Home theater made easy! Dolby Digital, DVD, A/V glossary, FAQs, and more!

# CRUTCHFIELD Guide

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# The Crutchfield Guide to Home Theater

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## The Magic of Home Theater

We all know how movie theater magic comes to life. The gorgeous, vivid images on the screen are enhanced by the impressive, enveloping audio. From the faint chirping of crickets in the background, to the crackle and boom of a thunderstorm, to the resounding roar of a spaceship rumbling into view, it is the *sound* that draws you into the action on-screen and holds you there.

Now, home theater systems make the same experience possible in your own living room. The detail and precision of surround sound enhance the picture, and make even your 27" television loom large. The result is stunning, three-dimensional sound, complete with the detailed special effects and imaging that you find in a theater. When that tornado tears across the screen, you'll feel like it's passing through the room, too — the winds will howl right past you, and far behind your right shoulder, you'll hear the "crash!" of a tractor hitting a barn.

#### Transform your room into a cinema!

Home theater is now so popular that it can be both easy and inexpensive to achieve. Whether you want to build an entire home theater system from scratch or add to your existing components, the options are plentiful. This guide is designed to answer your questions about home theater and give you an idea of what is involved. We also hope that you'll be able to identify what you, personally, need for great home theater. Some helpful things to think about are:

1) Which new technologies appeal to you the most? (Remember, home theater doesn't

mean having every component on the market! You can pick and choose.)

- What components do you already own? (Some may be ready for home theater now. You can always mix and match to create a system!)
- 3) Are you thinking of replacing any old components? (If so, now might be the time to upgrade.)

Before we get into DVD players, A/V receivers, and other A/V gear, let's take a look at Dolby Digital, and the concepts and technology behind surround sound.

## Dolby Digital, Pro Logic & DTS Surround Sound

Boom! Just seeing that word on the screen is not too startling, by itself. But if someone whacked a bass drum a few feet away from your chair, you'd jump! It's the same story when you replace the sound from those tiny speakers in your TV with wraparound home theater sound.

George Lucas, the creator of *Star Wars* and a master of movie excitement, has said, "Sound is 50% of the experience. If you don't have a good sound system, you cut the experience dramatically."

The key word here is "experience." Add realistic sound to whatever's on the screen (a movie, TV show, video game, concert, or ballgame) and suddenly you're no longer just watching — you're experiencing! Two-dimensional images become three-dimensional events. TV and movie viewing is transformed into a senses-grabbing cinematic experience, letting you enjoy the sights, sounds, and power of the movie theater in the comfort of your home.

#### Sound that surrounds you

When stereo was developed, music lovers who had only experienced mono were in heaven. Imagine one muddy channel of sound — the kind you'd find on an old-fashioned transistor radio — being replaced with 2 distinct channels! Suddenly, familiar recordings offered greater clarity and precise detail.

Now imagine the same kind of change taking place when it comes to watching a video. Although a movie soundtrack can be played through your regular stereo speakers, or just through the speakers built into your television, imagine the clarity and precision possible with *multiple* speakers surrounding you! Just like a movie theater, which uses lots of speakers to engulf you in sound, Dolby<sup>®</sup> Surround uses several carefully placed speakers to achieve the same effect — right in your own living room!



Turn your living room into a movie theater, with surround sound that re-creates the cinema experience!

Whether they're tiny speakers (called satellites) that hide away discreetly on shelves, or large, floor-standing tower speakers, you hear details you never dreamed were there. A multichannel soundtrack can even convey the impression of movement — so as a horse gallops across the screen, you can hear its hoofbeats begin far to your left, drum closer, seemingly thunder right past you, then slowly fade away in the distance to your right.

Dolby Surround comes in two flavors, **Dolby Digital** and **Dolby Pro Logic**, that add excitement and immediacy to every scene. Dolby Digital has rapidly become the standard for great home theater surround sound. What's more, it's widely available. You can find the Dolby Digital logo on thousands of DVDs, and it is the chosen audio format for **HDTV** (see pg. 14 for more information on HDTV). Read on to find out all about why Dolby Digital 5.1-channel sound has taken the world by storm.

#### **Dolby Digital**

Introduced in movie theaters in 1992, **Dolby Digital** is simply a digital form of encoding audio data, which ensures accurate reproduction of sound. The fact that Dolby Digital is digitally encoded means that it can be stored and sent as a digital signal — and digital signals are not prone to degradation the way analog signals are. As a

result, it was chosen as the standard audio format for DVDs and High-Definition Television (HDTV) — a guarantee that it has a future.

The accuracy and flexibility of Dolby Digital have resulted in the development of Dolby Digital 5.1-channel surround sound. 5.1-channel surround is a much newer system than Dolby Pro Logic, but it has quickly established itself as the preferred format. It offers top-notch audio precision and depth, and much clearer dialogue than other surround formats or regular TV listening. As a result, even though it can take the form of stereo, even mono, sound, Dolby Digital is often simply referred to as a "5.1-channel" system.

In 5.1-channel sound, there are five full-range (3-20,000Hz) channels of sound, for impressive depth and precision. Two channels offer full-range stereo sound in left and right front speakers (your regular stereo speakers can

fit this bill). A third channel plays through the **center channel** speaker (usually positioned right above or below the television's screen, so dialogue seems "attached" to the faces on the screen). The last two full-range, stereo channels of sound are sent to **surround speakers**, creating a spacious, ambient atmosphere and distinct special effects.



State-of-the-art "5.1-channel" Dolby Digital home theater surrounds you with six discrete channels of crystal-clear, dynamic digital audio. With 5.1-channel surround, your main, center and surround speakers are all fed separate full-bandwidth information, for increased three-dimensionality and more precise localization of sounds (it's important to have surrounds capable of handling all this information). Dolby Digital decoding also sends a channel of "low frequency effects," which adds bass excitement and immediacy to a soundtrack.

The ".1" (or subwoofer) channel, with a frequency range of 3-120 Hz, contains the additional low bass information (also called low frequency effects, or LFE) needed for the optimum excitement and impact of movie scenes involving explosions, crashes, and other sensational effects. It is referred to as ".1" because 3-120 Hz is a very limited amount of the soundtrack's frequency range.

On its way to your home theater, a 5.1-channel Dolby Digital soundtrack is "squeezed" down to a single digital bitstream for reproduction on DVDs and HDTV broadcasts. Your Dolby Digital decoder then converts this digital bitstream back to six discrete audio channels for playback in your home theater. Since all six channels are digital, they can be transferred — without loss — from the movie studio to your living room. This advanced home theater technology delivers pristine detail, incredible dynamic range and unparalleled sound localization. It's a significant improvement on earlier surround formats like Dolby Pro Logic, because the full-frequency stereo surround speakers add more spacious ambience and clearer off-screen effects, while the dedicated subwoofer channel gives realistic bass impact to the faintest rumbles and loudest roars.

To experience 5.1-channel Dolby Digital sound, you need a DVD (many DVDs are encoded with 5.1-channel Dolby Digital — check to see if the DVD case says "5.1" on the back cover), a DVD player, an A/V receiver, and a Dolby Digital decoder (either as a separate unit, or built into the DVD player or A/V receiver). You also need a complete home theater speaker system and a TV. There are a variety of ways to make connections between these different



#### How Dolby Digital Works

In a 5.1-channel Dolby Digital soundtrack, all the sound elements (dialogue, sound effects, and music) are encoded as six discrete channels of digital audio.



To re-create the realism and impact of the movie theater experience, Dolby Pro Logic home theater places you in the middle of a three-dimensional soundfield. It's a 4-channel system: (1) center channel for dialogue and on-screen sound; (2&3) front left and right channels for sound that moves with the action; and (4) a mono surround channel for ambience and effects.

components - just be sure, if you're thinking of adding to your system, that there are compatible inputs and outputs on each component. The digital audio connections you'll be making will probably use either an optical digital (or Toslink) connection, or a coaxial digital connection. In a few cases, DVD players with built-in Dolby Digital decoding may let you run 6 analog channels (the five full-range channels and one limited channel of 5.1 audio) into a Dolby Digital-ready receiver.

If you already have a substantial video library full of Dolby Pro Logic sources, don't worry. Dolby Digital decoders are Dolby Pro Logic decoders too - they automatically interpret Dolby Pro Logic signals and play them in that format, so upgrading to Dolby Digital doesn't make your other favorites obsolete. Now, we'll offer a quick overview of Dolby Pro Logic.

#### Dolby Pro Logic

Dolby<sup>®</sup> Pro Logic<sup>™</sup> was the home theater surround sound standard for years, and is still a very common form of Dolby Surround. It's the decoding format needed when your video source is a Dolby Surround-encoded videotape or stereo TV broadcast.

Dolby Pro Logic is a four-channel system, offering three channels of full-range sound in the left front, right front, and center channel speakers. A fourth (mono, not stereo) channel of limited-bandwidth sound is shared by two surround speakers, creating a spacious, ambient atmosphere and engaging special effects.

To make all this happen, the movie soundtrack goes through a Dolby Surround encoder, which "squeezes" four channels (left, right, center, and surround) into two matrixed channels. These channels are then stored on a videotape or broadcast in the same (matrixed) stereo format.



With Dolby Surround Pro Logic, the 4-channel movie soundtrack is "squeezed" into 2 channels for stereo VHS, cable, DBS and over-the-air broadcasting. A Dolby Pro Logic decoder separates it again.

#### How Dolby Pro Logic Works

Your A/V receiver's Dolby Digital or Dolby Pro Logic decoder converts the matrixed two-channel signal back into four-channel surround sound. The steering logic circuitry built into the decoder precisely directs sound to the appropriate channel, so each speaker plays the sounds intended for its location.

The rear surround information passes through a time-delay circuit before it reaches the surround speakers, adding a sense of space, and making off-screen sound effects seem distinct and realistically placed. Although this surround information is mono, keep in mind that it's necessary to use a pair of speakers to achieve the intended surround effect in your home theater. And remember ---even if Dolby Pro Logic can't quite measure up

to the precision and intensity of Dolby Digital, it's still a great way to get surround sound out of a number of home theater sources!

