# clarity
### visual systems

# 52" VideoWall Display
## WN-5220-V

User's
Guide

*clarity*
**visual systems**

# 52" VideoWall Display

**WN-5220-V**

## User's Guide

070-0002-07

**<u>LIMITED WARRANTY</u>**.  Clarity warrants to Buyer that the WN-5220-V (the "Product"), if properly used and serviced, will perform substantially in accordance with the product data sheet and users manual, and will be free from defects in material and workmanship for 1 year following date of shipment.  This warranty does not apply to lamps (see following section for lamp warranty) and other consumable parts.

The main illumination lamp is considered a consumable, and is warranted against failure for the first 3000 hours of usage, or 125 calendar days, whichever occurs first.  The replacement of other consumable parts are the Buyer's responsibility.

If any Product fails to conform to the written warranty, Clarity's exclusive liability and Buyer's exclusive remedy will be, at Clarity's option, to repair, replace or credit Buyer's account with an amount equal to the price paid for any such defective Product returned by Buyer during the warranty period, provided that:  (a) Buyer promptly notifies Clarity in writing that such Product failed to conform, furnishes an explanation of any alleged deficiency and obtains from Clarity a return authorization; and (b) Clarity is satisfied that claimed deficiencies actually exist and were not caused by accident, misuse, neglect, alteration, improper installation, repair or improper testing.  Clarity will have a reasonable time to make repairs, to replace Products or to credit Buyer's account.

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# *Table of Contents*

# *Product Introduction*

## *Introduction*

Clarity's VideoWall series of displays is the first liquid crystal display (LCD) projection systems specifically designed to meet the diverse needs of video wall, kiosk and dynamic signage applications.  Using the latest developments in LCD technology, Clarity's displays are custom designed to fulfill the needs of each specific application.  Our displays deliver the unique physical design and unsurpassed image quality that provides greater customer satisfaction.

## *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 640x480 pixels
- 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")
- consistent colors displayed on adjacent modules
- no convergence requirements
- no color drifting
- easy to service
- fast and easy setup

**Other Features**
- direct compatibility with a wide range of video and computer data sources: 640x480 VGA, MAC II and 31.5 kHz line doubled RGBS video
- with the optional VIM-200 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 upgraded with several accessories.

❖ **VIM 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 source new 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.

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

❖ **SRT-100 Screen Removal Tool**
This tool makes it easy to remove the screen 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.

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-V VideoWall. There are a number of potentially dangerous areas inside the unit. These are identified with the following warning labels.

⚠️
**WARNING**

Hazardous voltage inside.
Can shock, burn
or cause death.

No user servicable parts
inside.
Refer all service to qualified
serviceman.

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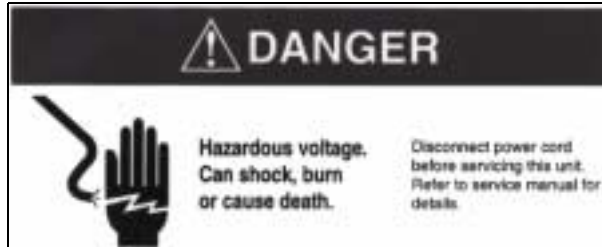
**⚠ DANGER**

Hazardous voltage. Can shock, burn or cause death.

Disconnect power cord before servicing this unit. Refer to service manual for details.

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

**⚠ DANGER**

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.

*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.*

**⚠ WARNING**

Hot surfaces near lamp. Skin burn hazard.

Wait more than 5 minutes for lamp housing to cool before replacing lamp assembly. See instructions manual.

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

**⚠ WARNING**

UV radiation from unprotected, operating bulb. Eye damage injury.

Do not disturb light path shielding from the bulb.

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

**⚠** *WARNING* Only the WN-5220-V lamp, air filter, and fuse are user serviceable. *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-V.

**⚠** *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-V's lamp assembly cool *for 5 minutes* before touching or replacing the lamp assembly.

**⚠** *WARNING* The WN-5220-V 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-V with any access panels or the front screen removed from the unit, except for servicing. Operating the WN-5220-V 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-V.

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

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

**CAUTION**  Where several WN-5220-V VideoWall displays are combined vertically, installation of the top level requires a minimum of 16 inches of clearance in order to position and fasten the VideoWall 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 WN-5220-V VideoWall. The WN-5220-V VideoWall installation should be positioned away from lighting to prevent heat buildup.

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

# *Installation*

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

The following table shows installation specifications for common WN-5220-V VideoWall wall configurations.

| Height x Width | 1x1 | 1x2 | 2x2 | 2x3 | 3x3 | 3x4 | 4x4 |
|---|---|---|---|---|---|---|---|
| Number of display units | Single | 2 displays | 4 displays | 6 displays | 9 displays | 12 displays | 16 displays |
| Screen Height, inches | 30.9 | 30.9 | 61.8 | 61.8 | 92.7 | 92.7 | 123.6 |
| 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-V VideoWall.

**Power Consumption**

Power consumption of the WN-5220-V VideoWall is 920 Watts, or approximately 8 Amps current draw at 115 VAC (4 Amps at 230 VAC). The WN-5220-V VideoWall 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-V VideoWall is set via a switch on the power supply near the AC power plug and on/off switch. Operation of the VideoWall 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-V 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-V displays may be installed. This allows an extra current margin. If any circuit used to power one or more WN-5220-V VideoWalls 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-V VideoWall. 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-V VideoWall 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-V VideoWall. VideoWalls 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-V VideoWall. Minimize the VideoWall's exposure to heating ducts, radiators, or other external heat sources.

## Flooring

A single WN-5220-V VideoWall unit weighs approximately 120 lbs (55 kg). Before installing the WN-5220-V VideoWall, 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 VideoWalls and other equipment used in the installation. Take special care when installing a WN-5220-V VideoWall 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-V VideoWalls 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-V VideoWall. 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 VideoWall is 6 inches. The minimum required clearance to the top at the front of the unit is 6 inches. See Environmental Specifications on page 67 for cooling requirements.

