



Solutions for Demanding Applications

VarTech Systems Inc.

Industrial CRT and Flat Panel Displays



Color TFT LCD Monitor

VT181R2 · VT181RH2 · VT181M2

User's Guide

Read these instructions completely before attempting to operate your new Color Display.

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About LCD Monitors

1.1 *What you gain by using an LCD monitor in your industrial controls*

LCDs are the future of display technology. CRTs although they have dropped in cost significantly, do not offer the performance, reliability, and mounting options available with LCDs. LCD monitors consist primarily of an LCD, Video Board and a Back Light video. The LCD

determines to a large extent the viewing angle, brightness and contrast. Beyond that it is the function of the video board which converts the analog RGB (Red, Green, Blue) signals from a standard video card to a high quality, digital RGB that the LCD can display.

Recently the video card has taken on a new role. It is the responsibility of this device to “scale” a particular video resolution to the “native” resolution of the LCD. Simply, consider that a computer is putting out a VGA [640x480] resolution signal, yet the LCD that is connected is an XGA [1024x768] display. The displayed picture would be in the center 1/3 of the LCD. With the introduction of the scaling engine. The converter will mathematically recalculate the 640x480 to 1024x768. This may sound simple but it is in fact a complex algorithm that adjusts for different aspect ratios and pixel alignment, essentially smoothing text and graphics to produce a picture that is pleasant to the eye.

All Vartech displays from 12.1” (800x600) to 23.1 (1600x1200) incorporate scaling engines in the converter card.

1.2 Product Safety Precautions

- ⇒ Ensure that sufficient space is available around the display to provide the circulation necessary for cooling.
- ⇒ Ensure that the ambient air temperature will not exceed the specified maximum temperature.
- ⇒ Do not attempt to service this display yourself. The rear chassis has a seal so that non qualified personal will not expose themselves to dangerous voltages or other risks.
- ⇒ To protect from electrical shock, unplug the display power supply from the wall before moving.
- ⇒ Do not expose the display to direct sunlight or heat.
- ⇒ Do not use this display near water
- ⇒ Do not place any heavy objects on the power cords. Damage may cause electrical shock.
- ⇒ Unplug the power supply from the wall or unit if one of the following conditions exists.
 - ⇒ Power cord or plug is damaged or frayed
 - ⇒ Liquid is spilled into the display or the display is exposed to rain or water.
 - ⇒ The display does not operate normally when the operating instructions are followed.
 - ⇒ The display has been dropped or the enclosure has been damaged.
 - ⇒ The display exhibits a distinct change in performance, indicating a need for service.

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2.1 INSTALLATION

Do not allow anything to rest upon or roll over the power cord, and do not place the display where the power cord is subject to damage.

Do not use this display near water such as near a sink, in a wet location where there is standing water. Displays are provided with ventilation openings in the cabinet to allow the release of heat generated during operation. If these openings are blocked, built-up heat can cause failures which may result in a fire hazard.

Therefore, NEVER:

- ◆ Block any ventilation slots.
- ◆ Place the display in a built-in enclosure unless proper ventilation is provided.
- ◆ Cover the openings with cloth or other material.
- ◆ Place the display near or over a heat source.

Do not rub or strike the Active Matrix LCD with anything hard as this may scratch, mar, or damage the Active Matrix LCD permanently.

Do not press the LCD screen with your finger for a long time as this may cause some afterimages.

Some dot defects may appear as Red, Green or Blue spots on the screen. However, this will have no impact or effect on the display performance.

If possible, use the recommended resolution to obtain the best image quality for your LCD display. If used under any mode except the recommended resolution, some scaled or processed images may appear on the screen. However, this is characteristic of the fixed-resolution LCD panel.

2.2 REPACKING

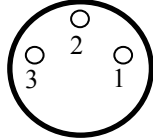
Do not throw away the carton and packing materials. They make an ideal container in which to transport the unit. When shipping the unit to another location, repack it in its original material.

2.3 Signal Connections Cont.

The power and signal inputs to the monitor are located on the rear of the unit.

