



Fig. 1 Sony's Model 230 "Stereo Compact," a portable 4-track stereo record/playback tape system with a stereo control center, is shown at left. It's also available as Model 230W in a walnut cabinet, as shown above. Matching walnut bookshelf speakers (not shown) are optional.

Sony/Superscope Model 230 4-Track Stereo Tape Recorder

MANUFACTURER'S SPECIFICATIONS — $7\frac{1}{2}$, $3\frac{3}{4}$ and $1\frac{1}{2}$ ips; automatic equaliz. change. Reel Size: Up to 7-in. Freq. Response: 30-18,000 Hz at $7\frac{1}{2}$ ips, 30-12,000 Hz at $3\frac{3}{4}$ ips, 30-6,000 Hz at $1\frac{1}{2}$ ips. Signal-to-Noise Ratio: Better than 50 dB (peak record level). Flutter and wow: Under 0.1% at $7\frac{1}{2}$ ips, under 0.15% at $3\frac{3}{4}$ ips, under 0.2% at $1\frac{1}{2}$ ips. Harmonic Distortion: Under 3% at 0 dB (0.77 mV) line output. Inputs: (2) Microphone (250 to 1000-ohm impedance); (2) Aux. (Tuner); (2) Phono. Outputs: (2) line; binaural for 8-ohm (or greater) headset; extra speaker (8 ohm). Speakers: Two 5-in. in detachable lids. Power Output: Max. 4 watts/channel. Dimensions: Model 230, 17" W x 9 $\frac{1}{2}$ " H x 14" D; Model 230W, 15 $\frac{1}{4}$ " W x 7 $\frac{1}{2}$ " H x 13 $\frac{1}{2}$ " D. Weight: Model 230, 29 lbs.; Model 230W, 22 lbs. Opt.: Speaker systems, Model SS-23 for Model 230W. Prices: Model 230, \$249.50; Model 230W, \$239.50 (\$299.50 with 2 SS-23 Speakers).

The compact Model 230 is another fine addition to the comprehensive Sony/Superscope line of tape recorders, which runs the gamut from mini cassette recorders through reel-to-reel players and recorder-speaker combinations, to solenoid-operated pro-

fessional machines. The unique feature of this particular unit is that it has its own control facilities to act as the audio control center of a solid-state stereo system, without assistance from a pre-amplifier or amplifier. That is, it accepts the output of a phono cartridge or FM stereo tuner directly, and its lever-type selector switch chooses between these sources just like a preamp control does. So with just a turntable and/or tuner added to the 230, we have a complete audio system—including tape recorder. If desired, the detachable speakers or internal amplifier, which are part of the 230 recorder (instead of being an add-on to an integrated amplifier or a receiver system, as most recorders are), can, instead, be the starter unit of a stereo system, with turntable and tuner planned as future acquisitions.

Features

The 230W model, as compared to the 230, which is a portable with leatherette-type case, is styled in walnut. The cabinet also has a walnut cover that conceals the tape recorder business end, revealing only the amplifier controls needed when using auxiliary input sources. This is a neat idea for installations in tight spots. The walnut-encased model is available with or without speaker systems. The portable 230 has split speakers which com-

bine with the machine to become the carrying-case lid. In use they may be spread up to 15 ft. apart. Both models are identical in operation and performance. Two dynamic cardioid microphones with plastic, attachable stands are furnished with the machines.

As a recorder, the Model 230 contains most of the useful features which make a unit pleasurable to use. Simplified controls, automatic shutoff, a re-settable tape-footage counter, and easy threading are the main ones. Sony's tight, neat packaging and clever design is evident in the guts of the machine as well as on the outside.

