



## **USER MANUAL**

**TEST SET, ELECTRONIC SYSTEM: AN-PSM-95K**

**MAINTENANCE SUPPORT DEVICE-VERSION 4**

**RUGGED TYPE 2 (MSD-V4R)**

**(PN: 13792400 NSN: 6625-01-719-0604)**

**MANUFACTURED BY LEONARDO DRS**

**7200 REDSTONE GATEWAY SW**

**HUNTSVILLE, AL**

**INCLUDING OPERATOR INSTRUCTIONS FOR THE MSD-V4R AND  
ACCESSORIES**



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**DATE: 29 May 2024**



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## Warnings, Cautions, and Notes

 **WARNING:** A **WARNING** indicates a potential for property damage, personal injury, or death.

 **CAUTION:** A **CAUTION** indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

 **NOTE:** A **NOTE** indicates important information that helps you make better use of the MSD-V4R.

### Warning Summary



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#### WARNING

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**EXPLOSIVE:** Using an incompatible battery may increase the risk of fire or explosion. Replace the batteries only with a compatible batteries. The batteries are designed to work with the MSD-V4R. Do not use a battery from other computers with the MSD-V4R. Do not attempt to use unserviceable batteries.

**FIRE:** To prevent ignition in a hazardous atmosphere, batteries must only be removed, changed, or charged in an area known to be non-hazardous. Do not operate the MSD-V4R within 50 feet of a refueling point. A dry type of fire extinguisher must be readily available when recharging batteries.



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#### WARNING

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**Shock Hazard:** Improper connection of the NATO connector can result in serious injury or death from shock. **DO NOT** touch NATO plug conductor while it is connected to a receptacle.



# 1 Introduction

## 1.1 Purpose and Function

The Maintenance Support Device (MSD) Kit is a modular, soldier-portable automatic test set used by maintenance personnel to augment system Built-in-Test (BIT) Equipment capabilities. It is also utilized to host Electronic Technical Manuals (ETMs) and Interactive Electronic Technical Manuals (IETMs), as well as to host Software Loader/Verifier (SL/V) applications.

## 1.2 Capabilities

The MSD-V4R can perform the tasks performed by previous MSD versions. The kit contains the accessories most used in a field environment to test or interface with tactical vehicles. Some performance characteristics of the MSD include:

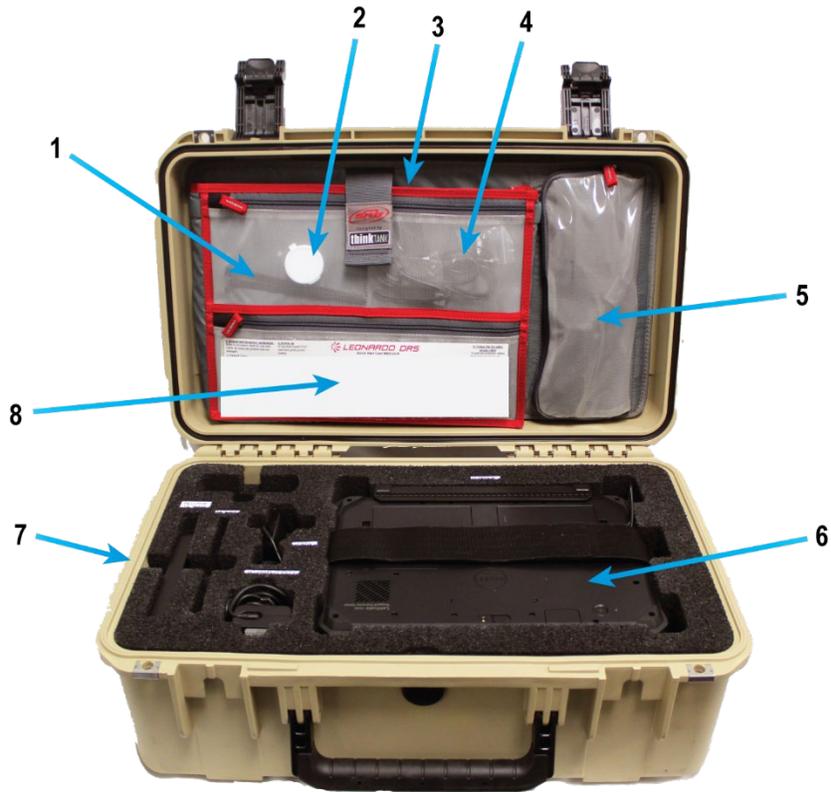
- Glove-capable, Daylight-Readable 12" Display
- 12<sup>th</sup> Generation Intel® i5 Processor
- 8GB LPDDR5 RAM
- Infrared Camera and Front Camera with Privacy Shutter
- Audio Jack
- Built-in Microphone
- Speaker
- Programmable Buttons on the Display
- Trusted Platform Module (TPM) 2.0
- 2 x Thunderbolt™4/USB 3.2 Gen 2 Type-C port with Power Delivery
- 1 USB-A 3.2 Gen 1 Port with PowerShare
- High-Definition Multimedia Interface (HDMI) Port
- Computer Access Card (CAC) Enabled Smartcard Reader
- Internal Ethernet Network (RJ45) Interface
- Rugged Detachable Keyboard
- Wireless Ethernet Network
- Cable Strain Reliefs
- Power Sources and Connections
- 2 Removable Hot-Swap Batteries

## 1.3 Equipment Description

### 1.3.1 Standard Accessories

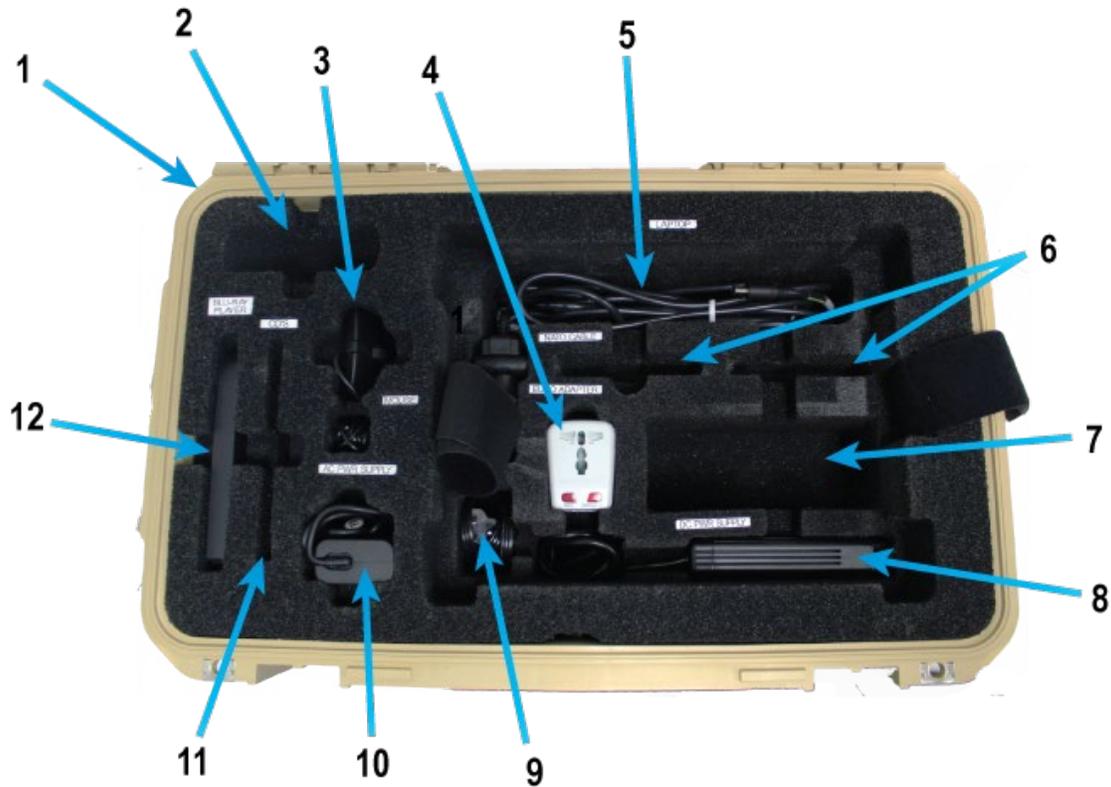
The MSD V4 kit comes equipped with the items commonly used in the field environment. The figures below describe those items in detail.

System specifications for the MSD-V4R system are listed in Appendix A.



**Figure 1. MSD V4 Kit-PN 13748530.**

ITEM	PART NUMBER	QTY	DESCRIPTION
1	13748489	2	MSD-V4 CABLE STRAIN RELIEF TIES (INSIDE POUCH)
2	13748518	1	MSD-V4 SPARE FUSE HOLDER ASSEMBLY (INSIDE)
3	13792389	1	MSD-V4R CONFIGURATION SHEET (INSIDE)
4	NA	1	STORAGE POUCH
5	13792390	1	MSD-V4R SHOULDER STRAP (INSIDE POUCH)
5	13748513	1	MSD-V4 ETHERNET CABLE (INSIDE POUCH)
6	13792401	1	MSD-V4R COMPUTER (STOWED WITH KEYBOARD ATTACHED)
7	13792387	1	MSD-V4R TRANSIT CASE
8	13792388	1	MSD-V4R QUICK START CARD



**Figure 2. MSD V4 Kit-Bottom with MSD Removed.**

ITEM	PART NUMBER	QTY	DESCRIPTION
1	13792387	1	MSD-V4R TRANSIT CASE
2	NA	1	MSD-V4 MIL-STD 1553 ADAPTER/PCMCIA STORAGE (OPTIONAL)
3	13748515	1	MSD-V4 MOUSE
4	13748516	1	MSD-V4 EUROPEAN ADAPTER
5	13748512	1	MSD-V4 NATO POWER CABLE, 20 FT, 10A, 16AWG, MP-205
6	13792384	1	MSD-V4R BATTERIES
7	13748545	1	MSD-V4 AC/DC 400 HZ POWER SUPPLY ADAPTER (OPTIONAL)
8	13792392	1	MSD-V4 DC/DC POWER ADAPTER, USB-C
9	NA	1	MSD-V4 AC/DC POWER CABLE STORAGE
10	13792386	1	MSD-V4 AC POWER ADAPTER
11	NA	1	MSD-V4 SOFTWARE POCKET
12	BRXL-PT6U2VB BRXL-PUS6U3B	1	MSD-V4 BLU-RAY OPTICAL DRIVE

Additional items may be required by the specific application or task being performed. Refer to that system's technical manual or operating instructions for specific items required.

**Table 1. Standard Kit Item Inventory.**

ITEM	PN	NSN	DESCRIPTION
	13792387	TBD	MSD V4R TRANSIT CASE
	13792401	6625-01-718-7260	MSD-V4R LAPTOP (SHOWN WITH KEYBOARD ATTACHED)
	TBD	TBD	REMOVABLE KEYBOARD
	13792384	TBD	MSD-V4R REMOVABLE BATTERY (2 EA.)
	13792383	TBD	MSD-V4R SOLID STATE HARD DISK DRIVE, REMOVABLE
	13792385	TBD	MSD-V4R STYLUS AND LANYARD
	13792386	TBD	MSD-V4R AC POWER ADAPTER

ITEM	PN	NSN	DESCRIPTION
	13748488	6130-01-676-6977	3 ft. POWER CORD FOR A/C POWER ADAPTER
	13748515	7025-01-668-9311	MSD-V4 MOUSE
	13748518  BK/ATM-10  BK/ATM-15  GMA-3-R	5920-01-684-7104  5920-01-611-7031  5920-01-611-7043  5920-01-659-0438	MSD-V4 SPARE FUSE HOLDER ASSEMBLY: 1. CONTAINER HINGE TOP, ROUND, 14MMHX40MM DIA, PLASTIC, WHITE 2- FUSE, BLADE, ATM, 10A, RED 2- FUSE, BLADE, ATM, 15A, BLU 2- FUSE, CARTRIDGE, 3A
	BRXL-PT6U2VB BRXL-PUS6U3B	7025-01-659-5984	MSD-V4 BLU-RAY OPTICAL DRIVE
	13792392	TBD	MSD-V4 DC/DC POWER ADAPTER, USB-C
	13748512	5995-01-684-7754	MSD-V4 NATO CABLE

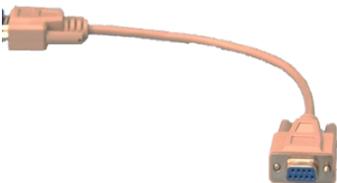
ITEM	PN	NSN	DESCRIPTION
	13748516	6130-01-684-4759	MSD-V4 EUROPEAN POWER ADAPTER, 100-240 VAC
	13792390	TBD	MSD-V4R SHOULDER STRAP
	13748513	5995-01-684-5770	MSD-V4 ETHERNET CABLE
	13792391	TBD	MSD-V4R CARRY HANDLE
	13748489	5975-01-684-4730	MSD-V4 CABLE STRAIN RELIEF TIE

### 1.3.2 Optional Accessories

In addition to the standard inventory listed above, the MSD-V4R set may also contain one or more of the following optional accessory items that may be required to fulfill the intended mission for that MSD.

**Table 2. Optional Additional Accessories.**

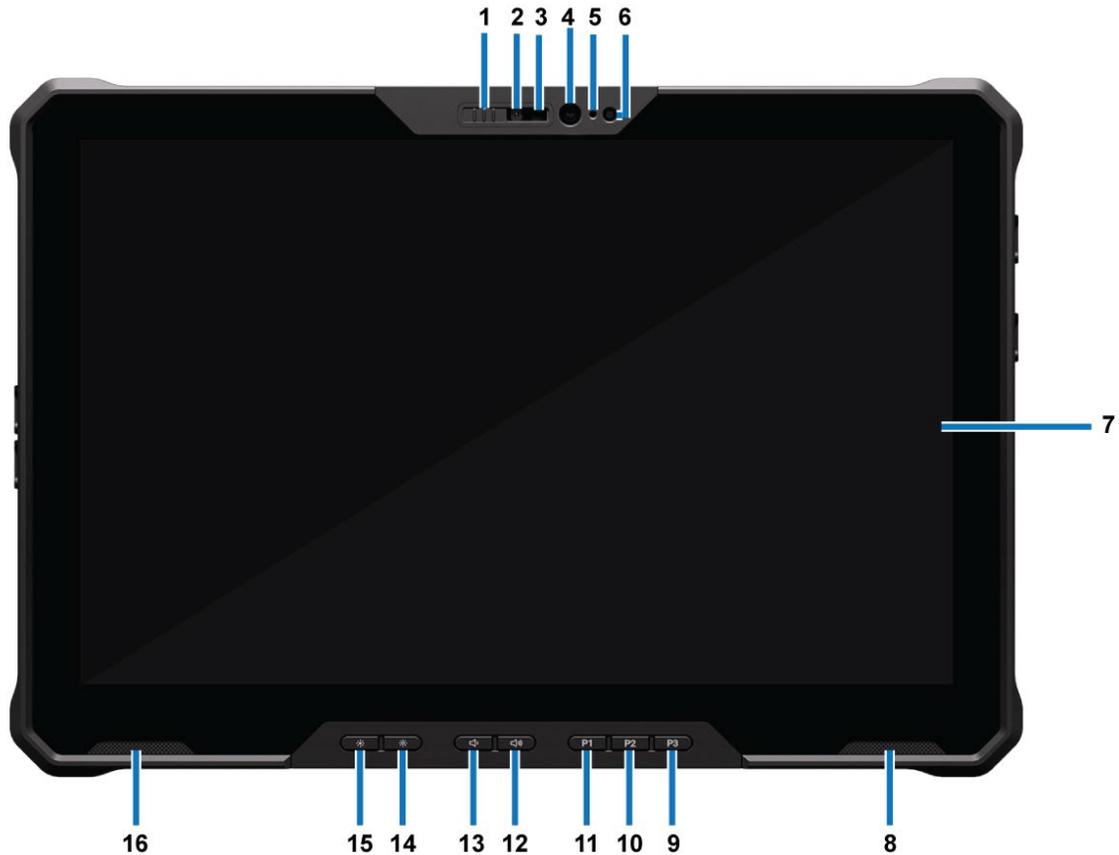
ITEM	CAGE CODE	PN	NSN	DESCRIPTION
	18876	13733870	5995-01-668-2169	MSD-V4 MIL-STD 1553 ADAPTER

ITEM	CAGE CODE	PN	NSN	DESCRIPTION
	18876	13748554	5995-01-718-7236	MSD-V4 USB HUB
	18876	13748547		MSD-V4 EXPRESS CARD ADAPTER W/CABLE
	18876	13748543	5895-01-677-1752	MSD-V4 RS 232/422/485 ADAPTER (P/O SERIAL CONVERTER KIT, PN 13748544)
	18876	13748542		MSD-V4 SERIAL EXTENSION CABLE, 1 FT (P/O SERIAL CONVERTER KIT, PN 13748544)
	18876	13748553		MSD-V4 PERSONAL COMPUTER MEMORY CARD INTERNATIONAL ASSOCIATION (PCMCIA) ADAPTER
	18876	13748548	7050-01-615-8761	MSD-V4 GPIB ADAPTER
	18876	13748546		MSD-V4 SMART CARD READER
	18876	13748545		MSD-V4 AC/DC 400HZ POWER ADAPTER

