HDTV Quick Reference Guide

Introduction

Whether you've already purchased a High Definition Television (HDTV) or are in the market to do so, there are a few key items you need to know. The premise of HDTV is simple: Deliver a picture that is up to 5X sharper than standard TV complete with digital surround sound that rivals the audio experience found in a typical movie theater. While this may sound simple enough in concept, enjoying all of the core benefits that HDTV has to offer can often be a challenge for consumers. A recent article by Peter Grant in the Wall Street Journal confirms this dilemma:

Anyone who thinks consumers understand high-definition television should consider a recent survey by Leichtman Research Group. It concluded that close to one-half of the 24 million households with HDTV's don't actually watch high-definition programs because they haven't obtained the necessary hardware from their cable, phone or satellite operators.

And about one half of those viewers, about 6 million, don't even realize they're not watching HDTV.

To truly enjoy all of the benefits offered by High Definition television, you absolutely must have a source capable of displaying High Definition content and the appropriate cables to connect that source to your HDTV display. This HDTV Quick Reference Guide discusses your various options for HD content and provides an overview of HDTV cable requirements.

Amphenol CablesonDemand.com stocks every common cable type used by today's HDTV display technologies such as DLP, LCD, and Plasma. This guide will be updated regularly with new tips and tricks to maximize your HDTV experience.
The HDTV Transition

The analog technology behind standard definition television (SDTV) broadcasts in North America has remained largely unchanged for nearly half a century. Color television broadcasts using the NTSC (National Television Standards Committee) system started in 1953 throughout North America, Japan, South Korea, and the Philippines. This proven, yet in many ways primitive analog video system is heading for extinction. On February 17, 2009, all U.S. television broadcasters will turn off their NTSC transmissions for good, marking the end of the analog broadcasting era. NTSC color broadcasts are characterized by a resolution of 480 \textit{interlaced} lines (480i) and an aspect ratio of 4:3 (the ratio between the width and height of the image).

This is an exciting transition for television viewers, as the concept of fuzzy, blurry, and ghosted reception will soon fade into history. High Definition Television (HDTV) has taken the North American market by storm; with 2006 marking the first year HDTV sales outpaced standard definition TV sales. The technology that makes high definition television possible has its roots in the digital video systems developed by NASA during the space race. The benefit of a digital signal is that it is less prone to the negative effects caused by interference over long distances. This core concept is what makes HDTV such a worthwhile upgrade, as it ensures crisp picture details, proper color rendition, and pristine audio from the source down.

The primary advantage of HDTV is its resolution. Resolution is the quantity of distinct pixels that make up an image. Resolution is often expressed in terms of “lines”, in which a line would represent a row of pixels. Much like digital cameras, a higher pixel count will produce a more detailed image on screen. HDTV signals are characterized by a resolution of 720 \textit{progressive} lines (720P) or 1080 \textit{interlaced} lines (1080i) and an aspect ratio of 16:9. The widescreen 16:9 aspect ratio for HDTV was selected as a middle ground between the standard TV 4:3 aspect ratio and the 2.35:1 aspect ratio found in many films.

The HDTV content providers must chose whether to broadcast in 720P or 1080i. While 1080i tends to be the more popular format due to its higher resolution, the interlacing used can
cause distortion in some instances. The 720P Progressive Scan format does not suffer from this type of distortion (shown below) and is the preferred format for televising live sporting events. **1080P** is currently the “hot new” HD format, but very few sources of 1080P material exist to take advantage of it.

![Images showing progressive vs. interlaced]  

(P)rogressive vs. (I)nterlaced

**HDTV Basic Setup Requirements**

There are two pre-requisites that must be met for your HDTV to properly display High Definition content. The most important consideration is having a proper source of HD programming. This source is generally a separate HDTV set-top box leased by a cable or satellite operator, but can include other technologies as well. Nearly as critical for HDTV viewing is selecting the appropriate cable to connect to your HD equipment. Many of the common Audio/Video cable technologies simply are not designed to handle High Definition content.

**HDTV Content Providers**

Most of today’s cable TV providers have embraced HDTV technology head-on through comprehensive technology upgrades to their infrastructure. To receive HDTV content from your cable company, you are generally required to subscribe to a High Definition programming package and lease an HDTV compatible cable box.

The cost is usually an additional $15 per month. Some HDTV’s are equipped with a **CableCard™** slot. **CableCard™** technology allows the end-user to avoid leasing a box and uses circuits in the HDTV and **CableCard™** itself to receive the signal. **Cable Cards** have not been well received since they do not support Pay-Per-View™ and OnDemand™ programming.

