1. **Video colour spaces**

A **color space** is a specific organization of [colors](https://en.wikipedia.org/wiki/Color" \o "Color). In combination with physical device profiling, it allows for reproducible representations of color, in both [analog](https://en.wikipedia.org/wiki/Analog_signal" \o "Analog signal) and [digital](https://en.wikipedia.org/wiki/Digital_data) representations. A color space may be arbitrary, with particular colors assigned to a set of physical [color swatches](https://en.wikipedia.org/wiki/Palette_(computing)" \o "Palette (computing)) and corresponding assigned [color names](https://en.wikipedia.org/wiki/Color_name" \o "Color name) or numbers such as with the [Pantone](https://en.wikipedia.org/wiki/Pantone) collection, or structured mathematically as with the [NCS System](https://en.wikipedia.org/wiki/Natural_Color_System), [Adobe RGB](https://en.wikipedia.org/wiki/Adobe_RGB_color_space) and [sRGB](https://en.wikipedia.org/wiki/SRGB" \o "SRGB). A "[color model](https://en.wikipedia.org/wiki/Color_model" \o "Color model)" is an abstract mathematical model describing the way colors can be represented as [tuples](https://en.wikipedia.org/wiki/Tuple) of numbers (e.g. triples in [RGB](https://en.wikipedia.org/wiki/RGB_color_model) or quadruples in [CMYK](https://en.wikipedia.org/wiki/CMYK_color_model)); however, a color model with no associated mapping function to an [absolute color space](https://en.wikipedia.org/wiki/Absolute_color_space) is a more or less arbitrary color system with no connection to any globally understood system of color interpretation. Adding a specific mapping function between a color model and a reference color space establishes within the reference color space a definite "footprint", known as a [gamut](https://en.wikipedia.org/wiki/Gamut), and for a given color model this defines a color space. For example, Adobe RGB and sRGB are two different absolute color spaces, both based on the RGB color model. When defining a color space, the usual reference standard is the [CIELAB](https://en.wikipedia.org/wiki/Lab_color_space) or [CIEXYZ](https://en.wikipedia.org/wiki/CIE_1931_color_space) color spaces, which were specifically designed to encompass all colors the average human can see.

Since "color space" identifies a particular combination of the color model and the mapping function, the word is often used informally to identify a color model. However, even though identifying a color space automatically identifies the associated color model, such a usage is incorrect in a strict sense. For example, although several specific color spaces are based on the [RGB color model](https://en.wikipedia.org/wiki/RGB_color_model), there is no such thing as the singular [RGB color space](https://en.wikipedia.org/wiki/RGB_color_space).



RGB density

The RGB color model is implemented in different ways, depending on the capabilities of the system used. By far the most common general-used incarnation as of 2006 is the 24-[bit](https://en.wikipedia.org/wiki/Bit) implementation, with 8 bits, or 256 discrete levels of color per [channel](https://en.wikipedia.org/wiki/Channel_(digital_image)). Any color space based on such a 24-bit RGB model is thus limited to a range of 256×256×256 ≈ 16.7 million colors. Some implementations use 16 bits per component for 48 bits total, resulting in the same [gamut](https://en.wikipedia.org/wiki/Gamut) with a larger number of distinct colors. This is especially important when working with wide-gamut color spaces (where most of the more common colors are located relatively close together), or when a large number of digital filtering algorithms are used consecutively. The same principle applies for any color space based on the same color model, but implemented in different [bit depths](https://en.wikipedia.org/wiki/Color_depth).

### Generic**[**

Additive color mixing: Three overlapping lightbulbs in a vacuum, adding together to create white.

Subtractive color mixing: Three splotches of paint on white paper, subtracting together to turn the paper black.

[RGB](https://en.wikipedia.org/wiki/RGB_color_space) uses [additive color](https://en.wikipedia.org/wiki/Additive_color) mixing, because it describes what kind of *light* needs to be *emitted* to produce a given color. RGB stores individual values for red, green and blue. [RGBA](https://en.wikipedia.org/wiki/RGBA_color_space) is RGB with an additional channel, alpha, to indicate transparency.

Common color spaces based on the RGB model include [sRGB](https://en.wikipedia.org/wiki/SRGB" \o "SRGB), [Adobe RGB](https://en.wikipedia.org/wiki/Adobe_RGB_color_space), [ProPhoto RGB](https://en.wikipedia.org/wiki/ProPhoto_RGB_color_space" \o "ProPhoto RGB color space), [scRGB](https://en.wikipedia.org/wiki/ScRGB" \o "ScRGB), and [CIE RGB](https://en.wikipedia.org/wiki/CIE_1931_color_space#CIE_RGB_color_space).

