Industrial 17" CRT Monitor

(Bulletin 6159 - Series B)

Installation and User Manual

AB *Allen-Bradley*
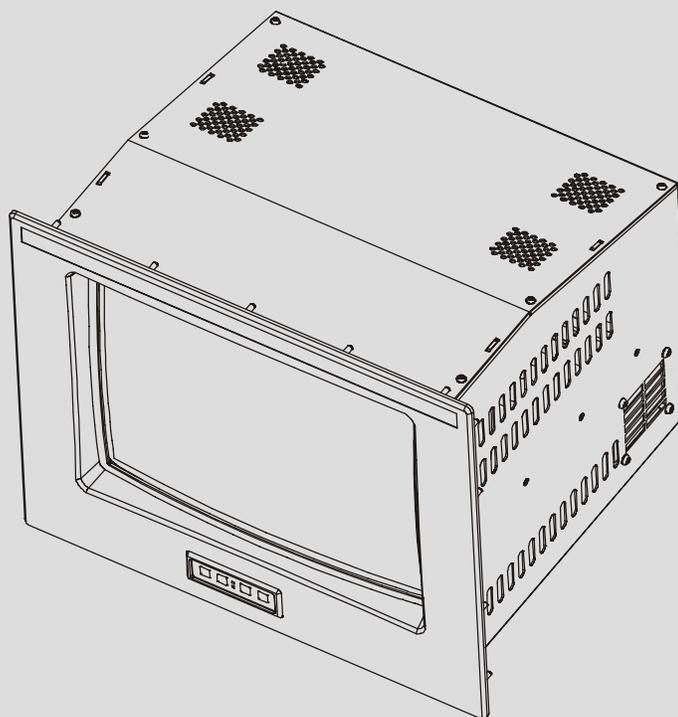
Rockwell Automation

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Important User Information	Solid state equipment has operational characteristics differing from those of electromechanical equipment. "Safety Guidelines for the Application, Installation, and Maintenance of Solid State Controls" (Publication SGI-1.1) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Rockwell Automation be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation cannot assume responsibility or liability for actual use based on the examples and diagrams.

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Throughout this manual, we use notes to make you aware of safety considerations.

ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss.

Important: Identifies information that is especially important for successful application and understanding of the product.

Industrial 17" CRT Monitor

Description

The Bulletin 6159 17" Industrial CRT Monitor is a general purpose monitor suitable for a wide range of industrial computing applications. It offers the following features:

- Reliable and rugged industrial design

- High-brightness

- Durable NEMA 4 sealed polycarbonate screen overlay

- Versatile multi-sync design (640 x 480 to 1280 x 1024 resolution)

    Note: This monitor can display resolutions up to 1280 x 1024. If you experience unexpected results operating the monitor at this resolution, verify that the monitor is operating at 60Hz.

ATTENTION: The equipment described in this document generates, uses, and emits radio frequency energy. The equipment has been tested and found to comply with FCC Rules, Part 15, subpart J, for Class A computing devices.

The use of non-shielded interface or power cords with Allen-Bradley industrial monitors is prohibited.

ATTENTION: X-ray emissions from these monitors are typically about 0.05 mR/hr maximum, well below the 0.5 mR/hr maximum recommended by the US. Department of Health and Human Resources and specified in "Federal Performance Standards for Television Receivers", Section 10, Part 1020, Title 21, of the U. S. Code of Regulation (PL90-620), Vol. 38, No. 198.

These monitors are equipped with X-ray protection circuits which cause automatic shutdown of the equipment in case its X-ray emissions begin to approach Federal limits.

Available Options

The following options are available to the 6159 Industrial Monitor:

- Video interface options (HD-15)
- Touchscreen options (resistive, capacitive)
- Touchscreen cable options
- Video cable options
- Power cord options

Package Contents

The monitor shipping carton contains the following items:

- Monitor
- Package of mounting hardware
- AC power cord (optional)
- Video cable (optional)
- This user manual

A 6159 Industrial Monitor with a touchscreen option is shipped with these additional items:

- Supporting software and manuals
- RS-232 serial extension cable (optional)

Unpacking the Unit

Before unpacking a new monitor, inspect the shipping carton for damage. If damage is visible, immediately contact the shipper and request assistance. Otherwise, proceed with unpacking.

Note: Make sure you keep the original packaging for the monitor in case you need to return the monitor for repair.

Installing the 6159 Industrial Monitor

This section describes how to install the monitor.

Tools Needed

In addition to the tools required to make the cutout, you will need the following tools:

- 3/8" Deep Well Socket

- 1/4" Drive Extension - 12" or longer

- 1/4" Drive Ratchet or 1/4" Drive Torque Ratchet

Before Installation

When installing the unit, it is important to consider environmental factors at the site that could affect performance as well as possible effects from equipment operation on personnel and nearby equipment.

Following the guidelines will help ensure that the monitor will provide safe and reliable service.

- Ensure that sufficient **power** is available from a single phase AC outlet at the site.

- Ensure that sufficient **space** is available around air inlets and outlets to provide the circulation necessary for cooling. Never allow air passages to become obstructed. The monitor is equipped with a fan to ensure proper cooling.

- **Dust and smoke** particles can cause problems, since they can collect at ventilating holes in the enclosure and interfere with cooling. Accordingly, where dust and smoke are problems it is especially important to keep air vents clean. Refer to the Routine Maintenance section (Page 27) for more information.

- Ensure that the **ambient air temperature** will not exceed the specified maximum temperature. A user supplied fan, heat exchanger or air conditioner may be required to meet this condition in some installations.

- Leave the monitor's **enclosure or cover** in place at all times during operation. The cover affords protection against high voltages inside the monitor and inhibits radio-frequency emissions that might interfere with other equipment.

- The Federal Communications Commission has prepared a pamphlet that addresses the problem of **radio frequency interference** to radio and television reception, which should be consulted in case of problems with such interference. This publication, "How to Identify and Resolve Radio/TV Interference Problems" (Stock #004-000-00345-4) may be obtained from the US. Government Printing Office, Washington, DC 20402.

- Determine the minimum and maximum ambient **humidity** for the monitor by consulting the specification sheets at the back of this manual. Ensure that the humidity of the ambient air will not exceed these limits. In very dry environments, static charges build up very readily. Proper grounding of the equipment through the AC power cord can help reduce the likelihood of static discharges, which may cause shocks and damage electronic components.

Panel Mounting

When properly installed, the 6159 Industrial Monitor is designed to provide protection against water and dust to NEMA 4 standards.

No slides or shelves are required because the 6159 Industrial Monitor is designed to be supported by the panels in which it is installed.

