

ELECTRONICS

THE UNIVERSITY DAILY

(Section B) Wednesday November 15, 1972



Stereo Receivers



Home Tape Maintenance



Tape Terminology



Tips for Tape Performance

Pioneer SX-727 AM/Stereo FM Receiver

PIONEER'S moderately priced SX-727 has a degree of operating flexibility and electrical performance previously found only in some of the most expensive receivers. The amplifiers of the SX-727 are rated at 37 watts per channel continuous into 8-ohm loads from 20 to 20,000 Hz, with less than 0.5 per cent distortion. Six other power ratings are also given in the specifications, thus enabling the shopper to make comparisons with other equipment rated by less rigid standards.

The FM tuner has a two-stage FET r.f. amplifier, complemented by IC's and ceramic filters in the i.f. section. The FM tuning - dial scale has linear calibration intervals, and there are two tuning meters: zero-center for FM, and signal-strength for FM and AM.

The SX-727's array of operating features is impressive. The power switch also selects one of three pairs of speakers, or two combinations of two pairs simultaneously. Like other Pioneer receivers, the SX-727 uses convenient plugs to which the speaker wires are connected before they are plugged into the rear of the receiver. Next to the speaker selector is the phone jack, followed by the bass and treble tone controls, of which there are two each, concentrically mounted for separate adjustment of each channel. They are detented, with five positions of both boost and cut plus a center "off" position for flat response. Two pushbuttons control the low-and hightcut filters.

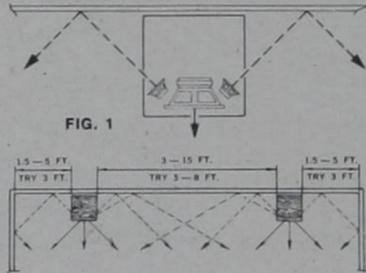
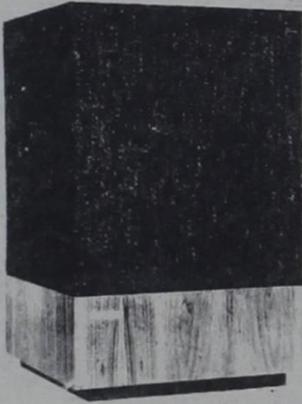
In the center of the control lineup is the balance control. At its right are the FM

interstation-noise muting and audio-muting pushbuttons (the audio-mute button drops the volume by 20 dB for temporary listening interruptions). Next is the volume control, followed by the loudness-compensation and stereo-mono pushbuttons. Two others control tape-monitoring for two tape recorders. With these buttons one can also dub from one recorder to the other, monitoring from the playback amplifiers of the second recorder.

The input-selector knob has positions for AM, FM MONO, FM AUTO (automatic stereo-mono switching), two magnetic-phonograph cartridges, a microphone, and a high-level AUX source. The front-panel microphone jack accepts a single mono microphone, the signal from which is fed into both channels. The microphone signal is present at the tape-output jacks, but there is no independent control of microphone level.

In the rear are the normal inputs and outputs, including FM and AM antenna terminals (there is also the usual pivoted AM ferrite-rod antenna) and three a.c. convenience outlets, one of which is switched. The preamplifier outputs and main amplifier inputs are brought out to separate jacks, normally joined by jumper plugs. This facility can be used to connect external electronic-crossover networks, equalizers, and similar accessories. The TAPE 1 connectors are paralleled by a DIN socket. The TAPE 2 inputs and outputs can be used for connections to and from an external

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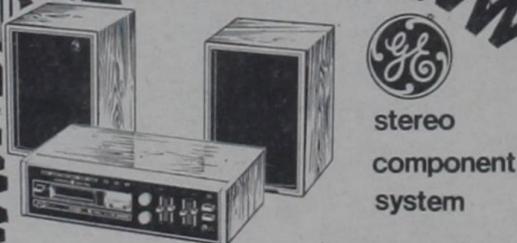
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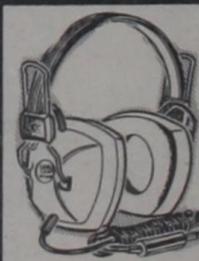
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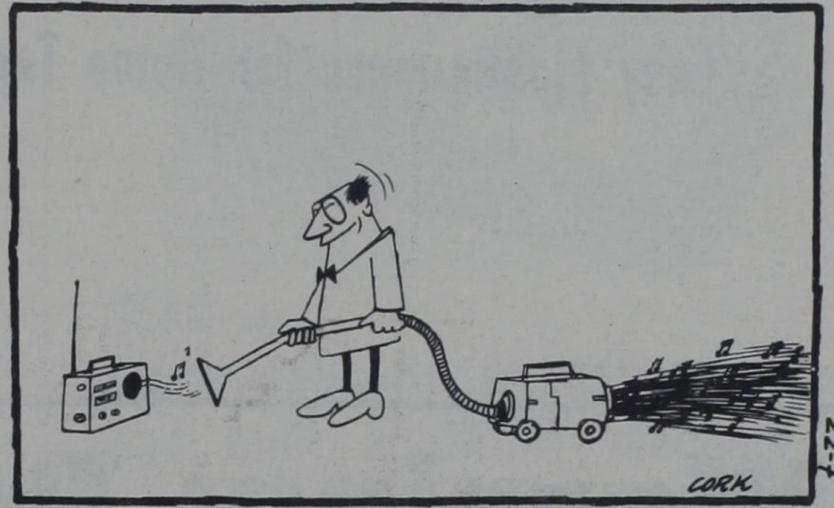
quadrasonic decoder and separate stereo amplifier to convert the system to four-channel operation. The Pioneer SX-727 is supplied complete with a walnut-finish wooden cabinet. Price: \$349.95.

