

As Seen In
ELECTRONICHOUSE



Build the **Home Theater** of your Dreams

Home Theater has become as American as popcorn at the movies. According to estimates by the Consumer Electronics Association, nearly 20 million American households own a complete home theater system. All it takes, according to the CEA's definition, is a TV set with a diagonal screen size of at least 25 inches, a

video source such as a hi-fi VCR or a DVD player, a surround sound-equipped stereo receiver and four or more speakers. But having the right equipment is only part of the equation. The room in which that equipment resides, how the video screen and speakers are positioned, the types of remote controls used to operate that equipment and even subtle shifts in lighting levels can all affect the home theater experience.

The Right Room

Any room can function as a home theater: a spare bedroom, the family room, a den or even the master bedroom. Ideally, a room dedicated to home theater should be rectangular in shape, as close to a 1-to-7 ratio as possible (for example, 14 by 20 feet). Walls constructed of double sheetrock will help soundproof the room, as will staggering the studs of any wall that the theater shares with another room. This construction technique prevents the studs of the two walls from touching, which can introduce noise into the theater.

Order carpeting and fabric draperies for the room; hard surfaces like hardwood floors and glass can distort the sound. Just as sound from outside the theater can creep in, sound from the theater can drift out. Packing the ceiling with insulation and installing acoustical material on the walls helps contain the movie sound. Use dimmer switches rather than standard toggle switches so the room lights can fade in and out.

Because little natural light seeps into a basement, it's one of the best spots to situate a home theater. Separated from the rest of the house, you can crank up the volume as loudly as you like.

The Audio/Video Equipment

Regardless of where a home theater resides, there are three basic pieces of equipment to work into the room design: video gear, audio

gear and control equipment.

In matters of video sizzle, bigger isn't always better; it's the distance from the couch to the screen that matters most. Professional home theater installers recommend a seating distance that's between two and two-and-a-half times the width of the screen. If a screen measures 27 inches wide, for example, the couch should be positioned between 54 inches and 68 inches away. To comfortably view a



120-inch screen, then, requires a room that's large enough to push the couch back at least 20 feet from the screen.

Next, you'll need to install at least five speakers into the room to create the full surround sound effect. Together, the speakers create a sense of movement and sound localization that links a movie's visual cues with the soundtrack. For example, when a jet flies left

to right across the screen, in a surround sound system the roar of the engine "moves" left to right through the room speakers.

To create this effect, place one speaker at each side of the TV screen, two behind the couch and one on top of the TV. The two stationed at the sides of the screen should sit about level with your ears (when you're in seated position) and about three feet away from the side walls. Place the center speaker, which distributes the dialog of the movie, smack dab in the center of the front left and right speakers. Finally, plant the two rear speakers on the wall behind the couch, lifted six to eight feet above the floor. Space them at least as wide apart as the front left and right speakers. Getting each speaker into its optimal position may require that you install a speaker mount to the wall.

Subwoofer placement is extremely tricky. There are no hard and fast rules on where to place them; only what sounds best to your ears. Generally, a subwoofer sounds better situated near the front of the room pulled five to six feet away from the wall. Rather than use one large powerful sub, you might opt for two smaller subs, which can be placed closer to the walls.

Regardless of where the home theater goes, make sure you and your audio/video specialist can reach the backs of the equipment easily. Ask your builder, if the building code permits him, to construct an eight-foot-by-eight-foot access area behind the equipment. Close the area off with a door.

Alternatively, the entire system can be stowed inside a closet or alcove in another room.

Finish the basement with a drop ceiling so that new cabling for new equipment can be easily routed from the equipment closet to the TV.

To minimize electrical interference, ask your electrician to route dedicated power cabling from the breaker box to the entertainment room. Plan on at least two dedicated 20-amp circuits for the setup.