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

## *Unpacking and Setup*

Follow these steps to unpack the WN-5220-V VideoWall.

| |
|---|
| 1.  Check the shipping carton for external damage. Notify the shipper immediately if you find external damage. |
| 2.  Cut the binding straps and open the shipping carton top cover. |
| 3.  Remove the accessories box (packed on top of the VideoWall), packing material, and the four corner protectors. |
| 4.  Lift (**do not cut**) the cardboard surround sleeve from the unit and set it aside.  If the cardboard is cut, the screen may be damaged. |
| 5.  Remove the protective plastic wrap. |
| 6.  Check for visible damage and if there is none, lift the VideoWall from the pallet. |
| 7.  Verify that all items listed on the contents sheet packed with the unit are present. |

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

## Mechanical Setup

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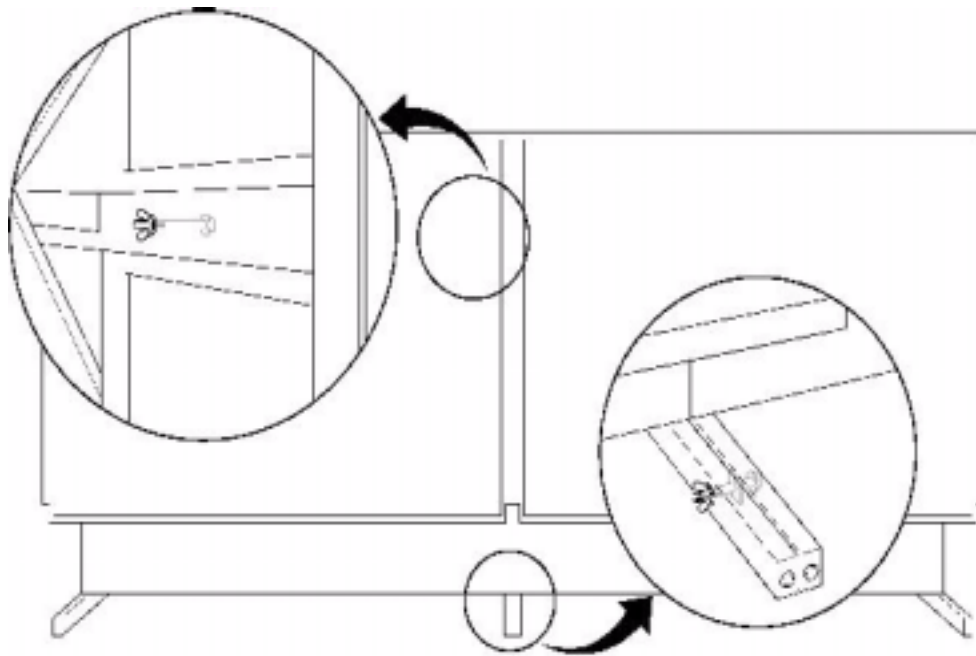


**Figure 1**

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

| | | |
|---|---|---|
| 1. | Remove the screen from each unit to be used in the video wall. | Keep each screen with it's unit. See Screen on page 45. Place the screen where it will not be damaged. |
| 2. | Build the video wall. | Build on a level floor strong enough to hold the weight of the finished assembly. See Flooring on page 9 for weight information |
| 3. | Assemble the lower row first. | Line up the legs 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-V. |
| 4. | Stack the next higher row. | Sliding the legs of each VideoWall into the mating sockets of the VideoWall in the first (lower) row. |
| 5. | Insert a supplied | Insert a bolt through the hole in side wall of the lower unit |

| | | |
|---|---|---|
| fastener. | into each leg of the unit above. Tighten a nut on this bolt to lock the units together. See **Figure 1 above.** | |
| 6. **Continue with subsequent rows of VideoWalls** | Lock each VideoWall to the adjacent VideoWalls after the row above it (if any) has been installed. | |
| 7. **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. | |
| 8. **Check** | Check that all VideoWalls in the video wall are locked together. | |
| 9. **Reinstall screens** | Reinstall each VideoWall's screen. | |

## Cables

Video connections from the signal source to the WN-5220-V VideoWall depend on the type of signal supplied by the source. The compatible video inputs are; 640x480 VGA, Mac II and 31.5 kHz RGBS Video.  With the optional VIM line-Doubler/Scaler card 15.75 kHz RGBS Video is recognized and with the optional VIM decoder card 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 VideoWall.  The format of the Loop-thru video is same as the source video.  VGA and MAC II 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.  VideoWall displays with the optional VIM-200 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 VideoWall via the RS-232 In connection, and is supplied to an adjacent VideoWall (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 VideoWalls 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 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 VideoWall 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
Color Balance
Curtain
Hours
Save Config
Recall Config
Reset Config
Misc Control
About
```

```
Source Select

 [X]  VGA
 [ ]  MAC II
 [ ]  31.5K Video
 [ ]  15.75K Video
 [ ]  Comp Video
 [ ]  S-Video
```

*(The menu with the VIM-200 option installed is pictured here.)*

After the displays are all turned on, use this procedure to select the correct source.

| | | |
|---|---|---|
| 1. | **Press the remote control SOURCE button** | The Source Select menu is displayed. |
| 2. | **Press the Up/Down arrow keys** | Select the type of input source: VGA, Mac II, 31.5K Video, 15.75K Video, Composite Video and S-Video. *Note – The VIM Line Doubler/Scaler card adds 15.75 kHz Video compatibility. The VIM decoder card adds Composite and S-Video compatibility.* |
| | | *If RGBS is the source and the format is Sync on Green, go to the Misc Control Menu and select the Sync on Green option.* |

### Adjust the Black Input Level - *VGA, MAC II or RGBS Video*

*(This does not apply to Composite or S-Video sources – see Comp Video/S-Video Level Adjustment on page 19.)*

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

```
Input Level

    White Level
    Black Level
```

```
        Black Level
   (Requires black field)

