# V8 User Guide



# Virtual Research Systems, Inc.

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# Introduction

Thank you for purchasing the Virtual Research V8 Head Mount Display (HMD). This V8 User's Guide describes the contents of the V8 HMD and control box along with operational guidelines, instructions and care for the V8. Please review this guide carefully and follow instructions to insure correct use and care for your HMD. Please feel free to contact us with any questions you may have. You can reach us at: **info@virtualresearch.com**

# Section One: Safety Issues

## Electrical Shock Hazard

The desktop power supply included with the V8 produces 24VDC. This voltage is also present on the HMD cable bundle, but should not be a hazard to the user. The circuitry in the HMD produces a high voltage (>500VAC) spike signal to drive the backlight. This voltage is generated at very low current levels and will cause only a moderate sensation when touched. This voltage is accessible only if the HMD is disassembled. DO NOT DISASSEMBLE THE V8.

## Blocked Vision and Hearing

By its nature, a head mount display blocks the user's sight and hearing. The danger of tripping over cables or other obstacles becomes a real concern while immersed in the virtual world. As system manager, you must provide an environment that does not allow the HMD user to fall or otherwise injure him/herself. We recommend using V8 only while seated to avoid tripping hazards.

## Eyestrain/Other Optical Effects

V8 will cause eyestrain if the IPD is set incorrectly. Like all head mounts, it is likely to cause some eyestrain effects even when correctly adjusted. This eyestrain stems from several causes; with perhaps the most significant being the fixed focal plane, which conflicts with the variable depth cues present in the imagery. There is no technology that we are aware of that corrects this conflict. Other sources of eyestrain could include optical aberrations, distortion, and mismatch of computer imagery with mechanical configuration. If you experience noticeable eyestrain, review and correct your adjustments and software configuration. If eyestrain persists, limit or end your use of the HMD. Please contact Virtual Research if you have questions or concerns about eyestrain.

## Lice/Other Pest Transmission between Users

Although we have not had any instances of user's reporting lice transmission to us, there has been at least one anecdotal report of lice transmission in a public use HMD. There are sprays available that will kill lice on furniture and clothing. Two of these are RID and A-200. Both are available in drug stores. We don't have information on the effectiveness of these sprays on HMDs and encourage you to research this if you are considering a multiple user application. These sprays are hazardous and you need to judge the benefits vs. risks of using them. Alcohol wipes are useful for cleaning the HMD between users. Alcohol will remove skin, oil and makeup that have been transferred to the HMD. As far as we know, alcohol has no effect on lice.

# Section Two: Getting Started

Please contact Virtual Research Systems, Inc. immediately if you find that any of the contents listed below are not present or have arrived damaged. Virtual Research Systems, Inc. (408) 748-8712

## Box Contents
1) V8 HMD with 13 ft. cable.
2) V8 control box
3) Universal power supply
4) Power cord
5) No-fog cloth

Universal Power Supply:

| Input AC | Output DC - Max 30W |
|---|---|
| 115/230 V~ | +5V - - - 3A |
| 0.9 / 0.45A | +24V - - - 0.7A |
| 60/50 Hz | -12V - - - 0.5A |

## Out of the Box Set Up

Prior to opening your V8 HMD boxes, be sure you have plenty of room and a hard stable surface to work on. We suggest keeping all packing materials for future shipping purposes.

**Sale units will include an extra box containing a styrofoam display head. Demo units will not include a styrofoam display head. Please treat demo units with additional care.**

**Step One**     Open the smaller of the two boxes and remove Styrofoam head. This head is to be used to place HMD on while not in use or while connecting HMD to your computer.

**Step Two**     Carefully open the side of the box which the shipping label is affixed. *This denotes the top of box. The arrow on the side of the box should be facing down,

**Step Three**   Remove the top layer of foam to reveal HMD.

**Step Four**    Remove the HMD and the foam packaging to gain access to the power supply and power cord. The V8 control box is located in a separate foam pocket by itself within this area. Look under the foam cut out to reach the control box.

Each V8 comes with serial numbers located on the position sensor mounting plate and the control box. **DO NOT REMOVE**. Removing these serial numbers may void the Virtual Research six (6) month warranty.