FUTURE-READY CLUES

- An abundance of audio/video inputs usually signifies a product that's prepared for the future.
- Upgrade programs offered by some manufacturers ensure that even as new processing technologies are introduced, their equipment can be easily upgraded with a simple software modification.
- Products specifically designed with home control in mind offer users the unique ability to integrate the operation of A/V products with other electronic systems in the house. Look for RS-232 ports on the backs of equipment.
- Firewire jack (also called an IEEE 1394 port) indicates that a component can be easily networked with other A/V devices in a home theater.



The Equipment

Technology has a way of reinventing itself almost daily. We've simply come to accept the fact that a new computer we bring home today will be completely outdated in just a couple of years as faster, smarter, more powerful models hit the shelves. ¶ Home theater equipment enjoys a slightly longer life cycle than home computers. Most TVs live in households for at least eight years before they're replaced. Portable computers, by comparison, come and go in about four years. Still, technological advancements are rapid in the audio/video industry and are expected to gain steam.

Manufacturers are continually upgrading video and sound equipment to mirror advances in commercial theater settings. Displays are bigger; projectors are brighter; sound is more realistic. Other manufacturers, expecting home theaters to grow increasingly PC- and Web-savvy, are integrating computer-esque features into traditional A/V gear. Change is exciting, sure, but it makes it nearly impossible to keep a home theater current and cutting-edge. You can almost always update a

computer by popping in some new software. Not so with most current home theater gear. That's why it's so important to choose equipment wisely...and with an eye to the future.

The Screen

The materials used to build big screens have changed little over the years. However, up-and-coming presentation technologies, like HDTV broadcasts and digital light processing (DLP) video projectors, will require a screen with certain characteristics.

DLP projectors (as well as more common LCD projectors) produce very bright images, which is helpful for viewing movies in a well-lit room. When these images are cast on a high-gain screen, though, hot spots (overly bright areas) can spoil the picture. Choose a screen with a gain of 1.3 or less.

Meanwhile, HDTV broadcasts and DVD movies call for a screen of a certain shape. Both HDTV and DVD pictures are wider than standard TV programs. Consequently, you'll want to install a wide video screen with an aspect ratio of 16:9. Screen manufacturers offer masking materials that conceal unused

parts of a widescreen as you watch 4:3 shows.

The Projector

If a screen is the most stable component of a home theater, its partner, the projector, is the most erratic.

But resolution means nothing without the right high-definition connection. In order to receive HDTV signals a projector must connect to an external HDTV converter box. To do this, the projector must be equipped with either an S-video or a component video jack. A component video connection provides a better reproduction of an HDTV signal than an S-video connection.

Finally, a future-ready projector must be able to fully display a variety of video formats, including conventional 4:3 TV shows and 1.77:1 HDTV programs and 1.85:1 DVD movies.

Keep your eyes peeled for projectors with digital connections. Today, when a DVD player feeds a projector a movie, signals are converted from digital back to old-fashioned analog. But when a DVD player is connected to a digital projector, the signal remains dig-

ital from source to projector.

The same goes for TVs. "TVs with RGB and component inputs will eventually have to have a digital connection," states Mitsubishi director of marketing Bob Perry. To ensure that its current lineup of HD-ready TVs can digitally connect to other pieces of A/V equipment, Mitsubishi has created a special Promise module (\$1,000) which can be fitted inside those TV sets at any time.

Multi-Format Monitors

PC monitors are perhaps the most future-ready display devices available for a home theater. Equipped with higher resolutions and higher scan frequencies than most projectors and conventional TV sets, PC monitors are able to reproduce both HDTV signals and computer graphics with unmatched clarity.

