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

The

CRUTCHFIELD®

Guide to

Home Theater

The Crutchfield Guide to Home Theater

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Visit our website at www.crutchfield.com. You'll find the latest components, essential accessories, and informative articles to help you maximize the value of your gear.

The Magic of Home Theater

We all know how movie theater magic comes to life. The gorgeous, vivid images on the screen pair up with impressive, enveloping audio. From the background noise of crickets chirping, to the realistic crackle and boom of a thunderstorm, to the sight of a massive spaceship rumbling into view, lifelike images and sounds draw you into the action onscreen and hold you there!

Now, home theater lets you thrill to the same experience — in the comfort of your own living room. With 5.1-channel **Dolby® Digital**, you enjoy 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. And video sources like DVD, with crisp, colorful detail and fluid motion, bring a movie to life visually — you'll be amazed!

Transform your room into a cinema!

Home theater is now so popular that it's 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 technologies appeal to you the most? (Remember, home theater doesn't mean having every component on the market! You can pick and choose.)
2) What components do you already own? (Some may be ready for home theater now. You can always mix and match.)
3) Are you thinking of replacing any older gear? (If so, it may be time to upgrade.)

Before we get into DVD players, home theater 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 the word on the page isn't 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, said, "Sound is 50% of the experience. If you don't have a good sound system, you cut the experience dramatically."

The key word there 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. Richly enveloping surround sound transforms TV and movie viewing into a senses-grabbing cinematic experience. Now, read on to learn just how surround sound works.

Need a definition? See the Glossary of Terms on pgs. 27-31

Surround sound decoding formats

Surround format	Number of channels	Types of channels	Type of media the format can be found on
Dolby® Pro Logic™	4	2 discrete, full-bandwidth channels *(front left and right)*; 1 matrixed, full-bandwidth channel *(center)*; 1 matrixed, limited-bandwidth channel *(surround left and right)*	• VHS movies • broadcast TV • can be downconverted from any Dolby Digital source
Dolby Pro Logic II	5.1	2 discrete, full-bandwidth channels *(front left and right)*; 3 matrixed, full-bandwidth channels *(center, surround left and right)*; 1 subwoofer channel via Pro Logic II's bass management	can be applied to: • stereo music • VHS movies • broadcast TV • can be downconverted from any Dolby Digital source
Dolby Digital	up to 5.1	5 discrete, full-bandwidth channels *(front left and right, center, surround left and right)*; 1 discrete LFE channel *(subwoofer)*	• all DVDs • some broadcast HDTV • some DBS
DTS®	5.1	5 discrete, full-bandwidth channels *(front left and right, center, surround left and right)*; 1 discrete LFE channel *(subwoofer)*	• some DVDs • some music CDs
THX Surround EX™ or Dolby Digital EX	6.1	5 discrete, full-bandwidth channels *(front left and right, center, surround left and right)*; 1 matrixed, full-bandwidth channel *(back surround)* 1 discrete LFE channel *(subwoofer)*	• some DVDs are THX Surround EX-encoded • regular Dolby Digital 5.1 DVDs can also be used with a THX Surround EX decoder
DTS-ES™	6.1	6 discrete, full-bandwidth channels *(front left and right, center, surround left and right, and back surround)*; 1 discrete LFE channel *(subwoofer)*	• some DVDs

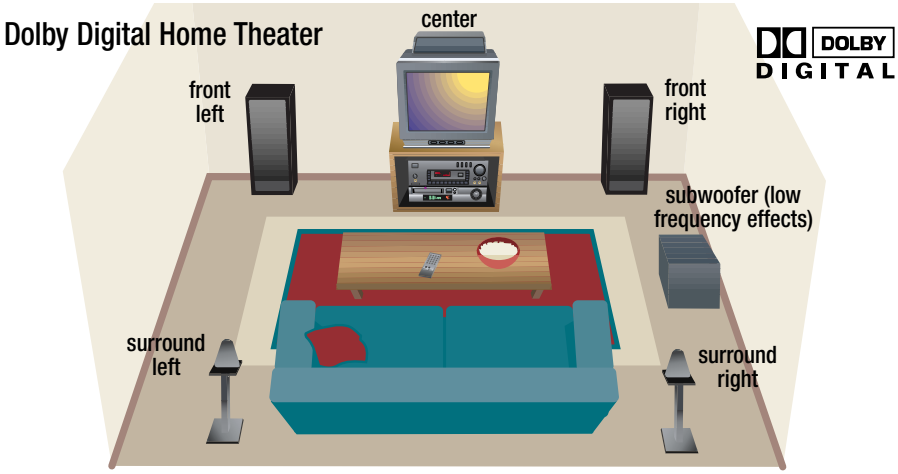
Sound that surrounds you

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 speaker(s) 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® Surround uses several carefully placed speakers to achieve the same effect.

A typical 5.1-channel setup involves a pair of front speakers (that act as your **main stereo speakers** for music), a **center channel speaker**, a pair of rear, or **surround**, speakers, and a **subwoofer** (for more info on the specific speakers involved, and on speaker placement, see pgs. 15-21). Whether you're using tiny speakers (called satellites) that hide away discreetly on shelves, or large, floor-standing tower speakers, you hear details you never dreamed were there. With this kind of setup, 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, thunder right past you, then slowly fade away in the distance to your right.

The most important form of surround sound today is **Dolby Digital**. It has rapidly become the standard for great home theater surround sound — plus, it's widely available. You'll find Dolby Digital on 12,000 DVD titles, digital cable, DBS broadcasts — and it's the chosen audio format for **HDTV** (see pgs. 12-13 and 29 for more info on HDTV). Read on to learn just why Dolby Digital 5.1-channel sound has taken the world by storm.



"5.1-channel" Dolby Digital surrounds you with six discrete channels of crystal-clear, dynamic digital audio. Your main, center and surround speakers are all fed full-bandwidth information, for three-dimensionality and precise localization of sounds. For serious bass impact, your sub is sent a channel of "low frequency effects."

Dolby Digital

Introduced in movie theaters in 1992, **Dolby Digital** is a *digital* form of encoding audio data, which ensures accurate reproduction of sound (digital signals are not prone to degradation the way analog signals are). As a result, Dolby Digital was chosen as the standard audio format for DVDs and High-Definition Television (HDTV).

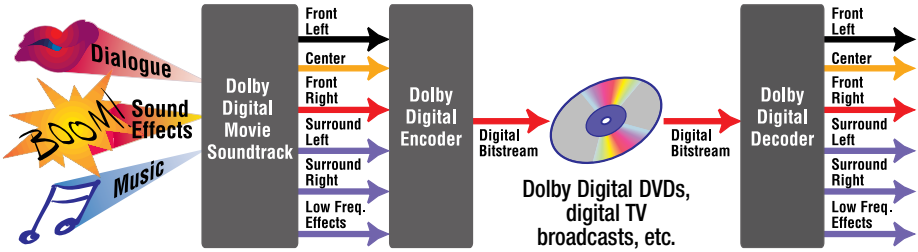
The accuracy and flexibility of Dolby Digital permitted the development of Dolby Digital **5.1-channel** surround, which quickly established itself as the preferred format. Dolby Digital 5.1 uses *five speakers* and a *subwoofer* to provide top-notch precision and clearer dialogue than other formats. As a result, even though it can take the form of stereo or mono sound, Dolby Digital is often simply called a "**5.1-channel**" format.

In 5.1-channel sound, there are five discrete, full-range channels. "Discrete" means each channel is separate and distinct, for precise localization of sound around your room. Two channels send stereo sound to left and right **main speakers**. A third channel plays through the **center channel** speaker (usually positioned right above the TV, so dialogue seems "attached" to the faces on screen). The last two discrete channels of sound are sent to **surround speakers**, creating a spacious, ambient atmosphere and distinct special effects.

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

Dolby Digital 5.1 is a *significant* improvement on earlier formats like Dolby Pro Logic, because the use of five discrete, full-frequency channels adds more spacious ambience and clearer off-screen effects, while the dedicated subwoofer channel gives realistic bass impact to

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.

Need a definition? See the Glossary of Terms on pgs. 27-31

the faintest rumbles and loudest roars.

Looking into Dolby Digital for yourself? There are many sources of 5.1-channel Dolby Digital; here are some popular choices:

- a DVD player (see pg. 10 for info. Many DVDs are encoded with Dolby Digital 5.1 — check to see if the DVD case says "5.1")
- a DBS system (see pg. 11)
- HDTV programming from over-the-air broadcasts or digital cable (see pgs. 12-13)

Of course, to experience Dolby Digital 5.1 sound, you must connect these sources to a Dolby Digital receiver and 5.1-channel speaker setup.

If you already have a substantial video library full of Dolby Pro Logic sources, don't worry. Dolby Digital receivers decode Dolby Pro Logic too, so upgrading to Dolby Digital doesn't make your other favorites obsolete.

Dolby Pro Logic

Dolby® Pro Logic™ was the home theater surround standard for years, and it's still very common. It's the format needed for **Dolby Surround**-encoded VHS tapes and TV broadcasts.

