TMM4500

4U 4-PANEL RACKMOUNT

LCD MONITOR

No. TMM4500-xxx   Revision A

REFERENCE GUIDE

Publication No. 8404500-04044

WARRANTY

The following is an abbreviated version of Trenton Systems' warranty policy for rackmount computer products. For a complete warranty statement, contact Trenton or visit our website at http://www.trentonsystems.com/.

All boards used in systems delivered by Trenton; including rackmount LCD monitors, are covered under a pass-through warranty. For example, if Trenton PICMG 1.3 boards are used in the system then these boards will carry a five-year warranty. All other system sub-components including but not limited to power supplies, LCD displays, DVDs, CD-ROMS, etc. are covered under their original manufacturer's warranty. All systems built by Trenton are warranted against defects in material, workmanship and design for a period of one year from date of delivery. Repair or replacement products will be warranted for a period of three months from the date of shipment or for the remainder of the original warranty period for that particular product, whichever is longer. Any software or firmware that is delivered by Trenton will be warranted for a period of one year to perform in accordance with published specifications prepared, approved and issued by Trenton and/or the appropriate 3rd party vendor. Contact Trenton for the complete system warranty policy.

Buyer agrees that if a Trenton product proves defective, Trenton is only obligated to repair, replace or refund the purchase price of this product at Trenton's discretion. The warranty is void if the product has been subjected to alteration, neglect, misuse, or abuse; if any repairs have been attempted by anyone other than Trenton; or if failure is caused by accident, acts of God, or other causes beyond the control of Trenton. Trenton reserves the right to make changes or improvements in any product without incurring any obligation to similarly alter products previously purchased.

In no event shall Trenton Systems, Inc. be liable for any defect in hardware or software or loss or inadequacy of data of any kind, or for any direct, indirect, incidental or consequential damages arising out of or in connection with the performance or use of the product or information provided. Trenton Systems, Inc.'s liability shall in no event exceed the purchase price of the product purchased hereunder. The foregoing limitation of liability shall be equally applicable to any service provided by Trenton Systems, Inc.

RETURN POLICY

Products returned for repair must be accompanied by a Return Material Authorization (RMA) number, obtained from Trenton Systems prior to return. Freight on all returned items must be prepaid by the customer, and the customer is responsible for any loss or damage caused by common carrier in transit. Items will be returned from Trenton Systems via Ground, unless prior arrangements are made by the customer for an alternative shipping method

To obtain an RMA number, call us at (800) 875-6031 or (770) 287-3100. We will need the following information:

> Return company address and contact
> Model name
> Serial number from chassis label
> Description of the failure

An RMA number will be issued. Mark the RMA number clearly on the outside of each box, include a failure report for each item and return the product(s) to our Gainesville, GA facility:

> TRENTON Systems, Inc.
> 2350 Centennial Drive
> Gainesville, GA 30504
> Attn: Repair Department

Contact Trenton for our complete service and repair policy.

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E-mail: Support@TrentonSystems.com
Web: www.TrentonSystems.com

TRENTON Systems, Inc.
2350 Centennial Drive • Gainesville, Georgia 30504
Sales: (800) 875-6031 • Phone: (770) 287-3100 • Fax: (770) 287-3150

Table of Contents

Advisory & Safety Conventions

Follow all instructions marked on the product and described in this document. Pay close attention to the three types of advisories used throughout this manual: Notes, Cautions, and Warnings. They provide helpful information or alert you to the potential for hardware damage or personal injury. The following is an example of each type of advisory. Use caution when servicing any electrical component.

NOTE: A Note indicates information that will help you make better use of the rackmount LCD.

	CAUTION A CAUTION indicates potential damage to hardware and tells you how to avoid the problem.	

	WARNING A WARNING indicates the potential for bodily harm and tells you how to avoid the problem.	

SAFETY INSTRUCTIONS

Before handling the product, read the following instructions and safety guidelines to prevent damage to the product and to ensure your own personal safety. Refer to the "Advisories" section for advisory conventions used in this manual, including the distinction between Warnings, Cautions, and Notes.

Do not remove any of the covers. Only qualified, experienced, authorized electronics service personnel should access the interior of the product. The power supplies produce high voltages and energy hazards, which can cause bodily harm.

Do not use the product near water. Do not place any liquids (even a wet or damp cloth) on or near the product. Liquids create an electrical hazard. Do not expose the Product to rain or moisture.

	WARNING To avoid the risk of severe electric shock, do not remove the cover or back of the monitor. There are no user serviceable parts inside. Refer all servicing to Technical Support.	

