Defence Research and Development Canada | Recherche et développement pour la défense Canada

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Helicopter Maritime Environment Trainer: Operational Software CSCI Version Description Document

Edited by:

Leo Boutette

Ken Ueno

Jason Dielschneider

This manual represents the operation of the HelMET System as originally installed with hardware updates to the current date. For current system start-up procedures consult the Helicopter Maritime Environment Trainer (HelMET) Start-Up, Virtual Lesson Plan (VLP) Editor & Shutdown Manual Application Version 4.0. For current Operational Procedures consult the Helmet 4 4 IOS User's Guide _Rev_011.

Defence R&D Canada

Technical Memorandum

DRDC Toronto TM 2011-051

June 2011

Canada

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Principal Author

Original signed by See Original Document. Edited by: Leo Boutette; Ken Ueno; Jason Dielschneider

See Original Document. Edited by: Leo Boutette; Ken Ueno; Jason Dielschneider

Human Effectiveness Exploitation Centre

Approved by

Original signed by David Eaton

David Eaton

Section Head, Human Effectiveness Exploitation Centre

Approved for release by

Original signed by Dr. Stergios Stergiopoulos

Dr. Stergios Stergiopoulos

Acting Knowledge and Information Management Committee

Acting Chief Scientist

This document is a revision of DRDC Toronto Document: CR2002-031 Atlantis Document: VD905-03128 titled Helicopter Maritime Environment Trainer: Operational Software CSCI Version Description Document with updates to Version 4.4 of the HelMET software.

Abstract

The Helicopter Maritime Environment Trainer (HelMET) was developed by Defence R&D Canada – Toronto (DRDC Toronto) for training helicopter pilots to land on the flight deck of a Canadian Patrol Frigate (CPF) in a virtual environment. The HelMET was installed at 12 Wing, Canadian Forces Base (CFB) Shearwater, Nova Scotia, Canada [reference: Summary per document cited in next paragraph].

DRDC Toronto Document: CR2002-031 Atlantis Document: VD905-03128 titled Helicopter Maritime Environment Trainer: Operational Software CSCI Version Description Document documented Version 1.1 of the HelMET Software.

As third party support for the HelMET system did not come to fruition, DRDC Toronto has been supporting the HelMET system at 12th Wing Shearwater with hardware and software updates. The current version of HelMET is Version 4.4. Many of the updates implemented were made to allow the simulator to be used as a procedures trainer.

This document is a revision of CR2002-031 updated to reflect the large number of changes that have been implemented by DRDC Toronto since version 1.1. The purpose of this document is to update the description so that the system can be maintained and operated by Director Aerospace Development Program Management, Radar and Communications Systems or its representatives.

Résumé

Le Simulateur d'entraînement virtuel pour hélicoptère maritime (HelMET) a été développé par Recherche et développement pour la défense Canada – Toronto (RDDC Toronto) afin d'entraîner les pilotes d'hélicoptère à l'atterrissage sur le pont d'envol d'une frégate canadienne de patrouille dans un environnement virtuel. Le système HelMET a été installé à la 12e Escadre, Base des Forces canadiennes Shearwater, Nouvelle-Écosse, Canada [référence : sommaire par document cité dans le paragraphe suivant].

Document RDDC Toronto : CR2002-031, document Atlantis : VD905-03128 intitulé Simulateur d'entraînement virtuel pour hélicoptère maritime : Logiciel opérationnel CSCI, document de description de la version, documentation de la version 1.1 du logiciel HelMET.

Étant donné que la prise en charge du système HelMET par un tiers ne s'est pas réalisée, c'est RDDC Toronto qui en assure, par conséquent, le soutien à la 12e Escadre Shearwater au moyen de mises à niveau de matériel et de mises à jour de logiciel. La dernière version du logiciel HelMET est la version 4.4. De nombreuses fonctionnalités qui ont été implémentées visaient à permettre au simulateur d'être utilisé comme système d'entraînement aux procédures.

Le présent document est une révision du document CR2002-031 dont la mise à jour vise à refléter le grand nombre de modifications apportées au logiciel par RDDC Toronto depuis la version 1.1.

L’objectif de ce document est de mettre à jour les descriptions de façon à ce que le système puisse être maintenu et utilisé par le Directeur – Gestion du programme de développement aérospatial (système de radar et de communication) ou ses représentants.

Executive summary

Helicopter Maritime Environment Trainer: Operational Software CSCI Version Description Document:

Leo Boutette; DRDC Toronto TM 2011-051; Defence R&D Canada – Toronto; June 2011.

Introduction or background:

The Helicopter Maritime Environment Trainer (HelMET) was developed by Defence R&D Canada – Toronto (DRDC Toronto) for training helicopter pilots to land on the flight deck of a Canadian Patrol Frigate (CPF) in a virtual environment. The HelMET was installed at 12 Wing, Canadian Forces Base (CFB) Shearwater, Nova Scotia, Canada [reference: Summary per document cited in next paragraph].

DRDC Toronto Document: CR2002-027 Atlantis Document: ED990-01155 titled Helicopter Maritime Environment Trainer: Software Test Description documented Version 1.1 of the HelMET Software.

As third party support for the HelMET system did not come to fruition, DRDC Toronto has been supporting the HelMET system at 12th Wing Shearwater with hardware and software updates. The current version of HelMET is Version 4.4. Many of the updates implemented were made to allow the simulator to be used as a procedures trainer.