A single motor with knurled, stepped pulley on its shaft, drives soft neoprene idlers. The latter, in turn, drive a heavy, balanced capstan flywheel and both turntables. See Fig. 2. A band of rubber links the pulley and one of the idlers. The supply and take-up turntable are clutch-driven. The drive is evidently pretty effective because flutter and wow measured as 0.07% at $7\frac{1}{2}$ ips and 0.1% at $3\frac{3}{4}$ ips, which is outstanding for this type of machine (and, incidentally, is much better than the manufacturer's specs. The pressure pads at the erase and record/play heads also contribute toward reducing wow and flutter. The 3-digit index counter is driven by a band of rubber off the supply turntable. A useful feature of the machine is that, in the stopped position, the capstan pressure roller swings downward out of the way so that the tape can be threaded from the front of the machine, not into the usual slot or through some other obstacle course. See Figs. 3 and 4.

The automatic shut-off switch is controlled by a wire lever located under the head cover. In STOP position, the shut-off lever recedes to make tape threading easier. Tape is removed from the heads in FAST FORWARD and REWIND modes.

Unusual spring-loaded, mechanically actuated linkages engage and disengage all rotating components. They also apply the pressure pads, which are mounted on hinged shields. This gets them completely out of the way for



Fig. 2—The 230's drive mechanism is pictured here. In rewind position, the outside of a band of rubber around the idler drives a clutched supply turntable. For fast-forward drive, the small rubber idler is driven by the outside band of rubber around the motor pulley.



Fig. 3—At left, the head assembly is shown with the gate open. You can see the flywheel at the bottom.



Fig. 4—The gate is closed here. Note how the pinch roller has moved up into position compared with Fig. 3.

cleaning the heads, as well as for threading tape. This feature also maintains good tape-to-head contact when closed. A terminal board-like tie point is used for the record/play tape head, useful in the event the head must be replaced. Heads and associated guides are mounted on a $\frac{1}{16}$ -in. steel platform, bolted to the $\frac{1}{16}$ -in. steel chassis.

The capstan idler has a plastic cap for protection against dirt; some springs have sleeving over them or styrofoam material stuffed into them to eliminate resonances. A plastic fan, which cannot become bent and therefore unbalanced, is mounted to the motor shaft, providing effective air circulation for cooling the motor and nearby power-transistor heat sinks. Other extra features, such as plastic retainer clips which hold the coiled-up speaker cables, are typical of the painstaking attention to detail put into the machine. There is a handy compartment in the rear which stores the microphones, cables and power cord.

Electronics are mounted on printed-

circuit assemblies which are accessible though somewhat crowded, as seen in Fig. 5. Use of plastic sleeving and harness-ties helps. Electrical controls are of good quality; selector switches have positive detent action; front-panel ganged potentiometers for volume (concentrically clutched so they may also act as balancing controls) and tone controls are sealed and smooth-acting. Other front-panel facilities include a stereo left-channel right-channel mode switch, on-off speaker pushbutton, power switch, twin VU meters, and a binaural monitor (stereo headphone). A speed-change control switches in the correct equalization in addition to switching pulleys.

Performance

Measurements taken to check the unit's performance proved it to be a fine performer that meets most of its specifications. Playback frequency response at $7\frac{1}{2}$ ips, shown in Fig. 6, is 50-15,000 Hz ± 2 dB, which is very good.



Fig. 5—The Sony 230's underside shows its electronics and motor. You can see the output transistors that are mounted in heat sinks in the bottom part of the photo, as well as a printed-circuit board at left.

Referring to the record/playback response in Fig. 7, at $7\frac{1}{2}$ ips there is a 5-dB rise at 9 kHz, which can be compensated for by the unit's tone control. The tone control, which is actually a treble control, starts to act above 2500 Hz and swings ± 15 dB at 15 kHz. Therefore, frequency response can be made fairly flat. The same is true for the other speeds. At $3\frac{3}{4}$ ips, the recorder has a respectable response, being down only 3 dB at 12 kHz. And the $1\frac{1}{2}$ -ips response is smooth, though the frequency range is compressed, naturally. The lowest speed is suitable for recording material that has no significant information above 6 kHz, where the unit's response is down 2 dB and starts to fall off rapidly. See Figs. 8 and 9.