SIGNAL INPUT	
Standard hi-density 15way video connection	
Pin Number	Function
1	Red video
2	Green Video
3	Blue Video
4	Not connected
5	Not connected
6	Red ground
7	Green ground
8	Blue ground
9	Not connected
10	Sync ground
11	Not connected
12	Not connected
13	Horizontal sync
14	Vertical sync
15	Not Connected

POWER INPUT	
Connector: 3 pin circular locking type	
DIN41524	
Pin Number	Function
1	+12VDC
2	0V
3	15-30VDC



COMMS

This connector is used in the factory or by service technician to program the monitor with setup information. The User should not attempt to use this connector.

TTL Input

This 9 way D connector allows monitor to operate with TTL video from EGA/CGA PC's or other TTL graphics cards.

Default factory setting is for 6 bit video. Factory set jumpers can select 3 or 4 bit video if required.

Pin Number	Function		
	3 bit video	4bit video	6 bit video
1	GND (0v) GND (0v)	GND (0v)	
2	NC	NC	Red Intensity
3	Red	Red	Red
4	Green	Green	Green
5	Blue	Blue	Blue
6	NC	NC	Green Intensity
7	NC	NC	Blue Intensity
8	Horizontal Sync	Horizontal Sync	Horizontal Sync
9	Vertical Sync	Vertical Sync	Vertical Sync

R.G.B.H.V.

BNC inputs for analog signals
These inputs allow monitor to be used with BNC connector leads with

3 wire operation

(sync on green)

4 wire operation

(composite syncs)

5 wire operation

(separate H,V syncs)

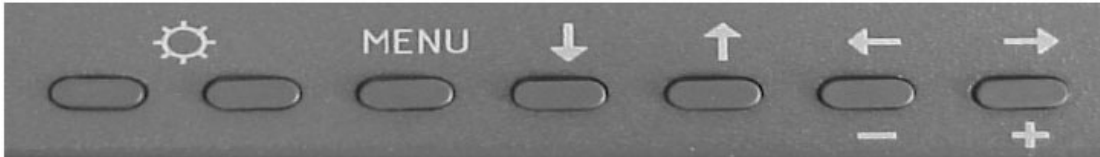
R,G,B inputs have 75Ω input resistance. H,V inputs must be TTL level inputs.

3.1 OPERATING INSTRUCTIONS

The monitor must be connected to a suitable DC power source and video signal. The monitor will switch on as soon as the power is applied and a picture will be displayed.

Basic User Controls

Adjustments to the picture can be made by means of the push button controls on the front of the monitor.

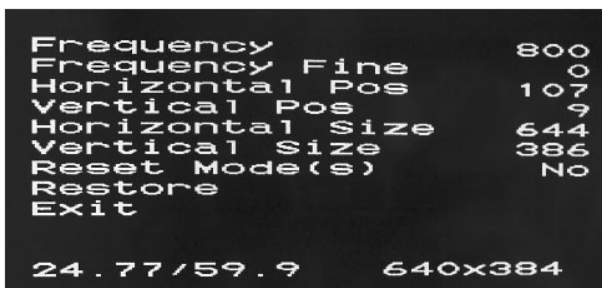


The → & ← buttons control the contrast of the display. If either of these buttons is pressed then the monitor displays a banner that shows the value of contrast. Further pressing of the buttons will then adjust the contrast.

The ↑ & ↓ buttons control the video brightness of the display.. If either of these buttons is pressed then the monitor displays a banner that shows the brightness. Further pressing of the buttons will then adjust the brightness.

The two left hand buttons control the illumination of the display backlights.

These basic user controls are the only adjustments that can be made when the OSD lockout function is enabled.



Advanced OSD Controls

Pressing menu button activates the monitor's main set-up controls. When this is done the monitor displays a menu of adjustments. The ↑ & ↓ buttons allow selection of which item to adjust. The → & ← buttons adjust the highlighted item.

OSD Information Banner

Information about the input signal is displayed at the bottom of the OSD. The values on the left hand side are the Horizontal Rate (48.40kHz) and the Vertical Rate (59.8Hz).

On the right hand side the values are the active video size that the current video made is based upon. This will be either in WHITE—indicating that the current scaling is based on factory preset standard mode, or CYAN—indicating that the scaling has been calculated by the monitor, either automatically or directed by the *Reset Modes* menu item. These values do not change and are only for reference.