# V8 Control Box Features

**Rear Control Box Panel**
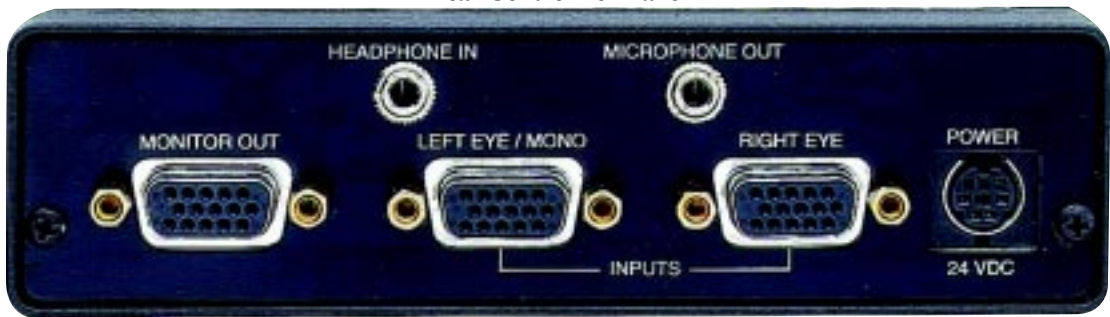


**Front Control Box Panel**



The V8 was designed to accept a 640 x 480 60 Hz, non-interlaced input signal. This format is often referred to as standard VGA. The connection is made via a 15-pin HD connector similar to that found on PC monitors. All inputs on the V8 control box are "female", refer to the Computer Interfacing Manual (Section 3) for cable requirements that are compatible with the V8 and your system. The V8 control box auto-detects when one input channel (left eye/mono) is being used and feeds an identical signal to both displays. The control box automatically switches to stereo mode when a second video source is connected to the right eye stereo input. The right eye source must also be standard VGA format and the same sync configuration as the left eye source. (i.e. cannot have separate sync on left and comp sync on right.)

The V8 control box is designed to accept either separate Horizontal and Vertical sync, composite sync on green video, or composite sync on the Horizontal sync line. When providing composit sync on the Horizontal sync line the Vertical Sync line should not be driven. When sync on green video is provided, both the Horizontal and Vertical sync lines should be undriven. Sync signals should be TTL levels. The VGA source is an analog signal, and since the V8 does not quantify the video (as in A/D and D/A conversion), it is capable of displaying any number of colors your graphics card is able to produce.

**Power**
Virtual Research supplies a desktop power supply unit with each V8. The power supply has (110 VAC - 220 VAC) universal input, +5, +24. -12 VDC output. It is important that the correct power supply be used to avoid damage to the unit. Do not use a different power supply than that supplied by Virtual Research.

**50 Pin SCSI Connector**
Do not connect or disconnect the HMD's 50 Pin SCSI connector while the control box power is on.

**Monitor Out**
To use an external monitor while using your V8 HMD, be sure to have a cable running from the "MONITOR OUT" connection on the control box into the back of your monitor. Refer to Interfacing Manual in Section 3 for the type of cable needed to connect from the V8 control box "MONITOR OUT" connection to the back of monitor.

**Mono/Stereo**
The stereo indicator LED will illuminate when a second video source is connected to the "Right Eye" Input.

**Brightness and Contrast**
These controls affect overall brightness and contrast of both displays. The displays are individually matched to one another during assembly. Please contact Virtual Research if you have any questions.

**Video Formats**
The V8 HMD accepts a VGA (640x480 60 Hz.) video format. The V8 does not accept NTSC, PAL or SECAM timing. It is possible to connect a V8 to any of these sources with the proper video format converter. Contact Virtual Research for details on your system.

**Audio**
The audio connection is a standard stereo 3.5mm mini jack. The control box passes the audio signal directly to the V8 headphones. Audio signal level supplied to the control box should be the same signal that would be supplied directly to stereo headphones.

**Microphone (optional)**
Contact Virtual Research for details.

## Pin Out Information:
**VGA input connector format**
**15 pin high density HD female connector**

| Pin | Signal |
|-----|--------|
| 1 | Red |
| 2 | Green |
| 3 | Blue |
| 4 | Ground |
| 5 | n/c |
| 6 | Ground |
| 7 | Ground |
| 8 | Ground |
| 9 | n/c |
| 10 | Ground |
| 11 | Ground |
| 12 | n/c |
| 13 | Horizontal sync |
| 14 | Vertical sync |
| 15 | n/c |

# Connecting the V8

**\*\* REMINDER: Refer to the Interfacing Manual (Section 3) to see which cables are required to successfully interface the V8 HMD to your system. \*\***

**Step One**      **Mono/Left Eye Input**
Connect one cable from the "Left Eye" input (mono) into the graphics channel of your system.