**HDTV via Cable Pros:**

Simple upgrade with no extra equipment to buy  
Decent selection of HD content including local HDTV channels
HDTV via Cable Cons:

Must lease HDTV box from the cable company
Cable companies often compress their HDTV feeds reducing quality

HDTV via Satellite Provider

Satellite operators have been waging a tough fight for supremacy of HDTV content by making significant investments in infrastructure. Dish Network™ recently integrated the satellites from VOOM™, an exclusively high Definition satellite provider, into their orbiting network. DirecTV™ has launched a constellation of HD satellites to expand their programming options. If you are already a subscriber to either of these services, upgrading to one of their recommended HDTV satellite receivers is a great option. Unlike the cable company, this receiver must be purchased up-front to receive HDTV service.

HDTV via Satellite Pros:

More HDTV channel selections than cable
HD programming packages are generally cheaper than cable

HDTV via Satellite Cons:

The required HDTV satellite receiver can cost upwards of $500
Not all local channels are carried in HD by the satellite providers

HDTV via Antenna (Over-the-Air Broadcasts)

While most television viewers receive their programming through a cable or satellite provider, several million tune in to standard definition over-the-air NTSC broadcasts through an antenna and tuner. A special ATSC (Advanced Television Systems Committee) digital tuner is required to pick up HDTV signals over-the-air, which are integrated into many HDTV’s and stand-alone receiver boxes. On February 17, 2009, viewers can only watch over-the-air television if they have an ATSC digital tuner, since stan-
standard NTSC broadcast signals will be shut down permanently by the FCC. To offset this cost and inconvenience for consumers, the Government will provide nearly $1 Billion in vouchers for ATSC digital tuners to those affected by this transition.

**HDTV via Antenna Pros:**

No monthly subscription costs required  
Picture quality is generally superior to satellite and cable

**HDTV via Antenna Cons:**

Costs associated with special ATSC tuner  
Reception problems similar to cell phones in some areas

**HDTV Cable Technology Overview**

Unfortunately one of the most critical factors in ensuring a stellar HDTV experience is often overlooked. Simply using an incorrect cable for your HDTV installation can lead to an 80% reduction in picture quality, even if you’ve invested in the proper equipment. Some of the most common video cables used by today’s A/V devices simply cannot handle the strict technical requirements imposed by HDTV.

**Common A/V Cable Types**

- **Coaxial / RF**  
  HDTV Support: NO

- **Composite Video**  
  HDTV Support: NO

- **S-Video**  
  HDTV Support: NO
If you are using any of the cables shown above as the connection between your HDTV and HD source equipment, you are missing out on the HDTV experience. This is one of the best indicators of HDTV compatibility, since a quick glance at the back of your equipment can verify whether the installation is compliant. These cables can still be used for connections between legacy equipment like VCR’s and an HD display.

**Common HDTV Cable Types**

Component Video  
HDTV Support: **YES**  

DVI  
HDTV Support: **YES**  

HDMI  
HDTV Support: **YES**

A great majority of HDTV’s can utilize any of the three cable types shown above. Component Video, DVI, and HDMI cables are all fully compatible with HDTV signals. All of these cables are optimized specifically for the purpose of carrying high resolution video signals such as HDTV. CablesonDemand.com carries all of these HDTV cable options for your home theater.

**Component Video**

Component Video is the oldest cable technology commonly used for HDTV’s. Component Video cables support an analog system of signal transmission. Component Video is very similar to the VGA/SVGA system used primarily on computer displays. Component cables can always be identified by their distinctive red, green, and blue markings. The image quality provided through a Component Video connection is quite impressive, but not quite as sharp as a digital connection like DVI and HDMI. DVD players almost always provide the best picture quality through the Component Video connections.

Since Component Video is an analog technology, it can be prone to interference, especially over extended runs. Component Video cables from CablesonDemand.com are designed to combat these problems. Gold Plated RCA connector terminations eliminate signal drop-outs caused by corrosion. Low-loss double shielded RG-59 coaxial cable permits longer cable runs and protects against interference.

Compatible with all devices featuring Component Video connections; including HDTV’s, DVD Players, Sony PS3™, and X-Box 360™ game consoles.
DVI Video

DVI, or Digital Visual Interface, was the first all digital video connection technology used for HDTV’s. Although originally developed for flat panel computer displays, the technology quickly migrated to the HDTV market. HDTV’s specifically use the DVI-D connection type designed to accommodate digital video signals. Due to its digital nature, a DVI connection produces a stunningly detailed image. DVI should be considered first over Component Video if the option is available. Although most late generation HDTV’s use HDMI connections, it is possible to convert between HDMI and DVI using the proper cable.

DVI cables from CablesonDemand.com feature a mixture of copper twisted pair and coaxial cable conductors in a flexible jacket. An additional layer of shielding is included to isolate the DVI cable from potentially harmful interference. Conductors are precisely spaced to maintain signal integrity over extended runs.

Compatible with all devices featuring DVI-D or HDMI (with converter cable) connections; including HDTV’s, Digital Computer Displays, Upscaling DVD Players, HD-DVD™ and BlueRay™ Players, Sony PS3™, and X-Box 360™ game consoles.

