① Scan™ HD *and* ① Scan™ HD+

HIGH RESOLUTION VIDEO SCALING ENGINE

How to Setup an iScan HD/HD+ Using the Internal Test Patterns and *AVIA: Guide to Home Theater* Calibration DVD

The iScan HD and HD+ have 27 built-in test patterns to assist in the setup of your display and your individual sources. We recommend that you use the *Avia: Guide to Home Theater* DVD to assist in this setup. This DVD can be purchased directly from DVDO at http://www.dvdo.com/companion/avia.php.
For initial setup please refer to the Quick Start Guide.

The built-in test patterns are:

Frame Geometry (FGEO)	Window IRE70 (I70)
Bright/Contr (BRCN)	Window IRE80 (I80)
Checker board (CHCK)	Window IRE90 (I90)
Ver. Lines (VLIN)	Window IRE100 (I100)
Hor. Lines (HLIN)	Gray Ramp (GRYR)
Judder (JUDD)	XHatch Coarse (CORR)
Color8 Bars75 (8F75)	XHatch Fine (FINE)
Color8 Bars100 (8F10)	Focus (FCS)
Window IRE10 (I10)	Half B/W (HBW)
Window IRE20 (I20)	H-Clr7 Bars75 (7H75)
Window IRE30 (I30)	H-Clr7 Bars100 (7H10)
Window IRE40 (I40)	H-Clr8 Bars75 (8H75)
Window IRE50 (I50)	H-Clt8 Bars100 (8H10)
Window IRE60 (I60)	

How to Read These Instructions:

In these instructions, we will refer to the menu structure in the iScan HD/HD+ in abbreviated form.
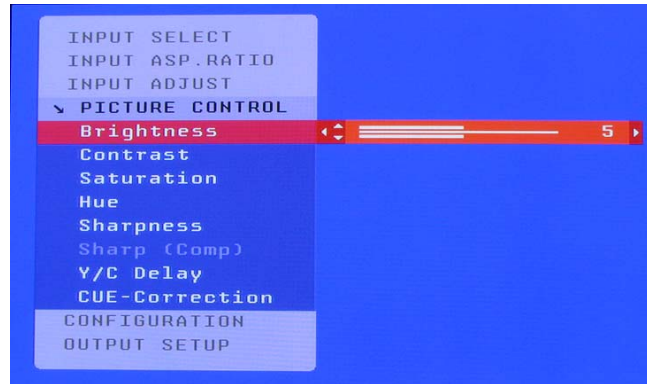
Navigating the On Screen Display (Image A)

As an example, to adjust the 'Brightness' you would press the 'Picture Control' button and then using the up/down arrow buttons you would highlight 'Brightness' and hit enter to adjust this setting.

If you were changing this value to 5, the abbreviated instructions would read like this:

Picture Control (PICT) -> Brightness (BRT) -> **5**

Note: The instructions in parentheses are to assist you if you do not have a picture on your display and they are what you will see on the Front Panel Display of the iScan HD/HD+.

The instructions in **bold** are the settings that needs to be changed.

Determining the Correct Output Resolution for Your Display:

First we need to determine the optimum output resolution to set your iScan HD/HD+ to get the best picture from your display. To do this correctly, you must know what the native resolution or maximum resolution of your display is. Native resolution refers to the actual pixel count of a fixed pixel display. Fixed pixel display technologies include plasma, LCD, DLP and LCoS. CRT-based technologies use scan lines so they do not have a native resolution but they do have a maximum resolution.

Keep in mind that some displays will not accept their native resolution. As an example look at these specs from an LCD TV:

Diagonal Screen Size (inches) 32
Display Capability **480p/720p/1080i**
Aspect Ratio 16:9 (Widescreen)
Aspect Control Normal, Zoom, Full, and Just
Resolution (Number of Pixels) **1280 x 768 (1,049,088 pixels)**

The native resolution of this display is 1280x768, which an iScan HD/HD+ can output but this display is only capable of accepting 480p, 720p, or 1080i signals. For this display, the best output resolution to choose on the iScan HD/HD+ is 720p, as it is the closest to the native resolution of this display.