### 1.3.3 System Overview of MSD-V4R

#### Controls and Indicators- MSD-V4R

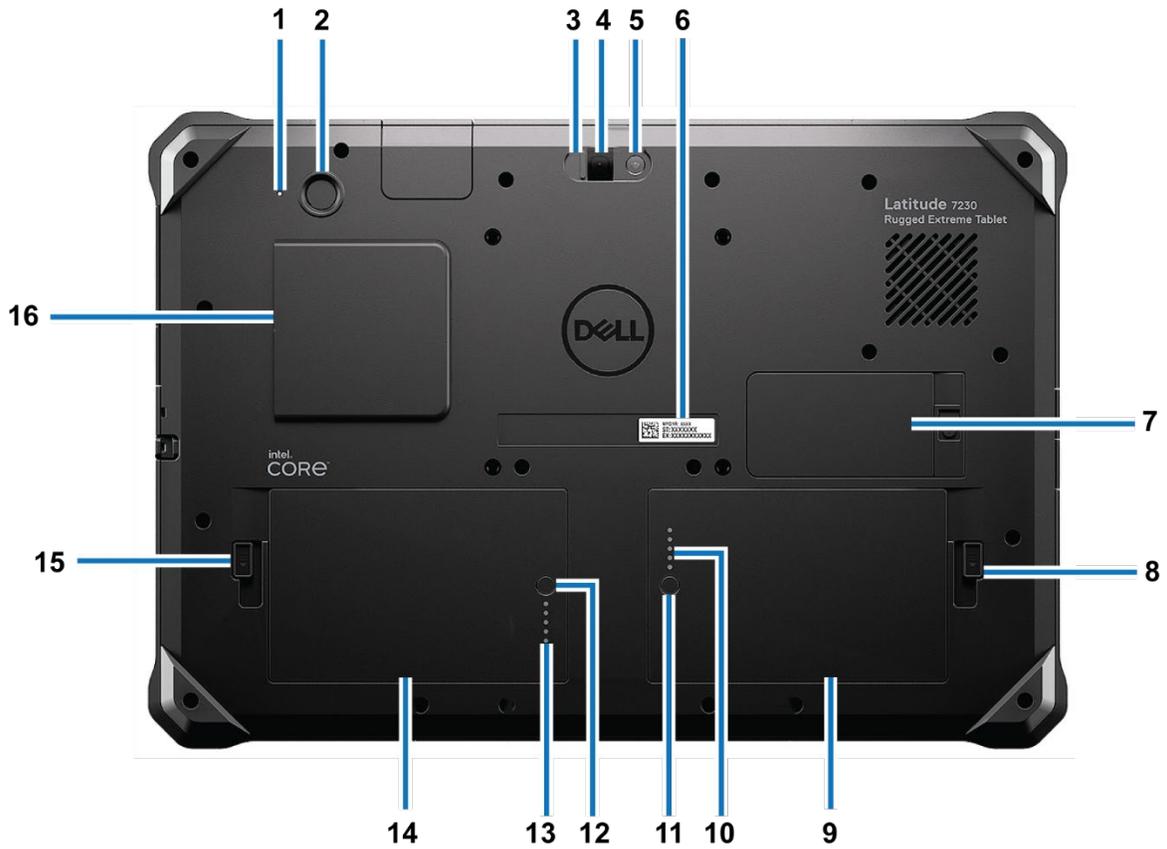
#### System Front View



**Figure 3. System Front View.**

1. Camera Shutter Door	2. RGB Camera
3. IR Camera	4. IR Emitter
5. Camera Status Light	6. Ambient Light Sensor
7. Display Screen	8. Right Speaker
9. P3- User programmable Button 3	10. P2- User Programmable Button 2
11. P1- User programmable Button 1	12. Volume Increase Button
13. Volume Decrease Button	14. Brightness Increase Button
15. Brightness Down Button	16. Left Speaker

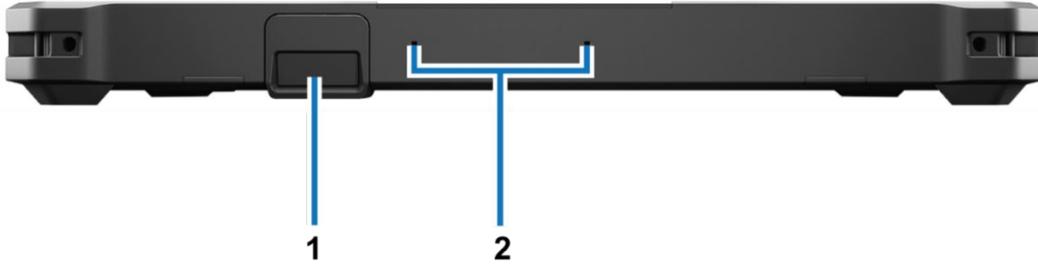
## System Back View



**Figure 4. System Back View.**

1. Power Button LED	2. Power Button with Fingerprint Reader
3. Camera Shutter Door	4. Camera Lens
5. LED Flash	6. Service Tag
7. Solid State Drive (SSD) door	8. Battery Latch Knob
9. Battery	10. Battery Status LED
11. Battery Button	12. Battery Button
13. Battery Status LED	14. Battery
15. Battery Latch Knob	16. Smart Card Reader Slot

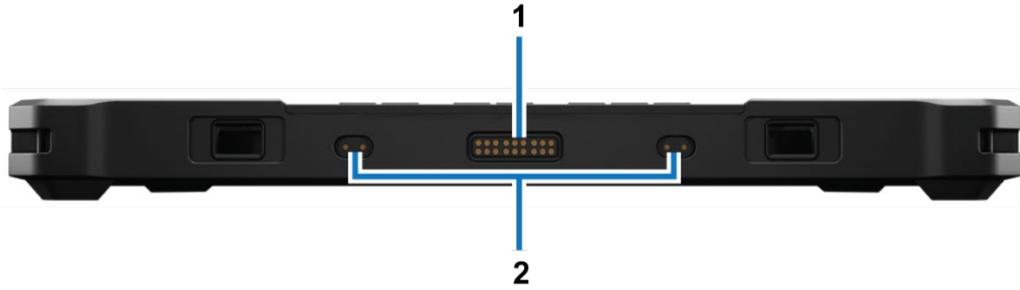
**System Top View**



*Figure 5. System Top View.*

1. Ethernet RJ45 Port	2. Microphone
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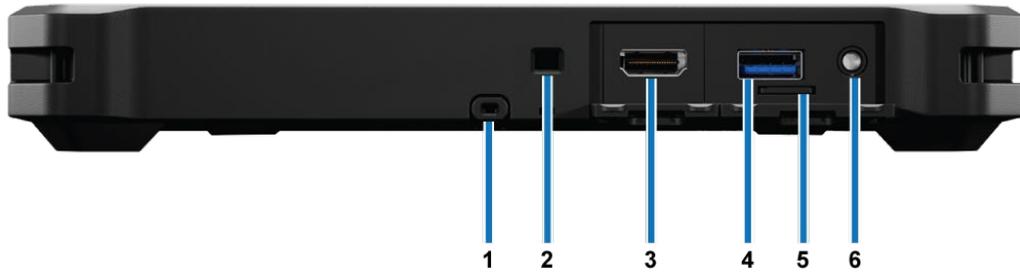
**System Bottom View**



*Figure 6. System Bottom View.*

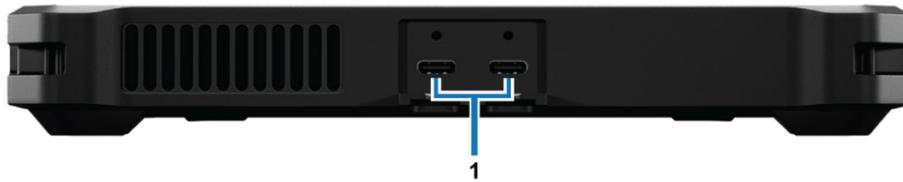
1. Docking Pogo Connector	2. RF Passthrough Dummy Cover
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## System Side Views



**Figure 7. System Side View- Right.**

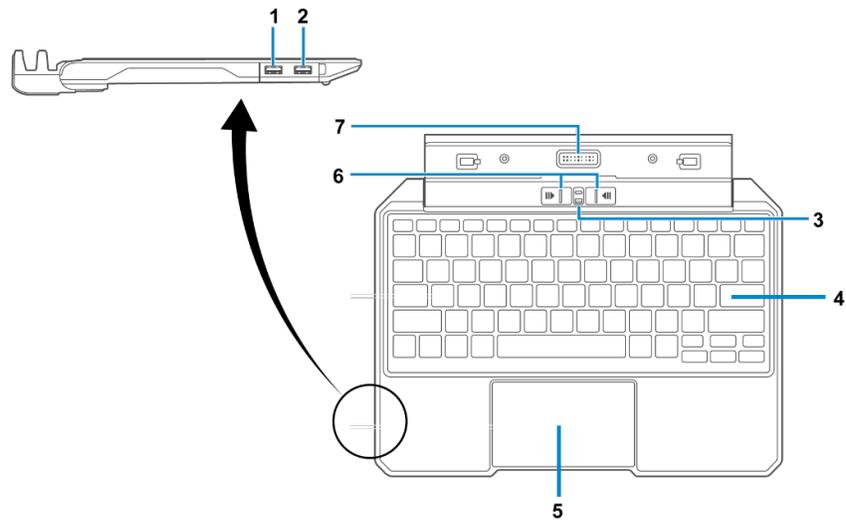
1. Stylus Slot	2. Wedge Lock Slot
3. HDMI Port	4. USB-A 3.2 Gen 1 Port with PowerShare
5. MicroSD Card Slot	6. Headset (Headphone and Microphone) Port



**Figure 8- System Side View- Left.**

1. Thunderbolt 4 Port with DisplayPort Alt Mode/USB4/Power Delivery
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### 1.3.4 MSD-V4R Keyboard



**Figure 9- Keyboard.**

1. USB 3.2 Gen 1 Type A Port with PowerShare	2. USB 3.2 Gen 1 Type A port
3. Tablet Lock	4. Keyboard
5. Clickpad	6. Tablet Release Sliders
7. Docking Pogo Connector	

## 2 Preparation for Use

### 2.1 Inspection

Before use, inspect the MSD-V4R set for shipping damage.

1. Carefully open the shipping container, noting if there is any damage to the container.
2. Remove MSD-V4R and all accessories from case.
3. Using the quick start card, inventory and thoroughly inspect case contents; inspect the MSD-V4R set for shipping damage. Check for dents, breaks, water damage, or any evidence of mishandling.
4. Look for and annotate any missing or broken items on a DA 2404 or DA 5988-E.
5. Connect the AC or DC adapter to the lower USB-C port on the LEFT side of the MSD-V4R and to the power source, and make sure it can power on. Refer to paragraph 2.3.1.

### 2.2 Removing and Installing Components

#### 2.2.1 Removing the Batteries



**WARNING: Using incompatible batteries may increase the risk of fire or explosion. Replace the batteries only with compatible batteries. The batteries are designed to work with the MSD-V4R. Do not use a battery from other computers with the MSD-V4R.**

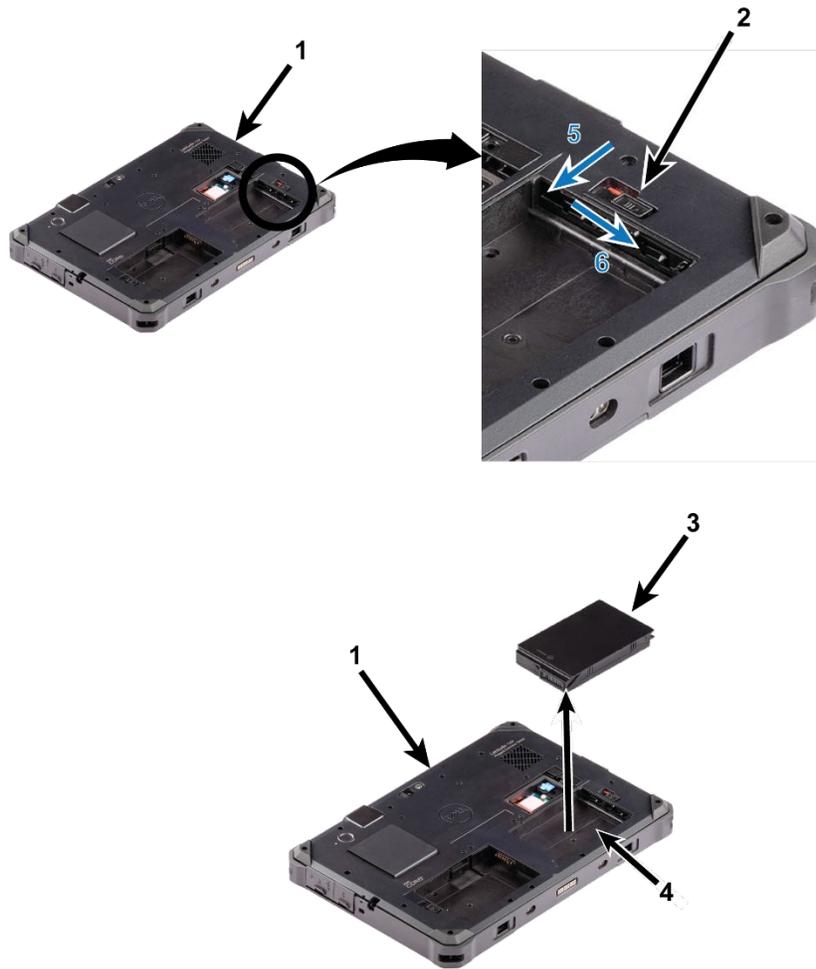


**WARNING: To prevent ignition in a hazardous atmosphere, batteries must only be removed, changed, or charged in an area known to be non-hazardous.**



**Note: The battery removal procedure is the same for either battery. Removal of the left-side battery is described in this procedure.**

1. Turn off the MSD-V4R (Figure 10, Item 1).
2. Disconnect the AC adapter from the electrical outlet and the MSD-V4R.
3. Remove any other external cables from the MSD-V4R.
4. Unlock the battery release latch (Figure 10, Item 2) by sliding the latch towards the battery (5). A red mark should be exposed when the latch is in the unlocked position.
5. Slide the latch down (6), towards the bottom of the MSD until the battery (Figure 10, Item 3) pops up slightly out of the battery bay (Figure 10, Item 4) .
6. Remove the battery (3) from the MSD-V4R.



**Figure 10. Battery Removal.**

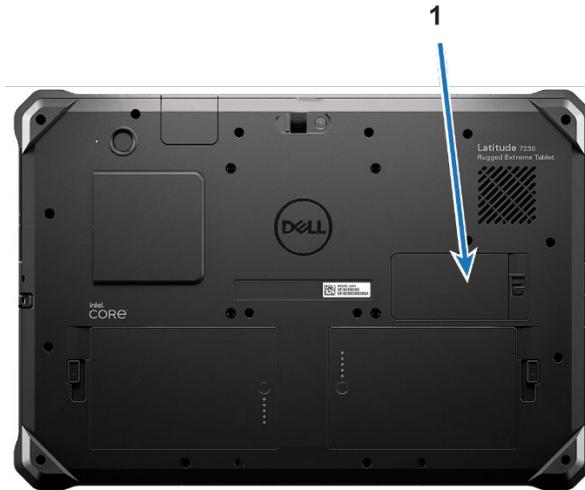
### 2.2.2 Installing the Batteries

1. Orient battery (Figure 10, Item 3) so that contacts face towards center of the MSD.
2. Place battery (Figure 10, Item 3) into battery bay (Figure 10, Item 4) and press down until an audible click is heard and battery snaps in place.
3. Slide battery latch (Figure 10, Item 2) outward from the MSD until it clicks in place and the red mark is covered.

### 2.2.3 Removing the Hard Drive

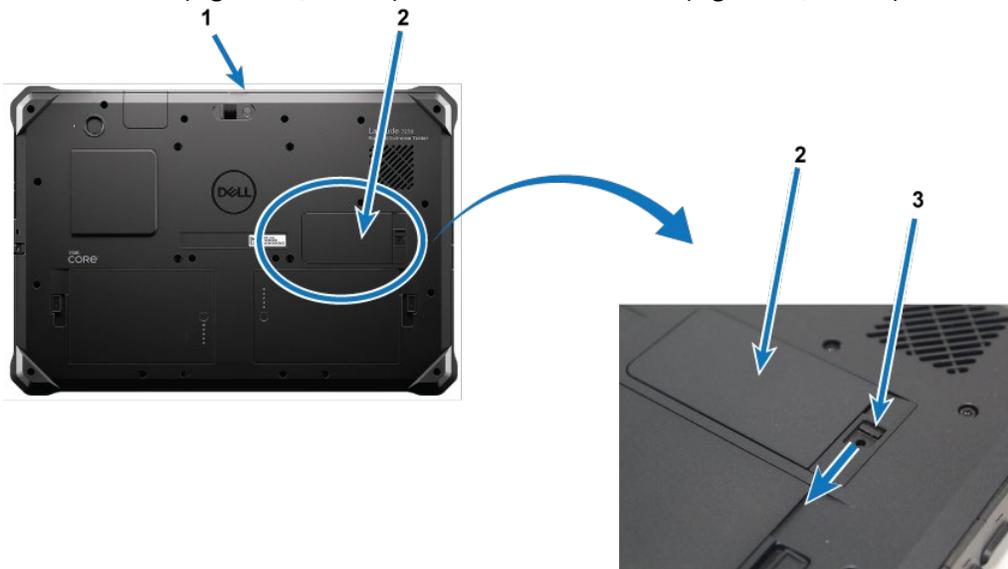
**△ CAUTION: DO NOT remove or install the hard drive while the system is powered on. Damage to the MSD-V4R or corruption of data on the hard drive may occur. Only a system administrator is authorized to perform system recovery.**

1. Turn off MSD-V4R, unplug from power supply, and remove batteries (Paragraph 2.2.1).
2. Turn MSD-V4R over and locate the SSD door on the back (Figure 11).



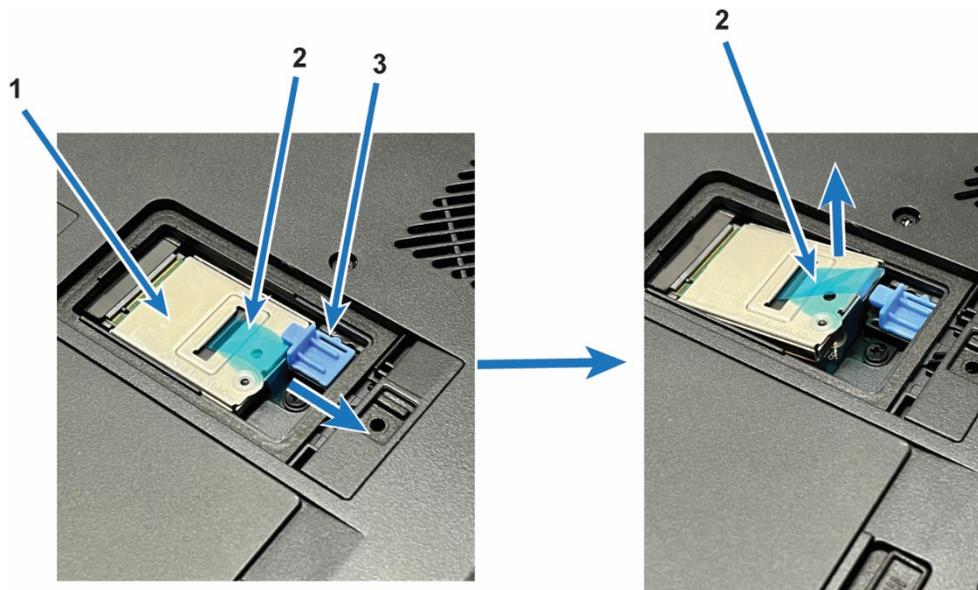
**Figure 11. SSD Door.**

3. Slide door latch (Figure 12, Item 3) in direction of arrow until door (Figure 12, Item 2) is released.
4. Lift door (Figure 12, Item 2) and remove from MSD (Figure 12, Item 1).



