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52” VideoWall Display

WN-5220-S

User’s
Guide

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070-0007-02

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Product Introduction

Introduction

The WN-5220-S VideoWall is a multi-frequency, multi-source display capable of displaying a wide range of video sources. The clear, bright image is a product of careful engineering and optical innovation. Setup is easy because of their light weight and simple mechanical connections. Setup is fast because there are only a minimal number of adjustments necessary to configure the image.

The optional ultra-thin mullion screen gives the display additional flexibility in meeting the most demanding image quality applications. By eliminating the front-surface frame, this screen nearly eliminates the visible seam between the displays.

Clarity's Big Picture™ option is a built-in data/videowall processor. Without the need for an external processor, Big Picture can scale the source video to accommodate any display wall size up to four high and four wide.

Features

Clarity's products are designed and developed by experts in LCD projection technology and offer significant advantages over conventional cathode ray tube (CRT) based systems including:

- optical resolution of 800x600 pixels
- ability to scale lower resolution sources up to 800x600
- supports a wide variety of computer and video formats
- superior image quality (even in high ambient light conditions)
- substantially lighter weight – 120 lbs (55 kg)
- significantly reduced depth (reduced footprint)
- lack of image flicker
- improved brightness uniformity (no "hot spots")
- no convergence requirements
- no color drifting
- easy to service
- fast and easy setup

Additional Features

- direct compatibility with a wide range of video and computer data sources: 800x600 and 640x480 for PC and MAC; 31.5 kHz line doubled RGBS video
- with the optional VIM-300 electronics, 15.75 kHz RGBS video and the ability to decode and display NTSC and PAL directly

Options and Accessories

Clarity's display products can be enhanced with several accessories.

- **Ultra-Thin Mullion Screen**
  The WN-5220-S has two screen options:
  - The standard screen has a mullion 1/8th inch wide. The mullion is a strip of sheet metal surrounding the screen which holds it in place.
  - The Ultra-Thin Mullion Screen, or mullionless screen, does not have the 1/8th inch strip of sheet metal around the screen. The edge of the glass goes right to the edge of the display unit, which makes the lines between display units almost invisible in the finished video wall.
- **VIM-300 Option - Video Input Module**
  The Video Input Module (VIM) adds the ability to scale the image on each edge of the display for a better image fit when working with multiple displays. It also adds three new source inputs: 15.75 kHz RGBS video, and composite and S-video in both NTSC and PAL.
- **Clarity's Big Picture™**
  This option allows a single video source to be expanded over an entire video wall, eliminating the need for an external processor. (*All* display units in the video wall must have this option.) Scaling and moving of the individual images facilitates exact matching at the borders.
- **SRT-100 Screen Removal Tool**
  This tool makes it easy to remove the normal mullion screens when the displays are used in video walls, where units are placed directly adjacent to each other. The SRT-100 minimizes the chance of damaging the screen and the screen's latches. (It cannot be used with Ultra-Thin Mullion Screens.)
- **SAT-500 Screen Alignment Tool**
  This tool is essential to properly position the display units with the Ultra-Thin Mullion Screen in a video wall. It assures the correct spacing between adjacent screens in the assembled video wall.

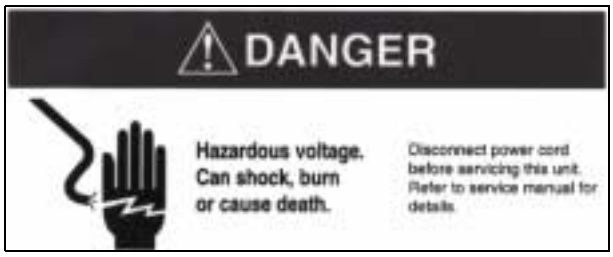
- **BAS-520 Base for the WN-5220-S**
  The BAS-520 provides a permanent attachment to flooring, or, with optional casters it allows easy roll-around movement.

Please contact your reseller for a current listing of available options or visit Clarity's website at **www.ClarityVisual.com**

Safety

Please read this chapter carefully before attempting to install, use, service, or repair the WN-5220-S VideoWall. There are a number of potentially dangerous areas inside the unit. These are identified with the following warning labels.

Hazardous voltage inside. Can shock, burn, or cause death. No user serviceable parts inside. Refer all service to qualified serviceman.



Hazardous voltage. Can shock, burn or cause death. Disconnect power cord before servicing this unit. Refer to service manual for details.

Explosion hazard. Hot bulb under high pressure. Wait more than 5 minutes before changing lamp. Handle lamp assembly carefully; do not touch bulb. See instructions for changing lamp assembly.

Hot surface near lamp. Skin burn hazard. Wait more than 5 minutes for lamp housing to cool before replacing lamp assembly. See instruction manual.

UV radiation from unprotected, operating bulb. Eye damage injury. Do not disturb light path shielding from the bulb.

WARNING Only the WN-5220-S lamp, air filter, and fuse are user serviceable. Always turn off and disconnect power before servicing these items. Refer all other service to a qualified service center. Failure to do so could result in electrical shock, ultraviolet radiation burns, contact heat burns, serious injury, or irreparable damage to the WN-5220-S and may void your factory warranty.

WARNING The area around the projection lamp and the projection lamp assembly become extremely hot during and after use. Use extreme caution and let the WN-5220-S's lamp assembly cool for 5 minutes before touching or replacing the lamp assembly.

WARNING The WN-5220-S contains electrical interlocks that prevent operation of the display when the front screen is removed. Do not bypass these interlocks, except for servicing. Never operate the WN-5220-S with any access panels or the front screen removed from the unit, except for servicing. Operating the WN-5220-S with access panels or the front screen removed can expose service or operating personnel to ultraviolet burns and high electrical voltages. Always wear ultraviolet-blocking eyewear with side guards when servicing the WN-5220-S.

WARNING The WN-5220-S uses a high-intensity projection-lamp module. Do not attempt to replace the projection lamp module with any alternative light source. Doing so can cause overheating or unacceptable image quality. Replacement lamp modules may

be ordered from Clarity Visual Systems, Inc. Use only the projection lamp module specified by Clarity Visual Systems, Inc. or an authorized Clarity Visual Systems, Inc. Service center. Use of any other lamp voids the warranty.

WARNING Do not block the WN-5220-S cooling fan or free air movement under, over, or around the WN-5220-S. Loose papers or other objects should not be nearer to the WN-5220-S than 6 inches on any side.

CAUTION Air handling ducts can discharge unwanted dust or high-temperature air directly on the display. Do not operate the WN-5220-S in dusty or high-temperature conditions.

CAUTION Where several WN-5220-S displays are combined vertically, installation of the top level requires a minimum of 16 inches of clearance in order to position and fasten the display in place.

CAUTION Some types of environmental lighting, such as incandescent, or high-intensity discharge lamps such as metal halide or mercury vapor lamps create high temperatures. This can cause excessive heating of the display. The unit should be positioned away from lighting to prevent heat buildup.

CAUTION The front screen of the WN-5220-S display can be easily scratched and the optical quality degraded by fingerprints. Install the WN-5220-S in such a way that it is not exposed to touching or possible scratching by hard objects.

Mechanical Installation

Read the chapter on safety precautions before installing and operating the WN-5220-S VideoWall.

WARNING Use help. The WN-5220-S weighs approximately 120 lbs (55 kg). Do not attempt to lift or move the WN-5220-S without help. Always use all four lifting handles to move or lift the WN-5220-S.

The WN-5220-S comes with either a standard screen or an Ultra-Thin Mullion Screen:

- The **standard screen** has a mullion about 1/8th inch (3 mm) wide. The mullion is a strip of sheet metal surrounding the "glass" and holds it in place.
- The **Ultra-Thin Mullion Screen**, or mullionless screen, does not have the 1/8th inch strip of metal around the screen. The edge of the "glass" goes right to the edge of the display unit. This makes the lines between display units much less apparent in the finished video wall.

The following table shows installation specifications for common display configurations. (The table applies to both the standard screen and the Ultra-Thin Mullion Screen.)

Height x Width Number of display units	**1x1** Single	**1x2** 2 displays	**2x2** 4 displays	**2x3** 6 displays	**3x3** 9 displays	**3x4** 12 displays	**4x4** 16 displays
Screen Height, inches	31.3	31.3	62.6	62.6	93.3	93.9	125.2
Screen Width, inches	41.7	83.4	83.4	125.1	125.1	166.8	166.8
Weight, pounds	120	240	480	720	1080	1440	1920
115 Volts A/C Input							
Current, amps	8	16	32	48	72	96	128
Power, watts	920	1840	3680	5520	8280	11,040	14,720
Heat, BTU/hr	2827	5655	11,310	16,965	25,448	33,931	45,241
Air Cond., tons	.24	.47	.94	1.41	2.12	2.83	3.77
230 Volts A/C Input							
Current, amps	4	8	16	24	27	48	64
Power, watts	920	1840	3680	5520	8280	11,040	14,720
Heat, BTU/hr	2827	5655	11,310	16,965	25,448	33,931	45,241
Air Cond., tons	.24	.47	.94	1.41	2.12	2.83	3.77

Table 1

Site Requirements

Power

Make sure the power cord is compatible with the nominal power source used with the WN-5220-S display.

Power Consumption

Power consumption of the WN-5220-S is 920 Watts, or approximately 8 Amps current draw at 115 VAC (4 Amps at 230 VAC). The WN-5220-S can be configured to operate on either 90-130 VAC or 180-260 VAC nominal power sources at 50/60 Hz.

Voltage Range

The operating voltage range of the WN-5220-S is set via a switch on the power supply near the AC power plug and on/off switch. Operation of the display at the incorrect voltage level can cause damage to the unit which is not covered by the warranty.

- **Select the setting labeled 115V if your power source is between 90 and 130 Volts AC.**

- **Select the setting labeled 230V if your power source is between 180 and 260 Volts AC.**

If the input voltage drops below approximately 85V (170V if the WN-5220-S is set to the 230V setting) the display will automatically shut down to protect itself.

On a typical 20A, 115V circuit, no more than two WN-5220-S displays may be installed. This allows an extra current margin. If any circuit used to power one or more WN-5220-S displays is not a dedicated circuit, the additional electrical load placed on the circuit by other equipment must be considered.

WARNING Displays that are intended for 240V configuration must have a properly rated power supply cord and attachment plug supplied by the installer.

WARNING If extension cords are used for power, use only 3-prong grounded cords sized to handle system power requirements. Using the wrong-size extension cord can cause a fire-safety hazard and can reduce the voltage available to the WN-5220-S. If the extension cord is warm to the touch it is too small and should be immediately removed from operation.

Temperature and Humidity

The WN-5220-S is designed to operate over an ambient temperature range of 0° to 35° C (32° to 95° F) and a humidity of 20 to 80 % R.H. non-condensing.

Some types of environmental lighting, such as incandescent, or high intensity discharge lamps such as metal halide or mercury vapor lamps, create high temperatures and this can cause excessive heating of the WN-5220-S. Displays should be positioned far enough away from high-temperature lights to prevent heat buildup.

Nearby heat sources can cause high operating temperatures in the WN-5220-S display. Minimize the display's exposure to heating ducts, radiators, or other external heat sources.

Flooring

A single WN-5220-S display unit weighs approximately 120 lbs (55 kg). Before installing the WN-5220-S, determine the structural integrity of the flooring where it will be used. The floor should be level and strong enough to support the combined weight of the number of displays and other equipment used in the installation. Take special care when installing a WN-5220-S in a wall configuration on a temporary structure such as a stage floor, where the flooring could bend or collapse under the weight of the installation. Never stack more than four (4) WN-5220-S displays vertically on a temporary floor.

Clearance

Normal maintenance, such as lamp module and air filter replacement, can be performed from the front or rear of the WN-5220-S. Maintain sufficient clearance to allow easy access from the front. A minimum of 4 feet is recommended. For full maintenance from the rear, the minimum recommended clearance is 3 feet.

To allow proper cooling, the minimum required clearance to the rear of the display should be 6 inches. The minimum required clearance to the top at the front of the unit is 6 inches. See Environmental Specifications on page 17 for cooling requirements.

If installed in a video wall configuration, a minimum of 12 inches to the ceiling from the top of the highest display is needed if the units are installed from the front.

Cooling

Regardless of clearances and the general ambient temperature, the most important factor that affects reliable operation is the temperature and quantity of air coming into the display. The intake air temperature at the air filter must not exceed 95° F (35° C). If there is any doubt about this temperature in an installation, run the displays for several hours before taking temperature measurements. Prevent problems by replacing dirty air filters and keeping the air path clear.

Mechanical Setup, Standard Screen

Install the WN-5220-S in the desired position and connect the power and signal cables. See the following section for an explanation of the cabling configuration.

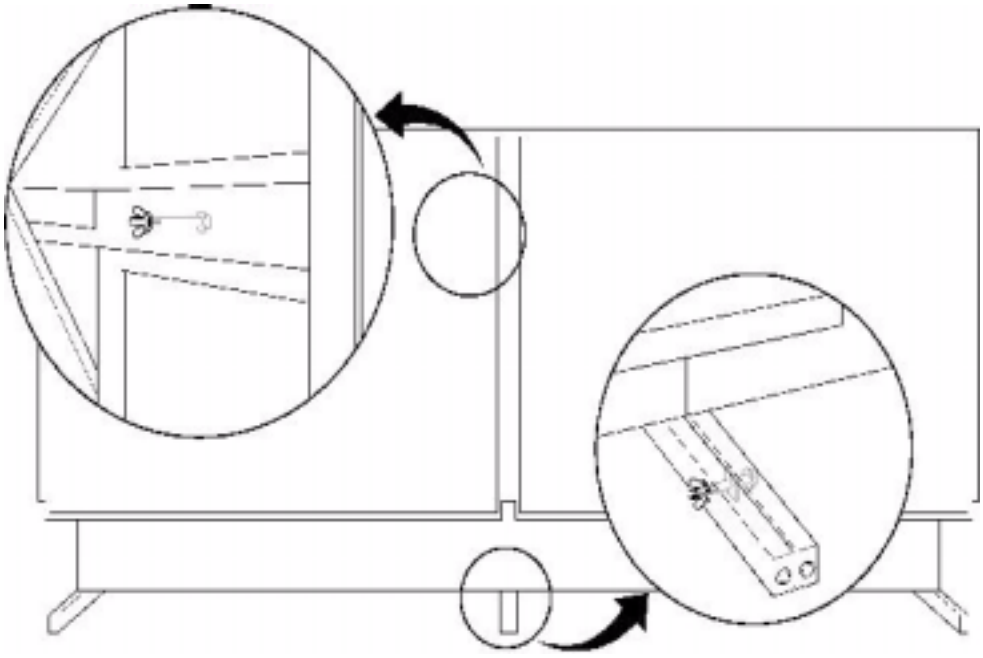


Figure 1 Connecting display units

To setup the WN-5220-S display in a video wall configuration, follow these steps:

1. Grasp the screen on each side at the bottom	The "screen" you are removing is 2 or 3 inches thick. Pull out at the bottom first, to separate the latch-hooks from the latches. It comes out with a "pop." The screen should now be loose at the bottom, but still attached at the top.
2. Slip fingers between the screen frame	Slip fingers between the screen frame and the display chassis, as close to the top latches as possible and pull the top of the screen from the latches.
3. Using both hands…	Carefully remove the screen and set it aside.

