

Deployable Joint Fires Trainer (DJFT)

Block 3 User's Guide



Geospecific simulation with game quality graphics



Copyright © 2023, MVRsimulation Inc. All rights reserved.

Printed in the United States of America. November 2023

MVRsimulation, the MVRsimulation logo, and VRSG (Virtual Reality Scene Generator) are registered trademarks, and First Person Simulator, VRSG Radar, IRserver, WorldPerfect, ChannelSurfer, Digital Moving Map Toolkit, ChannelSync, and the phrase "geospecific simulation with game quality graphics" are trademarks of MVRsimulation Inc. MVRsimulation's round-earth terrain architecture is protected by US Patent 7,425,952.

Esri, 3D Analyst, ArcCatalog, ArcGIS, ArcMap, ArcToolbox, and ArcTools are trademarks, registered trademarks, or service marks of Esri in the United States, the European Community, or certain other jurisdictions. CityEngine is a registered trademark of Procedural AG and is distributed under license by Esri. OpenStreetMap © OpenStreetMap contributors.

Microsoft is a registered trademark and Windows is a trademark of Microsoft Corporation.

Portions of the MVRsimulation Virtual Reality Scene Generator physics-based IR sensor modeling capability are licensed from Technology Service Corporation. © 2013 Technology Service Corporation.
RealIR is a trademark of Technology Service Corporation.

Portions of MVRsimulation Virtual Reality Scene Generator 3D ocean simulation include Triton 3D ocean technology, which is copyrighted and proprietary to Sundog Software, LLC.

Portions of the MVRsimulation Virtual Reality Scene Generator volumetric cloud library copyright © 2002 Mark J. Harris and The University of North Carolina at Chapel Hill. Permission to use, copy, modify, distribute and sell this software and its documentation for any purpose is hereby granted without fee, provided that the above copyright notice appear in all copies and that both that copyright notice and this permission notice appear in supporting documentation. Binaries compiled with this software may be distributed without any royalties or restrictions.

Portions of the MVRsimulation FBX conversion utility use the Autodesk® FBX® library © 2011 Autodesk, Inc. Autodesk and FBX are registered trademarks of Autodesk, Inc.

Portions of Boost C++ libraries copyright © 1998-2003 Beman Dawes, David Abrahams; 2004-2008 Rene Rivera.

Portions of the MVRsimulation software installation use portion(s) of the 7-Zip program (www.7-zip.org), which is licensed under the GNU LGPL license.

Portions of the 3D content libraries are licensed from aXYZ design. Copyright © 2007 aXYZ design.

Portions of the 3D content libraries are licensed from X-trusion. Copyright © 2007 X-trusion.

Portions of the 3D content libraries are licensed from Maxar SecureWatch. Copyright © 2021 Maxar.

All other trademarks are owned by their respective companies.

The copying and installation of files and usage of MVRsimulation software is subject to the MVRsimulation License and Warranty Agreement. See Appendix B for the MVRsimulation License and Warranty Agreement.

MVRsimulation Inc.

57 Union Avenue, Sudbury, MA 01776 USA

Phone: 617-739-2667

Fax: 617-249-0151

Website: www.mvrsimulation.com

Email: sales@mvrsimulation.com

Contents

PREFACE **V**

1 QUICK START **1-1**

2 POWER SEQUENCES AND THE POWER CONTROL BOARD **2-1**

3 USING THE VARJO XR-3 WITH THE DJFT **3-1**

4 MAINTAINING THE DJFT **4-1**

A LICENSE AND WARRANTY AGREEMENT **A 1**

Preface

This user's guide describes the setup, usage, and storage procedures of MVRsimulation's Deployable Joint Fires Trainer (DJFT). Failure to adhere to the manufacturer's (MVRsimulation's) recommended usage, storage, and transportation procedures may result in damage to the DJFT. Damage incurred from improper usage, storage, or transportation shall be beyond the scope of the warranty and all repairs and/or replacement costs will be born by the end-user.

The DJFT is an internally designed and developed simulator that focuses on Joint Terminal Attack Controllers and Forward Observers as the trainee. The DJFT is comprised of three stations: Instructor Operator Station (IOS), Observer Station (OBS), and Role Player Station (RP). You can purchase additional stations to expand the functionality of the DJFT. For more information about purchasing additional stations, email sales@mvrsimulation.com. You can also connect the DJFT to external networks to support LVC training. Contact the site information technology administrator for assistance configuring the DJFT to run in a networked environment.

MVRsimulation's Virtual Reality Scene Generator® (VRSG®) is the image generator for all 3D visuals throughout the DJFT. The IOS provides dynamic control of the scenario running on Battlespace Simulations' (BSI) Modern Air Combat Environment (MACE) and provides the networking hub for internal and external connections. The IOS also holds a VRSG round-earth architecture terrain server. The OBS is the student station that provides the out-the-window mixed reality training environment, emulated military equipment, and simulated radio and DACAS capabilities. The RP provides a dynamically controlled role player for trainee interaction and a dedicated sensor view from the role player's aircraft. The RP can be configured for fixed- and rotary-wing assets as well as remotely piloted aircraft systems.

In general, running the DJFT product entails the following steps:

1. Setting up the three stations as described in the chapter "Quick Start."
2. Using the single source power control to power each station as described in the chapter "Power Sequences and the Power Control Board."
3. Configuring the Varjo XR-3 head mounted display (HMD) as described in the chapter "Using the Varjo XR-3 with the DJFT."
4. Using the documentation provided for maintainers in the chapter "Maintaining the DJFT."

If you need technical assistance...

MVRsimulation is committed to providing you with a high-quality product experience. Most common issues can be resolved by the following steps:

- Make sure that stations were powered on in the correct order as described in the chapter “Power Sequences and the Power Control Board”.
- To resolve common anomalies in the mixed-reality environment follow the troubleshooting action items in the chapter “Using the Varjo XR-3 with the DJFT.”
- Refer to the MVRsimulation *Virtual Reality Scene Generator (VRSG) User's Guide* to use and customize VRSG.
- Refer to Battlespace Simulations' *Modern Air Combat Environment (MACE) User's Manual* and *MACE-VRSG Integration Guide* to use and customize MACE.

Completing these steps will solve many operational problems and often eliminate the need for further assistance.

Contacting MVRsimulation support

If you need further assistance, contact MVRsimulation support services via email at hardware.support@mvrsimulation.com with details about the sequence of actions that led to the problem and any resulting error messages. Attach any screenshots that might help to illustrate the problem.

In addition, supply the following information:

- The station serial number.
- The machine name.
- The product version number.
- The operating system and version number.
- Any special hardware or software configuration that might affect the problem.
- The contents of the appropriate log file (such as VRSG's `VrsgError.txt`, `VrsgInfo.txt`, and `ViveTrackerConfig.ini` files).
- The product dongle ID or SL reference number.

Most emails to MVRsimulation support services are answered within 24 hours, Monday-Friday 9:00 am to 5:00 pm US Eastern Time.

About this manual

This manual describes the setup, operation, and maintenance of MVRsimulation's DJFT.

MVRsimulation values any feedback you have on this manual. Email any comments or suggestions to: hardware.support@mvrsimulation.com.

For more information about MVRsimulation and its products, visit www.mvrsimulation.com.

CHAPTER 1

Quick Start

This chapter describes the steps for setting up the DJFT. The DJFT is configured to run out-of-the-box. Each station must be unpacked, inspected, and transitioned from transport mode (closed case) to operation mode (open cases with hard drives installed and network cables connected). Setting up the DJFT for the first time will consist of removing each station from its shipping container, opening the case, installing the hard drives, and connecting the network cables before power up.

Unpacking the DJFT

The DJFT is comprised of three stations: Instructor Operator Station (IOS), Observer Station (OBS), and Role Player Station (RP). Each station is shipped in its own reusable shipping container.

Note: Retain the shipping containers for re-use in all commercial shipping. MVRsimulation recommends using the original, re-usable shipping containers for all commercial shipping. When transported under your unit's control, make sure the cases are secured before transport and padded using 2" high-density shipping foam. Failure to do so may result in physical damage beyond the scope of the manufacturer's warranty.

Before unpacking

Before starting to unpack the DJFT complete these inspection items:

1. Inspect the ShockWatch® 2 impact indicators on the sides of the shipping containers. If any are triggered, note which container, and take a photo of the ShockWatch® 2. The photo should include the ShockWatch® 2 indicator and the surrounding area to identify the case and location.



ShockWatch® 2 impact indicators, not triggered.

Triggered impact indicator.

2. Complete a video walk-around recording of all the shipping containers. Alternatively, take photos of all sides of the shipping containers including the lid.
3. Inspect all shipping containers for visible damage. Take photos of any damage. Note the location and container of the damage.

4. Promptly send any information gathered from steps 1-3 to MVRsimulation at hardware.support@mvrsimulation.com and wait for further instructions before proceeding to unpacking the DJFT.

Removing the cases from the shipping container

Removing the DJFT cases from the shipping containers is a two-person job. Damage to the cases and shipping containers can occur with only one person unpacking them.

To unpack the DJFT:

1. Cut and discard the banding straps. Note: Future shipments in the reusable shipping container will require new 2x2 banding straps (not included). Do not rely solely on the locking tabs to keep the shipping container secure.
2. The crates have eight locking tabs to keep the lid and base attached to the side wall. Disengage the four lid locking tabs by moving them toward the inside of the crate. Remove the lid and top shipping foam.

Release locking lid tabs.

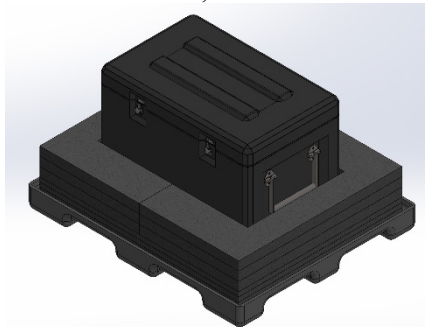


Top of the shipping container.



DJFT case inside the shipping container.

3. Unlock the bottom locking tabs. The tabs are located on the underside of the pallet in a mirror location from the lid locking tabs and unlock in the same fashion. Once all four tabs are unlocked, lift the side wall off the pallet and set aside.



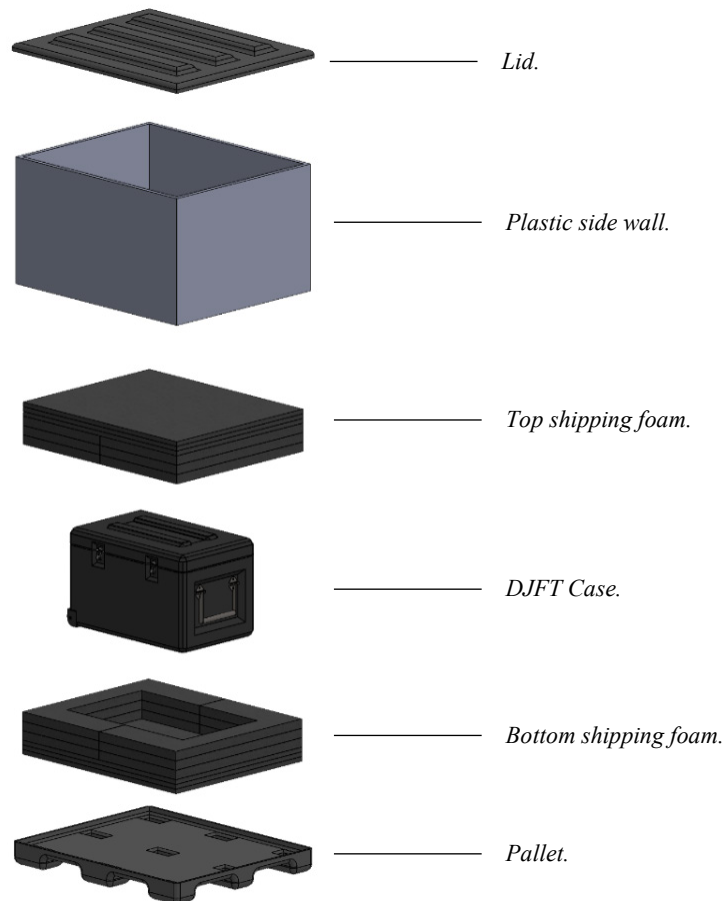
DJFT case in shipping foam without the side wall.

4. With the assistance of a second person, lift the case from the bottom shipping foam. Place the case on a secure surface.
5. Store the shipping containers for future use by rebuild the shipping containers or flat packing them.
 - If you rebuild them, you may stack them. Do not stack above three-high.

- If flat pack is preferred, place all pallets inside each other. Then, place the shipping foams on top of the pallets with the plastic side walls collapsed on top. Finally, place the nested lids on top and band all shipping components together. Only flat pack three containers and their foam together. Do not stack flat packed shipping containers.

6. Follow the procedures as described in the section “Opening the transport cases” to set up the case for training.

Below is an exploded view of the shipping container layers:



Opening the transport cases

Each station is self-contained in an all-aluminum transport case. MVRsimulation recommends that you set up one case at a time, starting with the IOS case. Make sure the case is sitting on a stable surface before beginning setup.

To open the transport cases:

1. Remove any locks from the locking swivel latches and dis-engage the latches.

*Locking swivel
latch.*



2. Open the lid and fully engage the locking lid-stays. You will hear a click and the grey handle will engage when the lid-stay is secured. The lid-stays will hold the lid at a 90° angle during use. *Note:* To close the lid, you must release both lid-stays simultaneously.

Locking lid-stay.



Locking lid-stay.

3. *Remove and retain* the internal packing foam labeled “RETAIN FOR FUTURE TRANSPORT.” This piece of packing foam completes the tight isolation within the DJFT, making it transportable. It also prevents any potential damage from an improperly secured desktop panel; mitigating damage to the screens. *Note:* This packing foam *must* be installed during transportation and storage.

*RETAIN packing
foam for transport.*



Setting up the desktop devices

Each station has a main desktop panel on the left that is larger than the right desktop panel. The main desktop stores and secures the PC chassis. The peripheral devices and the Emulated Military Equipment (EME) are stored under the right desktop. In general, the procedure for setting up each station is the same. Set up the desktop peripherals in the layout of your preference. Only the HOTAS in the RP station have specific mount points.

Note: Make sure not to pinch any cables in the desktop panels during setup. Special reliefs in the desktop have been added to remove the likelihood of pinching cables. Unless otherwise noted below, the peripheral cables come out the left side of the desktop panel closest to the lid. The cables extend from a chimney in the storage foam to force them to this location.

Open the right desktop panel and set up the peripheral devices:

1. Unscrew the two screws mounted in the front of the right desktop panel and open the desktop panel.



2. Remove each device, place it on the main desktop while following these specific instructions:
 - IOS: Pull out the network cables. Extend them to the Observer Station and Role Player Station as labeled.
 - OBS: The Varjo XR-3 and SOFLAM cables extend from the right side of the transport case. For more information on setting up the OBS and the XR-3, see “Using the Varjo XR-3 with the DJFT.”
 - RP: The throttle mounts to the left side of the desktop with four thumb screws. The Joystick mounts to the base installed in the right desktop. Line up the two arrows and use the large collar screw to attach the joystick onto its base.
3. Pull the power cord cables out from the right side of the case, but do not plug them in at this time. Each case has 10' of power cord extending outside the case. Do not pull on the power cord to try to make it longer; the cables are fastened internally, and all available cable length is in the storage compartment.
4. Close the right desktop lid. *Do not* pinch any cables with the desktop panel.

5. Arrange the peripheral accessories on the desktop for ease of use in the simulation.
Here are sample images of each station fully setup:

*External network
connections
(not included).*



*Power cord and
network cables for
the OBS and RP.*

Instructor Operator Station.

*Network cables
from the IOS.*



*Power cord,
SOFLAM cables
and XR-3 cables.*

Observer Station. SOFLAM can also be mounted on a floor tripod to the side of the case.



Role Player Station.

Connecting the network and power cables

The IOS has two 10 GB network switches that create a dedicated DISNet (black cables) and TerrainNET (blue and teal cables). The IOS has a network connection plate located on the main desktop for connecting additional stations or connecting to external networks. For more information about how to add additional stations to the DJFT, email hardware.support@mvrsimulation.com.

1. Lay out and connect the network cable looms from the IOS to the OBS and RP desktop keystone connections, as labeled. The network cable looms are stored in the IOS right storage compartment and are labeled OBS and RP. *Note:* Cable color coordinates with the keystone jack receptacle color. Cables are interchangeable but must be connected to a similarly colored connector. For example:
 - Connect a black cable to a black receptacle.
 - Connect a blue or teal cable to a blue receptacle.
2. Plug in all three stations. MVRsimulation recommends a dedicated 15A circuit for each station. Note the following:
 - For weight reduction, only 15' power cords with grounded NEMA 5-15 wall outlet plugs were used internally. MVRsimulation recommends you connect the internal power cord to a 15A surge protector with a longer lead for connecting to the main power source. The 1300-watt power supply uses a standard C13 plug. You can replace the 15' power cords with any length you prefer or to accommodate local power receptacles.
 - The use of country-specific power connector adapters is not recommended. Most of such devices are not rated for 13Amps continuous load. Instead, MVRsimulation recommends buying standard PC power cords specific to those countries where the DJFT will be used, replacing the internal power cord upon arrival in each country.

For more information on networking and network services in the DJFT see the chapter “Maintaining the DJFT.”

Hard drives and their storage

The DJFT includes two sets of hard drives: one set for classified and one set for unclassified environments. The unclassified drives are painted green, and the classified drives are painted red. Both drive sets are identical from the factory and only contain unclassified data. Both sets of hard drives will be located in separate Pelican cases.

You can clone more drive sets for additional levels of classification. For more information on cloning or purchasing additional sets of drives, contact MVRsimulation’s Hardware Support team at hardware.support@mvrsimulation.com. For more information on hard drives in the DJFT see the chapter “Maintaining the DJFT” later in this user’s guide.

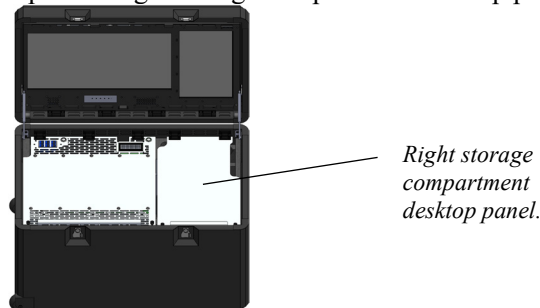
Installing the hard drives

The DJFT hard drives must be installed after shipping. *Note:* MVRsimulation recommends removing all hard drives prior to future shipping or transportation to prevent damage to the PC Chassis. Failure to remove the drives prior to shipping and transporting the DJFT may result in damage beyond the scope of the manufacturer’s warranty.

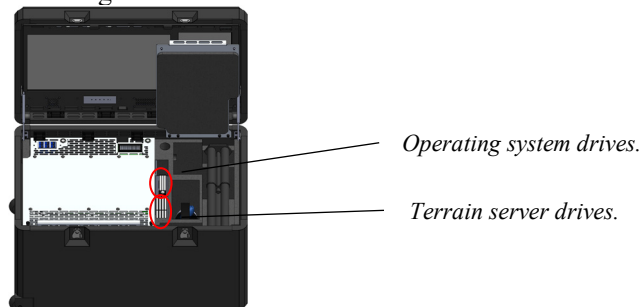
The DJFT ships ready to install the unclassified drives and begin training. If you want to install the classified drives, you will need to complete the steps in the section “Importing Terrain Server RAID array” in the chapter “Maintaining the DJFT”.