**Figure 12. SSD Door Removal.**

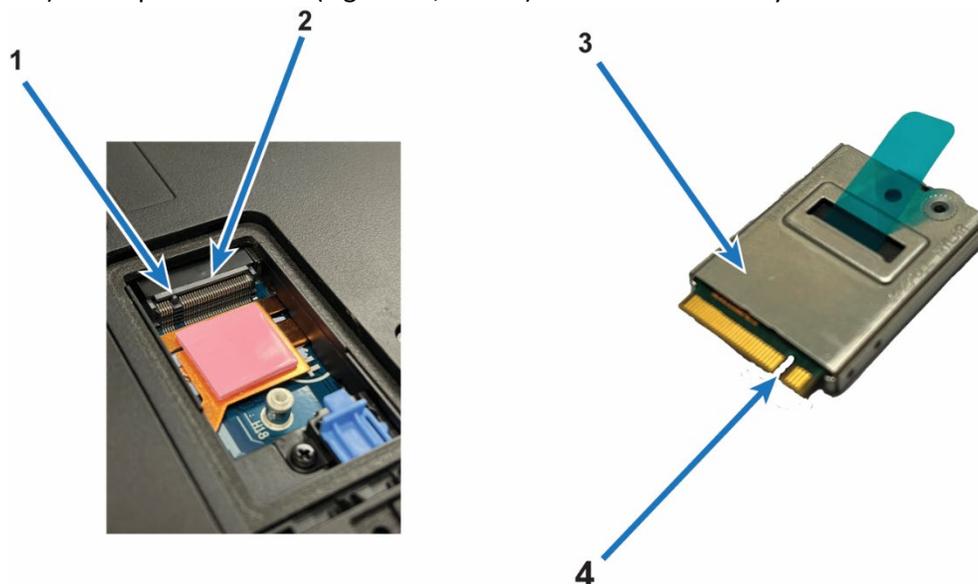
5. Slide BLUE SSD retention latch (Figure 13, Item 3) away from over the SSD assembly (Figure 13, Item 1).
6. Pull tab (Figure 13, Item 4) up and remove SSD assembly from the MSD.



**Figure 13. Remove SSD Assembly from MSD.**

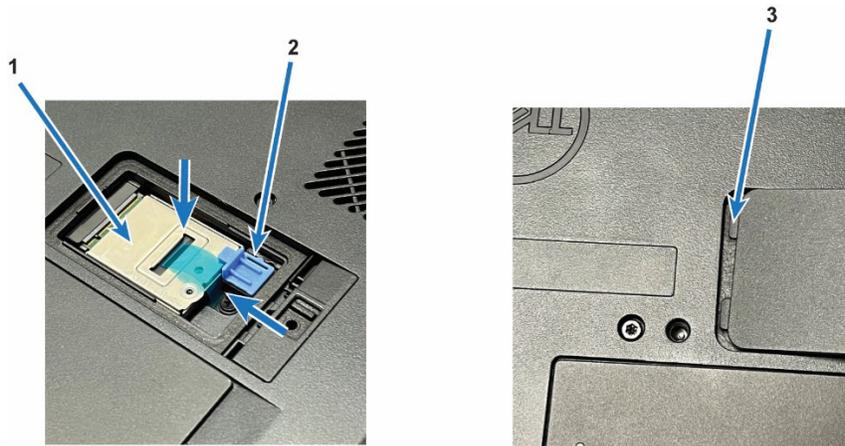
#### 2.2.4 Installing the Hard Drive

1. Align the SSD assembly (Figure 14, Item 3) so that the tab (Figure 14, Item 1) on the SSD slot (Figure 14, Item 2) lines up with the slot (Figure 14, Item 4) on the SSD assembly connector.



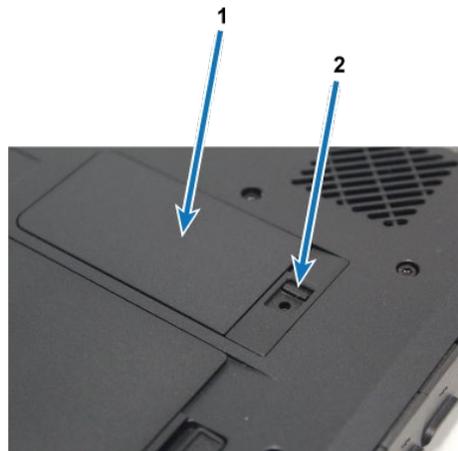
**Figure 14. SSD Connector Tab and Slot.**

2. Slide SSD assembly (Figure 14, Item 3) into the SD slot connector (Figure 14, Item 2) and press SSD assembly down (Figure 15, Item 1).
3. Slide SSD release latch (Figure 15, Item 2) over the SSD assembly (Figure 15, Item 1) and into the lock position.



**Figure 15. Install SSD Assembly.**

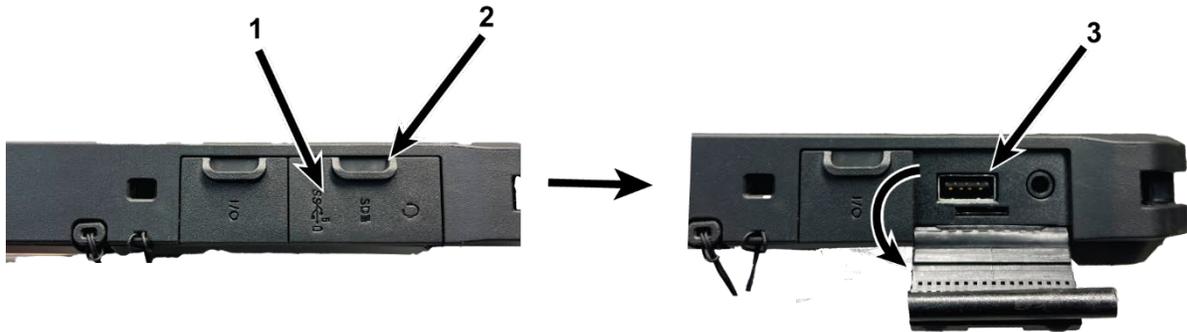
4. Line up the two tabs on the end of the SSD door (Figure 15, Item 3) with the slots in the MSD back cover.
5. Press door down (Figure 16, Item 1) until door latch (Figure 16, Item 2) engages to hold door in place.



**Figure 16. Install SSD Door.**

### 2.2.5 Accessing the I/O Ports

The I/O ports on the MSD-V4R and the detachable keyboard are protected with dustproof covers.

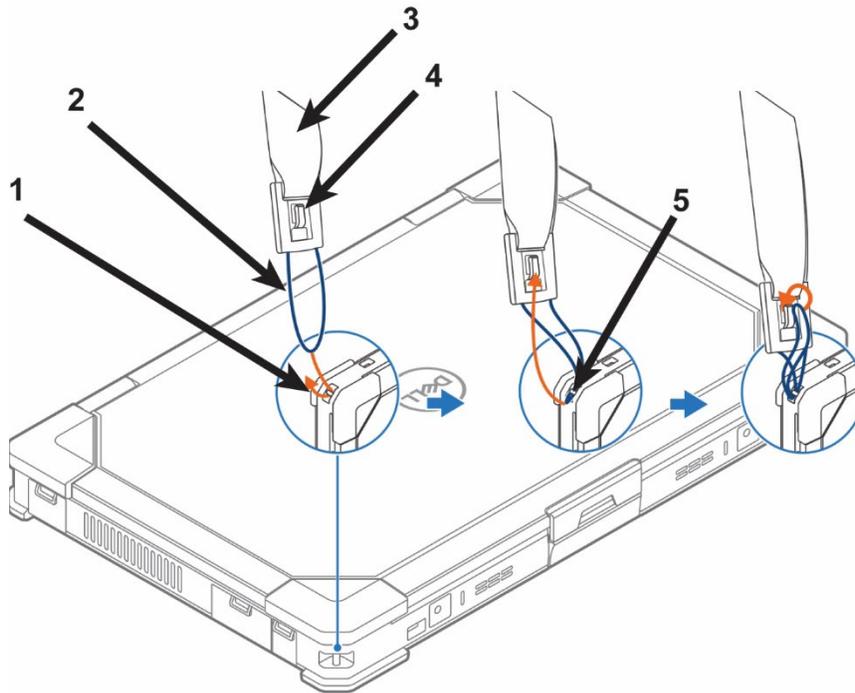


**Figure 17- Open I/O Port Cover.**

1. Locate correct port cover (Figure 17, Item 1). Covers have symbols corresponding to the type of port that it covers.
2. Use fingernail to pull out on tab ((Figure 17, Item 2).
3. Rotate cover down to reveal the I/O port ((Figure 17, Item 3).
4. To close cover, rotate cover back into position and push it in until a distinct click is felt.

### 2.2.6 Attach Shoulder Strap

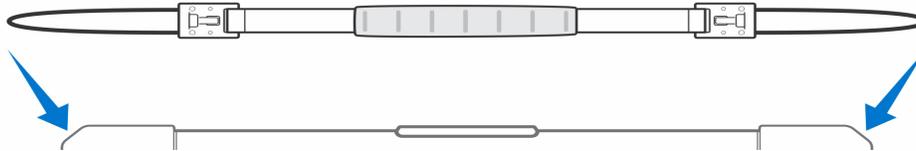
1. Identify side of MSD-V4R that shoulder strap (Figure 18, Item 2) will be attached to.



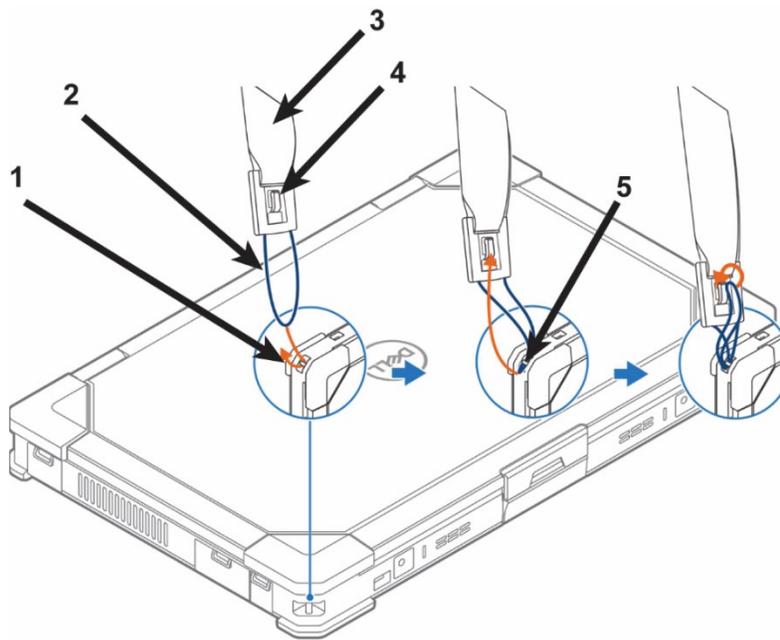
**Figure 18. Install Shoulder Strap.**

2. Hold shoulder strap (Figure 18, Item 3) so that retention tab (Figure 18, Item 4) on strap end is facing up/towards user.
3. Slide loop end of shoulder strap (Figure 18, Item 2) under the pin (Figure 18, Item 5) of the corner tether point (Figure 18, Item 1) as shown.
4. Push loop through tether point and pull back up and through itself.
5. Pull loop (Figure 18, Item 2) up and over retention tab (Figure 18, Item 4) on front of strap end.
6. Repeat for other end of shoulder strap.

### 2.2.7 Install Nylon Handle



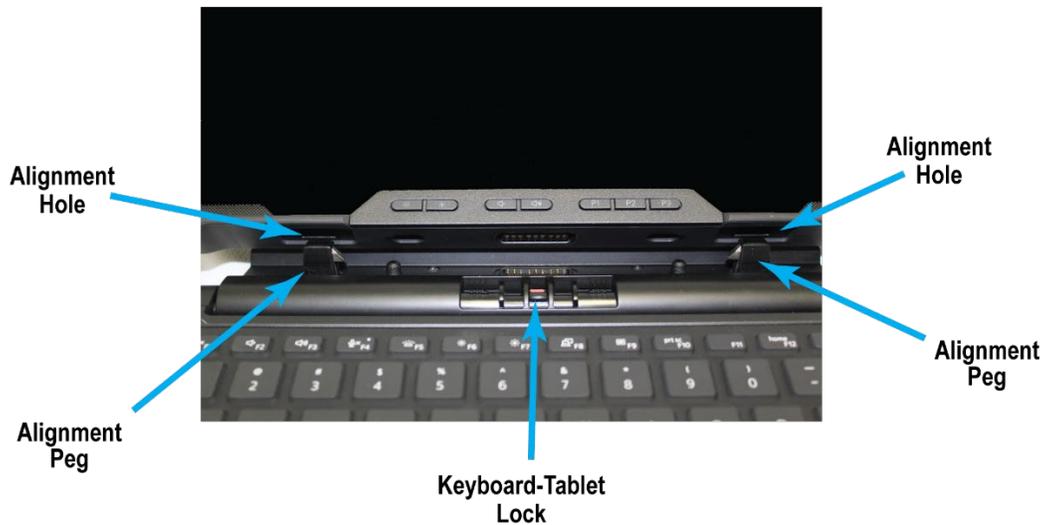
1. Hold handle (Figure 19, Item 3) so that so that retention tab (Figure 19, Item 4) on strap end is facing up/towards user.
2. Slide loop end of handle (Figure 19, Item 2) under the pin (Figure 19, Item 5) of the corner tether (Figure 19, Item 1) point as shown.
3. Push loop through tether point and pull end of loop back up through itself.
4. Pull loop up and over retention tab on front of handle end.
5. Repeat for other end of handle.



**Figure 19. Install Nylon Handle.**

## 2.2.8 Attach Keyboard

1. Place keyboard on a flat surface.
2. Rotate hinge to fully open position.
3. Insert tablet into the cradle near the hinge so that the alignment pegs on the keyboard fit into the alignment holes on the bottom of the tablet (Figure 20). Press into place until an audible click is heard.
4. Slide tablet lock (Figure 20) up to the LOCK position.



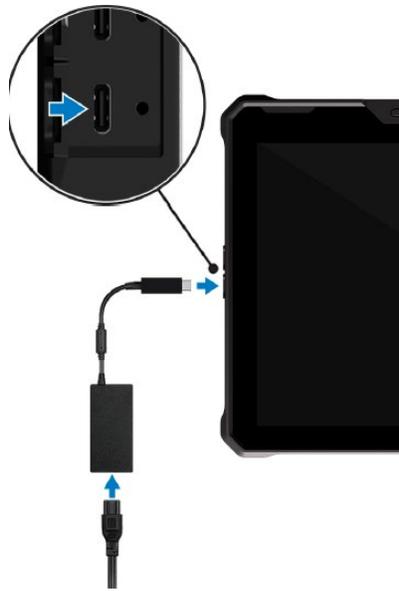
**Figure 20. Attach Keyboard to Tablet.**

## 2.3 Quick Setup

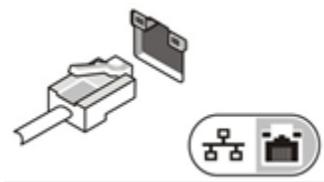
### 2.3.1 Power Up the MSD-V4R

**⚠ CAUTION:** The AC adapter works with electrical outlets worldwide. However, power connectors and power strips vary among countries. Using an incompatible cable or improperly connecting the cable to the power strip or electrical outlet may cause fire or equipment damage.

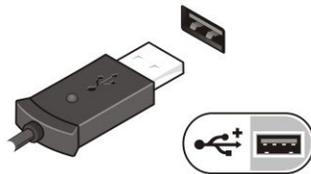
5. Remove MSD V4 and any accessories required for the specified operation from case.
6. Using quick start card, inventory case contents and annotate any missing or broken items on DA 2404 or DA 5988-E.
7. Connect the AC or DC adapter to the lower USB-C port on the LEFT side of the MSD-V4R and to the power source.



8. Connect the network cable, if applicable.

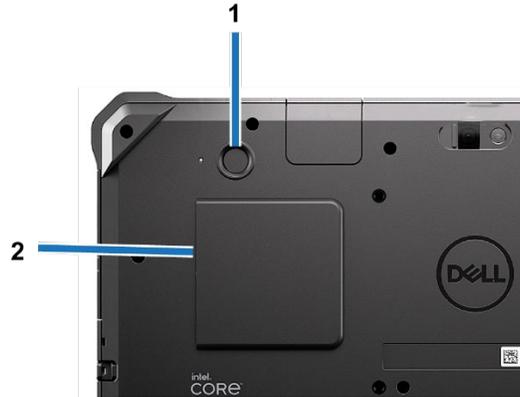


9. Connect USB devices to the appropriate USB ports. See Figures 7-9 to identify the USB ports.



10. Press and release the MSD power button (Figure 21, Item 1).

11. Insert CAC into Smart card reader (Figure 21, Item 2) when prompted by login. Smart card may be inserted prior to power up of the MSD.



**Figure 21. Power Button and Smart Card Reader.**

### 2.3.2 Turning off the MSD-V4R

**NOTE:** To avoid losing data, save and close all open files and exit all open programs before you turn off the MSD-V4R.

1. Click or tap .
2. Click or tap  and then click or tap Shut down.
3. Disconnect the AC adapter from the MSD-V4R. Grasp the connector end, not the cable, and pull firmly to avoid damaging the cable. When wrapping the AC adapter cable around the adapter for storage, follow the angle of the connector on the adapter to avoid damage to the cable.
4. Ensure that the MSD-V4R and all attached devices are turned off. If the MSD-V4R and attached devices did not automatically turn off when you shut down the operating system, press and hold the power button for about 6 seconds to turn them off.

### 3 MSD-V4R Normal Operation

This section provides information about the backlit keyboard, stealth mode, function keys and converting the MSD-V4R to notebook and tablet modes (if applicable).

#### 3.1 Theory of Operation

The MSD-V4R Test Set is composed of Commercial Off the Shelf (COTS) products that were assembled to support the military maintainer. The COTS solution allows for the US Army to update components as needed without a costly redesign. The kit also allows for items to be replaced without requiring the entire computer/kit to be returned to the maintenance facility.

The kit is composed of the following:

- Transit Case
- MSD-V4R Computer
- Standard Accessories
- Additional storage for Optional Accessories

Each of the items above will be discussed in further detail throughout this manual.