#### What's the buzz about DTS?



DIGITAL Digital Theater Systems (DTS) first appeared on the scene in 1993, providing commercial movie theaters with a digital surround sound

alternative to Dolby Digital. Nearly 9000 theaters worldwide support this format, and hundreds of movies have been encoded for the cinema in DTS. Now, DVDs with DTS encoding seem to be gaining some momentum.

Like Dolby Digital, DTS offers a discrete

# GEAR UP FOR CINEMA What you need for

# 1. A Dolby Surround source

You need an appropriate component — like a DVD player or satellite TV system - to pass Dolby® Digital-encoded audio along to a decoder. Also, thousands of movies and stereo TV broadcasts feature multichannel Dolby® Surround audio ready for Pro Logic decoding. You have a lot of choices. See pg. 10 for more info on Dolby Surround sources.



# 2. A Dolby Digital receiver

The Dolby Digital sound stored on DVDs must be decoded into separate audio channels for playback through your home theater speakers. Most new home theater receivers have built-in Dolby Digital decoding; some are "5.1-ready"



with inputs for an external Dolby Digital decoder (or DVD player with built-in decoding); all have built-in Pro Logic decoding. See pg. 12 for more info on Dolby Digital receivers



# 3. A TV

In home theater, your TV's critical contribution is a sharp, natural picture - and thanks to new technologies, TVs are better than ever. In addition, you can use a stereo TV as a home theater sound source for Dolby Surround-encoded TV broadcasts: just connect the TV's audio outputs to a receiver with Dolby Pro Logic decoding. See pg. 13 for more info on TVs. multichannel soundtrack. However, DTS uses less compression than Dolby Digital. As a result, DTS soundtracks are believed by some to sound slightly better than Dolby Digital soundtracks, providing still finer sonic and surround detail.

There are drawbacks to DTS, though. Because DTS uses less compression, it is difficult to fit lots of other features (like multiple viewing options and languages) onto a DVD. Additionally, even though many manufacturers have incorporated DTS decoding into their receivers and decoders, relatively few DTSencoded DVDs are available — as of May 2000, fewer than 100 could be found. (However, there are many DTS CDs available, offering impressive surround sound for music listening.) Because of the vast amount of Dolby Digitalencoded software already on the market, and the fact that it's the standard for DVDs and HDTV, we see Dolby Digital as the dominant home surround sound format for the foreseeable future. Remember that most DVD players are DTS-compatible, in that they will send the encoded signal along to a receiver or decoder, but very few can decode DTS. Many people choose to buy a receiver or decoder with both Dolby Digital and DTS decoding, for flexibility no matter what happens. The most important thing to keep in mind is that both Dolby Digital and DTS provide superb digital sound.

# home theater



To re-create the movie theater experience, home theater literally surrounds you with speakers: a pair of front left and right speakers for stereo soundtrack information and audio that moves across the front soundstage; a video-shielded center channel speaker for dialogue and on-screen action; and a pair of surround speakers

for ambience and effects. Dolby Digital also calls for a subwoofer: the added deep bass makes the entire soundtrack feel larger and more lifelike, and the special effects

> will blow you away. (It's great for music too!) See pg. 15 for more info on speakers and subwoofers.



# What You Need Dolby Surround Sources

There are several primary source components that figure prominently in today's home theater systems: DVD players, HiFi VCRs, and DBS systems. As you read, keep in mind that you'll need at least one such video source to enjoy home theater's great picture and Dolby Surround audio.

#### **DVD players**

If you really want to experience how exciting home theater can be, a DVD player is a must. **DVD** is the most popular high-quality video format around. A 5-inch disc — the same size as a music CD — can hold a two-hour-plus movie with picture quality that's twice as sharp as VHS tape. With up to 500 lines of **resolution**, picture quality is also better than laserdisc, which maxes

out at 425 lines, and far better than broadcast TV, which only manages 330 lines.

A DVD can have information on both sides of the disc. And because of the disc's "sandwich" construction, it can even have two layers of data per side! That's a lot of room to store picture and sound information. The DVD format also offers movie lovers amazing features that have never been possible before. Many DVDs contain two versions of the movie on a single disc: one in standard 4:3 **aspect ratio** for display on a regular TV, and one **widescreen** version. The same disc can also include, for example, soundtracks in multiple languages, with subtitles in English, French, and Spanish. Other common features include director's commentaries, actor bios, trivia

#### DVD: A closer look



Compared to CD, DVD uses smaller data pits and more closely spaced pit rows.

quizzes, and outtakes.

Along with all that information, DVD is also the first home entertainment medium to include state-of-the-art **Dolby® Digital** as its standard audio format. And while some movies, like *Casablanca*, retain their original mono soundtrack in an encoded Dolby Digital format, more and more DVD titles offer outstanding **5.1-channel** Dolby Digital.

Watching a movie on DVD is much more convenient than using a VCR. A DVD player lets you skip ahead or move back with the touch of a button, just like a CD player. And when the



A DVD/CD mega changer (like this 200-disc Sony) keeps your entire movie collection and all your favorite music ready to play at a moment's notice!

movie's over, you don't have to wait for a tape to rewind! DVD players aren't able to change sides automatically, but luckily, out of the thousands of DVD titles available, nearly all can fit an entire movie on a single side of the disc.

All DVD players are "backwards-compatible" with music CDs — they'll play them perfectly! And magazine reviews have generally described the CD audio performance of DVD players as "outstanding." On top of that, keep in mind the increasing prevalence and flexibility of DVD. DVD-ROM drives that will play regular DVD-Video discs are now available on many computers. Several manufacturers also offer DVD/receivers that come with a full set of voice-matched 5.1-channel surround speakers complete home theater systems that are extremely easy to set up. There are even a few portable laptop-style DVD players on the market - a great solution for travelers! (For other home theater solutions, see pgs. 17-18.)

If you already own a sizable laserdisc collection, you may want to consider a combination DVD/laserdisc player. (This is an especially good idea if your current laserdisc player lacks an AC-3 RF output for multichannel Dolby Digital sound.) A combination player is the easy way to enjoy Dolby Digital sound from DVDs *and* laserdiscs.

At this point, having a DVD player and

Dolby Digital decoding is undoubtedly the way to enjoy home theater at its best. There are already thousands of movies available on DVD (and around 200 more every month). Both major video rental chains and privately owned video stores have an increasingly large selection of DVD rental titles — there are even Internet rental services. And DVDs cost about the same as videotapes, with a price range of \$15 to \$25.

If you can only afford one Dolby Surround source right now, there are a few reasons why you *might* choose a VCR over a DVD player:

- By definition, players are playback-only; to record off the TV or other video sources, you need a VCR.
- 2) There are still more movies available on videotape than on DVD.

Of course, the ultimate solution is to include both a HiFi VCR and a DVD player in your home theater system!

#### HiFi VCRs

You probably have a HiFi VCR at home — and you'll be glad to know it can be an integral part of home theater. HiFi VCRs can work with **Dolby Pro Logic** decoding to unlock rich, wraparound surround sound (over 11,000 movies are ready for Dolby Pro Logic playback). They also let you record TV and DBS broadcasts for later viewing (and they're great for editing, copying, and watching home movies you make with your camcorder!).

In addition to HiFi stereo sound (a must for home theater), there are some other basic features to consider when selecting a VCR. One is the number of video heads. Fourhead VCRs (as opposed to models with only two heads) offer improved special effects like slow motion and freeze frame. Without four video heads, slow

motion is barely watchable and freeze frames are hardly ever still or clear. Fortunately, with the advance of video technology, four-head models are so inexpensive that two-head VCRs are practically a thing of the past.

If you plan to tape your favorite TV shows when you're not at home, VCRs with VCR Plus+ simplify timer recording. Many VCRs even include a controller to change channels on a cable box or DBS receiver.

For ease of operation, consider a VCR with a multibrand **remote control**, for operating the VCR and TV (and sometimes cable boxes or DBS controllers) from other brands as well. A shuttle control improves the ease with which you search through a video for the segment you want.

If you plan to do a lot of editing, a flying erase head makes transitions between segments cleaner, by erasing a portion of the tape a splitsecond before the new image is recorded. And if you edit from your camcorder or a second VCR, front-panel **A/V inputs** will make hook-up extra quick and easy. Front-panel A/V inputs are also convenient for connecting video game systems.

For the best possible analog video recording quality, in an increasingly affordable package, go **Super VHS**. With horizontal resolution of 400+ lines (compared to 240 lines for standard VHS), S-VHS preserves the detail in high-resolution sources like DBS (regular TV recordings look better, too). Some brands offer Super VHS ET, which lets you record with Super VHS quality on standard tapes. And don't worry, S-VHS models also do a great job with those VHS movies from the video store.

Now there's even a digital alternative to a VCR — a hard disk video recorder! This new technology makes recording and watching TV broadcasts easier than ever before. You can even pause regular programming to get a snack, walk the dog, or answer the phone, and then return to your program where you left off — because these recorders record everything you watch *while* you watch it. They also work with a programming service that adds loads of innovative features.



A Super VHS VCR, like the JVC above, offers all the recording and playback flexibility of a regular VCR, plus higher resolution for a clearer picture.

#### **DBS (Direct Broadcast Satellite)**

Whether you want to see hundreds of movies from HBO, Cinemax, Showtime, and The Movie Channel, all your favorite teams' games from the NFL, Major League Baseball, NBA, and NHL, a wide range of concerts and other specials, or even commercial-free, DJ-free digital music channels, you'll find programming you like with **Direct Broadcast Satellite (DBS)**.

Along with all that variety, DBS is a great source of home theater. First of all, it comes to you with near-DVD-quality resolution (450+ lines). On top of that, high-end DBS receivers can pass a **Dolby Digital** signal to your Dolby Digital receiver! Also, many programs and virtually all movie channels are Dolby Surround-



DBS systems like this JVC offer a flawless digital image, great sound quality, and a wide variety of programming.