Laboratory Measurements. We measured the IHF sensitivity of the SX-727's FM tuner at 2 microvolts. A 50-dB signal-to-noise ratio was achieved with only a 2.5-microvolt input, and the ultimate quieting was 74 dB (better than the rated 70 dB). These figures indicate that the Pioneer will provide more listenable stations than some other FM receivers that may have slightly better sensitivity, but without the Pioneer's very steep limiting curve. The image rejection and alternate-channel selectivity were also exceptionally good: 95 dB and 90 dB, respectively—both considerably better than Pioneer's ratings. The AM rejection was 57 dB, and the capture ratio was a good 1.6 dB. The stereo FM separation was among the best we have measured, exceeding 40 dB from 300 to 2,000 Hz; it was no lower than 19 dB at the extremes of 30 and 15,000 Hz. The FM frequency response was flat within 0.5 dB from 30 to 11,500 Hz; it was down 2.6 dB at 15,000 Hz. The AM tuner was unexceptional in quality, with restricted high-frequency response that was down 6 dB at 2,300 Hz.

The audio section of the SX-727 easily surpassed its ratings in every respect. The output clipped at almost 60 watts per

channel (continuous) into 4 ohms, 44 watts into 8 ohms, and 25.4 watts into 16 ohms. Harmonic and intermodulation (IM) distortion were very low. HD was under 0.05 per cent at most frequencies and power levels up to 40 watts per channel into 8 ohms, and reaching a maximum of 0.2 per cent at 20,000 Hz and 40 watts output. For a 1,000-Hz test signal, the distortion was under 0.03 per cent from less than 1 watt to slightly over 40 watts (it was below the noise level at power outputs much below 1 watt). The IM distortion remained under 0.1 per cent at all power outputs from 45 watts to 15 milliwatts, and reached 0.3 per cent only at the very low minimum measurable level of 1.5 milliwatts. This indicates a virtually complete absence of "crossover distortion," which means that in this area the unit is comparable to the finest amplifiers we have tested.

The phono gain was high (1.15 millivolts for a 10-watt output), yet the overload level was 100 millivolts—an excellent safety margin. Noise levels were very low: -80 dB on AUX and -78 dB on the phono inputs, referred to a 10-watt output. The audio tone-control characteristics were conventional, with a moderate boost and cut range at low frequencies and somewhat less at high frequencies. The loudness compensation boosted both low and high frequencies at volume-control settings of -20 dB or less. The filters had mildly effective 6-dB-per-



octave slopes, with the -3-dB points at 60 and 5,000 Hz. RIAA equalization was very accurate—within 0.8 dB from 30 to 15,000 Hz. The microphone frequency response was flat from 20 to about 4,000 Hz, falling off slightly to -3 dB at 15,000 Hz. This is considerably beyond the frequency range of any microphone likely to be used with the unit.

Comment. When we examined the features and tested the performance of the Pioneer SX-727, it was clear that in its flexibility and in many areas of its measured performance it is somewhat better than much of the competition at its price level. Perhaps no one of the SX-727's characteristics gives it a clear advantage over any other receiver, but taken in the aggregate they define a really superb product.

In use tests, everything worked smoothly and exactly as intended. The muting was noise- and thump-free, and its threshold of about 4 microvolts means

that any station strong enough to un-mute the receiver will be heard free of distortion and noise. With a combination of tasteful styling and top-notch performance, the SX-727 speaks well for the new line of Pioneer receivers. **

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Easy Maintenance for Home Tape Machines

By RICK REED
Owner, Audio Lab

Tape recorder - cassettes, eight tracks, and reel to reels - offer much to music lovers, students, educators, businessmen and others. But they can not be used to their fullest capacity unless the owners are familiar with the day to day upkeep necessary to keep the machines out of the service center, except when necessary.

In order to discuss owner maintenance, a few definitions are needed.

TAPE GUIDES are recessed grooves or fitted spacers that align the tape and center it across the heads.

MAGNETIC HEADS that either erase, record, or play are small metal or plastic blocks that the tape passes over. The head transfers the sound signal to or from the magnetic tape.

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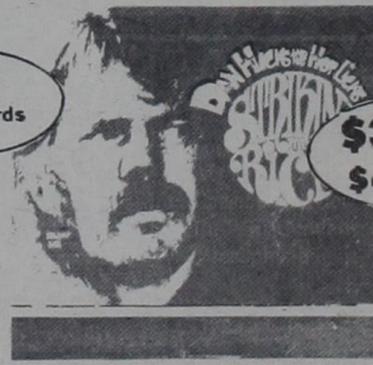
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MAGNETIC TAPE is a thin ribbon of plastic (acetate) or polyester (mylar) coated with a special iron oxide. This reddish material is the main villain in tape recorder maintenance.

CAPSTAN shaft revolves and controls the speed and direction of the tape. The capstan is controlled by the main motor.

PINCH ROLLER is a rubber wheel that presses the tape against the capstan shaft, thereby insuring good speed control.

DEMAGNETIZER, a device used to remove residual magnetism from the heads, guides, and other metal parts the tape contacts.

