5DT HMD 800-26 Series

User's Manual

5DT

Fifth Dimension Technologies

www.5DT.com

5DT HMD 800-26 2D

Head Mounted Display

5DT HMD 800-26 3D

Stereo Head Mounted Display

User's Manual

Unless otherwise indicated, the term "5DT HMD 800-26" in this manual refers to both the 2D and the 3D HMD. The stereo HMD will be indicated as "5DT HMD 800-26 3D" where there are differences between the two devices.

Version 3.0   *August 2004*

Table of Contents

1   Introduction

Thank you for choosing this product. We trust that you will have a lot of fun and satisfaction using it.

The 5DT Head Mounted Display (HMD) 800-26 offers the user an affordable immersive viewing experience with 1.44 million pixels of resolution. This product is particularly useful for research and development, virtual reality simulation, computer graphics applications, 3D CAD systems, virtual showrooms and personal entertainment.

Features

- Affordable quality
- Adjustable top/back ratchets
- 2D and 3D models
- Cable organizer
- Mounting base for head trackers
- Crisp SVGA image
- Extreme comfort
- User configurable immersivity
- Lightweight
- Flip-up mode for reality checks
- High quality headphones

2   Safety First!

Please take **CAREFUL NOTE** of the following **SAFETY ISSUES**.

Due to medical safety reasons, this product should **not** be used by the following persons:

2.1   Individuals with Epilepsy

Individuals who have been diagnosed with Epilepsy, or who have a personal or family history of Epilepsy, should **not** use this product because it may trigger epileptic seizures. If you have any doubts about this, consult with a medical doctor and/or neurologist before using the product.

2.2   Individuals Younger than 10 Years of Age

The eyes of a person younger than 10 years of age are still developing the ability to focus. Therefore, individuals younger than 10 years of age should **not** use this product because it may adversely affect the focusing ability of their eyes.

2.3   Termination of Usage
STOP using this product **IMMEDIATELY** if:

- You experience discomfort of any nature

- You develop a headache

- You start feeling nauseous

- You start experiencing vertigo (dizziness)

Do not wear the product for longer than one hour at a time. When this period has expired, take a break for at least 10-15 minutes before wearing the device again. A warning to stop using the device will appear in the displays after two hours.

2.4   Electrical Safety

- Make sure that the line voltage of the power adapter (AC adapter) is the same as the line voltage of the country where the HMD will be used. For example if the line voltage of the power adapter is 100-120V AC, it should not be used in a country where the line voltage is 220-240V. Using an incorrect power adaptor may cause it to explode.

- Unplug the power adapter when the unit is not in use.

- Always use the designated AC power adapter (included with the product).

- To prevent electric shock and/or fire, do not unplug by pulling on the cord and do not touch the power plug with bare hands.

- Do not use the product in a wet environment (such as a bathroom).

2.5   Cleaning the Product

- Always unplug the power adapter before cleaning the product to prevent electric shock and/or fire.

- Remove dust on the headset by using a soft cloth.

- To remove stains or dirt, wipe the HMD with a soft cloth dampened with a neutral detergent.

- Do not use solvents like paint thinner, benzene or other products that may damage the surface of the product.

2.6   Personal Hygiene

- Alcohol wipes are useful for cleaning the HMD between users for multiple user applications. Alcohol will remove skin, oil and makeup that has been transferred to the HMD.

- The front, back and top foam inserts should also be cleaned or replaced as necessary. Soak the foam inserts in a mild detergent, rinse lightly and leave in the sun to dry.

- There have been anecdotal reports of lice/pest transmission between HMD users in multiple user applications. There are sprays available that will kill the lice on furniture and clothing. These sprays are **hazardous** and you need to judge the benefits versus the risks of using these sprays.

- Make sure to switch the HMD **off** and to cover the optics before wiping it or spraying it.

3   Package Contents

Please confirm that the package contains the following:

- 5DT HMD with connected interface cable
- Power supply
- This manual

4   Connecting the HMD

To connect your 5DT HMD 800 to a PC, follow these steps (see Figure 1):

a. Connect the supplied D-sub SVGA connector of the 5DT HMD 800-26 to the output of your video card.

b. Connect the audio connection cable of the 5DT HMD 800-26 to the audio out line of your soundcard.

c. Connect the power supply plug of the 5DT HMD 800-26 to the supplied 9V Power Supply Unit.