A DBS receiver connects to your TV just like a VCR, but getting the signal into your home is a little different from the cable TV or antenna hookup you're used to. A DBS system receives its signals via an 18"-24" dish mounted outside your home, aimed at a particular spot in the southern sky, depending on where in the U.S. you live (not everyone's home is DBS-ready). Popular mounting locations include roofs, exterior walls, and decks. The dish is specially designed to pick up the digital broadcasts from high-power satellites orbiting 22,300 miles above the planet. A coaxial cable runs from the dish, into the house, and to the DBS receiver near your TV. It's the receiver's job to convert the digital video and audio signals into the picture on your TV and the sound for your home theater system. You just sit back and enjoy the vast amount of programming beaming down to you.

# What You Need A Dolby Digital Receiver

In your home theater system, an A/V receiver serves as the central component — both the brain and muscle of the system. It has the complex task of processing, switching, and amplifying the various input signals from your source components (DVD player, VCR, DBS system, etc.).

Dolby Digital receivers include both Dolby Digital and Dolby Pro Logic decoding for unlocking the multichannel surround sound hiding in videodiscs, videotapes, satellite and TV broadcasts, etc. They also offer optical and/or coaxial digital inputs for accepting the digital audio signal from a DVD player. Full-featured A/V receivers have at least two video signal inputs, as well as separate inputs for the accompanying audio. Instead of struggling to connect several audio/video sources to your TV, you can hook them up to your receiver, then run a single video connection from your receiver to your TV. When you want to watch movies on your DVD player, just select the appropriate video input, and the receiver does the rest! You also get the flexibility of selecting and recording both audio and video.

For convenience and flexibility, A/V receivers combine a preamplifier, power amplifier(s), and an AM/FM tuner in a single chassis. Most people prefer this all-in-one design because it's more cost-effective and space-efficient than separates. (You'll find a more complete discussion of separates on the next page.)

#### What does the "preamp" section do?

An A/V receiver's preamplifier functions as the control center of your entire home theater system. This means providing the capability to switch from one source to another, route the signal between your components, and prepare the signal to be boosted by the amplifier(s). Common features you'll find in an A/V receiver's preamp section are **Digital Signal Processing** (including Dolby Digital and Pro Logic surround decoding), **soundfields** for enhancing movies and music, digital audio inputs, and video inputs and outputs for video switching.

#### What does the amplifier section do?

If a receiver's preamplifier supplies the brains, its amplifier section supplies the muscle. The amplifiers actually deliver the power that drives your speakers. The amount of power you'll need depends on several factors:

- Speaker efficiency High-efficiency speakers need less power; low-efficiency speakers require more power. Check your speakers' sensitivity rating.
- Room size Other factors being equal, if your system is in a large living room, you'll need more power than if it's in a small den or bedroom.
- Listening volume The louder you like to play your music and video soundtracks, the more power you'll need for clean sound.

When it comes to amplifier power, having more than you need is better than not having enough. Overdriving an under-powered amplifier can cause speaker drivers to distort — so if you routinely play your receiver so loud that the sound distorts, there's a good chance that your speakers (if not your ears) will be damaged. At normal listening levels, an amplifier's output averages less than one watt — it's usually about  $\frac{1}{3}$  watt. The key word here is "average."

Music is characterized by abrupt changes in volume, or **transients**: the crash of a cymbal, the blast of a brass section, or the kick of a bass drum. To reproduce transients accurately may require an amplifier to suddenly deliver several *hundred* watts for a fraction of a second. (The same applies to explosions, gunshots, etc. on video soundtracks.) The more reserve power an amplifier has, the better it will be able to cope with these momentary demands, and the more "live" the music or video soundtrack will sound.



Most audio/video receivers (like this Kenwood) now include Dolby Digital decoding. Thousands of films have been made using Dolby Digital, many of which are available in 5.1-channel Dolby Digital on DVDs for your home theater!

#### The separates option

A/V receivers include a complete preamplifier section with inputs and switching for your audio and video components plus built-in surround decoding. They also offer built-in amplification for main, center and surround channels, and an AM/FM tuner.

An alternative to an A/V receiver is to build your system with separates, which distribute a receiver's functions to different components (preamp, power amp(s), and tuner). There are a wide range of A/V separates available, designed specifically for home theater. You can choose between separate surround processors, A/V preamp/processors, A/V tuner/preamp/processors, and home theater power amps.

Separates designers — not as concerned with price and space constraints as A/V receiver designers — can be more generous with highquality parts, dedicated circuitry, and magnetic shielding. As a result, separates frequently offer higher-quality performance, as well as more flexibility, than an all-in-one receiver.

Of course, building a home theater with separates requires more time, knowledge, and money. You'll need to make sure that all your gear is compatible (A/V receiver manufacturers have already done that work for you). And connecting your separates, as well as making all the necessary system adjustments, is more complex.

## What You Need A TV

Because the TV is the focal point of your home theater, make sure that your TV does justice to the picture quality of all your video sources. Some older TVs just can't measure up to the standards associated with DVD — especially TVs with only an RF input.

> We also recommend that you go with the largest screen your viewing area can accommodate. We've found a 27" screen to be about the minimum for good home theater performance, although some smaller screens are very effective in smaller rooms. Keep in mind, though, that the larger the screen, the greater your comfortable viewing distance will be. (See below for some suggestions.)

Really large images are more visible from a distance away, so they usually require fairly deep rooms for optimum visibility.

However, if your room is small, a giant projection TV will be overkill. And remember, although the home theater systems you see advertised often include giant screens, it's amazing how much bigger *any* screen image seems when you have a good surround sound system.

#### Suggested TV Viewing Distances

TV Screen Size	Minimum Viewing Distance
24" TV	72" away
27" TV	81" away
32" TV	<b>X 3</b> = <sub>96" away</sub>
36" TV	108" away

One rule many people find useful is to multiply the screen size by three, and use the result as a guide for how close to their TV they should sit. The chart is based on this guideline.



Digital television Keep your eyes peeled! Digital television, or DTV, is the way our future is heading. Making use of digital rather than analog signals, digital TV is aimed at achieving topquality resolution – picture quality will start at DVD-quality, 480line resolution and go all the way up to 1080 lines of resolution! Other exciting options being discussed are sophisticated interfaces that will give viewers point-and-click interactivity with the show they're watching, and "datacasting" for custom-tailored news feeds. The nation's largest television

For home theater, we recommend a TV with direct audio/video inputs and picture-enhancing technology like a digital comb filter.

For great home theater viewing, the following features are some of the most important:

- Direct audio/video inputs and outputs They provide hookup flexibility and clean signal transfer. Especially useful are
  S-video and component video. Both offer much better picture quality than RCA patch cords (composite) or an RF input.
  DVD players have either an S-video output, a component video output, or both.
  They offer the most accurate delivery of DVD's high-resolution picture.
- 2) Improved picture technology Many TVs now include very useful technology designed to clean up the images you see. Line doublers and other picture enhancement technologies make the picture richer and less grainy (Sony's Digital Reality Creation actually enhances each pixel). Digital comb filters help provide a clear picture they offer a significant reduction of jitter and dot crawl.
- 3) Flat screens Increasingly, TVs are offering flatter screens, instead of the gently curved screen that was standard for the last 45 years or so. Flat-screen TVs reflect less glare from windows or lamps, and many feel they give a more realistic, geometrically accurate picture. Some TVs have vertically flat screens (screens that are flat from top to bottom and gently curved from side to side), while some are flat vertically and horizontally.

markets (and several DBS channels) are already broadcasting DTV to viewers able to receive it, and cable TV providers have gotten on board too.

Within the two DTV categories, High Definition TV (HDTV) and Standard Definition TV (SDTV), there are 18 different formats. But don't worry - you don't have to memorize all of them. Just remember that HDTV will bring you between 720 and 1080 lines of resolution, in a 16:9 aspect ratio (like a movie theater's wider screen), while SDTV will offer 480 lines of resolution in either a 4:3 (traditional television screen) aspect ratio, or a letterboxed 16:9 aspect ratio. And one last thing to keep in mind - HDTV uses Dolby Digital as its standard audio format. That means that from some stations, you'll be able to get crystal clear images broadcast to your television, with Dolby Digital stereo or even 5.1-channel surround sound (for more on Dolby Digital, see pg. 5).

If you're looking for a new TV, however, don't think you have to run right out and find a digital one! Analog broadcasts will continue until at least the year 2006, and set-top decoder boxes are being created so people can receive digital signals on analog TVs. "Hybrid" TVs are also being built, incorporating the best technology of traditional NTSC TVs and the digital capability needed for DTV. Just keep in mind the home theater possibilities of digital television, so you can make an informed decision.

# What You Need 5 Speakers and a Subwoofer

Your speakers have the greatest impact on the sound quality of your system. After all, the speakers are what you actually hear. And no matter how high the quality of your components, they can only sound as good as your speakers. That's why your choice of speakers goes a long way toward determining how your whole system sounds.

To re-create the movie theater experience in the home, 5.1-channel Dolby Digital home theater systems surround you with five full-range speakers — a pair of mains, a center channel speaker, and a pair of surrounds — and add a powered subwoofer to add crucial bass punch. (This same speaker arrangement works for Dolby

Pro Logic and DTS surround, as well as soundfields designed to enhance your music.)

#### Main speakers

For those of us who want great music and impressive home theater, choosing the right main speakers is important. They'll need to act as front left and right speakers for home theater, but be able to handle the job of main stereo speakers when it comes to music enjoyment. Choosing your mains is really a matter of personal taste.

Music lovers often appreciate the way large, floor-standing tower speakers provide a wide, full front soundstage, while blending nicely with surrounds to achieve big home theater sound. For those who want great sound and flexibility, but can't afford expensive tower speakers, bookshelf speakers are popular their ability to combine high performance and easy, inconspicuous placement is always a winner with people who split their lis-



These Polk powered towers offer impressive sound for music and home theater alike.

tening between home theater and music. And tiny, discreet **satellite** speakers, coupled with a subwoofer, are a great way to extract wraparound surround sound from speakers you barely see a nice compromise between home theater and unencumbered decor.

One of the best ways to choose your main speakers is to identify what kind of listening you'll be doing most. For top quality Dolby Digital surround sound, many people recommend that you use matched speakers all the way around. Although it's not imperative, it can offer optimum balance and seamless transitions when home theater sound effects move from speaker to speaker.