Performed regularly, user maintenance requires little effort. Although most owner's guides give information regarding the care and cleaning of their product, experience has shown that this information is usually lost or forgotten. Manufacturers often quote "hours of play" in determining when to clean and demagnetize a tape recorder. If the machine is used regularly, this is a useful measurement. However, for the average user, a weekly or bi-weekly schedule makes a lot more sense.

Unless the tape has a specially formulated oxide coating, the oxide will be reddish in color. This red, dust-like material rubs off the tape leaving a visible residue on pinch rollers, guides, heads, etc. Its presence clogs guides, fills in head gaps, causes a loss of capstan traction and speed control, and accelerates head wear.

Cleaning guides, capstans, pinch rollers and spacers requires only the removal of the red oxide adhering to them with a suitable solution. Head cleaning requires a little more thought and thoroughness.

For simplicity, consider a magnetic head to be a circular piece of metal with an extremely small slice removed. This "gap" cannot be easily seen without magnification. The location of this gap is in the center of the small shiny bar (s) seen on the part of the head that the tape travels over. The gap runs up and down like the ones between your teeth and just as the finishing stroke with a toothbrush is supposed to be up or down to clean out the space, so is the final motion to be with the head cleaner. The head should be absolutely free of oxide particles, dust, and residue.

Solutions for tape head cleaning are formulated to cut through oxide, wash out the head gap, and leave little or no residue of their own. Any hi-fi dealer, hobby store, or electronic supply house should have the necessary solutions for

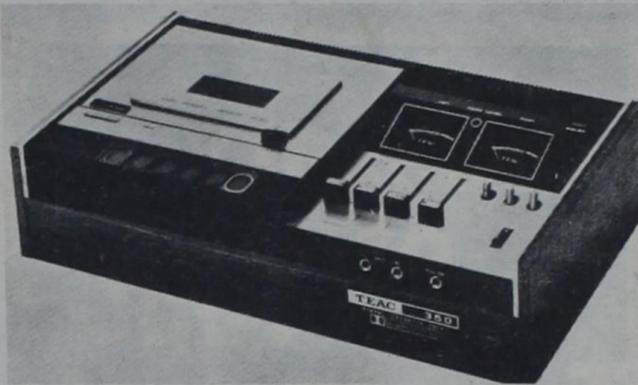
sale. Most cleaners come with a brush applicator. Do not use it. Buy Q-tips or their equivalent and dip them into the cleaner. Alcohol is recommended for rubber tires and belts. Always use cleaners sparingly except when washing out the head gaps.

The most misunderstood procedure for owners is that of demagnetization. Remember grade school science when a needle was rubbed across a magnet and magnetized? When the needle floated on water, it acted like a compass. When magnetic tape passes across a guide, head, or other metal part, it tends to magnetize these parts. This magnetism is quite small, but it gradually builds up. Unless it is removed, it will partially erase the high frequencies and generate noise on pre-recorded tapes. Some manufacturers build special circuits to prevent this buildup. The circuits usually work on the heads only and unless the guides are non-magnetic, they will still require periodic demagnetization. Some rules to use in using a demagnetizer are: Rule One; Never apply power to a demagnetizer near a tape recorder or a tape. Always plug in the device while holding it at least an arm's length away from the shut-off machine. Rule Two; approach the heads very slowly. Rule Three; slowly move the tip (s) of the device up and down the guides and heads without touching the heads. Rule Four; slowly remove the device until it is an arm's length away, THEN remove power.

It is a good idea to clean and demagnetize heads before recording regardless of the use since the last cleaning. Cassettes present a problem sometimes due to the way many are built. The manufacturers seem to try to bury the heads under covers or compartments. Eight track cartridge machines are almost as bad but cotton swabs on six inch wooden sticks will reach to the heads.

Oil should be applied sparingly to motors, capstan bearings, pinch roller bearings and pivots. Any light machine oil will work. Follow the owner's manual if possible, but usually a drop or two every three to six months will suffice.

If a channel is ever lost to play, record or both, clean the heads before doing anything else. The odds are good that the gap is clogged with oxide and a simple cleaning will cure the problem. If this does not remedy the situation and the connecting cables are known to be good, a trip to a reputable repair center is necessary. However, if just once you cure the problem by cleaning it first, it is worth the time and effort. **



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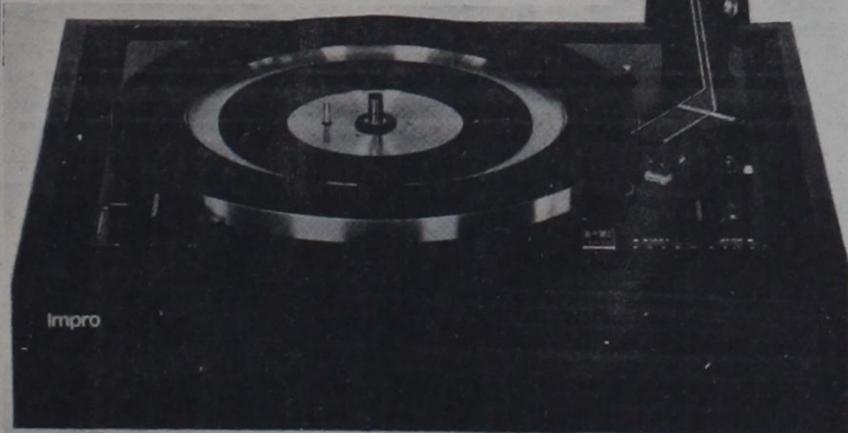


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Glossary of Tape Terminology

Acetate—Cellulose acetate, an inexpensive, transparent plastic film used as the backing material for many recording tapes.