Figure 1
Generic Panel Mount Diagram
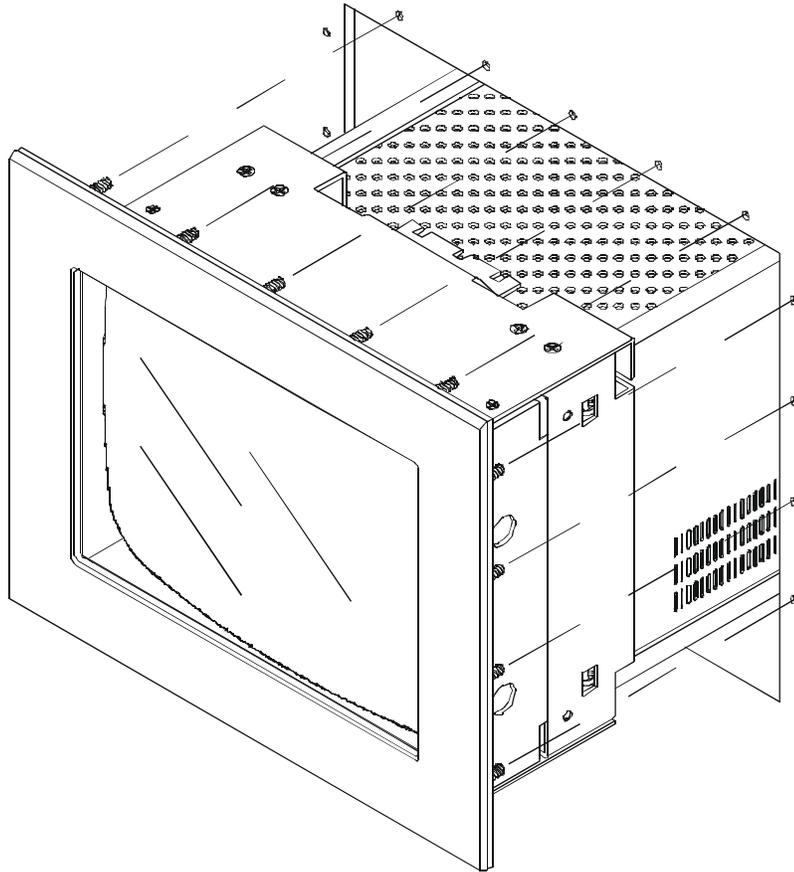
Panel Mounting Guidelines

Observe the following precautions before installing the unit in a panel:

- Confirm that there is adequate space behind the panel. Remember to allow extra space (63.5 mm (2.5 in) behind and25.4 mm (1 in) below and on each side) for air circulation and cabling. Allow 12.7 mm (0.5 in.) top clearance for mounting.

- Confirm that the cabinet is deep enough to accommodate the monitor's depth while providing rear clearance for airflow. A cabinet with depth of 449.3 mm (17.69 in.) is sufficient.

- Take precautions so that metal cuttings do not enter any components that are already installed in the panel.

- Supporting panels should be at least 14 gauge to ensure proper sealing against water and dust and to provide proper support. The mounting hardware supplied accommodates panels up to 6.4 mm (0.25 in) thick.

    Note: Supporting panels must be cut and drilled to specifications prior to installation.
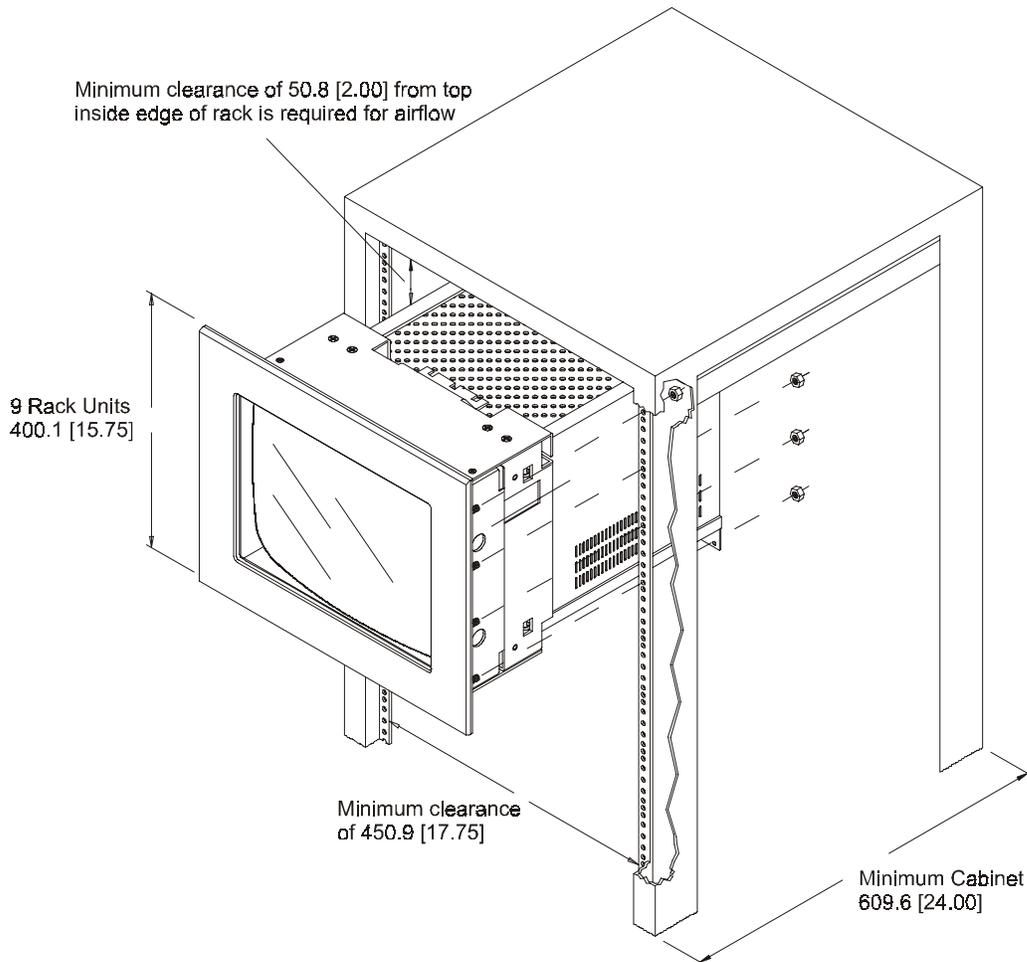
ATTENTION: Failure to follow these warnings may result in personal injury or damage to the panel components.