#### 3.2 Battery Charge and Status Light

The Battery Charge and Status Light (Figure 22, Item 1) indicates the current power state of the MSD-V4R. Refer to Table 3 for LED behavior.

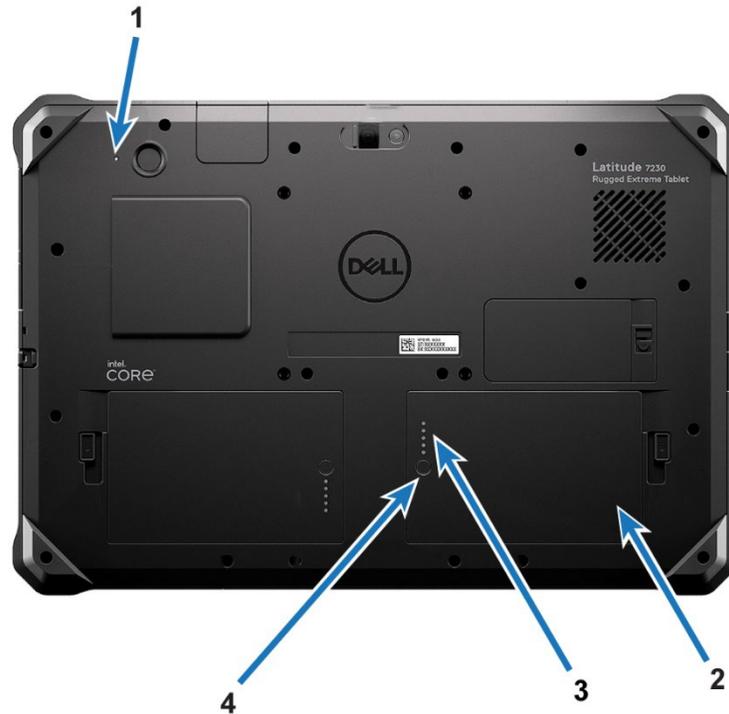
**Table 3. Power Status LED Behavior.**

Power Source	LED Behavior	Power State*	Battery Charge Level
AC Adapter	OFF	S0-S5	Fully charged
AC Adapter	Solid White	S0-S5	< Fully charged
Battery	Off	S0-S5	11-100%
Battery	Solid Amber	S0-S5	< 10%
Green light on	Battery in charge mode with AC adapter present		

\* Power States

- S0 (ON)- System is turned on.
- S4 (Hibernate)- The system consumes the least power compared to all other sleep states. The context data is written to the hard drive.
- S5 (OFF)- The system is in a shutdown state.

Press the Battery Status button (Figure 21, Item 4) to illuminate the battery status LED (Figure 21, Item 3) for that battery (Figure 21, Item 2). The battery status LEDs will indicate the charge status for the battery. Both batteries are identical in form and function.

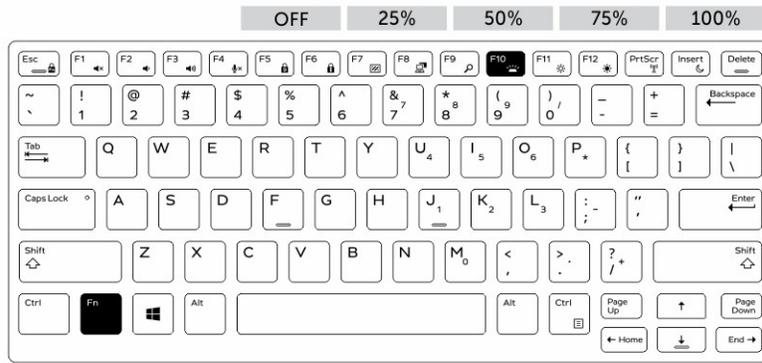


**Figure 22. Power and Battery Status LEDs.**

### **Turning the Keyboard Backlight On/Off or Adjusting Brightness**

To turn the backlight on/off or adjust the backlight brightness settings:

1. To initialize the keyboard backlight switch, press **Fn+F5** (the Fn key is not needed if function key Fn lock is enabled).
2. The first use of the preceding key combination turns on the backlight to its lowest setting.
3. Repeated pressing of the key combinations cycles the brightness settings through 25 percent,
4. 50 percent, 75 percent, and 100 percent.
5. Cycle through the key combination to either adjust the brightness or turn off the keyboard backlight.

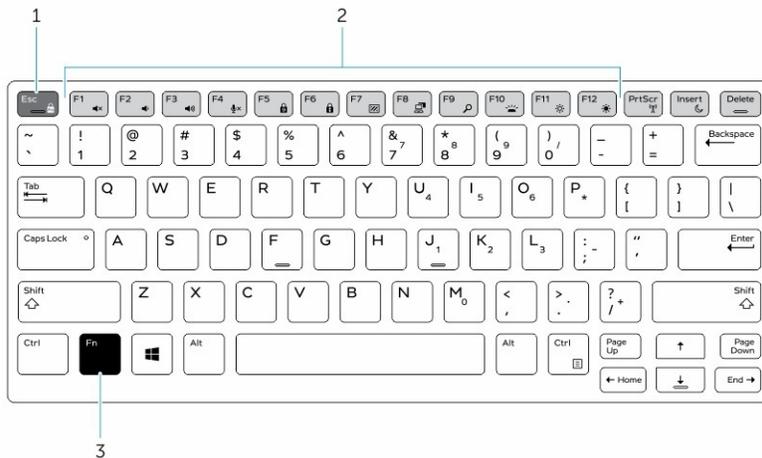


**Figure 23. Changing Keyboard Backlight Brightness.**

6. Cycle the backlight colors by pressing Fn+C on the keyboard. Default colors are White, Blue, Green and Red.

### 3.3 Keyboard Shortcuts

**NOTE:** The keyboard has Function key Fn lock capability. When activated, the secondary functions on the top row of keys become default and will not require use of the Fn key.



**Figure 24. Fn Key Callouts.**

1. Fn lock key
2. Affected Fn keys
3. Fn key

Keyboard shortcuts use the function keys to perform specific tasks. The Default functions are listed in Table 4.

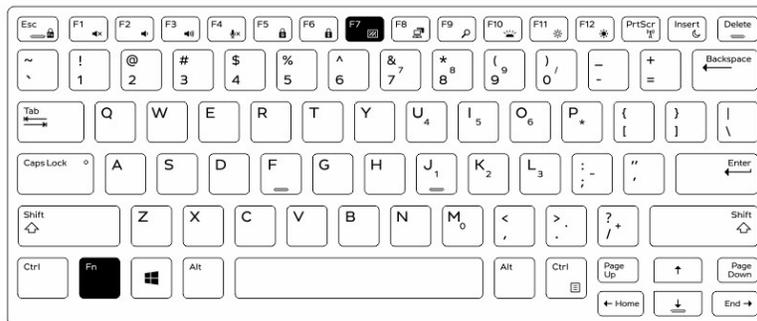
**Table 4. Keyboard Shortcuts.**

Function Key	Result
F1	Mute Audio
F2	Decrease Volume
F3	Increase Volume
F4	Mute Microphone
F5	Keyboard Backlight Brightness
F6	Decrease Screen Brightness
F7	Increase Screen Brightness
F8	Switch to External Display
F9	Scroll Lock
F10	Print Screen
F12	Home
Fn + Esc	Toggle Fn-key Lock

### 3.4 Stealth Mode

The MSD-V4R comes equipped with a stealth mode feature. When stealth mode is enabled, the MSD-V4R remains functional but does not emit any light or sound. Stealth mode allows you to turn off the display, all the LED lights, internal speakers, the fan, and all wireless radios with a single key combination.

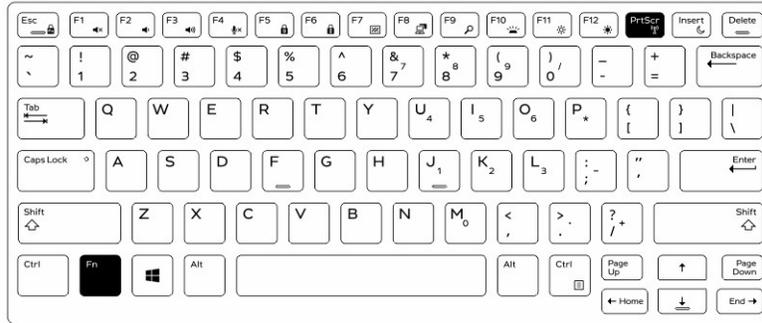
1. Press the **Fn + F7** key combination (Fn key not needed if Fn lock is enabled) to turn on stealth mode.
2. All the lights and sounds are turned off.
3. Press the **Fn + F7** key combination again to turn off the stealth mode.



**Figure 25. Fn + F7 Stealth Mode Control**

### 3.5 Enabling and Disabling the Wireless (Wi-Fi)/Airplane Mode Feature

1. To enable wireless Networking, press **Fn + PrtScr**.
2. Press **Fn + PrtScr** again to disable wireless Networking.



**Figure 26. Enable WiFi Feature.**

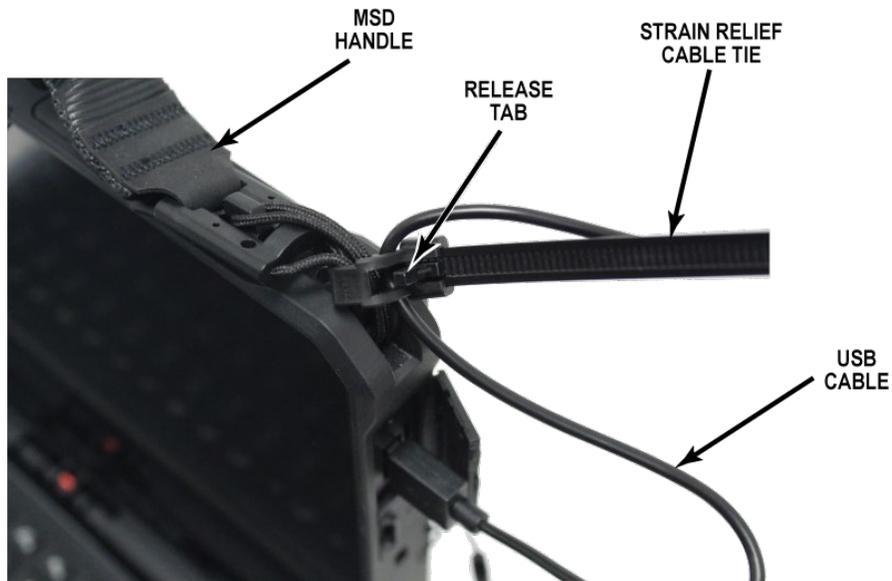
### 3.6 Strain Relief Cable Tie

Use the strain relief cable tie when any accessory is connected to the MSD-V4R using a USB or serial cable. The strain relief cable tie prevents accidental disconnection of a cable during operation.

**CAUTION:** Accidental disconnection of cables can result in damage to equipment.

Connect Strain Relief:

1. Connect shoulder strap to MSD-V4R.
2. Connect device cable to MSD-V4R. Refer to appropriate chapter of this manual for proper device connection.
3. Use strain relief cable tie to secure cable to ring of MSD-V4R shoulder strap quick disconnect.
  - a. Wrap strain relief around MSD Handle and device cable.
  - b. Slide end through slot and slide slotted end down until strain relief is snug around device cable.



**Figure 27. Strain Relief Cable Tie**

4. Remove strain relief from MSD-V4R.
  - a. Press and hold release tab.
  - b. Slide slotted end out and off straight end of strain relief cable tie.

## 4 Standard Accessories- Normal Operation

The test set comes with the following accessories as standard to use the MSD in most field conditions and applications. Additional accessories may be included in a test set, according to the intended application of the MSD.

### Other Standard Accessories:

The items listed in Table 3 indicate the items that are furnished with the MSD-V4R itself. These items are resident in the MSD-V4R and do not have separate operating procedures.

**Table 5. Standard Components of the MSD-V4R**

Item description
Hard Drive
AC Power Adapter
Stylus and Tether
Handle
Shoulder Strap
Batteries
Keyboard

### 4.1 DC/DC Power Adapter

#### Description

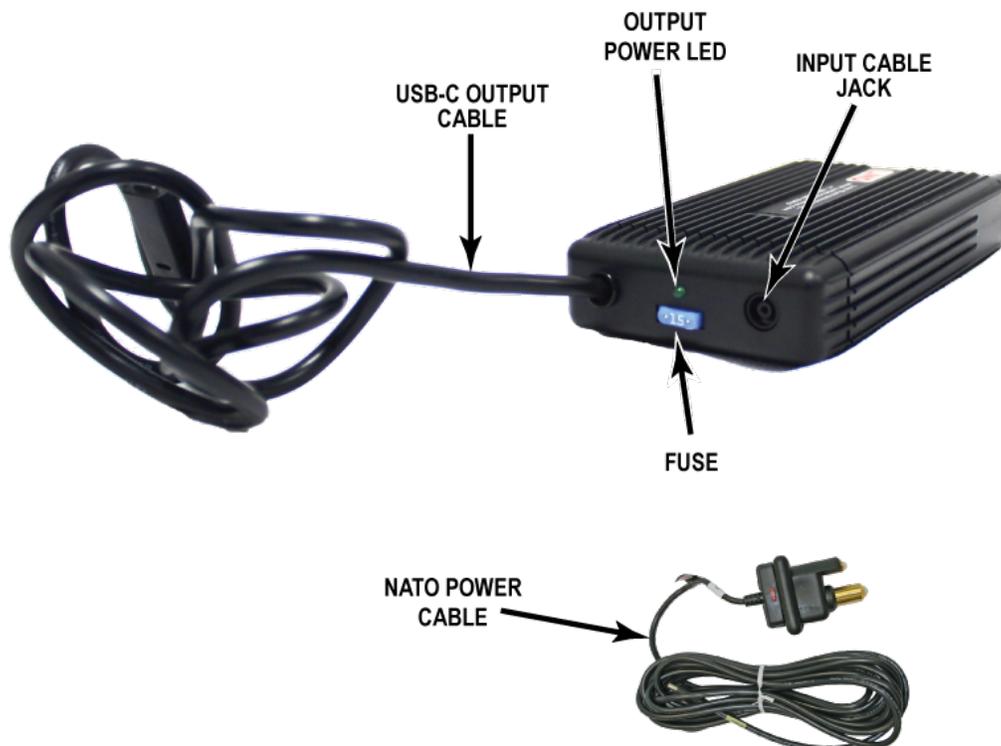
**⚠ CAUTION: DO NOT Jump start vehicle with the MSD connected. Many jump start systems use high voltage and can damage the MSD or adapter.**

The DC/DC Power Adapter is designed to power the MSD-V4R and to charge its internal batteries from an appropriate DC voltage power source (see adapter label for acceptable DC voltage ranges). The adapter supplies current and voltage levels as required by the laptop.

The adapter provides safe power to the laptop by protecting it from spikes and power surges which may occur in a DC voltage electrical system.

You can start or stop the vehicle engine with the adapter plugged in; however, do not jump start the vehicle with the adapter plugged in. Many jump start systems use high voltages that will normally shut down the adapter output, but extreme voltage spikes may damage the adapter circuitry. Also, starting the vehicle may turn the adapter off. After a ten second delay, the adapter will turn back on.

## Operating Instructions



**Figure 28. DC/DC Power Adapter Connections.**

1. Connect NATO power cable to input cable jack.
2. Connect output cable to output cable jack.
3. Connect NATO cable to power source (See paragraph 4.4).
4. Check output present LED and ensure it is lit.
5. Connect output cable to MSD-V4R power jack.



**Figure 29. DC/DC Adapter with NATO Cable.**

**NOTE:** This adapter utilizes components that may degrade if stored unused for several years. Apply power for several minutes yearly to avoid problems.

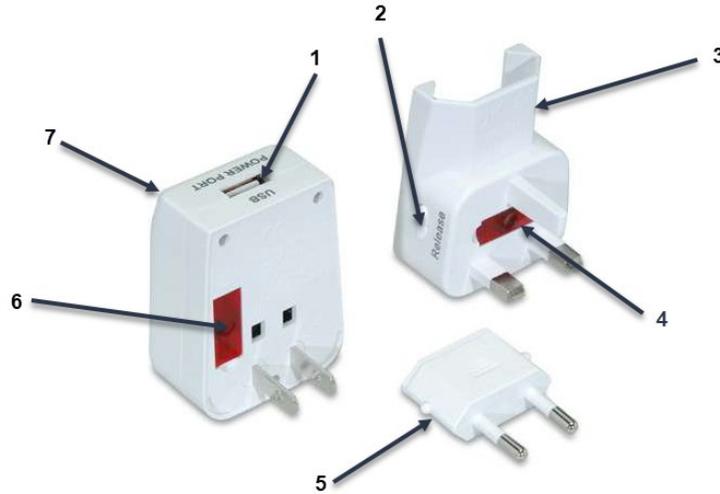
## Technical information

Power Input:	18-32 VDC
Power Output:	20 VDC
Input Fuse:	See label on input cable
Indicators:	LED on adapter (output power present)
Features:	Output short circuit protected Output current limit Internal Overtemperature shutdown Low input voltage shut down High input voltage shut down Automatic reset of safety shut down

### 4.2 European Adapter

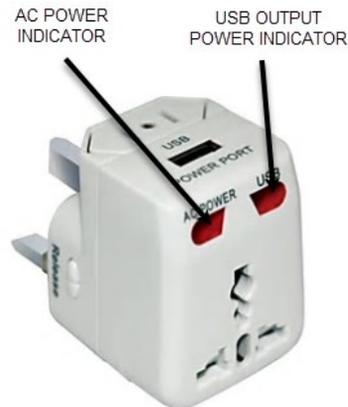
The 4.2 European Adapter with USB power port allows you to power up and charge up the gear at the same time. The AC POWER and USB Status LED lights indicate ON/OFF status respectively. It is designed to fit UK, US, AU, and EU styled outlets. The USB port is compatible with both 100-125 and 220-250 VAC standards.