The record/playback signal-to-noise ratio averages out for all speeds at -45 dB left and -40 dB right, which is average for this type of machine (perhaps there was a noisy component in the right channel of the sample unit, in which case the corrected signal-to-noise ratio would be better). Crosstalk is at least 45 dB away and therefore adequate. Harmonic distortion at -10 VU is a low 1%, while intermodulation distortion at -10 VU is below 3%—also excellent. On the built-in meters, 0 VU is 1 dB off from standard 0 VU, a most acceptable figure for this class of recorder. With the recording volume control turned up full, 30 mV is required into the high-level auxiliary input for recording at 0 VU. This means that the auxiliary input can accommodate any type of input source not requiring special equalization. RIAA equalization is provided internally when going through the phono input. Rewind time was a satisfactory one minute for a 1200-ft. tape. The same time period was consumed in the fast-forward position.

Unlike most playback amplifiers that are built into recorders, the ones inside the 230 are really good performers. In fact, they exceed specifications and are capable of driving efficient speakers to room-filling sound levels at low distortion. Amplifier frequency response, shown in Fig. 10, is practically a straight line, ignoring the rolloff below 30 Hz. Harmonic distortion and IM distortion are plotted in Fig. 11. With both channels driven simultaneously, 5 clean rms watts are available throughout the audio spectrum for each 8-ohm speaker per channel. In mass-market consumer parlance this could be called 20 watts total music power.

The magnetic input, sensitive enough for most cartridges, is RIAA equalized, as shown in Fig. 12.

In use, the 230 handles smoothly and efficiently. The tape deck is quiet, with remarkably little motor vibration,

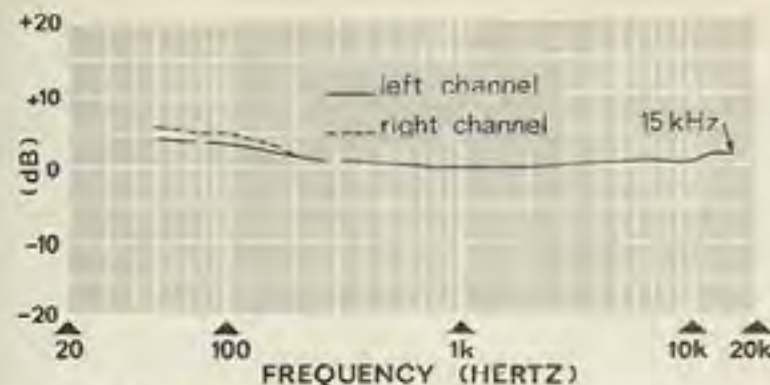


Fig. 6—Playback response of the Sony Model 230 at 7 1/2 ips.

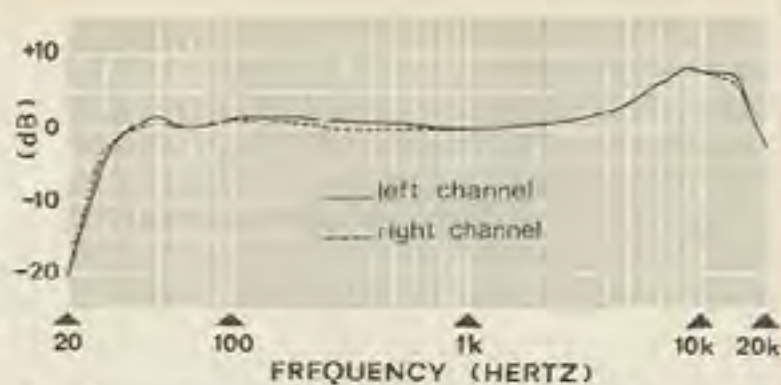
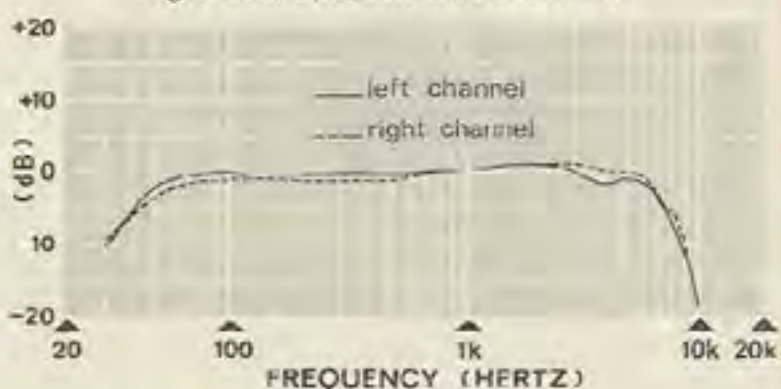


Fig. 7—Record/playback response at 7 1/2 ips (recorded at -10 VU).

