



Sony Breathes New Life into an Old Format

The Equipment: Sony STC-7000, a stereo FM and AM tuner combined with a stereo preamp-control section (no power amplifier section). Dimensions in metal case supplied: Front escutcheon, 18 $\frac{1}{8}$ by 5 9/16 inches; chassis depth behind panel, 13 9/16 inches. Price: \$589.50. Manufacturer: Sony Corp. of America, 47-47 Van Dam St., Long Island City, N.Y. 11101.

Comment: With the model STC-7000, Sony has reintroduced in modern, high-quality stereo terms a home-audio product format that enjoyed some vogue in pre-stereo days. Sony calls it an "integrated tuner." Actually, it is a tuner combined with a system preamplifier but without a power amplifier—a "semi-receiver" if you will. In offering this type of component at this time, and with the superior performance and versatility that characterize the STC-7000, Sony is making available a unit that should appeal to the home-music system planner who wants to have his audio cake and eat it too. That is to say, the STC-7000 offers the convenience of radio reception and system control facilities in one handsome, high-performing unit while at the same time permitting you to use a power amplifier of your own choice, including any of the new superheavyweights. Since these latter models are aimed at the perfectionist market, and since the Sony tuner-preamp has the kind of performance a perfectionist would seek, the design approach makes good sense. Without an ultrahigh-powered amplifier on the same chassis, the tuner-preamp can be installed wherever convenient and with only normal regard for ventilation. The heavier power amp then can be located for best ventilation, rather than accessibility. For the serious tape recordist, the STC-7000 offers many options, including a front-panel microphone level control that may be used for fading or mixing in conjunction with another input signal to a recorder and a very versatile tape duplication facility.

The STC-7000, in short, has been designed as both a hobbyist's tool and a serious listener's delight. Dominating the front panel is a generously proportioned sta-

tion tuning dial with illuminated indicators for FM, AM, stereo, plus a meter showing maximum signal (operates on both FM and AM) and another meter showing center-of-channel (for FM only). To its left is the volume control mounted concentrically around a channel balance lever. The power off/on switch is at the lower left. Next comes a stereo headphone jack, and separate bass and treble tone controls for each channel (friction-coupled). Then there's a "hi-blend" switch (for use only on noisy stereo FM programs), and an interstation muting switch. The large tuning knob itself is at the center. To its right are three more switches for low filter, loudness contour, and high filter. Next comes a channel mode knob with positions for "check L" (both channel inputs are combined and fed to the left-channel output), "check R" (both channel inputs are combined and fed to the right-channel output), reverse, stereo, L plus R (both channels are combined and fed to both channel outputs), left (left inputs are fed to both channel outputs), and right (right inputs are fed to both channel outputs). The microphone level-and-mixing control follows. The right-hand portion of the panel is given over to the elaborate signal selector and monitor facility, worked out between a knob and two slide switches. The knob has positions for AM, FM, mic, phono 2, aux 2, "1 to 2," and "2 to 1" (the last two positions for tape duplication work). The slide switch just to the left of this knob has positions for aux 1 (this cuts out the knob), a center spot that returns control to the knob, and phono 1 (which also cuts out the knob). The monitor control below these two has positions for tape 2, source, and tape 1. A stereo input phone receptacle, next to the monitor switch, is controlled by the aux 2 position of the selector knob.

Everything is logically arranged and clearly marked in exemplary fashion that combines a genuine functionalism with a neat, even pleasing, appearance. Similarly, the back panel of the set is also quite "busy" but carefully planned and laid out. Inputs include stereo pairs for microphone, phono 1, phono 2, and aux 1. The mike jacks are phone types; the others are phono jacks (pin-plug types). The aux 1 jacks are controlled by a level ad-

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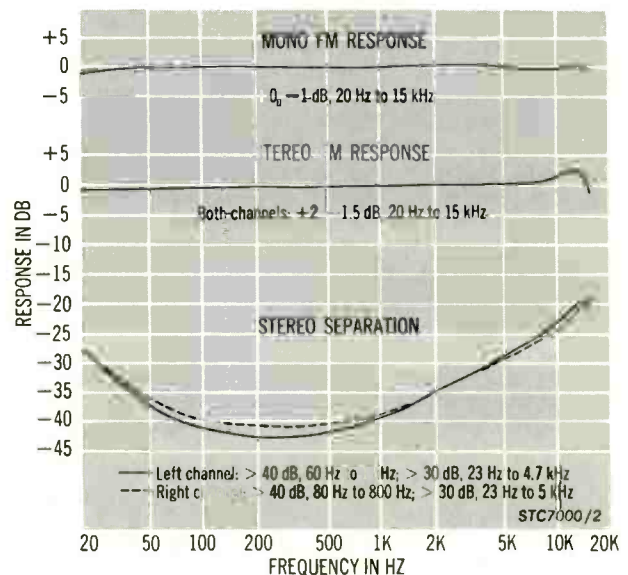
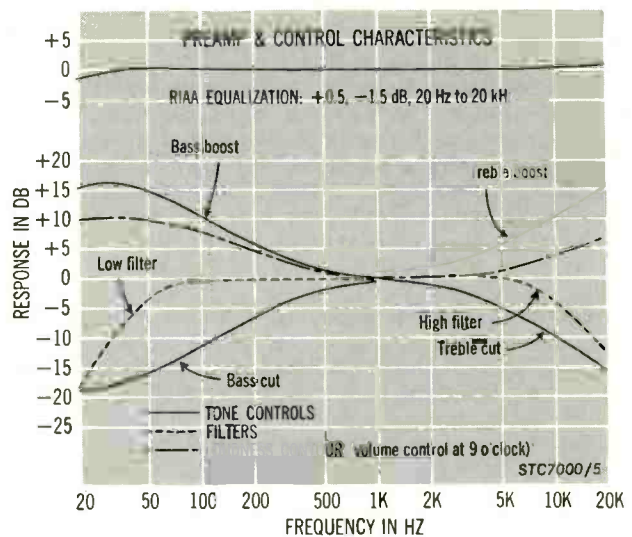
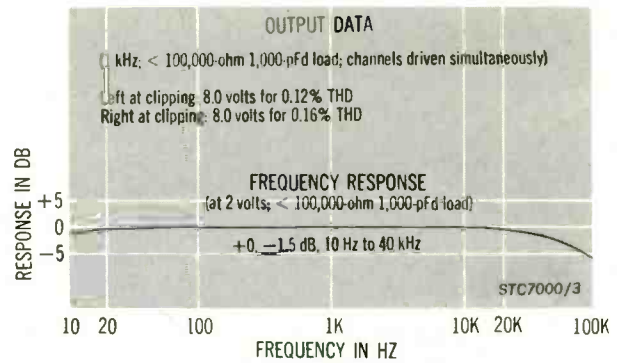
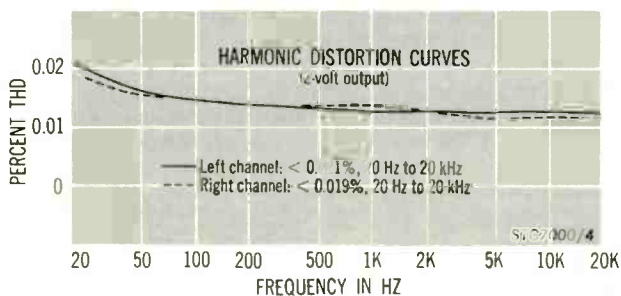
justment. Under this group of connectors is a system-grounding terminal (the easiest to use and most secure one we've yet seen). Antenna terminals are provided for AM, and 300-ohm (twinlead) FM. There's also a true coaxial connector for 75-ohm cable, and a loopstick AM antenna. Stereo pairs of jacks are provided for feeding signals to, and playing signals from, two tape recorders. The tape 1 connectors may be alternated with a DIN connector just above them, and the tape 1 playback jacks are controlled by their own level adjustment. For main signal output (to power amplifiers) there are two stereo pairs plus a "center channel" (mono, or left plus right, signal) output jack. Special "display" outputs permit feeding signals from the STC-7000 into "scopes" to observe FM reception patterns (from the FM multipath jacks) or a graphic display of audio (via the "audio-scope" jacks). Finally, the rear apron contains four AC convenience outlets, three of them controlled by the front-panel power switch, the fourth "hot" as long as the set's power cord is plugged into an AC source.