If you already have a set of stereo speakers that you love, don't worry — they can probably work as your front left and right home theater speakers. Just remember, it's important to try to **voice-match** them to your center channel speaker. (Some center channel speakers have adjustable tweeters, so you can voice-match them

to almost any set of mains.) Voice-matched surrounds are important too, for creating seamless surround sound. Many speaker manufacturers can recommend matches for older lines.

#### Center channel speaker

In home theater systems, the center channel speaker is the most important speaker. It handles over 50% of the total sound in the soundtrack — including almost all dialogue, and all on-screen effects. Because on-screen action (including explosions, gunshots, roaring engines, whispers, and other sound effects) as well as dialogue must seem visually anchored to the TV screen, your center channel speaker should include video shielding (to protect your TV's picture from magnetic interference) and be positioned above or below your TV.

When shopping for a center channel speaker, we recommend that you choose one with a wide frequency range that's able to handle all of your A/V receiver's center channel power. It's also important to match this speaker as closely as possible to the other speakers in your home theater, so the sound doesn't change in tonal character as the sound moves around your room. If your center channel is not voice-matched, especially to your front speakers, you will notice awkward transitions from speaker to speaker which can jar you out of the engrossing home theater experience!



In home theater systems, the center channel speaker anchors all on-screen sounds to your TV screen.

#### Surround speakers

To become totally enveloped by a movie soundtrack, you need a pair of **surround speakers** beside or behind your listening position. Surround speakers are responsible for creating wide, diffuse effects around you, while occasionally giving directionality to distinct sounds. As a result, they can recreate almost any effect realistically, from a shower of raindrops to a jumbo jet thundering overhead. This threedimensionality is achieved when a time-delayed signal is sent to the surrounds, creating a greater sense of space and improved sound localization.

In a Dolby Digital system, some experts recommend **bipole** or direct-radiating surround speakers, mounted on the back walls well above ear level. This placement adds diffusion to the stereo, full-bandwidth sound of the surrounds,



These versatile Polk surround speakers feature a dipole/bipole switch to change the phase relationship between its two sets of drivers.

The dipole mode creates a diffuse, ambient soundfield when your speakers are mounted on your side walls. If you're mounting them on your back walls, the bipole mode fires the drivers in phase to flood your room with surround sound. while still conveying precise off-screen effects.

In a Dolby Pro Logic system, where the surround channel is a mono signal, it's believed that **dipole** speakers work best, mounted on the side walls (also above ear level). Dipole speakers fire sound forward and backward — and out of phase — along the walls to keep surround effects from becoming too localized.

As you consider speaker placement in your home theater, just keep in mind that good surrounds should deliver three things: envelopment without "gaps" in the sound, seamless movement of sonic sources, and convincing placement of stationary sounds.

#### Powered subwoofer

In a home theater system, you can't fully experience the bone-rattling tremor of an earthquake or the jarring impact of a bomb blast without a subwoofer.



To maximize the performance of your system, a powered subwoofer is a must. Adding one dramatically improves the home theater experience.

Designed to handle the lowest bass frequencies, a powered subwoofer does more than just reproduce the low frequency effects, or LFE, in the ".1" channel of a Dolby Digital soundtrack (or enhance the bass in a Dolby Pro Logic soundtrack). It can also improve the sound of your system's midrange and upper bass frequencies by freeing the main stereo speakers from the stresses of reproducing deep bass. Cabinet resonances in your main speakers caused by deep bass can also muddy the midrange frequencies. Adding a subwoofer alleviates these problems, so the overall sound quality — not just the bass is greatly improved.

A *powered* subwoofer will lighten the load on your receiver's amplifier, too, so the power normally used for low bass can be redirected to those higher frequencies. With a powered sub, your entire system plays cleaner and louder!

#### Satellite/subwoofer option

Another speaker system design to consider is the **satellite/subwoofer system**. Often designed to be low-profile, satellite/subwoofer systems provide a room-friendly alternative to traditional speakers. This approach uses small satellite enclosures for the tweeters and mid-ranges, and a separate, specially designed box to house the woofer(s).

Besides saving space and blending into your room's decor, the advantages are numerous:



This satellite/subwoofer system from Sony delivers fullrange sound without taking over your room. The small satellites nestle in a bookshelf or can be placed on stands. The subwoofer can be hidden out of sight.

- 2) The subwoofer can be placed almost anywhere because it produces only low, omnidirectional bass frequencies. You can hide the subwoofer under a table or behind draperies, and still get full-range sound without giving up living space or compromising your room's appearance.
- 3) These systems are designed to provide voice-matched sound and easy setup. That means that if you want instant surround sound, you don't need to hassle over choosing and matching speakers — the manufacturer has already done that for you!

For these reasons, satellite/subwoofer systems can be a great choice when building a home theater system.

And, just in case you're wishing that a speaker system like this also came with a DVD player and receiver — read on! The next section discusses some unique options designed to widen the home theater possibilities.

# Home Theater Anywhere More Options

Love the idea of home theater, but looking for something a little different? Maybe you don't want to worry about choosing and matching components and speakers. Maybe you don't have room for a full-fledged home theater system in your living room. Or maybe you have a unique spot — like a small bedroom, dorm room, boat, or camper — just begging for home theater. Perhaps you want to use your computer's DVD-ROM drive to achieve home theater. Some folks even like to take their home theater on the road!

In this section, we'll discuss just a few of the new possibilities in the world of home theater.

#### Complete home theater systems

Some folks call these systems "home-theater-ina-box" — and that's pretty much what they are. A single package offers a DVD player/receiver with 5.1-channel decoding, a satellite/subwoofer system, and all the wires and instructions you need. The idea is simplicity — you make the connections, turn it on, and hit play!

These systems are perfect for people who want worry-free, instant home theater. All the speakers are **voice-matched** and designed to work together, and the DVD/receiver unit usually has extra inputs for hooking up your VCR and other components. The design of these systems is generally sleek and inconspicuous, for those of us who don't want huge, bulky black speakers all over their living room. (Different home theater systems offer different levels of flexibility, however, so if you're thinking

of starting out with one, and expanding or upgrading down the road, compare the different connection options and features to see what will serve you best in the future.)



Sleek, discreet, and surprisingly powerful, complete home theater systems (like this JVC) are voice-matched for seamless surround.

#### Home theater shelf systems

Your living room may already be set up for home theater. But sometimes, you want surround sound in other rooms. Home theater-ready shelf systems are a great solution when it comes to dens or dorm rooms, where there just isn't room for a full-sized component stack, five large speakers and a huge subwoofer. Thanks to the incredible popularity of home theater, some manufacturers now offer shelf systems designed to provide great music *and* surround sound performance.



This 5.1-ready mini system lets you enjoy home theater sound in an office, bedroom, or dorm room!

These systems usually include five speakers, Dolby Pro Logic decoding, and, occasionally, a powered subwoofer. Some even let you achieve Dolby Digital surround, with 5.1-channel inputs for attaching a Dolby Digital decoder or DVD player with built-in decoding.

#### Surround sound from your PC

Many computers nowadays include a DVD-ROM drive, which is capable of reproducing all the digital glory of DVD movies on your computer monitor. Now, instead of hearing the movie's sound on disappointingly small, tinny speakers built into your computer monitor, you can use a PC receiver to process and amplify the sound.

These receivers are designed to connect to your computer through a USB port, and can play sound from any of a number of



PC receivers play sound from a variety of sources: CDs, DVDs, and the 'Net.

sources — CDs through your CD-ROM drive, downloaded music files, game sound, or DVD soundtracks with Dolby Digital 5.1-channel surround (they use special processing to **downmix** those soundtracks into Virtual Surround, an approximation of the surround experience created with only a pair of stereo speakers). Students and executives will find that the combination of a PC's DVD-ROM drive and a desktop receiver makes for great A/V entertainment in any workspace.

#### Portable DVD players

Whether your business asks you to travel, your family takes a lot of long car rides, or you just can't bear to leave home theater at home, there is an answer. Several manufacturers now offer portable DVD players. Some players come in the shape of a slim, laptop-style portable with a DVD deck and a built-in flip-up screen — easy to watch and easy to transport. They usually include a headphone output, plus a variety of digital and analog audio outs for connecting to a variety of A/V gear. (One popular add-on is wireless 5.1-channel headphones, that replicate the surround sound experience within a simple pair of over-the-ear headphones.)



No TV needed! This compact, portable player lets you take DVD entertainment everywhere you go.

Other portable DVD players lack an attached screen, and are instead ready to plug into TVs wherever you go — in your van, camper, boat, or vacation house. You can also use one as your regular DVD player at home!

# Planning Ahead Speaker Placement

Before you create a home theater system, it's important to think about how it will work in your own home. Because home theater relies so heavily on seamless surround sound, speaker type and placement is especially important. The next few sections may help you determine what kinds of speakers you need, while offering some guidelines to follow when experimenting with speaker placement. Your goals should be balanced, accurate sound and a convincing soundstage — left-to-right, front-to-back, and everywhere in between. This discussion should also give you a detailed idea of what each speaker does, how it should sound, and how you can best achieve home theater sound.

The key to good sound is matching the speakers' output to your room's particular acoustics. You don't need test equipment, just your ears and a willingness to experiment. The variables you'll work with are the distances your speakers are from you, the walls, the floor, and each other. Even slight changes in positioning can make major differences in how your speakers sound.

And don't forget — read your owner's manual! Manufacturers sometimes offer very specific recommendations for ideal speaker placement, based on a speaker's performance during the design phase.

#### Placing your main speakers for optimum performance Stereo speakers

Almost everyone is familiar with a traditional stereo setup, but there may be a few details you've missed or forgotten. Here are the basics behind arranging your main stereo speakers:

- Stereo speakers should, ideally, radiate sound throughout the length of the room.
- Place them at equidistant points to the left and right of your listening position. Seen from above, you and your left and right speakers should form an equilateral triangle.



Seen from above, you and your left and right speakers should form an equilateral triangle.

