



**Planar® WeatherBright™**

**LC3251 & LC4751**

**OUTDOOR DIGITAL SIGNAGE DISPLAYS**

**PRODUCT MANUAL**

**[www.planar.com](http://www.planar.com)**

This manual is designed for use with the Planar® WeatherBright™ LC3251 and LC4751 outdoor digital signage displays. Information in this document has been carefully checked for accuracy; however, no guarantee is given to the correctness of the contents.

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# Precautions and Warnings

To maximize the life and safe use of your unit, always be sure to follow the warnings and precautions in this product guide as well as the maintenance recommendations as described in the Preventative Maintenance section.

## Important Safety Instructions

1. Read, retain, and heed all warnings and instructions.
2. The WeatherBright™ open frame outdoor digital display products must be installed into an approved NEMA 3R enclosure for outdoor use. See [Installing the display in an Enclosure](#)
3. Perform preventative maintenance regularly on the WeatherBright Outdoor Digital Displays. See [Preventative Maintenance](#)
4. Do not defeat the safety purpose of the grounding type power plug. A grounding type plug has two blades and a third grounding prong. The grounding prong is provided for your safety. Consult an electrician for a fixed installation or if the outlet does not accommodate all connections to the plug.
5. Protect the power cord from being walked on or pinched particularly at plugs and receptacles.
6. Only use the accessories or spare parts specified by the manufacturer. See [Accessories and Field Replaceable Parts](#)
7. You must follow all National Electrical Code regulations. In addition, be aware of local codes and ordinances when installing your system.
8. Refer all servicing to qualified service personnel. Servicing is required when any of the Outdoor Digital Display products have been damaged in any way. Examples of damage requiring service could include the AC power cord or plug is damaged, liquid has been spilled or objects have fallen into the product, the products do not operate normally, or have been dropped.

## Product Description

Planar® WeatherBright™ LC3251 and LC4751 displays are high bright, open-frame, liquid crystal, full color digital displays intended for extreme weather, outdoor use. The displays utilize interlaced LED backlights providing greater than 2000 nits of luminance for direct sunlight outdoor readability. The displays are 32" and 47" diagonal sizes utilized in portrait mode with a 9:16 aspect ratio and with a WXGA (1366x768) or FHD (1920x1080) native resolution, respectively. The WeatherBright displays come standard with Planar's ERO™ (Extended Ruggedness and Optics) technology, providing optically bonded tempered vandal-resistant cover glass that delivers the best optical and physical performance. Standard PC graphics DVI and VGA video inputs are accepted. An RS-232 serial connection enables full system control and smart monitoring. Both displays accept 120V AC input and have rated power consumption allowing them to run on a single 120V/15A standard electrical service.

The displays are designed to be field-serviceable with easy access for field cleaning or servicing. Field replaceable components include LEDs, fans, and power supplies. The fans and power supplies are redundant, allowing the displays to continue operating if these components fail with minimal effects to the end-user experience. The system self monitors for any component failures or over-limit events and continues operating in a safe but still functional mode until the unit can be serviced. In the event of a component failure, fault flags are raised and can be accessed through the RS-232 serial interface using a simple command set.

These LC3251 and LC4751 are open-frame displays intended to be mounted in NEMA 3R enclosures that provide basic protection from the elements. The displays are ruggedized to utilize outside air for cooling without the need for air conditioning. The enclosure is required to provide an intake and exhaust for the air cooling with a replaceable standard air filter. It is recommended that the enclosure provide a window opening for the display with no additional cover glass or window material in front of the display. The ERO™ optically bonded displays will not experience any fogging, contamination, or reflections that would otherwise compromise the image view ability over the life of the product.

## Product Features

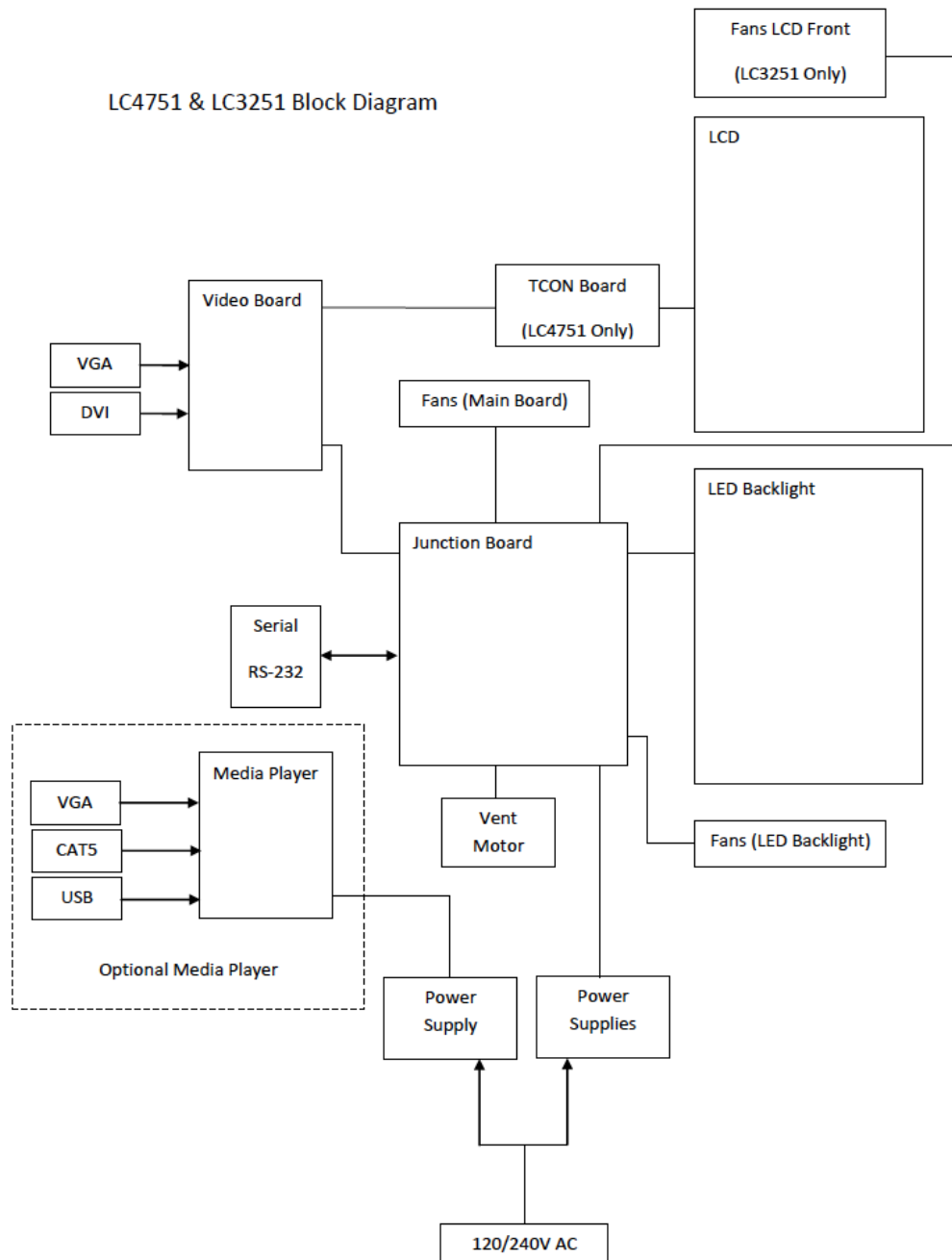
The following are features of the WeatherBright LC3251 and LC4751 outdoor digital signage displays, with best-in-class image quality, and 24/7 mission critical performance with fail-safe designs:

- True brightness of >2000 nits over 7 years
- Designed to withstand -40°F up to 122°F
- Optically-bonded ERO™ tempered cover glass
  - Dramatically improves contrast, viewability, and durability
  - No air gap between the display and cover glass
  - Glare and reflections are significantly reduced
  - No condensation or contamination can block display viewing
  - Image appears in the foreground instead of appearing to be recessed in a box
  - Tempered cover glass is durable and vandal-resistant
  - No front surface coatings, which can degrade over time
  - Air gaps in competing solutions result in more reflections reduced brightness, lower overall contrast and viewability, and increased potential for condensation and debris
- Components selected and ruggedized for 24/7 mission critical use
- Redundancy and interlaced LED back light design ensures power supply or fan failure doesn't result in system failure
- Field-serviceable with easy access for field cleaning or servicing
- Smart system self-monitoring and safe-mode ensures continuous operation
  - Automatic video input switching if one video source fails
  - Temperature, fan, power supply, and LED backlight monitoring
- No air conditioning required in all climates
- Standard installation using existing power supply – operates on single 120V/15A service

## Product Architecture

The WeatherBright™ LC3251 and LC4751 displays are based upon a large-area LCD, using interlaced LED backlights. The Video Board provides an industry-standard video interface to the user. The Junction Board accepts the power and serial inputs and manages the system with smart monitoring and control. The system also incorporates a 12V power supply, fans, a diffuser, temperature sensor boards, and an open-frame metal framework that mechanically holds the assembly together. A block diagram of the primary system is shown in the following figure.

Figure 1 Block diagram of the LC3251/LC4751 display



## **System Status and Fault Monitoring**

The WeatherBright™ LC3251 and LC4751 displays incorporate a microcontroller that monitors and controls overall display functionality without user intervention. The microcontroller provides thermal and power management of the display and continuous fault checking. It checks the status or looks for faults at a maximum interval of every 10 seconds. The display continues operating even with a failure unless directed otherwise. Fault tests are independent from each other. Actions taken in response to a particular fault will not stop fault monitoring and response for other faults. Faults remain stored in non-volatile memory even if conditions indicate resumption of normal operation. For further information on system control and status, see [Appendix 1 – RS-232 Serial Interface](#).



## Product Part Numbers

This manual applies to these products:

Planar Part Number	Planar Model Name	UPC
997-6127-00	Product, LC3251 (open frame)	8 10689 06127 4
997-6609-00	Product, LC4751 (open frame)	8 10689 06609 5
997-6673-00	Product, LC3251-MP (w/ruggedized media player)	8 10689 06673 6
997-6674-00	Product, LC4751-MP (w/ruggedized media player)	8 10689 06674 3
997-6696-00	Product, LC3251-Encl (enclosure)	8 10689 06696 5
997-6697-00	Product, LC4751-Encl (enclosure)	8 10689 06697 2

## Recommended Usage

The following is a list of Planar recommendations for using the LC3251 and LC4751 displays:

- The LC3251 and LC4751 displays are designed for 24/7 mission critical usage in extreme outdoor conditions
- Use the display in portrait orientation
- The displays are intended for use in NEMA 3R enclosures that provides basic protection from the elements
- The displays utilize outside air for cooling:
  - Allow adequate intake and exhaust air provisions without constricting airflow
  - Custom air-flow enclosures can be designed to allow for flush wall mounting applications. Top/bottom or side venting would need to be incorporated. If using the Planar free standing enclosure design for wall mounted applications, allow at least 6 inches between a wall and unit for adequate airflow
  - Utilize a suitable air filter for the environment and service it to ensure unimpeded airflow

# Specifications

This section contains specifications for the LC3251 and LC4751 displays.