[CMYK](https://en.wikipedia.org/wiki/CMYK) uses [subtractive color](https://en.wikipedia.org/wiki/Subtractive_color) mixing used in the printing process, because it describes what kind of [inks](https://en.wikipedia.org/wiki/Inks) need to be applied so the light *reflected* from the [substrate](https://en.wikipedia.org/wiki/Substrate_(printing)) and through the inks produces a given color. One starts with a white substrate (canvas, page, etc.), and uses ink to subtract color from white to create an image. CMYK stores ink values for cyan, magenta, yellow and black. There are many CMYK color spaces for different sets of inks, substrates, and press characteristics (which change the dot gain or transfer function for each ink and thus change the appearance).

[YIQ](https://en.wikipedia.org/wiki/YIQ) was formerly used in [NTSC](https://en.wikipedia.org/wiki/NTSC) (North America, Japan and elsewhere) television broadcasts for historical reasons. This system stores a [luma](https://en.wikipedia.org/wiki/Luma_(video)" \o "Luma (video)) value roughly analogous to (and sometimes incorrectly identified as)[[5]](https://en.wikipedia.org/wiki/Color_space#cite_note-5)[[6]](https://en.wikipedia.org/wiki/Color_space#cite_note-6) [luminance](https://en.wikipedia.org/wiki/Luminance_(relative)), along with two [chroma](https://en.wikipedia.org/wiki/Chrominance" \o "Chrominance) values as approximate representations of the relative amounts of blue and red in the color. It is similar to the [YUV](https://en.wikipedia.org/wiki/YUV) scheme used in most video capture systems[[7]](https://en.wikipedia.org/wiki/Color_space#cite_note-7) and in [PAL](https://en.wikipedia.org/wiki/PAL) (Australia, Europe, except France, which uses [SECAM](https://en.wikipedia.org/wiki/SECAM)) television, except that the YIQ color space is rotated 33° with respect to the YUV color space and the color axes are swapped. The [YDbDr](https://en.wikipedia.org/wiki/YDbDr" \o "YDbDr) scheme used by SECAM television is rotated in another way.

[YPbPr](https://en.wikipedia.org/wiki/YPbPr) is a scaled version of YUV. It is most commonly seen in its digital form, [YCbCr](https://en.wikipedia.org/wiki/YCbCr" \o "YCbCr), used widely in [video](https://en.wikipedia.org/wiki/Video_compression) and [image compression](https://en.wikipedia.org/wiki/Image_compression) schemes such as [MPEG](https://en.wikipedia.org/wiki/MPEG) and [JPEG](https://en.wikipedia.org/wiki/JPEG).

[xvYCC](https://en.wikipedia.org/wiki/XvYCC) is a new international digital video color space standard published by the [IEC](https://en.wikipedia.org/wiki/International_Electrotechnical_Commission) (IEC 61966-2-4). It is based on the ITU BT.601 and [BT.709](https://en.wikipedia.org/wiki/Rec._709) standards but extends the gamut beyond the R/G/B primaries specified in those standards.

[HSV](https://en.wikipedia.org/wiki/HSV_color_space) (**h**ue, **s**aturation, **v**alue), also known as HSB (hue, saturation, **b**rightness) is often used by artists because it is often more natural to think about a color in terms of hue and saturation than in terms of additive or subtractive color components. HSV is a transformation of an RGB color space, and its components and colorimetry are relative to the RGB color space from which it was derived.

[HSL](https://en.wikipedia.org/wiki/HSL_color_space) (**h**ue, **s**aturation, **l**ightness/**l**uminance), also known as HLS or HSI (hue, saturation, **i**ntensity) is quite similar to [HSV](https://en.wikipedia.org/wiki/HSV_color_space), with "lightness" replacing "brightness". The difference is that the *brightness* of a pure color is equal to the brightness of white, while the *lightness* of a pure color is equal to the lightness of a medium gray.

# 2. **Sound Card**

The sound card is a [component](https://techterms.com/definition/component) inside the computer that provides audio [input](https://techterms.com/definition/input) and [output](https://techterms.com/definition/output) capabilities. Most sound cards have at least one [analog](https://techterms.com/definition/analog) line input and one stereo line [output](https://techterms.com/definition/output) connection. The connectors are typically 3.5 mm minijacks, which are the size most headphones use. Some sound cards also support [digital](https://techterms.com/definition/digital) audio input and output, either through a standard TRS (tip-ring-sleeve) connection or via an optical audio port, such as [Toslink](https://techterms.com/definition/toslink) connector.