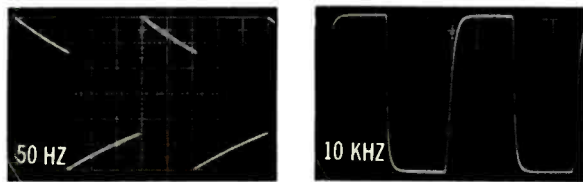
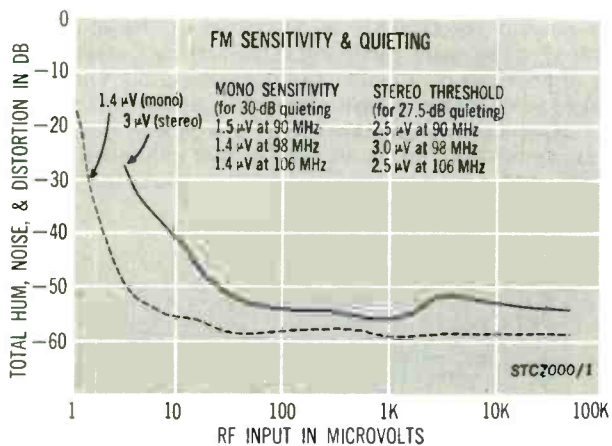
Performance of the STC-7000 is as impressive as its many features and controls. The tuner achieves the very high sensitivity of only 1.4 microvolts and the sensitivity curve levels off to a superb quieting value of -59 dB for a mere 25 microvolts of RF input signal. The stereo sensitivity curve parallels this performance quite closely, remaining well below the -50 dB quieting level for signal strengths of 21 microvolts or more. In fact, the FM performance of this set is fairly astonishing since it is superior on all (not just some) counts: distortion, audio response, signal-to-noise, selectivity, channel separation—the works.

No less remarkable is the audio section of the STC-7000, which shapes up as a first-rate preamp-control unit. It is capable of furnishing up to 8 volts of signal per channel at no more than about 0.2% THD. At normal (rated) output of 2 volts per channel, distortion is literally one hundred times lower than that—in fact the lab measured values that were significantly better than those specified. All other tested parameters were generally better than typically found in receivers.

Listening tests of the Sony STC-7000 depend largely on what power amplifier and loudspeakers are connected to it. This is not only true in terms of how the unit is connected in a system, but also in terms of its performance, which is so good that one could say it is limited virtually only by what program sources are fed to it, and what external equipment it drives. This impression is further reinforced by listening to the STC-7000 on its own, i.e., via headphones. The set obviously supplies an ultraclean, wide-range signal. The unit can be recommended without reservation to anyone who appreciates better-than-average sound and the better-than-average apparatus for reproducing it.

CIRCLE 149 ON READER-SERVICE CARD





Square-wave response



The Equipment: Shure V-15 Type III, a stereo pickup cartridge with elliptical diamond stylus. Price: \$72.50. Manufacturer: Shure Brothers, Inc., 222 Hartrey Ave., Evanston, Ill. 60204.

Comment: Shure has gone through several versions of the top-of-the-line V-15. The V-15 Type II was considered a state-of-the-art model when it appeared some seven years ago. Then, three years later, the stylus assembly was redesigned. The Type II with the new stylus was called the Type II Improved—and it was, though not dramatically. Now Shure has redesigned the entire cartridge, the most striking innovation in the Type III model being the use of laminated—as opposed to solid—pole pieces in its electromagnetic structure.

The V-15 Type III bears a strong family resemblance to its predecessors in all respects, though it exhibits marked improvements in many. Both on the test bench and in the living room its behavior refines and surpasses that of the Type II Improved without changing the V-15's basic identity—which has, since the beginning, been very attractive indeed. All models have been, for their respective eras, wide-range, uncolored, un-

Sony STC-7000 Tuner/Preamp Additional Data

Tuner Section			
Capture ratio	0.75 dB		
Alternate-channel selectivity	100 dB		
S/N ratio	70 dB		
THD	Mono	L ch	R ch
80 Hz	0.13%	0.34%	0.35%
1 kHz	0.13%	0.15%	0.15%
10 kHz	0.38%	0.35%	0.45%
IM distortion	0.5%		
19-kHz pilot	-64 dB		
38-kHz subcarrier	-65 dB		
Preamp Section			
Input characteristics (for 2 V output, input controls at max.)			
	Sensitivity	S/N ratio	
phono 1 & 2	2.1 mV	68 dB	
mike	0.6 mV	51 dB	
tape 1 & 2	200 mV	82.5 dB	
aux 1	200 mV	82.5 dB	
aux 2	200 mV	83.5 dB	

Shure Improves Its Improved V-15

usually high in channel separation, and at least as low in distortion as other top models.

The specific means employed by Shure in designing the Type III have involved a careful reassessment of resonance factors with a view both to extending and flattening high-frequency response, and to providing optimum values, when used in an appropriate arm, to cope with the problems of warped records—which, as readers keep reminding us, are at least as much of a problem today as they ever have been. The frequency response in our graph shows some rise at high frequencies, but not the Type II's tendency to peak—particularly noticeable unless input capacitance was carefully matched to design values. Low-frequency resonance in the SME arm occurs at 6.5 Hz with the Type III—somewhat lower than in earlier versions.

Separation is the best the lab has measured so far and, as the graph shows, went below the limits (-30 dB) of the chart recorder over virtually all of the midrange. Intermodulation distortion (at 0.4% in the lateral plane, 1.6% vertically) is among the very lowest the lab has measured; harmonic distortion is about par for the better cartridges in the midrange (say 3% or better up to 3

kHz) and better than par above that (a maximum of 5% in one channel at 10 kHz, as opposed to almost double that in some measurements for other top models). Static compliance measures 35×10^{-6} cm/dyne in the lateral plane, 17 vertically—very close to the measurements for the Type II Improved, average or lower for other top models. The lab measured vertical tracking angle as 20 degrees and stylus-tip geometry as good, with a 0.22-mil radius in contact with the groove wall.

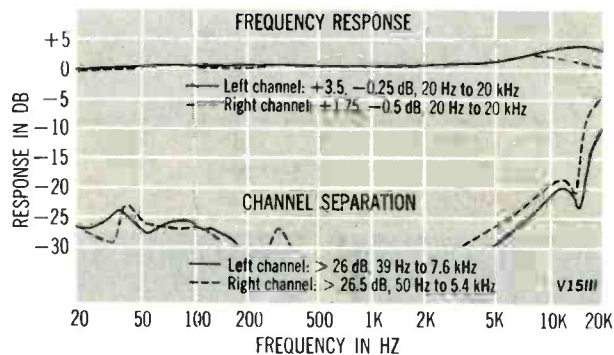
The audible net gain in the Type III consists less in these considerations than in what Shure calls "trackability"—the cartridge's ability to track a high velocity at low tracking force. In the standard torture test the Type III came through at 0.6 grams as opposed to 0.7 grams for Type II Improved and 0.75 grams for the earlier Type II. This information is more important, however, when stated conversely: The Type III can be expected to track higher groove velocities than its predecessors at normal tracking forces. We used 1.0 grams in listening to it and the lab made all other measurements at that tracking force.

Output from our standard groove (modulated at 1 kHz for a peak velocity of 5 cm/sec) was measured at 3.9 mV in the left channel, 3.8 mV in the right. This is higher than the Type II's output, a little higher and better balanced than that of our Type II Improved sample, and perhaps a little higher than average among today's better cartridges.