Test the presentation of music, or "soundstage," by moving the speakers nearer and farther apart. Identify the placement that brings you a full wide soundstage with complete "centerfill" (just what it sounds like, center-fill means that sound completely fills the space between the speakers, with no gaps or holes).

- Often, angling the speakers inward toward your listening position, so the tweeters point toward your ears, improves the sound.
- Ideally, the tweeters should be at ear level when you are seated, for optimum high-frequency detail. Most tower speakers are designed this way. Bookshelf speakers can be placed on speaker stands of the appropriate height.
- You will generate more bass by moving your speakers near room boundaries (like walls or the floor).

Remember, not every room is perfectly designed for audio enjoyment. In that case, use the principles discussed here (of enhancing bass with placement near walls, positioning tweeters at ear level, and creating a full soundstage without audible gaps) to get the best sound out of your speakers and room. The more you experiment, the more likely you are to find the best sound your room can offer.

#### Home theater mains

Nearly all of the suggestions for stereo speakers apply to the front right and left speakers in a home theater system. The only major exception is that they should be placed after you've placed your center channel speaker. The center channel speaker's position is directly related to the placement of your TV, which doesn't leave you much room for adjustment. And since the center channel sends a great deal of sound into the center of the soundstage, it changes the way your mains add to the soundstage. As a result, you should always place the mains after the center channel.

- Set up mains at the exact same distance from your listening position as your center channel is — if you measure correctly, they should form an arc in front of your listening position (see the illustration on the next page).
- Angle the right and left speakers inward, so the tweeters are directed at your listening position.
- Again, the use of walls to enhance bass, and tower designs or speaker stands to raise tweeters to your ear level when seated, usually improves sound.
- Find the placement which provides the widest, most realistic soundstage possible (you can usually move home theater mains farther apart than stereo speakers without the center-fill suffering).

Even if you watch a lot of home theater *and* listen to music frequently, you should be able to find a position that makes for home theater enjoyment and great stereo listening. Patience will pay off. When you find just the right location, you'll know it. And you'll be amazed at how much better your entire system sounds.

#### Placing your center channel speaker

The center channel plays such a vital role in home theater that its correct placement is very important.



We recommend placing the center channel speaker the same distance from you as the left and right speakers.

- Make sure that your center channel speaker is video-shielded, so it will not cause picture distortion in your TV (almost all center channel speakers are).
- Place the center channel speaker directly above or below your TV, wherever it sounds the best (most experts say placement above the TV drastically improves the sound of the speaker).
- Make sure the speaker's front edge is precisely aligned with the front edge of the television screen. This reduces distortion caused by sounds being reflected off the TV, and helps anchor the dialogue and center channel effects to the action on the screen.
- Aim the speaker's sound directly toward your primary listening position.
- As we discussed before, placement of the center channel speaker at exactly the same distance from your primary listening position as your front left and right speakers usually produces a well-defined soundstage.

#### Placing your surround speakers

- For optimum performance, we recommend placing surround speakers to the sides of, or behind, your primary listening position.
- You can elect to use your surround speakers on a bookshelf, with speaker stands, or mounted on the walls (many surround speakers are designed to be used with wall brackets).

- Some home theater enthusiasts opt for speakers specifically designed for in-wall installation (see pg. 21 for information on *The Crutchfield Guide to Home Theater Installation*).
- Position the surrounds so they either face each other or into the room (see Dipole and Bipole illustrations below, and note Dolby Digital and Dolby Pro Logic home theater illustrations on pgs. 6-7).
- The height of your surrounds is especially important — unlike your main speakers, they should be aimed well above your ear level when seated. Many people place them at the height of ear level when standing, to make sure they're high enough.

#### **Bipole Surround Speakers**



Bipole surround speakers often work well if you're placing your speakers on the back wall behind your listening area. Bipole speakers are also often recommended in Dolby Digital home theater systems.

#### **Dipole Surround Speakers**



Dipole speakers mounted on the side walls is the surround sound setup recommended by many experts for Dolby Pro Logic home theaters.

#### Placing your subwoofer

In a surround sound system, you want the bass from your subwoofer to rumble throughout your room. Because bass frequencies are generally omni-directional, you can usually place a sub almost anywhere in the room. However, we've included some recommendations that we think will help you get the best sound out of your sub.

- Although you have a great deal of freedom in where you choose to put a subwoofer, keep in mind that sometimes, positioning it too far to the left or right can call attention to the sub as the source of low frequency effects.
- Placing a subwoofer next to a wall or in a corner will deliver the most bass, because the subwoofer can use the wall(s) as a soundboard.
- One good place for your sub is between your two main speakers. If that's not suitable, many people place the sub behind the listening area, or in a corner of the room (increasingly, manufacturers recommend corner placement).
- Because every room is different, feel free to test locations until you've found one that gives you a room full of low frequency effects.

# Planning Ahead More Resources

We hope this guide has helped give you a basic idea of what home theater entails (and maybe helped you figure out how it will work for you). On the following pages, you'll find an FAQ section with answers to frequently asked questions, and a glossary of all the words in bold throughout the guide. We also know you may have other questions that aren't easily answered here. For up-to-the-minute information on what's out there, or a more in-depth look at home theater, here are a few sources that might help:

#### Crutchfield Sales

Feel free to call our Sales Advisors at 1-800-955-3000 for more information. Not only can they offer you advice tailored to your individual needs, they can also recommend specific products based on what you care about.

#### www.crutchfield.com

Visit our website at www.crutchfield.com. Our online Info Center offers great information on home theater and all its separate components, with FAQs, glossaries, tips, and links to current products. You can also contact a web sales advisor with questions. And new and helpful features pop up there every day!

• The Crutchfield Audio/Video Reference Our A/V Reference is loaded with the details every home theater enthusiast needs. With MasterSheets for connecting a wide range of different components, an in-depth speaker placement and room acoustics guide, and color-coded CableLabels<sup>™</sup>, the *A/V Reference* is this guide's impressively knowledgeable big brother. (See the back cover for more info.)

# The Crutchfield Guide to Home Theater Installation

Yes! You can have an easy-to-operate A/V system that fits beautifully into your decor — and this handy new guide tells you how. It includes detailed instructions for installing in-wall speakers, setting up multi-room systems, and more. The pictures, diagrams, and hints from professional custom installers are perfect for do-it-yourselfers who want their speakers to literally vanish into the woodwork. Call 1-800-955-3000 to get this free guide, and visit www.crutchfield.com/htinstall to see our growing selection of A/V installation products.

#### Dolby Labs

At www.dolby.com, Dolby Laboratories offers discussions of their surround sound systems, along with diagrams and illustrations. Great if you're looking for a more in-depth understanding of how a soundtrack travels from the studio to your living room.

#### DVD FAQ

For up-to-date info on all things DVD, and all the various developments surrounding them, check out this fairly technical but extremely thorough site: www.dvddemystified.com.

#### Before you buy

Getting into home theater is exciting — but it's important to make a careful decision, too. We all know how frustrating it is to buy a new toy, and then get it home and find out that batteries aren't included. Planning ahead when buying home theater is vital, so you won't experience that kind of frustration (on a much larger scale!). Use this guide to:

- Figure out what kind of components you already have that will work with home theater.
- Decide what new ones you need.
- Determine what kind of system is right for you.
- Make sure your room is surround sound-ready — if you don't want to be able to see a single speaker, no matter how tiny, you may not want surround sound.
- Be ready to buy all the extras when you're setting up home theater, you need more than just components, a TV, and speakers. Good speaker and video cables are vital to producing great sound and picture, and you will almost certainly need either stands, shelves, or wall-mounting speaker brackets to place your surround speakers correctly.
- And above all, have fun! Enjoying yourself is what home theater is all about!

## **Frequently Asked Questions**

#### **Dolby Digital**

- **():** How do I know if a DVD is encoded with Dolby Digital?
- A: Look for the Dolby Digital logo. Almost every DVD's audio is encoded in Dolby Digital. (Keep in mind, though, that Dolby Digital does not automatically mean 5.1-channel surround sound. Movies like Alfred Hitchcock's *Psycho*, for example, retain the original mono soundtrack, although the form of digital encoding is Dolby Digital.)



- **():** Can I add Dolby Digital to my Dolby Pro Logic receiver?
- A: You can connect an external Dolby Digital decoder to your Dolby Pro Logic receiver under the following conditions: your receiver is "**5.1-ready**" (with 5.1-channel analog inputs).
- O: My surround speakers are only rated at 20 watts, and I'm not ready to spend the money on new ones. Do I have to buy new surround speakers for Dolby Digital?
- A: You don't need to buy new ones (although we think you will eventually want to!). Select the "small" setting for the surround channel on your Dolby Digital receiver, keep the volume in check, and you should be okay. It won't be the best performance possible, but it will work.

Keep in mind, though — Dolby Digital makes much larger demands on surround speakers than Dolby Pro Logic, so be careful not to play them to distortion (or you'll be purchasing new surround speakers much sooner than you expected)!

- **():** What's the difference between Dolby Digital and DTS?
- A: Basically, Dolby Digital and DTS are both systems of encoding digital sound, often in a multichannel surround format.

**Dolby Digital** was created by Dolby Laboratories and is the chosen audio format for **DVD** and **DTV** (**Digital Television**) in the U.S. There are currently thousands of Dolby Digital movie titles available on DVD. **DTS** was developed by Digital Theater Systems, and can be found in many commercial theaters worldwide. To date, fewer than 100 DTS titles have been recorded to DVD for use in home theater systems. However, there are many DTS CDs available, that offer impressive surround sound for music listening. See "What's the Buzz About DTS?" on pg. 8 for more information.

- **():** For 5.1-channel Dolby Digital, is it important to have equal power for all five full-range channels?
- A: Yes. Since the five channels in Dolby Digital are all full-bandwidth, it is more important than ever to have equal power fed to each speaker. Many experts even recommend using identical speakers for mains and surrounds.

#### **Dolby Pro Logic**

- **():** How do I know if a videotape or laserdisc is produced in Dolby Surround?
- A: Look for the Dolby Surround logo.