    Auto     [ ]
    All      < >

             Level   Sample
    Red       10       0
    Green     10       0
    Blue      10       0
```

Adjusting the input levels allows the VideoWall 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 prior to adjusting the input white level!

| 1. | Display an all-black image from the signal source | Examples of all-black sources are a black PC Paint screen or a frame 50882 on Reference Recordings, "A Video Standard" test disk. |
|---|---|---|
| 2. | Press the remote control LEVEL button | The Input Level menu is displayed. |

| | |
|---|---|
| 3.  Press the Up/Down arrow keys | Select Black Level. |
| 4. Press the ENTER button | The Black  Level  menu is displayed. |
| 5. Press the Up/Down arrow keys | Select Auto. |
| 6. Press the ENTER button | The black level is automatically adjusted. |
| 7. Press the  PREV  MENU button | Exit the Black Level menu. |

### *Adjust the White Input Level –* *VGA, MAC II or RGBS Video*

*(This does not apply to Composite or S-Video sources – see Comp Video/S-Video Level Adjustment on page 19.)*

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

```
Input Level

    White Level
    Black Level
```

```
        White Level
    (Requires white field)

    Auto     [ ]
    All      < >

             Level   Sample
    Red       128     255
    Green     128     255
    Blue      128     255
```

Adjusting the input levels allows the VideoWall 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 prior to adjusting the input white level!***

| | | |
|---|---|---|
| 1. | **Display an all-white image from the signal source** | Examples of all-white sources are a white PC Paint screen or frame 50823 on Reference Recordings, "A Video Standard" test disk. |
| 2. | **Press the remote control LEVEL button** | The Input Level menu is displayed. |
| 3. | **Press the Up/Down arrow keys** | Select White Level. |
| 4. | **Press the ENTER button** | The White Level menu is displayed. |
| 5. | **Press the Up/Down arrow keys** | Select Auto. |
| 6. | **Press the ENTER button** | The white level is automatically adjusted. |
| 7. | **Press the PREV MENU button** | Exit the White Level menu. |

*Comp Video/S-Video Level Adjustment*

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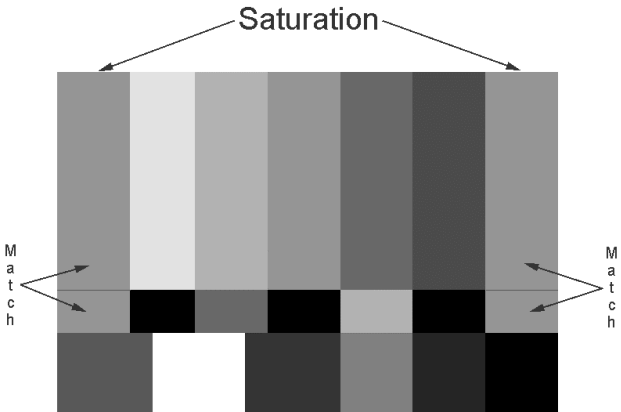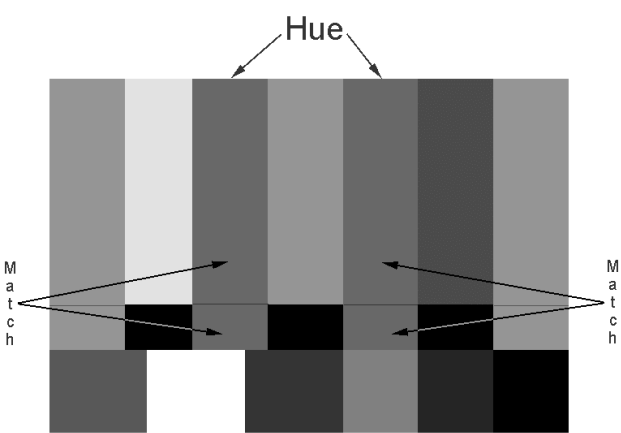
```
Video Controls

Brightness    128
Contrast      128
Saturation    128
Hue           128
Blue Only     [ ]

Sample
R:010 G:008 B:149
```

This menu selection is only available on VideoWalls with the VIM-200 option installed and the source selected is Comp Video or S-Video. It is not available when VGA, MAC II 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** | 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 the initial Sample values 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 that goes above 001 reaches 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 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 that goes below 254 reaches 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 and press the ENTER button 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 white and blue color bars most closely match the inverted color bar below each of them. |
|---|---|
| |  |
| 9. **Adjust Hue** | Adjust Hue up or down until the large cyan and magenta color bars most closely match the inverted color bar below each of 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.)*

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

```
Frequency Select

    096
```

## For RGBS Video Applications

Use the remote control FREQ button to adjust the image's horizontal width.

| 11. Press the remote control FREQ button | Displays the Frequency Select menu.  Observe the horizontal width of the image. |
|---|---|
| 12. Press the Left/Right arrow keys | Expand or contract the horizontal image size. |

## For Computer Applications

Use the FREQ button to match the internal sampling clock of the VideoWall with incoming video data.

| 1. Display an image containing many on/off transitions | A large checkerboard pattern works best, such as a common fill pattern with Paintbrush.  With Sharpness enabled, if the FREQ setting does not match the input source, you will see large vertical bands in the fill pattern. |
|---|---|
| 2. Press the remote control FREQ button | The FREQ adjustment menu is displayed. |

| | | |
|---|---|---|
| 3. | Press the left/right arrow keys | When you have found the proper setting, the vertical bands will disappear. |
| 4. | Press PREV MENU | Exit the FREQ menu. |

## *Adjust the Phase*

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

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

```
Phase Select

    028
```

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. |
| 3. | Press PREV MENU | Exit the PHASE menu. |

*Set the Sharpness*

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

```
   Misc Control

[X] Sharpness
[X] 16M Colors
[X] Buzzer Enable
[ ] Flip Horz
[ ] Flip Vert
[ ] Auto Lamp On
[ ] 525/625 Lines
[ ] Sync on Green
```

*(Misc Control menu shown with the VIM-200 option installed)*

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

| | | |
|---|---|---|
| 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*

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

```
Video Position
        ↑
    ←       →
        ↓
```
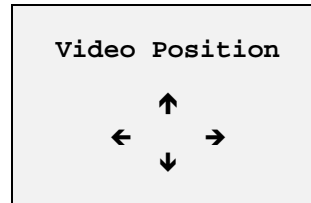
Use the arrow keys to adjust the position of the image on each VideoWall.

| 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. |

### *Scale the Image*

*This feature is only enabled with the VIM Line Doubler/Scaler option installed.*

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

