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## Chapter 14

# The Hi-Fi Language

**A-B Test**—Direct comparison of sound of two tape recorders made by simultaneously playing identical recorded selections on both machines and successively turning on the speaker of first one, then the other.

**AES**—Audio Engineering Society.

**AF**—Abbreviation for audio frequency.

**AFC**—Abbreviation for automatic frequency control; an electronic circuit used in tuners to correct inaccuracy in tuning a station.

**AM**—Abbreviation for amplitude modulation; the type of transmission utilized by the standard broadcast stations.

**Amplification**—Magnification (see Gain).

**Amplifier**—An electronic circuit which increases the amplitude of an electric voltage or power.

**Arm (phonograph)**—A movable bracket which holds the pickup in proper position over the record (also Tone Arm).

**Attenuation**—Reduction of an electric voltage or current; the opposite of amplification.

**Audio**—The range of frequencies from approximately 30 to 15,000 cps. Also an adjective used in reference to the electronic and acoustical equipment concerned with the reproduction of sound.

**Audiophile**—A person who is interested in improving musical reproduction for his own personal listening, by use of the latest audio equipment and techniques.

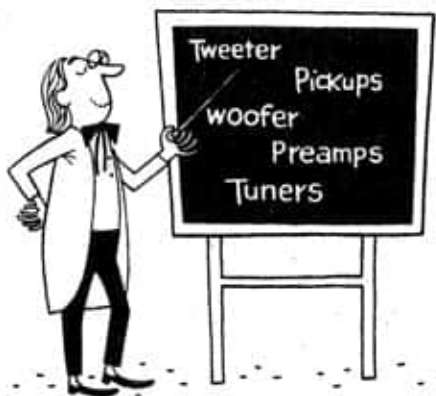
**Background Noise**—The total system noise, regardless of whether or not a signal is present.

**Baffle**—A barrier or partition designed to separate the sound waves generated by the front and back of a loud-speaker cone.

**Bass Reflex Speaker Enclosure**—Type of extension loud-speaker cabinet frequently available as accessory item for tape recorders. Design employs a "port" or opening which greatly reinforces the bass, yet requires but a relatively small cabinet.

**Capstan**—The spindle or shaft (often the motor shaft itself) which rotates against the tape, pulling it along at a constant speed on recording and playback.

**Cartridge**—Another name for the phonograph "pickup"; the device which converts the mechanical



energy stored in the record grooves into electrical energy.

**Chassis**—The metal box, framework or other support to which the components of a tuner or amplifier or other device are attached. The term is also used to designate the entire equipment (less cabinet) when assembled.

**Compensator**—An electronic circuit for altering the frequency response of the amplifier system to achieve a specified result. In general this refers to such things as record equalization or loudness correction.

**Constant Amplitude**—The disc recording characteristic wherein the groove displacement is directly proportional to the signal amplitude.

**Constant Velocity**—The disc recording characteristic wherein the groove displacement is inversely proportional to the signal frequency.

**Crossover Network**—A filtering circuit used on multiple speaker systems which separates the high frequencies from the low frequencies and channels them respectively to the tweeter and woofer speaker units.

**Crystal**—Used in reference to a phonograph cartridge, it is a small slab of piezoelectric material used to convert mechanical motion to an electrical voltage.

**Crystal Microphone**—Inexpensive piezoelectric type microphone supplied with many tape recorders which employs a natural crystal, usually Rochelle salt, as its element. As the diaphragm moves it causes the crystal to generate electrical voltages. Should be handled with care, however, and never exposed to heat. Provides best quality of all inexpensive microphones.

**Cycles Per Second**—The unit for measuring the frequency or pitch of any musical sound. Abbreviated cps.

**Decibel**—

(1) A logarithmic measure of the acoustical level of sound intensity. 0 db is the threshold of human hearing while 130 db is the threshold of pain, i.e. the intensity level at which physical pain is felt.