Installation Precautions

WARNING: This system has internal components which may be damaged by electrostatic discharge.

To protect yourself from harm and the internal components from electrostatic damage, be sure to observe the following precautions when handling or storing the system:

- When you disconnect the power cable from the socket, pull on the plug not the cord.

- To help prevent electric shock, connect the power cable to a properly wired and grounded power source. Do not use adapter plugs or remove the grounding prong from the cable.

- Always connect any equipment used with the product to properly wired and grounded power sources. Be sure to tighten all connector screws.

- Reliable earthing of this equipment must be maintained. Particular attention should be given to supply connections when connecting to power strips, rather than direct connections to the branch circuit.

- Do not connect or disconnect this product during an electrical storm.

- Do not place any object on the cables that might cause the cables to make sharp bends or that affect the integrity of the cables. Be sure that cables are not located where they can be stepped on or tripped over.

- Route all wiring and cabling away from heat sources and sharp metal edges to avoid damage.

- Keep product away from direct sunlight and heat sources. Hot air may cause damage to the cabinet and other parts.

- Install the product in a well-ventilated area. Do not block ventilation slots and openings with objects.

- Do not allow metal pieces or objects of any kind to fall into the ventilation holes. Keep the ventilation holes and openings clean. Vacuum openings if you notice dirt accumulating on them.

- Handle the product with care. The display may contain glass parts. Dropping the product may cause any glass parts to break.

- To help protect the product from sudden, transient increases and decreases in electrical power, use a surge suppressor, line conditioner, or uninterruptible power supply (UPS).

- Consideration should be given to the connection of the equipment to the supply circuit and the effect that circuit overloading might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

- The ambient temperature within the rack may be greater than room ambient. Installation should be such that the amount of air flow required for safe operation is not compromised. Consideration should be given to the maximum rated ambient.

- Installation should be such that a hazardous stability condition is not achieved due to uneven loading.

Rack Mounting Precautions (Where Applicable)

The following safety guidelines are provided for all rack-mountable equipment:

- Maximum operating ambient temperature is typically 50 °C.
- Never restrict the airflow through the devices' fan or vents.
- When installing equipment into a rack, distribute the units evenly.
- Otherwise, hazardous conditions may be created by an uneven weight distribution.
- Connect the unit only to a properly rated supply circuit.
- Reliable earthing (grounding) of rack-mounted equipment should be maintained.

Service and Repair Precautions

Unplug the product from the power outlet and refer servicing to qualified service personnel in the event that:

- Liquid is spilled in to the product or the product is exposed to rain or water.
- The product does not operate properly when the operating instructions are followed.
- The product has been dropped or the frame has been damaged.
- The product exhibits a distinct change in performance, indicating a need for service.
- The power cable or plug is damaged or frayed.

Safety Standards

Unplug the product from the power outlet and refer servicing to qualified service personnel in the event that:

- Liquid is spilled in to the product or the product is exposed to rain or water.
- The product does not operate properly when the operating instructions are followed.
- The product has been dropped or the frame has been damaged.
- The product exhibits a distinct change in performance, indicating a need for service.

Chapter 1 - System Overview

DESCRIPTION
The TMM4500 represents the first of its kind multi-head rackmount LCD monitor platform. Within a standard 19" component rack the TMM4500 "Hydra" display head design can accommodate from one to four 21.5" LCD displays.

BASE FEATURES
- 3U/4U 26" Deep 19" Rack Mount
- Rugged All Aluminum Design
- 1,2 or 3 Screens Available in 3U, Quad in 4U Only
- Unified Button Board Design (Patent Pending) - For Independent or Simultaneous LCD Control
- Heavy Duty Friction Slides
- Integrated Cable Guide
- Gas Spring Support Struts
- Innovative Front Face w/ Locking Display Module Stop
- Robust Torque Hinges
- 90 Degree Mechanical Swivel
- XLR Quick-Disconnect Power Cord

DISPLAY
- 21.5" widescreen Full HD 1920×1080, (1080p) with LED backlight
- 250NITS brightness
- Ultra wide viewing angle 178/178
- 16.7M colors
- 1000:1 contrast ratio
- Response time 8ms G to G Latest

LCD CONTROLLER
- Support for digital picture-in-picture
- Standard video inputs include: VGA, DVI, CVS(2x), YPbPr, and HDMI
- Optional video input interfaces include: Dual or single channel 3G HD/SD-SDI