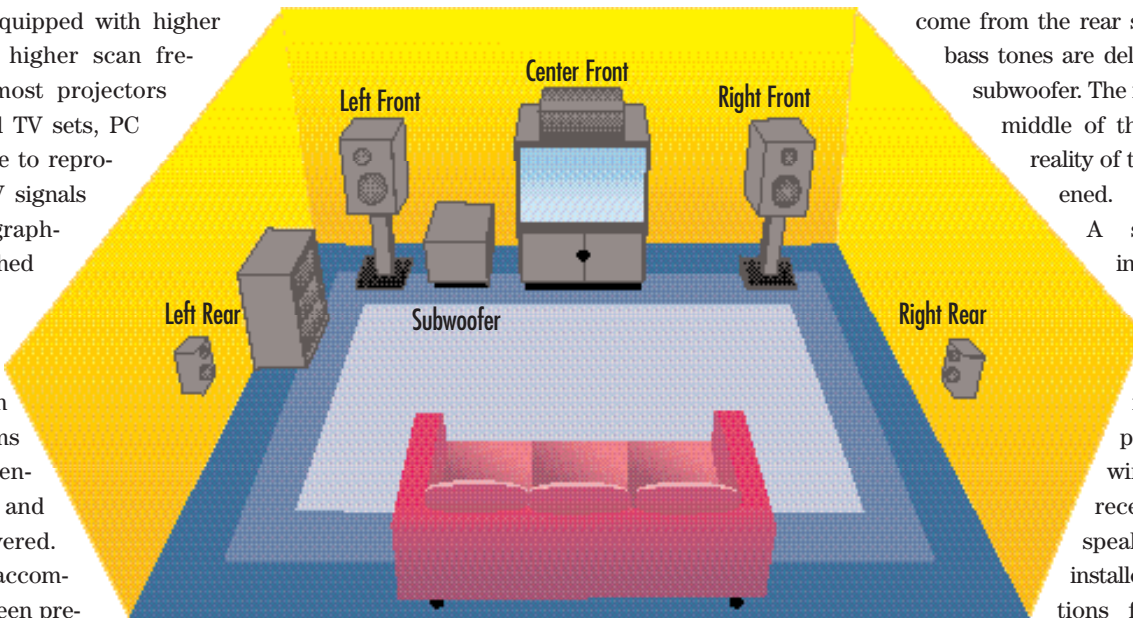
The 30-inch AF3.OHD from Princeton Graphic Systems has scan frequencies, resolution and aspect ratio covered. Its 16:9 screen accommodates widescreen presentations; its 50 Kilohertz horizontal scanning frequency means it can display 720p HDTV broadcasts with no signal compression; and its resolution of 1,024 x 768 means it can fully reproduce images from an XGA computer. More importantly, the AF3.OHD's frequency can be adjusted to match the scan rate of other movie sources, be it a TV, HDTV tuner, computer processor or some other future component.

A new plasma screen created by Electrograph not only functions as a state-of-the-art display, but looks state of the art too. The 42-inch screen, which measures a mere 3.9 inches deep, can fully reproduce 1,600 x 1,200 UXGA computer images as well as 1080i HDTV signals.

CD and DVD Storage

Devices that electronically organize huge libraries of CDs and DVDs have been available for a few years now. Most, like the PowerPlay from Escient, are designed as an accessory to a home theater's existing mega-CD and DVD changers.

An up-and-coming storage solution eliminates the need for a conventional CD or DVD changer. Instead, discs are loaded digitally onto a hard drive that feeds the data, i.e., music and movies, to surround sound receivers and video displays. One drive, can hold around 500 CDs for more than 400



hours of music listening. While these devices minimize the space ordinarily required in a theater to house a big CD collection (after the discs are downloaded into the hard drive you can pack them away), you'll still need a system to maintain an organized music library.

There are products that can download music from the Internet and play the tunes through the sound system of a home theater. Eventually, you'll be able to do the same thing with DVDs ... and without any help from a PC. Rather, an Internet-enabled set-top box may provide access to a pay-per-view DVD service like Direct Movies Online.com. To prepare for streaming DVD, as well as take advantage of interactive TV services

such as Wink and ACTV (available now through certain cable companies and digital satellite providers), outfit a home theater with several phone jacks so that your requests can be fed over the phone lines back to the service providers.