As another example, here are the specs from a CRT-based rear projection display:

> Diagonal Screen Size (inches): 53
> Aspect Ratio: 16:9 (Widescreen)
> CRT Type: 7" Diagonal
> HDTV Compatibility: **540p/1080i**

This particular display will only display two resolutions, both of which the iScan HD/HD+ can output. To find out which one looks best on your display you should use familiar material, like a favorite DVD, to compare to find out which resolution is more to your liking on your display.

A small amount of displays' documented native resolutions are incorrect. According to the information on Fujitsu's web site, the native resolution of the Fujitsu 50" plasma (Model P50XHA10US) is 1366x768.

> 50" diagonal screen size
> AVM Digital Video Processor
> **1366 x 768 native resolution**
> 3000:1 contrast ratio
> 3.9" thin and 99 pounds

Even though the specifications say that this 50" plasma has a native resolution of 1366x768, we have found that most plasmas that are stated to have this resolution, actually have a 1360x768 native resolution. Most other displays do specify the correct native resolution, this display is an exception.

Here are several different popular display technologies and their most likely native resolutions.

Plasma
42-43" – 852x480, 1024x768, 1024x1024 (ALiS)
50-63" – 1280x768, 1360x768, 1365x768, 1366x768

DLP
Rear Projection – 1280x720 (720p)
Front Projection – 852x480, 848x600, 1024x768, 1280x720 (720p)

LCD
Rear Projection – 1280x720 (720p), 1366x768
Front Projection – 1024x768, 1280x720 (720p), 1366x768
Direct View – 1024x768, 1280x720 (720p), 1366x768, 1920x1080 (1080p)

LCoS
Rear Projection – 1280x720 (720p), 1366x768
Front Projection – 1024x768, 1280x720 (720p), 1366x768, 1920x1080 (1080p)

CRT
Rear Projection – 480p, 540p, 1080i
Front Projection – 1280x720 (720p), 1280x960, 1440x960, 1440x1152, 1920x1080 (1080p)

Initial Setup of the iScan to Your Display:

Test Patterns used: Frame Geometry (FGEO)
Checker board (CHCK)
Ver. Lines (VLIN)
Hor. Lines (HLIN)
Judder (JUDD)

We will be using the Fujitsu 50″ plasma (Model P50XHA10US) as an example. As stated above, this display has an actual native resolution of 1360x768. Start by selecting the preset which is closest to the output resolution that you need. In this situation, the closest preset is 1366x768.

Output Setup (OSET) -> Format (FMT) -> **1366x768 (PLA3)**

Next, you want to display the 'Frame/Geometry' test pattern to verify that the image is positioned correctly on your display.

Configuration (CNFG) -> Test Patterns (TEST) -> **Frame Geometry (FGEO)**

Note: To turn the test patterns on and off, use the 'Test Patterns' button on your remote control. Additionally, you can navigate backwards and forwards through the test patterns, using the '1' and '3' buttons respectively.
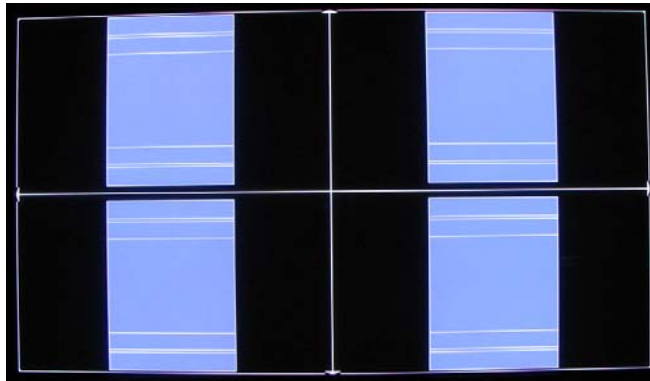
Frame/Geometry Test Pattern Displayed Correctly (Image B)

