HMD3 Head-Mounted Display User Guide

HMD3—VR1280 /Virtual Research Systems

Thank you for purchasing the HMD3—VR1280. This User Guide describes the contents of the HMD3—VR1280 HMD and control box along with operational guidelines, instructions and care for the HMD3—VR1280. 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 that you may have.

Safety Issues

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 HMD3—VR1280 only while seated to avoid tripping hazards.

Eyestrain/other optical effects

HMD3—VR1280 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 we are aware of that corrects this conflict. Other sources of eyestrain could include optical aberrations, distortion, 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.

HMD Cleaning

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 transferred to the HMD. As far as we know, alcohol has no effect on lice.

Electrical Shock Hazard

The desktop power supply produces +5, +12, and -12Vdc. These voltages are also present on the HMD cable bundle. These voltages should not be a hazard to the user. However, disassembly of the HMD is not recommended and may void your warranty.

Getting Started

Please contact BIOPAC Systems, Inc. immediately if you find that any of the contents listed below are not present or have arrived damaged. BIOPAC Systems, Inc. (805) 685-0066.

Box Contents

1. HMD3—VR1280 HMD with 15 foot cable
2. HMD3—VR1280 Control Box
3. Universal Power Supply (+5V, +12V, -12V)
4. Power Cord

Universal Power Supply: Input AC Output DC

$$100\text{-}240 \text{ V} \sim +5\text{V}\text{---}5\text{A}$$
$$130\text{-}144\text{VA} +12\text{V}\text{---}1.5\text{A}$$
$$60/50\text{Hz} -12\text{V}\text{---}0.5\text{A}$$

Prior to removing your HMD3—VR1280, be sure you have plenty of room and a hard stable surface to work on. We suggest keeping all packaging materials for future shipping purposes.

Each HMD3—VR1280 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.

Control Box

The HMD3—VR1280 was designed to accept a 1280 x 1024 60Hz, non-interlaced video signal. This format is often referred to as SXGA. The connection is made via a 15-pin HD connector similar to that found on PC monitors.

All inputs on the HMD3—VR1280 control box are "female", refer to the Computer Interfacing Manual (Section 3) for cable requirements that are compatible with the HMD3—VR1280 and your system.

The HMD3—VR1280 control box auto-detects when one input channel (right eye/mono) is being used and feeds an identical signal to both displays.

*   Use the Right Eye/Mono input when operating the HMD3—VR1280 in mono mode.
*   The control box automatically switches to stereo mode when a second 1280 x 1024 60Hz video channel is connected to the control box Left Eye input. This second channel must have the same sync configuration as the Right Eye source (i.e. cannot have separate sync on Right Eye and comp sync on Left Eye).

Power

Virtual Research supplies a desktop power supply unit with each HMD3—VR1280. The power supply has (100VAC – 240VAC) universal input, +5, +12, -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. To power on the Control Box lift the flat toggle switch and push down to power down. The red Power LED will light when the control box is powered on. Please allow 5 – 10 seconds for the internal software to boot prior to the displays turning on.

50 Pin SCSI Connector

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

Right eye / mono

The HMD3—VR1280 required input format is 1280 x 1024 at 60 Hz non-interlaced signal. This format is often referred to as SXGA in the PC world. The control box continually verifies that the proper 1280 x 1024 60Hz signal is present and will turn off the displays if the format is not correct in order to prevent damaging the displays. Please note that screen savers will alter video format and usually cause the displays to turn off. Simply disengage the screen saver and the displays should turn on again. The connection is made via a 15- pin HD connector similar to that found on PC monitors. The control box auto-detects when one channel is being used for a monaural display and feeds an identical signal to both displays. A single green LED above the right SCSI connector will light when only one input is connected to the rear of the control box, indicating that the HMD is operating in MONO mode.

Left eye

The HMD3—VR1280 control box automatically switches to stereo mode when a second video source is connected to the Left channel. The left eye source must also be 1280 x 1024 60Hz format and the same sync configuration as the right eye source. (ie. Cannot have separate sync on left and comp sync on right.) A second green LED will light indicating that the control box has detected a second input and is now operating in STEREO mode.

Monitor Out

The input signal that is supplied to the RIGHT EYE/MONO input is terminated, amplified, and rebroadcast to the MONITOR OUT connection. This terminal is identical to the input connections and is meant to drive an external monitor without having to split the incoming signal.

Audio

The audio jack is a standard stereo 3.5mm mini phone jack. The control box passes the audio signal directly to the HMD3—VR1280 headphones; there is no amplification in the control box. Audio signal level supplied to the control box should be the same signal that would be supplied directly to stereo headphones.

Microphone (optional)

If your HMD3—VR1280 is equipped with a microphone, a connection to your audio equipment is provided.