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Sommaire

Simulateur d'entraînement virtuel pour hélicoptère maritime : Logiciel opérationnel CSCI, document de description de la version :

Leo Boutette; DRDC Toronto TM 2011-051; R & D pour la défense Canada – Toronto; Juin 2011.

Le Simulateur d'entraînement virtuel pour hélicoptère maritime (HelMET) a été développé par Recherche et développement pour la défense Canada – Toronto (RDDC Toronto) afin d'entraîner les pilotes d'hélicoptère à l'atterrissage sur le pont d'envol d'une frégate canadienne de patrouille dans un environnement virtuel. Le système HelMET a été installé à la 12e Escadre, Base des Forces canadiennes Shearwater, Nouvelle-Écosse, Canada [référence : sommaire par document cité dans le paragraphe suivant].

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1 Scope

1.1 Identification

This Version Description Document (VDD), DRDC Toronto Document Number TM 2011-051, details the inventory of software contents and installation instructions of the released version of the HelMET Operational Software Computer Software Configuration Item (CSCI), Version 4.4.

1.2 System Description

1.2.1 Simulator Generation Description

The Helicopter Maritime Environment Trainer (HelMET) CSCI is a training software that runs on the HelMET developed by Defence R&D Canada – Toronto (DRDC Toronto) for training helicopter pilots to land on the flight deck of a Canadian Patrol Frigate (CPF) in a virtual environment.

The Sea King HelMET, herein referred to as the simulator, Helicopter Deck Landing Simulator (HDLS), or Virtual Reconfigurable Simulator (VR-Sim), or Reconfigurable Helicopter Simulator (RHS), is designed to provide comprehensive initial training and refresher courses for pilots of the Sea King helicopter in landing on a flight deck of a CPF in a virtual environment. Use of the simulator provides for effective training and evaluation while minimising the high cost of operating ship and aircraft for training missions and eliminating the inherent danger of personnel injury and/or damage of aircraft and ship.

The HelMET was installed at 12 Wing, Canadian Forces Base (CFB) Shearwater, Nova Scotia, Canada.

The simulator consists of the following major areas as illustrated in Figure 1*:*

- Administration Station
- Low Frequency Station
- Instructor Operator Station (IOS)
- Trainee Pilot Station

- Second Pilot Station
- Landing Signals Officer (LSO) Station
- Equipment Rack Station2
- Motion Platform Power Station
- Equipment Rack Station1
- Medium Frequency Station
- Audio Communication Subsystem Station

The Administration Station provides the computing facilities for simulations and controls.

The Low Frequency Station houses two low frequency loud speakers.

The Instructor Operator Station provides the IOS operator with the necessary controls and displays to effectively control, monitor, communicate and evaluate a helicopter deck landing training exercise.

The Trainee Pilot Station provides a crew station for the pilot to be trained in a virtual environment. The station is equipped with a head-mounted display (HMD) with headset, pilot seat, cyclic pitch stick, collective pitch lever and tail rotor pedals housed on an electric motion base.

The Second Pilot Station provides a crew station for the pilot to assist in training a trainee pilot in a virtual environment. The station is equipped with a head-mounted display (HMD) with headset, pilot seat, and controls for the landing gear.

The Landing Signals Offficer (LSO) Station provides a crew station for an operator to act as the LSO while training a pilot in a virtual environment. The station is equipped with a head-mounted display (HMD) with headset and a mockup of the LSO console including active switches and levers.

The Equipment Rack Station2 houses video distribution equipment.

The Motion Platform Power Station provides power supply and power control equipment for the Motion Platform Subsystem.

The Equipment Rack Station1 houses the Motion Platform Control Computer, voice mixer and sound generation equipment.

The Medium Frequency Station houses two medium frequency loud speakers on a stand.

The Audio Communication Subsystem Station provides the necessary facilities for the IOS operator and the pilot trainee to exchange audio communications during a training exercise.

