ANNUAL STEREO BUYER'S GUIDE

the authoritative magazine about high fidelity

AUDIO

SEPTEMBER 1969
60¢

Your Year-Long Guide To Stereo Hi-Fi Equipment

1970 STEREO PREVIEW DIRECTORY

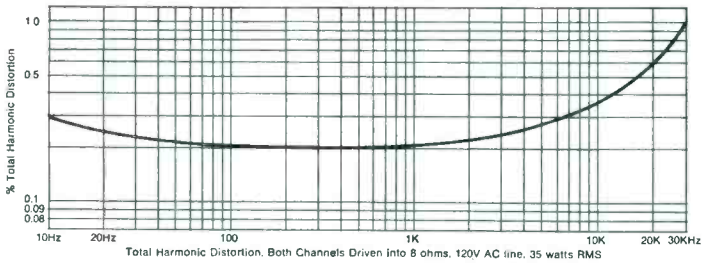
Preamplifiers • Amplifiers • Speaker Systems
Receivers • Stereo FM Tuners • Tape Recorders
Turntables • Phono Cartridges • Microphones
Headphones • Compact Music Systems * * *

ALSO: Regular Features and Record Reviews

This is the best receiver Scott has ever built

The 386 AM/FM high power stereo receiver

SCOTT 386...THE WORLD'S MOST ADVANCED HIGH POWER RECEIVER.

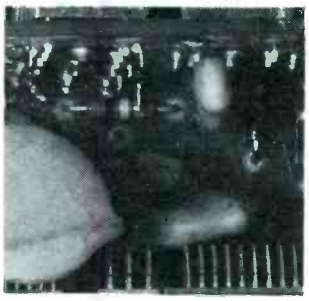


Total Harmonic Distortion. Both Channels Driven into 8 ohms. 120V AC line. 35 watts RMS

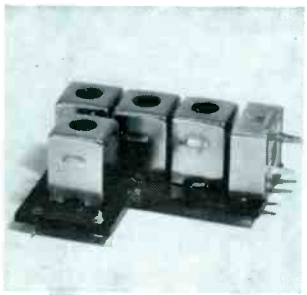
Scott guarantees at least this level of amplifier performance! Massive power transformer and Full Complementary Output circuitry give maximum undistorted power at all audible frequencies.

Featuring such sophisticated technological advances as electronic circuit protection and electronically regulated power supply, the new Scott 386 AM/FM stereo receiver is a new landmark in the field of audio engineering. High usable power and carefully considered design make the 386 the only choice for the experienced audiophile.

Instant-acting electronic overload protection, unlike conventional thermal cutouts, Scott's new protective circuit releases the drive when too much current flows through the output transistors. A circuit-breaker will also trip under prolonged short circuit conditions at high power. There are no fuses to burn out.

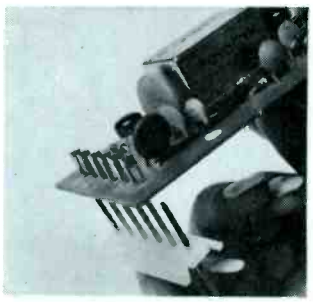


Ultra-reliable space-age circuitry Permanently aligned quartz crystal filter IF, FM amplifier, and four Integrated Circuits (including Perfectune logic module) are included in this small area.



AM reception virtually indistinguishable from FM New Integrated Circuit AM front end features pre-tuned multi-pole filter for optimum AM fidelity.

Instant-information panel indicator lights let you know at a glance whether you're receiving AM or FM, stereo or monaural broadcast. Scott Perfectune indicator tells when you're perfectly tuned for best reception.



New connection techniques eliminate solder joint failures Wire-wrap terminal connections plus plug-in module construction result in the kind of reliability associated with aerospace applications.

■ New illuminated dial results in increased visibility ■ New muting circuit eliminates noise between FM stations ■ Plug-in speaker connectors eliminate phasing problems ■ Silver-plated Field Effect Transistor front end receives more stations more clearly with less distortion ■ Integrated Circuit IF strip virtually eliminates all outside interference ■ Integrated Circuit preamplifier reduces distortion to inaudible levels ■ Full Complementary direct coupled all-silicon output circuitry provides effortless instantaneous power, with maximum reliability ■ Automatic stereo switching instantly switches itself to stereo operation . . . lets you relax and enjoy the music.

386 Control Features

Input selector ■ Tape monitor ■ Speakers #1 On/off ■ Speakers #2 On/off ■ Dual Bass and Treble controls ■ Stereo balance control ■ Power On/off ■ Volume compensation ■ Muting ■ Noise filter ■ Perfectune automatic tuning indicator ■ Stereo indicator light ■ AM indicator light ■ FM indicator light ■ Precision signal strength meter ■ Front panel stereo headphone output ■ Volume control ■ Stereo/mono mode switch.

386 SPECIFICATIONS

Power (± 1 dB) 170 Watts. IHF power specifications (@ 0.8% distortion, both channels driven): Dynamic power @ 4 Ohms, 67.5 Watts/channel; Continuous power @ 4 Ohms, 42 Watts/channel, @ 8 Ohms, 35 Watts/channel. Selectivity, 40 dB; Frequency response ± 1 dB, 20-20,000 Hz; Hum and noise, phono, —65 dB; Cross modulation rejection, 80 dB; Usable sensitivity, 1.9 μV; Tuner stereo separation, 40 dB; FM IF limiting stages, 9; Capture ratio, 2.5 dB; Signal to noise ratio, 65 dB; Phono sensitivity, 3, 6 mV; Price $349.95.

Specifications subject to change without notice.

H. H. Scott, Inc. complies with Institute of High Fidelity standards of measurement as well as their recommendations regarding publication of same. Specifications are based on regular production, not on special laboratory units.

H SCOTT®

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SPECIAL HI-FI SHOW ISSUE

Los Angeles Hi-Fi Music Show Preview—Audio will focus on outstanding, new stereo/hi-fi components and systems to be presented to the public October 1 through 5 at the Ambassador Hotel, Los Angeles, Calif.

Among other feature articles will be:

An Empirical Study of FM Antennas—Leonard Feldman details the results of using different antenna types—from an indoor folded dipole to a 12-element FM antenna/rotator combination.

Tape Transport Maintenance, Part II—H. W. Hellyer discusses tape recorder drive systems and how to keep them in good operating condition.

. . . and more.

PLUS:

Equipment Profiles (Crown DC-300 Stereo Power Amplifier, Dynaco A-25 Speaker System, Sony STR-6040 Stereo FM/AM Receiver, among others).

Record and Pre-Recorded Tape Reviews.

. . . and other regular departments.

ABOUT THE COVER:

Audio Magazine's annual product preview directory is depicted on the cover in type, with each product category identified. This yearlong guide to stereo hi-fi equipment begins on page 28.

Audioclinic

If you have a problem or question on audio, write to Mr. Joseph Giovanelli at AUDIO, 134 North Thirteenth Street, Philadelphia, Pa. 19107. All letters are answered. Please enclose a stamped, self-addressed envelope.

JOSEPH GIOVANELLI

Radio Frequency Interference

Q. My friend and I are attempting to remove radio interference from his tube-equipped tape recorder. We tried many ways to do this, including the lining of the carrying case with screening, but with no success. We attempted to bypass the interference with a 10K resistor in series, and a 5-pF capacitor to ground—paralling the input grid circuit. This did nothing.

Do you suggest the use of a long ground rod driven into the earth? Should we attempt to increase the values of the resistor and capacitor in the grid lines of the input tube? Do you recommend that an r.f. choke be tried in series with positive signal line? Is there a method for creating a balanced type of input when one of the signal lines is chassis ground? Would you recommend replacing the input tubes with transistors?—John C. Leissring, M.D., Los Altos, Calif.

A. Disconnect the microphone and notice if the radio frequency interference (RFI) is still present. If it disappears, this will prove that the microphone line is picking up the interference.

Assume that the interference is still present. If the RFI is eliminated by shorting out the grid circuit of the first stage of the recorder's mike circuitry, you are well on your way to correcting the problem. Obviously, a bypass capacitor of some sort will do the job. (However, do not use disc ceramic capacitors. They are not effective at VHF. Use button micas. Their inductance is lower and they are more efficient.) Rather than the 10K-ohm resistor, open up the input lead and use a VHF r.f. choke. Such a choke can easily be made by winding about 30 turns of fine wire on a high value, 1- to 2-watt resistor. The resistance value can be anything from one megohm and up. (The resistor serves as a winding form for the choke.) You solder the ends of your wires to the pigtails of the resistor. Put a bypass capacitor on the grid side of the choke. Proper ground placement of this capacitor is very important. It should be grounded to the input connector. Failure to do this will permit inductance to enter into the picture. Your bypass capacitor will not even be in the circuit so far as radio frequencies is concerned.

Assuming that shorting the input only partially eliminated the trouble, you must look further, isolating stages one at a time. Repeat the procedure of bypassing and choking each stage where the noise is found to enter.

It is possible that a balanced microphone system would reduce interference. This balanced configuration is obtained by using a matching transformer between the low-impedance microphone and the grid circuit of the microphone input. The primary of the transformer is so wired that both sides of the primary are above ground. Only the microphone cable's shield should be grounded. The length of cable between the matching transformer and the tape recorder should be kept as short as possible in order to reduce the possibility of cable picking up r.f. While it is true that the balanced-line arrangement may not eliminate the RFI, it is nevertheless a worthwhile addition to your friend's tape recorder inasmuch it will enable him to run long cables without picking up hum or without incurring a loss of high-frequency response.

A ground rod sometimes helps. Actually, several rods should be driven into the ground to a depth of at least six feet and wires should be run from each of them to the tape machine. Use the heaviest gauge wire possible for this application. Do not cut these ground lines to the same length.

Heat Sinks

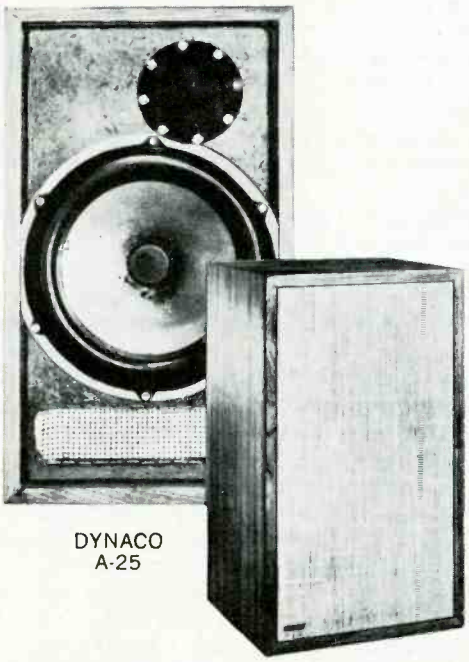
Q. Why do we need a heat sink when removing solid-state devices from a circuit?—Arthur Darrow, Albany, N. Y.

A. Transistors, diodes, and other solid-state devices are readily damaged when overheated. When soldering or unsoldering such a device from a circuit, you might not think there is much heat that could be transferred to the active element of the device. However, heat definitely can be transmitted to it via the connecting lead being soldered or removed. This will damage the device most of the time.

The solution is to clip a small piece of metal to the lead being soldered, and this must be placed between the point to which the soldering iron is applied and the body of the solid-state device. The heat will be conducted to this attached piece of metal more readily than to the innards of the device, thus preventing damage.

This piece of metal is called a "heat sink." Such devices are available com-

WHAT MAKES A GOOD SPEAKER?



DYNACO
A-25

1 Smooth, wide frequency response.

2 Precise transient response.

3 Uncolored, neutral sound.

4 Wide high-frequency dispersion.

5 Value.

We designed the A-25 loudspeaker with these attributes in mind. How well did we succeed?

HERE'S WHAT THE EXPERTS SAY:

1 ". . . the overall response curve (of the Dynaco A-25) was as flat and smooth as can be when measured in a 'live' environment."

Julian Hirsch in Stereo Review, June, 1969.

2 ". . . nothing we have tested had a better overall transient response."

Stereo Review, June, 1969.

3 ". . . we were impressed with the new speakers' honest, uncolored sound."

High Fidelity, July, 1969.

"In our listening tests, the Dynaco (A-25) had a remarkably neutral quality."

Stereo Review, June, 1969.

4 "The highs were crisp, extended, and well dispersed."

Stereo Review, June, 1969.

"An 11 kHz tone could be heard clearly at least 90 degrees off axis . . ."

High Fidelity, July, 1969.

5 "Not the least of the A-25's attractions is its low price of $79.95. We have compared the A-25 with a number of speaker systems costing two and three times as much, and we must say it stands up exceptionally well in the comparisons."

Stereo Review, June, 1969.

Send for literature or pick some up at your dealer where you can also hear the A-25.

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mercially. However, if you don't have one, you can use a pair of long-nose pliers held closed with a rubber band, a pair of tweezers held closed by a rubber band, or even an "alligator" clip.

Controlling Remote Speakers

Q. In addition to my transistorized receiver, which is the heart of my system, I am using a tubed stereo amplifier (32 watts) to power a number of remote speakers. The amplifier is fed from the receiver's record output and the remote speakers are powered from the mono speaker terminals. The amplifier has a speaker output which combines both stereo channels.

My system is built into a wall and the amplifier is located behind the wall where it is inconvenient to get to. The only control I have over it is an off-on power switch on the "business side" of the sound wall.

My problem: The output of the various signal sources varies from one to another, and, as a result, the remote speakers' sound level, depending upon the signal source selected. The result is that sometimes the remote speakers "blast out," and at other times they are too faint. Of course, there are volume controls installed at each of the remotes, but this does not solve the problem. I find it necessary to run to the amplifier to adjust it each time I change signal sources.

My possible solution: To maintain constant remote speaker output, I would like to install a "master" L pad in the remote line so that I can control the amplifier's output level from the control panel at the front of the sound wall.

My question: 1) Does my solution sound feasible? 2) Can you suggest a better solution? — Terry L. Black, Springfield, Ill.

A. 1) You could employ a master L pad in the remote line. However, such a device is wasteful of power. If you have a number of remote speakers, the use of this pad would, under some conditions, result in so severe a power loss that the amplifier might have to be driven into the clipping region at times unless care is taken to monitor the system.

2) I would not do the foregoing, therefore. I would bring out signal from the receiver *after* the volume control, so it could be controlled by the receiver's volume control. Fortunately, the amplifier is a stereo unit. If it were a mono amplifier, you would need to construct some kind of active mixer because connecting both channels of your receiver to a mono source would result in a loss of stereo information. As I stated, in your particular case you won't need the mixer. The signal from each point *at* or *after* the volume control would be fed directly to the appropriate input of the amplifier.

I think you could do very well indeed if you use the arm, or center contact, of the control. Naturally, there will be one such arm for each channel. The shield of the interconnecting cable is grounded to the ground side of the control.

What this means is that once you have a ratio of sound adjusted between your remote and main system, all you need to do is to adjust the gain of your main system whenever necessary and the remote system will automatically follow this gain change.

Keep the interconnecting cables between the receiver and the amplifier as short as possible or you stand a chance of losing some high-frequency response in both the main and the remote speakers.

The only time I can think where the L-pad scheme or some other similar arrangement might be preferable would be in the event that you wish to control the remote speakers separately from the main speakers. Such occasions as dinners or parties might come along where the main system might be used to provide fairly loud listening, and the remote system might be used only for background listening against a running conversation. Even so, I think I would try to find another way to do the same thing, rather than using the L pads. I would probably make up a small transistor preamplifier which would be used between the receiver and the remote system, and which would have a gain control that would affect only the remote system. I would tie the units into the circuit in such a way that the receiver could still be used to control the gain of the entire system, but you would still have the option of changing the gain setting of the remote equipment without need of touching the amplifier.

Copper Wire in Speaker Voice Coils

Q. What is the reason copper is used in woofer voice coils instead of aluminum?—Name withheld.

A. Copper is used in voice coils both because of its good electrical conductivity and its good heat conductivity. Each is an important consideration. Copper is better than aluminum in both these respects.

DYNACO SYNERGISM*
or
how two units combine for even greater value

We have always tried to give outstanding value at Dynaco; and when we work on new designs, our primary objectives are quality and value—quality second to none, and prices far below the levels of competitive quality. Following this philosophy, we have designed our newest power amplifier, the transistorized Stereo 80, in the tradition of the famous Dynaco Stereo 70—extreme reliability, conservative operation and specifications, outstanding quality, and moderate price. The Stereo 80 is compact (it fits any remote space, but is handsome enough to keep on display), cool-running, simple, and elegant. It delivers 40 watts **continuous** power per channel, with both channels operating simultaneously, from 20 Hz to 20 KHz.

The Stereo 80 and our PAT-4 preamplifier create an outstanding combination which delivers crystal clear sound, free of noise and distortion, and with excellent flexibility as the control center for the most complete hi fi installation.

Further, we have combined these units into a single, transistorized integrated package, the SCA-80, and through careful design have achieved SYNERGISM*, the combination giving even greater value than the sum of its parts. The SCA-80 has all the qualities of the Stereo 80 plus the performance and many of the features of the PAT-4—center-out tone controls, low noise, multiple input facilities, headphone output, center-speaker output without the need for a separate amplifier, and so on. It provides complete control facility and yet it is simple to operate with a basic two-knob control action for those who do not require sophisticated features such as loudness, filters, blending, and other subtle variations.

The SCA-80 gives quality plus compact flexibility. The Stereo 80 plus the PAT-4 gives quality, increased flexibility for installation, and greater range of control function. The Stereo 120 plus the PAT-4 gives all this plus extra power plus the benefits of a stabilized highly filtered power supply which makes performance independent of power line variations. In all these choices, quality and value are outstanding—and in the SCA-80, the synergistic benefit enhances the value of the unit.

*SYNERGISM—"Cooperative action of discrete agencies such that the total effect is greater than the sum of the two effects taken independently . . ."

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BEHIND THE SCENES

BERT WHYTE

A VTR Session

IT ALL STARTED as something of a joke. I was talking to an Ampex executive about video tape recording, particularly the prospects for color video tape in the home. He conceded that truly low-cost color recorders were probably a long time off, but that rapid advances were being made in the quality of color video recorders that were used in the industrial and educational fields, and that eventually some of the innovations and new technology would filter down to the lower cost units. "Take our new VR-7800 color recorder," said my friend. "It has a color capability that gets pretty close to the quality of our big studio recorders."

"Okay," I said, "send me one of these marvels and I'll put it through the works." "Oh sure!" said my friend laughingly, "would you like it delivered in a Rolls Royce?"

A week passed and, much to my astonishment, my friend phoned and casually informed me that a VR-7800 recorder was on the way to my home! In due course there was delivered to me the recorder, a 21" color TV monitor, and a black and white video camera—all $18,690.00 worth! Feeling like a Texas oil baron, I interconnected the monster-sized 140-pound recorder with the color monitor and the video camera and began a fascinating exploration of the world of video recording.

The recorder is an imposing 34" L x 19" W x 15" H, with (at first glance) an intimidating array of controls and signal lights. A panel in the front lower half of the recorder swings down on hinges to reveal no less than 21 secondary controls mounted on modular plug-in boards. The VR-7800 utilizes the by-now-familiar helical scan format. One video record/play head is mounted on a 5.3-inch-diameter drum. The head is used to record one field per scan or rotation of the drum. A drum speed of 3600 rpm is required because the drum rotation must follow each occurring field every 1/60 second. Because of the very high frequencies involved—up to 4.2 megahertz—1000 inches per second is the required writing speed. You can see that if you tried to use a linear drive system this would be highly impractical. The video and sync pulses are recorded on the tape in a series of parallel diagonal tracks. A longitudinal tape speed of 9.6 inches per second is used.

The VR-7800 uses one-inch-wide tape, which is available in half-hour and one-hour reels. There are five heads on the recorder, in addition to the video head on the drum. These are the "Audio One" erase head, the "Audio One" record/play head, the "Video/Audio Two" erase head, the "Control Track" record/play head (this is used in connection with the drum servo-control system) and the "Audio Two" record/play head. There are three servo-control systems: one for the drum, one for the capstan, and one for holdback tension.

On the control panel are a series of what Ampex calls "confidence lights."

There are one each for the drum and capstan servos, which when lighted indicate the drum and capstan are phase locked. There are confidence lights for color and monochrome that indicate which is being recorded. High- and low-carrier confidence lights are concerned with interchangeability of tape between differing models of recorders. For example, all tapes made on the model VR-7800 must be recorded while the high carrier is lighted. All motion controls on the recorder are solenoid operated. However, in addition to the usual rewind, fast forward, stop, and play, there is another set of buttons to the right of these controls which are labeled: stop, play reverse, and play forward. These are the controls for the slow motion and stop action modes. As with most professional recorders, there are switches for selecting monitoring of the two audio channels, selecting meters, etc. And there are a number of special items, such as a tension error meter. When this meter reads zero, correct holdback occurs. A minus reading means the top portion of the picture is bending to the left; a plus reading means the top of the picture is bending to the right. Another video control on the panel is a video level meter and control. In the record mode it is used to adjust record level. In the play mode this variable control adjusts the video head to tape tracking. Also found on the control panel are controls for electronic tape editing. Finally, there is the knob/lever called the Ready/Thread and the Tape Timer. In Thread position, the tape guides are pulled away from the drum to allow tape threading. In the Ready position, the guides hold the tape in operating position and ensure good tape wrap.

A Tape Timer is directly driven by the tape movement at 9.6 inches per second and measures tape in terms of minutes and seconds. It is operable in all modes, including rewind and fast forward. Since the timer is accurate to within plus or minus 0.1%, indexing to any part of the tape is virtually repeatable. The only trick here is to remember the particular time setting for a given scene. For example, if you mark down during the recording of a football game the time at which a touchdown occurred—say 4 min. 23 sec.—you can return at any time to that setting and you will be at the correct scene and moment.

Threading tape on these drum recorders is a bit tricky and takes a little practice before you can do it with ease. Getting the double layer of tape around the drum to form the helical scan seems so foreign a procedure after years of working with audio recorders. There are 19 assorted inputs and outputs on the rear panel of the recorder. Many are for professional usage and studio applications. The VR-7800 is compatible with NTSC color (National Television Standards Committee), meaning that the color signal can be broadcast over standard station facilities. Thus, one of the outputs provides a 3.58 megahertz pilot signal to a monitor, while one of the inputs accepts a 3.58 megahertz pilot signal from an external local generator. There are provisions for connection to station sync generator to provide master sync source, outputs to provide master horizontal-drive source for CCTV operation, and inputs for remote control operation, among others. My only concern was with the audio inputs and outputs, and the video inputs and outputs both from the TV monitor as a line source and from the video camera. The audio inputs can be connected for line or mike input, although strictly

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SEA permits tone compensation in any style room. It also compensates for the audio characteristics of components like speakers and turntable cartridges.

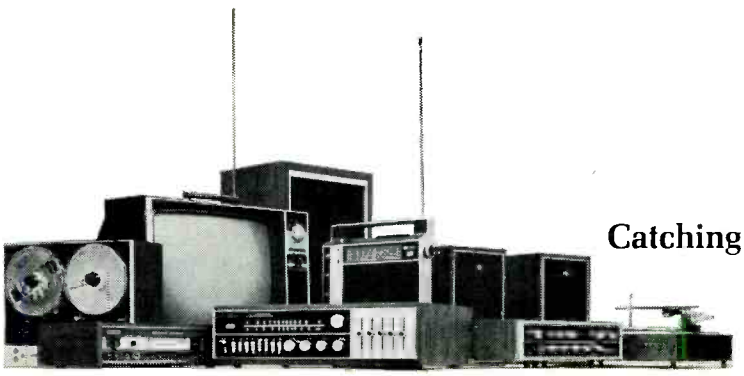
Model 5003 gives 140 watts, sensitive AM, FM and FM Multiplex reception through advanced FET circuitry, automatic stereo switching and a muting switch. Power bandwidth is from 20 to 30,000Hz with a negligible distortion figure of only 0.5% at rated output.

Model 5001 offers 60 watts, IC and FET circuitry, a wide 20 to 30,000Hz power bandwidth, AM, FM, and FM Multiplex reception, and many other features.

These complete stereo units are only two of the many ideas JVC has about making home entertainment products more entertaining. For more, see our color television receivers, tape recorders, radios and full line of professional hi-fi equipment. At any dealer near you handling JVC products.

5001

5003



Catching On Fast

JVC

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speaking, "Audio Two" has an internal captive mike. "Audio One" will accept any low-impedance mike. For most of my recording I used a condenser model.

Operating Observations

The VR-7800 color video tape recorder has a special input board on the rear of the accompanying color TV monitor (which must be used), allowing connection in and out of the video amplifier and in and out of the audio section. Otherwise, the monitor is strictly a garden variety of portable 21-in. color TV set.

I hooked up the color monitor to my antenna system, which is a very good color TV antenna mounted on a rotator. The VR-7800's TV monitor has a three-position switch on the input board: one position permits normal TV reception, another is used when recording from the monitor or the video camera, while the third is employed when using multiple monitors (the video output is said to be able to drive at least ten monitors without degradation of picture quality).

Now I live almost 60 miles from New York City, and I get a picture free of "snow" and excellent in all other respects on my own 25-in. color TV set. (In fact, I've painted the lily by having a remote control that can correct for hue and intensity, thus conveniently enabling me to maintain proper skin tones when camera angles and lighting change.) Using the VTR's monitor for standard TV reception, however, disappointed me. The picture quality was distinctly inferior to my own set. And the range of adjustments for color balance was quite limited. Finally, by rotating my antenna to face Connecticut's channels 3 and 8 across Long Island Sound, I managed to get a picture that could be called "acceptable." Of course, these channels may not necessarily be showing anything of interest. But for a test of the recorder, the subject matter wasn't too important. No doubt, close into the city, with a strong signal, this color monitor would work fine. However, not everyone who would purchase this sort of rig would live in the city, so it seems to me to be a silly thing to saddle a $17,000 color video tape recorder with an inferior monitor. If I owned this recorder, the first thing I would do would be to convert my own color set to accept the various input and output cables. Perhaps I was unlucky enough to get a "dog" for my particular TV monitor. In any case if the recorder is really an accurate machine, on poor channels I should get a poor recording, and on good channels a good recording. That is precisely what happened.

The audio response on the VR-7800 is quite good, but it is hard to appreciate it over the typical tinny speaker of the color monitor. Listening through another speaker, using the 8-ohm external speaker/phone jack on the rear panel, there was a distinct improvement in the sound.

The first impression you get on turning on the VR-7800 is mechanical noise. There is the sound of motors and cooling fans, and the whine of the drum getting up to speed. There are some surges of sound as the drum "hunts" a few times and then locks in on the servo. It is all just a bit disconcerting to someone who is used to audio recorders, but you soon get used to the higher noise levels. It is fascinating to watch the confidence lights come on as the various functions reach stability or readiness. The recording procedure itself is fairly straightforward and generally follows audio practices. The playback is easy enough, but you must remember to adjust the tracking control slowly, starting from a counterclockwise position for a maximum indication on the video level meter. Failure to do this results in a picture with streaks and bars of light and a bending of the picture.

Helical Recording

The VR-7800 has a resolution of some 350 lines to the inch, and when you have recorded a good color program the results are truly excellent. There is no tendency to fuzziness or grain, just a nice clear picture with color balance faithful to what values you had previously adjusted on the monitor. Black-and-white telecasts are recorded with equal facility and fine quality. I was impressed with the fact that when the monitor was adjusted for a picture with the desired brightness and contrast ratios, the recorder precisely mirrored the settings.

Recording a typical program off the TV monitor is, of course, somewhat analogous to the audio practice of recording an FM program. When you go "live" and record with the video camera, you are combining audio and video, and every man is his own producer. While one gets an undeniable kick out of recording a color football game off TV, it is certainly more stimulating and creative when you are using the video camera. The Ampex Model CC-324 is a video camera that can be used for closed-circuit work and attaches right into the antenna terminals of your own TV set, or with a typical video recorder such as this VR-7800. The CC-324 has a one-in. vidicon tube and is otherwise fully transistorized. It has a three-lens turret and is fitted with an Ampex 25-mm F-1.4 lens in the focusing mount. The lens stops down to F-22 and the lens is electronically compensated for scene brightness over a range of about six stops.

This is a fine camera; the lens produces pictures that are sharp and have good contrast, but it does have several drawbacks. The main problem is that it does not have even a simple optical viewfinder. Therefore you must frame and focus on the subject by viewing the monitor, not always the most convenient situation. Much more desirable are the cameras which have a two- or three-in. TV monitor/viewfinder mounted on top over the lens. The F-1.4 lens is fast enough so that at maximum aperture and normal room lighting you can get a fairly good picture. However, the contrast is reduced and, as is common with most lenses, resolution falls off when used wide open, especially at the edges. I found it better to use a photoflood lamp in a 12-in. reflector, bouncing the light off the ceiling. This enabled me to use the lens at F-8 or F-11, which produced a much better picture.

The CC-324 is a black-and-white camera, unfortunately. Working with a color camera would have really been something sensational. The cost situation with color cameras is pretty discouraging, though. The big professional jobs they use in the studios run $35,000 and up. Until fairly recently, there were no color cameras at lower prices. Then International Video Corp. brought out a model for around $14,000. Now I hear they have a model at $11,000, and Sony is said to be ready to market a model at under $9000. As you can see, this isn't exactly beer money!

A few weeks ago I saw a demonstration of a black-and-white video camera which I thought was just amazing. The camera was made by the Luxor Com-

IF YOU REALLY VALUE YOUR RECORDS

DON'T UNDERRATE THE GRAM!

(. . . a commentary on the critical role of tracking forces in evaluating trackability and trackability claims)

TRACKABILITY:

The "secret" of High Trackability is to enable the stylus tip to follow the hyper-complex record groove up to and beyond the theoretical cutting limits of modern recordings—not only at select and discrete frequencies, but across the entire audible spectrum—and at *light tracking forces that are below both the threshold of audible record wear and excessive stylus tip wear.*

The key parameter is *"AT LIGHT TRACKING FORCES!"*

A general rule covering trackability is: the higher the tracking force, the greater the ability of the stylus to stay in the groove. Unfortunately, at higher forces you are trading trackability for *trouble*. At a glance, the difference between ¾ gram and 1, 1½, or 2 grams may not appear significant. You could not possibly detect the difference by touch. *But your record can! And so can the stylus!*

TRACKING FORCES:

Perhaps it will help your visualization of the forces involved to translate "grams" to actual pounds per square inch of pressure on the record groove. For example, using ¾ gram of force as a reference (with a .2 mil x .7 mil radius elliptical stylus) means that 60,000 lbs. (30 tons) per square inch is the resultant pressure on the groove walls. At one gram, this increases to 66,000 lbs. per square inch, an increase of *three tons* per square inch—and at 1½ grams, the force rises to 75,000 lbs. per square inch, an increase of *7½ tons* per square inch. At two grams, or 83,000 lbs. per square inch, *11½ tons* per square inch have been added over the ¾ gram force. At 2½ grams, or 88,000 lbs. per square inch, a whopping *14 tons* per square inch have been added!

The table below indicates the tracking force in grams and pounds, ranging from ¾ gram to 2½ grams—plus their respective resultant pressures in pounds per square inch.

TRACKING FORCE		GROOVE WALL PRESSURE		
GRAMS	POUNDS	POUNDS PER SQUARE INCH		
		(See Note No. 1)		
¾	.0017	60,000		
1	.0022	66,000	+10%	(over ¾ gram)
1½	.0033	75,000	+25%	(over ¾ gram)
2	.0044	83,000	+38%	(over ¾ gram)
2½	.0055	88,000	+47%	(over ¾ gram)

SPECIAL NOTE:

The Shure V-15 Type II "Super-Track" Cartridge is capable of tracking the majority of records at ¾ gram; however state-of-the-art advances in the recording industry have brought about a growing number of records which require 1 gram tracking force in order to fully capture the expanded dynamic range of the recorded material. (¾ gram tracking requires not only a *cartridge* capable of effectively tracking at ¾ gram, but also a high quality manual *arm* [such as the Shure-SME] or a high quality automatic turntable *arm* capable of tracking at ¾ gram.)

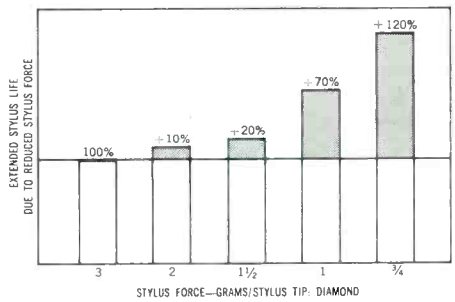
TESTS:

Our tests, and the tests of many independent authorities (see Note No. 2), have indicated two main points:

A. At tracking forces over 2 or 2½ grams, vinylite record wear is dramatically increased. Much of the "high fidelity" is shaved off of the record groove walls at both high and low ends *after a relatively few playings.*

B. At tracking forces over 1½ grams, *stylus wear is increased to a marked degree.* When the stylus is worn, the chisel-like edges not only damage the record grooves—but tracing distortion over 3000 Hz by a worn stylus on a brand new record is so gross that many instrumental sounds become a burlesque of themselves. Also, styli replacements are required much more frequently. *The chart below indicates how stylus tip life increased exponentially between 1½ and ¾ grams*—and this substantial increase in stylus life significantly extends the life of your records.

RELATIVE AVERAGE TIP LIFE VS. TRACKING FORCE



No cartridge that we have tested (and we have repeatedly tested random off-the-dealer-shelf samples of all makes and many models of cartridges) can equal the Shure V-15 Type II in fulfilling all of the requirements of a High Trackability cartridge—both *initially* and after *prolonged* testing, especially at *record-and-stylus saving low tracking forces.* In fact, our next-to-best cartridges—the lower cost M91 Series—are comparable to, or superior to, any other cartridge tested in meeting all these trackability requirements, regardless of price.

NOTES:

1. From calculations for an elliptical stylus with .2 mil x .7 mil radius contact points, using the Hertzian equation for indentors.
2. See HiFi/Stereo Review, October 1968; High Fidelity, November 1968; Shure has conducted over 10,000 hours of wear tests.

SHURE

V-15 TYPE II

SUPER-TRACK HIGH FIDELITY PHONOGRAPH CARTRIDGE

Write: Shure Brothers, Inc., 222 Hartrey Avenue, Evanston, Illinois 60204

Check No. 11 on Reader Service Card

pany, a Swedish concern which manufactures a line of audio tape recorders which were sold here some years ago. In this camera, the vidicon tube is mounted on a rack-and-pinion focusing mount. The camera was fitted with the same standard Ampex 25 mm, F-1.4 lens as the CC-324. This combination allows one to do some astonishing close-up photography. Given enough light you can focus so close you can almost touch the subject. It is really a form of macro-photography. In the demonstration I saw, a dollar bill was taped to a wall and the focus adjusted until the *eye* of George Washington filled the entire screen of the monitor! A tiny screw took on the dimensions of a huge bolt. The applications of such a camera are endless. One electronics manufacturer is using it to train employees in the fabrication of miniature circuits. It is being used to show details of surgical operations. Other lenses of different focal length can be used with this camera in the macro configuration, with results as equally impressive as the standard lens. If this focusing device is not patented, it would be a welcome addition to any camera.

Applications

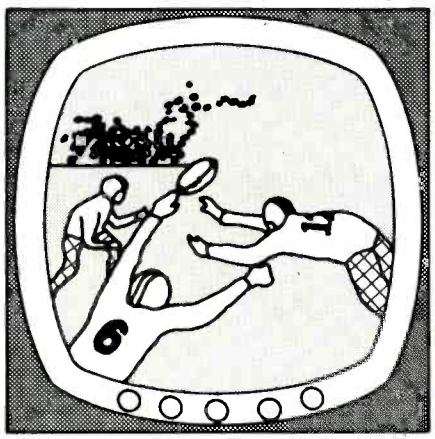
Once you have the camera properly adjusted and the lighting arranged, the fun begins. The things you can do with a video recorder and camera are limited only by your imagination. My wife bought a new dress and found she had to adjust the hem. Therefore, she pinned it up preliminary to sewing it. She asked me if it was even all around and hanging right. I told her that I was just a mere male, but that I could get her an expert opinion. So I took her down to the recreation room, turned on the video recorder, and photographed her making several full turns. On playback she was able to observe all angles, including the back of the dress.

As a party item, the video recorder has no equal. Many people have seen themselves on TV at expositions and fairs, but for one thing that was in public. For another, there usually wasn't any audio. Once they see and hear themselves on the monitor, even the most normally reserved and inhibited people become outrageous hams. Talk about mugging and yakking! Needless to say there are skits and playlets and "news broadcasts" that would never get by a station censor. The most fun is when someone is feeling no pain after imbibing freely and you tape his antics. When you show the tape when he is sober, the results are dramatic, with many howls of "Oh no! That can't be me!"

In a more serious vein, the video recorder is a great teaching tool for an infinite variety of subjects. The gift of being able to see yourself as others see you is finally a reality, sometimes a rather shocking reality, as you become aware of some of your shortcomings.

The VR-7800, as noted earlier, has slow-motion and stop-action facilities. When you are in the stop mode in normal operation, by depressing the stop button in the slow-speed group of controls, you activate this section. As far as I am concerned, no video recorder is complete without this convenience. As a teaching tool, this feature is valuable beyond all measure. People learning to dance or trying a new step merely need to record themselves, then observe the results in slow motion. The same holds true for your golf swing, trampoline flips, you name it.

On recording off TV, the slow facility has endless utility. On any sports event—football, baseball, golf—after you



have taped the program, you can select any portion or play and either play it back in slow motion or stop the action completely. Sure, you get some slow and stop action during most football games, for example, but with the recorder you can choose what you want to see rather than what the commentator chose for you. Furthermore, you can repeat a scene as many times as you want, until you understand the situation completely. I taped a spectacular racing-car crash from TV, and on replay was able to analyze with the slow and stop action what had caused it and how certain drivers coped with such an emergency.

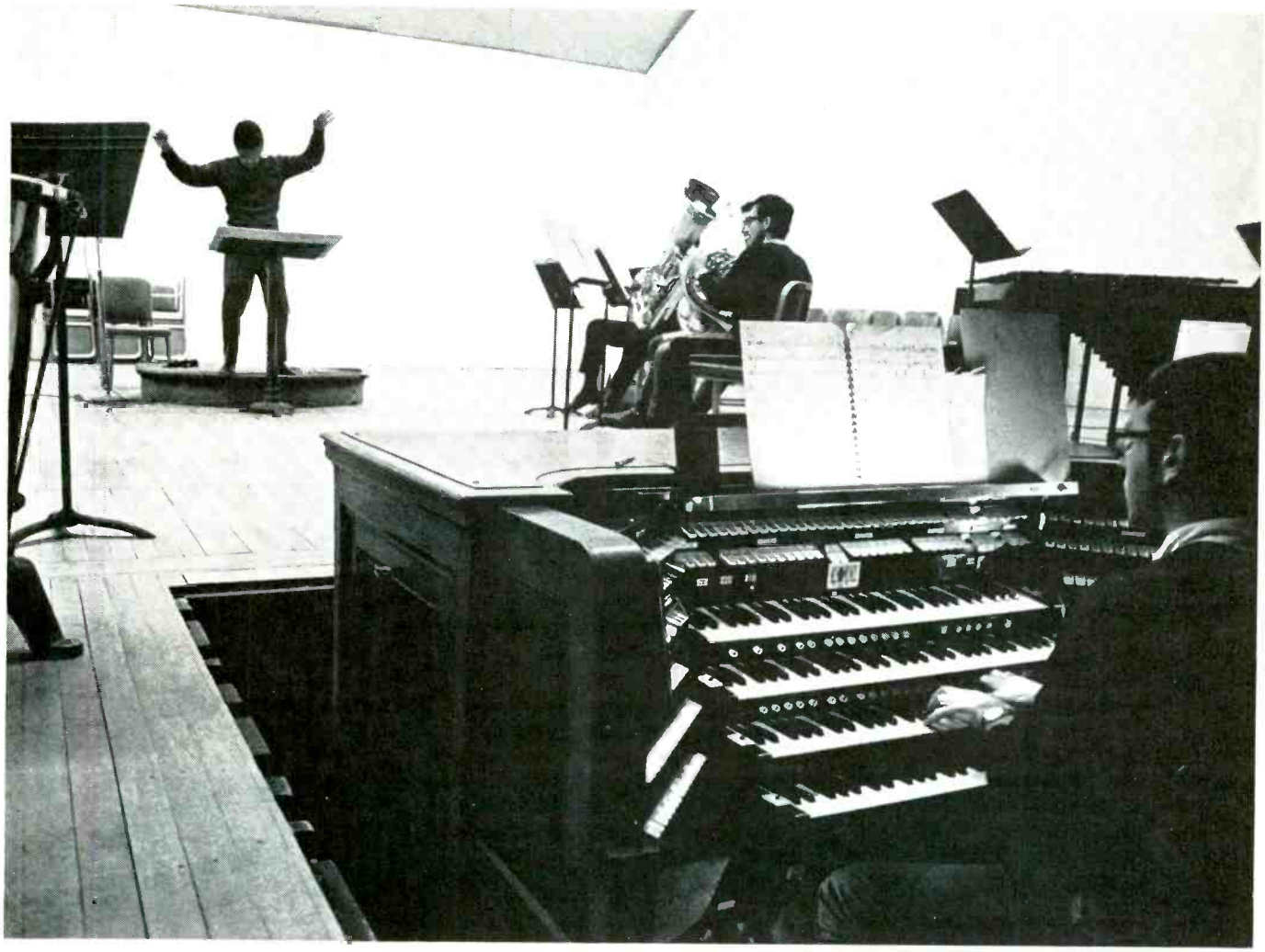
With these special controls you can also have some fun with gag effects, since there is a play reverse and play forward mode with a variable control. Thus you can do the old movie trick of having a person flip up out of a swimming pool and back onto the diving board. Or you can run at approximately twice normal speed in the play forward mode for a "Keystone Kops" effect. I did this with the aforementioned auto race and I had those cars cornering at unbelievable speeds!

One of the most unusual facilities of the VR-7800 is electronic editing. This allows electronic insertion of both audio and video information on previously recorded tape, thereby eliminating transients and picture roll caused by mechanical splices. Thus, such things are possible like adding new audio tracks to previously recorded material without erasing the video information. Short or long inserts with both andio and video information can be put into a previous recording. For a short insert, as an example, you simply connect up your monitor to recorder video out, connect your audio and video insert source to the appropriate input packs, set the Edit-mode selector to short insert, put the recorder in Play, and adjust the tracking control for maximum indication on the video level meter. When the tape has played to the point you have selected for the insert, you press the record and play buttons simultaneously, run the insert material no longer than 20 seconds, and then stop the tape. Long inserts follow the same procedure for longer periods. There is also an Assemble-edit mode, which is for adding information that extends past the end of a previously recorded section of tape. This is fairly involved and includes using the servo control track of the capstan servo, but it is all accomplished by switching to the Assembly mode and then following a relatively easy procedure.

The accurate timer is a great aid in all this electronic editing, as it enables you to make the inserts at the precise spot you wish. Would that audio recorders had such an editing function. There have been reports that an East German company had such an electronic editing device for audio recorders, but that it was terribly complicated and very expensive. Besides which, I've been told that it didn't always work too well!

In summation, there is no doubt that, for industrial and educational clients (or rich Texans), this Ampex VR-7800 is a superb performer. After a relatively short indoctrination period, I was able to handle the machine with ease and utilize all of its facilities to optimum purpose. I reiterate, I would like to see a better monitor set. And the need for a low-cost color camera is obvious. But I learned a great deal using this machine, had a lot of fun, and shall part from it with great reluctance. Æ

When absolute musical accuracy is required, Acoustic Research speaker systems are usually chosen.



A statement by composer Henry Brant:

"On March 24, 1969 the Eastman Wind Ensemble, Donald Hunsberger conductor, presented a program consisting of four of my spatial compositions.

The problems posed for the recording were unusual in that my music requires specific setups for the performers in particular positions in the hall, as well as on stage. In the four works heard, groups of woodwinds, brass and percussion — in some cases, each one led by a separate conductor — were disposed in the balconies, and behind and at the sides of the audience at the ground level, as well as on stage. A pipe organ, sounding from stage rear, was also used. The spatial arrangement of the players was different for each composition, and in all these pieces the music given to the separate groups is highly contrasted, no two groups ever playing the same music or even anything similar.

The photograph was taken during a rehearsal and shows one of the participating groups under my direction. (A separate orchestra in the top balcony, not shown in the photograph, is being simultaneously led by Dr. Hunsberger.)

The recording was made by using four channels simultaneously on ½-inch wide recording tape. Neumann U-47 microphones were spaced in a rectangular array in the audience seating area, to produce a recording which is played back through four speaker systems, one in each corner of the listening room. Four AR-3a speaker systems were used as control room monitors during the recording and playback.

The results, both in the amount of resonance achieved and in the quality of sounds produced, are impressive, and suggest the initiation of further experiments aimed at capturing the specific details of directionality which define the sound of classical and contemporary antiphonal music."