Installing the hard drives is a similar process for all cases. To install the hard drives:

1. Open the right storage compartment desktop panel.



2. Identify which hard drives belong in the Icy Dock. Drive locations and hard drives have matching identification based on the machine name the drives are associated with.



IOS hard drive locations. OBS and RP only have operating system drives.

3. Open the unclassified hard drive shipping Pelican case and identify the drives.
4. Install hard drives in their correct location one at a time.
 - Release the handle of the hard drive cage prior to inserting the drive.
 - The hard drives only install in one direction and they slide in easily. Do not force them into the Icy Dock.
 - Make sure the handle is locked in place before moving on to the next drive.



Hard drive cage being installed into the Icy Dock.

5. Once all drives have been installed, plug the power cords in and begin the startup sequence in the following order:
 - First: Instructor Operator Station
 - Second: Role Player Station
 - Last: Observer Station

Note: The IOS must be powered on and the network cable looms must be connected to their respective station before powering on the OBS or RP station. Powering up the OBS or RP before the IOS is powered up will result in a failure to properly connect the network drives. If you receive an error message saying a network drive is not mapped correctly, try restarting the station; this might resolve the problem.

Note: The central network services have a 5-minute startup cycle. The startup script for each station has a time delay to account for this. Do not bypass the time delay during initial startup. Bypassing the startup script time delay may result in a failure to properly connect the network drives.

For more information on startup procedures and using the central power control board, see the chapter “Power Sequences and the Power Control Board.”

CHAPTER 2

Power Sequences and the Power Control Board

The need for a single source start-up process led to the development of the MVRsimulation power control board (PCB). The single source power control along with specialized startup scripts make the DJFT a truly quick-deploy solution; from setup to training in a few minutes.

The PCB was developed and produced in partnership with a U.S. circuit board and electronics manufacturer. It was designed to distribute the power from a COTS power supply to all the electronics housed inside the DJFT. Distributing the power from a single power supply reduces size, complexity, and weight.

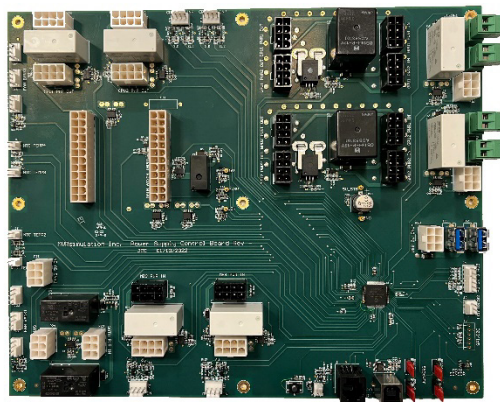
This chapter describes the process of powering up a station, powering down a station, and general information about the PCB and related components. For more information on the PCB, email hardware.support@mvrsimulation.com

Component overview

The single source power control system consists of several parts: the PCB, LCD information panel, LED power button, USB KVM switch, KVM switch button, and various cable harnesses. This section gives an overview of each of these components.

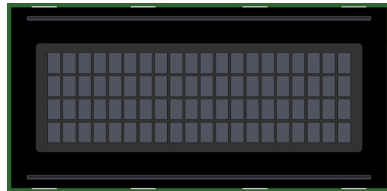
Power control board

The PCB is a specially designed printed circuit board that inputs the power from a COTS PC power supply and distributes the power to the internal electronic devices. Its firmware controls the startup and shutdown procedures of the DJFT.



LCD information panel

The LCD information panel is located on the rear of the main desktop in each station. The LCD gives feedback on the status of the DJFT including current power status, internal temperatures, and current power consumption.



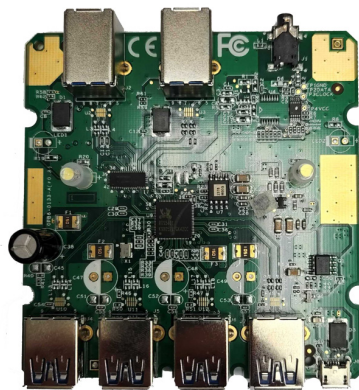
LED power button

The DJFT has two buttons located on the main desktop, the right button nearest the LCD panel, labeled PWR, is the single source power control button. This button has a circular LED light that gives feedback on the status of the DJFT.



USB KVM switch

The USB KVM switch is used to select the active machine. The keyboard and mouse will control the active machine. You can switch between machines by cycling through the KVM switch.



USB KVM button

This USB KVM button is mounted on the left side of the main desktop and is labeled KVM. Pressing the KVM button will cycle the active machine. After pressing the KVM switch, move the mouse to verify which machine is active.

In the IOS and RP the KVM switch only controls two machines and will switch back and forth between them.

There may be a non-responsive selection if less than four computer systems are configured in the DJFT OBS. The KVM will then cycle back to start with computer system 1.



Cable harnesses

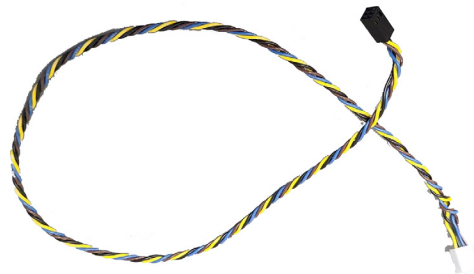
There are several proprietary cable harnesses in the DJFT. The five cables shown here are proprietary cables connecting the peripherals to the PCB. There are also several standard-type PC power cables connecting the PCB to the motherboards, GPUs, and hard drives. The PCB also supports connections for up to four devices that require 12V power and two devices that require USB 5V (power only, no data).



LED power button cable.



LCD information panel cable.



Motherboard switch control cable.



Internal thermistor and cable.



USB KVM switch button cable.

LCD feedback information

The LCD panel mounted to the main desktop provides feedback from the PCB. This feedback includes the current or next power sequence, internal temperatures, and power usage.

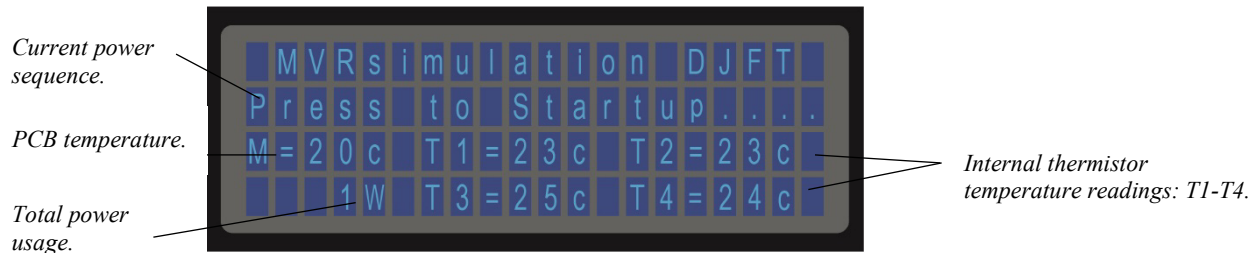
Understanding the LCD display messages

- Line 1 will display “MVRsimulation DJFT” during normal operating conditions. If an error occurs this line will update with critical system information.
- Line 2 shows the current power sequence, or the action required to cycle the next power sequence. In the event of an internal error, this line will update to give directions on how to remedy the error.
- Lines 3 and 4 reflect power consumption (in watts) and temperatures (in degrees Celsius) inside the case:

- M shows the temperature of the sensor physically located on the PCB.

- T1, T2, T3 and T4 provide the temperature of thermistors 1-4 located in the PC chassis. For more information about the thermistor locations, see “Maintaining the DJFT.”

- The lower left displays the current power usage in watts.



Power sequences

The single source power cycle controls the power sequences of the DJFT. This section will walk you through powering on, powering off, and resetting the DJFT stations. The same process is used for all stations.

Note: The momentary LED power switch has a special state to notify you if it is accidentally pressed. If you quickly press and release the button, the LED will flash white. The white LED flash signals that the button was pressed but did not execute any procedure. To activate the switch to cycle a power sequence, you need to press the button and hold it for a second, then release. The LED will light up a color as described below to identify the cycle in process.

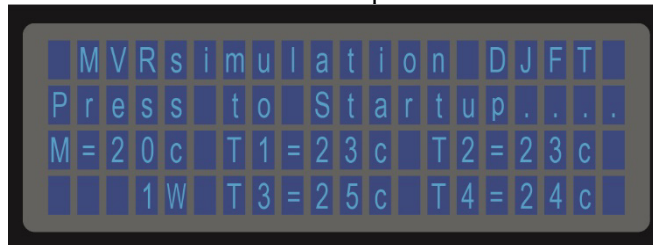
For the startup scripts to execute properly, the following conditions must be met:

- All network cables are connected correctly before a station is powered up.
- The IOS must be powered up before starting any other station. The OBS and RP are networked to the IOS during startup. Failing to start the IOS before the OBS and RP will result in broken network drive connections.

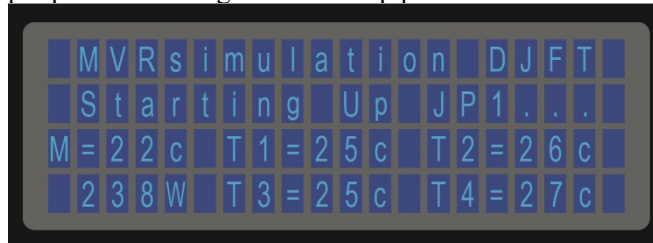
Steps to power up a station

To power up a station:

1. Press and hold the LED button for one second. This wakes up the PCB and puts it in an idle state. The LED will illuminate solid green and begin providing feedback about the status of the station on the LCD panel.

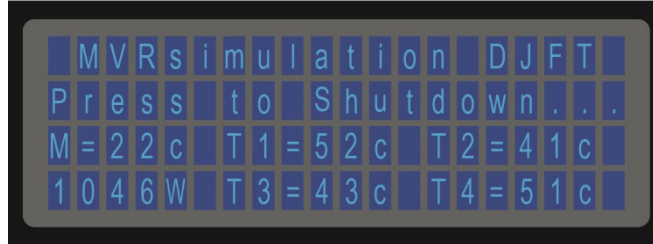


2. Press and hold the LED power button for one second to initiate the startup sequence. The LED will flash green during the power-up sequence. The computers, monitors, and peripherals will begin their startup process.



3. Once the PCB has completed its startup sequence, the LED power button will glow a solid blue, and the LCD will provide feedback stating "Press to Shutdown..." The PCB

may reach this state before all the computers, monitors, and peripherals fully power on.



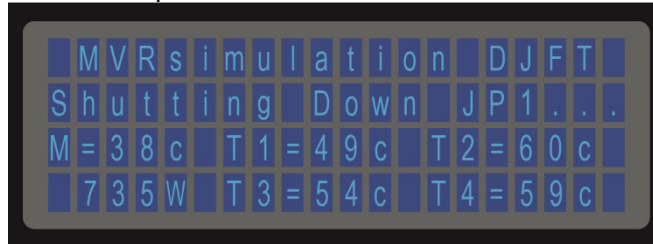
4. Wait until the startup scripts have finished executing before proceeding with the scenario setup. The Windows Command screen will disappear once the startup scripts are complete.

Steps to power down a station

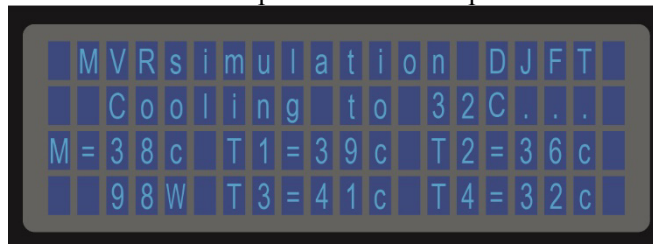
The shut down sequence sends a signal to the motherboards to start a soft shutdown. This shutdown is the equivalent of pressing and holding the power button on a standard desktop Windows PC. The operating system will go through its normal shutdown procedures.

To power off a station:

1. Press and hold the LED power button for one second. This will execute the PCB's shutdown sequence.

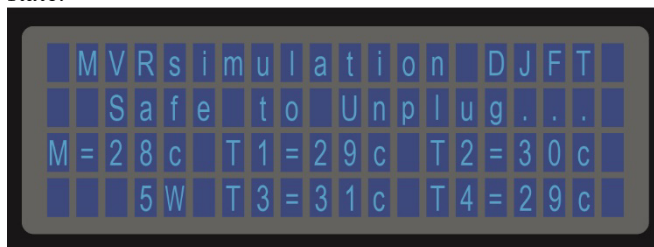


2. Once the PCB has completed the shutdown sequence, it will enter a cooling state. The fans will continue to operate until all temperature sensors fall below 32° Celsius.



3. Leave the station plugged in and open until all temperature sensors fall below 32° Celsius. The LCD will briefly state "Safe to Unplug..." before the PCB goes into a sleep

state.



The LED button and LCD panel turn off indicating it is safe to unplug the station.

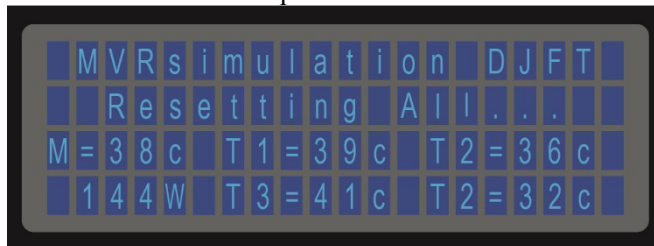
Forcing a Reset All cycle

A Reset All cycle disconnects the power from all machines and devices in the station. Reset All is effectively unplugging everything in the system and plugging it back in. The PCB will go into sleep mode.

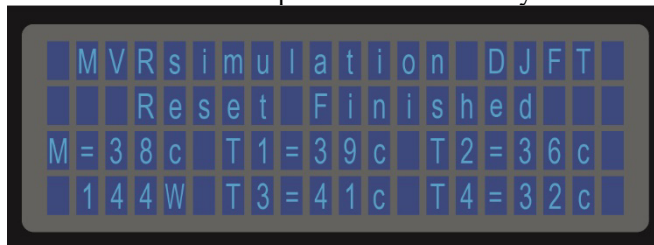
MVRsimulation recommends that you use Restart on the Windows Start Menu if you need to restart an individual machine. However, there may be times when a complete station restart is needed. A Reset All cycle will set the PCB back to its original power state. This feature is used when a hard-boot reset is needed on one or more of the machines. A Reset All is automatically performed when a station is first plugged in and when the shutdown cycle is complete.

To execute a Reset All:

1. Press and hold the LED power button for 5 seconds. This initiates the Reset All cycle.



2. When the PCB had completed the Reset All cycle it will briefly display "Reset Finished."



The LED button and LCD panel turn off indicating the Reset All is complete. Continue with powering on the station, unplugging the station, or letting the station remain in the current sleep mode.

CHAPTER 3

Using the Varjo XR-3 with the DJFT

To operate the DJFT Observer Station (OBS) you must be familiar with MVRsimulation's VRSG, the VarjoHMD.dll plugin that is delivered with VRSG, Varjo Base, and SteamVR.

This chapter describes the process of launching VRSG with the VarjoHMD.dll plugin, setting up the mixed-reality environment with the Varjo XR-3 head mounted display (HMD), and troubleshooting common issues. For more information about integrating HMDs with VRSG, see the chapter "Using VRSG With VR Systems, Trackers, and Simulated Military Devices" in the MVRsimulation *Virtual Reality Scene Generator (VRSG) User's Guide*.



MVRsimulation's DJFT Observer Station trainee looking through the Varjo XR-3 headset at the VRSG scene displayed in the emulated SOFLAM. The main screen shows the view inside the emulated SOFLAM.

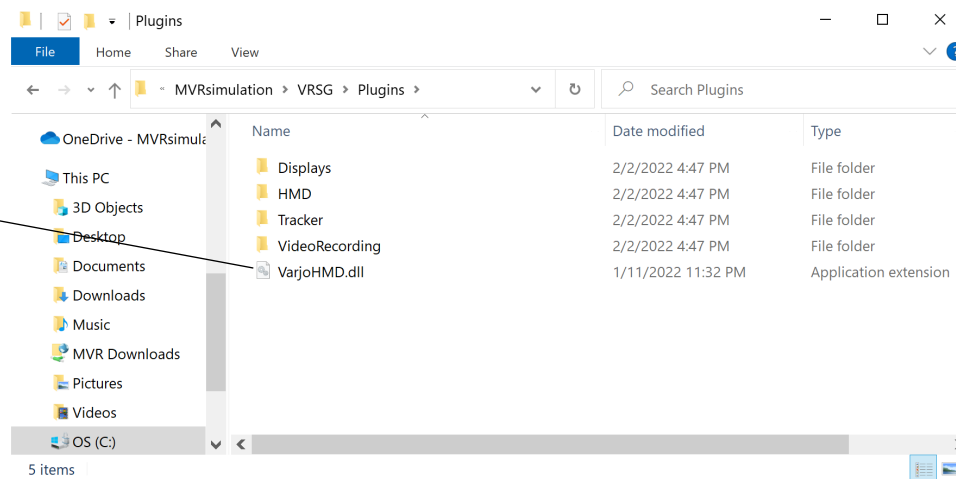
Loading the Varjo plugin

Use of the Varjo XR-3 mixed-reality HMD with VRSG relies on the VarjoHMD.dll plugin, which is installed with VRSG and delivered with the DJFT. Verify the VarjoHMD.dll plugin is present in the \MVRsimulation\VRSG\Plugins directory before starting VRSG.

To use the XR-3 with VRSG:

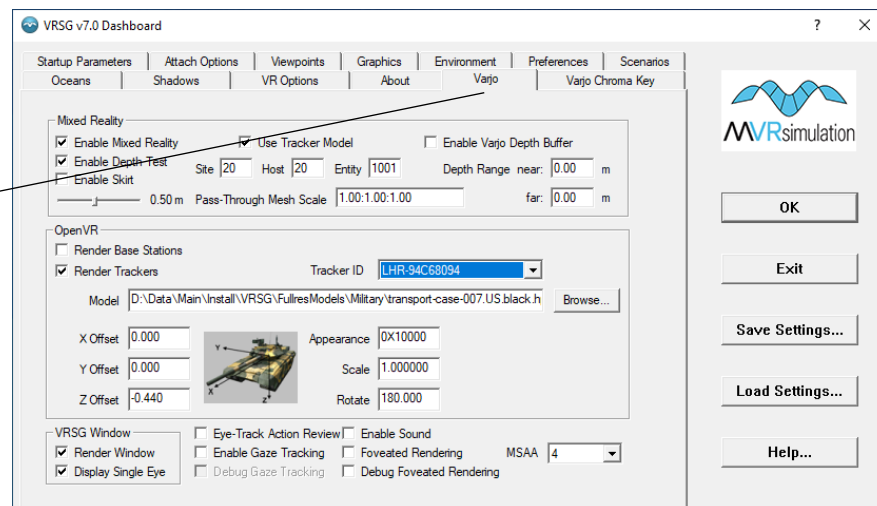
1. During the installation of VRSG the VarjoHMD.dll plugin is installed in the \MVRsimulation\VRSG\Plugins\HMD directory. Copy VarjoHMD.dll and paste it in the root plugin directory, \MVRsimulation\VRSG\Plugins. *Note: Do not move the .dll, simply copy and paste it to the \MVRsimulation\VRSG\Plugins directory.*

VarjoHMD.dll
installed in the
Plugins
directory.