- **():** Why aren't my surround speakers playing in stereo?
- A: Surround information in Dolby Pro Logic is mono, not stereo. (However, you still need a *pair* of surround speakers to be immersed in sound effects.)
- **():** Why do my surround speakers sound low in volume?
- A: The surround channel supplies off-screen sound effects and ambience, and only about 8% of a video soundtrack's information is dedicated to surround. To keep the surround information from overshadowing the front three channels, it's mixed to a lower volume level.

#### Video

- **()**: All my friend ever talks about is her new DVD player. Is DVD really that much better than VHS?
- A: VHS has a few advantages over DVD, in that you can record programs or play home movies on a VCR. Also, most video rental stores still have more movies available on VHS than DVD.

However, in terms of sound and picture quality, DVD far surpasses both VHS and

Super VHS, and does not degrade over time. Today, DVD is the best video format readily available.

# Can I play DVDs on my CD player or laserdisc player?

- A: DVD movies can only be played on DVD players and DVD-ROM drives. A DVD's information pits are smaller and the rows of pits are much more closely spaced than on CDs or laserdiscs. As a result, while DVD players can read CDs, the reverse isn't true — CD players can *not* read the denser data on a DVD. A few "combination" players are available, that play both laserdiscs and DVDs. However, DVD's data format is completely incompatible with regular laserdisc players.
- **():** Can I still get surround sound from my DVD player without a Dolby Digital receiver?
- A: Sure! Any Dolby Pro Logic receiver will decode Pro Logic surround sound from DVD.
- **():** Will I need a widescreen (16:9) format TV to view DVDs?
- A: Definitely not! Most DVDs come with a version (**pan-and-scan** or **letterboxed**) that can be played on a regular TV.
- **()**: What is this "regional coding" I keep hearing about on DVDs? Can I get a DVD player that will play all DVDs?
- A: Regional coding was developed to prevent piracy of DVD software overseas. Region 1 consists of the U.S., its territories, and Canada. All DVD players and DVDs purchased in Region 1 are compatible, so there's no need to worry. Unfortunately, you cannot get a player that will play all DVDs worldwide.
- **():** DVDs aren't very common where I live. Where can I get them? And are older movies being reissued on DVD?
- A: All major video store chains now offer DVDs at most locations, and many local video rental stores do as well. You can also get DVDs through mail-order CD and DVD companies, or from a variety of retailers on the Internet. And yes, some older movies (*The Wizard of Oz*, for example) are available on DVD right now!

**():** I have an old TV. How do I know if it has the inputs and **resolution** necessary for DVD?

A: It doesn't matter how old your current TV is, when it comes to resolution. All NTSC TVs have the resolution capable of showing all the detail on a DVD image. As long as your TV offers separate **A/V inputs** (very few DVD players have an RF output), and is still in good condition, the picture from DVD will be a dramatic improvement over what you currently enjoy. It will look fantastic now, and even better when you're ready to upgrade your TV to a high-tech model. (If your TV only has an RF input, you can connect a DVD player using a separate RF converter however, the picture quality will suffer.)

**():** When I tried to record a DVD movie onto a VHS tape using my VCR, the copy turned out to be distorted. Why?

A: Like most VCRs, DVD players include copy protection circuitry that prevents you from making recordings of copyright-protected movies. When you do record, the picture automatically distorts.

**()**: Do some VCRs have features that make timer recording easier? I'm especially interested in VCRs that can control my DBS receiver so I can record satellite programs when I'm not at home.

A: Easy timer recording? Absolutely. Look for models with built-in VCR Plus+ simplified timer programming. Setting up for unattended recording is as easy as punching in a show's "PlusCode," which is found in *TV Guide* and many local newspaper listings.

Several DBS systems include the capability to communicate with VCRs to perform "one-button recording." Some VCRs also include an infrared cable box controller for timer recording control over regular cable boxes as well DBS receivers.

#### Q: Can I get DBS where I live?

A: To receive the DBS signal, you must live in the continental U.S. (lower 48 states and Alaska). Your site must have an unobstructed view of the southern sky, free of signal-blocking trees, buildings, hillsides, etc. The best way to determine whether or not your site will work is to perform a site survey. For more information on doing a site survey, call a Crutchfield Sales Advisor. Everything you need to do a site survey is included in our DBS Starter Kit.

Just a quick note: if you live in a singlefamily residence, you don't need permission to put up a dish one meter or smaller, but if you have a condominium or town house, you should check with your homeowner's association. And if you live in an apartment, you'll need to check with your landlord.

# **():** What size TV screen do I need for home theater?

A: It depends on how big your room is, and how far you plan to sit from the screen (if you're too close to a really big screen, it doesn't look as good). We've found a 27" screen to be about the minimum for good home theater performance, although a smaller screen can supply great home theater in a den or bedroom. See the chart of suggested viewing distances on page 13 for more help fitting a TV to your room.

#### A/V receivers

[]: Is an A/V receiver's (or amplifier's) power rated in peak watts or RMS watts? And what exactly is RMS?

A receiver's power output can be measured in either RMS or peak wattage — or both.

Usually, however, RMS wattage ratings are more common for home audio equipment. RMS power is the amount of wattage an amplifier can produce on a *continuous* basis. The higher the RMS wattage, the louder and cleaner your music sounds.

The peak power rating tells you the maximum wattage an amp can deliver as a *brief burst* during a musical peak (like a cymbal crash, a sudden orchestra hit, or an explosion in a movie soundtrack).

Although the RMS figure is a more realistic measure of a receiver's or amplifier's power, occasionally stereo manufacturers display peak power ratings on their products. Many retailers are also happy to call attention to this higher but potentially misleading number.

#### (): What is DSP?

A: It's short for Digital Signal Processing.

Basically, any signal processing performed in the digital (not analog) domain qualifies as DSP. Digital processing is less susceptible to signal loss and added distortion than analog processing. Many A/V receivers offer DSP, although its functions vary from model to model. Some of the more common uses are Dolby Digital and Dolby Pro Logic decoding, digital soundfields (to create more lifelike listening environments), digital time delays, and digital sound equalization.

#### **():** What is THX? Is it a kind of surround sound?

A: **THX**<sup>®</sup> is a division of Lucasfilm Ltd. dedicated to accurate reproduction of movies. That includes overseeing film-to-DVD transfers, certifying those movie theaters and mixing studios (there are now over 2000 worldwide) whose design and equipment meet THX standards, and ensuring that home theater systems re-create more closely the movie theater experience. To receive THX certification and carry the THX logo, home theater processors, amplifiers and speakers (whether in a Dolby Digital or Dolby Pro Logic system) must meet very high performance standards. Very few are designated "THX Select" — still fewer receive the more demanding designation "THX Ultra."

Because movie theaters and homes have very different acoustics, a soundtrack can seem unbalanced or unnaturally bright when it is played back on a typical home system. To compensate, a home THX system includes special processing enhancements.

A THX-certified receiver first decodes the soundtrack, then adds patented signal processing enhancements, such as Re-Equalization<sup>™</sup>, Decorrelation<sup>™</sup>, and Timbre Matching<sup>™</sup>. These changes let the soundtrack reach your ears at home the way it was intended to reach your ears in the theater.

Keep in mind, though, that not every manufacturer applies for THX certification. Therefore, while THX certification is an indication of high-quality, non-THX-certified components can be of equally high quality.

So, are "THX Ultra" and "THX Select" a form of surround sound (like Dolby Digital)? No, they are simply performance standards. However, THX has recently developed "THX Surround EX," a form of surround that achieves 6.1- and 7.1-channel surround by sending a mono signal to an additional surround speaker or pair of surround speakers. At this point, however, only a few DVDs are encoded for it, and even fewer receivers can decode it.

# **()**: When I run "A" and "B" speakers at the same time, how much power is going to each speaker?

A: That depends on whether the receiver's outputs are wired in series or parallel. If wired in series, your total power decreases by about half when you switch from "A" to "A+B," and four speakers share this lower output. Your overall volume will decrease, and the sound quality can degrade, but the amp runs cooler and is less likely to overheat.

If wired in parallel, your total power is somewhat increased when you switch from "A" to "A+B" because the amplifier is presented with a lower impedance (ohm load), and four speakers share this higher output. (Please note that your amplifier must be capable of handling a 4-ohm load, and that it will run hotter than usual at this lower impedance.)

**():** Can I use my "B" speaker connections for surround sound?

A: "B" speaker connections are used for sending the same stereo signal that your main stereo speakers see to a second pair of speakers (often in another room). Usually, "B" speaker connections will *not* work for surround.

#### Speakers

- **():** What is the difference between a two-way and a three-way speaker?
- A: A two-way speaker's crossover splits the frequency band into two ranges: bass frequencies go to the woofer, and treble frequencies go to the tweeter. In a three-way speaker, the frequency band is divided into three ranges. The middle frequencies are sent to a third driver commonly called a midrange driver. (Keep in mind that these terms simply refer to types of design — one is not necessarily better than another!)

**():** What is a "bass reflex" speaker? Does it mean a speaker puts out a lot of bass?

- A: Unlike an acoustic suspension speaker that uses a completely sealed enclosure, a bass reflex speaker includes a port (a hole in the box tuned to a specific frequency) or a bass radiator (often referred to as a "drone cone") to produce more bass output in a tuned frequency range. With a bass reflex design, *efficiency* is better — a bass reflex speaker will play louder than an acoustic suspension speaker when driven with the same amount of amplifier power. This can be a big benefit, especially if you're using a low-powered receiver or amp.
- **():** If I buy a set of large floor-standing speakers, will I still need a powered subwoofer? What about speakers with their own built-in powered subs?
- A: The answer to your first question is going to depend on individual taste — how much you like bass, and how much bass you like. If your main interest is home theater, and you want to re-create the body-slamming bass you experience in a movie theater, it's a difficult thing to achieve without a powered subwoofer.

A pair of floor-standing speakers with built-in powered subwoofers will probably deliver as much bass as you need.

**():** How do I know if I should use speaker stands? If so, which size? And what exactly will spikes do for me?

A: Because midrange and treble frequencies are very directional, your speakers will sound their best when your ears are at the same height as the tweeter. Tower speakers are designed to be used without speaker stands, but small- to medium-sized speakers will most likely need stands to raise the tweeters to ear level. It's worth taking the time to measure, so that you can determine what size stand will work best with your speakers.