Dolby Pro Logic is a *four-channel system*, sending three channels of full-range sound to the left front, right front, and center channel speakers. A fourth *mono* channel of limited-bandwidth sound is shared by two surrounds. The center and surround channels are *matrixed*, or derived, from material in the left and right channels.

Although Pro Logic's surround information is mono, keep in mind that it's necessary to use a *pair* of speakers to achieve the intended effect. And remember — even if Pro Logic doesn't quite offer the precision and intensity of Dolby Digital, it's still a great way to get home theater surround!

Dolby Pro Logic II

An advanced version of Dolby Pro Logic, **Dolby Pro Logic II** gives you *multichannel* sound from stereo sources, including Pro Logic sources. Plus, Dolby Pro Logic II takes full advantage of all the speakers in your 5.1-channel setup, sending *full-bandwidth*, *stereo* surround channels to your rear speakers, and creating a dedicated low bass channel for your subwoofer. As a result, it's a noticeable improvement on original Pro Logic.

DTS, DTS-ES, and THX EX

There are other flavors of surround sound out there; here's a quick overview of what each offers.

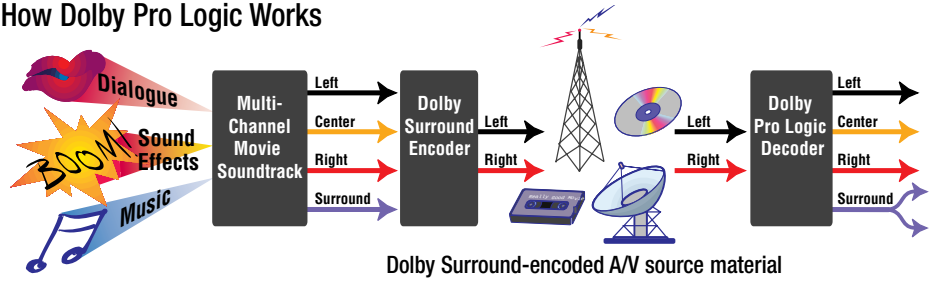
Like Dolby Digital, **DTS** (Digital Theater Systems) offers 5.1 channels of digital audio. However, because DTS uses less compression than Dolby Digital, some say DTS is slightly more accurate than Dolby Digital. The drawbacks: DTS takes up more space on a DVD (so there's less room for special features) and there aren't many DTS-encoded DVDs.

DTS-ES delivers the "5.1" channels of regular DTS, plus it can add a *discrete* "back surround" channel. That channel may be played through one speaker or two. As a result, you can enjoy true 6.1-channel surround (with the appropriate receiver and a 6.1 speaker setup). However, very few DVDs are encoded for 6.1-channel DTS-ES sound.

THX Surround EX and **Dolby Digital EX** are also a form of 6.1-channel surround; as they're essentially the same processing technology, we'll discuss them together. THX EX- or Dolby Digital EX-encoded DVDs play as 6.1-channel (with an appropriate receiver and a 6.1-channel speaker system); plus, a THX EX or Dolby Digital EX receiver can also get 6.1-channel sound from a regular Dolby Digital 5.1 DVD. The down side? Unlike DTS-ES, the rear channel is *matrixed* from the existing surround channels.

Because of the vast amount of Dolby Digital-encoded material already out there, and the fact that it's the standard for DVDs and HDTV, Dolby Digital is probably the dominant surround format for the foreseeable future. If you're interested in future-readiness *and* great sound today, consider a receiver with several types of decoding — many receivers offer both Dolby Digital and DTS decoding, and some add Pro Logic II and THX EX or DTS-ES as well.

How Dolby Pro Logic Works



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

Getting Started on Your System

When it comes to building your Dolby Digital home theater, you have a choice to make. Do you want to create a system from ***separate components*** — that is, choose a Dolby Digital receiver, a DVD player, and an array of speakers to go with your TV? Or do you want the ease of a ***DVD home theater system***, a ready-to-go package which includes a DVD player/receiver component with Dolby Digital decoding, five pre-matched speakers, and a subwoofer? Here are a few guidelines to use when deciding.

Separate components make sense if:

- **You have a large room.** Choosing separate components lets you tailor your system's power and capabilities to suit a larger space.
- **Music is a top priority**. If you listen to a lot of music (especially higher-end multichannel formats like **SACD** and **DVD-Audio**) and have defined tastes, you'll need high-performance main speakers and a powerful receiver. Hand-picking your gear lets you ensure that music *and* home theater sound exactly the way you want.
- **Expandability and upgradability matter.** Whether you're adding to existing gear, or just preparing for future technology, separate components offer greater flexibility for upgrades.
- **You want more exacting control and quality.** By choosing separate components and speakers with *your* room and tastes in mind, you have the opportunity to select *exactly* what you want. It's the best way to achieve top-quality sound reproduction that'll satisfy you for years to come.

GEAR UP FOR CINEMA

What you need for

1. Home theater sources

You need appropriate source components — like a DVD player, satellite TV system, or HDTV tuner — to pass a clean picture and Dolby® Digital-encoded audio along to a receiver. *See pgs. 10-12 for more info on home theater sources.*

2. Dolby Digital decoding

Dolby Digital soundtracks must be decoded into separate audio channels for playback through your home theater speakers. All new home theater receivers have built-in Dolby Digital decoding and built-in Pro Logic decoding. *See pgs. 12-13 for more info on home theater receivers.*

3. A Television

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 source for Dolby Surround-encoded TV broadcasts: just connect the TV's audio outputs to a receiver with Dolby Pro Logic decoding. *See pgs. 13-14 for more info on TVs.*

A DVD home theater system makes sense if:

- **You have a smaller room.** Whether you're looking for a main system for your family room or den, or a solution for a smaller space like a bedroom or dorm, you'll love the exceptional performance and value these packages offer.
- **Simple setup is key**. With a DVD home theater system, you don't have to select multiple components and make sure they're compatible. DVD home theater systems are designed for easy setup and use. The DVD player/receiver component, five speakers, and subwoofer have been created to work seamlessly together. Many systems even come with color-coded connection wires, and can be completely up and running in less than an hour!
- **You want an economical system.** Many DVD home theater systems give you DVD capability and Dolby Digital decoding for less than the price of most separate component systems. Ideal if you're just getting into home theater!
- **You're not interested in the small details.** Although there are user-adjustable settings, these systems' audio presets offer great performance — perfect for folks who aren't interested in tweaking sound and video settings.

Now you may have some idea of the home theater system *you* want. What next? We suggest you read on — you'll find a thorough discussion of the major parts of a system, and what each part does, in the following pages. A small summary of how a DVD home theater system incorporates each part will follow on pg. 17.

home theater

4. Five speakers and a powered subwoofer

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 pgs. 15-17 for more info on speakers and subwoofers.*

What You Need
Home Theater Sources

When it comes to getting a clear picture and crisp surround sound, there are several sources that figure prominently in today's home theater systems: DVD players, HiFi VCRs, and all that audio/video you get through TV, cable and DBS.

Read on to learn about the gear you need to assemble a great home theater system.

DVD Players

To truly experience the thrills of home theater, you need a DVD player. **DVD** is the most popular video format around. One disc can hold a two-hour-plus movie which, at up to 500 lines of **resolution**, offers picture quality that's *twice as sharp* as VHS, and far better than NTSC TV.

Because a DVD can have data on both sides of the disc — or even have two layers of data per side — there's a *lot* of room to store picture and sound information. Thanks to this extra storage space, DVDs often offer amazing features that weren't possible with VHS, like:

- two versions of the movie on one disc (one in standard 4:3 **aspect ratio** for display on a regular TV, and one **widescreen** version)
- soundtracks in multiple languages, with subtitles in English, French, and Spanish
- director's commentaries, actor bios, interviews, outtakes, and more

Along with all those extras, DVD is also the first video medium to offer state-of-the-art **Dolby® Digital** as its standard audio format. While some older movies retain their original soundtrack as stereo or mono Dolby Digital, many DVDs offer outstanding **5.1-channel** Dolby Digital.

What kind of DVD player is right for you? Well, here are some things to consider before buying:

- **Replace your CD player**. DVD players are "backwards-compatible" with music CDs — they play them perfectly! Many players also play CD-Rs and CD-RWs, even MP3 CDs. However, always check compatibility *before* buying.
- **Enjoy high-resolution audio**. A few players can also handle multichannel music formats like **SACD** and **DVD-Audio**. If you're going to be connecting your DVD player to a surround system, you may want playback of one of these formats too. You'll be impressed.
- **Think progressive-scan!** Some players offer progressive-scan playback, which provides smoother, more filmlike picture quality. (Keep in mind that to enjoy progressive scan, you also need a progressive-capable TV.)
- **Single-disc, changer, or portable?** *Single-disc players* are economical and straightforward, and often quite well-made. *Multi-disc changers* generally use a carousel format and hold between three and seven discs. *Mega changers* form a kind of entertainment jukebox, letting you store between 50 and 400 discs. *Portable DVD players* usually offer a travel-friendly, laptop-style design.
- **Want to record?** With the arrival of **recordable DVD**, you can store family movies and broadcast TV on DVD! See pg. 30 for more information on this new technology.