When this test pattern is displayed correctly, it should look like this, with a one-pixel wide white border around the edge of the screen:
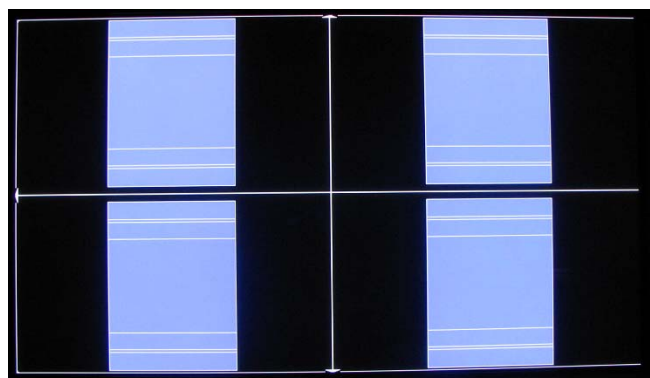
Frame/Geometry Test Pattern (Image C)

As you can see in image C, the test pattern is almost displayed correctly. You can see the 1-pixel wide white border on the top, bottom and left side of the image but not on the right side of the image. By adjusting the horizontal size of this signal to 1360 (rather than 1366), we can get this test pattern displayed correctly on our display.

To change the horizontal size of the image you must first put the iScan in 'Advanced' user mode.

> Configuration (CNFG) -> User Mode (USRM) -> **Advanced (ADV)**
>
> Output Setup (OSET) ->Format (FMT)->H-Size (HSIZ)->**1360**

In some cases, the output format is correct, but the image just needs to be shifted to fill the screen correctly. This can be done by using the Horizontal and Vertical Shift options in the 'Output Setup' menu.

> Output Setup (OSET) -> Format (FMT) -> 1366x768 (PLA3) -> H-Shift (HSHF) -> **Range**
> Output Setup (OSET) -> Format (FMT) -> 1366x768 (PLA3) -> V-Shift (VSHF) -> **Range**

Note: Any adjustments made to the output format will change your selected output from the resolution you selected to 'User'. This allows you to adjust the output without affecting the default settings.

There are three test patterns that are used to verify that the chosen output resolution is the native resolution of your display and that you are bypassing any internal processing in your display. They are the checkerboard, vertical lines and horizontal lines test patterns.

When the checkerboard test pattern is displayed correctly, close up you should be able to see a 1-pixel checkerboard and at proper viewing distance the image should appear as an even gray. If your display is CRT-based you will not see this checkerboard, but your screen should be an even gray.

When this test pattern is displayed incorrectly, the resulting image does not look like a fine checkerboard and may have irregular patterns. If this is the case then the chosen output resolution may not be the native resolution of your display or your display may scale all input signals even if the input resolution is already at native resolution. Check to make sure that the output resolution selected on the iScan is the correct output resolution for your display.

Note: If this test pattern does not appear as it should and you have chosen the native resolution of your display, you may not be able to bypass the internal processing on your display.

The 'Vertical Lines' test pattern should appear as one pixel wide black and white columns. If you see any irregular pattern(s) in the image then you know that the display is scaling the signal horizontally. To override the internal scaling you can adjust the horizontal size of the image to see if the test pattern can be displayed correctly.

> Output Setup (OSET) -> Format (FMT) -> User (USER) -> H-Size (HSIZ) -> **Adjust**

The 'Horizontal Lines' test pattern should appear as one pixel tall black and white rows. If you see any irregular pattern(s) in the image then you know that the display is scaling the signal vertically. To override the internal scaling you can adjust the vertical size of the image to see if the test pattern can be displayed correctly.

> Output Setup (OSET) -> Format (FMT) -> User (USER) -> V-Size (VSIZ) -> **Adjust**

The 'Judder' test pattern displays a bar that bounces back and forth at the chosen output frequency selected in the 'framerate' parameter. When this test pattern is displayed correctly, the bar will move smoothly across the screen and bounce from side to side. When this pattern is displayed incorrectly, this bar may 'tear' as it moves across the screen. To adjust the framerate conversion, go to the 'Output Setup' menu.