Surround Sound

A surround system adds more than just louder music and movies to your home theater. Immersing the viewer in the movie-watching experience, this audio system is called "multi-channel" because individual speakers deliver specific channels of sound. The dialog comes from front and center, the special effects come from the rear surrounds, and the bass tones are delivered through the subwoofer. The result: You're in the middle of the action, and the reality of the movie is heightened.

A surround system includes at least five speakers, an optional subwoofer and a receiver. All components have to be wired through the receiver, and the speakers should be installed in the best positions for the room in which you will be watching

movies.

The Receiver

A receiver integrates a processor, amplifier and tuner into one chassis. Pick a receiver that has Dolby Digital and DTS, about 85 to 100 watts per channel.

Components connect to a receiver through audio and video inputs. Look for a receiver with a few more inputs than you need. Because video components must be wired through the receiver as well, make sure some inputs are dedicated to S-video. S-video provides better picture quality than coaxial connectors. S-video inputs are used on satellite receivers, Super VHS VCRs, DVD players and most new high-quality large-screen televisions.

Sound Formats

Dolby Surround creates four channels of information: front left, “phantom” center (created by left and right), front right and rear surround. There is a greater separation in channels if you move up to Dolby Pro-Logic, which also incorporates a dedicated center channel but still has the same signal in both rear speakers. Dolby Digital (also called Dolby 5.1 or AC-3) adds stereo rear surrounds as well as a dedicated subwoofer channel (the .1 in 5.1). You must have a Dolby Digital receiver (or amplifier) to accurately decode the signal, because Dolby Digital uses its own encoding process.

Digital Theater Systems (DTS) has its own home theater surround process. Like Dolby Digital, this system also incorporates five separate channels plus a subwoofer. A rear center channel has now been added by the latest formats—Dolby Digital-EX and DTS-ES—creating new 6.1- and 7.1-channel sound.

The Speakers

In a Dolby Digital surround-sound system, you have two front speakers (left and right), a center channel, and two rear surround speakers (left and right). Ideally, all five speakers should be from the same manufacturer so that they can be “timbre-matched.”

The center channel produces approximately 80 percent of all the sound heard in an average movie, carrying much of the dialog as well as music and some effects. Place this speaker either directly on top of or directly below your television. The left and right front speakers should match the center channel and be mounted an equal distance from the center channel, pointed toward the listening area.

If you need to save money on speakers, the best place to cut costs is on the rear sur-