3.2 PROCEDURE FOR PICTURE ADJUSTMENT

Each value that is adjusted is automatically saved when the highlighted line is moved, the only exception is when the *RESTORE* function is used.

If at any time the monitor cannot accept the new settings it will recall the previous good values.

Step 1	Move picture so the top left hand corner is positioned correctly.	The top left hand of the picture needs to be 2 to 3mm from the corner of the screen. Use the ↑ & ↓ buttons until <i>HORIZONTAL POS</i> is highlighted. Then use the → & ← buttons to move the pictures horizontally. Next use the ↑ & ↓ buttons until <i>VERTICAL POS</i> is highlighted. Then use the → & ← buttons to move the picture vertically.
Step 2	Make picture the correct width.	Use the ↑ & ↓ buttons until <i>HORIZONTAL SIZE</i> is highlighted. Then use the → & ← buttons to adjust the picture to correct width. There should be a 2 to 3mm gap at each side between the picture and the edge of the screen.
Step 3	Adjust the Frequency and Frequency Fine.	Correct <i>Frequency</i> and <i>Frequency Fine</i> adjustment are vital to obtain a clear image. See Appendix A for an explanation of principles involved, before making these adjustments. Use the ↑ & ↓ buttons until <i>FREQUENCY</i> is highlighted. Then use the → & ← buttons to adjust it so that any noise lines move further apart from each other. Adjust until there are no noise lines seen. Use the ↑ & ↓ buttons until <i>FREQUENCY FINE</i> is highlighted. Then use the → & ← buttons to adjust to make the display characters appear as bright, sharp and noise free as possible.
Step 4	Adjust the Vertical Size.	The monitor must make many calculations when this control is used: These take several seconds. During this time the display is unstable and the OSD will flash. If the value of Vertical size is increased the display gets smaller and vice-versa. This is because the displayed value of vertical size is the number of lines of video that are being stretched to fit on the screen. If you try to change the vertical size by a large amount in one step, the monitor may be unable to make this change. It will be forced to restore the display to its previous height. Always change the size in steps of 2 or 4. There is a 0.5 second time delay from when the first key press is detected and when the monitor will attempt to set-up the monitor to the new value of vertical size.
Step 5	Repeat the Procedure.	Repeat the procedure for any other video signals that the monitor is used with.
Step 6	Exit the menu and lock the OSD.	When the monitor is set correctly for its intended application, it is recommended to enable OSD lockout function to prevent accidental adjustment by casual user. To lock the OSD: When there is no OSD displayed, press and hold down the <i>Menu</i> button. The OSD will appear. Keep the button down for several seconds until the OSD disappears. To unlock the OSD: Press and hold down the <i>Menu</i> button. Keep the button down for several seconds until the OSD appears. When OSD is locked only the Basic User Controls are functional.

3.3 OTHER OSD FUNCTIONS

Restore

Use this function if adjustments mad to monitor need to be undone. This returns the monitor to the state when the OSD was STARTED.

Use the ↑ & ↓ buttons until *RESTORE* is highlighted. Then use the → & ← buttons to undo adjustments made to the monitor.

Reset Mode(s)

This has four options that are selectable as detailed below.

Use the ↑ & ↓ buttons until *RESET MODE(S)* is highlighted. Then use the → or ← buttons to switchover between *NO-YES - ALL - NEW*.

These operate as follows:

NO - No action taken

YES - Resets currently detected video mod to its factory default setting.

ALL - Resets the complete monitor to its factory default settings.

NEW - Forces the monitor to automatically analyse the incoming video and set-up the monitor to display a stable picture. This will overwrite the current values for the video picture. A "PLEASE WAIT..." banner will be shown during this set-up period. The values decided upon are based on the assumption that the video aspect ratio is 4:3. This can be changed as described above.

When the selection has been made, use the ↑ & ↓ buttons until *EXIT* is highlighted. Then use the → & ← buttons to exit the OSD.

Exit

Use the ↑ & ↓ buttons until *EXIT* is highlighted. Then use the → or ← buttons to close the OSD.