Acicular—Needle-shaped. Descriptive of the shape of the magnetizable particles comprising the coating of a recording tape. Modern tapes are pre-magnetized during the coating process to line the "needles" up with the direction of the tape, thus providing maximum sensitivity from the oxide.

ALC—Automatic level (volume) control. A special compressor circuit included in some tape recorders, for automatically maintaining the recording volume within the required limits regardless of changes in the volume of the sound.

Alignment—The physical positioning of a tape head relative to the tape itself. Alignment in all respects must conform to rigid requirements in order for a recorder to function properly.

Automatic Reverse—Ability of some

four-track stereo tape recorders to play the second pair of stereo tracks automatically, in the reverse direction, without need to interchange the empty and full reels after the first pair of stereo tracks has been played.

Automatic Shutoff—Device incorporated into most tape recorders that automatically stops the machine when the tape runs out or breaks. Usually it is in the form of a mechanical switch.

Azimuth—The angle of a tape head's pole-piece slot relative to the direction of tape travel. See "Alignment."

Backing—Flexible material (usually cellulose acetate or polyester) on which is deposited the magnetic-oxide coat that "records" the signal on the tape. Also known as "Base."

Balance—Relative volume, as between different voices or instruments, bass and treble, or left and right stereo channels.

Balanced Output—A three-conductor output, as from a microphone, in which the signal voltage alternates above and below a third neutral circuit. This symmetrical arrangement tends to cancel any hum picked up by long lengths of interconnecting cable.

Bias—In tape recording, the bias is a constant magnetic field applied to the tape to enable it to respond more completely and more accurately to the fluctuating magnetic impulses of the audio signal. Although sometimes a DC (fixed-magnetic-polarity) field, the ideal bias is channels. A different signal is produced when stereo signals differing in electrical polarity or in intensity are mixed together in opposing polarity.

Directional Microphone—A microphone which is more sensitive to sounds coming from certain directions than to sounds coming from other directions.

Directivity—A tendency for some microphones to respond less strongly to sounds arriving from the sides and/or rear. Directional microphones are useful in discriminating on the basis of direction between wanted sounds (musical instruments) and unwanted sounds (audience noises). Directivity is typically graphed on a "polar pattern," and is thus classed as nondirectional (omnidirectional), bi-directional (figure-8), or unidirectional (cardioid), super-cardioid or hyperdirectional.

Discrete—A term applied to four channels when there are four electrically independent signals, as opposed to matrix.

Distortion—Any measurable or audible difference between the audio signal fed into a tape machine (or any other electronic component) and the signal coming

out of it. Distortions of various kinds are always present to some degree in every audio component, but careful design can keep them sufficiently low as to be inaudible or barely so.

Dolby—A device which increases the signal-to-noise ratio of a recording medium by raising the volume of quiet passages prior to recording, and lowering them to their original levels during playback. The lowering process automatically reduces any noise that was introduced as a result of the recording or playback processes.

Dolby A—The original form of the Dolby noise-reduction device, intended for professional use. The Dolby A has four independently-controlled noise-reduction channels, to increase signal-to-noise ratio at low, middle, high and very high frequencies.

Dolby B—A simplified version of the original Dolby A, intended primarily for use by nonprofessional recordists. The Dolby B functions identically to the Dolby A, but has only one controlled frequency band which is effective primarily on tape hiss.

Double-Play Tape—Tape having half the thickness, and hence double the running time (for a given reel size) of standard 1½-mil tape.

Dropout—A momentary loss of volume or treble response due to a brief separation of the tape from the surface of the record or play head. A very slight separation causes a treble dropout; more severe loss of head-to-tape contact causes the whole signal to drop out. Dropouts can be caused by buckled or crinkled tape, lumps or pits in the magnetic coating, or detached clumps of oxide passing across the head surface.

Dual-Track Recorder—Normally a monophonic recorder where the recording-head covers slightly less than half the width of a standard quarter-inch tape, making it possible to record one track on the tape in one direction and, after turning the reels over, a second track in the opposite direction. Known also as "half-track" or "two-track" recorder.

Dub—A copy of another recording.

Dynamic Microphone—A microphone using a permanent magnet and a vibrating coil or ribbon as its transducing system.

Dynamic Range—The span of volume between the loudest and softest sounds, either in an original signal (original dynamic range) or within the span of a recorder's capability (recorded dynamic range). Dynamic range is expressed in decibels. See "Signal-to-Noise Ratio."

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Sansui

Echo—In tape recording, this refers to a provision for picking up some of the sound from a play head while recording, and feeding it back to the record head to produce a rapidly periodic repetition of each sound. Correct echo-volume adjustment causes a "decay" of the repeated sounds to simulate acoustical reverberation.

Editing—The rearrangement of recorded material to provide a change of content or form, or for replacement of imperfect material. Usually accomplished by cutting and splicing the tape.

Equalization—The introduction of treble boost while recording and bass boost while playing back, in order to compensate for inherent losses in the tape recording and reproduction processes. With the proper equalizations added, the frequency response of the final playback can be virtually identical to that of the original signal.

Erase—The elimination of recorded signal from a tape, generally to allow for re-use of the tape for a new recording. Erasure is generally accomplished by exposing the magnetic coating to a very strong magnetic field of alternating polarity and then gradually reducing the strength of the field to zero, to leave the tape in a neutral (no magnetization) state. All recorders use a special erase head to obliterate the previously-recorded signal before the record head lays down the new signal.

Expander—A device which automatically widens the dynamic range of an audio signal, making loud passages louder and soft passages softer.