## General LC3251 and LC4751 Specifications

Product Name		LC3251	LC4751
Display	Screen size	32 inch diagonal	47 inch diagonal
	Orientation	Portrait	Portrait
	Aspect Ratio	16:9	16:9
	Brightness (max)	2500 nits	2500 nits
	Contrast Ratio (typ.)	3000:1	3000:1
	Backlight	LED 10:1 dimming, ambient light sensor, field replaceable	LED 10:1 dimming, ambient light sensor, field replaceable
	Response Time (typ.)	8 ms	9ms
	Viewing Angle (typ.)	176°H, 176°V	178°H, 178°V
	Native Resolution	1366 x 768 pixels	1920 x 1080 pixels
	Display Colors	8 bit - 16.7M	8 bit - 16.7M
	Display Active Area	392.26mm x 697.68mm (15.44in x 27.47in)	5640mm x 1096mm (23.02in x 40.93in)
	Surface treatment	Anti-Glare 4.7mm optically bonded, tempered Vandal Glass	Anti-Glare 4.7mm optically bonded, tempered Vandal Glass
Connectivity	Video	DVI - DVI-D VGA - DB15	DVI - DVI-D VGA - DB15
	Data	RS-232 - DB9	RS-232 - DB9
	Power	IEC C14	IEC C14
Power	Line voltage	120 VAC	120 VAC
	Line current	2A – 5A	5A – 8A
	Power Consumption (max.)	240 – 600W	600 – 960W
Environment	Operating temperature	-40°C to +50°C	-40°C to +50°C
	Storage temperature	-40°C to +60°C	-40°C to +60°C
	Humidity	95% RH	95% RH
Mechanical	Product Weight	32kg (70lbs)	50kg (110lbs)
	Product Dimensions (WxHxD)	22.8" W x 34.7" H x 11.1" D	29.5" W x 46.8" H x 11.1" D
Media	Processor	2.4 GHz Intel® Core® I5-520M	2.4 GHz Intel® Core® I5-520M
	Memory	2GB DDR3 SDRAM at 1066MHz	2GB DDR3 SDRAM at 1066MHz
	Hard Drive	40GB Solid-State Drive Intel 320 Series SATA 3.0 Gb-s	40GB Solid-State Drive Intel 320 Series SATA 3.0 Gb-s

Player (Optional)	Operating System	Windows® 7 Professional for embedded systems	Windows® 7 Professional for embedded systems
	Form Factor	Epic	Epic
	Connections	LAN x2 (RJ45) USB x4 (USB2.0) VGA output (DB15) for 2nd display VGA input (DB15) for media player by-pass/back-up	LAN x2 (RJ45) USB x4 (USB2.0) VGA output (DB15) for 2nd display VGA input (DB15) for media player by-pass/back-up

## PC Graphics Input Compatibility

The LCD monitor has been tested to synchronize to, and scale the following DVI digital signal graphics inputs and generate a stable display that has a similar geometry.

Item	Resolution	Vertical Refresh Rate	Standard
1	640 x 480	60Hz	IBM VGA
2	640 x 480	67Hz	Apple Mac II
3	640 x 480	72Hz	VESA
4	640 x 480	75Hz	VESA
5	720 x 400	70Hz	IBM VGA
6	800 x 600	56Hz	VESA
7	800 x 600	60Hz	VESA
8	800 x 600	72Hz	VESA
9	800 x 600	75Hz	VESA
10	832 x 624	75Hz	Apple Mac II
11	1024 x 768	60Hz	VESA
12	1024 x 768	70Hz	VESA
13	1024 x 768	75Hz	VESA
14	1280 x 720	60Hz	VESA
15	1280 x 1024	60Hz	VESA
16	1280 x 1024	60Hz	VESA

Item	Resolution	Vertical Refresh Rate	Standard
17	1360 x 765	60Hz	No Standard
18	1366 x 768	60Hz	No Standard
19	1600 x 1200	60Hz	VESA
20	1920 x 1080	60Hz	No Standard

## Reliability Specification

System is designed for 50,000+ hours of continuous 24/7 use with field replaceable LED backlights, and redundant replaceable fans, and power supplies.

## Regulatory Compliance

UL879 and C22.2 No. 207-M89 for Electric Signs (US and Canada)

# LC3251 and LC4751 Display Drawings

Figure 2 Front and Side Rendering of the LC3251 display

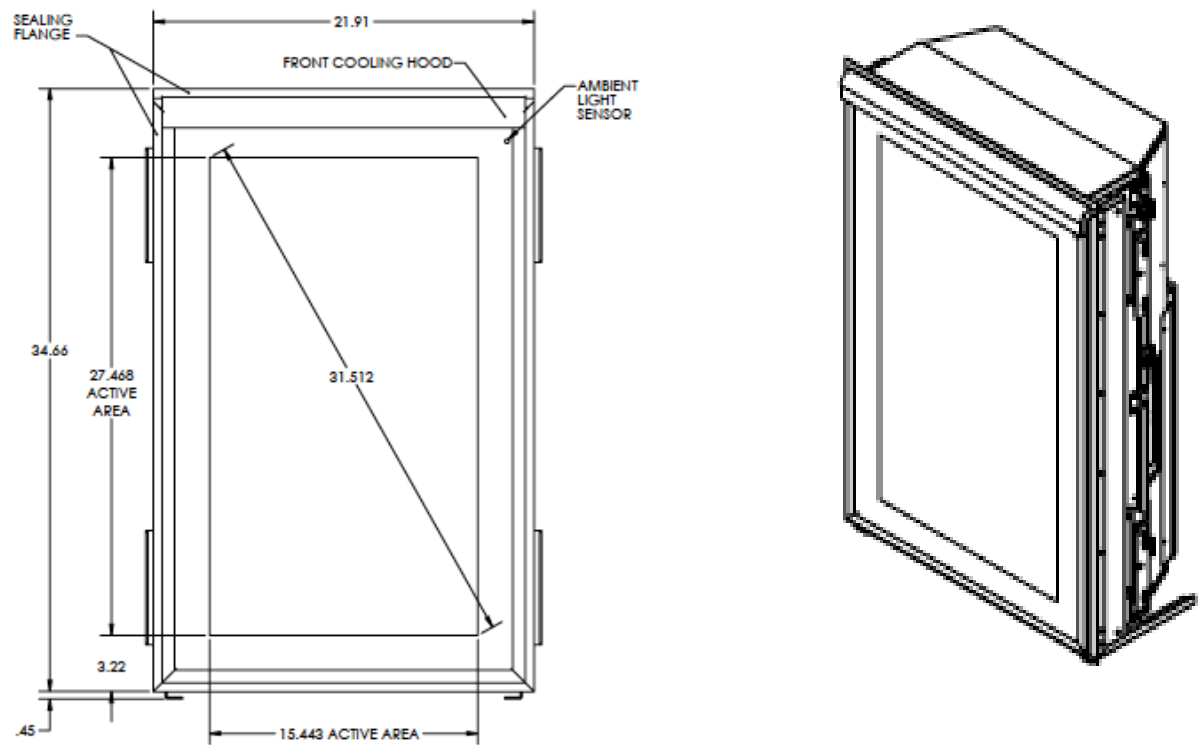
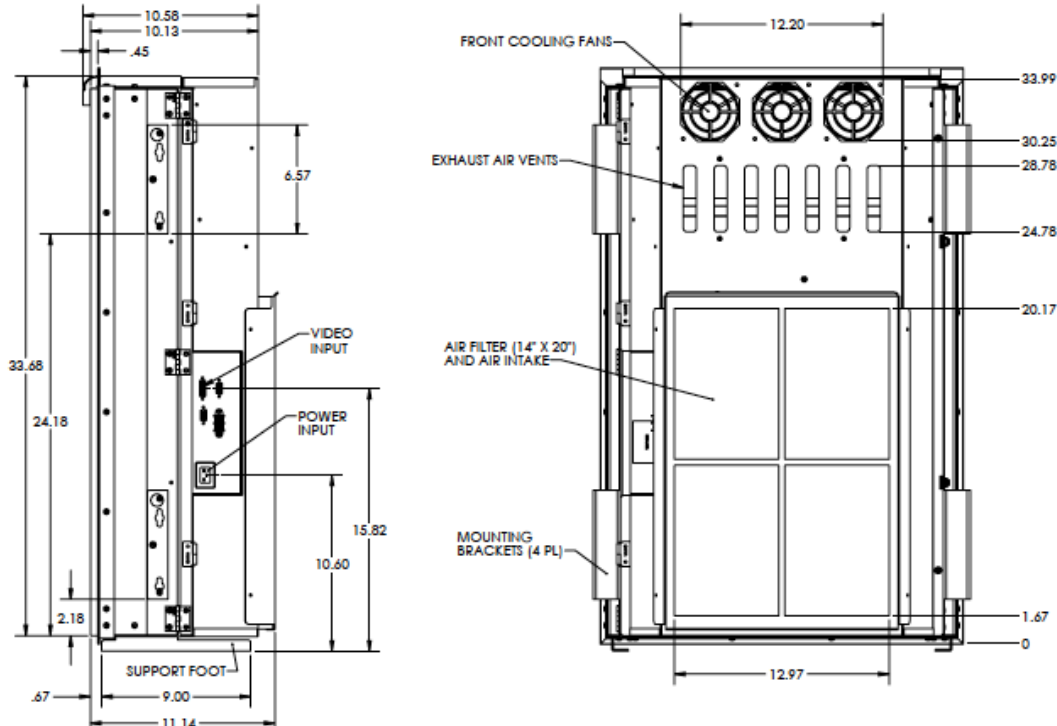
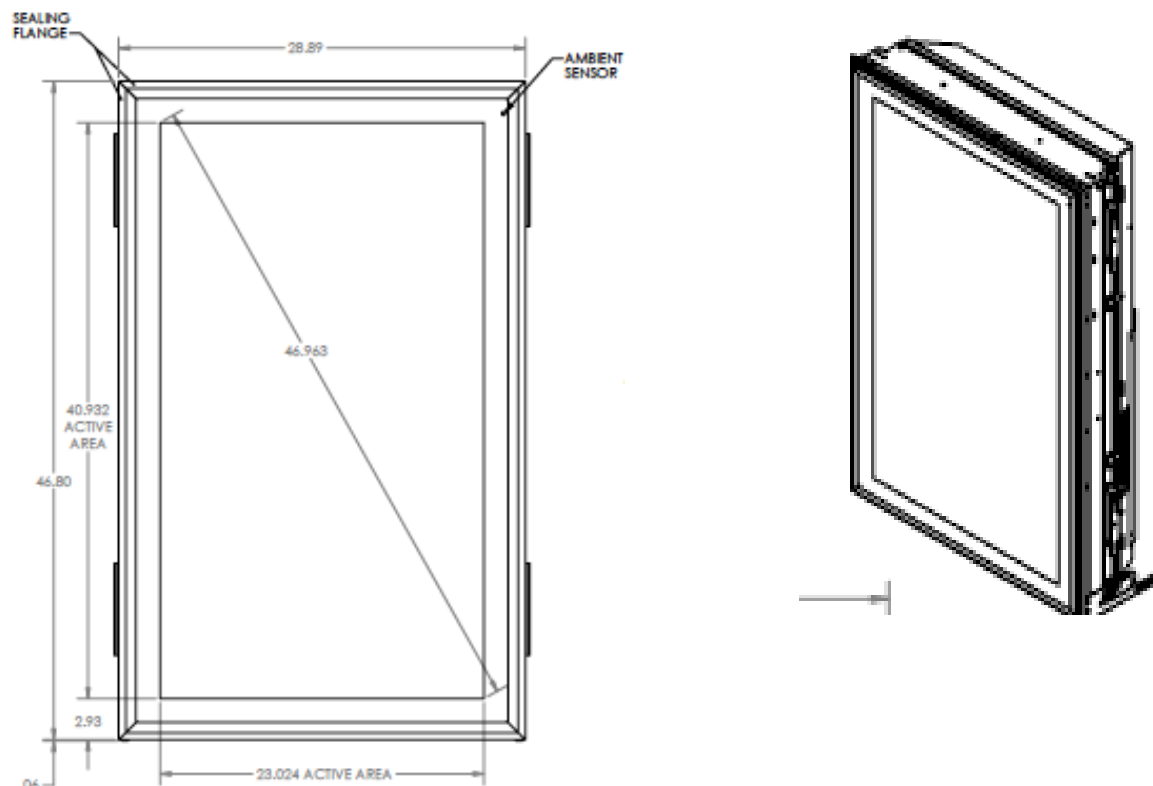