Mounting the 6159 Industrial Monitor in a Rack

Due to the front panel size and stud pattern, the 6159 Industrial Monitor can be installed in an EIA 19" 9U panel standard rack. Refer to the following figure:

Figure 2
Generic Rack Mounting Diagram

Minimum clearance of 50.8 [2.00] from top inside edge of rack is required for airflow

9 Rack Units
400.1 [15.75]

Minimum clearance
of 450.9 [17.75]
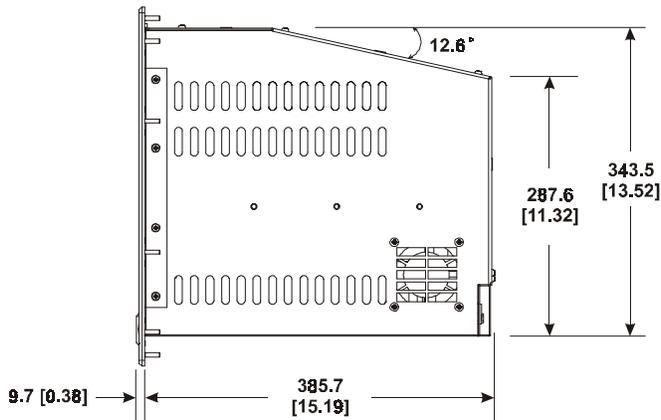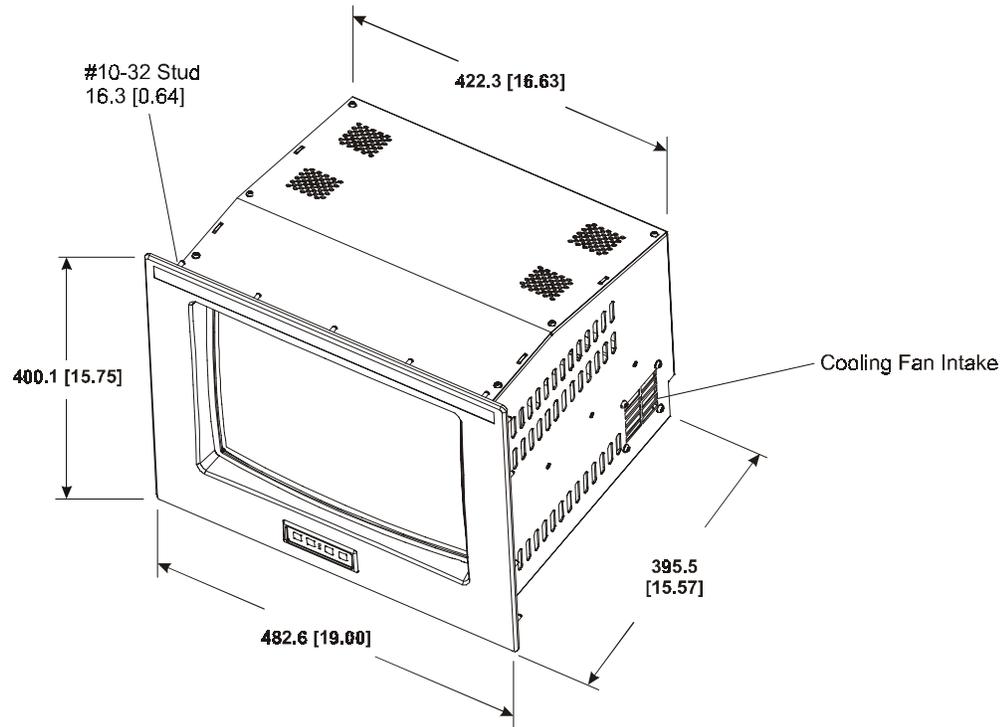
Minimum Cabinet
609.6 [24.00]

Important: If you install the 6159 Industrial Monitor in a rack, you must ensure that the rack can support the weight of the monitor.

You might need to install a support or shelf under the rear of the monitor to support the weight.

Dimensions

This section provides diagrams you need to follow to install the unit.

Figure 3
6159 Industrial Monitor Dimensions

#10-32 Stud
16.3 [0.64]

422.3 [16.63]

400.1 [15.75]

Cooling Fan Intake

395.5
[15.57]

482.6 [19.00]

12.6°

Note: Be sure to allow at least
63.5 [2.50] rear clearance for
cable connections and ventilation.

343.5
[13.52]

287.6
[11.32]

9.7 [0.38]

385.7
[15.19]

Panel Mounting Procedure

1. Confirm that the shipping carton contains a package of 20 10-32 lock nuts and 20 flat washers. You will need 18 nuts and washers for installation.

2. Refer to the physical dimension drawing (Figure 3) and confirm that there is adequate space behind the panel. Remember to allow extra space for circulation and cabling.

3. Refer to the panel cutout drawing below for dimensions of the panel cutout and mounting hole locations. Cut and drill the panel.

   Note: Use #10-32 or M5 self-locking nuts for mounting.

Figure 4
Panel Mounting Cutout
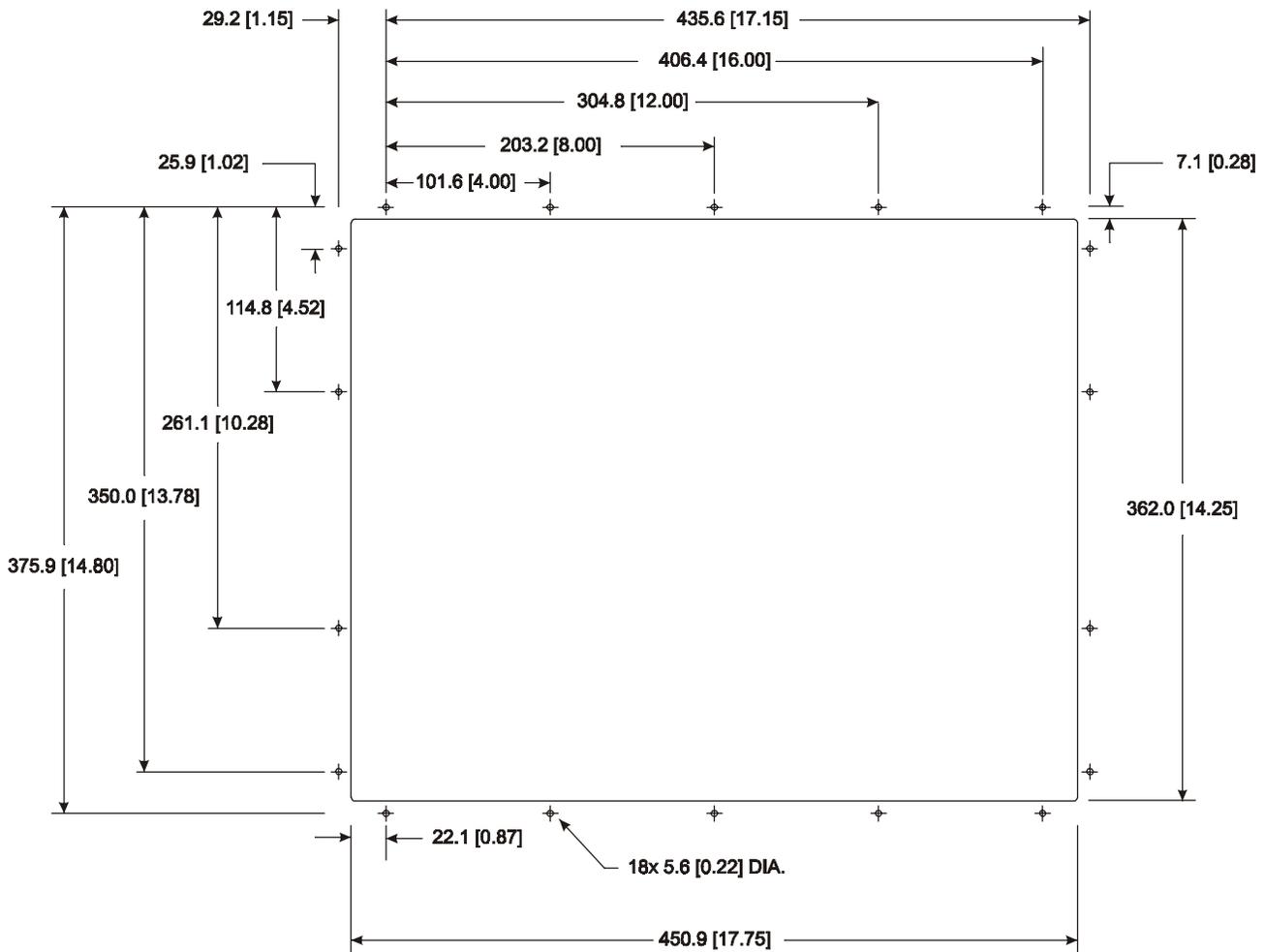
4. Carefully remove the monitor from its packaging. Avoid damaging the monitor gasket.