HMD output

HMD3—VR1280 uses two 50 conductor cables with standard SCSI connectors that terminate to the front of the control box. The connection should NOT be made or broken when the power is on.

User Controls (1-6)

Use the 6 position, rotating Selector Switch to select user controls for brightness, contrast, offset, color temperature, and setting saving. Use the UP and DOWN buttons to increase or decrease the following user controls.

1. Brightness – use the UP and DOWN buttons next to the Selector Switch to increase and decrease brightness levels of both eyes.
2. Contrast (Gain) – use the UP and DOWN buttons next to the Selector Switch to increase and decrease contrast (gain) of both eyes.
3. Offset (Average Signal Brightness)– use the UP and DOWN buttons next to the Selector Switch to increase and decrease the offset of both eyes.
4. Color Temperature – use the UP and DOWN buttons next to the Selector Switch to select between 3 LED color temperature settings. Changes are subtle and affect the white level of the LEDs. The factory setting is the middle setting which will be fine for most users. Push the UP button to select higher temperature setting and the DOWN button to select a lower temperature setting.
5. Save Current Settings – push the UP or DOWN buttons to save your preferred brightness, contrast, offset and color temperature settings. A color bar pattern will appear on the displays for 5 – 10 seconds while

the settings are saved. The next time you power on the control box your settings will be automatically loaded.

6. Factory Settings – push the UP or DOWN buttons to return to the default factory settings. A color bar pattern will appear on the displays for 5 – 10 seconds while the default settings are reloaded.

Mechanical Adjustments

Donning the HMD3—VR1280

There are several things to consider when first donning the HMD3—VR1280.

1. The top ratchet should be adjusted to bring the sides of the headband down to the base of the ear.
2. The rear ratchet should sit below the base of the skull.
3. The cables should fall down the user's back (not in front). The cable weight provides important counterbalancing for the display weight.
4. It is easier to don the HMD3—VR1280 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.
5. IPD and fore/aft motion adjustments are performed together to optimize the view.

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 HMD3—VR1280 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 each eye. Incorrect positioning of the IPD adjustment may lead to eyestrain. Range = 52-74mm

Fore/Aft motion

Fore/Aft motion allows the distance between the eyes and the displays (eye relief) to be adjusted, thus allowing the HMD3—VR1280 to be worn with glasses. This motion is controlled with the IPD knobs. It is best to don the HMD with the displays 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 toward the face until a suitable distance is set.

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 the ratchet knobs counter clockwise and to close turn ratchet knobs clockwise. Tension of ratchet knobs is adjustable by turning the Phillips screw at center of knob.

Headphones

Headphones are designed to pivot on the sides of the headband. When donning the HMD3—VR1280 unit, rotate the headphones above the headband. After video is adjusted, pull the headphones down. This makes fitting faster and easier.

Cable Positioning

HMD3—VR1280 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 down the user's back. If the cable is draped over the user's shoulder, HMD3—VR1280 will be front heavy. The position sensor cable should follow the cable bundle to add additional counterbalance weight and to minimize the tangle of separate cables.

Some Technical Information

Headphone removal

If you are not using your system with audio, you can remove your headphones to make the V8 simpler to use. The earphone 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.

Optics and Fogging

HMD3—VR1280 is supplied with a no-fog cloth to reduce fogging of lenses. To use it, breathe on the lens to create a fog, then gently wipe off with no-fog cloth. Keep no-fog cloth in closed pouch so it doesn't dry out. Reapply if fog reappears.

HMD3—VR1280 optics are custom diamond turned acrylic and are prone to scratching. Rubber bumpers around lenses provide protection, however, if you wear glasses, it is possible to scratch the lenses or your glasses if they come in contact. Try to avoid this contact when donning the HMD3—VR1280.

Position Sensors

HMD3—VR1280 is designed to be used with a variety of position sensing options. The position sensor mounting bracket behind the top ratchet has mounting screws.

Many different trackers are available today. If you would like to mount a tracker on your HMD3—VR1280, let us know. We can probably supply basic hardware for mounting. We are always glad to have feedback on your experience with new trackers.

Position sensor cabling is most easily handled if you attach it to the HMD3—VR1280 cable bundle. This can be done with plastic coil wrap or electrical tape. However, this does leave some sticky residue when you remove the tape. We do not recommend plastic cable ties since they tend to snag on their surroundings and if cinched too tight may damage the HMD3—VR1280 cable.

If you are using an electromagnetic tracker, you will get better tracker performance if you mount the transmitter above the user's head rather than below and to the side. The clear path from transmitter to receiver reduces noise induced by HMD3—VR1280 and distortion caused by the metal in the HMD3—VR1280.

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.

Limited Warranty

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