

# How to Get the Best Picture Quality from Your HDTV



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Feel like you aren't getting the best picture from your shiny new TV? Want to make sure you're watching movies as they were intended to be seen? Here's what you need to know about HDTV picture quality, and how to adjust your set for the best image.

## Why TV's Don't Come with Optimal Picture Quality

Most TVs are not designed to have the best picture quality out-of-the-box. Instead, they're designed to be eye-catching in the showroom, next to other TVs under fluorescent lights. That means their backlight is as bright as possible, contrast is set so the image "pops", sharpness is turned up way too high, and motion is ultra smooth.



However, most of these features are not ideal for your living room. Colors that "pop" are usually ugly and un-lifelike, and can remove detail from the image. Those overly bright whites actually have a blue tint, which is inaccurate and can strain your eyes when you're watching in the dark. Furthermore, extra sharpening and smoothing features are usually just marketing gimmicks, and actually *add* artifacts to your image, rather than making them look better.

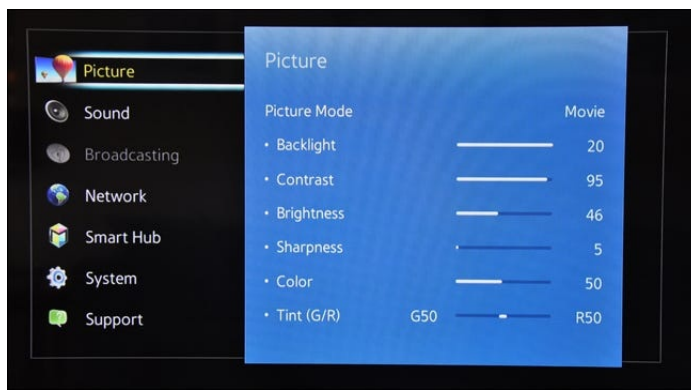
For a long time, TVs used to come with these "vivid" settings out of the box, which is terrible for at-home viewing. If you have a TV that's more than a couple years old, you may still be using those awful settings. These days, things are a little better, since most TVs will ask you to put them in "Home" or "Store Demo" mode when you set them up. But even the out-of-the-box "Home" settings are less than ideal, even if they're not quite as bad as the old "vivid" settings were.

For the best possible picture quality, you'll have a better viewing experience by turning most of these features off, and adjusting the brightness, contrast, and color to more lifelike settings. It may not "pop" like it did in the store, but you'll actually see *more* detail in the picture, and more lifelike colors. Once you get used to it, you'll never go back.

## Step One: Change Your TV's Image Preset

Most TVs come with different presets, like "Standard", "Movie", and "Vivid", that use different combinations of settings. The first—and biggest—step to getting better picture quality is to choose the right preset.

Open your TV's settings menu, usually by pressing the "Menu" button on your TV remote. Find the picture mode presets and enable the one labeled "Movie". (On some TVs, this may be called "THX" or "Film". If you don't see an option like this, or aren't sure, pick "Custom".)



You should see the picture already looks quite different, depending on which mode your TV was in before (again, many modern TVs use a not-terrible-but-still-not-ideal “Standard” mode, but if your TV is older or secondhand, it may use the god-awful “Vivid” mode).

Note that if you’re used to the default settings, you might be underwhelmed at first. For example, Movie mode may look dark and “washed out” in comparison, but that’s only because other modes, particularly “Vivid” or “Dynamic” ones, are too bright, oversaturated, and (ironically) *unnatural*. (Remember, if things are actually too dark to see, you can always turn the backlight up a little higher later.)



This simulated comparison gives you an idea of the difference between the “Movie” and vivid modes you’ll find on many TVs. Notice how the skin tones look pink and unnatural in the more vivid modes.

After enabling Movie mode, you may also think that some white areas (like clouds or snow) appear to have a reddish tint, but that’s your eyes playing tricks again. In fact, that color is probably much closer to true white—the other modes actually have a blue tint that makes them *look* brighter, but it’s not very accurate. This movie mode is not only truer to life, but it’s much less harsh on your eyes—especially if you’re watching in the dark.