Along with the cartridge you get a certificate that can be exchanged for a free test record ("Audio Obstacle Course—Era III") that will allow you to compare cartridges in terms of "trackability." The Type III can be bought (as the V-15 Type III-G) with the VN3-G 0.6-mil spherical diamond stylus. An accessory elliptical stylus

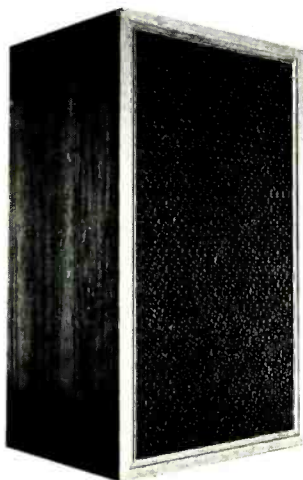
for playing 78s (VN78E) is described in "News and Views" in this issue. Since this is the first such stylus to be announced by a major manufacturer to our knowledge (and considering the interest readers have shown in our April article on playing old records with modern equipment), the 78-rpm elliptical further enhances the attractions of what must be reckoned as one of the very finest cartridges on the market.

CIRCLE 147 ON READER-SERVICE CARD



Square-wave response

Audioanalyst's



First Speaker

The Equipment: Audioanalyst A-100, a compact speaker system in wood enclosure. Dimensions: 24 $\frac{3}{8}$ by 13 $\frac{3}{4}$ by 12 inches. Price: \$129 (\$136 in western U.S.). Manufacturer: Audioanalyst, Inc., P.O. Box 262, Brookfield, Conn. 06804.

Comment: The Audioanalyst is, according to its manufacturer, a conventional acoustic suspension system that, as the first product from this company, is intended to offer good value in a highly competitive market.

Its handsome oiled walnut case has the connection terminals (thumbscrews that accept bare wires or

spade lugs) on a panel recessed into the back. The terminals are marked with a big "+" or "-" for polarity coding. Above them are two toggle switches for minor adjustments of treble (a boost of about 2 dB or less from 10 kHz up) and midrange (a similar boost between 1.2 kHz and approximately 8 kHz). We found that though the difference is slight, we often changed our minds about the "preferred" positions of these switches when we moved the speaker from one position to another in the room. The graph was made with both controls in the low position as suggested by Audioanalyst.

Behind the tweedy black-and-brown grille cloth are a 10-inch woofer, a 3-inch cone midrange driver, and a 2-inch tweeter. Crossovers are at nominal values of 2 and 7.5 kHz. Since the A-100 can be used either vertically or horizontally, Audioanalyst gives you a stick-on insignia so that you can position it as you choose (or leave it off altogether).

The manufacturer's impedance rating of 8 ohms characterizes the general value of the curve, but the lab found the actual rating point (the minimum level following the bass-resonance rise) to be 5.5 ohms. So though impedance rises to above 16 ohms in the midrange

around 1 kHz, it might be safer to treat the A-100s as 4-ohm models if you're contemplating multiple-speaker hookups.

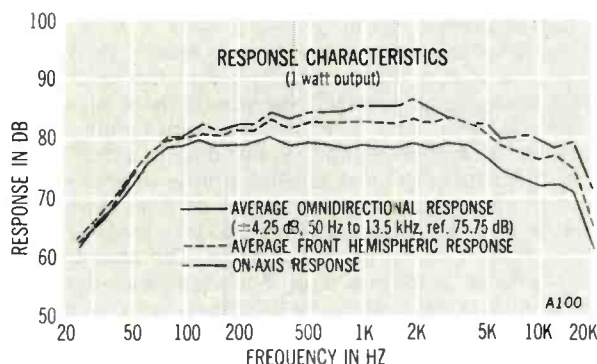
In our standard sensitivity test (driving the speaker to an output of 94 dB at 1 meter) the lab found that the A-100 needed 10 watts. The speaker handled steady tones of up to 100 watts power before distorting excessively, and it handled pulses of up to 227.3 watts average power. In the light of these figures, Audioanalyst's recommendation that the model be used with amplifiers rated at 10 to 60 watts of music power per channel seems eminently sensible.

One of the avowed design aims of the A-100 is linear response rather than what might be called "pleasing sound" where that phrase implies a compromise with accuracy of reproduction. It's no surprise then to note that the response curve has no midrange "presence" bump and also is unusually flat toward the top for a bookshelf system in this price category. By contrast to the common, less-flat speaker characteristics, the sound is slightly bright—though not aggressively so. In terms of balance and clarity it is good with any sort of program material, though—again predictably, in the light of the design intent—not particularly (or unnaturally) spectacular. Highs are well dispersed and clearly audible off axis—with music, test tones, or white noise—right up to about 14 kHz, where rolloff begins. In the bass, and driving the speakers to moderate listening levels, there is little doubling down to 40 Hz; below that frequency response audibly falls off, and at 30 Hz it becomes mostly doubling. At higher power levels, doubling increases, as indicated by the second-harmonic distortion figures for 80 Hz in the distortion chart. Definition is good without the unnatural (and random) prominence that can be afforded some musical sounds by a speaker with a peaky midrange response.

We think Audioanalyst has been successful in producing a good value in this popular price class, and we're not surprised to learn that in the relatively short time the company has been in business it already has

found dealers in many parts of the country. So perhaps the A-100 is not only a welcome newcomer in its own right, but a harbinger of good things to come as well.

CIRCLE 148 ON READER-SERVICE CARD



Audioanalyst A-100 Speaker Harmonic Distortion*

Output Level (dB)	Frequency			
	80 Hz		300 Hz	
	% 2nd	% 3rd	% 2nd	% 3rd
70	.90	.30	.22	.29
75	1.5	.25	.20	.21
80	2.6	.32	.19	.25
85	4.8	.40	.21	.27
90	9.5	.70	.35	.38
95			.68	.55
100			1.3	.75
102			1.7	.82

*Distortion data are taken on all tested speakers until distortion exceeds the 10 per cent level or the speaker produces the spurious output known as buzzing, whichever occurs first.



Yamaha Cassette Deck Allows Speed Adjustment

The Equipment: Yamaha TB-700, a cassette deck with built-in Dolby noise-reduction circuitry, in case with wood trim. Dimensions: 15½ by 4½ by 10 inches. Price: \$289. Manufacturer: Nippon Gakki Co., Ltd. of Japan; U.S. distributor; Yamaha International Corp., P.O. Box 6600, Buena Park, Calif. 90620.

Comment: Yamaha has been offering a variety of products in this country for some years. In audio it has been best known for its "ear-shaped" loudspeakers, though it has displayed some electronic components as well.

Last year it announced plans to offer a comprehensive line of stereo components; the TB-700 appears to be one of the first of these to go into production and is the first we've been able to examine in detail.

Toward the back of the top plate and tilted slightly upward are the VU meters. Between them are indicator lights for recording (red) and Dolby action (amber). Immediately in front of the meters are the turns counter and a series of switches. The first is a button for either "standard" or high-performance tapes; it is used in conjunction with the switch next to it, which chooses

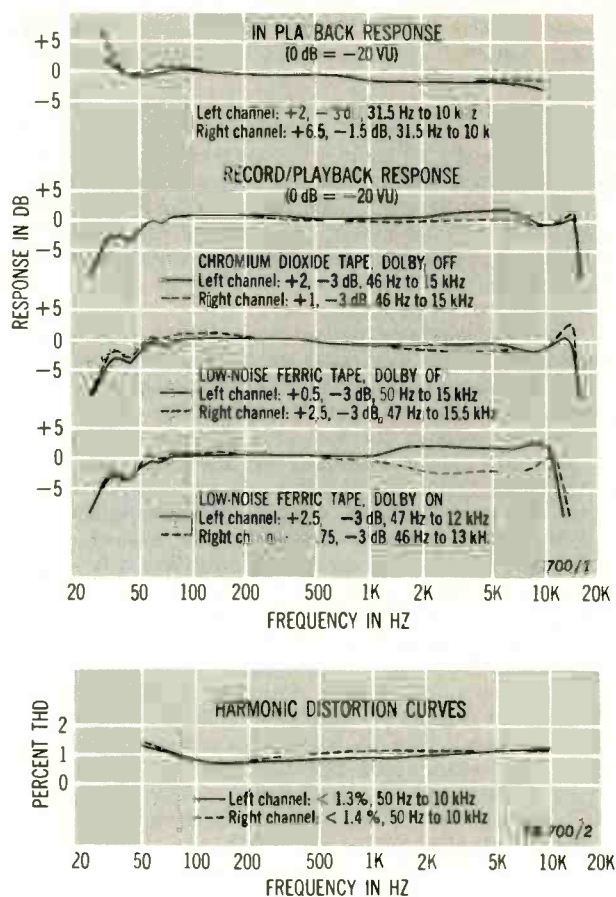
either low-noise ferric or chromium dioxide as the tape to which the unit is adjusted in the high-performance position of the first switch. All the lab tests were run with Scotch High Energy and the low-noise position or, where indicated, Sony CRO and the chromium dioxide position. The remaining switches are for Dolby (on/off), a built-in limiter (on/off), and AC power.