PC VGA Out

PC Audio Out

To HMD

9V PSU
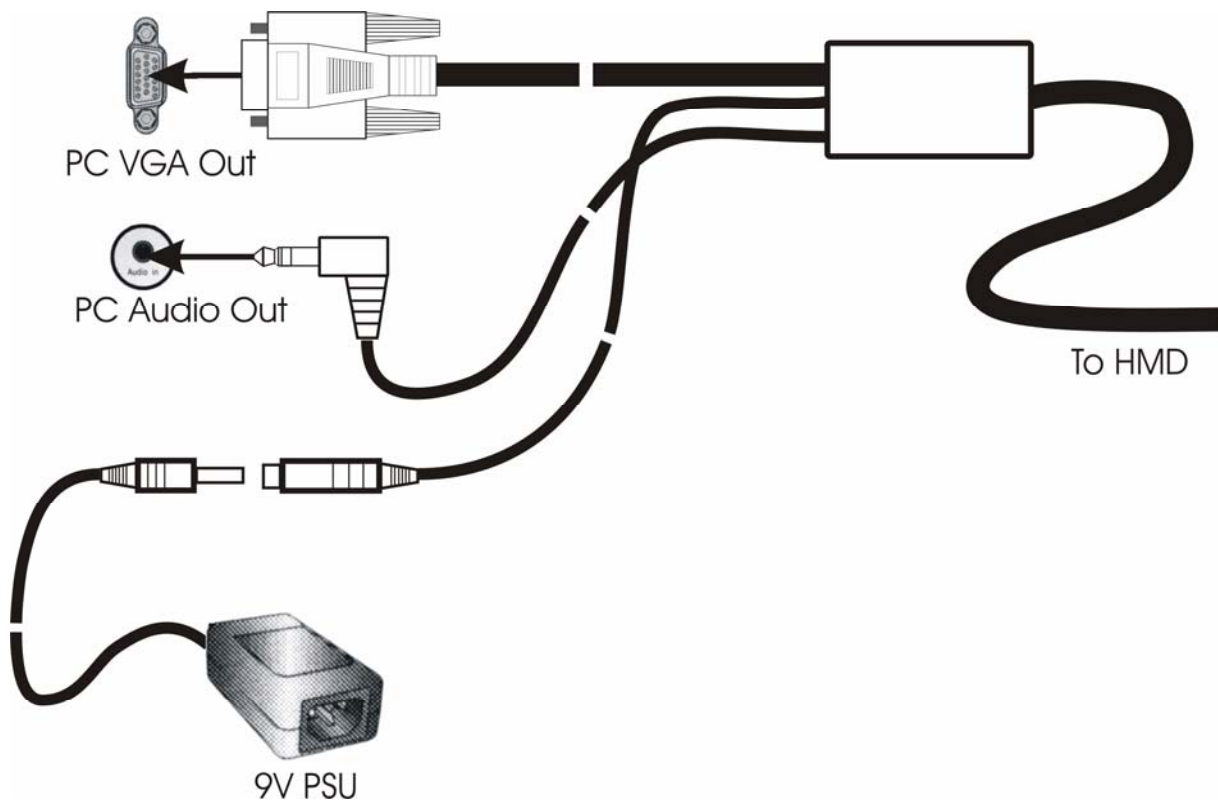
Figure 1 – Connecting the 5DT HMD 800

5   Using your HMD

5.1   Basic Use – Donning the Headset

Warning: If the headset is not adjusted properly, it can lead to fatigue of the eyes or blurred vision. In general the headset should not be worn if the user is experiencing discomfort and should not be worn longer than one hour at a time without taking a break for 10-15 minutes.

To don the HMD, follow these steps:

a. Place the headset on top of the head and gently slide it down.

b. Adjust the top and back ratchets (see Figure 2) so that the headset is comfortable and that the displays are as close to the eyes as possible. Take care not to tighten the back ratchet too much.

c. Adjust the angle of the headset so that the optical display is 5 to 10 degrees below the horizontal.

d. Adjust the earphones so that they are in a comfortable position.

Figure 2 – Adjust the headset using the top and back ratchets.

5.2   PC Setup

The 5DT HMD 800-26 will accept either a VGA (640 x 480) or an SVGA (800 x 600) computer input at 60Hz. If the resolution output and refresh rate of your computer is set at something other than (640 x 480) or (800 x 600) at 60Hz, please follow the instructions below before connecting the 5DT HMD 800 to the VGA port of your computer.