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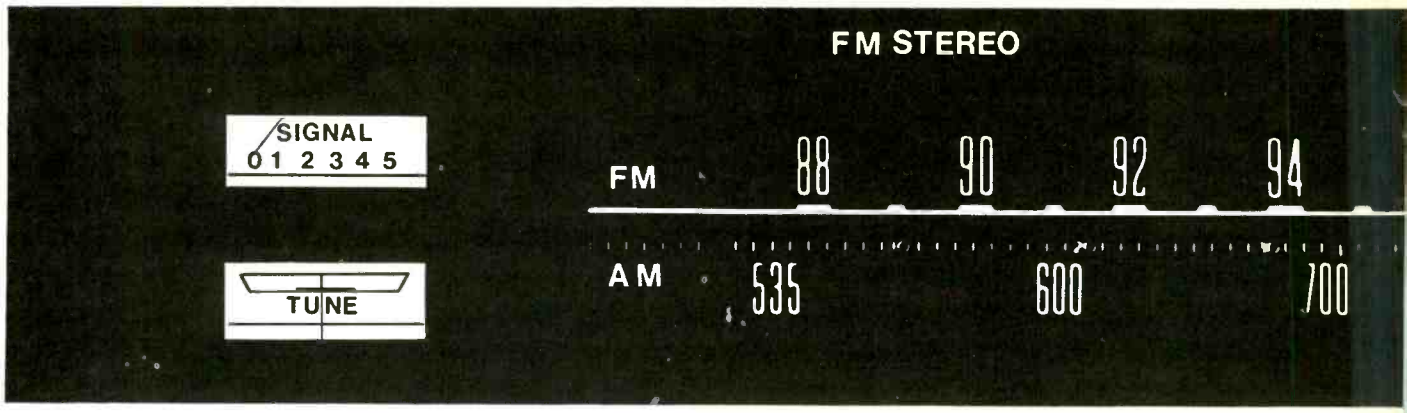
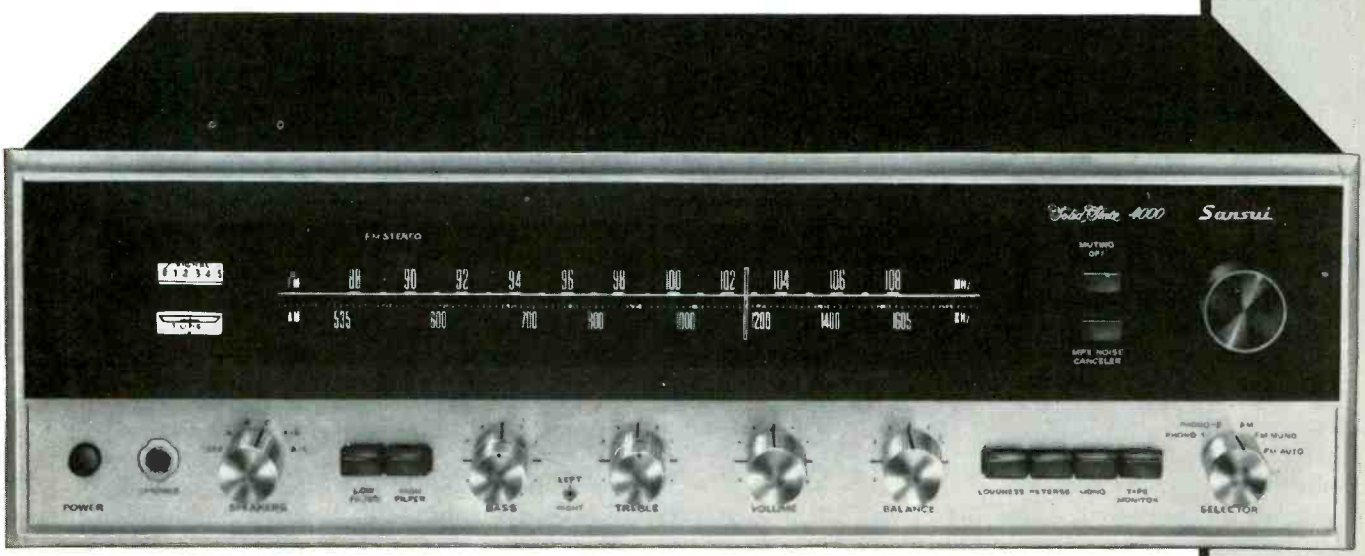


widedialed wonder ... and linear too



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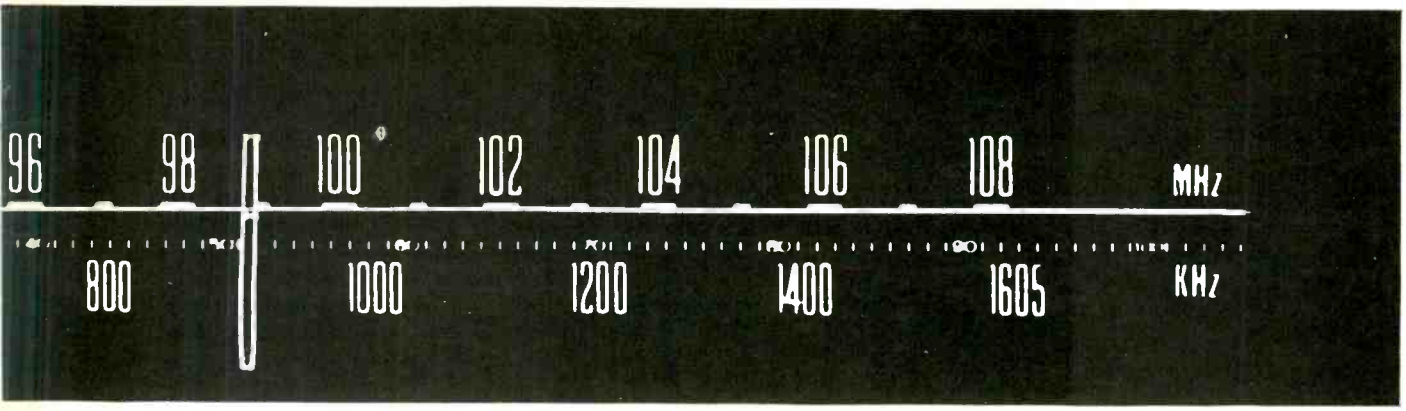

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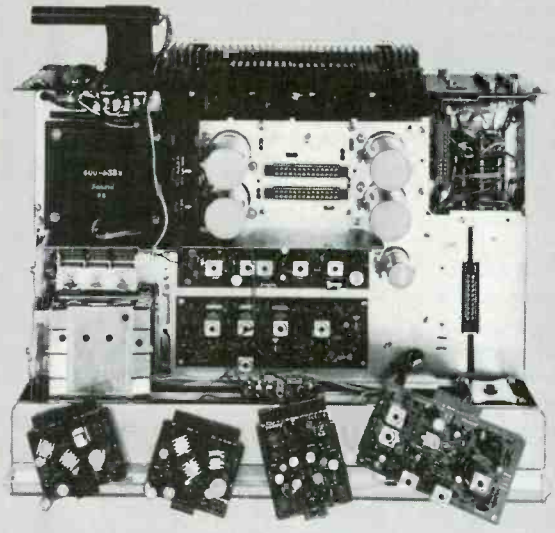
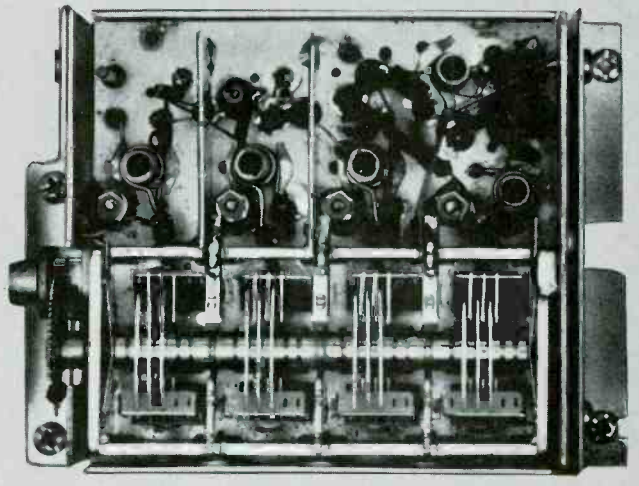


Sansui 4000's new printed circuit design features separate P. C. modules with plug-in multi-connectors for FM MPX, preamplifier and driver amplifiers, permitting faster more economical servicing.



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REAR VIEW
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Tape Guide

If you have a problem or question on tape recording write to Mr. Herman Burstein at AUDIO, 134 North Thirteenth Street, Philadelphia, Pa. 19107. Please enclose a stamped, self-addressed envelope. All letters are answered.

HERMAN BURSTEIN

Q. I wish to tape audio oscillator sounds, electronic organ sounds, piano sounds, etc. I plan to sell tapes of these sounds as part of a music course. Reproducing one tape at a time from a master tape, and maintaining good quality of sound reproduction, especially pitch accuracy, what equipment do I need?—A. M. Larson, Edison, N. J.

A. If you are planning to make tapes for resale, highly accurate speed is imperative. For example, if you say something is a 1000-Hz tone, it should be that within at most 0.2%. And this takes you into the area of professional equipment, both for a master recording unit, a master playback unit, and a duplicate recording unit or units. Accordingly you should pursue your inquiries in an audio house that deals extensively or exclusively in professional tape equipment.

Q. I wonder if you could give us information on various brands and kinds of magnetic tape. We need to make a large purchase of tape for several language labs and wonder what some of the best buys might be for such purposes. We want tape that can cope with problems of heat, humidity, and long use and storage. We wonder about non-name brand tape. What about sandwich tape? We've heard it tends to wear the playback head more than other tape. I have heard that the best buy is probably surplus computer tape. Is this generally true? Naturally we are interested in a tape that has good fidelity, low wear and abrasive qualities, and doesn't shed excessive oxide.—Rev. Harold Watson, Atchison, Kansas.

A. If you treasure your recordings and want to use and store them for a long time, and if you want assurance of high quality, it is worth investing in top-grade tape, probably of the 1½ mil polyester (Mylar) type. Second-grade tape may or may not be as good; there simply is no assurance of quality and stability of performance. Surplus computer tape is apt to have different frequency response characteristics than tape designed expressly for audio. Audio tape of less than first-grade quality may be inferior in various ways, including the extent to which it causes head wear. I don't know that sandwich tape is harder on tape heads than the regular kind of tape. It is designed for many, many playings with minimum tape wear. However, sandwich tape tends to have somewhat poorer treble characteristics than conventional tape.

*Q. I purchased a *** tape player with no playback preamp. Since my audio system amplifier has no tape-head input, I connected the tape head to the low magnetic phono input of my amplifier. However, my record player, which is connected to the high magnetic phono input, then won't play. What can I do?*—Adam Izzo, Ellwood City, Pa.

A. Assuming that your amplifier has a high-level input jack available, I suggest that you purchase one of the phono-tape head preamps available on the market. Feed your tape head into this preamp, and feed the output of the pramp into the high-level input jack of your audio amplifier. If you consult the catalogs published by audio mail order houses, you will find preamps such as I have described available for about $25 or less; this price will cover either a stereo unit or two mono units.

Q. I am extremely disenchanted with my tape recorder, the basic problem being noise. I am using top-flight tape and other audio equipment. Except for the tape recorder, no noise exists in my system. Tape hiss is absolutely unbearable. I have had the tape recorder back to the factory, and they assure me it is well within design specifications. I have tried various low-noise tapes, and they have done little good. I bought my tape recorder on the basis of test reports and audio room listening tests. The noise in a show room is far too high to permit listening to anything, so I did not pick up the tape hiss there. I have tried several other high-quality tape recorders in my home, but they are no better than the on I own. Is there anything I can do or try? At present the noise level is so high that I do not use the recorder.—R. B. Martin, New York, N. Y.

A. In an audio system with as fine a preamp and amplifier as yours, having extremely low noise, the noise of a component such as a tape recorder, which at best is only about 55 dB below peak recording level, tends to show up markedly. In other words, you will get appreciable noise with the best of tape recorders and the best of tapes, unless you are willing to incur serious deterioration in terms of distortion and limited treble response. I have two suggestions. First, try recording at increasingly higher levels until distortion becomes apparent. In other words, you may have a tendency to under-record. Second, try playing back at a more moderate level; possible you have a tendency to play back at levels "louder than life."

Q. I was under the impression that (where bias is adjustable) you should "peak the bias" for maximum output for each type of tape on which you wish to record. I mentioned this to two other people and was terribly put down. It seemed to be the consensus that the bias was to reduce cross-talk. This may be possible, but at the moment I fail to see how. I am now very confused and would like your help.—Michael Sykora, Ascension Island.

A. I have never heard of adjusting bias to reduce cross-talk. The purpose of bias is to minimize distortion and maximize the amount of signal recorded on the tape. Unfortunately, bias acts also to erase high frequencies. Therefore a compromise is sought between low distortion and extended treble response. A frequent technique for adjusting bias (or for arriving at a first approximation to correct bias) is to adjust bias for the maximum output at a frequency such as 500 or 1000 Hz, and then further increase bias slightly until output drops about ½ dB. The purpose of the further increase is to put bias in an area where moderate changes in bias current (for example due to oscillator warmup) will not appreciably affect frequency response.

*Q. I expect to purchase a stereo system and would like to include a *** tape deck. I understand that with it I may record four separate mono tracks. However, I am not quite sure as to how I will be able to reproduce just one of the tracks through both speakers.*—Philip Katowitz, Brooklyn, N. Y.

A. Most amplifiers and receivers permit you to play only the left channel, or only the right channel, through both speakers. The stereo mode switch, or a similarly designated switch, will have positions typically marked A and B, or left and right, or 1 and 2, for the purpose in question. However, I cannot promise that *every* stereo amplifier or receiver has this feature. Therefore in shopping for your audio equipment make sure this feature is included. Æ

How to recognize a stacked deck.

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Letters from Readers

Pre-Recorded Tape Blues

• I am a reel-to-reel pre-recorded tape fan. Some tapes are quite excellent, but far too many are defective due to poor quality control at the tape reproducers. This industry has not developed the quality controls that disc manufacturers have. Even worse is the fact that some do not back their defective tape products. I urge "Audio" readers to write to the manufacturer every time they buy a defective tape. Maybe consumer pressure will help.

DON B. SPANGLER
Dayton, Ohio

Burned-Out Headphones

• Your Audioclinic column discusses the principle cause for failure of headphones as overload [July 1969 AUDIO].

Koss Electronics, Inc., keeps accurate records of the causes for headphone failure through its Customer Service Department. By far, the highest instance of failure results from overload damage when the user plugs the phones in with the volume control of his receiver or pre-amplifier turned up for the higher speaker levels. Under these circumstances, headphones which will perform indefinitely at several watts of power or less, are subjected to overload by transients which exceed by 10 times or more the normal power rating.

HOWARD SOUTHER
Vice President—
Marketing/Engineering
Koss Electronics, Inc.
Milwaukee, Wisc.

Cleaner Records

• It has always puzzled me that so much time, effort, and money is expended by the average audiophile on the initial cost and maintenance of playback systems while playback sources are rarely, if ever, treated so carefully.

The device mentioned [to clean and maintain records] in the *Audio Techniques* section of the March issue is a good step in the right direction, but I feel the method I've been using for the last couple of years is an improvement . . . it produces short bursts of relatively high-velocity air, as opposed to a steady stream of low-velocity air. After trying to find the best way of cleaning disks, I found that short pulses were much more effective than steady streams in dislodging stubborn particles. Also, it's clear that higher-velocity air can both more easily dislodge particles and send them further away once dislodged so that they just land on the record again.

This wonder tool is simply a can of compressed air with a standard nozzle attached to which is a six-in. piece of 1/32" I.D. plastic tubing, the type of nozzle-tube arrangement found on cans of tuner cleaner. Electron microscopists use this type of arrangement to clean their specimens before examining them.

Sources of compressed air cans include: (1) Ladd Research Industries, Burlington, Vermont. They sell the can and nozzle as a unit for about two dollars; (2) Lafayette and Allied catalogs. These are the paint "Spray Brush" replacement power units such as that found on page 401 of the Lafayette catalog (14 T 5011). They will accept the nozzles found on cans of tuner cleaner or the Ladd nozzles. These nozzles can be used repeatedly; (3) Local hardware stores often carry such spray brush power units, but usually not as cheaply.

One possible note of caution should be added. Keep the Allied and Lafayette cans upright within 30° of vertical while spraying or a small amount of liquid freon may be discharged. If you manage to spray some of the liquid on the record there is usually no damage, unless quite a bit is sprayed. It's not that great a problem . . . after five minutes practice with a not-so-favorite record you'll be an old pro. The results are really amazing, particularly for those who enjoy classical guitar music or piano solos.

GEORGE HART, JR.
Bangor, Me.

ERRATA

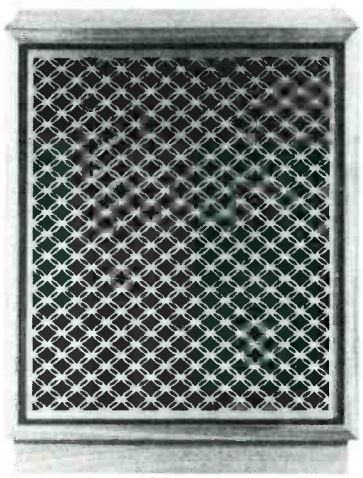
Illustration references in the text of **Layman's Guide to Microphone Specifications,** August 1969 AUDIO should be corrected as follows: Figure **25** references on pages 61 and 62 should be changed to Figure **20;** and Figure **21** reference on page 63 should be changed to Figure **17.**

No artificial coloring added.

The new Marantz Imperial speaker systems are completely free from artificial coloration, that unnatural, beefed-up sound which is so unlike the original music. A sound unfortunately inherent in so many well-known speakers, regardless of price.

What Marantz *does* give you is clean, crisp performance with an essentially-flat response up to 20,000 Hz. Performance that lets you enjoy music for hours on end without "listening fatigue."

The Marantz Imperial speaker systems' design incorporates five speakers in an enclosure only slightly larger than a standard book-shelf speaker. Yet, the power and quality of the sound they deliver are comparable to theatre speaker systems not only twice their size but many times their cost. The sleek, contemporary Imperial I has a smart, walnut cabinet with a hand-rubbed French lacquer finish and is priced at $299. The elegant Imperial II, handcrafted from selected hardwoods and finished in distressed antique, features a stunning hand-carved wood grille. It's yours for $369. Both possess a beauty of cabinetry equalled only by the beauty of their sound.



When you hear, when you see these magnificent speakers, only then can you fully appreciate what goes into making a Marantz a Marantz. Your local franchised Marantz dealer will be pleased to furnish you with complete details and a demonstration. Then let your ears make up your mind.

marantz.

THE SOUND OF MUSIC AT ITS VERY BEST.

EDITOR'S REVIEW

AUDIO Magazine's annual product directory, featured in this issue, covers about 725 models (not to mention receivers available with or without AM tuner sections, speaker systems available in a variety of finishes, kits with factory-wired versions, and so on). Electronics—receivers, amplifiers, preamplifiers, and tuners—constitute 191 of these models; speaker systems, 144 models; tape recorders, 126; microphones, 54; automatic turntables, manual turntables and separate tone arms, 50; phono cartridges, 40; modular systems, 43; headphones, 34; and many products that fall into a miscellaneous category. Clearly, stereo hi-fi enthusiasts have many components to choose from.

Here are some *mean* specification figures from the listings for you to ponder: Power output per channel (IHF) at 8 ohms: receivers, 45 watts at 0.5% total harmonic distortion (THD); amplifiers (both integrated and basic), 60 watts at 0.5% THD; basic power amplifiers only, 75 watts at 0.25% THD; modular systems, 20 watts at 0.8% THD.

Among other interesting facts gleaned from AUDIO's latest product directory are: ☐ Receivers: 28% include AM sections; mean FM sensitivity (IHF) is 2 μV, while mean selectivity is 45 dB. ☐ In contrast, about 40% of the separate tuners incorporate AM sections; mean FM sensitivity (IHF) is also 2 μV; mean selectivity is a more impressive 54 dB.

☐ Approximately 65% of speaker systems listed in this year's directory employ acoustic suspension systems; 38% are two-speaker, two-way systems. ☐ Of the open-reel tape recorders listed, 65% are decks (that is, they do not include power amplifiers). ☐ The under-$100 open-reel tape machines have given way to cassette and cartridge tape machines, a new product category initiated this year. Since auto tape machines were excluded from the directory, it is not surprising that 78% of the units listed in this section are cassette tape machines. Only 22% are decks, in contrast to the 65% figure previously noted for open-reel tape machines. ☐ Over 67% of the stereo phono cartridges listed incorporate elliptical styli. ☐ The great majority of microphones are dynamic types, though condenser types are well represented. Cardioid or uni-directional pickup patterns account for 68% of the models.

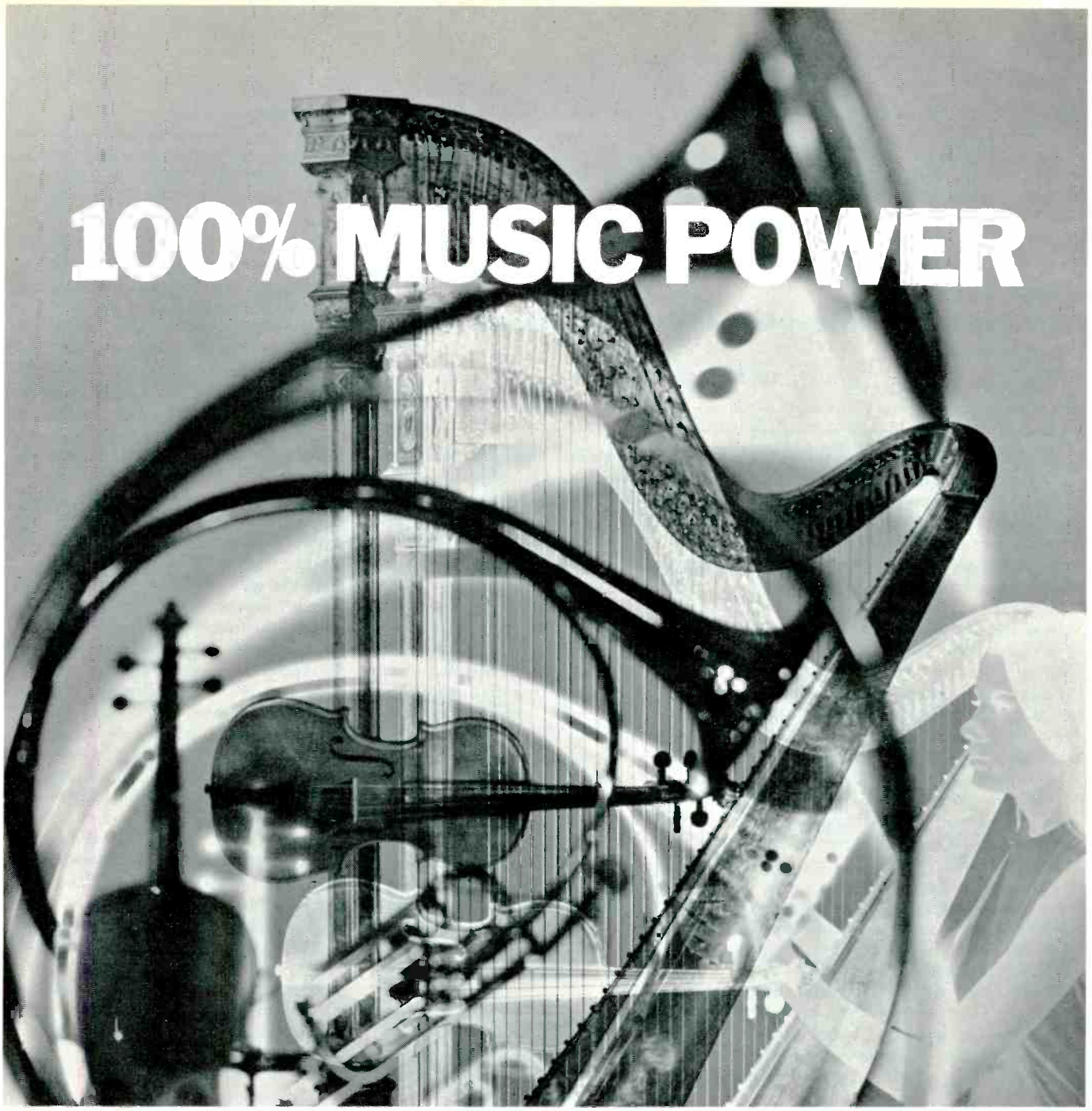
Median specification figures simply indicate ratings mid-way between extremes, of course. They do not indicate whether one can obtain a receiver with an amplifier section that has a .03% THD rating or one with a 200 watts (IHF) per channel power rating (0.1% and 100 watts are the best figures listed for receivers, so the answer here would be "no." The examples given represent ratings in the separate power amplifier category of components). Nor does a particular specification always point to a component that is best for *you*. For instance, if you live in a metropolitan area, a stereo FM tuner's sensitivity rating is certainly less important than its selectivity figure (the higher the better) and its capture-ratio specification (the lower the better). And though the amplifier power required to drive a speaker system properly in a typical room averages (mean) 10 watts (IHF) per channel at 8 ohms, it is not uncommon to find speaker systems for which manufacturers recommend a minimum of 25 watts or more per channel, and some which demand much more (as well as much less) power. Power considerations must also be weighed for listening to music reproduced in larger-than-average rooms, "dead" rooms, driving of extension speakers simultaneously, flexibility of changing to lower-efficiency speakers in the future, and so on, not to mention under-stated minimum power requirements.

Specification/feature/price comparison charts are certainly a great assist when one wishes to purchase a component. But do not overlook listening to and (if appropriate) handling the models under consideration. Though specifications of electronic hi-fi components can often be translated into actual performance capabilities, transducers cannot, except in a broad sense. But even with electronic components, there are many nuances that escape specification lists. Therefore, it is wise to supplement comparing specifications and prices by a trip to your local audio dealer for a personal look and listen.

For another golden opportunity to look, listen, and ask questions, do consider attending hi-fi shows. There's a big one coming up in Los Angeles, October 1 (Wednesday) through October 5 (Sunday). It will be held at the Ambassador Hotel, Los Angeles, Calif., with show hours as follows: October 1, 2, and 3 (4:00 PM to 10:30 PM); October 4 (12 Noon to 10:30 PM); October 5 (12 Noon to 6:00 PM).

Other hi-fi shows scheduled soon are: KXL-FM's Stereo Hi-Fi Show at the Sheraton Motor Inn, Portland, Oregon (Friday through Sunday, November 14 through 16) and KISW's (joint sponsorship with the *Post-Intelligencer*) Seattle, Washington show at the Washington Plaza Hotel (Saturday and Sunday, November 22 and 23).

A.P.S.



PHOTOGRAPH BY FRANZ EDSON

Words are inherently limited in stimulating the emotions aroused by music. This is especially so in describing how high fidelity components perform.

With cartridges, for example, we speak of flat frequency response, high compliance, low mass, stereo separation. Words like these enlighten the technically minded. But they do little or nothing for those who seek only the sheer pleasure of listening.

We kept both aspects in mind when developing the XV-15 series of cartridges. We made the technical measurements. And we listened.

We listened especially for the ability of these cartridges to reproduce the entire range of every instrument. With no loss of power. That's what it takes for a cartridge to recreate the most subtle nuances that distinguish one musical instrument from another. An oboe from an English horn. A trumpet from a cornet.

We call this achievement "100% music power."

When you play your records with an XV-15, you won't be concerned with even that simple phrase.

Instead, you'll just feel and enjoy the renewed experience of what high fidelity is really all about.

PICKERING

THE NEW PICKERING XV-15/750E.
PREMIER MODEL OF THE XV-15 SERIES. TRACKS AT ½ TO 1 GRAM. DYNAMIC COUPLING FACTOR OF 750 FOR USE IN FINEST TONEARMS. $60.00. OTHER XV-15 CARTRIDGES FROM $29.95. PICKERING & CO., PLAINVIEW, L.I., N.Y.

Check No. 21 on Reader Service Card

Tape Transport Maintenance

Part I: Tape Head Cleaning and Adjustment

H. W. HELLER

IN A RECENT service-shop review of repairs, we found that thirty per cent of the tape recorders brought in needed little more than routine cleaning and adjustment. A few notes from the workshop bench on general maintenance could assist one to avoid such "repairs."

Head cleaning is the sort of standard operation that is often taken for granted. However, perfunctory head cleaning can be worse than no effort at all. Also, attempting to scour and polish tape recorder heads without the right cleaning fluids may be an invitation to premature wear. Tape oxide is abrasive, especially when mixed with dust in a cement whose binding agent has been the very solvent employed to clean the heads.

First action is to clean any hard scale away, using a pointed wood scraper. There are special softwood tools for the job, but cocktail sticks, manicure picks and other wooden implements can be brought into use. Oxide can build up into thick deposits in the wedge angles of some heads, where tape guide plates are fixed to the head block. Clear such deposits first and blow away the scrapings, then tackle the head facing with a swab-stick soaked in surgical spirit, cotton wool or linen tapes and pads moistened with methylated spirit, or one of the several brand-name preparations.

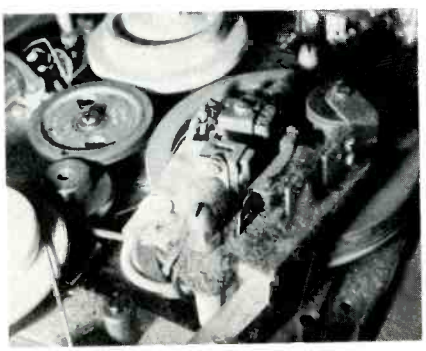
The important point to remember when spirit is used: clean away the residue. And never thread up the tape again until the cleaned surface is dry. It takes only a minute or two.

The exception here is the tape-head cleaning preparation that contains silicone. This is intended to clean and lubricate. The cleaning action is completed with a wipe over and, as the carrier fluid dries away, a fine layer of lubricant is left to coat the heads, guides and running surfaces. Watch that point, "running surfaces." There are some solvents intended for head cleaning *only*, which must never be allowed to attack the rubber of a pressure roller. Read the instructions on the cleaning-fluid package if there is any doubt. And if the package has no instructions, don't buy it!

Tape guides need their share of treatment, too, especially in the hard-to-see angles between the flanges and barrel. Constant tape friction can wear flats on the barrel face, and the problem of tape wear increases, as does the friction caused by a greater area of rubbing surface. If the wear has not been constant, the tape will pull toward the point of greatest pressure, the thin end of the wedge, and the double faults of mistracking and uneven tape contact will aggravate matters. If it is possible to turn the guide to present an unworn surface to the tape, so much the better, but not if doing so is going to alter the height of the guide in relation to the run of the tape through the head channel.

A few manufacturers let the guide height be the datum against which the head adjustments are made. Never alter these guides — unless you positively enjoy the tedious business of resetting the heads.

Fig. 1—When a tape deck gets into this condition it is a wonder that any high frequencies at all get through to the tape, or from the tape back to the amplifier.



Test Tape

Without a correctly recorded test tape, head setting can be a long process of "cut-and-try." The easiest kind of test tape to use is the full-track, white-noise type with Track 3 erased. Using this on either two- or four-track machines, the first adjustment is for Play head alignment, setting the head so that maximum output is obtained on the top track. Two reasons here: with this tape, the top track is fully recorded; and second, the angle of displacement may be the same as on lower tracks, but the physical movement needed to bring the head into line is greater, so a more delicate setting can be made.

A little thought about what is happening will help us understand why we make these adjustments. The frequency response of a tape recorder depends on a number of factors, important among them the width of the gap in the playback head. This must be as narrow as it can be engineered. It should be narrower than the wavelength of the highest frequency to be reproduced, which is why we get better top response when we re-play at a faster speed; the wavelength of any given note is then longer. Double the speed and twice as much tape passes the head in the same period of time.

Tilting the head so that the gap is out of true is effectively the same as widening the gap. So we find that azimuth adjustment has the most effect at the high end of the frequency spectrum. Wide-range white noise contains all the audio frequencies in equal proportion, so it comes out as a hiss with an underlying roar. Thus its use for head alignment, when a change in the hiss output is easily heard, and as easily measured, while the low-note roar is constant for reference.

The use of a test tape with track 3 erased with equipment that gives a perfectly "clean" lane up to the edge of the adjacent recorded track spacing, enables us to check four-track machines very simply. With the machine switched to play Track 3, and the head height altered up or down, there is a definite increase in white noise output once the head moves from the correct setting. As a bonus, by inverting the tape, now presenting the two quarter tracks with a similar white-noise signal, one can judge gain of the two channels of a stereo tape recorder or efficiency of the head of a mono machine.

All very well, I hear you say: I am not going to invest in a white-noise test

tape that I may use once in a while, and then briefly. So the answer for some might be to make some form of test tape ourselves. First we need to ensure that the machine is recording properly, with a modulation indication

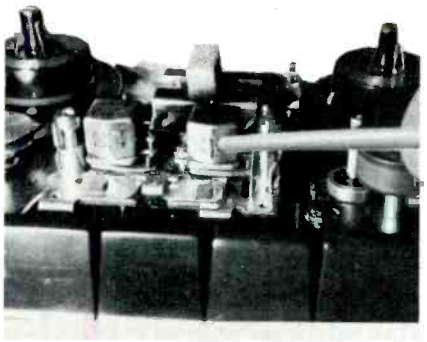


Fig. 2—Open-plan assembly such as this makes servicing easy. Pressure pads are mounted on a flap which comes up to meet the rear of the tape; falls horizontal to allow easy access when the mechanism is neutralized.

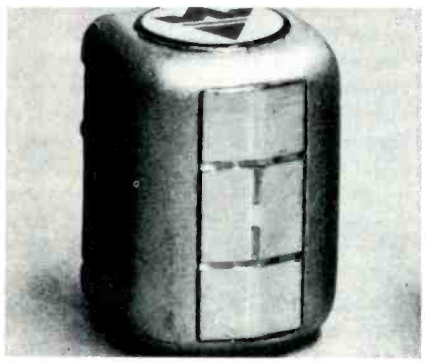


Fig. 3—A stereo head in close-up shows the gap formation. Note the head contouring and the grooves near tape edge location of the stereo head. These grooves act as a suction device when tape is moving past, but can trap oxide if not kept scrupulously clean.

up to 0 dB with an input equal to the specified level. Experience will tell us what to expect. Tape recorders differ widely; no exact rules can be laid down.

If we are sure the machine is punching modulation onto the tape, we can take it further. There is no need at this stage to investigate distortion. We simply record a signal with as much high-frequency content as possible, and, if we can, with some sustained passages of constant level. Radio stations are helpful to us sometimes, and television test signals can be poached with good effect. Do not be afraid to overload; the more signal you can get on the tape for this test the better.

Having modulated, replay this rudimentary test tape, and then rock the replay head for maximum top note output. The correct azimuth setting should be obvious. If it is not, look for head wear (a flattened portion of the facing, usually easy to see when a bright light is directed sideways at the head). Make sure that the pressure pads, if used, sit cleanly against the polished back of the tape, and that they are soft. Where pressure pads are not used, pins will often be employed to guide the tape past a contoured head. Make sure these have not been worn into flutter-producing grooves.

Head height is a lot easier to judge than might be thought. Visual inspection of record and replay heads (or combination heads) with the tape stretched across them in the playing position will show the upper edge of the top gap which should be brought to the tape edge for either two- or four-track operation. A two-track head is often set to overscan the tape slightly. The track "height" takes up 2.5 mm and there should be a safety lane of 1.8 mm between the lower edge of the two-track recorded signal and the inner edge of the lower track (that is, the track obtained when the tape is inverted). Best rough test is to modulate heavily on a new tape, then invert the tape and replay. Listen for breakthrough, which will indicate that the head setting is too low. Take care with this test, as some makers use a 3-mm track and a safety lane of 10 thou' or less.

Patience is the keyword. This is even more necessary for setting up four-track heads. Safety lanes are as small as 0.75 mm and only a minute amount of misalignment is needed to produce cross-tracking. The easiest test is to record Track 3 on a clean tape, again heavily modulating, then invert the tape and listen for cross-tracking on both Track 1 and Track 3. Breakthrough on the upper track indicates the head may be low; breakthrough on Track 3, the head was high when the first recording was made.

Emphasis on a clean tape brings us to the problem of the erase head. Here, the tolerances are a lot less exacting. The gap may overlap a millimeter or so. The gap itself is longer than that of the recording head, as well as being wider, so that the complete track can be erased, allowing for a little tape wander. For these reasons, the azimuth alignment is not nearly so critical, and visual alignment is generally sufficient. But exact height is important in four-track operation, and the method is to record a constant signal on Tracks 1 and 3, again using clean tape Then invert the tape and erase Track 3 for a spell, re-invert the tape and replay the previously recorded tracks. Misalignment of the erase head

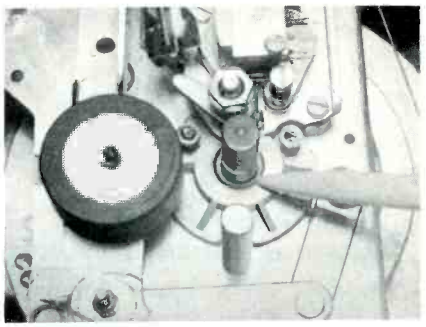


Fig. 4—Do not overlook the upper bearing of the flywheel capstan when cleaning around the deck. Accumulated oxide at this point can quickly lead to head wear and erratic running.

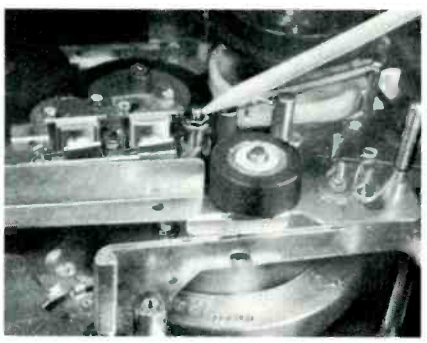


Fig. 5—Tape guide flange height can be reset by a threaded nut, but spacing is determined by the guide barrel proportions.

will cause a loss on one or the other track. A weakened replay on the upper track indicates the erase head was low, and vice versa.

Remember that a tape recorded half-track will have to be bulk erased or erased on a half-track tape recorder before it can be used quarter-track. This is because the quarter-track erase head will only cover a little more than the newly recorded track, and some of the previous half-track signal will occupy the safety lanes and break through on four-track replay.

Head and guide cleaning, setting and alignment are of primary importance. No use making a perfect job of repairing and adjusting the mechanism, or getting the highest of hi-fi from the amplifiers unless the heads are in line and doing their jobs properly. Having done this, we can check the drive system (next month), and ensure that the tape is running true. Æ

ABZs of Stereo FM

LEONARD FELDMAN

Time Division or Switching Circuit Decoders

SHORTLY AFTER STEREO FM matrix decoders began to appear on the market in late 1961, several manufacturers favored subtle circuit approach, variously called "Time Division" or "Switching."

This approach had two distinct advantages. First, in theory at least, it did not require carefully matched low-pass and band-pass filters (as did its predecessor, the "matrix" circuit). Secondly, because of the elimination of these complex filters, high orders of separation over the entire frequency spectrum from 50 Hz to 15,000 Hz could be achieved far more economically than had been possible before. Most written descriptions of the "switching" approach tend to present it as though it were a radically "new" idea, quite different from the simple matrix approach discussed earlier. We find that it can be discussed as "carrier re-insertion" just as easily—and in so doing, its operation is perhaps more clearly discernible.

To begin with, let's consider the block diagram of Fig. 1. The stereo composite signal, consisting of main channel information (L + R), sub-channel sidebands (L − R information), and 19-kHz pilot signal, is amplified by means of a composite-signal, wide-band amplifier. Following the upper path, the signal is applied to a 19-kHz amplifier (tuned circuits reject all but the 19-kHz pilot signal) which may either amplify the 19-kHz component or amplify it and use the resultant to "lock-in" a local 19-kHz oscillator. In either case, the 19-kHz signal (now several volts r.m.s. in amplitude) is then passed through a doubler stage (output tuned circuit is tuned to twice the frequency of the input, for example) to produce a stable, high-amplitude 38-kHz signal. This signal is often spoken of as a "switching voltage," but we shall continue to call it a "restored sub-carrier." The 38-kHz voltage appearing at point "A" of T_1 will be exactly 180 degrees out-of-phase with the 38-kHz voltage appearing at point "B." To phrase it another way, when the voltage at point "A" reaches its most positive instantaneous voltage, the voltage at point "B" is at its most negative value.

Consider, for a moment, the lower path of the signal in Fig. 1. Rather than being passed through low-pass and band-pass filters, the entire composite filter is simply passed through a 67-kHz band elimination filter. Even this filter would not be necessary, were it not for the fact that some stereo FM stations are simultaneously engaged in background music sub-carrier transmission which, if not rejected at this point, would cause an audible whistle or "swishing" sound in the audio output channels. The entire composite signal, containing all frequencies from 50 Hz to at least 53 kHz, is therefore applied to the center tap of the secondary of transformer T_1 (point "C" in Fig. 1). As a reminder, Fig. 2 is a 'scope photo of such a composite signal, with "left only" information being transmitted. For the purposes of this explanation, however, we shall omit the 19-kHz pilot-signal contribution, and *increase* the frequency of the "L"-only sinewave so that individual tracings of the sideband frequencies can be observed clearly. The results are shown in the photo of Fig. 3. Since this waveform is applied to the center-tap of the secondary of T_1, it will appear at points "A" and "B" as well (with no reversal of polarity at either point). Remember, however, that the 38-kHz signal (internally generated) also appears at points "A" and "B," but is of opposite phase (or polarity) at these two points.

Considering point "A," the two waveforms present are drawn in Fig. 4. Because of the precise phase relationships between the "L audio component" and the 38-kHz component, you will note that whenever the audio-component sideband waveform is at the base-line (or zero), the 38-kHz signal reaches a negative peak polarity, while when the audio waveform is at a sideband frequency "peak," the 38-kHz waveform reaches a positive peak polarity. If we were to add the two waveforms graphically to determine the total waveform at point "A" of Fig. 1, we would see a total waveform as shown in Fig. 5. Note that the entire L audio information is traced out along one edge of the resultant composite waveform, while the other edge traces out *nothing*. The diode D_1 is so arranged that it will detect the positive edge of the total waveform of Fig. 5, much like any AM diode detector would, so that at the output of D_1 we have the desired "L" audio information. The purpose of capacitor C is to "smooth out the ragged edges," or, to put it in more sophisticated terms, to bypass the r.f. component (in this case r.f. being the sideband frequencies at or near 38 kHz).

While all of this has been taking place, a "mirror image" (upside down) of the waveform of Fig 5 is present at point "B" because the 38 kHz is of opposite polarity at that point. Since

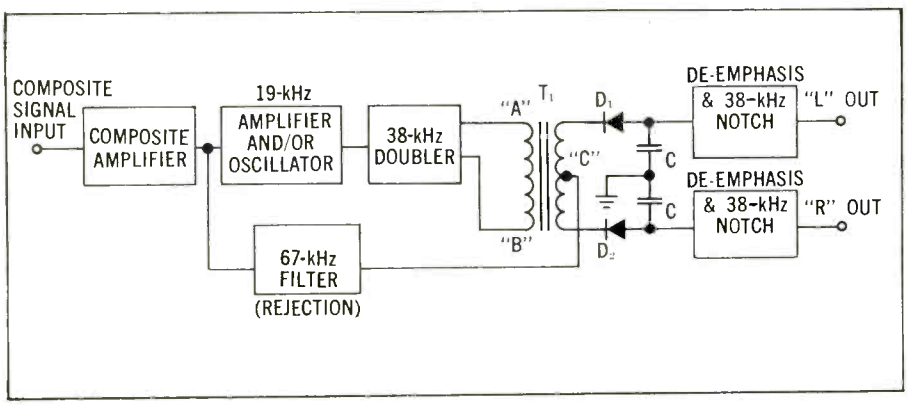


Fig. 1—Block diagram of "switching" or "time-division" stereo FM decoder.

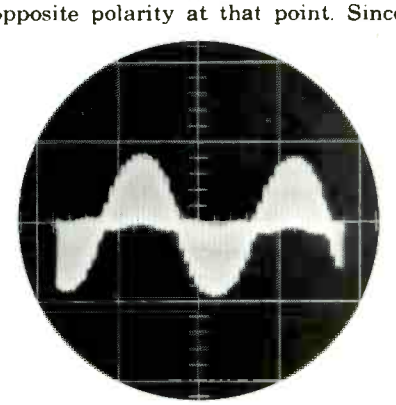


Fig. 2—Composite stereo "L"-only waveform, with 19-kHz pilot omitted.

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Here's the brilliant realization of sound, beyond your fondest dream. The new Pioneer SX-990 solid state AM-FM multiplex stereo receiver was designed with you in mind. Thoroughly flexible, you can plan a complete stereo system around it. Rated according to the Institute of High Fidelity standards (as all Pioneer units are), it contains top quality circuitry plus many refinements found only in much more expensive units. Versatile, it offers: 2 phono, tape monitor, microphone, auxiliary and main amplifier inputs. Outputs for two pairs of speakers make it ideal as a power source for any fine stereo system. Elegantly styled in an oiled walnut cabinet, it's the perfect complement to the most discriminating decor. Hear it at your local Pioneer dealer. Only $299.95

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diode D_2 is polarized in the same manner as diode D_1, however, it will respond or detect the waveform along the positive edge only. In this case, the positive edge of the total waveform is a *straight line*. Therefore, the output from diode D_2 will be zero for these conditions. This, of course, is just as it should be, since we said at the outset that we were dealing with an "L"-only signal, and the output of diode D_2 is the "R" output and is zero.

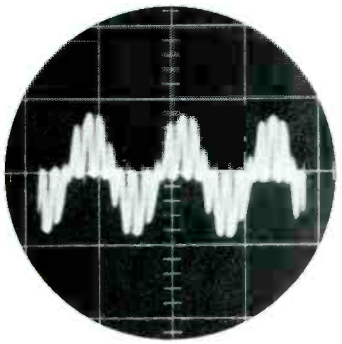


Fig. 3–Composite "L"-only signal, using a higher audio-frequency tone so that individual side-band alternations can be seen.

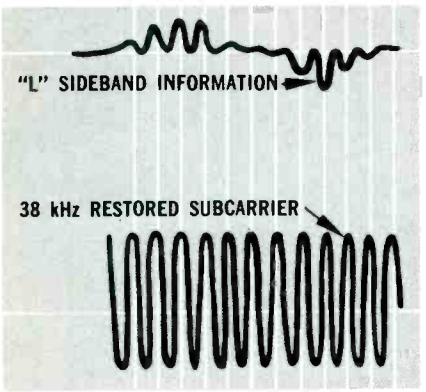


Fig. 4–Waveforms present at point "A" in block diagram of Fig. 1.

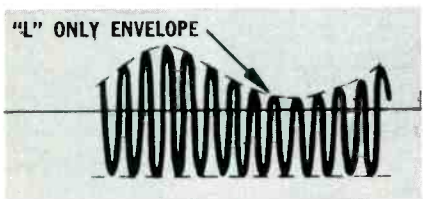


Fig. 5–Result of adding two waveforms of Fig. 4. This composite appears at point "A" of Fig. 1.

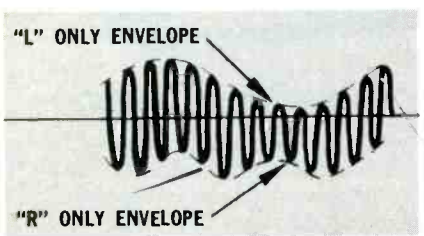


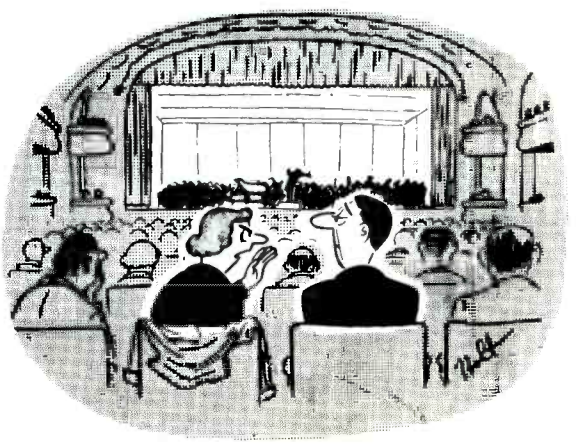
Fig. 6–Waveform appearing at point "A" of Fig. 1 when different "L" and "R" signals are broadcast simultaneously. (At point "B," "L" envelope will appear at lower edge of waveform, with "R" envelope at upper edge.)

If we *did* have both "L" and "R" audio signals present (as is most often the case, the phase relationship of the "R"-only sidebands with respect to the internally generated 38-kHz signal would be such that upon addition, the waveform for the "R" signal would be present at the *lower* edge of the total reconstituted waveform composite. In Fig. 6 we have depicted a total waveform in which both "L" and "R" information are present. Again, diode D_1 will detect only the upper edge of the waveform, demodulating the "L" information. Appearing at diode D_2, however, will be an inverted (upside-down) version of Fig. 6 (with the "R" information along the upper edge) so that diode D_2 will demodulate the "R" information.