> For displays that will only display 50Hz (PAL)
> Output Setup (OSET) -> Framerate (FRC) -> 50Hz (50->) -> **50Hz Lock (50L)**
> Output Setup (OSET) -> Framerate (FRC) -> 60Hz (60->) -> Unlock (UNLK) ->**49.95**
>
> For displays that will only display 60Hz (NTSC)
> Output Setup (OSET) -> Framerate (FRC) -> 50Hz (50->) -> Unlock (UNLK) ->**59.94**
> Output Setup (OSET) -> Framerate (FRC) -> 60Hz (60->) -> **60Hz Lock (60L)**

Display Calibration:

Test Patterns Used: Bright/Contr (BRCN)
Color8 Bars75 (8F75)
Color8 Bars100 (8F10)
Gray Ramp (GRYR)

The iScan HD/HD+ have several test patterns to assist in the setup of your display. Adjustments should be made on your display not on the iScan to correctly setup your iScan and display.

The 'Brightness/Contrast' test pattern will assist you in setting up both the brightness (black level) and contrast (white level) of your display. The 'Brightness/Contrast' test pattern is composed of 4 quarter-screen blocks. Two of the blocks have a background level of standard black and the other two blocks have a background level of standard white. Embedded in the black blocks are 3 bars. One is 4 IRE below black (blacker-than-black), one is 1 IRE above black, and the third is 2 IRE above black. Embedded in the white blocks are 3 bars. One is 1 IRE above white (whiter-then-white), one is 1 IRE below white, and the third is 2 IRE below white. The bottom two blocks differ slightly from these levels. For the bottom two blocks, the blacker-than-black is at the lowest possible luma level and the whiter-than-white bar is at the highest possible luma level. When the brightness and contrast are adjusted correctly, you should be able to see the 1 IRE and 2 IRE above black bars on the black background and the 1 IRE and 2 IRE below white bars should be visible on the white background. When the brightness is adjusted correctly, black objects should appear 'black' with the details still intact and lighter areas should be 'light', not gray, with the details still intact. When the contrast is adjusted correctly, white objects will appear 'white' with the details still intact. Because the contrast settings can affect brightness settings we recommend that you check the brightness setting after making this adjustment.

Note: If you have a CRT based display, following the instructions above may yield a contrast setting too high. If the contrast is set too high, you will get blooming and loss of details in the highlighted areas. It is more helpful to use the two vertical lines in the test pattern. Adjust the contrast up and down and you will notice that these lines will bend as you increase the contrast. To properly adjust contrast on a CRT based display, decrease the contrast until the vertical lines start to straighten out. If possible, the two lines should be straight. On some CRT, the lines may not straighten even if you turn the contrast to its minimum. If this is the case, slowly increase the contrast to a point just before the vertical lines have extreme bending. You have now properly set up the contrast of your display. Continue to set up brightness as detailed above.

The 'Color8 Bars75' and 'Color8 Bars100' will assist in setting up the saturation (color) and hue (tint) of your display. The 'Color8 Bars75' test pattern consists of 8 vertical bars across the screen at a 75% saturation level. The 'Color8 Bars100' test pattern consists of 8 vertical bars across the screen at a 100% saturation level. From left to right the bars are: white, yellow, cyan, green, magenta, red, blue, and black. To properly adjust the saturation and hue you will need to use the blue colored filter that comes with AVIA. You will also need to turn off any automatic flesh tone controls on your display before making these adjustments. When the Saturation and Hue are adjusted correctly, the white bar and the blue bar should be exactly the same shade when looking through the blue filter. Saturation and hue settings interact with each other so after making this setting you may want to go back and check that the saturation setting is correct.

The 'Gray Ramp' can help verify that your display is showing the gradients between black and white correctly. You should see a smooth transition between black and white with this test pattern.

Display Calibration – Special Equipment Needed:

To get the most accurate picture on your display, you may want to have an ISF-certified technician calibrate your display (www.imagingscience.com). To assist in this calibration we have included IRE windows to be used with the proper calibration equipment.