A DVD mega changer keeps your entire movie collection and all your favorite music ready to play at a moment's notice!

At this point, having a DVD player and a Dolby Digital receiver is the *best* way to enjoy top-notch home theater. Finding movies on DVD is easy: there are thousands available now, and many more are released each month. Most video rental stores have an increasingly large selection of DVDs. And DVDs cost about the same as videotapes, with a price range of $15 to $25.

No TV needed!
A compact DVD portable lets you take entertainment on the road.

The Bottom Line on DVD

- Superb resolution. The crystal-clear picture of DVD is a pleasure to see!
- Lots of goodies. The storage capacity of DVD means you get full-length movies and lots of special features.
- Sounds great! DVD offers state-of-the-art Dolby Digital sound.

Need a definition? See the Glossary of Terms on pgs. 27-31

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

HiFi VCRs & Hard Disk Recorders

You probably have a HiFi VCR at home — and you'll be glad to know it can be a part of home theater. Over 11,000 VHS movies offer the **Dolby Surround** material that works with **Dolby Pro Logic** and **Pro Logic II** decoding to unlock rich, wraparound surround. VCRs also let you record TV and DBS broadcasts for later viewing (and they're great for copying, editing, and watching home movies made with a camcorder!).

As well as HiFi stereo sound (a must for home theater), a few other features to consider include:

- four-head VCRs (as opposed to models with only two heads) offer improved special effects like slow motion and freeze frame.
- VCRs with **VCR Plus+** simplify timer recording — and some even include a controller that changes cable or DBS channels.
- a flying erase head makes transitions between segments cleaner if you plan to edit tapes.
- front-panel **A/V inputs** make hook-up of a camcorder or second VCR quick and easy.

For greatly improved VCR recording quality, go **Super VHS**. With horizontal **resolution** of 400+ lines (compared to 240 lines for standard VHS), S-VHS recordings preserve the detail in high-resolution sources like DBS or MiniDV. Some decks offer Super VHS ET, which lets you record with Super VHS quality on standard tapes. And don't worry, S-VHS models do a great job playing those VHS movies from the video store.

The Bottom Line on VCRs

- Recording capability. VCRs can record TV and home movies.
- Surround sound. Connected to a Dolby Digital system, your HiFi VCR can provide Dolby Pro Logic surround!
- The price is right! Most people already have a VCR — and if you don't, they're quite inexpensive.

Don't forget this digital cousin to a VCR — a **hard disk video recorder**! This technology makes timer recording very simple — and even watching TV is easier than ever. You can *pause* "live" programming to get a snack 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. Plus, they can pass Dolby Surround audio of some shows to your A/V receiver, so you can enjoy Pro Logic sound.

Broadcast, Cable and DBS Programming

A very important and very common source for home theater A/V is broadcast **NTSC** television. If you have a stereo TV, you're probably receiving Dolby Surround programming over the air! So, just by connecting your TV to your A/V receiver and home theater speaker system, you can probably enjoy surround sound with many shows.

The same goes for regular NTSC cable — if your cable provider outputs stereo programming and you have a stereo TV, you have access to Dolby Pro Logic sound already!

The Bottom Line on Broadcast TV and Cable

- Dolby Surround. With a stereo TV and a home theater system, you can enjoy Dolby Pro Logic from TV and cable.
- Satisfactory resolution. Better than VHS, though not as good as DVD, the 300+ lines of NTSC TV are just fine.

Another great source of NTSC audio/video is **Direct Broadcast Satellite** (**DBS**). Not only do you get access to hundreds of movies from HBO, Cinemax, Showtime, and The Movie Channel, all games from the NFL, Major League Baseball, NBA, and NHL, and a wide range of special events, you can also get impressive video quality and Dolby Surround-encoded audio. DBS comes to you with little video "noise" and resolution up to 380 lines. On top of that, higher-end DBS receivers can pass a **Dolby Digital** signal to your Dolby Digital receiver! Plus, many programs and virtually all movie channels are Dolby Surround-encoded, for when Dolby Digital isn't available.

A few DBS receivers even have a **hard disk video recorder** built in. Your stored programs maintain the clarity of digital video and the precision of Dolby Digital or Dolby Surround sound!

How do you get DBS to your home theater? 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 (as a result, not everyone's home is DBS-ready). The dish is specially designed to pick up the digital broadcasts from

DBS systems offer a very clean image, great sound quality, and a wide variety of programming.

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.

The Bottom Line on DBS

- Clear, noise-free picture.
- Tons of channels. DBS opens up your viewing possibilities big-time. Especially nice for folks in rural areas without over-the-air or cable options.
- Surround sound galore! Along with Dolby Digital sound on some programs or movies, you get plenty of Dolby Surround-encoded material for enjoying Pro Logic.

Digital Television Programming

In discussing over-the-air, cable, and DBS programming on the previous page, we touched on **NTSC** programming only. However, **digital television** (which includes the well-known **HDTV** and the less-demanding **SDTV** standards) can also be accessed via over-the-air broadcasts, cable, and DBS. (Of course, not *all* areas or cable providers are equipped for digital TV yet — and digital TV is *not* the same as digital cable; see pg. 23.) Still, where available, digital TV programming is an exceptional source for gorgeous home theater video and sharp multichannel audio.

What makes digital TV programming great? You get video at top-quality **resolution** — it starts at 480 lines of resolution and goes all the way up to 1080! You can also enjoy both **progressive** and **interlaced** video — progressive offers a more filmlike picture, which is great for home theater. Another big perk is **Dolby Digital**, the standard audio format for HDTV. That means HDTV's crystal-clear video is accompanied by precise Dolby Digital stereo or even 5.1-channel surround.

Plus, digital TV programming is available in both **widescreen** 16:9 aspect ratio (like a movie theater's wider screen) and 4:3 **aspect ratio**. Don't forget — you need an HDTV-capable TV to enjoy stunning **HDTV** video! (See pg. 13 and the glossary for more info on HDTV-ready TVs.)

The Bottom Line on Digital TV Programming

- Can't-be-beat resolution. With HDTV's top resolution of 1080 lines, it's the best around. Even 480 looks great!
- Dolby Digital. It's HDTV's audio format, so your sound, be it stereo or 5.1-channel surround, should be sharp and clear.
- The future. Though it can be expensive and is still only partially available, HDTV is the FCC-mandated future of TV.

What You Need
Dolby Digital Decoding

In your home theater system, the ability to decode and play 5.1-channel Dolby Digital sound is key. The most popular way to get that sound from your sources to your speakers is via an A/V receiver with Dolby Digital decoding. Let's take a look at what an A/V receiver offers to a home theater system, and why some major features are important.

Home Theater Receivers

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

Dolby Digital receivers include both **Dolby Digital** and **Dolby Pro Logic** decoding for unlocking the multichannel surround sound hiding in DVDs, videotapes, DBS, etc. Many receivers offer additional forms of decoding as well, such as DTS and Dolby Pro Logic II (see pgs. 5-7 for info on surround sound formats).

Most A/V receivers include Dolby Digital decoding — the key to an impressive, flexible 5.1-channel home theater system.

When choosing an A/V receiver, make sure it has two or more video inputs, and separate analog and digital inputs for the accompanying audio. That way, instead of trying to connect several A/V sources to a TV (especially one with only a few video inputs), you can hook the sources up to your receiver, then run a single video connection into your TV. When you want to watch movies on your DVD player, just select the appropriate video input — the receiver does the rest!

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 buying separate preamplifier, amplifier and tuner components.

Need a definition? See the Glossary of Terms on pgs. 27-31

What does the "preamp" section do?

An receiver's preamplifier is the control center of your entire home theater system. This means it controls switching from one source to another, routes the signal between your components, and prepares the signal that will be be boosted by the amplifier(s). Features often found in the preamp section are volume and tone control, **Digital Signal Processing** (including Dolby Digital and Pro Logic decoding), soundfields for enhancing movies and music, analog and digital audio inputs and outputs, and video inputs and outputs.

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 — If your system is in a large room, chances are 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 (having more than your speakers need is actually better than not having enough).

A receiver with built-in five-channel power for front left and right, center, and surround left and right speakers is key for home theater. Some receivers offer built-in 6- or 7-channel power, for use with 6.1- and 7.1-channel surround systems. Others offer high-quality, full-bandwidth-rated power amps — great if you plan on enjoying an audiophile-quality music format like **SACD**.

Always remember, the more reserve power an amp has, the better it will be able to cope with the demands of the audio material, and the more "live" the music or video soundtrack will sound.

The Bottom Line on Home Theater Receivers

- Processing. You'll want *at least* Dolby Digital decoding, and maybe some other processing as well!
- Power. Get the power you need for your speakers and room.
- Inputs and outputs. Be sure your receiver has a full complement of ins and outs, so you can connect everything you've got now and in the future.

What You Need A TV

The TV is the focal point of your home theater — make sure it's bringing you a great picture!