 **CAUTION: The AC POWER port does not convert power voltage. Please ensure the electronics adapter is rated to handle both 100-125 and 220-250 volt standards. Damage to equipment will occur if the adapter is not rated for the voltage standard in use.**



**Figure 30. European Adapter (Disassembled).**

Find number	Description
1	USB Port
2	Release Button- Releases Plug-UK from Plug-US
3	Plug-UK
4	Replacement Fuse Compartment with Supplied Spare Fuse
5	Plug-EU
6	Power Fuse
7	Plug-US



**Figure 31. European Adapter Power Indicators.**

#### 4.2.1 Configuring Universal Adapter for Use

1. Press the release buttons on both sides of the adapter assembly simultaneously to separate Plug-UK from Plug-US.



**Figure 32. Separating UK-US Plugs.**

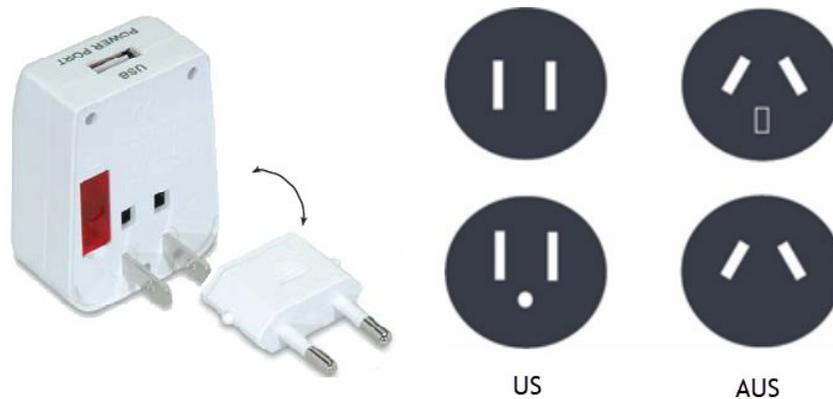
2. Pull plug-EU out from socket in plug-UK to separate the plug-EU from Plug-UK as shown in Figure 29.



**Figure 33. Separating Plug-EU from UK.**

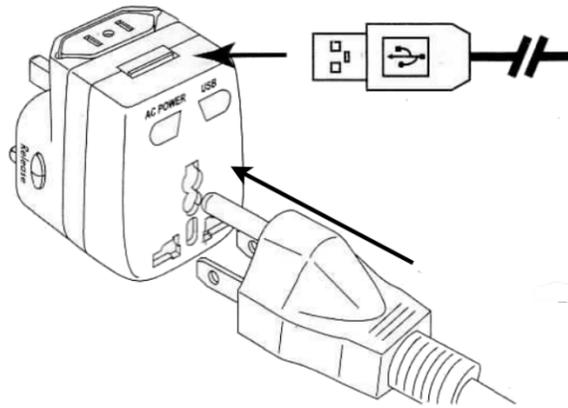
#### 4.2.2 Configure US Plug for AUS (Australia)

1. Insert one pin at a time into the plug-EU as shown.
2. Use the plug-EU to rotate and adjust pins for US or AUS standard use.



**Figure 34. US-AUS Pin Configuration.**

3. Connect power cord or USB cord to adapter as shown in Figure 31.

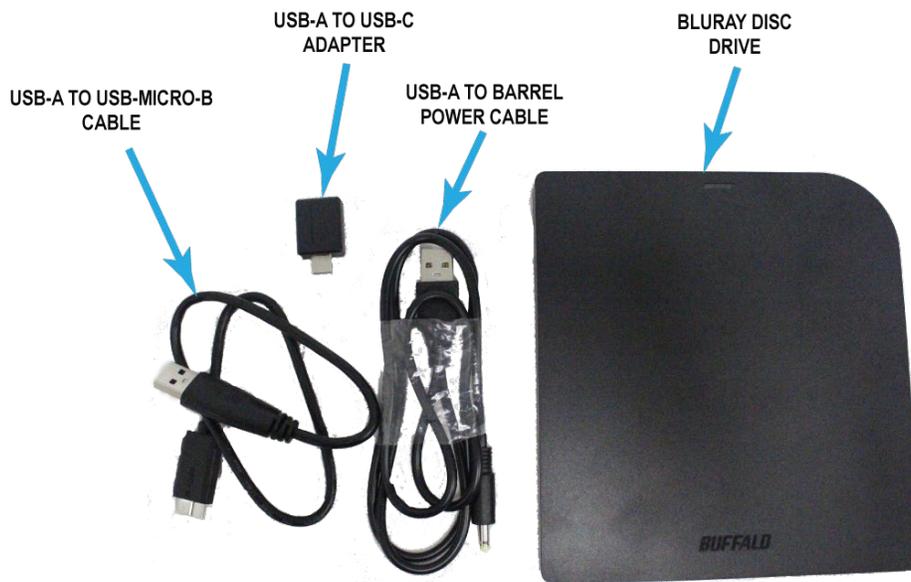


**Figure 35. Connect to adapter.**

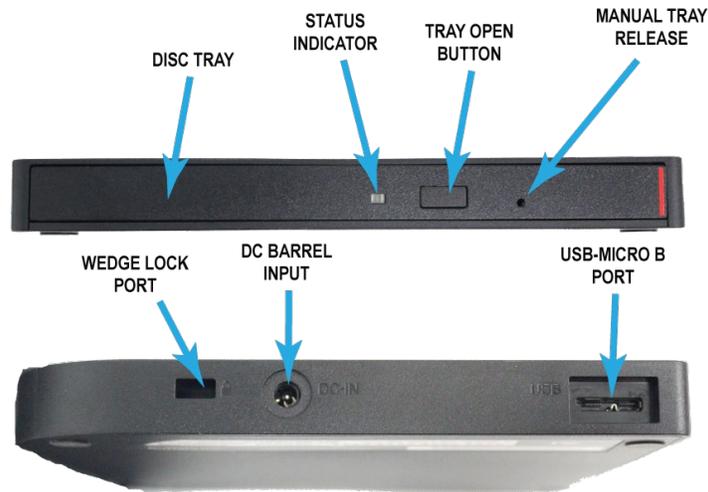
### 4.3 Blu-Ray Optical Drive (BD)

The Blue-ray allows users to burn, store and transfer data files – up to 128 GB capacity on a single BDXL format disc.

#### Controls and Indicators



**Figure 36. BD Drive and Cables.**



**Figure 37. BD Drive Controls and Indicators.**

### **Connecting the BD Drive to the MSD-V4R**

1. Power up the MSD-V4R.
2. Connect USB-Micro-B connector of cable to BD drive. Do not use the USB to barrel cable unless directed.
3. Connect USB cable to available USB port on right side of MSD-V4R, or use USB-a to USB-C adapter to connect cable to USB-C port on left of MSD.
4. The power indicator will glow green when the drive is initialized and properly powered.
5. If the indicator is RED, connect the secondary (USB to Barrel) USB cable of the BD drive to an additional USB port on the MSD-V4. This should not be necessary if using the MSD-V4R USB 3.0 port.
6. Press drive door open to open the BD disk tray.
7. Insert disk -label up- onto tray, ensuring disk snaps into place.
8. Slide tray into BD drive and press door to close disk tray.
9. Follow on-screen instructions.

## Specifications- BRXL-PUS6U3B

### SPECIFICATIONS

<b>USB PORTS</b>	USB 3.2 (Gen 1) x 1
<b>CONNECTOR TYPE</b>	Type-A/Type-C
<b>DIMENSIONS</b>	5.8 x 5.4 x 0.6 in. (147.3 x 137.1 x 15.2 mm), .58 lbs. (.26 kg)
<b>CLIENT OS SUPPORT</b>	Windows® 11 (64-bit) Windows® 10 (32-bit/64-bit) Windows® 8.1 (32-bit/64-bit) macOS® 10.15 or later
<b>POWER CONSUMPTION</b>	Max 7.5 W
<b>POWER SUPPLY</b>	USB Power

### BLU-RAY READ/WRITE SPEEDS

<b>BD-R SL</b>	6x Read / 6x Write
<b>BD-R DL</b>	6x Read / 6x Write
<b>BD-R TL</b>	4x Read/4X Write
<b>BD-R QL</b>	4x Read/4X Write
<b>BD-RE SL</b>	6x Read / 2x Write
<b>BD-RE DL</b>	6x Read / 2x Write
<b>BD-RE TL</b>	4x Read / 2x Write
<b>BD-ROM SL</b>	6x Read
<b>BD-ROM DL</b>	6x Read

### DVD READ/WRITE SPEEDS

<b>DVD-R SL</b>	8x Read / 8x Write
<b>DVD-R DL</b>	8x Read / 6x Write
<b>DVD+R SL</b>	8x Read / 8x Write
<b>DVD+R DL</b>	8x Read / 6x Write
<b>DVD-RW</b>	8x Read / 6x Write
<b>DVD+RW</b>	8x Read / 8x Write
<b>DVD-RAM</b>	5x Read / 5x Write
<b>DVD-ROM SL</b>	8x Read
<b>DVD-ROM DL</b>	8x Read

### CD READ/WRITE SPEEDS

<b>CD-R</b>	24x Read / 24x Write
<b>CD-RW</b>	24x Read / 16x Write
<b>CD-ROM</b>	24x Read

#### 4.4 NATO Power Cable

The NATO power cable is designed to allow the MSD-V4R to be powered through the NATO connector of a vehicle. It is connected between the vehicle and the DC/DC power supply.



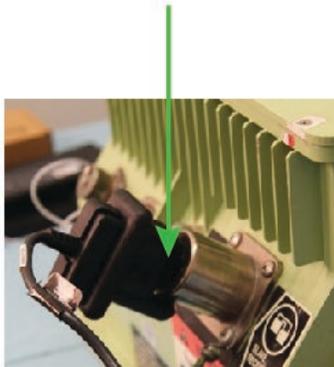
**Figure 38. NATO Power Cable.**

#### Using NATO Power Cable

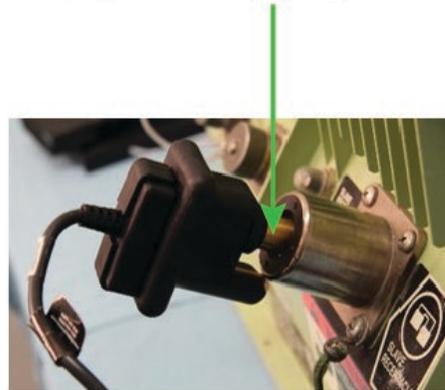
**⚠ WARNING: Shock Hazard: Improper connection of the NATO connector can result in serious injury or death from shock. DO NOT touch NATO plug conductor while it is connected to a receptacle.**

1. Connect NATO cable to DC/DC power supply input jack. Ensure connector is fully inserted into receptacle. No center conductor should be exposed when properly connected. See Figure 39.

Proper insertion, no exposed conductor



NATO plug not inserted properly, shock hazard



**Figure 39. Proper NATO Connection.**

2. Locate NATO port on vehicle and connect NATO power cable to NATO connector.
3. Apply power to NATO connector in accordance with the vehicle's normal operating procedures.
4. Connect DC/DC power supply output cable to the MSD power jack.

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## 5 Optional Accessories- Normal Operation

The MSD-V4R kit can include a combination of the following optional accessories, appropriate for the intended mission of the test set.

**NOTE:** Some of these devices may require software or drivers to be installed in order to work with the MSD-V4R. Contact your system administrator for any actions requiring software changes to the MSD-V4R.

### 5.1 MIL-STD-1553 to USB Interface Cable

The MIL-STD-1553 to USB interface cable allows the MSD to communicate on a MIL-STD-1553 bus via USB interface.

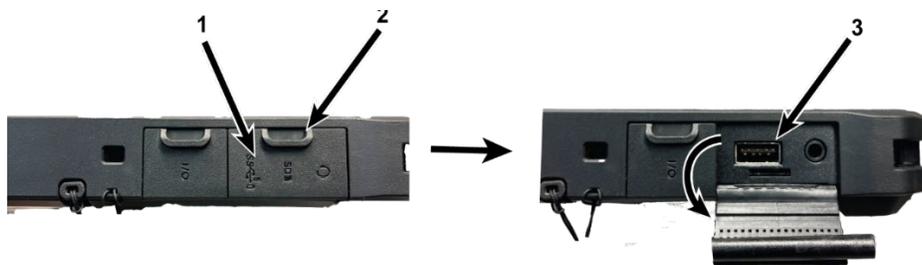


**Figure 40. 1553-USB Interface Cable.**

### Using the MIL-STD-1553 to USB Interface Cable

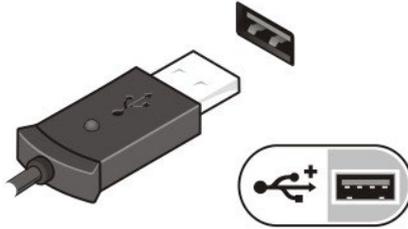
**NOTE:** While the USB connector can be plugged in with the MSD power on or off, it is preferred that the interface cable be connected to the USB port prior to powering on the MSD.

1. Locate the USB-A port on the right side of the MSD-V4R.
2. Open the I/O port dust cover.



**Figure 41. Open I/O Port Dust Cover.**

3. Connect the MIL-STD-1553 to USB interface cable USB connector to the MSD USB port.



**Figure 42. USB Connection.**

4. Follow on-screen instructions for the application that is in use.

## 5.2 USB Hub, 4 Port, USB 3.0, With Cable

The USB hub can be used when more USB 3.0 ports are required for a task. It plugs into any of the USB ports on the MSD-V4R.

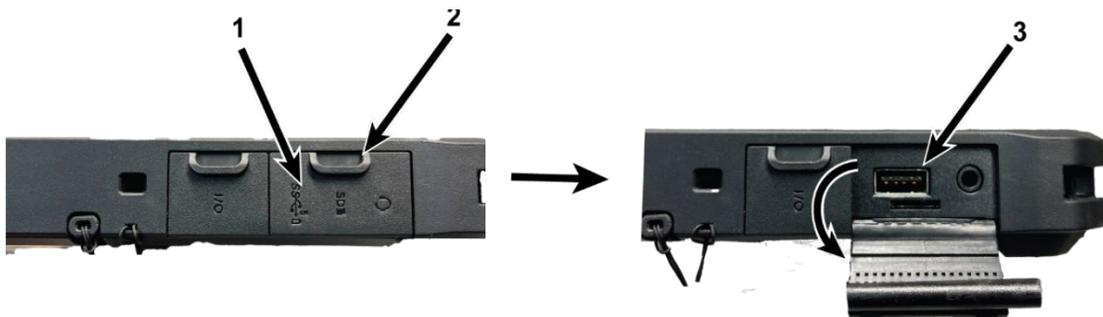


**Figure 43. USB Hub.**

### Using the USB Hub

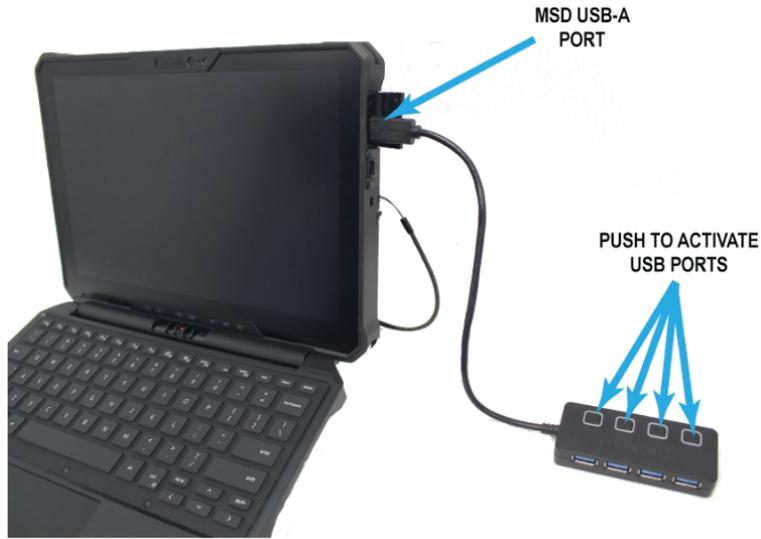
**NOTE:** While the USB connector can be plugged in with the MSD power on or off, it is preferred that the interface cable be connected to the USB port prior to powering on the MSD.

1. Locate the appropriate USB port to be used on the MSD. Refer to Figure 7 or Figure 8.
2. Open the I/O port dust cover.



**Figure 44. Latch Door Slide.**

3. Connect the required USB devices to the USB hub.



**Figure 45. USB Hub Connected to MSD-V4R.**

4. Press button above USB port on hub to activate that USB port.

### 5.3 Express Card Adapter

The Express card adapter works with USB-based Express cards. It allows for hot-swap (connect/detach devices without turning off the system) and is USB 2.0 compliant.



**Figure 46. Express Card Adapter.**

**NOTE:** While the USB connector can be plugged in with the MSD power on or off, it is preferred that the interface cable be connected to the USB port prior to powering on the MSD.

## Using the Express Card Reader

1. Locate the USB port on the back side of the MSD-V4R and connect the Express card adapter USB connector to the USB 2.0 port.
2. To insert an Express card, gently slide Express card device into the Express card slot of the Express card adapter until it stops.
3. To remove, gently pull Express card device out of the Express card slot of the Express card adapter.

## 5.4 AC/DC 400Hz Power Adapter

The AC/DC 400Hz Power Adapter is used to provide power to the MSD-V4R using various AC and DC voltage and frequencies.

This power adapter features:

- Rugged construction allows use in tough operating environments.
- Sealed and potted to resist moisture and high humidity.
- Output: 20 VDC.
- Extended life of the device batteries by using DC power in mobile devices.
- Replaceable input and output cables (most models).
- Operation over wide temperature range.
- Short circuit protection.
- Output overvoltage and overcurrent protection.

When using the ruggedized combination AC/DC adapter, follow these precautions:

- When using the AC power input, only use the provided cables.
- The rated AC input voltage is between 90 VAC and 264 VAC at 47 to 400 Hz. The input voltage need not be changed with a transformer or the like.
- Never attempt to disassemble or modify the adapter. In the event of failure, turn in adapter.
- Never use a multi-plug adapter to plug multiple power plugs in the same outlet.
- The metal case of the adapter can get hot during normal use, particularly when operating in high ambient temperatures. Use caution when handling and mounting the adapter.
- Do not cover or restrict airflow around adapter in any manner. Excessive adapter temperature may result.