Test Patterns Used: Window IRE10 (I10)
Window IRE20 (I20)
Window IRE30 (I30)
Window IRE40 (I40)
Window IRE50 (I50)
Window IRE60 (I60)
Window IRE70 (I70)
Window IRE80 (I80)
Window IRE90 (I90)
Window IRE100 (I100)

IRE stands for International Radio Engineers and it is a *relative* scale, **NOT** an *absolute*. It defines the volt peak to peak video divided up into 140 IRE units. This is done to make numbers for luminance levels easier to communicate. In the ISF Training Manual, it is described as the amplitude of the video signal from blanking (zero volts) to peak white is 0.714286 volts or 100 IRE units. Synchronization signals extend from blanking to -0.285714 volts or -40 IRE units.

CRT Display Calibration:

To get the best picture from your CRT-based display you will want to make sure that the red, blue and green signals are converged properly. To assist in converging these three signals we have included two test patterns. In addition to convergence, you will also want to make sure that the focus is optimally adjusted. We have included one test pattern designed specifically for this application. On some displays, these settings, may not be available unless you get into the service menu. We recommend that you hire an ISF-certified technician to make these adjustments if you do not feel comfortable getting into the service menu.

Test Patterns Used: XHatch Coarse (CORR)
XHatch Fine (FINE)
Focus (FCS)

Source Calibration:

Test Patterns Used: Half B/W (HBW)
                      H-Clr7 Bars75 (7H75)
                      H-Clr7 Bars100 (7H10)
                      H-Clr8 Bars75 (8H75)
                      H-Clt8 Bars100 (8H10)

To get the best performance out of each of your sources you will want to individually calibrate each input specifically to the connected source. Keep in mind that if you replace a source with a new component you will also want to recalibrate the input. To calibrate each source correctly you will need the source to output a reference test pattern similar to what is built in to the iScan. For sources like DVD, LD and D-VHS this content is readily available but for a source like HD satellite or cable these test patterns are played on channels like HDNet at off hours so if you have a DVR we recommend that you record these test patterns.

AVIA will assist in setting up the input which your DVD player is connected to. We recommend that you use a digital connection, DVI, HDMI or SDI, or a high quality analog connection, component video. We recommend that you do not use S-Video or Composite video for a higher quality source like DVD. Before calibrating the input for your DVD player, make sure that your DVD player is set to '16:9' output, not '4:3'. You will also want to turn off any extraneous features like noise reduction which may add more noise than help. Set all picture settings on the DVD player to either 'Off', 'default', or '0'.

Use the test patterns included on the AVIA DVD to adjust the picture controls on this input. If you are not familiar with how to make these adjustments watch the guided setup first and then make each adjustment. The guided setup can be found by clicking on 'Advanced AVIA' from the main menu, and then selecting 'Basic Video Adjustments' on the following menu page. Each picture control is explained in depth and the narrative will tell you what to look for in a properly adjusted display.

Once you have made the above adjustments there are several patterns on the AVIA DVD that can be used in conjunction with the built-in test patterns of the iScan to verify the settings are correct. After inserting the AVIA DVD into your DVD player, press the 'top menu' button to bring up the main menu. From the main menu, select 'Advanced AVIA'. On the right hand side of the 'Calibrations' menu page select 'Video Test Patterns'. From the 'Video Test Patterns' menu, select 'Gray Scale & Levels'. From the 'Black and White Levels' menu, select the 'Needle Pulses' test pattern. This is to be used with the 'Half B/W' internal test pattern from the iScan. Once you have adjusted brightness and contrast, go back to the 'Video Test Patterns' menu and select 'Color Adjustment'. From the 'Color Adjustment' menu, select 'Special Color Bars'. The 'Full Bars' test pattern is to be used in conjunction with the 'H-Clr7 Bars75' internal test pattern from the iScan. The 'Full 100 Bars' is to be used with the 'H-Clr7 Bars100' internal test pattern.

Record Your Settings

Once you have set up your iScan, we recommend that you record your settings on the installation worksheet which is available on our website.