```
            Zoom Factor

              -      +
    Left      ←      →     W:0640
   Right      ←      →
     Top      ←      →     H:0480
  Bottom      ←      →

    [ ] Lock
    [ ] Default
```

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

| | | |
|---|---|---|
| 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 Video Position menu. |
| 4. | Scale the image | Select an edge of the image that needs to be expanded or compressed (Left, Right, Up or Down)<br><br>Selecting the Lock feature causes the image to scale the same amount in both directions. If you scale the video on the right, the left will scale by the same amount.<br><br>The Default feature scales the image back to 640 X 480 pixels. |

## *Step 3 - Adjust the Colors*

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

```
Color Balance
         Wht  Gry
All      < >  < >
Red      031  007
Green    031  007
Blue     031  007
```

To adjust the colors, first match the luminance (brightness) and the color of white.  Do this for each one of the displays.  Then match the intermediate shades of gray.

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, while 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.

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

| Color | Increase will: | Decrease will: |
|-------|----------------|----------------|
| All | Increase the luminance (brightness) | Decrease the luminance (brightness) |
| Red | Change white to reddish | Change white to cyanish (sky-blue colored) |
| Green | Change white to greenish | Change white to magentaish (purple colored) |
| Blue | Change white to bluish | Change white to yellowish |

**Note**: The input level <u>must</u> be adjusted before executing this procedure. The input level adjustment has a large effect on color. Also, the input level adjustment procedure must be executed for each source (that is, each processor, computer, etc. in the system) prior to proceeding with color balancing.

| | | |
|---|---|---|
| 1. | **Display an all-white image** | Examples of all-white sources are a white PC Paint screen or frame 50823 on Reference Recordings, "A Video Standard" test disk. |
| 2. | **Press the COLOR button on the remote control** | Displays the Color Balance menu. |
| 3. | **Maximize all settings** | Adjust the white settings so that all are at 031 and all gray settings are at 007. |
| 4. | **Identify the least-bright display in the system** | This display will serve as a baseline to which the other displays will be adjusted since it cannot be adjusted to be brighter. |
| 5. | **Luminance match the displays** | Beginning with the cubes adjacent to the baseline cube, adjust the ALL settings on the white levels to approximately match the luminance (brightness) of the least bright display. |
| 6. | **Color balance the displays – white mode** | 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 cube.<br><br>If a color appears to need to be increased, but that color is already up as high as it can go, then the other two colors may be reduced. |
| 7. | **Display a mid-level gray image** | Examples of mid-level gray sources are a 50% gray PC Paint screen or frame 50824 on Reference Recordings, "A Video Standard" test disk. |
| 8. | **Color balance the displays – 50% gray mode** | 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 baseline cube. |

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 to back off to fine tune.  This helps to give an intuitive feel for the process.

It is often helpful to iterate between the full white and gray fields and actual video images to fine tune the system.  Avoid making major changes when adjusting to video images, as this can throw off the white or gray balance.  Remember also that the input level adjustment has a large effect on color, and the input level adjustment procedure must be followed for each source prior to color balancing.

## *Step 4 - Save the Settings*

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

```
Save Configuration

[X] All Modes
[ ] VGA Mode
[ ] MAC II Mode
[ ] 31.5K Mode
[ ] 15.75K Mode
[ ] Comp Video
[ ] S-Video
```

*(Misc Control menu shown with the VIM-200 option installed)*

After all adjustments are made, save the settings.  There is a separate save location for each source listed in this menu.  After adjusting the VideoWall for a particular source, save the settings before configuring for another source.

| | | |
|---|---|---|
| 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 selection. |
| 3. | Press ENTER | The SAVE menu is displayed. |
| 4. | Press the left arrow key | Move the cursor to the YES selection. |
| 5. | Press ENTER | The current settings are saved, and will remain in effect even after the power is cycled. Save the settings for each display in the system. |

## Turning off the System

### Turn off the Lamp, Enter Standby Mode

The main power switch is left on and the units remain in standby mode until turned on again. Use the remote to turn off the lamp and enter standby mode.

| | |
|---|---|
| 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.<br><br>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 VideoWall 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 described on page 14 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 VideoWall. |

# *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.  Because Big Picture can be setup and saved for each video source, 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 earlier sections.<br><br>Use a source amplifier/splitter device or 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 earlier sections, adjust black and white levels for each display; set phase, frequency, and color balance the wall. |
| 4. **Disable wall mode** | Open the Wall Processor menu and make sure that the <u>Wall mode</u> feature at the bottom of the menu is *not* checked. |
| 5. **Reset Zoom** | Set the Zoom feature in the menu to the default width and height of 640x480. |
| 6. **Center the image** | Find the edges of the image using the arrow buttons in the Position menu to move the image.<br><br>Each screen frame mullion covers about 3 lines of the image and each button press in the Position menu moves the image one line at a time.  Move the image so that 3 lines on each side of the image are behind their respective mullions. |

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

```
              Wall Processor

     Wall Size:

             Horizontal: 002
               Vertical: 002
           Current Unit: 000

     Misc:

     [ ] Calc wall pos
     [ ] Wall mode
```

| 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 *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 *always* has the highest address. |

2x2 example ➔

| | |
|---|---|
| 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 <u>Calc wall pos</u> line and press the ENTER button. This calculates the position of the selected display within the image and puts the display into wall mode. The 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 Step 2 was 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. |

**If there are other video sources that will use Big Picture, go back to Step 2 and select that source. Then go through all the remaining steps.**

# Other Features and Adjustments

The following features and adjustments are available via the remote.

## Curtain

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

```
   Curtain Select

[ ] Curtain On
```

| 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 VideoWall to prevent the unit from unintended adjustment while adjusting adjacent unit. |
|----|-----------------------------|------------------------------------------------------------------------------------------------------------------------------|
| 2. | Press MON SEL again | Restores remote functions on the VideoWall. |

*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 that contains:

> Sharpness
> 16M / 256K Colors
> Buzzer Enable
> Horizontal Flip
> Vertical Flip
> Auto Lamp On
> 525/625 Lines
> Sync on Green

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