In front of the switches is a series of sliders. The right-hand pair controls line input levels to the recording amp; the next pair controls mike inputs. These separate controls permit mixing of line and mike inputs. Next come the output-level controls, with detents at the "normal" position in the middle. And at the extreme left of this group is a speed vernier, which controls the servo system that regulates the unit's DC drive motor. It too has a detent at the normal position. The speed data shown in the "additional data" box were measured with the control in this position; perfect speed can of course be obtained by using this vernier, but you would need a test tape and a frequency counter unless the speed is audibly off pitch. The total range of this system is approximately a half tone either way from normal (± 5 per cent, according to Yamaha).

Though the transport keys look familiar, their operation is somewhat unconventional. You can go directly from recording or playback to the fast-wind modes, and from them back to play without activating the stop button. This makes for fast operation, and although many current decks intentionally prevent such abrupt changes in transport motion, we could detect no uneven winding of the tape as a result—let alone any suggestion of snarling or damage in the tape. During playback or fast winding the record key can be depressed, but it only stops the transport without putting it into the recording mode unless the play key is pressed simultaneously. We found the action of the pause key to be rather sluggish. When you press it, approximately a second elapses before the tape comes to a stop. When you release it there is a similar delay before sound returns to the monitor connections, though the tape gets back to speed sooner and the recording amp cuts in immediately. As a result you must time your use of the pause carefully during recording if the tapes are not to contain sounds that wow in or out. (Most LPs allow you about four seconds of silence between cuts, if that's what you're excerpting from.) At the end of the cassette the drive system automatically returns to stop.

Phone jacks for the two mike inputs and a stereo headphone jack are built into the dark trim stripe across the front. On the back panel are a DIN input/output jack, standard pin-jack pairs for line input and line output, and a two-position input sensitivity switch. The less sensitive of these positions is appropriate for the levels delivered by most stereo components. No Dolby alignment controls are accessible to the user.

The lab data show the unit to be average or better in all respects—and in some particulars well above average. Crosstalk figures are about 10 dB better than those we're used to seeing in a cassette deck and, among the units we've tested, are matched or bettered only by the Advent 201. Harmonic distortion curves are excellent—particularly at the high end, where many decks can't handle the high (-10 VU) level at which these curves are made, preventing meaningful measurements for them at 10 kHz. (Normal signal levels at this frequency are well below -10 VU, of course; that level is chosen for THD tests in order to give the midrange an adequate workout.) If the record/playback response curves are not quite as flat as most for comparable equipment, they



Yamaha TB-700 Cassette Deck Additional Data

Speed accuracy (vernier at "0")	105 VAC: 0.93% fast 120 VAC: 1.2% fast 127 VAC: 1.2% fast
Wow and flutter	playback: 0.10% record/playback: 0.18%
Rewind time, C-60 cassette	1 min. 36 sec.
Fast-forward time, same cassette	1 min. 36 sec.
S/N ratio (ref. DIN 0 VU, Dolby off)	playback L ch: 55.5 dB R ch: 51 dB record/playback L ch: 53 dB R ch: 50 dB
Erase (400 Hz at normal level)	52 dB
Crosstalk (at 400 Hz)	record left, playback right: 51 dB record right, playback left: 50 dB
Sensitivity (for 0-VU recording level)	line input (high) L ch: 55 mV R ch: 55 mV line input (low) L ch: 11.3 mV R ch: 11.3 mV mike input L ch: 0.40 mV R ch: 0.42 mV
Meter action (ref. DIN 0 VU)	L ch: 1 dB high R ch: 1 dB high
IM distortion (record/play, -10 VU)	L ch: 6% R ch: 6.5%
Maximum output (preamp or line, 0 VU)	L ch: 1.1 V R ch: 0.95 V

do represent better than average bandwidth. With the Dolby circuit in use they drop back to average at the high end—apparently because of the low-pass filter used to prevent any leakage of the 19-kHz FM pilot from interfering with Dolby action. There is some discrepancy in high-frequency level between channels in Dolby operation, but it is not severe and presumably has been improved in later samples; Yamaha says it has improved its production technique for setting Dolby levels, and this discrepancy (such as it is) falls just within the region where Dolby B operates.

Three features of the TB-700 require special mention. First is the thirteen-page owner's manual, which is unusually complete. Some statements in our copy are a little curious or even confusing, but Yamaha says the text has been rewritten and the booklet restyled to make it more attractive to American buyers. We trust this entails no suppression of content, since the original version is well above average in usefulness. Second is the speed vernier. Since a number of readers have complained that cassettes made on off-speed battery-portable equipment defy optimum playback on good home

equipment, we're delighted to see that some new decks (the Harman-Kardon HK-1000 and Nakamichi 1000 are among the others) allow for speed adjustment. A half tone either way should solve most problems of this sort. Third is the limiter. While it will be a help to the novice recorder in tackling subjects with extreme dynamic range (plain old living-room chit-chat can be a recordist's nightmare for example), it should not be overworked. When driven too hard by grossly and consistently high input levels the resultant distortion in the signal is clearly audible. Fortunately—considering the unit's inherent dynamic range, plus the Dolby feature to further extend it—we see no reason why the limiter should be used for anything but taming occasional unexpected peaks.

All told the TB-700 is a worthy first product in an expanded Yamaha component line. In terms of performance it can hold its own against other decks in its class, and its special features (the speed vernier and input mixing) should attract particular attention because of their comparative rarity in competing decks.

CIRCLE 145 ON READER-SERVICE CARD



Sherwood's Elegant and Versatile Receiver—With Dynaquad

The Equipment: Sherwood Model S-8900A, a stereo FM receiver with built-in Dynaquad circuitry for recovering quasi-quadraphonic "ambience" effects from stereo program material, in wood case. Dimensions: 16¼ by 5¼ by 14 inches. Price: \$429.95. Manufacturer: Sherwood Electronic Laboratories, Inc., 4300 N. California Ave., Chicago, Ill. 60618.

Comment: If Sherwood set out to prove that Dynaquad is more than a device for "faking" four channels and that it can live comfortably in a high-performance receiver with a luxurious "feel," the S-8900A must be reckoned a success. The Dynaquad circuit for deriving four signals from a two-channel amplifier has been widely adapted—sometimes in a shoddy attempt to palm off a run-of-the-mill mass-market product as the latest in quadraphonics. Sherwood will have none of that; it uses Dynaquad as a logical adjunct to stereo, in a receiver that is well adapted to eventual use as the central element in a true quadraphonic system.

The tuning dial is flanked by a center-tuning meter on the left and, on the right, by two large knobs: one for tuning, one for loudness/volume with the main AC power switch at its minimum position. This knob is marked "loudness," since Sherwood traditionally has considered that mode of operation as standard, and it is calibrated (in dB) with respect to loudness action: +8 at maximum rotation, 0 at the point (2:30 o'clock rotation) for the reference level at which no compensation is deemed necessary, -20 (10:30 o'clock), and -60 (at 7:30 o'clock). In the S-8900A loudness compensation is introduced in the bass only.