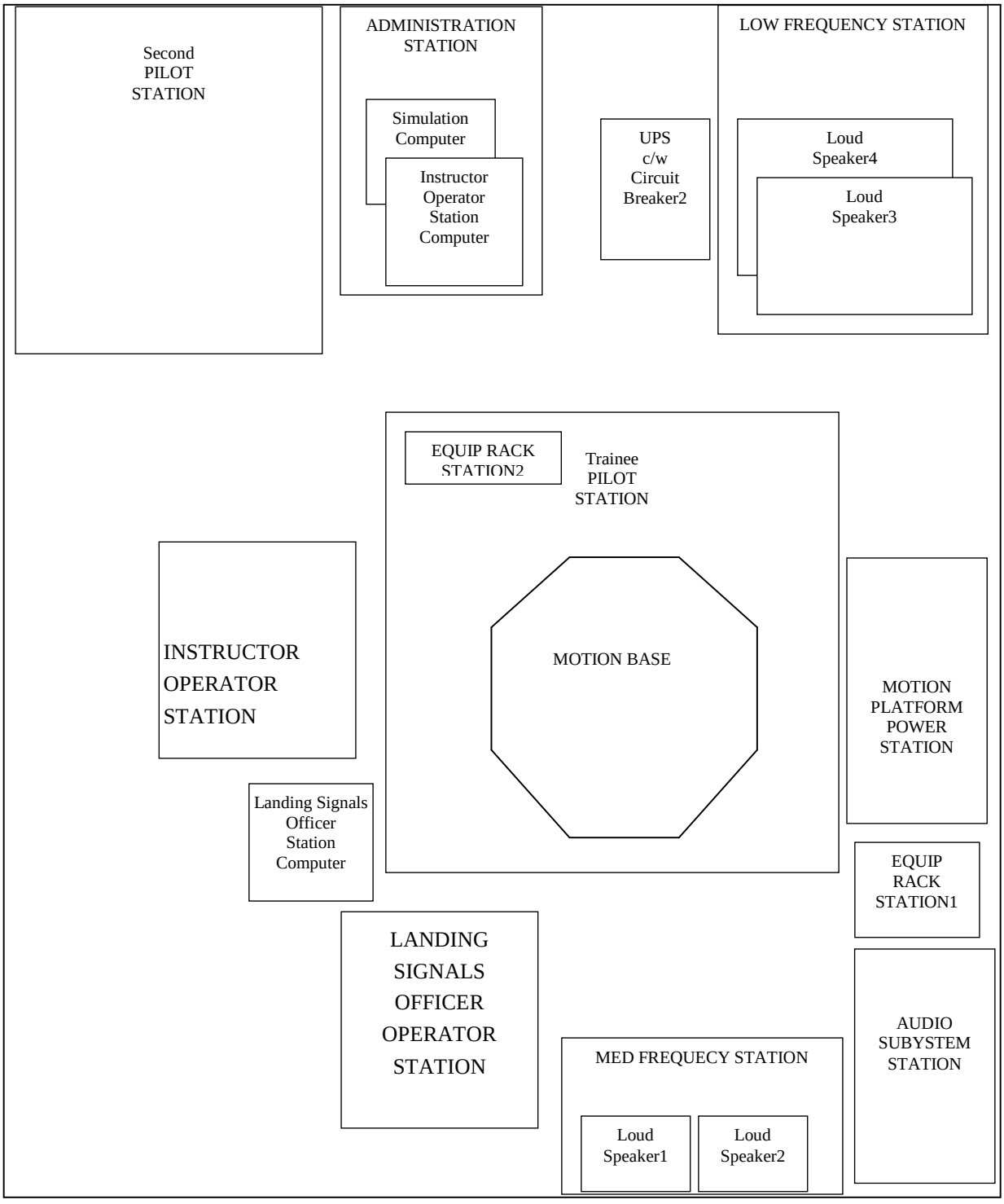

Figure 1 Simulator Floor Plan

1.3 System Overview

1.3.1 Background

Currently, Canadian Forces (CF) pilots flying the Sea King helicopter learn to land on the flight deck of a CPF through practice at sea. Although the training community has used a Sea King helicopter simulator at CFB Shearwater for more than thirty years, it does not have a visual display and consequently cannot be used for training visually guided tasks. Modern simulators are available with non-HUD visual displays, but they are expensive to procure and maintain. The acquisition cost of a typical commercial simulator can exceed $20 million Canadian. Although expensive, high-end simulators are cost-effective for some training operations when the high costs and risks associated with operational training are considered. However, the large acquisition price, the high maintenance costs, the small maritime pilot population and limited Sea King lifespan, as well as geographical considerations are likely factors that dissuade the purchase of high-end simulators for training deck landing skills.

In 1994, DRDC Toronto was requested by CF to investigate the potential use of low cost, virtual reality technologies for this purpose, following a successful demonstration of these technologies for training ship handling skills and reductions of sea time.

Landing on the deck of a CPF in high sea states is considered one of the most challenging visually guided tasks performed by any helicopter pilot in the CF. It requires fine motor skills, exceptional judgement and precise manoeuvring techniques. Moreover, good depth perception is an essential element and a necessity for this task as the helicopter blades are within 5 metres of the ship's hangar face in the properly landed position. The physics-based modelling aspects are also formidable challenges, since in addition to the aerodynamic modelling of the Sea King, the modelling of the ship's dynamics, interactions with the wind as affected by the ship's superstructure, as well as modelling of the undercarriage and its contact with the deck surface must be included.

The simulator design goals are to include affordability, portability, modularity and low maintenance. Low cost can be partially achieved by employing commercial off-the-shelf (COTS) components intended for the entertainment market, rather than components specialized for high-end simulators.

A detailed description of the HelMET/HDLS development can be found in [References a, b].

1.3.2 Simulator System Description

The simulator design builds on common COTS components supplemented with specific aircraft parts from the Sea King helicopter. The Pilot Station includes a adjustable Sea King seat and primary flight control equipment linked to the Simulation Computer Subsystem and various subsystems for sensory cueing. The Simulation Computer Subsystem, flight control components, and other subsystems are further discussed, along with their general characteristics. The pilot's flight controls, including tail rotor pedals, collective pitch lever, and cyclic pitch stick were obtained from the CF supply system or were built from technical drawings. Sensory cues are provided by a visual subsystem, motion platform subsystem, and sound and vibration subsystems. Control of pilot training is conducted via the Instructor Operator Station and Audio communication Subsystem.

The simulator system block diagram is shown in Figure 2. The simulator consists of the following major subsystems [References a, b]:

- Motion Platform Subsystem
- Flight Control Component Subsystem
- Visual Subsystem
- Video Distribution Subsystem
- Sound Subsystem
- Vibration Subsystem
- Audio Communication Subsystem
- Simulation Computer Subsystem
- Instructor Operator Station Subsystem
- Landing Signals Officer Station Subsystem
- Local Area Network.

The Motion Platform Subsystem, a six-degree of freedom (DOF) motion base unit, provides the necessary motion cues (roll, pitch, yaw, heave, surge and sway) for a simulated helicopter.

The Flight Control Component Subsystem is to provide user control interfaces to three unique flight control characteristics: the vertical control, the horizontal control and the heading control.