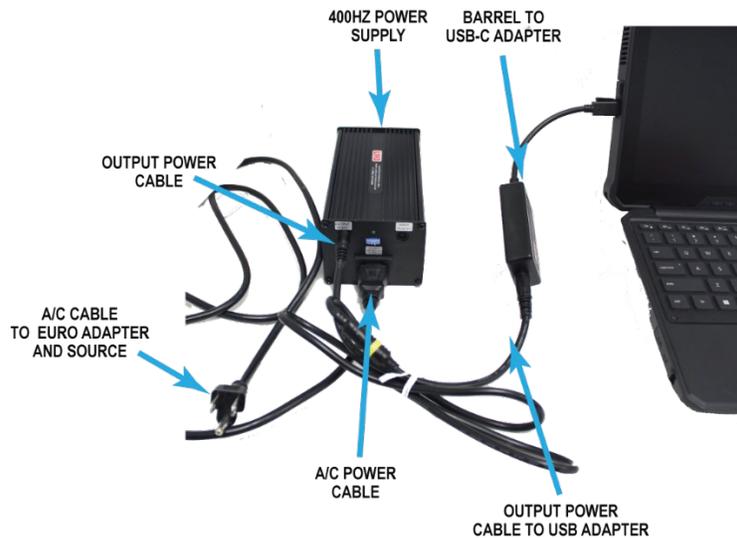
 **WARNING:** Do not damage, stretch, or excessively bend the power cord. A fire or electric shock may result.

 **WARNING:** When unplugging the power plug, grasp the plug, not the cord. Pulling the cord forcibly can damage the cord and consequently cause a fire or electric shock.

 **WARNING:** Never attempt to plug or unplug the power plug or the connector of the AC adapter when the hands are wet. An electric shock may result.

 **CAUTION:** If you detect smoke or unusual smell, turn the device off and unplug the power plug immediately.

## Operating Instructions

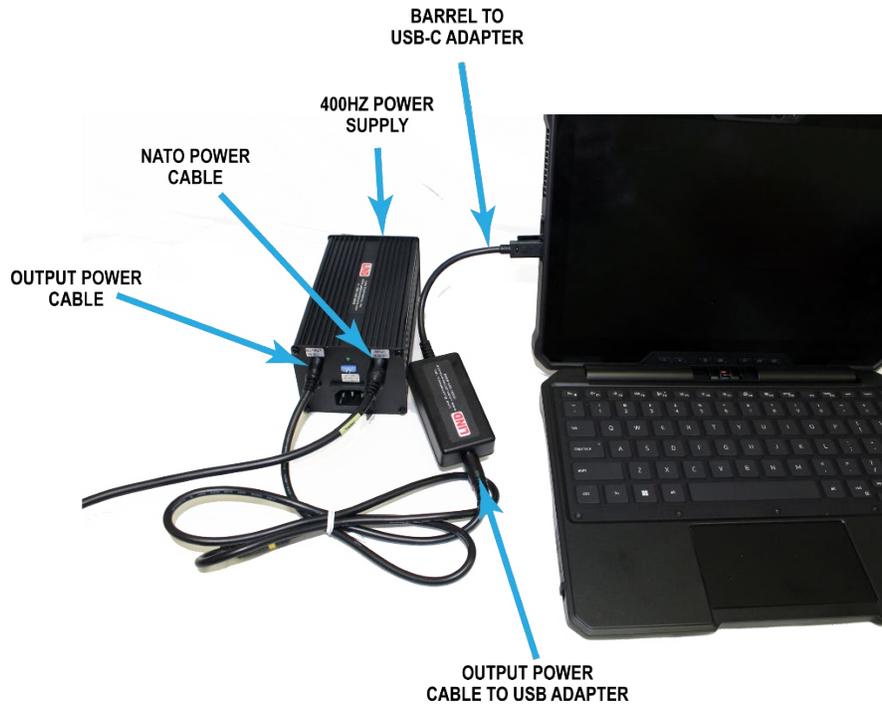


**Figure 47. Power Supply with AC Input.**

To connect the AC/DC 400Hz Power Adapter to the system from an AC voltage source:

1. Firmly plug the snap-in connector of the DC output cable into adapter output jack.
2. Plug the connector of the DC output cable into the mating DC input connector on the electronic device you are to power.
3. Plug the AC power cord into the power adapter.
4. Plug the outlet end of the AC power cord into the AC wall outlet.
5. Confirm that the green "Output Present" LED is on, and that power is now being supplied to the device.

This connection sequence may be altered without an effect on operation.



**Figure 48. Power Supply with DC Input.**

To connect the AC/DC 400Hz Power Adapter to the system from a DC voltage source (**Figure 42**):

1. Firmly plug the snap-in connector of DC output cable into adapter output jack.
2. Plug the connector of the DC output cable into the mating DC input connector on the electronic device you are to power.
3. Insert the supplied NATO DC input cable into the power adapter.
4. Insert the supplied NATO DC input cable into the NATO DC voltage source.
5. Confirm that the green “Output Present” LED is on, and that power is being supplied to the device from the DC source.

This connection sequence may be altered without an effect on operation. You can now use the system with the power supplied by the adapter.

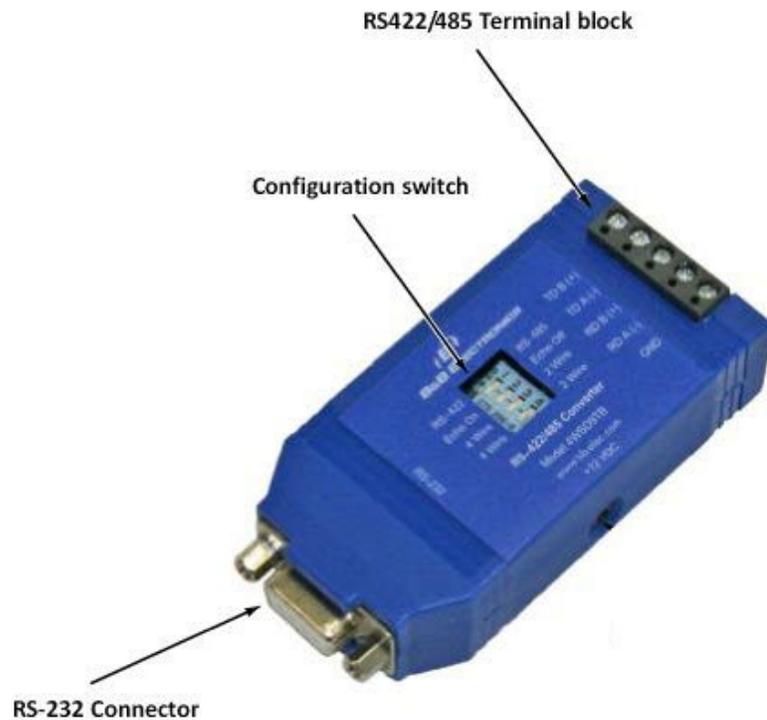
## TECHNICAL INFORMATION

Input Voltage:	100-240 VAC, VDC (noted on label)
Input Fuse:	Noted on Input Cable Label
Indicators:	LED on Lighter Plug on some Models (input present) LED on Adapter (output power present)
Frequency:	47-400 Hz
Input Current:	1.5 Amperes Maximum
Output Voltage:	20 VDC

Weight/Size:	31.3 ounces / 6.0 x 1.75 x 1.75 inches
Operating Ambient Temp:	-18°C to 60°C (0°F to +140°F)
Storage Temp:	-32°C to +71°C (-25°F to +160°F)
Operating Rel. Humidity:	5—95% Non-Condensing
Features:	Output Short Circuit Protected Output Current Limit Internal Overtemperature Shutdown (DC input only) Low Input Voltage Shutdown (DC input only) Automatic Reset of Safety Shutdown

### 5.5 RS232/422/485 Adapter

The RS232/422/485 Adapter may be used in applications where communication across different RS-232/422 busses is necessary. Used with a DB-9 extender cable, it converts RS-232 traffic from the MSD-V4R to RS422/485 data, and vice versa.



**Figure 49. RS232/422/485 Adapter.**

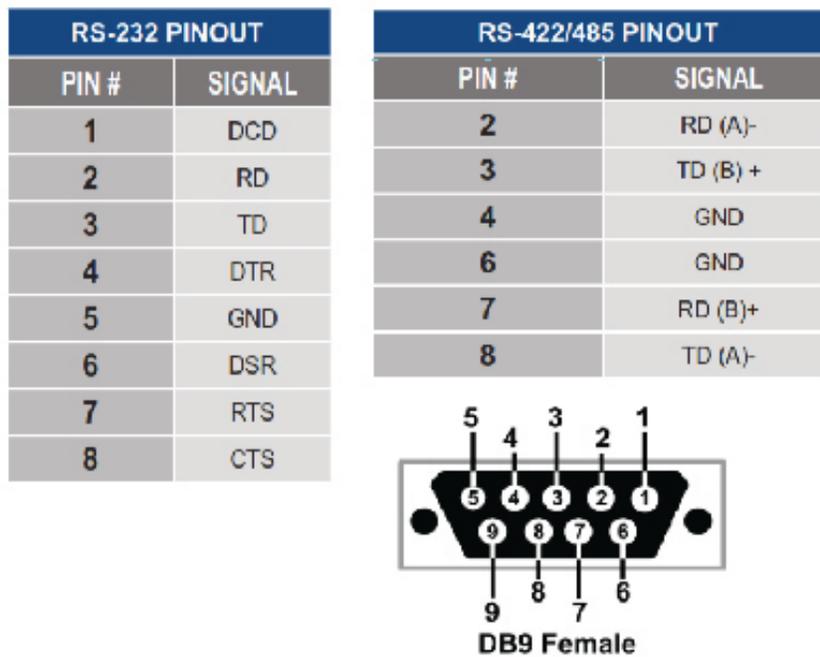
## Using the RS232/422/485 Adapter

1. Set adapter configuration switches as needed for the intended application.

SWITCH SETTINGS RS-485 2-Wire Half-Duplex		SWITCH SETTINGS RS-485 4-Wire Full-Duplex		SWITCH SETTINGS RS-422 4-Wire Full-Duplex	
SWITCH #	POSITION	SWITCH #	POSITION	SWITCH #	POSITION
1	RS-485	1	RS-485	1	RS-422
2	Echo Off	2	Echo On	2	Echo On
3	2-wire	3	4-wire	3	4-wire
4	2-wire	4	4-wire	4	4-wire

**Figure 50: Configuration Switch Settings**

2. Connect output cable to the terminal block according to the mode in which it will be used.



**Figure 51. Terminal Block pinouts.**

3. Connect serial extender cable to adapter to RS232 to USB adapter.



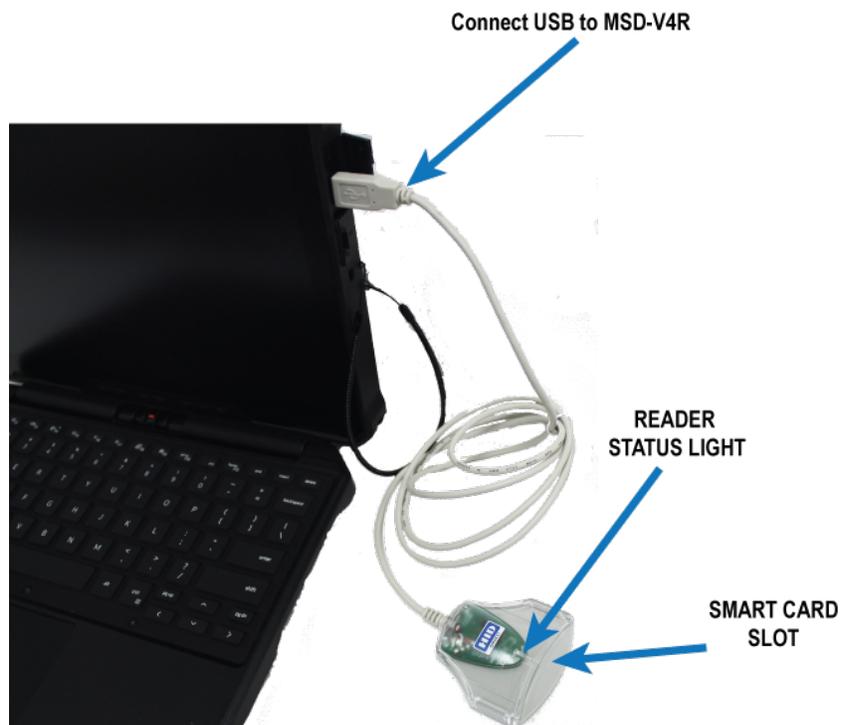
**Figure 52. Connect RS232-485 to MSD.**

4. Connect RS232 to USB adapter to MSD-V4R USB-A port.
5. Follow on-screen instructions or instructions from system or test set being supported.

## 5.6 USB Smart Card Reader

The USB Smart Card reader can be used to add an additional Smart Card reader to the MSD-V4R.

1. Connect reader to a USB port on the MSD-V4R.
2. Insert Smart Card into reader slot when instructed by application.



**Figure 53. Smart Card Reader Connection.**

## 6 Troubleshooting

The MSD-V4R is under warranty. Refer to Chapter 11 of this manual for warranty repair process.

### 6.1 Troubleshooting the MSD-V4R

Using the table below, locate the appropriate symptom or symptoms, and perform corrective action listed in the corrective action column.

**Table 6. MSD-V4R Symptoms and Corrective Actions.**

Symptom	Corrective Action
Battery Charging Problems	<p><b>NOTE: The batteries should be charged while the system is off for faster charge time. Longer charge times may occur when the system is turned on and running graphics-intensive applications.</b></p> <ul style="list-style-type: none"> <li>• Check connections between system and power supply. Reseat any loose connections.</li> <li>• Switch to different power supply and check for correct charging. If the battery begins charging, the power supply that was removed may be faulty.</li> <li>• If above steps do not correct the fault, replace the system's batteries.</li> <li>• If fault persists after replacing the batteries, turn in MSD for warranty repair (refer to Chapter 11).</li> </ul>
No Power On Self-Test (POST), or System Does Not Power Up	<ul style="list-style-type: none"> <li>• Connect power supply to the MSD and check that the system has a power light.</li> <li>• If the system has no power light, make sure that it is plugged into AC power and that AC power is present at the outlet.</li> <li>• If using DC power supply, ensure DC power supply input indicator is lit. Correct connections if needed and check MSD again for power light.</li> <li>• Remove the batteries. Make sure that the power is turned off and the system is unplugged.</li> <li>• Remove all accessories and peripherals from the system, reconnect the AC adapter to the system and try again.</li> <li>• Turn in MSD for warranty repair (refer to Chapter 11).</li> </ul>
Display Does Not Show, or is Garbled	<ul style="list-style-type: none"> <li>• If the LCD is not displaying any video, connect an external monitor to eliminate a no-POST problem. A good image on the external monitor eliminates a video card problem or a POST problem.</li> <li>• If LCD screen has color problems, lines that should not be there, or burned-out pixels, turn in MSD for warranty repair (refer to Chapter 11).</li> </ul>
Touch Pad and Keyboard	<ul style="list-style-type: none"> <li>• Connect external mouse, or keyboard if available.</li> <li>• Turn in MSD for warranty repair (refer to Chapter 11).</li> </ul>

Symptom	Corrective Action
Issues Using Touchscreen, or Cannot Access Items Near the Edge of the Screen	<ul style="list-style-type: none"> <li>• Perform touchscreen calibration procedure (7.6).</li> <li>• If touchscreen calibration procedure fails to correct the problem, turn in MSD for warranty repair (refer to Chapter 11).</li> </ul>

## 6.2 DC/DC Power Adapter

**Table 7: DC/DC Power Adapter Symptoms and Corrective Actions.**

Symptom	Corrective action
The Output LED on the Adapter Does Not Light When Plugged In	<ul style="list-style-type: none"> <li>• It is possible that one of the safety shut down circuits in the adapter has tripped. If so, allow the automatic reset to restore the output power for the adapter.</li> <li>• Visually check the adapter fuse for damage. Also check fuse for continuity using multimeter. Replace fuse if it shows signs of damage or multimeter reads as open. <a href="#">Preventive Maintenance Checks and Services (PMCS)</a></li> <li>• If adapter does not reset, or fuse checks as ok, turn in DC/DC power adapter. Refer to warranty procedures (Chapter 11).</li> </ul>
Adapter Gets Warm During Normal Use	Restricted air flow around the adapter may cause the adapter to overheat and shut down. This is a safety feature and does not harm the adapter or the MSD-V4R. Do not place the adapter in an air flow restrictive area or cover it with anything that prevents the heat from dissipating.

## 6.3 AC/DC 400 Hz Power Adapter

**Table 8: AC/DC 400 Hz Power Adapter Symptoms and Corrective Actions.**

Symptom	Corrective action
The output LED on the Adapter Does Not Light When Plugged In	<ul style="list-style-type: none"> <li>• It is possible that one of the safety shut down circuits in the adapter has tripped. If so, allow the automatic reset to restore the output power for the adapter.</li> <li>• Visually check the adapter fuse for damage. Also check fuse for continuity using multimeter. Replace fuse if it shows signs of damage or multimeter reads as open. <a href="#">Preventive Maintenance Checks and Services (PMCS)</a></li> <li>• If adapter does not reset, or fuse checks as ok, turn in AC/DC power adapter. Refer to warranty procedures (Chapter 11).</li> </ul>
Adapter Gets Warm During Normal Use	Restricted air flow around the adapter may cause the adapter to overheat and shut down. This is a safety feature and does not harm the adapter or the MSD-V4R. Do not place the adapter in an air flow restrictive area or

Symptom	Corrective action
	cover it with anything that prevents the heat from dissipating.

#### 6.4 Universal World Traveler Adapter

Symptom	Corrective action
The AC Power Light Does Not Come On When Adapter is Plugged In	<ul style="list-style-type: none"> <li>• Ensure there is adequate AC voltage at the socket the adapter is plugged into. Move adapter to a different outlet and check that the AC power light comes on.</li> <li>• Check outlets for adequate AC power.</li> <li>• Turn in adapter for warranty repair (refer to Chapter 11).</li> </ul>
No AC Output From Adapter	<ul style="list-style-type: none"> <li>• Ensure AC power light is on. If not, go to previous action.</li> <li>• Replace adapter fuse: <a href="#">Preventive Maintenance Checks and Services (PMCS)</a></li> <li>• If problem persists, turn in adapter for warranty repair (refer to Chapter 11).</li> </ul>

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## 7 Maintenance

### 7.1 Service Upon Receipt

#### 7.1.1 Unpacking

The MSD-V4R is shipped in its transit case with the standard accessories. It does not require unpacking or assembly.

#### 7.1.2 Equipment Inventory

The MSD-V4R contains a configuration sheet which lists the standard accessories. Use the configuration sheet or Table 1. Standard kit item inventory to conduct inventory of the MSD-V4R set.

#### 7.1.3 Inspection

Inspect the MSD-V4R set for shipping damage. Check for dents, breaks, water damage, or any evidence of mishandling.

#### 7.1.4 Performance Verification

Upon completion of inspection, when appropriate, verify normal and adequate performance has been restored before use.