**Step Two**      **Stereo/Right Eye Input**
Connect a second cable from the "Right Eye/Stereo" Input to the second graphics channel of your computer. You must have two graphics channels to run your V8 in stereo. \*\* Reminder all V8 control box inputs are female, so you must use male connections from the control box to whatever connection your computer accepts. Refer to the Interfacing Manual in Section 3. \*\*

**Step Three**      **External Monitor Option**
Connect your external VGA monitor to the V8 Control box "Monitor Out" connection.

**Step Four**      **Connecting V8 to control box**
Secure the HMD's 50 Pin SCSI connector to the Control box.

# Section Three:  Computer Interfacing Manual

## PC/INTERGRAPH

Use a standard 15 pin male to 15 pin male (VGA) cable(s) to connect the V8 control box to your graphics boards(s).  Two graphics boards (channels) are required for stereoscopic viewing (i.e. one for left eye viewpoint and one for right eye viewpoint.)  Change the video output format of your graphics to standard VGA (640 x 480 60Hz).  For example, Windows NT users will go to:

**Control Panel / Settings / Display**

Select 640 x 480 as the screen resolution, and 60Hz frame rate.  Users may connect their monitor to the V8 control box "Monitor Output" connector via another VGA cable to view the same image that's seen in the HMD.

## O2

Like the PC configuration above, use a standard 15 pin male to 15 pin male (VGA) cable to connect the V8 control box to the Monitor connector on the rear of your O2.  Since the O2 only has the one graphics output, stereoscopic (3D) viewing is not possible.  Use the "setmon" command to change the video format output (vfo) to standard VGA (640x480 60Hz).  Those users not familiar with the "setmon" command should contact Silicon Graphics or run a "man" page on the "setmon" command for further details.  The "setmon" command should look something like:

**%/usr/gfx/setmon 640x480_60.vfo**

Users may connect their O2 monitor to the V8 control box "Monitor Output" connector via another VGA cable to view the same image that's seen in the HMD.

## INDIGO IMPACT

The standard Indigo Impact does not support a VGA graphics format, only higher resolution workstation formats like 1280 x 1024 and 1024 x 768.  V8 users have the following 3 options to choose from.

**Option 1 -** Silicon Graphics offers Impact customers the Impact Channel Option (ICO) which supports many different graphics formats including VGA (640 x 480 60Hz).  Use the "setmon" command to change the video format outputs (vfo) of the ICO to the VGA (640x480 60Hz) format found among the list of available vfo's.  Those users not familiar with the "setmon" command should contact Silicon Graphics or run a "man" page on the "setmon" command for further details.  The "setmon" command should look something like:

**%/usr/gfx/setmon  640x480_60_ext**

The "_ext"command will enable the ICO to output separate H and V syncs. Use a 15 pin to 5 BNC (R, G, B, H sync, V sync) breakout cable(s) to connect the V8 control box to one of four channels located on the ICO. Stereo users will use 2 channels and 2 cables (one for left eye and one for right eye). Connect all 5 BNCs (Red, Green, Blue, H sync and V sync) to the ICO and the 15 pin to the V8 control box. Since only one H sync and V sync BNC is available for all four channels, customers running in stereo will need to T the H sync and V sync BNC's to provide 2 connection points for each. Alternatively, ICO users may download a separate VGA vfo from Virtual Research's web site http://www.virtualresearch.com in order to run V8 in sync on green mode. After downloading and placing this new vfo in the correct directory, use the "setmon" command as before except use the new vfo. The command will look something like:

**%/usr/gfx/setmon 640 x 480_60_vr**

Use the same 15 pin to 5 BNC (R, G, B, H sync, V sync) cable, but this time do not connect the H and V sync.

**Option 2 -** External video converters (1280x1024 to VGA or 1024x768 to VGA) are available from 3rd party vendors that will enable users to interface V8 to their Indigo Impact. Since only one graphics channel is available, stereoscopic (3D) viewing is not possible.

**Option 3 -** Silicon Graphics offers Impact customers the Impact Video Option (IVO) that supports standard NTSC and s-video formats. V8 users can then convert this video format to standard VGA using an external video converter (NTSC to VGA). These converters are available off of the shelf at computer and workstation related stores. Since only one graphics channel is available, stereoscopic (3D) viewing is not possible.

## OCTANE
The standard Octane currently does not support a VGA graphics format, only higher resolution workstation formats like 1280 x 1024 and 1024 x 768. This may change in the near future, but for now V8 users have the following three options to choose from.

