542-4380.

The DC Power Cable Assembly must be compatible with a non-rechargeable Land Warrior Battery, NSN 6135-01-583-8973.

The DC Power Cable Assembly must be at least six metres in length.

If the DC Power Cable Assembly includes a power converter, then the length of the two associated cables (from LRF HHTI-LR to converter and from converter to vehicle receptacle) must be at least three metres in length each.

The DC Power Cable Assembly must satisfy the common cable requirements specified in Section 6.2 Common Cable Requirements.

5.18 AC Power Cable Assembly

It is intended that the AC Power Cable Assembly be used to power the LRF HHTI-LR and to power the Battery Charger, but not both at the same time.

The LRF HHTI-LR System must include an AC Power Cable Assembly.

The AC Power Cable Assembly must include power converters and adapters necessary to power the LRF HHTI-LR.

The AC Power Cable Assembly must include power converters and adapters necessary to power the Battery Charger.

The AC Power Cable Assembly must be compatible with the LRF HHTI-LR.

The AC Power Cable Assembly must be compatible with the Battery Charger.

The AC Power Cable Assembly must be compatible with a European 220/240 VAC 50 hertz power source.

The AC Power Cable Assembly must be compatible with a North American 110/120 VAC 60 hertz power source.

The AC Power Cable Assembly must connect the LRF HHTI-LR to a standard North American 110/120 VAC NEMA 5-15R receptacle.

The AC Power Cable Assembly must connect the LRF HHTI-LR to a standard European 220/240 VAC power receptacle using a Europlug.

The AC Power Cable Assembly must be at least four metres in length.

If the AC Power Cable Assembly includes a power converter, then the length of the two associated cables (from LRF HHTI-LR to converter and from converter to AC power receptacle) must be at least two metres in length each.

The AC Power Cable Assembly must satisfy the common cable requirements specified in Section 6.2 Common Cable Requirements.

Requirements related to powering of the LRF HHTI-LR by an AC power source are specified in Section 4.3.11.2.4 AC Power Source.

5.19 Lens Cleaning Kit

The CAF has a standardized lens cleaning kit in-service, NSN 1240-20-004-3852. The LRF HHTI-LR System Lens Cleaning Kit may be specific to the LRF HHTI-LR, or it may be determined that this component is GFE.

The LRF HHTI-LR System must include a Lens Cleaning Kit.

The Lens Cleaning Kit must include cleaning tools and consumables that are required to clean, de-fog and de-ice the exterior optical surfaces of the LRF HHTI-LR.

5.20 User Manual

The LRF HHTI-LR System must have a User Manual.

Requirements for the User Manual are specified in DID < TBC >.

5.21 Quick Reference Guide

The LRF HHTI-LR System must have a Quick Reference Guide.

Requirements for the Quick Reference Guide are specified in DID < TBC >.

6 LRF HHTI-LR System - Common System Requirements

6.1 Required States and Modes

6.1.1 Transport and Storage Mode

In the Transport and Storage Mode, all components of the LRF HHTI-LR System are stored within the Field Kit Storage and Transport Case and the Support Kit Storage and Transport Case. In the Transport and Storage mode, batteries are removed from the LRF HHTI-LR. Depending on the operational situation, batteries may be stored within the two storage and transport cases, or may be stored elsewhere.

The storage configuration of LRF HHTI-LR System components within the storage and transport cases is described in:

- Section 5.1 Field Kit Storage and Transport Case
- Section 5.2 Support Kit Storage and Transport Case

The LRF HHTI-LR System must have a Transport and Storage Mode.

6.1.2 Field Carriage Mode

In the Field Carriage Mode, all components of the LRF HHTI-LR System (with the exception of the two storage and transport cases) are distributed between the Field Pouch, Tripod Pouch, and Accessories Pouch. In the Field Carriage Mode, Internal Batteries are loaded in the LRF HHTI-LR, and the LRF HHTI-LR is not turned on.

The configuration and distribution of LRF HHTI-LR System components between the three pouches is described in:

- Section 5.4 Field Pouch
- Section 5.5 Tripod Pouch
- Section 5.6 Accessories Pouch

The LRF HHTI-LR System must have a Field Carriage Mode.

6.2 Common Cable Requirements

6.2.1 Functional Requirements

LRF HHTI-LR System cables must comply with recognized military standards applicable to the use of the cable and the environment in which it is used.

6.2.2 Cable Marking

6.2.2.1 Functional Cable Marker Tags

LRF HHTI-LR System cables must have Functional Cable Marker Tags.

Functional Cable Marker Tags must be located at each end of the cable.