4. Assemble the lower row first.	Line up the legs for the bottom row as straight as possible. Insert a ¼" X 2 ½" bolt through the holes as shown in Figure 1. Tighten a nut securely on this bolt. Secure the legs to the floor using the tapped 5/16-18 holes in the front and rear of the legs when stacking more than two units high or use the optional **BAS-520** base to secure the WN-5220-S.
5. Stack the next higher row.	Sliding the legs of each display into the mating sockets of the display in the first (lower) row.
6. Insert a supplied fastener.	Insert a bolt through the hole in side wall of the lower unit into each leg of the unit above. Tighten a nut on this bolt to lock the units together. See **Figure 1 above**
7. Continue with subsequent rows of displays	Lock each display to the adjacent displays after the row above it (if any) has been installed.
8. For added stability...	Use the rear-tapped holes in the legs of the upper units to fasten to a solid support, such as a structural wall. The threaded inserts in each leg are female 5/16-18 UNC.
9. Check	Check that all displays in the video wall are locked together.
10. Reinstall screens	Reinstall each display's screen.

Mechanical Setup, Thin Mullion Screen

Note that displays with the Ultra-Thin Mullion Screens are *not easily* serviceable from the front. Service should be performed through the rear access cover.

You will need these tools:

- a large, flat blade screwdriver
- an Alignment Tool (Two of these tools makes installing a video wall even easier.)
- black cloth tape
- a tape measure (inches or centimeters)
- ½-inch open end wrench, or an adjustable wrench
- 5/64-inch Allen hex wrench

The thin mullion display screens consist of two basic parts. There is the screen itself and the frame it is held in, an assembly which is about 2¾ inches (7 cm) thick. This screen attaches to the second part, an Adapter Plate which is about 1.5 inch (3.8 cm) thick. The Adapter Plate is mounted on the front of the display unit.

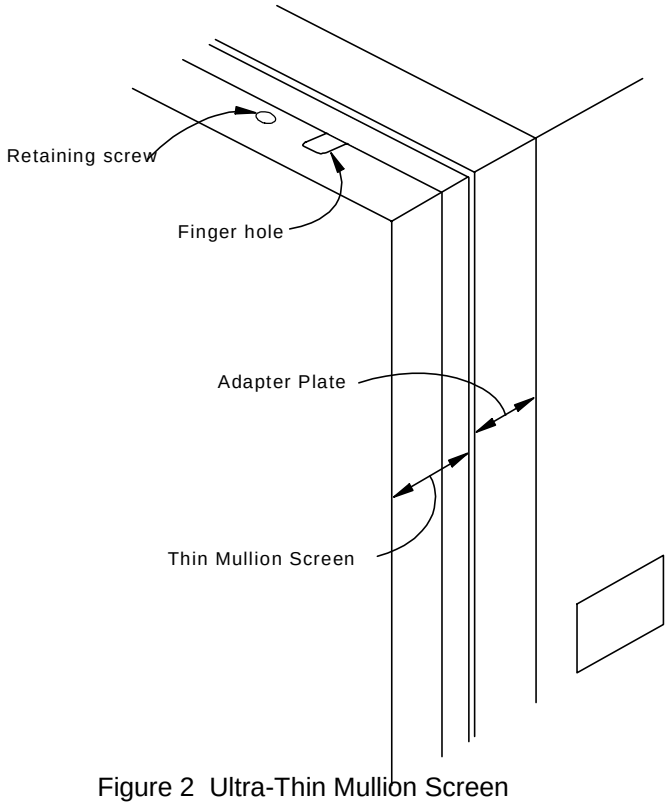


Figure 2 Ultra-Thin Mullion Screen

During this alignment process, the screen is removed from the Adapter Plate. Then the Adapter Plate is adjusted to make its corners square and to align correctly with its neighbors. Then the screen is re-installed and adjusted in or out.

Installing a video wall with Ultra-Thin Mullion Screens is a little more complex than installing the wall with standard mullion screens. Mechanical alignment is more critical, and the larger the video wall, the more precisely each unit must be aligned to produce a good looking image. The outcome of this alignment process is partly dependent on how flat the floor is, but it is mostly dependent on how tightly the displays are fitted to each other.

Basic Steps for Alignment

This is a summary of the steps necessary to build a video wall thin mullion displays and align their screens. Each step is expanded, and detailed instructions follow this summary.

1. Remove the screens from all the display units.
2. Build the video wall.
3. Start with the display unit in the center of the bottom row and align its Adapter Plate. (This step can be done *before* the wall is built, if necessary.)
4. Working along the bottom row in both directions, align each of the adapter plates, using the Alignment Tool.
5. Align the adapter plates on the rest of the rows, working upward.
6. Hang the screens on the bottom row and adjust them in or out so the front surfaces (the screen faces) are flat with each other.
7. Hang the screens on the upper rows, and make them flat.
8. Put retaining screws in the top row and cover any holes and seams with black tape to prevent light leaks.

Alignment Procedure in Detail

Read through all the detailed parts of each numbered step before starting it.

1. Remove the screens from all the display units.	Look down on the top of the screen and locate the two retaining screws. Remove these screws, using the 5/64-inch Allen hex wrench, and set them aside. Grab the sides of the screen, or use the finger holes, and lift it up about half an inch (one centimeter), and remove it from the Adapter Plate. Set it aside.
2. Build the video wall.	Assemble the lower row first. Line up the legs for the bottom row as straight as possible. Insert a ¼" X 2 ½" bolt through the holes as shown in Figure 1. Tighten a nut securely on this bolt, but not so tight as to bend the legs. Secure the legs to the floor using the tapped 5/16-18 holes in the front and rear of the legs when stacking more than two units high or use the optional BAS-520 base to secure the WN-5220-S. Stack the next higher row. Sliding the legs of each display into the mating sockets of the display in the first (lower) row. Insert a bolt (supplied). Insert a bolt through the hole in side wall of the lower unit and into each leg of the unit above. Tighten a nut on this bolt to lock the units together. See Figure 1 above. Continue with subsequent rows of displays. Lock each display to the adjacent displays after the row above it (if any) has been installed For added stability, use the tapped holes in the rear of the legs of the upper units to fasten to a solid support, such as a structural wall. The threaded inserts in each leg are female 5/16-18 UNC. Check that all displays in the video wall are locked together.
3. Start with the display unit in the center of the bottom row and align its Adapter Plate. If the bottom row has an even number of display units, choose either one. (This step can be done before the wall is built, if necessary.)	Look at the sides of the Adapter Frame. (See Figure 3, below.) Starting at the top edge and moving down you will see a large Locking Screw, a pointed Alignment Bolt, and an Alignment Hole. Near the middle of each side is a threaded hole for the Alignment Tool's spring-loaded screws. (Do not attach the Alignment Tool yet.) At the bottom of the side notice the Alignment Hole, the Alignment Bolt, and the Locking Screw. Check to see that the two bottom Locking Screws are tight. Measure the opening diagonally, from corner to corner in both directions, and compare the results. Be sure to measure from exactly the same points each time. An accuracy of 1/32nd inch (0.8 mm) is sufficient for most applications, but the more accurately you can measure this, particularly in the bottom center unit, the better the video wall will be aligned and the better the picture will look. If the two measurements are the same, you may go on to Step 4. If the two measurements are not the

<table>
<tr><td></td><td>same within 1/32nd inch (0.8 mm), loosen the top Locking Screws on each side. Move the Adapter Plate left or right a bit and tighten the screws. Measure the diagonals again. Repeat this process until you are satisfied that the two diagonals are the same. This means the Adapter Plate is a perfect rectangle with square corners.</td></tr>
<tr><td>4. Working along the bottom row in both directions, align each of the adapter plates, using the Alignment Tool.</td><td>Now that the center unit Adapter Plate is squared, move to its neighbor (in either direction) and align the next unit to the center display you just finished.

<table><tr><td>7</td><td>8</td><td>9</td></tr><tr><td>6</td><td>5</td><td>4</td></tr><tr><td>2</td><td>1</td><td>3</td></tr></table>
The diagram above shows the order in which you should align the displays in a typical video wall. (Note: This is not the same as the address of the display units.)

The Alignment Tool fits over the seam of two adjacent Adapter Plates. The Tool has six guide pins, three on each side, and four spring-loaded screws, two on each side. (Only two of the spring-loaded screws, one on each side, will be used at a time.)

Position the Alignment Tool between the two displays. One of these (#1) is already aligned and the other (#2) is about to be aligned. Fit the tool into display #1 first and attach it with one of the spring-loaded screws. The guide pins should go into the Alignment Holes in display #1.

Loosen the two Locking Screws in #2 under the Alignment Tool, and move the adapter plate of display #2 until the guide pins go in the Alignment Holes. Secure the Alignment Tool to #2 with the spring-loaded screw. Tighten the two Locking Screws on #2 under the Alignment Tool. (Do not be concerned about the units in the row above at this time.)

With the Alignment Tool still in place, check display #2 for squareness by measuring the diagonals. Loosen the Locking Screws on #2 that are on the other side from the Alignment Tool, and adjust Adapter Plate #2 until it is rectangular.

When you are satisfied that display #2 is aligned to display #1 and it has perfectly square corners, remove the Alignment Tool.

Go to the display on the other side of the center</td></tr>
</table>

	display (#3) and align it to the center display, following the steps 4.C. through 4.F.
5. Align the adapter plates on the rest of the rows, working upward.	Start with a display at the end of the row. Align display #4 to display #3. Put the Alignment Tool on the outside edge of #3. One of the upper guide pins should now fit the Alignment Hole in #4. Loosen the bottom Locking Screw in #4 and make it fit. Move the Alignment Tool between #1 and #3 so it reaches up and covers part of the seam between #4 and #5. Align this side of #4 and tighten the Locking Screw at the bottom. Measure the diagonals of #4. Loosen the top two Locking Screws and make its corners square, then tighten the screws. Continue with display #5, working your way across the video wall. (If you have two Alignment Tools, put one on each side, and the work will go faster.) When the second row is complete, move up a row.
6. Hang the screens on the bottom row and adjust them in or out so the front surfaces (the glass) are flat with each other.	Hang all the screens on the bottom row. Be sure the finger holes are on the top of each screen. When each screen is seated, pull on it slightly to make sure it is secure. Notice the seams. Are the two screens flush at each seam? If not, note how much you will have to adjust one of the screens to make it flat and flush with its neighbor. Measure this amount, but be careful not to scratch the screens. It is a good idea to make a diagram of the video wall. Make notes about how far to move each corner in or out. Then remove all the screens again. Working from your notes, adjust the pointed Alignment Bolts with the ½-inch wrench. Looking at the display from the front, each complete turn of the bolt CW (clockwise) pulls the corner of the screen IN (away from you) by 1/32nd of an inch (0.8 mm). Hang the screens on the bottom row again and check your work. You can now secure the screens to the Adapter Plates with the two screws you saved. Some installers prefer to use these screws only on the top row.
7. Hang the screens on the upper rows, and make them flat.	When the bottom row is aligned, hang the screens on the row above; adjust these to be flush with the bottom row and with each other.
8. Put retaining screws in the top row and cover holes and seams with black tape to prevent light leaks.	When all the screens are aligned with each other to make a flat, square video wall, put the screws in the top row of screens to hold them in place. The finger holes and the space between the screen and the Adapter Plate can be a source of light leaks, allowing stray light to hit the back of the screen and wash out some of the picture. To prevent this, cover the finger holes in the top row of displays with black cloth tape. Gaffer tape does a nice job of this. Masking tape is sometimes difficult to remove cleanly. You can check for light leaks during the video setup process. Select “Curtain” from the main

	menu and verify that the whole screen is black.

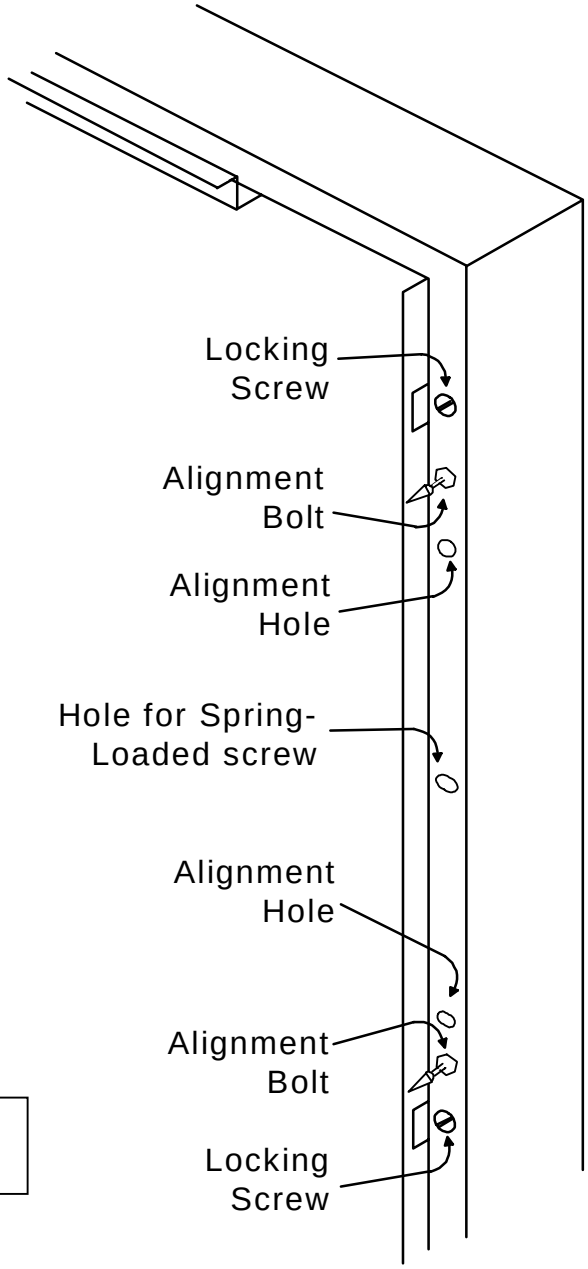


Figure 3 Adapter Plate Parts

Cables

Video connections from the signal source to the WN-5220-S depend on the type of signal supplied by the source. The compatible video inputs are; PC 800x600 (SVGA), PC 640x480 (VGA), MAC 800X600

or 640X480, and 31.5 kHz RGBS Video. With the optional VIM-300, 15.75 kHz RGBS Video is recognized composite video and S-Video will be processed and displayed.

The Loop-thru video output uses a standard 15-pin VGA type connector for output to an external computer monitor or another display. The format of the Loop-thru video is same as the source video. VGA and MAC will have RGB with separate H-Sync and V-Sync. RGBS video will come out RGBS with the composite sync on the connector's H-Sync pin. RGB Sync on Green sources will loop-thru RGBS-Sync on Green. Displays with the VIM-300 option using a Composite Video or S-Video source will not output a loop-thru signal for those two sources.

The video cables used should be high quality and shielded to insure the best image quality when displayed.

Using poor quality cables can lead to picture noise, jitter and crosstalk.