(2) A logarithmic unit of measure used to express

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## The Hi-Fi Language

the voltage or power gain of an amplifier. With a minus sign it is also used to express the loss in attenuating circuits.

Because the ear measures differences in sound level logarithmically rather than arithmetically (if sound A is twice as loud as sound B, it will appear to the ear to be only slightly louder), and because decibel numbers can be used to represent large figures in a convenient manner (60 db equals a power ratio of 1,000,000 to 1), the decibel system is universally used by electronic engineers.

**De-Emphasis**—A form of equalization complementary to pre-emphasis.

**Distortion**—The modification of the input signal by the discrimination against some frequencies, or by the introduction of additional frequencies not present in the original.

**Dual Track Recorder**—Usually a tape recorder with a recording head that covers about half of the tape width, making it possible to record one track on the tape, then turn the reels over and record a second track in the opposite direction. Sometimes called a half-track recorder.

**Dynamic Microphone**—High quality electromagnetic microphone which employs a moving coil in a magnetic field to produce varying voltages.

**Dynamic Range**—The ratio between softest and loudest sounds a tape recorder or other device can reproduce without undesirable distortion. Usually measured in db.

**Editing**—Selecting certain sections of a tape recording, or of a number of different tape recordings, then splicing them together in the desired sequence.

**Equalization**—Either boosting or decreasing the intensity of the low, middle or high tones of a recording during recording or playback or both. This compensation serves to correct any deficiencies in the recording system and to increase the signal-to-noise ratio.

**Erase**—Neutralizing the magnetic pattern on tape by placing it in a strong magnetic field, thereby removing the recorded sound from the tape.

**Feedback**—The combining of a portion of the output signal with the input signal.

- (a) Degenerative (Inverse or Negative) Feedback is the type which reduces the distortion caused by vacuum tubes and improves the frequency response characteristic.
- (b) Regenerative (Acoustic) Feedback is the type which causes distortion or sustained "howling" —as between the loud-speaker and cartridge.

**Feed Reel**—Reel on the recorder which supplies the magnetic tape.

**Fidelity**—A measure of the exactness with which any sound is duplicated or reproduced.

**Flat Response**—The ability of a sound system to reproduce all audible tones in their proper proportion. A hi-fi sound system might be specified as having a flat response, plus or minus 1 db, from 30 to 15,000 cycles per second.

**Flutter**—Very short, rapid variations in tape or turntable speed causing similar variations in sound volume and pitch, not present in the original sound. A form of distortion.

**FM**—Abbreviation for frequency modulation; the type of radio transmission which can provide truly high fidelity with practically no static or background noise.

**Frequency Range**—The range between the highest and lowest pitched sounds which a tape recorder or other sound system can reproduce at a usable output or volume level.

**Frequency Response**—The output level of a recorder or sound system over a given range of frequencies. A more specific term than frequency range. Usually in the form of a curve plotted on a chart.

**Gain**—The ratio between the input and output levels of a piece of sound equipment. Gain is increased by means of an amplifier.

**Gap**—The tiny distance between the poles of the recording head, measured in mils. The head gap of most home recorders may range from 1 mil down to  $\frac{1}{4}$  mil. The smaller the gap, the higher the frequency range of the tape recorder can be.

**Head**—The ring-shaped electromagnet across which the tape is drawn and which magnetizes the iron oxide-coated tape in a series of patterns. Most tape recorders employ a combination record-playback head and also an erase head. Some professional machines also employ a monitor head for listening to the recorded sound a split second after it has been put on the tape.

**Head Alignment**—Positioning of the record-playback head on a tape recorder so that its gap is exactly perpendicular to the path of travel of the tape.

**Head Demagnetizer**—Device to eliminate any magnetism built up and retained in a recording head.

**Hum**—The extraneous portion of the output signal deriving from unwanted introduction of the power line frequency and its harmonics into the audio circuit.