▶ **Tip:** It will be easier to install the monitor if you support it with a shelf or other support adjusted to the appropriate height.

5. Insert the monitor in the panel cutout from the front. Do not damage the threaded mounting studs as you position the monitor.

6. Secure the unit with the lock nuts and washers provided. Tighten evenly to 24 inch-pounds of torque.

   Important: To ensure a proper seal, be sure to install a washer and nut on each of the 18 mounting studs.

   ⚠️ **ATTENTION:** Mounting nuts must be tightened to a torque of 24 inch-pounds to provide panel seal and avoid potential damage. Rockwell Automation assumes no responsibility for water or chemical damage to the monitor or other equipment within the enclosure due to improper installation.

7. Remove the protective adhesive sheet from the screen of the Industrial Monitor. The sheet is designed to prevent scratching of the polycarbonate screen protector or the optional touchscreen during shipping and installation. It should be removed before use.

Connecting the 6159 Industrial Monitor

The rear panel of the 6159 Industrial Monitor has connectors for attaching cables to accomplish the following:

- Connecting to a host video source (HD-15 VGA)
- Connecting to a host touchscreen control port (DE-9 connector) (optional)
- Connecting to AC power

Note: Some connectors on your monitor may differ from the following figure.

The following figure illustrates the standard configuration for the 6159 Industrial Monitor.

Figure 5
Rear Panel

Chassis Ground Terminal

Serial Port for Optional Touchscreen

HD-15 Video Input

Power Input
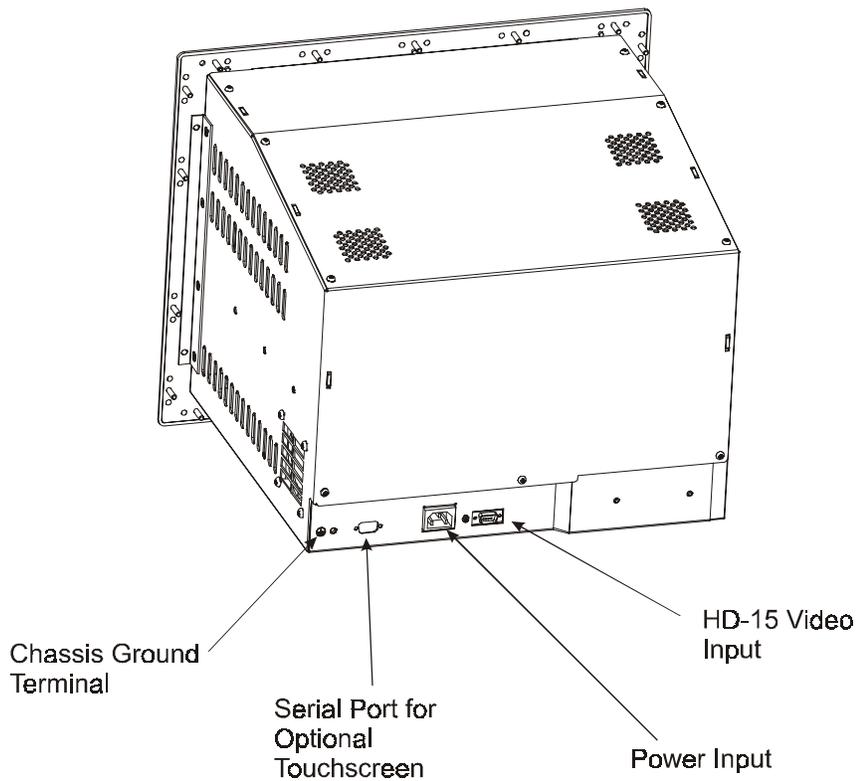
Connecting the Video Source

The video connection to the host is made through a HD-15 (female) connector.

To establish a signal using the HD-15 connector:

Note: For more information on using an HD-15 video cable to connect to the host computer, refer to Appendix B (Page 33).

1. Obtain a shielded, properly terminated video cable of length as short as possible. Longer cables (up to approximately 50 feet in some cases) may be used, provided they are properly constructed. Your package may include a 6- or 15-foot video cable, if specified.

2. Connect one end of the cable to the female HD-15 video input connector on the rear panel of the monitor.

3. Connect the other end to the output of any IBM-compatible VGA adapter or other video generator.

   Note: You may connect the monitor to video generators that do not conform to VGA standards. The main requirement is that the generator provide analog RGB video signals (0.714V or 1V above reference black into 75 ohms) and separate horizontal and vertical sync signals. For information on setting the video input level, refer to Page 25.

Connecting the Touchscreen Interface

The serial touchscreen interface connection to the host is made through an RS-232 DE-9 (female) connector located on the rear panel.

The optional touchscreen provides a high-resolution touch input system. Driver software included with the package allows the touchscreen to function with many popular DOS and Windows®-based industrial applications as a pointing device (mouse).

Note: Refer to the manual included with the touchscreen option and Appendix A of this manual (page 30) for additional details on the installation and operation of the touchscreen.