The Visual Subsystem provides the pilots with a view of simulated environment. It consists of head tracking devices, an image generator, and head mounted displays. The head tracking devices determines the position and orientation of the pilots' heads, which is used to determine his/her point of view. These measurements are passed to the image generator that renders the images within this field of view (FOV), and transmits the images to the Video Distribution Subsystem.

The Video Distribution Subsystem accepts display images in SVGA video signals from the Image Generator and distributes images to the HMD displays for pilots viewing, the IOS display repeater for instructor viewing, and the projector screen for presentation to a larger audience.

The Sound Subsystem drives the sound and vibration subsystems' speakers and delivers continuous auditory cues as a function of the Sea King's simulated flight regime based on data received from the Simulation Computer Subsystem.

Like the Sound Subsystem, the Vibration Subsystem provides continuous cues to supplement the Motion Platform Subsystem. The Vibration Subsystem is to provide the higher frequency vibration environments that are not normally provided through the Motion Platform Subsystem.

The Audio Communication Subsystem provides the necessary audio communication interfaces between the pilot and IOS operator.

The Simulation Computer Subsystem executes the helicopter simulation model and management utilities, uses the pilot's controls to calculate the motion dynamics, determines the pilot's point of view from tracking head movements and generates the graphics for the pilot's visual display and the Instructor Operator Station repeater monitors.

The Instructor Operator Station communicates with the Simulation Computer Subsystem and the LSO Computer Subsystem for the simulation control.

The Landing Signals Officer Station communicates with the Simulation Computer Subsystem for the simulation status and provides the Landing Signals office with visual representation of the virtual scene. It also accepts input via the LSO console and provides this data to the simulation computer to update the simulation.

The Simulation Local Area Network provides communication among the six major computers (Motion Platform Control Computer, Simulation Computer, IOS Computer, LSO computer, Audio Subsystem Computer 1 – Audio cues and Audio Subsystem Computer 2 – External sound Effects and vibration) that host the applications software for the simulation.

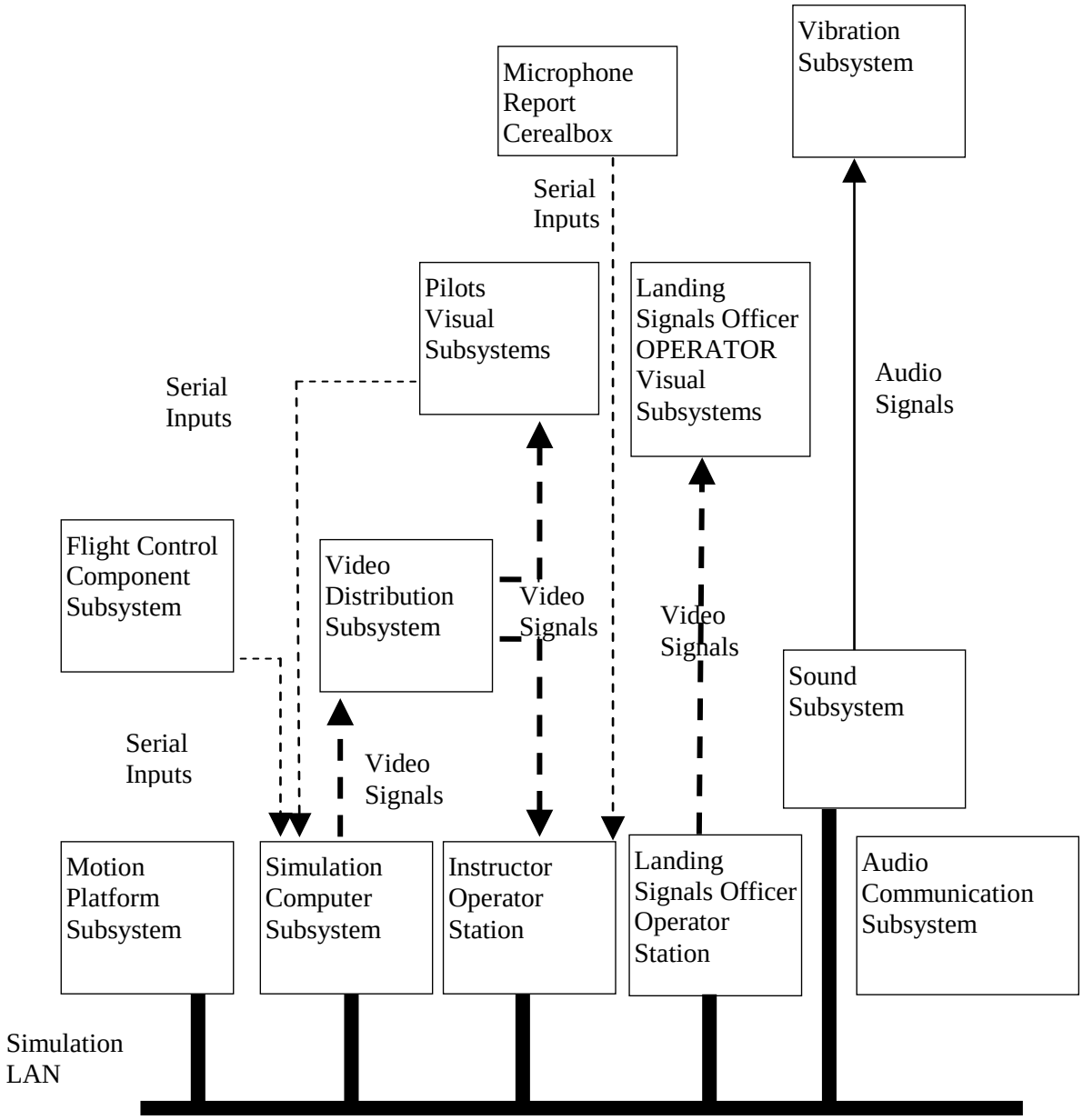

Figure 2 Simulator System Block Diagram

1.4 Document Overview

This Version Description Document (VDD) provides the inventory of software contents released and the installation steps. A brief outline of the contents of this document is given below:

Section 1 – Scope

This section describes the identification, system overview, and document overview for the simulator.