**Impedance**—A rating in ohms of the input and output of any electrical component, referred to in a general way either as high or low impedance. Importance is that, in connecting any two components, the output and input impedances must match. Most home tape recorders use a high-impedance microphone and require a relatively short-shielded connecting cable. Low-impedance microphones used on professional recorders can use much longer cables with no loss in high frequencies.

**In-Line Heads**—Arrangement of stereophonic heads on a tape recorder so that gaps are directly in line. One head is mounted directly above the other. Also called stacked heads.

**Input**—The terminals or connections to which wires carrying the electrical current are attached. Also refers to the electrical energy which is being fed into an amplifier, etc.

**Inverter**—Device to change one type of electrical current to another type. Frequently used to change 6-volt or 12-volt direct current to 110-volt alternating current for operation of a tape recorder in an automobile.

**IPS**—Abbreviation for tape speed in inches-per-second.

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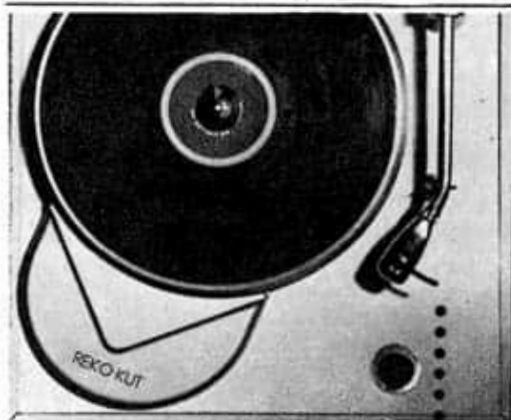
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## The Hi-Fi Language

**Jack**—Receptacle for a plug connector leading to the input or output circuit of a tape recorder or other piece of equipment.

**Lateral Recording**—The common form of disc recording in which the groove modulation is perpendicular to the motion of the disc and parallel to its surface.

**LCS**—Abbreviation for loudness contour selector. A circuit for altering the frequency response of an amplifier so that with various levels of loudness the characteristics of the amplifier will more closely match the requirements of the human ear.

**Level Indicator**—A device on the tape recorder to indicate the level at which the recording is being made, and which serves as a warning against under-recording or over-recording. It may be a neon bulb, a magic eye or a VU meter.

**Load**—The component or device which is being supplied with electrical energy from a source such as an amplifier.

**Loud-speaker**—The electro-acoustical device which converts electrical current to mechanical motion, which in turn creates sound waves.

**Matching**—The technique of selecting and connecting equipment so that each unit works at its peak performance capabilities.

**Magnetic Tape**—A high-quality plastic or paper tape which has been precision-coated with a layer of magnetizable iron-oxide particles.

**Micro**—One one-millionth (prefix).

**Milli**—One one-thousandth (prefix).

**Mixer**—Device by which signals from two or more microphones can be fed simultaneously into a tape recorder at the proper level and balance.

**Monaural Recorder**—Standard type tape recorder which uses a single-channel system consisting of one microphone, amplifier and recording head, as opposed to a binaural or stereophonic recorder.

**Monitor Head**—Additional playback head featured on some tape recorders making it possible to listen to the material off the tape while the recording is being made.

**Motor Board**—Also called tape transport mechanism. The platform or assembly of a tape recorder on which the motor(s), reels; heads and controls are mounted. It includes those parts of the recorder other than the amplifier, pre-amplifier, loud-speaker and case.

**NARTB Curve**—Standard tape recording and playback equalization curve set by National Association of Radio and Television Broadcasters. The NARTB disc curve is the same as RIAA.

**Noise Suppressor**—An electronic circuit which reduces high frequency hiss or noise. It is utilized primarily with old records.

**Ohm**—The fundamental unit of measure of electrical resistance and impedance.

**Output**—The terminals or connection to which the load is connected. Also refers to the electrical energy being supplied from the device.