Functional Cable Marker Tags must identify the cable based on function, for example "LRF HHTI-LR / ISS Interface Cable".

6.2.2.2 Catalogue Cable Marker Tags

LRF HHTI-LR System cables must have Catalogue Cable Marker Tags.

Catalogue Cable Marker Tags must be located at each end of the cable.

If the cable is over five metres in length, Catalogue Cable Marker Tags must be located at three metre intervals along the cable.

Catalogue Cable Marker Tags must include the following information as indicated on the Cable Assembly Drawing associated with the cable:

a) NATO Stock Number.
b) Cable number followed by length in millimetres.
c) Part Number.
d) Manufacturer’s NSCM Code or CAGE Code

6.2.2.3 Cable Marker Tags - Common Requirements

Cable marker tags must have a white solid background plastic identification marker tube or sleeve printed in dark contrasting ink using a character height not smaller than 2 millimetres.

Cable marker tags must be covered and protected by clear heat shrink tubing.

6.3 System Environment Requirements

6.3.1 General

The LRF HHTI-LR System must meet all performance requirements in this SRS without incurring physical damage and without degradation of performance of the LRF HHTI-LR System and its sub-systems (including any supplied interface cables/connections to Government Supplied Material (GSM) and Government Furnished Equipment (GFE)) during and after exposure to any combination of the meteorological and induced climatic conditions that can be found within the geographic climatic regions identified in this SRS and described in NATO STANAG 4370, AECTP 200, AECTP 230, Leaflet 2311/1 and Leaflet 2311/2.

6.3.2 Climatic / Natural Environments

6.3.2.1 Operation - High Temperature

The LRF HHTI-LR System must operate without physical damage and without degradation of performance in all high temperature environments associated with the A3, A2 and A1 (+49°C max) climatic regions as described in NATO STANAG 4370, AECTP 200, AECTP 230, Leaflet 2311/1 and Leaflet 2311/2.

6.3.2.2 Storage - High Temperature

The LRF HHTI-LR System must be transported and stored without physical damage and without degradation of performance in all high temperature environments associated with the A3, A2, and A1 (+71°C max) climatic regions as described in NATO STANAG 4370, AECTP 200, AECTP 230, Leaflet 2311/1 and Leaflet 2311/2.

6.3.2.3 Operation - Low Temperature

The LRF HHTI-LR System must operate without physical damage and without degradation of performance in all low temperature environments associated with the C0 and C1 (-32°C min) climatic regions as described in NATO STANAG 4370, AECTP 200, AECTP 230, Leaflet 2311/1 and Leaflet 2311/2.

The LRF HHTI-LR System should operate without physical damage and without degradation of performance in all low temperature environments associated with the C0, C1 , C2 and C3 (-51°C min) climatic regions as described in NATO STANAG 4370, AECTP 200, AECTP 230, Leaflet 2311/1 and Leaflet 2311/2. < rated >

6.3.2.4 Storage - Low Temperature

The LRF HHTI-LR System must be transported and stored without physical damage and without degradation of performance in all low temperature environments associated with the C0 and C1 (-32°C min) climatic regions as described in NATO STANAG 4370, AECTP 200, AECTP 230, Leaflet 2311/1 and Leaflet 2311/2.

The LRF HHTI-LR System should be transported and stored without physical damage and without degradation of performance in all low temperature environments associated with the C0, C1, C2 and C3 (-51°C min) climatic regions as described in NATO STANAG 4370, AECTP 200, AECTP 230, Leaflet 2311/1 and Leaflet 2311/2. < rated >

6.3.2.5 Temperature Shock

The LRF HHTI-LR System must operate without physical damage and without degradation of performance under conditions of rapid changes in ambient air temperature as encountered during movements between in-door controlled temperature environments to out-door

environments that are at either high temperature (+49°C) and low temperature (-32°C) extremes.

The LRF HHTI-LR System must not require any physical modifications or preparations in advance of encountering a temperature shock and must be fully operable during and following the temperature shock.

6.3.2.6 Solar Radiation (Sunshine)

The LRF HHTI-LR System must be stored, transported and operate without physical damage and without degradation of performance in all solar radiation conditions associated with the A3, A2, and A1 climatic regions as described in NATO STANAG 4370, AECTP 200, AECTP 230, Leaflet 2311/1 and Leaflet 2311/2.

6.3.2.7 Rain

The LRF HHTI-LR System must be stored, transported and operate without physical damage and without degradation of performance in conditions of blowing Steady-State (1.7 mm/min) rain up Extreme (14 mm/min) rain conditions as described in NATO STANAG 4370, AECTP 300, Method 310.