Step 1. Set your computer to 800 x 600 Resolution:

In Windows, go to "Display Properties" found in your control panel. When the "Display Properties" window appears, click on the "Settings" tab. When the "Display Settings" window appears adjust your "Desktop Area" control to 800 x 600 pixels. When you have selected the desired screen resolution, click on "Apply" to accept the change.

Step 2. Set Color Resolution:

For best results, make sure that your computer is set for a minimum of 16 Bit color resolution. The color resolution settings are found in the "Settings" tab of "Display Properties". Click "Apply" once the desired color resolution has been selected.

Step 3. Set Refresh Rate:

Set your refresh rate to 60Hz. For Windows NT and 2000 users, this is done on the same screen in Display Properties as display resolution (see Figure 3). For Windows 95/98/ME/XP users, go to the "Settings" tab as outlined in Step 1, then click on "Advanced" then "Adaptor". Set the refresh rate to 60Hz and then click "Apply" to accept the change (see Figure 4 and Figure 5).
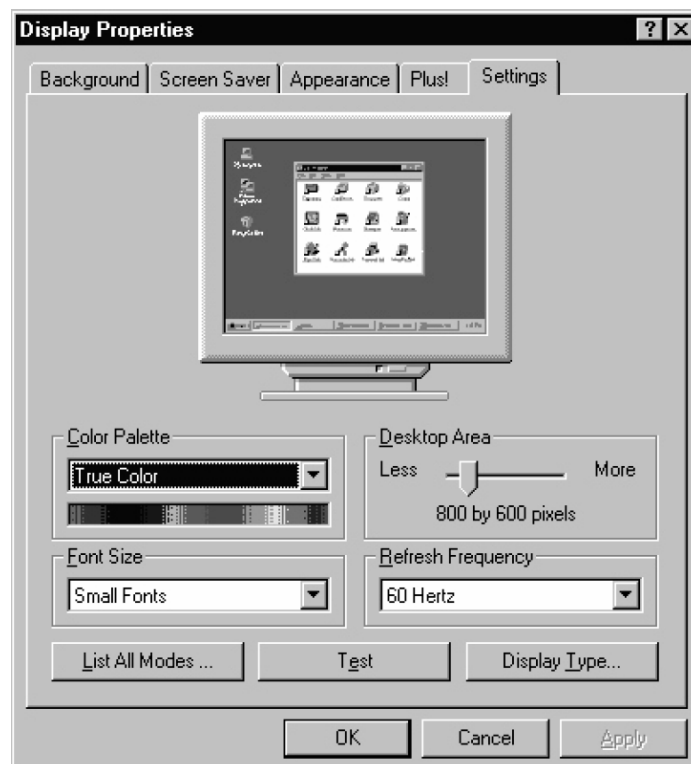
Figure 3 – Setting the display properties for Windows NT/2000

Figure 4 – Setting the display resolution for Windows 95/98/Me/XP
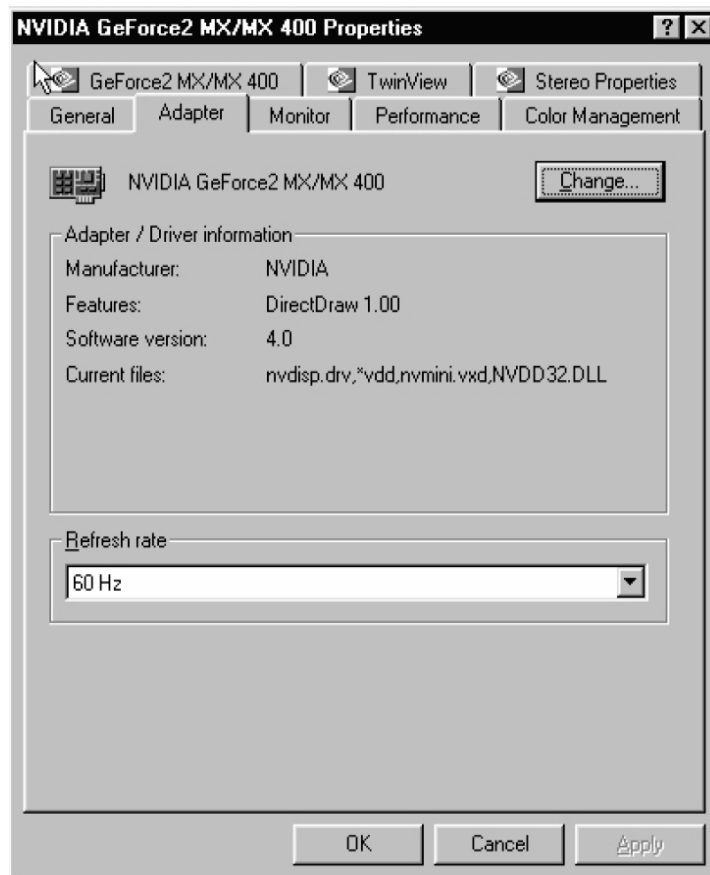
Figure 5 – Setting the refresh rate for Windows 95/98/Me/XP