**Oxide**—Microscopically small particles of ferric oxide dispersed in a liquid binder and coated on a tape backing. Red oxide is most common, although High Output tape employs a dark green oxide. These oxides are magnetically hard, that is, once magnetized they remain magnetized permanently.

unless they are demagnetized by exposure to another strong magnetic field.

**Patch Cord**—Sometimes called attachment cord. A short cord or cable with a plug on either end, or with a pair of clips on one end, for conveniently connecting two pieces of sound equipment such as a phonograph and tape recorder, or an amplifier and speaker. Not used for 110-volt current.

**Peak**—A point in the frequency range where a component delivers excessive energy, i.e., departs from a "flat" characteristic. Also used to denote the maximum instantaneous output of a device.

**Pickup**—The device which converts the vibrations of the stylus or needle to an electrical current which can be amplified. (Cartridge)

**Playback Head**—Magnetic head used to pick up signal off a tape. Often same head as used for recording, but with circuitry changed by means of switch.

**PM**—Permanent magnet. Used as an adjective to differentiate from previous designs of speakers which required an electrical current for magnetization.

**Polyester Backing**—Plastic film backing for magnetic tape used for special purposes where strength and resistance to humidity change are important. Often referred to by the DuPont trade name Mylar.

**Power Amplifier**—An amplifier designed to operate a loud-speaker.

**Power Cord**—Cord for connecting any hi-fi equipment to 110-volt AC current.

**Preamplifier**—An amplifier that raises extremely weak signal levels such as those from a microphone, magnetic playback head, or a phonograph pickup to a level usable by the power amplifier.

**Pre-Emphasis**—The introduction of additional amplification over a limited range of frequencies. FM stations introduce pre-emphasis in the treble range to override atmospheric noise.

**Pressing**—A disc recording produced in a record-molding press from a master or stamper.

**Pressure Pads**—Felt pads mounted on spring brass arms which hold the magnetic tape in close contact with the heads on some machines.

**Pressure Roller**—Also called capstan idler or puck. A rubber-tired roller which holds the magnetic tape tight against the capstan by means of spring pressure to insure constant tape speed and prevent slippage.

**Print-Through**—Transfer of the magnetic field from layer to layer of tape on the reel.

**Quieting**—Denotes (in rating FM tuners) the degree to which noise in the receiver is reduced below the signal.

**RF**—Abbreviation for radio frequency. This refers to that range beyond the limit of hearing which is suitable for transmission through the air by means of broadcasting.

**Recorded Tape**—Usually a recording on tape that is commercially available. Also called a pre-recorded tape. Not to be confused with **Recording Tape**, which is the unrecorded magnetic tape often called raw tape, virgin or blank tape.



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## The Hi-Fi Language

**Recording Noise**—Noise induced by the amplifier and other components of the recorder. High quality magnetic tape itself is inherently noise-free.

**Reluctance Microphone**—Inexpensive electromagnetic type microphone supplied with many tape recorders which is extremely rugged and durable but generally not as high quality as crystal or ceramic types. Employs a metal "wand" which moves in a magnetic field to produce varying voltages.

**RIAA Curve**—Standard disc recording and playback equalization set by the Record Industry Association of America.

**Response**—A contraction of "frequency response" which is the reaction of an amplifying system to a range of signal frequencies. See also Peak.

**Reverberation**—The persistence of sound in a room due to repeated reflections from walls, ceiling, floor, furniture and occupants.

**Roll-Off**—A term used in connection with recording to describe a reduction in the intensity of the high bands of frequencies to provide a specified deviation in the frequency response. It is used when playing phonograph records which have been recorded with pre-emphasis, and also in FM receivers.

**Rumble**—A low frequency vibration mechanically transmitted to the turntable and appearing in the reproduction as noise.

**Selectivity**—The ability of a tuner to select and separate between two broadcasting stations which are close together on the dial.

**Sensitivity**—A measure of a tuner's ability to receive weak signals.

**Signal**—The designation given to those impulses generated by a pickup, a microphone, or received from a broadcasting station via the antenna. These signals are the electrical energy corresponding to the music or speech.