POWER
- +12VDC operation via a universal 100-240VAC adapter
- The input power connector is a secure XLR quick disconnect
- 175W power supply

ADDITIONAL SPECIFICATIONS
- Operating Temperature: 0-50c
- Storage Temperature: 20-60c
- Standard 4-Screen System Dimensions: 7"H (4U)x 19"W x 26"D
- Optional Single/Dual/Triple System Dimensions: 5.25"H (3U)x19"Wx26"D
- Standard 4-Screen System Weight: 85 lbs. (Approx.)
- Optional Single-Screen System Weight: 50 lbs. (Approx.)
- Optional Dual-Screen System Weight: 61 lbs. (Approx.)
- Optional Triple-Screen System Weight: 70 lbs. (Approx.)

PACKING LIST
The standard Trenton TMM4500 is shipped with the following:
- Universal 100-200VAC, 175W power supply and a cable with a XLR quick disconnect cable
- One or two, 10ft. (3.1m) AC power cord(s)
- Four (4) video interface cables (interface type depends on what was ordered from Trenton)
- Friction slides (installed)
- Ship kit containing standard rackmount hardware
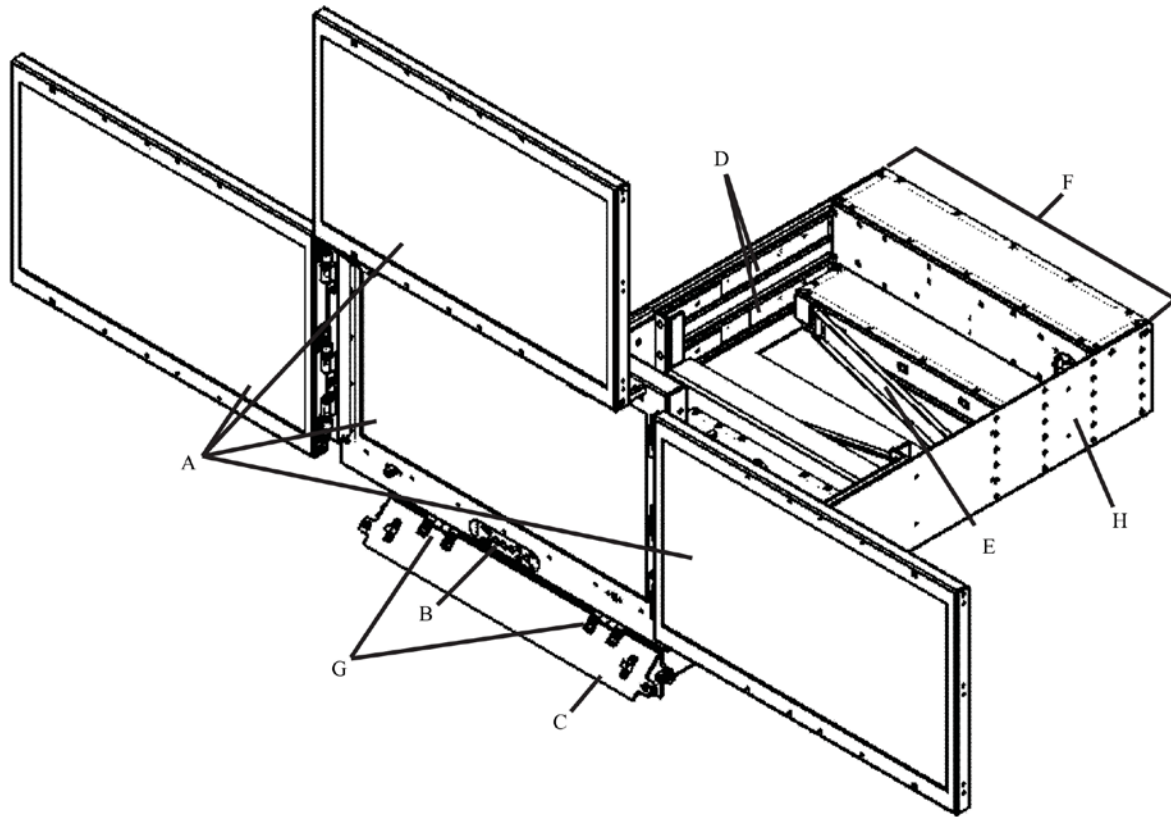
A. 1,2, or 3 Screens Available in a 3U; Quad Available in 4U Only
B. New Unified Button Board Design for Independent or Simultaneous LCD Control
C. Front Face - Innovative folding front face which acts as a display module stop
D. Solid Bearing Slides - 2 Sets of heavy duty steel solid bearing/friction slides
E. Cage-Style Cable Guides - To protect and secure cabling for continuous use
F. Electronics Back - Large area for easy connections and access to electronics
G. Display Module Lock Downs - To ensure the panel is secure during transport
H. Telescoping Arms w/ "L" Brackets - This technology facilitates easy straight-in mounting (Actual arms/brackets not shown)
I. Assembly Cover - (Comes with 4U only, not shown)