Section 2 – Referenced Documents

This section lists by document number, title, revision, and date all documents referenced in this document.

Section 3 – Version Description

This section provides, where applicable, the inventory of material release, inventory of software contents, changes installed, Adaptation Data, Installation Instructions and possible problems and known errors.

Section 4 – Notes

This section contains general information.

2 Referenced Documents

The following government and non-government documents are referenced in this manual:

a.	DRDC Toronto Specification	Helicopter Deck Landing Simulator & Landing Signalling Officer Simulator Preliminary Specification (Updated)
b.	DRDC Toronto Technical Report	Helicopter Deck Landing Simulator: Technology Demonstrator by F.A. Lue And L.E. Magee
c.	DRDC Toronto /12 Wing	Operational Sequence Diagram (OSD): Daytime Freedeck Launch
d.	DRDC Toronto /12 Wing	Operational Sequence Diagram (OSD)Night-Time Freedeck Recovery
e.	DRDC Toronto /12 Wing	Operational Sequence Diagram (OSD): Daytime Hauldown Recovery
f.	C-12-124-A00/MB-000	Aircraft Operating Instructions, CH124Sea King Helicopter, 2000
g.	CFTO B-06-282-000/FP-000	Shipborne Helicopter Operating Procedures (SHOP)
h.	DRDC Toronto Document: CR2002-027	Helicopter Maritime Environment Trainer Software Test Document
i.	DRDC Toronto Document: CR2002-022	Helicopter Maritime Environment Trainer Operator Manual
j.	DRDC Toronto Document CR2002-028	Helicopter Maritime Environment Trainer Maintenance Manual
k.	DRDC Toronto Document : CR2002-030	Helicopter Maritime Environment Trainer Software Product Specification
l.	DRDC Toronto Document : CR2002-032	Helicopter Maritime Environment Trainer Data Package

3 Version Description

3.1 Inventory of Material Released

The HelMET Operational Software CSCI media material released is described in Table 1. The security and privacy consideration are detailed on the first page of this document.

Table 1 Inventory of HelMET Operational Software CSCI Material Released

Part Number	Media Title	Media Type	Duplication	Licence
MEDIA1	HelMET Support Software Install CD for LINUX	3	2	1
MEDIA2	HelMET Operational Software CSCI Install, Version 4.4	3	2	1

(1) Media Types:	(2) Duplication	(3) Licence
1 – 3.5 inch, 1.44Mb DOS formatted floppy disk 2 – 8mm DAT, DOS formatted 3 – Compact Disc	1 – For backup purpose only 2 – Unlimited 3 – Refer to 3rd party licence	1 – N/A 2 – Refer to Third Party contract

3.2 Inventory Support Software

The contents of the “HelMET Support Software Install CD for LINUX”, is detailed in Table 2.

<MEDIA1> = HelMET Support Software Install CD for LINUX

Table 2 Inventory of Support Software Contents

MEDIA	File Name	Description	CheckSum	Size	Date
<MEDIA1>	RH8.tgz	Redhat Helmet Tools and Files		96mb	

MEDIA	File Name	Description	CheckSum	Size	Date
<MEDIA1>	RH8_Installation.pdf	Installation instructions for RH8.tgz		11 kb	
<MEDIA1>	redhat8_applications.tar.gz	Other redhat tools not required for HelMET		144 mb	
<MEDIA1>	Redhat8_applications_install .pdf	Alias for CVS		11 kb	

Note: The checksum is calculated using the checksum program md5.

3.3 Inventory of Software Contents

The contents of the "HelMET Operational Software CSCI Install, Version 4.4", is detailed in Table 3.

<MEDIA2> = HelMET Operational Software CSCI Install CD – LINUX

Table 3 Inventory of Software Contents

MEDIA	File Name	Description	CheckSum	Size	Date
<MEDIA2>	hdls.tgz	Redhat Helmet Source files		662 mb	

Note: The checksum is calculated using the checksum program md5.

3.4 Changes

At one time, a formal, centralized, dedicated bug tracking tool was used not only to track bugs but also collect feature requests. Due to the diverging mandate of DRDC Toronto research from the operational HelMET, this database was only last updated during the summer of 2005. However, the following software changes, as identified in Table 4, have been incorporated in the HelMET Operational Software CSCI Install, Version 4.4, but do not constitute a complete list relative to previous versions. Some of the identified changes may have been introduced in ealier major or minor revisions. In general, the changes reflect the introduction of the Virtual Lesson Plan (VLP) and the conversion of the simulation from fully interactive by default to a sophisticated after action review (AAR) playback device.

Table 4 Software Changes Installed in Version 4.4

ID	Area	Description
	IOS Control Window	(1)Events panel has been significantly modified.
	IOS Control Window	There is a new Training Point (TP) Details panel
	IOS Control Window	Auto playback feature is networked to automatically start playback on other active federates and receive IOS playback file selection
	IOS Control Window	Federate executables are provided with new options -v (act as VLP master) and -w (acts as a VLP slave)

3.5 Adaptation Data

There is no unique-to-site data contained in this software release. The current simulator computer network is configured to be a standalone local area network. However, in the event that the simulator computer network is required to connect to the site's corporate network, the Ethernet IP address must be reviewed and changed as required.