Control data enters the display via the RS-232 In connection, and is supplied to an adjacent display (if used) via the RS-232 Out connector. High quality shielded cables designed for RS-232 communication should be used to ensure proper data transmission and control.

Initial Setup

After the displays are installed, follow these steps for *each* display unit:

Step 1 - Power-Up

Step 2 - Adjust the Input Signal Settings

Step 3 - Adjust the Colors

Step 4 - Save the Settings

Step 1 – Power-Up

CAUTION **100 Volt Users – Set the red voltage switch at the power *plug* on the power supply to 115V.**

CAUTION ***115*** **Volt Users - Set the red voltage switch at the power plug on the power supply to 115V.**

CAUTION **230 Volt Users - Set the red voltage switch at the power plug on the power supply to 230V.**

1. Turn the main power switch (next to the power cord) to the ON (1) position	The STBY LED flashes, indicating the power up cycle has begun. Wait approximately three minutes until the STBY LED is on continuously.

2. Press the remote control ON button to power up each Display	You will hear a 'beep," and the sound of the internal fans. The lamp will come on, but will require approximately 5 minutes to fully warm up. There is a built-in delay from when you press the remote's ON button to when the lamp lights. The extent of the delay depends on the Monitor ID Unit setting. The two switches have a total number of 256 individual Monitor ID settings. GROUP - ID numbers are 0 – 9 and A – F for a total of 16 different settings. Each number is equal to that number times 16. A setting of 3 is equal to 48. UNIT - ID numbers are 0 – 9 and A – F for a total of 16 different settings. Each number is equal to that number times one. A setting of C equals 12. The Monitor ID number is the combination of the Group ID plus the Unit ID. A Group ID number of 2 and a Unit ID number of 5 equals a Monitor ID of 37. The delay the time between an "on" command to the display and the ignition of the lamp is approximately 2 seconds times the Monitor Unit ID number.
3. Check for normal operation	Observe the LED on the rear of each unit. When proper power is on, the STBY LED is off, and the fan and lamp LED's are on. A faint glow from the lamp exhaust vent in the rear of the unit indicates the lamp is on.

Step 2 - Adjust the Input Signal Settings

Select the Source

```
Source Select
Frequency
Phase
Input Level
Position
Zoom
Wall Processor
Color Balance
Curtain
Hours
Save Config
Recall Config
Reset Config
Misc Control
About
```

```
  Source Select          Source

←→ PC                  • PC
←→ 800x600               MAC
[ ] Auto                 9-PIN
[ ] Sync On Green        BNC
[ ] Interlace            C-Video
                         S-Video
Horz: 0000
Vert: 0000
Rate: 00.0
```

```
  Source Select          Mode

←→ PC                    640x480
←→ 800x600             • 800x600
[ ] Auto                 525/60Hz
[ ] Sync On Green        625/50Hz
[ ] Interlace

Horz: 0000
Vert: 0000
Rate: 00.0
```

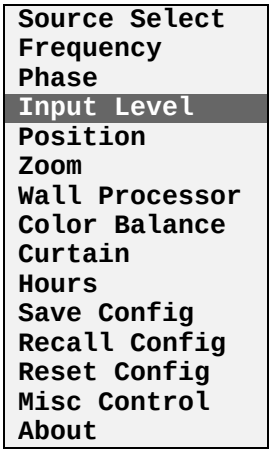
(The menu with the VIM-300 option installed is pictured here.)

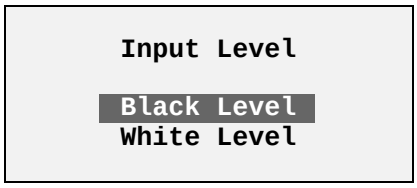
After the displays are all turned on, use this procedure to select the correct source. This must be done with *each* unit in a video wall.

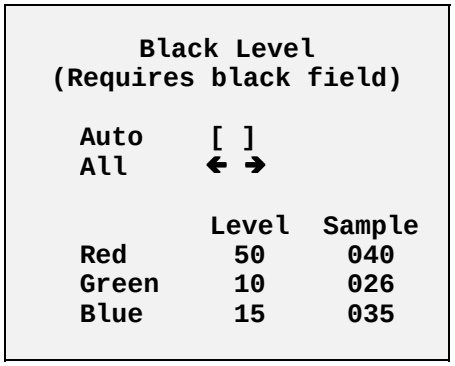
1. On the remote control, press SOURCE	The Source Select menu is displayed.
2. Press the Up/Down arrow keys and highlight the *upper* pair of arrows ← →	Notice the menu choices of "Source" on the right. The current selection in shown next to the arrows and is marked with a bullet in the right hand list. Use the left/right keys to make this selection. (Depending on options, your unit may not display all these choices.)
3. Press the Down arrow key and highlight the *lower* pair of arrows ← →	Notice the menu choices for "Mode" on the right. The current selection in shown next to the arrows and has a bullet in the right hand list. Use the left/right keys to make this selection. (Depending on options and on the Source Selection, your unit may not display all these choices.) – Or – Skip this step and go to Step 4.
4. Auto	If you have selected a good Source in Step 2, Auto can set Mode and Interlace automatically. Highlight the **[ ]** next to Auto and press ENTER. Auto takes information from Horz, Vert, and Rate, below, and sets Sync on Green and Interlace accordingly. It does this just once. The X will appear in Auto for a very brief moment. If the incoming signal is weak or erratic, Auto may not be able to perform its function reliably, and you will have to set the Sync on Green and Interlace manually.
5. Sync on Green	If the Source is RGBS, whether 9-Pin or BNC, and the source has sync on the green channel, press ENTER to put an X in this box. (See Auto above.)
6. Interlace	If the source is interlaced, press ENTER to put an X in this box. If it is progressive scan, this box should be cleared. (See Auto above.)
Horz:	Shows the horizontal frequency of the displayed signal. You can't change this value.
Vert:	Shows the number of horizontal lines in the displayed signal. You can't change this value.
Rate:	Shows the frame rate of the displayed signal. You can't change this value.

Adjust the Black Input Level - PC, MAC or RGBS Video

(This does not apply to Composite or S-Video sources – see Comp Video/S-Video Level Adjustment on page 17.







Adjusting the input levels allows the unit to display the full color range of the video source. If the input levels are not properly adjusted the image may look washed-out or posterized.

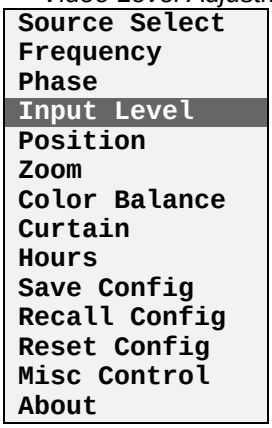
The Black Level must be adjusted *before* adjusting the White Level.

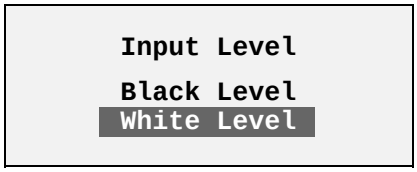
Note: Black Level Adjust and White Level Adjust should *not* be used to color balance the displays. Matching the displays so they all produce the same colors is done in a later step called Color Balance. Color Balance and Level Adjust are entirely independent from each other. Level Adjust must be done with external video signals. Color Balance may be done with internally generated patterns.

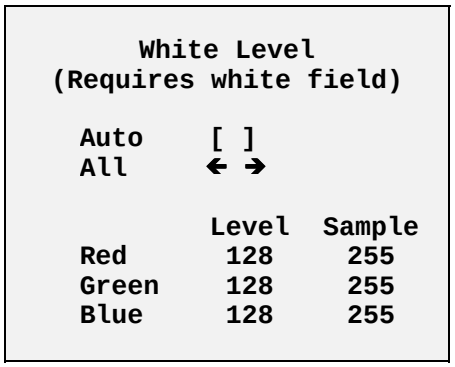
1. Display a black screen image from the signal source (*not* from the built-in test patterns)	Examples of all-black sources are a black PC Paint screen or frame 50882 on Reference Recordings, "A Video Standard" test disk. Note: It is not necessary for the entire screen to be black. The area of interest is within 100 pixels of the upper left corner of the Black Level menu.
2. Press the Level button, or highlight Level in the main menu and press ENTER.	The Input Level menu is displayed.
3. Use the up/down arrows to highlight Black Level and press ENTER.	The Black Level menu is displayed
4. Move the cursor to Auto and press ENTER.	The display will automatically seek the black level of the input signal and adjust the A/D converter to it.

Adjust the White Input Level – PC, MAC or RGBS Video

(This does not apply to Composite or S-Video sources – see Comp Video/S-Video Level Adjustment on page 17.)





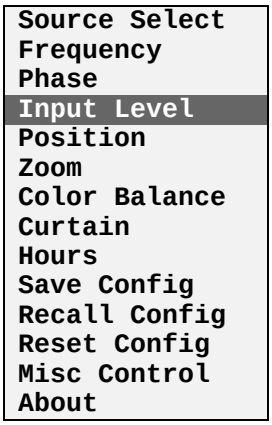


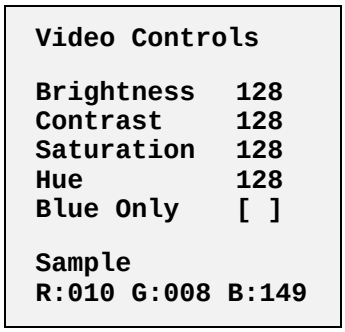
Adjusting the input levels allows the unit to display the full color range of the video source. If the input levels are not properly adjusted the image may look washed-out or posterized.

The input black level must be adjusted to match the source <u>before</u> adjusting the input white level!

1. Display an all-white image from the signal source (*not* from the built-in test patterns)	Examples of all-white sources are a white PC Paint screen or frame 50823 on Reference Recordings, "A Video Standard" test disk. It is not necessary for the entire screen to be white. The area of interest is within 100 pixels of the upper left corner of the White Level menu.
2. Press the Level button, or highlight Level in the main menu and press ENTER.	The Input Level menu is displayed.
3. Use the up/down arrows to highlight White Level and press ENTER.	The White Level menu is displayed
4. Move the cursor to Auto and press ENTER.	The display will automatically seek the white level of the input signal and adjust the A/D converter to it.

Comp Video/S-Video Level Adjustment





This menu selection is only available when the source selected is Comp Video or S-Video in units with the VIM-300 option installed. It is not available when PC, MAC or RGBS sources are selected.

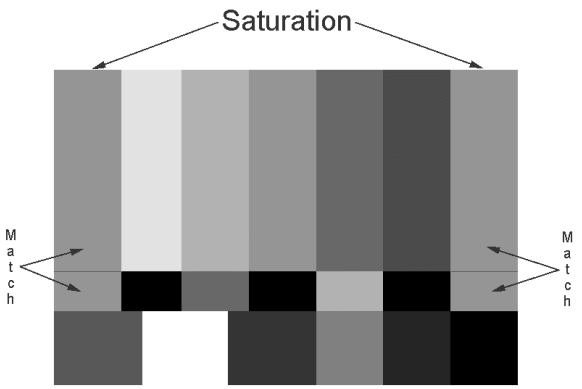
Brightness: This adjusts the overall lightness and darkness of the image.

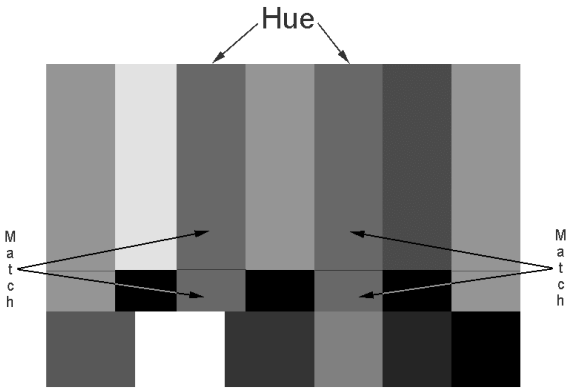
Contrast: Increases the difference between light and dark parts of the image.

Saturation: Adjusts the amount of color the image has.

Hue: Changes the tint of images to be more green or more magenta colored.

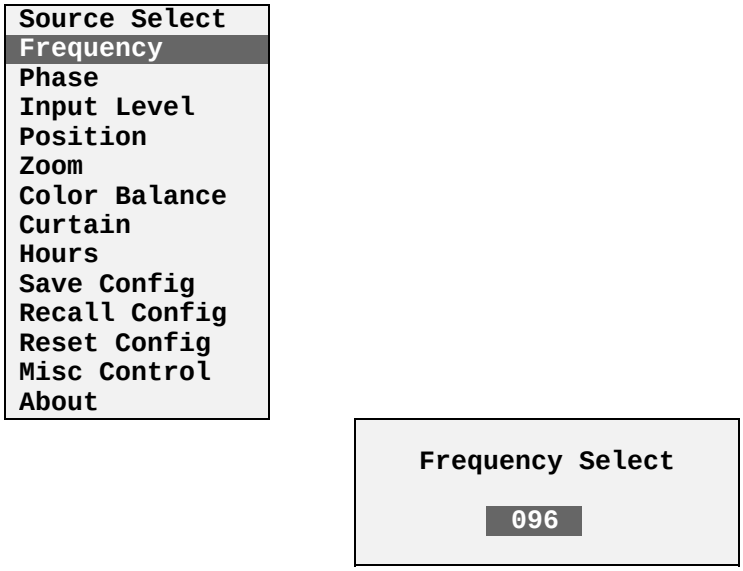
1. Press the remote control LEVEL button	Brings up the Video Controls menu (must have Comp Video or S-Video selected as a source).
2. Display an all-black image from the source (*not* from the built-in test patterns)	Frame 50882 on Reference Recordings, “A Video Standard” test disk is an all-black image.

3. Adjust Brightness	Set the Sample values for R, G and B as close to 001 as possible while keeping the Brightness number as high as possible. If all the initial Sample values (R, G, & B) are greater than 001, then reduce the Brightness number until the first Sample value reaches 001. If the initial Sample values are showing 001, then increase the Brightness number until all Sample values are 002 or greater. Stop adjusting when the last Sample value goes from 001 to 002. If Brightness is decreased while the Sample values are at 001, the color range for the displayed image will be decreased.
4. Display an all-white image from the source	Frame 50823 on Reference Recordings, "A Video Standard" test disk is an all-white image.
5. Adjust Contrast	Set the Sample values for R, G and B as close to 254 as possible while keeping the Contrast number as low as possible. If all the initial Sample values are less than 254 then increase the Contrast number until the first Sample value reaches 254. If the initial Sample values are showing 254 then decrease the Contrast number until all Sample values are 253 or less. Stop adjusting when the last Sample value goes from 254 to 253. If Contrast is increased while the Sample values are at 254, the color range for the displayed image will be decreased.
6. Display a standard SMPTE Color Bar pattern	A SMPTE Color Bar pattern is available at frame 17177 on Reference Recordings, "A Video Standard" test disk.
7. Enable the Blue Only function	Select the Blue Only option with the up/down arrows and press ENTER to enable it. At this point the screen will show only shades of blue.
8. Adjust Saturation	Adjust Saturation up or down until the large color bars at the each end of the pattern match the smaller color bars beneath them. 