Fig. 8—Record/playback response at 3 3/4 ips.



Fig. 9—Record/playback response at 1 7/8 ips



thanks to its excellent shock absorbers; tape threading is particularly convenient. A minor problem, correctible externally, is that with one orientation of the power plug, power line filtering of the electronics is not as good as it could be because an oil burner going on caused clicks to be heard through the unit. Simply turning the plug around corrects this, though.

When a good sound source is fed into the unit, or when playing pre-recorded tapes while using efficient external speaker systems, the sound is crisp and full. Its own speakers are handy for portable or monitoring use and put out lots of sound. Each 230 speaker is a 5-in. unit, surrounded with felt-like insulation, in a wooden baffle. The baffle is covered with grey leatherette-type material that matches the rest of the recorder. The model SS-23 speaker option for the 230W unit utilizes the same 5-in. wide-range speaker as the portable's, but is in an oiled walnut enclosure (9 in. x 4 3/4 in. x 16 1/2 in.).

Conclusion

The new Sony 230 (or 230W) is ideally suited for one who does not yet own a stereo hi-fi system and who wishes to start with a reel-to-reel tape recorder/player first, following this later with a turntable, a tuner and, perhaps, more sophisticated high-efficiency speaker systems. And for someone who already owns a good stereo system, the 230 will serve just fine as a moder-

ately-priced tape machine (used as a deck) with the added filip of being a good, complete portable tape recorder/player system.

This may not be a unit for the tape recordist buff, who will insist on three tape heads, echo facility, mixing provision, etc., but it is a fine unit in its price class. The 230's control amplifier is the real star here. Though a low-power one in relation to what we expect from component amplifiers and receivers, it nevertheless combines clean output with wide operating flexibility, all built into one compact package. The tape transport itself has been proved out in other Sony models, while incorporating additional refinements that recordists will welcome.

With the understanding that the amplifier will not be able to match the higher-power ones commonplace in component amplifiers, and therefore would not be able to drive low-efficiency speaker systems satisfactorily, we would have to call the 230 a particularly excellent buy at its price (\$249.50), capable of producing good recordings and playback. (This would be enhanced further by better microphones and speaker systems, of course.)

Therefore, kudos go to Sony for creating this all-in-one concept—a respectable stereo control amplifier integrated with a good, basic tape machine—at what is truly a very low price when you consider the 230's versatility and overall quality.

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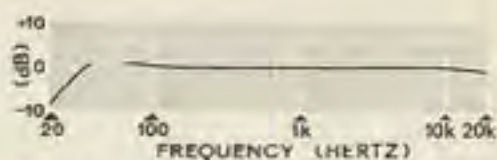


Fig. 10—Frequency response of the Sony Model 230's amplifier preamplifier at 1 watt into 8 ohms.

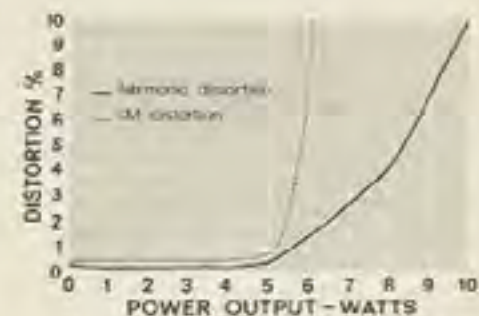


Fig. 11—Distortion characteristics.

Fig. 12—Photograph equalization characteristics. The dotted line represents RIAA equalization; the solid line, measured equalization.