### 7.2 Preventive Maintenance Checks and Services (PMCS)

**Table 9. Preventive Maintenance Checks and Services (PMCS) Procedures.**

**B= Before M= Monthly A= Annually**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
1	B/M	Transit Case	1. Inspect transit case for breaks or cracks. 2. Check case latches to ensure they fasten securely.	1. Any breaks or cracks that would let moisture penetrate the transit case. 2. Any missing or broken latches.
2	B/M	MSD-V4R	Inspect for signs of physical damage.	Any damage that will prevent operation.
3	B/M	MSD-V4R-EXTERNAL DOORS	1. Check I/O port dust covers. Ensure dust covers are present and attached to MSD-V4R. 2. Ensure dust covers stay in place over I/O connectors.	Dust covers are missing, damaged or do not seal properly over I/O ports.

<b>ITEM NO.</b>	<b>INTERVAL</b>	<b>ITEM TO BE CHECKED OR SERVICED</b>	<b>PROCEDURE</b>	<b>EQUIPMENT NOT READY/AVAILABLE IF:</b>
4	B/M	MSD-V4R DISPLAY	1. Check display for physical damage. 2. Power on MSD and ensure display screen powers on and is visible.	1. Display has physical damage. 2. Display does not turn on.
5	B/M	MSD-V4R BATTERIES	1. Check batteries for physical damage. 2. Ensure batteries install properly into MSD-V4R. 3. Ensure batteries charge when MSD-V4R is connected to power source.	1. Battery has physical damage that exposes internal components. 2. Battery cannot be properly installed into MSD-V4R. 3. Batteries does not charge.
6	B/M	MSD-V4R STYLUS	Check for missing or damaged stylus and tether.	Stylus or tether is missing or damaged.
7	B/M	MSD-V4R CARRY HANDLE	Check for missing or damaged carry handle, connect handle to MSD-V4R.	Carry handle is damaged, missing, or cannot be connected to MSD-V4R.
8	B/M	DC/DC POWER ADAPTER	1. Check power adapter and cables for physical damage. 2. Ensure output status light comes on when adapter is powered. 3. Connect each cable to adapter to ensure proper connection.	1. DC/DC power adapter has physical damage. 2. Output LED does not come on when adapter is powered. 3. One or more cables do not connect properly to adapter.
9	B/M	ACCESSORY CABLES	Check for any nicks, cuts, or physical damage to cable, connectors, or connector pins.	1. Cuts or nicks that expose conductor. 2. Damage to connectors or connector pins.
10	B/M	TRANSIT CASE FOAM INSERT	1. Damage or chunks missing from foam insert. 2. Damaged or missing pouches.	Any damage or chunks of foam missing that hinder the protection for items stored in case.
11	B/M	CABLE STRAIN RELIEF TIES	Check for missing or damaged strain relief ties.	Strain relief ties missing or damaged.
12	B/M	MSD-V4R ACCESSORIES	1. Check accessories for physical damage. 2. Connect accessories to MSD-V4R and power up to ensure proper function.	1. Physical damage to the body or connectors of an accessory. 2. Accessory does not power up or function properly when connected to the MSD-V4R.

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/AVAILABLE IF:
13	B/M	MSD-V4L SOFTWARE	Inspect date on desktop image to verify	Date displayed is 3 months or greater than current date. See Page # (insert page #) for install directions
14	A	DC/DC ADAPTER	If adapter has not been used, power for 10 minutes annually.	DC/DC Adapter does not power up or output DC voltage.
15	A	AC/DC 400HZ ADAPTER	If adapter has not been used, power for 10 minutes annually.	AC/DC 400Hz Adapter does not power up or output DC voltage.

### 7.3 Cleaning

#### Clean the Display

**⚠ CAUTION: Do not use abrasive solvents to clean any part of the MSD-V4R or any of the accessories. Damage may occur to the MSD-V4R due to improper cleaning methods.**

1. Using a microfiber cloth to remove any obvious dust and gently brush off any dust particles.
2. Spray solution of soap and water onto cleaning cloth. DO NOT spray water or cleaning solution on the screen.
3. Gently wipe the screen in a circular motion. Do not press hard on the cloth.
4. Remove all excess moisture from the screen.
5. Let the display dry thoroughly before you turn it on.
6. For stains that are hard to remove, repeat procedure until display is clean.

#### Cleaning the MSD-V4R or accessory body

1. Use a soft, dry brush or cloth to gently wipe off dirt and debris from outside of MSD-V4R.
2. Brush off dirt and debris from the outside of the dust covers and Pogo connectors.
3. Soap and water may be used, taking care not to introduce moisture to the inside of any I/O ports.

### 7.4 Replace Stylus and Tether

1. Remove old stylus from MSD.
  - a. Pull the stylus out from its slot.
  - b. Release and remove the tether from the MSD-V4R.
  - c. Insert new tether into the slot on the MSD-V4R.
  - d. Insert stylus into its' slot.



**Figure 54. Replace Stylus and Tether.**

2. Install Stylus and Tether
  - a. Slide loop of tether through the hole next to the stylus slot.
  - b. Run stylus through the loop to create a knot that holds the tether to the chassis.
  - c. Insert stylus into slot.

## 7.5 Fuse Replacement

Several items in the kit require fuses.

- DC/DC Power Adapter
- NATO Power Cable
- AC/DC 400 Hz Power Adapter
- Universal World Traveler Adapter

### 7.5.1 DC/DC Power Adapter

Add procedure and photos

### 7.5.2 NATO Power Cable

Add procedure and photos

### 7.5.3 AC/DC Power Adapter

Replace Adapter Fuse:

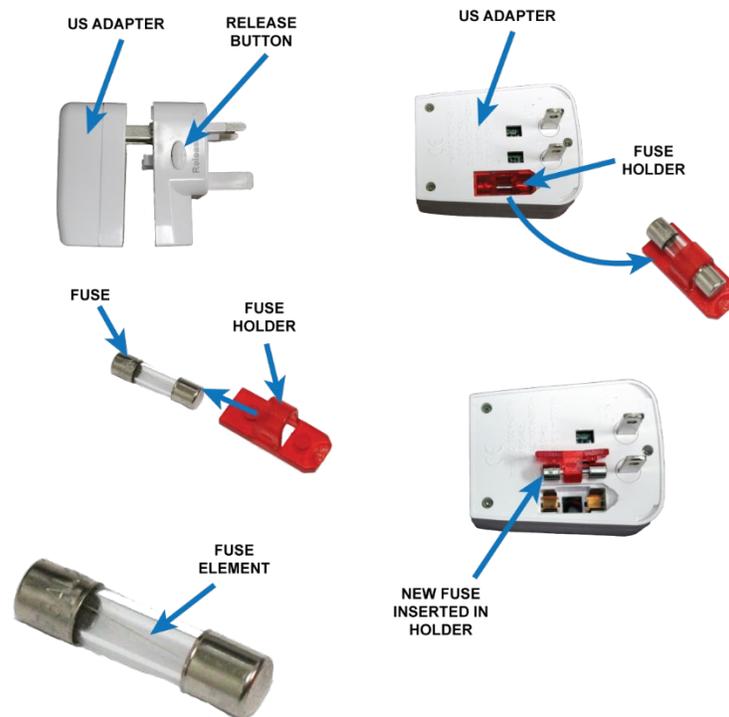
1. Remove spare fuse from replacement fuse compartment.
2. Open fuse compartment.
3. Remove power fuse and check for serviceability.
4. Install new fuse into power adapter.
5. Plug adapter into outlet and check for AC output.

### 7.5.4 Universal World Traveler Adapter

Materials Needed: FUSE, CARTRIDGE, 3A (found in MSD spare fuse holder).

Setup: Travel adapter disconnected from wall socket. No power cable connected.

1. Press RELEASE button on side of adapter to separate the US adapter from the World adapter.
2. Using plastic tool or small screwdriver, insert tool under fuse holder and carefully remove holder and fuse out of US adapter.
3. Slide fuse from fuse holder.
4. Inspect fuse element for burns or breaks. Discard fuse if element is burned or broken.
5. Slide new cartridge fuse into fuse holder. Ensure fuse stays roughly centered in the fuse holder.
6. Snap fuse holder and fuse into place in the US adapter as shown in .

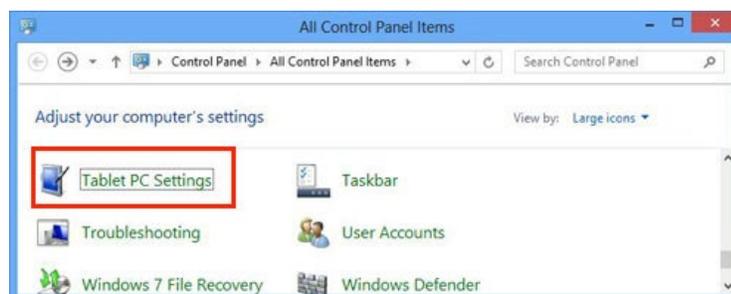


**Figure 55. Traveler Adapter Fuse Replacement.**

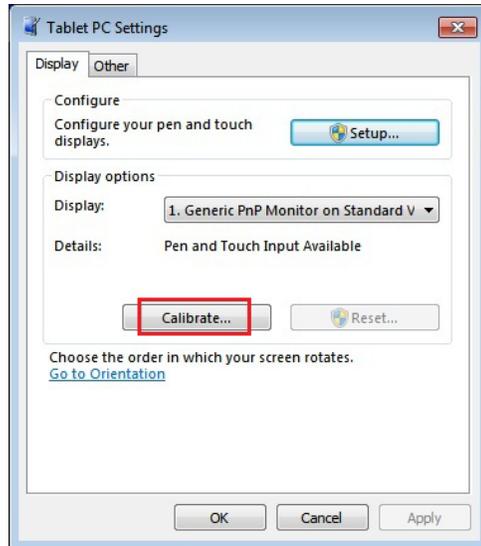
## 7.6 Touchscreen Calibration

Perform the following steps to re-calibrate the touchscreen.

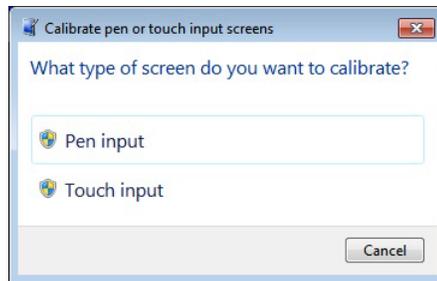
1. Restart the MSD-V4R.
2. Select the Windows “Start” button.
3. Go to the control Panel and select “Tablet PC Settings”.



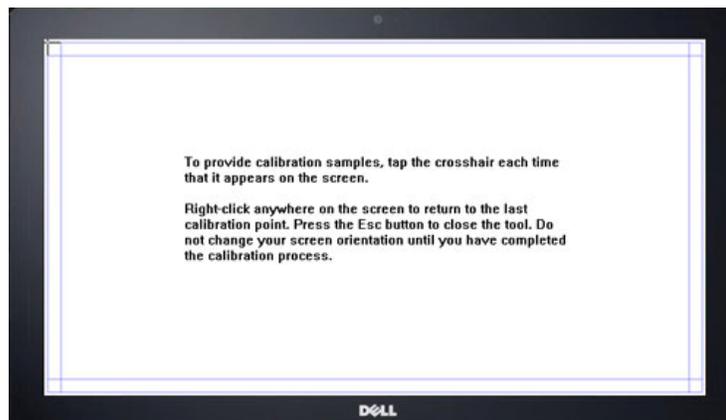
4. Under Display tab, select “Calibrate”.



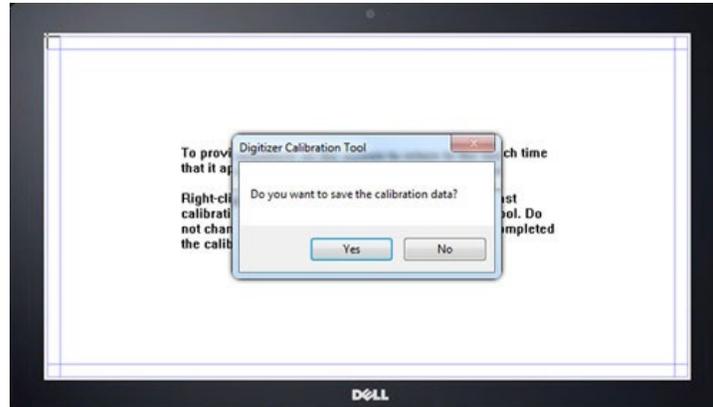
5. Choose pen or touch Input.



6. Perform the instructions on the screen.



7. Save the calibrated data.



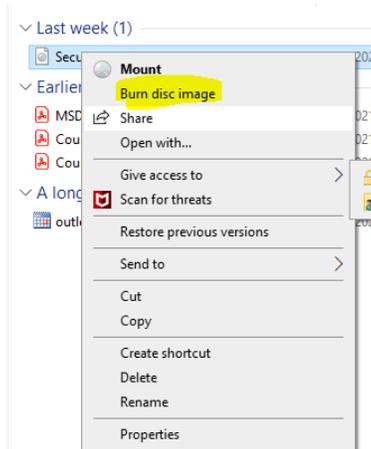
## 7.7 Software Update Instructions

Perform the following to update the software monthly:

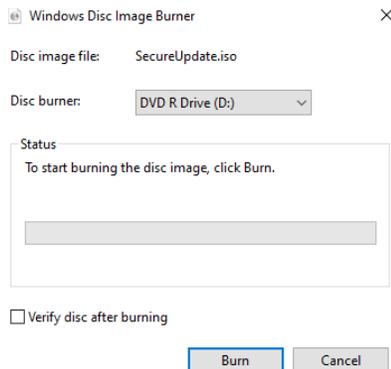
1. Download .iso file from CMTool.

Edit	SecureUpdate.iso	MSD V4 Win 10 1809 Build Monthly Updates	March Cumulative Updates	This is the MSD V4 patch to resolve the issue with Windows Auto Updates.	CHADWICK GUERIN	5/10/2021 3:12:00 PM	CHADWICK GUERIN	5/11/2021 12:12:00 PM
------	------------------	--	--------------------------	--	-----------------	----------------------	-----------------	-----------------------

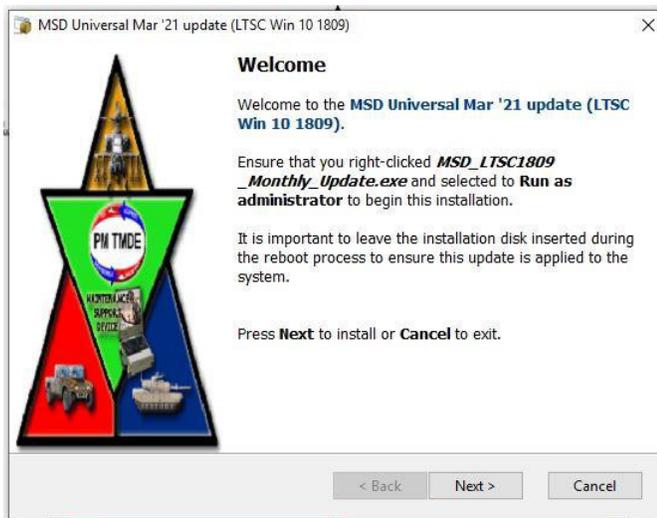
2. Locate the download, right click on the file, and select "Burn Disc Image".



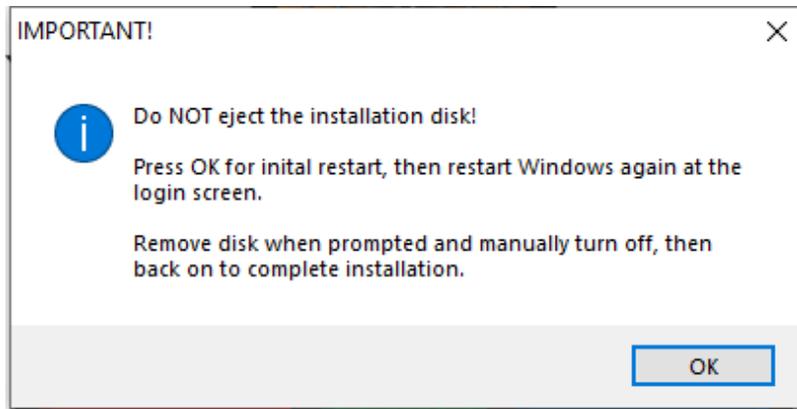
3. This Windows “Disc Image Burner Utility” will pop up next. Select “Burn” to continue.



4. Burn the .iso file as a disk image to a Disc (CD, DVD, Blu-ray depending on size of update).
5. From the MSD: Login to Windows as an administrator.
6. Insert media into disk drive.
7. Open Folder on disk.
8. Right click on .exe file; run as administrator. Time before next step will vary (For MSD- V4 ~ 3 Minutes).
9. Click “yes” for “Do you want to allow this app from an unknown publisher to make changes to your device?”
10. Next screen will be similar to the following:

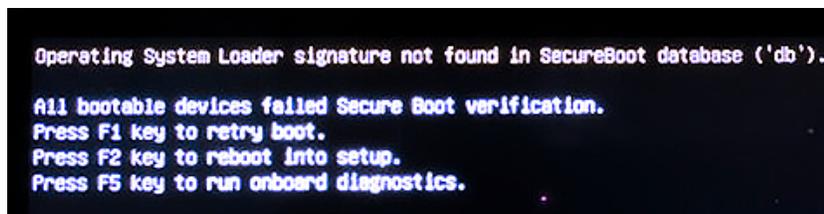


11. Click “next”; updates will now install, and window will provide a message “Installing Windows Updates...”. (Release may takes over 12 minutes for the MSD-V4).
12. Next screen will be similar to the following:



13. After restarting windows again, at the login screen you should get the following message:  
**SUCCESS: Remove disk and restart computer.**

14. If this screen appears instead, keep disk in drive, restart, and press F12 to launch the boot menu. Select "UEFI Boot" from UEFI: Optical Drive (BUFFALO).



15. You should then get the following message:  
**SUCCESS: Remove disk and restart computer.**

16. Remove disk and reboot.

17. System is now ready.



## 8 Preparation for Shipment and/or Storage

 **NOTE: Before removing or replacing the batteries, the MSD-V4R MUST be powered down, with all cables and accessories removed.**

1. Power down MSD-V4R.
2. Disconnect any accessories from the MSD-V4R.
3. Attach keyboard to MSD and fold it in against the MSD.
4. Remove batteries from MSD-V4R.
5. Remove shoulder strap or handle from the MSD.
6. Close all dust covers on the MSD-V4R and slide latch buttons to the locked position.
7. Place batteries, accessories, and MSD-V4R in their corresponding compartments in the carry case. Refer to Figure 1 and Figure 2.
8. Use configuration card to inventory the case contents and locate or annotate any missing components.
9. Return configuration card to case.
10. Close case and secure latches.