Extra-Play—Originally, all recording tapes were 1½ mils (1-1000's of an inch) thick, and a 7-inch reel would accommodate about 1200 feet of this for a half-hour of continuous recording at 7½ ips. The later extra-play tapes are 1-mil thick, and allow for 45 minutes of recording, or 15 minutes "extra."

Fast Forward—High-speed winding (shuttling) of tape from the supply reel onto the takeup reel.

Feedback—A build-up of system energy due to output signal getting back into the input of the system. In recording, feedback is most likely to occur when recording microphones pick up sounds from monitoring loudspeakers and feed them back through the recording system to the

Bi-Directional Microphone—A microphone which is equally sensitive to sounds arriving at it from in front or in back but discriminates against sounds arriving at it from the sides. See "Polar Pattern."

Binaural—Literally, two-eared. Binaural recordings are made with two microphones in locations simulating those of the human ears, and are intended for reproduction through headphones.

Boom—A long, horizontal extension from the top of a microphone stand, usually counterweighted, to allow a mike to be positioned above a sound source located some distance from the stand.

Bulk Eraser or Degausser—A device for effecting the erasure of an entire tape recording without unwinding the tape.

Capacitor Microphone—A microphone whose transduction principle is based on the varying electrical charge across a sound-modulated capacitor.

Capstan—The motor-driven spindle that feeds a tape at constant speed past the machine's heads. The tape is usually gripped between the capstan and a soft-surfaced pinch wheel or "idler" to minimize slippage at the capstan.

Cardioid Microphone—A microphone having a heart-shaped "polar pattern."

Cartridge—Generally, any enclosed "package" containing a length of magnetic tape and its basic winding receptacles, designed to eliminate the need for handling or threading the tape. Specifically, the word cartridge is used to describe that variety of package that

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Magnavox, the world leader in console stereo, brings you this great stereo package that will please your ears . . . and your budget! Check these quality features: Solid-State tuner/amplifier with built-in 8-Track Stereo Cartridge. Complete audio controls. A full-size Automatic Mark I record player. Two High-Efficiency 6" speakers. Headphones. Even a sturdy mobile cart. Model E-1000—a great value for the better Magnavox sound. And, it's just one of many for year 'round entertainment!

Complete Stereo System with: Stereo FM/AM Radio-Phonograph, 8-Track Tape Player, Headphones and Cart!



Records and 8-Track cartridges not included.

\$178⁰⁰ Complete Package Price

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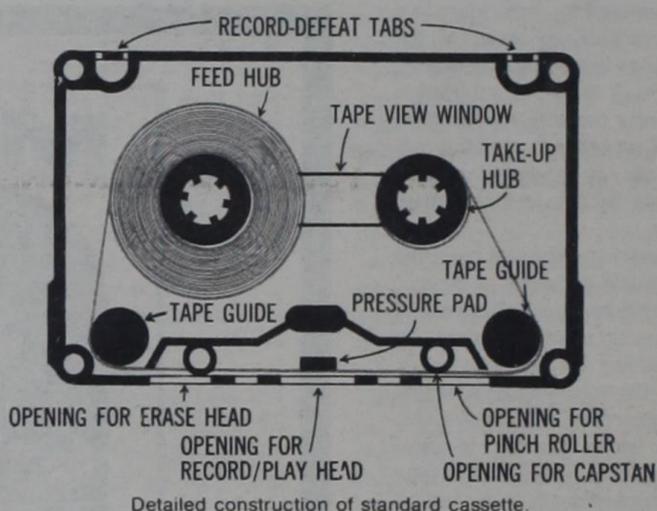
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YOUR COMPLETE HOME ENTERTAINMENT CENTER

contains a continuous loop of tape.
Cassette—A sealed "package" instant-load cartridge containing a length of tape and separate supply and takeup reels or hubs. Cassettes, unlike continuous-loop cartridges, can be rewound as well as fast-forwarded.
Channel—A single, complete through-path, as from microphone to loud-speaker. A 2-channel recorder has the necessary separate through-paths to record and reproduce 2-channel stereo.
Coating—The magnetizable material on one surface of a recording tape which stores the audio signal when recording.
Coercivity—A measure of the amount of

applied magnetic field (of opposite polarity) that is necessary to restore a magnetized tape to a state of zero magnetism. High-coercivity tapes exhibit less tendency toward self-erasure and thus have enhanced high-frequency-response characteristics, but they require more current through the erase head for full erasure of a recorded signal.
Condenser Microphone—See "Capacitor Microphone."
Cps—Obsolete abbreviation for cycles-per-second (of frequency). Now called Hertz, abbreviated Hz.
Crosstalk—Leakage of recorded signal from one channel of a stereo device into



the adjacent channel or channels. Crosstalk between stereo channels impairs stereo separation; crosstalk between reverse-direction tracks causes the reverse-track signal to be heard, backwards, during quieter parts of the desired program.
Cueing—Locating a particular spot on a recorded tape, preparatory to playing through from that spot.
Decibel—Abbreviated dB, the decibel is a unit of change in sound intensity. One decibel is approximately the smallest change that the ear can perceive. Larger decibel increments reflect the fact that sound intensity must be squared in order for the ear to perceive a doubling of intensity. An increase in intensity is expressed as a plus number of dB's, a