9. Adjust Hue	Adjust Hue up or down until the two central color bars match the smaller color bars beneath them. 
10. Exit the Video Controls menu	Press the PREV MENU button on the remote. This will exit the menu and de-select Blue Only at the same time.

Adjust the Frequency

(This does not have any effect with Composite or S-Video sources.)



For RGBS, Composite, or S-Video Sources –

Use the FREQ function to adjust the image's horizontal width.

1. Press the remote control FREQ button	Displays the Frequency Select menu. Observe the horizontal width of the image.
2. Press the Left/Right arrow keys	Expand or contract the image horizontally.

For Computer Video Sources –

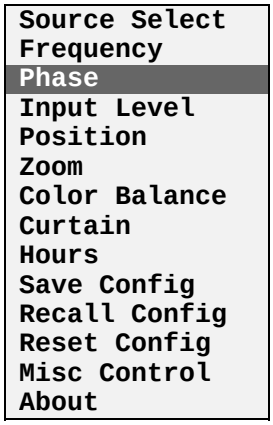
Use the FREQ function to match the internal sampling clock of the display to the incoming video data.

1. Turn Sharpness on	In the main menu, highlight Misc Control and press Enter. If there is *not* an X for Sharpness, highlight Sharpness and press Enter.

2. Display an image containing many on/off (black/white) transitions	A checkerboard pattern works well. One of the "fill" patterns in Windows 95 Paint has this. Start Paint program found under Accessories. Select Image, Attributes, Black and White, OK, Yes. Select View and see that Color Box is checked. Choose the Fill tool (paint jar spilling over). In the bottom row of black/white shades, click the 9th box from the left. Click in the drawing area. Choose View, View Bitmap to fill the computer screen with this pattern. With Sharpness *enabled*, if the FREQ setting is not correct and does not match the input source, you will see large vertical bands in the pattern.
3. Press the remote control FREQ button	The FREQ adjustment menu is displayed.
4. Press the left/right arrow keys	The vertical bands will disappear when the frequency matches the incoming signal.
5. Press PREV MENU	Exit the FREQ menu.

Adjust the Phase

This setting is important for computer input. It has no effect with Composite or S-Video sources.

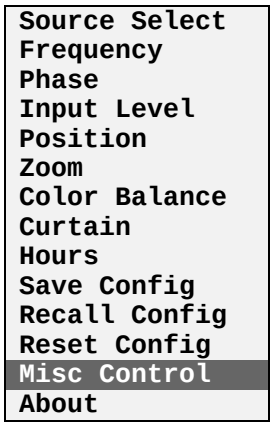


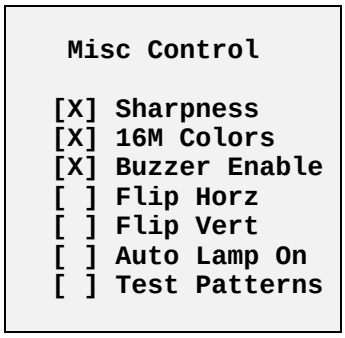
Use the PHASE button to adjust the phase of the internal sampling clock relative to the incoming data. This adjustment is usually not

necessary for most applications, but can be used to eliminate some types of video noise.

1. Press the remote control PHASE button	The PHASE adjustment menu is displayed.
2. Press the Left/Right arrow keys	Adjust to produce the best image quality. For computer applications, use the same large area checkerboard as for the FREQ adjustment. Incorrect Phase will show up as horizontal streaks of random noise. This shows most clearly with Sharpness ON.
3. Press PREV MENU	Exit the PHASE menu.

Set the Sharpness

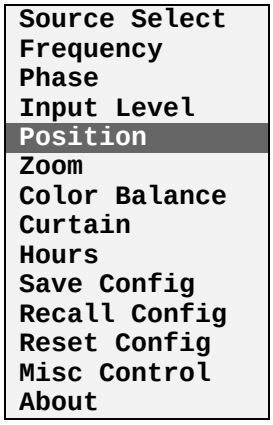


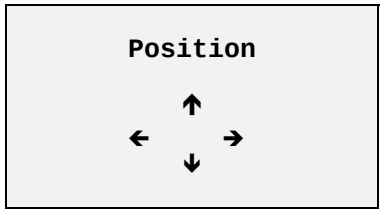


Use the Sharpness menu to toggle Sharpness On/Off. In general, the sharpness should be off (no X) for normal video sources, and on (with X) for computer sources. Sharpness controls an internal filter that reduces some types of video noise and softens the edges.

1. Press the remote control MENU button	Displays the main menu.
2. Press the up/down arrow keys	Move the cursor to the Misc Control selection.
3. Press ENTER	The Misc Control menu is displayed.
4. Press the up/down arrow keys	Move the cursor to the Sharpness Selection.
5. Press ENTER	Use the ENTER key to toggle sharpness on or off.
6. Press PREV MENU	Exit the Misc Control menu.

Position the Image



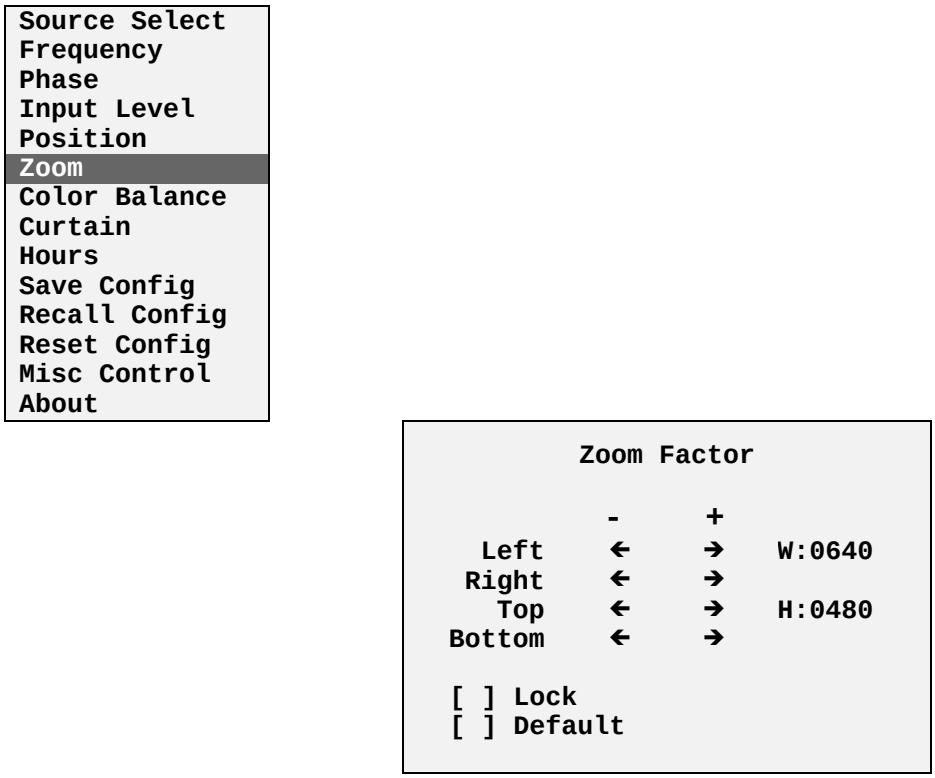


Use the arrow keys to adjust the position of the image on each display unit.

1. Press the MENU button on the remote control	Displays the main menu.
2. Press the Up/Down arrow keys	Move the cursor to the Position selection.
3. Press ENTER	Displays the Video Position menu.
4. Press the remote control arrow keys	Position the image. It is easiest to see the effect of Position when the image is a some form of geometry pattern, one that exactly defines the edges of the image.

Scale the Image

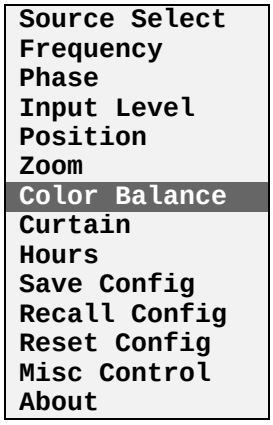
This feature is only enabled with the VIM-300 option installed.

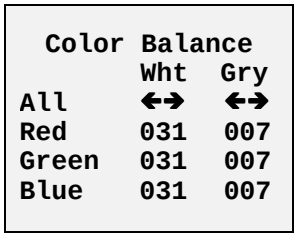


Use the arrow keys to adjust the size of the image on each display.

1. Press the MENU button on the remote control	Displays the main menu.
2. Press the Up/Down arrow keys	Move the cursor to the Zoom selection.
3. Press ENTER	Displays the Zoom Factor menu.
4. Scale the image	Select an edge of the image that needs to be expanded or compressed (Left, Right, Up or Down). It is easiest to see the effect of Zoom when the image is a some form of geometry pattern, one that exactly defines the edges of the image. Selecting the Lock feature causes the image to scale the same amount in the opposite direction. If you scale the Right, the Left will scale by the same amount. Similarly, Up and Down The Default feature scales the image back to 800x600 or 640x480 pixels, depending on the source.

Step 3 - Adjust the Colors





The purpose of color balancing is to get all the displays in a video wall to display the same color. This is done with an internally generated white pattern. Color balancing is independent of Black and White Level Adjust, which was described earlier. Color balancing may be done *before or after* Level Adjust.

The color balance menu provides control over the individual RED, GREEN, and BLUE settings to balance the white color, as well as an ALL adjustment to control the overall luminance. In addition, similar control for the RED, GREEN, and BLUE settings are provided to adjust the balance of the gray shades without affecting the white balance.

For *white balancing*, the individual RED, GREEN, and BLUE color selections have a number associated with them between 0 and 31, with 0 being the least amount of that color, and 31 being the most. The ALL selection allows all of the balance settings to be adjusted simultaneously. The up/down arrow keys moves the cursor from selection to selection, and the left/right arrow keys increment and decrement the setting.

For *gray balancing*, the individual RED, GREEN, and BLUE balance settings have a number associated with them between 0 and 7, with 0 being the least amount of that color at the mid gray level, and 7 being

the most. The ALL selection allows all of the gray balance settings to be adjusted simultaneously.

1. Select an internal White pattern for all displays	Press Menu to display the main menu. With the up/down arrows, highlight Misc Control and press Enter. Highlight Test Patterns and press Enter. Highlight White and press Enter. Do this for all displays.
2. Maximize all settings	Adjust the white settings so that all are at 031 and all gray settings are at 007.
3. Choose the least bright display	The least bright display cannot be adjusted brighter than it is now. It will serve as a "standard," and all the other displays will be adjusted to it.
4. Luminance match the displays	Starting with a cube next to the standard cube, adjust the ALL settings on the white levels to approximately match the luminance (brightness) of the standard display. Then do the same for the other displays, working outward from the standard cube.
5. Color balance the displays – white mode	Again starting with a cube next to the "standard" cube, adjust the relative amounts of RED, GREEN, and BLUE in the white (Wht) column to achieve the best match in color and luminance to the baseline display. Start with the cubes nearest the "standard" display and work outward. See the chart below for some hints about color adjustment.
6. Select an internal Gray pattern for all displays	Press Menu to display the main menu. With the up/down arrows, highlight Misc Control and press Enter. Highlight Test Patterns and press Enter. Highlight Gray and press Enter. Do this for all displays.
7. Color balance the displays – gray mode	Starting with a cube next to the standard cube, adjust the relative amounts of RED, GREEN, and BLUE in the gray (Gry) column to achieve the best match in color and luminance to the standard display. Do the same for the other cubes, working outward from the standard cube.

The following chart shows the relationship of the menu item adjustments.

Color	Increase will:	Decrease will:
All	Increase the overall luminance (brightness)	Decrease the overall luminance (brightness)
Red	Change white toward red	Change white toward cyan
Green	Change white toward green	Change white toward magenta
Blue	Change white toward blue	Change white toward yellow
Note: If one color needs to be increased, but that color is already as high as it can go, then the other two colors can be decreased.		

A helpful technique to use when adjusting the colors and gray shades is to "overshoot" as you adjust to emphasize the effect that the current adjustment is having to the overall image, and then back off to fine tune. This helps to give an intuitive feel for the process.

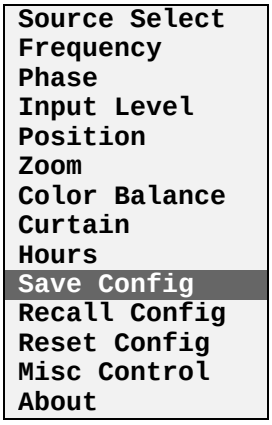
It is often helpful to switch between the internal white and gray patterns and actual video images to fine tune the system. Avoid making major changes when adjusting to the video images because this can throw off the white or gray balance. Remember also that the Input Level adjustment has a large effect on color. If Input Level adjustments have not been made, color balance for live video will be difficult. However, you may adjust Color Balance *before or after* you do the Input Level adjustment. They do not affect each other – that is, an adjustment in Color Balance does not affect the Input Level adjustment, and vice versa – but they must both be adjusted properly for the screens in the cube to match in color balance, luminance and black level.

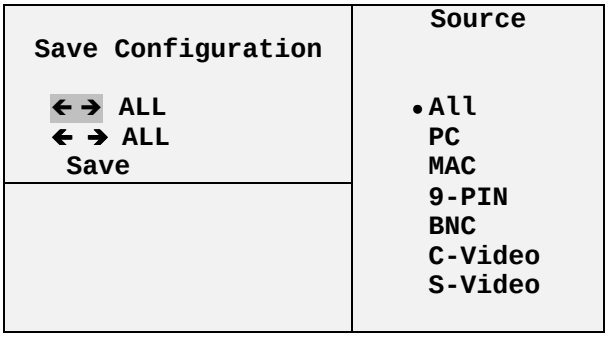
Color Balance is an internal adjustment which matches the color temperature of the different lamps to each other. It is not affected by changing the input source. After you have performed Color Balance once, you do not need to do it again until you change one of the lamps.

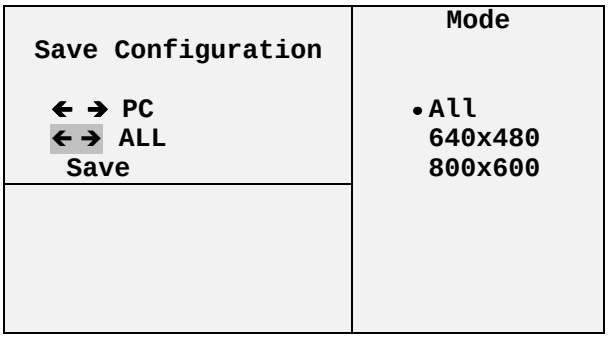
Step 4 – Save, Recall, or Reset the Settings

After all adjustments have been made, Save the settings. There is a separate Save location for each source in each mode – PC at 800x600, PC at 640x480, RGBS at 31.5 MHz, RGBS at 15.75 MHz, etc. After you have adjusted the displays for one source, save these settings before going to the next source and adjusting it.