From the foregoing, it should be clear how very important phase relationships are in this detection process. We have drawn Figs. 5 and 6 ideally—so that "infinite" stereo separation is possible. In actual practice, however, it is still rather difficult to make certain that each cycle of sideband contribution of both "L" and "R" (at every audio frequency from 50 Hz to 15,000 Hz) is in perfect and ideal phase relationship with the re-inserted 38-kHz subcarrier. For one thing, the mere presence of the 67-kHz filter in the "line" tends to introduce some finite amount of phase shift, particularly for the higher audio frequencies. You will recall that the higher audio frequencies cause sidebands which are further removed from 38 kHz than are the lower audio frequency sidebands. Thus, a 15-kHz audio tone will generate sidebands at 23 kHz and *53 kHz* (38 kHz ±15 kHz), the latter sideband being perilously close to the 67-kHz frequency of maximum filter attenuation. Other causes of non-linear phase shift are also present, such as wiring capacitance, etc. All of these combine to make it more difficult to achieve high orders of separation at the high-frequency end of the audio spectrum.

While most component high fidelity stereo tuners and receivers are now able to boast separation figures in excess of 30 dB at 1 kHz (some even claim and actually meet 40 dB separation figures at mid-frequencies) few, if any, can sustain this excellence of separation "across the audio band." Obviously, if enough care were taken in design of filters, choice of parts, compensation, etc., it is perfectly possible to achieve 30 dB or even 40 dB of separation at any frequency from 50 Hz to 15,000 Hz, but the problem becomes one of cost versus listener requirements.

Having recovered distinct "L" and "R" signals, it is still necessary to apply de-emphasis to each, to compensate for the pre-emphasis normally introduced at the transmitting end for signal-to-noise improvement. De-emphasis can be accomplished as usual by means of a suitable R-C roll-off network having the proper time constant or it may be combined with a notch-filter, affording extreme attenuation at 38 kHz in addition to normal de-emphasis. This latter approach is desirable, since any residual 38 kHz present in the output channels, while not audible in and of itself, may cause "beats" with the bias oscillators of certain tape recorders. These beats might be permanently recorded onto tapes of otherwise perfectly recorded favorite FM programs. Æ



They play louder at home . . .

EDWARD TATNALL CANBY

VANGUARD, that long-time purveyor of fine disc records, has suddenly introduced a dramatic new four-channel stereo recording technique that is practical *only on tape* —a surprisingly acute ploy for such a company. SURROUND STEREO is the trade name, and it puts two channels out in front of you and two more behind your back, for a very solid increment of new spatial information, most pleasing to the listening ears.

The system isn't exactly commercial at this point. Vanguard merely offers a few tantalizing open-reel four-track tapes (cassettes and/or cartridges may follow) and leaves the playing arrangements strictly on a do-it-yourself basis. But in this system we may have the first intimations of our next big wave of change, already overdue and gathering potency in rapid-fire developments behind the scenes.

It's not merely the multiplication of two channels to four, a change that will have our ever-present cynics again fuming with disgust. More gadgetry and gimmickry! As a matter of fact, four channels up front at this stage would no no more than sharpen up a few stereo details, adding little significantly new for a lot of trouble. Vanguard has done much better. The very special nature of the front-to-back plus side-to-side stereo array, a four-way complex of interactions between all four channels in every direction, is its first significance. Not only is there the conventional continuous arc of sound in front and beyond the speakers to each side, but another arc, appropriately different in quality, extends around behind you—and the complex of diagonal and front-to-rear interactions weaves an unbroken tissue of apparent, or virtual, sound images on all sides, re-creating a whole concert hall, or any other surround that you may wish, synthetic or otherwise. Versatile, and of immense interest to all who understand how much two-channel stereo has already contributed to the play of directionality and spatial perception in recorded sound.

But there's more. Though launched on a plane of seriousness, SURROUND STEREO happens to be squarely on commercial target as per the presently heated tape situation. Moreover, it carries right on in the long line of development in recording technique that extends back to the spaceless sound of the early acoustics. Good ideas here.

Most intriguing ideas of all is the possibility that the disc has at last met its match. When tape pulled a fast one in the mid Fifties with stereo on several tracks, disc was able to get the same channels into its single groove with astonishing ease (as we look back, anyhow . . .), and thereby assured itself another dozen years of increasing vigor. But *four* channels? Highly unlikely. On the other hand, in tape the use of multiple channels is increasingly common in a thousand areas in and out of audio. Pressure to do something dramatic for the audio consumer is rising spectacularly, slow-speed tape improvements continue to pile up, and subminiature (integrated circuit) button-sized electronics steadily penetrate audio from computer and space technology. We already have more potential than we know what to do with.

After all, there's such a thing as too much playing time. And too much miniaturization. We may have both. Suppose the tape cartridge were to blossom out with a dozen tracks, at half the present speed—we would have tracks to burn and time beyond conceivable use! Put all the Beatles' music on one half and the whole of Frank Sinatra on the other, and let the thing play forever? Much better, you see, would be to use four tracks at a time, and burn up all that excess. Mechanically simple in any present configuration. You can play both halves of a cassette at once via a single head. Or half an 8-track. Or all four tracks of an open-reel tape. All you need is a new head, an extra pair of preamps, extra power amplifiers and, of course, more speakers.

But four preamps? Four amplifiers? Four speakers? Ah, there's the potential in present and coming technology! By all means, yes.

Build an IC amplifier on the head of a pin. Build four of them in half a matchbox. Don't laugh—it's entirely possible now and may soon approach commercial feasibility, given the right impetus. But who wants a pinhead amplifier with finger-sized controls? Actually, the IC circuits are also spoiling for something dramatic to do in audio, something where their tiny size will really count. They're doing OK in FM multiplex tuners, where space is tight. (And there's that new cordless stereo phone set with multiplex tuner built in.) But what else? The ICs should fairly blossom with *any* sort of multiple-channel, multiple-circuit miniature tape to come, for there's where we will need lots of electronics in tiny lumps. A portable cassette player, say, with four preamps and four power amplifiers stowed away in one corner. That's the kind of thinking. You could even toss in four recording preamps, if and when. As you may understand, then, everybody (*except* the disc maker) has something with which to jump into this heady new game. All we need is the match to light the consumer fire.

To be sure, four speakers would seem to impose a major consumer burden. Not necessarily, in the long view. Present stereo has relatively reduced the cost *per unit* of speakers now bought in

pairs instead of singly. Groups of four should bring, relatively speaking, a further discount. But there is a subjective factor of greater importance: for each new increment of information density in our recordings, and for each new widening of the apparent sound spread *away* from the speakers themselves, the ear will more easily accept and ignore any speaker deficiencies. Good speakers will improve the sound, but in stereo we can in fact tolerate less fancy sound than in equivalent mono. Four-channel surround stereo should further increase that tolerance. And low-cost speakers have in fact been much improved in recent years. All in all, I see no serious problems in adapting home listening to a four-channel configuration of speakers. All in due time, of course.

How Does It Sound? I had only minor temporary quibbles as to mike placement, an area wide open for experiment. With two rear channels in operation, I found Vanguard's orchestra and soloists rather too large and too close within the new space surround. Mikes should have been moved back a bit to compensate for the fuller information being presented to the ears.

Even so, the sound "feel" was impressive, clearly superior to the (very good) "ordinary" stereo of the front speakers with the rear channels turned off. The four-channel "stunts" were good, too—multiple brass choirs in the Berlioz *Requiem,* at last spaced out at the four points of the compass as intended, Mahler's children's choir singing behind us, away from the up-front main choir, just as Mahler directed. As for pop-mood music, the sky is the limit in four-channel surround and never a thought of a concert hall. Marvelous effects here, too, though easily ignored. Who *listens* to mood music? (But it's nice to be in the middle of it.)

So if you're gadget minded go get a four-channel head for your four-track recorder, rig up some extra preamps (you can use the two in another machine), add amplifiers and speakers galore, and go to town with Vanguard's open-reel four-track SURROUND STEREO, due for release just about now. Whether it's Mahler, Berlioz, Joan Baez or something called The Amazing Electronic Sound of Jean Jacques Perrey, strictly *salon,* you won't regret the sonic experience. All good, all very significant. *Æ*

Editor's Note: A 4-channel stereo broadcasting technique will be demonstrated at Tanglewood, Lenox, Mass., in mid-August.

AUDIO's 1969-1970 STEREO HI-FI EQUIPMENT PRODUCT DIRECTORY

This is the eleventh product preview of hi-fi component equipment published by AUDIO Magazine. The tabular style used here was adopted in 1965 to simplify direct comparison of specifications and prices between models in each product category.

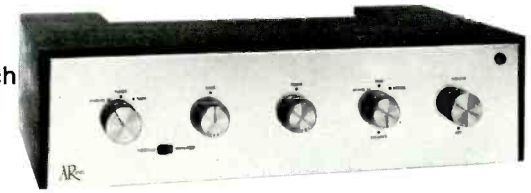
Dashes in columns indicate that the characteristics do not apply to the product; a blank space indicates that manufacturers did not supply AUDIO with information. Letter codes are employed in some instances for purposes of clarity (examples: "B" next to an amplifier indicates it is a basic power amplifier; "T" denotes tubed rather than solid-state construction; and so on).

All specifications have been supplied by respective manufacturers. Since some measurement methods may differ, absolute comparisons cannot be made. One can obtain good indications of how a unit stacks up against another in the specifications department, however. And having such information at hand in an easy-to-compare format will be an immense help when considering purchase of a component.

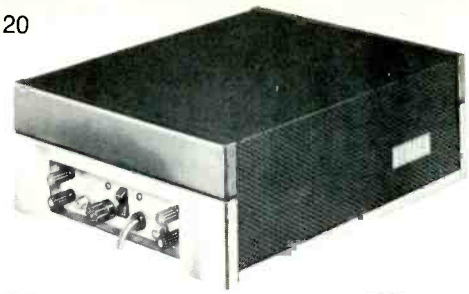
For more information on a product, a circled number under a manufacturer's name directs you to the page on which his product is advertised. Further information may be obtained by checking the appropriate number on the reader service card appearing opposite page 114 or by writing directly to the manufacturer. A directory of manufacturers' names and addresses starts on page 97 for the latter purpose.

AMPLIFIERS

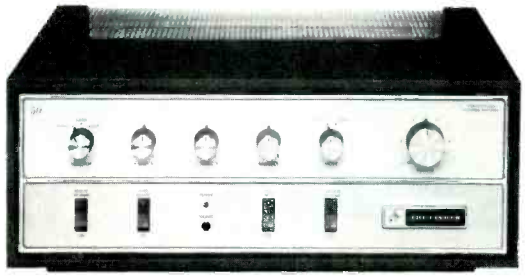
Acoustic Research "A"



Dynaco 120



Crown D-40



Fisher TX-50

NOTES: (1) All models solid-state except when model number is preceded by (T)
(2) Basic power amplifiers have model number preceded by (B)
(3) "K" indicates kit price; "W" indicates wired price

MANUFACTURER (Circled numbers indicate adv. page)	MODEL	IHF Power/Chan, W	RMS Power/Chan, W	THD at Rated Power, %	THD at 1 Watt, %	IM at Rated Power, %	IM at 1 Watt, %	Power Bandwidth, Hz to kHz	Freq. Response at 1 Watt, Hz ± ? dB	Rated Output S/N, dB	Phono Sensitivity, mV	Phono Overload, mV	Tape Head Input, mV	High-Level Input, V	Output Z, Ohms	Damping Factor	Dimensions, In. W x D x H	Weight, lbs	Price	SPECIAL FEATURES
ACOUSTECH	VA	100*	50	0.45	0.1	0.45	0.1	20-20K	3-125K ±3	75	3	100	–	0.4V	4-16	100	15 x 10 x 5	25	399.00	*4 ohms; oversize transformers; computer grade capacitors.
B	XII	100*	50	0.45	0.1	0.45	0.1	20-20K	3-125K ±3	90	–	–	–	1.2V	4-16	100	15 x 10 x 5	22	159.50K	*4 ohms power amp kit – Add PAM module for integ. amp.
ACOUSTIC RESEARCH (13) (83)	A		50	0.5	0.5	0.25	0.25	14-44K	20-20K ±1	75	2-5 adj.	100	–	0.2		40	15¾ x 10 x 4½	19	250.00	*at 4 ohms opt. wood case, $15.00; opt. spkr. cables, $6.00.
	AU		60*																	
	UNIV.	Same as above except for 100, 120, 220, 240 V, 50-60 Hz.																	250.00	
ALLIED RADIO (113)	995	100	60	0.8	0.2	0.5	0.6	35-50K	20-80K ±1	65	2.5		–	–	4-16	30	16 x 13¾ x 5½	30	199.95	IC's; tape monitor.
BOGEN	TA 150	25	15	0.4	0.2	0.5	0.3	20-20K	15-50K ±2	75	2.5	40	–		4/8	12	14½ x 10 x 3¾	11	119.95	Opt. wal. encl.
C-M LABS	CC50S		50			<0.5		10-30K	5-60K ±3	70	3-5 adj.	90	6-30 adj.	0.25	4-16	>200	17 x 13 x 6	40	435.00	Pushbutton source selection; hi and lo filters; loudness contr. switchable.
B	35D		35	<0.5		<0.5	<0.5		1-100K ±3	70	–	–	–	1.0		>200	10⅛ x 12¼ x 6⅛	25	285.00	
CROWN B (71)	D-40	80*	30	0.05	0.05	0.25	0.12	5-50K	5-100K ±0.5	115	–	–	–	0.68	4-16	400	19 x 7¾ x 13¾	8¼	199.00	*4 ohms. Four regulated power supplies.
B	DC 300	400*	150	0.03	0.008	0.05	0.02	0-20K	0-100K ±0.5	115	–	–	–	1.75	4-16	400	19 x 9¾ x 7	40	685.00	*4 ohms. True direct-coupled (DC) design; 1 KW power supply; electronic protection.
DYNACO	SCA-80	50	40	<0.5	<0.2	<0.5	<0.1	6-50K	15-50K ±0.5	80	3	80	–	0.13	8	>40	13 x 10½ x 4	16	169.95K 249.95W	Essentially similar to the PAT-4 plus stereo 80; includes cover.
(5) B	Stereo 120	60	60	<0.5	<0.2	<0.5	<0.1	5-50K	5-100K ±0.5	95	–	–	–	1.5	8	>40	13 x 10½ x 4	20	159.95K 199.95W	Modular constr.; fully reg. power supply, elec. protective circuits, inc. cover.
(7) B	Stereo 80	50	40	<0.5	<0.2	<0.5	<0.1	6-50K	15-50K ±0.5	95	–	–	–	1.3	8	>40	13 x 9 x 4	13	119.95K 159.95W	Similar to Stereo 120, but lacking reg. pwr. supply; cur. limiting protect; incl. cover.
T	SCA-35	22.5	17.5	<1.0	<0.2	<1.0	<0.2	20-20K	20-20K ±0.25	80	4	150	2.5	1.0	8, 16	>10	13 x 10½ x 4	20	99.95K 139.95W	Provision for 3rd channel output; includes cover.
EICO B	Cortina 3150	50	40	<0.15	.08	<1	0.2	10-20K	10-30K ±1.5	80	4.7	80	–	0.27	4, 8, 16	35	14⅜ x 8 5/16 x 3⅛	17	225.00W 149.95K	Hi and Lo filters; headphone jack; main/rem. speaker switch.
	Cortina 3070	25 35*	15 20*	<0.8		<2	<1		5-100K ±1.5	72	4.2	80			4, 8, 16	30	12 x 7¾ x 3⅛	7½	139.95W 99.95	*at 4 ohms; Hi and Lo filters main/rem. speaker switch; phone jack.
ELECTRO-VOICE	EV 1244	32½	18	1.0				20-20K	20-30K ±1½	70	3.0		–	0.25	4, 8, 16		8⅜ x 10¼ x 3⅜	18	147.00	Function indicator lamps.
Cover IV (2)	EV 1122	15	10	1.5				30-20K	20-20K ±1½	50	4.0		–	0.1	4, 8, 16		15¾ x 8½ x 5	11	102.00	Function indicator lamps.
FISHER	TX-1000	60*	50*	0.5	0.2	0.8	0.2	22-24K	20-40K ±1.5	90	2.0, 7.5	40	1.8	0.2	4	>10	15⅛ x 12¾ x 4 13/16	24	329.95	*4 ohms.
(31)	TX-50	28	20	0.5	0.2	1.0	0.3	25-25K	20-25K ±2	85	2.5	45	–	0.22	8	>10	15⅛ x 9 x 4 13/16	13½	149.50	
GROMMES	270A	32½	25	0.3	0.1	0.5	0.1	20-20K	15-50K ±1	75	2	70	–	0.15	4, 8, 16	40	13½ x 11 x 4⅜		189.50	
HARMON-KARDON B (40) (41)	Citation Twelve		60	0.2	.03	0.15	.02	5-40K	2-70K ±0.5	100	1.5				4-16	45			249.95W 199.95K	Dual pwr. sup.; thermal and mechanical circuit guards.

AMPLIFIERS (continued)

NOTES: (1) All models solid-state except when model number is preceded by (T)
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(3) "K" indicates kit price; "W" indicates wired price

Heath AA-15

Kenwood KA-2500

McIntosh MC-250

MANUFACTURER (Circled numbers indicate adv. page)	MODEL	IHF Power/Chan, W	RMS Power/Chan, W	THD at Rated Power, %	THD at 1 Watt, %	IM at Rated Power, %	IM at 1 Watt, %	Power Bandwidth, Hz to kHz	Freq. Response at 1 Watt, Hz ± ? dB	Rated Output 5% IM, dB	Phono Sensitivity, mV	Phono Overload, mV	Tape Head Input, mV	High-Level Input, V	Output Z, Ohms	Damping Factor	Dimensions, in. W x D x H	Weight, lbs	Price	SPECIAL FEATURES
HEATH (35)	AA-15	75	50	0.5	0.2	0.5	0.2	6-30K	8-40K ±1	60	2.2	155	–	0.2	8	45	16⅞ x 12½ x 4¾	21.5	169.95K	Indiv. input level controls, main and remote spkr. sws.; tone-flat sw; phone jacks.
	AA-21D	50	35	0.5	–	1.0	–	13-25K	13-25K ±1	45	3.0		2.0	0.25	8		15½ x 14 x 5¼	25	139.95K	Secondary controls under front panel; lighted panel.
	AA-22	33	20	0.7		1.0		15-30K	15-30K ±1	50	6.0		–	0.25	8	20	15⅝ x 11⅜ x 3¾	14	99.95K	Secondary controls behind hinged front panel; low silhouette.
	AA-14	15	10	0.5	0.5	1.0	–	15-50K	12-60K ±1	60	4.5		–	0.3	4-16	50	12 x 10¼ x 3	8.5	64.95K	Clutched vol. cont. tandem bass & treble. Edge-lighted panel; phone jack.
JBL B	SA 660		60	*	*	*	*	10-130K	10-130K ±1.5	85	4.0	250	–	0.25	4-16	32	16 3/16 x 13¾ x 5 1/16	26	435.00	*Too low to specify. Aural-null bal. sys.; Dir-cpld "T" cct; phono sens. sw.
	SE 400S		40	*	*	*	*	3-175K	3-175K ±1.5	90	–	–	–	0.8	4-16	27	15¼ x 7¾ x 4⅝	22	300.00	*Too low to specify. Free-stding. energzr; plug-in brd. sets damping factor and freq. resp. to match specific speakers used.
JVC B (9)	5012	80	60	0.07	0.03	0.2	0.03	10-70K	* 40-100K +0, -1	** 115	–	–	–	1.0	8	80	19 x 13½ x 6	36	699.95	*With rumble filler **ASA "A" curve 2 VU meters with sensitivity selector.
KNIGHT-KIT (113)	KG-865	25	17	1.0	0.25	1.0	0.7	20-20K	15-50K ±1.0	60	5.0	45	–	0.4		50	13 x 10 x 3½	10	69.95K	Compl. sym. output.
KENWOOD (43)	KA-6000	85	58	0.5	0.1	0.3	0.1		20-50K ±1	77	0.05 0.5, 2.0 2.0	65	2.3	0.2	8	29	16 5/16 x 11 1/32 x 5 5/32	24.5	249.95	
	KA-2500	22.5	20	0.8	0.2	0.8	0.2	15-30K	11-32K ±2	70	2.0	65	2.5	0.2	8	25	11½ x 9 5/16 x 4 1/16	13	119.95	
	KA-2000	17.5	16	0.8	0.4	0.8	0.4	20-30K	20-30K ±2	70	2.0	65		0.13	8	20	10¼ x 9⅜ x 4 3/16	10	89.95	
LAFAYETTE (111)	LA-125TA	62.5	45	0.8	0.15	1.0	0.3	20-40K	20-20K ±1	65	1.8, 7.0	35, 110	–	0.27	4	25	13 x 9 x 3 7/16	13½	129.95	Automatic overload protection. Fused spkr. outputs; mult.-pos. spkr. mode sw.
	LA-750	40	25	0.8	0.07	0.7	0.2	15-30K	20-20K ±1	75	2.3	42	–	0.25	4	20	12 x 9 1/16 x 3⅜	12	79.95	As above.
LEAK	Stereo 70		35	0.1	0.1	0.3	0.3	25-47K		66	30		10	0.4			13 x 8¾ x 4¼	13	299.00	Tape monitor.
MARANTZ B (19) (45)	16	120	80	0.1	.005	0.1	.01	10-25K	10-80K ±3	90	–	–	–	–	8	150	15⅜ x 8 x 5¾	30	395.00	Var. overld. drive; sep. pwr. sups.; x-over notch elim.; massive heat sinks.
	30	75	50	0.15		0.15	.02	10-25K	10-80K ±3	90	1.0	120	1.0	–	8	100	15⅜ x 11 x 5¾	30	325.00	As above; slide tone conts.; phone and dubbing jacks on front panel.
B	32	75	50	0.15		0.15	.01	10-25K	10-80K ±3	90	–	–	–	–	8	100	15⅜ x 11 x 5¾	29	225.00	Var. overld. drive; massive heat sinks; x-over notch elim. sgl. pwr. sup.
MC INTOSH B (76)	MC-2105		105	0.25		0.25		20-20K	5-70K +0, -3	90	–	–	–	0.5	4-16, 25V		16 3/16 x 4½ x 7 1/8	65	649.00	Full rated power at all impedances.
B	MC-2100		105	0.25		0.25		20-29K	10-100K +0, -3	90	–	–	–	0.5	4-16, 25V		17 x 11¾ x 7¾	67	499.00	Same as above.
B	MC-250		50	0.25		0.25		20-29K	10-100K +0, -3	90	–	–	–	0.5	4-16, 25V		17 x 11¾ x 7¾	40	379.00	Same as above.
	MA-5100		45	0.25		0.25		20-20K	10-80K +0, -3	75	2.0	100	2.0	0.5	4-16		16 x 14½ x 5 7/16	25	449.00	Same as above.

AUDIO magazine is probably the world's toughest critic of audio equipment.

Here's what they write about the Fisher 500-TX:

- "The Fisher 500-TX is a top-grade receiver. . . ."
- "The flexibility normally associated with Fisher products has been expanded in completely new directions. . . ."
- "In addition to an ample quantity of controls, this new receiver features *four* ways in which to tune in desired FM stations."
- "... the optional remote control (Model RK-30, $9.95) enables the user to change stations from his chair without approaching the receiver itself."
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- "... AutoScan is probably more accurate in tuning to [the] center of [the] desired channel than can be accomplished manually..."
- "Usable sensitivity was everything we could have desired and limiting took place at a remarkable 1.5 μV. Ultimate signal-to-noise ratio was 65dB, as claimed. Stereo FM performance was excellent.
- "We can confirm the power output specification, as given in terms of r.m.s., as actually exceeding the 65 watts per channel claimed... Rated distortion (0.5%) is achieved at 66 watts, while IM reaches 1% at 68 watts. Power bandwidth extended from 8 to 38,000 Hz, based upon 65 watts per channel..."
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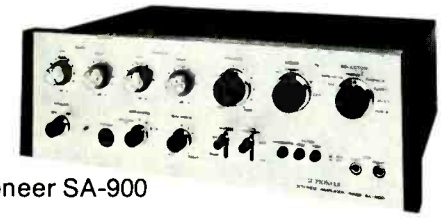
AMPLIFIERS (continued)



Pioneer SA-900

Scott LK-60 B

Sony TA-1120A

Nikko TRM-50

Sansui AU-777

NOTES: (1) All models solid-state except when model number is preceded by (T)
(2) Basic power amplifiers have model number preceded by (B)
(3) "K" indicates kit price; "W" indicates wired price

MANUFACTURER (Circled numbers indicate adv. page)	MODEL	IHF Power/Chan, W	RMS Power/Chan, W	THD at Rated Power, %	THD at 1 Watt, %	IM at Rated Power, %	IM at 1 Watt, %	Power Bandwidth, Hz to kHz	Freq. Response at 1 Watt, Hz ± dB	Rated Output S/N, dB	Phono Sensitivity, mV	Phono Overload, mV	Tape Head Input, mV	High-Level Input, V	Output Z, Ohms	Damping Factor	Dimensions, in. W x D x H	Weight, lbs	Price	SPECIAL FEATURES
NIKKO (105)	TRM-50	26	18	<0.3		0.6	0.3	20-30K	10-70K ±1.5	75	2.8			0.3	4-16	25	13 x 9½ x 3¾	11.4	119.95	All IC constr. except 1 transistor in power sect.
	TRM-40	22	15	<1.0		2.0	0.5	50-15K	15-20K ±1	60	1.8			0.2			12 x 9½ x 3½	10	99.95	Triple cct. brkr. protection.
PIONEER B (25) (65)	SM-100	105	90	0.5	0.2	0.5	0.2	10-30K	5-100K ±1	110	–	–	–	–	4-16	1.5 100	16½ x 11⅝ x 6¾	31	375.00	Damping factor control; 5 and 20 Hz low cut filter.
	SA-900	100	84	0.3	0.1	0.7	0.2	20-50K	20-50K ±1	95	3.1 0.155	60	1.8	0.18	4-16	67	15 15/16 x 13 11/32 x 5½	27	259.95	Stepped tone controls: 20 dB muting level control.
	SA-700	60	44	0.5	0.2	1.0	0.2	15-60K	20-40K ±1	100	3.0 0.12	60	–	0.2	4-16	40	14 9/16 x 12 5/16 x 4⅝	17	199.95	As above.
	SA-500	22	16	0.5	0.2	1.0	0.2	20-40K	20-50K ±1	90	2.5	60	–	0.2	4-16	40	13 x 12 5/16 x 4⅝	14	99.95	
REVOX (67)	A 50	50	40	0.1	0.1	0.3		10-40K	20-20K ±1	80	2.0		–	0.25	4-16	20	16⅜ x 9⅝ x 6¼	18	359.00	Stepped tone controls.
SAE (114)	Mark II		60*	<0.2	<.05	<0.2	<0.1	8-50K	3-100K +0, –2	>110	–	–	–	1.0	8-16	150	15 x 12 x 4	30	400.00	*100 + W @ 8Ω, mono. 120 + W @ 16Ω mono. Unconditionally stable with any or no load, incl. ESL's.
SANSUI (14) (15)	AU 777	35	30	<0.5	<0.5	<0.8	<0.8	20-50K	20-100K ±1	100	2.0		1.5		8-16	24 @ 8Ω	17 x 13 x 6	27	279.95	Step controls; 7 inputs, 4 outputs; ctr. chan. output.
	AU 555	30	25	<0.5		<0.8		20-35K	20-80K ±1	>80	2.0		1.5		4-16	12&45 @ 8Ω	15 x 10¾ x 4⅜	17½	159.95	As above, plus damping factor sel. sw.
	AU 222	23	18	<0.8		<0.8		20-20K	20-30K ±1	>80	2.0		1.5		4-16	>20 @ 8Ω	11½ x 10½ x 4⅜	12¾	119.95	NF ampl. circuitry; 6 inputs
B	BA 90	45	32	<0.3		<0.3		15-50K	15-100K ±1	>80	–	–	–			10&50 @ 8Ω	7½ x 14¼ x 4⅜	16½	149.95	Damping factor sel. sw.; aural null bal. sw; level adj; phase sw; phone jack.
SCHOBER B (111)	TR-2	50	40	0.75	0.5	1.4	0.9	20-20K	20-20K ±0.5	83				0.1	4, 8, 16		5½ x 11¼ x 7½	14	74.50K	Fan cooled; short-circuit protected.
SCOTT Cover II (1)	260-B	65*	40	0.8	0.4	0.5	0.45	20-20K	10-26K ±1	55	3, 5, 9	70, 90, 155	–	0.5	8	20	14¾ x 12 x 4⅛	16¼	249.95	*4 ohms.
	299-F	32.5*	18	0.8	0.4	0.5	0.45	25-20K	15-25K ±1	55	4, 8	70, 140		0.5	8	20	14⅜ x 12¾ x 4⅛	12½	179.95	*4 ohms.
	LK-60B	60*	40	0.8	0.4	0.5	0.45	20-20K	10-26K ±1	55	3, 5, 9	70, 90, 155	2.0	0.5	8	20	14¾ x 13¾ x 4⅛	16¼	149.95K	*4 ohms.
SHERWOOD (33)	S-9500 b	40	30	0.35	0.15	0.6	0.3	15-25K	20-20K ±0.5	75	1.6	250	–	0.2	4-16	25	14 x 10½ x 4	16	189.50	Front-panel-variable phono gain; main/remote spkr. sw.
SONY (96) (97)	TA-1120A	60	50	.05	.01	0.2	.02		5-200K +0, –2	110	1.2	100	1.2	0.15		360	15¾ x 12¾ x 5¾	24.3	449.50	Integ. amp; jacks bet.pre-amp and pwr. ampl.
B	TA-3120A	60	50	.05	.01	0.2	.02		5-200K +0, –2	110				1.0		360	1⅛ x 17½ x 5¾	17.6	249.50	Stereo power amp.
TEAC (75)	AS-200U	60*	50	0.5*		<0.5* (40W)	<0.5	20-30K	20-80K +0, –1	100	2.0		–	0.15	4-16		16⅝ x 11½ x 6	21	299.50	*4-ohm load: bass and treble tone conts; hi and lo filters; loudness contour.

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8 OHMS	175	140	60 + 60	0.2%

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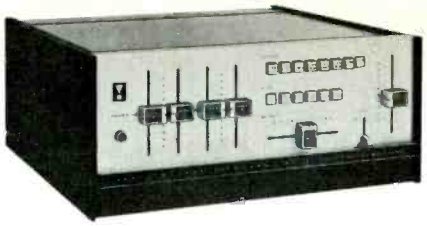

JBL SG520

McIntosh C-26

Dynaco PAT-4

Marantz 7T

Sony TA-2000

NOTES: (1) All models solid-state except when model number is preceded by (T)
(2) "K" indicates kit price; "W" indicates wired price

MANUFACTURER (Circled numbers indicate adv. page)	MODEL	Frequency Response, Hz ± ? dB	Rated Output, V	THD at Rated Output, %	IM at Rated Output, %	S/N at Rated Output, dB	Phono Sensitivity, mV	Phono Overload, mV	Tape-Head Sens., mV	High-Level Sens., V	Tape-Monitor Z, Ohms	Dimensions, In. W x D x H	Weight, lbs	Price	SPECIAL FEATURES
ACOUSTECH	VI	2–1M ±3	2	0.1	0.1	80	3.0	110	1.8	0.4	1M	15, 8 5	15	249.00	Stepped tone controls. Outputs to Acoustech X, electrostatic speaker system.
C-M	CC–1	2-100K ±3	2	<0.25		80	1.5 5	150	2.0	0.2		15¾ x 12 x 5½	10	315.00	Mixing ability; stepped tone conts; blend cont; ctr chan. output.
	CC–2	1-100K ±3	2	<0.1	<0.1	80	3-8 Var	9-250 Var		0.1		12½ x 9 x 4	10	225.00	As above; simplified controls
CROWN OF AMERICA (71)	MCC-300	1-100K ±0.5	2 nom 20 max	<.01	<.02	80 120	0.7-7.0 Var	40-400	–	0.2	Source Phono 600	19 x 11 x 7	18	495.00	Graphic-equalizer tone conts; precision vol. and loudness conts; 2 meters; illum. p.b's; dual tape-monitor outputs.
DYNACO (5) (7)	PAT-4	10-100K ±0.5	2	.03	.05	70* 85	4	80 400	2	0.2	400	13 x 8 x 4	10	89.95K 129.95W	Front panel in and out jacks. Dual audio outputs (one switched by front panel headphone jack). Incls. cover. Matches FM-3.
	(T) PAS-3X	10-40K ±05	2	<.05	.05	72* 85	2	200	1.5	0.2	1000	13 x 8 x 4	11	69.95K 99.95W	Blend control, 7-KHz filter. Incls. cover. Matches FM-3. *phono input, all models.
	(T) PAS-2X	10-40K ±0.5	2	<.05	.05	72* 85	2	200	1.5	0.2	1000	13 x 8 x 4	11	59.95K 99.95W	Same as PAS-3x with different panel and knobs.
	(T) PAM-1	10-40K ±0.5	2	<.05	.05	72* 85	4	200 1.0V	–	0.2	1000	12 x 6 x 3	7	34.95K 59.95W	Reqs. ext. pwr. source, as from socket on Dyna tube ampls; mono; d.c. heaters.
HARMAN KARDON	Citation 11	2-200K ±0.5	5	.02	.02	85	2.0	135		0.15				199.95K 249.95W	Audio equalizer sliding tone conts; defeat sw; low-Z phone jack; spkr. switching facility.
JBL	SG 520 Graphic Controller	20-20K ±0.25	3	*	*	90	2.0 **	110	1.0 **	0.15 **	40K	15½ x 13 6½	20	450.00	Aural Null bal. sys; linear controls; illum. P.B. switches; sec'dry controls behind hinged front panel. * Too low to specify accurately. ** For 1.5-V output.
JVC (9)	5011	10-30K ±0.5	3	0.03	0.03	100	3.0 1.2	270 87	1.2	0.17	10K	19 x 13½ x 6	24	699.95	Graphic Tone Controls.
MARANTZ (19) (45)	7T	20-10K ±0.5	–	<0.05	0.05	10 dB below 1mV input	0.7 mV for 1V out	–	–	–	–	15⅜ x 8½ x 5¾	9	395.00	8 inputs; mode sw; Bal. cont, tape mon/dubbing sw; 3 phono eq. curves, lo and hi cut sws; step tone conts; dubbing and phone jks. on front panel; scope output; adj tape eq.
MC INTOSH (76)	C 26	20-20K +0, –0.5	2.5	<0.1	–	85 74*	2.0	>100	2.0	0.5	200	16 x 13 x 5 7/16	18	349.00	* low level inputs.
	(T) C22	20-20K +0, –0.5	2.5	<0.1	–	85	2.0	>100	2.0	0.5	2000	16 x 11 x 5 7/16	16	279.00	
	C 24	20-20K +0, –0.5	2.5	<0.1	–	75 110*	2.0	>100	2.0	0.5	200	16 x 13 x 5 7/16	17	249.00	* with v.c. at zero.
PIONEER (25) (65)	SC–100	5-50K ±1	5.0	0.04	0.04	70	0.08 1.5	100	1.2	0.08	150K	16¾ x 11¾ x 6¾	15	375.00	Stepped v.c., passive stepped tone conts.
SCIENTIFIC	MK. I	10-100K ±0.25	2.5	<.05	<0.1	85	2.5			0.25		16 x 10½ x 5	18	500.00	Inputs for phono and mic; Output z–600Ω. Eq. contr. range ±15 dB at 60, 120, 220, 320, Hz 2.5K, 5K, 10K, and 15 kHz.
SONY (96) (97)	TA–2000	12-150K	1.0	.03	.05	90	1.2 .06	100	1.2	0.120 adj.	–	15¾ x 12½ x 5¾	19.4	329.50	2 VU meters, step tone conts.

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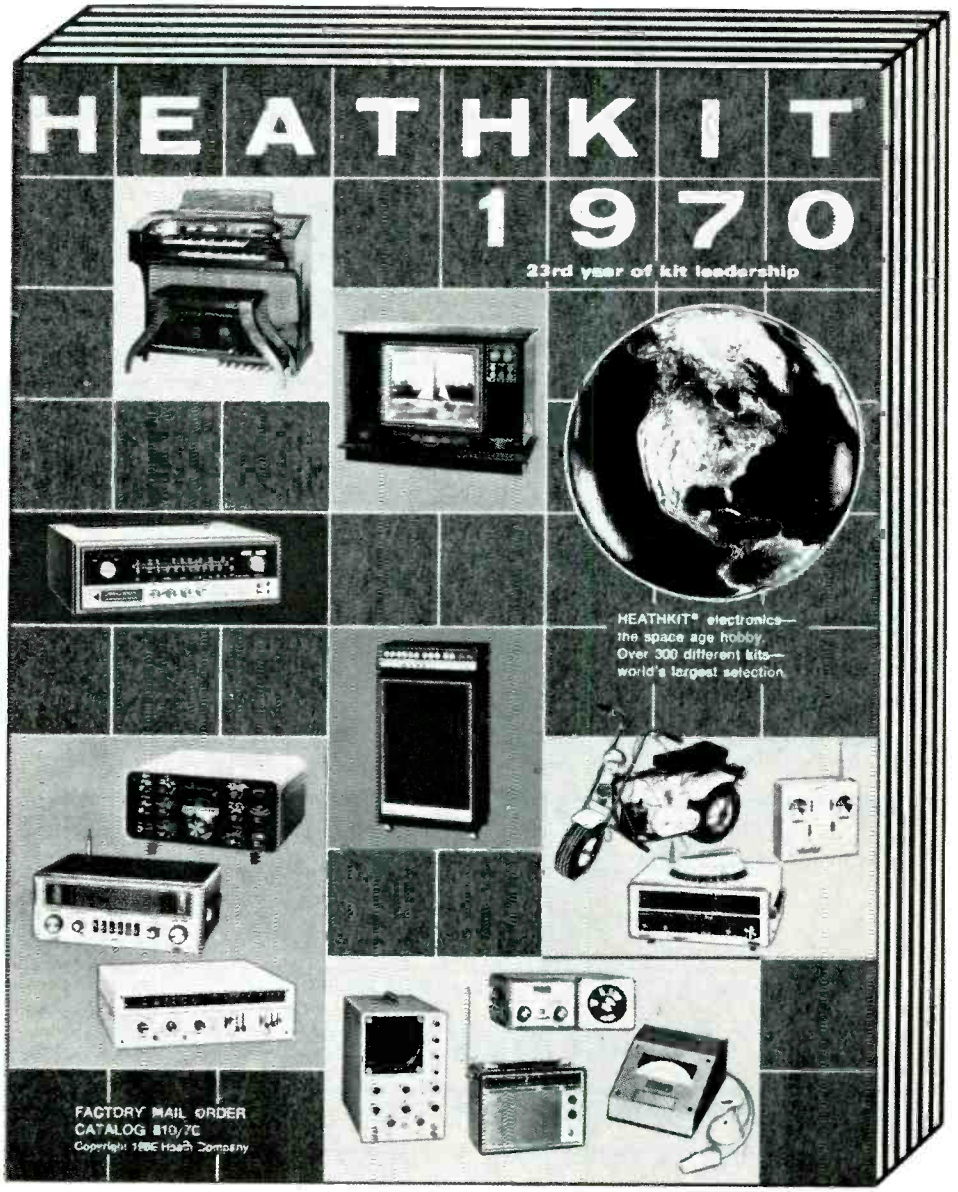

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TUNERS

Dynaco FM-3

Marantz 20

Acoustech VIII

Kenwood KT-7000

NOTES: (1) All models solid-state except when model number is preceded by (T)
(2) "K" indicates kit price; "W" indicates wired price

MANUFACTURER (Circled numbers indicate adv. page)	MODEL	IHF Sensitivity, μV	THD, Mono, 100% Mod., %	Capture Ratio, dB	Alt. Chan. Selectivity, dB	Frequency Response, Hz ± ? dB	AM Suppression, dB	Stereo Separation, 1000 Hz, dB	Stereo Separation, 10 kHz, dB	THD, Stereo, 100% Mod., %	Tuning Indicator	S/N, dB	Dimensions—in. W x D x H	Weight, lbs.	Price	SPECIAL FEATURES
ACOUSTECH	VIII	2.0	0.5	2	55	30-15K ±1		35	20	1.0	Meter		15 x 10 x 5	14	349.00	Incls. stereo headphone ampl. see-thru dial panel, interstation muting.
	VIII-K	2.0	0.5	2	55	30-15K ±1		35	20	1.0	Meter		15 x 10 x 5	14	249.00K	Kit of above. Stereo ampl. module can be added later.
ALLIED (113)	T285	2.5	1.0	2	55	20-20K ±1.0	30	40	22	1.0	Meter		13¾ x 9¼ x 4¾	18	79.95	FM-AM, 3 IF stages.
CROWN RADIO	FM-500	2.5	0.7	4				30		1.4			15 5/16 x 10½ x 3 15/16	14.8	99.95	
DYNACO (5) (7)	(T) FM-3	4	0.5	5	54	10-15K ±0.5	63	30	17	1.0	Eye	70	13 x 8 x 4	13	99.95K 154.95W	Auto stereo switching; matches PAS3X and PAT 4; incls. cover.
	(T) FM-1	4	0.5	5	54	10-40K ±0.5	63	–	–	–	Eye	70	13 x 8 x 4	12	74.95K 109.95W	Mono tuner: MPX can be added with FMX-3 kit @ 29.95; incls. cover.
EICO	Cortina 3200	2.4*	<0.75	4.5	45	20-15K ±1	40	40			Meter	60	12 x 7¾ x 3⅛	7	139.95W 99.95K	* for 30 dB quieting.
ELECTRO-VOICE Cover IV (2)	EV 1256	2.5	1.0	2.5		30-15K ±1		30		1.5	Meter	60	8⅜ x 10¼ x 3⅜	8	199.00	AM/FM with loopstick for AM; movable station markers; afc.
	EV 1255	2.5	1.0	2.5		30-15K ±1 dB		30		1.5	Meter	60	8⅜ x 10¼ x 3⅜	8	164.00	Same as above, but FM only.
	EV 1159	3.5	1.5	2.8		30-15K ± 2.0 dB		25		2.0	Meter	55	15¾ x 8½ x 5	16	102.00	
GROMMES	108	2	0.5	3	45	20-15K ±1	45	35	20	0.6	Meter	65	13½ x 10 x 4⅜		199.95	FET r.f.; 4-stage i.f.; IC limiter, FM and AM.
	110	2	0.5	3	45	20-15K ±1	45	35	20	0.6	Meter	65	13½ x 10 x 4⅜		167.50	As above, but FM only.
HEATH (35)	AJ-15	1.8	0.5	1.5		20-15K ±1	50	40	25	1.0	Meter	65	16⅞ x 12½ x 4¾	11½	(K)189.95	Xtal filters, IC's, FET's; all silicon, noise-operated FM squelch.
	AJ-43D	2.0	1.0	3.0		20-15K ±3	40	40	30	1.0	Meter	50	15 x 14¾ x 5½	14½	(K)114.95	Pre-built, pre-aligned front end; auto stereo switching, stereo phase control.
	AJ-33A	3.0	1.0	3.0		20-15K ±3	35	30	25		Meter	50	15⅝ x 11½ x 3¾	12	(K) 99.95	Pre-built, pre-aligned front end and i.f. stages; AFC; stereo ind. light.
	AJ-14	5.0	1.0	3.0		20-15K -3 +0	40	30			–	50	12 x 9¾ x 3¼	4¼	(K) 54.95	Pre-built, pre-aligned front end; stereo/mono sw; stereo phase cont; stereo ind. light.
KLH	18	2	0.5	4	35	20-15K ±1dB	50	35	20	0.8	Meter	55	9 x 5⅜ x 4¼	4	129.95	FET front end, 5 IF's, "0"-center tuning meter, planetary tuning; includes cabinet.
KENWOOD (43)	KT-7000	1.5	0.3	1.3	60	20-15K +0, −2	60	35	25	0.6	2 Meters	70	16 5/16 x 11 1/32 x 5 5/32	18	249.95	3 FET's; 4 IC's; 2 crystal filters; signal strgth. meter & FM zero-ctr. tuning mtr.; muting; noise filter; 300-ohm & 75-ohm antenna terminals; with AM.
	KT-3500	1.9	0.6	2.5	45	20-15K +0, −2	55	35	20	0.9	2 Meters	60	13 x 9 5/16 x 4⅛	10.8	119.95	FET's front-end; IC if stages; sig. strgth. meter & FM zero-ctr. tuning mtr.; muting; noise filter; with AM.
	KT-1000	3.0	0.6	4	35	20-15K +0, −2	50	30	18	0.9	Meter	60	10¼ x 9⅜ x 4⅜	8.5	89.95	FET's front-end; auto stereo/mono switching; stereo light ind.; noise filter; with AM.
KNIGHT-KIT (113)	KG-796	2.5	<1.0	10	45	30-15K	30	30	15	1.5	Meter	50	13 x 10 x 3 5/16	7	69.95K	FM-AM.