3.4 ADJUSTING MORE THAN ONE MONITOR

The procedure for setting a monitor is quite complex. If there are more monitors t be used on identical systems, then this can be done more easily by manually copying the OSD values from the first monitor.

```
Frequency          800
Frequency Fine     0
Horizontal Pos     107
Vertical Pos       9
Horizontal Size    644
Vertical Size     386
Reset Mode(s)     No
Restore
Exit

24.77/59.9      640x384
```

These values can be set in subsequent monitors to speed up their adjustment to the same signals.

FACTORY SETTING SERVICE

VarTech can offer a programming service for the next deliveries. The values that you have set up on a sample monitor can be pre-loaded in the factory.

The monitors will then work with your system with minimal adjustments.

3.5 Frequency & Frequency Fine

Adjustment of TFT monitors

The Video signal is made up of pixels. These are generated in the video generator (process controller, PC, etc.) A crystal oscillator controls the rate at which the pixels are generated: this is called the Dot Clock.

When the TFT monitor receives the video signal it must convert it back to its individual pixels in digital form. To do this it must sample the video at the same rate as the dot clock.

When the *frequency* control is adjusted the monitor is changing the rate at which the video is sampled. Each press of the *frequency* control changes the sample rate by one pixel per line.

The visual effect on the monitor screen of incorrect *frequency* adjustment is that there are vertical bands of darkened or noisy pixels running down the screen. The greater the *frequency* error, then the more bands there are. If the *frequency* value is wrong by two pixels, then two noisy bands will be seen. If the value is wrong by 100 pixels then 100 noisy bands will be seen. Strangely, a picture that has the *frequency* wrong by a very large amount can actually appear better than the one where the frequency is only slightly wrong.



The actual content of the picture also has a big effect on how easy it is to see the noise bands. To set the frequency easily, it is best to display a picture that has a large number of individual pixels displayed—a screen of “

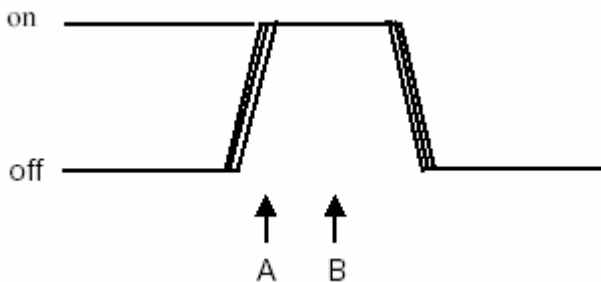
Figure 1: Correct Frequency



Picture 2: Incorrect Frequency

A Windows Shutdown screen contains a large amount of the “

Picture 2 picture had six vertical dark bands due to incorrect frequency.



This figure shows what a single bright pixel looks like in the video signal. The pixel does not have vertical sides and the exact start time of the pixel is uncertain. If the monitor samples the pixel at “B”, then “A” then the uncertainty of the pixels start time and the slope of the pixel edge will combine to make the pixel appear noisy and dark on the screen.

It is the *frequency fine* control that lets the monitor be adjusted so that the sample is taken at B instead of A.

3.6 SIGNAL FORMATS

These signals are currently factory programmed into the monitor

Resolution	V Rate	H Rate	Syncs		Application
640 x 350	70Hz	31.475kHz	H	V	VGA
640 x 400	70Hz	31.475kHz			VGA
640 x 480	60Hz	31.475kHz			VGA
1024 x 384	40Hz	16.67kHz			IECC Railway Signaling
1024 x 768	60Hz	48.40kHz			XGA
1280 x 1024	60Hz	63.98kHz			SXGA
640 x 384	50Hz	20.65kHz			ABB Mod300
640 x 384	60Hz	24.78kHz			ABB Mod300
800 x 600	56Hz	35.21kHz			SVGA
604 x 240	60Hz	15.72kHz			Honeywell TDC2000
662 x 315	50Hz	17.86kHz			Honeywell PMX (see note 1)
810 x 246	60Hz	15.63kHz			Honeywell TDC3000 EOS
650 x 450	66Hz	31.25kHz			Honeywell TDC3000 EPDG2
560 x 275	50Hz	15.63kHz			Confidential
640 x 200	60Hz	15.7kHz	+	+	CGA
640 x 350	60Hz	21.83kHz	+	+	EGA
714 x 288	50Hz	15.625kHz			CCIR
508 x 338	50Hz	17.85kHz	+	-	Aydin 5215 (see note 2)
508 x 240	60Hz	15.72kHz	+	+	Aydin 5215 (see note 2)
564 x 304	50Hz	16.10kHz			Aydin 5215 (see note 2)
564 x 240	60Hz	15.72kHz	+	-	Aydin 5215 (see note 2)
1280 x 1024	75Hz	80.00kHz			SXGA
1024 x 328	50Hz	27.03kHz			Confidential
1152 x 864	75Hz	67.50kHz			Apple Mac
640 x 480	50Hz	208.92kHz			Confidential

Note 1:

Honeywell PMX has video pedestal that requires special model.