In addition, on some TVs, Movie mode is the only preset that gives you access to *all* the advanced settings. Other presets may have them blocked or greyed out. This is important, since we’ll tweak those advanced settings in step two and three.

## Step Two: Turn Off the Unnecessary Features

Modern TVs come with a host of advanced settings that claim to make the picture look better. In reality, most of these are marketing gimmicks meant to one-up the competition, and you should turn them off. Head back to your TV’s menu and look at any “Picture Options” or “Advanced Settings” menus.



You should turn off most of these features, including:

- **Dynamic Contrast**, which attempts to make the picture “pop” by making the dark areas darker and the light areas lighter. Unfortunately, with this enabled, you lose some detail in the picture. In some situations, this can even introduce artifacts like [color banding](#).

- **Black Tone or Black Detail** aims to make blacks darker, but like Dynamic Contrast, will reduce detail in the picture. These are different from **Black Level**, which you'll want [set to RGB Limited](#) (or the equivalent) if your TV has the option.
- **Color Temperature** should already be handled by your preset, as described above—but in case it isn't, you'll want this set to the warmest option, since that's most likely to set whites to "true white" instead of "blue white".
- **Flesh Tone** lets you adjust skin colors, but on a properly calibrated TV, this shouldn't be necessary. In fact, it can cause other quirks, like blond people having pink streaks in their hair. Leave this at 0.
- **Noise Reduction or DNR** sounds like a good thing, but for HD content like Blu-Ray discs, it'll cause more problems than it solves. (It could be useful for some low-quality videos, though, like VHS tapes.)
- **Game Mode** reduces the lag between your video game console and the TV for super responsive video games. For movies and TV, it's best to turn off, since it can lower picture quality.

RELATED: [Why Does My New HDTV's Picture Look Sped Up and "Smooth"?](#)

- **Motion Interpolation** may be called something else on your TV—Samsung calls it Auto Motion Plus, Sony calls it MotionFlow, and so on. This creates new frames in between the ones in your video, smoothing out motion and causing [what's commonly known as the soap opera effect](#). This is mostly personal preference—a lot of people hate it, while others like it on (especially for sports).



Many of these settings reduce detail, especially in dark or light areas. This simulated image may "pop" more with dynamic contrast, but you lose a lot of depth and detail in Bond's tuxedo—notice how the wrinkles in the sleeves nearly disappear.

Some of these features may go by different names depending on your TV's manufacturer. If you're unsure what a setting does, google it and see if it matches any of the above descriptions.

There are a few exceptions to this rule, of course. **Local LED Dimming**, for example, can be a good feature if it's implemented well (though sometimes it can cause flickering). Try it both on and off to see which you prefer.

When in doubt, though, if you aren't sure what a feature does, you can't go too wrong turning it off.

## Step Three: Adjust Your Settings with a Calibration Disc

Steps one and two should take you most of the way. If you're willing to do a tad more work, you can fine-tune some of your TV's other settings to really dial in optimal picture quality.

You'll need a calibration disc to perform this step. We're going to be using the free [AVS 709 patterns available here](#). You can either burn it to a Blu-ray disc, or copy the MP4 version to a flash drive and use your Blu-ray player, Xbox, PlayStation, or other USB-enabled device to play the test patterns on your TV.

There are a lot of other calibration discs out there you can buy, like [Spears & Munsil HD Benchmark](#), [Disney's World of Wonder](#), or [Digital Video Essentials](#). And if you have an Apple TV or Android TV, the THX Tune-Up app ([Apple TV](#), [Android TV](#)) can walk you through a similar process as well. For today's purposes, we'll use the free AVS 709 disc should do everything we need on almost any TV.