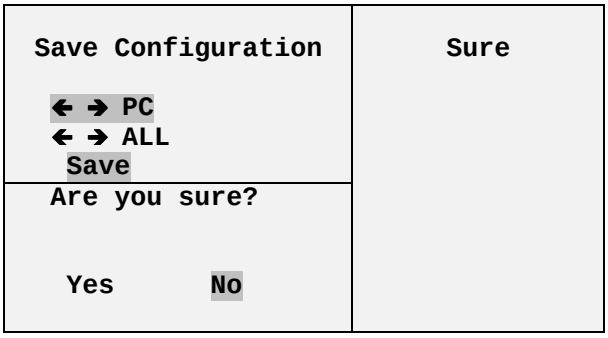
The Save, Recall, and Reset menus look alike and operate in the same way, so the explanation for Save will tell you how the Recall and Reset menus operate. (Resetting does *not* overwrite the memory where settings are saved. See Figure 4 later in this section.)







1. Press the remote control MENU button	The Main menu is displayed.
2. Press the Up/Down arrow keys	Move the cursor to the Save Config (or Recall Config or Reset Config) selection.
3. Press ENTER	The Save Config (or Recall Config or Reset Config) menu is displayed.
4. Press the Up/Down arrow keys to highlight the *upper* pair of arrows ← →	This is the Source selection area. The list of sources is shown in the right column, with the current selection preceded by a bullet • and stated next to the arrow symbols.
5. Press the Left/Right arrow keys	Use the left/right buttons to choose the Source you want to Save/Recall/Reset.
6. Press the Up/Down arrow keys to highlight the *lower* pair of arrows ← →	This is the Mode selection area, where you will choose the modes that will be Saved/Recalled/Reset for the previously selected Source. There is a separate memory for *each* source in *each* mode.
7. Press the Left/Right arrow keys	Use the left/right buttons to choose the Mode you want to Save/Recall/Reset. (If the Source is "ALL," the only choice for Mode is also "ALL.")
8. Press the Up/Down arrow keys to highlight Save (or Recall or Reset)	Press ENTER. A new menu appears as shown below.



9. Press the Left/Right arrow keys to highlight Yes	Press ENTER. The settings will be saved/recalled/reset for the Sources and Modes you chose.

Shortcut: Unless you have made changes to a source or mode that you *do not* want to save, it is easiest and safest to Save All sources, All modes.

Note: Resetting to factory default settings does *not* destroy the saved settings in memory until you Save them.

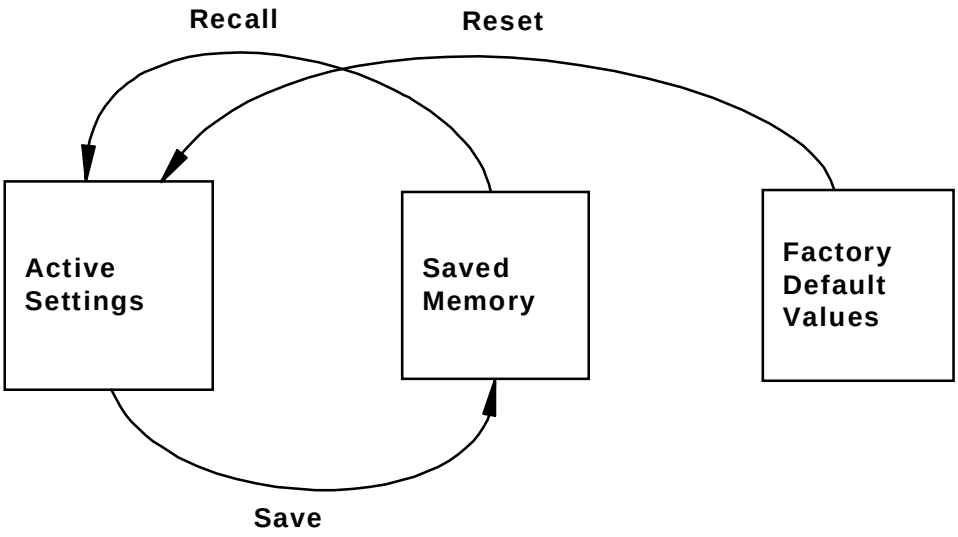


Figure 4 Block diagram of memory system

Turning off the System

Turn off the Lamp, Enter Standby Mode

Use the remote to turn off the lamp and enter standby mode. The main power switch on the back of the power supply is left on and the unit remains in standby mode until turned on again.

1. Press the remote control OFF button – or the hard-wired REMOTE ON/STBY switch – or the POWER button on the rear connector panel	The unit is placed in the standby delay mode and the lamp is shut off and locked out for 3 minutes. The fans continue to operate during lockout to ensure proper cooling. Three beeps will sound if an attempt is made to turn on the units during the 3 minute lockout. During the standby delay cycle the STBY LED on the rear connector panel will blink.

Turn off Main Power Switch

Turn off the main power switch *only* for servicing or moving the display, or if the display will not be used for an extended period of time. If the unit is turned off at the main power switch, the 3 minute power up delay is required.

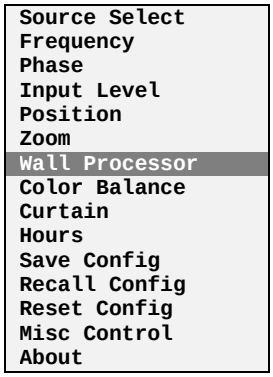
1. Turn off main power switch	The main power switch is located next to the AC power plug at the back of the display.

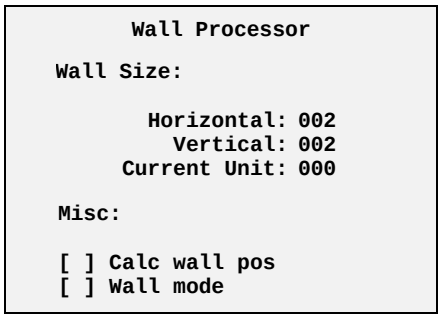
Clarity's Big Picture™

Wall Processor Setup Instructions

These are the basic steps to follow to display a single image over an entire wall of displays. Big Picture can be setup and saved for each video source, so you can switch between sources while maintaining the specific magnification and position settings for each source.

1. Build the wall	Install the wall and attach source and power cables as described in earlier sections. Use an amplifier/splitter device (distribution amplifier) from the source or use short cables to minimize video noise and image jitter.
2. Select the source	In the menu for *each* display, select the source that will use Big Picture.
3. Adjust the image settings	As described in Step 2, Step 3, and Step 4 in earlier sections, adjust black and white levels for each display; set phase and frequency; color balance the wall.
4. Disable wall mode	Open the Wall Processor menu and make sure that the Wall mode feature at the bottom of the menu is *not* checked. Do this for *each* display.
5. Reset Zoom	Set Zoom in the menu to the default width and height of 800x600 or 640x480, depending on the source.
6. Center the image	Find the edges of the image using the arrow buttons in the Position menu to move the image. For standard mullions, each mullion covers about 3 lines or pixels of the image and each button press in the Position menu moves the image one line or pixel at a time. Move the image so that 3 lines or pixels on each side of the image are behind their respective mullions.





7. Set each display's address

Assign each display a unique address using the Unit ID knob. (The Group ID setting has no effect on the display addressing for Big Picture.)

The address of the display in the upper left corner (as seen from the front) *must* be zero. The addresses of the other displays must increase left to right, top bottom, increasing by one for each display. Therefore, the display in the lower right corner (as seen from the front) *always* has the highest address.

2x2 example ➔

(Seen from the front)

0	1
2	3

3x3 example ➔

0	1	2
3	4	5
6	7	8

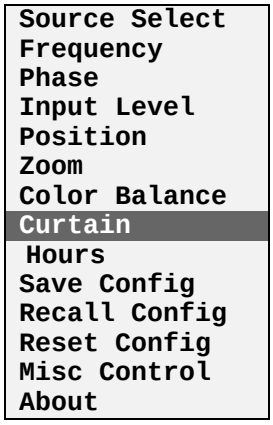
8. Set the Wall Size on each display	Open the Wall Processor menu. Enter the horizontal and vertical number of displays in the wall. Each display should show the same horizontal and vertical wall size. Each display should show a different Current Unit value. This value represents its location in the wall.
9. Put each display into Wall Mode	Move the menu cursor to the Calc wall pos line and press the ENTER button. This calculates the position of the selected display within the image and puts the display into Wall Mode. Each display will now show only its segment of the overall image. Do this with each display in the wall and exit the Wall Processor menu.
10. Fine tune the wall image	If the previous steps were done correctly, the image in each display should not need to be adjusted by more than two lines in any direction. If an adjustment to the image must be made, use the scaling function in the Zoom menu to move only the edge that needs adjustment.
11. Save the settings	Open the Save Config menu and save the settings for each display, as described above in *Step 4 – Save, Recall, or Reset the Settings* on page 17.

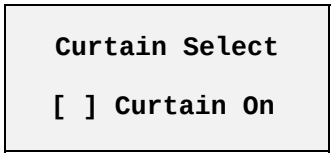
If there are other video sources that will use Big Picture, go through this whole process for each video source. Then save the settings.

Other Features and Adjustments

The following features and adjustments are available via the remote.

Curtain





1. Press the CURTAIN button on the remote	Displays a black screen instead of the input signal.
2. Press CURTAIN again	Displays the input signal.

Monitor Select

1. Press MON SEL on the remote	Disables most remote functions on the display to prevent the unit from unintended adjustment while adjusting adjacent unit.
2. Press MON SEL again	Restores remote functions on the display.

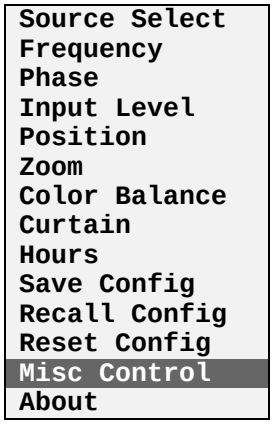
ID

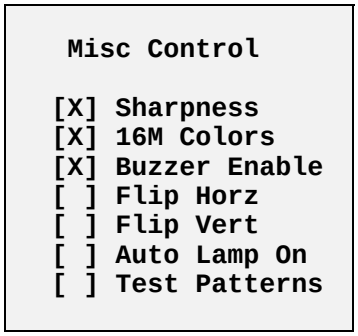
1. Press ID on the Remote	Displays the Monitor ID position as selected by the Monitor ID switch in the rear of the unit.
2. Press ID again	Removes the display of the Monitor ID position

Miscellaneous Controls

The Misc Control menu contains:

Sharpness
16M Colors
Buzzer Enable
Horizontal Flip
Vertical Flip
Auto Lamp On
Test Patterns





1. Press the MAIN MENU button on the remote	The Main menu is displayed.
2. Press the up/down arrow keys	Move the cursor to the Misc Control selection.
3. Press ENTER	The Misc Control menu is displayed.

Set the Number of Colors

1. Press the up/down arrow keys	Move the cursor to the 16M Colors selection.
2. Press ENTER	Select between 256 thousand and 16 million colors. Normally, the full 16 million color palette is used.

Remote Control Tone

1. Press the up/down arrow keys	Move the cursor to the Buzzer Enable selection.
2. Press ENTER	Press ENTER to toggle the remote control buzzer on or off.

Flip the Image Horizontally

1. Press the up/down arrow keys	Move the cursor to the Flip Horz selection.
2. Press ENTER	Flips the displayed image horizontally.

Flip the Image Vertically

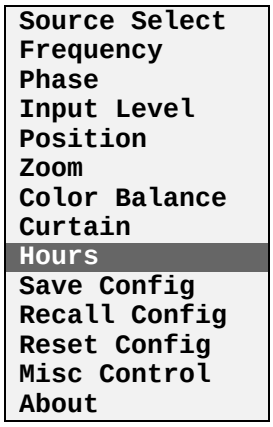
1. Press the up/down arrow keys	Move the cursor to the Flip Vert selection.
2. Press ENTER	Flips the displayed image vertically.

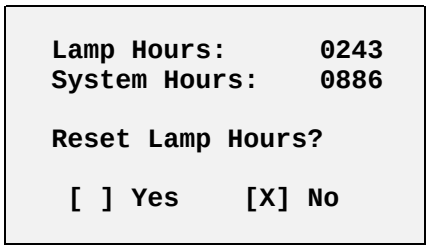
Auto Lamp On

1. Press the up/down arrow keys as required	Move the cursor to the Auto Lamp On selection.
2. Press ENTER	When enabled, the lamp will automatically come on after the 3 minute standby timer has elapsed.

Reset Lamp Hours

After a lamp change, use this menu to reset the lamp hour timer to zero. The system hour timer displays the total hours that power has been applied to the display with the power supply switch on. The system hour timer cannot be reset. Lamp hours accrue when the display is running (FAN and LAMP LED's are on solid).

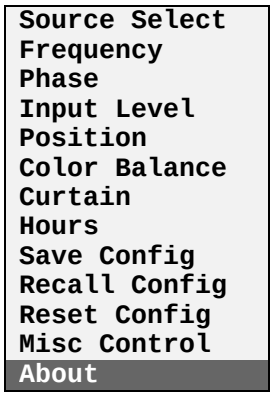




1. Press the MAIN MENU button on the remote	The Main menu is displayed.
2. Press the up/down arrow keys	Move the cursor to the Hours selection.
3. Press ENTER	The Lamp Hours menu displays the current number of lamp operating hours. Replace the lamp at 3000 hours. This menu also shows total system hours.
4. Press left/right arrow keys	Use the left or right arrow keys to highlight the Yes selection.
5. Press ENTER	Press the ENTER button to proceed in resetting the lamp hours to zero.
6. Press left/right arrow keys	At this point a warning will prompt 'Did You Replace The Lamp?' If the lamp was replaced, use the left or right arrow keys to highlight the Yes selection.
7. Press ENTER	Press the ENTER button to proceed in resetting the lamp hours to zero.

About

This displays the Clarity Visual Systems contact information. It also displays the version of firmware being used. (The Project and Build information is of concern only to manufacturing.)



Cleaning and Maintenance

Use the procedures in this section to remove and replace WN-5220-S modules as needed to maintain trouble-free operation.

Screen

The WN-5220-S has two screen options:

- The **standard screen** has a mullion about 1/8th inch (3 mm) wide. The mullion is a strip of sheet metal surrounding the screen which holds it in place.
- The **Ultra-Thin Mullion Screen**, or mullionless screen, does not have the 1/8th inch strip of sheet metal around the screen. The viewing area of the screen goes right to the edge of the display unit. This makes the lines between display units much less apparent in the finished video wall.

With standard screens, electrical interlocks prevent operation when the front screen is removed. Do not operate the display with any access panels or the front screen removed from the unit, except when required for servicing. Operating the display with access panels or the front screen removed can expose service or operating personnel to ultraviolet burns and high electrical voltages. Always wear ultraviolet-blocking eyewear with side guards when servicing the display.

For Standard Screens, removing the screen provides service access to other replaceable modules from the front of the display. Service access for Ultra-Thin Mullion Screens in done more easily from the rear access panel.

Removing Standard Mullion Screens

CAUTION For the standard screens, with the wider mullion, the screen may be removed by hand from stand-alone displays without damaging the screen. Where screen edges are adjacent to each other in a video wall, removing the screen without a screen removal tool may damage the female part of the screen latch. In video wall configurations, use the SRT-100 Screen Removal Tool (see Options on page 2) to prevent damage to the screen.

Follow these steps to remove the **standard, wider mullion** screen, if the display unit is *not* built into a video wall. Read all the steps before starting.