Note 2:

Aydin5215 generator requires 180ohm resistor placed in series with each R,G,B lead.

TROUBLESHOOTING GUIDE	
Trouble	Troubleshooting Tip
Unable to set Vertical Size	<p>The <i>Vertical Size</i> value is limited by what values are set for <i>Frequency</i> and <i>Horizontal size</i>. Not all video modes can be shown full screen. Sometimes the vertical size will have to be small.</p>
Cannot Set Correct Frequency	<p>On some systems there are no pictures available that make frequency setting easy. This can make it very hard to see what is happening on the screen.</p> <p>Tip One: Adjust the <i>frequency fine</i>. When this adjusted any vertical frequency bands on the screen will move. This makes them much easier to see - especially if they have been hiding in blank parts of the display.</p> <p>Tip Two: If there are any specifications for the system then you may be able to calculate what the approximate value of <i>frequency</i> should be. The <i>frequency</i> value to set on the monitor is the TOTAL number of pixels in one horizontal period.</p> <p>Example: If the Horizontal Line Frequency = 25kHz Dot Clock = 10mHz Then <i>frequency</i> = $10\text{mHz} \cdot \frac{25\text{kHz}}{400}$</p> <p>OR: If 80 characters per line an 12 x 16 character cell And 35us horizontal active time And 40us horizontal scanning time Then <i>frequency</i> = $80 \times 12 \times 35 / 40 = 840$</p> <p>Using calculations like this should make it easy to preset the frequency into roughly the correct range, but further adjustment normally will be needed for the last few percent.</p>
Menu button does not work	<p>The OSD lockout feature is enabled. Hold menu button in for several seconds.</p>

If these tips do not solve your problem, contact VarTech Systems Customer Service Support.

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CLEANING AND MAINTANENCE

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 touch screen or polycarbonate shield that is installed over the screen. Abrasive and certain chemical cleaners can easily damage the surface.

Never use alcoholic or ammoniac cleaners to clean the polycarbonate shield or a touch screen.

Note:

For best results cleaning a monitor with the optional antireflective tempered glass display shield, a solution of denatured alcohol is recommended to thoroughly clean the display.

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.

Mechanical Drawings		
Model	Description	Page(s)
VT181M2	18.1" Low Scan Tabletop Mechanical Drawing	13
VT181R2	18.1" Low Scan Rack Mount Mechanical Drawing	14
VT181RH2	18.1" Honeywell Configured Rack Mount Mechanical Drawing	15

ENGINEERING SPECIFICATIONS	
Input voltage:	90-264VAC Universal
Power consumption:	60W max
Display area	14.135" x 11.310" 359.02mm x 287.27mm
Pixel Format	1280 x 1024
Signal formats	640 x 480 pixels, 800 x 600 pixels, 1024 X 768 pixels, 1280 X 1024 pixels ABB MOD 300
Horizontal scan	15-70kHz
Vertical scan	56-75Hz
Clock rate	135MHz max
Viewing angle(CR>5)	±70° Horizontal +70°, -40° Vertical
Contrast ratio	300: 1
Brightness	200 cd/m ² typ
Colors Displayed	16M
Video Input	Analog RGB 0.7V p-p 75Ω or TTL > 2.75V p-p DB9(F)
Sync	Separate H&V (TTL pos. or neg.) or Composite (TTL pos. or neg.) or Sync on Green (0.3V p-p, neg.)
Video Input Connector	HD15(F), 5BNC, DB9(F)
Temperature	Operating: 0 to 45° Storage: -20 to 60°
Humidity	Operating: 10 to 95% NC Storage: 10 to 95% NC
Altitude	Operating: up to 10,000 ft Storage: up to 40,000 ft

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