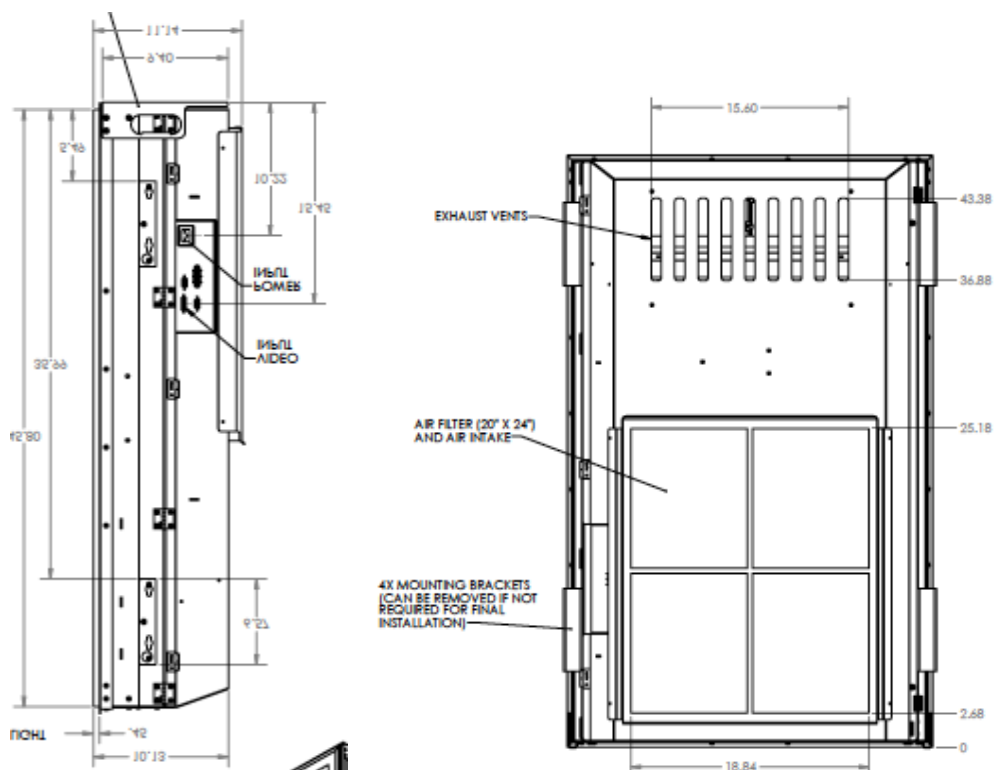
Figure 3 Back and Side Rendering of the LC3251 display



**Figure 4 Front and Side Rendering of the LC4751 display**



**Figure 5 Back View of the LC4751 display**



# Installation, Turn-On, Troubleshooting

## Installing the display in an Enclosure

The WeatherBright LC3251 and LC4751 are open-frame displays intended to be mounted in a NEMA 3R enclosure that provides basic protection from the elements. The displays are ruggedized to utilize outside air for cooling without the need for air conditioning. The enclosure is required to provide an intake and exhaust for the air cooling with a replaceable air filter. The displays are optically bonded to 4.7mm tempered vandal-resistant cover glass intended for exposure to the elements while providing the best viewability. It is recommended that the enclosure provide a window opening for the display with no additional cover glass or window material in front of the display. The ERO™ optically bonded displays will not experience any fogging, contamination, or reflections that would otherwise compromise the image viewability over the life of the product.

Reference: [Appendix 2 – Installing the Display in a Typical Enclosure](#)

## Connection and Display Power Up

Follow these steps to hook up and power on a LC3251 or LC4751 display.

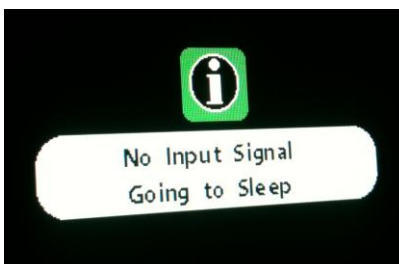
1. Attach a DVI-D or VGA cable to the corresponding video input of the display.
2. Attach a RS-232 null serial cable to the serial input of the display. A null modem serial cable or a standard serial cable using a null mode adaptor is required.
3. Attach IEC C14 power cable to the power input of the display. A 6 foot power cable is provided with the display.
4. Provide power to the display.

**Note:** The displays do not have an on/off switch. It is acceptable to plug/unplug the IEC C14 power cable at the display to turn power on and off.

On power-up the display backlight will turn on and a Planar splash screen will appear on the display for 10 seconds. The display will then auto-sync to a connected video signal. The display is then ready to use.

If a video input signal does not exist or there are problems with it a 'No Input Signal – Going to Sleep' message will be displayed and the display will go to sleep turning off the backlight. If a valid video input signal is provided the display will auto-sync to that signal and come out of sleep mode.

Figure 6 No Input Signal message



# Troubleshooting Tips and Fundamentals

## ***Video Input & Connections***

A basic first step troubleshooting for displays is to verify the video input to the display. The display will auto-sync to an available DVI-D or VGA video input. If no video input is detected the display will go into sleep mode; turning the backlight off and resulting in a black screen. If a video input signal is provided the display will come out of sleep mode and display the image.

Verify display is getting power. Cycle the power to the display and verify per normal operation the backlight turns on and the Planar splash screen appears for 10 seconds.

## ***Fault Conditions – Read Through RS-232 Serial***

The LC3251 and LC4751 displays are designed to self monitor and self regulate to do everything possible on their own to remain functional even with a fault condition present. Redundancy in lamps, ballasts, fans, and temperature sensors are designed into the product to enable this. In the event of an issue the unit will raise a fault flag that can be accessed through the RS-232 serial interface.

The best first step for troubleshooting is to connect to the RS-232 serial interface and query the unit for any faults. See [Appendix 1 – RS-232 Serial Interface](#) for information on connecting through the RS-232 serial interface and for commands to access fault codes and to troubleshoot further using this interface. Note the Planar Control Panel utility is also available for one-to-one display RS-232 Serial troubleshooting.

## ***Replace Failed Components***

If the problem or fault condition is identified as a component failure then replace the faulty component(s). See [Accessories and Field Replaceable Parts](#) for a list of available replacement parts. After replacing components, reset the fault flags on the unit using the RS-232 Serial Interface and query the status of the unit again to ensure no other faults exist.

## ***Contact Support***

If the problem cannot be resolved, contact Planar Support at [www.planar.com/support](http://www.planar.com/support) or your place of purchase for further troubleshooting assistance.



## Preventative Maintenance

Planar recommends preventative maintenance every 6 months as a conservative estimate depending on environmental conditions. However, your environment is going to dictate the practical frequency of preventative maintenance. Locations with particulates such as dust or smog, and possibly very high humidity are more likely to need more frequent preventative maintenance.

As part of your preventative maintenance for the LC3251 or LC4651 display, we recommend doing the following:

1. Wipe down/clean the inside back of the display and diffuser glass with any standard glass cleaner product. With the back cover of the enclosure removed the door of the display hinges open for access to the back of the display and optical diffuser glass. Close the door of the display and turn it on for a visual inspection. It is possible that inadequate cleaning may have left streaks on the optical surfaces . If streaking exists re-clean the surfaces and re-inspect. Clean the outside customer-facing surface of the LCD. Clean the outside of enclosure, if necessary.
2. Clean or replace the air filter. (can be cleaned with water hose).
3. Check the system status locally using a PC plugged directly into the unit via the RS-232 serial interface. If there are any error flags, then troubleshooting should occur to fix the unit until no errors register. See the Troubleshooting Tips and Fundamentals section for information on troubleshooting. If errors cannot be cleared consider replacing failed components or the entire unit.

## Items Required for Field Service and Preventative Maintenance

The following is a list of items and tools Planar recommends having on hand prior to a technician going out to perform Preventative Maintenance (PM) services on LC3251 and LC4751 products. Expectations for the quantities of parts that may be used on preventative maintenance calls under typical conditions are included in parentheses:

1. 1 backlight (PM 1 backlight)
2. 6 fans (127mm: main cooling) (PM 2 – 3 fans)
3. 3 fans (80mm: electronics cooling) (PM 1 – 2 fans)
4. 6 fans (92mm: LC3251 front cooling) (PM 2 – 3 fans)
5. Standard glass cleaner and cloths for wiping glass (PM)
6. 2 - 3 filters (PM 1 filter)
7. Remote PC with serial cable to connect locally to unit to diagnose system status or help determine if image issues are with media player or display (PM). A USB to serial cable is okay as long as the user manages the USB driver installation from their remote PC.

Customers may consider sparing a unit for larger deployments or deployment in a business critical environment. Preventative maintenance parts can be ordered as needed or purchased in advance and stored at a location convenient for deployment.