McIntosh MR-73

Scott 330-T

Pioneer TX-900

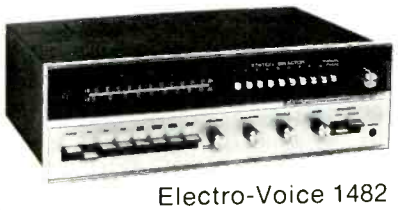
Sony ST-5000F

MANUFACTURER (Circled numbers indicate adv. page)	MODEL	IHF Sensitivity, μV	THD, Mono, 100% Mod., %	Capture Ratio, dB	Alt. Chan. Selectivity, dB	Frequency Response, Hz ± ? dB	AM Suppression, dB	Stereo Separation, 1000 Hz, dB	Stereo Separation, 10 kHz, dB	THD, Stereo, 100% Mod., %	Tuning Indicator	S/N, dB	Dimensions – in. W x D x H	Weight, lbs.	Price	SPECIAL FEATURES
LAFAYETTE (111)	LT-425	1.6	0.4	1.5	40	50-15K ±1	50	40	24	0.7	Dual Meter	68	13 x 9 7/32 x 3 7/8	9	109.95	AM/FM, 2 FET's; 4 IC's; built-in ants; sig. str./ctr-tuning meter. Tape output front & rear.
	LT-725	1.7	0.25	1.5	50	50-15K ±1	50	42	26	0.6	Dual Meter	75	12 x 9 1/8 x 3 3/4	9	99.95	AM/FM, 2 FET's, 4 IC's, built-in ants.; "Black-out" dial; signal strgth/ctr.-tuning meter, tape output front & rear.
LEAK	Trough Line Stereo T	2.5	1.0	3	–	20-20K ±3	45	26	20	1.5	EM 84	66	11 1/2 x 8 1/4 x 4 1/4	13 1/2	209.00	FM stereo.
MARANTZ (19) (45)	20	2.8						45	35		Oscillo-scope		15 3/8 x 14 1/8 x 6 1/8	21	495.00	Built-in scope; inter-sta. muting; bal. bridge hot-carrier mixer; four limiters; 12-pole phase-linear i.f. filters.
	23	2.4	0.3	2.5		20 Hz-15 kHz ± 1		40		0.5	2 Meters	65	15 3/8 x 12 1/2 x 5 5/8	16	250.00	Ctr.-chan. & sig. str/multipath mtrs.; inter-sta. muting; 4 IC's; 4 FET's in tuner, 2 in phono preamp sect.; incls. AM.
	24	2.4	0.3	2.5		20-15K ±1		40		0.5	2 Meters	65	14 1/4 x 12 1/2 x 5 5/8	19	325.00	As above, but incls. complete pre amp-spkr. sel. sw; loudness contr.; phone jack; hi & lo filters; 2 sets phone inputs; tape monitor.
MC INTOSH (76)	MR-73	2.5	<0.3	1.5		20-20K ±0.5		>35		0.7	2 Meters	>70	16 x 13 x 5 7/16	25	549.00	Xtal i.f.'s; 2 IC's; multipath ind; 2 meters-sig. str. and ctr. chan. incls. AM.
	(T) MR-71	2.5	<0.5	1.5		20-20K ±0.5		>30			2 Meters	>70	16 x 13 x 5 7/16	27	399.00	
NIKKO (105)	FAM-14	1.8	0.5	2.5		15-15K ±1	45	40				60	13 x 9 1/2 x 3 3/4	8.8	139.95	Incls. AM; FET's in both front ends, and in FM i.f.; ceramic i.f. filter; headphone ampl.
	FAM-12	1.8						40					12 x 10 x 3 1/2	7.5	109.95	FET front ends.
PIONEER (25) (65)	TX-900	1.7	0.3	1.5	65	20-15K ±2		38		1.0	Meter	60	15 15/16 x 14 x 5 1/2	18	239.95	X'tal filters. 4 IC's, 3 FET's. FM/AM ; wating and output level controls.
	TX-500	2.5	1.0	2.5	35	20-15K ±2		35		1.5	Meter	50	13 x 13 1/8 x 5	15	99.95	FET. FM/AM.
REVOX (67)	A76	1.0		1	80	30-15K ±1	54	40		0.2	Meter	70	16 3/8 x 9 5/8 x 6 1/4	18	469.00	Delay line demodulator, bandwidth 5 MHz, multipath indicator.
SCOTT Cover II (1)	312 D	1.7	0.6	2.5	60	50-15K ±1	55	35	25	0.8	Meter	65	14 3/4 x 12 1/2 x 4 1/8	11 1/8	249.95	
	330-T	1.9	0.6	2.5	40	50-15K ±1	50	35	25	0.8	Meter	65	15 3/4 x 11 1/2 x 5	11	199.95	
	LT-112B	1.8	0.6	2.5	45	50-50K ±1	55	35	25	0.8	Meter	65	14 3/4 x 12 1/2 x 4 1/8		149.95K	
SHERWOOD (33)	S-3300	1.8	0.15	2	60	20-15K ±0.5	55	35	25	0.3	Meter	70	14 x 4 x 10 1/4	13	197.50	FET front end. Micro circuits.
	S-2300	"	"	"	"	"	"	"	"	"	"	"	"	"	224.50	Same as above plus AM.
	S-2500														177.50	Same as S-2300 above but mono FM.
SONY (96) (97)	ST-5000F	1.8	0.2	1.5	90	20-15K ±0.5	65	40	30	0.35	2 Meters	70	15 3/4 x 12 1/4 x 5 3/4	21	449.50	FET front end; 8-element ceramic i.f. filters; 7 i.f. stages, 5 limiters, muting control; mono-auto-stereo sw; var. hi-blend

RECEIVERS

Altec 711B

Harman Kardon
Nocturne 330



Electro-Voice 1482

Fisher 500-TX

Bogen BR-360

NOTES: (1) All models solid-state except when model number is preceded by (T)
(2) "K" indicates kit price; "W" indicates wired price

MANUFACTURER (Circled numbers indicate adv. page)	MODEL	AMPLIFIER SECTION: IHF Power/Chan., W	RMS Power/Chan., W	THD at Rated Power, %	IM at Rated Power, %	IM at 1 Watt, %	Power Bandwidth, Hz to kHz	1-Watt Freq. Response, Hz ± 2 dB	Rated Output S/N, dB	Phono Sensitivity, mV	Phono Overload, mV	TUNER SECTION: IHF Sensitivity, µV	Capture Ratio, dB	THD, Mono, 100% Mod., %	THD, Stereo, 100% Mod., %	Stereo Sep., 1000 Hz, dB	Tuning Indicator	Alt. Chan. Selectivity, dB	Dimensions, In. W x D x H	Weight, lbs.	Price	SPECIAL FEATURES
ALLIED (113)	395	80	55	0.5	.07	.05	15-40K	18-60K ±2	79	2.5		1.6	2	0.5	38	38	Meter	35	16 x 12½ x 5	30	299.95	All Silicon Transistors; FET and IC circuitry.
	339	16	10	1.0	.07	.05	35-20K	20-40 ±3	60	4	–	2.0	5	1.0		30	Meter	35	16 x 13⅜ x 5½	26	149.95	All Silicon Transistors; FET and IC circuitry.
ALTEC LANSING (39) (91)	711B	50	30	<0.5	0.8	0.8	15-25K	15-30 K ±1	88	2.5	25	1.9	2.5	0.3		35	Meter		16⅜ x 12 x 5⅜	32	378.00	Two IC's in IF strip, FET Tuner FM muting automatic switching and indicator for FM stereo
ADC (98)	1000	50	30	0.3	0.2		10-25K	10-60K ±1	65	2		2.5	3	0.5	0.5	32	Meter		17½ x 5½ x 11	23	299.95	Push button selection for 5 stations 100-watt output. FET front end.
	606A	45	25	0.3	0.4		10-25K	10-60K ±1	80	3		2.0	3	0.5	0.5	32	Meter		17 x 5 x 9	19	224.50	True book shelf depth; FET front end.
BOGEN	BR 320	25	15	0.5	0.7	0.35	20-20K	20-35K ±2	80	2.5	50	2.7	1.9	0.3	0.4	35	Meter	60	16¼ x 4½ x 14	19	249.95	Ceramic IF filters, IC's, FET front end, slide controls, opt. wal. encl.
	BR 340	40	30	0.5	0.7	0.35	20-20K	20-35K ±2	83	3	60	2.7	1.9	0.3	0.4	35	Meter	60	16⅛ x 4½ x 14	19	279.95	As above.
	BR 360	50	40	0.5	0.7	0.35	20-20K	20-35K ±2	83	3	60	2.7	1.9	0.3	0.4	35	Meter	60	16⅛ x 4½ x 14	19	339.95	Lo Hi filters, Expander–Compressor.
	DB 240	22.5	18	0.6	0.8	0.4	20-20K	20-30K ±2	80	2.5 7.0	40 120	2.5	2.5	0.7	0.8	35	Meter	55	16½ x 4½ x 11½	18	249.95	Varactor tuner, auto tuning, Rem. cont. accessory. Ceramic IF filters, IC's FET front end.
EICD	Cortina 3770	25 35*	15 20*	1	2	0.6	10-40K	10-50K ±1	70	4.5	80	4.0	4.5	1.5		40	Meter		16 x 9 x 4⅛	14	279.95W 189.95K	*at 4 ohms; **30 dB quieting; incls. AM.
	Cortina 3570	25 35*	15 20*	<0.8	<2	<1	10-40K	5-100K ±1.5	72	4.5	80	2.4**	4.5	1.5		40	Meter		16 x 9 x 4⅛	14	259.95 169.95	*at 4 ohms; **30 dB quieting.
ELECTRO VOICE Cover IV (2)	EV-1482	100	60	0.5			10-40K	10-55K ±1	80	2.0		2.0	2.0	0.5		35	Meter	60		19	444.00	10 sta presets; varactor-tuned; muting; Xtal filters; incls. AM
	EV-1382	60	40	0.8			10-40K	10-55K ±1	75	2.5	140	2.5	3.0	0.8		32	Meter	40	18 x 17 x 5⅛	23	333.00	Dual conts; muting; main-rem spkr SW incls. AM.
	EV-1277	32½	18	1.0			20-20K	20-30K ±1.5	70	3.0		2.5	2.8	1.0	1.5	30	Meter		8⅜ x 10½ x 8⅜	16	280.00	EV-1278 – Same with AM, 315.00
	EV-1182	25	19	0.8			20-20K	20-20K ±1.5	70	3.0		2.2	2.0	0.8		25	Meter		14⅜ x 10½ x 3¾	15	233.00	Incls. AM. EV-1181, same w/o AM 210.00
FISHER (31)	500 TX	75	65	0.5	0.8	0.15	8-35K	20-25K ±1.5	90	2.5 10	45 150	1.7	1.5	0.4	0.4	38	Meter	70	16⅞ x 14½ x 4 13/16	30	449.95	Electronic tuning; tune-o-matic p.b. tuning; Xtal & Ceramic filters dual-gate MOSFET's
	400-T	60	55	0.5	0.8	0.15	10-30K	20-20K ±2	90	2.5 7.5	45 135	2.0	2.5	0.5	0.5	38	Meter	45	15½ x 14¼ x 4⅞	25	349.95	Tune-o-matic p.b. tuning
	250-T	40	30	0.5	1.0	0.2	15-25K	20-20K ±2	90	2.5 7.5	45 135	2.0	2.8	0.5	0.5	38	Meter	45	15½ x 12⅜ x 4⅝	19	299.95	As above
	175-T	28	20	0.5	1.0	0.2	25-20K	20-20K ±2	85	2.5 7.5	45 135	2.0	2.8	0.6	0.6	35	Meter	45	15½ x 12⅜ x 4⅝	18	249.95	2-FET front end; IC FM i.f.
GROMMES	503 A	50	30	0.3	0.5	0.1	20-20K	15-50K ±1	75	2	70	2	3	0.5	0.6	35	Meter	45	16 x 13 x 5¼		349.95	FET RF, 4stg.IF, IC limiter, silent tuning, FM-AM DC coupled audio 504A, same W/o AM, 309.95.
HARMAN-KARDON (40) (41)	Nocturne 330	35	30	0.8	0.5	0.1	15-35K	7-50K ±1.5	90		110	2.7	4.0	0.8		30	Meter	50	13 x 15 9/16 x 4¼	20	199.95	Illuminated function indicator lights. AM section-
	Nocturne 820	55	43	0.5	0.4	.08	10-40K	5-60K ±1.0	90		115	1.8	3.0	0.5		35	Meter	85	12 x 16½ x 4¼	25	299.95	Illuminated function indicator lights. Crystal filters. IC's

The new Bolero's exclusive fretwork grille is a beautiful cover-up for the finest bookshelf speaker system you can buy.

Inside there's a new low-resonance 10″ woofer with an overgrown 10½ lb. magnetic structure and a 3″ voice coil. It's designed for high power handling and improved transient response. The woofer is backed up by a 10″ phase inverter to improve low frequency performance (you'll feel the power of a bass drum or organ pedal notes as well as hear them).

For frequencies above 2000 Hz, a new compression-driven cast aluminum horn takes over. It's a combination that assures smooth, resonant-free response to beyond audibility. To compensate for room acoustics, there's a three-position shelving control on the back of the enclosure.

Talk about the enclosure. It features a design so distinctive it's really the first new look in bookshelf speakers to come along. Besides its classic grillework, the Bolero is finished in choice walnut veneer, then hand-rubbed to a deep enduring lustre.

We make two other bookshelf speakers, too. The Madera and the Corona. They're top-value, full range systems that sell for as low as $85.50.

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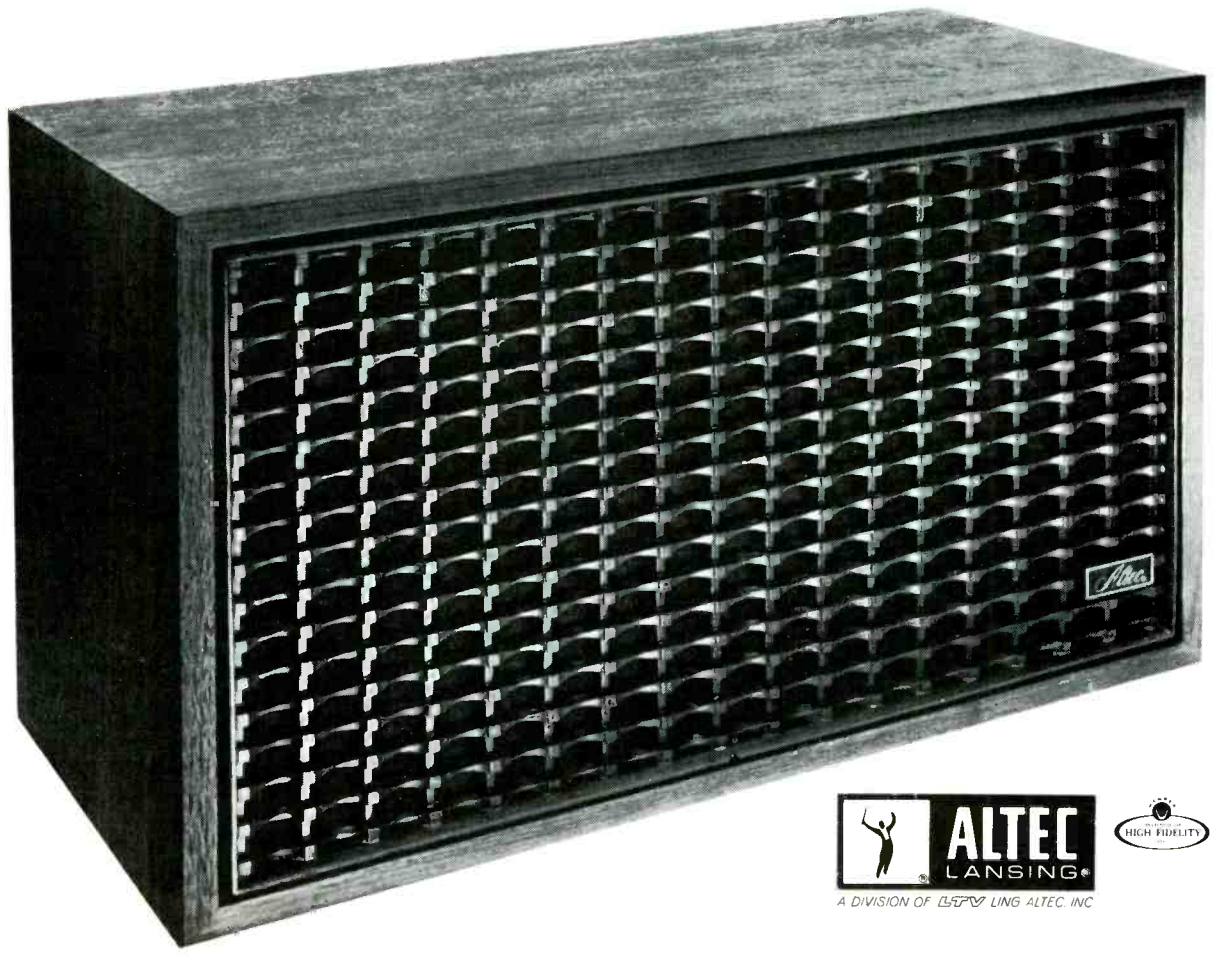
We wouldn't put on such a beautiful front if we didn't have the speakers to back it up.



ALTEC LANSING®

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"VISIT ALTEC LANSING'S EXHIBIT AT THE LOS ANGELES HI FI SHOW, AMBASSADOR HOTEL, OCTOBER 1-5."

The new Nocturne Eight Twenty solid state receiver has 140 Watts of power and perhaps the most sophisticated FM stereo tuner ever built.

But it doesn't have an AM radio.

At $299.95, we had to make a choice. So we made the one we thought you would make. We traded the AM radio for an inordinate amount of performance. For instance, the Eight Twenty has enough guts to drive four speaker systems flawlessly, without the slightest sign of strain. The amplifier is unlike any power output stage found in conventional stereo receivers. It employs wideband silicon transistors and a heavy duty power supply which extends the amplifier's response to below 5Hz and above 60,000Hz. This results in flawless reproduction of all harmonics without phase and transient distortion. The output stage uses a quasi-complimentary symmetry design which insures accurate balance and symmetry at the clipping points. A high degree of feedback is used to keep distortion down and stability high. Harmonic distortion products are kept below 0.5% at full output across the audio spectrum of 20-20,000Hz. This insures unusually smooth and transparent sound.

At $299.95 we had to choose between an AM radio and better performance. We left out the AM radio.

Newly designed integrated circuits and crystal filters in the I.F. strip make FM tuning as precise as switching the channel selector of a television set. The tuner accepts only the station to which it is tuned, regardless of how close an alternate or adjacent station may be. An FET front end coupled with a four ganged tuning capacitor assures unprecedented sensitivity and selectivity. Crossmodulation has been reduced to the vanishing point.

The new Harman-Kardon Nocturne Eight Twenty doesn't have an AM radio. But it has everything else you could possibly want in a receiver. And at an amazingly low price. Hear it soon at your Harman-Kardon dealer.

For more information, write: Harman-Kardon, Inc., Dept. A-9, 55 Ames Court, Plainview, N.Y. 11803.

harman kardon

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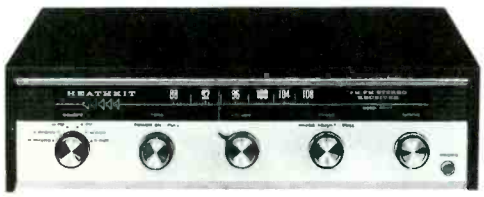
140 Watts, ± 1 db; 110 Watts, IHF

Check No. 40 on Reader Service Card

RECEIVERS (continued)

JVC 5003

McIntosh MAC-1700



Heath AR-17

Kenwood TK-140X

Nikko STA-501

MANUFACTURER (Circled numbers indicate adv. page)	MODEL	AMPLIFIER SECTION: IHF Power, Chan., W	RMS Power, Chan., W	THD at Rated Power, %	IM at Rated Power, %	IM at 1 Watt, %	Power Bandwidth, Hz to kHz	1-Watt Freq. Response, Hz ± dB	Rated Output S/N, dB	Phono Sensitivity, mV	Phono Overload, mV	TUNER SECTION: IHF Sensitivity, µV	Capture Ratio, dB	THD, Mono, 100% Mod., %	THD, Stereo, 100% Mod., %	Stereo Sep., 1000 Hz, dB	Tuning Indicator	Alt. Chan. Selectivity, dB	Dimensions, in. W x D x H	Weight, lbs.	Price	SPECIAL FEATURES
HEATH (35)	AR-15	75	50	0.5	0.5	0.2	6-30K	8-40K ±1	60	2.2	155	1.8	1.5	0.5	1.0	40	2 Meters		16⅞ x 14½ x 4¾	27	339.95K	FET's; IC i.fs, loudness and speaker sws.
	AR-13A	33	20	0.7	1.0	–	20-20K	15-30K ±1	50	6.0		2.0	3.0	1.0		30	Meters		17 x 16 x 5½	24	189.95K	Separate AM and FM tuning conts.
	AR-14	15	10	1.0	1.0	–	15-50K	12-60K ±1	60	4.5		5.0	3.0	1.0		30			15¼ x 12 x 3⅞	14	114.95K	a.f.c., phone jack, stereo indicator, stereo phase adj.
	AR-17	7	5	1.0	2.0	–	25-35K	25-35K ±1	45	5.0		5.0	3.0	1.0		30			12 x 10⅜ x 3	7	69.95K	Compl. sym. output; stereo phase adj.
JVC (9)	5040	100	75	0.5	1.0	1.0	7-30K	50-15K ±1	70	1.5	25	1.8	2	0.5	0.8	>35	Meter	50	20⅜ x 16¼ x 5⅞	36.0	449.95	Graphic tone controls
	5003	70	50	1.0	1.0	1.0	7-30K	50-15K ±1	70	1.5	25	1.8	2	0.5	0.8	>35	Meter	50	20⅜ x 16½ x 5⅞	30.8	349.95	As above
	5001	30	25	1.0	1.0	1.0	20-30K	50-15K ±1	65	1.8	24	2.0	3	0.8	1.0	>35	Meter	45	20⅜ x 16¼ x 5⅞	28.6	289.95	As above
KLH	27	45	30	<0.5	<0.5	<0.25	17-20K	6-25K	70	1.3	105	2.0	3	0.5	0.8	35	Meter	35	13½ x 14¾ x 4½	18	319.95	FM/AM; separate planetary tuning FET's; 5 stg. IF; MX noise filter
KENWOOD (43)	TK-140X	100 @ 4Ω 85 @ 8Ω	80 @ 4Ω 60 @ 8Ω	0.5	0.5	0.2	15-30K	20-30K ±1.5	75	2.0	65	1.7	1.0	0.5	0.8	35	Meter	45	16½ x 12½ x 5½	28.5	349.95	
	KR-100	70 @ 4Ω 55 @ 8Ω	50 @ 4Ω 40 @ 8Ω	0.5	0.5	0.2	18-30K	20-30K ±1.5	70	2.5	65	1.8	2.5	0.5	0.8	35	Meter	45	16½ x 12¼ x 5½	23.5	299.95	
	KR-77	37.5 @ 4Ω 28 @ 8Ω	33 @ 4Ω 24 @ 8Ω	0.5	0.5	0.2	20-30K	20-30K ±1.5	70	2.0	65	1.9	2.5	0.8	1.0	35	Meter	45	16½ x 12½ x 5½	23.0	239.95	KR-70, same w/o AM, 199.95
KNIGHT-KIT (113)	KG-988	40	25	1.0	0.3	0.7	20-20K	15-50K	65	2.5	45	3	3.5	1.0	1.5	30	Meter	45	17½ x 14 x 5½	21	179.95K	FM-AM, IC's, FET, complementary-symmetry amp. des.
LAFAYETTE (111)	LR-1500T	87.5	70	0.8	1	0.15	12-40K	20-20K ±0.75	75	1.8, 4.5 12	30, 75, 200	1.5	1.25	0.25	0.6	42	Meter	50	16¾ x 14¼ x 5	30	299.95	AM/FM, 2 FET'S, 4 IC's Auto-overload protection main rem. spkr. sw.
MARANTZ (19) (45)	18	40	40	0.2 max.	0.2 max.		10-30K	20-20K	80	1 For 40W					0.2	45	Oscilloscope		18¼ x 16 x 6	46	695.00	Built-in scope; front-panel phone jack, 2 dubbing jacks.
	22	60	40	<0.3	.3			20-15K ±?		1.5	–	2.4	2.5	.3	.5	40	2 Meters		16⅞ x 14 x 5	30	425.00	Ctr. chan and sig. str/multi-path meter, front panel dubbing jacks
	26	18	10	1	1				50				3	0.7	1	30	Meter		15½ x 17½ x 3 11/16	18	199.00	Inter-station muting; "quick-connect" spkr. terms.
MARTEL	330	30	17	.3			30-17K	25-20K ±1.5	67	2		2.5	2.5	1.0	1.5	35	Meter		15⅞ x 11 x 4⅞	13.5	179.95	Luodness control noise filter
MCINTOSH (76)	1700		40	0.25	0.25		20-20K	10-80K +0, -3	75	2.4	150	2.5	<2	0.25		30	Meter		16 x 15 x 5½	34	599.00	Ctr-chan mtr; spkr sw; headphone jack.
MIKADO (88)	2425	30	15	0.5			1-32K	1-32K	70	3		2	2.5			38	Meter	50	16¾ x 12 x 4¾	20	189.95	Very low distortion entire bandwidth.
	2420	20	10	1%			20-20K		60	6		3.5	5			25	Meter		15 x 11 x 4½	13	129.95	
NIKKO (105)	STA-701B	35	25	<0.8	1.0	0.4	20-20K	15-50K ±1	65	2.8	70	1.8	2.0	0.8	1.0	38	Meter	45	15¼ x 12⅜ x 4½	17.7	239.95	2 FET's 3 IC's
	STA-501	25	18	0.8	1.0	0.4	20-20K	15-50K +1	65	2.8	65	1.8	2.0	0.8	1.0	38	Meter	45	15⅛ x 12¼ x 4½	17.7	189.95	2 FET's 1 IC
	STA-301	15	12	0.8	1.0	0.4	30-20K	20-50K ±1	65	2.8	70	2.5	3.0	0.8	1.0	32	Meter	43	14¼ x 12⅜ x 4½	14	159.95	1 FET 2 IC's
NORDMENDE	8001ST	32		0.5	0.7		15-35K	30-20K ±2	65	4		2.5	2.5	0.6	0.8	30	Meter	60	19½ x 15 x 6	26½	429.95	Incls. metal cover and ebony side panels. lo and hi filter sws

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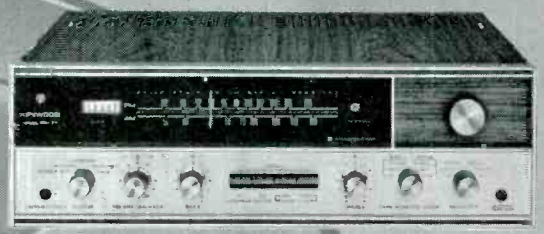
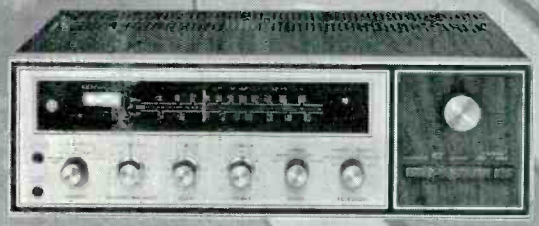
When you pick from the KENWOOD Tree you are sure to pick the finest. And KENWOOD's new stereo receivers certainly prove the point! Whichever one you choose, you will be getting top performance, top quality, and top value. That is because KENWOOD brings you the most carefully engineered hand-crafted stereo components on the market today, with "extras" that set each model apart from the competition and give even the least expensive unit a mark of luxury. Throughout the world the KENWOOD Tree stands as a symbol of quality, dependability and fine stereo performance... so take your pick—and pick the finest!

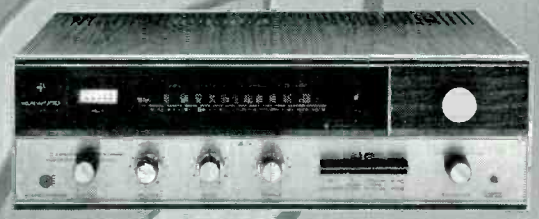
TK-140X . . FET, IC, Solid State, FM/AM, 200-Watt . $349.95



KR-77 . . . FET, IC, Solid State, FM/AM, 75-Watt . . . $239.95



KR-100 . . FET, IC, Solid State, FM/AM, 140-Watt . . . $299.95



KR-70 . . . . FET, IC, Solid State, FM, 75-Watt $199.95

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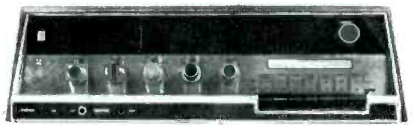
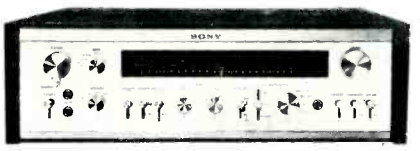
RECEIVERS (continued)

Pioneer SX770

Sansui 5000



Scott Stereomaster 3800



Sony STR-6120

Sherwood S 7800a

University Studio PRO 120

MANUFACTURER (Circled numbers indicate adv. page)	MODEL	AMPLIFIER SECTION: IHF Power/Chan., W	RMS Power/Chan., W	THD at Rated Power, %	IM at Rated Power, %	IM at 1 Watt, %	Power Bandwidth, Hz to kHz	1 Watt Freq. Response, Hz ±, dB	Rated Output S/N, dB	Phono Sensitivity, mV	Phono Overload, mV	TUNER SECTION: IHF Sensitivity, µV	Capture Ratio, dB	THD, Mono, 100% Mod., %	THD, Stereo, 100% Mod., %	Stereo Sep., 1000 Hz, dB	Tuning Indicator	Alt. Chan. Selectivity, dB	Dimensions, in. W x D x H	Weight, lbs.	Price	SPECIAL FEATURES
PANASONIC	SA-4000	80	60	0.1	0.2		20-30K	20-50K ±3	90	3		1.5	1.0	0.15		45		60	20 3/16 x 16 5/16 x 7	46	990.00	
	SA-60	25	22.5	0.8	1.0		20-50K	30-60K ±3	75	3.5		2.2	2.5	0.6		35		45	19 9/16 x 14 x 5 7/8	25	279.95	Incls AM
PIONEER (25) (65)	SX-1500TD	90	70	0.5	0.7	0.2	15-40K	20-70K ±1	60	3.3	60	1.7	0.7	0.7	1.0	42	Meter	40	18 1/16 x 14 1/2 x 5 11/16	26	–	FM/AM FET's IC's Mic. Jack speaker sw. 2 meters.
	SX-990	65	35	0.5	0.7	0.2	15-40K	20-70K ±1	62	3.3	60	1.7	2	0.7	1.0	42	Meter	35	18 1/16 x 14 1/2 x 5 1/16	26	299.95	FM/AM FET. IC's Mic. Jack 2 Meters.
	SX-770	35	20	0.8	1.0	0.2	15-35K	20-40K ±3	70	2.5	60	1.8	2	0.7	1.0	40	Meter	35	16 15/16 x 13 3/4 x 15 11/16	25	249.95	FM/AM FET. IC's Mic. Jack
	SX-440	20	15	1.0	1.0	0.2	30-20K	20-70K ±3	50	3.0	60	2.5	2.5	0.7	1.0	35	Meter	35	15 15/16 x 15 x 5 7/16	22	189.95	FM/AM FET IC's
SANSUI (14) (15)	5000	90	75	<0.8	<0.8		15-30K	10-50 ±1	>65	2.5		1.8	1.5		<0.5	>35	Dual Meter	>50	17 1/8 x 14 1/2 x 4 7/8	29	449.95	Switchable d.f.; noise canceler, short-free spkr. conns.; black window des; spkr. sw.
	2000	50	36	<0.8	<0.8		20-40K	30-20K ±2	>65	2.2		1.8	2.5		<0.8	>35	Meter		16 1/4 x 13 1/4 x 5	26 1/2	299.95	As above, less switchable d.f.
	800	35	28	<0.8	<0.8		20-40K	15-40K ±1.5	>50	2.2		2.8	3		<1.0	>35	Meter		15 3/4 x 13 x 4 1/2	23	259.95	As above
	350	23	18	<1.0	<1.0		30-20K	20-30K ±1 db	>50	2.2		3			<1.0	>35	Meter		15 3/4 x 13 x 4 1/2	19 1/2	199.95	Same as above
SCOTT Cover II (1)	3800	85*	43	0.8	0.7	0.6	10-25K	10-25K ±1	65	3,6	38,64	1.9	2.5	0.6	0.8	35	Meter	40	18 1/4 x 14 1/2 x 5 3/4	25	449.95	* 4 Ohms
	386	67.5*	35	0.8	0.7	0.6	10-25K	10-25K ±1	65	3,6	38,64	1.9	2.5	0.6	0.8	35	Meter	40	17 1/2 x 15 3/4 x 5 1/2	17	349.95	* 4 Ohms
	342C	45*	25	0.8	0.7	0.6	14-25K	14-25K ±1	60	4	42	1.9	2.5	0.6	0.8	35	Meter	40	15 3/4 x 11 1/2 x 5	16	269.95	* 4 Ohms
	341	27.5*	15	0.8	1.0	0.5	25-20K	15-25K ±1	60	4	70	2.5	2.5	0.6	0.8	30	Meter	36	14 3/8 x 12 1/2 x 4 1/8	15	199.95	* 4 Ohms
SHERWOOD (33)	SEL 200	140* 225**	60* 85**	0.2	0.3	0.1	8-30K	20-20K ±½ dB	−90	1.5, 3,6	120	1.5	1.7	0.15	0.3	45	2	70	19 1/8 x 14 x 6 1/4	35	599.00	** 4 ohms. * 8 ohms. Toroidal FM i.f. filter. Field Strength and zero ctr. mtrs.
	S7800a	80	60	0.35	0.6	0.15	12-30K	20-20K ±1	80	1.6	120	1.8	2.0	0.15	0.3	40	Zero centi meter	55	16 1/4 x 14 x 4 1/4	27	439.50	Var. phono sens. sw; Main-rem spkr. sw.
	S-8800a	80	60	0.35	0.6	0.15	12-30K	20-20K ±1	80	1.6	120	1.8	2.0	0.15	0.3	40	Zero centi meter	55	16 1/4 x 14 x 4 1/4	27	399.50	As above
	S-7600a	50	35	0.35	0.6	0.15	15-25K	20-20K ±1	80	1.4, 3,6	120	1.8	2.0	0.15	0.3	40	Zero centi meter	55	16 1/4 x 12 x 4 1/4	22	359.60	Incls. AM; main-rem spkr. sw.
	S-8600a	50	35	0.35	0.6	0.15	15-25K	20-20K ±1	80	1.4, 3,6	120	1.8	2.0	0.15	0.3	40	Zero centi meter	55	16 1/2 x 12 x 4 1/4	22	319.50	Incls. AM; main-rem spkr. sw.
SONY (96) (97)	STR-6120	75	60	0.2	0.3	.05		15-20K +0, -3	90	1.5		1.8	1.5	0.2	0.35	40	2 Meters	100	19 x 15 7/8 x 5 13/16	34	699.50	
	STR-6060	55	45	0.2	0.2	0.15		20-60K +0, -3	90	2.1		2.2	2	0.3	0.5	40	Meter	80	17 3/8 x 13 13/16 x 5 15/16	29	399.50	Incls. AM
	STR-6050	35	30	0.2	0.4	0.2		30-50K +0, -3	90	2.5		2.6	2	0.4	0.5	40	Meter	70	17 7/16 x 13 7/8 x 5 15/16	20	279.95	Incls. AM
	STR-6040	16	15	0.5	0.5	0.2		30-50K +0, -3	90	2.5		2.6	2	0.4	0.5	40	Meter	70	15 3/4 x 12 1/4 x 5 3/4	16	199.95	Incls. AM
STANDARD	SR-606S	50	30	0.5	0.7	0.7	30-30K	20-100K ±3	70	3.0		3.0	3	0.3	0.8	35	Meter	40	17 x 12 x 4 1/2	18	299.95	Attenuator controls; piano keys for funct; auto stereo switching.
UNIVERSITY (101)	STUDIO PRO-120	60*	30	0.8	<0.5	<1.0	10-40K	10-40K +0, -3	80	3		2.3	<1.0			40	Meter	55	16 3/8 x 12 x 4 1/2	17	399.50	*At 4 Ohms; fully automatic logic cct.

If you have $695 to spend on a stereo receiver, here's the one to spend it on.

Let's not kid around. At 695 bucks plus tax, a Marantz Model 18 Stereophonic FM Receiver isn't for everyone.

But, if you'd like to own the best solid-state stereophonic receiver made anywhere in the world, this is it. Here are just a few of the reasons why.

The Marantz Model 18 is the only receiver in the world that contains its own built-in oscilloscope. That means you can tell a lot more about the signal a station is putting out besides its strength or whether or not it's stereo. Like if they're trying to put one over on you by broadcasting a monaural recording in stereo. Or causing distortion by overmodulating. (It's nice to know *it's their fault.*)

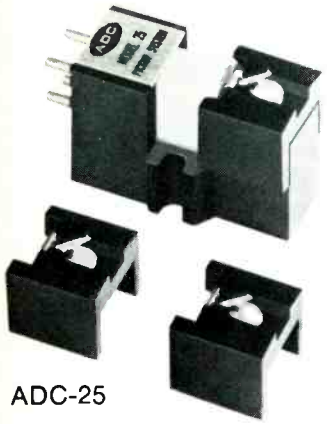
The Marantz Model 18 is the only stereo receiver in the world with a Butterworth filter. Let alone four of them.

The result: Marantz IF stages *never need realigning.* Marantz station selectivity is superior so strong stations don't crowd out adjacent weaker stations. And stereo separation is so outstanding that for the first time you can enjoy true concert-hall realism at home. Moreover, distortion is virtually non-existent.

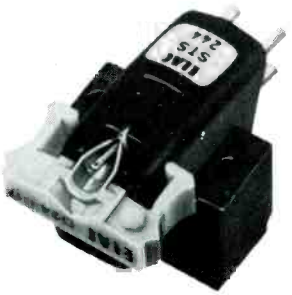
But there is much more that goes into making a Marantz a Marantz. That's why your local franchised Marantz dealer will be pleased to furnish you with complete details together with a demonstration. Then let your ears make up your mind.

marantz.®
THE SOUND OF MUSIC AT ITS VERY BEST.

STEREO PHONO CARTRIDGES



ADC-25



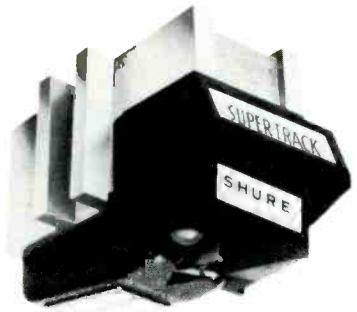
Elac STS 224

Ortofon SL-15

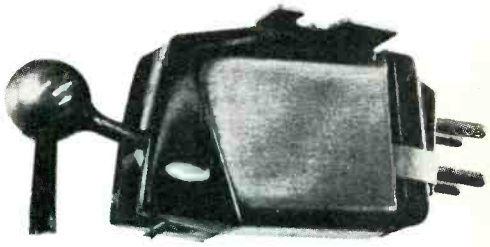
Empire 999VE

MANUFACTURER (Circled number indicates adv. page)	Model	Frequency Response, Hz ±2 dB	Separation, 1000 Hz, dB	Separation, 10 kHz, dB	Output, mV/cm/sec.	Tracking-force Range, gms.	Load Resistance, ohms	Stylus Type (see letter code)	Stylus Radius (Radii) mils	Replacement	Weight, gms.	Price	SPECIAL FEATURES (Stylus type: C – Conical, E – Elliptical)
ADC (98)	ADC-25	10-24K	30	30	0.73	½-1¼	47K	E C	0.3 x 0.7 0.3 x 0.9 0.6	User	7	100.00	Furnished with 3 styli to accommodate all groove types.
	ADC-26	10-24K	30	30	0.73	½-1¼	47K	E	0.3 x 0.9	User	7	80.00	Single stylus; additional types available.
	ADC-27	10-22K	30	30	0.73	½-1½	47K	E	0.3 x 0.7	User	7	70.00	Similar to above but styli not interchangeable.
	10E, MK II	10-20K	30	20	0.73	½-1½	47K	E	0.3 x 0.7	User	7	59.50	Induced magnet design as in above types.
ELAC (53)	444 E	10-24K	26	17	1.0	.075	47K	E	0.2 x 0.9	User	6.5	69.50	
	444-12	10-24K	26	17	1.0	.075	47K	C	0.5	User	6.5	59.50	
	344-17	20-22K	24		1.0	1	47K	C	0.7	User	6.5	39.50	
	244-17	20-22K	22		1.5	1.5	47K	C	0.7	User	6.5	24.95	
EMPIRE	1000 ZE	4-40K	35	>20	1.0	¼-1¼	47K	E	0.2 x 0.7	User	7	99.95	
	999 VE	6-35K	35	>20	1.0	½-1½	47K	E	0.2 x 0.7	User	7	74.95	
	888 E	10-30K	30	>20	1.0	¾-3	47K	E	0.4 x 0.9	User	7	39.95	
	808	15-25K	30	>20	1.0	1-5	47K	C	0.4 x 0.9	User	7	19.95	
GOLDRING	800 Super E	20-20K	32	22	0.8	½-1¼	47K	E	.3 x .7	User	8	69.50	Duo-pivoting stylus for low tracking force in high-quality arms.
	G 800 E	20-16K	30	20	1	¾-1½	47K	E	.3 x .7	User	8	49.95	"True transduction" principle – wide dynamic range, flat mid band.
GRADO	F-2	7-40K	25	25	1.6	¾-1½	10K	E	.6 x .3	User	5.5	60.00	
NORELCO	412	20-20K	30			¾-1½	>47K	E	.3 x .7		7	67.50	Super-M magnet.
ORTOFON (99)	S-15 M/T	20-20K	30	25	0.6	1-2	47K	E	0.3 x 0.7	Fty	31	85.00	Factory mounted for use in Ortofon tone arms.
	S-15/T	20-20K	30	25	0.6	1-2	47K	E	0.3 x 0.7	Fty	18.5	80.00	
	SL-15/T	20-20K	30	25	0.6	¾-1½	47K	E	0.3 x 0.7	Fty	7	75.00	With Ortofon 2-15K in-line matching transformers.
	SL-15	20-20K	30	25	0.02	¾-1½	2	E	0.3 x 0.7	Fty	7	60.00	

Pickering
XV15-750E



Shure V15-II



Stanton 681EE

MANUFACTURER (Circled number indicates adv. page)	Model	Frequency Response, Hz ± 2 dB	Separation, 1000 Hz, dB	Separation, 10 kHz, dB	Output, mV/cm/sec.	Tracking-force Range, gms.	Load Resistance, ohms	Stylus Type (see letter code)	Stylus Radius (Radii), mils	Replacement	Weight, gms.	Price	SPECIAL FEATURES (Stylus type: C – Conical, E – Elliptical)
PICKERING (21)	XV15/750E	10-25K	35	25	0.8	½-1	47K	E	0.2 x 0.9	User	5½	60.00	High-performance cart. for use with manual or high-quality auto TT.
	XV15/400E	10-25K	35	25	1.0	¾-1½	47K	E	0.3 x 0.9	User	5½	49.95	High-performance cart. for use with auto-manual TT's.
	XV15/200E	10-25K	35	20	1.4	2-4	47K	E	0.4 x 0.9	User	5½	44.95	Designed for use with auto-TT's and higher tracking forces.
	V15AME3	10-25K	32	22	1.0	¾-1½	47K	E	0.3 x 0.9	User	5	44.95	Elliptical stylus provides ruggedness.
	V15ATE3	10-23K	32	22	1.2	2-5	47K	E	0.4 x 0.9	User	5	39.95	Gives elliptical perf. at slightly greater tracking forces, for use/auto. TT's.
	XV15/100	10-20K	35	20	1.4	3-7	47K	C	0.7	User	5½	29.95	Designed for use in changers requiring greater tracking forces.
	V15AT3	10-23K	32	22	1.4	2-5	47K	C	0.7	User	5	29.95	Basic automatic TT cartridge noted for broad application.
SHURE (11)	V-15 Type II	20-25K	25+		0.7	¾-1½	47K	E	0.2 x 0.7	User	6.8	67.50	Analog-computer-designed for finest-quality TT's.
	V-15 Type II-7	20-25K	25+		0.7	¾-1½	47K	C	0.7	User	6.8	62.50	As above, except with conical stylus.
	M91E	20-20K	25+		1.0	¾-1½	47K	E	0.2 x 0.7	User	5	49.95	New series of high-trackability cartridges for good turntables.
	M92G	20-20K	25+		1.0	¾-1½	47K	C	0.7	User	5	39.95	As above, with conical stylus.
	M93E	20-20K	25+		1.2	1½-3	47K	E	0.4 x 0.7	User	5	39.95	As above.
	M75E	20-20K	25+		1.2	¾-1½	47K	E	0.4 x 0.7	User	6	34.95	Lowest cost high-trackability cartridge for upgrading older turntables.
	M-75-6	20-20K	25+		1.2	1½-3	47K	C	0.7	User	6	24.50	As above, conical stylus
STANTON Cover III	681EE	10-20K	35	25	0.7	¾-1.5	47K	E	0.2 x 0.9	User	5.5	60.00	
	681A	10-20K	35	25	0.9	1-3	47K	C	0.7	User	5.5	55.00	Professional tool designed for calibration of recording channels. Each cartridge supplied with a calibration chart.
	681SE	10-20K	35	25	1.1	2-5	47K	E	0.4 x 0.9	User	5.5	55.00	
	500E	20-20K	35	25	0.8	2-5	47K	E	0.4 x 0.9	User	5.0	35.00	
	500AA	20-20K	35	25	0.8	¾-3	47K	C	0.5	User	5.0	30.00	
	500A	20-20K	35	25	0.8	2-5	47K	C	0.7	User	5.0	25.00	Bdcst-std. cart.; complete select. of replaceable styli in concl. 0.5, 0.7, 1., 2.7 mil & elptcal. 0.2 x 0.9 & 0.4 x 0.9 mil.

MANUAL TURNTABLES and ARMS

Acoustic Research "XA"

Empire 598

Ortofon RS-212

Rabco Arm

SPEEDS (use letter code)

A – 33, 45, 78
B – 33, 45
C – 33 only
D – 16, 33, 45, 78
E – 16, 33, 45
F – Cont. variable

MANUFACTURER (Circled numbers indicate adv. page)	TURNTABLES: Model	Speeds (see letter code)	Wow and Flutter at 33⅓, %	Rumble (NAB) dB	Motor Type	Platter Diameter, in.	Platter Weight, lbs.	Drive	Arm Mounting Provision	Dimensions, W x D x H, in.	Weight, lbs.	TONE ARMS: Model	Overall Length, in.	Pivot-stylus dist., in.	Vertical Bearing	Lateral Bearing	Stylus Force Method	Max. Tracking Error, deg.	Cart. Weight Range, gms.	Arm Resonance, Hz	Stylus Force Range, gms.	Weight, if sep., oz.	Price	SPECIAL FEATURES
ACOUSTIC RESEARCH (13) (83)	XA	B	0.5	-38	24-P sync	11¾	3.3	belt	integ.	16¾ x 12¾ x 5¼	13½	–	12	9	cone point	ball sleeve	counter balance	0.35/		10-15	0.5-8.0	–	78.00	All models include: stylus-force and overhang gauges, base, cover, oil.
	TA	C	0.5	-38	24-P sync	11¾	3.3	belt	integ.	16¾ x 12¾ x 5¼	13½	–	12	9	cone point	ball	counter balance	0.35/ in		10-15	0.5-8.0	–	75.00	Same as above.
	XA UNIV.	Same as XA, except usable on 100-120 or 220-240V 50-60 Hz																					87.00	Same as above.
BOGEN	B62	D,F	0.2		4-P ind.	12	7¾	idler	integ.	15 x 13 x 3½	23	–	–	–	–	–	–	–	–	–	–	–	67.95	Integral tone arm
	B52	D,F	0.2		4-P ind.	12	3¾	idler	integ.	14¾ x 11⅞ x 3½	12	–	–	–	–	–	–	–	–	–	–	–	49.95	As above.
EMPIRE	598	A	<.05		hys	12	6	belt	integ.	17 x 15 x 8¾	30	–	–	–	–	–	–	–	–	–	–	–	199.95	Incls. 990 arm.
	–	–	–	–	–	–	–	–	–	–	–	990	12⅜					0.65	2-10	6	0.4	26½	74.95	
	398	A	<.05		hys	12	6	belt	integ.	17 x 15 x 8¾		980 A	12⅜	–	–	–	–	0.65	2-25	6	–	–	200.00	
	208	A	<.05		hys	12	6	belt	integ.	16 11/16 x 14 11/16 x x 8¾	–	–	–	–	–	–	–	–	–	–	–	–	125.00	
NORELCO	202 ELEC-TRONIC	A	0.13	-38	D-C	11½	2½	belt	integ.	15½ x 13 x 5½	10	–	–	–	–	–	–	–	–	–	–	–		
PIONEER (25) (65)	PL-41C	B	0.08		hys.	12¼	4	belt	integ.	20 x 16 x 7¾	33	–	–	–	–	–	–	–	–	–	–	–	220.00	Magnetic anti-skating
ORTOFON (99)	–	–	–	–	–	–	–	–	–	–	–	RS-212	12	9	ball	ball	balance spg.	1.19	7-19	8	0-4½		90.00	
	–	–	–	–	–	–	–	–	–	–	–	RMG-309	16	12	ball	ball	balance spg.	0.83	7-19	8	0-7		75.00	
RABCO (108)	–	–	–	–	–	–	–	–	–	–	–		14	7	cone	cone	weight	0.16	0-18	10	0-5	arm 1 oz. unit 3 lbs.	149.50	Servo straight line tracking

Check No. 49 on Reader Service Card →

If you already own an earlier Dual automatic turntable, you're equipped to really appreciate the new Dual 1209.