**Option 1 -** Silicon Graphics offers Octane customers the Octane Channel Option (OCO) which supports many different graphics formats including VGA (640 x 480 60Hz). Use the "setmon" command to change the video format outputs (vfo) of the OCO to the VGA (640x480 60Hz) format found among the list of available vfo's. Those users not familiar with the "setmon" command should contact Silicon Graphics or run a "man" page on the "setmon" command for further details. The "setmon" command should look something like:

**%/usr/gfx/setmon 640x480_60_ext**

The (_ext) command will enable the OCO to output separate H and V syncs. Use a 15 pin to 5 BNC (R, G, B, H sync, V sync) breakout cable(s) to connect the V8 control box to one of four channels located on the OCO. Stereo users will use 2 channels and 2 cables (one for left eye and one for right eye). Connect all 5 BNCs (Red, Green, Blue, H sync and V sync) to the OCO and the 15 pin to the V8 control box. Since only one H sync and V sync BNC is available for all four channels, customers running in stereo will need to T the H sync and V sync BNC's to provide 2 connection points for each. Alternatively, OCO users may download a separate VGA vfo, developed by SGI for Virtual Research, from Virtual Research's web site http://www.virtualresearch.com in order to run V8 in sync on green mode. After downloading and placing this new vfo in the correct directory, use the "setmon" command as before except use the new vfo. The command will look something like:

**%/usr/gfx/setmon 640 x 480_60_vr**

Use the same 15 pin to 5 BNC (R, G, B, H sync, V sync) cable, but this time do not connect the H and V sync.

**Option 2 -** External video converters (1280x1024 to VGA or 1024x768 to VGA) are available from third party vendors that will enable users to interface V8 to their Octane. Since only one graphics channel is available, stereoscopic (3D) viewing is not possible.

**Option 3 -** Silicon Graphics offers Octane customers the Octane Video Option (OVO) that supports standard NTSC and s-video formats. V8 users can then convert this video format to standard VGA using an external video converter (NTSC to VGA). These converters are available off of the shelf at computer and workstation related stores. Since only one graphics channel is available, stereoscopic (3D) viewing is not possible.

# ONYX 2
A 13W3 to 15 pin (VGA type) cable will be required (2 cables for stereo) to connect to the V8 control box to the Onyx 2. We use a cable that contains dipswitches on the 13W3 connector and suggest our customers use the same. These dipswitches allow users to isolate particular pins for various sync modes. If your 13W3 to 15 pin cable does not have these switches, please try the following options and let us know what you find.

**Option 1 -** Use "ircombine" to configure all available graphics channels (usually 2 or 8) for VGA resolution. All available Channels must be configured before clicking "Download". If you are unfamiliar with the "ircombine" command we suggest that you run a "man" page to learn more about it. The VGA vfo for the channel or channels used by the HMD should look something like: 640x480_60 Select this format and change the default sync configuration of "Composite" sync on green to separate "Horizontal" and Vertical. This is done by clicking on the "Composite" sync box menu and selecting "Horizontal". You will also need to de-select the check mark in the green box denoting that the sync signal will appear on green. All three boxes "R", "G", and "B" should not contain a check. Lastly, set the dipswitches of the 13W3 to 15pin cable for separate H and V sync. Click "Download" to start.
**Option 2 -** Silicon Graphics has written a special vfo.cmb file for Virtual Research's V8 that may be

downloaded from our web site (www.virtualresearch.com). This vfo will allow the V8 to operate in sync on green mode. After downloading this new vfo and placing it in the correct directory, use "ircombine" to again configure all available channels. Note that the Onyx 2 supports the ability to run a variety of resolutions at once (i.e. Channel 1 outputting 640x480 60Hz and Channel 2 outputting 1280x1024 60Hz). However, please review your SGI Onyx 2 manual, as there are some restrictions. After configuring at least one channel with this new vfo(640 x 480_60.pc), select "Composite" sync and check the "G" box for sync on green mode. You will also need to set the dipswitches of the 13W3 to 15 pin cables for sync on green support. Click "Download" to begin.

## ONYX with MULTI CHANNEL OPTION (MCO)

Previous generations of the Onyx series machines used the Multi Channel Option (MCO) for supporting multiple output channels and stereoscopic viewing for HMDs. Use the "setmon" command to change the video format outputs (vfo) of the MCO to VGA (640x480 60Hz) with separate H and V sync. Those users not familiar with the "setmon" command should contact Silicon Graphics or run a "man" page on the "setmon" command for further details. It is best to conduct the following configuration from a remote terminal, as the Onyx's Monitor will disengage when the MCO is activated. Reverting back to the original settings may be difficult if any problems arise. The "setmon" command should look something like:

**%/usr/gfx/setmon -S -s 640x480_60.vfo**

A "man" page on the "setmon" command will further explain the use of parameters like "-S" and "-s". Use a 15 pin to 5 BNC (R, G, B, H sync, V sync) breakout cable(s) to connect the V8 control box to the desired channel(s) of the MCO. Stereo users will use 2 channels and 2 cables (one for left eye and one for right eye). Connect all 5 BNCs (Red, Green, Blue, H sync and V sync) to the MCO.