Right now, there are a few kinds of TVs you can get:

- An analog NTSC **CRT** (cathode-ray tube) TV, usually with a 4:3 **aspect ratio** screen
- An NTSC **projection** TV, with either a 4:3 or a **widescreen** 16:9 aspect ratio screen
- An **HDTV**-ready TV (either CRT or projection) with a 4:3 or widescreen design
- An HDTV TV (either CRT or projection) with a 4:3 or a widescreen design
- A flat-panel plasma TV (we won't get into discussing this high-dollar technology because these TVs aren't very common)

As far as traditional analog **NTSC** TVs go — the kind that've been used for years, often with a squarish 4:3 aspect ratio screen — your existing model may be just fine for home theater. These TVs are still going strong, and will be around for years. But upgrading to a newer model can make a difference when it comes to picture quality. Some older TVs can't do justice to the quality of DVD video — especially TVs with only an **RF** input, which makes for lower image quality.

4:3 or widescreen?

You may be trying to choose between a traditional TV with a squarish 4:3 aspect ratio and a widescreen TV, with an approximate aspect ratio of 16:9. Here are some guidelines which may help.

- Watch lots of movies? Consider a widescreen TV — especially an HDTV-ready one
- Mainly watch TV and cable broadcast in 4:3 aspect ratio? Stick with a squarish screen

Digital televisions

Many TVs out there are **HDTV** and HDTV-ready. They possess sophisticated technology that lets them present the crisp digital picture of HDTV with stunning accuracy (older NTSC TVs can't handle the higher resolution of a 1080i HDTV signal; for more info on HDTV programming and formats, see pg. 12 and the glossary). Don't worry — NTSC programming looks great on 'em too!

Some of these HDTV-capable TVs offer a regular 4:3 aspect ratio — others are widescreen. And keep in mind, an *HDTV-ready* set offers HDTV compatibility, *without* including a built-in HDTV tuner, whereas a true HDTV set should include both playback capability and a tuner for receiving and processing an HDTV broadcast.

What your TV needs for home theater

Whether you decide to go with an NTSC TV for the time being, or want to move ahead into HDTV viewing, the following features are key:

- *Direct audio/video inputs and outputs* — They provide hookup flexibility and clean signal transfer. **S-video** and **component video** inputs are ideal. Both offer more accu-

For home theater, we recommend a TV with direct audio/video inputs and picture enhancement technology like a digital comb filter and 3:2 pulldown. The TV to the left has a 4:3 aspect ratio.

rate delivery of DVD's high-resolution picture than RCA patch cords (**composite**), and a *much* better picture than an **RF connection**.

- *Improved picture technology* — Good TVs now include helpful technology designed to clean up the images you see. Upconversion via **line doubling** and other picture enhancement technologies make the picture smoother and less grainy. **Digital comb filters** help provide a clear picture — they offer a significant reduction of jitter and dot crawl. 3:2 pulldown processing creates clear, accurate **progressive-scan** video from converted film-based sources. Some TVs, especially HDTV-capable sets, include progressive-scan capability, which gives sources like DVD a smoother look with more fluid motion, when compared to **interlaced** video.
- *Flat screens* — Many CRT TVs offer flat screens, instead of the gently curved screen that was standard for the last 45 years or so. Flat-screen TVs reflect less glare, and many people feel they give a more realistic, geometrically accurate picture. (Flat CRT screens are different from the flat-panel plasma TVs you see advertised occasionally.)

It's also important, when it comes to home theater, to have the largest screen your viewing area can accommodate. We've found a 27" 4:3 aspect ratio screen to be about the minimum for good home theater performance, although some smaller screens are very effective in smaller rooms. Larger screens can go up to 72" and more! Keep in mind, too, that the larger the screen, the greater your comfortable viewing distance will be. If your room is small, on the other hand, a giant projection TV is 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 with good surround sound.

Suggested TV Viewing Distances

For NTSC TVs with 4:3 aspect ratio screens

TV Screen Size (measured diagonally)		Suggested Viewing Distance
27" TV		81" away
32" TV	x 3 =	96" away
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.

* Trying to position a widescreen TV? See the FAQ for some suggestions.

The Bottom Line on TVs for Home Theater

- Great picture. With the high resolution of today's home theater sources, a sharp, colorful image is a must.
- Make connections. Direct audio and video inputs and outputs (especially S-video and component video) are key.
- Innovations. HDTV-capability, flat screens, widescreen design — all these things can make for real impact.

Need a definition? See the Glossary of Terms on pgs. 27-31

What You Need
5 Speakers and a Subwoofer

Your speakers have tremendous impact on the sound quality of your system — after all, 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 system sounds.

To re-create the movie theater experience in your home, 5.1-channel Dolby Digital systems surround you with five full-range speakers and add a powered **subwoofer** for crucial bass punch. Serious home theater aficionados try to use five identical speakers, but since this doesn't work for most people, manufacturers have come up with families of voice-matched speakers — **main** speakers, **center channel** speakers, and **surround** speakers — intended for home theater. (A 5.1 speaker setup also works for DTS and Dolby Pro Logic sound, as well as soundfields designed to enhance your music. For 6.1-channel surround, another rear surround or pair of surrounds is added.)

Main speakers

For those of us who want great music *and* impressive home theater, choosing the right mains 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 for music enjoyment too. Choosing mains is really a matter of taste and budget:

- **Floor-standing tower speakers** are a favorite with music lovers. They offer rich bass and a wide, full soundstage, while blending nicely with surrounds to achieve big home theater sound.
- **Bookshelf speakers** make great mains if your budget doesn't quite stretch to towers — their ability to combine high performance and easy, inconspicuous placement is always a winner with people who split their listening between home theater and music.
- **Satellite speakers** are a great way to extract engrossing sound from speakers you barely see — a nice compromise between home theater and uncluttered decor. Satellites are generally part of a **satellite/subwoofer system**.

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. Voice-matched surrounds are important, too, for creating seamless surround sound. Many speaker manufacturers can recommend matches for older lines.

These tower speakers make great mains, offering impressive sound for music and home theater alike.

Voice-Matching

Voice- or **timbre-matched** speakers share the same tonal characteristics. For the most part, this means having the same kind of tweeter. Most manufacturers provide families of speakers which are all voice-matched and suited for use together.

Voice-matched speakers are essential when it comes to providing seamless, wrap-around surround sound for home theater.

The Bottom Line on Mains

- Main role! They act as stereo mains *and* your front left and right speakers. Choose 'em well!
- Voice-matching. Your mains should be voice-matched to your center channel speaker.

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 many effects. Because on-screen action (like explosions, gunshots, whispers, etc.) and dialogue must seem visually anchored to the TV screen, your center channel speaker should be positioned above or below your TV, and include **video shielding** (to protect your TV's picture from magnetic interference).

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

When shopping for a center channel speaker, we recommend that you voice-match it as closely as possible to the other speakers in your system, so the sound doesn't change in tonal character as it 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! It's also important to choose one with a wide frequency range that's able to handle all of your A/V receiver's center channel power.

The Bottom Line on the Center Channel

- Voice-matching. It's vital that your center channel speaker is voice-matched to your front left and right speakers.
- Positioning. Your center channel must be positioned above or below the TV for dialogue and effects to sound real.
- Good power handling and frequency range. The center channel handles 50% of the soundtrack and must be able to provide clean, clear sound.

Experience realistic off-screen effects from your surrounds!

Surround speakers

To become totally enveloped by a soundtrack, you need a pair of **surround speakers** beside or behind your listening position (if you're setting up a 6.1-channel system, you'll need an additional rear surround or pair of surrounds). Surround speakers help create wide, diffuse effects around you, while occasionally giving directionality to distinct sounds. As a result, they can re-create almost any effect realistically, from a shower of raindrops to a jumbo jet thundering overhead. This three-dimensionality is achieved when rear-channel information is sent to the surrounds.

In a 5.1 speaker system, there are a variety of possible placements for surrounds (see pg. 21 for some examples). One thing to remember, though, is that most surrounds will need to be wall-mounted or placed on stands — they can't just sit on the floor behind or to the side of your listening position. Don't forget to budget for speakers stands or mounting brackets!

The Bottom Line on Surround Speakers

- Full-bandwidth. Dolby Digital sends stereo, full-range sound to the rear channels, so you may want full-range surrounds, for a completely engrossing surround effect.
- Placement. Good positioning provides enveloping surround.
- Voice-matching. Surrounds that are voice-matched to your mains and center will make for more seamless effects.

To maximize the performance of your home theater system, a powered subwoofer is a must.

Powered subwoofer

In a home theater system, you usually can't experience the wall-shaking tremor of an earthquake or the rumbling boom of thunder without a sub.

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. It also improves your system's midrange and upper bass sound, by freeing the main stereo speakers from the stresses of producing deep bass. The cabinet resonances in your mains caused by deep bass can also muddy the midrange frequencies.

A *powered* subwoofer lightens the load on your receiver's amplifier, too, so the power normally used for low bass can be redirected to higher frequencies. (A few well-designed towers have built-in amps that give them, effectively, a powered sub — yet another option.) With a powered sub, your entire system plays cleaner and louder!