# Shipping and Packaging

## *Unpacking List:*

- LC3251 or LC4751 display
- 6 ft. power cord

**Note:** An enclosure, DVI video cable, and serial cable are not included with this Planar product.  
(enclosure is shipped separate if ordered with the open frame displays)

## *Package dimensions and weights:*

Product	Unit Weight	Shipping Weight	Package Dimensions
LC3251	67 lb.	85 lb.	17 in x 28 in x 42 in
LC3251-MP	72 lb.	90 lb.	17 in x 28 in x 42 in
LC4751	109 lb.	129 lb.	17 in x 35 in x 53 in
LC4751-MP	114 lb.	134 lb	17 in x 35 in x 53 in
47" Enclosure	75 lb.	150 lb.	35 in x 35 in x 59 in
32" Enclosure	60 lb.	135 lb.	30 in x 35 in x 46 in

## Accessories and Field Replaceable Parts

Optional accessories and field replaceable parts are available for the LC3251 and LC4751 as noted below.

### *Field Replaceable Parts List:*

Part Number	Product Manual Description
997-6874-00	Backlight – LC3251
997-6875-00	Backlight – LC4751
902-0707-01	Power Supply – LC3251 – 380W, 48V, CC
902-0711-01	Power Supply – LC4751 – 650W, 48V, CC
170-0292-03	Fan Assembly – 48V, 127mm, PWM, IP55 (LC3251/LC4751)
170-0299-03	Fan Assembly – 48V, 92mm, PWM, IP55 (LC3251)
170-0300-03	Fan Assembly – 48V, 80mm, Low, IP55 (LC3251)
170-0304-00	Fan Assembly – 48V, 80mm, Low, IP55 (LC4751)
944-2749-00	ECA, Temp and Photo Sensor – Top
944-2748-00	ECA, Temp Sensor Board – Bottom
259-0122-00	Air Filter (LC4751)
259-0121-00	Air Filter (LC3251)

## How You Get Parts

Contact Planar Support at [www.planar.com/support](http://www.planar.com/support) or your place of purchase to order optional accessories or field replaceable parts.

## Warranty

Planar warranty and service plans will help you maximize your investment by providing great support, display uptime, and performance optimization. From post-sale technical support to a full suite of depot services, our services are performed by trained Planar employees. When you purchase a Planar product, you get more than a display, you get the service and support you need to maximize your investment.

To find the latest warranty and service information regarding your Planar product, please visit:  
<http://www.planarcontrolroom.com/support>

# **Appendix 1 – RS-232 Serial Interface**

## **RS-232 Serial Interface Introduction**

The RS-232 Serial interface allows for remote control and access to overall status of the display. A series of intuitive ASCII formatted commands are used for bi-directional communication with the display. This section provides specific information on the RS-232 Serial command format with a table of fault codes and commands to manage the displays.

## **RS-232 Interfaces**

The display includes two RS-232 interfaces. The primary RS-232 interface allows a remote PC to control and obtain status of the display. The secondary RS-232 interface provides communication between the Junction Board and the Video Interface and is internal to the display.

## **RS-232 Hardware Interface to the Remote PC**

This is the external interface to the Remote PC. No handshaking is used. Pin 3 of the DB-9 connector on the display is data transmitted from the host (Tx); pin 2 is data transmitted from the display and received by the host (Rx). Baud Rate = 19200, 1 Stop Bit, No Parity.

## **RS-232 Hardware Interface to the Video Interface Board**

This is the internal interface between the Junction Board and the Video Interface Board. No handshaking is used. Baud Rate = 19200, 1 Stop Bit, No Parity.

## **RS-232 Serial Communication Formats**

This section provides general RS-232 communication format rules and samples of commands to use when communicating with the LC3251 and LC4751 displays. See the [RS-232 Serial Commands](#) table for a list of commands.

### ***General Rules***

- RS-232 commands consist of a string of ASCII characters
- All numeric values are decimal; you do not need to use hex or binary digits in the commands
- Spaces or tabs may be used in the commands to separate the parts and make them easier for users to read. This "white space" is ignored by the command reader
- You cannot use commas, slashes, or other punctuation as separators. Periods have a special purpose in commands
- Commands are not case sensitive, so you can use upper and lower case letters as you wish
- Limited editing of the command is supported – backspace may be used to correct errors in the command text, but not in the command type
- When a command requires a response, wait for the response before sending another command to another display
- All commands must end with a carriage return character, shown as [CR] in the rest of this document. Depending on your serial communications program, commands may automatically be ended with a [CR]

## ***Port Settings***

Baud Rate: 19200

Data bits: 8

Parity: None

Stop bits: 1

## ***Command Format***

All commands fit the following structure, where parameters in brackets [] are optional:

*Command\_Type* *Command\_Text* [*Function*] [*Value*]

No other parameters, such as addresses or targets, are supported.

*Command\_Type* may be 'OP' or 'ST' (case insensitive) for Operations and String commands respectively.

*Command\_Text* is the ASCII string that identifies the command (listed in command table).

*Function* is one of the following symbols:

Symbol	Function	action on unit
=	Set	makes the unit take that value
?	Get	asks what the value is
+	Increment	adds 1 to the current value
–	Decrement	subtracts 1 from the current value
[none]	Execute	performs an action, such as a reset

*Value* is only applicable for 'Set' commands and must be within the range listed in the command table for a particular command.

## ***Response format***

If the command is for the Junction Board, the response is in text format. Returned values, if applicable, are generally in decimal format, with the exception of fault codes, which are in hexadecimal format.

## ***Sample commands and responses***

**Command:** op temp.setpoint?

**Response:** Over temp limit 1: 70 deg C

Over temp limit 2: 80 deg C

**Command:** op temp.setpoint.limit1=65

**Response:** Over temp limit 1 set to: 65 deg C

**Command:** st product?

**Response:** Display ID: 00

Model: LCxxxx  
Serial Number: 000000000  
Date of manufacture: 01-01-2010  
Part number: 000-0000-00  
Junction board firmware version: 2.00.00  
Video board firmware version: 0

**Command:** op contrast=100

**Response:** Video board opcode 0x4004 - value: 100

**Command:** op brightness?

**Response:** Video board opcode 0x4003 - value: 0

**Command:** st panel?

**Response:** Panel resolution: 1366 x 768

**Command:** op display.power=off

### ***Response Errors***

There are several situations where an error message will be returned. Below is a list of possible error messages and the likely cause of the error.

- Commands must start with 'op' or 'st'[CR] - This error code will be returned if the command is not prefixed properly with an 'op' or a 'st'
- Unknown command[CR] - Command set is not recognized
- Invalid operation[CR] – The operation type is not supported by that command or the operation is not recognized
- Invalid value[CR] – The argument value is not supported by that command
- No valid response from video board[CR] – The video board did not respond, try resending command



## RS-232 Serial Fault Codes

This is a list of possible fault codes returned from a status query of the displays.

LED_OVP1	= 0xA1,
LED_OVP2	= 0xA2,
LED_OVP3	= 0xA3,
LED_OVP4	= 0xA4,
LED_OVP5	= 0xA5,
LED_OVP6	= 0xA6,
LED_OVP7	= 0xA7,
LED_OVP8	= 0xA8,
LED_OVP9	= 0xB1,
LED_OVP10	= 0xB2,
LED_OVP11	= 0xB3,
LED_OVP12	= 0xB4,
LED_OVP13	= 0xB5,
LED_OVP14	= 0xB6,
LED_OVP15	= 0xB7,
LED_OVP16	= 0xB8,
LED_OVP17	= 0xC1,
LED_OVP18	= 0xC2,
LED_OVP19	= 0xC3,
LED_OVP20	= 0xC4,
LED_OVP21	= 0xC5,
LED_OVP22	= 0xC6,
LED_OVP23	= 0xC7,
LED_OVP24	= 0xC8,
FanSpeed1	= 0x21,
FanSpeed2	= 0x22,
FanSpeed3	= 0x23,
FanSpeed4	= 0x24,
FanSpeed5	= 0x25,
FanSpeed6	= 0x26,
FanSpeed7	= 0x27,
FanSpeed8	= 0x28,
TempSensorJunctionBoard	= 0x31,
TempSensorIntakeAir	= 0x32,
TempSensorTopChassis	= 0x33,
OverTemp1JunctionBoard	= 0x34,
OverTemp1IntakeAir	= 0x35,
OverTemp1TopChassis	= 0x36,
OverTemp2JunctionBoard	= 0x37,
OverTemp2IntakeAir	= 0x38,
OverTemp2TopChassis	= 0x39,
LightSensorTop	= 0x41,
AcuatorTimeout	= 0x51,
PowerSupply1	= 0x61,
PowerSupply2	= 0x62,

## RS-232 Commands

Function	Function Type	Default Value	Description	ASCII Command	Value/ Range	Possible Responses
Power On/ Standby/Off	Set/Get	On	On – Backlight On; AMLCD On ; Fans Auto Off – Backlight Off; AMLCD Off; Fans Off (even with video input) Standby mode will be entered if the state is on but no video is detected. Standby -with video input – Backlight On; AMLCD On; Fans Auto -without video input - Backlight Off; AMLCD Off; Fans Auto	OP display.power	ON OFF	Set Responses: Display power on[CR] Display power off[CR]  Get Responses: Display is on[CR] Display is off[CR] Display in standby[CR]
Contrast	Set/Get/ Increment/ Decrement	50	Adjusts the contrast of the display.	OP contrast	0-40	Contrast set to: XX[CR] Contrast: XX[CR] Contrast increased[CR] Contrast decreased[CR]  XX = contrast value
Backlight Brightness	Set/Get/ Increment/ Decrement	10	Adjusts the brightness of the backlight. Backlight can either be set to full on or 50%.	OP backlight.brightness	1-10	Set Responses: Backlight brightness set to XX[CR] Backlight brightness: XX[CR] Backlight brightness set to XX[CR] Backlight brightness set to XX[CR]  XX = Backlight brightness value
Red Temperature	Set/Get/ Increment/ Decrement	50	Adjusts the red color temperature when 'Color Temperature' is set to 'USER'	OP red.temp	0-100	Red temp set to: XXX[CR] Red temp: XXX[CR] Red temp increased[CR] Red temp decreased[CR]  XXX = Red color temp value.
Green Temperature	Set/Get/ Increment/ Decrement	50	Adjusts the green color temperature when 'Color Temperature' is set to 'USER'	OP green.temp	0-100	Green temp set to: XXX[CR] Green temp: XXX[CR] Green temp increased[CR] Green temp decreased[CR]  XXX = Green color temp value.
Blue Temperature	Set/Get/ Increment/ Decrement	50	Adjusts the blue color temperature when 'Color Temperature' is set to 'USER'	OP blue.temp	0-100	Blue temp set to: XXX[CR] Blue temp: XXX[CR] Blue temp increased[CR] Blue temp decreased[CR]  XXX = Blue color temp value.