To connect the touchscreen:

1. For units with the touchscreen option, make sure you have one of the optional serial cables.

2. Connect one end of the touchscreen serial cable to the T/S port connector on the rear of the monitor.

3. Connect the other end to any serial communications port on the host computer.

4. Tighten the captive screws on the cable connector to secure it.

Connecting AC Power

The 6159 Industrial Monitor requires a single phase power supply providing 100 to 240V AC at 50 or 60 Hz. Power must be available at a grounded three-pin outlet located nearby. Whenever possible, connect the monitor to the same AC source that supplies the computer.

To connect AC power to the monitor:

1. Turn off the main switch or breaker.

2. Use the ground terminal of the monitor to establish a chassis-to-earth ground connection. Secure one end of a ground strap to the ground terminal. Connect the other end of the ground strap to a good earth ground.

   The ground terminal is an M5 screw.

> **ATTENTION:** Chassis ground must be connected for safe operation of the monitor. The AC receptacle on the monitor is a 3-wire type with chassis ground pin, and the mating AC cord supplied is a 3-wire type, designed for connection to a grounded 3-pin AC outlet. However, a properly ground AC outlet is not always available, and grounding using a 3-wire cord can easily be defeated. If you fail to ground the monitor properly, the setup may result in personal injury from electrical shock or damage to the equipment.

3. Connect the socket end of the AC power cord to the mating connector on the rear panel of the monitor.

4. Connect the plug end of the AC power cord to the main outlet.
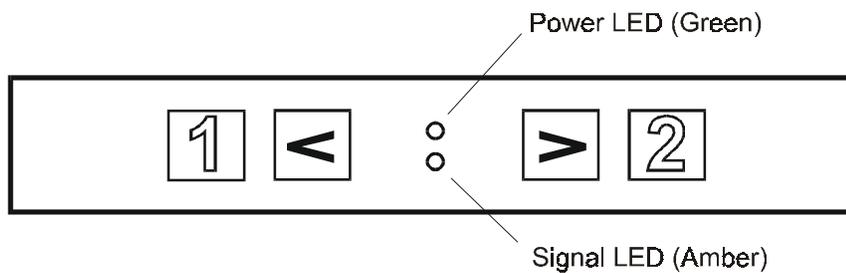
5. Restore AC power to the outlet.

Operating the 6159 Industrial Monitor

This section describes how to operate the 6159 Industrial Monitor.
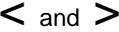
Operator Controls and Indicators

The 6159 Industrial Monitor is furnished with operation keys on the front panel that allow digital on-screen adjustments. On-screen adjustments are performed from the main menu (see figure on following page). Using the operation keys (see below figure), the user can maneuver to the appropriate selection or setting in the menu.

Figure 6
Front Panel Operation Keys

Table A
Operation Keys Description Table

Control	Description
1	This operation key: • Displays the main menu. • Records changes made to the selection when the control box for a desired selection is displayed. The control box closes and the main menu is displayed. • Closes the main menu. This action memorizes any settings and completes the adjustments. • Answers "Yes" to questions.
< and >	Arrow keys have several functions: • If the main menu is displayed, pressing these keys moves the cursor to desired selection that needs adjusting. Arrow keys to move to the left(<) and to the right (>). • If a control box is displayed, may be used to select a value for the adjustment. • If no menu is displayed, pressing these keys adjusts the contrast.
2	This operation key: • Displays the control box for the highlighted selection when the main menu is displayed. • Displays the secondary control box for the highlighted selection when a control box is displayed. • Toggles between the control box and any of its secondary control boxes. • Answers "No" to questions.

Status LEDs

The 6159 Industrial Monitor has two status LED indicators on the front panel. The following table lists the functions assigned to the LEDs:

Table B
6159 Industrial Monitor Status LED Indicators

LED	Description
Power LED (Green)	• Indicates that power is applied to the monitor.
Status LED (Amber)	• Indicates that the monitor is not receiving a video signal.

Note: For information on troubleshooting the 6159 Industrial Monitor, refer to Page 28.

Operating the Main Menu

This section explains the digital main menu and explains how to make operation adjustments.

To display the main menu:

Press ① to display the menu. The main menu (see below figure) appears on the screen.

Figure 7
Main Menu
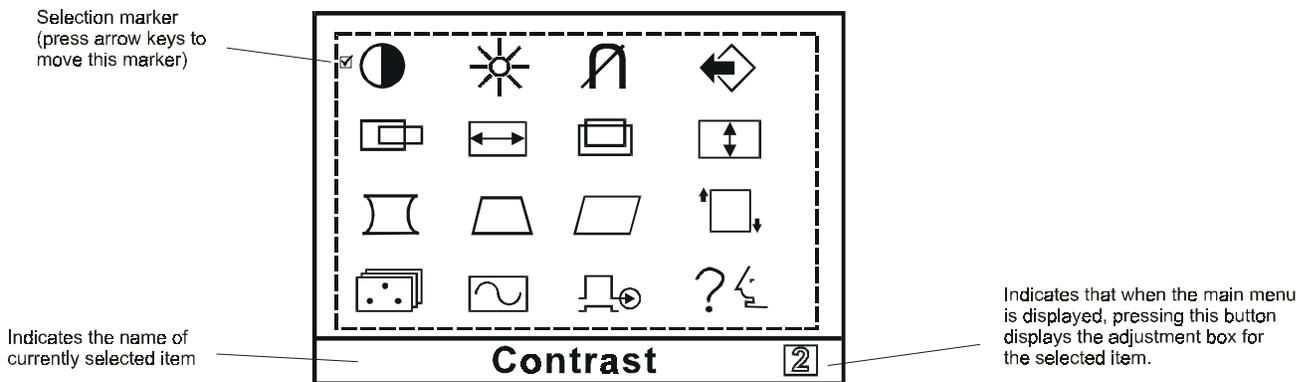
The user can make all the necessary adjustments by making selections in the main menu using one or all of the operation keys. The following pages describe how to make these individual adjustments.

Before advancing to these adjustments, the user needs to understand the basic procedure in using the operation keys. To aid in this understanding, a sample procedure is provided below:

Sample Procedure (Adjusting the Horizontal Position):

1. Press ① to display the main menu.

2. Use the arrow keys to maneuver to the ⬓ icon.

3. Click on ② to display the adjustment box for horizontal position.

4. Use the arrow keys to reach the desired value.

5. Press the ① key to memorize the settings and complete the adjustments.

Main Menu

Contrast Control ◑

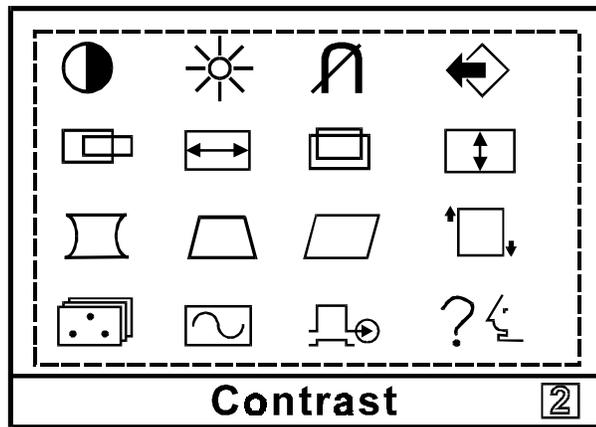Use the contrast control to vary the difference between the display's light and dark elements. The optimum setting may vary slightly with different types of displays and changes in ambient lighting, as well as individual taste. Use this control to adjust the screen contrast to match the brightness level in the room.