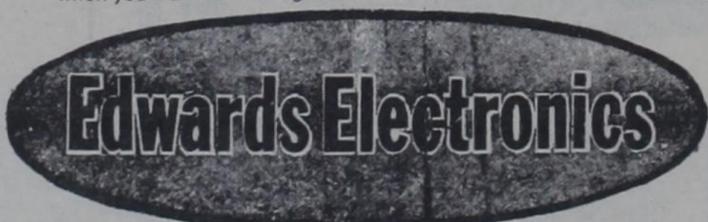
decrease as a minus value. No change in intensity is 0 db, and 0 is also used to indicate a starting point, from which changes are measured.
Deck—A term usually applied to a tape machine having no built-in power amplifiers or loudspeakers of its own, but intended rather for feeding a separate amplifier and speaker system, as in a component installation.
Decoder—A device that takes an encoded stereo signal and provides a four-channel output.
Degausser—Any device for neutralizing magnetism, as in a recorder head or in a separate unit also called a "Tape Eraser" for use with a complete tape recording on its reel. **



The CS-R700 It Sounds Better Because It's Made Better

The CS-R700's 12-inch (30 cm) woofer has a very large magnet, an ultra-hard duralmin cap and special damping material for smooth frequency response. Plus an exceptionally long edge-width voice coil. In sum, bass reproduction of very rich tonal quality. The mid-high range horn-type speaker covers an ultra-wide frequency range (750-14,000 Hz) and has a specially designed driver, diaphragm and edge. Super-highs are covered by a multi-cellular horn-type super tweeter.
 The grille of CS-R700 is in two sections, both removable. The saran cloth color combination is black/brown.

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10 Tips to Top Tape Performance

1. Keep Your Tape Path Clean. Always the bane of cassette players, wow and flutter is now in some cases below 0.2 per cent. A dirty capstan or tape head—bothersome in open-reel—is disastrous in a cassette machine.

Routinely clean the tape path (heads, guides capstan, and pinch wheel) every 15 to 20 cassettes—always before making any special recording. Use "Q-Tip" swab moistened in liquid head cleaner, rubbing it over every accessible part that comes in contact with the tape.

2. Keep Head Demagnetized. With normal use, recording heads build up residual magnetism. If not eliminated by a degausser, it can add hiss to your tapes or even wipe some of the high frequencies from previously-recorded cassettes.

Degauss the record-play head after every 20 to 30 hours of use. Special head-degaussing cassettes are available, and at least one company offers a cassette which combines degaussing and cleaning operations.

3. Check Your Channel Balance. Only one value of ultrasonic recording bias current will yield the requisite linear high-frequency response. Different tapes require different biases. While some machines have bias selection switches, each channel may be factory set for a slightly different current. The result is improper playback balance from "equal" recording levels.

Check for this by setting system controls for proper balance when reproducing a mono FM or disc signal.

Record with identical levels, play back without level adjustment and note any unevenness in balance. (Dolby system will double level change). Use service manual for adjustments (or take to qualified repairman.) Tolerances should be 1/2 dB or better.

4. Select the Right Tape. If your channels are in adjustment and the high end on playback is exaggerated or dulled in both channels, better sound can be obtained by using a tape with bias requirements more closely matched to your recorder.

Exact matching is trial and error, but: the higher the tape's biasing requirement, the greater the treble output for any bias level ("Premium" tapes have higher requirements). A "regular" grade tape may give you dulled highs, while higher grades (ex:chromium dioxide) produce "brilliant" highs if not matched to the recorder. Precision of internal cassette mechanics count as they contain supply and takeup reels and tape guides found on open-reel machines. Wow and flutter increase with poor tape-moving characteristics in a cassette.

5. Watch Recording Levels. Open-reel recorders can handle too high a signal level without significant distortion: no so with cassettes where audible strain can begin at -2 dB (2 dB below zero level). Squishy or fluffy bass sounds; thud, pop or click of treble transients (like those of a triangle) indicate an overload.

Experience with correctly and in-

correctly recorded tapes is your best indicator of optimum recording levels. Noise-reduction systems do allow greater cushion between loss of quiet passages and overload point. Premium tapes, especially chromium dioxide, have a higher overload level.

6. Never Force Anything. Be gentle with cassette equipment. If something doesn't go smoothly and easily into place, coax it, don't use brute force.

Inspect machine, search for obstructions. For instance, a cassette won't fit into its receptacle if the mechanism is in Play mode, and you won't be able to depress the Record button if the safety tab is missing from the back of the cassette.

7. Stay With the Same-Length Tape. Most cassette machines will handle 2-hour C-120 cassettes, but: the recorders are designed to provide flattest frequency response with C-60s. C-120s use thin tape and thin magnetic coating, have poor response and are prone to winding problems.

Use C-60 cassettes for all recordings where fidelity is of paramount importance, and longer lengths only when extended play is important enough to swap for fidelity.

8. Handle With Care. Keep fingers off exposed tape, and either use a pencil-point under the tape or wait until leader is visible if you must adjust felt pressure pads. A fingerprint on the tape results in signal dropouts.

Avoid reeking or fast-forwarding tape in the middle, which results in irregular winding and tape stress. If stored thusly, tape becomes permanently subject to binding, jamming and other

malfunctions. Either play to the end or store partially-wound tape until just prior to next use.

If a cassette binds, eject it and use a pencil tip against cogs on one reel hub to draw in spilled tape. Re-insert cassette upside down and let it play through to other end. If still binding, slap cassette flat on table top, and if necessary on other side, to compress wound layers of tape. Run tape all the way through for proper winding and tension.

Open cassette only as last resort. Stubborn cassette can sometimes be freed by loading the disassembled cassette very carefully into the deck (using fingertips to seat the hubs) and letting machine play through to the end.