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## 9 Storage Conditions

Storage Temperature:  $-32^{\circ}\text{C}$  to  $+71^{\circ}\text{C}$  ( $-25^{\circ}\text{F}$  to  $+160^{\circ}\text{F}$ )

Altitude (maximum): 9144 m (30,000 ft.)

Relative humidity (maximum): 95% (noncondensing)

Airborne contaminant level: G1 as defined by ISA-71.04–1985

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## 10 Parts list

**Table 10. Basic Issue Items.**

DESCRIPTION	CAGE	PART NO.	NSN	QTY
TEST SET, ELECTRONIC, MSD-V4R	18876	13792400	TBD	1
MSD-V4R COMPUTER	18876	13792401	TBD	1
MSD-V4R DETACHABLE KEYBOARD	18876	13792393	TBD	1
MSD-V4R SOLID STATE HARD DISK DRIVE	18876	13792383	TBD	1
MSD-V4R BATTERY	18876	13792384	TBD	2
MSD-V4R STYLUS AND LANYARD	18876	13792385	TBD	1
MSD-V4R AC POWER ADAPTER	18876	13792385	TBD	1
POWER CORD, MSD-V4R AC POWER ADAPTER	18876	AC19V90K1	6130-01-676-6977	1
MSD-V4R QUICK START CARD	18876	13792388	7610-01-684-7107	1
MSD-V4R TRANSIT CASE	18876	13792387	TBD	1
MSD-V4R CONFIGURATION SHEET	18876	13792389	7610-01-684-7106	1
MSD-V4R SHOULDER STRAP	18876	13792390	5340-01-684-7068	1
MSD-V4R HANDLE	18876	13792391	5340-01-684-4801	1
MSD-V4R SPARE FUSE HOLDER ASSEMBLY	18876	13748518	5920-01-684-7104	1
MSD-V4R CABLE STRAIN RELIEF TIE	18876	13748489	5975-01-684-4730	2
MSD-V4R EUROPEAN ADAPTER	18876	13748516	6130-01-684-4759	1
MSD-V4R MOUSE	3DMD3	13748515	7025-01-668-9311	1
MSD-V4R BLURAY OPTICAL DRIVE	4K6V5	BRXL-PT6U2VB BRXL-PUS6U3B	7025-01-659-5984	1
ETHERNET CABLE, CAT 5	18876	13748513	5995-01-684-5770	1
MSD-V4R NATO POWER CABLE, 20 FT, 10A, 16AWG, MP-205	18876	13748512	5995-01-684-7754	1
MSD-V4R DC/DC POWER ADAPTER	18876	13792392	TBD	1
MSD-V4R RECOVERY DEVICE	18876	TBD	TBD	1

**Table 11. Additional Authorized Listings.**

DESCRIPTION	CAGE	PART NO.	NSN	QTY
RS232/422/485 SERIAL CONVERTER KIT	18876	13748544	TBD	1
RS232/422/485 ADAPTER, P/O KIT	18876	13748543	5895-01-677-1752	1
DB9 SERIAL EXTENSION CABLE, P/O KIT	18876	13748542	TBD	1
MSD-V4R PCMCIA ADAPTER	18876	13748553	TBD	1
MSD-V4R AC/DC 400 HZ POWER SUPPLY ADAPTER	18876	13748545	TBD	1
MSD-V4R BATTERY	18876	13748526	6140-01-684-5877	1
MSD-V4R EXPRESS CARD ADAPTER	18876	13748547	TBD	1
MSD-V4R 4 PORT USB HUB	18876	TBD	TBD	1
MSD-V4R GPIB ADAPTER	18876	13748548	7050-01-615-8761	1

<b>DESCRIPTION</b>	<b>CAGE</b>	<b>PART NO.</b>	<b>NSN</b>	<b>QTY</b>
MSD-V4R MIL-STD 1553 ADAPTER	18876	13733870	5995-01-668-2169	1
IUID READER ASSEMBLY	18876	13748549		1

***Table 12. Consumable Items List.***

<b>DESCRIPTION</b>	<b>CAGE</b>	<b>PART NO.</b>	<b>NSN</b>	<b>QTY</b>
STRAIN RELIEF CABLE TIE	18876	13748489	5975-01-684-4730	2
FUSE ASSEMBLY	18876	13748518	5920-01-684-7104	1

## 11 Warranty Program and Customer Support

For replacement or support notify the MSD Help Desk. The MSD-V4R warranty expiration date is located on the transit case ID plate, and on the MSD-V4R ID plate. For more specific warranty information refer to TB 9-6625-2301-40.

MSD/ICE Helpdesk

Phone# 877-564-1137

Email: [apats@redstone.army.mil](mailto:apats@redstone.army.mil)

Web: <https://www.milsuite.mil/book/groups/msd-ice>

### General Information

DRS warrants for the duration of this warranty that the Hardware Product(s) produced by DRS will be free from defects in material and workmanship under normal use and service, subject to the terms and conditions set forth herein. This warranty applies to all product and accessories supplied and/or distributed by DRS for Maintenance Support Device V4 (MSD). This warranty extends only to the original purchaser of Products and accessories from DRS ("Original Purchaser") and original customers of PD TMDE who leverage this contract and purchase products. It is not transferable to anyone who subsequently purchases or obtains the Products from the Original Purchaser.

### Length of Warranty

During this period, DRS will, at its option and expense, either repair or replace with new or reconditioned (of equal or better quality) parts of any of the Products which prove to be defective, provided that such Products are returned in accordance with the terms of this warranty. All exchanged parts and Products replaced under this warranty will become the property of DRS. Any replacement part or Product will be warranted for the remainder of the original warranty period or ninety (90) calendar days, whichever is longer. **The MSD-V4R, MSD-V4S, MSD-V4L Kits and optional accessories shall be under warranty as stated herein plus an extended warranty for a total of sixty (60) months.**

## Terms and Conditions

This warranty covers defects in materials and workmanship in the Products, as follows:

Term	1 year standard and extended for a total of 60 months
Technical Assistance	Yes-through telephone, electronic mail, and website. Warranty actions will be coordinated through PD TMDE MSD Helpdesk and follow established Customer Support Requests (CSR) processes and procedures. DRS will assist customers to complete a CSR for all warranty actions, hardware, or software inquiries as necessary. CSRs provide a means to distribute MSD specific information to and from the contractor. CSRs will be tracked by the Government.
Shipping Costs	Shipping costs of a Product to DRS are included as part of this Warranty. Shipping costs of a Product to the Original Purchaser after a Warranty repair is included as part of this warranty to any Continental U.S. (CONUS) and outside Continental U.S. (OCONUS) location. If after receipt of a Product for repair under this warranty, it is later determined to be a non-warranted repair, all shipping costs are to be paid by the Original Purchaser.

### Turn Around Time on Warranted Items:

Under this warranty agreement, all non-mission capable (i.e., malfunctioning/non-operational) assets procured by the Government will be repaired or replaced within 72 hours from the time of receipt by

DRS to the time turned over to carrier for return to the end user, not including weekends and holidays. If an item is needed for further analysis and turn-around time will not be met, DRS will notify the Government immediately to determine specific course of action. Shipping time for warranted items located within the CONUS will not exceed 72 hours, not including weekends and holidays, to or from

DRS once the failed/repaired asset is in the shipper's hand. Shipping time for OCONUS warranted items will not exceed 168 hours, not including weekends and holidays, to or from DRS once the failed/repaired asset is in the shipper's hand.

### This Warranty Does Not Cover:

- Software, including the operating system and software added to the DRS hardware products through our factory-integration system, third- party software, or the reloading of software.
- Normal wear and tear such as cosmetic damage that does not affect the product's performance, and abusive wear (this warranty does cover any product failure that is a result of normal wear and tear). Any product or accessories subjected to extremes outside specifications MIS-DTL-61265 & MIS-DTL-58668.
- Spare parts and repairs outside of warranty are warranted for 90 calendar days from the date of repair or shipment.
- Problems that result from external causes such as accident, fire, floods, or acts of God; abuse; misuse; or problems with electrical power; servicing not authorized by DRS; failure to follow the Product instructions or failure to perform preventative maintenance.

- Problems caused by using accessories, parts, or components not supplied by DRS; improper installation (to include the absence of surge protection in vehicle installations), improper testing, improper operation, improper use, or handling of the Product; or unauthorized alteration of Products.
- Products with missing or altered service tags or serial numbers.
- Products for which DRS has not received payment.
- DRS is not responsible for and shall not be liable for transportation and insurance charges incurred in or damages resulting from transporting the Products, Accessories and/or Replacement Products to DRS for warranty service.
- DRS is not responsible for any third-party software created for use in the integration and/or operation of any Products, Accessories and/or Replacement Products whether or not such third-party software was installed by DRS. Maintenance and support service for third-party software is the sole responsibility of the creator thereof.

#### Additional Information

The agents, dealers, and employees of DRS are not authorized to make any modifications to this warranty, or additional warranties binding on DRS about or for Products, Accessories and/or products sold or supplied by DRS. Additional statements, whether oral or written, except signed written statements from an officer of DRS, do not constitute warranties and should not be relied upon.

DRS' SOLE LIABILITY, AND ORIGINAL PURCHASER'S SOLE REMEDY, FOR ANY MALFUNCTIONS AND DEFECTS IN THE PRODUCTS IS LIMITED TO REPAIR AND REPLACEMENT AS SET FORTH IN THIS WARRANTY STATEMENT. EXCEPT AS OTHERWISE EXPRESSLY STATED HEREIN, DRS DISCLAIMS ALL OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND ANY IMPLIED WARRANTIES OTHERWISE ARISING FROM COURSE OF DEALING OR TRADE. NO WARRANTIES WILL APPLY AFTER THE WARRANTY PERIOD HAS EXPIRED.

DRS HEREBY DISCLAIMS, AND THE ORIGINAL PURCHASER HEREBY AGREES, THAT DRS DOES NOT ACCEPT LIABILITY BEYOND THE REMEDIES PROVIDED FOR IN THIS WARRANTY OR FOR ANY INDIRECT, CONSEQUENTIAL, PUNITIVE, SPECIAL, OR INCIDENTAL DAMAGES, INCLUDING, WITHOUT LIMITATION, ANY LIABILITY FOR THIRD PARTY CLAIMS FOR DAMAGES, FOR PRODUCTS NOT BEING AVAILABLE FOR USE, OR FOR LOST DATA OR LOST SOFTWARE. NOTWITHSTANDING ANYTHING CONTAINED HEREIN, DRS' TOTAL LIABILITY FOR ANY ALLEGED OR ACTUAL BREACH OF WARRANTY WILL BE NO MORE THAN THE AMOUNT PAID FOR THE PRODUCT THAT IS THE SUBJECT OF ANY SUCH CLAIM. THIS IS THE MAXIMUM AMOUNT FOR WHICH DRS SHALL BE RESPONSIBLE.

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## 12 Appendix A

### System characteristics for the MSD-V4R

#### Physical Dimensions (MSD)-Closed

<b>Description</b>	<b>Specification</b>
Height	.94 inches (23.9 mm)
Width	11.65 inches (29.6 mm)
Depth	7.99 inches (203 mm)
Weight (with Keyboard)	3.49 lbs. (1.59 kg)

#### Processor Specifications

<b>Description</b>	<b>Specification</b>
Processor Type	12 <sup>th</sup> Generation Intel Core i5
Wattage	9 W
Core Count	10
Thread Count	12
Speed	Up to 4.4 GHz
Cache	12 MB
Graphics	Intel Iris Xe Graphics

#### Chipset

<b>Description</b>	<b>Specification</b>
Chipset	Intel ADL -P PCH
Processor	12 <sup>th</sup> Generation Intel Core i5
DRAM BUS Width	64-bit
Flash EPROM	48 MB
PCIe BUS	Gen4

## Memory Specifications

<b>Description</b>	<b>Specification</b>
Memory Slots	Two Integrated on System Board
Type	Dual-Channel LPDDR5 (Non-ECC)
Speed	5200 MHz
Maximum Memory Configuration	32 GB
Memory Configurations Supported	<ul style="list-style-type: none"><li>● 8 GB, 2 x 4 GB, LPDDR5, 5200 MHz</li><li>● 16 GB, 2 x 8 GB, LPDDR5, 5200 MHz</li><li>● 32 GB, 2 x 16 GB, LPDDR5, 5200 MHz</li></ul>

## Audio Specifications

<b>Description</b>	<b>Specification</b>
Audio Controller	Realtek ALC3254
Stereo Conversion	Supported
Internal Audio Interface	High-definition audio interface
External Audio Interface	Universal Audio Jack/HDMI 1.4b port
Number of Speakers	2
Internal Speaker Amplifier	Supported
External Volume Controls	Supported
Speaker Output	2 W average/ 2.5 Peak output
Subwoofer Output	Supported
Microphone	Dual-Array

## Display Specifications

Description	Specification
Display Type	Full High Definition Plus (FHD+)
Touch Option	Touch Support
Technology	Wide Viewing Angle
Dimensions	Height- 6.38 in (162 mm) Width- 10.19 in (259.2 mm) Diagonal- 12 in (305.7 mm)
Native Resolution	1920 x 1200
Luminance	1200 nits
Megapixels	2.304
Refresh Rate	60 Hz
Response Time (Max)	35 ms
Viewing Angle	88 +/- degrees
Surface	Anti-Glare Touch Glass Surface

## External Ports

Description	Specification
Network Port	Ethernet connection- RJ45 I/O port.
USB Ports	<ul style="list-style-type: none"> <li>• Two Thunderbolt 4 Ports with DisplayPort Alt Mode/USB4/Power Delivery</li> <li>• One USB 3.2 Gen 1 Port with PowerShare</li> </ul>
Audio Port	One headset Port
Video Port	Supported through dock or directly through USB Type-C/HDMI
Media-Card Reader	One micro-SD slot
Power Adapter Port	65 W/90 W adapter USB-C

## Wireless Module

Description	Specification
Model Number	Intel AX211
Transfer Rate	2400Mbps
Frequency Bands	2.4/5/6 GHz
Standards	<ul style="list-style-type: none"> <li>• Wi-Fi 802.11a/b/g</li> <li>• Wi-Fi 4 (WiFi 802.11n)</li> <li>• Wi-Fi 5 (WiFi 802.11ac)</li> <li>• Wi-Fi 6E (WiFi 802.11ax)</li> </ul>
Encryption	<ul style="list-style-type: none"> <li>• 64-bit/128-bit WEP</li> <li>• AES-CCMP</li> <li>• TKIP</li> </ul>
Bluetooth	Bluetooth 5.2

## Keyboard Specifications

<b>Description</b>	<b>Specification</b>
Keyboard Type	1-zone RGB Backlit Keyboard
Layout	QWERTY
Number of Keys	82
Key Size	.75 x .75 in (19.05 x 19.05 mm)

## Front Camera Specifications

<b>Description</b>	<b>Specification</b>
Number of Cameras	Two
Type	5M RGB camera/ VGA IR camera
Location	Front
Sensor Type	CMOS Sensor
Camera resolution	Still image: 2592x1944 megapixel Video: 1920x1080 (VGA/HD) at 30 fps
IR Camera Resolution	Still Image: 640x480 Megapixel Video: 640-480 (VGA/HD) at 30 fps

## Rear Camera Specifications

<b>Description</b>	<b>Specification</b>
Number of Cameras	One
Type	11M RGB camera
Location	Rear
Sensor Type	CMOS Sensor
Camera Resolution	Still Image: 3976x2376 Megapixel Video: 1920x1080 (VGA/HD) at 30 fps

## Sensors

<b>Sensor Support</b>
Hall Effect Sensor
Accelerometer + Gyroscope
eCompass/Magnetometer
Ambient Light Sensor
Proximity Sensor (SAR)

### Touchpad Specifications

Description	Specification
Resolution	Horizontal: >300dpi Vertical: e.g. 749
Dimensions	Horizontal: 4.1 in (104 mm) Vertical: 2.16 in (54.9 mm)

### Power Adapter Specifications

Description	Specification
Type	65 W adapter USB-C
Dimensions	Height: 1.1 in (28 mm) Width: 2.01 in (51 mm) Depth: 4.41 in (112 mm)
Input Voltage	110-240 VAC
Input Frequency	50 – 60 Hz
Input Current (Maximum)	1.7 A
Output Current (Continuous)	<ul style="list-style-type: none"> <li>• 20 V/3.5 A</li> <li>• 15 V/3 A</li> <li>• V/3 A</li> <li>• 5.0 V/3 A</li> </ul>
Temperature Range, Operating	32°F to 104°F (0°C to 40°C)
Temperature Range, Storage	-40°F to 158°F (-40°C to 70°C)

### Battery Specifications



#### NOTE:

- If the ambient temperature is between 50°C and 60°C and the batteries is ABOVE 70% charge, the system will switch to battery power to lower the batter charge level. This will protect the batteries.
- If the ambient temperature exceeds 60°C AND the batteries is ABOVE 70% charge, the unit will shut down.
- The batteries will not charge if ambient temperature is above 50°C.

Description	Specification
Type	35.6 Wh 2-cell battery, ExpressCharge™
Voltage	7.6 VDC
Weight	.37 lbs. (.17 kg)
Width	215 mm (8.46 inches)
Weight	318 g (0.70 lb.)
Voltage	14.8 V DC
Temperature Range Operating	<ul style="list-style-type: none"> <li>• Charging: -18°C to 50°C (0°F to 122°F)</li> <li>• Discharging: -18°C to 60°C (0°F to 140°F)</li> </ul>

Temperature Range Non-Operating	-32° to 71°C (-25°F to 160°F) <b>NOTE: The battery pack is capable of safely withstanding the above storage temperatures with 100% charge. The battery pack is also capable of withstanding storage temperatures from -20°C to +60°C with no degradation in its performance.</b>
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#### Environmental Specifications

<b>Description</b>	<b>Specifications</b>
Temperature — Operating	-18°C to 60°C (-0°F to 140°F)
Temperature — Storage	-32°C to 71°C (-25°F to 160°F)
Relative Humidity (Maximum) — Operating	95% (noncondensing)
Relative Humidity (Maximum) — Storage	95% (noncondensing)
Altitude (Maximum) — Operating	4572 m (15,000 ft.)
Altitude (Maximum) — Non- Operating	9144 m (30,000 ft.)
Airborne Contaminant Level	G1 as defined by ISA-71.04-1985

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