5.3 Using the HMD 800 Controls

Turn on the 5DT HMD 800

Press and release the **Power/Menu** button located on the middle right-hand of the headset. This will illuminate the green LED above to the **Power/Menu** button and, within a few seconds, an image will appear on the headset. Your 5DT HMD 800-26 has been preset at the factory and no further adjustments should be required.

Audio Controls

If you have an audio source, you can increase or decrease the volume level using the **Vol**. (**+/-**) buttons on the bottom right side of the headset.

5.4 Accessing the On-Screen-Display Menu (OSD)

Access to the ON-SCREEN-DISPLAY (OSD) allows the user to make additional image corrections and adjustments to the image quality. Changes that can be made include: BRIGHTNESS, CONTRAST, COLOR, AUDIO BALANCE, HORIZONTAL CENTERING as well as a FACTORY RESET option. You can activate and deactivate the 3D mode by accessing the OSD at any time.

To access the OSD, press and hold down the **Power/Menu** button for approximately 3 seconds and then release. The on-screen-display window will appear on your screen (see Figure 6).
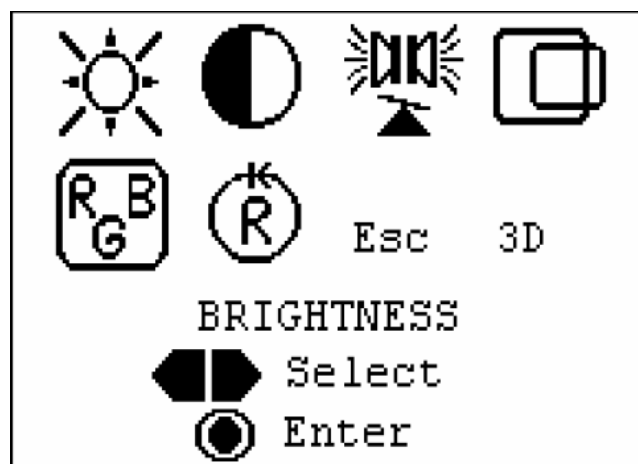
Figure 6 – The OSD main menu display

Use the **Vol** (**+/-**) buttons to select the icon for the display function you would like to activate. Notice that the selected icon is highlighted. Once you have highlighted the desired icon, press and release the **Power/Menu** button once to activate. Once activated, a new screen will open. Use the **Vol** (**+/-**) buttons to increase or decrease the setting between 0 and 100%. Once you are satisfied with the new setting, depress the **Power/Menu** button to save the changes and the main OSD menu will appear. To select another display function icon, use the **Vol** (**+/-**) buttons to scroll between icons.

5.5   On-Screen Display (OSD) Menu Options

A. Brightness: ☼

Selecting the Brightness icon allows you to make adjustments to the display brightness. When the brightness submenu is displayed, as shown in Figure 7, you may change the setting between 0-100% by pressing the **Vol** (**+/-**) buttons. Once the desired brightness level has been determined, you may press the **Power/Menu** button once to save the setting. Alternatively, you may save the setting by simply waiting for about 5 seconds. The main OSD screen will reappear and you can then make additional adjustments to any display function.