Chapter 2 - Mechanical Overview

TMM4500 LAYOUT DIMENSIONS AND OPTIONAL CONFIGURATIONS

23.0"
(58.4cm)   26.0"
(66.0cm)

TMM4500 Open Position With Maximum Extension

7.0"
(17.8cm)

26.0"
(66.0cm)

19.0"
(48.3cm)
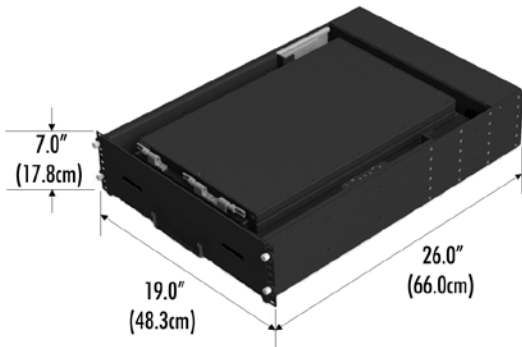
TMM4500 Closed Position (4-Screen Model)
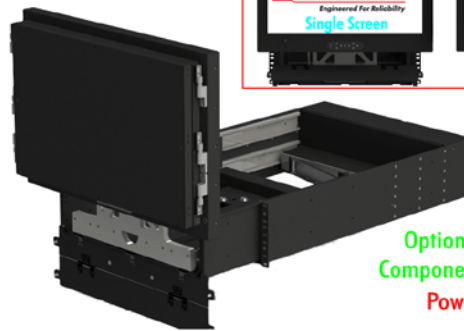
TMM4500 Monitor Assembly Open - 90° Position
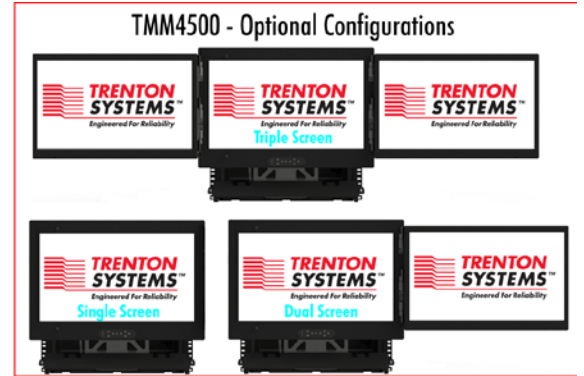
TMM4500 - Optional Configurations

TRENTON SYSTEMS™
Engineered For Reliability

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Engineered For Reliability
Triple Screen

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Engineered For Reliability

TRENTON SYSTEMS™
Engineered For Reliability
Single Screen

TRENTON SYSTEMS™
Engineered For Reliability
Dual Screen

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TMM4500 Video & Power
Connections (4 Screens)

Optional
Component

Power

Standard VGA, DVI-D, HDMI & IP50

TMM4500 - Rear Panel

Chapter 3 - Installation Instructions

BEFORE YOU BEGIN
- ✓ We suggest you power the unit up and confirm it functions correctly and that nothing was damaged in shipping.

- ✓ We suggest you power the unit up and confirm it functions correctly and that nothing was damaged in shipping.

⚠️	**CAUTION** Do not remove the cover or back of your new equipment. There are no user serviceable parts inside. Contact Trenton Systems technical support if you need assistance.	⚠️

RACK MOUNTING
The TRC4012 system can be installed in a rackmount cabinet that conforms to EIA standards for computer equipment with 19-inch wide panels. The cabinet must be tall enough to accommodate the computer's height and deep enough to accommodate the system's depth, while providing the proper clearances for air flow and cabling. A cabinet with a standard depth of 31.5 inches (800mm) should be sufficient; however, a rack with a non-standard depth dimension of at least 22 inches (559mm) will provide the suggested minimum front and rear chassis clearances needed for an installation.

The TRC4012 is designed to be supported in the cabinet with rack slides or placed on a cabinet shelf. The front flanges of the computer are designed to secure the TRC4012 to the rack cabinet's front mounting rails

RACKMOUNT INSTRUCTIONS
A)   Determine the mounting location within the rack and mark the mounting holes in the front and rear of the rack enclosure accordingly (this is for easy reference while you are mounting the equipment).