The operator can vary the contrast one of two different ways:

Direct Operation

If the main menu is not displayed, the user can use the arrow keys to adjust the contrast.

- Press < to decrease the contrast of the image.

- Press > to increase the contrast of the image.

Note: Pressing the arrow keys simultaneously sets the standard level.

Using the Contrast adjustment box

1. Display the Contrast adjustment box.

2. Use the arrow keys to select a value.

    *   Press < to decrease the contrast of the image.

    *   Press > to increase the contrast of the image.

3. Press the ⬚ key to memorize the settings and complete the adjustments.

Brightness Control ☼

Use the brightness control to adjust the overall intensity of the display. After allowing the CRT to warm up for at least a minute, adjust for the least amount of brightness needed to make the display clearly viewable.

Adjust the brightness to match the brightness level in the room so that the level will be easy to see.

1. Display the Brightness adjustment box.

2. Use the arrow keys to select a value.

    *   Press < to decrease the brightness of the image.

    *   Press > to increase the brightness of the image

    Note: Pressing the arrow keys simultaneously while the Brightness adjustment box is displayed sets the standard level.

3. Press the ⬚ key to memorize the settings and complete the adjustments.

Degauss ⋂

The display screen is degaussed automatically each time the monitor is powered on. This degaussing eliminates color impurities and other distortions of the display by neutralizing the effects of magnetic fields in the surrounding environment.

When the unit is left on for a long period, or is repositioned following power-up, the screen may pick up additional magnetic flux, causing colors to appear "blotchy" or otherwise distorted. For full effectiveness, allow at least fifteen minutes between manual degaussings. Shorter intervals may result in an incomplete removal of flux and residual color impurities.

Note: The internal degauss will not prevent color impurities caused by local magnetic fields. Metal enclosures can easily become magnetized by welding and machinery operations.
Use a hand held degaussing coil to remove residual magnetism from the enclosure.

Note: If the unit is located near electric transformers, motors, loudspeakers or other strong magnetic sources, degaussing alone may not be sufficient to eliminate interference. Try reorienting the unit relative to the magnetic source or moving the monitor further away.
If this still does not solve the problem, contact Rockwell Automation about magnetic shielding.

The degaussing operates for approximately five (5) seconds after selection. In this duration, the front panel keys are not operational.

Memory Recall ⬅️

Use this selection to return to the initial factory settings. A menu displays asking if you want to return to the initial settings.

1. Display the Memory Recall adjustment box.

2. Make the appropriate selections.

    *   For **YES**, press 1. This action recalls the original settings and returns you to the main menu.

    *   For **NO**, press 2. This action returns you to the main menu without recalling the original settings.

    Note: This adjustment box disappears after a 30-second inactivity period.

3. Press the 1 key to memorize the settings and complete the adjustments.

Horizontal Position ⬚

Centers the image horizontally on the screen.

1. Display the Horizontal Position adjustment box.

2. Use the arrow keys to select a value

    Note: Pressing ② toggles between the horizontal size and horizontal position control boxes.

    *   Press < to move the image to the left.

    *   Press > to move the image to the right.

3. Press the ① key to memorize the settings and complete the adjustments.

Horizontal Size ↔

Makes the image wider or narrower.

Note: Before adjusting the horizontal size, first center the image in the screen.
Pressing ② toggles between the horizontal size and horizontal position control boxes.

1. Display the Horizontal Size adjustment box.

2. Use the arrow keys to select a value

    *   Press < to decrease the size of the image horizontally.

    *   Press > to increase the size of the image horizontally.

3. Press the ① key to memorize the settings and complete the adjustments.

Vertical Position ⬜

Centers the image vertically on the screen.

Note: Pressing ② toggles between the vertical size and vertical position control boxes.

1. Display the Vertical Position adjustment box.

2. Use the arrow keys to select a value

    •   Press < to move the image down.

    •   Press > to move the image up.

3. Press the ① key to memorize the settings and complete the adjustments.

Vertical Size ⬍

Makes the image taller or shorter.

Note: Before adjusting the vertical size, first center the image in the screen.

Note: Pressing ② toggles between the vertical size and vertical position control boxes.

1. Display the Vertical Size adjustment box.

2. Use the arrow keys to select a value

    •   Press < to decrease the size of the image vertically.

    •   Press > to increase the size of the image vertically.

3. Press the ① key to memorize the settings and complete the adjustments.

Vertical Pincushion ⊐⊏

Corrects the image for barrel distortion.

1. Display the Vertical Pincushion adjustment box.

2. Use the arrow keys to select a value

    -   Press < to curve the screen image's edges inwards.

    -   Press > to curve the screen image's edges outwards.

3. Press the ①️ key to memorize the settings and complete the adjustments.

Trapezoid ⊏⊐

Corrects the image for trapezoidal distortion.

1. Display the Trapezoid adjustment box.

2. Use the arrow keys to select a value

    -   Press < to make the image narrower at the top.

    -   Press > to make the image wider at the top.

3. Press the ①️ key to memorize the settings and complete the adjustments.

Parallelogram ⊏⊐

Corrects the image for parallelogram distortion.

1. Display the Parallelogram adjustment box.

2. Use the arrow keys to select a value

    -   Press < to skew the image leftward.

    -   Press > to skew the image rightward.

3. Press the ①️ key to memorize the settings and complete the adjustments.

Rotation

Adjusts for tilt of the image on the screen.

1. Display the Rotation adjustment box.

2. Use the arrow keys to select a value

    *   Press < to tilt the image to the left.

    *   Press > to tilt the image to the right.

3. Press the 1 key to memorize the settings and complete the adjustments.

Color Temperature

Adjusts the color white in an image (in Kelvin). The higher the temperature, the redder, or warmer, the image color scheme. The lower the temperature, the bluer, or colder, the image color scheme.

Note: Before making any adjustments, record the initial color setting because memory recall will not reset this value.

1. Display the Color Temperature adjustment box.

2. Press the < and > arrow keys to make one or the following selections:

    *   **1** : 9300K

    *   **2** : 6550K

    *   **3**: User-defined temperature value

3. If you selected "**3**", the 2 icon displays in the lower-right corner of the Color Adjustment control box. This instructs the user to press 2 to display the User Color Adjustment control box..