```
   Misc Control

[X] Sharpness
[X] 16M Colors
[X] Buzzer Enable
[ ] Flip Horz
[ ] Flip Vert
[ ] Auto Lamp On
[ ] 525/625 Lines
[ ] Sync on Green
```

| 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. |

### *525/625 Lines*

*(This is only functional with the optional VIM module installed.)*

| 1. Press the up/down arrow keys as required | Move the cursor to the 525/625 Lines selection. |
|---|---|
| 2. Press ENTER | When enabled, the VideoWall will display 625 line 50 Hz video correctly. When not enabled it will display 525 line 60 Hz video correctly. |

With Comp Video or S-Video selected, the correct line number is automatically selected.

### *Sync on Green*

| 1. Press the up/down arrow keys as required | Move the cursor to the Sync on Green selection. |
|---|---|
| 2. Press ENTER | When enabled, the VideoWall will decode the composite sync on green signals and properly display the image.<br><br>**This function only works with the RGBS 9-pin and BNC connections and not with the MAC II source.** |

## 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 VideoWall with the power supply switch on. The system hour timer cannot be reset. Lamp hours accrue when the VideoWall is running (FAN and LAMP LED's are on solid).

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

```
Lamp Hours:      0243
System Hours:    0886


Reset Lamp Hours?


 [ ] Yes    [X] No
```

| | | |
|---|---|---|
| 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. |

## *Recall a User Configuration*

Once settings have been saved for a video source, use this menu to recall a setting and override any unsaved changes to the display settings.

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

```
Recall Configuration

[X] All Modes
[ ] VGA Mode
[ ] MAC II Mode
[ ] 31.5K Mode
[ ] 15.75K Mode
[ ] Comp Video
[ ] S-Video
```

*(menu with the VIM-200 option installed is pictured here)*

| 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 Recall Config selection. |
| 3. | Press ENTER | The Recall Configuration menu is displayed. |
| 4. | Press up/down arrow keys | Use the arrow keys to select the last saved settings for the current source. |
| 5. | Press ENTER | Press the ENTER button to restore the last saved settings. |
| 6. | Press PREV MENU | Exit the Recall menu. |

### Reset to Factory Defaults

Resetting any of these modes will overwrite any user saved settings for that mode.  It restores all settings to the factory defaults.

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

```
Reset Configuration

[X] All Modes
[ ] VGA Mode
[ ] MAC II Mode
[ ] 31.5K Mode
[ ] 15.75K Mode
[ ] Comp Video
[ ] S-Video
```

*(The menu pictured here is with the VIM-200 option installed.)*

| | | |
|---|---|---|
| 1. | Press the MAIN MENU button on the remote. | The Main menu is displayed. |
| 2. | Press the up/down arrow keys as required. | Move the cursor to the Reset Config selection. |
| 3. | Press ENTER | The Reset  Configuration menu is displayed. |
| 4. | Press up/down arrow keys | Use the arrow keys to select the factory default settings for the current source. |
| 5. | Press ENTER | Press the ENTER button to restore the factory default settings for the current source. |
| 6. | Press PREV MENU | Exit the Reset menu. |

### *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 manufacuturing.)

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

```
Clarity Visual Systems
9025 SW Hillman Court
Suite 3122
Wilsonville, OR 97070
USA