Figure 7 – The Brightness OSD menu

B. Contrast: ◑

Selecting the Contrast icon allows you to make adjustments to the display contrast. When the Contrast submenu is displayed, as shown in Figure 8, you may change the setting between 0-100% by pressing the **Vol** (**+/-**) buttons. Once the desired level of contrast has been determined, you may save by pressing the **Power/Menu** button once or by simply waiting about 5 seconds. The main OSD screen will reappear and you can then make additional adjustments to any display function.
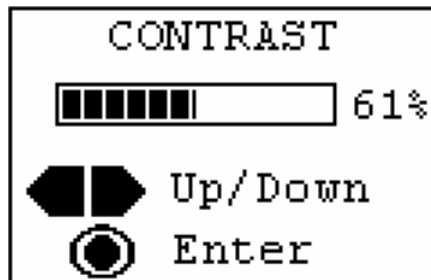

Figure 8 – The Contrast OSD menu

C. Audio Balance:

Audio Balance allows you to adjust the sound between the left and right earphones. When the Audio Balance submenu appears (see Figure 9), you may change the balance by pressing the **Vol** (**+/-**) buttons until you achieve the desired balance. Press the **Power/Menu** button to save any changes you have made to the settings.

Figure 9 – The Audio Balance OSD menu

D. Centering Screen:

If the image on the screen appears to be off center, you can make adjustments by selecting this function. Again, use the **Vol** (**+/-**) buttons to position the image on the screen as desired. Press the **Power/Menu** button to save any changes you have made to the settings.

E. RGB Color Balance:

Selecting the RGB (Red / Green / Blue) Color Balance icon allows you to make individual changes in the primary colors in each eye. From the main OSD menu select the RGB icon, which brings up the next sub-menu (see Figure 10).
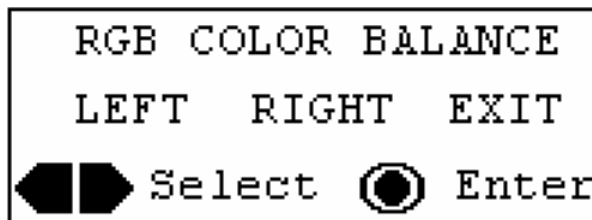
Figure 10 – The RGB Color Balance OSD menu

Use the **Vol** (**+/-**) buttons to select which eye (LEFT or RIGHT) you want to adjust or EXIT to return to the main OSD menu. Then use the **Vol** (**+/-**) buttons to select one of the RGB colors, notice that the color name (Red, Green, Blue) toggles as you press one of the Up (**+**) or Down (**-**) buttons. Press the **Power/Menu** button to go into the next sub-menu (see Figure 11). Using the **Vol** (**+/-**) buttons, make the necessary adjustments to the color you have chosen. Once you have made the adjustments, press the **Power/Menu** button to save the setting and return to the main OSD menu.

Figure 11 – The RGB Color Balance OSD sub-menu

F. Factory Reset Option:

To reset all settings to the original, factory preset levels, highlight the Factory Reset icon and select YES, as shown in Figure 12.

```
● RESET SYSTEM TO
   FACTORY SETTINGS
        Yes
  ◀▶ No/Yes ◉ Enter
```
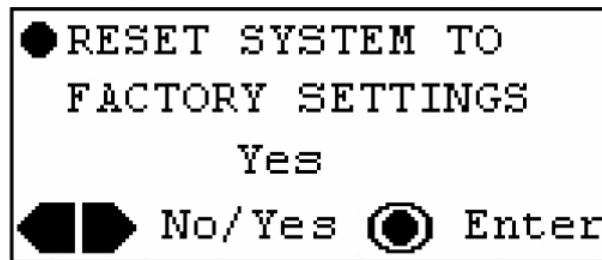
Figure 12 – The Factory Reset OSD menu

G. 3D mode (5DT HMD 800-26 3D Only): 3D

Selecting this icon allows you to switch your 5DT HMD 800-26 3D between 2D and 3D modes. ***Please Note***: Before switching to 3D mode, you will want to increase the refresh rate to a minimum of 85Hz., but 100Hz or higher is preferable. (Please see section 5.2). Once the HMD is set to 3D mode, the user cannot make changes to the refresh rate or the resolution settings without first going back into 2D mode.

3D Modes: 3D1 and 3D2

The 5DT HMD 800-26 3D supports two 3D modes. In both modes, full resolution frame sequential image input is required.

```
   OFF   3D1   3D2

  ◀▶ Select ◉ Enter
```

Figure 13 – The 3D Mode Selection OSD menu

Mode 1: DDC Line Protocol

The DDC line protocol is used principally by the nVIDIA Stereo drivers. If nVIDIA stereo drivers are active and outputting a 3D signal, the headset will automatically detect the DDC line and stay locked on the signal.