1. Grasp the screen on each side at the bottom	The "screen" you are removing is 2 or 3 inches thick. Pull out at the bottom first, to separate the latch-hooks from the latches. It comes out with a "pop." The screen should now be loose at the bottom, but still attached at the top.
2. Slip fingers between the screen frame	Slip fingers between the screen frame and the display chassis, as close to the top latches as possible and pull the top of the screen from the latches.
3. Using both hands...	Carefully remove the screen and set it aside.
4. Reinstall	Reinstall the screen by lining up the latches and pressing the screen inward. It will go in with a distinct "pop." Give it a slight pull to see that it is securely in place.

Note: To remove the screens from a video wall configuration, where each unit is tight against its neighbor, it will be easier to remove the screens of the adjacent displays to allow access for your hands to the screen frame.

There is an optional **screen removal tool** available, the SRT-100. This tool allows you to remove the center screen of a video wall without removing the surrounding screens. Contact Clarity Visual Systems or your Reseller for more information.

To remove a standard screen with the SRT-100 Screen Removal Tool:

1. Find the bumps on the side mullions	On both sides of the screen, near the top and bottom, the mullion is slightly lifted from the screen material, forming a little bump. The removal tool fits here.
2. Insert the removal tool	The small hook on the removal tool slips under the bump in the mullion. The other side of the tool should press against the mullion of the neighboring screen.

3. Squeeze the handle of the SRT-100	Squeezing the handle of the removal tool pulls one screen out far enough to let it "pop" out at that corner. The tool uses the neighboring screen for leverage.
4. Repeat for all four corners	Remove the screen carefully and set it aside.

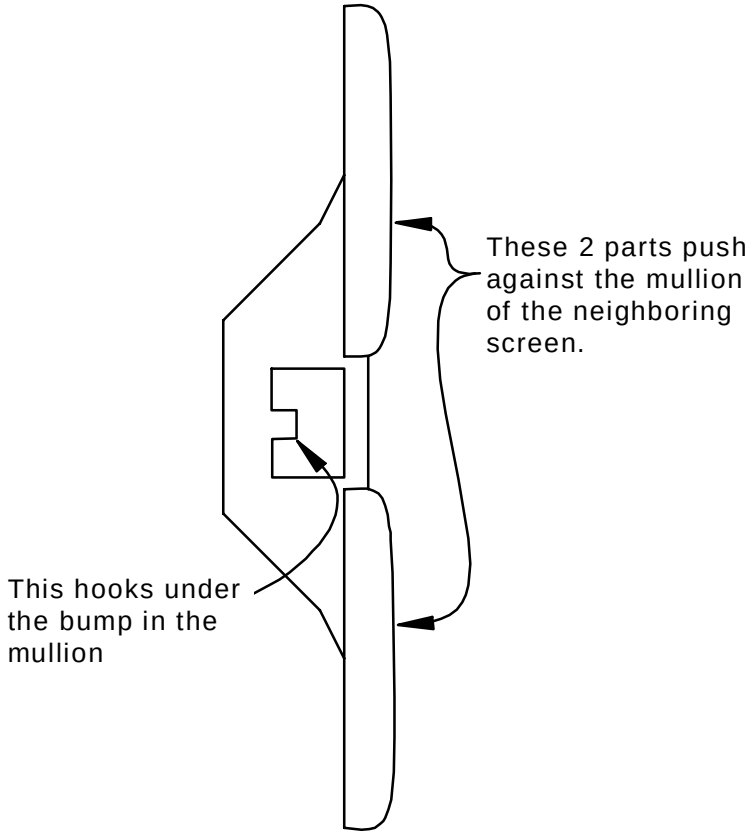
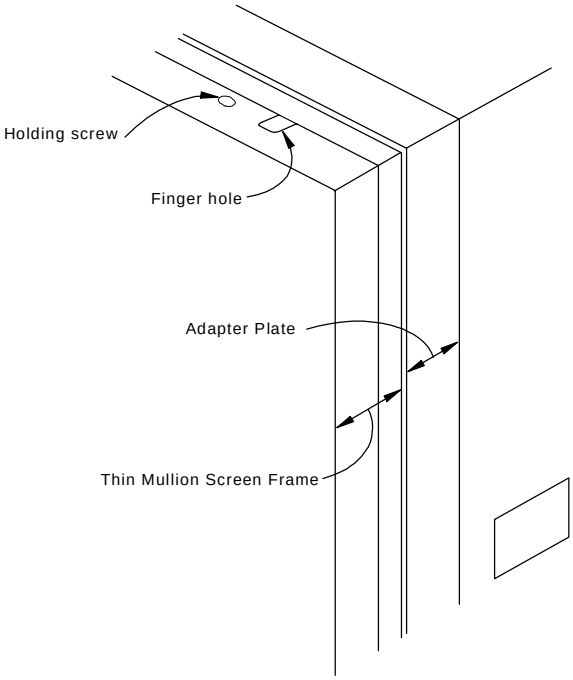


Figure 5 SRT-100, Screen Removal Tool

Removing Ultra-Thin Mullion Screens



The thin mullion display screens consist of two basic parts. There is the screen itself and the screen it is held in, which is an assembly about 2¾ inches (7 cm) thick. This screen attaches to the second part, an Adapter Plate which is about 2 inches (5 cm) thick. The Adapter Plate is mounted on the front of the display unit.

Figure 6 Ultra-Thin Mullion Screen and Adapter Plate

1. Locate the two retaining screws	Look down on the top of the screen and locate the two retaining screws. Remove these screws and set them aside.
2. Using both hands . . .	Grab the sides of the screen, lift it up about half an inch (one centimeter), and remove it from the Adapter Plate. Set it aside. Note: You can also use the two finger holes in the top of the screen to lift it off. This is particularly useful after a wall is constructed.
3. Reinstall	To reinstall the screen, line up the four holes in the screen with the two pointed bolts. Hang the screen in place on the ledge at the top. Secure it with the two screws in the top edge.

Lamp

The lamp must be allowed to cool prior to removal. Wait at least 3 minutes after turning off the display to remove the lamp.

Before attempting to remove the lamp module, switch off the WN-5220-S with the remote and allow the lamp cooling cycle to complete (3 minutes) before switching off power at the rear-panel power switch. The lamp module may be removed and replaced from the front,

for Standard Mullion screens only, by first removing the screen (see Removing Standard Mullion Screens on page 17), or from the rear by removing the lamp service access cover. Lamps are most easily replaced from the rear for Thin Mullions Screens.

WARNING Before servicing the display, always switch the AC power off at the *rear* panel power switch and remove the power cord. When the WN-5220-S VideoWall is connected to the electrical mains, some circuits still contain line voltage, even when power is switched off.

CAUTION Do not *touch* the lamp or reflector. Oils from the skin will cause these surfaces to become etched when the lamp is operated, dramatically shortening the life of the lamp.

1. Turn off the power	Switch off the WN-5220-S using the remote and allow the cooling cycle to complete (3 minutes) before switching off the AC power at the rear-panel switch.
2. Unplug power cord	Remove the AC power cord from the WN-5220-S.
3. Remove screen or lamp access cover	For Standard Screen units, to gain access to the lamp from the front unit, remove the screen. For either screen type, to gain access to the lamp from the rear unit, unfasten the 8 quarter-turn screws on the lamp access cover and remove the cover.
4. Unplug lamp connector	The lamp connector is next to the reflector fan. Unplug the connector by pulling up on it.
5. Unhook the lamp	Unhook the two latches holding the lamp module to the optical assembly.
6. Remove the lamp	Lifting up on the handle, tilt the lamp module away from the latches until it can be pulled free of the optical assembly. Carefully remove from the display by lifting the lamp module straight up to clear the fans, and then withdrawing.
7. Install new lamp	Replacement is the reverse of the above procedure. After installing the lamp module, ensure that the high-voltage connector is in place and that the latches are securely latched before replacing the screen or the lamp service access cover.
8. Reset the Lamp Hours	Reset the lamp hours in the menu.

Air Filter

Length of time between air filter replacements depends on the environment in which the display is operated. Air filter cleanliness should be periodically checked and the air filter replaced when dirty, at a minimum of every 3,000 hours of operation. An excessively dirty air filter can block air flow to the optical assembly and cause excessive heat buildup inside the display. The air filter is most easily accessed from the rear of the display by first removing the lamp access cover.

CAUTION Use care when removing the air filter to avoid causing accumulated dust to fall into the optical assembly.

1. Turn off the power	Switch off the WN-5220-S using the remote and allow the cooling cycle to complete (3 minutes) before switching off the AC power at the rear-panel switch.
2. Unplug power cord	Remove the AC power cord from the WN-5220-S.
3. Remove screen or lamp access cover	To gain access to the filter from the front of the display, remove the screen first. To gain access to the filter from the rear of the display, unfasten the 8 quarter-turn screws on the lamp access cover and remove the cover.
4. Remove the filter	From the rear, pull the filter straight out. From the front, pull the filter up and to the right. Gently work the filter out of the display.
5. Remove residual dust	Vacuum away any dust around the fan and filter supports.
6. Install new filter	Install a new filter with the arrow on the top edge up and pointed toward the optical assembly (front of display).
7. Replace the screen or lamp access cover	
8. Check for airflow	Switch on the unit and check for proper airflow by holding a piece of paper near the airflow exhaust at the rear of the unit.

Cleaning the Screen

To clean smudges from the screen, use a soft cloth and a non-abrasive, non-hydrocarbon cleaner. Use a good quality optical cleaning solution and lint-free paper wipes.

Cleaning the Mirrors

The WN-5220-S's optical mirrors can become dusty in normal operation, particularly if the operating environment is dusty. When the WN-5220-S is serviced, these mirrors may also accumulate accidental smudges and fingerprints. Dust and smudges on the mirrors can seriously degrade the WN-5220-S's performance, so these should be removed as soon as possible.

Because the mirrors are front surface mirrors and the lens is coated, use care when attempting to clean them. They are easily scratched if improperly cleaned. Use an inert dry dusting gas or dry, filtered compressed air to remove dust from the mirrors. To remove smudges, use an optical quality liquid cleaner and a disposable commercial lens tissue. If the liquid is not a spray, apply it to the tissue first.

Troubleshooting

This section provides tips and strategies for resolving problems or issues you might encounter either during installation or in normal use of the display. Many problems can be rectified without the need for service by following the troubleshooting steps below.

If you are unable to resolve the problem by following the suggestions listed under the Failure Symptoms column, you will need to contact your service provider.

Power and Start-Up Problems

When AC power is applied to the unit by turning on the main AC power switch, the unit enters a 3-minute standby-delay sequence. During this time, the STBY lamp on the rear panel flashes and the Lamp and Fan lamps are off. Also during this time, the unit does not respond to remote or manual controls and alerts you that it is locked by giving 3 short beeps when you press a button on the remote control.

The unit enters the standby mode when the 3-minute standby delay is complete. This is shown when the STBY lamp comes steadily on. At this time the unit is ready to accept an "ON" command.

This is the sequence of events that must occur for a WN-5220-S to light the lamp and display an image.

Normal Power-Up Sequence	Sequence Note	Failure Symptoms At This Part Of The Sequence
1. Attach acceptable AC power to display	Verify that 115V/230V switch is set to the appropriate voltage!	
2. Turn on main power switch	The main power switch is located on the back of the display, next to the connector that the AC power cord plugs into.	
3. Electronics go into standby mode	STBY LED comes on for a few seconds and then flashes for 3 minutes *The status LED's are located on the rear connector panel*	STBY LED does not come on at all • Check the voltage at the wall outlet • Check fuse at AC plug on Power Supply Module • Contact your service provider STBY LED comes on and then goes out and stays out • Cover the IR window on the Electronics Module with a piece of opaque tape to determine if the problem is due to too many stray IR signals • Contact your service provider
4. VideoWall is in a ready state waiting for an ON command	STBY LED stays on solid LAMP and FAN LED's are off If Auto On is enabled in the Misc Control menu, the display will attempt to turn on automatically	
5. When the display receives an ON command the fans turn on and the lamp ignites	Buzzer will beep once Fan turns on FAN and LAMP LED's light STBY LED goes off The time that it takes for the lamp to fire is 2 seconds times the Monitor Unit ID setting on the rear connector panel	Electronics go back into standby-delay mode (the fans will run and the FAN LED will stay on while in this standby mode) Verify that the interlock switches are fully closing Contact your service provider The lamp doesn't ignite Verify that the lamp power connector is plugged in Replace the lamp. Contact your service provider All 3 LED's are on Press the POWER button on the connector panel or cycle power to the display Contact your service provider

Normal Power-Up Sequence	Sequence Note	Failure Symptoms At This Part Of The Sequence
6. The electronics turn on the LCD and start sending data to it	If there is video present on the selected source (see Source Select in menu), the video image will be displayed. If there is no video present, the message "SOURCE ABSENT" will be displayed. Menus can be accessed and settings saved and changed.	Menu can be selected, but no video is present • Make sure that the right source is selected in the menu • Verify that the Curtain option in the menu is not on • Check the video cable connections • Contact your service provider No menu or video can be displayed • Replace the remote batteries and/or remote • Contact your service provider

Much of the preliminary diagnostics can be done by observing the 3 LED's on the rear connector panel. Table 2 shows the LED combinations for the most likely failure modes if the WN-5220-S is not operating correctly.

Standby LED	Lamp LED	Fan LED	Indication
Flashing	Off	On	Normal operation or Interlocks open. See Note 1
Off	On	On	Normal operation or lamp problem. See Note 2
On	Off	Off	Display is in the STBY (standby) mode waiting for an ON command.

Table 2

Note 1 If the STBY LED is flashing and the Lamp LED is off, one of two conditions exist. Either the display was just shut down normally with the On/Off button or the unit has shut itself down and the likely cause is that the interlock circuit is open. The interlock circuit consists of switches on the front screen and rear lamp access panel. These prevent accidental exposure to the lamp when it is turned on. Verify that the screen and rear lamp access doors are in place. If the problem persists, contact your service provider.

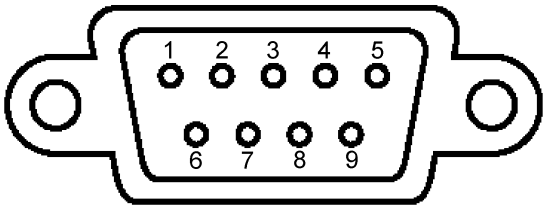
Note 2 If the STBY LED is off, the Lamp LED is on, the Fan LED is on and the lamp is not lit, the electronics module is operating and the likely problem is with the lamp or it's power system. If replacing the lamp and restarting the WN-5220-S does not resolve the problem, contact your service provider.