While there are many types of sound cards, any type that produces an analog output must include a digital-to-analog converter ([DAC](https://techterms.com/definition/dac)). This converts the outgoing signal from digital to analog, which can be played through most speaker systems. Sounds cards that support analog input also require an analog-to-digital converter ([ADC](https://techterms.com/definition/adc)). This [digitizes](https://techterms.com/definition/digitize) the incoming analog signal, so the computer can process it.

In some computers, the sound card is part of the [motherboard](https://techterms.com/definition/motherboard), while other machines may have an actual card that reside in a [PCI](https://techterms.com/definition/pci) slot. If you want to more audio capabilities to your computer, such as additional input or output channels, you can install a new sound card. Professional sound cards often support higher [sampling](https://techterms.com/definition/sampling) rates (such as 192 kHz instead of 44.1 kHz) and may have more inputs and outputs. Some cards may also have 1/4 in. connectors instead of 3.5 mm, which accommodates most instrument outputs.

While professional sound cards can add more audio capabilities to your computer, another popular option for multi-channel recording is a breakout box. This is an external box that typically includes a built-in sound card and multiple audio connections. For example, a breakout box may support 16 channels of audio, which would be impossible to fit on a single card. Most breakout boxes connect to a [Firewire](https://techterms.com/definition/firewire)or [USB](https://techterms.com/definition/usb) port, though some connect to a sound card specifically designed to communicate with the box.

1. **components of an audio system**

The [components of a stereo audio system](https://www.lifewire.com/guide-to-stereos-and-systems-3134848) can be confusing for those just starting to put together a system. What are the differences between receivers and amplifiers? Why would you choose to have a system of separate components, and what do each of them do? Here is an introduction to the components of [audio systems](https://www.lifewire.com/multiroom-music-system-overview-3134661) so you can better understand the role each one plays in your listening experience.

### Receivers

A receiver is a combination of three components: an amplifier, a control center and an [AM/FM tuner](https://www.lifewire.com/how-fm-radio-works-3135076). A receiver is the center of the system, where all audio and video components and speakers will be connected and controlled. A receiver amplifies the sound, receives AM/FM stations, selects a source for listening and/or viewing (CD, DVD, Tape, etc.) and adjusts tone quality and other listening preferences. [There are many receivers to choose from](https://www.lifewire.com/best-stereo-receivers-3135075), including stereo and multichannel home theater receivers. Your decision should be based on how you will use the receiver. For example, if you enjoy listening to music more than watching movies, you probably won't want a multichannel receiver. A stereo receiver and a CD or DVD player and two speakers would be a better choice.

### Integrated Amplifiers

An integrated amp is like a receiver without the AM/FM tuner. A basic integrated amplifier combines a two-channel or multichannel amp with a pre-amplifier (also known as a control amp) for selecting audio components and operating tone controls. Integrated amplifiers are often accompanied by a separate AM/FM tuner.

### Separate Components: Pre-amplifiers and Power Amplifiers

Many serious audio enthusiasts and very discriminating listeners prefer separate components because they provide the best audio performance and each component is optimized for its specific function. In addition, because they are separate components, there is less possibility of interference between the pre-amp and the higher current stages of a power amp.

Service or repair can also be important, should it become necessary. If one part of an a/v receiver needs repair, the entire component must be taken to a service center, which is not true of separates. It is also easier to upgrade separate components. If you like the pre-amplifier/processor, but want more amplifier power you can purchase a better amp without replacing the pre-amp.

### Pre-Amplifiers or Control Amplifiers

A pre-amplifier is also known as a control amplifier because it’s where all components are connected and controlled. A pre-amp provides a small amount of amplification, only enough to send the signal to the power amplifier, which amplifies the signal enough to power speakers. Receivers are excellent, but if you want the best, no-compromise performance, consider separate components.

### Power Amplifiers

A power amplifier provides the electrical current to drive loudspeakers and they are available in two-channel or several multichannel configurations. Power amps are the last component in the audio chain before the loudspeakers and should be matched with the capabilities of the speakers. In general, the [power output](https://www.lifewire.com/stereo-amp-wattage-3135065) of the amp should be closely matched with the power handling capabilities of the speakers.