Because the 1209, just like your present Dual, offers flawless tracking and smooth, quiet performance that will be yours for years to come.

All Duals are made that way. And all recent ones have such exclusive features as pitch control that lets you "tune" your records by a semitone. No wander so many hi-fi professionals use Duals in their personal stereo component systems.

But the 1209 does have some new refinements of more than passing interest.

Its motor combines high starting torque with dead-accurate synchronous speed. Its anti-skating system is separately calibrated for elliptical and conical stylus types.

The tonearm counterbalance has a click-stop for every hundredth-gram adjustment. The cue control is farther front, for greater convenience. And the styling is very clean.

These refinements aren't likely to seduce you away from your present Dual. They're not intended to. But if you don't already own a Dual, perhaps it's time you talked with somebody who does.

And whether or not you own a Dual now, you might enjoy a look at our literature about the 1209, at $119.50, and about other Duals from $79.50.

United Audio Products, Inc.,
120 So. Columbus Ave., Mount Vernon,
New York 10553. Dual

The people most likely to appreciate the new Dual 1209 are the least likely to need one.

MANUAL TURNTABLES and ARMS (continued)

[1]SPEEDS (use letter code)

A – 33, 45, 78
B – 33, 45
C – 33 only
D – 16, 33, 45, 78
E – 16, 33, 45
F – Cont. variable

Shure-SME 3012

Sony PS-1800

Rek-O-Kut B-12GH

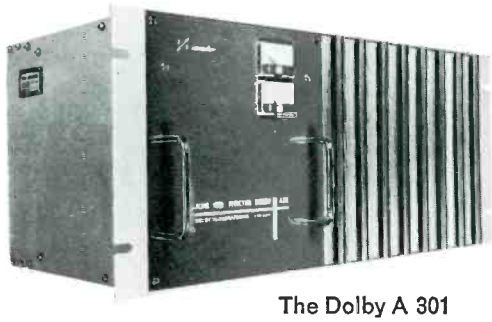
Thorens TD-125

MANUFACTURER (Circled numbers indicate adv. page)	TURNTABLES Model	Speeds (see letter code)	Wow and Flutter at 33⅓ r.p.m. %	Rumble (NAB) dB	Motor Type	Platter Diameter, in.	Platter Weight, lbs.	Drive	Arm Mounting Provision	Dimensions, W x D x H, in.	Weight, lbs.	TONE ARMS Model	Overall Length, in.	Pivot-Stylus dist., in.	Vertical Bearing	Lateral Bearing	Stylus Force Method	Max. Tracking Error, deg.	Cart. Weight Range, gms.	Arm Resonance, Hz	Stylus Force Range, gms.	Weight, if sep., oz.	Price	SPECIAL FEATURES
REK-O-KUT	B-12H	A	.08		hys.	12	5	idler	hole in deck	18 x 16 x 10	19	–	–	–	–	–	–	–	–	–	–	–	–	
	B-12GH	A	.09		hys.	12	5	idler	hole in deck	18 x 16 x 8	17	–	–	–	–	–	–	–	–	–	–	–	–	
	–	–	–	–	–	–	–	–	–	–	–	S-320	12	9	ball	ball	balance and sprg.	1.0		9-12	0-5		44.95	
SHURE/SME (11)	–	–	–	–	–	–	–	–	–	–	–	3009		9	knife edge	ball	rear weights		3-20		¼-5		106.50	Adj. antiskating, viscous damping; cueing.
	–	–	–	–	–	–	–	–	–	–	–	3012		12	knife edge	ball	rear weights		3-20		¼-5		116.50	Same as above.
SONY (96)	TTS-3000A	B	.05	-47	D.C. servo	12	3	belt		14 9/16 x 15 x 5 1/8	14	–	–	–	–	–	–	–	–	–	–	–	–	149.50	Motor speed mon. by servo-cont. ampl.
(97)	PS-1800	B	.08	-41	D.C. servo	12	3	belt	integ.	19 5/16 x 16 1/4 x 7 5/16 w/ base & cvr.				9 1/16							0-3		199.50	As above; auto stop; incls. case and plastic dust cover.
	–	–	–	–	–	–	–	–	–	–	–	PUA-237	13⅜	9 11/32	prec. ball	prec. ball	balance			9			85.00	Integ. cueing; damped anti-skating comp.
	–	–	–	–	–	–	–	–	–	–	–	PUA-286	15⅜	11¼	prec. ball	prec. ball	balance			8			99.50	Same as above.
TEAC (75)	TS-85	B	<.06	-46	hys	12		belt	integ.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	299.50	Anti-skating; incls. moving coil. cartridge.
THORENS	TD-125	E*	.08	-48	sync	12	8½	belt	independ.	18 x 14 x 5	32	–	–	–	–	–	–	–	–	–	–	–	–	185.00	*To int. osc. and pwr. ampl.
	TD-124II	D	.08	-38	ind.	12	8½	idler & belt	independ	15 x 12 7/8 x 2¾	28													149.50	
	TD-150AB	B	.08	-45	sync	12	7½	belt	integ.	15 5/8 x 12 7/8 x 5	14¾	TP-13	12	9	ball	ball	balance	1.5	5-19	10	3½		110.00	
	TD-150	B	.08	-45	sync	12	7½	belt	independ.	15 5/8 x 12 7/8 x 5	14	–	–	–	–	–	–	–	–	–	–	–	–	85.00	
	–	–	–	–	–	–	–	–	–	–	–	TP-14	12	9	ball	ball	balance spring	1.5	5-19	8	0-4	8	59.50	

"The Dolby System effectively reduces print-through in our spoken word recordings,"

say Marianne Mantell and Barbara Holdridge, co-founders of Caedmon Records.

"Because of the 'open' nature of spoken word recordings, print-through and hiss often are problems," says Mrs. Mantell. "Since our Caedmon catalog is exclusively spoken word, we naturally strive for clean, distortionless recordings for optimum articulation," says Mrs. Holdridge. "The Dolby system is of great help in this respect, and we also have the added assurance that masters stored in the Dolby compressed mode will not accumulate print-through."



The Dolby A 301

Spoken word . . . Opera . . . Symphony . . . multi-track pop, whatever your recording endeavors . . . the dependable Dolby system will help you to produce superior noise-free masters.

DOLBY LABORATORIES INC.

333 Avenue of the Americas, New York, N.Y. 10014 □ Telephone (212) 243-2525 □ Cable: Dolbylabs New York

So. CALIF.	*No. CALIF.*	*MIDWEST*	*CANADA*
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Hollywood, Calif. 90028	San Francisco, Calif. 94107	Chicago, Illinois 60636	Toronto 17, Ontario, Canada
Tel: 213—HO 5-4111	Tel: 415—647-2420	Tel: 312—HE 6-2700	Tel: 416—421-9080

AUTOMATIC TURNTABLES

Dual 1219

Miracord 50H

BSR 600

Garrard SL-95B

Perpetuum Ebner PE 2018

SPEEDS (use letter code)

A – 33, 45, 78
B – 33, 45
C – 33 only
D – 16, 33, 45, 78
E – 16, 33, 45
F – Cont. variable

MANUFACTURER (Circled number indicates ad page)	Model	Speeds (See Letter Code)	Platter Diameter, in.	Wow and Flutter at 33⅓, %	Rumble (NAB) dB	Max. Tracking Error, Deg.	Pivot-Stylus Dist., In.	Arm Type	Cart. Weight Range, Gms.	Arm Resonance, Hz	Max. Stack Records	Change Cycle at 33⅓, Secs.	Clearance Below Board, In.	Clearance above Board, In.	Overall W x D, In.	Overall Height, In.	Weight, Lbs.	Price	SPECIAL FEATURES
BSR (109)	600	D	11	0.12	-38	0.75	7.5	Balance	0-12	15	7	7	3	4	13⅛ x 11¼	6 19/64	9⅜	74.50	Cont. var. anti-skate, self-locking arm rest, cast platter, clip-in cart. head, cueing. automatic, semi-auto or manual play. Avail. as package w/cart., base, cover.
	500A	D	11	0.15	-38	0.75	7.5	Balance	0-12	15	7	7	3	4	13⅛ x 11¼	6 19/64	7½	59.50	As above but with large drawn alum. platter.
	400	D	11	0.18	-32	1.0	7.5	Lo-Mass Spring	0-9	20	7	7	3	4	13⅛ x 11¼	6 19/64	7½	49.50	As above.
	300T	D	10⅜	0.18	-32	1.0	7.5	Lo-Mass Spring	2-6		7	7	3	4	13⅛ x 11¼	6 19/64	7½	44.50	Includes base and pre-mounted Shure M-75 type mag. cart
DUAL (49)	1219	A	12	.05		1.5	8¾	Balance & Spring	1-12	8-14	6	13	3	5	14¾ x 12	8	15½	159.50	7-lb. platter; adj. tone arm height for 15o vert. angle on sgl. disc hys. motor; double damped cueing.
	1209	A	10⅝	.08		1.75	8¼	Balance & Spring	1-12	8-14	6	13	2¾	5	13 x 10¾	8	10	119.50	Separate anti-skate scales for conical and ell. styli; rotating sgl-play spindle.
	1212	A	10⅝	.08	37	2.0	8	Balance & Spring	1-8	8-14	6	13	2¾	5	13 x 10¾	8	9⅓	79.50	Direct-dial tkg-force control coupled to anti-skating; silicone damped cueing
GARRARD (3)	SL-95B	A	11½	.07		0.75	8¼	Balance	0-15	8	6	10	3	4⅜	16 1/16 x 14 9/16	7⅜	11	129.50	Synchro-lab motor; low-mass viscous-damped tone arm; 2-point record support; oversized platter; anti-skating control; slide-in cartridge clip.
	SL-75B	A	11½	.07		0.75	8¼	Balance	0-15	8	6	10	3	4⅜	15 13/16 x 14⅝	7⅜	11	109.50	Synchro-Lab motor; adj. counter weight; viscous-damped arm; 2-pt. record support; anti-skating cont; cart. clip.
	SL-72B	A	10½	.08		0.75	7½	Balance	0-15	8	6	10	3	4⅜	15 13/16 x 14⅝	7⅜	10½	89.50	Synchro-Lab motor; viscous damped arm; anti skating cont; cart. clip.
	SL-65B	D	10½	.09		0.85	7½	Balance	0-18	10	8	12	2⅞	4	15⅜ x 13⅛	6⅞	9	79.50	As above.
	SL-55B	D	10½	0.12		0.85	7½	Balance & Spring	0-12	12	8	12	2⅞	4	15⅜ x 13⅛	6⅞	9	59.50	As above.
	40B	D	10½	0.14		0.85	7½	Balance & Spring	0-12	12	8	12	2⅞	4	14⅞ x 12½	6⅞	9	44.50	Viscous-damped cueing lever, cart. clip; tubular tone-arm; Super-sensitive trip.
MIRACORD (53)	50H	D	12	.06	-40	0.5	7	Dyn. Balance	0-6½	<8	10	12	3¾	5⅝	14½ x 12½	7¾	13	159.50	Push button operation; adjustable stylus overhang. Hysteresis motor
	750	D	12	.06	-40	0.6	7	Dyn. Balance	0-6½	<8	10	12	3¾	5⅝	14½ x 12½	7¾	13	139.50	As above, exc. induction motor.
	630	D	10⅜	.06	-39	0.7	4¾	Dyn. Balance	0-6½	8	10	12	2⅝	5⅝	13⅝ x 11⅝	7¾	12	119.50	As above.
	620	D	10⅜	.06	-38	0.7	2¾	Dyn. Balance	0-6½	8	10	12	2⅝	5⅝	13⅝ x 11⅝	7¾	11	99.50	As above.
PERPETUUM EBNER (99)	PE-2020	D	11½	0.10	-43	1.8	8 3/16	Balance & Spring	5-15	10	8	16	3 9/16	4⅞	14 1/16 x 12	8⅞	16	129.95	Vertical tracking angle adjustment.
	PE-2018	A	10⅔	0.15	-42	1.8	8 3/16	Balance & Spring	5-15	10	8	16	3 9/16	4⅞	13 1/16 x 10⅞	8 7/16	12.2	99.95	As above.
SEEBURG	AP-1	C	–	0.15		0.8		Dyn. Balance	–	16	50	8	–	–	33 x 22½	21½	140	795.00	Chgr. in cabinet; incls plug-in Pickering cartridge, pre-amp; auto cleaning brush; tel. dial selection of 100 sides.
SHERWOOD (33)	SEL 100	B	11¾	0.10	-52	1.0	9½	Balance & Spring	3-9	12	8 (7") 6 (12")	15		5½	17 x 13	5½	14½	149.50	2 motors, belt drive, light-beam arm trip sync motor, intermix sizes anti-skate, adj. stylus overhang.

Benjamin proudly announces the world's second best automatic turntable.

Small wonder that the Miracord 50H is the world's most coveted automatic turntable. The top, top authorities have awarded it top rating. And who doesn't want the very best?

The Miracord 750 is virtually identical to the 50H except that it employs a dynamically-balanced, 4-pole induction motor instead of a Papst hysteresis synchronous motor. It also costs $20 less—$139.50.

The new 750 still offers all of these wonderful Miracord features: the exclusive Miracord push-buttons; the slotted lead screw for precise stylus overhang adjustment; piston-damped cueing; effective anti-skate; the 6 pound cast aluminum turntable; and a dynamically-balanced arm that tracks to 1/2 gram.

Enjoy the world's second best automatic turntable and save $20 over the cost of the world's best. The Miracord 750 is only $139.50 at your high-fidelity dealer.

Benjamin Electronic Sound Corp., Farmingdale, N.Y. 11735. A division of Instrument Systems Corp. Available in Canada.

ELAC/MIRACORD 750

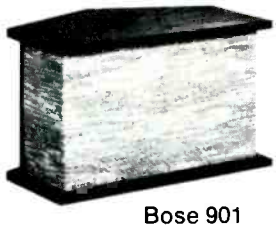
another quality product from BENJAMIN.

Check No. 53 on Reader Service Card

SPEAKER SYSTEMS

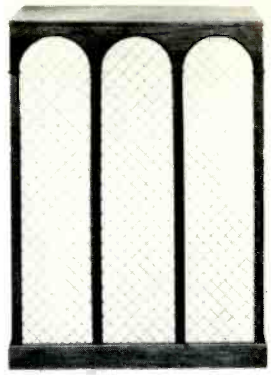
ADC 210

Altec 848A



Bose 901

Acoustic Research 3a



Bozak B410 Moorish

MANUFACTURER (Circled numbers indicate adv. page)	Model	WOOFER Diameter, In.	WOOFER Resonance (In System), Hz	WOOFER Enclosure Type	MID-RANGE Diameter, In.	MID-RANGE Type	TWEETER Diameter, In.	TWEETER Type	Overall Freq. Response, Hz to kHz ± ? dB	Ampl. Pwr. for Avg. Room, W	Pwr. Handling Capacity (RMS Cont)	Crossover Frequency (ies), Hz	Impedance, Ohms	Enclosure Dimensions, W x D x H, In.	Wood Finish	Grille Material Color	Weight, Lbs.	Price	SPECIAL FEATURES
ADC (98)	450	12		Acous.	1½	Dome	¾	Dome	18-22K ±3	6	60		8	25½ x 14¾ 11⅞	Oil Wal.	Cloth, Black	50	200.00	Separate midrange and tweeter level conts.; interchangeable grille.
	410	12		Acous.			1½	Dome	22-20K ±3	6	60		8	23 x 14 x 11½	Oil Wal.	Cloth, Black	39	129.50	Treble control switch; interchangeable grille.
	210	8		Acous.			2½	Cone	37-18K ±3	6	60		8	23¼ x 13 x 11	Oil Wal.	Cloth, Black	37	74.50	3-pos. treble control sw.
	404	6		Acous.			1½	Dome	45-20K ±3	6	50		8	11⅞ x 7¾ x 8¼	Oil Wal.	Cloth, Beige	22*	56.00	*Twin pack.
ACOUSTIC RESEARCH (13) (83)	AR-3a	12	43	Acous.	1½	Dome	¾	Dome	*	25	**	575 5000	4	25 x 11⅜ x 14	Wal ch, teak, mah, birch. unf.	Cloth, Beige	53	250.00	* Complete frequency response and distortion data available from AR on request. ** Depends on various factors; available on request.
	AR-5	10	55	Acous.	1½	Dome	¾	Dome	*	20	**	625 5000	8	24 x 13½ x 11½	Wal ch, teak, mah, birch, unf.	Cloth, Beige	39	175.00	
	AR-2ax	10	55	Acous.	3½	Cone	1⅜	Dome	*	20	**	2000 7000	8	24 x 13½ x 11½	Wal chan, teak, mah, birch, unf.	Cloth, Beige	36½	128.00	
	AR-4x	8	65	Acous.	–	–	2½	Cone	*	15	**	1200	8	19 x 10 x 9	Wal unf.	Cloth, Beige	18½	57.00	
ACOUSTECH	X	All Electrostatic System							30-30K			1300		30 x 4 x 72	Wal.	Beige	175	1690.00	Includes 4 built-in amplifiers; electr. x-over.
ALLAN	Pavane	12	60	inf.	8	Cone	4	Cone	30-17K	4	15	700 5000	4 to 8 or 15	15½ x 12 x 25	Teak	Vynair Green	38		
ALLIED (113)	Allied 2385	15		Bass Ref.		Horn		Dome	20-Aud.	10	50	1000 8000	8	20½ x 14 x 30¼	Wal.	Cloth, Olive	70	149.95	VHF tweeter; two level conts.; incl. floor base; tuned ducted port.
ALTEC (39) (91)	A7-500 W II	15	25	Horn & reflex	25" sectoral horn compr. driver				30-22K	15	50	500	8-16	32 x 25 x 44	Wal.	fretwk. brn.	170	512.50	"Voice-of-the-Theatre" sys. in cabinet.
	846 A	15	25	Reflex	18" sectoral horn compr. driver				35-22K	15	50	800	8-16	27½ x 19 x 29¾	Wal.	Fretwk. brn.	100	399.00	A-7 components; smaller cabinet.
	848 A	15	25	Reflex	As above				35-22K	15	50	800	8-16	27½ x 19⅜ x 27¾	Oak	Wrought iron	105	339.00	As above; Spanish-Mediterranean styling.
	892 A	10	28	inf. baffle	7" horn compr. driver				45-18K	25	50	2,500	8	23¾ x 11¾ x 13	Wal.	Cloth, neutral	44	145.00	Contemporary styling; snap-on grille.
AMPEX (81)	414	4½	140	Air susp.					90-15,000 Hz ±6*	5	20 40**	–	8	6 x 6 x 6	Wal.	Dark Brown	6	49.95 pr.	*Response with 10-dB boost at 90 Hz. Special high comp. annulus. **Rec. max. ampl. pwr/chan.
AZTEC	Rembrandt I	10	43	Ducted Reflex	–	–	2 x 6	Horn	40-16K ±5	6	30	2,000	8	23⅞ x 11⅞ x 13½	Wal.	Cloth, Brown	38	135.50	6 lb. woofer-mag.; 12 db/oct. LRC Adj. x-over network.
BOGEN	LS30	10		Acous.	5	Cone	3	Cone	40-20K ±5	10	50	600 5,000	8	22 x 11 x 14	Wal.	Cloth grn-blue tweed	32	99.95	
BOSE (59)	901	9 full-range, high-compliance long-throw spkrs. in each enclosure								20	270	none	8	20⅜ x 12⅞ x 12¾	Oil Wal.	Linen Beige	33	238.00	89% reflected, 11% direct sound. Active equalizer with 20 sep contours.
BOZAK (61)	B-410 Moorish	(4) 12	40	Inf.	(2) 6	Metal Cone	(8) 2½	Metal Cone	28-20K	50	100	400 2,500	8	36 x 19 x 52	Wal.	Cloth, Wht met. grille	229	862.00	Interchangeable grille cloth.
	B-4000 Classic	(2) 12	40	Inf.	8	Metal Cone	(8) 2½	Metal Cone	35-20K	40	80	400 2,500	8	26 x 15⅝ x 44½	Wal.	Cloth, wht met. grille	190	555.00	As above.
	B-305 Century	(2) 12	40	Inf.	6	Metal Cone	(4) 2½	Metal Cone	35-20K	40	80	800 2,500	16	36 x 20 x 27⅝	Wal.	Cloth, Brown	140	415.00	As above.
	B-302A Mediterranean	12	40	Inf.	6	Metal Cone	(2) 2½	Metal Cone	40-20K	20	35	800 2,500	8	27½ x 20⅛ x 28⅛	Oak	Cloth, Gold		333.00	As above.
CELESTION	Ditton 25	12	20	Reflex	12	Press. type	1	Dome	20-40K		25	2,500 9,000	4-8	32 x 14 x 11	Teak or Wal.	Cloth, Bl.-gold fleck	48		Ultra-wide resp.; good sensitivity.
DELTA-RET	Cleopatra	(2) 8	50	sealed			(2) 3½	Cone	40-18K ±5	6	35	1,000	4	24 x 11¾ x 12¼	Wal.	Cloth, Brown	40	110.00	Tweeters are made with their own tuned chamber. Both bass spkrs. are driven.

Check No. 55 on Reader Service Card →

Memo

Wharfedale

From: Sales Department

To: Engineering Department

Subject: Development of a speaker system that permits control of the sound distribution in a room.

Give us a speaker system that:

1- Permits a pair of speakers to be used any distance apart, any spacing from a wall, and can be used on the floor or on a wall.

2- Can also be used side-by-side, yet produce stereo the acoustical equivalent of optimum spacing.

3- Does not require an inordinately high power amplifier or extraneous electronic equalizer.

4- Will preserve stereo separation and definition everywhere in the listening area.

Memo

Wharfedale

From: Engineering Department

To: Sales Department

Subject: Speaker system that permits control of the sound distribution in a room

Okay. We've done it!

We call it "VARIFLEX".

Memo

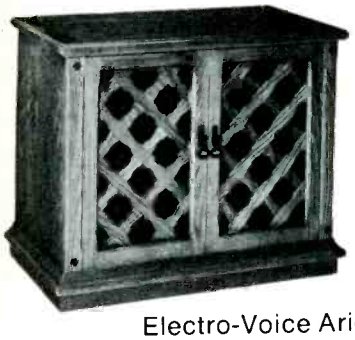
Wharfedale

From: Sales Department

To: The Public

Subject: VARIFLEX

This exceptional, unique speaker system, probably the most significant breakthrough in home stereo reproduction, will be formally announced in October.



Electro-Voice Aries

Dynaco A-25

EMI 300

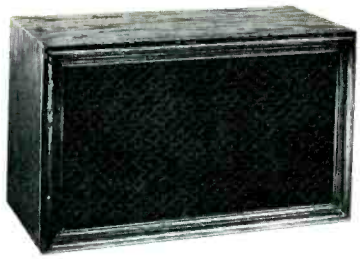
Empire 9000M

Fisher XP-18

MANUFACTURER (Circled numbers indicate adv. page)	Model	WOOFER Diameter, in.	WOOFER Resonance (In System), Hz	WOOFER Enclosure Type	MID-RANGE Diameter, in.	MID-RANGE Type	TWEETER Diameter, in.	TWEETER Type	Overall Freq. Response, Hz to kHz ± ? dB	Ampl. Pwr. for Avg. Room, W	Pwr. Handling Capacity (RMS Cont)	Crossover Frequency (ies), Hz	Impedance, Ohms	Enclosure Dimensions, W x D x H, in.	Wood Finish	Grille Material Color	Weight, Lbs.	Price	SPECIAL FEATURES
DYNACO (5) (7)	A-25	10	58	Friction loaded	–	–	1½	Dome	47-20K ±5		35	1,500	8	20 x 10 x 11½	Oil. Wal.	Linen, nat. beige	20	79.95	Oiled walnut standard. Also available at $89.95 in teak and rosewood.
ELECTRO-VOICE (2) Cover IV	Aries	12	42	Acous.	6	Cone	2½	Cone	25-20K	10	35	400 1,500	8	27½ x 16¼ x 22¼	see note	Various	60	275.00	Deluxe furn cab. avail. in cont./pecan, trad./cherry and Spanish Oak.
	E-V Four-A	12	47	Acous.	6	Cone	2½	Cone	30-20K	10	35	400 1,500	8	25 x 13½ x 14	Wal.	Cloth, dk. brn.	45	199.95	Ultralinear 12-inch foam susp. woofer.
	E-V Nine	10	50	Acous.	5	Cone	3½	Cone	30-20K	10	35	400 1,000	8	22½ x 12 x 13½	Wal.	Cloth, dk. brn.	30	144.00	Smooth 5-Inch mid-range fills out treble range.
	E-V Five-C	10	50	Acous.	–	–	2½	Cone	30-20K	10	35	1,000	8	21¾ x 10⅜ x 12¼	Wal.	Cloth, dk. brn.	22	99.95	Four-layer voice coil for efficiency at low freqs.
	E-V Seven-B	8	75	Acous.	–	–	3½	Cone	40-20K	10	35	1,500	8	19 x 9 x 10	Wal.	Cloth, dk. brn.	19	66.50	Symmetrical tone damping.
	E-V Eleven	6	110	Reflex	–	–	–	–	80-15K	5	15	–	8	15¼ x 6½ x 8¼	Wal.	Cloth, dk. brn.	9	37.00	Low cost dual-radiator system.
EMI (53)	300	15	53	Acous.	(2) 5	Cone	(2)	Comp	10-30K	35	100	1,000 6,000	8	26 x 19 x 27½	Wal.	Cloth, Brown	90	350.00	
	205	13½* x 8⅜	55	Acous.	5	Cone	3⅜	Cone	25-20K	20	90	1,500 5,000	8	14¼ x 13¼ x 24¾	Wal.	Cloth, Brown	52	225.00	*Elliptical; glass/paper cone.
	92	13½* x 8⅜	83	Acous.	–	–	3⅜	Cone	50-20K	10	60	4,500	8	11¾ x 10¾ x 23⅛	Wal.	Cloth, Black	36	109.95	*Elliptical; co-ax with alum. ctr.
	55	10 x* 6⅝	98	Acous.	–	–	3⅜	Cone	65-20K	12	30	4,000	8	10¼ x 7½ x 18	Wal.	Cloth, Black	15	54.95	*Elliptical.
EMPIRE	9000 M	15	20	Inf. baffle	4	Cone	1	Dome	20-20K	10	100	450 5,000	8	22 dia x 29	Satin Wal.	None	120	299.95	3-way sys.; w.a. lens, marble top.
	7000 M	12	25	Reflex	4	Cone	1	Dome	25-20K	10	90	450 5,000	8	19 dia. x 26½	Satin Wal.	None	75	209.95	As above.
	3000 M	10	30	Acous.	3	Cone	1	Dome	35-20K	10	75	1,200 5,000	8	11⅞ x 11⅞ x 21¼	Satin Wal.	None	50	149.95	3-way sys.; w.a. tweeter.
	2000 M	10	30	Acous.	–	–	3	Cone	30-18K	10	75	1,200	8	11⅞ x 11⅞ x 18¼	Satin Wal.	None	45	119.95	Marble top; "Kitten"
EPICURE	100 Standard	8	43	Acous.	–	–	1	Acous.	40-18K ±3	17	50	1,800	8	11 x 9 x 21	Wal.	Cloth, brn. or wh.	22	109.00	Uniform dispersion ±5 dB 40-13K Hz.
	500 Studio	(4) 8	31	Acous.	–	–	(4) 1	Acous.	30-18K ±3	17	200	1,800	6	38 x 15 x 33	Wal.	Cloth, Tan	115	500.00	Designed for recording studios.
	1000 Tower	(4) 8	22	Acous.	–	–	(4) 1	Acous.	22-18K ±3	17	250	1,800	6	18 x 18 x 78	Wal.	Cloth, Tan	225	1,000.00	Complete spherical sound 22-18K Hz.
FAIRFAX (79)	FH-C			Folded Horn	3½	Cone		Dome	25-20K ±5		40		8	28¾ x 20 x 12				169.50	
	FX-100	8		Reflex	–	–	3½	Cone	30-20K ±5			5,500	8		Oil Wal.	21 x 12 x 8	24	89.50	
FISHER (31)	XP-18	18	14	Acous.	8 Lower 5¾ Upper	Cone	(2) 2	Mylar Dome	30-22K	10	50	150 1,500 3,000	8	30½ x 29½ x 16½	Wal.	Cloth, Brown	105	359.95	
	XP-7B	12	15	Acous.	5¾ Lower 5¾ Upper	Cone	(2) 3	Cone	30-20K	10	30	300 800 3,500	8	24½ x 14 x 11⅞	Wal.	Cloth, Brown	40	149.95	
	XP-66B	12	15	Acous.	5	Cone	3	Cone	30-20K	10	20	500 1,000	8	24½ x 14 x 11⅞	Wal.	Cloth, Brown	40	99.95	
	XP-55B	8	38	Acous.	–	–	3	Cone	37-20K	10	15	1,500	8	20 x 10 x 7½	(Vinyl) Wal.	Cloth, Brown	18	49.95	

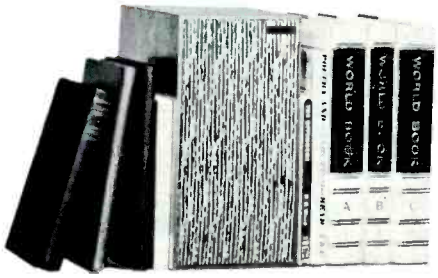
SPEAKER SYSTEMS (continued)

Harman Kardon 50

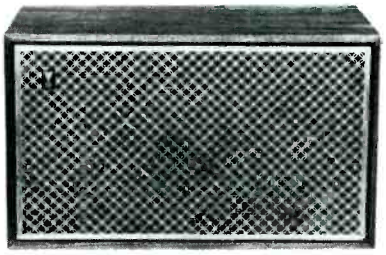


Heath AS-48

Hartley Concertmaster



Goodmans Maxim

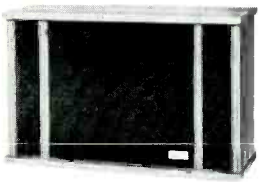


JBL S99 Athena

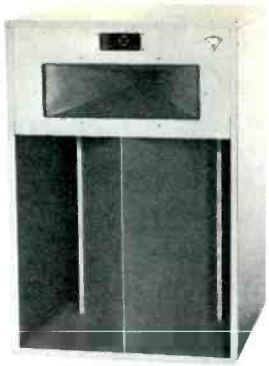
JVC 5303

MANUFACTURER (Circled numbers indicate adv. page)	Model	WOOFER Diameter, In.	WOOFER Resonance (In System), Hz	WOOFER Enclosure Type	MID-RANGE Diameter, In.	MID-RANGE Type	TWEETER Diameter, In.	TWEETER Type	Overall Freq. Response, Hz to kHz ± ? dB	Ampl. Pwr. for Avg. Room, W	Pwr. Handling Capacity (RMS Cont)	Crossover Frequency (ies), Hz	Impedance, Ohms	Enclosure Dimensions, W x D x H, In.	Wood Finish	Grille Material Color	Weight, Lbs.	Price	SPECIAL FEATURES
FRAZIER (107)	MK V Manhattan	8					3	Cone	40-15K	0.4	12		8	23⅞ x 11⅞ x 19	Oil Wal.	Cloth, off wht.		99.50	With or w/o opt. base.
	F8-K Patio	8		Acous.		Cone			50-15K		12		8	15⅞ x 8¾ x 15⅞	Multi-color			49.75 ea.	For patio use; packed 2 to a carton.
GOODMANS	Magnum-K	12	40	Acous.	4	Cone	4	Cone	30-20K ±5	6	25	1,500 6,000	8	15 x 11¼ x 24	Wal.	Cloth, Ch. & Wh.	47	189.00	Vinyl cone susp. – Tweeter control and mid range control.
	Mezzo-II	12	48	Acous.	–	–	4	Cone	40-20K ±5	6	15	2,000	8	19½ x 9 x 12	Wal.	Cloth, Ch. & Wh.	20	139.00	Vinyl cone susp. – Tweeter control.
	Maxim	4	60	Acous.	–	–	3½	Cone	45-20K ±5	8	12	2,000	8	5½ x 7¼ x 10½	Wal.	Cloth, Brn. & Wh.	8	59.95	Vinyl cone susp. – Extremely compact.
GOTHAM	OY	10	20		4	Cone		Horn	40-16K ±2			500 8,000	<4700	19 x 9 x 12	Wal. or gray	Metal Silver	44	520.00	Low-level input; contains 2 30-W ampls; elect. x-over separate level conts.
HARMAN-KARDON (40) (41)	HK 50	8	35	Acous.			2¼	Cone	35-20K ±4	20	45	1,500	8	11¼ sq. x 18 H.	Wal.	Dk. Brn.	22	99.95	Omnidirectional 360° dispersion.
	HK 25	6	40	Acous.			2¼	Cone	42-20K ±4	20	40	2,000	8	12⅝ dia 16½ H.	Wal.	None	15	69.95	Omnidirectional 360° dispersion.
HARTLEY	Concertmaster Models V & VI	24	13	Semi-inf.	10	Polymer Cone	7	5⅝" cone & 2" dome	16-25K ±3	20	50	300 3,000	16	39 x 29 x 18	Wal.	Cloth Brn. & Gld	150	730.00 760.00	Magnetic susp.; cones of identical mat'l; x-overs are 12 dB/Oct.; baskets of cast alum.
	Concert Jr.	10	28	inf. baffle	5⅝	Polymer Cone	2	Dome	30-25K +4	15	30	3,000	8	30 x 15 x 12	Wal.	Cloth, Brn. & Gld. Thrd	55	305.00	
HEATH (35)	AS-48	14		ducted port			2	Direct radiator	40-20K		50	2,000	8	23½ x 12 x 14	Pecan (Oak)	Cloth Brn.-Blck.	42	169.95K	HF balance switch. RLC cross over.
	AS-10W	10		Acous.			Two 3½	Cone	30-15K ±5	10	40	2,250	16	24 x 11½ x 13½	Wal.	Cloth cane	28	64.95K	HF level control.
	AS-16	8		Acous.			3½	Cone	45-20K ±5	25	50	1,500	8	19 x 8 x 10	Wal. vinyl	Cane	15	49.95K	HF level control.
	AS-37	8		Acous.				Horn	50-12K	–	25	1,600	8	23 x 11⅛ x 11½	Wal. Polyester	Cloth Brown	22	39.95K	HF level control.
IMF	TLS Monitor	9 x 12	18	Trans-mission Line (dual)	5	Cone	¾	Dome	20-25K ±3	30	30	3,500	8	20 x 17 x 43	Teak & Grey	Black	140	600.00 575.00	Dual transmission line; plastic driver systems.
JBL	Sovereign S8R	8 & 8	45*	passive rad.	Horn & Acous. Lens		Ring Radiator		Full Range	10	60	500 7,000	8	40 x 19½ x 26½	gld. or country oak	Pleated Cloth	217**	936.00	*Freq. to which port or res. is tuned. **Shipping weights. Passive radiator, 375 comp. driver; 075 ring radiator.
	S99 Athena	12 &12	28*	passive rad.	–	–	1.7	Cone	Full Range	10	40	2,000	8	23½ x 12 x 14	Oil Wal.	fret.	54	237.00	Avail. in energized stereo pair (L99) or with cloth grille (SL99).
	L75 Minuet	15 & 15	32*	passive rad.	–	–	8 full rng.	Cone	Full Range	10	25		8	16½ x 7¾ x 9	Oil Wal.	Cloth, dk. brn.	21	114.00	Passive radiator, compact system.
JVC (9)	5303	(4) 5	35	Acous.	–	–	2	Horn	20-20K ±6	25	40	5,000	8	spherical 13½ dia.		Metal Black	26.4	199.95	Omni-directional radiation. Spherical shape.
	5304	12	45	Acous.	6½	Cone	3½ 2	Cone Horn	30-20K ±6	20	40	1,500 7,000 10,000	8	12⅝ x 15 x 24⅝	Wal.	Cloth, Brown	35.2	149.95	2 level controls. Multi-channel input terminals.
	5320	8	45	Acous.	3½	Cone	2	Cone	37-20K ±6	15	30	5,000 10,000	8	13 x 9¾ x 21½	Wal.	Cloth, Brown	19.8	89.95	Level controls.

SPEAKER SYSTEMS (continued)



Jensen TF-25



Klipsch LaScala

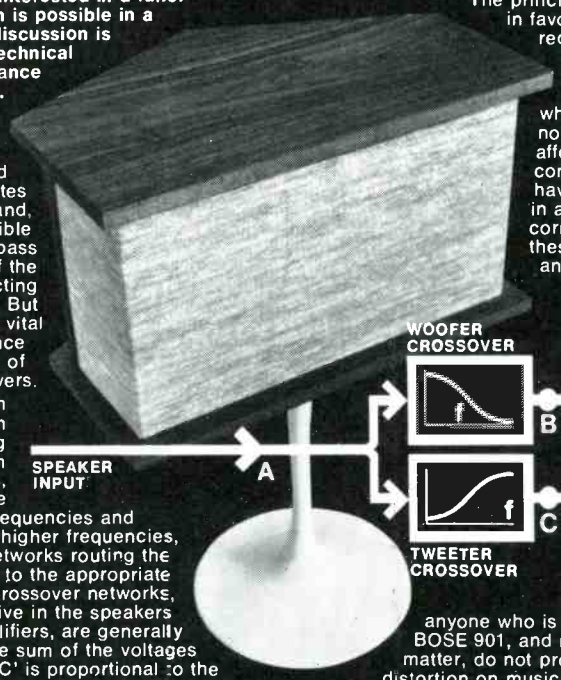
LWE I

Marantz Imperial II

MANUFACTURER (Circled numbers indicate adv. page)	Model	WOOFER Diameter, in.	WOOFER Resonance (In System), Hz	WOOFER Enclosure Type	MID-RANGE Diameter, in.	MID-RANGE Type	TWEETER Diameter, in.	TWEETER Type	Overall Freq. Response, Hz to kHz ± 7 dB	Ampl. Pwr. for Avg. Room, W	Pwr. Handling Capacity (RMS Cont)	Crossover Frequency (ies), Hz	Impedance, Ohms	Enclosure Dimensions, W x D x H, in.	Wood Finish	Grille Material Color	Weight, Lbs.	Price	SPECIAL FEATURES
JENSEN	700-XLW	12	20	Acous.	–	Horn	–	Horn Loaded Dome	20-25KH	10	40	600, 4,000 10,000	8	25½ x 12 x 16¼	Wal.	Cloth, Brown	60	275.00	4 way system, hor. or vert. opt. floor stand Flexair® woofer.
	TF-3C	10	25	Acous.	3½	Cone	–	Dome	25-20KH	10	25	2,000 10,000	8	23¾ x 11⅞ x 13½	Dura-syn. Wal. Ven.	Cloth, Brown	40	128.00	Superflex® enclosure. Sonodome® tweeter, Flexair® woofer.
	TF-25	10	25	Acous.	–	–	2 x 6	Horn	25-19KH	10	25	2,000	8	22½ x 8⅝ x 14	Dura-syn. Wal. Ven.	Cloth, Brown	27	89.50	2-way air suspension, Flexair® woofer, horn-loaded tweeter.
	X-45	8	35	Acous.	–	–	2 x 6	Horn	30-18KH	10	25	2,000	8	19½ x 9 x 10½	Wal.	Cloth, Brown	24½	69.50	Flexair® woofer, horn-loaded tweeter.
KLH	12	12	35	Acous.	(2) 3	Stiff paper cone	1¾	Stiff paper cone		30		600 2,500	8	22¼ x 15 x 29	Oil Wal.	Bouclé off white	101	275.00	Contour control w/four 3-pos. level controls for matching to room. Can be used remotely. Changeable grille cloth.
	5	12	44	Acous.	(2) 3	Stiff Paper cone	1¾	Stiff paper cone		25		600 2,500	8	26 x 11½ x 13¾	Oil Wal.	Cloth, light brn.	51	179.95	Two 3-pos. level control. Finished on 4 sides. Changeable grille cloth.
	6	12	55	Acous.	–	–	1¾	Stiff paper cone		20		1,500	8	23½ x 11⅞ x 12⅝	Several	Bouclé off white	34	122.00 to 134.00*	3-pos. tweeter level control unf. birch, maple, cherry, walnut, oil walnut; fin. 4 sides. *Depending on finish.
	17	10	60	Acous.	–	–	1¾	Stiff paper cone		12		1,500	8	23½ x 9 x 11¾	Oil Wal.	Cloth, off white	27	69.95	3-pos. tweeter level control; finished on 4 sides Changeable grille cloth.
KARLSON (113)	X-15	15	40	Spec.	–	–	2½	Special	20-18K ±4	2	100	4,000	16	20 x 14 x 28	Wal.	Woven Plastic	90	299.00	Sep. conn. for woofer for organ or instrument use avail. utility and other finishes.
KENWOOD (43)	S-44	6½		Acous.	–	–	3	Cone	50-20K		20	2,000	8	10 x 8 x 16⅛	Wal.	Cloth, Brown	13	79.95	
KLIPSCH	K-447 La Scala	15		Horn	2	Horn	1	Horn	45-19K	20	100	400 6,000	16	23¾ x 24½ x 34½	Theatre black only	None	110	550.00	Comp. architects and eng. specs. available on request.
	Klipsch's Heresy (Model H)	12		Total encl.	2	Horn	1	Horn	45-19K	30	60	700 6,000	16	15 x 13⅛ x 21½	Wal., Mah., Maple, others	Several	55	258.00 209.00*	As above; *depending on finish.
LWE (85)	I	15	Non Res	Sealed	6	Cone	2 x 5	Horn	22-20K ±5	25	50	1,000 5,000	4	25 x 17 x 12	Wal.	Linen Beige	61	250.00	Elec. susp. feedback; unf. kit. $75.00
	II	(2) 15	Non Res	Sealed	(2) 6	Cone	2 x 5	Horn	20-20K ±5	40	100	1,000 5,000	4-8	34 x 24 x 16	Wal.	Brown Strip	141	550.00	Unf. kit $330.00
	III	12	Non Res	Sealed	6	Cone	3½	Cone Dome	25-17K ±5	20	40	1,000 5,000	4	22½ x 15 x 9½	Wal.	Linen Beige	35	175.00	Unf. kit $105.00.
	VI	8	Non Res	Sealed	6	Cone	3½	Cone Dome	29-13K ±5	20	25	1,500	8	19 x 10 x 9	Wal.	Linen Beige	23	100.00	Elec. susp. feedback; unf. kit. $75.00.
LAFAYETTE (111)	Criterion 80	12	25	Acous.	6½	Cone	(2) 3 (2) 1½	paper cone aluminum	18-25K ±5	10	75	800, 4,500, 10,000	8	18 x 12 x 38	Oil Wal.	Cloth, dk. brn.	66	159.95	Mid and Hi freq. level controls; floor-standing; 5-year warranty.
	Criterion 100A	10	45	Ported	–	–	4	paper cone	20-19K ±6	4	20	2,800	8	21½ x 10½ x 11¾	Oil Wal.	Cloth, wh/gold	30	44.95	Hi freq. control; 5 year warranty.
LEAK	Mark II	13	19	Acous.	2	Cone	1	Dome	30-20K ±5	8	70	900	15	26 x 15 x 12	Wal.	Cloth, Tan	49	199.00	Piston action sandwich cone.
3M	A-1000	4	100	Acous.	–	–	–	–	80-12K ±4	10	14	–	8	8 x 5 x 13	Wal.	Cloth	4½	49.95/ pair	
MARANTZ (19) (45)	Imperial II	12	–	Inf. baffle	(2) 4	Cone	(2) 2	Cone	20-20K		40	700 6,000	8	22 x 15 x 26	Lacq. Wal.	Carved Grille	60	369.00	Separate brilliance and presence controls.
	Imperial I	12	–	Inf. baffle	(2) 4	Cone	(2) 2	Cone	20-20K		40	700 6,000	8	22 x 15 x 26	Lacq. Wal.	Cloth, Brown	60	299.00	As above.
	Imperial III	12	–	Inf. baffle	2	Dome	1	Dome	30-20K		100	1,500 6,000	8	13½ x 12 x 23	Lacq. Wal.	Cloth, Brown	42	199.00	As above.
MARTEL	VS-1200	12		Acous.	5	Cone	3	Dome	35-20K	25		1,400 5,000	8	26¼ x 15 x 11⅜	Wal.	Cloth, Brown	47	179.95	

Why BOSE eliminates woofers, tweeters and CROSSOVERS

If you have heard the BOSE 901 Direct/Reflecting™ speaker system or if you have read the unprecedented series of rave reviews in the high fidelity publications, you already know that the 901 is the longest step forward in speaker design in perhaps two decades. Since the superiority of the 901 (covered by patents issued and pending) derives from an *interrelated group of advances*, each depending on the others for its full potential, we hope you will be interested in a fuller explanation than is possible in a single issue. This discussion is one of a series on the technical basis of the performance of the BOSE 901.



Block Diagram of Conventional Speaker System Employing Woofers, Tweeters and Crossovers.

In other issues we describe how a multiplicity of same-size, acoustically coupled speakers eliminates audible resonances and, in addition, makes possible the unprecedented bass performance of the BOSE 901 Direct/Reflecting speaker system. But there is yet another vital benefit from this advance — the elimination of crossovers.

The best answer which had previously been found, for reproducing the full audio spectrum with dynamic speakers, was the use of a large speaker for the bass frequencies and smaller speakers for the higher frequencies, with crossover networks routing the appropriate frequencies to the appropriate speakers. (see fig.) Crossover networks, whether they are passive in the speakers or electronic in amplifiers, are generally designed so that the sum of the voltages at 'B' and 'C' is proportional to the speaker input signal at 'A'. This would be adequate only if the speakers were themselves perfect for then we might have an acoustical signal at 'D' which bore a close relation to the speaker input 'A'. However, woofers and tweeters are far from ideal. They exhibit both phase and amplitude irregularities in the crossover region. Phase differences between the woofer and tweeter, for example, can cause the cone of the woofer to advance while the cone of the tweeter is retreating. The result is sound coloration caused by the fact that the sum of the output of the woofers and tweeters is widely varying in the region of the crossover frequencies.

Equally important, the directionality (dispersion) of a speaker varies with its diameter. Therefore, the spatial characteristics of the sound can change sharply in the crossover region as the radiation shifts from the large woofer to the small tweeter. "This spatial property of the sound incident upon a listener is a parameter ranking in importance with the frequency spectrum . . . for the subjective appreciation of music."*

The principal reason which had been put forth in favor of the use of crossovers was the reduction of possible doppler distortion. (When a high frequency note is emitted from a speaker core which is 'slowly' moving toward or away from the listener while it is also reproducing a bass note, is the frequency of the higher note affected audibly?) Measurements and computations in support of this hypothesis have been based on sine waves, on one axis, in an anechoic environment. No correlation has been established between these numbers and what we hear with music and speech signals, in a room. In another issue, on the subject of DISTORTION, we shall explain how we were able to prove (in an experiment which is reproducible by anyone who is sufficiently interested) that the BOSE 901, and many other good speakers, for that matter, do not produce audible doppler distortion on music or speech.