4. To enter a user-defined value, you must manually set the red, green, and blue values.

5. To adjust the value, press ② to advance to the appropriate color.
    Press the < and > arrow keys to adjust the value of the selected color (0-255).

6. Press the ① key to memorize the settings and complete the adjustments.

Display Frequency 〰

This option displays the input synchronization signal frequency. Display the Display Frequency adjustment box to view signal.

Video Input Level 🖵⊛

This option allows the user to match the video input signal level to the computer being used. The user can choose from one of two selections (0.7V or 1V).

1. Display the Video Input Level adjustment box.

2. Press ② to toggle to the correct selection.

3. Press the ① key to memorize the settings and complete the adjustments.

Language Selection ?㏑

The user can alter the language of the on-screen menu. Selections include German, French, English, Italian, and Spanish.

1. Display the Language Selection adjustment box.

2. Press the < or > arrow keys to move ☑ to the correct selection.

3. Press the ① key to memorize the settings and complete the adjustments.

Self-Test Menu (NO SIGNAL screen)

Figure 8
Self-Test Menu
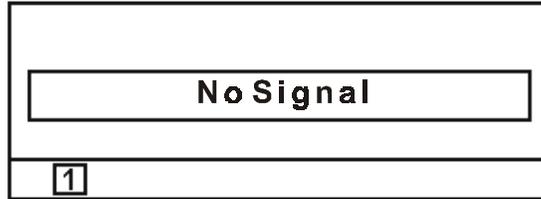
This screen indicates that the monitor is working properly. Press one of the 4 front panel operation keys to call the appropriate adjustment box if one of the following conditions occur:

- The input synchronization signal is out-of-range.

- The unit entered a power-saving mode (only displayed in the OFF STATE).

- There is no signal (not connected to the computer, computer is OFF, etc.).

Table C
Recommended Size Settings Table

	Vertical Size	Horizontal Size
4:3 Aspect	225mm (8.9 in.)	300mm (11.8 in.)

Routine Maintenance

Cleaning

Occasionally clean the display panel and cabinet with a soft cloth
dampened (not soaked) with a mild (non-abrasive) glass cleaner. Keep
turning a fresh side of the cloth toward the screen surface to avoid
scratching it with accumulated grit.

Note: The solvent should be applied only to the cloth, and not
directly on the monitor screen.

Do not use paper products as they may scratch the surface.
To minimize the risk of abrasion, allow the screen to
stand dry.

Special care should be taken when cleaning a resistive touchscreen or
polycarbonate shield that is installed over the screen. Abrasive and
certain chemical cleaners can easily damage the surface.

Replacing a Line Cord

To avoid shock and fire hazards, the monitor's power cord should be
replaced if the insulation becomes broken or if it develops a loose
internal connection.

Other Maintenance

Qualified service personnel should perform all maintenance, except for
the power cord replacement described above.

Troubleshooting

You can refer to this table to help identify the cause and offer a solution to a problem. This table lists typical problems you may encounter.

Table D
Troubleshooting Table

Symptom	Possible Problem	Action
No screen image and the green power LED is not lit.	Power cord not connected.	Open power switch. Reconnect power cord at monitor and at AC outlet. Close power switch.
	No power available at AC outlet.	Test AC outlet by plugging in a lamp or other known good device.
	Power cord faulty.	Replace power cord. Refer to Page 27.
	Blown fuse.	Have monitor serviced.
	Monitor faulty.	Have monitor serviced.
The green power LED is lit, but no screen image when power switch is closed.	Screen saver or power management feature activated.	Disable screen saver by activating an input to the host system. Press a key or move the mouse to cancel power save mode.
	Brightness and contrast controls not properly adjusted.	Adjust brightness and contrast controls.
The amber status LED is lit, and no screen image.	Monitor not synched to video source.	Check for proper video cable installation. Replace suspected faulty cable. Check to ensure that video source is operating within the monitor's range.
	Monitor faulty.	Have monitor serviced.
No raster visible even when brightness and contrast are set full ON.	Monitor out of adjustment or faulty.	Have monitor serviced.
Raster dimly visible with brightness and contrast controls set full ON, but no display present	Video cable problem.	Check for proper installation of video cable(s). Refer to installation instructions. Replace suspected faulty cable(s).
	Fault in video source.	Test video source by connecting to another monitor that is known to be operational.
	Fault in monitor.	Have monitor serviced.
Display is present, but garbled or rolling	Monitor not synched to video source.	Refer to installation instructions. Check for proper video cable installation. Replace suspected faulty cable. Check to ensure that video source is operating within the monitor's range.
Display is present and stable, but appears "wrapped" at one side or otherwise not properly centered or sized.	Size and position controls not properly adjusted.	Adjust controls for proper size and position of display. Refer to operator instructions
Display is present and stable, but missing some color(s)	Video cable problem.	Check for proper video cable installation. Replace suspected faulty cable.
	Fault in monitor.	Have monitor serviced.
Display is present and stable, but colors are not pure	Monitor requires degaussing.	Manually degauss the monitor. Refer to Page 19.
	Enclosure requires degaussing.	Manually degauss the enclosure. Refer to Page 19.

Symptom	Possible Problem	Action
Display is present, but "jitters" or is severely distorted **NOTE:** Do not confuse the flicker associated with an interlaced video mode with jitter.	Interfering external AC or DC magnetic shield	If possible, reposition the monitor beyond the proximity of large transformers, motors, bus bars, etc. Ask Rockwell Automation about various shielding options available to protect the monitor.
Display is present, but "bars" appear across it.	"Noise" generated by other equipment in the environment is present at the video inputs	Consult the application note which discusses method's of eliminating noise.
Connected monitor to computer. When powered, the PC locked up	Graphics card driver is not compatible with monitor	Update the graphics card drivers to the latest version.

Appendix A: Touchscreen Serial Interface

Description

All touch controllers are configured by default to provide serial communications at 9600 baud, 8 data bits, 1 stop bit, no parity.

For Allen-Bradley monitors equipped with touchscreens, a serial communications cable is required. A suitable cable can be obtained from Rockwell Automation or you can create one.

The cable provides a communications channel between the touchscreen controller, which is mounted inside the monitor, and an RS-232-C serial port on the host computer. Because the touch controller obtains power from the monitor's power supply, no external touch power connections are necessary.

Software supplied with the touchscreen must be loaded on the host computer to handle communications with the touch controller over the channel.

Because the touchscreen emulates a mouse, there may be compatibility issues involving how the touchscreen emulates mouse buttons, especially multiple buttons. For a complete discussion of these issues and how to troubleshoot them, refer to the touchscreen documentation.