The Bottom Line on Powered Subwoofers

- Low frequency effects. Your sub turns the ".1" channel into the rumble needed for thrillingly realistic home theater.
- Take a load off. Your receiver's amp and stereo mains get a break if you have a powered sub to deliver the bass.

Need a definition? See the Glossary of Terms on pgs. 27-31

Satellite/subwoofer systems

Another possibility to consider is a home theater speaker system, or **satellite/subwoofer system**. Often designed to be low-profile, these systems provide an economical, room-friendly alternative to traditional speakers. They usually include five small satellite enclosures for the tweeters and midranges, and a subwoofer enclosure containing the woofer or woofers (sometimes the sub is powered, sometimes passive).

These systems offer numerous advantages:

1) They're often well-priced for the budget-conscious.
2) The small size makes for discreet placement in almost any room.
3) A satellite's small face reduces diffraction; sound is projected far into the room, contributing to a three-dimensional soundstage.
4) These systems are designed to provide voice-matched sound and easy setup — so 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!

This home theater speaker system delivers great sound without taking over your room. The satellites nestle on a bookshelf or can be placed on stands. The subwoofer can be hidden out of sight.

The Bottom Line on Satellite/Subwoofer Systems

- Easy setup. Already voice-matched and designed with complementary frequency response levels, these handy speaker systems can be added to an existing receiver and DVD player system without a hassle.
- Discreet positioning. The small satellites and omnidirectional subwoofer can be placed inconspicuously in a room, thus avoiding clashes with decor.
- Economical pricing. Home theater speaker systems tend to cost less than a full set of speakers purchased separately.

Home Theater
The All-in-One Option

Love the idea of home theater, but worried about choosing and matching components and speakers? Maybe you don't have room for a full-fledged system in your living room. Or maybe you have a unique spot — like a bedroom or dorm room — just begging for home theater. Sounds like you're a perfect candidate for a DVD home theater system!

DVD home theater systems

These systems are one of the handiest ways to achieve home theater. A single package offers a CD/DVD player/receiver with 5.1-channel decoding, a satellite/subwoofer system, and all the wires and instructions you need. It's all about simplicity — set it up, connect a TV, and hit play!

All the speakers are **voice-matched** and designed to work together, and the DVD player/receiver unit has extra inputs for hooking up a VCR and other components. The design of these systems is generally sleek and inconspicuous, for those of us who don't want bulky speakers all over the living room.

DVD home theater systems are ideal for folks who want worry-free, instant home theater. What's more, these systems range from very affordable packages, to higher-quality systems which offer impressive picture and sound. If you're just getting started in home theater, or looking for a second system, a DVD home theater system may be the answer.

Sleek, discreet, and surprisingly powerful, DVD home theater systems are voice-matched for seamless surround, and include a DVD player/receiver component — just add a TV!

Still not sure whether this kind of system is right for you? We've got a short assessment of the differences between a hand-picked system of separately assembled pieces and a DVD home theater system on pgs. 8-9. And in the pages to come, we've included information that should help you determine more about what you'll need for home theater in *your* home.

The Bottom Line on DVD Home Theater Systems

- Ultra-easy setup. The speakers are voice-matched and designed to work with one another and the DVD/receiver component, and cables are included. You just add a TV!
- Great for smaller rooms. The small size and lower power of these systems makes them perfect for smaller spaces.
- Economical pricing. DVD home theater systems tend to cost less than home theater components and speakers purchased separately.

Planning Ahead
Your Own Home Theater

Before you buy

Getting into home theater is exciting — but it's important to make a careful decision, too. Remember how frustrating it was to buy a new toy, only to get home and find out that batteries weren'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 the guidelines in the next few pages to:

- Make sure your room is surround sound-ready — if you don't have room for several speakers, or don't want to see even tiny speakers, you may not want 5.1 surround. (Of course, you can also opt for nearly invisible in-wall speakers).
- Determine what kind of system is right for you — separate components or a DVD home theater system? See the discussion on pgs. 8-9 for help.
- Note the components you already have that will work with home theater, and decide what new ones you need.
- Be ready to buy all the extras — when you're setting up home theater, you need more than components, a TV, and speakers. Good speaker and video cable makes for great sound and a good picture, and you'll probably need stands or brackets to place your surrounds correctly.

And above all, have fun! Enjoying yourself is what home theater is all about!

What size is your room?

Large or small, wide or narrow, it doesn't matter — just about any room can be used for great home theater. But some of that depends on you. To achieve an engrossing cinematic experience, you need to have correct speaker placement and components suited to your entertainment area.

- **Is your room small?** Consider a satellite/subwoofer system or a DVD home theater system — something with smaller speakers and power designed for a small- to medium-sized area. There's no point in paying for an immensely powerful system that you won't be able to use without deafening yourself. And a small room will feel very cluttered with four huge tower speakers and a massive subwoofer crammed into it. Bear TV size in mind as well — you won't need a huge projection TV in a small room — in fact, you may find viewing one profoundly unsatisfying there.
- **Is your room medium-sized?** You've got lots of options. Depending on your comfort levels for listening, you can go with a variety of different options, from pre-matched satellite/subwoofer or DVD home theater systems, to an entirely hand-picked system of separate components. Don't forget to choose a TV that's the right size for your viewing area!
- **Is your room large?** A system of separate components may be right for you. Choose the speakers that best suit your room. The room's size means you can probably crank up the volume — so you may want a powerful receiver. And depending on where you'll be sitting for viewing, you should have room for a large TV — even a projection TV.

Where will you put your speakers?

Because home theater relies so heavily on seamless surround sound, speaker placement is key. First let's establish a few basics. We'll go on to discuss speaker placement in detail on pg. 20-21.

- **Will you be able to position your main speakers on either side of the TV?** Some folks have always had their main speakers far from their TV, but this won't work for surround sound. Your main speakers need to be on either side of your TV, so that action moving from left to right on the screen corresponds with sounds moving from left speaker to right speaker. If your speakers are going to be within a foot of your TV, make sure they are **video-shielded**.
- **Will you be able to position your center channel speaker above or below the TV?** Your center channel handles most on-screen dialogue and effects, as well as sounds that move across the front soundstage. As a result, it's important to place your center channel speaker as close as possible to your TV's screen. Centering it above the screen is preferred, although placement below the screen is also acceptable.

Need a definition? See the Glossary of Terms on pgs. 27-31

- **Are you ready to have speakers in front of *and* behind your listening area?** If not, you may want to reconsider surround sound. All too many people buy 5 speakers and a subwoofer, then end up not using their surrounds, or even putting them up front with their stereo mains!
- **Do you have places to put surround speakers?** Most surround speakers can't just go on the floor. Do you have a wall in the right place for wall-mounting your surrounds? Is there a handy set of bookshelves? Will you need to buy speaker stands on which to place your surrounds? Decide what kind of placement you'll need (see our section on surround placement on pg. 21 for ideas) and keep that in mind when you buy. For example, if wall-mounting makes the most sense in your room, be sure to choose wall-mountable surrounds! And remember to budget in the cost of wall-mounting brackets or speaker stands.
- **What about speaker cable?** When you set up your speakers, you're going to need to connect them to your receiver — and that means running cable. Good cable, while more expensive, can significantly improve sound quality (especially if you're covering fairly long distances with a single piece of cable). The cost of cable is an important factor to consider when determining your budget (of course, a DVD home theater system may come with cable supplied).

What do you have now?

If you're thinking of adding to your existing system, just be sure that the gear you have is suitable for home theater. We'll go component by component and tell you what each should offer.

- **Your existing VCR.** You should have no problems using a HiFi stereo VCR with a Dolby Digital setup — in fact, if you have a large library of tapes, hanging on to your VCR is a good idea. However, an older mono VCR won't let you enjoy even the Pro Logic audio available from Dolby Surround-encoded tapes. If you need a new VCR, try **S-VHS** — it's very affordable and a *big* improvement on VHS picture quality.
- **Your existing DVD player.** You're all set! A DVD player is key when it comes to home theater. Just make sure your DVD player's digital audio outputs can connect to the Dolby Digital receiver you plan to use. And you want to use the best possible video connections (preferably **S-video** or **component video**) to carry the video signal to your TV.
- **Your existing TV.** Consider screen size and video inputs. Except in very small rooms (where you're unlikely to have home theater anyway), you need a 27" screen or greater. Smaller TVs just don't offer the same visual impact! You're also going to want plenty of video inputs, so you can connect more than one video source to your TV. **Composite video** inputs are good, **S-video** inputs are even better, and **component video** is best. If your TV only has an **RF** input, think seriously about an upgrade — an RF connection degrades the quality of incoming video.
- **Your existing receiver.** If you have a stereo receiver and want Dolby Digital surround, you'll need a new receiver. Got an older Pro Logic receiver with 5.1-channel inputs? You can use a DVD player with built-in Dolby Digital decoding to run 6 analog channels (five full-range channels and one limited channel) into those inputs. (You still won't be able to enjoy Dolby Digital from DBS or HDTV, however.) If you already have a Dolby Digital receiver, be sure it has the same kind of digital audio connections as your DVD player, and that its power ratings suit the speakers you select.
- **Your existing speakers.** You have main stereo speakers that you love, and you want to use them as **mains** in your home theater. Go ahead! Just keep in mind that seamless surround relies on **voice-matched** speakers. The manufacturers of your existing speakers may be able to recommend closely matched **center channel** and **surround speakers**. If you have a pair of full-size mains, a center, and two surround speakers from a Pro Logic system, you may only need to add a sub to achieve a 5.1-channel speaker setup. Just remember, if you're going to be enjoying 5.1-channel music as well as home theater, your surround speakers should be full-range speakers, unlike many Pro Logic surround speakers.