Tel(503) 570-0700
Web www.ClarityVisual.com

Project: 573-0001-00
Version: Rev G
  Build: 0013
   Date: Mon, Aug 10, 1998
```

# Cleaning and Maintenance

Once the VideoWall is set up and adjusted, operation consists of selecting and displaying material, turning on and off the curtain, and switching the unit on and off. All other display effects are controlled by the input device.

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

## Screen

The WN-5220-V VideoWall contains electrical interlocks that prevent operation when the front screen is removed. Never operate the VideoWall with any access panels or the front screen removed from the unit, except when required for servicing. Operating the VideoWall 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 VideoWall.

Removing the screen provides service access to other replaceable modules from the front of the VideoWall.

**CAUTION**  The screen from a single WN-5220-V may be removed by hand without damaging the screen.  Where screen edges are adjacent to each other in a wall configuration, removal of the screen without a screen removal tool may damage the female part of the screen latch.  In these applications use an SRT-100 screen removal tool to minimize the chance of damaging the screen.

Follow these steps to remove the screen, if the display unit is *not* part of 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 approximately 2 inches thick. Pull out at the bottom first, to separate the latch-hooks from the latches. 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 VideoWall 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." |

**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 or your Reseller for more information.

## *Lamp*

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

Before attempting to remove the lamp module, switch off the WN-5220-V with the remote and allow the lamp cooling cycle to complete (3 – 4 minutes) before switching off power at the rear-panel power switch. The lamp module may be removed and replaced from the front by first removing the screen (see Screen on page 45), or from the rear by removing the lamp service access cover.

*WARNING*   Before servicing the VideoWall, always switch the AC power off at the rear-panel power switch and remove the power cord. When the WN-5220-V 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-V using the remote and allow the cooling cycle to complete (3 – 4 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-V. |
| 3. Remove screen or lamp access cover | To gain access to the lamp from the front of the VideoWall, remove the screen first.<br><br>To gain access to the lamp from the rear of the VideoWall, 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.<br><br>Carefully remove from the VideoWall 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 VideoWall 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 VideoWall. The air filter is most easily accessed from the rear of the VideoWall 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-V using the remote and allow the cooling cycle to complete (3 – 4 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-V. |
| 3. Remove screen or | To gain access to the filter from the front of the VideoWall, |

| | |
|---|---|
| lamp access cover | remove the screen first.<br><br>To gain access to the filter from the rear of the VideoWall, 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.<br><br>From the front, pull the filter up and to the right.  Gently work the filter out of the VideoWall. |
| 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

The screen's lenticular pattern is sensitive to smudges and scratches. To clean smudges from the screen, use a soft cloth and a non-abrasive, non-hydrocarbon cleaner. Wipe the screen from top to bottom, in the same direction that the lenticular runs.

## Cleaning the Mirrors

The WN-5220-V's optical mirrors can become dusty in normal operation, particularly if the operating environment is dusty. When the WN-5220-V is serviced, these mirrors may also accumulate accidental smudges and fingerprints. Dust and smudges on the mirrors can seriously degrade the WN-5220-V'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 VideoWall. 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-V 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 VideoWall | 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 VideoWall, 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<br><br>*The status LED's are located on the rear connector panel* | STBY LED does not come on at all<br>• Check the voltage at the wall outlet<br>• Check fuse at AC plug on Power Supply Module<br>• Contact your service provider<br><br>STBY LED comes on and then goes out and stays out<br>• 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<br>• 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<br><br>If Auto On is enabled in the Misc Control menu, the VideoWall will attempt to turn on automatically | |
| 5.  When the VideoWall receives an ON command the fans turn on and the lamp ignites | Buzzer will beep once<br>Fan turns on<br>FAN and LAMP LED's light<br>STBY LED goes off<br><br>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)<br>Verify that the interlock switches are fully closing<br>Contact your service provider<br>The lamp doesn't ignite<br>Verify that the lamp power connector is plugged in<br>Replace the lamp.<br>Contact your service provider<br><br>All 3 LED's are on<br>Press the POWER button on the connector panel or cycle power to the display<br>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.<br>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<br>• Make sure that the right source is selected in the menu<br>• Verify that the Curtain option in the menu is not on<br>• Check the video cable connections<br>• Contact your service provider<br><br>No menu or video can be displayed<br>• Replace the remote batteries and/or remote<br>• 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-V 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 |
| Off | Off | On | Electronics Module. See Note 3 |

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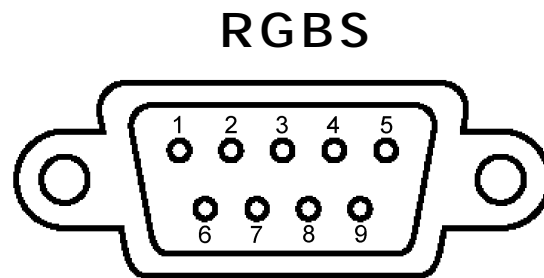
Note 2    If the STBY LED is off, the Lamp LED is on, the Fan LED is on and the lamp is not lit, the electronics module is operating and the likely problem is with the lamp or it's power system. If replacing the lamp and restarting the WN-5220-V does not resolve the problem, contact your service provider.

Note 3    If the STBY LED is off and Lamp LED is off and the Fan LED is on, the electronics module is probably at fault. Contact your service provider.
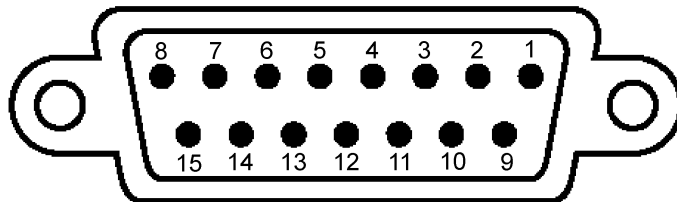
## *Image Problems*

| Symptom | Follow these steps in order.  Check the operation of the VideoWall after each step. |
|---|---|
| **Image is dim** | 1. Verify that the VideoWall has adequate ventilation and that the fans are working<br>2. Verify that the input signal is good<br>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<br>4. Replace the lamp<br>5. Check the light path for obstructions<br>6. Contact your service provider |
| **Lamp ignites, but –**<br>• **No image**<br>• **Screen is all black or all white**<br>• **Image has an abnormally strong hue of a single color** | 1. Verify that the correct source is selected in the Source Select menu<br>2. If the image has a strong green hue:<br>*MAC II* - verify that the input signal is not setup as sync on green.  If it is, it will need to be set to use separate Horizontal and Vertical sync pulses.<br>*RGBS* – enable the Sync on Green feature in the Misc. Control menu<br>3. Verify that the input signal is good.<br>*VGA or MAC II* – video card is outputting 640x480 pixels, 72 Hz or less<br>*15.75K/31.5K Video* – video processor settings are properly set<br>4. Verify that Curtain in the menu is off by pressing the Curtain button on the remote.<br>5. Adjust the White Level and Black Level in the menu<br>6. Contact your service provider |
| **Displayed image is too small or too large** | 1. Make sure that the processor driving the VideoWall is scaling the video correctly<br>2. Adjust the Frequency setting in the menu<br>3. Make sure that the image is positioned correctly on the screen using the remote control<br>4. Contact your service provider |
| Active area of the image is not fully on the screen | 1. Adjust image position with the remote<br>2. Contact your service provider |

# *Connector Pinouts*

## RGBS



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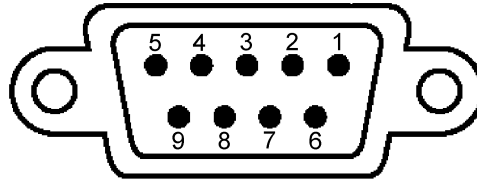6. Ground
7. Ground
8. Ground
9. Ground

# MAC I I

```
8  7  6  5  4  3  2  1
●  ●  ●  ●  ●  ●  ●  ●

  ●  ●  ●  ●  ●  ●  ●
  15 14 13 12 11 10 9
```

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

---

# VGA