Image Problems

Symptom	Follow these steps in order. Check the operation of the display after each step.
Image is dim	1. Verify that the display has adequate ventilation and that the fans are working 2. Verify that the input signal is good 3. Adjust the Black Level via the menu while displaying a black video image and the White Level while displaying a white video image and set each of the colors in the Color Balance menu to 31 4. Replace the lamp 5. Check the light path for obstructions 6. Contact your service provider
Lamp ignites, but – • **No image** • **Screen is all black or all white** • **Image has an abnormally strong hue of a single color**	1. Verify that the correct source is selected in the Source Select menu 2. If the image has a strong green hue: Verify that Sync on green is selected in the source menu for sources that have sync on the green channel. 3. Verify that the input signal is good. *PC or MAC* – video card is outputting 800x600 or 640x480 pixels *RGBS Video* – video processor settings are properly set 4. Verify that Curtain in the menu is off by pressing the Curtain button on the remote. 5. Adjust the White Level and Black Level in the menu 6. Contact your service provider
Displayed image is too small or too large	1. Make sure that the processor driving the display is scaling the video correctly 2. Adjust the Frequency setting in the menu 3. Make sure that the image is positioned correctly on the screen using the remote control 4. Contact your service provider
Active area of the image is not fully on the screen	1. Adjust image position with the remote 2. Contact your service provider

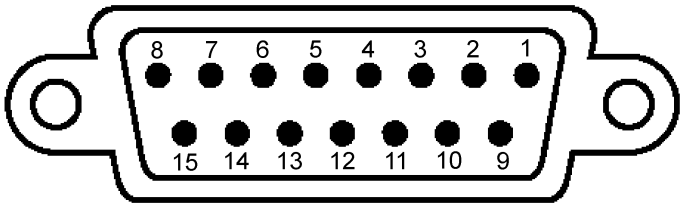
Connector Pinouts

RGBS



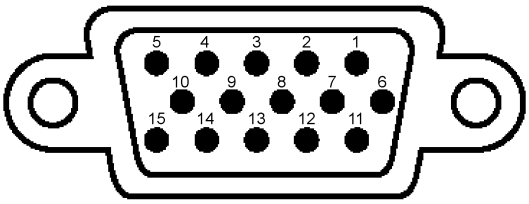
1. Red Video
2. Green Video
3. Blue Video
4. Composite Sync
5. Ground
6. Ground
7. Ground
8. Ground
9. Ground

MAC



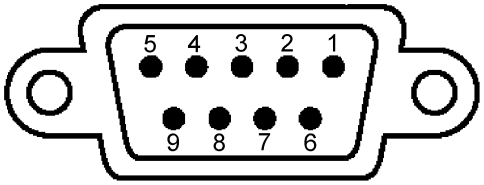
1. Ground
2. Red Video
3. Horizontal Sync
4. Ground
5. Green Video
6. Ground
7. No Connect
8. No Connect
9. Blue Video
10. No Connect
11. Ground
12. Vertical Sync
13. Ground
14. Ground
15. No Connect

PC



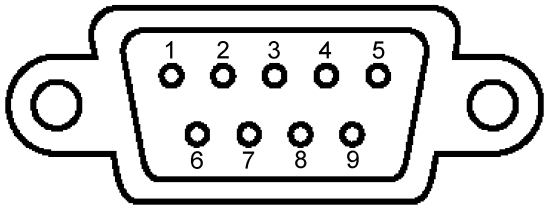
1. Red Video
2. Green Video
3. Blue Video
4. No Connect
5. No Connect
6. Ground
7. Ground
8. Ground
9. No Connect
10. Ground
11. No Connect
12. No Connect
13. Horizontal Sync
14. Vertical Sync
15. No Connect

RS-232 IN



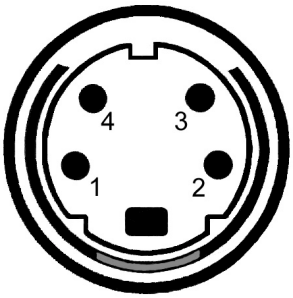
1. No Connect
2. Transmit Data (TXD)
3. Receive Data (RXD)
4. Connected to pins 6 and 8
5. Ground
6. Connected to pins 4 and 8
7. No Connect
8. Connected to pins 4 and 6
9. No Connect

RS-232 OUT



1. No Connect
2. Receive Data (RXD)
3. Transmit Data (TXD)
4. Connected to pins 6 and 8
5. Ground
6. Connected to pins 4 and 8
7. No Connect
8. Connected to pins 4 and 6
9. No Connect

S-VIDEO

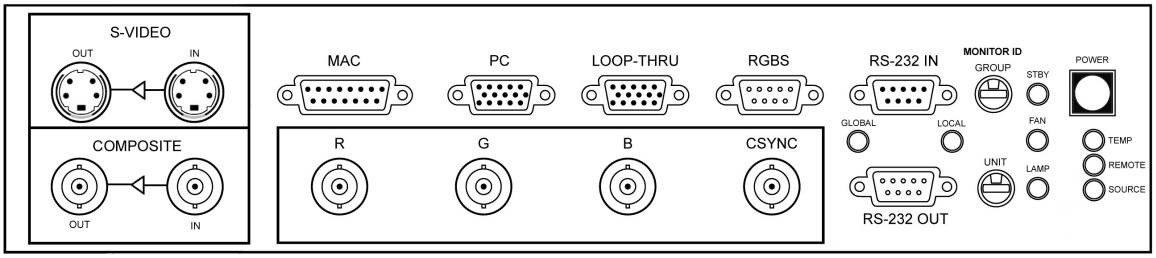


1. Ground
2. Ground
3. Y (Luma)
4. C (Chroma)

Interface and Controls

Rear Panel Indicators, Connectors and Controls

The rear panel of the WN-5220-S VideoWall is shown below.



The S-Video and Composite Video inputs are part of the VIM-300 option. If your units do not have this option, these connector ports will be empty.

Rear Panel Indicators

LED Indicators	Description
STBY	On steady when unit is in STBY mode and main electrical power is switched on. This LED blinks for 3 minutes when the main power is initially switched on or when the lamp is switched off to enter STBY mode. When blinking, the cooling fan is on, but the projection lamp cannot be turned on.
FAN	On during cooling fan operation. Remains on for 3-minute cool-down cycle after lamp is switched off.
LAMP	On during projection lamp operation.
TEMP	(Not functional in the WN-5220-S)
REMOTE	Indicates activity of the IR sensor. Stray Infrared radiation causes a faint glow and flicker. A signal from the Remote Control causes a 1/10th second flash.
Source	On = valid source detected. If this is off, either the wrong source is selected, or the source has no signal in it.

Local	Indicates valid *local* RS-232 command received, a command which will affect *this* unit (and any other with the same unit address, regardless of group) only. This LED flashes for only a very brief moment.
Global	Indicates valid *global* RS-232 command received, a command which will affect all the units, regardless of address. This LED flashes for only a very brief moment.

Rear Panel Connectors

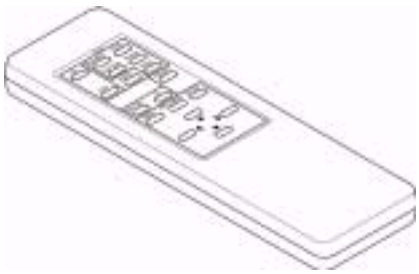
Connector	*Description*
MAC	Macintosh II video signal input, 800x600 or 640x480 pixels. 15-pin D-Sub, female.
PC	IBM-compatible SVGA or VGA signal input, 800x600 or 640x480 pixels. 15-pin high-density D-Sub, female.
LOOP THRU	The selected video input is output from this 15-pin, high-density, D-Sub, female connector (but see exception below). The format of the loop-thru video is same as the source video. PC and MAC will have RGB with separate H-Sync and V-Sync. RGBS IN with separate composite sync will come out the loop-thru as RGBS with the composite sync on the connector's H-Sync pin and separated V-Sync on the V-Sync pin. RGB Sync on Green sources will loop-thru as RGB-Sync on Green, plus composite sync on the H-Sync output pin and separated V-Sync on the V-Sync pin. Exception: If the selected input is Composite or S-Video, the Loop-thru connector has no output. Composite and S-Video have separate loop-thru connectors.
RGBS (9-pin D-Sub, male)	Video input from a 31.5 kHz device (such as scan-doubled NTSC video). 9-pin D-Sub, male input. This input is separate from the BNC RGBS input. Video can be cabled to both the 9-pin D-Sub and the BNC connectors and selected in the Source menu. With the VIM-300 option, this port will also accept component 15.75 kHz video. Sync can be composite sync on the S pin or sync-on-green. This is also the input to use when coming from the Loop-Thru connector of another display unit.
RGBS (R, G, B, Csync; 4 BNC connectors)	Video input from a 31.5 kHz device (such as scan-doubled NTSC video). BNC, female connectors. This input is separate from the BNC RGBS input. Video can be cabled to both the 9-pin D-Sub and the BNC connectors and selected in the Source menu. With the VIM-300 option this port will also accept component 15.75 kHz video. Sync can be composite sync on the S connector or sync-on-green.
S-VIDEO	Only available with the VIM-300 option. IN = NTSC, PAL or SECAM S-Video OUT = buffered output of the input signal

Connector	*Description*
COMPOSITE	Only available with the VIM-300 option. IN = NTSC, PAL or SECAM composite video OUT = buffered output of the input signal
RS-232 IN	RS-232 control input from a direct computer link or looped from the RS-232 OUT of another display, when controlling multiple displays from one computer. 9-pin D-Sub, female.
RS-232 OUT	RS-232 control output connects to the RS-232 IN on another display, when controlling multiple displays from one computer. 9-pin D-Sub, male.

Rear Panel Controls

Control	*Description*
MONITOR ID	16-position rotary switches select a unique Monitor ID number for each unit in a video wall configuration. The two switches have a total number of 256 individual Monitor ID settings. **GROUP** - ID numbers are 0 – 9 and A – F for a total of 16 different settings. Each number is equal to that number times 16. A setting of 3 is equal to 48. **UNIT** - ID numbers are 0 – 9 and A – F for a total of 16 different settings. Each number is equal to that number times one. A setting of 3 equals 3, a setting of B equals 11. The Monitor ID number is the combination of the Group ID plus the Unit ID. A Group ID number of 2 and a Unit ID number of 5 equals a Monitor ID of 37. This setting also delays the time between an "on" command to the display and the ignition of the lamp. The delay is approximately 2 seconds times the Monitor Unit ID number.
POWER	Power On/STBY push-button switch. Controls power to the lamp and fans by toggling unit between ON and STBY modes.
Power On/Off	Rocker switch near the A/C power input connector. Main AC power switch.

Remote Control



Use the remote control or RS-232 input for all setup and control functions.

The remote must be pointed directly at the display's screen when the remote is used to access the items in the menu. The most reliable position for control of the display is on an axis perpendicular to the front of the screen.

The farther away that the remote control is from the display, the weaker the signal will be that reaches the screen. The weaker the signal, the less reliable the control of the display will be. The remote is powered by two 1.5 volt AAA batteries.

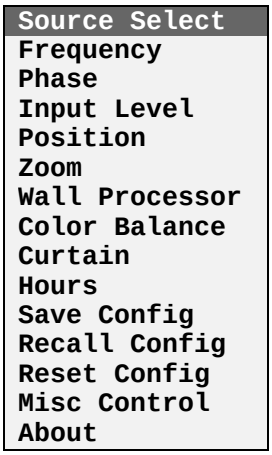
Remote Control Functions

Some on-screen sub-menus can be accessed directly by pressing the specific menu item's associated button on the remote control.

Remote Button	***Description***
On	If the main power breaker on the rear is on, and the 3-minute delay period has been completed so the STBY LED is on and *not* blinking, this button turns on the lamp.
Off	Turns the lamp off immediately. The fan will remain on for 3 more minutes. The lamp may not be turned on again until this 3-minute period is finished.
Source	Displays the Source Select menu, from which the type of input source, PC, MAC, and RGBS 31.5 kHz video. With the VIM-300 option, RGBS 15.75 kHz video, Composite video and S-Video may be selected.
Curtain	Toggles between the selected video and a black screen.
Level	Displays the Input Level menu, where input levels for black and white are set. These can be set automatically.
Phase	Displays the Phase Select menu, for synchronizing the WN-5220-S internal clock to the clock phase of the incoming signal.
Freq	Displays the Frequency Select menu, for matching internal clock frequency to source frequency (for computer sources) and for adjusting horizontal width for video sources.
Color	Displays the Color Balance menu, which allows color and luminance matching among the several WN-5220-S displays in a video wall.
Reset	Displays the Reset Menu. From here, you can reset some or all sources and modes to factory default settings. This does *not* affect the Saved settings unless you Reset, then Save.

Remote Button	*Description*
Mon Sel	Allows you to disable or enable the control of this display with the remote control. This is useful when configuring multiple displays in a video wall, to prevent remote adjustments on all units except one. Also prevents interference of the from strong ambient sources of IR radiation.
ID	Displays current setting of the Monitor ID switches. Group numbers are 0-F (0 – 15) and Unit numbers are also 0-F (0 – 15), giving a total addressable range of 256. In a video wall, all units should have the same Group number and different Unit numbers.
Menu	Displays the Main Menu, from which all other functions may be selected and set by navigating with the arrow keys. The following items in the Main Menu are also available from dedicated buttons, providing shortcuts to the most commonly used functions: Source, Curtain, Level, Phase, Freq, Color, Reset. (If the Main Menu is visible, pressing Menu again closes it.)
Prev Menu	Closes the current menu and moves the cursor to the parent menu.
Enter	Accepts the current menu selections, or opens the selected sub-menu.
Up/Down arrow buttons	Navigate through the menus. The up/down arrows move up and down a menu. They never make a selection. Use Enter or the Left/Right keys to make selections. The only menu in which Up/down does not move you to a new menu item is in Positioning.
Left/Right arrow buttons	The Left/Right arrows are used to make choices from multi-choice menus, such as Mode and Source Select. They do *not* navigate through the menus. Use the Up/Down arrows to navigate, even for items in two columns, such as those found in the Color menu.

On-Screen Menus



The main menu can be accessed by pressing the MENU button, and each sub-menu can be selected by scrolling to it with the Up/Down arrow keys and then pressing the ENTER button.

Menu Selection	***Description***
Source Select	Selects the type of input source: PC, Mac, 31.5K Video, 15.75K Video, Composite Video and S-Video. Note – The VIM-300 option adds component 15.75 kHz Video compatibility and adds Composite and S-Video compatibility.
Frequency	Displays the Frequency Select menu, for matching internal clock to source and adjusting horizontal width.
Phase	Displays Phase Select menu, used to synchronize the display's internal system clock to the clock phase of the incoming signal.
Input Level	Displays the Input Level menu, where input levels for red, green, and blue are set. Has automatic calibration for white and black levels. With Composite or S-Video selected (VIM-300 only) a different menu will appear that controls Brightness, Contrast, Saturation and Hue. ***Note – The Black Level must be set before the White Level is set!***
Position	Adjusts the horizontal and vertical position of the image.
Zoom	Optimizes the image size by making it larger or smaller. Requires the VIM-300 option. Scales the image in all four directions independently.
Wall Processor	Turns on and off the Wall mode for *this* unit. Sets the size of the wall. Displays the Unit number of *this* unit.
Color Balance	Displays the Color Balance menu, to allow color and luminance matching among multiple WN-5220-S units in a video wall.
Curtain	Displays a black screen instead of the input video.