3.6 Related Documents

The following list contains all other deliverable documents generated as part of the software version being released:

TM 2011-048	HelMET Software Test Document
TM 2011-047	HelMET Operator Manual
TM 2011-049	HelMET Maintenance Manual
TM 2011-050	HelMET Software Product Specification
TM 2011-052	HelMET Data Package

3.7 Installation Instructions

The following sections of this document provide the installation instructions for the HelMET Operational Software CSCI Version 4.4.

It is assumed that the operating environments such as operating systems for the Simulation Computer Subsystem, Instructor-Operator Station Computer Subsystem, Landing Signals Officer Station Computer Subsystem, Audio Computer Subsystem, and Motion Platform Subsystem have been properly installed.

Information about the inventory of material released and installation instructions of these subsystems is described in the Helicopter Maritime Environment Trainer Software Product Specification [reference k].

The security and privacy considerations are detailed on the first page of this document.

3.7.1 Installation Environment

3.7.1.1 Simulation Computer System

The Simulation Computer Subsystem is a Concurrent Computer Corporation IHawk Imagen system, which is equipped with the following system environments:

1. Hardware Environment
   - Four dual-core AMD CPUs
   - 6 GB RAM
   - 250 GB 7.2K SATA hard drive
   - 250 GB 7.2K SATA hard drive
   - 250 GB 7.2K SATA hard drive

2. Software Environment

- Red Hat Linux 4.0-4 / RedHawk Linux 4.2.1
- OpenGL Performer for Linux 3.1.1

3.7.1.2 Instructor-Operator Station Computer Subsystem

The Instructor-Operator Station Computer Subsystem is a Dell Precision WS530 Workstation system, which is equipped with the following system environments:

1. Hardware Environment

- Two 1.75GHz Xeon processors
- 512 MB RDRAM
- 40 GB hard drive
- 20/40X CDROM
- 3COM 10/100 Ethernet network interface card

2. Software Environment

- Red Hat Linux 8.0
- OpenGL Performer for Linux 3.1.1

3.7.1.3 Landing Signals Officer Station Computer Subsystem

The Instructor-Operator Station Computer Subsystem is a Dell Precision WS650 system, which is equipped with the following system environments:

3. Hardware Environment

- Two 3.0GHz processors
- 3GB SDRAM
- 146 GB hard drive
- 32X DVD-CDRW
- 48X CD

4. Software Environment
   - Red Hat Linux 8.0
   - OpenGL Performer for Linux 3.1.1

3.7.1.4 Audio Computer Subsystem

The Audio Computer Subsystem is an IBM-compatible PC, which is equipped with the following system environments:

1. Hardware Environment
   - Intel Pentium III 933 MHz with 256 KB cache
   - 512 MB RAM
   - Creative Labs Sound Blaster Live sound card (x2)
   - Nvidia GeForce 2 with 64 MB DRAM
   - 3Com 3C905C NIC
   - 48X EIDE CD-ROM drive
   - 40 GB Ultra ATA 7200 RPM hard drive

2. Software Environment
   - Red Hat Linux 8.0

3.7.2 Installation Process

3.7.2.1 Simulation Computer Subsystem

The following steps must be performed to install this version of the HelMET Operational Software CSCI.

1. Log on to the Simulator Computer as root.

2. Insert the MEDIA1 CD titled “HelMET Support Software CSCI Install for LINUX” into the CD-ROM drive. If it does not automount, mount the cdrom i.e. mount /dev/cdrom /mnt/cdrom

3. Open a console window and type “tar -xvf /mnt/cdrom/RH8_Setup.tar” and then press Enter.

4. Type “cd RH8” and press Enter.

5. Type “tcsh configure_system.csh”

6. Follow the on-screen instructions. This installation will take over 10 minutes to complete. The installation will install PVM, openal, fltk, fluid, the RTI and OpenGL Performer with a demo license.. Note that it is assumed that LINUX has already been installed. Refer to Section for information on Compile/Build Environment on LINUX.

7. Unmount the cdrom “umount /mnt/cdrom” and insert the “HelMET Operational Software Install CD”. If it does not automount, mount this CD as above.

8. logout.

9. Log in as vrsim with password being sea_king.

10. Open a console window and type “tar -zxvf /mnt/cdrom/hdls.tgz” and then press Enter.

3.7.2.2 Instructor-Operator Station Computer Subsystem

The following steps must be performed to install this version of the HelMET Operation Software CSCI.

1. Log on to the Instructor-Operator Station Computer as root.

2. Insert the MEDIA1 CD titled “HelMET Support Software CSCI Install for LINUX” into the CD-ROM drive. If it does not automount, mount the cdrom i.e. mount /dev/ cdrom /mnt/cdrom

3. Open a console window and type “tar -xvf /mnt/cdrom/RH8_Setup.tar” and then press Enter.

4. Type “cd RH8” and press Enter.

5. Type “tcsh configure_system.csh”

6. Follow the on-screen instructions. This installation will take over 10 minutes to complete. The installation will install PVM, openal, fltk, fluid, the RTI and OpenGL Performer with a demo license.. Note that it is assumed that LINUX has already been installed. Refer to Section for information on Compile/Build Environment on LINUX.