```
5  4  3  2  1
●  ●  ●  ●  ●
 10  9  8  7  6
 ●   ●  ●  ●  ●
15 14 13 12 11
●  ●  ●  ●  ●
```

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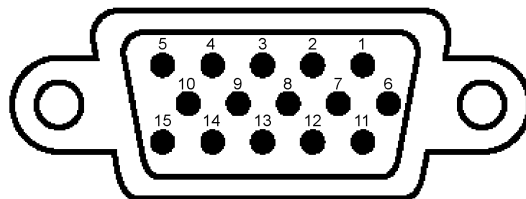
9.  No Connect
10. Ground
11. No Connect
12. No Connect
13. Horizontal Sync
14. Vertical Sync
15. No Connect

# 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
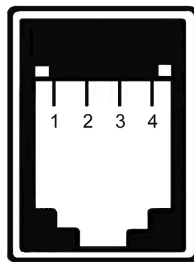8. Connected to pins 4 and 6
9. No Connect

# RS-232 OUT
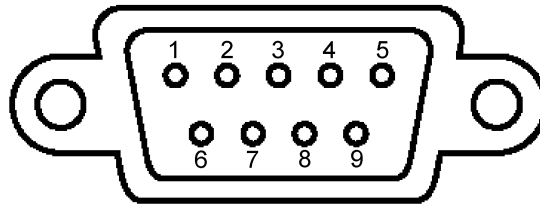
1. No Connect
2. Receive Data (RXD)
3. Transmit Data (TXD)
4. Connected to pins 6 and 8
5. Ground
6. Connected to pins 4 and 8
7. No Connect
8. Connected to pins 4 and 6
9. No Connect

# S-VIDEO
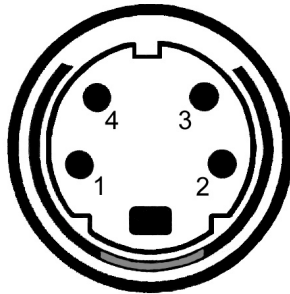
1. Ground
2. Ground
3. Y (Luma)
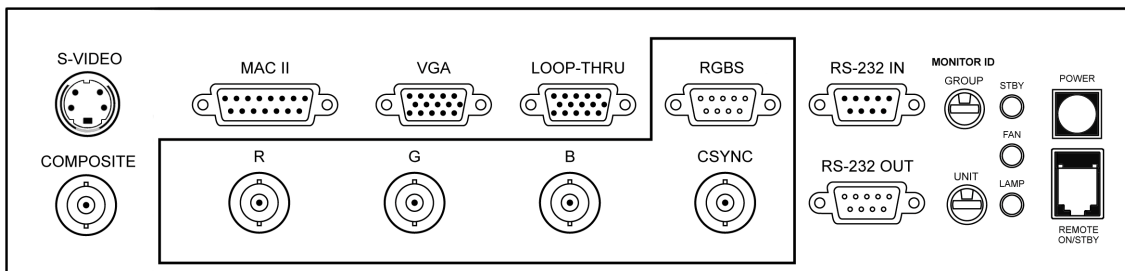4. C (Chroma)

---

# REMOTE ON/STANDBY

1. Ground
2. ON (momentary short to ground to turn on)
3. Ground
4. Standby (momentary short to ground to go into standby mode)

# *Interface and Controls*

## *Rear Panel Indicators, Connectors and Controls*

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



The S-Video and Composite Video inputs are part of the VIM-200 option.

## *Rear Panel Indicators*

| Indicator | Description |
|---|---|
| STBY | LED, 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, projection lamp power on is inhibited. |
| FAN | LED, on during cooling fan operation. Remains on for 3-minute cool-down cycle after lamp is switched off. |
| LAMP | LED, on during projection lamp operation. |

## Rear Panel Connectors

| Connector | Description |
|---|---|
| MAC II | Macintosh II video signal input, 640x480 pixels. 15-pin D-Sub, female. |
| VGA | IBM-compatible VGA signal input, 640x480 pixels. 15-pin high-density D-Sub, female. |
| LOOP THRU | The selected video input is output to this 15-pin high-density D-Sub, female connector.  The format of the Loop-Thru video is same as the source video.  VGA and MAC II 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.  VideoWalls with the optional VIM-200 option using a Composite Video or S-Video source will not output a loop-thru signal for those two sources. |
| 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 also connected to the R, G, B, Csync BNC connectors. Video should only be cabled to either the 9-pin D-Sub or the BNC connectors, but not both.  With the VIM option this port will also accept component 15.75 kHz video. |
| RGBS (R G, B. Csync, BNC) | Video input from a 31.5 kHz device (such as scan-doubled NTSC video). BNC, female connectors. This input is also connected to the 9-pin D-Sub connector. Video should only be cabled to either the 9-pin D-Sub or the BNC connectors, but not both.  With the VIM option this port will also accept component 15.75 kHz video. |
| S-VIDEO | Only available with the VIM-200 option.  Uses separate luma and chroma signals. |
| COMPOSITE | Only available with the VIM-200 option.  Standard        15.75 kHz composite video. |
| RS-232 IN | RS-232 control input from a direct computer link or from the RS-232 Out, supplied from another VideoWall when controlling multiple displays from the same computer. 9-pin D-Sub, female. |
| RS-232 OUT | RS-232 control output connects to the RS-232 In on another VideoWall for controlling multiple displays in a video wall from the same computer. 9-pin D-Sub, male. |
| REMOTE ON/STBY | Connection for remote operation of the On/STBY push-button switch.  Connector is a 4 conductor female FCC 68 telephone handset connector. |

## 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.<br><br>**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.<br><br>**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.<br><br>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.<br><br>This setting also delays the time between an "on" command  to the VideoWall 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 VideoWall's screen when the remote is used to access the items in the menu. The most reliable position for control of the VideoWall is on an axis perpendicular to the front of the screen.

The farther away that the remote control is from the VideoWall, the weaker the signal will be that reaches the screen.  The weaker the signal, the less reliable the control of the VideoWall 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 | Switches the WN-5220-V lamp on if power switch on rear panel is on and the STBY LED is on steady. |
| Off | Switches WN-5220-V off by switching lamp off and starting 3-minute cool-down, in which fan remains on. The WN-5220-V Lamp may not be switched on again until the 3-minute cycle completes. |
| Source | Displays the Source Select menu, from which the type of input source, VGA, Mac II, 31.5 kHz video. With the VIM Line Doubler/Scaler board, 15.75 kHz video may be selected. The VIM decoder board adds Composite and S-Video sources. |
| Curtain | Displays a black screen instead of the input video. |
| Level | Displays the Input Level menu, where input levels for red, green, and blue are set. Also has automatic calibration for white and black levels. |
| Phase | Displays the Phase Select menu, for synchronizing the WN-5220-V internal clock to the clock phase of the incoming signal. |
| Freq | Displays the Frequency Select menu, for matching internal clock to source and adjusting horizontal width. |
| Color | Displays the Color Balance menu, to allow color and luminance matching among multiple WN-5220-V VideoWalls in a video wall. |
| Reset | Resets all adjustments to factory defaults and erases all other settings. |
| Mon Sel | Allows you to disable or enable the remote control. This is useful when configuring multiple VideoWalls in a video wall, to prevent remote adjustments on specific units while allowing adjustments to others. |
| 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. |
| Menu | Displays the main menu, from which all other functions may be selected and set by navigating with the arrow keys. |
| Prev Menu | Closes the current menu. |
| Enter | Causes the WN-5220-V to accept menu selections. |
| Arrow keys | Used for navigation when menus are displayed or for changing settings in an adjustment menu. |