If you would like to hear the performance of a speaker with no woofers, tweeters or crossovers (and several other major advances), ask your franchised BOSE dealer for an A – B comparison of the BOSE 901 with the best conventional speakers he carries — *regardless of their size or price.*

***From 'ON THE DESIGN, MEASUREMENT AND EVALUATION OF LOUDSPEAKERS', Dr. A. G. Bose, a paper presented at the 1968 convention of the Audio Engineering Society. Copies of the complete paper are available from the Bose Corp. for fifty cents.**

You can hear the difference now.

THE BOSE® CORP.

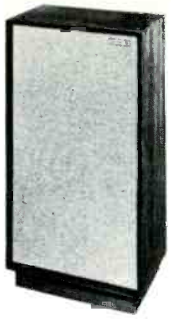
East Natick Industrial Park, Natick, Massachusetts 01760

BOSE 901 DIRECT/REFLECTING™ Speaker System — $476 the Stereo Pair, including Active Equalizer. Slightly higher in the west and southwest. Pedestal base extra.

SPEAKER SYSTEMS (continued)

Maximus 22

Pioneer CS-44



Rectilinear III

Scott S-17

MANUFACTURER (Circled numbers indicate adv. page)	Model	WOOFER Diameter, in.	WOOFER Resonance (In System), Hz	WOOFER Enclosure Type	MID-RANGE Diameter, in.	MID-RANGE Type	TWEETER Diameter, in.	TWEETER Type	Overall Freq. Response, Hz to kHz ± 7 dB	Ampl. Pwr. for Avg. Room, W	Pwr. Handling Capacity (RMS Cont)	Crossover Frequency (ies), Hz	Impedance, Ohms	Enclosure Dimensions, W x D x H, In.	Wood Finish	Grille Material Color	Weight, Lbs.	Price	SPECIAL FEATURES
MAXIMUS	7	12	45	Acous.	(2) 5	Cone	3½	Dome	20-35K ±5	15		1,000 8,000	8	14 x 12 x 24	Wal.	Cloth, Brown	58	189.00	Controls accessible under removable grille.
	44	10	45	Acous.	–	–	3½	Cone	30-18K ±5	15		2,000	8	9½ x 12½ x 22	Wal.	Cloth, Brown	28	76.00	As above
	1	4	70	Acous.			3	Cone	45-20K ±5	25		1,900	8	7½ x 5½ x 10½	Wal.	Cloth, Brown	12	64.50	As above
	22	6	65	Acous.	–	–	3	Cone	40-18K ±5	10		2,000	8	18½ x 9½ x 13½	Wal.	Cloth, Brown	14	39.95	As above
MIKADO (88)	106	12		Hi Eff.	6½	Cone		Horn	40-20K		30	1,300 6,500	8	14 x 24 x 11 5/8	Wal.	Cloth, Brown	35	99.90	
	104	8		Hi Eff.	5	Cone		Cone	50-18K		20		8	9¾ x 18 7/8 x 8 5/8	Wal.	Cloth, Brown	17	39.90	
NESHAMINY	JanKit 41	11	46	Inf. baffle	2 Electrostatic elements				30-30K	20	100	800 2,000	8	Kit	–	–	18	114.95	To be housed in customer's 2 to 3 cubic feet enclosure.
NIKKO (105)	SS-83	8		Acous.			3	Cone	30-20K	10	25	4,000	8	9 x 14¼ x 9	Oil Wal.	Cloth, Black	10	89.95 pr.	High-compliance woofer.
PANASONIC	SB-88	12	20	Accus.	(2) 5		(2) 2		24-22K	10	80	800 6,000	8	15 11/16 x 26 11/16 x 13 1/4	Oil Wal.		48.5	249.95	3-pos treble and mid-range controls.
PIONEER (25) (65)	CS-63DX	15		Acous.	5 x 2	Cone	horn, cone, (2) domes		20-22K	4	80	700 3,300 12,000	8	19 x 13 x 29	Wal.	Cloth, Brown	80	250.00	4-way, 6 spkrs; lattice wood grille.
	CS-99	15		Acous.	5	Cone	horn, cone, (2) domes		25-22K	4	80	600 4,000 7,500 14,000	8	16 x 12 x 25	Wal.	Cloth, Brown	53	215.00	5-way, 6 spkrs.; lattice wood grille.
	CS-66	10		Acous.	6½	Cone	1	Cone	35-20K	16	40	1,850 6,850	8	13 x 12 x 22	Wal.	Cloth, Brown	29	109.00	Lattice wood grille.
	CS-44	8		Acous.			2½	Cone	35-20K	16	25	2,500	8	12 x 10 x 20	Wal.	Cloth, Brown	18	67.50	Lattice wood grille.
RECTILINEAR (62) (63)	III	12	40	Duct port	5	Cone	(2) 2½ (2) 2	Cone Cone	22-18.5K ±4	20	60 - 8,000 11,000	500	8	18 x 12 x 34	Oil Wal.	Polyester	70	279.00	Very low mass mid & twtrs. for opt. transient resp.
	X	10	45	Acous.	5	Cone	2	Cone	40-18.5K ±5	30	80	100 5,000	4	24 x 12 x 14	Oil Wal.	Polyester	50	199.00	As above.
	Mini	8	58	Acous.	5	Cone	2	Cone	50-18.5K ±5	20	60	400 8,000	4	19 x 9½ x 12	Oil Wal.	Polyester	25	89.50	As above.
SANSUI (14) (15)	SP 2002	12			5 6½	Cone Cone	(2) 1	Dome	35-20K		50	600 5,000	8	15 x 12¾ x 25½	Wal.	hand carvd fret-work	46	179.95	Elect. x-over terms; mid & hi conts; baffle damped with acetate acous. matl.
	SP 1001	10			6½	Cone	1	Dome	35-20K		40	600 5,000	8	14 x 12 x 24½	Wal.	hand-carvd fret-work	38½	139.95	As above.
	SP-50	8					2	Horn	50-20K		25	7,000	8	12¾ x 19⅜ x 9¾	Wal.	hand-carvd fret-work	19¾	79.95	Baffle damped with acetate acous. mat'l.
	SP-30	6½					2	sq. horn	50-20K		20	7,000	8	10⅜ x 7⅝ x 16¾	Wal.	hand-carvd fret-work	10	119.95 pr.	As above.
SCHOBER (111)	LSS-10A	12	32	Reflex	8	Cone		Horn (optional)	30-18K (W/tweeter)	2	40 cont. progm	250 3,500	8	24 x 16 x 34	Wal.	cane beige	60	175.00 kit	2-way without optional tweeter. 3-way with optional tweeter.
SCOTT Cover II (1)	Q-100	8	70	Acous.	–	–	3	Cone	38-20K	10	80	2,000	8	14¼ x 14¼ x 22	Wal.	Cloth, dk. brn.	37	149.95	
	S-15	10	60	Acous.	4¼	Cone	3	Cone	35-20K	10	50	750 3,800	8	23½ x 11¾ x 9	Wal.	Cloth, dk. brn.	24½	119.95	
	S-10	10	60	Acous.	–	–	3½	Cone	40-20K	7	50	1,200	8	23½ x 11¾ x 9	Wal.	Cloth, dk. brn.	21	89.95	
	S-17	8	70	Acous.	–	–	3	Cone	40-20K	7	35	2,000	8	18 x 10½ x 8½	Wal.	Cloth, dk. brn.	16	59.95	
	S-14	6	76	Acous.	–	–	3	Cone	50-20K	7	28	2,500	8	16 x 10 x 6½	Wal.	Cloth, dk. brn.	13½	49.95	

In an era of audio gimmickry, there are three things on which you can rely...

PHYSICS, MUSIC and BOZAK

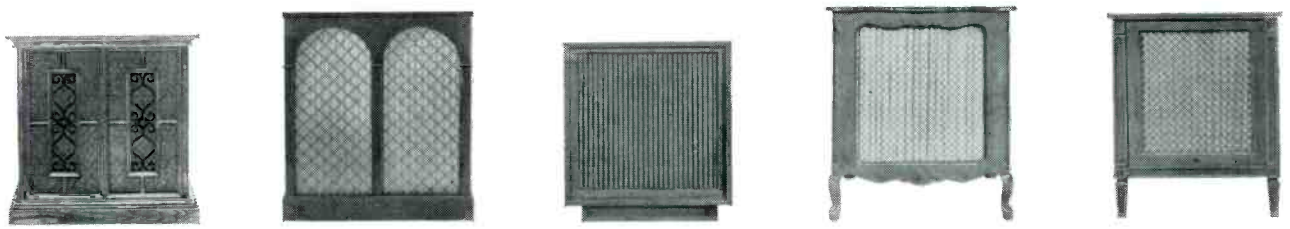
Over the past 20 years, scores of "fantastic" new loudspeaker systems have been heralded, only to fade quietly from the scene.

While we at Bozak have recognized the momentary commercial advantage of dream-inspired developments, our desire to reproduce music realistically and our knowledge of the immutable laws of physics have prevented our indulging in gimmickry.

Rather than challenge physics, our laboratories have devoted themselves to adapting modern physical technology to reproducing music as realistically as possible, both in the home and in the concert hall.

You may have heard the results of that effort last summer at the Ravinia Festival of the Chicago Symphony; the New York Philharmonic's Concerts-in-the-Park series; the St. Louis Symphony's Mississippi River Festival; Chicago's Grant Park Orchestra series, or at the Boston Symphony's Summer Festival at Tanglewood.

You can hear them any day of the year at your Bozak dealer's store.



Bozak® Box 1166, Darien, Connecticut 06820

Check No. 61 on Reader Service Card

Rectilinear is announce the high-fidelity

The time was ripe, to say the least.

High-fidelity amplifiers (i.e., amplifiers whose output closely resembles their input) have been around for more than twenty years. High-fidelity FM tuners just about as long. Even high-fidelity pickup cartridges, capable of producing a reasonably accurate electrical replica of the groove, could be had as far back as the mid-1950's.

But, until Rectilinear did something about it, you still couldn't buy a high-fidelity loudspeaker after all these years. Not if you accept any definition of high fidelity as applied to other audio components. (How would you like, for example, a "high-fidelity" amplifier with the response and distortion characteristics of your favorite speaker system?)

This isn't just academic hairsplitting or a question of semantics. Audiophiles are in universal agreement that there are only the subtlest audible differences among the finest amplifiers or phono cartridges, whereas no two loudspeakers of different design have ever sounded even remotely alike. Both may sound pleasing, or realistic, or musical, or better than last year's model; but in an A-B comparison their outputs invariably disagree about the input. Because, invariably, both outputs are at least partially *wrong*.

We believe that our new bookshelf speaker, the **Rectilinear X** (that's a ten, not an ex), is the first speaker system whose output is *right* about its input. We further believe that future speaker systems designed with the same basic principles in mind will sound very much alike, just like the best amplifiers or pickups, no matter how different they may turn out to be in actual engineering execution.

The initial concept behind the **Rectilinear X** was to try to isolate what everybody else was doing wrong. Since speakers are undeniably getting better all the time, speaker designers must be doing something (or even a lot of things) right; but is there anything fundamental that everyone has overlooked?

We came to the conclusion that there is. *Envelope delay distortion*. This is a type of time delay distortion having to do with loudspeaker phase characteristics, which has been a rather neglected subject among members of the hi-fi Establishment.

Actually, the phase response of a loudspeaker is at least as important as its amplitude response, although the latter is nearly always accepted as the "frequency response" specification. The matter is a bit too technical to be pursued in detail in this ad, but we'll be pleased to give you additional information if you write to us. For the moment, let it suffice that envelope delay distortion causes an audible coloration of speaker sound.

In terms of practical speaker design, this line of thinking produced, first of all, a highly unorthodox approach to woofers. We realized that in just about all speaker systems the woofer was responsible for envelope delay distortion as well as IM distortion far up into the midrange.

The woofer of the **Rectilinear X** is an entirely new 10-inch unit with a *completely linear* excursion capability of ½ inch in either direction, meaning one full inch of travel from peak to peak. There has never been anything like it. It can move more air than most 12-inch woofers, and of course far less sluggishly. Furthermore, it is crossed over to the midrange driver at the unprecedentedly low frequency of 100 Hz, with an attenuation slope of 12 dB per octave. As a result, it remains virtually motionless without a deep bass input and can't possibly mess up the midrange. But when there's a bass drum or a tuba or double basses in the program material, it produces music instead of mud.

Of course, a 100 Hz crossover with a 12 dB slope would be quite impractical with conventional crossover networks. The **Rectilinear X** network is designed around unconventional iron-core chokes, which will probably upset Establishment engineers, but then so did rear-engine automobiles . . .

The 5-inch midrange driver is equally remarkable. It covers more than six octaves, from 100 to 8000 Hz, in a separate subenclosure and is therefore virtually a full-range speaker system in its own right. This accounts for the completely seamless, homogeneous sound quality of the **Rectilinear X.** The cone structure is of a special paper not available in any other unit, permitting rigid piston behavior at the lower mid-frequencies and, at the same time, extraordinary transient detail higher up in the driver's working range.

At 8000 Hz, the midrange is crossed

pleased to world's first loudspeaker.

over to the 2½-inch tweeter. With only a little more than an octave assigned to this driver, its exceptionally light cone and voice coil operate only in their most comfortable range, without the slightest possibility of strain. (Speaker systems that demand too much work of a tiny tweeter are asking for trouble.)

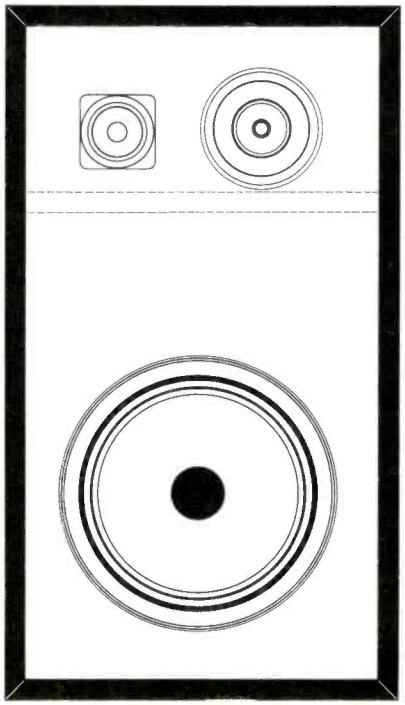
The spacing of the three drivers in the **Rectilinear X** is an important part of the design and is by no means dictated by convenience or visual symmetry, as in many other bookshelf systems. The distance of the midrange speaker from the woofer is particularly critical for the best possible phase characteristics in the crossover region.

The final touch of sophistication is provided by the grill cloth. In other speaker systems the grill cloth is made acoustically transparent, allowing sound waves to pass through unaffected. In the **Rectilinear X** a specially prepared fabric presents a graduated acoustic impedance to the midrange speaker and the tweeter, for greatly improved sound dispersion at the higher frequencies. Stretched on a slightly raised frame open at the sides, the grill cloth actually functions as a superior form of acoustic lens, making the speaker nondirectional over an extremely wide angle. This, combined with a cabinet size of only 25" by 14" by 10¾" deep, opens up new possibilities in speaker placement.

We must emphasize that none of these unusual engineering details are in themselves revolutionary. Perhaps the most gratifying thing about the **Rectilinear X** is that it's still an eminently sensible bookshelf speaker designed around three rugged, reliable drivers of the classic moving-coil principle, rather than a far-out experiment utilizing some exotic new driving system along the lines of, say, ionized air speakers. Our new standard of performance is the result of new insights into the existing technology, not of an unproven new invention.

What does the world's first high-fidelity loudspeaker sound like? It can't really be described in words and you must hear it for yourself. But the few people who have already heard it seem to agree on the following points:

The bass is startlingly clearer and more natural than one is prepared to hear through any electronic medium.



The midrange is so completely neutral and devoid of coloration that all other speakers seem nasal by comparison. There isn't the slightest hint of boxiness or enclosure sound. In fact, the sound gives no indication of the size or even existence of the enclosure.

On complex program material like Wagnerian climaxes or hard rock, the same unstrained clarity is retained as, for example, on solo flute.

Above all, the **Rectilinear X** is supremely *listenable*. Even after several hours of listening at high volume levels, there isn't the slightest aural fatigue or irritation. None of that "I've had enough, let's turn it off" feeling.

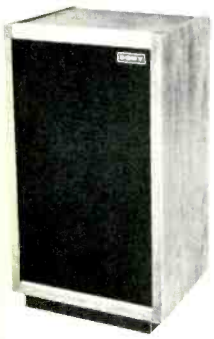
We left the price of the **Rectilinear X** for the last. Since it sounds superior to speaker systems selling for up to $2400, the price could have been whatever the traffic would bear. But based on our manufacturing costs plus the normal profit margin, we decided to set it at $199.

You'll have to agree that for a high-fidelity speaker, that's not high.

(For additional information, see your audio dealer or write directly to Rectilinear Research Corporation, 30 Main Street, Brooklyn, N.Y. 11201.)

Rectilinear X

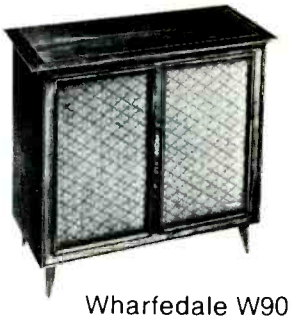
SPEAKER SYSTEMS (continued)



Sony SS-3100

Tannoy Mallorcan

University Mediterranean



Wharfedale W90D

MANUFACTURER (Circled numbers indicate adv. page)	Model	WOOFER Diameter, In.	WOOFER Resonance (In System), Hz	WOOFER Enclosure Type	MID-RANGE Diameter, In.	MID-RANGE Type	TWEETER Diameter, In.	TWEETER Type	Overall Freq. Response, Hz to kHz ±? dB	Ampl. Pwr. for Avg. Room, W	Pwr. Handling Capacity (RMS Cont)	Crossover Frequency (ies), Hz	Impedance, Ohms	Enclosure Dimensions, W x D x H, In.	Wood Finish	Grille Material Color	Weight, Lbs.	Price	SPECIAL FEATURES
SHERWOOD (33)	SR-4 Tanglewood	(2) 10	19	Acous.	8 5	Cone Cone	3½	inv. cone	22-22K	12	75	200 600 3,500	8	24 x 31½ x 13	Dil Wal.	plas. cane	73	219.50	
	SR-1 Newport	10	23	Acous.	–	–	4	inv. cone	35-22K	10	45	1,800	8	24 x 13 x 9½	Dil Wal.	plas. cane	30	84.50	
SONY (96) (97)	SS-3100	12	25	Reflex	6½	Cone	2	Horn	30-20K		30	400 5,000	8	15¾ x 11⅞ x 26¾	Wal.	Cloth, Blk.	55	229.50	Sep. sw. for multi-channel use.
	SS-2800	10	30	Reflex	6½	Cone	2	Horn	40-20K		20	600 6,000	8	13¾ x 9⅛ x 23⅛	Wal.	Cloth, Blk.	35	124.50	
SOUND-CRAFTSMEN (95)	Lancer SC-6	12		bass ener-gized		diffuser		Horn	26-22K	10	60	1,000 3,000	8	27 x 16 x 14⅛	Oil Wal.	opt.	57	179.50	
	Lancer 9711	8			–	–	–	–	45-15K					20¼ x 10 x 9½	Dil Wal.			47.50	
TANNOY (109)	Windsor GRF	15	cut-off 35	Rear Horn Loaded	–	–	2½	Exp. Horn	35-20K ±4	15	50	1,000	8	23¾ x 17 x 42	Dil Wal.	Dec. crvd. wood; wht. cloth	120	440.00	Dyn. & freq. bal. cont.; non-dec. model (GRF) $393.00.
	Belvedere	15	54	Reflex	–	–	2½	Exp. Horn	38-20K ±5	15	40	1,000	8	23⅜ x 16 x 33½	Oil Wal.	Clth, Bge. neutral	80	290.00	Dyn. & freq. bal. cont.; dec. model (Lancaster) $345.00.
	Mallorcan	12	68	Reflex	–	–	2½	Exp. Horn	45-20K ±5	20	30	1,000	8	23½ x 14⅝ x 11½	Oil Wal.	Dec. crvd. wood; wht. cloth	45	215.00	Dyn. & freq. bal. control.
TELEX	4400	8		Acous.			3½	Cone	20-20K ±2		30	2,500	8	16 x 14 x 5	Wal.	Cloth, Brown	22 pr.	149.95	Two speaker cabinets with built-in 60W stereo power amp; phone jack.
TRUSONIC	12													14 x 12 x 23¾	Dil Wal.			177.00	Incls. 12-in. coaxial. Avail. with 12-in. extended-range spkr., $135.00.
UNIVERSITY (101)	Mediterranean	12		RRL	8	Cone	4 x 2	Horn	20-beyond aud.	5	50	800 5,000	8	24⅜ dia. x 22½	Butternut	Cloth, Beige	74	285.00	
	Laredo	12		RRL	8	Cone	2	Dome	30-30K	5	40	600 1,500 3,000	8	24 x 15¾ x 12 9/16	Wal.	Cloth, Brown	47½	119.95	
	Project M	11		RRL			2½	Cone	30-20K	5	60	1,000	8	23½ x 12⅜ x 11⅞	Wal.	Cloth, Beige	30	99.95	
	Ultra D	10		RRL	8	Cone	3½	Cone	30-beyond aud.	5	32	1,000 5,000	8	23 13/16 x 11⅞ x 9¾	Wal.	Cloth, Beige	24	79.95	
UTAH (103)	AS-8	12	25	Acous.	4 x 10	Horn	1⅜	Horn	35-20K	20	30	2,200 5,000	8	30 x 25½ x 12⅜	Wal.	Cloth, Brown	60	189.00	Credenza; mid & h.f. controls.
	AS-6	12	25	Acous.	4 x 10	Horn	1¾	Horn	35-20K	20	30	2,200 5,000	8	25 x 14 x 13½	Oil Wal.	Cloth, Gold	49	120.00	As above.
	AS-1	10	25	Acous.	–	–	3½	Cone	32-18.5K	10	20	3,500	8	24 x 12 x 12	Oil Wal.	Cloth, Gold	41	79.95	h.f. cont.
WHARFEDALE (55)	W90D	12 12	40 45	Acous.	5 5	Piston cone	2 2	Dome Dome	20 to inaud.	10	50 IHF	125 1,000 4,000	4-8	23⅜ x 13½ x 30	Wal.	Cloth, brn.pattern	100	340.00	6-spkr., 4-way sys. sand-filled const.; divided bass range. Removable grille.
	W70D	12	50	Acous.	8 5	Cone Cone	2	Dome	25-20K	10	40 IHF	175 1,250 3,500	4-8	22 x 13 5/8 x 24	Wal.	Cloth, Mix	73	211.00	Sand-filled const. Use as Hi or Lo-Boy. Removable grille.
	W60D	12	42	Acous.	5	Cone	2	Dome	30-20K	8	40 IHF	1,000 3,500	4-8	14¼ x 13 x 24	Wal.	Cloth, Blk./Brn.	56	153.00	Sand-filled const. Phase comp. diffuser. Removable grille.
	W40D	10	60	Acous.	5	Cone	2	Dome	35-20K	8	35 IHF	1,250 3,500	4-8	12½ x 10⅛ x 23½	Wal.	Cloth, Mix	37	111.25	Variable mid and treble controls. Removable grille. Phase comp. diffuser.
	W30D Mark II	8	54	Acous.	–	–	2	Dome	40-18,500	10	35 IHF	2,000	4-8	10 x 9¼ x 19	Wal.	Cloth, Mix	22	69.95	Removable grille; tweeter phase-comp. diffuser.
	W20D	8	62	Acous.	–	–	3	Dome	45-18K	10	35 IHF	1,600	4-8	9⅜ x 8¼ x 14	Wal.	Cloth, Mix	14	52.95	Var. treble cont.; removable grille.

Their custom looks are only excelled by their matchless performance

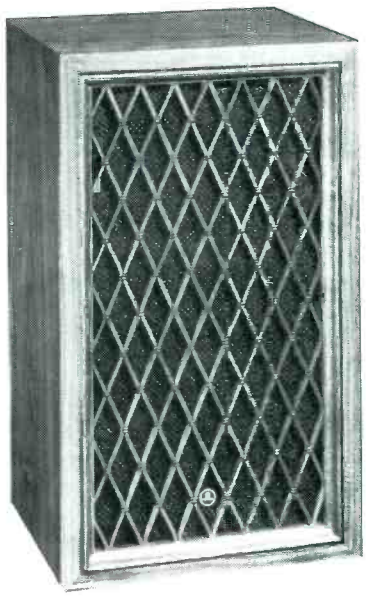
the NEW PIONEER® CS-5 and CS-44 *Custom Decorator Speaker Systems*

Better performance from a smaller bookshelf system. That's what this new pair of Pioneers is all about. Their custom looks are only excelled by their matchless performance. If you want to call them bookshelf compacts, go ahead, (We call them "Intermediates") but recognize that their Pioneer performance is setting new standards in new and less bulky dimensions.

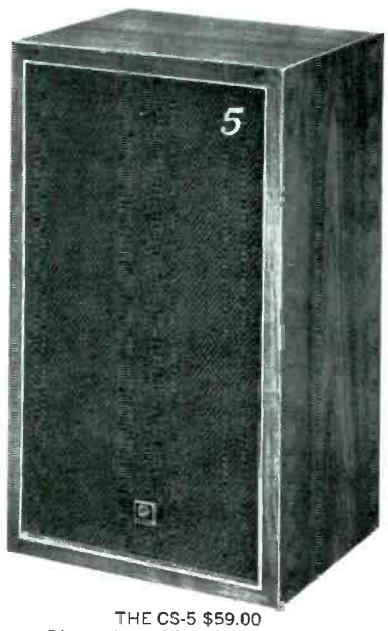
Both speaker systems employ a specially designed 8" high compliance woofer with long-throw voice coil, and an extraordinarily efficient wide dispersion cone-type tweeter to bring it all to you with superb clarity, balance and naturalness.

Choose the CS-5 for its clean, modern look, or pick the CS-44 for its "decorator" accent featuring a custom-crafted wood lattice grille. But choose Pioneer. For when it comes to creating the highest quality sound and cabinetry — Pioneer is in a class by itself!

Insist on a Pioneer demonstration, available only at fine High Fidelity Dealers — or write for full details on the entire Pioneer component line.



THE CS-44 $67.50
Dimensions: 19" x 11" x 9⅝" deep



THE CS-5 $59.00
Dimensions: 19" x 11" x 9" deep

PIONEER ... More Value All-Ways!

PIONEER ELECTRONICS U.S.A. CORP. 140 Smith St., Farmingdale, L.I., New York 11735

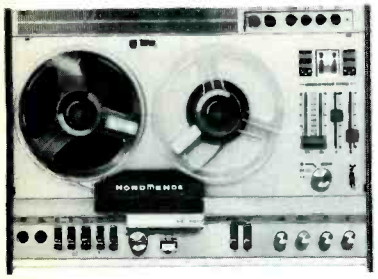
Check No. 65 on Reader Service Card

Indicate speed by letter code:

	A	B	C	D	E	F	G	H
15					x	x	x	
7½	x	x	x		x	x	x	
3¾	x	x	x		x		x	x
1⅞	x		x	x			x	x
15/16			x					

* at the highest speed of the machine

OPEN REEL TAPE RECORDERS (continued)



NordMende

Pioneer T-600F

ReVox A-77

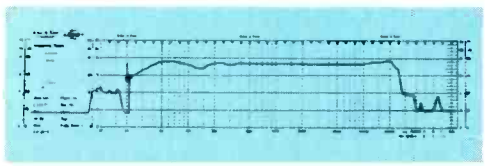
Sony/Superscope TC-666D

MANUFACTURER (Circled numbers indicate adv. page)	Model	Speeds (See letter code)	Power Amp(s) Built in ?	Max. Reel Size, In.	No. of Heads	No. of Tracks	No. of Motors	Drive Motor Type	Drive to Capstan	Frequency Response Hz to kHz * ± dB	Wow and Flutter, % *	Signal-to-noise Ratio, dB*	Fast Wind, 1200 Ft., Sec.	Mic Input Z, Ohms	Rec'ng Level Indicator Type	Dimensions, W x D x H, In.	Weight, Lbs.	Price	SPECIAL FEATURES
KLH	40	B	No	7	3	4	3	Ind.	Belt	45-20K ±2.5	<0.1	>68	65	200K	VU Meter	16 x 14⅜ x 7⅓	60	650.00	Dolby Noise Reduction System.
	41	A	No	7	3	4	1	Ind.	Belt	50-20K ±3	<0.1	>68	130	100K	VU Meter	14 5/16 x 11½ x 7⅜	17⅓	229.95	As above
LAFAYETTE (111)	RK-960	A	Yes	7	4	4	2	4-p	Belt	30-22K ±3	0.25	50	120	10K	2 Mtrs.	22 x 8¼ x 15½	44	299.95	Auto rev; 2 built-in spkrs; inputs for mag. cart. & aux; ext. spkr. outputs; auto shutoff.
NORDMENDE	8001T	A	Yes	7	3	4	3	Hys.	Idler	50-15K ±3	0.1	53	48	500	Dual Meter	19½ x 14 x 6	36	429.00	Built-in mixer.
NORELCO	4408	A	Yes	7	2	4	1	4-p	Belt	40-18K ±3	0.15	>50	120	2K	2 Mtrs.	19 x 13 x 8½	28½	349.95	Auto stop, program search selector, digital counter s-o-s, mixing.
	4407	A	Yes	7	2	4	1	4-p	Belt	40-18K ±3	0.2	>50	120	2K	2 Mtrs.	19⅜ x 13¾ x 7¾	24	239.95	Auto stop, digital counter; built-in loud-speakers; dust cover.
PANASONIC	RS-790	A	Yes	7	4	4	1	4-p	Belt	30-20K	0.1	52	180	20K	2 Mtrs.	17 x 9 x 16½	38	329.95	Dual capstan drive, headphone output, auto reverse.
	RS-796	A	No	7	4	4	1	4-p	Belt	30-20K	0.1	52	180	20K	2 Mtrs.	20 x 8½ x 14	33	249.95	Auto reverse, dual capstan drive, 4-head sys.
	RS-768	A	No	7	3	4	1	Hys.	Idler	20-27K	0.09	52/57/w NS	150	20K	2 Mtrs.	18½ x 8 x 13¼	24	219.95	3 head sys. source/tape mon; noise suppr.
	RS-765	A	No	7	2	4	1	4-p	Idler	30-18K	0.1	50	240	20K	2 Mtrs.	13¾ x 5½ x 11	17½	125.00	Headphone output jack
PIONEER (25) (65)	T-600	B	No	7	4	4	1	Hys.	Belt	30-20K	0.12	50	110	50K	2 Mtrs.	17¼ x 17⅛ x 8	33	299.95	Rec/playback auto reverse; swing-out pinch roller. Automatic brake.
REVOX (67)	A-77	B	Opt.	10½	2 or 4	2 or 4	3	Servo	Direct	30-20K ±2	.08	58	60	Lo, Hi	2 Mtrs.	16 x 8 x 14	34	529.00	Electronic governed capstan motor, all-metal low-wear heads. 15/7½-IPS version $629.00.
ROBERTS (77)	5050XD	A	Yes	10½	4	4	3	Hys.	Belt	30-25K ±3	0.12	48	60	5K	2 Mtrs.	17 x 15 x 9½	49		24-hr. programming; mag. brake; auto rev; deck model.
	420XD	A	No	7	4	4	3	Hys.	Belt	30-22K ±3	0.12	48	60	5K	2 Mtrs.	16 x 17½ x 10	62	699.95	24-hr. programming; auto rev; auto rec. vol. cont; deck model.
	333X	A	Yes	7	7	4/8/4	1	Ind.	Belt	30-22K ±3	0.20	48	120	5K	2 Mtrs.	14 x 18 x 9½	44		Comb. r-to-r, cartg, & cassette recorder/player; 4-tk mono or stereo.
	800X	A	Yes	7	3	4	3	Hys.	Belt	30-22K ±3	0.12	48	60	5K	2 Mtrs.	18 x 19 x 9½	49		Auto-rev; s-o-s; sws; 4-tk mono or stereo
SONY SUPERSCOPE (6) (17) (73)	770	A	No	7	4	2,4	1	Servo	Belt	20-22K	.09	58	120	250	2 Mtrs.	16⅛ x 15 5/16 x 3 13/16	24¾	750.00	Noise reduction; built-in limiter; mic-line mixing; var. speed cont; Scrape-flutter filter; 4th head for 2-or 4-tk p.b.
	666-D	B	No	7	4	4	3	Hys.	Belt	20-22K	.09	53	60	Low	2 Mtrs.	17 3/16 x 16⅝ x 8 1/16	48¾	<575.00	Auto rev; ultra-h-f bias, SNR Noise reduction; Solenoid oper; auto tape lifters.
	630	A	Yes	7	3	4	1	Ind.	Idler	30-22K	.09	50	150	Low	2 Mtrs.	17⅞ x 20 x 11⅝	46¼	<449.50	S-on-s; echo; slide vol. conts; ultra-h-f bias, 40W pwr. ampl; scrape flutter filter, auto shutoff.
	540	A	Yes	7	2	4	1	Ind.	Idler	30-20K	.09	50	140	Low	2 Mtrs.	9 11/16 x 15 7/16 x 9 15/16	41⅝	<399.50	s-on-s; 20-W pwr. ampl; separate tone conts; s.w.s, pause cont; auto shutoff; scrape flutter filter.

a soft touch...

That's all it takes, a gentle touch of the solenoid operated controls of the new Model 407 by Astrocom/Marlux to make you a soft touch for this outstanding new tape recorder.

No wonder, with such features as two reel drive motors plus a hysteresis synchronous capstan motor, four heads which allow you to monitor off tape and gives you automatic reverse play as well; calibrated vu meters; speed change is at the touch of a button and there is a tape tension control for proper playback of the very thinnest tapes. **And a special feature unique in the entire industry:** every **Astrocom/Marlux 407** is delivered with its own actual graphic laboratory read-out of its frequency response.* Ask your **Astrocom/Marlux** dealer for a demonstration of the **Model 407,** the recorder you'll want to buy—today.



*all laboratory equipment calibrated to National Bureau of Standards.

ASTROCOM | MARLUX

Oneonta, New York 13820

Indicate speed by letter code:

	A	B	C	D	E	F	G	H
15					x	x	x	
7½	x	x	x		x	x	x	
3¾	x	x	x		x		x	x
1⅞	x		x	x			x	x
15/16			x					

* at the highest speed of the machine

OPEN REEL TAPE RECORDERS (continued)

Tandberg 1200x Series

TEAC A-6010

Uher 9500

Viking 423

MANUFACTURER (Circled numbers indicate adv. page)	Model	Speeds (See letter code)	Power Amp(s) Built in ?	Max. Reel Size, In.	No. of Heads	No. of Tracks	No. of Motors	Drive Motor Type	Drive to Capstan	Frequency Response Hz to kHz * ± ? dB	Wow and Flutter, % *	Signal-to-noise Ratio, dB *	Fast Wind, 1200 Ft., Sec.	Mic Input Z, Ohms	Recrng Level Indicator Type	Dimensions, W x D x H, in.	Weight, Lbs.	Price	SPECIAL FEATURES
SONY SUPERSCOPE (Continued) (6) (17) (73)	560-D	A	No	7	3	4	1	Servo	Belt	30-18K	.07	52	140	Low	2 Mtrs.	16⅜ x 15½ x 6½	27	<349.50	ESP auto rev; scrape flutter filter; Servo-control motor; vari-speed pitch control.
	355	A	No	7	3	4	1	Ind.	Idler	30-22K	.09	52	150	Low	2 Mtrs.	15 3/16 x 14 x 7 1/16	22	<229.50	Tape/source mon, ultra-h-f bias; noise suppressor, scrape flutter filter; s-o-s, auto shut off; auto tape lifters.
	255	A	No	7	2	4	1	Ind.	Idler	30-18K	.09	52	150	Low	2 Mtrs.	15⅜ x 13¾ x 7¼	19¾	<179.95	s.w.s, ultra-h-f bias; scrape flutter filter; auto shutoff; auto tape lifters; phone mon. jack
	222-A	H	Yes	5	2	2	1	Servo	Belt		0.15	48	--	Low	Mtr.	11⅝ x 11⅞ x 4⅝	8⅞	99.50	AC/DC servo contr. motor; auto or manual rec. level cont; built-in recharging cct; p.a. capability; mono.
TANDBERG (104)	(T) 6X Series	A	No	7	3 plus bias	4 and 2	1	Hys.	Idler	40-18K ±2	<0.1	58	120	0.5 M	eyes	15⅜ x 11 13/16 x 6¾	23	549.00	
	1200X Series	A	Yes	7	2 plus bias	4 and 2	1	Hys.	Idler	40-18K ±2	<0.1	58	120	Low	2 Mtrs.	15⅜ x 11 13/16 x 6⅞	23	485.00	
	11 Series	A	monitor amp	7 5 w/ cover	3 plus tach	full and half	1	9V d.c.	Idler	40-16K ±2	0.1	55	105	Low	Mtr.	13 x 10 x 4	9.5 w/o batt.	449.50	This series also available in pilotone version with synchronizer for lip sync at $699 + $350 for sync unit.
	1600X Series	A	No	7	2 plus bias	4 and 2	1	Shaded pole	Idler	40-20K ±2	<0.1	58	100	Low	2 Mtrs.	15⅜ x 11 13/16 x 6 11/16	19½	249.00	
TAPESONIC	70-TRSQ	E	No	10½	3	4 or 2	3	Hys.	Direct	35-26K ±2	.08	56	35	10K-50K	2 Mtrs.	19 x 14 x 5½	69	615.00	Two low-Z mic. transf. inputs with Cannon XLR conn. $35.00 Port. Carry Case: $34.50
TEAC (75)	7030	F	No	10½	4	2	3	Hys.	Idler	30-20K ±2	.06	55	120	10K	2 Mtrs.	20⅞ x 17½ x 8¼	49	749.50	
	6010	B	No	7	4	4	3	Hys.	Idler	30-20K ±3	.08	55	90	10K	2 Mtrs.	20⅞ x 17½ x 8¼	46	664.50	
	4010	B	No	7	4	4	3	Hys.	Idler	30-20K ±3	0.12	50	100	10K	2 Mtrs.	17¼ x 17½ x 9¾	48	469.50	
	2050	A	No	7	4	4	1	Hys.	Idler	30-20K ±3	0.12	50	110	10K	2 Mtrs.	11⅜ x 10⅛ x 5½	33	349.50	
UHER	4400	C	Yes	5	2	4	1	Sync d.c.	Belt to flywheel	4-20K ±2	0.10	50	120	2K	2 Mtrs.	11 x 9 x 3½	8	399.95	Stereo portable w/professional quality.
	9500	C	No	7	4	4	1	Hys.	Idler	20-20K ±2	.04	54	120	200	2 Mtrs.	17¾ x 13¾ x 7¾	27	450.00	Interchangeable 2-track head assembly available. Mod. 10,000, same w 20w ampl. $550.00.
VIKING	880	B	Yes	7	3	4	2	Ind.	Belt	30-18K ±3	0.2	55	60	50K	2 Mtrs.	22 x 14 x 9	44	449.95	S-o-s; mon. sw; phone jack; 2 spkrs; port. case.
	433	A	No	7	3	4	3	Ind.	Belt	40-18K ±3	0.2	54	70	50K	2 Mtrs.	15¾ x 14⅜ x 8¾	30	374.95	Sgl. cont. for operation; ill. indicators; mixing conts; phone jack; pause cont.
	88	B	No	7	3	4	2	Ind.	Belt	30-18K ±3	0.2	55	60	50K	2 Mtrs.	13 x 13 x 8	22	349.95	S-o-s; mon. sw; pause cont.
	423	A	No	7	2	4	3	Ind.	Belt	50-15K ±3	0.2	50	70	2.5K	2 Mtrs.	15¾ x 12⅝ x 8¾	29	274.95	4-digit counter; stereo/mono. Sel. sw; pause cont.
WOLLENSAK	6200	B		7	4	4	2	Ind. & d.c.	Idler	40-15K ±2	0.15	50	90	500	2 Mtrs.	16 x 6 x 13	15	229.95	Stereo, self-contained spkrs. open front threading, dymanic braking.

FOR THOSE WHO DEMAND

The Very Best

Some people can accept reduced quality in their audio components. For others — the recording engineer, the professional musician, the music connoisseur — there is only *one* quality — *the very best.* These are the uncompromising — the people who choose CROWN.

They know that behind each Crown product stands the teamwork of some of the nation's finest audio engineers and proudest American craftsmen. These are the designers whose innovations have led the tape industry with exclusive electro-magnetic braking, the first solid-state components, original computer logic tape control, the new industry standard power amplifier — DC300, and now an ultra-flexible, high-performance control center. These are the craftsmen who carefully hand-fabricate and test each unit, entering measurements on individual proof-of-performance records. This is the product line that is worthy the pride of both its makers and its owner.

To discover what you're missing — compare CROWN's Total Performance sound today. Write Crown, Box 1000, Elkhart, Indiana, 46514.

Crown®

MADE ONLY IN AMERICA

CX844 For the audio perfectionist or professional, the ultimate in live recording. 4 channels in-line, 3 speeds, computer logic tape control never breaks tapes, remote control optional, sound-on-sound, sound-with-sound, echo effects

All models shown feature total silicon solid-state design, non-mechanical brakes, precision micro-gap heads, 5" VU meters, 4 mic or line inputs, 3/16" panel with massive central casting, third head monitor with A/B switch, rugged construction, 100 hours in-plant testing.

CX722 Superlative professional quality with outstanding flexibility for on-location recording. 2 channels, 3 speeds, pushbutton electric control, remote start/stop optional, sound-on-sound, sound-with-sound, echo effects, shown in studio console.

SX724 Professional performance at a minimum price, essential for the finest component systems. 4 channels in-line, 2 speeds, push-button electric control, remote start/stop optional, sound-on-sound, shown in scuff-proof carrying case.

SX824 For the serious audiophile, the ultimate home recorder. 2 channels, 2 speeds, computer logic control never breaks tapes, remote control optional, sound-on-sound, shown in genuine walnut hardwood cabinet.

DC300 Laboratory standard basic amplifier. 300 watts per channel RMS, complete output protection, extreme purity, shown in walnut cabinet

D40 The ideal monitor amplifier. 40 watts per channel RMS, compact, low distortion, shown in walnut cabinet.

Check No. 71 on Reader Service Card

CASSETTE and CARTRIDGE MACHINES

Ampex Micro-95

Bell & Howell 2398

Craig 3302

Harman Kardon CAD-4

Norelco 2602

MANUFACTURER (Circled number indicates ad page)	Model	Cassette	Cartridge; No. of Tracks	Type: Portable, P; Home, H; Car Mount, C	Power Amp. Built-In	Rated Power Output, W	Mode: Stereo, S; Mono, M	Frequency Response, Hz, ± ? dB	Wow and Flutter, %	S/N, dB	Supply Voltage	Speakers – Built-In or External	Dimensions, W x D x H, in.	Weight, Lbs.	Price	SPECIAL FEATURES
ALLIED (113)	1150	Yes		P	Yes	1.25W	M	200-11K	0.25	35	9 Batt 110 AC	Built-In	6 x 9⅜ x 2⅝	3½	69.95	Battery/AC; keyboard push-button controls, pause button; switchable automatic level control.
	1100	Yes		P	Yes	0.75W	M	100-6K	0.3	35	7.5 Batt 110 AC	Built-In	4 x 12 x 2⅝	5	39.95	Keyboard push-button controls, snap-on AC adapter solid state; record level/battery meter.
AMPEX (81)	Micro-95	Yes		H	Yes	20 W	S	50-12K ±2	0.3	42	117 AC line	Ext.	15¼ x 9¼ x 4⅜		269.95	Auto changer; plays up to 6 cassettes in sequence.
	Micro-42	Yes		P	Yes	1	M	100-10K	0.35	42	117 AC 7.5-12 DC	Built-In	12½ x 7 x 3	9¾	129.95	Built-in AM/FM tuner-AC/DC oper; Ni-Cad battery recharger cct.
BELL & HOWELL	337B	Yes		H	No	20/chan.	S	50-11K	0.18	45	117 AC	Deck only	15 x 9¼ x 4¼ (plus stacker)	8	219.95	Recs. & plays stereo; autoload changer for 6 cassettes; spkr., stereo output, mic, ext. input jacks
	2398	Yes		P	Yes	2	M	70-10R	0.20	40	9 Batt. 117 AC	Built-In	10 x 10 x 3¼	6½	89.95	Has AM-FM radio - has excl. Audio Eye which monitors transport functions - sep. FM-AM antennae
CONCORD	F-400	Yes		P	Yes	8	S	50-10K	<0.25	45	117 AC Batt.	Built-In	12¾ x 9¾ x 3¾	11	<180.00	
	F-103	Yes		P	Yes	4	M	50-10K	<0.25	45	117 AC Batt	Built-In	12 x 9¼ x 3¾	5½	<130.00	
	F-101	Yes		P	Yes	1	M	50-10K	<0.25	45	Batt	Built-In	4½ x 6⅞ x 2	2¾	<125.00	
	F-98	Yes		P	Yes	4	M	50-10K	<0.25	45	117 AC, Batt	Built-In	12 x 9 x 4½	8	<90.00	
CRAIG	2805	Yes		H	No		S	50-10K	0.3	45		Deck only	17¼ x 10 x 8½	26.5	189.95	Auto-change and reverse plays both sides ea. cassette
	2707	Yes		H	Yes	3/chan.	S	100-8K	0.35	40	120 AC	External	14⅞ x 7¾ x 3¼	17.6	169.95	Auto. level control (ALC).
	3302		8	H			S	50-10K	0.25	40	120 AC		9½ x 11½ x 4	12	139.95	8-track rec. deck for taping cartridges; auto. level control; auto-stop
	3205		8	H	Yes	7/chan.	S	70-10K	0.25	45	120 AC	External	8⅞ x 10½ x 5	21 incl. speaks	119.95	
CROWN RADIO	CRC-7550F	Yes		P,C	Yes	1.5	M	100-10K	0.4	35	6,12 or 117	Built-In	10 7/16 x 8 11/16 x 2 15/16	5.1	129.95	
	SHC-448	Yes		H	Yes	3/chan.	S	100-10K			9 or 117	Ext	13 3/16 x 8⅞ x 3 9/16	7.7	99.95	Uses 6 "D" cells or a.c. line; accommodates FM-400 tuner as plug-in
	CTR-8750	Yes		P	Yes	1.0	M	100-10K	0.5	30	6, 117	Built-In	7⅝ x 7 11/16 x 2½	4.4	69.95	
	CTR-9001	Yes		P	Yes	1.0	M	100-8.5K	0.5	30	6	Built-In	4¾ x 8 13/16 x 2½	3.3	49.95	
HARMAN-KARDON (40) (41)	CAD 4	Yes			No		S & M	30-12.5K	0.15	49	117 AC	Deck only	12½ x 9 x 3¼	10	159.95	2 mic inputs, dual mtr; auto shutoff; o-load ind. light; reg. motor spd. cont; push-pull bias oscillator
LAFAYETTE (111)	RK-510	Yes		H	Yes	1.0	S	35-22K ±2	0.2	45	117 V AC	Ext (Spkrs. optional ex.)	14⅞ x 8½ x 4½	12	149.95	Rec/play stereo; inputs for tuner, car, phono; pre-amp & 8-ohm spkr outputs; dual mtrs; counter. Incls. mics.
	RK-550	Yes		H	No		S	40-12K ±1	0.2	45	117V AC		15 x 9 x 5	12	119.95	Rec/play stereo deck; push-button operation; 2 mtrs; counter
NORELCO	2401	Yes		H	Yes	4/chan.	S	60-10K ±3		43	117 AC	Ext	15 x 9¼ x 5¼	11	249.95	Records & plays 6 cassettes, auto. wal. 8" satellite speakers
	2602	Yes		C	Yes	4/chan.	S	60-10K ±3		43	12 DC	Ext	7 5/16 x 7 5/16 x 2⅜	4	119.95	Auto use, fast forward and rewind.
	150	Yes		P	Yes	0.4	M	80-10K ±3		45	7.5 Batt	Built-In	7⅛ x 4½ x 2¼	3	54.95	Records, dynamic mic with remote switch line input and output

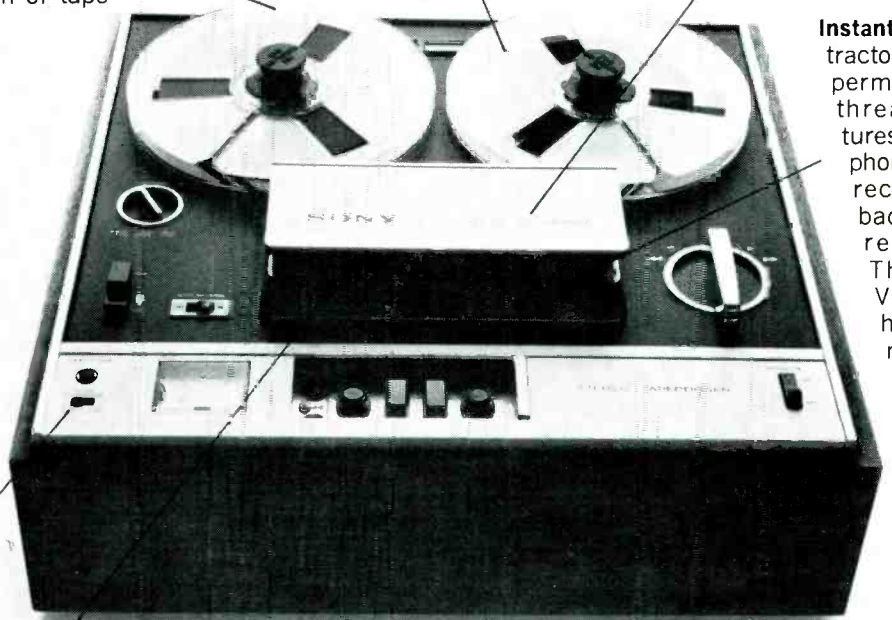
Check No. 73 on Reader Service Card →

ESP automatic tape reverse.