NOTE If installing by yourself or even with a helper, just below where you are going to mount the unit install 2 of the 10-32 screws (or M6 if using an alternate rack) in the front mounting surface leaving at least 1/4" inch of thread exposed. This will act as a wrest to assist holding the unit in place when installing the unit.

B)   Install the rear "L" mounting brackets to the rear face of the enclosure using 4x 10-32 Panhead Screws set at the desired height/location.

C)   Find the target installation depth by measuring the front face/mounting surface of the rack to center- line of the mounting hole of the rear "L" mounting bracket.

D)   The measurement from the front ear to the rear arms elongated mounting holes must be the same length as step 3. Some adjustment of the aluminum support arms is likely needed ensure a proper fit. To adjust the arms use the Hex Head tool to loosen or remove the Pancake screws as necessary until the elongated holes of the arms match the measurement. Once at the correct measurement then once again secure the arms in place.

NOTE: The arm may need to be adjusted to the next set of mounting holes to fit correctly.

E)   Slide the rack mount unit straight into the rack (if following the TIP you can wrest it on the screws you previously installed in the front) and secure the rear arms into the "L" brackets with the provided 10-32 Panhead screws.

F)   With the remaining 10-32 screws, secure the unit into the Rack Frame. (Removing the 2x 10-32 screws you were using as stops in the TIP and install them into the remaining hold of the rack ears). Ensure the unit is level and then tighten all of the 10-32 screws.

G)   Your equipment should now be mounted in the rack.

NOTE: This is a general install guide. Actual rack mount install may vary from unit to unit. For additional assistance please contact Trenton Systems technical support.
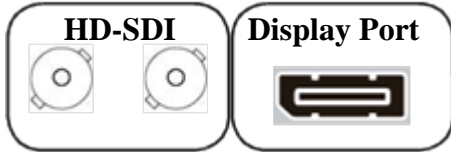
Chapter 4 - TMM4500 Operation

CONNECTING THE TMM4500 DISPLAYS

There are four sets of video input connectors on the TMM4500 in the standard four-display configuration.

VGA	DVI-D	HDMI	YPbPr	Composite
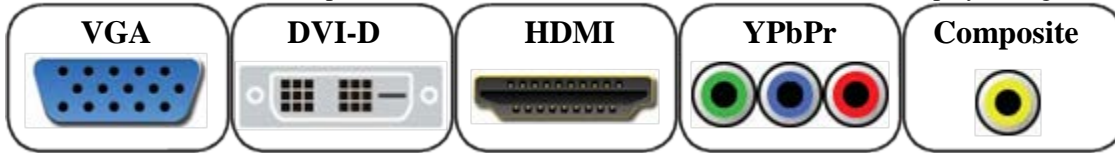
Additional video interface options may include:

HD-SDI	Display Port

Other video interface options may be available for specialized applications.

The silk screen located above the video connectors indicates the video interface connection type. Some video input connectors may not be populated depending on your specific TMM4500 product configuration. Use the appropriate video interface cable to connect each video input connector to the corresponding video output source.

BACK PANEL LAYOUT AND CONNECTING TMM4500 POWER

Illustrated below is a typical back panel layout for a 4-screen TMM4500 configuration. Using the information below, connect power and ground to the unit and ensure that the desired video connections between the TMM4500 and the video source devices are secure.