Note: The DDC Line Protocol is the highest priority 3D function. If this signal is present, the headset will function correctly in either 3D1 or 3D2 modes.

Mode 2: Frame Sequential Stereo

With frame sequential stereo input the user can select either 3D1 or 3D2 to activate the frame swapping function. However, if the image on the headset is in reverse stereo, simply switch to the opposite mode.

6   About 5DT

5DT <Fifth Dimension Technologies> is a high technology company specializing in Virtual Reality (VR). 5DT develops, produces and distributes affordable virtual reality hardware, software and systems. 5DT can also develop custom systems for all your VR needs.

5DT's focus is Virtual Reality Training Systems and Virtual Reality Peripherals.

The **Virtual Reality Hardware** currently produced by 5DT includes:

- 5DT Data Glove 14 Ultra (Right and Left)
- 5DT Data Glove 5 (Right and Left)
- 5DT Data Glove MRI 5 (For Magnetic Resonance Imaging environments)
- 5DT Data Glove MRI 14 (For Magnetic Resonance Imaging environments)
- 5DT Data Glove Ultra Wireless Kit
- 5DT Head Mounted Display 800-40
- 5DT Head Mounted Display (HMD) 800-26 2D
- 5DT Head Mounted Display (HMD) 800-26 3D
- 5DT Virtual Binoculars (2D and 3D)

Some of the **Training Systems (Computer Based Training [CBT])**, **Training Simulators** and **Technology Demonstrators** that have been developed by 5DT include:

Automotive
- Driver Training Simulator
- Road Safety Training System

Aviation
- Airspace Visualizer
- Air Traffic Control (ATC) Training Simulator
- Experimental Avionics Testbed
- Flight Visualization System
- Unmanned Aerial Vehicle (UAV) Training Simulator

Defense
- Air Defense Training Simulator
- Fiber Optic Guided Missile Training Simulator
- Integrated Virtual Battlefield

- Rocket Launcher Training Simulator
- Stand-off Weapon Training Simulator and Visualizer

High Voltage
- High Voltage Line Inspection Logging System
- High Voltage Line Inspection Program
- High Voltage Line Inspection Training System
- High Voltage Line Repair Training System
- High Voltage Yard Training Simulator

Industrial
- Crane Operator Training Simulator

Marine
- Marine Technology Demonstrator
- Unmanned Underwater Vehicle (UUV)/(ROV) Training Simulators

Medical
- Bronchoscope Training Simulator
- Exposure Treatment Phobia Simulator
- Gastroscope Training Simulator

Mining
- Continuous Miner Training Simulator (Mechanized Coal Mining)
- Surface Mining Training Simulator

Visualization
- Flight Visualization System
- Flow Visualization System

Other
- Landscape Generation and Real-time Rendering Technology

Information on these systems may be supplied on request.

7   Contact Information

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Web: www.5dt.com

Appendix A - Troubleshooting

There is no video Signal
- Check that the power adapter is plugged in and the POWER LED is lit.   - Check that the resolution of the input signal is 800x600.   - Check that the video cable is plugged into the PC VGA output port.   - Check that the screen refresh is set up correctly. The refresh rate should be 60Hz for 2D mode.

The picture is dark and fuzzy
- Make sure that the external source is connected and is turned on.   - Adjust the brightness of the display.

There is no sound
- Check that the volume is not set to zero.   - Check that the control is not muted.

The color appears incorrect
- Check the color control settings.   - Check that the VGA connector is properly inserted.

The image rolls, has static or is jumpy.
The 5DT HMD 800 is looking for a very precise 800 x 600 input signal at 60Hz. Some computers may output a signal at a frequency other than 60Hz despite the fact that your computer is set at 60Hz. Many computer monitors offer a "view meter" function that will tell you the exact signal output. See your monitor manual for details. Try raising or lowering your refresh rate slightly to see if this solves the problem.

The image flickers in 3D mode.
The 5DT HMD 800 operates at a refresh rate that is *double* the input refresh rate *up to* 60Hz. The headset will operate at the input refresh rate if the input rate is *above* 60Hz. If you experience image flicker, make sure the input refresh rate is 60Hz or less. Alternatively, reset the refresh rate on your computer to a minimum of 85Hz, preferably 100Hz or higher. Generally, at a refresh rate above 85Hz, the human eye should not be able to detect image flicker.