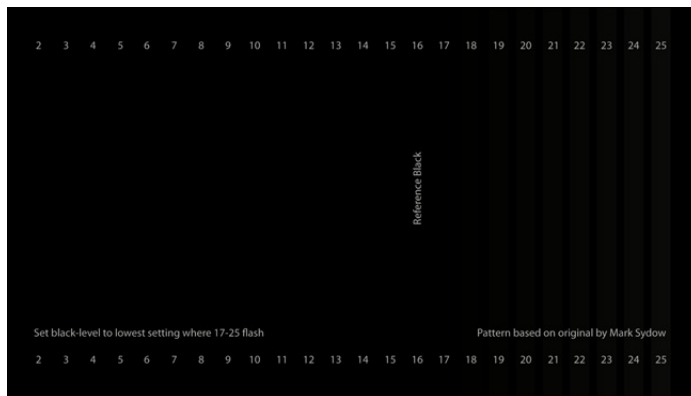
Once you've got the patterns ready to play on your TV, read on—we'll start with some basic adjustments and then move into slightly more advanced territory.

## Adjust Brightness and Contrast for Deep Blacks and Maximum Detail

RELATED: [Turn Up Your TV's Backlight---Not the Brightness---to Make It Brighter](#)

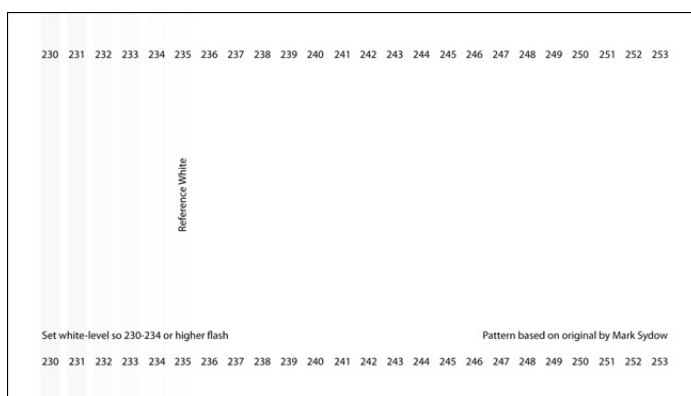
First, you'll want to adjust your TV's brightness, which affects how dark your blacks are ([not to be confused with the backlight setting](#), which you can set to whatever is comfortable for your eyes).

On the AVS 709 disc, head to Basic Settings and play the first chapter, “Black Clipping”. You’ll see the following image on your screen.



Then, open your TV’s menu and head to the Brightness setting. Lower it until the black bars on the right start to disappear, then increase it one step at a time. You want the brightness set so that you just barely see the black bar at 17. If you set the brightness any lower than that, you’ll lose detail as your blacks get crushed.

Setting contrast is similar. Head to Chapter 3 in Basic Settings, called “White Clipping”. It’ll look like this:



Then, open your TV’s menu and head to the Contrast setting. Set it as high as you can while still being able to see the distinct grey bars from 230 to 234. If one of them turns as white as the background, lower the contrast a bit.

If that means setting your Contrast to the maximum value, that’s fine. Don’t worry if you see white values beyond 234, too—that’s normal on some TVs. You just don’t want the bars at 234 or lower to disappear.

After adjusting your contrast, go back and adjust the brightness again, and make sure you’re at the right level. Changing the contrast can affect the optimal brightness level, and vice versa. Once you go through both a second time, though, you should be able to find the ideal setting for each.

## Tweak Overscan and Sharpness for a Pixel-Perfect Picture

RELATED: [HDTV Overscan: What It Is and Why You Should \(Probably\) Turn It Off](#)

Back in the days of big CRT televisions, content creators used [something called overscan](#) to ensure the picture filled the screen. It would cut off a small portion of the picture around the edges, usually by a couple percent. But on modern digital LCD TVs, this is a bad thing—if your screen has 1920×1080 pixels, and your Blu-ray has 1920×1080 pixels of information, you want each pixel to show up exactly where it’s supposed to—otherwise your TV is zooming in on the picture, things won’t be as sharp, and you won’t get that pixel-perfect image.