ESP Automatic Tape Reverse. A special electronic sensory perception circuit indicates the absence of any recorded signal at the end of a tape and automatically reverses tape direction within ten seconds.

Non-Magnetizing Record Head. Head magnetization build-up—the most common cause of tape hiss—has been eliminated by an exclusive Sony circuit, preventing any transient surge of bias current to the record head.

ServoControl Motor. Automatically corrects for speed variations and maintains precise timing accuracy. Vari-speed feature of motor can be adjusted up or down to match musical pitch of tape playback to any piano.



Instant Tape Threading. Retractomatic pinch rollers permit simple one-hand threading. Other features: Four-track Stereophonic and Monophonic recording and playback. Also records in reverse direction. Three speeds. Two VU meters. Stereo headphone jack. And more.

Noise-Suppressor Switch. Special filter eliminates undesirable hiss that may exist on older prerecorded tapes.

Scrape Flutter Filter. Special precision idler mechanism located between erase and record/playback heads eliminates tape modulation distortion. This feature formerly found only on professional studio equipment.

Sony Model 560D. Priced under $349.50. **Also available:** The Sony Mode 56C Tape System with stereo control center, stereo pre-amplifier and stereo amplifier, microphones, and lid-integrated full-range stereo extension speakers for less than $449.50. For your free copy of our latest tape recorder catalog, please write to Mr. Phillips, Sony/Superscope, Inc., 8142 Vineland Avenue, Sun Valley, California 91352.

SONY SUPERSCOPE The Tapeway to Stereo

You never heard it so good.

CASSETTE and CARTRIDGE MACHINES (continued)

Sony/Superscope TC-50

Sony/Superscope TC-124

Teac A-20

Viking 811R

MANUFACTURER (Circled number indicates ad page)	Model	Cassette	Cartridge: No. of Tracks	Type: Portable, P; Home, H; Car Mount, C	Power Amp. Built-In	Rated Power Output, W	Mode: Stereo, S; Mono, M	Frequency Response, Hz, ± ? dB	Wow and Flutter, %	S/N, dB	Supply Voltage	Speakers – Built-in or External	Dimensions, W x D x H, in.	Weight, Lbs.	Price	SPECIAL FEATURES
PANASONIC	RS-252	Yes		H	Yes	20	S	30-12 K			117 V AC	Ext 2-6½	19¼ x 5½ x 11½	20	229.95	AM/FM/FM stereo radio, 2 spkrs, stereo eye, slide cont.; blackout dial; 2 mtrs, pop-up cassette
	RQ-210	Yes		P	Yes	0.6	M	50-10 K			6 Batt.	Built-In 2½	3¾ x 1⅞ x 6⅜	2¼	125.00	Mini cassette, rec & pb; auto rec. level cont; pop-up cassette
	RS-256	Yes		H	No		S	30-12K			117 AC	Deck only	10⁷⁄₁₆ x 10 x 3¾	7⅜	109.95	Stereo deck, pb oper; counter; pause cont.; 2 mtrs; noise suppressor; phone jack
	RS-802		8	H	No		S	50-12 K			117 AC	Deck only	9½ x 9½ x 4	6⅝	59.95	Lighted chan. ind; p.b. chan. sel.
SONY-SUPERSCOPE (6) (17) (73)	130	Yes		H	Yes	15	S	50-10 K	0.2	45	117 AC	Ext	13⁵⁄₁₆ x 3¹⁵⁄₁₆ x 9⁷⁄₁₆	9⅜	<229.50	2 ext spkrs; ph jk; bal, vol. & tone conts; counter, pop-up cassette ejector, spkr/mon.sw; noise supp. sw; mic & aux inputs
	124 CS	Yes		P	Yes	1.0	S	50-10 K	0.28	45	6 DC 117 AC	Built-In & Ext	6¹¹⁄₁₆ x 9¾ x 2¹¹⁄₁₆	5	<199.50	2 ext spkrs & built-in spkr; 12v. opt recharg. batt., built-in charging cct; ph jack, batt cond incl; p.a. capability.
	120	Yes		P	Yes	1.5	M	50-10 K	0.25	46	6 DC 117 AC	Built-In	10¼ x 6 x 2½	5	<129.50	Built-in electret cond mic; batt. cond. ind; rec-level mtr; counter; leather case; ph jack; ac/dc w/built-in recharging cct
	50	Yes		P	Yes	0.25	M	80-8 K			4.5 DC	Built-In	3⁹⁄₁₆ x 1⁷⁄₁₆ x 5⁷⁄₁₆	1¾	<125.00	Pocket sized; built in mic & spkr; ext remote mic input; batt. cond. indicator; auto rec. level cont, pb vol cont; phone jack
	110	Yes		P	Yes	1.0	M	50-10K	0.28	46	6 DC 117 AC	Built-in	5¼ x 9⅜ x 2⅜	4⅞	99.50	Ac/dc, built-in recharg. cct; built-in spkr, mic & aux. inputs; batt. cond. indicator; tone cont; electret cond. mic; phone jack
	70	Yes		P	Yes	1.2	M	50-10K	0.28	42	6DC 117 AC	Built-in	8¹³⁄₁₆ x 8¼ x 2⁵⁄₁₆	5⅛	69.50	Ac/dc; built-in recharging cct; built-in spkr; end-of-tape alarm; mic and aux inputs; tone and vol. conts; rec-level and batt cond. indicator.
	TC-8		8	H	No	–	S	45-13K		52	117 AC	None	12 x 8½ x 4½	11½	129.50	Auto rec-level cont; auto shutoff; cart. prog. indicator; stereo phone jack; record interlock.
STANDARD	SR-T800P		8	H	No	–	S	50-10K ±6	0.2	45	117 AC	Deck only	13⅜ x 7⅛ x 3½	8.8	79.95	Built-in preamp.
TEAC (75)	1250		8	H	No	–	S	30-15K ±3	0.3	48	12V AC	No	15 ³⁄₁₆ x 9¾ x 4⅛	14.0	149.95	8-track recorder Automatic eject system Fast forward system
	1624	Yes		H	No	–	S	30-15K ±3	0.3	43	12 V AC	No	3½ x 8¾ x 10¾	9.9	139.95	Hysterises Synch Motor 3 VU meters Head Phone Output jack
	A20U	Yes		H	Mon.	0.1	S	60-10K ±0.5	<0.2	45	117 AC	Deck Only	9¾ x 10 x 4¼	10	139.50	Headphone mon. cct; hys. motor, incls stereo mic.
VIKING	811-R		8	H	No		S	40-15K	0.3	50	110 AC	None	15 x 11 x 4½	25	189.95	Recdr/player, w/logic ccts for auto stop at end of prog; wal. case
	811W		8	H	Yes	10	S	40-50K	0.3	50	110 AC	2 ext	15 x 11 x 4½	30	159.95	Player, w/vol, bal, tone conts, and power ampl; incls spkrs. wal. case.
	811A		8	H	Yes	10	S	40-50K	0.3	50	110 AC	None	15 x 11 x 4½	22	129.95	Player, w/vol, bal, tone conts, and power ampl; wal. case.
	811		8	H	No		S	40-50K	0.3	50	110 AC	Deck only	15 x 11 x 4½	20	99.95	Player deck; feeds hi-fi. sys.
WOLLENSAK	4800	Yes		H	Yes	16 *	S	60-12K ±3	0.25	46	110AC	Ext.	14 x 9 x 4	22 with Speaker.	229.95	Separate compression-loaded speakers heavy duty biperipheral flywheel * total, EIA.
	4300	Yes		P	Yes	–	M	50-10K	0.35	45	7.50 bat	Built-in	12 x 10 x 3	7¾	99.95	Auto. rec. level cont; manual override.

Check No. 75 on Reader Service Card →

A-7030U Unsurpassed sound reproduction at 15 or 7½ ips • Tape tension adjustment for reels up to 10½ inches • Dual-speed hysteresis synchronous motor for capstan drive, with unique electrical speed change • Two exclusive induction motors for reel drive • Effortless operation with solenoid control system • Optional remote control/pause control • Cueing button • Instant off-the-tape monitoring without interruption of recording • Sound-on-sound, sound-with-sound, echo, and built-in mike-line mixer • Automatic rewind and shutoff

Fly me to the TEAC statusphere.

Maybe you're not quite ready for this trip. The A-7030U stereo tape deck is a professional machine. If you don't run a radio station or recording studio, you don't really need it. But this deck is bound to appeal to the home-grown perfectionist. And what's wrong with a handy home living room sound studio? It's bound to be the first one on your block.

TEAC

TEAC Corporation of America • 2000 Colorado Avenue • Santa Monica, California 90404

VIDEO TAPE RECORDERS

Ampex VR7500

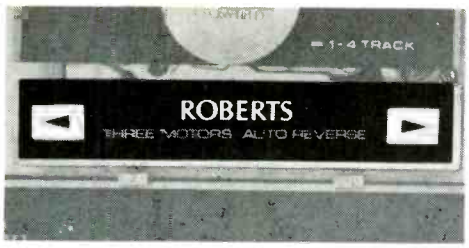
Panasonic NV-8080

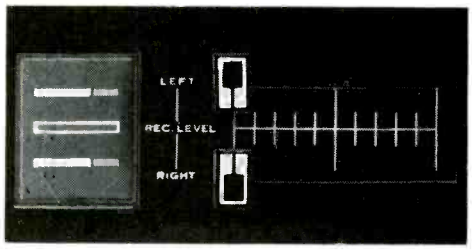
Bell & Howell 2966

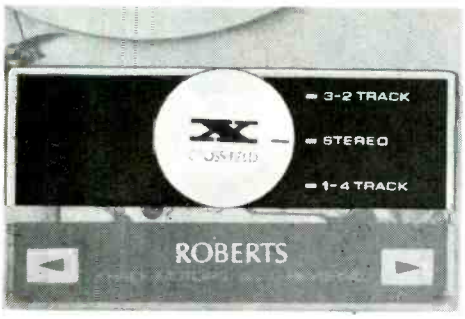
Roberts 1000

Sony CV 2200

MANUFACTURER (Circled number indicates ad page)	Model	Tape Width, In.	Tape Speed, ips.	Video Head-to-Tape Speed ips	Video Bandwidth, Hz to MHz	Lines Resolution	Audio Frequency Response Hz to kHz, ± dB	Weight, Lbs.	Price	SPECIAL FEATURES
AMPEX (81)	VR-7800	1	9.6	1000	20-4.2M	350	50-15K ±2	140	10,000.00	Opt. items: color, proc. amp., drop out comp. features elec. ed. brdcst. stndrd.
	VR-7500	1	9.6	1000	30-4.2 or 30-3.5M	350	50-12K ±4	100	4,500.00	High or low band color recording optional.
	VR-5100	1	9.6	1000	30-3M	300	90-9K ±4	62	1,600.00	
	VP-4900	1	9.6	1000	30-3M	300	90-9K ±4	61	995.00	Playback-only unit.
BELL & HOWELL	2910	1	6.91	723	30-4.2M	>400 (mono)	80-10K ±4 (tk 1) 250-7K ±4 (tk 2)	65	4,200.00	Monochrome; converts to color by addition of 1 plug-in cct. board; stop motion; full NTSC-type color.
	2020	1	6.91	723	30-4.2M	>400 (mono)	75-10K ±4	47	2,335.00	Full NTSC-type color; avail. w/or w/o case; avail. in monochr., conv. as above; stop motion.
	2966	½	7.5	518	30-3M	300	60-10K	52	995.00	In port. case; stop motion standard.
CONCORD	VTR-700	½	12	484	30-2.5M	250	50-12K	60	1,495.00	Rem. cont. oper.; auto rewind; auto shutoff.
	VTR-600	½	12	484	30-2.5M	250	80-10K	52	1,150.00	Built-in head cleaning; portable.
	VTR-900	½	12	484	30-2.5M	250	50-12K	52	995.00	Simple oper.; p.b. conts.; plays through std. TV; portable.
CRAIG	6401	½	9.5			250	70-10K	65	850.00	Rotary-transf.-coupled video head; color adapt.; auto audio-level cont. Remote control optional.
	6402	½	9.5			250	70-10K	59	1,200.00	As above, but with built-in sync gen.; ed.; slow motion; auto video-level cont.
PANASONIC	NV-8100 AD	½	12	484	50-2M	>260	80-10K	63	1,400.00	Appr. prices.
	NV-8080	½	12	484	50-2M	260	80-10K		1,400.00	Portable batt.oper. model uses 4½-in. reels
	NV-505	1	1	484	10-4.5M	>450	40-20K ±2	120	5000.00	
ROBERTS (77)	1000	½	11¼	300	30-2.5M	250	80-10K	66	1,095.00	Also serves as 4-tk audio rec. at 7½ & 3¾ ips. Any TV recvr. adapt. as monitor.
	1050	¼	11¼	300	30-2.5M	250	80-10K	20	1,695.00	Battery oper. port. 5-in. reels, recs and plays on mon. Includes camera, mon., recharger. Available Dec.
SONY (96) (97)	EV-310	1	7.8	590		300 (mono) 240 (color)	50-12K +1, −76	77	3,700.00	NTSC color rec/pb capability w/CLB-1B color adaptor; solenoid oper. remote; guar. tape interchangeability with other E V recdrs.
	DVK/VCK 2400 "Videorover"	½	7½			220	100-8K	16	1,250.00	Trans.; batt. oper.; auto vid. & aud. rec. level; built-in screen viewfinder; 20-min. rec. time on 5" reel; incls. camera.
	TCV-2110	½	7½			220	80-10K	70	1,050.00	Auto vid & aud rec. level cont.; 1 hr. rec time on 7-in reel; auto shutoff; suitable for audio dubbing.
	CV-2200	½	7½			220	80-10K	49	850.00	Duplicate tape with 2 units and VDC-1 adapter; 1 hr. rec. time on 7-in reel.







ROBERTS 650XD

with exclusive Cross Field Head

3-MOTOR REVERSE CUSTOM STEREO DECK

We really sharpened our pencil when we designed this one! Features you'd expect to pay $700 for! Like automatic reverse, 3-speed hysteresis synchronous capstan motor (without belt shifting), two 6-pole Eddy current reel motors, automatic shut-off, sound-on-sound, 30 to 23,000 Hz frequency response, ultra-modern slide-pot controls, and attractive twin VU meters! **Plus** ROBERTS' exclusive Cross Field Head, which records an extra octave in the high frequency spectrum and delivers consistent high-quality sound reproduction even at slow speed! Then there's the 4-digit counter with push-button reset and the elegant walnut case and cover to complete the luxury touches! And the price? An incredible $379.95! Which makes the ROBERTS 650XD the lowest priced state-of-the-art stereo recorder on the market!

For complete specifications write . . .

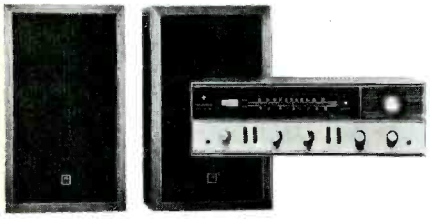
The Pro Line

ROBERTS

Check No. 77 on Reader Service Card

Div. of Rheem Manufacturing Co.
Los Angeles, California 90016

MODULAR SYSTEMS (continued)



Kenwood KRS-44

Panasonic SC-666

Scott 2506

Sony HP480

MANUFACTURER (Circled numbers indicate adv. page)	Model	AMPLIFIER SECTION: IHF Power/Chan, W	THD at Rated Power, %	IM at Rated Power, %	IM at 1 Watt, %	Power Bandwidth, Hz	1-Watt Freq. Resp., Hz ± ? dB	Rated Output S/N, dB	TUNER SECTION: IHF Sensitivity, μV	THD, Mono, 100% Mod., %	Freq. Response, Hz ± ? dB	Stereo Sep'n, 1000 Hz, dB	THD, Stereo, 100% Mod., %	Tuning Indicator	Auto Stereo Switching?	Changer Type	SPEAKERS: Woofer Size, in.	Tweeter size, in.	Type	Enclosure Type	Enclosure Size W x D x H, in.	System Weight, lbs.	Price	SPECIAL FEATURES
KLH	20								3.0	0.5	20-15K	35	0.8	Meter	Yes	Garrard Custom	10	1¼	Sealed Box	23⅛ x 9 x 11¾	81	399.95	Spkrs. and ampl. critically matched for opt. performance.
	24	17½							3.0	0.5	20-15K	35	0.8	Meter	Yes	Garrard Custom	8	2	Sealed Box	18 x 10¼ x 7⅜	65	299.95	As above.
	14W	17½							NONE							Garrard Custom	Single 3-in. full range cone		Sealed Box	8 x 4 x 14	32	199.95	As above; avail. as portable, same price.
KENWOOD (43)	KRS-44	24* 20	0.8	0.8	0.4	20-20K	20-50K ±2	70	2.2	0.8	20-15K +0, −2	30	1.0	Meter	Yes	none	6½	3 Cone		10 x 8 x 16½	46	239.95	*at 4 ohms.
	KS-33	15* 12.5	0.9	0.9	0.5	30-15K	30-40K ±2	70	3.0	0.8	20-15K +0, −2	30	1.0	Meter	Yes	none	6½	2¾ Cone		8¼ x 7⅞ x 14⅛	38	199.95	*At 4 ohms.
LAFAYETTE (111)	RK-580	25	1	1.4	0.7	30-20K	20-20K ±2	60	3	0.5	50-15K ±1	35	1.2	Meter	Yes	BSR Mc Donald 500	–	–	–	–	50	329.95	W/O speakers. Built-in cassette stereo record/play.
MARANTZ (19) (45)	25		0.3	0.3					2.8	0.3	20-15K ±2	35	0.5	Meter	Yes	all	–	–	–	–		329.00	IC's, FET's; spkr. sel. sw. phone jack; loudness cont.
MIKADO (88)	2410	10	3			100-10K			5	3		27		Meter	Yes	Garrard 30	5		Hi Eff.	16 x 4¾ x 17	54	169.95	
PANASONIC	SC-666	20	1.0			20-25K		60	2.8	0.8		35			Yes	BSR	8	2 Cone	Acous.	11⅜ x 17⅜ x 8¾	55	349.95	Incls. AM.
	SC-555	15	1.0			22-25K		60	2.9	0.8		35			Yes	BSR	6½	2 Cone	Acous.	15⅜ x 9¾ x 8¼	35¼	279.95	Incls. AM.
PIONEER (25) (65)	C-7000	18	1.0	0.5	0.2	30-20K	20-70K ±3	50	2.5	0.7	20-15K ±2	35	1.5	Meter	No	Pioneer	8	2½ Cone	Acous.	11 x 9 x 19	96	690.00	Cassette recorder, glasstop, pedestal.
	C-6000A	18	1.0	0.5	0.2	30-20K	20-70K ±3	50	2.5	0.7	20-15K ±2	35	1.5	Meter	No	Pioneer	8	2½ Cone	Acous.	11 x 9 x 19	90	550.00	Glasstop, pedestal.
	C-5600	15 x 2	0.8	0.5	0.2				2.5	0.7	20-15K ±2	35	1.5	Meter	No	Pioneer	8	2½ Cone	Acous.	12 x 10 x 22	71	499.95	Bi-amplified system, lattice grille speaker.
SCOTT Cover II (1)	2506	25*	0.8	2.0	1.0	20-20K	18-25K ±1	65	2	0.6	50-15K ±2	30	0.8	Meter	Yes	Garrard	With Q-100 speakers With S-15 speakers With S-10 speakers				106 90 87	499.95 449.95 399.95	* At 4 ohms.
	2503	20*	0.8	0.7	0.6	20-20K	18-25K ±1	60	2	0.6	50-15K ±2	30	0.8	Meter	Yes	Garrard	With S-10 speakers With S-17 speakers With S-14 speakers				84 58 57	379.95 339.95 309.95	* At 4 ohms.
	2505	20*	0.8	2.0	1.0	20-20K	18-25K ±1	60	2	0.6	50-15K ±2	30	0.8	Meter	Yes	Garrard	With S-10 speakers With S-17 speakers With S-14 speakers				84 58 57	359.95 319.95 289.95	* At 4 ohms.
SHERWOOD (33)	S-6000	60	0.75	1.0	.20	15-20K	20-20K ±1	90	1.8	0.15	20-15KC ±1 dB	40	0.3	zero cent mtr.	Yes	**	NONE				32	419.50	*At 4 ohms. **Accepts Garrard SL65 or SL55, or Dual.
SONY (96) (97)	HP-180	9	1.5				50-20K	53	4.5			38			Yes	BSR Full Size	5	2	air tight	7 9/16 x 5 11/16 x 14⅝	28.8	239.95	HP-150A, same less tuner, 179.95.
	HP-480	19	1				20-50K ±1	65	2.6	0.6	30-15K	38	0.8		Yes	Dual	6½	3	reflex	14 3/16 x 7½ x 14 3/16	45	319.95	HP-460, same less tuner, 249.95.
	HP-550	33	0.6	1.5			20-50K ±1	65	2.8	0.6	30-15K	38	0.8		Yes	Garrard	10	4	air tight	16 9/16 x 7½ x 16 9/16	55.5	379.95	

Some people say Ampex stereo recorders are expensive.

They're right.

We put more into them. So you get more out of them. More sound, because our recorders actually produce their stated specifications. And every Ampex keeps giving you the stated spec performance over a much longer period of time.* Here are the facts.

Every Ampex recorder frame is die-cast. We don't cut it out of sheet metal. Connection points on it are milled, not stamped, for greater accuracy. Then we die-cast and mill a special block that connects with the frame and holds the tape heads absolutely rigid. This total die-cast framework costs more, but heads mounted on a less rigid framework can move. And if they move, even a fraction, maximum frequency response is gone.

Every Ampex uses famous deep-gap heads. These heads cost us a lot more to make, but they deliver far better sound far longer than any others in the industry.** We install them more precisely. And on bi-directional units we make sure the heads are equally sensitive. So both directions sound identical.

Every Ampex tape drive system is powered by a special, heavy-duty hysteresis synchronous motor. A motor we make even better with a die-cast flywheel/fan for consistently cooler, smoother operation. And we use an exclusive Ampex-designed drive belt with built-in damping factor to further reduce flutter.

The Ampex reel drive and brake system costs more to build. But it makes tape breaking, tearing or stretching almost impossible no matter how fast you change direction. Our dual capstan drive is expensive but insures less wow, flutter and less wear on tapes. Our stainless steel tape guides are ground more accurately and set more precisely into each unit. This insures that tape crosses the heads at an optimum frequency response angle even after years of use.

Finally, every Ampex uses higher grade electrical components. Our transistors, resistors, capacitors and semi-conductors surpass engineering specifications. And we don't push them to their limits. Even our transformers are larger, with more laminations and copper, so they don't have to hum to handle the electrical load, magnetize the heads less, run cooler and have a much longer life span.

The result? Every Ampex tape recorder lives up to its high performance specifications. And keeps living up to those specifications for years longer. You pay a little more for an Ampex but *in the long run* it's a bargain.

A case in point: the new Ampex 1467 system. You get Sound-on-Sound, Sound-with-Sound, Echo Effect, "Silent Signal" Automatic Reverse, Automatic Repeat, Monitor, Pause Control, 4 Deep Gap Heads, Two Walnut Acoustic Suspension Speakers, Two Dynamic Mikes and performance specs only matched by another Ampex. (Especially after you use it a year or so.) Suggested retail price: $449.95.

Write Ampex Corporation, Consumer Equipment Division, Dept. A9, 2201 Lunt Ave., Elk Grove Village, Ill. 60007 for a full color spec sheet on the 1467 and a brochure on the entire Ampex line.

AMPEX

* *See "Will your tape recorder sound as good in December as it did in May." in leading audio magazines, April, 1969.*

** *See "A message from the heads of Ampex. Listen." in leading audio magazines, March, 1969.*

MICROPHONES

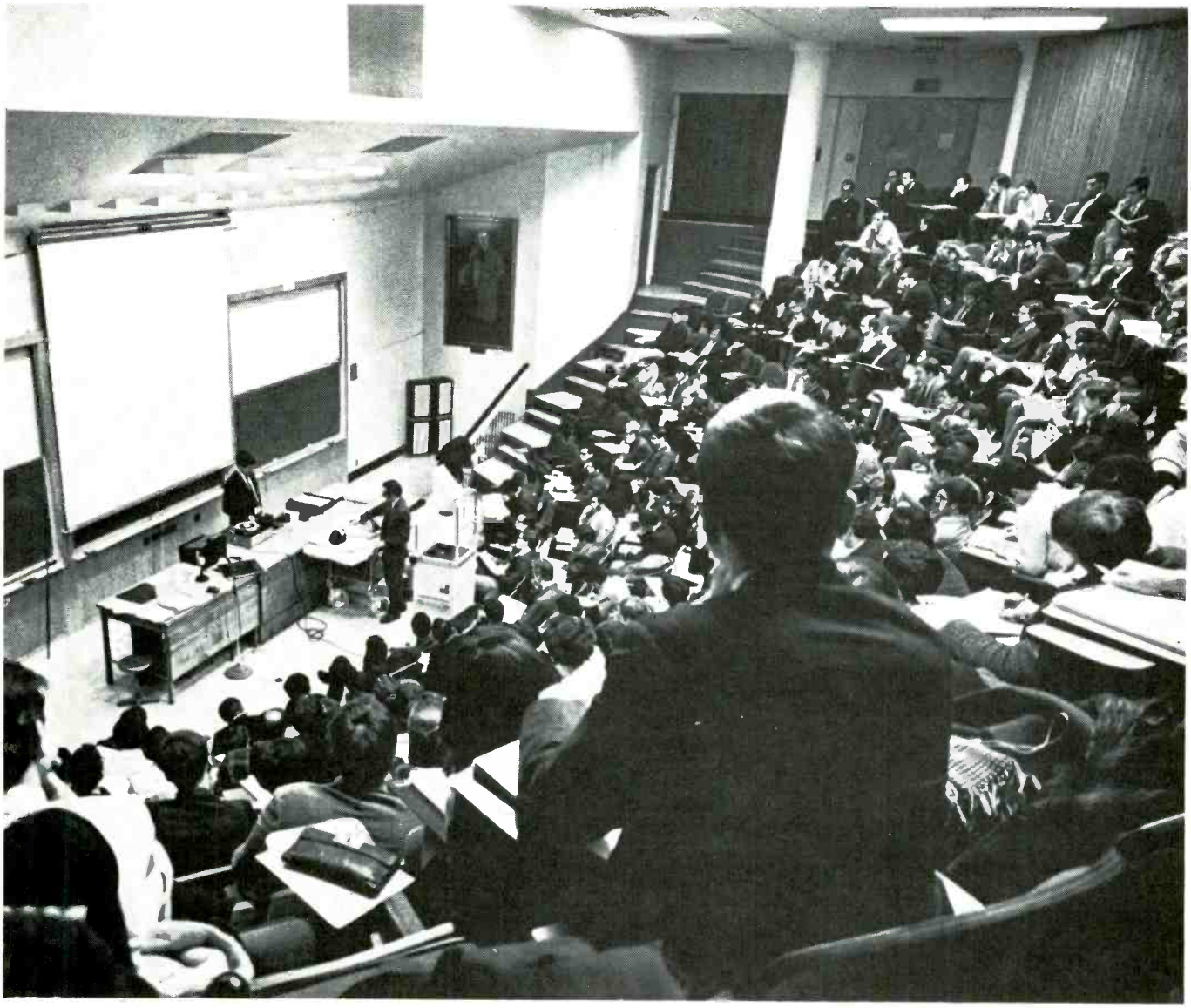
AKG C-451E

Altec 651AH

Electro-Voice RE55

MANUFACTURER (Circled number indicates ad page)	Model	Directional Pattern	Operating Principle	Case Material	External Finish	Impedance, Ohms	Frequency Response, Hz to kHz, ± ? dB	EIA Sensitivity, dBm	Mic Connection	Cable Length, Ft.	Cable Plug Type	Dimensions, in.	Weight, Oz.	Mounting Method	Price	SPECIAL FEATURES
AKG	D-190E	Card.	Dyn.	Metal	Satin	200	40-15,000 ±3	–149	XLR	15	Free	6¼ x 1½ d.	6	5/8 – 27	50.00	Internally suspended capsule
	D-200E	Card.	Dyn.	Metal	Chrome	200	30-15,000 ±3	–151	XLR	15	Free	7 5/16 x 1 5/8 d.	8	5/8 – 27	69.00	Two-way cardioid mic. Similar to two-way spkr; woofer & tweeter & cross-over.
	D-24E	Card.	Dyn.	Metal	Satin	200	30-18,000 ± 2.5	–148	XLR	15	Free	6½ x 1 9/16 d.	6	5/8 – 27	160.00	Wide range, studio microphone.
	C-451E	Vari.	Con-denser	Metal	Satin	200	30-20,000 ± 2.5	–135	XLR	–	–	¾ x 5 7/16 d.	4.5	5/8 – 27	179.00	Modular system features: a) interchangeable capsules b) Phantom, a.c. and d.c. powering.
ALTEC LANSING (39) (91)	650A	Card.	Dyn.	Steel	Satin Chrome	150/250 or 20,000	50-15K	–150	3 Pin Cannon	15	Phone Plug	6 13/16 x 1¾ Dia.	10	5/8 – 27	85.00	Built-in wind/pop screen, on-off sw., bass roll-off switch, personal carrying case.
	651AH	Card.	Dyn.	Steel	Satin Chrome	20,000	60-15K	–151	Cable se-cure to mic	15	Phone Plug	6 13/16 x 1¾ Dia.	11 Incl. Cable	5/8 – 27	70.00	Built-in wind/pop screen, on-off switch, personal carrying case.
CROWN (71)	C-100	Card.	Cond.	Metal	Satin	200	30-20K ± 2.5	–133	Cannon XLR	None	–	5 7/16 L x ¾ Dia.	4½	Std.	240.00	Direct power from "CX" recorders; optional 3-pattern capsules.
	M-80	2-way Card.	Dyn.	Metal	Satin	200	30-15K ±2	–149	Cannon XLR	15	None	8½ L x 2½ dia	10	Std.	150.00	Sintered bronze filter; linear cardioid pattern
ELECTRO-VOICE (General Purpose) (2) Cover IV	664	Card (Var. D)	Dyn.	Diecast Zinc	Chrome gray or Gold	Dual-150 and Hi	60-15K	–149 –151	E-V QC4M	15	None	7¼ x 1 7/8 Max. Dia.	26	5/8 – 27	53.40	Variable-D card.; resp. independent of dist; on-off sw.
	674	Card. (Var D)	Dyn.	Diecast Zinc	Chrome	Dual-150 and Hi	60-15K	–151 –152	E-V QC4M	15	None	7 7/8 x 1¼ Dia	18	5/8 – 27	53.40	As above, w/3-pos. bass-tilt sw. for control of room rumble.
	676	Card. (Var. D)	Dyn.	Diecast Zinc	Chrome	Dual-150 and Hi	60-15K	–151 –152	E-V QC4M	15	None	7 3/8 x 1¼ Dia.	12	300 Std Adapt.	53.40	As above, w/out on/off sw.
	631	Omni	Dyn.	Diecast Zinc	Chrome	150 or Hi	80-13K	–149 –151	Amph	15	None	6 x 1 3/8 Max Dia.	6	310 Std Adapt.	37.80	For hand-held ent. use; 4-std. pop filter; removeable mag. reed on-off sw.
	627A	Card. (Sgl. D)	Dyn.	Diecast Zinc	Black & Chrome	150 or Hi	60-13K	–151 –153	Amph	15	None	6 1/8 x 1 5/8 Max. Dia.	8	310 Std Adapt.	37.80	For above use; bass resp. var. w/dist. — 14 dB incr. at 100 Hz, 24" to ¼".
	626	Card. (Sgl. D)	Dyn.	Diecast Zinc	Fawn Beige Micomatte	Dual-150 and Hi	70-12K	–151 –153	None	15	None	6 11/16 x 1 5/8 Max. Dia.	8½	310 Std Adapt.	27.90	Integral-cable version of 627A.
ELECTRO-VOICE (Professional) (2) Cover IV	RE-20	Var-D card.	Dyn.	Steel	Fawn beige matte	50, 100, 150	40-20K	–150	Swcrft A3M	18	Not furn.	8½ x 2 1/8 max. d.	26	Adapt.	249.90	Very wide range; uniform polar curve.
	RE-16	Var-D car.	Dyn.	Steel	Fawn beige matte	150	80-15K	–150	Swcrft A3M	18	Not furn.	7 3/8 x 1 7/8 max. d.	8	Adapt.	159.00	Super-effective opo filter similar to RE-15.
	RE-15	Var-D card.	Dyn.	Steel	Fawn beige matte	150	80-15K	–150	Swcrft A3M	18	Not	6 7/16 x 1 3/8 max. d.	6	Adapt.	153.00	Super-cardioid; max. rejection at 150 deg; uniform resp. at all angles.
	RE-55	Omni	Dyn.	Steel	Fawn beige matte	150	40-20K	–149	Swcrft A3M	18	Not furn.	10½ x 1¼ max. d.	8½	Adapt.	126.00	Extremely smooth resp. suitable as secondary calib. std.
	RE-50	Omni	Dyn.	Alum.	Fawn beige matte	150	80-13K	–149	Swcrft A3M	18	Not furn.	7¾ x 1 15/16 max. d.	9½	Adapt.	66.00	"noiseless" version of 635A; max rejection of cord, handling, and breath-pop noise.
	635A	Omni	Dyn.	Steel	Fawn beige matte	150	80-13K	–149	Swcrft A3M	18	Not furn.	6 x 1 3/8 max. d.	6	Adapt.	49.20	Integral 4-stagepop filter; for hand-held use.

Because of their exceptional accuracy, Acoustic Research speaker systems are usually chosen for special scientific applications.



One of the world's leading medical schools has recently solved a long-standing problem in its training of first-year students: how to enable a lecturer and hundreds of listeners to hear simultaneously the heart sounds of a living patient. Usable microphonic pickups exist; the difficulty arises because most of the sound in a heartbeat is in the range below 40 Hz. At these very low frequencies, even many speaker systems which seem to have "good bass" are unable to provide results comparable to those of a doctor's stethoscope. The stethoscope, simple as it is, couples the physician's ears directly to the patient's chest, and can, in principle, convey acoustic pulses near 0 Hz. It is this kind of extended low-frequency response which was needed, but individual listening devices were out of the question; they would not allow lecturer and students to hear and recognize the same abnormalities without ambiguity.

The problem was solved by the school's purchase of four standard full-range AR-1x speaker systems and an AR amplifier; the latter is used with all controls "flat". Despite the large size of the lecture hall, the heart sounds are clearly audible to all students, and levels can be produced which literally rattle the doors and windows of the amphitheater.

Our best system for music reproduction is our AR-3a; it has the same low-frequency characteristics as the AR-1x, but includes our most accurate mid-range and high-frequency drivers also. Other AR speaker systems are described in the free AR catalog.

AR

Acoustic Research Inc.
24 Thorndike Street, Cambridge, Massachusetts 02141

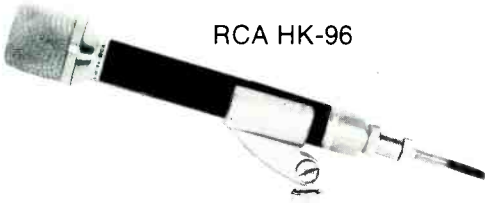
Acoustic Research International
Radiumweg 7, Amersfoort, Holland

Check No. 83 on Reader Service Card

MICROPHONES (continued)

Neumann KM-84

Sennheiser MD 408

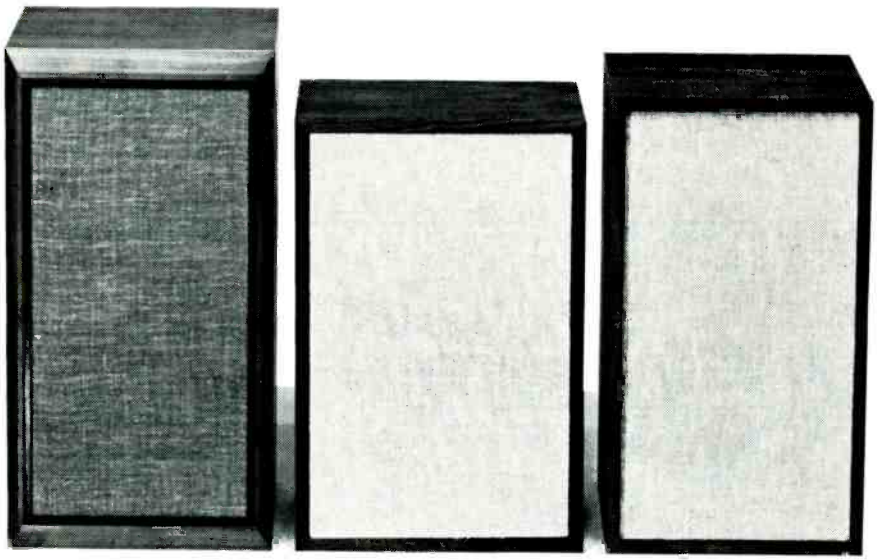


RCA HK-96

Shure 548

MANUFACTURER (Circled number indicates ad page)	Model	Directional Pattern	Operating Principle	Case Material	External Finish	Impedance, Ohms	Frequency Response, Hz to kHz, ± ? dB	EIA Sensitivity, dBm	Mic Connection	Cable Length, Ft.	Cable Plug Type	Dimensions, In.	Weight, Oz.	Mounting Method	Price	SPECIAL FEATURES
NEUMAN	U-87	Omni-card. Fig. 8	Cond.	Metal	Satin Chrome	150/250	40-16K	–137	Can	25	Can	8 x 2¼ d.	20	5/8-27	From 336.00	Studio std. for close miking; int. compartment for batt. oper; switchable lo-freq. and 10-dB o-load attenuation.
	KM-84	Card.	Cond.	Metal	Satin Chrome	200	40-20K	–137	Can	25	Can	4 3/8 x 7/8 d.	3	5/8-27	From 252.00	Reqs. batt. or a.c. supply; flat freq. resp. on or off mic; 10-dB o-load sw. for close-up use; accessories available.
PML	F67 BS	Card.	Dyn.	Alum.	Satin Chrome	200, Hi	40-16K	–160	Att. Cable	20	Not furn.	7¾ x 1 Dia.	16	Stand	59.50	Incls. on/off switch; Stand adapter supplied.
RCA (100)	HK-111	Omni.	Dyn.	Diecast	Black & Sat. Chr.	200, 15K	50-20K		RCA Conn.	20	Not furn.	10.6 x 1.6 d	9	5/8 & 5/16	54.00	Integ. wind screen; flat wide freq-resp. characteristics.
	HK-96	Card	Dyn.	Diecast	Black & Sat. Chr.	200, 15K	50-15K	–	RCA Conn.	20	not furn.	9¾ x 1.6 d	16	5/8	50.00	3-pos bass roll off sw.
	HK-106	Super Card	Dyn.	Diecast	Black & Sat. Chr.	200, 15K	150-10K	–	RCA Conn.	20	Not furn.	5.3 x 1.2 d	69	5/8	44.00	2 transfs; 2 ctgs; gentle rolloff at low freqs.
SENNHEISER	MHK-804	Narrow beam	r.f. cond.	Brass	Satin Chrome	*	50-20K ±1.5	–125.7	Tuchel	not furn.	Can XLR	22 x ¾ d.	13	Boom	391.00	Ultra-directional. * acc. available to match any Z.
	MD-211N	Omni.	Dyn.	Alum.	Satin Chrome	200	40-20K ± 2.5	–149.3	Not furn.	30	Not furn.	4¾ x 7/8 d	4.5	Clamp	124.00	Multi-purpose.
	MD-214N	Omni	Dyn.	Alum.	TV gray	200	60-12K ± 1.5	–149.3	Not furn.	30	Not furn.	3 x 1 1/8 x 1 1/8	5	lanyard	110.00	Lavalier model; built-in shock mount; equalized freq. resp.
	MD-408	Super Card.	Dyn.	Brass	Chrome	200	100-14K ± 1.5	–149.3	Tuchel	Not furn.	Not furn.	1 5/8 d. Sphere	10.5	Stand	59.00	Flex-Shaft mount.
SHURE (General Purpose) (11)	548	Card.	Dyn.	Diecast Zinc	Black & Chrome	Hi, Lo	40-15K	–151	Can. XLR	15	Not furn.	6 1/8 x 1 9/16 d	9	Adapt.	63.00	Unidyne IV; available with sw. as model 5485.
	565	Card.	Dyn.	Diecast Zinc	Black & Chrome	Hi, Lo	50-15K	–150.5	Amph MC4M	15	Not furn.	6 1/32 x 2 d.	11	Adapt.	60.00	Unisphere I; with sw, 565S.
	545	Card.	Dyn.	Diecast zinc	Black & Chrome	Hi, Lo	50-15K	–151	Amph MC4M	15	Not furn.	5 13/16 x 1¼ d	9	Adapt.	53.40	Unidyne III; with sw, 545s.
	55SW	Card.	Dyn.	Diecast Zinc	Chrome	Hi, Med. Lo	50-15K	–151.5	Amph MC3M	15	Not furn	7 11/16 x 2 3/16 x 3 1/16	26	5/8 – 27	53.40	Undyne II; with on/off sw.
	579SB	Omni	Dyn.	Diecast Zinc	Satin Chrome	150	50-15K	–151	Can XLR	20	Not furn.	6 3/8 x 1 9/16 d	5½	Adapt.	45.00	Vocal sphere.
	585SA	Card.	Dyn.	Diecast Zinc	Chrome	Hi	50-13K	–153.5	Amph MC1F	15	Not furn.	6¾ x 2 1/16 d	13½	Adapt.	40.80	Unisphere A. Available in low-Z as 585SB
	588SA	Card.	Dyn.	Diecast Zinc	Chrome	Hi	80-13K	–155	Can XLR	15	Not furn.	6½ x 2 1/8 d	12	Adapt.	36.00	Unisphere B. Available in low-Z as 588SB
	515SA	Card.	Dyn.	Diecast Zinc	Black & Chrome	Hi	80-13K	–154	–	15	Not furn.	6½ x 1½ d	15	Adapt.	25.20	Unidyne B. Available in low-Z as 515SB

Which of these comparably priced, top quality speakers offer you Electronic Suspension?



KLH FIVE
in oiled walnut

LWE III
in oiled walnut

AR 5
in oiled walnut

Only LWE.

LWE introduces a whole new era in speaker design. No longer must a speaker depend on porting, or reflex, or resonance, or baffles, or sand, or weighted cones, or cabinet size, shape or design. LWE's newly patented (March 1969) Electronic Suspension speakers actively eliminate reproduction distortion by electrical commands to the amplifier. The result is remarkable and unrivaled fidelity. □ LWE research has uniquely applied the principle of inverse — or negative — feedback to control the speaker cone electronically at all times. This produces greatly improved transient response, virtual elimination of speaker distortion, and extension of low frequency response. In short, LWE out-performs any conventional speaker on the market today — regardless of size or price. Hear LWE for yourself. And for more detailed information write for our Sound of Excellence brochure. Our prices range from $60 to $469. LWE Electronic Suspension has arrived, and you've never heard it so good.