Menu Selection	***Description***
Hours	Displays Lamp Hours and System Hours menu. The projection lamp should be changed when it accumulates 3,000 operating hours and the Lamp Hours reset.
Save Config	Saves configuration for each video-input source. After saving, the WN-5220-S may be turned off and on without erasing the settings. Settings may be saved for all sources, or only for some selected sources.
Recall Config	Recalls previous user-saved configuration settings. Recall may be for all sources, or only for some selected sources.
Reset Config	Resets the display to factory default configuration settings and erases all previous user settings. Reset may be for all sources, or only for some selected sources.
Misc Control	Sharpness: With the Sharpness On box checked, computer graphics will look their clearest. When using composite or other motion video, un-checking the Sharpness On box will filter out some of the image artifacts and makes the image look its best. 16M Colors: Selects between 16 million and 256 thousand colors displayed. Buzzer Enable: Turns on or off the buzzer that sounds briefly for every Remote Control key press. Flip Horz: Flips the displayed video horizontally. Flip Vert: Flips the displayed video vertically. Auto Lamp On: After the standby timer elapses, the lamp will automatically turn on if this box is checked. Test Patterns: Displays a list of the internal test patterns available.
About	Clarity Visual Systems' address and phone number. It also displays the Firmware version.

RS-232 Control

Transmission Speed	9600 BAUD
Transmission Data	Data Length: 8, Stop Bit: 1, Parity Bit: None

No standard hardware or software pacing is used such as DTR/RTS or XON/XOFF. Commands should be paced using the ACK, NAK, UNK, or ERR responses from the display.

The display's RS-232 port is always active except during the boot process which is the first 10 seconds after power is applied to the display electronics.

In single address mode (not when global commands are being used) the host machine must wait for an ACK, NAK, UNK or ERR response from the display before sending the next command. When global commands are sent, the displays will not return a response, so a delay of ½ second should be maintained between commands to avoid possible errors.

The protocol for communication to the display consists of a 7 byte command line as described below.

STX(1 byte) **IDT**(2 byte) **CMD**(3 byte) **ETX**(1 byte)

Where;

ASCII STX - Start of transmission character, = 02h

Description	Abbreviation	Hex	Decimal	Character	Control
Start of Text	STX	02	2	☻	Ctrl- B

IDT - Monitor ID bytes are used to identify which display will receive the RS-232 command. This is a 2 byte address that is set by the Group and Unit Monitor ID knobs on the display's connector panel. Each knob has 16 possible settings with the Group setting the high byte and the Unit setting the low byte. The address consists of the ASCII Alphanumeric characters (0-9, A-F for the Group setting and

0-9, A-F for the Unit setting) providing the means to control up to 256 combinations (00 to FF).

Multiple units can be controlled simultaneously by using the ASCII character for the asterisk (*) in place of either or both of the IDT monitor ID bytes. The (*) is a wild card character and provides a means to control multiple units simultaneously. There are four types of addressing that are supported.

1. Single address mode – the entire address is specified: 00, 01, 02, A2, AA, FF are valid examples. Only the single display that matches this address responds to it. An acknowledgment is sent in this mode. Do not set multiple displays to the same address.
2. Group address mode – the group part of the address is specified, while the unit part of the address is not: 1*, 9*, A*, F* are valid examples. All displays that match the group respond to this addressing mode. No acknowledgment is sent in this mode. All displays must be set to a unique address.
3. Unit address mode – the unit part of the address is specified, while the group part of the address is set as global: *2, *9, *F are valid examples. All displays that match the unit respond to this addressing mode. No acknowledgment is sent in this mode. All displays must be set to a unique address.
4. Broadcast mode – both group and unit are "*". All displays respond to this address. No acknowledgment is sent in this mode.

All addressing is done in hex.

CMD - CMD is a 3 byte command character string. These command strings are shown in the table listing the RS-232 command codes.

ASCII ETX - End of transmission character, = 03h

Description	Abbreviation	Hex	Decimal	Character	Control
End of Text	ETX	03	3	❤	Ctrl- C

For example, to turn on a display with an address of 06 it would need to receive the following command:

☻06PON❤

RS-232 Control Items

Function	RS-232 COMMANDS		RS-232 DATA		Comments
System Controls	**Increment**	**Decrement**	**Get**	**Set**	
Power / Stand by	PON	POF	PO*		X=Lockout, F=Stby, N=On
PC Input Select			IN*	IN1	
MACII Input Select			IN*	IN2	
31.5K Video Input Select			IN*	IN3	
15.75K Video Input Select			IN*	IN4	
Composite Video Input Select			IN*	IN5	
S-Video Input Select			IN*	IN6	
Curtain	CON	COF	CO*		
Buzzer	BON	BOF	BO*		
Hours Menu Display	LHR				
Read Lamp Hours, Low Byte			LL$		
Read Lamp Hours, High Byte			LH$		
Lamp Hour Reset	LRS				
Read Total Hours, Low Byte			TL$		
Read Total Hours, High Byte			TH$		
Monitor ID Menu Display	MID				
IR Remote Enable/Disable	ION	IOF	IO*		
Save PC				SA1	
Save MACII				SA2	
Save 31.5K Video				SA3	
Save 15.75K Video				SA4	
Save Composite Video				SA5	
Save S-Video				SA6	
Recall PC				RC1	
Recall MACII				RC2	
Recall 31.5K Video				RC3	
Recall 15.75K Video				RC4	
Recall Composite Video				RC5	
Recall S-Video				RC6	
Reset PC				RS1	
Reset MACII				RS2	
Reset 31.5K Video				RS3	
Reset 15.75K Video				RS4	
Reset Composite Video				RS5	
Reset S-Video				RS6	
Clear Display Menu's	CLM				Clears all menu's with one command
Input Level / Setup Controls					
Input Level White Menu Display	LVW				
Input Level Black Menu Display	LVB				
Input Level Adjust ALL	LAU	LAD		IA#	
Input Level Adjust Red (Fine)	LRU	LRD	LR$	IR#	IR works on fine adjust
Input Level Adjust Green (Fine)	LGU	LGD	LG$	IG#	IG works on fine adjust
Input Level Adjust Blue (Fine)	LBU	LBD	LB$	IB#	IB works on fine adjust
Input Level Adjust Red (Coarse)			L1$	JR#	JR works on coarse
Input Level Adjust Green (Coarse)			L2$	JG#	JG works on coarse
Input Level Adjust Blue (Coarse)			L3$	JB#	JB works on coarse
Input Level Data Red			DR$		
Input Level Data Green			DG$		
Input Level Data Blue			DB$		

Function	RS-232 COMMANDS		RS-232 DATA		Comments
System Controls	**Increment**	**Decrement**	**Get**	**Set**	
Auto White Input Level Adjust	AWL				
Auto Black Input Level Adjust	ABL				
Input Level Adjust ALL	OAU	OAD		QA#	
Input Offset Adjust Red	ORU	ORD	OR$	QR#	
Input Offset Adjust Green	OGU	OGD	OG$	QG#	
Input Offset Adjust Blue	OBU	OBD	OB$	QB#	
Frequency Adjust	FRU	FRD	FR$	FW#	
Phase Adjust	PHU	PHD	PR$	PW#	
Sharpness	SON	SOF	SO*		
256k Colors	CLO		CL*		Responds with “0” for 256k
16M Colors	CHI		“		Responds with “1” for 16M
H-Position Right	HPR		HR$	HW#	
H-Position Left	HPL				
V-Position Up	VPU		VR$	VW#	
V-Position Down	VPD				
Decoder Controls					
Brightness	D1U	D1D	D1$	E1#	
Contrast	D2U	D2D	D2$	E2#	
Saturation	D3U	D3D	D3$	E3#	
Hue	D4U	D4D	D4$	E4#	
Monitor Setup / Control					
Color Balance Menu Display	BAL				
Red Color Balance Adjust	BRU	BRD	BR$	CR#	
Green Color Balance Adjust	BGU	BGD	BG$	CG#	
Blue Color Balance Adjust	BBU	BBD	BB$	CB#	
Gamma Control	GON	GOF	GO*		
Test Signal Controls					
Test Signal Disable (Pass Video)	TSD		TS*		TSD Will Clear All Color Registers
Test Signal - White Field	WHT				
Test Signal - 50% Gray Field	GRY				
Test Signal - Black Field	BLK				
Test Signal - Red Field	RED				
Test Signal - Green Field	GRN				
Test Signal - Blue Field	BLU				
Test Signal - Geometry Pattern	GEO				
Test Signal - Data Red				TR#	
Test Signal - Data Green				TG#	
Test Signal - Data Blue				TB#	
H- Image Control 0 (H-No Flip)	HF0		HF*		
H- Image Control 1 (H-Flip)	HF1		“		
V- Image Control 0 (V- No Flip)	VF0		VF*		
V- Image Control 1 (V-Flip)	VF1		“		
ACK/NAK					
Received Valid Command (1)	ACK				
Received Invalid Command	NAK				

Notes:

- (*) Indicates an ASCII character is returned from the cube in this location.
- ($) Indicates 8-bit data is returned from the cube in this location
- (#) Indicates 8-bit data is transmitted to the cube in this location
- (1) ACK or NCK will be transmitted following the video cube receiving a non-global instruction. For commands which request data transmitted back the transmitted response will be the acknowledge.

Specifications

Environmental

Specification	Units	Maximum	Minimum	Typical	Notes
Temperature (operating)	Deg. C	35	0		All performance specifications are maintained within this temperature range
Non operating	Deg. C	60	-10		
Shock	Inches	8			Drop onto hard floor, bottom surface (packaged product)
Altitude	Feet	10,000			
Humidity	% R.H.	80	20		≤40°C Non-condensing

Picture Control

Specification	Units	Maximum	Minimum	Typical	Notes
User controls					
Input gain		2x	0.5x		
RGB Gain	# of levels			±64	For white color balance. Each level individually gamma corrected.
Position	# of pixels			±64	Both H and V
Fan timeout in standby	Minutes			3	
Lamp restart time	Minutes			3	
Lamp start incremental delay	Seconds			Monitor Unit ID # x 2	Sequential start to avoid power sag
IR remote				Infrared	Allows control over all user adjustments
Serial I/F					RS-232 control for all user adjustments

Optical

Specification	Units	Maximum	Minimum	Typical	Notes
Viewable screen size	Inches				
Diagonal				51.71	
Width				41.40	
Height				30.99	
Image position	Pixels	-1	+1	0	Deviation of center pixel
Rotation	Pixels	-1	+1	0	Slope displacement over image length
Pincushion/Barrel	Pixels	-2	+2	0	Deviation at center of edges
Keystoning	Pixels	-2	+2	0	Slope displacement over image length
Focus/Aberration	Inches				Maximum spot size
Center		0.072			
Halfway		0.098			
Corner		0.130			
Screen					
Type					Two-part composite screen composed of a front vertical black stripe lenticular and a main element fresnel lens.
Gain				3.85	±10% nominal
Brightness					
ANSI white	fL.		110	150	Using ANSI 9 point avg. at optimum viewing angle
Center to edge non-uniformity	Percent	40			Using ANSI 9 point (1-[min./max.])
Viewing angle	Degrees				Optimum viewing angle at normal axis
Horizontal half-gain			27	34	
Vertical half-gain			8.2	10	
Contrast ratio	Ratio		100:1		Dark room measurement, ANSI 16 point
Color Temperature	Deg. K			6000	
White color matching	CIE xy				Relative to any other display via RGB color balance
	x			± 0.02	
	y			± 0.02	
Luminance matching	Percent	10			Relative to any other display after calibration
Gamma				2.2	

Optical (Cont.)

Specification	Units	Maximum	Minimum	Typical	Notes
Resolution	Color Pixels				
Horizontal				800	
Vertical				600	
Color				16 million	
Bright dots		12			Green/red/blue dots appear bright in a dark field.
Black dots		10			Dots appear black in a white field.
Chromatic aberration	Inches	0.10			
Lamp type					Metal halide
Lamp life	Hours			3000	

Mechanical

Specification	Units	Maximum	Minimum	Typical	Notes
Outside dimensions	Inches				
Width				41.67	±0.0625
Height				40.54	±0.0625
Depth				28.58	±0.0625
Weight	Lbs.			120	
Shipping weight				214 Lbs.	
Stacking	Units	4			Vertical plane, stabilization required when stacked 3 or more.
Chassis color				Black	
Ventilation	Inches		6		To the rear of the display
Screen size	Inches				Including mullion
Diagonal				52.16	
Width				41.72	
Height				31.31	
Mullion	Inches	0.170	.150	.160	From edge of viewing area to edge of display.
Noise	Decibels			49	

Electrical

Specification	Units	Maximum	Minimum	Typical	Notes
Video input amplitude	V p-p				
Separate RGB analog		1.4	0.35	0.7	75Ω termination
Composite sync	V p-p	5.0		0.3	75Ω termination
Input connectors					
BNC (row of 4 connectors)					31.5/15.75 kHz video input, RGBS
9-pin D-Sub (female)					31.5/15.75 kHz video input, RGBS
HD D-Sub 15 female					Computer input, (PC, SVGA / VGA)
D-Sub 15 Female					Computer input, (MAC II)
9-pin D-Sub (female)					RS-232 input
Optional Decoder Input Connectors					
BNC					Composite Video In
4-Pin Mini DIN					S-Video In
Output connectors					
9-pin D-sub (male)					RS-232 output
15-pin HD D-sub, female					Video loop through
Optional Decoder Output Connectors					
BNC					Composite Video Out
4-Pin Mini DIN					S-Video Out
Frequency					
Dot clock	MHz	56			
Horizontal frequency	kHz	48	15	38	
Vertical frequency	Hz	85	50	60	
Sync lock					Will not lose sync lock with signal inputs within stated frequency range.
Maximum input DC offset	Volts	±2			
Total pixels per line	Pixels	1120	768		800 displayed
Active vertical lines	# of HS	860	500		600 displayed
Low-pass bandwidth filter	MHz			10	Selectable via remote control
Voltage requirements	Volts AC				
Line input (Range 1)		130	90		@ 50/60Hz
Line input (Range 2)		260	180		@ 50/60Hz
Current Draw	Amps AC			9.2	@100 Volts
	Amps AC			8	@115 Volts
	Amps AC			4	@ 230 Volts

Specification	Units	Maximum	Minimum	Typical	Notes
Total power requirements	Watts			920	

Regulatory Information

Declaration of Conformity

Manufacturer's Name:	Clarity Visual Systems
Manufacturer's Address:	9025 SW Hillman Court, Suite 3122 Wilsonville, Oregon 97070

declares that the product

Model Number:	WV-5220-S (LCD projector)
Product Options:	All

conforms to the following Product Specifications:

Safety:	EN 60950 — Safety of IT Equipment		
EMC:	EN 55022 — Emissions from IT Equipment		
	EN 55082-1 — General Immunity Standard,		
	including:	IEC 801-2	ESD
		IEC 801-3	Radiated E Field
		IEC 801-4	Fast transients

FCC Regulations

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in an installation. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate receiving antenna.
- Increase separation between equipment and receiver.
- Connect equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult your dealer or an experienced radio/TV technician.

Note: Any changes or modifications to the display not expressly approved by Clarity Visual could void the user's authority to operate this equipment.

Use of a shielded interface cable is required to comply with the Class A limits of Part 15 of FCC rules.

Other Certifications

UL, CUL, TüV, CE

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