Alas, overscan still exists on modern TVs, so you’ll want to make sure it’s turned off. On the AVS 709 disc, go back to the Basic Patterns menu and head to chapter 5, “Sharpness & Overscan”. You’ll see something like this:



If you see the one-pixel white line around the outside of the image, you're all set—overscan is turned off. Otherwise, you'll have to jump into your TV's menu and [turn overscan off](#). If you can't get it to fit perfectly, you may also need to disable overscan on your Blu-ray player or set-top box.

Once that's done, you can move on to adjusting sharpness, which uses this same test pattern. Many TVs come out of the box with the sharpness dialed too high, and while it may look good at first glance, the edge enhancement algorithm can actually create lots of artifacts that make the picture worse.

In most cases, you can probably just turn Sharpness down to 0—that will show the movie, pixel for pixel, as it is on the disc. But if you want to add a little bit of sharpening, this test pattern will help you find the right level. Turn the sharpness up until you start to see a [Moiré pattern](#) around any of the black lines, particularly the really skinny ones. As soon as you see that, turn the Sharpness down until they disappear. That's the highest sharpness can be without causing serious artifacting.

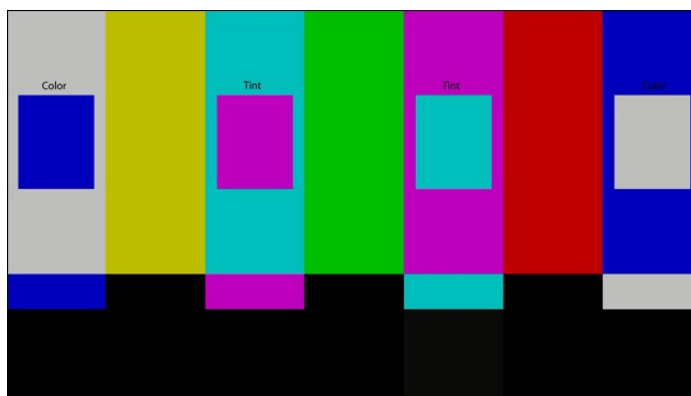
## Fix Color Saturation and Tint for More Accurate Colors

Lastly, it's time to adjust the actual colors on your screen. You can't do serious color adjustment without a colorimeter, but you can perform a few basic adjustments that should get you close, provided you have a decent TV.

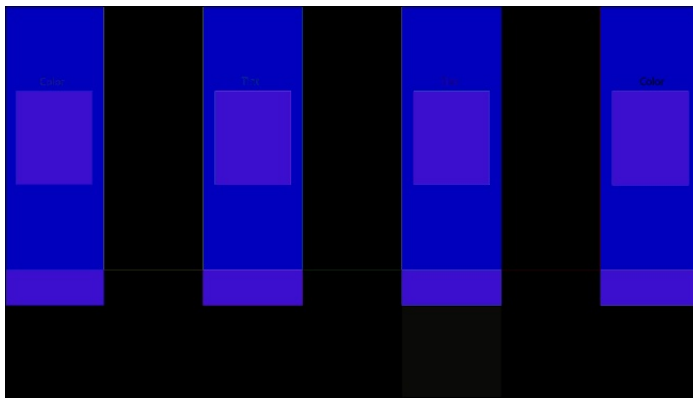
There are two ways to perform this adjustment. If your TV has a built in "RGB Mode" or "Blue Mode", you're golden—dig through the settings and see if you can find something by that name.

If it doesn't, you'll need a pair of blue filter glasses. They come with some of the aforementioned calibration discs, but if you're using the free AVS 709 disc like we are, you'll need to buy a pair—[THX sells them for \\$5](#).