## CAMERA/NTSC INPUTS

V8 users can convert NTSC and SVHS video formats to standard VGA using an external NTSC to VGA video converter. These converters are available off of the shelf at most computer stores. As with computer interfaces, 2 inputs are required for stereoscopic viewing.

## Section Four:  Using Position Sensors

**Position Sensors:** V8 is designed to support a variety of position sensing options. The position sensor mounting plate behind the top ratchet provides mounting screws for Polhemus (Fastrak, Isotrak, Insidetrak), Ascension Flock of Birds and the Intersense series of sensors.

* The Logitech Ultrasonic sensors require a triangular mounting pattern. Virtual Research can supply (at no charge) a second position sensor mounting plate for the Logitech receiver.
Other sensors are becoming widely available. If you would like to mount another sensor, beside the above options, please contact Virtual Research. We are always glad to have feedback on your experience with new sensors.
Position sensor cabling is most easily handled if you attach it to the V8 cable bundle. This can be done

with electrical tape wrapped at about 18" intervals around both cables.  However, this can leave a sticky residue when you remove the tape.  We do not recommend plastic cable ties since they tend to snag on their surroundings. If you order a V8 and a position sensor together from Virtual Research, we can attach the position sensor to the V8 at time of assembly.

If you are using an electromagnetic position sensor, you will get better performance if you mount the transmitter above the user's head rather than below.  The clear path from transmitter to receiver reduces noise possibly induced by the V8.

# Section Five:  Mechanical Adjustments
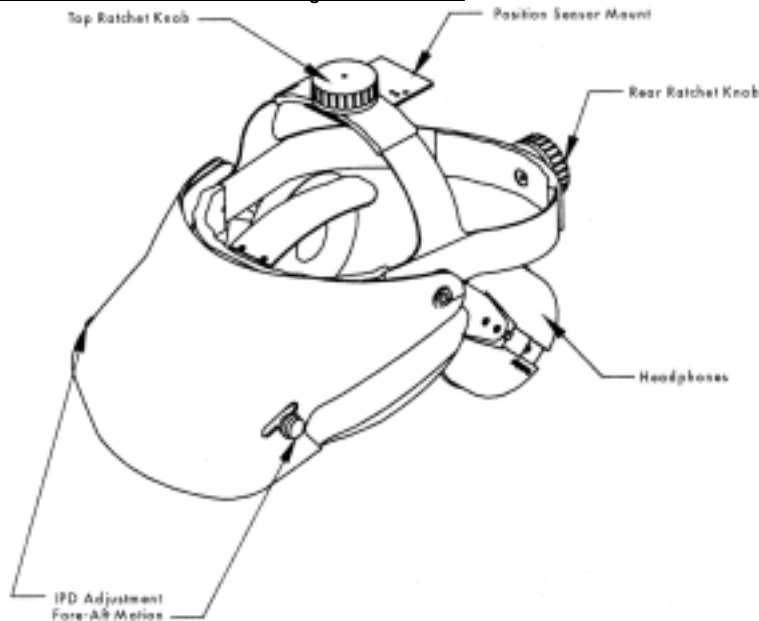


### Ratchet Knobs
The ratchet knobs adjust the size of the HMD making it possible to secure the HMD snuggly to your head.  To open turn ratchet knobs counter clockwise and to close turn ratchet knobs clockwise.  Tension of ratchet knobs can be adjusted by turning the Phillips screw at center of knob.

### Interpupillary Distance (IPD)
Interpupillary distance is the distance between the right and left pupils.  Adjustments are made via the dual function knobs located at the front of the V8 HMD shell.  Twist knobs until both images are evenly visible.  Close one eye at a time to confirm the image is centered in front of the eye.  Incorrect positioning of the IPD adjustment may lead to eyestrain.
Range: 52mm - 74mm.

### Fore/AFT Motion - Eye Relief
Slide the dual function IPD knobs forward and back to adjust eye relief (the distance between the eyes and optics).  This allows the V8 to be worn with glasses.  It is best to don the HMD with the optics in

the fully forward position.  Grasp both IPD knobs together and slide them toward the front of the HMD.  After the HMD is on the head, pull IPD knobs toward the face until a suitable distance is set.  The closer the optics are to the eyes, the greater the immersive effect.  Eye Relief Range: 10mm - 30mm.