At the left along the bottom of the front panel are five knobs: mode (right, left, stereo, stereo reverse, left-plus-right mono), selector (phono, FM, aux), bass, treble, and balance. Next are two stereo phone jacks, one for connections to an outboard tape recorder, the other for stereo headphones (and live no matter how the speakers are switched). Then come seven on/off pushbutton switches: four-channel mode (about which more in a moment), tape monitor, high filter, FM "hush" (interstation muting), loudness compensation, main speakers, and remote speakers.

On the back panel are pin-jack pairs for phono input, aux input, tape-recording output, tape-monitor input, output to a quadraphonic adapter, and front-channel input from a quadraphonic adapter. Near these connections is a single, red-coded pin jack for use with a discrete-quadraphonic FM adapter when one becomes available. Nearby are a thumbscrew grounding terminal, a three-position phono-input sensitivity switch (for tailoring the pickup's output both to the dynamic range of the S-8900A's preamp and to its loudness-control action), and a Dynaquad/stereo switch. Following the fuse and line cord, plus two convenience outlets (one of which is unswitched), there are screwdriver antenna (300-ohm and 75-ohm) connections, and a special mono speaker output. This last is for use with a center-fill speaker or as a mono extension; it is, in fact, connected into the remote-speaker switching and therefore cannot be used independently of speakers attached to the remote terminals, which—with those for the main speakers—are at the upper left of the back panel and are knurled screws that will accept spade lugs or bare

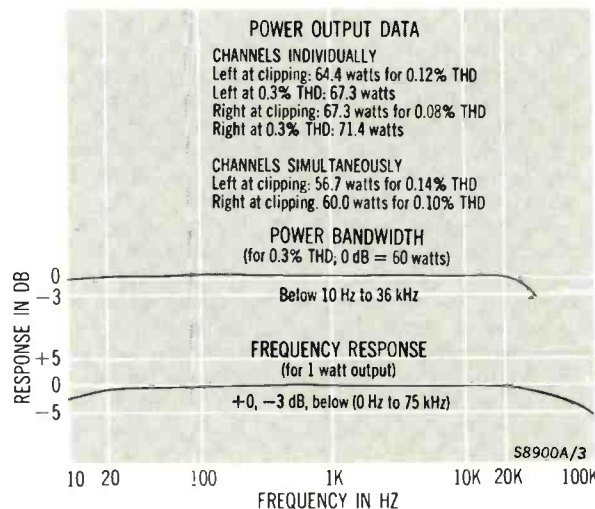
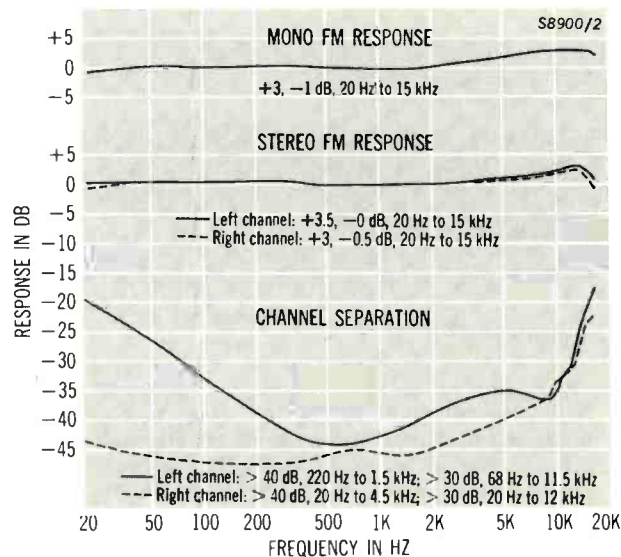
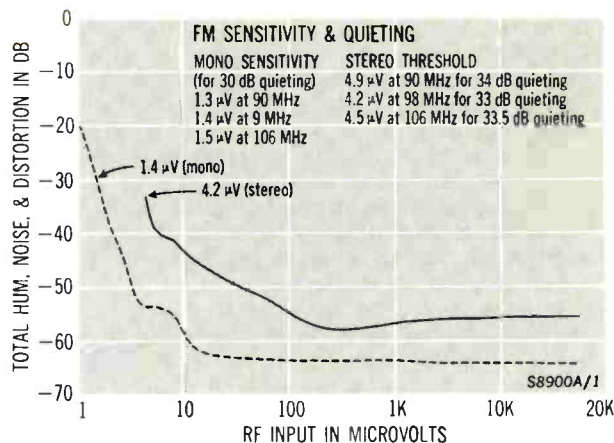
wires. (The mono output will accept similar wiring, but has regular screws.)

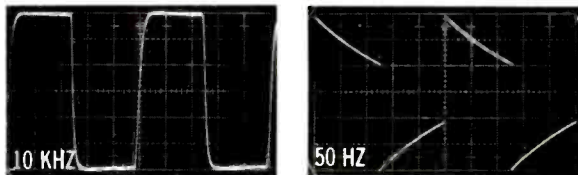
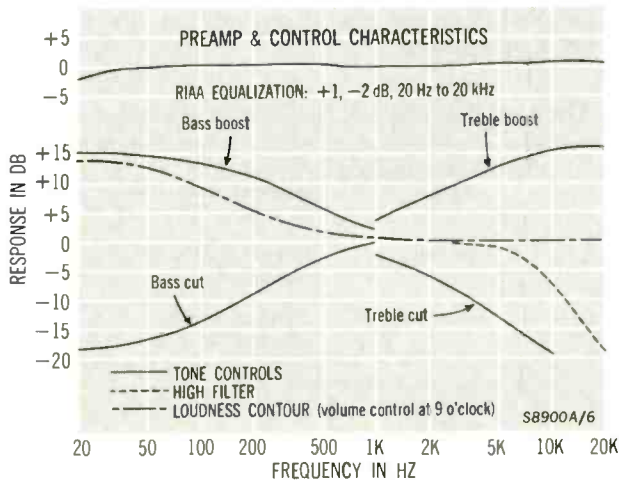
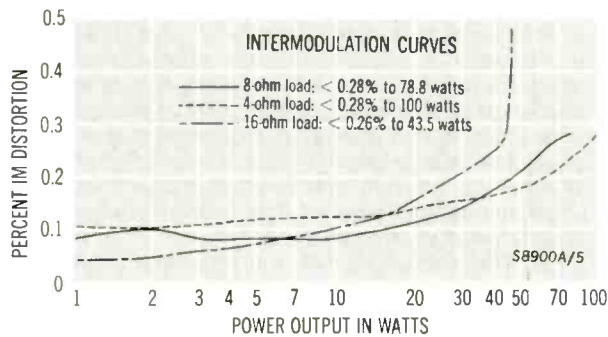
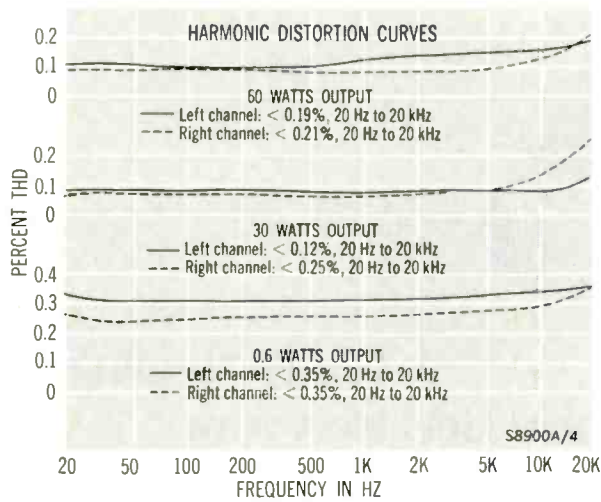
When you switch into the Dynaquad mode, the output to the main speakers is unaffected, but the hookup configuration of the remote speakers is altered so that they are differentially driven. When these speakers are placed at the back of your listening room they therefore reproduce ambience information implicit in the original stereo signal. Sherwood says that for this purpose all four speakers should be of "reasonably similar efficiencies and sonic characteristics" and that you should "sit in a centered position in the rear one-third of the room." The implied relatively low output from the back is partly because of the padding used (presumably to prevent excessively low impedances as seen by the amplifier when all four speakers are connected) in the remote-speaker circuit, and if there is a dissimilarity in efficiency between your front and back pairs, we'd suggest that the more efficient speakers go at the back.