To adjust the color saturation and tint, head to chapter 4 of Basic Settings, "Flashing Color Bars". It'll look something like this:



Then, turn Blue mode on, or put your blue filter glasses on. Once you do, the screen should look a bit more like this:

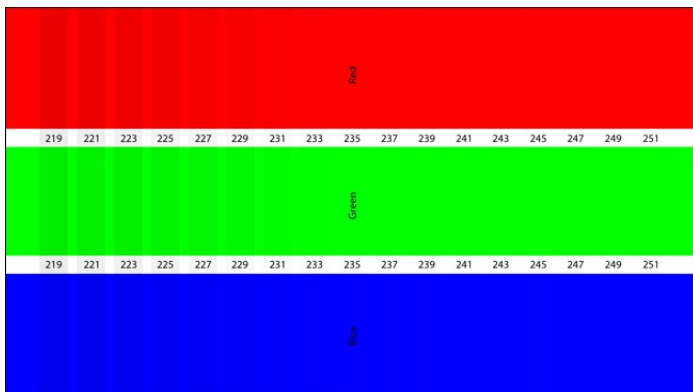


Your goal is to get the blue inside the boxes to match the blue of its corresponding bar. Start by adjusting the “Color” setting on your TV—turn it up or down until the outside bars match their boxes as close as possible.

Then, move onto Tint, and do the same thing with the middle two bars. Note that as you adjust the Tint, the Color bars on the outside will get a little out of whack too, since both of these settings are a little dependent on one another. So keep flipping back and forth between the two, adjusting them until all four boxes match all four bars.

### Check Your Colors and Fine-Tune If Necessary

At this point, you should be mostly done. You can go back and double-check all your settings now (in case any of them affected the others), and I like to go into the Misc Patterns > Additional section of the AVS 709 disc and check a few extra patterns. The Grayscale ramp is useful for seeing if you’re getting any [color banding](#), and the Color Steps and Color Clipping ensure that colors aren’t bleeding together. If you see problems with these patterns, it’s likely you have some advanced setting turned on that you shouldn’t, so you should go back and experiment until the grayscale ramp looks as gradual as possible, the color steps look distinct from one another, and the color clipping is showing each distinct bar on the left side of the screen.



Once you’re happy with how everything is set up, pop in a movie and see how it all looks. It should be quite an improvement over that “vivid” setting.



A simulated comparison of vivid mode and a calibrated image. Isn’t that better? The vivid mode’s street is purple for crying out loud!

Remember, things may look a bit more muted compared to that vivid setting, but give your eyes a bit of time to get used to the change. At the end of the day, these adjustments will ensure you’re getting the maximum amount of detail out of your TV, and you’re seeing the movies pixel-for-pixel as they were intended—or at least as close as you can get without professional calibration.

Speaking of which...

## The Easier Option: Is Professional Calibration Worth



It?

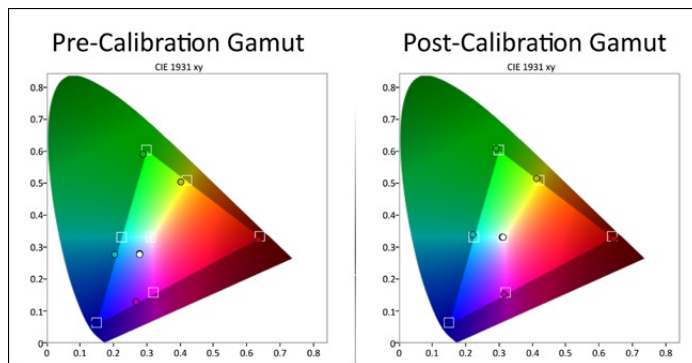


If all that sounds like too much work for you—or if you want to get the *absolute most* out of your TV—a professional calibrator might be the answer.

The price of a professional calibrator can vary a lot, though on average they cost around \$300 to \$500 (though you can occasionally find some cheaper or more expensive). A professional calibrator will do all of the above adjustments, plus a few more that you can't do by eye. By using special equipment, a calibrator can perfect your greyscale, map your color gamut, and adjust gamma to your preferences.