## Focus

There are no focus adjustments on the V8.  **If you wear glasses we strongly encourage that you keep them on while using the V8 HMD.**

The V8 focal plane is set at 3 ft.  If you wear glasses for Myopia, Hyperopia or Presbyopia and you can adjust within this focal plane, then you may not need to wear your glasses.  If you think you may have trouble viewing within this focal plane, then wear your glasses while using the V8 HMD.
\* If you have astigmatism, you must wear your glasses while using the V8. \*

## Overlap Adjustment

Contact Virtual Research for information.

## Headphones

Headphones are designed to pivot on the sides of the headband.  When donning the V8 unit, rotate the headphones above the headband.  After video is adjusted, pull the headphones down.  This makes fitting faster and easier.

\*Headphone Removal: If you are not using your HMD with audio, you can remove the V8 headphones.  The headphone will snap off the end of the detented rod that it slides on.  First remove the capture screw at the bottom of the rod, unplug the signal connection at the earphone, and pull down.  Tuck the cable into the end of the padded leather on the headband to keep it from dangling and flip the arm upward.
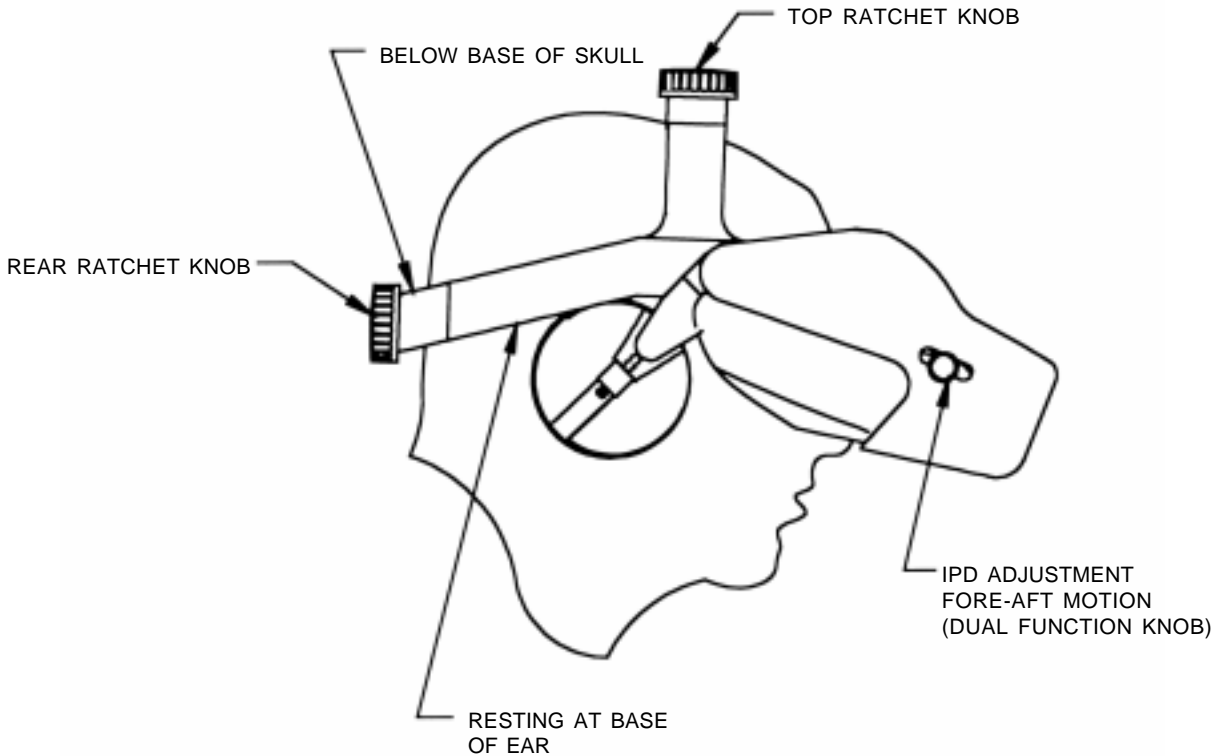
## Cable Positioning

V8 is designed to be lightweight and well balanced.  The cable bundle provides a significant counterbalancing effect without adding weight to the product.  The cable bundle should drop directly behind the user's shoulder and down the back.  If the cable is draped in front of the user's shoulder, the V8 may become front heavy.  The position sensor cable should follow the cable bundle to add additional counterbalance and to minimize the tangle of cables.