2. Next, launch VRSG and verify the Varjo tab is visible in the VRSG Dashboard.

Varjo tab in
the VRSG
Dashboard.



Setting up the DJFT mixed-reality environment

The OBS must have the Varjo XR-3 and the three Vive Trackers connected and powered. The two Steam Base Stations must also be mounted properly and connected to power.

The base stations use a multi-axis infrared laser emitter to sweep the simulation room with multiple sync pulses and laser lines. By registering the timings between pulses and sweeps, SteamVR uses simple trigonometry to locate each sensor within a fraction of a millimeter. The Base Stations have no data transmitters and are only connected to a 12V power source. The Vive Trackers and Varjo XR-3 calculate their position in the simulation environment based on the infrared signals emitted by the base stations.

Setting up the base stations

The base stations are stored in a compartment below the audio headset in the OBS. *Note:* Both base stations must be mounted and powered during the entire training.

A third base station, typically stored in the IOS case, is required to complete full 360-degree immersion with the XR-3. Without the third base station, the XR-3 may experience momentary tracking loss when turning past 180-degrees. Place the third base station behind the student.

To setup the base stations:

1. Open the Observer Station.
2. Extend the telescoping poles on both sides of the lid and secure them.
3. Open the right desktop.
4. Remove the radio headset from its storage compartment.
5. Lift the foam tray at the bottom of that compartment.
6. Remove the base stations from the bottom compartment, and then replace the foam tray.
7. Screw the two base stations to the threaded mount on top of the two poles.
8. Connect the power cable from each pole to the back of its corresponding base station.
9. Position the base stations such that they point toward the trainee and are slanted down approximately 45°. A precise orientation is not required.
10. Continue setting up the OBS peripheral accessories.
11. Once the station is physically set up, start the power up sequence.
12. When the PCB has completed the power up sequence, verify both base stations have an illuminated LED indicating they are powered on.

Setting up the Vive Trackers

The OBS has two Vive Trackers mounted to the desktop panels and one that is mounted on the emulated Laser Target Designator (LTD), either a SOFLAM or Type 163 device. The two desktop trackers are used to set the location of the polygon pass-through mesh of the OBS case in the virtual world. The polygon pass-through mesh of the 3D aluminum case model is what lets the trainee interact with the real-world devices. The LTD tracker places the virtual LTD in the virtual world so the trainee can directly interact with it in the real-world.

Note: Only one desktop tracker is required to run the OBS. Two trackers are included on the desktop for redundancy, in the event that one of the trackers is covered by the trainee or fails. Always keep the trackers uncovered and in line-of-sight of the base stations during training.

After starting the OBS, verify the trackers are connected to the USB Type-C cable and you can see the status light. The trackers have a status light near the center triangle button.

Vive Tracker status lights:

- Green – normal mode.
- White – fully charged and off.
- Blue, blinking – pairing with headset.
- Blue – connecting with headset.
- Red, blinking – low battery.
- Orange – charging.

The tracker's status light will blink blue during start up and pairing. During a training session in the DJFT you should verify that the trackers' status lights are green to indicate they are on and connected. If you notice a Vive Tracker's status light turn white, press and hold the center button on the tracker for a few seconds to wake it up. Because the trackers in the OBS are directly connected to the computer, they should always stay charged. You should not see red or orange status lights.

Setting up the Varjo XR-3

The Varjo XR-3 is ready to use once you remove it from the storage area. During setup you need to be aware of the virtual environment and the real-world operating space to properly handle the cables of the XR-3.

To setup the HMD:

1. Open the right desktop and remove the XR-3 from its storage bin.
2. Remove the length of cable you need and place it out the right side of the case. The length of cable needed will depend on the amount of movement anticipated by the trainee during training. MVRsimulation recommends that you use the minimum amount of cable length to complete the exercise to minimize excess cable and reduce tripping hazards.
3. Once the cable is situated, close the right desktop.

Note: Be aware of the cables on both sides of the right desktop. *Do not* pinch any cables when you secure the desktop panel.

Boresighting the XR-3

Once the OBS powered up and VRSG is running, you need to put on the XR-3 and boresight the HMD. Boresighting aligns the MIL-HUD, the height of the trainee, and the forward direction of the HMD.

To boresight the XR-3:

1. Using the KVM switch button, set the desktop keyboard to the OBS-OTW machine (the removable monitor that shows Varjo Base).
2. Put on the headset and complete the eye-track calibration.

3. Verify the case polygon pass-through for the 3D case model and the SOFLAM virtual model are correctly aligned with the real-world objects. If the pass-through mesh and SOFLAM are not aligned correctly, see the “Troubleshooting” section later in this chapter for help correcting alignment.
4. Locate the F7 key on the keyboard.
5. Point the HMD in the direction of the monitors in the OBS case and lean slightly into the case. Leaning into the case during boresighting helps with the alignment of the IZLID.
6. Press the F7 key to boresight.
7. The reticule should now be aligned in the center of the trainee’s view and move as their head moves.
8. If the reticule does not line up as expected, repeat these steps.
9. The HMD is setup and ready to use in a training scenario. Move to MACE to control the mission and begin training.

Note: If you have any alignment issues, you must complete the Room Setup in SteamVR before boresighting. For information about Room Setup, see the “Using SteamVR for room setup” section later in this chapter.

Runtime controls in VRSG

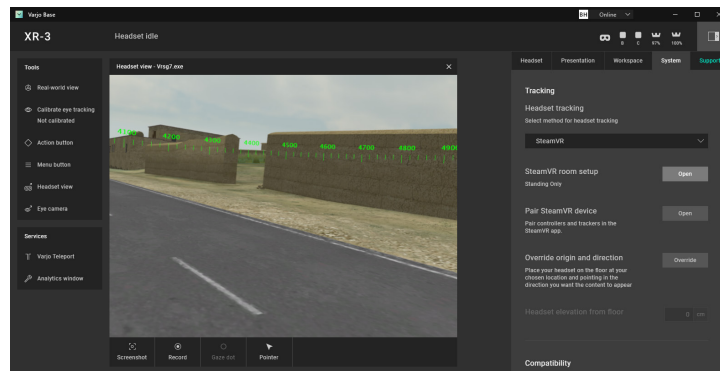
VRSG uses keyboard shortcuts to control various aspects of the simulation. For a list of common keyboard shortcuts see the “VRSG Keyboard Functions” appendix of the MVRsimulation *Virtual Reality Scene Generator (VRSG) User’s Guide*.

Here is a list of VRSG keyboard shortcuts that are specific to the Varjo HMDs:

- F5 – Switch between Varjo HMD and Desktop Rendering: This feature enables you to interact with VRSG on the removable monitor without the HMD, similar to a desktop training system. There should be no need to use this with the OBS since trainees use the XR-3 for training. However, if the F5 key is accidentally pressed, the HMD will stop working until the operator presses F5 again.
- F7 – Boresight: The XR-3 should be boresighted when the station is powered up. Boresight aligns the forward-looking direction of the HMD and the MIL-HUD. This is necessary to align the HUD, height of the operator, and forward direction of the HMD. For more information, see the “Boresighting the HMD” section of this chapter.
- F8 – Switch between Vive Trackers: The OBS uses two trackers to track the orientation of the physical case in the virtual world. Only one tracker is used at a time to track the case. The second tracker is for redundancy in the event that one of the trackers is covered by a trainee or fails. Use the F8 key to specify which tracker is the primary tracker.

Using Varjo Base

Varjo Base is the software used to control the Varjo XR-3. In Varjo Base, you can evaluate what the headset viewer is seeing, access settings, and get feedback on the status of the mixed-reality devices in the OBS.

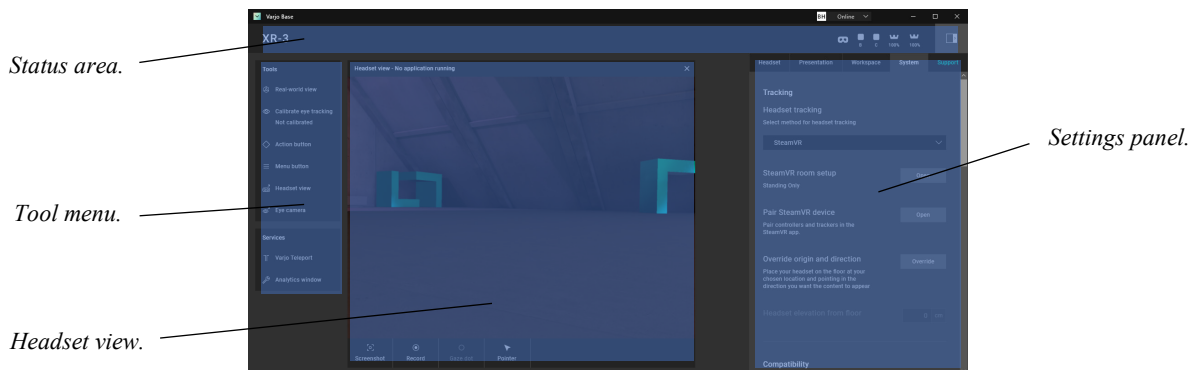


Real-time screen capture of Varjo Base running on the Observer Station.

Configuring Varjo Base

Varjo Base has four main sections:

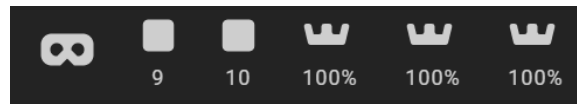
- **Status area:** Shows what devices are installed, their battery level and current status. If a device becomes inactive it will be greyed out in the status area.
- **Tools menu:** Enables you to access the built-in tools for the XR-3.
- **Headset view:** Used for interacting with the view displayed in the XR-3.
 - *Screenshot* will take a screenshot of the view in focus.
 - *Record* will capture a video file and save it locally in the video folder specified in Varjo Base.
 - *Gaze dot* displays the user's eye tracking in the headset view. This feature is only available when eye tracking is calibrated.
 - *Pointer* will turn the mouse cursor into a pointer that is seen in the XR-3.
- **Settings panel:** Controls settings for the XR-3 such as presentation, headset, and system settings. Use the *System* tab to access SteamVR for positional tracking setup.



Varjo Base window.

The DJFT has an HMD, two base stations, and three trackers. An optional third base station for 360-degree training is also included and stored in the IOS. To experience the full benefit of training in a mixed-reality environment, verify that all components are turned on and connected in the Varjo Base window. The connected components will be shown as a solid white icon. Icons for a component that is connected but is inactive will be greyed out. A

device that is not connected will be missing from the window or shown only with an outlined icon.



Varjo Base showing one HMD, two base stations, and three trackers, respectively.

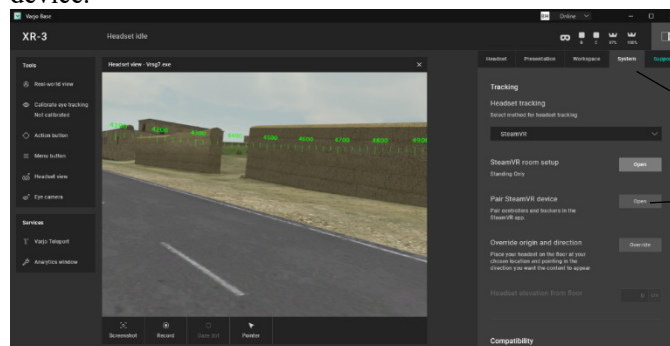
If the correct number of devices are not detected and active, use SteamVR to activate the device. See the “Using SteamVR to pair a device” section for more information on connecting devices.

Using SteamVR to pair a device

SteamVR is a software tool for supporting virtual- and mixed-reality content. SteamVR can work with multiple HMDs. The DJFT uses the Varjo XR-3 and SteamVR to provide the spatial awareness needed for mixed-reality.

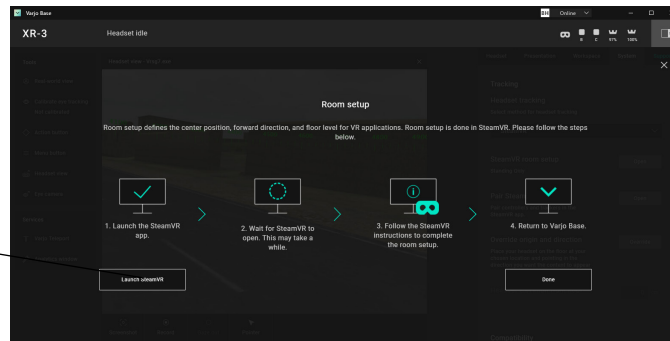
To pair a Vive Tracker in SteamVR:

1. Select the System tab in Varjo Base and click the Open button next to Pair SteamVR device.

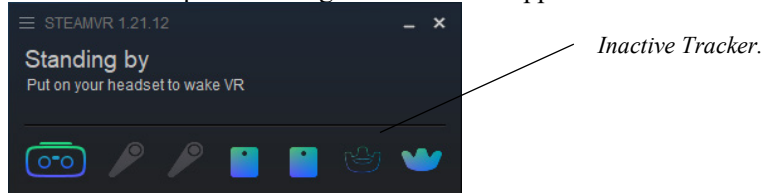


2. Click Launch SteamVR.

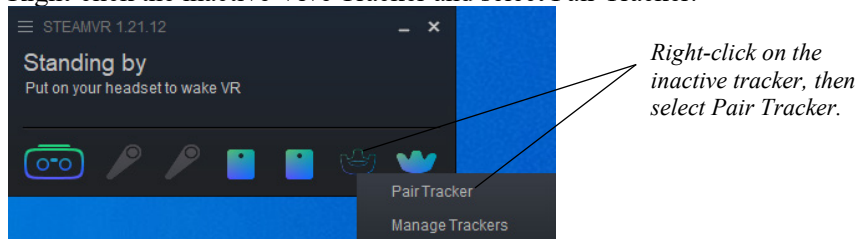
Click Launch SteamVR.



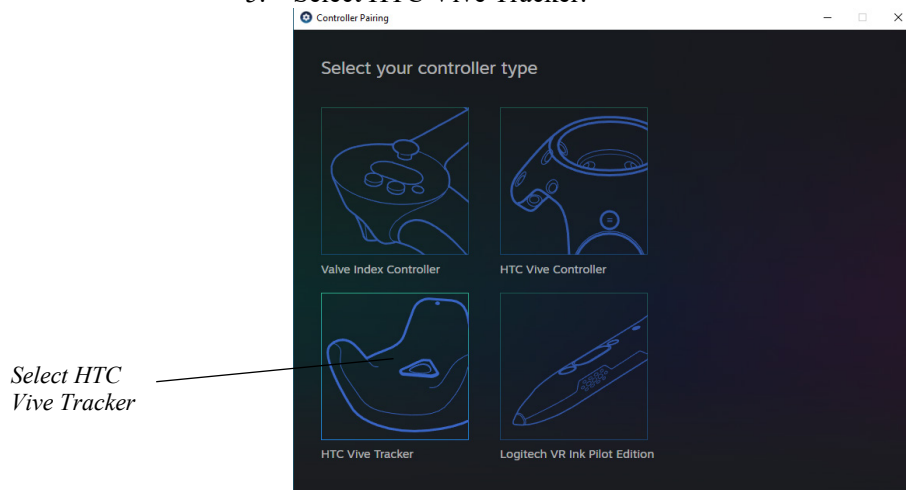
3. SteamVR indicates the inactive Vive Tracker with an outline icon of the tracker. The device must be paired through the SteamVR application for it to be used in the OBS.



4. Right-click the inactive Vive Tracker and select Pair Tracker.

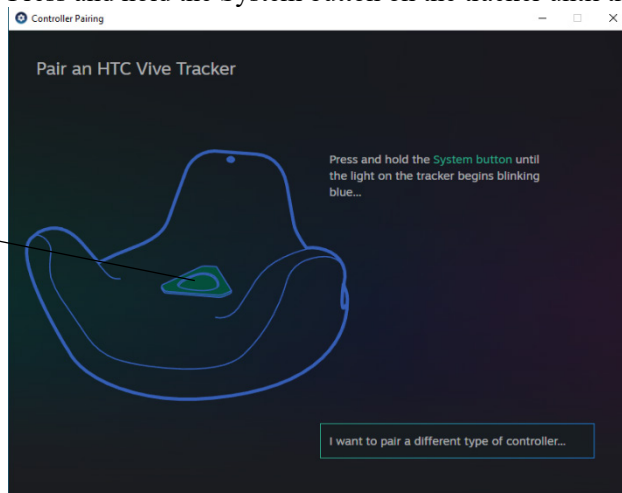


5. Select HTC Vive Tracker.

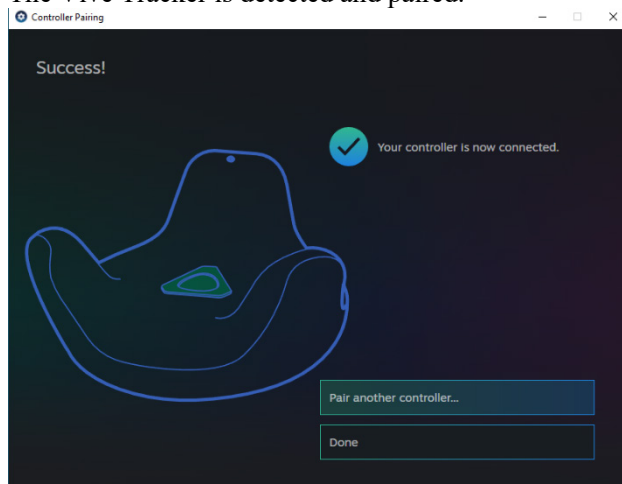


6. Press and hold the System button on the tracker until the status light starts blinking blue.

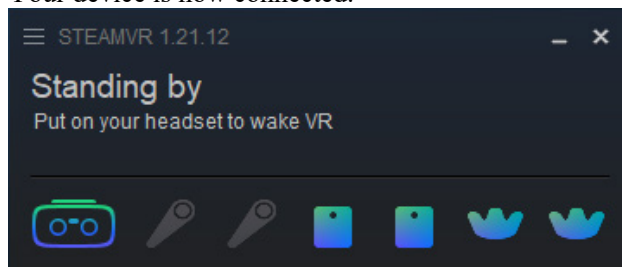
System button



The Vive Tracker is detected and paired.



Your device is now connected.



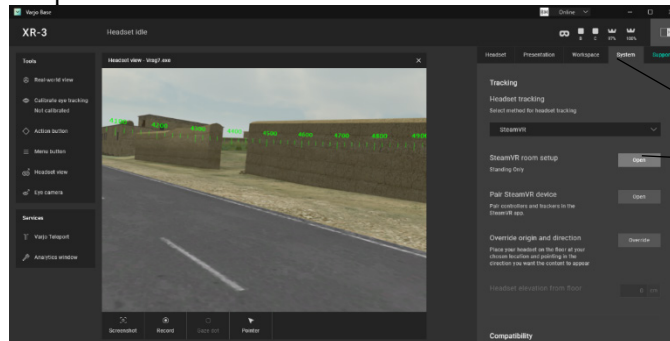
Note: The DJFT does not use virtual reality controllers. It is normal for the controller icons to be displayed greyed out in the SteamVR window to indicate no controllers are connected.