This part of the process is a bit more about adhering to a certain standard than getting perfect picture quality. It ensures that when you watch *Avatar*, the Na'vi will be the same shade of blue that James Cameron saw in the editing room. The white snow in *Planet Earth* will be a true white, not drifting toward other hues like blue or red.

Some panels will be pretty close to accurate after the basic adjustments we discussed in this article, while other TVs will need professional calibration to look anywhere close to accurate.



So how do you know whether it's worth the money? It mostly comes down to how critical you are of your picture. If you're one of those people that wants the most accurate possible picture, professional calibration may be worthwhile for you. But if you just watch the occasional comedy in a brightly-lit living room, and your TV looks fine to you after the above adjustments, you may not need to go any further.

The cost and complexity of your setup can make a big difference too. If you have a high-end video receiver that also has its own image adjustments, a professional calibrator can help you make sense of it all. If you have a TV that cost \$2000, a \$300 calibration may be a small price to pay for perfect picture—while it may seem overly expensive for a TV that itself was \$300.

And, of course, the less of the above work you want to do yourself, the more a professional calibrator will be worth your money. \$300 may be a lot of money if you're going from "almost there" to "perfect", but well worth it if you're going from "bad vivid settings" to "perfect". This is especially true if you aren't super tech-savvy to begin with—a calibrator may find little things you missed that can make a big difference (like a cable box that got stuck outputting in standard definition instead of HD).

You can get a calibration from big-box stores like Best Buy, usually for pretty cheap—but it's hard to know what you're getting, because they employ so many calibrators. Some may be great, others may be terrible. If you really want to ensure you get your money's worth, you're best off searching for a list of ISF or THX certified calibrators in your area. You can find good lists for [ISF calibrators here](#) and [THX calibrators here](#), as well as sites like [AVS Forum](#). Find a calibrator with a good reputation. Ask them about their services—what kind of equipment they use, how long they've been in the business, and whether they offer you a full report after calibrating your set. If you do a little due diligence, you can be much more confident that you've picked a good person for the job.

**Remember: Your TV Is Only As Good As the Source Material**



Lastly, we should remind you: your TV is only as good as the video you're playing on it. You can calibrate your TV to perfectly fit any standard out there, but no amount of calibration will save you from a bad quality video. If you're using DVD instead of Blu-Ray, you aren't getting the best quality possible. Streaming video like Netflix will always be more compressed than its Blu-Ray counterparts. And if you're illegally pirating low-quality episodes of Game of Thrones instead of watching the real thing, you're going to have a bad time.

**RELATED:** [How Can You Make DVDs Look Better on Your HDTV?](#)

So as you go through the above process, make sure you're getting your movies and shows in the best quality they're available in. Blu-ray is the best quality most consumers can get. If you can't do that, HD streaming or HD downloads (from stores like iTunes) will suffice, with DVDs being a last resort (if the movie or show isn't available in HD anywhere). If you are forced to watch something on DVD, [a better DVD player can make things look a little sharper](#) on an HDTV.

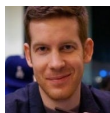
In addition, not every movie is perfectly mastered. Some movies are just a little more washed out than others, or were over-sharpened when put on a Blu-ray disc, and there's nothing you can do about that. These settings will match how most movies were mastered, but don't expect every movie to look perfect—if the studio wasn't doing its job well, that'll come through on the TV, no matter what settings you use.

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TV quality is a surprisingly complex subject, but with a little research and tweaking, you'll be surprised how much better you can make your picture look. Just remember: these tips may make your picture look dim or washed out at first glance, but that's mostly your eyes playing tricks on you. This is how those movies and shows were edited and colored, and how they were intended to be seen in the theater at home. Give yourself some time to get used to it, and you'll probably see how much better it really is.

*Special thanks to calibrators [David Abrams](#), [Ray Coronado](#), and [Bill Hergonson](#) for offering their expertise as we wrote this article.*

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