

What to look for in audio equipment

Amplifiers

The stereo amplifier is the most sophisticated part of an Audio System—marvellously ingenious in construction, very simple to operate.

You use the amplifier's controls to adjust the sound reproduction—volume, tone, the 'balance' of sound between the two loudspeaker enclosures, and make other adjustments that vary from model to model.

As you go up the price range, the extra money buys you more features that increasingly enable you to satisfy your individual taste.

There are several important qualities to look for in an amplifier. First is the power output—the energy supplied to drive each loudspeaker. This output is given in Watts, and, as with Horsepower in a car, the more Watts the higher the cost.

Unfortunately, manufacturers use at least three ways to rate power output—peak power, music power, and continuous (sine wave) power. It's worth remembering that power output figures may be up to twice the true continuous (sine wave) rating, depending on the method of specification.

Output is important because low bass tones and massive orchestral crescendos need a reserve of power for true reproduction.

An amplifier's output is quoted as being delivered into a certain 'load' or 'impedance', measured in Ohms. This means the amplifier should be matched with loudspeakers of similar impedance. You will see that with Philips equipment, amplifiers and loudspeakers are well matched.

Another important figure to look for in an amplifier's specification is the amount of distortion. Harmonic distortion affects the balance of overtones and so falsifies tone colour. Intermodulation distortion results from interaction of low and high notes in the amplifier and gives a harsh sound. No amplifier can be completely distortion-free. All Philips amplifiers keep distortion down to acceptable levels, in other words, virtually inaudible.

Record Decks

Record decks present difficult electro-mechanical problems. For one thing, the motor has to drive the turntable, yet should be mechanically insulated from it to prevent the highly sensitive stylus from picking up vibrations, heard as a low roar known as 'rumble'.

The motor should keep the turntable spinning at a constant speed to prevent variations in musical pitch (see 'wow' and 'flutter' on opposite page).

The pick-up's downward force on the record should be neither too great nor too small. So it's an advantage to have clearly calibrated playing weight adjustment.

You should be able to raise the pick-up head quickly and lower it slowly onto the record to prevent damage. Hydraulic damping is therefore an advantage.

The pick-up arm should be able to move very freely, so that the stylus exerts minimum side-force on a record's grooves.

The stylus should be able to follow the tiniest variations in the groove, to pick up every nuance stored there. This is known as 'tracing', and depends partly on compliance and partly on the shape and effective mass of the stylus tip.

Another advantage is to have a switch-off device that exerts no mechanical force on the pick-up arm and therefore cannot damage the record grooves.

Loudspeaker Enclosures

Basically, a loudspeaker sets up a train of sound waves by moving air to and fro, its cone acting as a piston.

For bass tones, a large amount of air has to be moved at a relatively slow rate—so a large cone is needed.

For treble tones a relatively small amount of air has to be moved to and fro more rapidly—so a small light cone is needed which, having little inertia, can respond to rapid vibrations.

The sound waves from the rear of the cone, which is instantaneously moving in the opposite direction

from the front, must be prevented from mingling with those from the front, so cancelling them.

This may be done by increasing the path length between the front and rear of the cone, as in vented, or bass reflex enclosures, or by suppressing the rearward radiation altogether by placing the speaker in a sealed box or "infinite baffle".

Because of the conflicting needs of low—and high—note reproducers, different size cones are provided for each frequency range. These may be combined in one "dual cone" unit, or separate speakers of different sizes may be placed in one enclosure with filter circuits (crossover networks) to feed the correct frequency range to each unit as in the RH402 and RH407 models.

Where to sit

A stereophonic system is designed to recreate, in domestic surroundings, the ambience of the original performance, perhaps in a theatre, concert hall, jazz club or opera house. A Hi-Fi system gives faithful reproduction in regard to frequency response and tonal balance. Stereophony adds breadth and depth in such a way as to indicate the scale of the original sound source.

Purely acoustic considerations would suggest that loudspeakers should aim into the length of a rectangular room, angled slightly inwards, about 8 to 12 feet apart and 3 to 4 feet above the floor.

Such an arrangement will give a large listening area in which stereo sound may be heard. If the speakers are too far apart, the sound source may appear to have a 'hole in the middle', if they are too low, the upper frequencies may be absorbed by the carpet, soft furnishings and the members of the audience.

For detailed information on tape and cassette recorders please ask for the Reel-to-Reel booklet or the Compact Cassette System booklet from your local dealer.

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Glossary of some audio terms

AM—amplitude modulation, a system of broadcasting, used mainly for long, medium and short wave transmissions. See also FM.

STEREO 4—A simple, economic, yet effective method of producing 4-speaker “surround sound” from conventional stereo equipment, by employing a matrix circuit between the power amplifier and speaker system.

Bias compensator—device used to counteract the inward side-thrust of a pick-up arm as it tracks a record. The compensator exerts on the arm a slight outward force which may be arranged to have a definite relationship to the pick-up playing weight.

Bi-radial stylus—stylus tip with small radius where it touches each groove wall and a large radius across the groove. Used in suitable lightweight pickups to reduce tracing distortion (compared with conventional conical stylus having hemispherical tip). Sometimes referred to as an elliptical stylus.