Planning Ahead
Speaker Placement

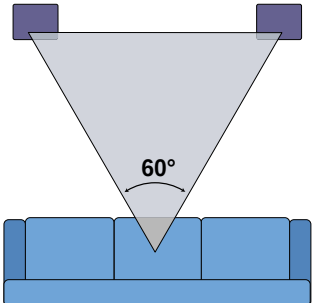
The key to good sound is matching the speakers' output to your room's particular acoustics. You don't need test equipment, just your ears and a willingness to experiment. The variables you'll work with are the distances your speakers are from you, the walls, the floor, and each other. Even slight changes 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 placement, based on a speaker's performance during the design phase.

Placing your main 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 positioning 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. You and your left and right speakers should form an equilateral triangle, as in the diagram below.



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

- Test the "soundstage" by moving the speakers nearer and farther apart. Find a placement that brings you a full soundstage with complete "center-fill" (just what it sounds like, center-fill means that sound completely fills the space between the speakers, with no gaps or holes).
- Angling the speakers inward toward your listening position, so the tweeters point toward your ears, may improve the sound.
- 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 can generate more bass by moving your speakers near boundaries, like walls or the floor.

Remember, not every room is perfectly designed for audio enjoyment. Using the principles discussed here, you can get the best sound possible out of your speakers and room. The more you experiment, the more likely you are to find the best sound your room can offer.

Placing your 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.)

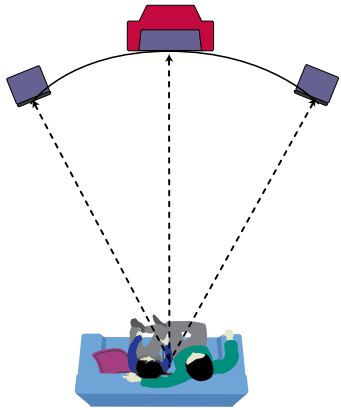
- Set up mains at the exact same distance from your listening position as your center channel is — if you measure correctly, they should form an arc in front of your listening position (see the illustration below).
- Again, to improve sound, try the following: 1) direct the tweeters at your listening position, 2) raise tweeters to your ear level when seated through the use of towers or stands, and 3) place speakers near walls to enhance bass.
- Find a placement which offers the widest, most realistic soundstage possible (you can move home theater mains farther apart than stereo speakers without the center-fill suffering, thanks to the presence of a center channel speaker).

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 impact and great stereo listening. When you find the right placement, you'll know it. And you'll be amazed at how much better your whole system sounds.

Placing your center channel speaker

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

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

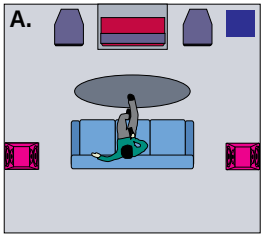


We recommend placing the center channel speaker the same distance from you as the left and right speakers.

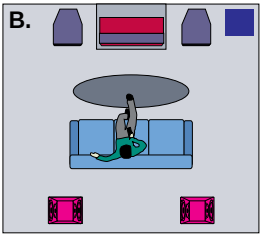
Need a definition? See the Glossary of Terms on pgs. 27-31

Placing your surround speakers

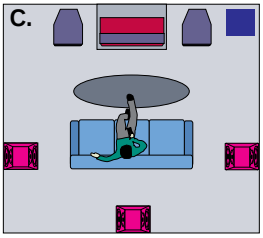
- For optimum performance, we recommend placing surround speakers to the sides of, or behind, your primary listening position.
- You can put your surrounds on shelves or stands, or mount them on the walls (many surrounds are designed for use with wall brackets).
- The height of your surrounds is important — unlike your mains, they should be aimed above your ear level when seated. Many people install them at the height of ear level when standing.
- With 6.1-channel systems, you can add an additional surround or pair of surrounds to the rear of your speaker setup (the examples below should give you some ideas of possible placement).



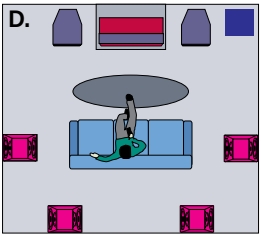
A. 5.1-channel setup with the surround speakers wall-mounted beside the listening position.



B. 5.1-channel setup with the surround speakers behind the listening position on stands.



C. 6.1-channel setup with the surrounds wall-mounted beside the listening position, and one rear surround wall-mounted behind the listening position.



D. 6.1-channel setup with the surrounds wall-mounted beside the listening position, and two rear surrounds wall-mounted behind the listening position.

Placing your subwoofer

Use these hints to get great sound out of your sub.

- Because bass frequencies are omni-directional, you can usually place a sub almost anywhere in the room. Still, remember that 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 to the side of or behind the listening area.

Planning Ahead
More Resources

On the following pages, you'll find an FAQ section with answers to common 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 in this guide — here are a few sources that might help:

- **Crutchfield Product Advisors**
  Call our friendly, expert Product Advisors at 1-800-955-3000 for more info. Not only can they offer you advice tailored to your individual needs, they can also recommend gear.
- **www.crutchfield.com**
  Visit our website for help! We've got great information on home theater, with FAQs, glossaries, and links to current products. You can also e-mail us with questions.
- ***The Crutchfield Audio/Video Reference***
  Our *A/V Reference* is loaded with the details every home theater enthusiast needs to know. With MasterSheets for connecting a wide range of different gear, an in-depth speaker placement and room acoustics guide, and color-coded CableLabels™, the *A/V Reference* lets you get right to the fun. (See back cover for more info.)
- ***The Crutchfield Guide to Home Theater Installation***
  Yes! You *can* have an easy-to-operate A/V system that spreads music and video discreetly throughout your home — and this handy guide tells you how. It reveals the secrets of professional custom installers, and is a must-have for do-it-yourselfers who want their speakers to literally vanish into the woodwork. Call 1-800-955-3000 to get this free guide, or visit crutchfield.com/htinstall to see our selection of A/V installation products.
- **Dolby Labs**
  At www.dolby.com, Dolby Laboratories offers thorough discussions of their surround sound systems. 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.

Frequently Asked Questions

Dolby Digital

Q: *How do I know if a DVD is encoded with Dolby Digital?*

A: Look for the Dolby Digital logo. 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.)

Q: *I thought I'd be hearing full-range, stereo sound coming from my surrounds, and all I'm getting is a few effects here and there. What's wrong?*

A: If you have a Dolby Digital setup, you are enjoying full-range, stereo sound from your rear speakers — however, not every soundtrack has a lot of rear surround effects mixed in. It doesn't mean your system isn't working right.

Q: *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 **HDTV** 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. However, not many DTS titles have been recorded to DVD for use in home theater systems. See pgs. 5-7 for more information on surround sound formats.

Q: *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

Q: *How do I know if a videotape or TV show is produced in Dolby Surround?*

A: Look for the Dolby Surround logo.

Q: *Why do my surround speakers sound low in volume?*

A: The surround channel in Dolby Pro Logic soundtracks 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.

Q: *What's Dolby Pro Logic II?*

A: Pro Logic II is not so much a form of decoding, as a way of reading and playing back stereo or Dolby Surround-encoded soundtracks on a 5.1-channel setup. It's a great way to get crisper, more intense sound out of non-Dolby Digital materials, and is a distinct improvement on original 4-channel Dolby Pro Logic. Of course, you need a receiver with Dolby Pro Logic II processing and a 5.1-channel speaker setup to enjoy it.

Video

Q: *All my friend ever talks about is her new DVD player. Is DVD really that much better than VHS?*

A: In terms of sound and picture quality, DVD far surpasses both VHS and Super VHS, and does not degrade over time. Plus, while it's easy to record TV programs onto VHS tapes, the advent of **recordable DVD** components means you have that capability with DVD too. However, VCRs still have a place when it comes to watching existing videotapes!

Q: *Can I play DVDs on my CD 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 (and in some cases, CD-Rs, CD-RWs, SACDs, and DVD-Audio discs), the reverse isn't true — CD players can *not* read the denser data on a DVD.

Need a definition? See the Glossary of Terms on pgs. 27-31

Q: *My new computer has a DVD-R/W drive. Can I play these discs on my home DVD player?*

A: That depends. Because DVD-R/W and DVD-RAM drives are relatively new, it's impossible to make a blanket statement about which players will play **recordable DVD** videos. So far, it looks like DVD-R is the recordable format most compatible with home DVD players. Just check compatibility before you count on your DVD player handling DVD-Rs.

Q: *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.

Q: *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.