After all that has been written on the subject, no more need be said of Dynaquad except that it is widely used and that it does work for its intended purpose. It does not produce true quadraphonics, of course, but the S-8900A allows for that too. The connections and switching for a quadraphonic adapter can be used in conjunction with the sort of all-in-one unit that includes matrix decoder and back-channel amplifier, or these functions can be borne by separate units. When discrete quadraphonic FM broadcasting becomes a reality (assuming that it will) the special FM-signal output would be used to feed a separate adapter for that purpose—which would, in turn, feed its output to the quadraphonic add-ons you're using. They, in turn, would return the front-channel signals to the Sherwood via the aforementioned jack pair.

In terms of circuit configuration this feature can be described as a simple "circuit interrupt" and is identical to the wiring of a tape-monitor switch. In fact if you are not planning to go quadraphonic right away the S-8900A might best be described as a stereo receiver (with the Dynaquad option) having complete switching for two tape decks plus tape-copying options in using a third via the front-panel jack—which can function as either an input jack or an output jack, depending on the way the related switches are treated. The instruction manual spells out the possibilities for tape copying, which may be summarized as follows: from the outboard deck to the regular back-connected deck and/or one attached to the four-channel jacks; or from the regular back-connected deck to the outboard unit and/or one connected to the four-channel jacks. The manual suggests that the receiver be left off in dubbing via the front-panel jack to prevent any noise pickup from related circuitry. But we found that if you leave the receiver on it can be used as a sort of make-do mixer to combine signals from a new source (disc, for instance) with those previously recorded on tape and being played back via a deck with its own output controls.

Obviously this receiver has versatility to spare. But how does it perform? Excellently. Sensitivity figures are superb; and though raw sensitivity numbers have little meaning in themselves, they are here matched by excellent quieting curves. In this respect the stereo curve is particularly striking and is over-all one of the best the lab has measured so far. Stereo quieting reaches 50 dB before input has reached 50 microvolts and remains better than 55 dB over the entire normal operating range from 100 microvolts upwards. Distortion is very low, as are noise factors. The consistent excellence of





Square-wave response

these figures is a joy to behold—and the sound is a joy to hear even with signals that would provide only borderline reception with most good receivers. The FM response curves, with their upward tilt at the high end, lend a slight added brightness to the results. Whether this is good or bad will depend on your speakers and your room; it is neither excessive nor uncommon.

The amplifier section also is excellent. Sherwood's THD rating of 0.3 per cent is slightly more stringent than most today (many manufacturers choose 0.5 per cent as the rating point in better receivers), but the S-8900A comes through better than most. Only at extremely low outputs (0.6 watts) did the lab find the amp hard put to make its rating point, though it clears the 0.5-per-cent point handily. IM too stays below 0.3 per cent over the normal measurement range—except at 16 ohms, where reduced effective output power is to be expected in solid-state equipment.

The word for the S-8900A is "silky." The feel of the controls and the performance—on FM in particular—all contribute to this impression. But there is a subtler elegance to the design: that of achieving significant purpose by simple means. The Dynaquad circuit for example adds materially to the enjoyment available to the user, yet it involves only one slider switch and one resistor by comparison to a comparable stereo receiver equipped with the usual two pairs of speaker outputs. Sherwood's secret ingredient, then, appears to be care in thinking the product through in terms of user needs. It shows in the versatility of the monitor/quadrasonic/outboard-tape connections and in the consistency of FM performance—even in the normally-unmeasured stereo quieting curve. In these days of almost baroque elaboration, often to very little purpose, this is a welcome approach indeed.

CIRCLE 146 ON READER-SERVICE CARD

Sherwood S-8900A Additional Data

Tuner Section			
Capture ratio	20 dB		
Alternate-channel selectivity	60 dB		
S/N ratio	74.5 dB		
THD	Mono	L ch	R ch
80 Hz	0.07%	0.10%	0.12%
1 kHz	0.07%	0.11%	0.11%
10 kHz	0.14%	0.55%	0.60%
IM distortion	0.2%		
19-kHz pilot	-67.5 dB		
38-kHz subcarrier	-65.5 dB		
Amplifier Section			
Damping factor	43		
Input characteristics (for 60 watts output)			
	Sensitivity	S/N ratio	
phono (max)	1.2 mV	60 dB	
phono (mid)	2.7 mV	60 dB	
phono (min)	6.0 mV	60 dB	
aux	125 mV	70 dB	
tape monitor	260 mV	80 dB	



A Top Performing Turntable Gets New Arm

The Equipment: Thorens TD-125 Mk. II, a three-speed (16, 33, and 45 rpm) manual turntable supplied on walnut base and with tone arm. Dimensions: 18 $\frac{5}{16}$ inches wide, 14 $\frac{1}{4}$ inches deep, 6 $\frac{3}{4}$ inches high. Price: \$310. Optional TX-44 dust cover, \$15; TX-25 cover with hinge, \$30. Manufacturer: Thorens, S.A. (of Switzerland and West Germany); U.S. distributor: Elpa Marketing Industries, Inc., New Hyde Park, N.Y. 11040.

Comment: The Thorens TD-125 Mk. II is an updated and improved version of a well-known manual, single-play turntable. Its most obvious new feature is the Thorens arm, but there are other improvements too. A new motor, new electronic circuitry, and a redesigned pulley reduce start-up time from the former 4 seconds (at 33 rpm) to only 1.5 seconds. The redesigned drive system also is credited with reducing any stray magnetic field and consequently the chance of hum.

Styling of the Thorens combines a modern look with generously sized controls. Topside of the chassis and at the front left is the three-position speed selector. To its right is a fine speed adjustment and a built-in illuminated strobe. Next is the power off/on switch and finally the arm lift (cueing) control, another new feature of the Mk. II. As in previous Thorens models, the arm fits onto a removable board that facilitates installation (should you want to use an arm of your own choice), or substitution of other arms for experimental purposes or special applications.

The new arm itself (model TP-16) is a gimbal-suspended metal tubular type of low mass with removable pickup shell and all the requisite adjustments, including stylus overhang, vertical tracking force, and magnetically applied antiskating. It comes with a damped cueing device, an arm rest, and a prewired signal cable harness.

At an ARLL rumble level of -63 dB, as measured in the lab, the Thorens TD-125 Mk. II is one of the quietest

turntables we have yet tested. The platter itself weighs 5 pounds; its average flutter at 33 rpm was clocked at 0.08 per cent (not as low as its predecessor's but still inaudible). Arm resonance was negligible, showing only a 4-dB rise at 8 Hz with a Shure V-15 Type II Improved pickup. Arm friction similarly was negligible both laterally and vertically, too low to measure accurately. The built-in gauge for setting vertical tracking force was accurate to within 0.1 gram up to forces of 3 grams. Exact measurements are shown in the accompanying table. The unit has inherent speed accuracy plus the feature of variable speed if desired. The cueing device worked smoothly and gently with no side drift.

As in the former TD-125, the two-piece nonferrous platter is covered with a ridged rubber mat that is held in place by a center piece that may be inserted upside down to accommodate large-hole 45s. Finish and workmanship are exemplary throughout, and the handsome wooden base not only dresses up the ensemble but also serves as an excellent shock-mount for it. All told, if any turntable merits the title of "professional," the TD-125 Mk. II surely does.