Setting Up the Touchscreen Interface

This section describes how to set up the touchscreen system using the 6159 Industrial Monitor. Setup involves the following:

- Enabling the touchscreen interface

- Installing the software on the host computer that will handle communications with the touchscreen controller

- Performing a calibration

Enabling the Touchscreen Interface

The 6159 Industrial Monitor provides a female DE-9 connector on the rear panel. This connector provides the serial interface for the touch controller.

Interconnecting wiring to the host serial port connection is shown in the following table.

Table E
Touchscreen Interface

Monitor (DCE Device) DE-9 (Female)	Signal Description	Host (DTE Device)	
		DE-9 (Male)	DB-25 (Male)
1	Not Connected (DCD)	1	8
2	Transmit Data (TXD)	2	3
3	Receive Data (RXD)	3	2
4	Data Terminal Ready (DTR)	4	20
5	Common Signal Return (SG)	5	7
6	Not Connected (DSR)	6	6
7	Request To Send (RTS)	7	4
8	Clear To Send (CTS)	8	5
9	Not Connected	9	22

Installing the Touchscreen Driver Software

To install the touchscreen driver software correctly, obtain the following information about the host hardware:

- The COM port in use for the touchscreen. Ensure that the RS-232 cable is properly installed between the monitor port and the host's COM port.

- The baud rate at which the controller is operating. You will need to match the baud rate at the COM port. The controller baud rate is factory set at 9600.

Note: If you are using older touchscreen software, you may be prompted for the type of touchscreen controller being used. The 6159 uses the following controllers:

- Resistive: MicroTouch model SMT3V.

- Capacitive: MicroTouch model SMT3R.

Once you have obtained this information, install the software using the installation disks found in the touchscreen accessory package.

Note: Before installation, you may want to check the touchscreen manufacturer's site on the World Wide Web for the latest software drivers. Enter the following address in your Internet browser to access the manufacturer's web site:
   www.microtouch.com
   Look for one of the following product names on the web site:

- TouchTek5 resistive touchscreen

- ClearTek capacitive touchscreen

Performing a Calibration

After installing the driver software, follow the instructions in the touchscreen documentation.

Following installation of the touchscreen software and calibration, the touchscreen is ready to use.

Appendix B: Video Cables

You use an HD-15 video cable equipped with a conventional HD-15 connector at each end to connect the 6159 Industrial Monitor to the host computer.

Note: The following figure is the view looking into the pin end of the male connector or solder term end of the female connector.

Figure 9
HD-15 Video Connector
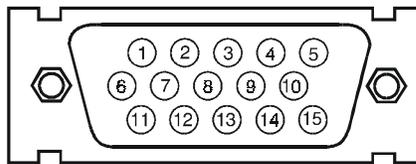
The following table provides the pin numbers and corresponding pin assignments for the HD-15 video connector with the DDC2B capability:

Table F
Standard HD-15 Video Cable

Monitor HD-15 (Female)	Signal Description	Host HD-15 (Male)
1	Red Video	1
2	Green Video	2
3	Blue Video	3
4	Ground	4
5	Ground	5
6	Red Video Ground	6
7	Green Video Ground	7
8	Blue Video Ground	8
9	Not Used	9
10	Sync Ground	10
11	Ground	11
12	Bi-Directional Data (SDA)	12
13	Horizontal Sync	13
14	Vertical Sync (VCLK)	14
15	Data Clock (SCL)	15

Specifications

Display	
CRT Type	17" diagonal flat square, 0.27mm dot pitch
	RGB short persistence (Hi-EU Red)/Dark TINT, Tension-band implosion protected
Degaussing	Manual and automatic
Nominal Display Area	
(4:3 aspect) Horizontal	11.8in. (300mm +/- 3mm)
(4:3 aspect) Vertical	8.9in. (225mm +/- 3mm)
Diagonal	14.8in. (375.9mm)
Non Linearity (CHP Method)	
Horizontal	7% max
Vertical	6% max
Regulation	2mm max peak deviation
Misconvergence	0.3mm max inside centered circle 225mm dia., 0.4 max outside
Luminance (typical)	35 fL +/- 5% fL, small white square
CIE coordinates	
White	x:=0.283, y:=0.298 (9300K +8MPCD)

Video	
Resolution	640 x 480 to 1280 x 1024 (monitor will sync to 1280 x 1024, though tube dot pitch 1024 x 768
Supported Standards	IBM VGA (640x480 at 60Hz)
	VESA (640x480 at 60/72Hz, 800x600 at 56/60/72Hz, 1024x768 at 60/70Hz)
	DEC (1024x864 at 60Hz, 1280x1024 at 66/72Hz)
Horizontal Scan Rate	Variable: 30kHz to 70kHz
Vertical Scan Rate	Variable: 50Hz to 180Hz
Retrace Times	
Horizontal	2.7 usec max
Vertical	0.475 msec max
Video Bandwidth	86MHz
Video Input Signal	RGB analog (white level = 0.714V above ref. black, into 75 Ohms, single ended)
Sync Input Signals	Separate Horizontal and Vertical Sync Control, TTL signal levels
	Sync on green (0.286V below ref. black) or Composite separate (into 75 Ohms, single ended)
Input Connection	HD-15

Controls and Indicators	
	Front Panel: operation keys access on-screen display (H Size, H Pos, V Size, V Pos, Contrast, Brightness, Manual Degauss, Raster Rotation, etc.)

Operator Input	
	Touchscreen Option: Resistive or capacitive touchscreen, with serial controller and driver software

Environmental

Panel Rating	NEMA 4/12, designed to IP65 standards
Operating Temperature	0C to 40C
Storage Temperature	-20C to 60C
Relative Humidity	5% to 90% non-condensing
Operating Altitude	Sea level to 10,000 ft (3048m)
Non-Operating Altitude	Sea level to 40,000 ft (12000m)
Operating Electrostatic Discharge	8.0K VDC (IEC 801-2, level 3)
Non-Operating Electrostatic Discharge	20.0K VDC
Operating Shock	20g (1/2 sine, 11msec)
Non-Operating Shock	30g (1/2 sine, 11msec)
Operating Vibration	0.006in. p-p, 5-57Hz, 0.5g peak, 57-640Hz sine
Non-Operating Vibration	0.015in. p-p, 5-51Hz, 1.0g peak 51-640Hz sine

Electrical

Line Voltage	100 to 240VAC
Line Frequency	50-60Hz
Ground Leakage	1.0 uA max at 1.5KVDC
Power Consumption	95W max, 180 VA max

Physical

Panel Bezel Dimensions (W x H x D)	19.0in. x 15.7in. x .7in. (482mm x 399mm x 17mm)
Overall Dimensions (from rear surface of front panel to back)	16.6in. x 13.5in. x 15.2in. (422mm x 344mm x 386mm)
Net Weight	50lb (23kg)

Certifications CE cULus cULus	UL 1950 Recognized Component, C-UL 950 Recognized Component, CE97 (89/336/EEC and 73/23/EEC), FCC Class A

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