6.3.2.8 Icing / Freezing Rain

The LRF HHTI-LR System must be stored, transported and operate without physical damage and without degradation of performance in conditions of ice accretion on the product's surfaces from freezing rain and other cold water spray conditions, up to a Light (6 mm) loading as described in NATO STANAG 4370, AECTP 300, Method 311.

The LRF HHTI-LR System must allow the removal of ice from the LRF HHTI-LR System surfaces using hands or hand-held mechanical tools, such as ice-scrapers, without causing physical damage to the system.

6.3.2.9 Frost and Condensation

The LRF HHTI-LR System must not be physically damaged and must not be degraded in performance under conditions of frost and condensation formation on the product's surfaces in any stored, transported or operating configuration.

The LRF HHTI-LR System must not require any physical modifications or preparations in advance and must be fully operable during and following any frost and condensation conditions.

6.3.2.10 Humidity

The LRF HHTI-LR System must operate without physical damage and without degradation of performance in all high humidity environments associated with the B1, B2 and B3 climatic regions as described in STANAG 4370, AECTP 200, AECTP 230, Leaflet 2311/1 and Leaflet 2311/2.

6.3.2.11 Blowing Sand and Dust

The LRF HHTI-LR System must be stored, transported and operate without physical damage and without degradation of performance in environments with airborne fine dust particulates, as described in STANAG 4370, AECTP 300, Ed. 3, Method 313, Procedure I.

The LRF HHTI-LR System must be stored, transported and operate following exposure to blowing sand (with lens protection in place)without physical damage and without degradation of performance in environments with blowing, large particle sand, as described in STANAG 4370, AECTP 300, Ed. 3, Method 313, Procedure II.

6.3.2.12 Salt Fog

The LRF HHTI-LR System must operate without physical damage and without degradation of performance in salt laden atmospheric environments as described in MIL-STD-810H, Method 509.7.

6.3.2.13 Fungus

The LRF HHTI-LR System must not contain materials that are susceptible to fungus growth.

6.3.3 Induced Environments

6.3.3.1 Shock

The LRF HHTI-LR System must operate without physical damage and without degradation of performance following shocks associated with dismounted soldier operations.

The LRF HHTI-LR System must operate without physical damage and without degradation of performance following shocks associated with transportation.

The LRF HHTI-LR System must operate without physical damage and without degradation of performance following a transit drop.

6.3.3.2 Transport Vibration

The LRF HHTI-LR System must operate without physical damage and without degradation of performance following exposure to the vibrations associated with transport in Ground Vehicles.

6.3.3.3 Immersion

The LRF HHTI-LR System must operate without physical damage and without degradation of performance following immersion under water in any stored, transported or operating configuration to a depth of not less than 1 meter below the water surface for a duration of not less than 30 minutes.

The LRF HHTI-LR System must not require any physical preparations or modifications in advance of being immersed and must be fully operable immediately following the immersion without any preparations or drying.

6.3.3.4 Low Pressure (Altitude)

The LRF HHTI-LR System must be stored, transported and operated without physical damage and without degradation of performance in all low ambient air pressure environments from sea level to 4,572 m (15,000 ft) pressure-altitude above sea-level.

6.3.3.5 Contamination by Fluids

The LRF HHTI-LR System must operate without damage and without degradation of performance following occasional exposure to contaminating fluids.

6.3.4 Electromagnetic Environmental Effects (E3)

6.3.4.1 Emission Control

The LRF HHTI-LR System must control radiated fields necessary to operate with the other collocated systems and to limit threat capability to detect and track the system when operated in ground applications in an Army environment.

The LRF HHTI-LR System must control radiated fields necessary to operate with the other collocated systems and to limit threat capability to detect and track the system when operated above deck on a surface ship.

6.3.4.2 Electric Field, Radiated Susceptibility

The LRF HHTI-LR System must operate without physical damage and without degradation of performance when subjected to radiated electric fields, when operated in ground applications in an Army environment.

The LRF HHTI-LR System must operate without physical damage and without degradation of performance when subjected to radiated electric fields, when operated above deck on a surface ship.

6.3.4.3 Electrostatic Discharge

The LRF HHTI-LR System must operate without physical damage and without degradation of performance when subjected to personnel-borne electrostatic discharge.

6.4 Design and Construction Constraints

6.4.1 Assembly for Operation

Starting from the Field Carriage Mode, the LRF HHTI-LR System must be assembled ready for operational use on the Tripod by a trained user in darkness in less than five minutes.

6.5 Product Marking and Nameplates

All LRF HHTI-LR System components must have nameplates or product markings in accordance with D-02-002-001/SG-001 Identification Marking of Canadian Military Property.