Q: *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.

Q: *My cable provider offers "digital cable." Is this the same thing as digital television, or HDTV?*

A: "Digital cable" is simply a means of sending clearer cable to subscribers by using digital signals rather than analog signals. Digital cable is *not* the same thing as **digital television**. Digital TV, with its HDTV and SDTV formats, is a new television standard that offers improved video resolution and digital audio. See pgs. 12, 13 and the glossary for discussions of the benefits of digital television, the TV sets that can handle it, and some of the intricacies of the standard.

Of course, it may be that your cable provider is already broadcasting digital television via their digital cable service. Still, we recommend asking your cable company what percent of their content is digital TV if you're unsure.

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

A: When it comes to resolution, it doesn't matter how old your current TV is. 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** (no new 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.)

Q: *I'm not sure I understand about resolution — do different video sources have different resolutions?*

A: Definitely. Check out the table below to get an idea of the various resolutions for some common video sources.

Format	Horizontal lines of resolution
VHS	240+
Broadcast NTSC TV	330+
Super VHS	400+
DVD	480+
Digital TV	between 480-1080

Q: *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. For the same reason, you shouldn't run your DVD player's video through your VCR to your TV — you may experience the same picture distortion.

Q: *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.

When it comes to NTSC 4:3 aspect ratio TVs, 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. If you know where you'll be sitting, see the chart of suggested viewing distances on page 14 for more help fitting a 4:3 aspect ratio TV to your room.

If you're interested in a widescreen TV, try measuring the height of the screen and multiplying that number by 4 to establish

viewing distance. Using that figure, you may gain a better idea of what size widescreen TV suits your room.

Another factor which may affect your viewing distance is the type of TV. If you go with a projection TV, your viewing area may be curtailed, owing to most projection TVs' narrow "sweet spot." If you choose an HDTV-capable CRT TV, you can sit closer than you would to an NTSC TV of similar size, because the scan lines are thinner and less detectable on an HDTV or HDTV-ready TV.

Home theater receivers

Q: *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.

Q: *What is THX? Is it a kind of surround sound?*

A: **THX**® 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."

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.

Therefore, "THX Ultra" and "THX Select" are not a form of surround sound (like Dolby Digital) — they are simply performance standards. However, THX has recently developed "THX Surround EX," a form of surround that achieves 6.1-channel surround by sending a mono signal to an additional surround speaker or pair of surround speakers. (**Dolby Digital EX** works the same way; see the definition on pg. 28.) Although there aren't many THX EX-encoded DVDs, and few receivers can decode it, those that can are also able to apply THX EX processing to 5.1-channel Dolby Digital DVDs — a nice perk.

Q: *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.

Q: *My new receiver has "dual-source, dual-zone" capability. What does this mean?*

A: A receiver with dual-source and dual-zone capability can process two signals simultaneously and send them to different speaker setups. As a result, you could potentially listen to the radio in your main room, while a housemate enjoys CD sound in another room — all emanating from the main room.

Down sides? Most receivers that do this kind of processing can't send that second signal as a *powered* signal — meaning you'd have to find some other way of amplifying the speakers in the second zone. Plus, many receivers lose multi-channel capability while dual-zone operations are taking place.

Speakers

Q: *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!)

Q: *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 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

Need a definition? See the Glossary of Terms on pgs. 27-31

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. However, what you gain in volume you can lose in accuracy.

Q: *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 depends 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.

Q: *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.

Q: *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.

Q: *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.

Q: *My receiver puts out 100 watts per channel. Do I need 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.

Q: *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 speakers?*

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 allows, select surround speakers that are **voice-matched** to your front speakers.

Q: *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.

Q: *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. 19 for a more detailed discussion of speaker placement.

Connections

Q: *Does special, high-quality cable really make a difference?*

A: Yes. The better the cable, the better the picture and sound! Well-made cables 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. They also offer better shielding, and so are less susceptible to interference from other sources. Even though high-quality cable costs more, it can be a key part of achieving the clear picture and pure sound you paid for when you bought your components.

Q: *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 should be connected to a receiver — the digital connection makes it possible for you to transmit an encoded digital signal for decoding into multichannel sound, as well as passing along digital audio from CDs played in your DVD player.

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.

Q: *Should I use an **optical digital** (Toslink) connection or a **coaxial digital** 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. Some folks prefer optical cable because the fiber optics they contain are immune to radiated noise. Some audiophile users swear by coaxial digital, saying it handles a fuller bandwidth. For most people, the difference will be negligible.

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.

Q: *I keep hearing about three different types of inputs on a TV: composite video inputs, S-video inputs, and component video inputs. Is one kind better than the others?*

A: First, it's important to understand that a video signal can be broken down into **chrominance** (color) and **luminance** (black-and-white) information. 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 players, DBS receivers, Super VHS VCRs, and Hi8, Digital8, and Mini DV camcorders.

Many TVs are now available with three-jack (RCA-type) **component video** inputs designed to be compatible with the component video outputs on 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.

Plus, component video connections are those used to pass along progressive signals between progressive-capable DVD players and TVs. The higher-bandwidth of this video connection also means that HDTV can be passed through it intact.

Q: *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 use your TV's remote control to select the appropriate "Video" input.

Need a definition? See the Glossary of Terms on pgs. 27-31

Q: *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.

Q: *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

A setup with 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 with 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 is either "squeezed" — everything appears tall and thin, and actors have pointed heads — or automatically converted to 4:3.

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 digital HDTV standard may call 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 quick and easy hook-up of a camcorder, video game console, 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**.

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.

Coaxial digital

Coaxial digital connections are one popular way to move digital audio from one component to another. Although the jacks and plugs used in a coaxial digital connection look exactly like RCA-type jacks and plugs, the cable you use should be designed specifically for use as a coaxial digital cable, so that it can handle digital's higher bandwidth.

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 most DVD

players. If you think of **S-video** as a type of component video signal (separate brightness and color portions), a *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. Component video is also the type of connection capable of carrying a wider-bandwidth video signal (like progressive-scan video and HDTV video).

Composite video

A video signal which carries the color (chrominance) and brightness (luminance) portions of video as one signal. While better than an **RF** input, this kind of connection is of lower quality than an S-video or component video connection. A composite video connection is often found in tandem with stereo AV connections, so you may see it as one of three jacks on a cable, the colors of which will be white, yellow and red. The yellow jack carries the composite video signal.

CRT (cathode-ray tube)

Often called direct-view, this is the type of TV we think of as traditional. In a CRT TV, an electron gun (or guns) projects an image onto the back of a large vacuum tube — the front of which is the TV's screen.

DBS (Direct Broadcast Satellite)

A method of receiving over 200 channels of programming via satellite signals beamed to a small (18-24") dish and passed through a receiver. Most DBS networks also supply some 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)

DTV falls into two general categories: **HDTV** and **SDTV**. The formats in the SDTV category are less common but easier to achieve, and include resolution starting at 480 lines, and aspect ratios from standard 4:3 to, in a few cases, 16:9. See **HDTV** for more information on HDTV and the availability of DTV as a whole.

Dipole

A speaker design which generates equal amounts of sound both forward and backward, with the two sounds being *out of phase*. See also **Bipole**.

Dolby® Digital

A form of encoding audio information digitally. 5.1-channel Dolby Digital provides a bitstream of digital data consisting of six discrete channels (front left, center, front right, left surround, right surround, and a subwoofer channel). The 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 stereo or even mono audio — and can be downconverted to Dolby Pro Logic. See the diagrams on pg. 6 for more info on a Dolby Digital surround setup and the Dolby Digital encoding/decoding process.

Dolby Digital EX

A form of surround processing essentially identical to THX Surround EX. It achieves 6.1-channel surround by sending a matrixed, mono signal to an additional surround or pair of surrounds. Although there are few DVDs encoded for Dolby Digital EX, and not many receivers can decode it, those that can are also able to apply Dolby Digital EX processing to 5.1-channel Dolby Digital DVDs — a nice perk.

Dolby® Pro Logic™

An earlier form of surround consisting of four channels of sound (front left and right, and center and surround channels *matrixed* from the regular left and right channels). See pg. 7 for more information on Dolby Pro Logic and the Dolby Pro Logic encoding/decoding process.

Dolby Pro Logic II

Dolby Pro Logic II is less a decoding format than a kind of sound processing — it can take the sound from a stereo or Dolby Pro Logic soundtrack, and convert it for playback through a 5.1-channel system (unlike original Dolby Pro Logic, which could only send Dolby Surround-

encoded material through a limited 4-channel system). The result is increased detail and precision, as well as more intense bass.

Dolby Surround

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

Downmix

If you don't have a Dolby Digital system, you can still enjoy 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.

DTS (Digital Theater Systems) & DTS-ES

Multichannel digital audio formats used in theaters and homes. See pg. 7 for more info.

DTS-ES

A form of surround processing that can provide up to 6.1 channels of sound. DTS-ES delivers the 5.1-channels of regular 5.1 DTS, and adds a sixth "back surround" channel. The extra channel may be played through a surround or pair of surrounds. Unlike **THX Surround EX** or **Dolby Digital EX**, the "back surround channel" can be discrete (however, on some DTS-ES encoded discs, this channel is only available in a matrixed form). As a result, DTS-ES is one of the purest forms of 6.1-channel sound available. As of yet, very few discs are encoded for 6.1 DTS-ES.