Using SteamVR for room setup

SteamVR is used for spatial awareness of the XR-3 while in use in the DJFT. The Room Setup tool will guide you through how to setup the simulation area.

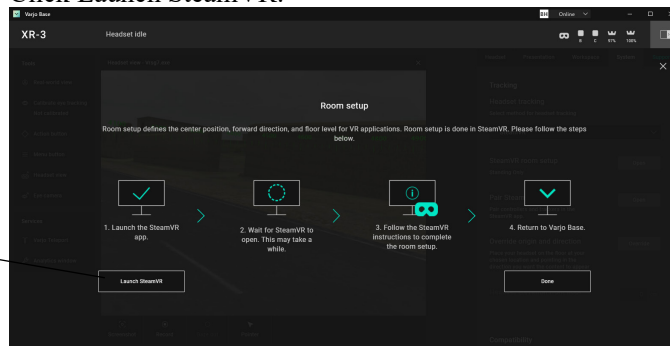
Note: If the base stations are moved after completing Room Setup, you may need to re-calibrate the room setup if you experience anomalies in the simulation environment.

1. Select the System tab in Varjo Base and click the Open button next to SteamVR room setup.



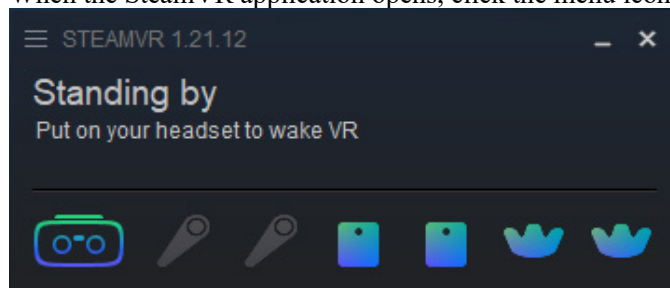
2. Click Launch SteamVR.

Click Launch SteamVR.



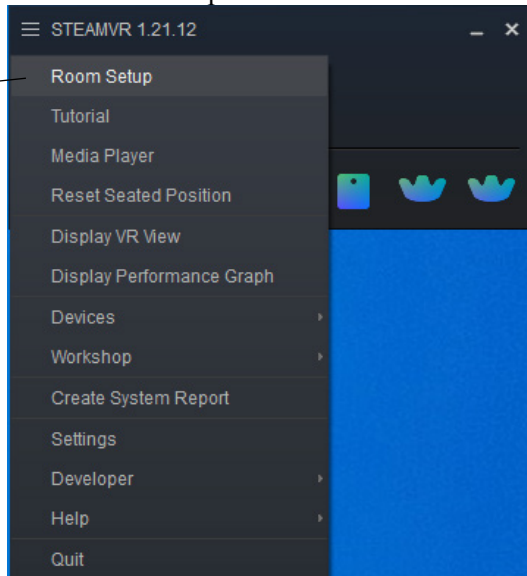
3. When the SteamVR application opens, click the menu icon (≡).

Click the menu to display the options.

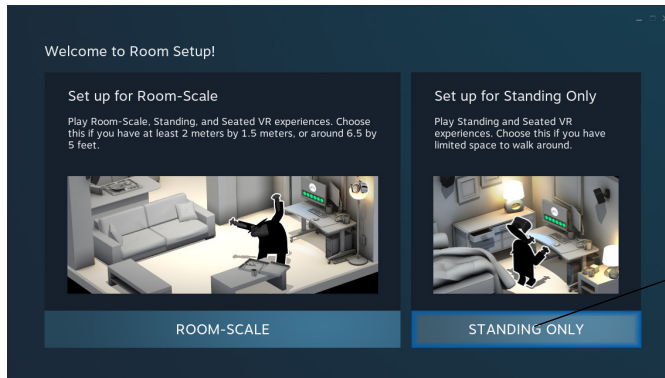


4. Select Room Setup.

Select Room Setup.



5. Click the STANDING ONLY button and follow the on-screen prompts.



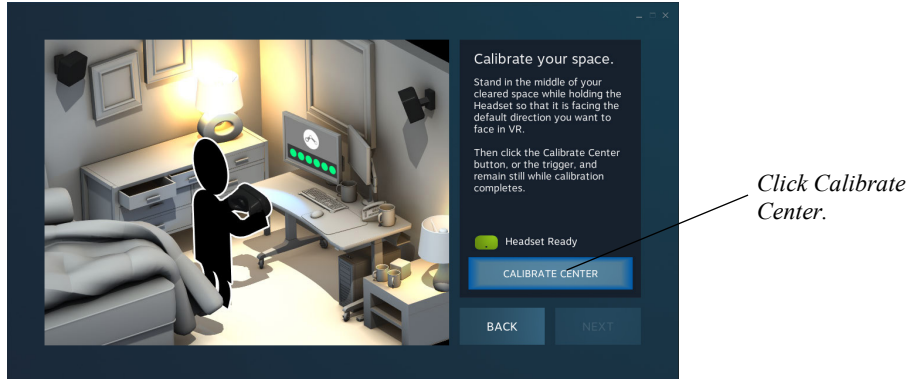
Click Standing Only.

6. Click NEXT.

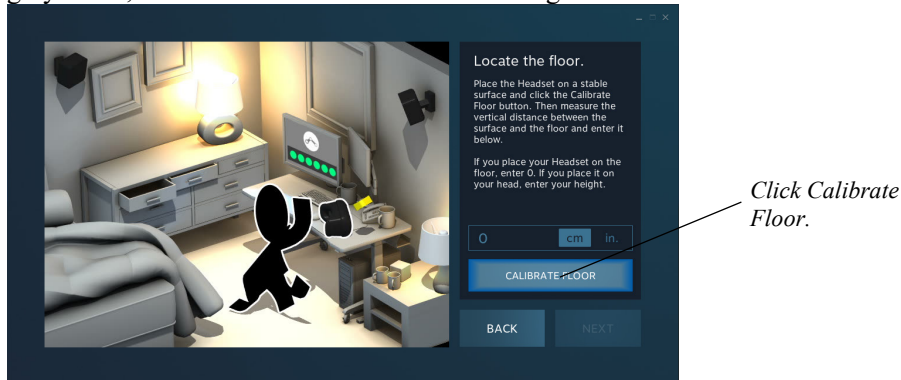


Select Next.

7. Point the Varjo XR-3 at the DJFT screens where the trainee will be standing and click CALIBRATE CENTER.



8. Place the Varjo XR-3 on the floor and click CALIBRATE FLOOR. Verify the XR-3 is in view of the base stations. If the CALIBRATE FLOOR button is greyed out, it means the XR-3 has lost line-of-sight to the base stations.



9. Room Setup calibration is complete. Verify the view inside the HMD is oriented correctly. The real-world and virtual models should be aligned.

Note: You will need to boresight the HMD after completing a Room Setup calibration. For more information about boresighting, see the section “Boresighting the HMD” earlier in this chapter.

Configuring the Vive Trackers

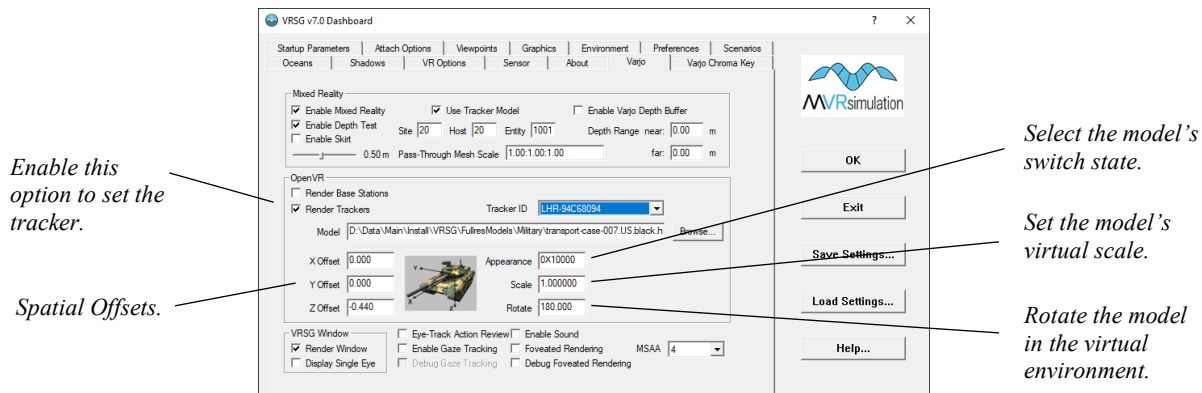
This section gives an overview of the ViveTrackerConfig.ini initialization file. This initialization file governs the location and settings of the trackers on the virtual model in VRSG. The .ini file is located in the \MVRsimulation\VRSG directory.

The OBS has two Vive Trackers mounted on the desktop, in the front corners of the OBS case closest to the trainee. These trackers locate the pass-through polygon mesh of the virtual case in the same reference frame as the XR-3. The pass-through polygon mesh is what allows the trainee to see the real-world inside the OBS case.

The third Vive Tracker should be mounted to the emulated LTD during setup of the OBS. Verify the third tracker is mounted to the LTD. The third Vive Tracker is used to orient the virtual model of the SOFLAM in the virtual world to coordinate with the real-world LTD.

This third tracker setup enables the trainee to see the virtual LTD in the XR-3 coordinated with the real LTD's location. The USB Type-C cable labeled "LTDTRK" must be connected to the tracker. Verify the tracker is on and paired correctly.

Use the settings on the Varjo tab on the VRSG Dashboard to configure the trackers. In the OpenVR section, select the Render Trackers checkbox to set the tracker parameters. In the Tracker ID drop-down, select the tracker you want to initialize. You can set which VRSG model is associated with the selected tracker in the Model field; click Browse to browse to the location of the model. Finally, set the spatial offsets, switch state, scale, and rotation. The changes you make in the Varjo tab in the Dashboard during a VRSG session will be saved in the ViveTrackerConfig.ini configuration file when you exit.



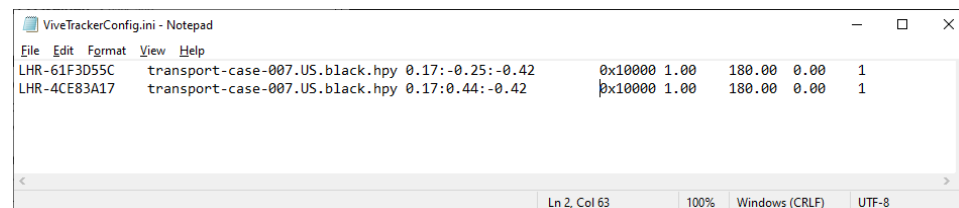
Note: After the first initialization or after making any updates to the configuration exit VRSG to save the changes to the ViveTrackerConfig.ini file. Then, copy the updated config file from \MVRsimulation\VRSG\ to \MVRsimulation\VRSG\Plugins\HMD. This file will serve as a backup in the event a Vive Tracker is lost by SteamVR. **Note:** Do not move the ViveTrackerConfig.ini file, simply copy and paste it.

Manually editing the ViveTrackerConfig.ini file

The ViveTrackerConfig.ini file can also be edited manually with a text editor like Notepad. For most cases, you should use the Varjo tab in the VRSG Dashboard for initial configurations. Manually editing the initialization file is useful in the event a tracker has lost communication with SteamVR. Copy the backup ViveTrackerConfig.ini file you created in the previous section from \MVRsimulation\VRSG\Plugins\HMD to \MVRsimulation\VRSG. This resets all the configurations in VRSG to their previous settings before the tracker lost communication.

Field descriptions of the ViveTrackerConfig.ini file

The following is an example of a ViveTrackerConfig.ini file.



Next is a description of each parameter in an entry in the ViveTrackerConfig.ini file, denoted by column number.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|--------------|---------------------------------|------------------|--------|------|--------|------|---|
| LHR-61F3D55C | Transport-case-007.US.black.hpy | 0.17:-0.25:-0.42 | 0x1000 | 1.00 | 180.00 | 0.00 | 1 |
| LHR-4CE83A17 | Transport-case-007.US.black.hpy | 0.17:0.44:-0.42 | 0x1000 | 1.00 | 180.00 | 0.00 | 1 |

1. Vive Tracker ID.
2. VRSG model associated with the tracker.
3. X:Y:Z positional offset: VRSG uses this offset to place the virtual models relative to the tracker.
4. Switch state: the value used when rendering the model (in the above example, value 0x1000 opens the transport-case model).
5. Model scale.
6. Rotational offset.
7. Pitch offset.
8. Tracker sharing: Indicates whether the tracker is sharing the model with another tracker in the .ini file (1: shared | 0: not shared). In the above example, both trackers are being used to track the transport-case-007.US.black.hpy model.

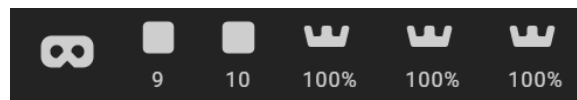
Troubleshooting

The DJFT mixed-reality environment requires the XR-3 HMD, two Steam base stations, three Vive Trackers, SteamVR, and Varjo Base all to be working correctly together to properly display the real world inset in the virtual world. This section covers common issues that may occur and how to resolve them.

Verify all devices are connected properly

If you experience an anomaly in the mixed-reality environment, first verify all devices are connected and paired properly. The OBS is delivered with one HMD, two base stations and three trackers. An optional third base station is located in the IOS storage compartment.

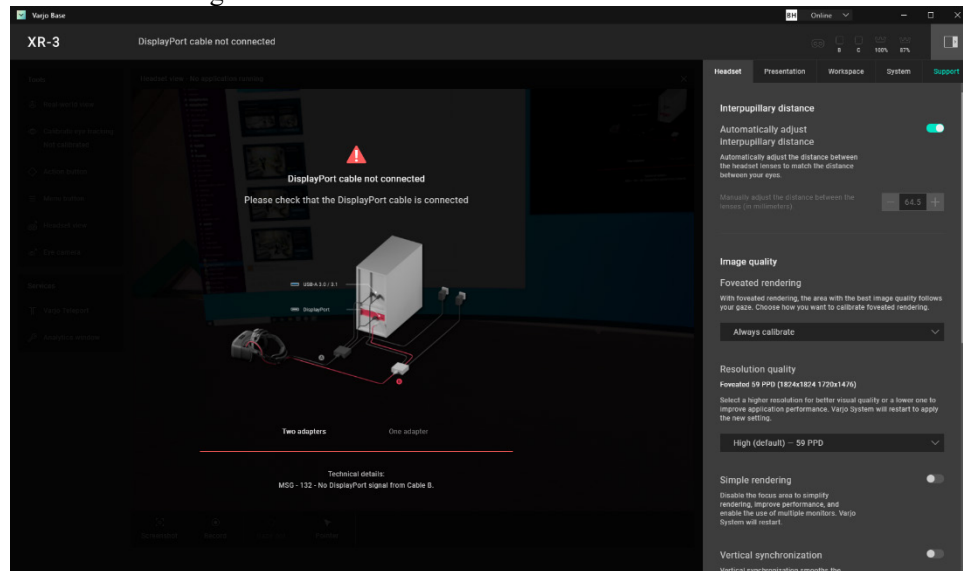
The status area in Varjo Base shows the status of all the devices that are connected. If the devices are not detected and operational, shut down VRSG and start troubleshooting the hardware.



Status area of Varjo Base, showing that all devices are properly connected.

The following list describes common issues and how to resolve them:

- A greyed out or wireframe device shown in the Varjo Base status area means the device is not paired correctly. For more information on pairing a device, see the section “Using SteamVR to pair a device.”
- If the XR-3 does not appear in the status area, verify the XR-3 is properly connected to the two USB Type-C cables on the top of the HMD, that the two cables are tightly connected into their power brick, and the two HDMI and two USB cables are connected directly to HDMI ports and USB 3.1 ports on the OBS-OTW machine.
 - If one of the cables has become disconnected, Varjo Base will typically provide a schematic showing the troublesome cable.



- If a base station is not registering, verify that the base station is on and properly connected to power. An LED visible on the face of the base station verifies the base station is on and powered.
 - If the base station is on, verify it is aligned in a manner that it can be seen by the front of the HMD and the trackers.
 - If the LED is off, make sure the power cord is connected and tight in the back of the base station.
 - If the LED is off and the power cord is tight in the back of the base station you will need to open the left desktop and verify the power cord is connected to the PCB located in the PC chassis. For more information on connecting the power cord to the PCB, see the chapter “Maintaining the DJFT.”
- If a Vive Tracker connected to the system is not showing up as solid or wireframe in SteamVR, see the section “Using SteamVR to pair a device.”
 - Verify the USB Type-C end of the cable is connected to the Vive Tracker.
 - Verify the USB Type-A end of the cable is connected to the OBS-OTW machine.
 - You will need to set up the ViveTrackerConfig.ini once the tracker is connected and paired. You can do this on the Varjo tab in the VRSG Dashboard or by copying a backup ViveTrackerConfig.ini file and pasting it in the \MVRsimulation\VRSG folder. For more information, see the section “Configuring the Vive Trackers.”

Virtual models of real-world devices are misaligned

The most common reason the virtual models of real-world devices become misaligned is because of a change in the base station locations. If a base station is moved, you will likely need to run a Room Setup from SteamVR to align all the devices properly in the virtual space.

If this misalignment occurs, you may experience the OBS case pass-through polygon mesh shift several degrees away from the real-world case. The virtual model can shift in any direction around an X, Y, or Z axis because the base stations can rotate in all three directions.

Note: While wearing the HMD, you can rotate the Vive Trackers on the desktop to make slight adjustments to the alignment of the virtual case and the real case. Use F8 to switch between the two trackers and verify the alignments are correct.

Try these steps to re-align virtual models with the real-world devices:

1. Verify the base stations are mounted securely and do not move freely.
2. Verify all trackers are uncovered and in the field of view of both Base Stations.
3. Follow the steps described in the section “Using SteamVR for room setup.”
4. Restart Varjo Base and VRSG.
5. Unplug the base stations by removing the power cord from the back. Plug them back in. Follow the steps described in the section “Using SteamVR for room setup.”
6. Restart the OBS:
 1. MVRsimulation recommends transferring the MACE entity back to the IOS before powering down the OBS. *Note:* Not transferring the entity back to the IOS will lose the MACE platform that the OBS was controlling. You will need to create a new entity or reload your mission on the IOS and complete the MACE-to-MACE transfers once the OBS is back online.
 2. Use the main power control button to power down the OBS.
 3. Wait for the OBS to shut down.
 4. Press the power button to wake up the OBS.
 5. Press the power button again to start the OBS.

HMD display is black, but everything else looks correct

VRSG has a feature that swaps rendering between the HMD display and the desktop monitor. This toggle is controlled in real-time using the F5 key. When you press the F5 key while you are wearing the HMD, VRSG will no longer render the view in the HMD display but render it instead on the monitor as it would in a desktop training environment. The view will be rendered on the monitor that is connected to the OBS-OTW machine, initially the removable monitor in the OBS. Press the F5 key again to toggle the render view back to the HMD.