- A. Video Inputs and optional I/O connections
- B. Power Input 0 This is the 12VDC input from the external 100-240VAC power supply adapter
- C. Chassis Ground
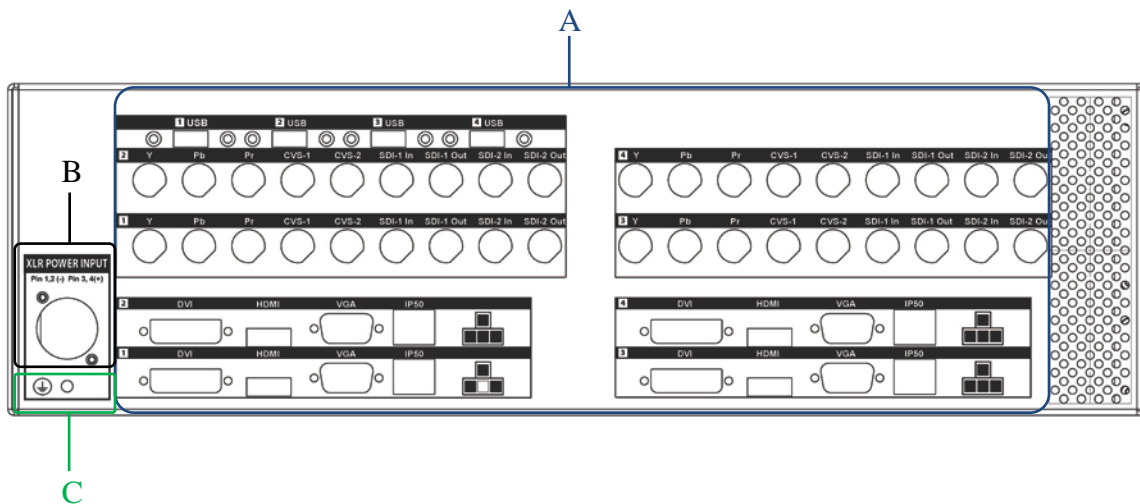
DEPLOYING THE TMM4500 – BASIC DISPLAY DRAWER OPERATION

	⚠	**CAUTION** Ensure that the TMM4500 is securely mounted in the component rack before opening and extending the display drawer.	⚠

The display head of the TMM4500 contains the majority of the unit weight. Failure to secure the unit before sliding open the display drawer will cause the unit to tip forward and may result in system damage or injury. For pre-installation, testing situations the back of the unit should be secured to a stable surface or countered-weighted to prevent the unit from tipping forward.

Follow the steps below to open the TMM4500 display drawer, slide out the display assembly and rotate and rotate the display assembly to the stable-deployment position.

STOWED POSITION

1. Unscrew the four thumb screws located on the unit's front face

FULL EXTENSION

2. Pull drawer out
3. Unlock the two ¼ turn latches
4. Fold front face down 180 degrees

FULL EXTENSION - UP

6. Release any display securing latches that may be engaged
7. Grab back of display head
8. Lift display head up 90°

STABLE – VERTICAL

5. Push the display head into the stable up position just far enough the clear the component rack, transit case or pre-installation test station

ROTATION MANEUVER

10.   Ensure front face is hanging straight down at 180° as shown
11. Rotate display head 90°

STABLE - HORIZONTAL

9. STOP! Before opening the display head, the front face must be setup to enable the display head module stop. See the next step.

DEPLOYING THE TMM4500 – SETTING UP THE DISPLAY HEAD MODULE STOP
The information and illustrations below will enable you to properly set-up the display head module stop. This step is important because the module stop ensures a stable display reading experience in typical application environments.

Display Front Face Hardware Overview

1. **Thumb Screws**
   The four (4) thumb screws are used to secure the assembly into the component rack.
2. **Quarter-Turn Latches/Receptacles**
   These quarter-turn fasteners are used to secure the front face to the display drawer.
3. **Display Module Lock Down Latches**
   The lockdown latches are used to secure the modules when stowed for transit.
4. **Rubber Bumpers**
   The rubber bumpers are used as stops and prevent the display module head from moving once the screens are deployed.

UNLOCK	FOLD	SECURE
3. Unlock display head assembly lock downs	2. Fold front face as shown	1. Secure front face into the display drawer using the quarter-turn latches
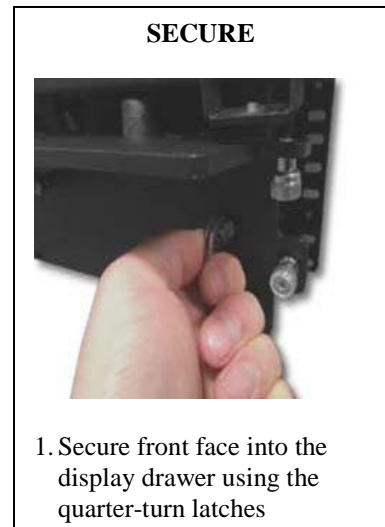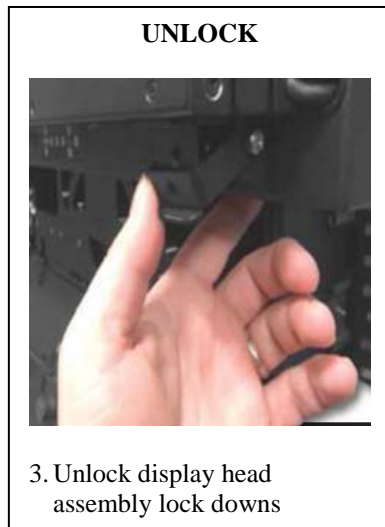
The multi-head display of the TMM4500 is now ready for deployment.