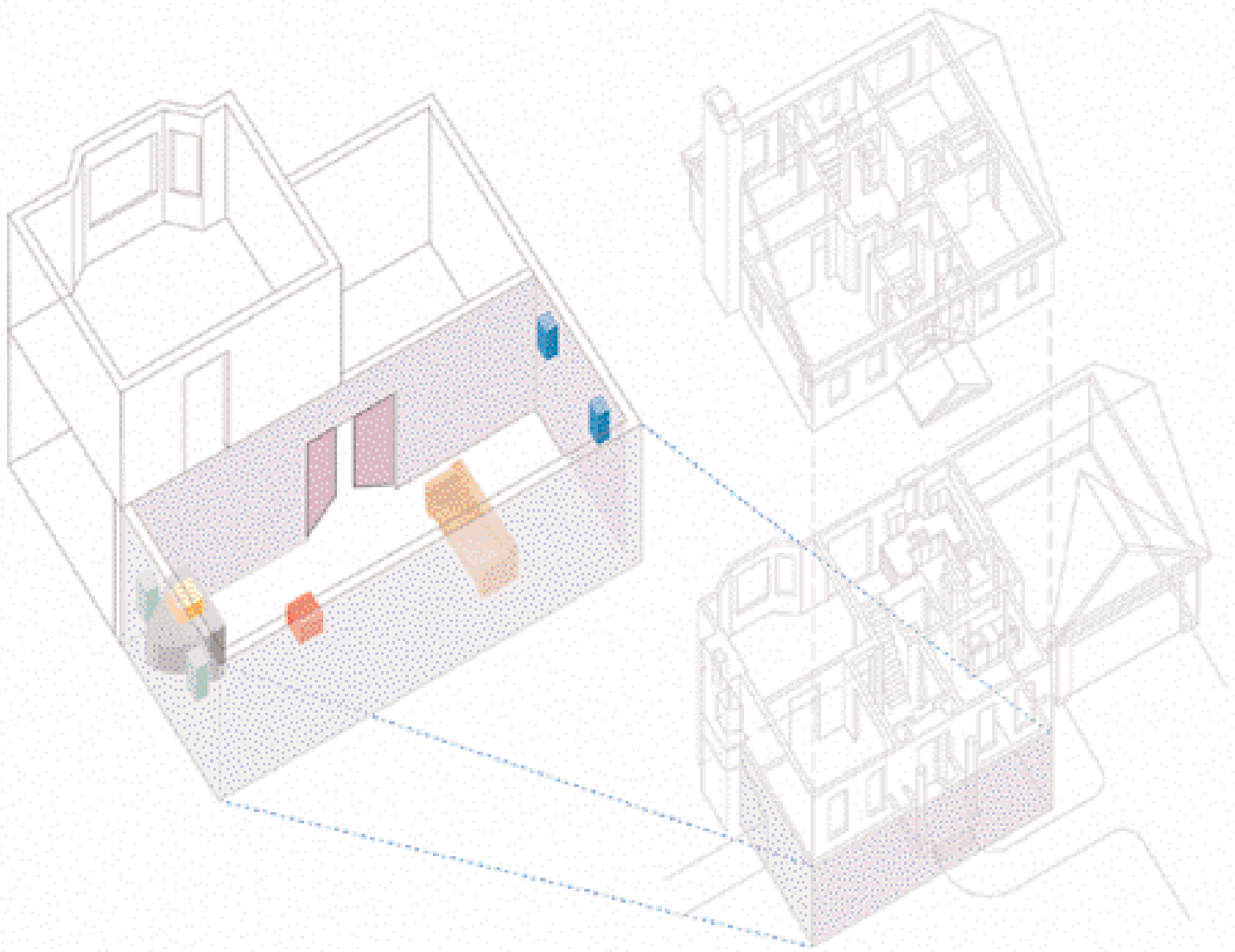


rounds. Because they produce mostly ambient sounds and special effects and aren't required to deliver low bass tones, rear speakers can be small and inconspicuous. Surround speakers ideally should be placed above and only slightly behind the listening position.

A subwoofer is optional but highly recommended for a true movie experience. Almost all Dolby Digital and DTS soundtracks now have a “.1 LFE” (low-frequency

effects) track designed specifically for a subwoofer. Subwoofers are typically cube-shaped, with a large single woofer pointing either directly at the ground or directly at the listener. Standard subwoofers are usually placed in a corner of the room. “Powered” subwoofers are subwoofers with their own onboard power amps. Movies have more low-bass information than music, so subs are particularly effective in a home theater. **EH**

Compliments of:



The Key

The Room Construct the shell of your home theater in the shape of a rectangle. 14 by 20 feet is a good size.



The TV Select a TV that's in proportion to the size of the home theater room. Divide the distance between the position of the screen and the couch by 2 to find the ideal screen width.

The Furniture Place the couch the proper distance from the screen. Professional home theater designers recommend a seating distance that's between two and two-and-a-half times the width of the screen.



The Front Speakers Raise the front left speaker and front right speaker 3-1/2 to 4 feet off the floor, and about 3 feet away from the side wall.

The Center Speaker Place the center speaker on top of the TV, situated parallel to and in the center of the front left and right speakers.



The Rear Speakers Plant the rear left speaker and the rear right speaker on the wall behind the couch, 6-8 feet above the floor. Space them at least as wide apart as the front speakers.



The Subwoofer Place the subwoofer in a corner. Listen to the sub in your normal seating position. If it sounds distorted, move it along adjacent walls, drawing it closer or further away from the wall until the bass "smooths" out.



Equipment Access If building code permits, construct a 8-by-8 foot space behind the audio-video equipment.