HMD loses tracking when turning away 180° from the OBS

Due to the compact and transportable nature of the DJFT, the trainee might experience some loss of tracking for the virtual case and LTD when turning 180° away from the OBS. This loss of tracking is due to the limited height of the two base stations and both base stations

being located behind the trainee's head blocking the line of sight between the base stations and the HMD.

For some scenarios, this loss of tracking may not interfere with the goal of the training. If you need complete 360° movement of the HMD, MVRsimulation recommends that you mount and power the third base station. The third base station and external tripod are located in the IOS storage area. Mount the base station on the tripod and locate it behind where the trainee will stand. This base station must be plugged into an AC power source independent of the DJFT. Once the base station is powered on, SteamVR will recognize it and allow the HMD to turn 180° from the OBS without any loss in tracking.



Diagram showing approximate location of the third base station.

CHAPTER 4

Maintaining the DJFT

This chapter contains information about maintaining the DJFT, including hardware used, accessing the monitors and PC chassis, general information about the machines and the process for swapping the operating system and terrain server hard drives. The DJFT is designed to be quickly serviceable and modular for future updates. This chapter covers the DJFT as it was delivered by MVRsimulation. Any modifications made to the DJFT once you have taken receipt of the system need to be recorded locally and added as an appendix to this user's guide.

Hardware inside the DJFT

All the hardware in the DJFT should have a locking component, either a lock washer or lock nut. The locking component is required to keep the hardware securely attached during transportation and mitigate risk of failure due to vibration. You must take caution to account for all hardware that is removed and verify it is replaced appropriately. DO NOT leave any loose hardware inside one of the cases. Doing so may cause damage to the electronics inside the system.

The DJFT has two main types of screws: main mounting screws (10-32 thread) and PC chassis screws (M3 thread). A few exceptions to meet specific requirements in the system are noted in this section.

Main mounting screws

- 10-32 x 5/8" black anodized screws with flat and lock washers. Used to secure the lid stays, lid bezel, lid hinge screws, and telescoping poles. The same thread is used for the captive screws in the desktop panels.



- 10-32 press-in studs with a flat washer and a lock nut. Used in the lid bezel to secure the monitor mount brackets.



PC chassis screws

- Most of the PC Chassis screws are M3 x 10mm with a lock and retaining washer.
- M3 x 25mm screws are used to secure the fans to the fan housing.

Miscellaneous screws

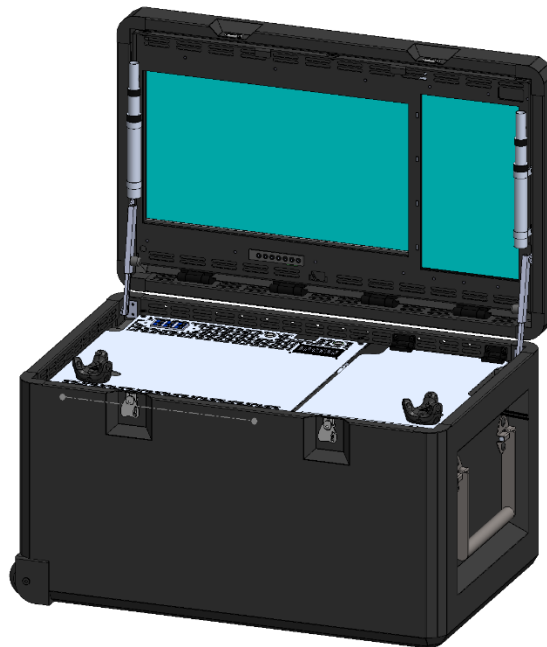
- 8-32 screws are used to secure the hinges on the right desktop.
- M2 screws are used to mount the LCD panel to the left desktop.
- 5-16 x 0.625" carriage bolts, aluminum washers with neoprene, and locking nuts are used to secure the case handles.
- 5-16 x 1.5" shoulder bolt, aluminum washers with neoprene, and locking nuts are used to mount the wheels to the case.
- 4-40 x .25" security screws are used to mount the lid latches.

Servicing the lid-mounted monitors

The two touchscreen monitors located in the lid are mounted to a single lid bezel. The DJFT trainee will not access the lid monitors during operation. The only reason you need to open the lid bezel is for servicing. MVRsimulation recommends having two people available to assist in servicing the lid bezel.

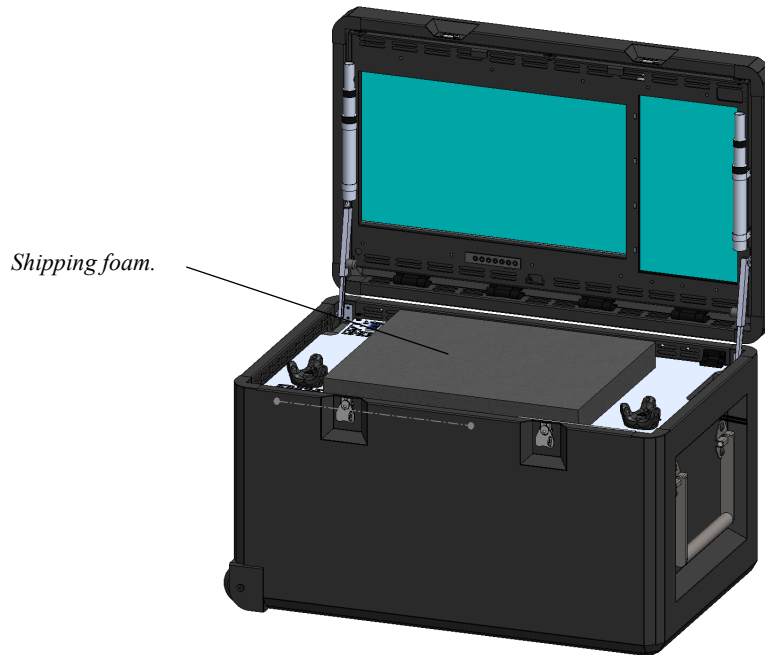
To open the lid bezel:

1. Place the DJFT case on a solid surface with the rear of the case near a wall.
2. Open the lid and fully engage the locking lid-stays. You will hear a click and the grey handle will engage when the lid-stay is secured. The lid-stays will hold the lid at a 90° angle.

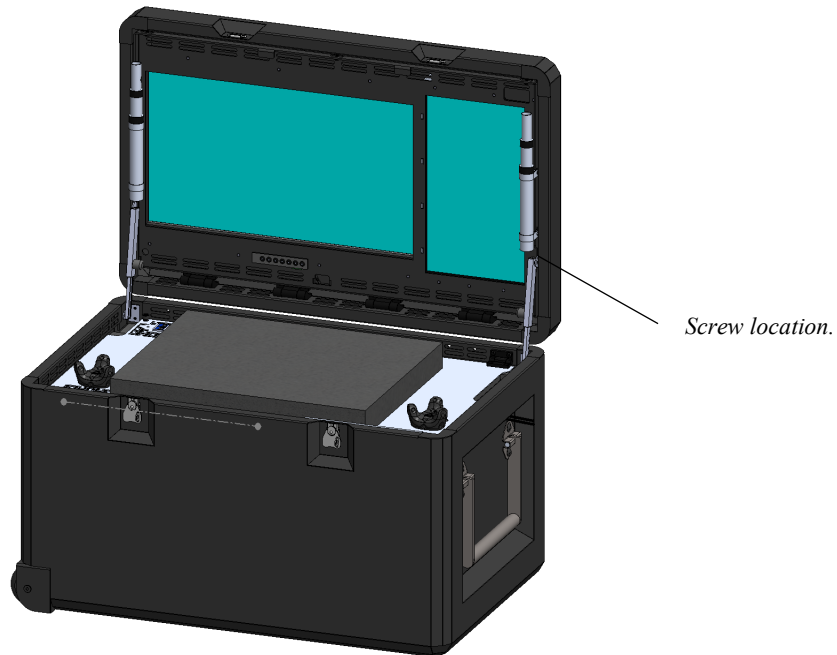


3. Move the case back toward the wall so that the lid is 1-2 inches from the wall.

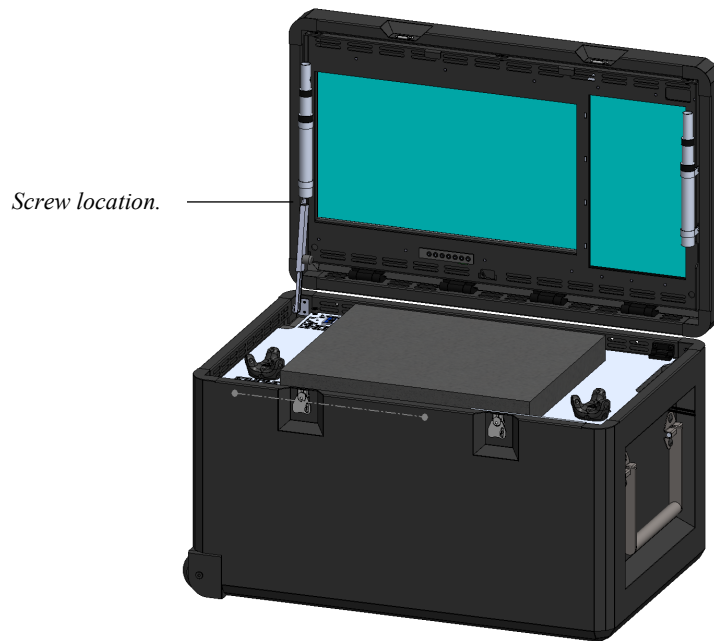
4. Place the shipping foam on the desktop for protection.



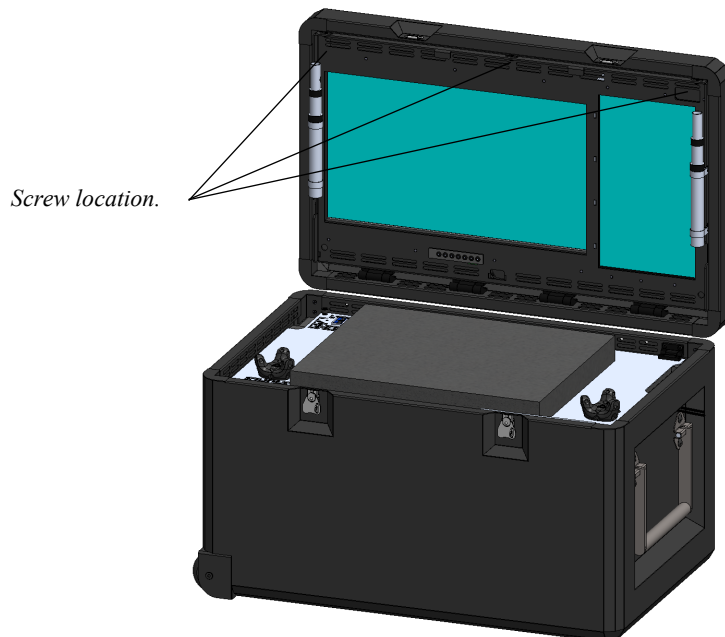
5. Remove the top two screws securing the locking lid-stays from the right side. Lay the lid-stay down on the desktop.



6. With the assistance of a second person, remove the top two screws securing the locking lid-stays from the left side. Lay the lid-stay down on the desktop and let the lid rest on the wall behind the case. Once the left lid-stay is removed, the lid will open and close freely. Prop the lid against the wall. Alternatively, you can place a box under the lid to support it in a fully open position.



7. Remove the three screws at the top of the lid bezel.



8. The lid bezel is supported by friction hinges. Carefully pull the lid bezel out of the lid and rotate the lid bezel down to the desktop. The lid will be held up by the friction hinges once the lid bezel is laying on the desktop.



9. You can now access the monitors for servicing.

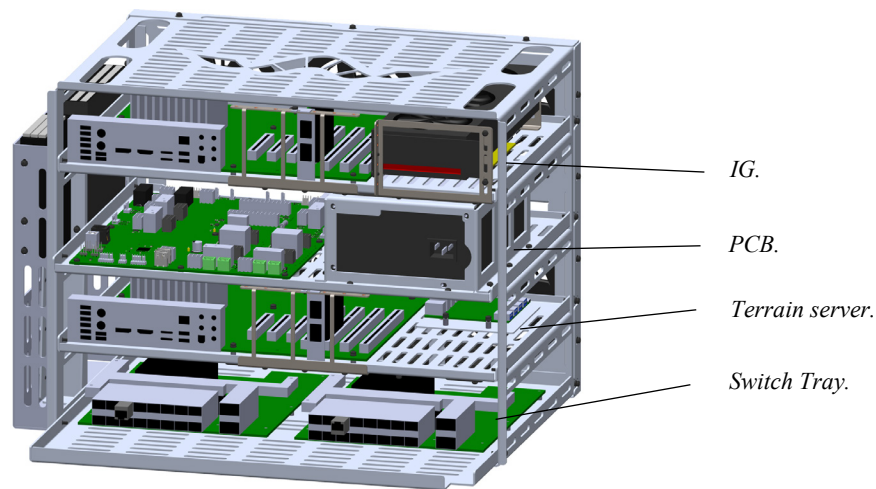
To close the lid bezel, you must make sure all cables are tightly secured to the mounting brackets. Then follow the steps in reverse order. *Note:* When raising the lid bezel into the lid, verify there are no cables that can get pinch on the sides; specifically the USB cable originating from the lower left side of the 23" monitor.

The PC chassis

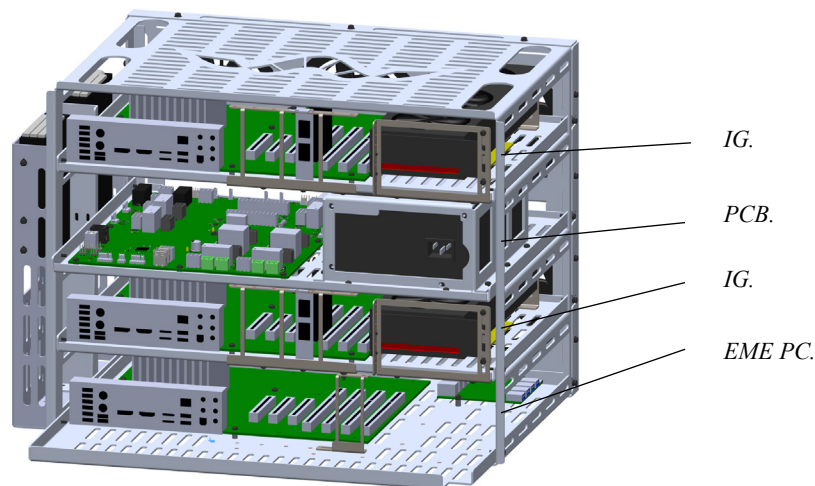
The PC chassis is located under the left desktop panel. The PC chassis contains all the computing power of the DJFT. Each case has a unique chassis corresponding to the electronics needed to run the DJFT.

PC chassis configurations

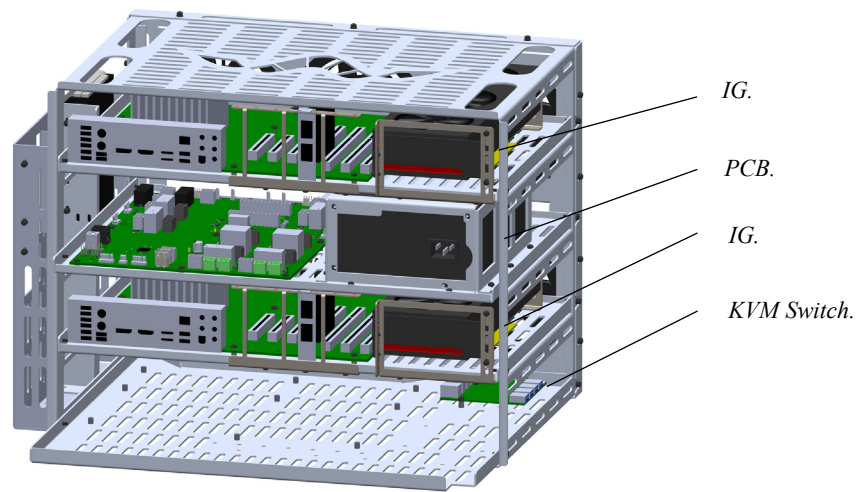
The IOS PC chassis contains an image generator PC (IG), a power control board (PCB), a terrain server, and a network switch tray. The IG holds MACE EW, Viper radios, and OSM Server. For more information about the PCB, see the chapter "Power sequences and the Power Control Board". The terrain server holds all MVRsimulation's 3D terrain and the OSM data. The KVM switch is located beside the terrain server. The network switch tray holds the two 16-port 10 gigabit switches.



The OBS PC chassis contains two IGs, a PCB, and an EME machine. The first IG drives the out-the-window view in the Varjo XR-3. The second IG drives the emulated laser target designator (LTD) view. The EME machine holds MACE SE along with the BSI JTAC tools, Viper radios, and the emulated Defense Advanced GPS Receiver (DAGR). If a unit wants to install and connect to WinTAK, the EME machine has extra hard drive space to install the software package. The KVM switch is located on the EME machine tray.

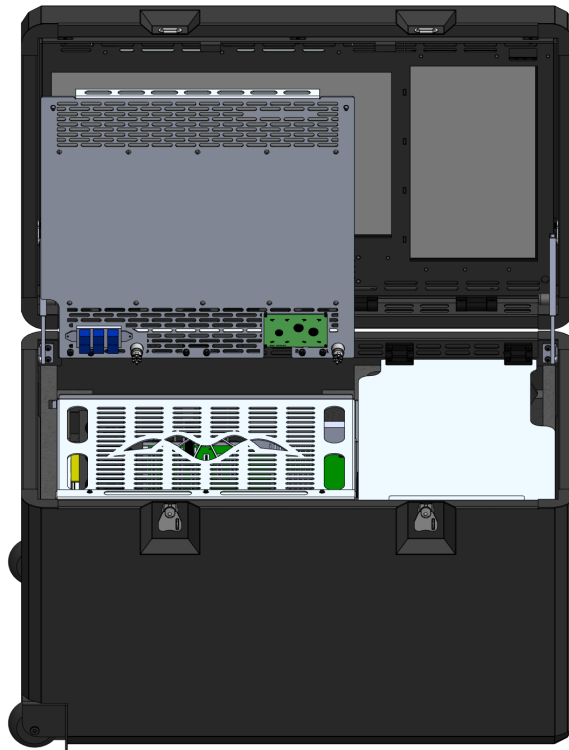


The RP PC chassis contains two IGs, a PCB, and blank tray for the KVM. The first IG drives the out-the-window view for the role player. The second IG drives the role player targeting sensor pod view and has a MACE install along with the Viper Radios. The bottom layer is blank and holds the KVM switch. If an additional PC is required, a Mini-ITX tray can be ordered and placed in this location. For more information about adding another machine to this PC chassis, email hardware.support@mvrsimulation.com



Removing the PC chassis

Access the PC chassis by loosening the 2 thumb screws in the left desktop panel and hinge the desktop open. Then, you can disconnect the cables connected to the desktop.



IOS case with left desktop opened.

The PC chassis has two slots on either side for lifting the chassis out of the case. *Note:* Do not grab the middle of the chassis to lift it from the case; doing so can cause damage to the external metal frame.