Chapter 5 - Unified Button Board Operation

The TMM4500 includes an On-Screen Display (OSD) button board for use with multi-display systems. In the past each panel required its own OSD button board and controls to manage the basic display functions. The single unified OSD button board mounted on the center screen allows the user toggle control functionality of each individual display or all of the panels at once. This single OSD management feature brings a new level of control to multi-screen display systems.
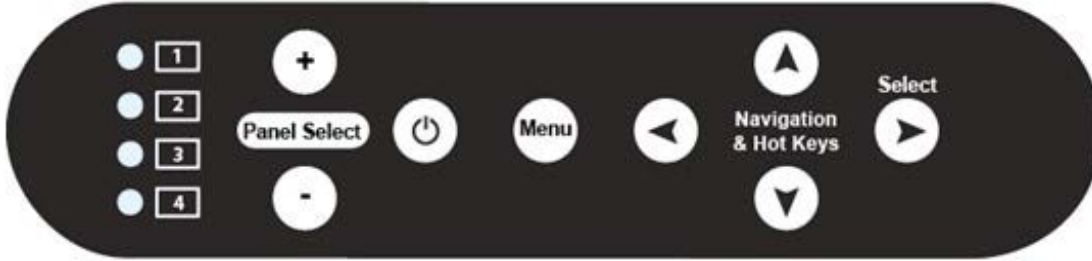
OSD BUTTON BOARD LAYOUT

The OSD button board located on display screen one (1), i.e. the center display screen, is illustrated below.

The basic functions of the OSD button board are:
- Power Button – Turns the TMM4500 on and off
- Menu – Activates the OSD set-up menu
- Navigation & Hot Keys, Up Arrow – Brightness
- Navigation & Hot Keys, Down Arrow – Auto-Calibrate (VGA Only)
- Navigation & Hot Keys, Left Arrow – Contrast
- Navigation & Hot Keys, Right Arrow – Activates Volum3

OSD INDICATOR LIGHT DEFINITIONS

The OSD button board has a bank of four (4) LEDs that indicate LCD display status.

RED — No Video Signal

GREEN — Good Video Signal

BLUE- Display 1 — Shows Current Status
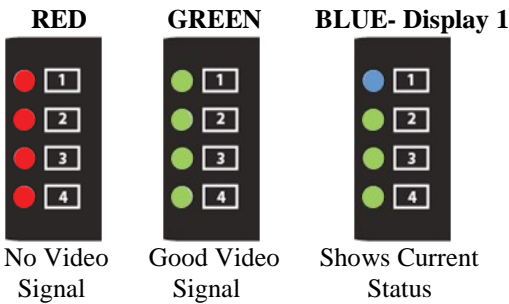
Here are the definitions of the OSD indicator lights:
- Red – Power is applied to an individual display screen, but no active video source is detected.
- Green – Power is applied to an individual display screen, and an active video source is detected.
- Blue – In the example above, display screen 1 is selected or "in focus".
- Focus Options – Display screen selection is accomplished by using the Panel Select + or - buttons shown below

Reset / No Focus   Panel 1 Focus   Panel 2 Focus   Panel 3 Focus   Panel 4 Focus   All Panel Focus
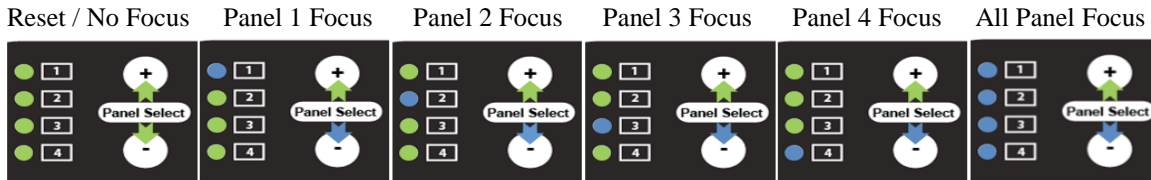
NOTE: The unified button board supports up to four displays. TMM4500 configurations with fewer than four displays will have LEDs that are not populated.

Chapter 6 - Maintenance and Troubleshooting

If you have a problem setting up or using this product, refer to the suggested actions in this chapter to troubleshoot the problem. You may also want to consult the video card user's manual section for additional troubleshooting advice.