DVD

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

DVD-Audio (DVD-A)

A music-oriented DVD format that can carry up to 6 channels of 96kHz/24-bit audio; therefore, these discs can provide music for 5.1-channel home theater systems, and offer much higher-resolution sound than CD. Most DVD-Audio discs also carry Dolby Digital or stereo sound-tracks for playback on players that lack DVD-Audio decoding.

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.

Hard disk video recorder

Hard disk video recorders use a large hard drive to store video while you watch it! As a result, you can essentially pause live TV and walk away for a while, then go back to watching where you left off. They can also be set for unattended recording, and the programming services used with them usually offer lots of details about broadcast and stored programs. Additionally, because hard disk video recorders are storing everything digitally, a few are able to store and pass along a Dolby Digital signal.

HDTV (High-Definition Television)

HDTV has become a commonplace way to refer to all DTV television signals. However, HDTV, or High-Definition Television, is actually one of two categories of the new American digital broadcast TV standard for digital television, DTV. HDTV is the higher-quality category, and includes a number of formats, which share the same basic characteristics: **resolution** from 720 to 1080 lines, a widescreen **aspect ratio** of approximately 16:9, and **Dolby Digital** audio. Only HDTV and "HDTV-ready" televisions are able to display HDTV programming — and HDTV-ready TVs require the addition of an HDTV tuner in order to receive the signal. Over 80 major television markets are broadcasting over-the-air DTV and HDTV signals — in addition, DBS systems are beaming DTV and HDTV signals on some channels.

Interlaced

A type of video scanning where the odd- and even-numbered lines of a video frame are transmitted consecutively as two separate, interleaved fields. Analog **NTSC** video uses interlaced scanning, as do several **digital television** formats, such as 1080i (the "i" stands for interlaced).

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. 16:9 screens may also show some letterboxing, even when playing widescreen movies, because not all movies appear in a precise 16:9 ratio.

Line doubling (upconversion)

Technology found in television sets which, by doubling the amount of information per line, offers a clearer, more defined picture.

Luminance

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

Main stereo speakers

Also known as "front" speakers, your mains play the role of regular stereo speakers during stereo listening, and act as important parts of your front soundstage during home theater. See pgs. 15 and 18-20 for more info on the role and placement of main speakers in a home theater speaker setup.

NTSC

Stands for National Television System Committee, which established this North American 525-line analog broadcast standard 50 years ago. Realistically, we're able to see about 480 lines on an NTSC display. NTSC TVs are only capable of displaying video in **interlaced** form. The new **digital television** standard is slated to eventually replace NTSC.

Optical digital (Toslink)

Optical digital, or Toslink, cable transfers digital audio as light, for a super-accurate, distortion-free signal transfer. Optical cable uses a uniquely shaped plug. The plugs on a new cable may be protected by caps, which should be removed before use. Because optical digital cable contains fiber optics, it is sensitive to bending and kinking, and should be handled gently.

Pan-and-scan

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

Progressive-scan

Several HDTV formats (720p, 480p) and some higher-end DVD players use a type of video signal known as progressive scan. A progressive-scan format displays an entire video frame in a single sweep, unlike interlaced video, which splits each frame into sequential fields. So, where NTSC video displays 30 frames (60 fields) per second, progressive-scan video displays 60 full frames per second. As a result, progressive-scan picture quality is more filmlike, with greater detail and less flicker. For progressive-scan viewing, you need a TV that's "HDTV-ready."

Projection TV

A TV in which the image is projected onto a screen, commonly from behind, although occasionally from the front. These TVs are larger and thinner than most direct-view televisions; however, they have a narrower viewing range and can look blurry close up.

Recordable DVD

Now there are both computer drives and home recorder components that can both play DVDs and record to them. As far as recordable DVD media go, there are three competing camps: DVD-R/RW, DVD+R/RW, and DVD-RAM. Some of these formats use discs that can be recorded upon only once; others use discs that can be erased and re-recorded. As of 2002, only a handful of DVD players claimed playback of recordable DVD video, and DVD-R was the most compatible type of media by far.

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 signals such as TV broadcasts (330 lines) and VHS VCRs (240 lines). Technology like upconversion enhances built-in NTSC resolution still further. And **HDTV** and HDTV-ready TVs have noticeably better resolution. See the chart on pg. 23 for a comparison of various source resolutions.

RF (radio frequency) connection

An RF connection uses a large, shielded coaxial cable to connect such things as antennas and cable boxes to a TV. (It should not be confused with the **coaxial digital** cable used for digital audio.) The large, F-type connectors on an RF cable either push or screw on, and have a center pin which can be easily bent. RF is an older type of connection, and is not recommended for running video from a DBS system, VCR or DVD player into a TV, because of its limited bandwidth, and the resulting picture quality degradation and mono sound.

SACD (Super Audio Compact Disc)

An optical disc format that takes advantage of an entirely new recording technology called Direct Stream Digital. DSD is a 1-bit technology that samples music 2.82 million times per second, resulting in warmer, smoother and more "analog" sound than any we've yet heard from standard CDs. Some SACDs are encoded for multichannel music, making SACD playback a handy feature if you have a 5.1-channel speaker setup.

Satellite/subwoofer system

Speaker system that teams between two and five

small satellite speakers and a subwoofer. Also called a *home theater speaker system*.

SDTV (Standard Definition Television)

The category, containing multiple specific formats, for standard DTV broadcasts. Maxing out at 480 lines of resolution, this format is less demanding than HDTV. It offers both 4:3 and 16:9 aspect ratios, and a wide range of sound encoding (from stereo to Dolby Digital 5.1).

Speaker efficiency

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

Stereo

Two-channel, left and right audio. Stereo has been the standard music-listening format for years.

Subwoofer

A speaker designed specifically for bass output. Subwoofers are usually powered (with a built-in amplifier). Subs offer deep, resounding bass, and are a key part of 5.1- and 6.1-channel surround.

Super VHS (S-VHS)

An improved VHS format that offers finer picture quality than standard VHS' 240-line resolution. S-VHS VCRs record at 400+ lines of resolution, and thanks to advanced technology, a few players can even improve the picture quality of standard VHS tapes during playback. Some can also 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.

Surround speakers

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

S-video

A type of video connection which uses 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 home systems. See pg. 24 of the FAQ for more info.

THX® Surround EX

A surround format designed with 6.1-channel surround sound in mind. See the definition for **Dolby Digital EX**, as well as the surround sound formats chart and discussions on pgs. 5, 7 and 24.

Transients

Brief bursts of sound energy. In a musical piece, a transient might be a single, sudden trumpet blast; in a movie, it could be a single gunshot.

VCR Plus+ with cable box & DBS control

A useful feature for folks who plan on doing a lot of unattended VHS recordings of cable, DBS, and over-the-air broadcasts. A VCR with VCR Plus+ lets you enter the show's "PlusCode" (found beside its title in most TV listings) to automatically set the VCR for the appropriate 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 DBS receivers, so you can make timed recordings of satellite programs.

Video shielding

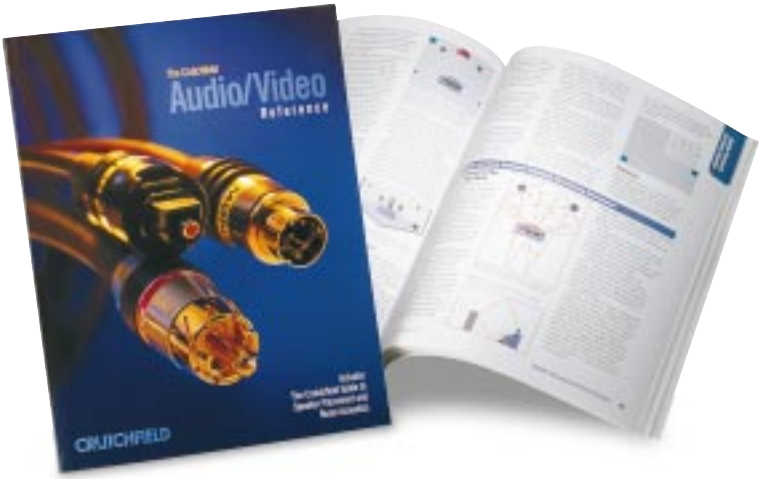
A way of containing a speaker's magnetic energy inside its enclosure. This is usually achieved by placing another speaker magnet back-to-back with the existing one so that the two magnetic fields cancel each other. Shielding may also be achieved by lining the inside of the speaker cabinet with metal. 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. In home theater, widescreen usually means 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, which are split between 1.85:1 and 2.35:1). When transferred to video for home viewing, widescreen films are released in a **pan-and-scan**, "modified to fit your screen" format, a **letterboxed** format, or both. Thanks to **DVD** and **digital television**, we will see more films available in a true, non-letterboxed widescreen, or **anamorphic**, format.



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