9. Eschew Abrasives. At the beach, watch the sand. It can jam the cassettes, eventually ruin drive transport. If recorded music is a must, bring a cheap, disposable cassette machine and unwanted cassettes. At home, dust, carpet piles and pet hairs do a slow but equally destructive job.

Keeping the cassette receptacle covered when not in use is best protection against airborne abrasives. Failing this, frequent dusting and blowing out of receptacle is almost as effective.

10. Be Leery of Bargain Tapes. Save the three-for-a-dollar cassettes for that beach trip. Most "bargains" are highly abrasive, wear heads at alarming rate, are prone to binding, speed variation and jamming.

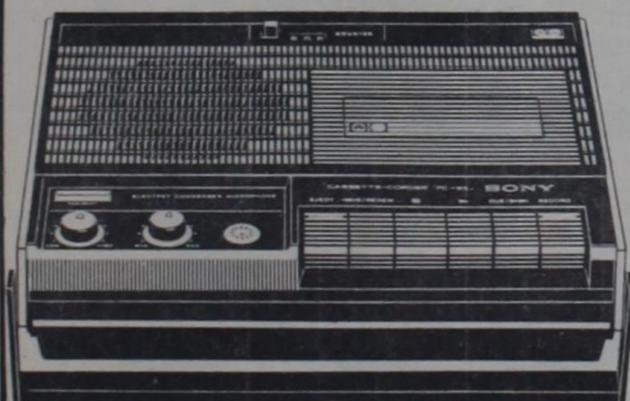
Safest "cheap" cassettes are the "economy" ones sold by firms whose more expensive lines are evidence they at least know how to make a good product. **