The image seems to darken over time.
The micro-display used in the 5DT HMD 800-26 may darken in color as they heat up over time. Minor adjustments can be made by accessing the OSD functions. Please make sure that you are using the HMD in an environment within the operating tolerances of the unit. Avoid long periods of direct sunlight exposure. *Please Note*: The micro displays will NOT be damaged if they do overheat during operation.

If you experience problems or have complaints, suggestions or other comments, please feel free to contact your supplier (preferably via e-mail). Please have the following information available, or include it in your written correspondence:

a. Computer processor make and model (e.g. Pentium V 2.8GHz)

b. Computer graphics card (e.g. GeForce FX)

c. Operating system and version (e.g. Windows 2000)

d. The symptoms of the problem and what was happening when the problem occurred

e. Can you reproduce the problem easily? Describe how

f. Actions taken by yourself to solve the problem

You may also contact 5DT directly at support@5DT.com

Appendix B - Specifications

Model	5DT HMD 800
Signal System	VGA / SVGA
LCD	0.49 inch 1.44 million Dot Micro Display
Dot Number / panel	800 (H) x 600 (V)
Virtual Image Size	44-inch at 2m
Viewing Angle	26° Diagonal
PC Input	RGB, Positive Sync in SGVA Mode
Connectors PC Input	PC Input D-sub 15 pin
Audio Input	Stereo Mini Jack
Power Consumption	Approx 4W
Operating Temperature Range	10 – 50 °C
Storage Temperature Range	0 – 60 °C
Dimensions	300 mm (L) x 200 mm (W) x 240 mm (H)
Weight	600 grams

Appendix C - Product Warranty

3 Month Product Warranty

5DT warrants to the original purchaser of the 5DT HMD 800-26 2D or 5DT HMD 800-26 3D that it will be free of defects in materials and workmanship for a period of 3 months from the original date of purchase. During the warranty period 5DT will at their discretion repair or replace (with a reconditioned unit) components that are defective.

Exclusions

The above warranty is provided for private use only and shall not apply to any commercial use of the product, including (but not limited to):

- Location Based Entertainment (LBE) applications
- Trade show demonstrations

This warranty shall not apply to defects resulting from the following:

- Misuse
- Improper or inadequate maintenance
- Unauthorized modification

Warranty Claim Instructions

We will try our best to get your repaired product back to you as soon as possible. In order to do this, we request your full cooperation with respect to the warranty claim instructions below.

Please adhere strictly to the following instructions:

a. Contact your supplier to determine if you need to return the product. If your supplier is unable to determine this, contact 5DT directly. Do not return a product to your supplier or to 5DT without first contacting them.

b. Your supplier (or 5DT) will issue you with a Return Material Authorization (RMA) number. Do not return a product to your supplier or to 5DT without an RMA number.

c. Pack the items to be returned securely using the original packaging material (if possible).

d. Please enclose the following:

- Your original sales bill
- Name, address, contact telephone/fax numbers
- E-mail address
- Reason for returning the item
- RMA number

e. Mark your shipping container with the RMA number to expedite handling by customs or your supplier at 5DT.

f. Ship prepaid to your supplier or to 5DT. Shipping charges to 5DT are your responsibility. COD shipments will not be accepted by 5DT.

g. When completing customs or courier documentation, please clearly indicate: "Unit returned for repairs under warranty. Not for resale. No commercial value. Amount shown is for customs purposes only."

h. If you are shipping the unit internationally, you <u>must</u> supply/attach a <u>commercial invoice</u> with your shipment, otherwise the customs authorities in the destination country will not release the shipment. The invoice <u>must</u> indicate a value. We suggest that you assign a value of US$50 (maximum) on the invoice, so that 5DT is not required to pay excessive import taxes on this product.

i. It is <u>important</u> that you assign the same maximum value of US$50 to <u>both</u> the invoice and the courier waybill.

j. If you do not adhere to the warranty claim instructions and 5DT has to incur costs to release the shipment from customs, these costs will be for your account. 5DT will not return your product until these costs are paid.

5DT is not responsible for any damage that may occur during shipping.

Ship via courier to your supplier or (if arranged) to:

US and Americas - 5DT Inc
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