## On-Screen Menus

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

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 pressing the ENTER button.

| Menu Selection | Description |
|---|---|
| Source Select | Selects the type of input source: VGA, Mac II, 31.5K Video, 15.75K Video, Composite Video and S-Video.<br><br>*Note – The optional VIM line-Doubler/Scaler card adds component 15.75 kHz Video compatibility. The optional VIM decoder card 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 WN-5220-V VideoWall'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.<br><br>With Composite or S-Video selected (VIM-200 only) a different menu will appear that controls Brightness, Contrast, Saturation and Hue.<br><br>***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 option. Scales the image in all four directions independently. |
| Color Balance | Displays the Color Balance menu, to allow color and luminance matching among multiple WN-5220-V VideoWalls 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 Configuration | Saves configuration for each video-input source. After saving, the WN-5220-V may be power cycled without erasing the settings. |
| Recall Config. | Recalls previous user-saved configuration settings. |
| Reset Config | Resets the WN-5220-V VideoWall to factory default configuration settings and erases all previous user settings. |
| 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. <br><br> 16M Colors: Selects between 16 million and 256 thousand colors displayed. <br><br> Buzzer Enable: Turns on or off the function indicator buzzer. <br><br> Flip Horz: Flips the displayed video horizontally. <br><br> Flip Vert: Flips the displayed video vertically. <br><br> Auto Lamp On: After the standby timer elapses, the lamp will automatically turn on if this box is checked. <br><br> 525/625 Lines: With the VIM line-Doubler/Scaler and a 15.75 kHz RGBS source (or Composite/S-Video source with the VIM-200 option installed), it selects between 525 lines at 60 Hz (NTSC) and 625 lines at 50 Hz (PAL). <br><br> Sync On Green: Allows CSYNC signals (on the 9-pin or BNC connectors) that utilize the sync on green format to be decoded and displayed properly. Does not work with MAC II sync on green. |
| 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 hardware or software pacing is used such as DTR/RTS or XON/XOFF.

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. <u>Unit address mode</u> – 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. <u>Broadcast mode</u> – 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:

<p align="center">⚫<b>06PON</b>❤</p>

<p align="center"><i>or</i></p>

<p align="center"><b>0206PON03</b></p>

## 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 |
| VGA 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     VGA | | | | SA1 | |
| Save     MACII | | | | SA2 | |
| Save     31.5K Video | | | | SA3 | |
| Save     15.75K Video | | | | SA4 | |
| Save     Composite Video | | | | SA5 | |
| Save     S-Video | | | | SA6 | |
| | | | | | |
| Recall VGA | | | | RC1 | |
| Recall MACII | | | | RC2 | |
| Recall 31.5K Video | | | | RC3 | |
| Recall 15.75K Video | | | | RC4 | |
| Recall Composite Video | | | | RC5 | |
| Recall S-Video | | | | RC6 | |
| | | | | | |
| Reset VGA | | | | 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$ | | |

Clarity Visual Systems

| 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 | | | | 51.37 | |
|    Width | | | | 41.36 | |
|    Height | | | | 30.46 | |
| 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 | | | | 5 | ±10% nominal |
| Brightness | | | | | |
|    ANSI white | fL. | | 125 | 175 | 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 | | | ∀31 | ∀34 | |
|    Vertical half-gain | | | ∀8.5 | ∀10 | |
| Contrast ratio | Ratio | | 100:1 | | Dark room measurement |
| 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 | |

| Specification | Units | Maximum | Minimum | Typical | Notes |
|---|---|---|---|---|---|
| Resolution | Color Pixels | | | | |
| Horizontal | | | | 640 | |
| Vertical | | | | 480 | |
| 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 | | | | 41.72 | ±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 | | | | 51.87 | |
| Width | | | | 41.72 | |
| Height | | | | 30.89 | |
| Mullion | Inches | 0.188 | | | From edge of viewing area to edge of display. |
| Noise | Decibels | | | 49 | At 1 meter from the center of the screen |

## *Electrical*

| Specification | Units | Maximum | Minimum | Typical | Notes |
|---|---|---|---|---|---|
| Video input amplitude | V p-p | | | | |
| Separate RGB analog | | 1.4 | 0.35 | 0.7 | 75  termination |
| Composite sync | | 1.0 | | 0.3 or TTL | TTL at 330 ̦ nominal |
| Input connectors | | | | | |
| BNC (row of 4 connectors) | | | | | 31.5 kHz video input, RGBS |
| 9-pin D-Sub (female) | | | | | 31.5 kHz video input, RGBS |
| HD D-Sub 15 female | | | | | Computer input, (VGA) |
| D-Sub  15 Female | | | | | Computer input, (Mac II) |
| 9-pin D-Sub (female) | | | | | RS-232 input |
| BNC  (single connector) | | | | | Composite video input |
| 4-pin mini circular DIN | | | | | S-Video input |
| Output connectors | | | | | |
| 9-pin D-sub (male) | | | | | RS-232 output |
| 15-pin HD D-sub, female | | | | | Video loop through |
| Frequency | | | | | |
| Dot clock | MHz | 30.24 | | | |
| Horizontal frequency | kHz | 35 | 30 | 31.5 | |
| Vertical frequency | Hz | 75 | 59 | 59.94 | |
| 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 | 895 | 770 | | 640 displayed |
| Active vertical lines | # of HS | 560 | 515 | | 480 displayed |
| Low-pass bandwidth filter | MHz | | | 10 | Selectable via remote control |
| Voltage  requirements | Volts AC | | | | |
| Line input (Range 1) | | 130 | 90 | | @ 50/60 Hz |
| Line input (Range 2) | | 260 | 180 | | @ 50/60 Hz |
| Current Draw | Amps AC | | | 9.2 | @100 Volts |
| | Amps AC | | | 8 | @115 Volts |
| | Amps AC | | | 4 | @ 230 Volts |
| 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:**           WN-5220-V (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

# *Index*