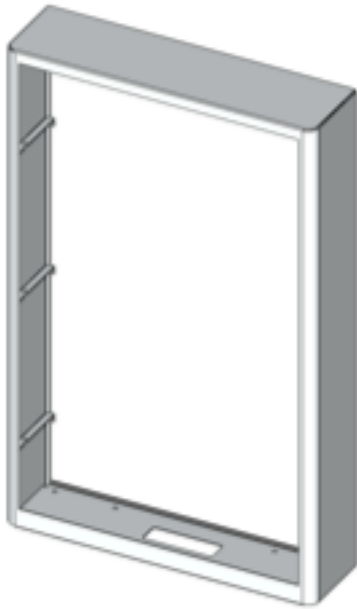
Function	Function Type	Default Value	Description	ASCII Command	Value/ Range	Possible Responses
Product	Get		Returns Display ID, Model, Unit Serial Number, Date of Manufacture, Part Number, Master Board Firmware Version.	ST product		Display ID: XX[CR] Model: XXXXX[CR] Serial Number: XXXXXXXX[CR] Date of manufacture: XX-XX-XXXX[CR] Part number: XXX-XXXX-XX[CR] Master board firmware[CR] version: X.XX.XX[CR]
Display ID	Set	00	Sets displays identification number	ST display.id	00-ZZ	Display ID set to XX[CR]  XX = Display ID
Runtime	Get		Reports the runtime of the unit	OP runtime		Days: XXX [CR] Hours: XXX [CR] Minutes: XXX [CR]  XXX = Time
Backlight Runtime	Set/Get		Reports the runtime of the backlight.	OP backlight.runtime		Days: XXX [CR] Hours: XXX [CR] Minutes: XXX [CR]  XXX = Time
Backlight Runtime Reset	Execute		Resets the backlight runtime	OP backlight.runtime.reset		Days: 0 [CR] Hours: 0 [CR] Minutes: 0 [CR]
Reset	Execute		Hardware reset, all adjustable parameters remain unchanged.	OP hardware.reset		System resetting... [CR]
Factory Reset	Execute		Display restores all adjustable parameters back to the factory settings.	OP data.reset		Adjustable parameters reset[CR]
Status	Get		Returns operational status of display (OK or Alarm) and any alarm or failure flags.	ST status		No faults[CR]  Faults: 0xXX, 0xXX, 0xXX ...[CR]  XX = fault code, see table 1.3.1 of fault codes for possible values. The number of fault codes returned could be anywhere from 1 to 19
Status Reset	Execute		Resets fan status register	OP status.reset		Faults cleared[CR]
Fan Control	Set	Auto	Set or read fan control status. Turn fans full ON/OFF set to manual speed control or place in auto mode. Note: Fans will default to auto mode on power up.	OP fan.control	AUTO ON OFF MANUAL	Fans AUTO[CR] Fans ON[CR] Fans OFF[CR] Fans MANUAL[CR]
Main Fan Speed	Set/Get	50	Set the speed of the main cooling fans when they are in manual mode	OP main.fan.speed	20-100	Main cooling fan speed set to XXX[CR]  XXX = Fan speed 20-100

Function	Function Type	Default Value	Description	ASCII Command	Value/ Range	Possible Responses
Front Fan Speed	Set/Get	50	Set the speed of the front cooling fans when they are in manual mode	OP front.fan.speed	30-100	Front cooling fan speed set to XXX[CR]  XXX = Fan speed 30-100
Temperature Sensors	Get		Read the values of the internal temperature sensors. Returns value at all 3 sensors	OP temperature.c		Electronics: XX deg C[CR] Intake air: XX deg C[CR] Top chassis: XX deg C[CR]  XX = Temperature
Get Thermal Set Points	Get		Returns the upper and lower thermal set points	OP temp.setpoint		Over temp limit 1: XXX deg C[CR] Over temp limit 2: XXX deg C[CR]  XXX = Temperature limit
Input Source Selection	Set/Get		Set or read primary video input. This input would be displayed as a priority. If the primary input is missing auto-search will search for another input.	OP select.source	VGA DVI	Input set to VGA[CR] Input set to DVI[CR]
Panel	Get		Returns the native panel resolution	ST panel	EX:1366x768	Panel resolution: 1366 x 768 [CR]
Auto Dimming	Set/Get	ON	Controls backlight based off the ambient light sensor	OP auto.dimming	OFF ON	Auto Dimming OFF[CR] Auto Dimming ON[CR]  Auto dimming is OFF[CR] Auto dimming is ON[CR]
Minimum Dimming Level	Set/Get/ Increment/ Decrement	5	Sets the lowest brightness level the display will go when placed in auto dimming mode	OP minimum.dimming.level	1-10	Minimum dimming level set to XX[CR] Minimum dimming level: XX[CR] Minimum dimming level set to XX[CR] Minimum dimming level set to XX[CR]  XX = Dimming level
Motion Sense Control	Set/Get	OFF	Have panel respond to an external motion sensor.	OP motion.sense	OFF ON	Motion Sensing OFF[CR] Motion Sensing ON[CR]  Motion Sensing is OFF[CR] Motion Sensing is ON[CR]
Motion Sense Polarity	Set/Get	High	Determines if the motion sense input is active high or active low.	OP motion.sense.polarity	HIGH LOW	Motion Sense Polarity set to Active High[CR] Motion Sense Polarity set to Active Low[CR]  Motion Sense Polarity is Active High[CR] Motion Sense Polarity is Active Low[CR]
Motion Sense Off Brightness	Set/Get	5	Sets the brightness level the display will dim to when no car is detected	OP motion.sense.off.brightness	1-10	Motion Sense Off Brightness set to XX[CR] Motion Sense Off Brightness: XX[CR] Motion Sense Off Brightness set to XX[CR] Motion Sense Off Brightness set to XX[CR]
Ambient Light	Get		Returns the value read from the ambient light sensor	OP ambient.light	0-4015	Ambient Light: XXXX[CR]  XXXX = Ambient Light

Function	Function Type	Default Value	Description	ASCII Command	Value/ Range	Possible Responses
Louver Control	Get/Set	Auto	Set or get the state of the louver	OP louver.control	Open Close Auto	Louver Opening[CR] Louver Closing[CR] Louver Control set to Auto[CR]  Louver is Opening[CR] Louver is Closing[CR] Louver Control is set to Auto[CR]
Video Firmware	Get		Display video board firmware on the display	OP video.firmware		Check firmware version displayed on screen[CR]