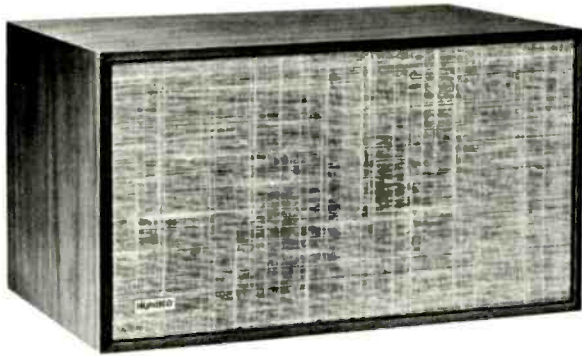
Thorens TD-125 Mk. II Additional Data

Vernier speed accuracy					
33 rpm	set exact at 120 VAC; no error at 105 or 127 VAC				
45 rpm	no error at 105, 120, or 127 VAC				
16 rpm	0.8% fast at 105, 120, and 127 VAC				
VTF gauge accuracy (grams)					
gauge setting	0.5	1.0	2.0	3.0	4.0
VTF measured	0.6	1.0	1.9	3.1	3.8

Big Sound from Dynaco's Small Speaker

The Equipment: Dynaco A-10, a compact full-range speaker system in enclosure. Dimensions: 8 $\frac{1}{2}$ by 7 $\frac{7}{8}$ by 15 inches. Price, sold only as a pair, \$104. Manufacturer: Dynaco Div., Tyco, 3060 Jefferson St., Philadelphia, Pa. 19121.

Comment: Dynaco has entered the "\$50-speaker market" with a worthy competitor for this burgeoning product area. A two-way direct-radiating system, the A-10 consists of a 6 $\frac{1}{2}$ -inch extended-range woofer crossed over at 2,500 Hz to a soft-dome tweeter. Both drivers are



mounted on the front baffle (behind the decorative grille) where there also is a vent that helps load the system to the listening room at low frequencies. The cabinet is a neatly styled walnut enclosure that may be positioned vertically or horizontally and also is lightweight enough to hang on a wall (brackets for this purpose are fastened to the rear). Input is via color-coded screw terminals that will accept large or small spade lugs or bare wires. No level controls are provided.

In contrast to bass-reflex design, which relies on cabinet resonance for bass enhancement, the A-10 employs what Dynaco calls an "aperiodic" or nonresonant design in which the vent opening is treated with special material to add acoustic resistance to smooth the woofer's response and aid in the transfer of low-frequency energy from the speaker to the room.

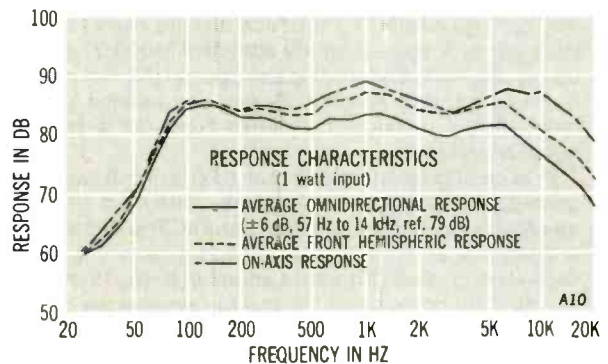
Our tests confirm that the design works. The A-10, to our ears, furnishes a level and quality of sound at all frequencies that are hard to believe for the size and cost of the unit. The lab measurements show response within plus or minus 6 dB from 57 Hz to 14 kHz. On test tones of audible response we found the bass holding up cleanly to just below 50 Hz, with a gradual rolloff below this frequency, but with a surprising freedom from doubling. The middles and highs sounded well rounded and balanced, with very good dispersion, to beyond audibility. Rated for 8 ohms, the A-10's lowest impedance was measured as 6.5 ohms at the usual bass dip above bass resonance. From this area it rises rapidly and never falls below 8 ohms out to its response limits. Efficiency is moderate; the A-10 needed 6.3 watts to produce the standard test output of 94 dB at 1 meter on axis. It could

The Equipment: Pioneer Model SA-9100, an integrated amplifier (preamp and power amp) in wood case. Dimensions: 17 by 5¼ by 12½ inches (not including clearance for knobs and back-panel connections). Price: \$399.95. Manufacturer: Pioneer Electronics Corp., Japan; U.S. distributor: U.S. Pioneer Electronics Corp., 178 Commerce Rd., Carlstadt, N.J. 07072.

Comment: Whether you admire fine audio products for their specifications, for their sound, for their versatility, or even for their looks, you've got to count this a whiz-bang of a product. Pioneer has long been known for the great "feel" and excellent styling of its electronics—and for matching these qualities with sound internal design. The SA-9100 has all these elements but its performance is so exceptional and the many extras in the way of

take up to 72 watts of steady-state power (producing an output of 100 dB) before distorting significantly. Its maximum capability for handling power pulses was 69 watts average or 138 watts peak. These figures indicate ample dynamic range but within obvious design limits. That is to say, the A-10 should not be driven with any of the recent super-powerhouse amplifiers but it will do nicely when coupled with a unit that can deliver up to and even a bit more than 50 watts average sine-wave (or "rms" power) per channel. By the same token, don't look to the A-10s to cover a ballroom-size area with sound—but you can expect it to furnish a surprising and pleasant impression of "big sound" in a room of normal size or slightly larger. In such a room, its sound is quite natural on both voice and instruments, and a pair projects a good, firm stereo image.

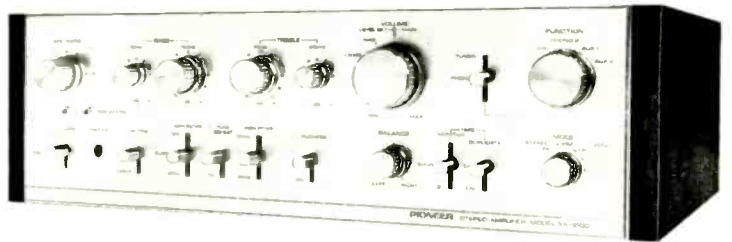
CIRCLE 141 ON READER-SERVICE CARD



Dynaco A-10 Speaker Harmonic Distortion*

Output Level (dB)	Frequency			
	80 Hz		300 Hz	
	% 2nd	% 3rd	% 2nd	% 3rd
70	0.55	0.55	0.22	0.28
75	0.85	0.60	0.20	0.35
80	1.6	0.75	0.22	0.40
85	2.5	1.0	0.28	0.33
90	4.0	1.4	0.35	0.33
95			0.42	0.28
100			0.45	1.1

*Distortion data are taken on all tested speakers until distortion exceeds the 10 per cent level or the speaker produces the spurious output known as buzzing, whichever occurs first.



A Superb Integrated Amp from Pioneer

switching options and so on so eminently useful that we find it perhaps the most exciting piece of audio hardware we've yet tested from this company.

It all begins when you open the packing and find that muslin snood in which Pioneer lovingly packs its more deluxe items. That's impressive—but the front panel is far more so. Following a speaker selector (which allows you to use any one of three speaker pairs, any two of these pairs simultaneously, or none) at the upper left you come immediately to one unusual feature: the four tone-control knobs. The two larger ones are conventional in effect and operation except that they are stepped—and as lab tests proved, are extremely accurate in their calibration (so many dB of cut or boost at 100 Hz in the bass and 10 kHz in the treble). The smaller knobs affect only the frequency extremes; hence their calibration points are, respectively, at 50 Hz and 20 kHz and their effect is cumulative with the standard controls. You can, for example, introduce a slight rise in the upper bass only by turning the standard (100-Hz) control up by, say, 4 dB and turning the special (50-Hz) control down by a similar amount. Or you can use the special bass control to boost only deep bass—as a speaker equalizer might.

Proceeding to the right, the next control also has some special—and useful—features. The main knob is a standard volume (or loudness) control. The ring around it limits output. It is calibrated (again, with fine accuracy—within ½ dB) for attenuations of 0 dB, 15 dB, and 30 dB. This control can be used in several ways. You may turn it down to prevent speaker overload; you may use it to compensate for altered power requirements depending on the speakers in use; it helps in tailoring loudness-control action (which is, of course, keyed to the position of the volume control) to actual listening levels.