7. Unmount the cdrom “umount /mnt/cdrom” and insert the “HelMET Operational Software Install CD”. If it does not automount, mount this CD as above.

8. logout.

9. Log in as vrsim with password being sea_king.

10. Open a console window and type “tar -zxvf /mnt/cdrom/hdls.tgz” and then press Enter.

3.7.2.3 Landing Signals Officer Station Computer Subsystem

The following steps must be performed to install this version of the HelMET Operation Software CSCI.

1. Log on to the Instructor-Operator Station Computer as root.

2. Insert the MEDIA1 CD titled “HelMET Support Software CSCI Install for LINUX” into the CD-ROM drive. If it does not automount, mount the cdrom i.e. mount /dev/cdrom /mnt/cdrom

3. Open a console window and type “tar -xvf /mnt/cdrom/RH8_Setup.tar” and then press Enter.

4. Type “cd RH8” and press Enter.

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7. Unmount the cdrom “umount /mnt/cdrom” and insert the “HelMET Operational Software Install CD”. If it does not automount, mount this CD as above.

8. logout.

9. Log in as vrsim with password being sea_king.

10. Open a console window and type “tar -zxvf /mnt/cdrom/hdls.tgz” and then press Enter.

3.7.2.4 Audio Communication Computer Subsystem

The following steps must be performed to install this version of the HelMET Operation Software CSCI.

1. Log on to the Audio Communication Computer as root.

2. Insert the MEDIA2 CD titled “HelMET Support Software CSCI Install for LINUX” into the CD-ROM drive. If it does not automount, mount the cdrom i.e. mount /dev/cdrom /mnt/cdrom

3. Open a console window and type “tar -xvf /mnt/cdrom/RH8_Setup.tar” and then press Enter.

4. Type “cd RH8” and press Enter.

5. Type “tcsh configure_system.csh”

6. Follow the on-screen instructions. This installation will take over 10 minutes to complete. The installation will install PVM, openal, fltk, fluid, the RTI and OpenGL Performer with a demo license.. Note that it is assumed that LINUX has already been installed. Refer to Section for information on Compile/Build Environment on LINUX.

7. Unmount the cdrom “umount /mnt/cdrom” and insert the “HelMET Operational Software Install CD”. If it does not automount, mount this CD as above.

8. logout.

9. Log in as vrsim with password being sea_king.

10. Open a console window and type “tar -zxvf /mnt/cdrom/hdls.tgz” and then press Enter.

3.8 Simulator Normal Operating Procedures

Information on operating the simulator is described in the Helicopter Maritime Environment Trainer Operator Manual [reference I]

3.9 Possible Problems and Known Errors

A list of possible problems and known errors for the HelMET Operational Software CSCI Version 4.4 is provided in Table 5. Note that the item identifiers do not correspond to the once-used dedicated, centralized bug tracking system identifiers.

Table 5 List of Possible Problems and Known Errors

Item	Area	Description
	Federates De-	The IOS and Pilot federates lose time-synchronization as HLP's

Item	Area	Description
	Synchronizing	are run. This is believed to be because of the delays experienced when the IOS federate executes audio event playback. The amount of de-sync is consistent for a given HLP, but is relatively minor.
	Auto-stop Overruns End of Event	Network issues initially prevented the auto-stop feature from stopping all federates at precisely the same time. A by-product of the workaround for this causes a brief overrun at the end of HLP events. Fast-forwarding the session or running through a very short event exacerbates the problem. It is even possible for the overrun to pass through the next event altogether if both conditions are present. Could be contributing to the "federates de-synchronizing" issue. System is limited by current networking design. Not practical to correct.
	Performer Memory Crash	Uncorrectable memory leaks in the OpenGL Performer software required to run HDLS cause crashes after a certain number of missions are run. The number of missions before failure can be increased by allocating more memory to Performer. Problem cannot be corrected as OpenGL Performer is no longer in development.
	Blinking Ocean Texture	Putting the pilot and co-pilot in different eyepoints, particularly one far away from the other, will cause the ocean texture to blink and stutter randomly. This is an optimization issue, as federates were not originally intended to have two active eyepoints running at the same time (and thus, the LOD/graphics switches are not designed to draw two seperate scenes at full detail). Other artifacts, such as pieces of the helicopter exterior and parts of the ship disappearing or drawing at lower detail, are caused by the same issue. Correction would require re-writing large amounts of core federate code. Not practical to correct.
	Co-Pilot Graphics Run at 30Hz	Legacy hardware for the simulator could not support two active eyepoints (pilot and co-pilot) in one federate, running at full speed. The graphics for the second seat have only been able to run at 30hz (versus 60hz). The new IG hardware may support higher performance, pending configuration. Hardware-related performance issues. Possible re-examination in the future.
	Federate not Starting the First Time	Occasionally either the Pilot or IOS federate will close immediately on the first attempt at a session. Shutting down the software and starting up again corrects the issue and it will not

Item	Area	Description
		occur again until the computers are rebooted. No amount of temporary file clean-up, scripting, or adjustment to config files seems to have any effect on this problem. As it only occurs once per hardware boot-up and can be corrected by simply starting the software again, this issue is left as-is.
	China hat broken	At the time of the last software installation in Shearwater by DRDC Toronto, the china hat on the joystick was still broken, a result of rewiring of simulation instrumentation in an attempt to remove excess cabling.
	Help About	The Help About dialog is out of date, providing information for HelMET v2.0.
	Manual mode GUIs	Due to the addition of the assumable co-pilot role, GUIs were compressed as possible to account for the limited monitor real estate. However, some GUI interactive items may have been compromised to the point of making it too difficult to use.