## Appendix 2 – Installing a Planar Enclosure





**Front Enclosure**



**Pedestal**



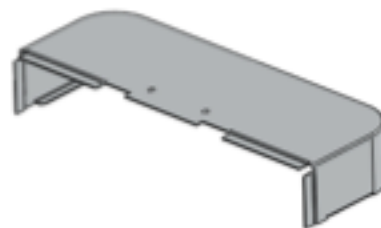
**Stiffener Plate**



**Support Block (x2)**



**Foot Bezel Front**



**Foot Bezel Rear**



**Pedestal Cover**



**Junction Box Mount**

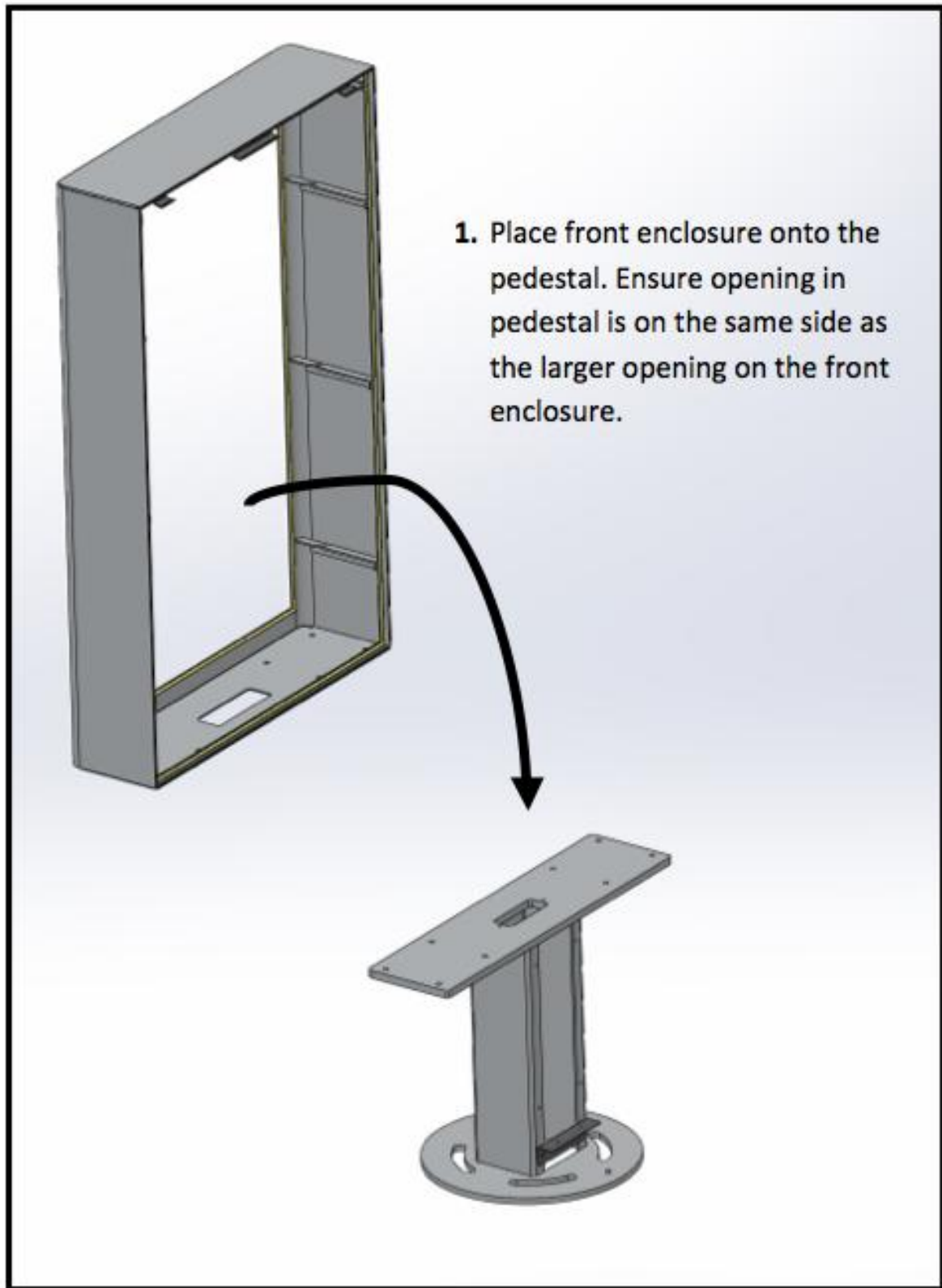


**Rear Cover**

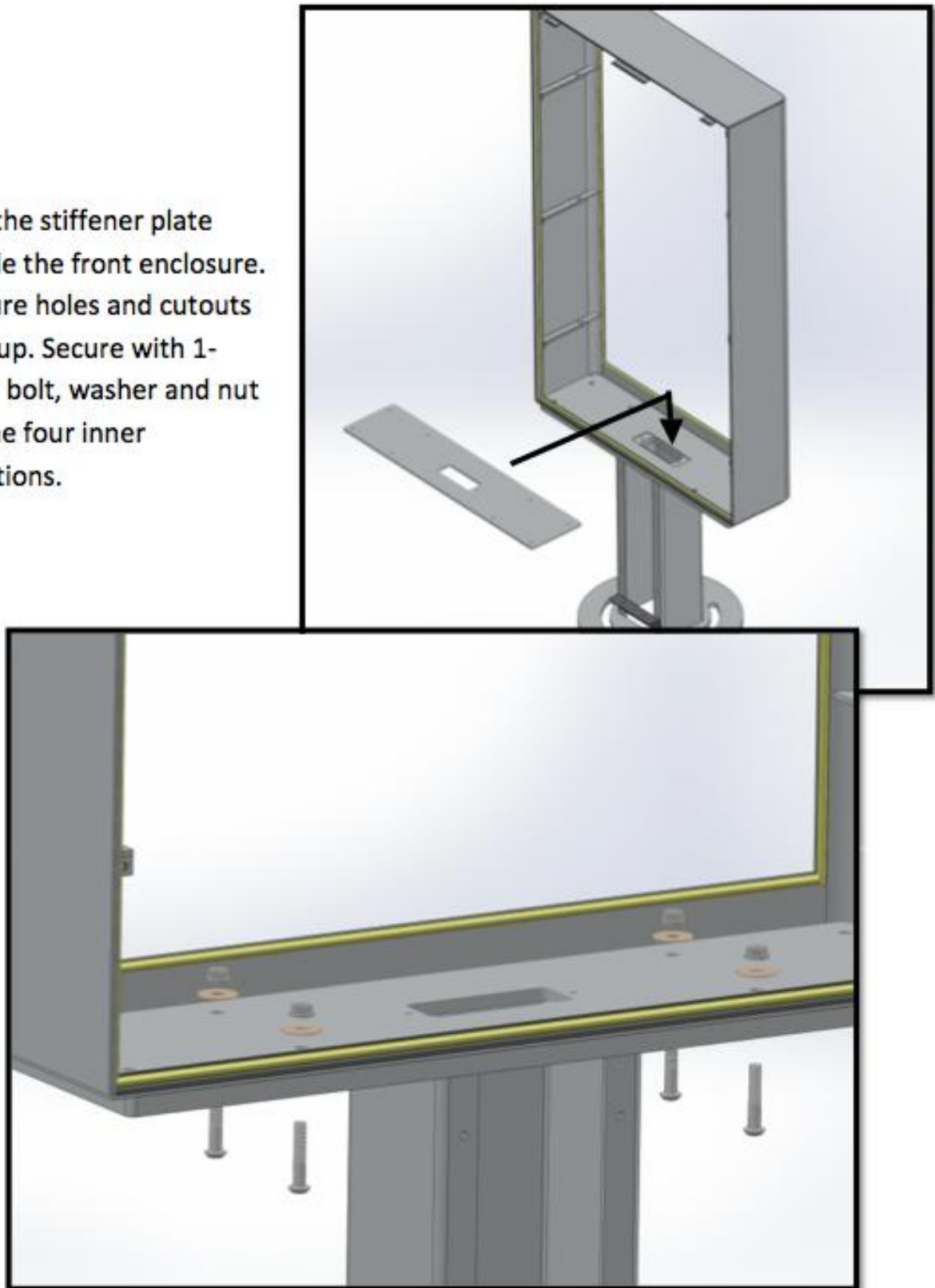


**Installation Bracket (x4)**

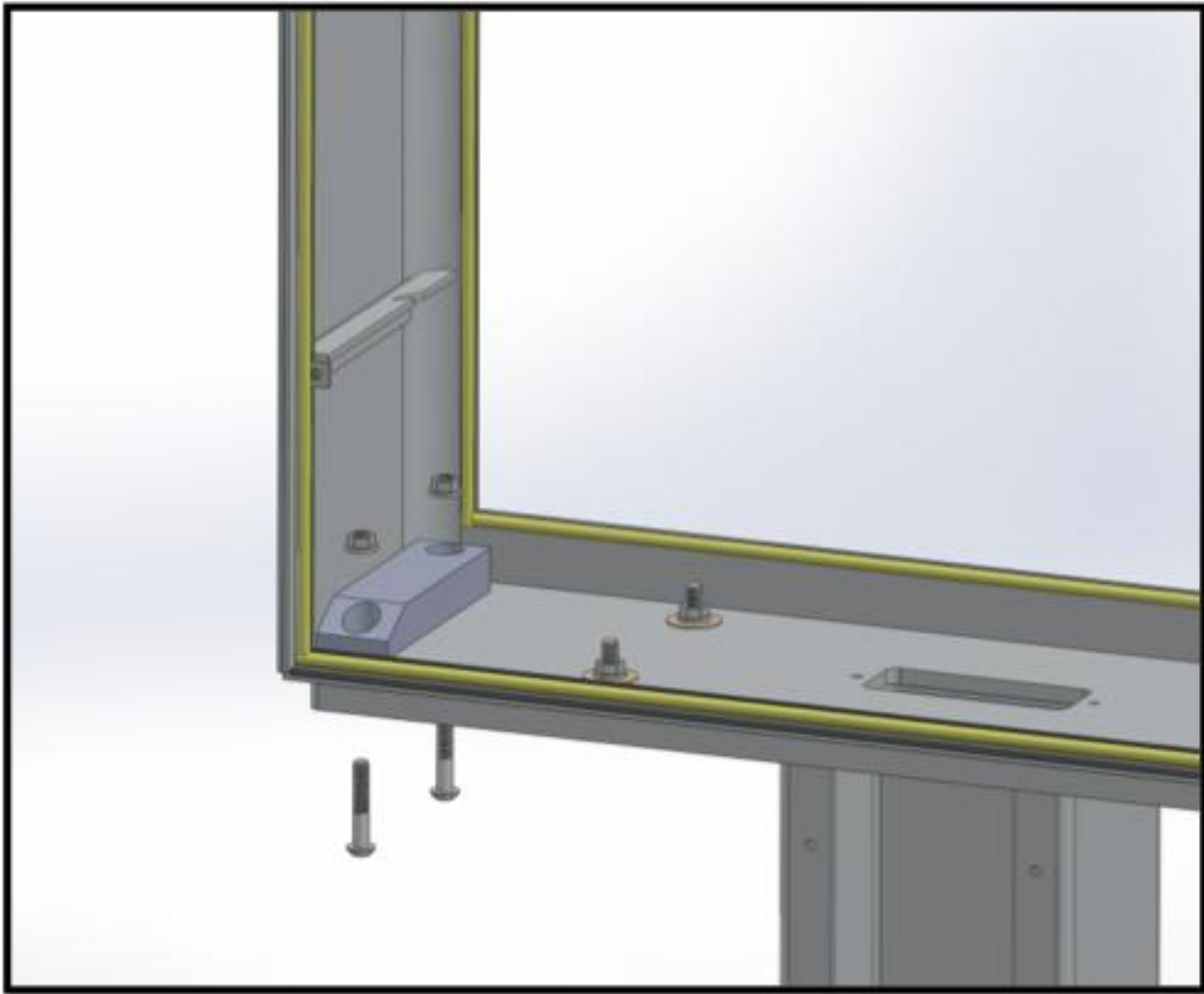


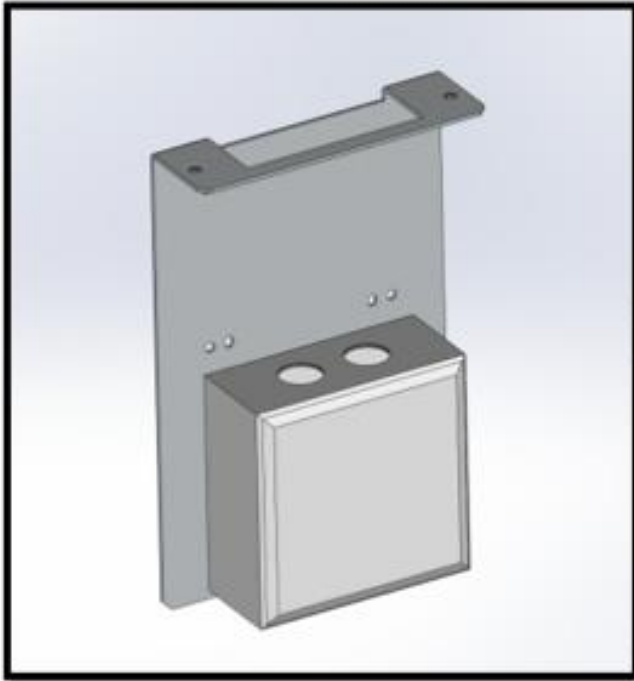


2. Put the stiffener plate inside the front enclosure. Ensure holes and cutouts line up. Secure with 1-3/4" bolt, washer and nut at the four inner positions.



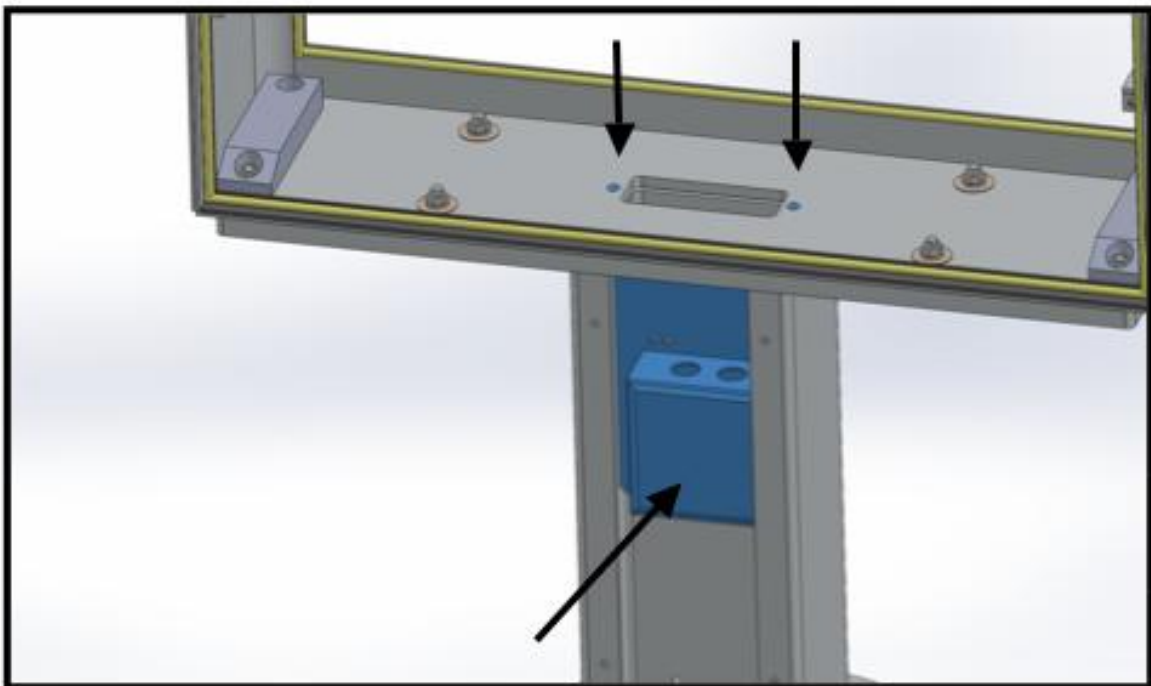
- 3.** Install the Support blocks using 1-3/4" bolts and nuts. The sloped surface of the block should face out the larger opening in the enclosure.