## Cleaning V8 Lenses and Optics

The V8 HMD is supplied with a No-Fog cloth for cleaning lenses.  To use, create a fog by breathing on the lenses, then gently wipe off with the No-Fog cloth.  The No-Fog cloth contains de-fogging agents that may dry out if not kept in a sealed pouch.  The V8 optics are glass and are not prone to scratching.  Rubber eyecups around the lenses help provide protection.  If you wear glasses, it is possible to scratch the V8 lenses and/or your glasses if they come in contact.  Try to avoid contact while donning the V8.

# Donning the V8

TOP RATCHET KNOB

BELOW BASE OF SKULL

REAR RATCHET KNOB

IPD ADJUSTMENT
FORE-AFT MOTION
(DUAL FUNCTION KNOB)

RESTING AT BASE
OF EAR

**Step One**    Open both rear and top ratchet by turning knobs counter clockwise.
*It is easier to don the V8 with the earphones in an up position—out of the way.  After
the other adjustments are made, it is easy to bring the earphones down.  While pulling
them down, pull them out away from the head to avoid bending your ear.

**Step Two**    Place HMD on head and tighten the rear ratchet making sure it sits below the base of
the skull.  The top ratchet should be adjusted to bring the sides of the headband down to  the base of
the ear.  Tighten top ratchet until comfortable.

**Step Three**   The cable should fall behind the user's shoulders and down their back—not in front.
The cable weight provides important counterbalancing for the display weight.

**Step Four**   Adjust IPD and Fore/Aft motion until you have a clear image.
*To adjust IPD twist dual function knobs. To adjust Fore/Aft motion slide dual function
knobs towards and away from eyes

# Section Six: Technical Adjustments

**Power Requirements**
The V8 HMD runs on a universal power supply: 110 - 230 VAC, 50/60 Hz.  Please be sure that you use the correct power cord for your particular country.  If you have any questions please contact Virtual Research.

**Running Your SW in Stereo**
Before running your HMD in stereo, review the software settings for parallax and convergence.  If you have any questions regarding these settings you should contact the software company directly.

## Troubleshooting

If you are having trouble with your V8 HMD, please review the scenarios below for suggestions. If you are unable to solve the problem please contact Virtual Research for further assistance: Tel. (408) 748-8712, or via email: info@virtualresearch.com.

| | |
|---|---|
| **Problem** | Power LED not lit. |
| **Check** | Power supply correctly plugged into Control Box. Power supply plugged into AC outlet. |
| **Comment** | Power Supply contains no fuse, has self-resetting circuit breaker. |

| | |
|---|---|
| **Problem** | Power LED flickers and power supply audibly ticks or squeals. |
| **Check** | Switch unit off. Double check power supply connections and HMD cable connection. Try powering up again. |
| **Comment** | There may be a short or other serious problem with the unit. If problem persists, return to Virtual Research for repair. |

| | |
|---|---|
| **Problem** | Circular black spot appears on LCD. |
| **Check** | Clean lenses with No-Fog cloth to clean any dust that may have formed. |
| **Comment** | This dot may be a result of leaving the V8 in direct sunlight, which will burn the polarizer of the LCD. Do not try to fix this problem. Contact Virtual Research for further assistance. |

**The Power LED light is on but...**

| | |
|---|---|
| **Problem** | No video in either eye. |
| **Check** | HD-15 pin connector is connected to the Left Eye/Mono Input. |
| **Comment** | No video will be present without connection to a source. |

| | |
|---|---|
| **Problem** | Image in right eye only, and not stable. |
| **Check** | Video input connected to right eye only |
| **Comment** | Left Eye/Mono must have signal for Right Eye/Stereo to function properly. Right eye is a secondary channel for stereoscopic display. Be sure all cables are securely attached to the back of the V8 control box |

| | |
|---|---|
| **Problem** | Image in both eyes is not stable, or aspect ratio seems wrong. |
| **Check** | Incorrect video format. |
| **Comment** | Video format should be 640x480 60Hz. Image may appear stable at different refresh rates but should not be used. |

| | |
|---|---|
| **Problem** | Image in both eyes is unstable, rolling and flickering. |
| **Check** | Be sure SCSI connector was not removed from the control box while the power was "on". |
| **Comment** | It is possible that you removed the SCSI connector from the control box while the power was "on". Contact Virtual Research for further assistance. |
| **Problem** | Image is too dark or too light. |

**Check**        Adjust front panel brightness and contrast.  If unsuccessful check video termination.

**Comment**    Video should not be split to additional peripherals.  Use the provided monitor out connection.


## Working in Mono, but...

**Problem**    Video is functioning properly in both eyes but cannot fuse image.

**Check**        Check that IPD is properly adjusted.

**Comment**    Contact Virtual Research if problem persists


## Working in Stereo, but...

**Problem**    Stereo LED does not light.

**Check**        Video not connected at right input or at computer.

**Comment**    If symptom occurs while using sync on green and connections are correct, contact Virtual Research for firmware update.