4 Notes

4.1 Abbreviations and Acronyms

Item	Descriptions
ADS	Aeronautical Design Standard
BDHI	Bearing Distance Heading Indicator
CD	Compact Disk
CD-ROM	Compact Disk Read Only Memory
CDI	Course Display Indicator
CF	Canadian Forces
CFB	Canadian Forces Base
CFTO	Canadian Forces Technical Order
COTS	Commercial Off The Shelf
CPF	Canadian Patrol Frigate
CPU	Central Processing Unit
CSCI	Computer Software Configuration Item

Item	Descriptions
DCS	Dynamics Coordination System
DLP	Deck Landing Procedures
DMSO	Defense Modelling and Simulation Organization
DOF	Degrees of Freedom
DOS	Disk Operating System
DRAM	Dynamic Random Access Memory
DRDC	Defence Research and Development Canada
FLTK	Fast Light Tool Kit
FLUID	Fast Light User Interface Designer
FLYCO	Flying Coordinator
FOV	Field of View
GB	Gigabytes
GUI	Graphical User Interface
HAM	Helicopter Air Manoeuver
HDLS	Helicopter Deck Landing Simulator

Item	Descriptions
HelMET	Helicopter Maritime Environment Trainer
HLA	High Level Architecture
HMD	Head Mounted Display
HUD	Head Up Display
IBM	International Business Machines
IOS	Instructor-Operator Station
ICS	Inter-Communication System
LAN	Local Area Network
LSO	Landing Signals Officer
MB	Megabytes
MHz	Mega Hertz
N/A	Not Applicable
NFC	Non-Flying Crew
NIC	Network Interface Card

Item	Descriptions
NIM	Network Interface Module
OM	Operator Manual
OS	Operating System
OSD	Operational Sequence Diagram
PC	Personal Computer
PVM	Parallel Virtual Machine
RAM	Random Access Memory
RBI	Range Bearing Indicator
RAT	Robust Audio Tool
RGB	Red Green Blue
RHS	Reconfigurable Helicopter Simulator
RPM	Rotation Per Minute
RTI	Run Time Infrastructure
SA	Situation Awareness

Item	Descriptions
SAVDB	Sound Audio Video Database
SCS	Static Coordinate System
SGI	Silicon Graphics Inc.
SHOP	Shipborne Helicopter Operating Procedures
SMART	Simulation Modelling Acquisition Rehearsal Training
UPS	Uninterruptible Power Source
VDD	Version Description Document
VLP	Virtual Lesson Plan
VR	Virtual Reality
VR-Sim	Virtual Reconfigurable Simulator

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(U) The Helicopter Maritime Environment Trainer (HelMET) was developed by Defence R&D Canada – Toronto (DRDC Toronto) for training helicopter pilots to land on the flight deck of a Canadian Patrol Frigate (CPF) in a virtual environment. The HelMET was installed at 12 Wing, Canadian Forces Base (CFB) Shearwater, Nova Scotia, Canada [reference: Summary per document cited in next paragraph].

DRDC Toronto Document: CR2002−031 Atlantis Document: VD905−03128 titled Helicopter Maritime Environment Trainer: Operational Software CSCI Version Description Document documented Version 1.1 of the HelMET Software.

As third party support for the HelMET system did not come to fruition, DRDC Toronto has been supporting the HelMET system at 12th Wing Shearwater with hardware and software updates. The current version of HelMET is Version 4.4. Many of the updates implemented were made to allow the simulator to be used as a procedures trainer.

This document is a revision of CR2002−031 updated to reflect the large number of changes that have been implemented by DRDC Toronto since version 1.1. The purpose of this document is to update the description so that the system can be maintained and operated by Director Aerospace Development Program Management, Radar and Communications Systems or its representatives.

(U) Le Simulateur d'entraînement virtuel pour hélicoptère maritime (HelMET) a été développé par Recherche et développement pour la défense Canada – Toronto (RDDC Toronto) afin d'entraîner les pilotes d'hélicoptère à l'atterrissage sur le pont d'envol d'une frégate canadienne de patrouille dans un environnement virtuel. Le système HelMET a été installé à la 12e Escadre, Base des Forces canadiennes Shearwater, Nouvelle Écosse, Canada [référence : sommaire par document cité dans le paragraphe suivant].

Document RDDC Toronto : CR2002 031, document Atlantis : VD905 03128 intitulé Simulateur d'entraînement virtuel pour hélicoptère maritime : Logiciel opérationnel CSCI, document de description de la version, documentation de la version 1.1 du logiciel HelMET.

Étant donné que la prise en charge du système HelMET par un tiers ne s'est pas réalisée, c'est RDDC Toronto qui en assure, par conséquent, le soutien à la 12e Escadre Shearwater au moyen de mises à niveau de matériel et de mises à jour de logiciel. La dernière version du logiciel HelMET est la version 4.4. De nombreuses fonctionnalités qui ont été implémentées visaient à permettre au simulateur d'être utilisé comme système d'entraînement aux procédures.

Le présent document est une révision du document CR2002 031 dont la mise à jour vise à refléter le grand nombre de modifications apportées au logiciel par RDDC Toronto depuis la version 1.1. L'objectif de ce document est de mettre à jour les descriptions de façon à ce que le système puisse être maintenu et utilisé par le Directeur – Gestion du programme de développement aérospatial (système de radar et de communication) ou ses représentants.

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(U) Helicopter, Deck landing, Virtual Reality Simulator, Team Trainer, CPF Frigate, Sea King

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