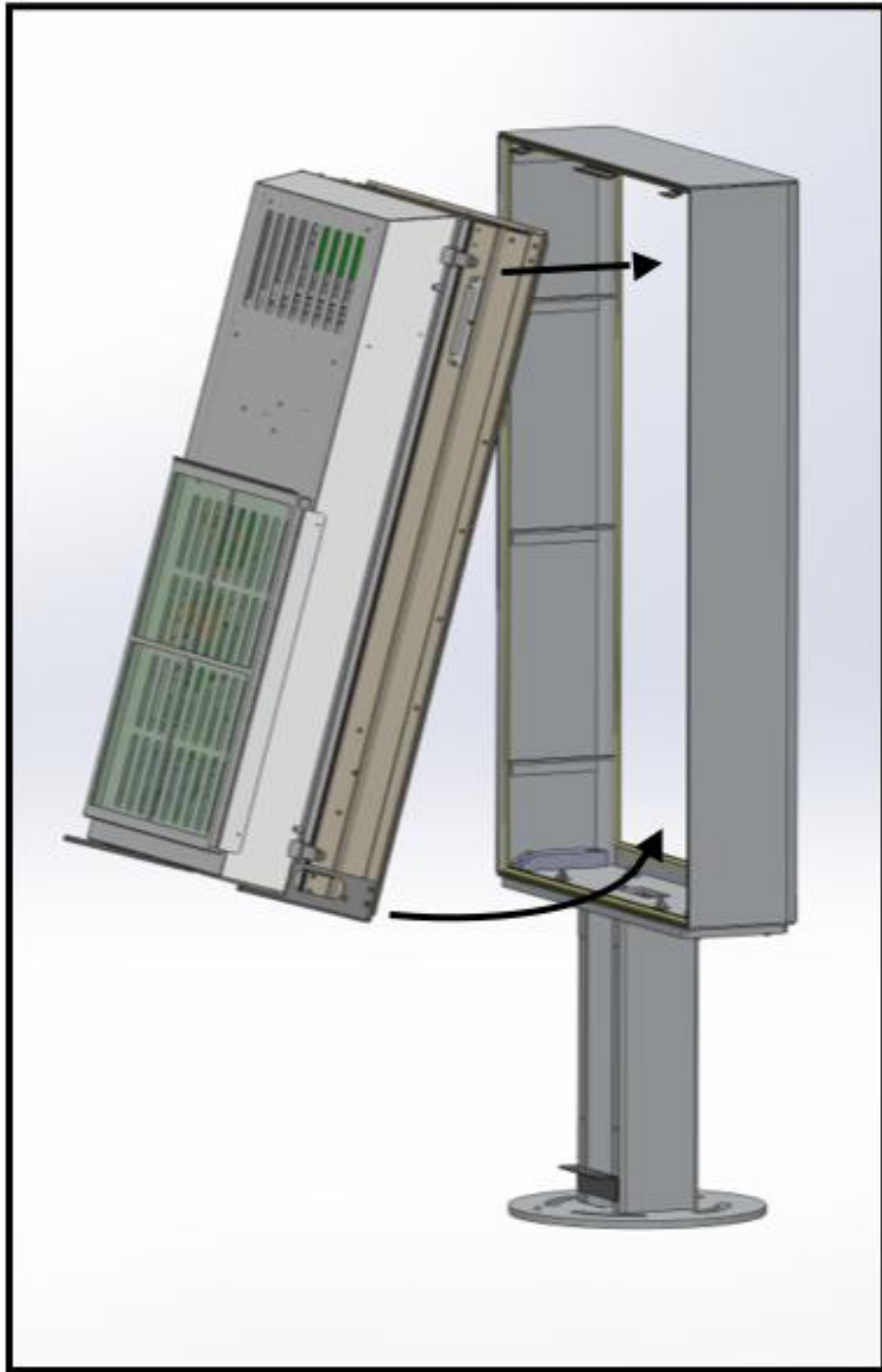
4. Assemble the Junction box and mount with box in lower position.

5. Install the Junction box mount into the pedestal assembly (drop screws in from top, inside enclosure)



**6. With two people,** carefully lift display into place inside enclosure.

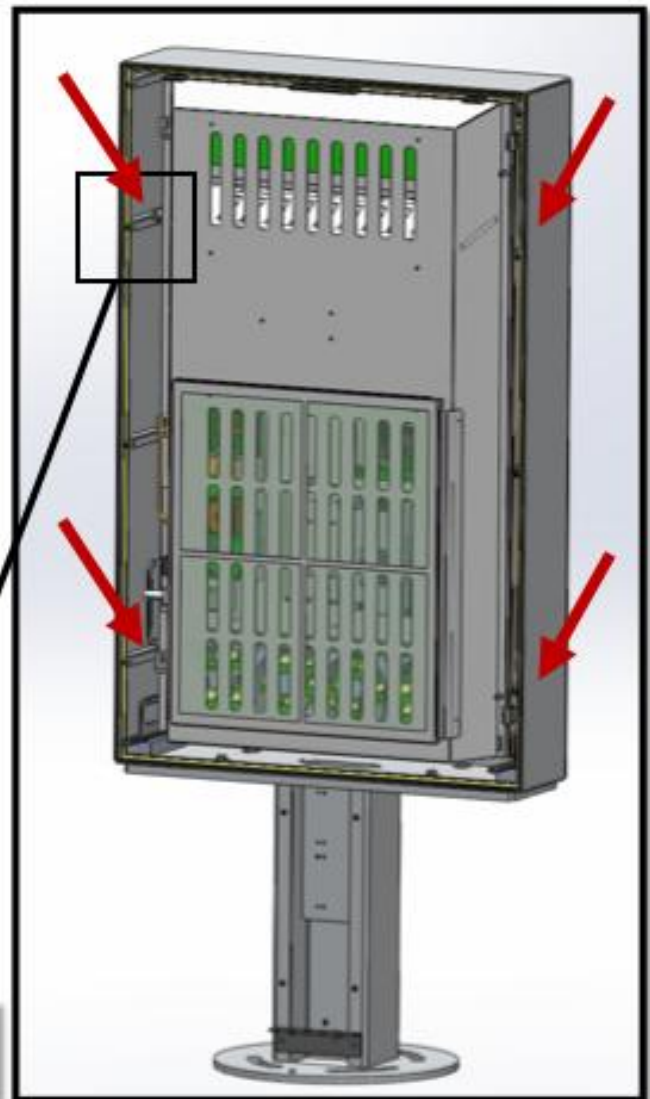
**Tip:** Clear top flange first, then swing bottom forward onto support blocks.



7. Slide installation brackets onto side rails (red arrows) and hook them in place. Tighten the screw to push the display forward.