With the assistance of a second person, lift the PC chassis out of the case. Be mindful of the cables located in the plenum space behind the PC chassis. MVRsimulation recommends using a crash cart to support the PC chassis outside the case for easy servicing. You *must* make sure the PC chassis is fully supported when you remove it from the case. Do not balance the PC chassis on the side of the case while servicing. MVRsimulation recommends the following products (or equivalent) with an anti-static foam for use as a crash cart to support the DJFT:

- Two Shelf Wire Rack: <https://www.uline.com/Product/Detail/H-2938-34BL/Industrial-Wire-Shelving/Two-Shelf-Wire-Shelving-Unit-24-x-18-x-34-Black>



- Casters for Wire Shelving: <https://www.uline.com/Product/Detail/H-1205WH-BL/Wire-Shelving-Accessories/Polyurethane-Casters-for-Wire-Shelving-Units-Set-of-4-Black?PDPRelatedItem=H-2938-34BL>



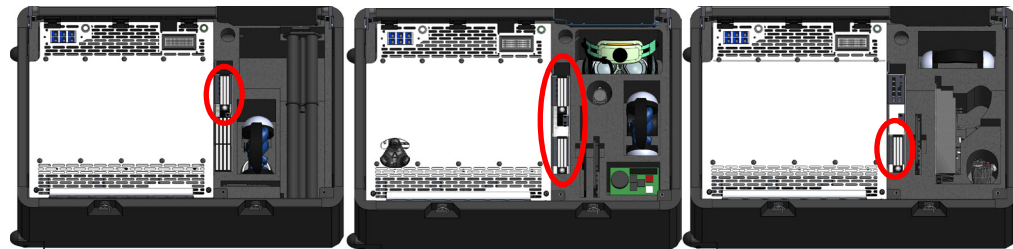
Install the PC chassis in reverse order as described above. MVRsimulation recommends a two-person installation of the PC chassis; one person to support the chassis from the front and a second person standing on the left side of the case to guide the cables. Verify no cables are

pinched under the chassis when it is fully installed. Make sure the chassis is sitting behind the lower, front foam. The lower, front foam sits directly under the bottom fans.

Replacing the OS hard drives

The DJFT was designed to support multiple classification levels by having swappable hard drives. The hard drive trays are all located in the right storage compartment in a specially designed hard drive housing. The hard drives are installed in Icy Dock enclosures. This section discusses the operating system OS hard drives. For more information about swapping the drives in the terrain server, see the section “Importing Terrain Server RAID array” in this chapter.

*OS drives
circled in red.*



Instructor Station.

Observer Station.

Role Player Station.

Drive identification

The OS drives contain the operating system and applications run by each host machine. These drives are specific to the licenses assigned to each PC chassis and are not interchangeable between machines. Because drive cloning utilizes the licenses assigned to a specific machine, no new licenses are needed for the drives that are only used in the machine they are associated with.

Each drive in the DJFT is labeled with the name of the machine it is associated with. The drive must be installed in the correct machine for the system to work properly.

The DJFT ships with two drive sets to accommodate an unclassified and classified set of drives (green and red, respectively). The classified (red) set of hard drives are identical to the unclassified (green) set of hard drives coming from the factory. No classified data is installed on any of the drives from the factory.

You can clone more drive sets for additional levels of classification. For more information on cloning or purchasing additional sets of drives, contact MVRsimulation’s Hardware Support team at hardware.support@mvrsimulation.com.

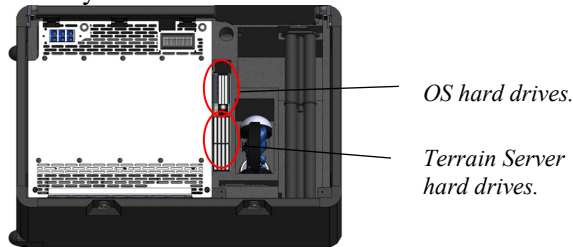
Removing and installing OS hard drives

Before removing the OS hard drives, you must power down the DJFT station.

Locate the drives. The OS drives are all located in a similar location installed in a 2- or 3-bay Icy Dock in the right storage compartment. The 8-bay Icy Dock holds the terrain server hard drives. For more information about swapping the drives in the terrain server, see the section “Importing Terrain Server RAID array” in this chapter.

To remove the OS hard drives:

1. Identify the OS drives in the IOS. The OBS and RP only contain OS drives.



2. Release the locking latch.



3. Pull the handle to remove the drive.
4. Press the handle to lock the latch.
5. Store the drive in the drive storage pelican.

To install a new drive, follow these steps:

1. Release the locking latch. The handle must be open to install the drive.
2. Slide the drive into the Icy Dock. It will only install in one direction. Do not force the drive cage into the Icy Dock, it should slide in easily.
3. Press the handle firmly until the latch clicks.

Importing Terrain Server RAID array

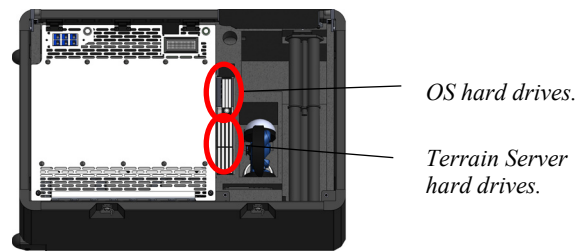
This section will explain the Terrain Server drive configuration and describe the process of updating the configuration. The DJFT is shipped with an unclassified set of hard drives installed with green enclosures. A second set of hard drives with red colored enclosures are included for use in a classified environment. The classified (red) set of hard drives are identical to the unclassified (green) set of hard drives coming from the factory. No classified data is installed on any of the drives from the factory.

To swap the drives for a specific classification you must import the Foreign Configuration after the drives have been physically swapped. The RAID controller will see the drives, but the data will not be accessible by Windows Explorer until the configuration is completed.

Replacing the hard drives

Before removing the terrain server hard drives, you must power down the IOS.

The Terrain Server hard drives are located in the IOS case's right storage compartment. It is the 8-Bay Icy Dock.



To remove the terrain drives:

1. Release the locking latch.



2. Pull the handle to remove the drive.
3. Press the handle to lock the latch.
4. Store the drive in the drive storage pelican.

To install a new terrain drive, follow these steps:

1. Release the locking latch. The handle must be open to install the drive.
2. Slide the drive into the Icy Dock. It will only install in one direction. Do not force the drive cage into the Icy Dock, it should slide in easily.
3. Press the handle until the latch clicks.

Importing Terrain Server RAID array

The RAID 5 array will not be recognized until its Foreign Configuration is imported. The RAID 5 controller will see the drives, but you will not be able to access the data. Importing the terrain server RAID array is required for Windows to be able to access the data stored on the drives. *Note:* In the event of a power failure Windows Server may not be able to access the data and you might need to import the Foreign Configuration.

To import the RAID array configuration after swapping the hard drives:

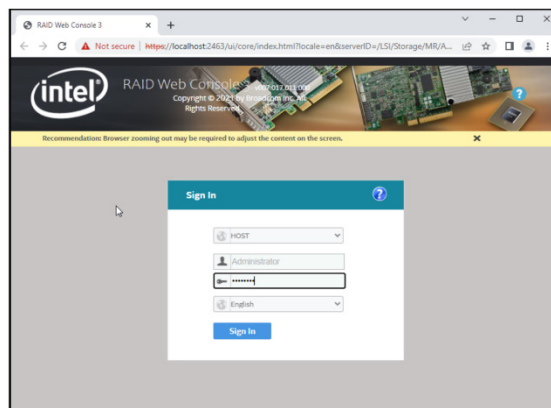
1. Power on the IOS. For more information about powering on the IOS see the section “Steps to power on a station” in the “Power sequences and the Power Control Board” chapter.
2. Use the Input button on the front of the lid bezel to cycle the 23” monitor to HDMI 2.
3. The 23” monitor should now display the Microsoft Windows Server 2019 operating system login screen.
4. Press the KVM button to cycle the active machine to the Terrain Server.

5. Press Ctrl+Alt+Del to log into Windows Server.
 - Login: Administrator
 - Password: Passw0rd
 - Note: The “O” in the password is number zero (0). If you change the login or password, please keep a record of it as there is no way to recover the username or password once it has been changed.
6. Start the Intel RAID Web Console by double-clicking the icon on the desktop.

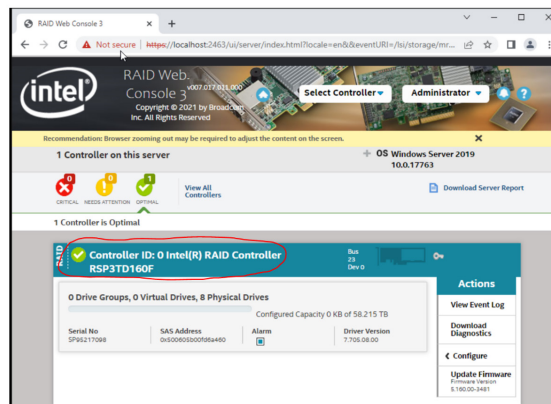


7. Log into the Intel RAID Web Console using the following credentials:
 - Login: Administrator
 - Password: Passw0rd

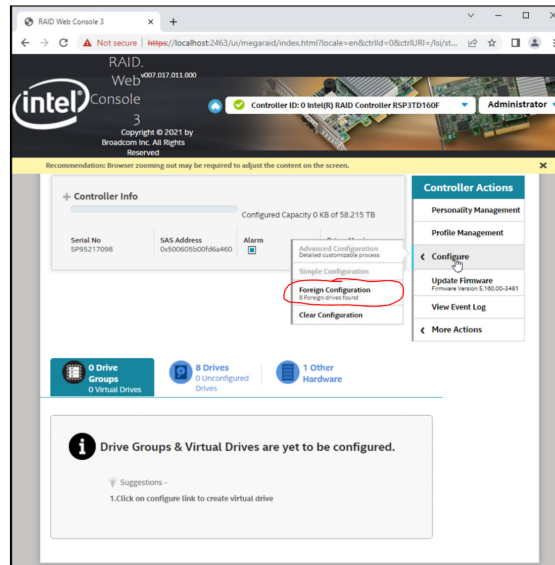
Note: The “O” in the password is number zero (0). If you change the login or password, please keep a record of it as there is no way to recover the username or password once it has been changed.



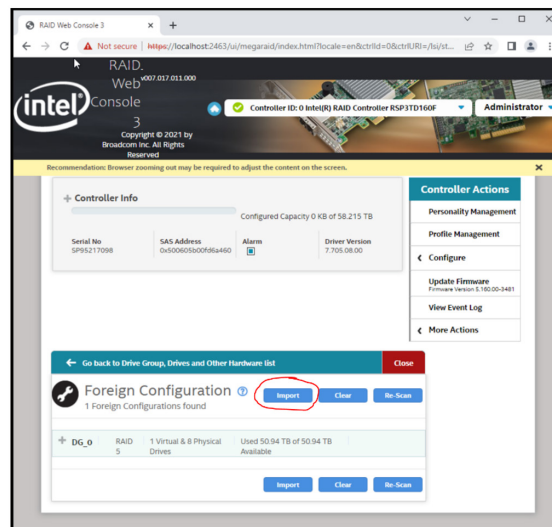
8. Click on the RAID Controller header name.



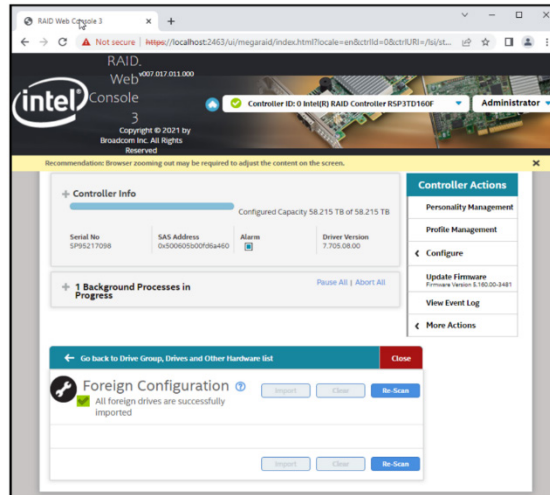
9. Click Configure from the controller action menu. Then, click Foreign Configuration.



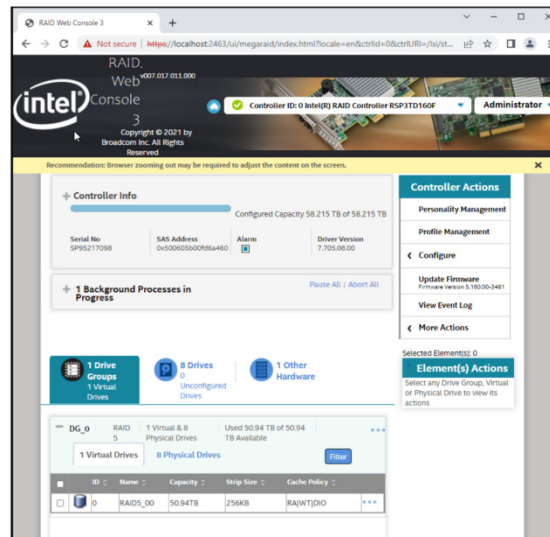
10. Click Import to import the Foreign Configuration.



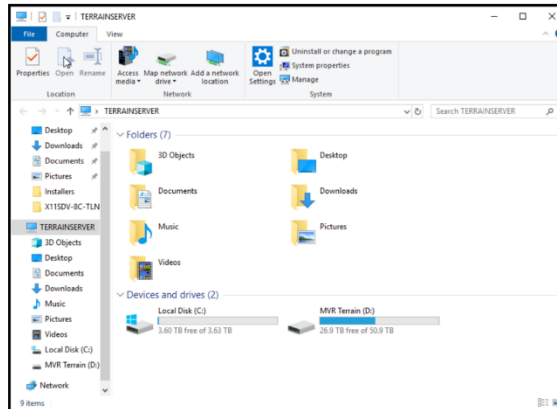
A message stating “All foreign drives are successfully imported” will appear once the configuration is updated.



The virtual drive group is now seen by the RAID controller.

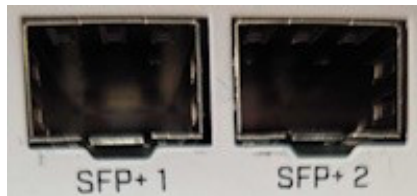


MVR Terrain (D:) is now accessible through Windows Explorer.



The DJFT network services

The DJFT uses two Allied Telesis AT-x55018XSQ-J90 switches as the core backbone switches. These switches are 16-port 10GB DISA-Approved JTIC devices that are re-hosted to fit the DJFT PC chassis in the IOS. Both switches support 10Gb port speeds which allows the DJFT to act as a network backbone for interconnected simulators and other devices that may be available at various locations where training occurs. The switches utilize SFP+ cages to allow flexible media selection by simply changing transceiver modules.



SFP+ cages.



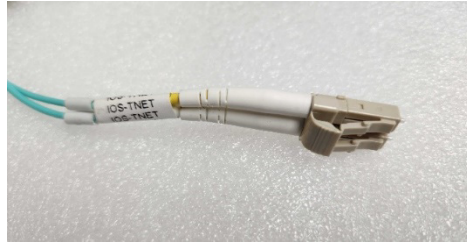
Transceiver modules.

6 keystone jacks on the IOS desktop support short-range fiber and copper networking and can be changed to long range fiber or other Ethernet media in order to connect into specific building or campus cable plants. The switches are shipped with factory default administrative access credentials noted below in “DJFT switch configuration.” These credentials should be changed to adhere to your unit’s specific information assurance requirements.

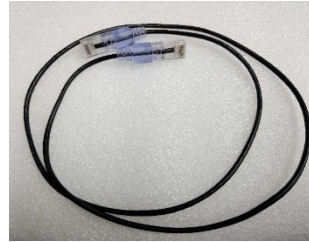
The IOS case contains a Microsoft Windows server PC that is minimally configured as a stand-alone workgroup machine running only file sharing. This server can be extended to provide Active Directory, DNS, DHCP, NTP, and other services network as required by your unit’s or other distributed network training interconnection requirements.

Each switch supports a single dedicated subnet that isolates DIS UDP broadcast packets from TCP file sharing and other general traffic in the simulator. Keeping network traffic segregated prevents packet delivery delays that can be a problem for the DIS protocol with very high entity count scenarios trying to load content over the network while the simulation is running. We call the DIS/UDP network DISNet or DNET for short. The File Sharing/TCP network is called TerrainNET or TNET for short. The computers in the DJFT have two Ethernet ports and are connected to both networks, using the same host number portion of the network IP address on each network.

Wherever possible, the TerrainNET uses blue OM3 multimode duplex fiber cables with LC/LC connectors as these are lighter and much cooler than 10Gb copper cabling. Blue CAT6A cable is used for devices that require RJ-45 connectors on the TerrainNET. The DISNet always uses black CAT6A slim run copper cables with RJ-45 connectors.



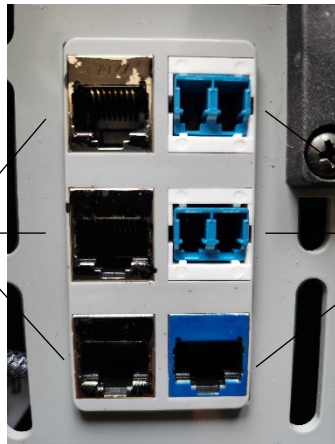
Duplex OM3 multimode fiber with LC connector.



CAT6A slim run copper with RJ-45 connectors.

The IOS case has dedicated 25-foot jacketed cable assemblies that extend to the OBS and RP. The OBS and RP have keystone jacks on their desktops for network interconnection to the IOS case cable assemblies. For more information about interconnecting the DJFT cases, see the section “Connecting the network and power cables” in the “Quick Start” chapter.

DNET connections.



TNET connections.

OBS keystone jack desktop plate.

Default computer IP address assignments

| Default DISNet(DNET) Class C: 192.168.5.0/24 | | Default TerrainNET(TNET) Class C: 192.168.55.0/24 | |
|---|--------------|--|---------------|
| Manual Static Assignments | | Manual Static Assignments | |
| DNET-SW | 192.168.5.3 | TNET-SW | 192.168.55.3 |
| TerrainServer | 192.168.5.5 | TerrainServer | 192.168.55.5 |
| IOS | 192.168.5.10 | IOS | 192.168.55.10 |
| RP-OTW | 192.168.5.20 | RP-OTW | 192.168.55.20 |
| RP-SENSOR | 192.168.5.21 | RP-SENSOR | 192.168.55.21 |
| OBS-OTW | 192.168.5.30 | OBS-OTW | 192.168.55.30 |
| OBS-LTD | 192.168.5.31 | OBS-LTD | 192.168.55.31 |
| OBS-EME | 192.168.5.32 | OBS-EME | 192.168.55.32 |
| OBS-ATAK | 192.168.5.33 | OBS-ATAK | NA |

Default switch configuration

All the switch ports are configured for Full Duplex and 1000/10000 for DNET/TNET respectively to avoid possible auto-negotiation issues. All hosts should be configured accordingly. If a host machine supports 2.5Gb or 5Gb it should be configured for 1Gb in Windows Networking.

DISNet

DNET is a 1Gb UDP only network for DIS protocol that uses black CAT6A copper cabling. Host machines use their built-in motherboard network ports for DISNET.