MAINTAINING THE TMM4500

To maintain the TMM4500 and to keep the unit operating at peak performance:
- Keep the display screen clean
- Adjust the OSD controls for optimum display performance.
- Keep all ventilation openings clean and occasionally vacuum the openings to remove any accumulation of dust or dirt.
- Do not block ventilation openings with objects or install the TMM4500 in a place where ventilation may be obstructed. Always maintain adequate ventilation to protect the TMM4500 from overheating and to ensure reliable and continued display operation.

TROUBLESHOOTING THE TMM4500

Problem	Possible Causes and Solutions
No image displayed (blank screen)	Is the unit receiving power? Check that the computer's power cable is connected properly and securely into a grounded electrical outlet. Check that the monitor's power cable is connected properly and securely to an electrical outlet. Check that the panel is in a raised position for the power switch to automatically activate. Try using another electrical outlet. Is the unit receiving a valid video signal from the PC or video source? Check that the computer/video source is powered on. Check that the video cable is connected properly and securely to the computer/video source. Check that no pins are bent in the video cable connector. Check that the video card is firmly seated in the card slot in your computer. Is the unit in Power Management mode? Touch the screen (if applicable), press any key on the keyboard, or use the touch pad to restore operation. Are the brightness and the contrast settings too low? Use the monitor controls to adjust these values.
Abnormal image	Check that the video signal is within specifications for the monitor Check that the video cable is connected properly and securely to the computer.
Image colors are abnormal	Check that the video cable is connected properly and securely to the computer. Check that no pins are bent in the video cable connector. Check that a magnetized object is not nearby. Check the settings under the color balance options.

TROUBLESHOOTING THE **TMM4500** (CONTINUED)

Problem	Possible Causes and Solutions
"Video Mode Not Supported" message	Check the maximum resolution and the frequency on the video port of your computer. Compare these values with the data in the Display Modes Timing Chart.
Image is too dark or too light	Adjust the display's Brightness and Contrast
Horizontal bars appear to flicker, jitter or shimmer on the image	Adjust the Fine function
Vertical bars appear to flicker, jitter or shimmer on the image	Adjust the Coarse function and then adjust the Fine function
Image is not stable and may appear to vibrate	Check that the display resolution and frequency from your PC or video board is an available mode for your display screen. On your computer check: Control Panel -- Display Settings, if the setting is not correct, use your computer utility program to change the display settings. Horizontal Frequency: 30kHz ~ 61kHz Vertical Frequency: 50kHz ~ 75kHz Maximum Refresh Rate: 1280 x 1024 @ 75Hz
Image is not centered on a display screen	Adjust the screen's horizontal and vertical positions
Display screen video cable not connected	If power is applied to the unit without the video cable connection between a display screen and the computer, one of the following on-screen messages will be displayed: "**No Signal Going to Sleep**" or "**No Signal**" The OSD adjustment buttons are inactive for the unconnected display screen. This message will appear for 10 seconds before turning off. If the video cable is connected to the computer, this information is not displayed.
Video Signal Out of Specification If the video sync signals do not meet the monitor specifications, the unit will display the following screen: Out of Range – or – Invalid Mode FH: 93.6 KHz FV: 74.9 Hz	The message will detail the current horizontal and vertical scan frequencies, which the LCD panel does not support. This message will appear for 15 seconds before turning off.

Chapter 7 - TMM4500 Specifications

ENVIRONMENTAL

Temperature	
Operating	0°C to 50°C
Storage	-20°C to 60°C

ELECTRICAL

TMM4500 Input Voltage	+12VDC
Power Supply Adapter Line Voltage & Power	100-240VAC, 175W
Line Frequency	50-60Hz

PHYSICAL

TMM4500Approximate Dimensions (W x H x D) 4-Screen Configuration	19" x 7.0" x 26.0" 48.30cm x 17.78cm x 66.04cm
Net Weight	85 lbs. (38.59 kg)

DISPLAYS

Type	21.5" WFHD, 1920 x 1280, LED backlight
Brightness	250 NITS
Viewing Angle	89° Left of vertical center and 89° Right of vertical (178° total), 89° Up over horizontal center and 89° Down from horizontal center (178° total)
Color Depth	16.7M
Contrast Ratio	1000:1
Response Time	8ms G to G Latest

SAFETY STANDARDS

	The product(s) described in this manual have been designed and built to meet the safety requirements of Underwriters Laboratories (UL) for the US and Canadian market based on UL's published Standards for Safety.
	The product (s) described in this manual have been designed and built to meet the safety requirements of TUV Rhineland for the European Union and is based on the Low Voltage Directive.