### Signal-Noise Ratio

- (1) The basis for rating sensitivity in an FM tuner. The ratio between the signal and background noise, expressed in decibels, at a stated input signal.
- (2) The ratio in an audio system between the rated output power and the noise and hum content—usually expressed in decibels.

**Single-Track Recorder**—A tape recorder which records only one track on the tape. Usually a full-track recording head is used which covers the full width of the 1/4-inch tape, although some machines use a narrower half-track recording head which records a single track down the middle of the tape.

**Splicing Tape**—A pressure-sensitive non-magnetic tape used for splicing magnetic tape. Its hard adhesive will not ooze and consequently will not gum up the recording head, or cause adjacent layers of tape on the reel to stick together.

**Stacked Heads**—Arrangement of recording heads used for stereophonic sound where the two heads are located directly in line, one above the other.

**Staggered Heads**—Arrangement of recording heads used for stereophonic sound where the heads are located 1-7/32" apart. Stereo tapes recorded using staggered heads cannot be played on

recorders using stacked heads, or vice versa.

**Stereophonic Sound**—Dimensional or directional sound reproduction achieved through use of two or more sound tracks, or channels, heard simultaneously through loud-speakers arranged in the same relative positions as were the microphones during the recording. In tape two channels are used, one on each track of a standard tape, with a recording head for each channel. On phonograph discs, a 45°-45° groove is cut in the record, with the stereo pickup riding in this groove. The left side of the groove plays one stereo channel, the right side plays the other channel. A special stereo cartridge must be used to play these stereo records.

**Stroboscope Disc**—A device for measuring the speed of a rotating object such as a phonograph turntable.

**Stylus**—The correct name for "needle." A rounded point of specified radius which is inserted into a pickup and rides a record groove.

**Take-up Reel**—Reel on the tape recorder which accumulates the tape as it is recorded or played.

**Tape Deck**—Tape recorder designed for use in a hi-fi music system. Usually consists only of motor-board mechanism and does not include preamplifier, power amplifier, speaker or case.

**Tape Speed**—Speed at which tape moves past the recording head. Standard tape speeds for home use are 3¾ and 7½ ips. Faster speeds are 15 ips and 30 ips. Slower speeds sometimes used

are 1⅞ and 15/16 ips. Faster speed makes possible improved high-frequency response, while slower speed means greater tape economy. If a tape is recorded at 3¾ ips, then played back at 7½ ips, all sound will be raised one octave in pitch and the tempo doubled. Cutting the speed in half lowers a tone one octave.

**Tone Control**—Control knob on preamp or amplifier used to vary bass and treble response to achieve most desirable balance of tone.

**Triode**—A type of tube used in amplifiers. It is characterized by very low distortion.

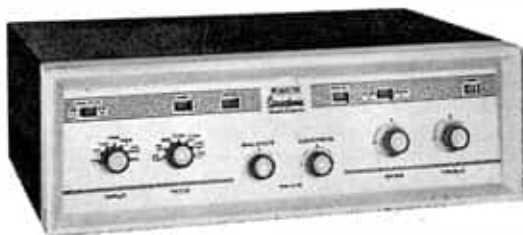
**Turnover**—A specified point in the lower frequencies where the recording signal is decreased in amplitude. In order to obtain proper fidelity on playback, equalization or increase of the lower frequencies is introduced in the amplifier.

**Volume**—An acoustical, rather than electrical, measurement which refers to the pressure of the sound waves in terms of dynes per square centimeter. The louder the sound, the greater the pressure. Most technicians prefer to talk in terms of decibels.

**VU Meter**—A volume-unit meter which indicates the relative levels of the various sounds being recorded by measuring the electrical voltages.

**Woofer**—A loud-speaker designed to reproduce the lower range of frequencies.

**Wow**—Slow variations in tape or disc speed causing similar variations in sound volume and pitch not present in original sound. A form of distortion.



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