HDMI Video

HDMI, or High Definition Multimedia Interface, is the premier HDTV interface. Specifically designed for High Definition devices, HDMI provides both uncompressed high resolution digital video and multi-channel surround sound over a single link. This drastically reduces your cabling requirements and setup time. The video component of the HDMI interface is backwards compatible with DVI when using the proper cable. HDMI should always be the preferred connection method if your equipment supports it. HDMI is a scalable technology, thus allowing for future technology upgrades without the need to replace the cable.

HDMI cables from CablesonDemand.com have been certified by an HDMI compliant test lab. This compliance testing ensures that the cable uses the proper wire gauge and layout per the HDMI specification. By following such tight tolerances in the construction of the cable, HD resolutions up to 1080P are supported.
Compatible with all devices featuring DVI-D (with converter cable) or HDMI connections; including HDTV’s, Digital Computer Displays, Upscaling DVD Players, HD-DVD™ and BlueRay™ Players, Sony PS3™, and X-Box 360™ game consoles.
Tips and Tricks

Although HDTV’s can look great right out of the box, most of the time some simple tweaks need to be done to optimize the picture. HDTV’s tend to produce a cooler image (with emphasis on blue) with standard settings. This may look good on display at the electronics store, but for home viewing this is undesirable. Here are some suggestions to optimize your HDTV experience:

Tip #1: HDTV Calibration

Calibration is the process of fine-tuning your HDTV’s settings to provide the most accurate picture possible. This ensures that you, as a viewer, will be able to see a movie exactly the way the director intended. Basic calibrations can be done by anyone using a special DVD. More in-depth calibrations can be done by a professional.

For a basic calibration, take a look at your DVD collection. DVD’s mastered in THX™ usually include a feature called the THX Optimizer™. This is a free calibration tool that handles Brightness/Contrast, Color/Tint, and other basic performance benchmarks. For more information on THX Optimizer™, please visit the link below:

http://www.thx.com/home/dvd/optimizer/index.html

Test Pattern Used for HDTV Calibration
Tip #2: Brightness and Contrast

Brightness controls the black level of the picture while Contrast controls the white level of the picture. Incorrect settings can really degrade the image quality. Low brightness eliminates shadow detail while high brightness washes the image out. Low contrast makes an image look weak and dark while high contrast can make the white portion of the image bloom. These settings are simple to dial in using a calibration DVD.

Tip #3: Color/Tint

Color and Tint controls the saturation and the hue of color images on your HDTV. If you are using a DVI or HDMI connection, these settings can usually be left alone. This is because a digital signal will display the color/tint level exactly as it was meant to be displayed. For Component Video connections, the color and tint can shift or weaken since it is an analog signal. Adjust the settings as needed either through preference or through a calibration DVD.

Tip #4: Color Temperature

![Color Temperature](image)

Color Temperature describes the appearance of white light within an image, expressed in Kelvins. A warm color temperature tends to take on a pinkish hue while a cool temperature will appear blue. The recommended color temperature for HDTV is 6500K. Some HDTV’s will have a setting known as 6500K or D65. Selecting this setting is usually recommended. For more advanced users, the color temperature can be set manually by adjusting the separate R, G, and B gain/drive settings. An easy method is to set the display’s color setting to zero so a black-and-white image appears. Adjust the R, G, and B settings up and down as needed until the black and white image looks perfect and free of any color (i.e. a blue hue). Once set, you can raise the color setting back to normal.

Tip #5: Native Display Settings

Nearly all HDTV’s have a Native Display resolution. This means that the display device has a fixed pixel count. The most common native HDTV display resolutions are:
1280x720
1280x768
1366x768
1920x1080

HDTV’s will always look their best when they are fed with a signal equal to or close to their native resolution. If your HDTV has a native display resolution of 1280x720, 1280x768, or 1366x768, feed the TV with a 720P signal. If your HDTV has a native display resolution of 1920x1080, feed the TV with a 1080i signal. Most HD capable satellite and cable boxes allow you to manually select the signal output between 720P and 1080i.

**Tip #6: Bad Signal Diagnostic**

Diagnosing signal problems can be difficult. A bad HDMI or DVI cable will result in signal drop-outs and pixilation. These symptoms can also result from a bad HDTV signal feed from the cable or satellite provider. To pin-point where the source of the problem lies, tune through multiple channels. If the problem persists on all of the channels, you most likely have a bad cable.

A bad or low quality HDTV signal can be checked using the CBS™ HD test. CBS™ will only allow their HD signal to be re-broadcast if the signal is not manipulated by the cable or satellite operator. Tune to the CBS™ HD channel. This channel should be crystal clear and free of distortion. If this channel appears distorted, there is likely a problem with your HDTV signal. Please contact your cable and satellite operator if this is the case. They can remotely check the HDTV signal strength for you.