If your room has a carpeted floor, and your speakers or speaker stands accept carpet-piercing spikes on the bottom, installing them may improve your speakers' sound. Spikes often "tighten up" bass response by reducing sound-muddying speaker cabinet resonances and vibrations. Spikes also provide greater stability on carpeted floors (when you install them, be sure your speakers remain level, with no tendency to tip over). Some spikes are reversible for use on carpeted *or* hardwood floors.

- **()**: How can I make sure my home theater speakers are balanced properly?
- A: Your surround decoder supplies test tones for adjusting the speaker levels. As these sounds cycle through your speakers, simply adjust the level with your remote control. Your goal is to set all speakers at the same loudness.
- **()**: When I try to use test tones from my A/V receiver to set up my speakers, I don't really get tones, just hissing sounds. Why?
- A: There's nothing wrong. Those "hissing" sounds, also called pink noise, *are* the test tones.

**()**: I am a little confused about surround speakers. Do I need a special kind of speaker (I keep hearing about "**dipole**" and "**bipole**" models)? Or should I use a conventional pair of direct-radiating speakers?

A: The truth of the matter is that you can get excellent sound results with dipole, bipole, or direct-radiating speakers. It all depends on your home theater system, your room, and your personal tastes. See "Surround speakers" on pg. 16 for more information.

#### **()**: My receiver puts out 100 watts per channel. Should I get a speaker with the same rating?

A: Don't worry! Unless you plan to run your speakers at abusive volume levels, it's no problem if they're rated to handle less power than your receiver delivers. The power rating most manufacturers assign to a speaker is the amount of *continuous* (RMS) power the speaker can absorb without damage.

Receivers and amplifiers are also usually rated for continuous power, so as long as both ratings are fairly close to each other, you shouldn't encounter any power-handling problems. Actually, an amp or receiver with a high power rating is often safer for speakers than one with a low power rating. A low-powered model may "clip" (run out of amplifier headroom) and produce distortion at high volumes, which is a common cause of tweeter damage.

**()**: I can see why my front speakers should sound alike. Should I also try to get surround speakers that are voice-matched to my front ones?

A: Yes! Surround sound is most believable when you feel enveloped in a three-dimensional soundstage. The less attention each speaker calls to itself, the more consistent and seamless the surround effect. If your budget and aesthetic preferences allow, select surround speakers that are **voice-matched** to your front speakers.

[]: I don't have a subwoofer output on my receiver. Can I still hook one up?

A: Sure. You can connect a powered subwoofer via its speaker-level inputs. However, the dedicated LFE effects of Dolby Digital won't pass through your subwoofer.

**():** Why can't I play the "A," "B," and surround speakers at the same time?

A: In many receivers, the amplifier dedicated to the "B" speakers in stereo mode is dedicated to the surround speakers when the receiver is set for surround sound. As a result, separate "B" and "surround" speakers cannot be used at once. Some other receivers are simply designed that way so internal amplifiers are not overdriven. Just keep in mind that "B" speakers are used for stereo music, not home theater surround sound.

**():** How close can I place my main speakers to the TV if they aren't **video-shielded**?

A: You should place them at least a foot away. (Let the TV be your guide — if the picture distorts, the speaker is too close!) Keep in mind that narrow placement like this will deliver a less-than-adequate soundstage with very poor imaging. See "Planning Ahead: Speaker Placement" on pg. 18 for a more detailed discussion of speaker placement.

**()**: Can I use my TV's speakers for the center channel?

A: Yes, provided that your TV has separate audio/video inputs, and your receiver has a preamp-level center channel output.

However, most people find that using the TV as a center channel is, at best, a temporary solution. Surround sound just sounds so much better with a real center channel speaker! Because a large portion of the sound information recorded on a video soundtrack is in the center channel, it's best to have a speaker that can handle full-range sound and is **voice-matched** with your other home theater speakers.

#### Connections

# **():** Does special, high-quality cable really make a difference?

A: Yes. The better your cable, the better your picture and sound! Well-made cables tend to carry cleaner signals over longer distances, and as time goes by, they are less likely to be damaged by the inevitable bending and twisting that most cables undergo. Even though high-quality cable costs a bit more, it can be a key part of achieving the clear picture and pure sound you paid for when you bought your components.

**():** What component would I connect to a DVD player's digital output?

A: The optical and/or coaxial digital outputs on a DVD player's back panel are for sending the Dolby Digital audio bitstream to some type of Dolby Digital decoder — either a separate decoder unit, or one built into a Dolby Digital receiver. Although coaxial digital connections use standard RCA-type connectors, the cable itself is specially designed to handle the much wider frequency bandwidth of digital signals. With optical connections, the signal is transmitted as pulses of light through a cable housing a slender bundle of glass or plastic fibers.

# **():** Is an optical (Toslink) digital connection better than a coaxial connection?

A: It all depends on the quality of the internal digital and optical conversion circuitry of your component, as well as your sonic preferences. However, over longer lengths,

fiber optics are preferred since they are immune to radiated noise.

Whatever type of connection you use, we strongly recommend using high-quality cables for the best signal transfer possible. You'll be amazed at what a difference good interconnects will make in the overall sound of your system.

**()**: I keep hearing about three different types of inputs on a TV: composite video inputs, S-video inputs, and component video inputs. Which is better, and will I really be able to see a difference?

A: First, it's important to understand that a TV's picture can be broken down into **chrominance** (color) and **luminance** (black-and-white). The more clearly defined these elements are when they are sent to the TV, the better the picture.

Composite video is a single video signal that contains both luminance and chrominance information. A composite video jack is usually a single RCA-type. (If your television has a set of 3 inputs on the back, labeled "audio left," "audio right," and "video," you have a composite video input.)

An **S-video** signal uses a four-pin connector that provides a sharper picture by transmitting the chrominance and luminance portions of the video signal separately, reducing interference. Direct S-video connections are a *significant* improvement over composite video, and are found on high-performance video components like DVD, DBS, Super VHS, Hi8, D8, Mini DV, and some laserdisc players.

Many TVs are now available with three-jack (RCA-type) **component video** inputs designed to be compatible with the component video outputs on some DVD players. If you think about S-video as a type of component video signal that separates brightness and color into 2 portions, this three-jack connection carries the concept even further. Component video carries a single brightness portion of the signal, then splits the color signal into *two* parts, for even greater accuracy and less color bleeding.

**():** For making a video connection between my VCR and my TV, should I use RF cables or video patch cables?

A: If both your VCR and TV have direct video connectors (RCA or S-video), you should use them because they provide improved picture quality. And since video signals are of much higher frequency than audio signals, use a cable designed specifically for video use. Additionally, when your VCR is turned on, its RF output can only transmit a mono signal. Note: When using direct video connections, you'll need to select the appropriate "Video" input on your TV remote control.

**()**: Do I really need to route my DVD player's and VCR's video outputs through my receiver?

A: It is not necessary to run video connections through your receiver; you can run them directly to your TV. However, if you have two or more video sources, it may be more convenient to run all audio and video signals through your receiver.

**()**: A friend told me that I should connect my A/V gear to a surge suppressor. What are the real benefits?

A: A reliable surge suppressor or line conditioner is a must in any system, both for protecting your A/V investment against damaging power surges, and for filtering out electromagnetic interference (EMI) and radio frequency interference (RFI).

To protect your full audio/video system, be sure to choose a suppressor (or suppressors) with AC outlets for your electronics gear, coax connectors for DBS, TV cable, or antenna, plus telephone (RJ-11) jacks (if subscribing to DBS programming).

# **Glossary of Terms**

#### 5.1-channel

Dolby Digital has six discrete digital audio channels: 5 full-bandwidth (for front left/right, center, and surround left/right) and 1 "low frequency effects" subwoofer channel. These six channels are sometimes referred to as "5.1-channel."

#### Acoustic suspension

Speaker design that uses a sealed, airtight enclosure.

#### Anamorphic

An anamorphic video image is one filmed in true 16:9 aspect ratio. If it is watched on a screen with 4:3 aspect ratio, it gets "squeezed" — everything appears taller and thinner, and actors have pointed heads! An anamorphic image needs to be viewed on a true 16:9 screen to look normal.

#### Aspect ratio

The ratio of width to height for an image or screen. The North American NTSC television broadcast standard is 4:3 (1.33:1). The new HDTV (High Definition digital television) standard calls for a wider screen with a 16:9 (1.78:1) ratio.

#### A/V inputs

They allow direct connection of your video components.

Rear A/V inputs are located on your gear's rear connector panel, for components you normally leave connected.

Front-panel A/V inputs allow for quick and easy hook-up of a camcorder, second VCR, video game, etc.

#### Bandwidth

Refers to the range of frequencies a component can reproduce. For audio components, like receivers, "full bandwidth" is generally considered to be the entire frequency range of human hearing (20-20,000 Hz).

#### Bass reflex

Speaker enclosure design that uses a port (a hole in the box tuned to a specific frequency) or a bass radiator ("drone cone") to produce more bass output in the "tuned" frequency range.

#### Bipole

A speaker design which generates equal amounts of sound both forward and backward, with the

two sounds being *in phase*. See also Dipole, and the surround speaker illustrations on pg. 20.

#### Center channel speaker

In a home theater system, a video-shielded speaker placed above or below your TV dedicated to reproducing on-screen sound and dialogue.

#### Chrominance

The portion of the video signal that carries the color information.

#### Component video

A video signal which has been split up into its component parts. TVs with three-jack component video inputs are designed to be compatible with the component video outputs found on some DVD players. If you think of S-video as a type of component video signal (separate brightness and color portions), the *three-jack* component video connection carries the concept a step further by splitting the color signal into two parts for even greater accuracy and less color bleeding.

#### Direct Broadcast Satellite (DBS)

A method of receiving over 200 channels of programming via satellite signals beamed to a small (18-24") dish and passed through a receiver. DBS systems include Sony's DIRECTV and JVC's DISH networks. These networks also supply SDTV-format and limited HDTV-format programming, and a few high-end DBS receivers can pass the Dolby Digital audio signals accompanying some programs to your Dolby Digital receiver.