At the far right in this upper rank are the selectors. A lever switch chooses tuner, phono 1, or the main function knob's setting. That knob, at the extreme right, has positions for microphone, phono 2, and two aux inputs.

The bottom rank begins with the AC power switch and a stereo headphone output jack, which is live at all times. Next come switches for muting (a 20-dB level cut—again accurately calibrated), low filter (off, subsonic—below 8 Hz and 30 Hz), tone defeat (on/off), high filter (12 kHz/off/8 kHz), and loudness/volume. The 30-Hz filter is a standard rumble filter; the subsonic filter produces virtually no effect in the audible range, as the lab data show, and Pioneer recommends that it be left on in normal use to prevent feedback disturbances, woofer damage, and such potential problems, which can be occasioned by a poorly isolated turntable, excessive arm resonance, or warped records—among other phenomena.

Next comes the balance control. At its right are two tape switches. The first selects tape monitor 1, source, or tape monitor 2. The second is marked "duplicate" (on/off) and is so wired that it permits copying either from tape deck 1 to tape deck 2 or vice versa. The last knob is for mode selection: stereo, reverse stereo, left-plus-right mono, left-only mono, and right-only mono.

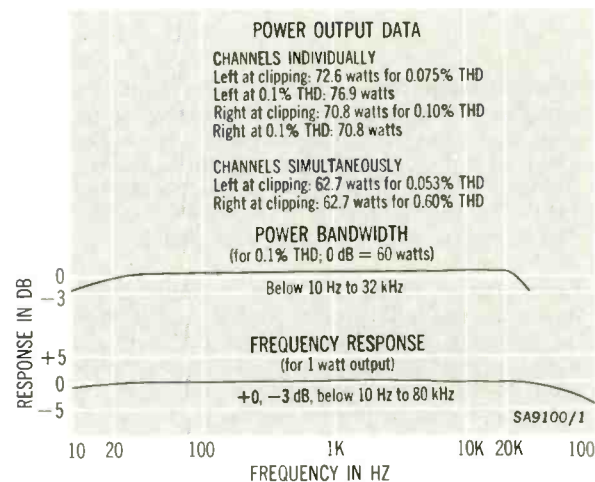
Across the top of the back panel are a series of input and output jacks, most of them in the standard pin-jack pairs. They are for phono 1, phono 2, tuner, aux 1, aux 2, tape monitor 1, tape recording 1, tape monitor 2 (or input from a quadraphonic adapter unit), tape recording 2 (or output to a quadraphonic adapter unit), tape 2 record/playback (a 5-pin DIN socket), preamp out, and power amp in. Whew! Next to the phono-2 inputs is a

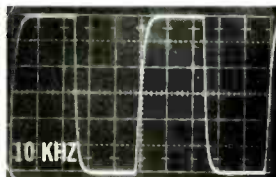
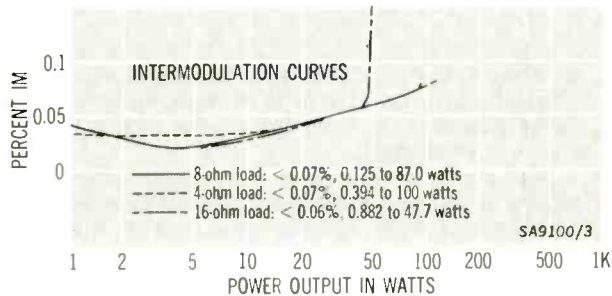
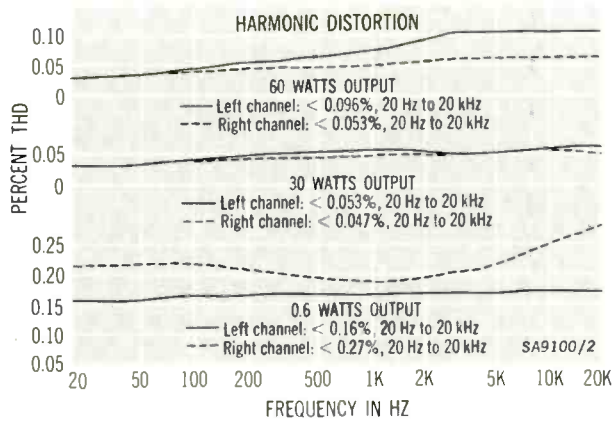
three-position impedance switch: 25k, 50k, and 100k ohms. (The 50k position is normal for magnetic cartridges spec'd at 47k.) Though the tape 2 connections are marked for use with a quadraphonic adapter, such a unit might also be connected to the pre-out/main-in jacks. Or those jacks might be used for an equalizer or electronic crossover unit. Next to them is a switch for normal (internal feed directly from preamp to power amp), separated, and separated with automatic inclusion of a subsonic filter.

Across the bottom are phone jacks for left and right mike inputs, two thumbscrew terminals for grounding ancillary equipment (particularly turntables, the audio inputs for which are just above), input level controls for phono 2 and aux 2, an output level control for speaker pair B, color-coded spring-clip connections (intended for bared wires) for all three speaker pairs, and three AC convenience outlets, one of which is switched.

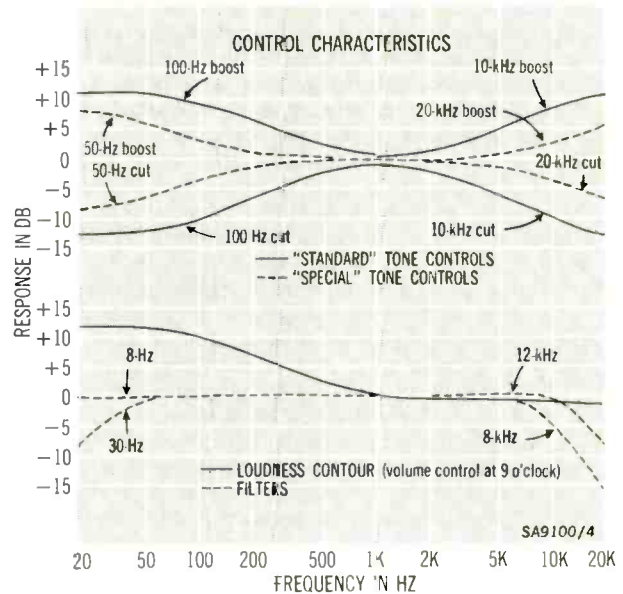
How does all this perform? In a word, superbly. We've indicated some of the major options open to the user, but there are many more—for example, in the use of the phono and aux input level controls to balance a variety of widely differing units so that all work together efficiently in the resulting system. And for an integrated unit the performance data are exceptional. All distortion measurements are below 0.1 per cent except at extremely low outputs. There is room to spare above the amplifier's 60-watt output rating. (Note, for example, that output to a 4-ohm load goes beyond 100 watts before intermodulation distortion zooms; at 113.8 watts IM still is only 0.08 per cent.) And not only is calibration of the various frequency-selective controls unusually accurate, but the "flat" curves are just that; the RIAA equalization curve is at least as perfect as any we have ever seen.

A product for the elite? Perhaps. But there is not a switch or a knob on it for which we cannot find good (as opposed to marginal) use. And it is a joy to use: luxurious, refined, and exceptionally well thought out. Along with the amplifier, Pioneer sent us data about its use of differential amplifiers and direct coupling in both preamp and power sections, full of terms like OCL and NFB and SEPP. While such information doubtless will fascinate design engineers, we always have been more interested in the proof of the pudding—which in this case turns out to be a feast.





Square-wave response



Pioneer SA-9100 Amplifier Additional Data

Damping factor	72	
Input characteristics (for 60 watts output)		
	Sensitivity	S/N ratio
mike	2 mV	60 dB
phono 1	2.5 mV	81 dB
phono 2	2.5-10 mV	65-72 dB
tuner	155 mV	80 dB
aux 1	155 mV	80 dB
aux 2	155-1,450 mV	80 dB
tape monitor 1	155 mV	86 dB
tape monitor 2	155 mV	85 dB
RIAA equalization accuracy ± 0 dB, 20 Hz to 20 kHz		