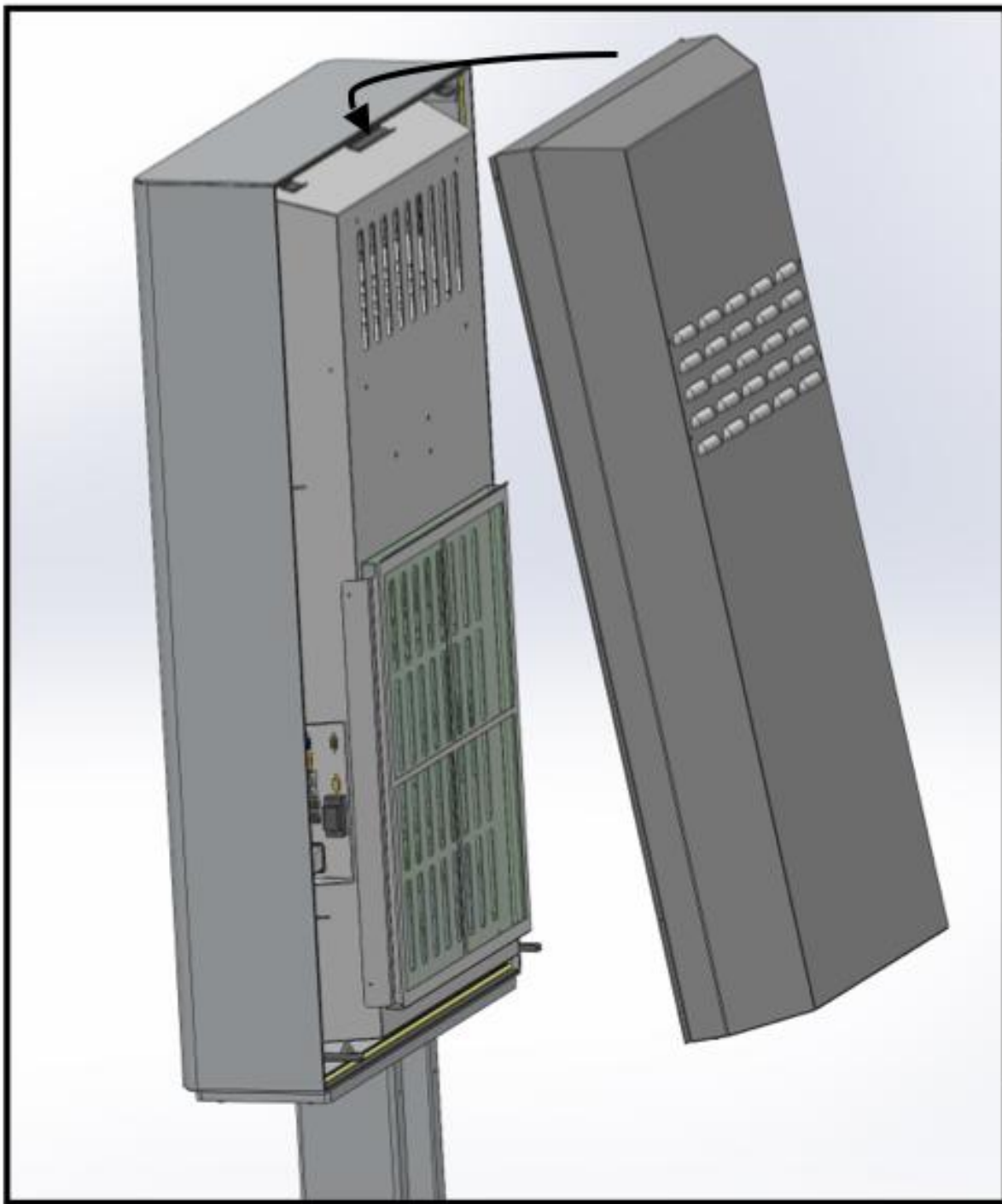
**DO NOT OVERTIGHTEN!**

**Hand screw driver is recommended.**



**Setup electrical components and ensure display functions properly before continuing to install rear cover.**

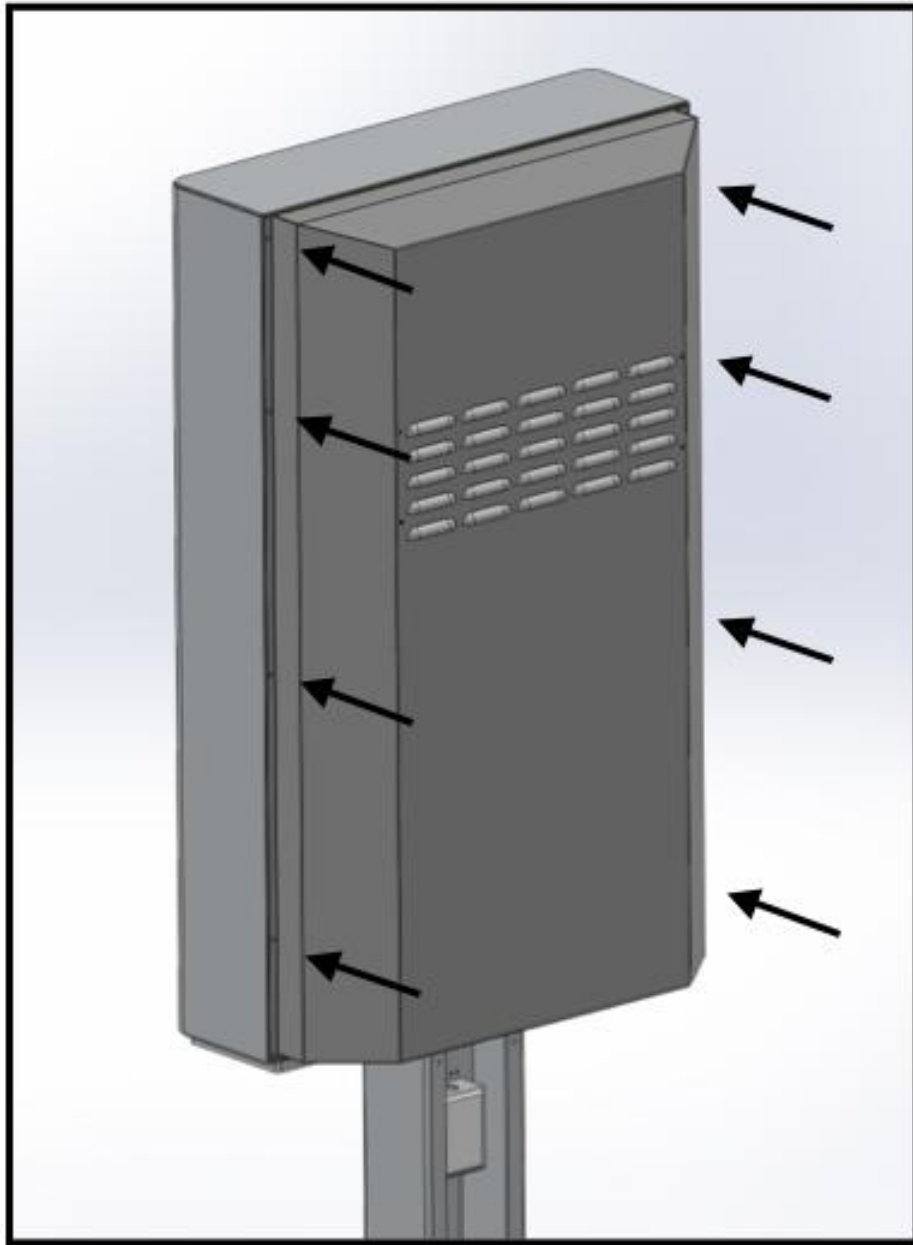
8. Hang rear cover from hooked flanges at top of enclosure and align holes along sides of rear cover.



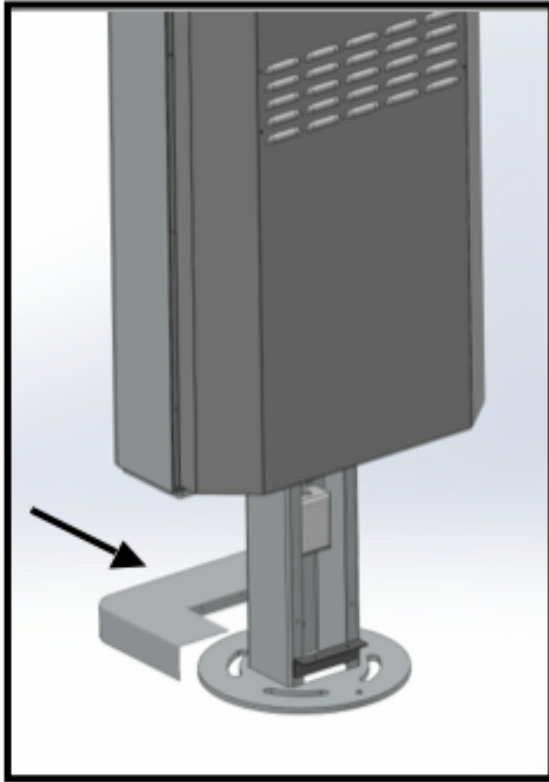


9. With a torx hand screwdriver, carefully drive in eight 1" torx screws to secure the rear cover.

**DO NOT CROSS THREAD SCREWS!**

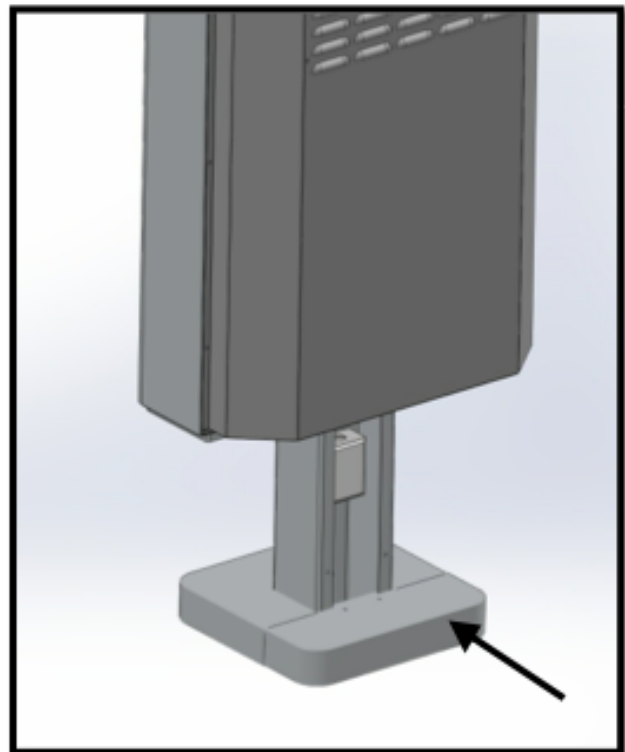


**10. Install the front and back foot bezels**

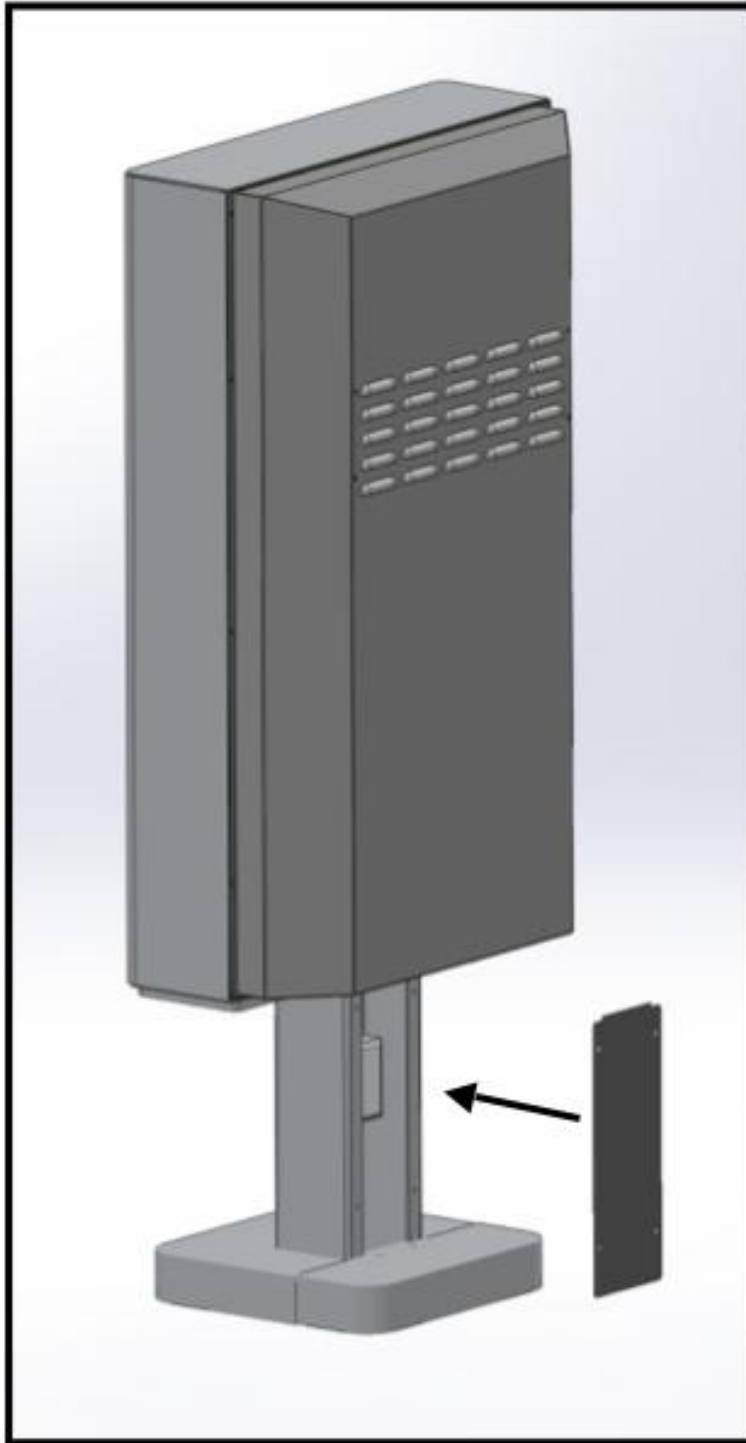


- i. Slide on the front foot bezel (the larger one). Use two 1" torx screws to secure it to the pedestal. Start screws from inside pedestal.

- ii. Screw in the rear bezel cover by putting two 1" torx screws in through the top surface.



- 11.** Complete the installation by securing the pedestal cover with four 1" torx screws.



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