- 192.168.5.2/24
- 1Gb/Full Duplex

TerrainNET

TNET is a 10Gb TCP/UDP network for file sharing that uses blue CAT6A copper or blue OM3 LC/LC cabling. Host machines use a PCIe Ethernet NIC with SFP+ cages for TNET. Fiber is preferred as it is much lighter, much cooler, and uses much less power than Copper for 10Gb operation.

The TNET switch has 3 copper transceivers to support the OBS-EME machine, the external network keystone jack on the IOS desktop, and one of the AUX cable assemblies for connecting to the OBS-ATAK tablet. If you need additional copper interfaces, you can replace fiber transceivers in the switch with RJ-45 transceivers.

- 192.168.55.3/24
- 10Gb/Full Duplex

Switch firmware management console

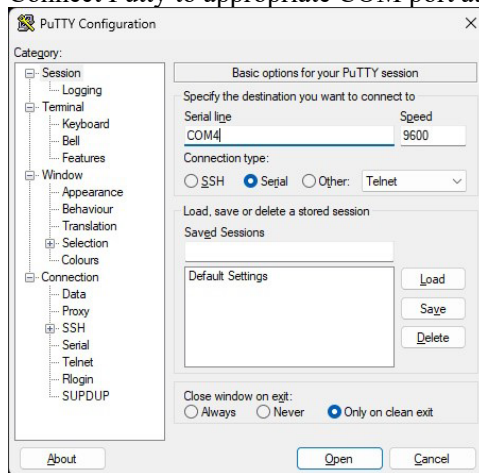
The process to connect to either switch for firmware updates is the same. To connect to a switch for management:

1. Connect Switch Console Port to the configuration PC via USB Serial Console cable.



Switch USB to RS-232 Console Cable.

2. Launch Putty on the configuration PC and determine COM port via Manage > Show Hidden Devices > COM and LPT Ports.
3. Connect Putty to appropriate COM port at 9600-N-8-1.



4. Plug-in the switch to power and watch it boot on Putty screen.
5. Log into the Switch Control Console using the following credentials:
 - Login: manager
 - Password: friend
6. Enable configuration mode with 'enable'

Switch initial setup commands

The switches in the DJFT are setup to from the factory to support the dedicated DISNet and TerrainNET. If you ever replace one of the switches, the following command sequences can be used to initialize the switch to the factory default.

DISNet

Add 16x 1Gb Ethernet TX SFP+ transceivers to cages 1-16.

Plug in USB Thumb Drive with latest AT Firmware to switch front.

Switch command sequence for DJFT-DNET-SWITCH and to set the IP address of the switch to 192.168.5.3/24

1. copy usb:/5.5.3-0.1/x550-5.5.3-0.1.rel flash:/
2. copy usb:/5.5.3-0.1/awplus-gui_553_29.gui flash:/
3. config term
4. service http
5. service ssh
6. ssh server allow-users * 192.168.5.*
7. hostname DJFT-DNET-SWITCH
8. interface vlan1
9. ip address 192.168.5.3/24
10. interface port1.0.1-1.0.16
11. speed 1000
12. duplex full
13. switchport
14. switchport mode access
15. [CTRL] + [Z]
16. write file
17. show running-config
18. copy running-config startup-config
19. reboot

CTRL+ B for boot menu

2 Change Default Boot Source

1 Flash

1 5.5.3-0.1

0 Restart

You can now browse to the switch at its IP address and view the status of ports.

TerrainNET

Install 3x 10G Ethernet TX SFP+ transceivers to cages 1-3

Install 13x 10G Ethernet SR SFP+ transceivers to cages 4-16

Plug in USB Thumb Drive with AT Firmware to switch front.

Switch command sequence for DJFT-TNET-SWITCH and IP address of the switch as 192.168.55.3/24

1. copy usb:/5.5.3-0-1/x550-5.5.3-0.1.rel flash:/
2. copy usb:/5.5.3-0.1/awplus-gui_553_29.gui flash:/
3. service http
4. service ssh
5. ssh server allow-users * 192.168.55.*
6. hostname DJFT-TNET-SWITCH
7. interface vlan1
8. ip address 192.168.55.3/24
9. interface port1.0.1 (repeat for all 16 ports)
10. speed 10000
11. duplex full
12. [CTRL] + [Z]
13. write file
14. show running-config
15. copy running-config startup-config
16. reboot

CTRL+ B for boot menu

2 Change Default Boot Source

1 Flash

1 5.5.3-0.1

0 Restart

You can now browse to the switch at its IP address and view the status of ports.

APPENDIX A

License and Warranty

MVRsimulation Inc. Software License Agreement

Version 44930 (5 February 2023)

DO NOT INSTALL THIS SOFTWARE UNLESS YOU HAVE READ, UNDERSTOOD AND AGREE TO THESE TERMS

MVRsimulation Inc. (“**MVR**”), a Massachusetts corporation, is supplying a copy of its VRSG®, Scenario Editor or Terrain Tools software to You (as that term is defined below) on the terms set forth herein and in the Purchase Order (as defined below). This License Agreement is entered into as of the date first written above between MVRsimulation and the undersigned licensee (“**you**”), with an address indicated below your signature line. Now, therefore, you and MVRsimulation agree as follows:

Article 1 DEFINITIONS: As used herein:

“**Additional Materials**” means software, libraries and databases other than VRSG, Scenario Editor or Terrain Tools or Updates to either VRSG, Scenario Editor or Terrain Tools, including, without limitation, MDS Read API, MDX Read API and the MVR Viewpoint Protocol.

“**Authentication Files**” means the files in .C2V, .V2C or .A2C format that are exchanged in the course of a License Authentication or the reinstallation of the Software onto another computer.

“**Data Files**” means data files created or supplied by MVR under a Purchase Order or as Additional Materials or created by you or MVR as part of the License Authentication process.

“**Demonstration Video**” includes any visual display involving VRSG, Scenario Editor or Terrain Tools or the Data Files that can be viewed by a third party, whether hosted on a public server, circulated in a format that permits individual viewing, or demonstrated at your facility or that of a third party.

“**Documentation**” means documentation published by MVR describing the functions and operation of the Software.

“**Dongle ID**” means a unique digital identifier of a physical dongle transmitted as part of the authentication process described in Section 2.02.

“**Initial Maintenance Term**” is a one year term beginning on the date on which you first receive a long-term License Authentication or, if different, the maintenance term is specified in the Purchase Order.

“**License Authentication**” means the authentication described in section 2.02 below.

“License ID” means a unique digital identifier of a physical computer installation transmitted as part of the authentication process described in Section 2.02.

“Maintenance Term” means the Initial Maintenance Term as it may be extended from time to time pursuant to Section 3.04.

“Materials” means the Software and related Documentation.

“Proprietary Data Files” means Data Files provided in any proprietary data format of MVR, including without limitation data provided in the .VIR, .MDY, .MDX, .MDS, .HPZ, .HPY, .HPX, .TEX, .C2V, .V2C and/or .A2C format.

“Purchase Order” means the purchase order, quotation or online order form, including the Standard Terms, pursuant to which you have agreed to purchase and MVR has agreed to sell licenses of Software.

“Refresh”: A License Authentication may be **“Refreshed”** if you transfer your Software to a new computer or request the right to use additional Software features beyond those in your original Purchase Order. This refreshing may take the form of reprogramming of a dongle or the exchange of new Authentication Files.

“Scenario Editor” means MVRsimulation’s VRSG Scenario Editor software product.

“Software” means the MVR software (which may include VRSG) identified in the Purchase Order and any entity libraries, Data Files, upgrades, updates, new releases, versions, corrections or revisions thereto which MVR makes or has previously made available to you.

“Standard Terms” means MVR’s standard terms and conditions available at www.mvrsimulation.com/howtobuy/standard_terms_and_conditions.html or, if attached as an exhibit to the Purchase Order or this license agreement, in the form so attached.

“Terrain Tools” means MVR’s Terrain Tools for Esri ArcGIS software product.

“Updates” means updates, upgrades and new releases and subreleases of VRSG, Scenario Editor or Terrain Tools software product.

“VRSG” means MVR’s Virtual Reality Scene Generator software product.

“You” means the legal entity or governmental agency on behalf of which the user of this copy of VRSG, Scenario Editor or Terrain Tools is acting in installing and using this copy of VRSG, Scenario Editor or Terrain Tools. This definition applies even when “you” appears with a lower case ‘y’.

Article 2 LICENSE

Section 2.01 **Grant.** MVR grants you a non-exclusive license (i) to install the Materials onto a computer under your control, whether the computer is accessed directly or over a private network and when installed over a private network, and (ii) for you or your employee (and, if you are an accredited college or university, your students) to use the Data Files and Software so installed for your own internal business, operational or educational purposes, provided, however that the Data Files and Software may only be run or otherwise used on a computer that has been authenticated, as described in Section 2.02.

Section 2.02 **Authentication.** Authentication of a computer may occur either as a result of an exchange of Authentication Files or by your use of a dongle obtained from MVR. If your Purchase Order refers to authentication by means of Authentication Files, the exchange of Authentication Files will occur when you install the Software on a computer. As part of the installation process, the

Software will collect and compile unique identity information of the physical computer either (i) into a .C2V file, or (ii) into a License ID output to the computer's video display, to be transmitted via email to MVR. Upon receipt of the .C2V file or the License ID code, MVR will create and send by reply e-mail either a .V2C or .A2C Authentication File which you will be able to use to complete the authentication process. MVR's transmission to you of the Authentication File will trigger the commencement of the Initial Maintenance Term for the copy of VRSG, Scenario Editor or Terrain Tools to which it is related.

For users whose authentication is to be done by means of dongle(s), MVR will provide the number of dongles stated on the Purchase Order. An individual dongle may not be used by more than a single user or on more than a single computer simultaneously. As part of the installation process, you will be prompted to send the applicable Dongle ID(s) via email to MVR. Upon receipt of these Dongle ID(s), MVR will send by reply email an unlock code for each dongle for which a Dongle ID has been received. You will be able to use these unlock code(s) to complete the authentication process. MVR's transmission to you of the unlock code for a dongle will trigger the commencement of the Initial Maintenance Term for the copy of VRSG, Scenario Editor or Terrain Tools to which it is related.

Although MVR may provide you with temporary License Authentication (which may involve a temporary unlock code for a dongle or a .A2C or .V2C authentication file with a temporary duration), MVR shall have no obligation to extend any such temporary License Authentication, provide additional temporary License Authentication or provide you with a permanent License Authentication unless and until you have paid in full for the Software and any other services or materials identified in the Purchase Order. Accordingly, your use of the Software may be interrupted until such payment has actually been received and processed by MVR.

Section 2.03 **Restrictions.** You may not do or permit any other party to do any of the following:

- a) Use the Materials other than as specifically permitted in this Agreement;
- b) Operate the Software for use by, or make the Data Files available to, persons other than those described in clause (ii) of Section 2.01 or more concurrent users than the number of licenses that you have purchased;
- c) Permit simultaneous use of the Materials by more users than are authorized by the License Authentication, whether over a computer network, or on a virtual or emulated computer or otherwise;
- d) Attempt to (a) alter, merge, modify, adapt, or translate the Software (including without limitation any Proprietary Data Files but excluding Data Files that are not Proprietary Data Files), (b) decompile, reverse engineer, disassemble, derive, or otherwise reduce the Software to a human-perceivable form, or (c) develop any software that would permit an end user to read or access the Proprietary Data Files. The parties understand that, as used herein, the term "reverse engineer" shall include, without limitation, any use of benchmarking information or incremental output from the Software to determine MVR source code, algorithms or data format, or for the purpose of recreating the Software (including without limitation any MVR Files) or creating software or files substantially similar thereto;
- e) Bypass the copy protection code or any other technological measure that controls access to the Software or Materials;
- f) Make copies of the Materials other than one copy for back-up or archival purposes or use a back-up copy other than as a replacement for the original copy. You must include on any back-up copy all copyright and other notices included on the Materials;
- g) Export, re-export or use the Materials or any copy thereof in violation of the export control laws of the United States of America or any other country;

- h) Use any dongle or Authentication File supplied to you by MVR in connection with the license of the Software in any manner other than in connection with the use of the Materials as permitted hereunder;
- i) Use the Software to test or analyze the performance or user interface of the Software in order to develop or improve a product which competes with the Software;
- j) Publish or provide to third parties performance characteristics relating to the Materials without the express written consent of MVR;
- k) Demonstrate the Materials in public or private forums without using (i) a platform that provides the Software sufficient performance capacity to operate at peak capacity, and (ii) the most recent versions of any Software and Data Files;
- l) Use or circulate any Demonstration Video without first obtaining the approval of MVR, which approval MVR may withhold if it reasonably determines that the Demonstration Video will not correctly reflect the peak performance of the Software and Data Files;
- m) Publish or provide this document to third parties in electronic or printed form;
- n) Create or distribute derivative works based upon the Software or Materials (including without limitation databases derived from files provided to you by MVR).

Section 2.04 **Updates to License Agreement.** If you renew, revive or extend the Maintenance Term, Refresh your License Authentication, or request and receive any Updates or Additional Material, you may be prompted to accept the then-current version of this Agreement, which if accepted shall apply to all Materials licensed hereunder. You will not be able to use Updates or Additional Material or extend or revive the Maintenance Term without accepting the then-current version of this Agreement unless MVR then expressly permits it (which it may refuse in its absolute discretion), but any extension of the Maintenance Term previously paid for will continue in effect under the existing Agreement until it expires.

Section 2.05 **Ownership and Copyright.** Title and copyright to the Materials (including, without limitation, any databases, libraries, images, “applets”, photographs, animations, video, audio or music and text incorporated therein and any hardware keys provided in connection therewith) and all copies thereof remain with MVRsimulation and/or its licensors. The Materials are copyrighted and are protected by United States copyright laws and international treaty provisions. You may not remove the copyright and other proprietary rights notices from the Materials. You agree to prevent any unauthorized copying of the Materials. Except as expressly provided herein, MVR does not grant any express or implied right to you in the Materials or under the patents, copyrights, trademarks, or trade secret information of MVR or its licensors.

Article 3 MAINTENANCE AND SUPPORT

Section 3.01 **Initial Support.** Except as you and MVR may otherwise have mutually agreed in writing, MVR will provide technical support and maintenance in connection with your use of the Materials during the Initial Maintenance Term. If MVR later provides you with any subsequent License Authentication (as may arise if the Software is transferred to a replacement computer, or MVR provides you with a replacement dongle or any new unlock code for a dongle), your subsequent License Authentication shall not restart or extend the Maintenance Term. If you have purchased multiple seats of the Software and have therefore received multiple License Authentications, the Materials accessed with each License Authentication will have a separate Maintenance Term, based on the date on which MVR first provides you with a long-term License Authentication for the applicable copy of the Software. Upon the expiration or termination of the Maintenance Term, MVR will have no obligation to provide maintenance or support for the Materials. MVR may temporarily suspended its support in the event of interruptions beyond its reasonable control, such as may arise in

the event of flood, earthquake, terrorist attack, failure of third party communications systems and the like.

Section 3.02 **Nature of Support.** All maintenance and support will be provided remotely during MVR's normal business hours. The maintenance and support provided by MVR hereunder will consist of:

- a) responding promptly via e-mail during the Maintenance Term to any questions regarding reports of errors or defects in the Software;
- b) providing assistance via e-mail and telephonically during the Maintenance Term relating to the installation and use of the software;
- c) if you first received the Materials electronically, permitting you to re-install the Materials electronically on the same or a different computer until the end of the Maintenance Term or, if longer, until the fifth anniversary of the end of the Initial Maintenance Term. However, if you extend the Maintenance Term beyond six years, MVR reserves the right to provide you with a later version of the Materials than the version that was specified in your Purchase Order; and
- d) providing access during the Maintenance Term to (1) any "Additional Materials" generally released to MVR's customers, (2) error corrections (i.e. patches) and updates intended to fix reported errors, and (3) all product updates, upgrades and enhancements to the Software that MVR generally releases to its customers during the Maintenance Term.

If you request that MVR perform maintenance or support on site at your premises or outside normal business hours, you will be responsible for all reasonable expenses incurred by MVR in connection with performance thereof and MVR reserves the right to charge its then prevailing rates per hour of service provided, or to refuse to provide such service.

Section 3.03 **Exclusions and Limitations.** MVR's maintenance and support obligations do not include: custom programming, training, implementation, database changes or support, product upgrades for which MVR generally imposes a separate price or fee, any requests for content revisions or changes of any kind, or any other matters not specifically covered hereunder. In addition, the provision of maintenance or support hereunder is subject to commercial availability and technological compatibility and the absence of any actual or threatened litigation between you and MVR. MVR provides no guarantee that the Software or any upgrades or updates to the Software provided pursuant to this Maintenance Agreement will function or perform when used on equipment that does not conform to the specifications indicated in the documentation relating thereto. MVR shall have no obligation to provide maintenance or support if you use or attempt to use the Software with hardware that fails to meet the minimum requirements indicated in the Documentation or otherwise modify, revise or transfer the software other than as permitted herein or without MVR's prior written permission.

Section 3.04 **Extension of Maintenance Term.** At any time before the expiration of the Maintenance Term associated with a particular copy of the Software, you may extend such Maintenance Term for successive one (1) year terms, provided, however, that such extensions shall no longer be available or applicable if MVR has generally discontinued maintenance of the licensed version of the Software (in which case MVR shall refund any amounts that you have already paid for extensions that have not yet commenced). For each annual extension of the Maintenance Term associated with a copy of the Software, you shall pay MVR the applicable maintenance fee set forth in the Purchase Order for extension of the Maintenance Term or, if an applicable maintenance fee is not

specified, the price then generally charged by MVR for the maintenance and support services described herein. All payments for extensions purchased hereunder must be received by MVR before the expiration of the then current Maintenance Term.

Section 3.05 **Termination of Maintenance Term.** The Maintenance Term will terminate automatically in the event that you (a) breach any term of this Agreement (including without limitation any payment obligation contained herein), or (b) violate or infringe any of MVR's intellectual property in any manner unless such proposed termination is governed by the Contract Disputes Act of 1978, in which case MVR may pursue its rights in the manner prescribed in that Act and the regulations promulgated thereunder.

Section 3.06 **Effect of Termination or Expiration.** The Software and any updates, upgrades and enhancements thereto that are installed during the Maintenance Term will continue to be accessible after the expiration or termination of the Maintenance Term. However, even though you may be able to download and install product updates, upgrades and enhancements to the Software after the expiration or termination of the Maintenance Term, these updates, upgrades and enhancements will not function on your computer unless and until you have revived and reinstated the Maintenance Term as described below.

Section 3.07 **Revival.** In the event that you wish to receive maintenance and support after the expiration or termination of the Maintenance Term, you may request that the Maintenance Term be revived and reinstated for a new one (1) year term. MVR may, accept or refuse such a request in its sole and absolute discretion. Upon notice that MVR has agreed to revive the Maintenance Term, you shall pay to MVR a maintenance fee at its then-applicable rates for (a) the one (1) year term commencing as of the date when MVR receives the payment and (b) any gap period (measured in months) between the end of the expired or terminated Maintenance Term and the commencement of the newly revived one-year term described in clause (a).