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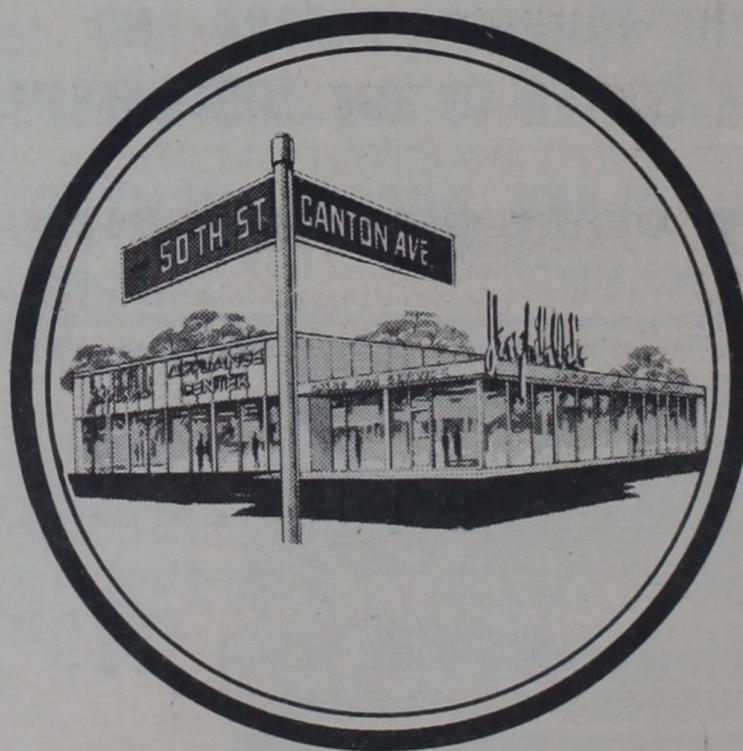
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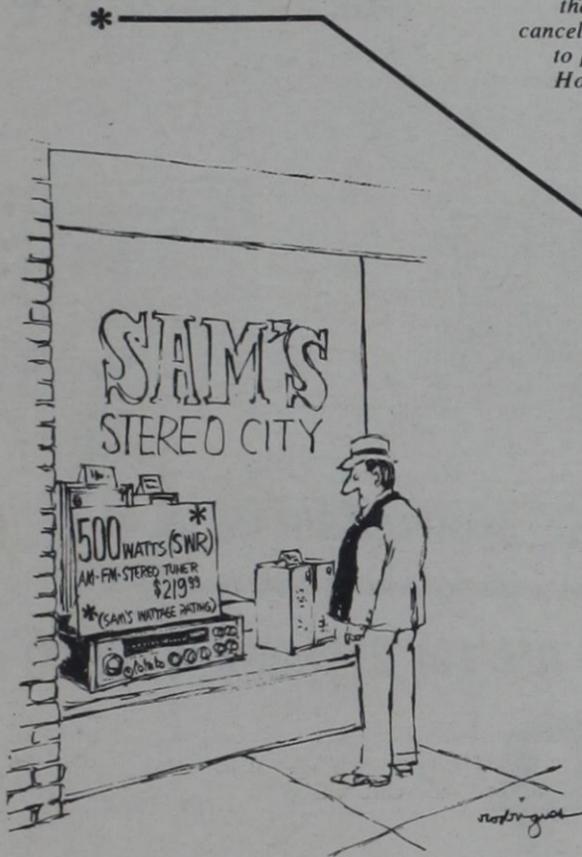
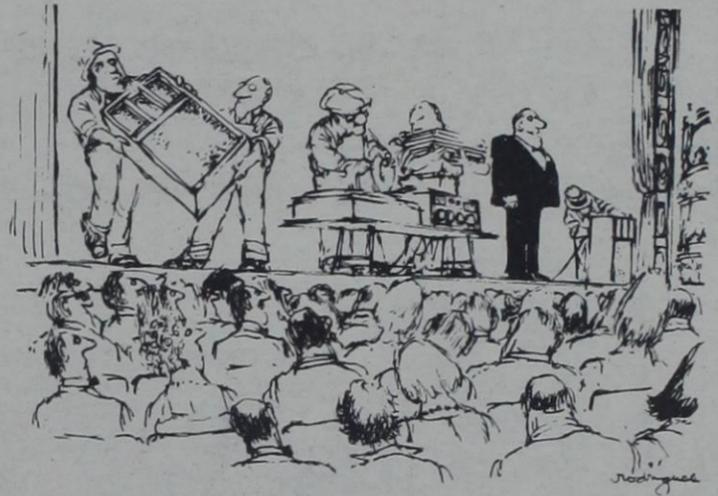
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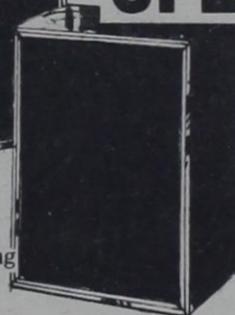
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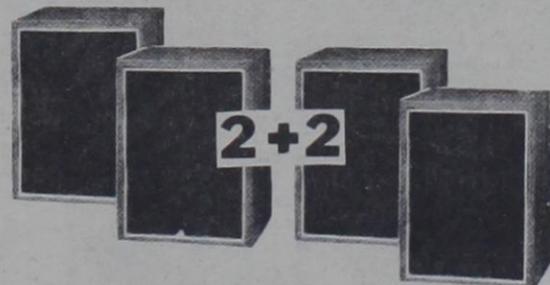
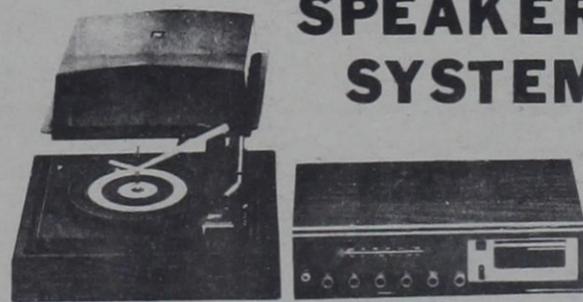
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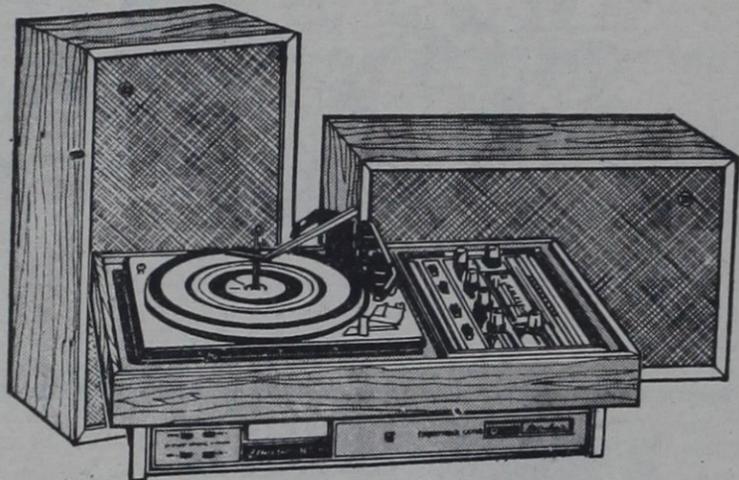
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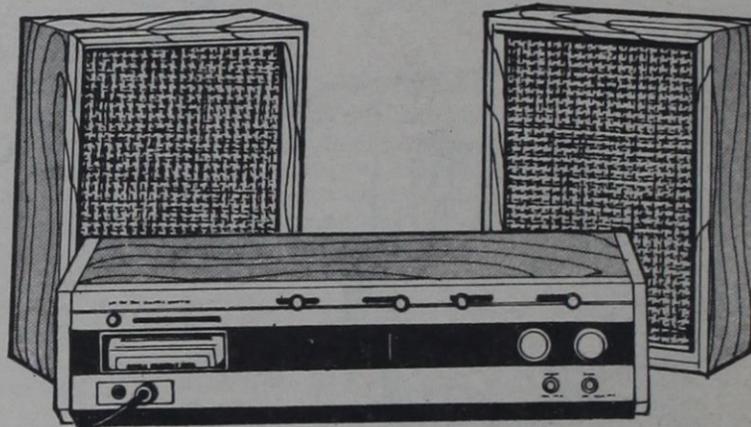
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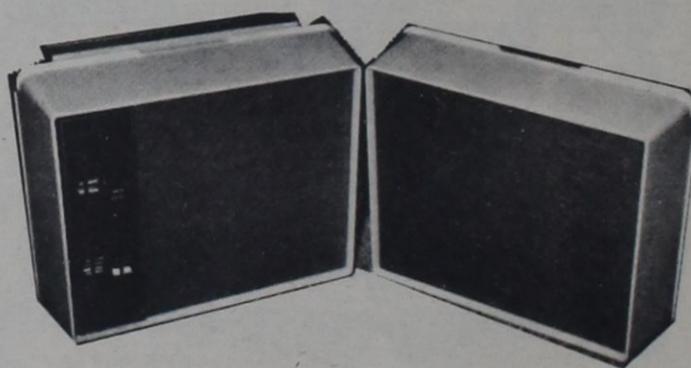
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