Cartridge—although not especially apt, this term is accepted through long usage as a label for the essential electro-mechanical parts of a pick-up. A cartridge is always equipped with holes or a mounting device which enables it to be fitted into the head-shell of the pick-up arm.

Channel separation—ability to isolate the two channels in stereo reproduction.

Compliance—ability of pick-up to respond to wiggles in record groove.

Contour—When the sound volume reaching the ear is at a relatively low level, bass notes and, to a lesser degree, high notes, are reduced in volume with respect to the middle notes. The contour control (variously referred to as physiology or compensation) applied to the volume control, automatically adapts the amplifier frequency response to boost bass and treble as the volume is reduced.

Crossover—device for separating amplifier output into frequency bands to be fed to different loudspeakers designed to handle those frequencies (e.g. tweeter and woofer). Crossover frequency is that frequency at which the bands divide.

Crosstalk—the amount of signal breakthrough from one stereo channel to the other.

D.N.L. (Dynamic noise limiter)—A Philips circuit designed primarily for use with cassette equipment to increase the subjective signal to noise ratio during the replay process. Thus the system is compatible with Compact Cassette equipment already in existence.

Flutter—rapid variations in the speed of a turntable or tape transport. Observed as a wavering of musical pitch.

FM—frequency modulation, a form of radio broadcasting offering a wide-range frequency response and almost complete freedom from interference. Also known as VHF (Very High Frequency).

Frequency Response—the range of frequencies that sound equipment can handle. Sound is simply vibrating air and the air vibrates at different rates, measured in cycles per second or Hertz (Hz). The lower the note, the slower the vibrations. The human ear may be sensitive to frequencies from about 20 to 20,000 Hz, though research evidence suggests that some people can ‘sense’ greater richness of tone when the frequency response is greater than their measured range of perception.

Frequency response will usually be accompanied by a figure showing by how much the sound reproduced may vary from the mean level, expressed as plus or minus so many decibels intensity (a decibel is the unit of sound).

For example, the RH 591 amplifier has a frequency response of 20-20,000 Hz ± 0.5 dB. It will also handle notes as low as 10 and as high as 50,000 Hz, but at these extremes, the variation can be ± 3 dB.

Infinite baffle—sealed loudspeaker enclosure that prevents sound waves generated at rear of speaker cancelling those radiated from the front.

Playing weight—the pick-up’s downward force on the record. It is sometimes referred to in other ways, such as stylus pressure, tracking weight and so on. The pick-up manufacturer makes recommendations for playing weight (e.g. 1-2g) which the user should follow. A playing weight set too low is as potentially damaging to the record groove as one that is excessive.

Pre-amplifier—first stages of an amplifying system. Equalises and boosts low-level signal, for instance from a magneto-dynamic cartridge, and feeds signals to the power amplifier, which in turn feeds loudspeakers.

Presence—Used to describe a preponderance of middle frequencies variously referred to as “sparkle” or “brilliance”. The addition of ‘presence’ to an amplifier response produces a rise in level of middle frequencies (usually centred around 3kHz) with respect to lower and higher frequencies.

Quadrophony—True quadrophony offers 4 discrete channels, from signal source to loudspeakers (i.e.—4 microphones for recording, 4-track tape

replay, 4-channel power amplifier and 4 loudspeakers). In practice various modulation systems can be used to obtain 4 discrete channels from nominally 2-channel equipment (a stereo pick-up head for example). The information must then be decoded in much the same manner as a stereo broadcast to reproduce 4 separate channels. Pseudo-quadrophony or “surround sound systems” can produce comparable effects using matrix circuits in conjunction with traditional two-channel set-ups.

Rumble—noise from the motor and turntable bearings of a record player, picked up by the stylus and reproduced as a low roar.

Scratch—the term loosely applied to deformations (usually on disc) and producing annoying sharp high-frequency sounds. The effects of these and of hiss (high-frequency background noise) can be reduced by the application of a scratch filter.

Selectivity—the ability of a tuner to choose between two stations close together on a waveband.

Sensitivity—the ability of a tuner to receive weak or distant signals. Expressed in micro-Volts (μ v). The fewer the micro-Volts, the greater the sensitivity.

Signal-to-noise ratio—the proportion of signal to unwanted equipment noise. The higher the ratio, the better.

Solid-state—transistorised. Term used because in transistors and other semi-conductor devices, movement of electrons is in a solid material. (In valves, electrons move in a vacuum.)

Transcription—term used to label a turntable of high quality, as is required for a high fidelity system with a wide frequency response.

Tracing—the ability of a stylus to follow the variations in the record groove, partly dependent on compliance and the stylus profile.

Tracking—the ability of a pick-up arm assembly to follow the record groove. Tracking error is the angle between the axis of the pick-up head and the tangent to the record groove followed by the record cutter in producing the master disc. Tracking force is the downward pressure of the stylus on a record.

Tweeter—high-frequency speaker for treble tones.

Woofer—low-frequency speaker for bass tones.

Wow—slow, regular variations in the speed of a turntable or tape transport. Observed as a wavering of musical pitch.