Article 4 SAFEKEEPING OF DONGLES AND AUTHENTICATION FILES

If you have been provided a dongle or an Authentication File format in connection with your license of Software, the safekeeping of the dongle or Authentication Files is your responsibility. MVR has no responsibility to replace a dongle or Authentication Files that has been lost. **For that reason, MVRsimulation strongly recommends that you back up your .A2C or .V2C files to a separate storage device and retain that backup file for archival purposes.** MVR will however replace a damaged dongle if you physically return it (including the casing with identifiable labeling and all mechanical and electrical parts) to MVR in a manner sufficient to allow MVR to troubleshoot any damage thereto and confirm to MVR's satisfaction that there has been no attempt to use the dongle in a manner not permitted under this Agreement.

Article 5 LIMITED WARRANTIES; DISCLAIMERS; REMEDIES; INDEMNITY

Section 5.01 **Limited Warranties.** MVRsimulation warrants that:

- (a) The Software will perform substantially in accordance with the technical functionality set forth in the Documentation during the Maintenance Term; and
- (b) Any physical media on which the Materials are delivered will be free from defects in material and workmanship that will prevent you from loading the Software on your computer for a period of sixty (60) days from the date of shipment to you.

These warranties shall be null and void in the case of any defect caused by any of the following:

- (i) modification of the Materials by any party other than MVR;

- (ii) use of the Materials with hardware or software other than that supplied or recommended by MVR;
- (iii) other improper or unauthorized use of the Materials by you; (iv) failures or defects in third party software or hardware; or (v) external factors such as, but not limited to, power failures or electrical surges.

Section 5.02 **Remedies.** If the Software fails to perform substantially in accordance with the Documentation, your sole remedy is to initiate a technical support ticket by contacting MVR at support@mvrsimulation.com; and MVR's sole obligation will be to provide reasonable commercial efforts to resolve the issue to your satisfaction in accordance with Section 3.02. Your sole and exclusive remedy with respect to any defective media shall be the right to return such media to MVR, and MVR's sole liability to you shall be the replacement of any defective media.

Section 5.03 **DISCLAIMERS.** EXCEPT AS SET FORTH ABOVE, THE MATERIALS ARE PROVIDED "AS IS" WITHOUT ANY EXPRESS OR IMPLIED WARRANTY OF ANY KIND INCLUDING WARRANTIES OF SATISFACTORY QUALITY, MERCHANTABILITY, NONINFRINGEMENT OF THIRD-PARTY INTELLECTUAL PROPERTY, OR FITNESS FOR ANY PARTICULAR PURPOSE. WITHOUT LIMITING THE GENERALITY OF THE FOREGOING, NO WARRANTY IS MADE THAT THE ENCLOSED SOFTWARE WILL GENERATE COMPUTER PROGRAMS WITH THE CHARACTERISTICS OR SPECIFICATIONS DESIRED BY YOU OR THAT THE MATERIALS WILL BE ERROR-FREE. THE WARRANTY PROVIDED HEREIN DOES NOT EXTEND TO ANY HARDWARE PURCHASED FROM MVRSIMULATION. ANY SUCH WARRANTY MUST BE PROVIDED IN A SEPARATE WRITING. THESE DISCLAIMERS OF WARRANTY CONSTITUTE AN ESSENTIAL PART OF THIS AGREEMENT.

Without limiting the foregoing, MVR provides no guarantees that the Software or any upgrades or updates to the Software provided as part of the maintenance and support described below will function or perform when used on equipment that does not conform to the specifications indicated in the Documentation relating thereto.

Because certain jurisdictions prohibit the waiver of certain warranties, the above disclaimer may not apply to you and you may have additional legal rights that vary by jurisdiction.

Section 5.04 **LIMITATION ON LIABILITY.** TO THE MAXIMUM EXTENT PERMITTED BY LAW, IN NO EVENT SHALL MVRSIMULATION OR ANYONE ELSE WHO HAS BEEN INVOLVED IN THE CREATION OF THE MATERIALS BE LIABLE FOR ANY DAMAGES OR LOSSES WHATSOEVER (INCLUDING, WITHOUT LIMITATION, DIRECT OR INDIRECT DAMAGES, INCIDENTAL OR CONSEQUENTIAL DAMAGES, DAMAGES FOR LOSS OF PROFITS, BUSINESS INTERRUPTION, LOSS OF INFORMATION AND/OR LOSS OF DATA), WHETHER ARISING IN TORT, CONTRACT OR OTHERWISE, ARISING OUT OF THE USE OF OR INABILITY TO USE THE MATERIALS, EVEN IF MVRSIMULATION HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN ANY CASE, MVRSIMULATION'S ENTIRE LIABILITY HEREUNDER SHALL BE LIMITED TO THE AMOUNT ACTUALLY PAID FOR THE MATERIALS.

Because some jurisdictions prohibit the exclusion or limitation of liability for damages, the above limitation may not apply to you and you may have other legal rights that vary by jurisdiction.

Section 5.05 **Indemnity of MVRsimulation.**

a) **Commercial Customers.** If you are not an agency of the United States Government, you agree to indemnify MVR and its affiliates against any loss, liability or expense (including reasonable legal

fees) it incurs arising out of or in connection with any breach or violation of the terms of this Agreement by you or your use of the Materials.

b) Purchases By U.S. Government. If you are the United States government or an agency thereof, then you authorize and consent to all use and manufacture, in performing this license, of any invention described in and covered by a United States patent,

- (1) Embodied in the structure or composition of any article the delivery of which is accepted by the Government under this contract; or,
- (2) Used in machinery, tools, or methods whose use necessarily results from compliance by MVR with (i) specifications or written provisions forming a part of this contract or (ii) specific written instructions given by the Contracting Officer directing the manner of performance. The entire liability to the Government for infringement of a United States patent shall be determined solely by the provisions of the indemnity clause, if any, included in this license, and you assume liability for all other infringement to the extent of the authorization and consent hereinabove granted.

Article 6 CONFIDENTIALITY

You agree that the Materials, the object and source code of the Software, the algorithms used by the Software, the performance characteristics of the Software, and the algorithms and functioning of any dongles or Authentication Files provided to you in connection therewith (collectively, the “**Confidential Information**”) are or contain the confidential and proprietary information and trade secrets of MVR and that MVR is providing the Materials to you in confidence. You shall not and you shall not permit others to reverse engineer the Software (including by analysis of benchmarking or output information) or to access the source code, algorithms or performance characteristics of the Software, the dongles or the Authentication Files. In addition, you agree (i) to preserve in strictest confidence all Confidential Information, (ii) not to disclose the Confidential Information to any third party except as expressly permitted herein, (iii) only to disclose the Confidential Information within your business organization to those employees (and, if you are an accredited college or university, your students) who have first agreed to be bound by the terms and conditions substantially similar to those contained herein, (iv) not to disclose any Confidential Information to any agents, contractors or consultants except if such disclosure is related to the authorized use of the Materials hereunder and after having received a commitment from such agents, contractors or consultants to be bound by substantially similar obligations with respect to such information as you are hereunder, and (v) not to use the Confidential Information for any reason except in connection with the authorized use of the Materials. You shall be responsible and liable for any unauthorized disclosure, publication or dissemination by any of your employees, students, agents or contractors of any Confidential Information. Confidential Information shall not include any information which: (a) you possess prior to the receipt hereof without obligation of confidentiality; (b) you rightfully receive from a third party without any obligation of confidentiality to such third party, and which such third party received without any obligation of confidentiality, direct or indirect, to MVR; or (c) is or becomes publicly available lawfully and without breach of any obligation to MVR by you. You may disclose Confidential Information if such disclosure is required under the terms of any statute, regulation, order, subpoena or document discovery request, provided that prior written notice of such disclosure is furnished to MVR as soon as practicable in order to afford MVR an opportunity to seek a protective order or otherwise contest or restrict such required disclosure. The parties agree to cooperate fully to limit disclosure in the event of any apparent legal requirement that Confidential Information be disclosed.

Article 7 **TRANSFER AND ASSIGNMENT**

Section 7.01 **Transfer or Assignment by Licensee.** Except as otherwise permitted by law or expressly permitted herein, you may not transfer or assign this Agreement or the Materials to another person without the prior written permission of MVR, except:

- (i) if the Purchase Order identifies a U.S. Department of Defense (“DOD”) contract in furtherance of which you have ordered the Materials, this license may be transferred to any other DOD contractor who needs the Materials in furtherance of a DOD contract or to the United States government agency for which the contract is being performed,
- (ii) in connection with the sale of all or substantially all of your assets, this license may be transferred to the purchaser, and
- (iii) if you are acting as a systems integrator for an end user identified in the Purchase Order, this license may be transferred to the end user;

provided, however, that (x) you are then in compliance with your payment obligations under any related Maintenance Agreement then in effect with respect to the Materials, and (y) the transferee provides MVR with:

- (A) an unqualified, written acceptance of the terms of this License and any related maintenance agreement fifteen (15) days after the transfer (and, for transfers pursuant to clause (i), identifying the DOD contract for which the Materials are required), and
- (B) the name, address, telephone number and e-mail address of an employee of the transferee authorized to communicate with MVR in connection with this License and any related maintenance agreement.

In no case shall the Software and Materials or any related dongle or Authentication File be knowingly or intentionally licensed, transferred or assigned to terrorist sponsored organizations or to organizations which primarily reside within terrorist countries as defined by the United States of America Department of State.

Any transfer made pursuant to this Section must include all of the Software and Materials and any related dongle and Authentication Files. You shall be solely responsible for any transfer being in compliance with United States export laws and regulations. Upon a transfer in compliance with this Section, the transferee shall thereafter be solely responsible for compliance with the terms of this license agreement (except for any breach or violation which predates the transfer, for which you shall remain responsible) and you will have no further obligation to indemnify MVR hereunder except with respect to your use of the Materials prior to the transfer. If you are acting as a systems integrator for an end user, you may only use the Materials to develop, install and support the systems for the end user and not for any other purpose.

Section 7.02 **Transfer to Another Computer.** If you wish to transfer the Software from one of your computers to another, the process involved will depend upon your method of authentication. If you have a hardware dongle, you may install that dongle in the new computer and install the Software on it. If you authenticated by means of Authentication Files, you may (i) transfer the hard drive containing the Software from your old computer to your new one, or (ii) reinstall the Software on a new hard drive by requesting permission to effectuate such a transfer in an e-mail to MVR, which may impose a fee for permitting such a transfer. If MVR permits such a transfer, it will instruct you as to how to generate a License ID or .C2V file that will de-install the Software from the original computer. You must then send a License ID or .C2V cancellation receipt that will be generated as part of the de-installation process to MVR by e-mail, and MVR shall (upon your payment of any fee required as part

of the transfer process) generate a new .A2C or .V2C Authentication File for your use in installing the Software on the replacement computer. **If you are unable to generate a new License ID or .C2V file (which may happen if, for example, your original computer has become lost, stolen or inoperable) then you may be unable to reinstall the software on a new computer other than by using the old hard drive on the new computer.**

Section 7.03 **Transfer by MVRsimulation.** MVR may not assign its rights and delegate its duties hereunder without your prior consent, which you may not unreasonably withhold, condition or delay, except that MVR may freely assign its rights and delegate its duties hereunder to a purchase of substantially all of its assets or to a merger partner in a merger in which MVR is not the surviving entity. After such an event, MVR shall have no further obligation to you hereunder except to provide you, or to cause its successor to provide you, with notice of the transaction within 30 days of its occurrence.

Article 8 SUPPLEMENTAL LICENSE TERMS

Section 8.01 **Additional Materials.** In certain cases MVR may provide Additional Materials at no extra charge to customers with whom MVR has an active maintenance relationship, as part of its maintenance and support. Such Additional Materials are provided under a license that is revocable by MVR without cause in its sole and absolute discretion. Upon request by MVR, you agree, within five (5) days of receiving such request, to return to MVR all of your copies of the Additional Materials, destroy all electronic copies of the Additional Materials in your possession or control, and take such additional actions as MVR may reasonably request to ensure that no copies of the Additional Materials remain in your possession and control. Except that the license to such Additional Materials is terminable by MVR at will, and except as may be otherwise agreed in writing by MVR, the Additional Materials and the use thereof are (i) subject to all of the provisions and restrictions contained in this license as "Software" and (ii) provided solely for the purpose of integration with systems that use VRSG, Scenario Editor or Terrain Tools. MVR makes no representation or warranty regarding Additional Materials and you are responsible for compliance with any export laws and regulations applicable to any export or deemed export of them.

Section 8.02 **Third Party Materials.** MVR may include among the Materials or Additional Materials software, libraries or databases provided by third parties ("**Third Party Materials**"). Although MVR makes these Third Party Materials available for your convenience, in certain cases you will not be able to use or access specific Third Party Materials with, or as part of, the Software until you have first accepted specific terms and conditions provided by the owner of such Third Party Materials (e.g., by executing a clickwrap or license agreement). Your use of any Third Party Materials provided by MVR will be subject to both the terms of this Agreement and any terms and conditions provided by the owner of such Third Party Materials.

Section 8.03 **U.S. Government Restricted And Limited Rights.** The Materials have been developed entirely at private expense and have been sold and offered for sale to non-governmental customers. The Software is "commercial computer software" as defined in DFARS 252.227-7014 (Feb. 2012) and in FAR 2.101(a), and "restricted computer software" as defined in FAR 27-401 (Oct. 2014) (or any equivalent agency regulation or contract clause). The Materials comprising computer software are provided with the rights set forth in FAR 52.227-19 (November 2007). The Materials comprising computer software are provided with the rights set forth in FAR 52.227-19 (November 2007). The Materials comprising technical data are pre-existing technical data developed entirely at private expense and, are provided with the rights described in DFARS 252.227-7015(b) (Feb. 2014). The foregoing grants of Restricted and Limited Rights are only for the benefit of the United States government and its contractors and, in their hands, override any inconsistent restrictions

set forth elsewhere in this License Agreement. The Materials may only be sold or transferred to an agency or instrumentality of the United States Government under prime contracts that effectively incorporate restrictions on government use, reproduction, or disclosure no less protective of MVR than the foregoing and any other attempted sale is null and void. Use, reproduction, or disclosure of the Materials by the government or its agents or contractors is subject to the restrictions set forth herein and/or therein, as applicable. Contractor and manufacturer are MVRsimulation Inc., 57 Union Avenue, Sudbury, MA 01776. Use of the Materials by the United States government constitutes acknowledgment of MVR's proprietary rights in them.

Article 9 TERMINATION

Upon any material violation of any of the provisions of this Agreement, your right to use the Materials shall automatically terminate without reimbursement and you shall be obligated, within thirty (30) days of receiving a notice of termination of this license from MVR, to return to MVR all of your copies of the Materials and any hardware keys provided to you in connection therewith, destroy all electronic copies of the Materials and Authentication Files in your possession or control, and take such additional actions as MVR may reasonably request to ensure that no copies of the Materials or Authentication Files remain in your possession and control. However, the foregoing shall not apply if the matter constitutes a dispute governed by the Contract Disputes Act of 1978, in which case MVR may pursue its rights in the manner prescribed in that Act and the regulations promulgated thereunder.

Article 10 GENERAL

Section 10.01 **Complete Agreement.** This Agreement, the manually signed license agreement between you and MVR (if any) and the Purchase Order constitute the entire agreement between you and MVR and supersedes all representations, understandings and other agreements between the parties with respect to the subject matter described herein or therein. In the event of an express inconsistency between this Agreement or the manually signed license agreement and the Purchase Order, the inconsistency shall be resolved by giving precedence to the inconsistent terms as follows:

- (a) first, to any negotiated rider or addendum to a manually signed version of this Agreement (or any proper termination thereof), regardless of whether it is signed before or after the electronic acceptance of this Agreement (with such documents taking precedence with respect to each other in reverse chronological order of their effective dates);
- (b) second, to terms specifically added to the Purchase Order as a result of negotiations between the parties;
- (c) third, to the terms of this Agreement; and
- (d) fourth to preprinted or standard terms of the Purchase Order that were not modified or included as a result of negotiations between the parties.

To establish that Purchase Order terms were negotiated, a party must produce e-mail or other written correspondence pre-dating the execution of the Purchase Order constituting or acknowledging such negotiations. If this agreement is presented in connection with your installation of an Update of VRSG, Scenario Editor or Terrain Tools, it shall supersede any prior electronic version of the license agreement that You accepted upon an earlier installation of this copy of VRSG, Scenario Editor or Terrain Tools or an Update to it but shall remain subject to the documents identified in clauses (a) and (b) above.

Section 10.02 **Amendment and Waiver.** Failure of a party to enforce any provision of this Agreement does not constitute and should not be construed as a waiver of such provision or the right

to enforce such provision. This Agreement may be amended only by a writing executed by both parties or by your electronic acceptance of a more recent version of this license agreement provided to you by MVR.

Section 10.03 **Trademarks.** Nothing contained herein shall give you the right to use any of MVR's trademarks or trade names and you agree not to remove or alter any trademark, trade name, copyright or other proprietary notices, legends, symbols or labels appearing on or in any copies of the Materials.

Section 10.04 **Governing Law; Venue.** This Agreement is governed by the laws of the United States of America and the Commonwealth of Massachusetts, without giving effect to conflict of laws provisions thereof. Any action or proceeding brought by either party against the other arising out of or related to this Agreement shall be brought only (i) in a Massachusetts state court or federal district court for the District of Massachusetts, or, (ii) in the case of a proceeding brought by or against the United States government, the Federal Court of Claims or any successor thereto, and each of MVR and you hereby consent to the personal jurisdiction of such courts. The application of the United Nations Convention on Contracts for the International Sale of Goods is expressly excluded. If any provision of this Agreement is held to be unenforceable, such provision shall be reformed only to the extent necessary to make it enforceable.

Section 10.05 **Customer Suggestions.** MVR considers developing product features requested by customers at no additional cost. MVR retains all rights to these features and may incorporate them in its commercial off-the-shelf products. For further information about MVR's practices in this regard, go to www.mvrsimulation.com/howtobuy/customerfeatures.html.

Section 10.06 **No Corrupt Practices.** You warrant that, in the course of obtaining this license of the Materials, or of selling any products (the "Purchaser Products") into which the Materials are to be integrated, (a) neither you nor your employees or agents have made, offered or promised to make or offer, any payment or any proffer of anything of value, including bribes, either directly or indirectly to any public official, regulatory authority or anyone else for the purpose of influencing, inducing or rewarding any act, omission or decision involving sales of the Materials or the Purchaser Products in order to gain an improper advantage, nor have you authorized or encouraged any other party to do so, and (b) you shall comply, and shall cause your employees and agents to comply, with all applicable anti-corruption and anti-bribery laws and regulations in the course of obtaining purchase orders, requisitions or other authorizations to purchase the Materials and the Purchaser Products. You shall notify MVR immediately upon becoming aware of any breach of your obligations under this Section.

To initiate a support ticket, please contact MVR at support@mvrsimulation.com.

MVRsimulation and the MVRsimulation logo and VRSG (Virtual Reality Scene Generator) are registered trademarks and the phrase "geospecific simulation with game quality graphics" is a trademark of MVRsimulation Inc.

MVRsimulation's round-earth VRSG terrain architecture is protected by U.S. Patent 7,425,952. All other brands and names are property of their respective owners.

© 1996 - 2023 MVRsimulation Inc. All rights reserved.