**Problem**    HMD functions properly in mono but not stable in stereo.

**Check**        Video format sync for right channel identical to left (640x480 60 Hz).  Both channels must have the same sync configuration.

**Comment**    Video source for right channel must be identical format to left input.


## Mechanical Problems

**Problem**    HMD seems front heavy.

**Check**        HMD cable and tracker cable should fall behind the user's shoulder and down the user's back, not in front of the user.


**Problem**    Headband ratchet knobs too loose or too tight.

**Check**        Adjust ratchet tightness with Phillips #2 screwdriver at center of ratchet knob.

# __Glossary__

__Aspect Ratio__   The ratio of the Horizontal to Vertical screen size. For example, an Aspect Ratio of 4:3 indicates that the ratio of the width to the height of the viewing plane is 4/3.

__BNC__   Connector type found on a variety of workstations and monitors, including the ICO, OCO and MCO from Silicon Graphics

__Channel__   When used in this manual, a channel refers to one independent image source. Some computers can be configured with more than one channel, i.e., one for left and right image sources.

__Color Triads__   In LCD displays, this term refers to a group of three-color elements, Red, Green and Blue.  These three-color elements make up one full triad.

__FOV__   Field of View.  An angular measurement of the viewable area in a display.  A large Field of View provides a more immersive experience. Field of View is either specified as a diagonal angular measurement accompanied by the Aspect Ratio of the image, or it can be specified as two values, one horizontal and the other vertical.

__HMD__   Head Mount Display

__ICO__   Impact Channel Option.  This device enables users of Indigo Impact workstations to generate standard VGA.  In addition, it allows users to generate multiple video channels for running V8 in stereo mode.

__IPD__   Inter-Pupilary-Distance is the distance between the right and left pupil. This parameter is adjustable and will vary from user to user.

__ircombine__   On Onyx/Onyx2 InfiniteReality workstations, users can configure and customize video output parameters for each channel independently.  This allows users to operate multiple peripherals and video formats simultaneously.  See your SGI user's guide.

__LCD__   Liquid Crystal Display

__MCO__   Multi-Channel Option. This option is added to the Onyx RE workstations to sup port up to four independant video channels. The MCO is required for running V8 in stereo.

**Monoscopic**      Images generated from a single view. Monoscopic imagery does not contain the 3Ddepth cues normally found in stereoscopic imagery.

**Non-Interlaced**  Non-interlaced displays draw each scan line during one refresh cycle; (one full refresh is at 60Hz). As opposed to interlaced formats that draw odd scan lines in one 60 Hz. field and even lines in a second 60 Hz. field. This results in a 30Hz. frame.

**OCO**             Octane Channel Option. This device enables users of Octane workstations to generate standard VGA. In addition, it allows users to generate multiple video channels for running V8 in stereo mode.

**Overlap**         This term indicates the percentage of the Field of View where one eye overlaps with the other. The standard configuration for HMDs is full (100%) Overlap.

**Position Sensor** Equipment used to capture real world motion data.

**RGB**             Video format containing separate signals for Red, Green, and Blue.

**Resolution**      The resolution of LCD displays often counts the total number of color elements. This number must then be divided by three to indicate the total number of triads. This number may be used to compare to other displays, such as CRT's.

**Setmon**          SGI systems other than InfiniteReality machines use the "setmon" command to change between various video format resolutions.

**Sync**            The timing component of the video signal. Depending on the particular video format, sync may be combined with one of the colors, i.e., sync on Green. Or, sync may be transmitted independently (horizontal and vertical) on separate lines as it is in VGA.

**VGA**             Video Format. Standard VGA is known as 640x480 at 60Hz with separate horzontal and vertical components for sync.

# FCC  Statement

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 interference if installed and operated properly in a commercial environment.  This equipment generates, uses, and can radiate radio frequency energy, and if not properly installed and used in accordance with instructions in this manual, may cause harmful interference to radio communications.  Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.  Only peripherals (computer I/O devices, terminals, printers, etc.) tested and complying with Class A Limits should be attached to this device with shielded I/O cables.

Finally, any changes or modifications to the equipment by the user not expressly approved by the grantee or manufacturer could void the user's authority to operate such equipment.