#### Digital comb filter

A filter for picture sharpness which reduces "jitter" and "dot crawl." Standard digital comb filters are "2-line" — they compare consecutive scan lines within a field. 3-line digital comb filters compare three consecutive scan lines within a field, for still better clarity. The most effective comb filter, the 3D digital comb filter, compares a scan line to adjacent lines in the same field, as well as the corresponding lines in the preceding and following fields.

#### Digital Signal Processing (DSP)

Some receivers use Digital Signal Processing for creating soundfields (simulated acoustic environments) and time delays, and for precise steering of multichannel surround information. When an audio signal is processed and routed in the digital domain (instead of the analog), it is less susceptible to signal loss and distortion.

#### Digital Television (DTV)

The new American digital broadcast TV standard, it falls into two general categories: HDTV and SDTV. HDTV includes a number of formats, which share the same basic characteristics: resolution from 720 to 1080 lines, Dolby Digital audio, and an approximately 16:9 widescreen format. The formats in the SDTV category are far more common, and include resolution starting at 480 lines, and aspect ratios from standard 4:3 to, in a few cases, 16:9. Only digital televisions and analog televisions with digital set-top converter boxes are able to receive the signal. Digital TV is being broadcast in over 30 major markets across the country already, and by 2006, every broadcaster (whether local, national, cable, or satellite) is required to comply with digital broadcasting standards.

#### **Digital Theater Systems (DTS)**

A multichannel digital audio format first introduced in commercial movie theaters in 1993. See pg. 8 for more info.

#### Dipole

A speaker design which generates equal amounts of sound both forward and backward, with the two sounds being *out of phase*. Dipoles are often used as surround speakers. See also Bipole, and the surround speaker illustrations on pg. 20.

#### Dolby<sup>®</sup> Digital

A form of encoding audio information digitally. 5.1-channel Dolby Digital contains an advanced decoding matrix for a bitstream of digital data consisting of six channels (front left, center, front right, left surround, right surround, and a subwoofer channel). Five main channels are full-bandwidth and the "low frequency effects" subwoofer channel has a frequency range of 3-120 Hz. Although it is often used in reference to 5.1-channel surround sound, Dolby Digital can also take the form of Dolby Pro Logic surround sound, stereo, or even mono audio. See the diagrams on pg. 6 for more information on a Dolby Digital surround setup, and the Dolby Digital encoding/decoding process.

#### Dolby Digital "ready"

A/V receivers that do not have Dolby Digital decoders built in, but feature **5.1-channel** inputs for hooking up an external Dolby Digital decoder. Increasingly, these receivers are called "5.1-ready."

#### Stereo

Audio in a two-channel, left and right format.

Years ago, stereo sound replaced mono sound as the standard music-listening format.

#### Dolby<sup>®</sup> Surround

The term used with consumer equipment and for the identification of Dolby-encoded video software released for use at home. **Dolby Pro Logic** and **Dolby Digital** are the two current formats of Dolby Surround.

#### Dolby<sup>®</sup> Pro Logic<sup>™</sup>

An audio format consisting of four channels of *matrixed* sound (front left, center, right, and surround). Dolby Pro Logic delivers distinct channel separation, precise localization of on-screen sounds and dialogue, plus realistic special effects and theater ambience. See the diagrams on pg. 7 for more information on a Dolby Pro Logic surround setup, and the Dolby Pro Logic encoding/decoding process.

#### Downmix

If you don't have a Dolby Digital system, you can still enjoy excellent Pro Logic or stereo sound from your DVDs. All DVD players have the ability to take a "5.1-channel" Dolby Digital soundtrack and "downmix" it to two channels, which can then be sent to a stereo receiver, a TV, or an A/V receiver with Dolby Pro Logic decoding.

#### DVD

A 12 cm optical disc format for video and audio, which is rapidly superseding VHS in popularity. There are already thousands of movies available on DVD, and hundreds more are released each month.

#### Frequency response

Expressed in cycles per second, or Hertz (Hz), it tells you how wide a range of music an amplifier or speaker is reproducing.

#### High Definition Television (HDTV)

A high-quality **DTV** category which refers to several different formats, all of which have the following attributes: **resolution** of 720 lines or higher, a 16:9 **aspect ratio**, and **Dolby Digital** audio.

#### Letterboxed

Videos that show the entire picture as seen in a movie theater. The resulting image width is much greater than its height. On a TV screen with standard 4:3 **aspect ratio**, letterboxed videos appear with horizontal black bars above and below the image.

#### Line doubler

Technology found in television sets which, by doubling the amount of information per line, offers a clearer, more defined picture. Other variations on this theme include Sony's Digital Reality Creation, which is more efficient and more precise than standard line doublers because it enhances each pixel.

#### Luminance

The brightness or black-and-white component of a color video signal. Determines the level of picture detail.

#### Pan-and-scan

The process of transferring a movie or other source material to videocassette or broadcast so that it fits the 4:3 aspect ratio of the NTSC (National Television System Committee) system, as well as nearly all current TVs. This results in some lost picture information, particularly in the width of the image.

#### Remote control

The capabilities of receiver remotes can vary a lot from brand to brand, and model to model. *A/V remote controls* can operate several A/V components from the same manufacturer. *Multibrand* remote controls have preprogrammed commands for components made by popular brands. *Programmable*, or *learning*, remotes can be programmed by the user to operate A/V equipment from other manufacturers.

#### Resolution

The sharpness of a video display in the horizontal direction; the number of vertical lines that can be resolved from one side of the screen to another. The detail you see depends on your signal source. All NTSC TVs offer resolution that surpasses standard signals such as TV broadcasts (330 lines) and VHS VCRs (240 lines). New technology enhances built-in NTSC resolution still further. However, future hybrid TVs (a mixture of NTSC and ATSC capability) and digital TVs should have noticeably better resolution.

#### Satellite/subwoofer system

Speaker system that uses between two and five small satellite speakers for tweeter and midrange drivers, and a separate box specially designed to house the woofer(s).

#### Signal-to-noise ratio (S/N)

Expressed in decibels (dB), it compares the level of an audio or video signal to the level of internally generated noise (such as audio hum).

#### Speaker efficiency

Measures in decibels (dB) how well a speaker system turns input power into sound.

#### Standard Definition Television (SDTV)

The category, containing multiple specific formats, for standard DTV broadcasts. This format will be more common than HDTV, and entails a minimum of 480 lines of resolution. It will offer both 4:3 and 16:9 aspect ratios, and a wide range of sound encoding (from stereo to Dolby Digital 5.1).

#### Subwoofer

A speaker designed specifically for bass output. Subwoofers are usually powered (with a built-in amplifier). Subwoofers offer deep, resounding bass, and are an important part of Dolby Digital surround sound.

#### Super VHS

An improved VHS format which offers better picture quality than standard VHS 240-line resolution. S-VHS VCRs record at 400+ lines of resolution, and can even improve the picture quality of standard VHS tapes during playback. Some also use S-VHS ET to record at S-VHS quality on standard VHS tapes. Although S-VHS players will play standard tapes, most standard players will not play S-VHS tapes (however, some brands offer Quasi S-VHS to let you do just that!).

#### Surround speakers

In a home theater surround sound system, this pair of speakers is positioned to the sides or behind your listening seat, creating ambience and providing directionality to off-screen sound effects.

#### S-video inputs/outputs

Special four-pin connectors that carry the chrominance (color) and luminance (brightness) portions of the video signal separately, for improved color accuracy and reduced distortion.

#### THX®

A division of Lucasfilm Ltd. devoted to accurate sound reproduction in theaters and on home systems. See FAQ on pg. 24 for more info.

#### Total harmonic distortion (THD)

A measurement of amplifier accuracy, it indicates the presence and amount of internally generated noise.

#### Transients

Brief bursts of musical energy.

#### VCR Plus+ with cable box & DBS control

Easy videotaping for cable, DBS, and over-theair broadcasts! Simply enter the show's "PlusCode" (found beside its title in most TV listings) and the VCR is automatically set for the channel, date and times. Cable box control means the VCR is able to switch most cable boxes to the appropriate channel at the appropriate time, automatically. Some VCRs also include infrared transmitters which let them control of DBS receivers, so you can make timed recordings of satellite programs.

#### Video shielding

A way of containing a speaker's magnetic energy inside its enclosure. This is usually achieved by placing another speaker magnet back-to-back with the existing one so that the two magnetic fields cancel each other. Shielding may also be achieved by lining the inside of the speaker cabinet with metal. Video shielding is important in home theater — especially with the center channel speaker. If an unshielded speaker is placed too close to your TV, the magnetic energy can cause picture distortion and even *permanently* damage the TV's picture tube.

#### Voice-matched

Refers to speakers with a similar timbre or tonal quality. Voice-matched speakers will result in more seamless, consistent, and convincing wraparound sound in your home theater.

#### Widescreen

The aspect ratio associated with movie theaters from around the 1950s on. Widescreen usually means movies filmed in a 16:9 **aspect ratio** (although theaters do not use 16:9 as their standard, it is a close approximation of the wide screen size of theaters). When transferred to video for home viewing, widescreen films are released in a **pan-and-scan**, "modified to fit your screen" format, a **letterbox** format, or both. With the onset of **HDTV**, we will see more films available in a true, non-letterboxed widescreen, or **anamorphic**, format.



Be sure to ask your Sales Advisor about Crutchfield's exclusive *Audio/Video Reference* — free with the purchase of any home audio/video component (or you can order it separately). This popular and informative guide includes:

- over 150 color-coded, self-adhesive CABLELABELS<sup>™</sup> for quick, easy identification of every speaker wire and patch cord in your system
- easy-to-understand A/V MasterSheets which include close-up illustrations and hook up instructions, and provide a visual reference for applying your CABLELABELS
- audio/video glossary
- "The Crutchfield Guide to Speaker Placement & Room Acoustics" with placement tips for your speakers, plus information that will help you get better sound from your system's biggest component your room!

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