LWE

The Sound of Excellence

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STEREO HEADPHONES

Fisher HP 100

AKG K-60

Beyer DT 48s

Clark 100

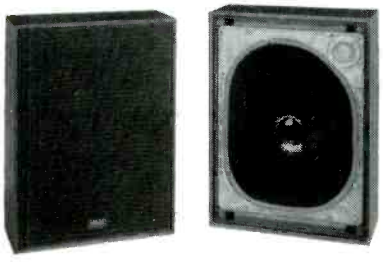
Koss ESP-9

MANUFACTURER (Circled numbers indicate adv. page)	Model	Type	Frequency Response, Hz ± ? dB	Impedance, Ohms	Sensitivity mW input for 100 dBm Out	Maximum Input, mW	Distortion, %	Cord Length, Ft.	Weight, Oz.	Price	SPECIAL FEATURES
AKG	K-60	Dyn.	20-20K	600/chan.	1.0	20	1.0		11	39.50	
	K-20	Dyn.	20-20K	600/chan.	1.0	20	1.0		11	19.50	
BEYER	DT-48S	Dyn.	16-18K ±3	5 ea.	.0625	2 x 200	0.1	9	16	90.00	Sgl. or dbl. mtchg. transfs. avail. for 600-ohm lines; spkr-phone switchover box
	DT-48SN	Dyn.	16-18K ±2	50	.0625	400	0.1	9	16	90.00	For NAGRA recorder only. monophonic.
CLARK	1000	Dyn.	20-16K ±3	8	1	500	<1.0	8	16	85.00	Sim. wal. grain domes; gold-plated hdwe; carrying case.
	100	Dyn.	20-12K ±3	8	1	500	<1.0	10 coiled	16	45.00	Also available in impedances of 300,600, 1200 ohms.
	200	Dyn.	30-8K ±3	8	0.5	1000	1.5	10 coiled	16	26.95	Model 250 – same with vol. controls, 32.00
	300	Dyn.	30-8K ±3	8	0.5	1000	1.5	10 coiled	14	19.00	
FISHER (31)	HP-60	Dyn.	30-18K	8	1 mW	500	0.1	8	15	24.95	
	HP-100	Dyn.	18-22K	50	2mW	700	0.1	8	10	34.95	
JENSEN	HS-2	Dyn.	20-17K	4/chan.	14	2,000	>1.0	8	16	24.95	High compliance, comfortable listening at 1 mW– loud at 10mW
KOSS	ESP-9	Electro-static	10-19K ±5	4-16	135 dB SPL	12,000	0.2	6	19	150.00	Self-or a.c. line-energzd. Contr. monitoring for 10 octaves ±2 dB
	ESP-6	Electro-static	27-19K ±5	4-16	135 dB SPL	12,000	0.2	10 coiled	27	95.00	Self-energized electrostatic phones. Delivers 3 octaves beyond limits of ord. dyn. elements
	ESP-7	Electro-static	30-15K ±8	4-16	135 dB SPL	12,000	0.25	6	17	79.00	Self-energizer furnished separate from phones;
MIKADO (88)	M 3800	Dyn.	30-16K	8		500		6	10	19.90	Volume control stereo-mono sw.
PML	D-42	Dyn.	30-20K	200/ea.	0.3		2 at 5mW	6	9½	29.95	Usable for stereo or mono. mono Z = 400 ohms in series; 100 ohms parallel.

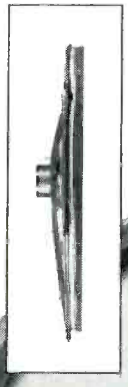
We've closed the degeneration gap

Tests show that a symmetrically designed speaker — round, rectangular, square, conical, triangular — gives rise to degeneration in the vibration mode at specific frequencies. Distorting natural sound. That's why the Yamaha Natural Sound Speaker has such an unusual shape. It operates on the same sound concept as the sounding board of a grand piano, violin or guitar. To prevent sound degeneration. To give you natural sound . . . the way your ear was meant to hear it.

THE NATURAL SOUND SPEAKER shapes the sound so that you don't get those unreal, booming bass sounds . . . nor the strident, irritating highs. The system is based on the principles of acoustic musical instruments such as the piano. The quality of sounds produced is directly correlated to the acoustical design of their sounding boards. They are called BENDING MOTIONS of sound. And they are natural.



Following this concept, Yamaha developed the Natural Sound Speaker. It is entirely different from the conventional cone. It has a rigid diaphragm constructed of a specially formulated polystyrene. The entire edge of the speaker is firmly fixed on the frame. And it is shaped for natural sound . . . like the sounding board of a piano.



So, if you've been listening to degenerated sound — close the gap. With Yamaha.

The specifications:

NS-15
Impedance — 8 ohms
Power capacity — 30 watts
Tone control — Continuously variable
Speakers —
Natural Sound: 13" x 17"
Cone: 2"
Cabinet —
Removable grille
Straight-grain American Walnut
Open pore, oil finish
Dimensions —
Height: 23"
Width: 16"
Depth: 7"
Weight: 22 lb.

5 models available, starting at $69.50.

Now available. Two outstanding new receivers that do the Yamaha Natural Sound Speakers justice.

Yamaha International Corporation, Audio Products Division
7733 Telegraph Road, Montebello, Calif. 90640

Please send me your 1970 catalog containing complete specifications on all Yamaha audio products.

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Street City State Zip Code

YAMAHA

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STEREO HEADPHONES (continued)

Pioneer SE-50

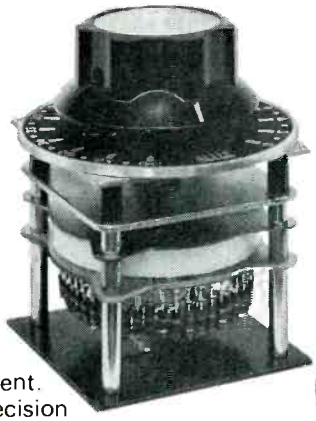
Sennheiser HD-414

Superex ST-PRO-B

Telex Serenata

MANUFACTURER (Circled numbers indicate adv. page)	Model	Type	Frequency Response, Hz ± ? dB	Impedance, Ohms	Sensitivity mW Input for 100 dBm Out	Maximum Input, mW	Distortion, %	Cord Length, Ft.	Weight, Oz.	Price	SPECIAL FEATURES
PIONEER (25) (65)	SE-50	Dyn.	20-20K	8		500		16	20	49.95	2-way, volume, tweeter controls w/case
	SE-30	Dyn.	20-20K	8		500		8	14	29.95	w/case
	SE-20	Dyn.	20-18K	8		500		8	13	19.95	w/case
SENNHEISER	HD-414	Dyn.	30-20K	2500 ea.			1.0	10	5	29.95	Lightweight, plastic band, foam ear pads.
SHARPE	HA-770/GP	Dyn.	20-20K	11 (500 opt.)	1.12V.	2 ea.	<1.0	10 coiled	26	100.00	Calibrated, matched, fused. Liquid-filled cushions; Freq. resp. curve furnished.
	HA-660/PRO	Dyn.	20-20K	11 (500 opt.)	1.12V.	2 ea.	<1.0	10 coiled	26	60.00	As above, less curve.
	HA-10 MK II	Dyn.	30-15K	8	0.5V.	2 ea.	<1.0	10 coiled	24	45.00	Modern design; Forest Green.
	HA-9	Dyn.	30-15K	8	0.13V.	2 ea.	<1.0	6	23	25.95	Color: Gray
SONY (Superscope) (6) (73) (17)	DR-6C	Dyn.		10K				6	14	29.50	Padded band; plastic foam cushions; polyester diaphragm dome-shaped.
	DR-6A	Dyn.		8				6	13	27.50	As above.
SUPEREX	ST-PRO-B	Dyn.	18-22K ±5	4-16		2,000	0.7	7	20	50.00	Woofer/tweeter; 10-ft. coiled cord avail; replaceable cushions Avail. with Z of 600, 2000, 15KΩ
	ST-M	Dyn.	20-20K ±5	4-16		2,000	0.85	7	18	29.95	As above, adj. tweeter level.
	ST-S	Dyn.	30-15K ±5	4-16		2,000	0.85	7	15	24.95	10-ft. coil cord avail., repl. cushions. Avail. with Z of 600,2000, 15K ohms.
	ST-C	Dyn.	40-15K ±5	4-16		2,000	0.85	7	15	19.95	Replaceable cushions; avail. in Z of 10K ohms.
TELEX	Serenata	Dyn.	20-20K	3-16		2,000	0.5	8	16	59.95	Brown; band press. cont; built-in tone cont; liquid-filled cushions; det.cord; storage caddy Incl
	ST-20	Dyn.	16-15K	3-16		2,000	1.0	8	12	34.95	Brown; built-in vol. cont. for ea. chan; foam cushions.
	Combo	Dyn.	10-12K	3-16		10,000	1.0	8	12	19.95	Brown; 3½" spkrs. matched; foam cushions; wide band.
	Encore	Dyn.	50-18K	4-8		5,000	1.0	8	11	9.95	Brown & avocado grn; molded plug; foam cushions.

More than 1000 standards



Units shown with cases removed.

Altec attenuators are the standard of the broadcast and recording industry. And not only do we make them better, but we make more of them—over a thousand different kinds of rotary and straight line attenuators for every broadcast and recording requirement.

Available are bridging pads, precision decade attenuators, projection and turntable faders, fixed loss pads, mixer networks, minimum loss matching pads, impedance matching networks, stereo pan pots, calibrated attenuators, rotary differential attenuators, mixer controls, grid control pots, VU meter extenders and many more.

Variety is only part of the story. Every Altec-built attenuator will last hundreds of thousands of operations. Precisely constructed, they're also "overbuilt"—for rugged dependability. Electrical integrity is assured, too, because of our exclusive use of cold-forged contacts of fine (100%) silver; also pure silver brushes, individually suspended to maintain perfect contact. Noise-free operation is further assured by dust-tight cases.

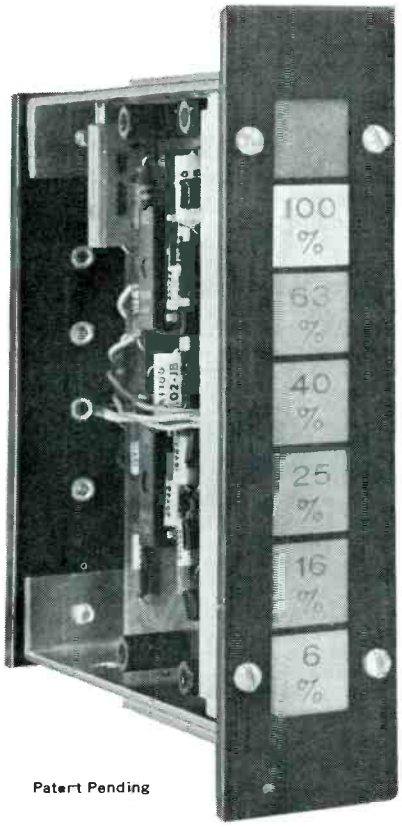
The most commonly needed Altec attenuators are available off the shelf. Custom configurations will be made to your exact requirements. For a complete catalog of the Altec attenuator line, please write.

and a brand-new hit.

Our new illuminated audio peak reading indicators are bound to be a hit with recording engineers. Levels are indicated by a slim, vertical column of different colored lights. Each light represents a percent of modulation—blue: 6% (—24dBm); green: 16% (—16%dBm), 25% (—12dBm), 40% (—8dBm), 63% (—4dBm); yellow: 100% (0dBm); and red: Overload (+4dBm). Overload represented by a red light is easily spotted, even out of the corner of your eye.

Are they responsive? More so than any regular meter movement, because the lights are triggered by solid-state circuitry.

(Actual size; 4¼" H x 1" W x 4" D—including terminals)



Patent Pending

Other benefits, too. Like size: Each indicator can be mounted on a 1" center.

For more information about this revolutionary product, please write for literature on the peak limiting indicator, model #9713A.

Altec Lansing, Dept. A-9
1515 So. Manchester Ave.,
Anaheim, Calif. 92803

- ☐ Please have authorized Altec representative call with complete information.
- ☐ Please send catalog "Altec Precision Attenuators and Networks"
- ☐ Please send information on Altec's new audio peak limiting indicator Model #9713A.

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Company_____

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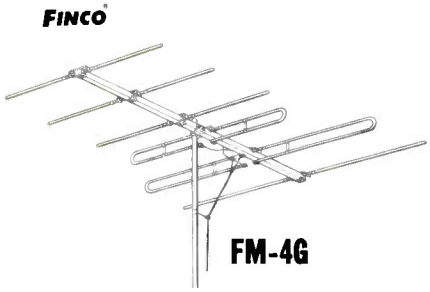
MISCELLANEOUS

FM Antennas

The Finney Company offers a wide variety of FM antennas, ranging from Model FM-WT designed for window mounting and providing an omni-directional pattern at $16.95, up to the Model HWK-75 Home Distribution System for TV and FM at $129.95. The



latter includes everything needed to wire an average home with four TV/FM outlets—225 feet of 75-ohm cable, a distribution amplifier, and flush-mounting wall plates. In between is Model FM-4G at $25.95, a 6-element twin-driven FM antenna with an average gain of 8.5 dB over a simple dipole and a front-to-back ratio of 21 dB. Also available is an indoor behind-the-set FM signal amplifier with 20 dB of gain. Transistorized, it will drive one or two 300-ohm loads.

Check No. 70 on Reader Service Card

JFD Electronics Corp. has a complete line of antenna accessories in addition to several types of FM antennas. Topping the line is the LPL-FM10A at $49.95. This is a 10-element rig with a boom over 12 feet in length which incorporates a low-impedance braced triple boom. Also available is the LPL-FM4A—a 4-element antenna of similar design for suburban and local use. A complete list of preamplifiers and splitter/couplers rounds out the line.

Check No. 72 on Reader Service Card

Electronic Items

C-M Labs offers its Model 601 Electronic Crossover Network, which features variable crossover frequencies at 100-Hz intervals from 100 Hz to 12,000

Hz. Separate gain controls are provided for each of the high-pass and low-pass outputs. The slope of the crossovers is 6 dB/octave. Price, $126.00.

Check No. 74 on Reader Service Card

Fisher Radio Corporation is still marketing the "Dynamic Spacexpander" reverberation device. This self-powered unit has a delay time on attack of 33 milliseconds, and a decay time of 2 seconds at 300 Hz. A front-panel control

is provided so that the user can vary the amount of reverberation added to the signal. This is a stereo unit, and reverberation is added to both channels simultaneously. Price, $69.95.

Check No. 78 on Reader Service Card

Hartley Products offers a line of passive crossover networks designed to be connected in the speaker voice-coil circuits. Model 300 has two crossover points—300 and 3000 Hz—with slopes of 12 dB/octave, and is priced at $75.00. Model 350 and Model 1500 are single networks with crossover frequencies of 350 and 1500 Hz, respectively, and are priced at $40.00 for the 350 and $35.00 for the 1500. Both provide a slope of 12 dB/octave.

Check No. 115 on Reader Service Card

Lafayette Radio has available a stereo mixer/preamp, Model 99-0178, which is designed for use with amplifiers which do not have low-level magnetic phono or tape-head inputs. Operating from a 9-volt battery, it provides inputs for microphone, as well as for cartridge and tape head, and it is equipped with controls for equalization, mode, left volume, right volume, and an on-off switch. The unit measures 7 in. wide, 5½ in. deep, and 2½ in. high, and is priced at $14.95. Also available is a home reverberation amplifier rated at

10 watts. This model, RK-777, is designed to connect to the extra- or remote speaker output, and provides center-channel operation with percentage of reverberation controllable, as are tone and volume. Price, $59.95.

Check No. 116 on Reader Service Card

Martel Electronics Sales, Inc. has a number of accessories available for use with their line of Uher tape recorders. The model 121 mixer has inputs of 3000 and 47,000 ohms, and mixes and fades five mono signals, or two stereo and one mono signals to an output of 20,000 ohms. All controls are of the "slide" type, and the unit operates from one 9-volt battery. Price, $140.00. Model 422 "Dia-Pilot" automatically operates any electrically remote-controlled slide projector by recording a low-frequency signal on the tape in the record mode, and by activating the projector when the tape is played back past the recorded tones. Price, $70.00.

Check No. 117 on Reader Service Card

Pioneer Electronics U.S.A. Corp. has recently introduced the Model SR-202 solid-state reverberation amplifier. This unit, which measures 11 13/16 in. wide, 9 13/16 in. deep, and 4½ in. high, offers a controllable reverberation time which is adjustable over the range from 1.9 to 3.2 seconds. It has an input impedance of 300k ohms, and an output impedance

of 10k ohms and is designed to be connected between the preamp and the power amplifier of a typical hi-fi system. The complete amplifier, which weighs 8¾ pounds, is priced at $95.00. Also available is the Model STP-2 Equalizer Preamp, which accommodates phono, tape-head, and microphone inputs, provides enough gain to work into a basic amplifier with a distortion less than 0.3 per cent. It is priced at $25.00.

Check No. 118 on Reader Service Card

S.C.A. Services, Inc., offers Model SCA-1 Background Music Decoder—a self-powered model with an audio output of 0.6 volts at an impedance of less than 5000 ohms. This unit attaches to any FM tuner or receiver to decode subcarrier background-music programs with no commercials or talking. The price is $64.50, completely assembled.

In kit form, Model SCA-1K is priced at $49.95, and includes all parts to produce a unit identical to SCA-1. For those who would install the circuit inside an existing FM tuner or receiver, a wired circuit board is available as Model SCA-1PC, with the power being supplied by the set itself. It is priced at $49.95 also. For those who would build "from scratch," a printed-circuit board and the integrated circuit are available as Model SCA-1BD for only $12.50.

Check No. 119 on Reader Service Card

Sansui Electronics Corp. has a new three-channel electronic crossover with low-to-midrange crossovers adjustable

*Wadyakallus?

*What do you call us?

Give our club a name...
we'll give you a FREE Stereo system of your choice and a FREE Record, Tape, or Book Every Week for a Whole Year.

IF you've ever wanted to buy **UNLIMITED SELECTION** of **BOOKS, RECORDS, TAPES, CARTRIDGES, CASSETTES,** and **HI FI STEREO GEAR** at substantial savings **(25%-80%)** with **NO MINIMUM BUYING OBLIGATION,** our club is for you. Now through the use of one club membership you can have all the advantages of 4 clubs plus much much more.

A club so NEW IN CONCEPT and DESIGN that we ask your help in naming it. What's more, we're willing to pay you for that help. Send us a Name and we'll give you $3 off the Regular **Lifetime Membership** price of $5 and a chance for the big prize. If you're not a gambler here's a sure thing. We're willing to offer **Charter Club Membership** for the same low introductory price. **ALL YOU EVER PAY IS $2.**

The winning name selected by our judges will receive a **FREE STEREO SYSTEM, plus a FREE RECORD, TAPE, or BOOK Every Week for a Whole Year. CONTEST CLOSES NOV. 1,** so you'd better hurry.

Whether you win the big prize or not you'll certainly come up a winner with your club benefits. As a member you have **UNLIMITED SELECTION** of any book you wish: fiction, non-fiction, historical, scientific — even valuable art books at 25% discount. A **FREE Schwann** Catalog comes with your membership which conveniently lists over 30,000 LP's by category: Popular, Classical, Folk, Jazz and so on. **FREE Harrison** Catalogs listing all available 4 and 8 track tapes, cartridges, and cassettes are yours for the asking.

Your **FREE QUARTERLY CLUB MAGAZINE** keeps you informed of all New releases in Records, Tapes, and Books, while offering you valuable extra discount Club Specials.

We've really stacked the deck in your favor: Tape deck, that is. We offer savings up to 50% on stereo equipment from all famous makers. Regulations prohibit us from listing those Nationally advertised brands. Write for our complete list of famous makes as well as a low quote on your stereo needs.

You, of course, receive only **BRAND NEW,** factory sealed, guaranteed perfect **EQUIPMENT, RECORDS, TAPES,** and **BOOKS.** Nothing will ever be shipped unless you order it and there's never any buying requirement.

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SAVE 33⅓% ON TAPES
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There are NO Membership dues, NO Annual fees and NO Minimum orders. There are tremendous savings, extra discount specials, unlimited selection, 4 Clubs in one convenience, fast same day processing of orders and a chance to be a big winner.

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3. NO MINIMUM PURCHASE OBLIGATIONS. Nothing will ever be sent until I order it.

I must be delighted with the Club or within 30 days I will let you know and receive a full refund.

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HERE'S THE WINNING NAME:

_____

Contest closes November 1, 1969. Judges decisions are final. In case of duplicate names, prizes will be awarded to earliest postmarked entry.

Check No. 93 on Reader Service Card

Check No. 96 on Reader Service Card

Miscellaneous (continued)

Superscope offers the complete line of Sony recording tapes, with the PR-150 series most in demand. This is a 1.0-mil polyester-base tape packaged 1800 feet on a 7-in. reel, and with correspondingly less tape on smaller reels. PR-200 fits 2400 feet on a 7-in. reel, and SLH-180 is a low-noise, high-output tape with 1800 feet on a 7-in. reel. Computer-styled empty tape reels are also available in 7-, 5-, and 3¼-in. sizes. "Easy-Threader" tabs are included free in every box of PR-150 and PR-200 tapes. The HE-2 Head Demagnetizer is a useful device for those who wish to keep their recorders in tip-top shape, and it is priced at less than $12.95. Cassettes are available in the popular C-60 (1-hour) types at under $1.89; in the C-90 (1½-hour) type at less than $2.79; and as the C-120 type which plays for two hours at less than $4.39. 8T-60 is an 8-track cartridge for 60 minutes playing time, and it is priced at less than $6.25.

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Joel Tall is a recognized authority on tape editing, and his products are available from Elpa Marketing Industries as aids in his specialty — editing. The aluminum splicing blocks, long used by the professional, are available in the usual ¼-in. size at $6.50, and additionally in 0.150-, ½-, and ¾-, and 1-in. sizes at $8.00, $24.00, $30.00, and $34.00 respectively. His Edi-Tabs are priced at $1.50 per box of 50 tabs, and a plastic block splicing kit is available at $3.50.

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Cabinetry

Audio Originals provides a number of cabinets designed to accommodate the electronic components in conventional spaces, drawers, and so on, and to accommodate speaker systems in their own cabinets without modification. Model 3003, shown, measures 32⅝ in. high, 16 in. deep, and 72½ in. in length, and is priced at $142.50. Other models range from $82.50 to $182.50. All are available in a variety of furniture finishes.

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Barzilay offers the Design X stereo cabinet in either kit or assembled form. This unit measures 97½ in. wide, 29½ in. high, and 18 in. deep, and is priced at $299.00 in kit form, or $509.00 finished. It features a new design with 15-deg. slanted panels, and with part

of the front lifting with the top for ease of access. Also available are a number of Multipsan Wall Systems made up of cabinets and shelves of various sizes which may be combined in limitless arrangements.

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Linkage

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The New Sony PS-1800 playback system has something missing. It also has several things not found in other turntables. And therein lies the story of its superior performance.

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What does this all mean to you? A turntable with a precisely balanced tonearm of low mass design that tracks records flawlessly. A turntable that is absolutely silent (total wow and flutter, only 0.08% rms and rumble 60 dB below the NAB reference level).

The new Sony PS-1800 playback system —turntable, tonearm, oil-finish walnut base, dust cover. Under $200. Evolution? It's a revolution. Sony Corporation of America, 47-47 Van Dam Street, Long Island City, New York 11101.

SONY® PS-1800 PLAYBACK SYSTEM

Miscellaneous (continued)

For those who prefer to build their own cabinets and equipment housings, **Furn-a-Kit** offers a choice between a number of models, beginning with Equipment Cabinet No. 1, priced at $178.00. The model is 7 feet long, and will accommodate speakers, tuner, turntable, tape recorder, records, and tapes. A steel hutch and steel legs are optional. A complete 52-page catalog is available from the company for 50¢.

Check No. 134 on Reader Service Card

Among its wide line of audio furniture, **Toujay Designs'** speaker columns (shown) are designed to accommodate complete speaker systems in their own cabinets. These columns are on a rotating base so they may be turned around to hide the appearance of the grille or to provide a higher ratio of reflected-to-direct sound. The company's

"Towers" are well known for their modern appearance and their versatility in housing any element of a hi-fi system in a variety of attractive combinations. All models are available in kit form or completely built and finished.

Check No. 135 on Reader Service Card

NAMES AND ADDRESSES OF MANUFACTURERS

ADC (see Audio Dynamics Corp.)

AKG (see Norelco)

Acoustech, Inc. (see Koss Electronics)

Acoustic Research Inc.
24 Thorndike St.
Cambridge, Mass. 02141

Allan, Richard, Radio, Ltd.
Bradford Rd., Gomersal,
Cleckheaton, Yorks, England

Allied Radio Corp.
100 N. Western Ave.
Chicago, Ill. 60680

Altec Lansing Corp.
1515 S. Manchester Ave.
Anaheim, Calif. 92803

Ampex Corporation
2201 Lunt Ave.
Elk Grove Village, Ill. 60007

Astrocom/Marlux
Oneonta, N. Y. 13820

Audio Dynamics Corp.
Pickett District Rd.
New Milford, Conn. 06776

Audio Originals
546 S. Meridian St.
Indianapolis, Ind. 46225

Aztec Mfg. Co.
2140 S. Lipan St.
Denver, Colo. 80223

Manufacturers' Addresses (Cont'd)

BSR (USA) Ltd.
Rt. 303
Blauvelt, N. Y. 10913

Barzilay Co., Inc.
16245 S. Broadway
Gardena, Calif. 90247

Bell & Howell Photo Sales Co.
7100 McCormick Rd.
Chicago, Ill. 60645

Benjamin Electronic Sound Corp.
40 Smith St.
Farmingdale, N. Y. 11735

Beyer (see Gotham Audio)

Bogen Communications Div.
Lear Siegler, Inc.
P.O. Box 500
Paramus, N. J. 07652

Bose Corp., The,
East Natick Industrial Park
Natick, Mass. 01760

Bozak Mfg. Co.
Box 1166
Darien, Conn. 06821

British Industries Corp.
Westbury, N. Y. 11590

C-M Labs, Inc.
575 Hope St.
Springdale Conn. 06907

Celestion (see Rola Celestion)

David Clark Co.
360 Franklin St.
Worcester, Mass. 01604

Concertone, Inc.
7035 Laurel Canyon Blvd.
North Hollywood, Calif. 91605

Concord Electronics Corp.
1935 Armacost Ave.
Los Angeles, Calif. 90025

Craig Corporation
2302 E. 15th St.
Los Angeles Calif. 90021

Crown of America
P.O. Box 1000
Elkhart, Ind. 46517

Crown Radio (see Industrial Suppliers)

Delta-Ret
P.O. Box 10734
Houston, Texas 77018

Dual (see United Audio Products)

Dynaco, Inc.
3060 Jefferson St.
Philadelphia, Pa. 19121

EMI (see Benjamin Electronic)

EdiTall (see Elpa Marketing)

EICO Electronic Instrument Co.
283 Malta St.
Brooklyn, N. Y. 11207

Elac (see Benjamin Electronic)

Electro-Voice, Inc.
602 Cecil St.
Buchanan, Mich. 49107

Elpa Marketing Industries
New Hyde Park, N. Y. 11040

Elite Electronics, Inc.
195 Central Ave.
Farmingdale, N. Y. 11735

Empire Scientific Corp.
1055 Stewart Ave.
Garden City, N. Y. 11530

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Epicure Products, Inc.
185 Somerville Ave.
Somerville, Mass. 02143

Ercona Corp.
2121 Bellmore Ave.
Bellmore, N. Y. 11710

Fairfax Industries, Inc.
165 Ward St.
Paterson, N. J. 07505

Ferrograph (see Elpa Marketing)

Finney Co.
34 W. Interstate St.
Bedford, Ohio 44146

Fisher Radio Corp.
11-35 45th Rd.
Long Island City, N. Y. 11101

Frazier, Inc.
1930 Valley View Lane
Dallas, Texas 75234

Furn-a-Kit
1308 Edward L. Grant Highway
Bronx, N. Y. 10452

Garrard (see British Industies)

Geloso—American Geloso Electr. Inc.
251 Park Ave. South
New York, N. Y. 10010

Goldring (see IMF Products)

Goodmans (see Elite Electronics, Inc.)

Gotham Audio Corp.
2 W. 46th Street
New York, N. Y. 10036

Grado Laboratories, Inc.
4616 Seventh Ave.
Brooklyn, N. Y. 11220

Grommes Div. of Precision Electronics, Inc.
9101 King St.
Franklin Park, Ill. 11803

Harman-Kardon, Inc.
55 Ames Court
Plainview, N. Y. 11803

Hartley Products Corp.
Box 68A
Ho-Ho-Kus, N. J. 07423

Heath Company
Benton Harbor, Mich. 49022

IMF Products
7616 City Line Ave.
Philadelphia, Pa. 19151

Industrial Suppliers, Inc.
755 Folsom St.
San Francisco, Calif. 94107

Irish Tape (see Morhan National Sales Co.)

JBL (see James B. Lansing Sound, Inc.)

JFD Electronics Corp.
15th Ave. at 62nd St.
Brooklyn, N. Y. 11219

JVC America, Inc.
50-35 56th Rd.
Maspeth, N. Y. 11378

Jensen Manufacturing Div., The Muter Co.
5655 W. 73rd St.
Chicago, Ill. 60638

KLH Research & Development Corp.
30 Cross St.
Cambridge, Mass. 02139

Manufacturers' Addresses (Cont'd)

Karlson Research & Mfg. Div., KRC Corp.
Box 117
West Hempstead, N. Y. 11552

Kenwood Electronics, Inc.
3700 S. Broadway Pl.
Los Angeles, Calif. 90007
69-41 Calamus Ave.
Elmhurst, N. Y. 11377

Kersting Mfg. Co.
504 S. Date St.
Alhambra, Calif. 91803

Klipsch and Associates
P.O. Box 280
Hope, Arkanssas 71801

Knight-Kit (see Allied Radio)

Koss Electronics, Inc.
2227 N. 31st Street
Milwaukee, Wis. 53208

LWE, Div. of Acoustron Corp.
2418 Bartlett
Houston, Texas 77006

Lafayette Radio
P.O. Box 10
Syosset, N. Y. 11791

Lansing, James B. Sound, Inc.
3249 Casitas Ave.
Los Angeles, Calif. 90039

Leak (see Ercona Corp.)

3M Company
2501 Hudson Rd.
St. Paul, Minn. 55119

Marantz Company
8150 Vineland
Sun Valley, Calif. 91352

Martel Electronic Corp.
2339 S. Cotner Ave.
Los Angeles, Calif. 90064

Matsushita Electric Corp. of America
200 Park Ave.
New York, N. Y. 10017

Maximus Sound Corp.
809 Stewart Ave.
Garden City, N. Y. 11530

McIntosh Laboratory, Inc.
2 Chambers St.
Binghamton, N. Y. 13903

Mikado Electronics Corp.
1072 Bryant St.
San Francisco, Calif. 94103

Miracord (see Benjamin Electronic)

Morhan National Sales Co.
453 Broadway
New York, N. Y. 10013

Multicore (see British Industries)

Neshaminy Electronics
Furling & Edison Rds.
Furlong, Pa. 18925

Neumann (see Gotham Audio)

Nikko
5001 Lankershim Blvd.
North Hollywood, Calif. 91601

Nordmende (see Sterling)

Norelco (see North American Philips Co.)

North American Philips Corp.
100 E. 42nd St.
New York, N. Y. 10017

Nortronics Co., Inc.
8101 W. Tenth Ave., No.
Minneapolis, Minn. 55427

Manufacturers' Addresses (Cont'd)

Ortofon (see Elpa Marketing)

PML (see Ercona)

Panasonic (see Matsushita Electric)

Perpetuum Ebner (see Elpa Marketing)

Pickering & Company, Inc.
Sunnyside Blvd.
Plainview, N. Y. 11803

Pioneer Electronic (USA) Corp.
140 Smith St.
Farmingdale, N. Y. 11735

Premier Electronic Labs
382 Lafayette St.
New York, N. Y. 10003

RCA Elect. Components & Devices
415 S. Fifth St.
Harrison, N. J. 07029

Rabco
11937 Tech Rd.
Silver Spring, Md., 20904

Rectilinear Research Corp.
Sweeny Bldg., 30 Main St.
Brooklyn, N. Y. 11201

Reeves Soundcraft Corp.
Great Pasture Rd.
Danbury, Conn. 06810

Rek-O-Kut (see Koss Electronics)

ReVox Corporation
212 Mineola Ave.
Roslyn Heights, N. Y. 11577

Roberts Electronics, Inc., Div. Rheem Mfg. Co.
5920 Bowcroft Ave.
Los Angeles, Calif. 90016

Rola-Celestion, Ltd.
Ferry Works
Thames Ditton, Surrey, England

SAE (see Scientific Audio Electronics)

SCA Services Co.
Box 601
Port Washington, N. Y. 11050

Sansui Electric Co., Ltd.
34-43 56th St.
Woodside, N. Y. 11377

Scientific Audio Electronics
P.O. Box 60271, Terminal Annex
Los Angeles, Calif. 90060

Schober Organ Corporation
43 W. 61st St.
New York, N. Y. 10023

Scotch Tape (see 3M Company)

Scott, H. H., Inc.
111 Powder Mill Rd.
Maynard, Mass. 01754

Seeburg Corp.
1500 N. Dayton St.
Chicago, Ill. 60622

Sennheiser Electronics Corp.
500 Fifth Ave.
New York, N. Y. 10036

Sharpe Instruments, Div. of Scintrex, Inc.
Amherst Industrial Park
Tonawanda (Buffalo), N. Y. 14150

Sherwood Electronic Laboratories, Inc.
4300 N. California St.
Chicago, Ill. 60618

Shure Brothers, Incorporated
222 Hartley Ave.
Evanston, Ill. 60202

Sony Corp. of America
47-47 Van Dam St.
Long Island City, N. Y. 11101

Soundcraftsmen
P.O. Box 6894
Los Angeles, Calif. 90022

Standard Radio Corp.
60-09 39th Ave.
Woodside, N. Y. 11377

Stanton Magnetics
Terminal Drive
Plainview, N. Y. 11803

Sterling Hi-Fi
22-20 40th Ave.
Long Island City, N. Y. 11101

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4 Radford Pl.
Yonkers, N. Y. 10704

Superscope, Inc.
8150 Vineland Ave.
Sun Valley, Calif. 91352

Switchcraft, Inc.
5585 N. Elston Ave.
Chicago, Ill. 60640

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Tandberg of America, Inc.
P.O. Box 171
Pelham, N. Y. 10803

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1756 Ocean Ave.
Bohemia, N. Y. 11716

TEAC Corporation of America
2000 Colorado Ave.
Santa Monica, Calif. 90404

Telefunken Sales Corp.
South Street, Roosevelt Field
Garden City, N. Y. 11530

Telex Communications Div.
9600 Aldrich Ave., South
Minneapolis, Minn. 55420

Thorens (see Elpa Marketing)

Toujay Designs, Inc.
146 E. 53rd St.
New York, N. Y. 10022

Trusonic
4959 Santa Anita
Temple City, Calif. 91780

Turner Company, The
909 17th Ave. N.E.
Cedar Rapids, Iowa 52402

Uher (see Martel Electronic)

United Audio Products
535 Madison Ave.
New York, N. Y. 10022

University Sound
9500 W. Reno
Oklahoma City, Okla. 73101

Utah Electronics
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Huntington, Ind. 46750

Viking (see Telex)

Watts, Cecil E. (see Elpa Marketing)

Wharfedale (see British Industries)

Wollensak (see 3M Company)

AUDIO MUSIC REVIEW

Classical Record Reviews

Edward Tatnall Canby

Larry Adler—Works for Harmonica and Orchestra (Milhaud: Suite; Arnold: Concerto; Benjamin: Concerto; Vaughan Williams: Romance). Royal Philharmonic Orch., Morton Gould.
RCA LSC 3078 stereo ($5.98)

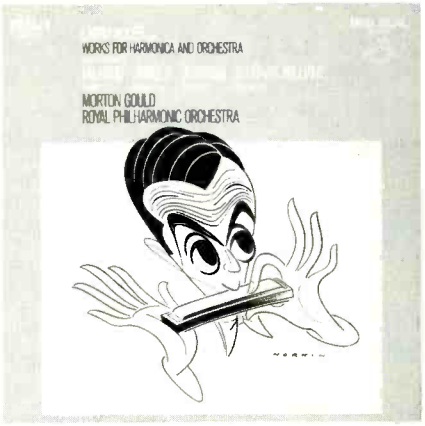
Here is one of the most delightful and surprising records of "modern" music I've heard in a long time. Four works, more or less in "classical" style, for the incredible harmonica playing of Larry Adler, all composed in the decade-plus from 1943 to 1954, the performances by Sir Thomas Beecham's old orchestra livened by the sure touch of no less than Morton Gould.

You would never believe a harmonica could be as versatile and as expressive as this one (unless, of course, you've heard Larry Adler before). It sounds like a cross between a clarinet and a super-saxophone in a very high register, and Mr. Adler can make it run and jump, wail, sing, exult in the most human manner, as the old-time blues harmonica players did with their simpler instruments. (This is a large chromatic harmonica, easily playing all the notes of the 12-tone scale.)

The Arnold and Benjamin Concerti, one short, the other full-size, are wonderfully sophisticated vehicles for the instrument, tuned exactly right, quirky, colorful, yet full scaled, British music at the height of its postwar expansiveness. Neither is a "great" work, nor so intended; both are beautifully crafted with the most suave professionalism, conservative-modern in style. I fairly reveled in them, and in Mr. Adler's amazing playing.

The Milhaud Suite, dating from 1943 and California, is one of the better examples (among many not so good) of that composer's wildly eclectic individual style. For no reason at all—but typically Milhaud—the first movement is a pseudo-Bach gigue that seems on the verge of turning into "The Irish Washerwoman"; the slow movement, for no reason in particular, is a "sailor's song" and the finale a hornpipe, somehow mated with a Brandenburg Concerto. Totally zany, but delightful as well as fiendishly difficult; Adler took four years to make up his mind to play it in public.

As for "the old man," Vaughan Williams, his short Romance is characteristic late V-W, straight out of the age of Romantic Impressionism, toned up with mildly modern dissonance. It dates from 1952, and is surely one of



his more important works, ranking easily alongside his later symphonies, if on a smaller scale.

Astonishing how effectively Larry Adler plays in these four very different works. His harmonica is more versatile, more adaptable than most classical instruments of greater familiarity.

Performances: A *Sound:* B+

Copland Conducts Copland (Short Symphony; Dance Symphony). London Symphony Orch., Copland.
Columbia MS 7223 stereo ($5.98)

Odd how unseeing composers are concerning their own work—at least in spoken commentary. The liner notes on this record are a dialogue between the composer and Philip Ramey, interviewing him; listening in (the interview was presumably taped), the intelligent listener could no more get any idea of the actual sound and style of these two works than if some totally uninformed outsider were describing them second hand. If you play the music, it's a different story.

The "Short Symphony" on side 1 dates from the years 1931 to 1935, just previous to the famous and well known series of Copland ballet and entertainment scores which have made him his "rep" with the larger musical public. It sounds just like that—the familiar jerky, syncopated Copland rhythms, the angular, wide-jumping melodies, are already here but in a less popular and outgoing vein, some severely "classical." An interesting and characteristic piece, nevertheless, and this is its first recording.

The earlier Dance Symphony, reworked from a 1924 ballet (when Copland was 24), is wholly different; except for a few tell-tale bits in the finale, most of us would never guess that this smooth, eclectic postwar-I style of music, out of early Stravinsky, was by Copland. I found it very professional, skillfully, almost slickly written for orchestra, and not a bit the mature Copland. He himself is particularly fond of it, so we must agree to disagree.

Performances: B *Sound:* B

Schubert/Mozart for Piano Four Hands. Paul Baruda-Skoda, Joerg Demus.
Westminster WST 17156 stereo ($4.79)

Westminster's Vienna-born piano team has been making Viennese recordings for this company for years, both together and separately, and a more perfect choice could hardly be found to convey that peculiarly Austrian kind of music, the duet for two players at one keyboard—so right and intimate in the home parlor or salon, so awkward on the concert stage. And so right, of course, on records where the physical clumsiness of the shared piano bench is invisible yet the music is as large as life. Westminster's four-handed piano sound is shaped accordingly, of an intimate sort with minimal suggestion of large concert-hall liveness, yet big enough to have the required "resonance," as musicians sometimes vaguely put it. A very tasteful recording.

There are three Schubert works here (out of a large number he wrote), the early Rondo in D (Op. 138), the large-scale Fantasy in F Minor, and the big but gentle Grand Rondo in A with its unbelievably lovely melodies. At first

listening you may find the playing a bit sluggish, here and there. Not really. This is simply the Viennese sort of playing, which is definitely of a lower voltage than much international concert-style performing, its tempi often slower than the competition pace. Good, and the Viennese are surely right—our ears are misled by too much fancy show-off stuff. You adjust to the Vienna pace very quickly.

The Mozart, somehow, seems livelier —a brilliant set of variations written for a pair of sisters who also received other Mozartean offerings; they must have been reasonably apt pupils.

Performances: A— *Sound:* B+

Baroque Trumpets

The Art of the Baroque Trumpet. Edward Tarr, Robert Bodenroder and others, Consortium Musicum, Lehan.
Nonesuch H-71217 stereo ($2.98)

This good single-disc collection of wide-ranging trumpet music from the whole span of the middle to very late Baroque (well beyond the normal middle-18th century limits) is played, astonishingly, on the authentic valveless instruments of the time, both the seven-foot straight trumpet and the coiled variety. Only a few of the more formal late concerti and sonatas, by Handel, Torelli, Fasch, are heard via a modern high valved trumpet. A few years ago this feat would have been thought impossible — the Baroque trumpet parts weren't even playable *with* the aid of modern valves. (Toscanini used to spell off the Bach trumpet with a high clarinet, to give the trumpeter periods of rest. Alfred Cortot's pioneer Bach trumpeter, back in 78 days, simply omitted clumps of notes in the Brandenburg No. 2 when his lips gave out from the strain.)

You would never know, here—so sure, so faultless, are these numerous valveless performances, waltzing all over the high-trumpet diatonic scale via lip pressure alone. Only the slightly odd sound and intonation (as of the pure overtone series) of some tones gives them away as natural or unvalved in origin. The music, considering the trumpet's limited number of notes, is remarkably varied, the program expertly managed for continuing interest as we listen. There is, for instance, one concerto for seven trumpets and tympani, spaced in depth perspective, a number of works have solid orchestral music to set of the solo sound, others are in the nature of brief, brilliant trumpet fanfares. An imaginative and beautifully played disc.

Performances: A *Sound:* B+

The Baroque and Classical Trumpet. (Scheidt, Bach, Handel, Telemann, Purcell, Vivaldi and others). Assorted soloists and orchestras.
Turnabout TV 34295-99 (5 discs) stereo ($12.50)

A heavyweight five-record collection, here, of the sort Vox has produced over many years, this one exploiting a variety of different Vox "house-organ" orchestras in such places as Mainz, Württemberg, Stuttgart, in Germany, and Rochester (Eastman) in New York State. All the recordings are in stereo and the sound, though varied in acoustics and in quality, is up to date in the over-all. A few items are slightly buzzy (Mainz); most are clear as a bell.

The German-based performances of a wide variety of Baroque concerti plus a few "classic" (the late 18th century) are as could be expected remarkably uniform in style and approach and the remaining music fits into the pattern

well enough; Stuttgart, within this framework, is a bit sluggish under Rolf Reinhardt; the Eastman brasses are all American efficiency and precision; the Richard Schultze Telemann Society offerings are slightly on the driven and harsh side. But these differences are not striking. Among the excellent trumpeters is the same Edward Tarr who plays valveless solo trumpet in Nonesuch's "The Art of the Baroque Trumpet" (H-71217).

Even at a higher cost these performances would offer a superb view of the brilliance of trumpet art in the 18th century and the variety of formats and of orchestral colors into which the trumpet injected its stunningly effective highlighting. At the Vox-Turnabout level, the album is a bargain.

Performances: B to A—
Sound: C+ to B

Baroque to Classic

Music at Drottningholm. Chamber Orch. of the Drottningholm Theater, Ulf Bjorlin.

Nonesuch H-71213 stereo ($2.98)

A lively small orchestra plays some typical and quite worthy "unknown" music here, out of the archives of a restored royal Swedish theatre near Stockholm. The works range from sturdy late Baroque, slightly post-Bach, to some less sturdy and more frivolous sounds from the later 18th century.

The best, and longest, work on the record is the Suite from a large collection of short movements (somewhat like the Handel Water Music) collectively titled Drottningholms-Musique, by Johan Helmich Roman, who directed the music of the Swedish court for many years in the time of Bach and Handel—his outside training had been in England during Handel's "reign." The music is both well written and interesting, by no means slave to the Handelian tradition though there are suggestions of that composer and the very idea of the long celebration suite (it was for a royal wedding) is Handelian.

The other works, by two later men, are interestingly contrasted in style; both seem relatively behind-the-times, as of their late dates, the 1770s and 80s, but this was in part due to local requirements, notably the King's interest in the reform opera of Gluck. The Naumann ballet music is pleasant, the Uttini overture is lively and very *galant*, but not much else.

Performances: A— *Sound:* B+

Antonio Soler: Six Double Concertos for Two Organs. E. Power Biggs and Daniel Pinkham, organs.
Columbia MS 7174 stereo ($5.98)

"Composed for Stereo in the 18th Century" says the cover—Mr. Biggs' fertile imagination is on the loose again! Technically, after a fashion, he is quite right. The two organs were on opposite sides of a Spanish church and the Concerti were played by a Spanish prince and his teacher, Antonio Soler, in the later 18th century. The stereo must have been terrific.

The music is played for this recording on two Dutch organs in Cambridge, Mass., one of them the neo-Baroque Flentrop instrument that is Mr. Biggs' home organ, the other an elderly and

moveable organ lent for the purpose. Lovely sounds from both, and different enough in tone quality (though of the same general Baroque type) to afford extra stereo interest and musical contrast. The music itself is wholly lightweight, varying from quite charming to rather elegantly dull and repetitive, though there's never a heavy note—this is post-Baroque music, perhaps identifiable as Rococo, not unlike that of D. Scarlatti with a bit of Mozart thrown in.

The stereo, as Mr. Biggs says, *is* wonderful.

Performances: B+ *Sound:* B+

Nonesuch H-71214 stereo ($2.98)

Master Works for Organ, Vol. 7: The Netherlands 17th Century. Jorgen Ernst Hansen, Marcussen Organ, Jaegersborg, Denmark.

D. Buxtehude: Organ Music. Walter Kraft, Marienkirche Organ, Lübeck.
Turnabout TV 34283 stereo ($2.50)

These two Baroque organ series, recordings of impeccably interesting middle-Baroque music played impeccably on instruments of the highest classification, have been going on for ages, and I tend to mix them up; for I have found both organists disappointing in the past, their playing didactic, correct, and unimaginative, if immensely competent in technical and stylistic matters. One cannot argue very far in such matters, of course. Obviously both Turnabout and Nonesuch think otherwise and so must the record buyers that, presumably keep the records coming via satisfactory sales. So—try for yourself and by all means disagree if you find the records as enjoyable as others seem to.

The organs themselves, needless to say, are superb in sound, the Marienkirche (Buxtehude's home church centuries back) having an edge of interest in tone-color terms. You cannot really kill Buxtehude's sturdy music on such an instrument short of total ineptitude unthinkable here. The eight Chorale Preludes on side 2 of the Turnabout disc are its finest offering, gentle, colorful Bach-like works; the livelier Preludes and Fugues on side 1 just don't seem to be very lively.

As for the lesser Netherlanders that inhabit the Nonesuch disc (including, of all people, John Bull, who fled from Britain to the continent), they impress less easily, and tend now and then towards sonic dullness, in these performances. Again it's a matter of opinion to an extent, though none of these men can match Buxtehude in musical charisma, not even John Bull, nor, by a hair, that solid earlier Dutchman Jan Pieterszoon Sweelinck. *He's* OK.

. . . And so I end up recommending both discs in spite of their severally didactic approaches.

Performances: B— *Sound:* B

Orchestral Suites from Baroque Operas—Lully: Amadis; Purcell: King Arthur.

Collegium Aureum, Reinhard Peters.
RCA Victrola VICS 1432 stereo ($2.50)

A splendid Baroque specialty record here, in a number of ways. First, the juxtaposition of Lully, the great originator in France, and Purcell, who followed Lully in music normally thought of as highly British, is extremely interesting. We can hear at once how thor-

close to being funny is a parody about a female smoker).

Our advice to brother Shore: Heal thyself!

* * *

And since we're talking about losers, discussion of TOTIE FIELDS LIVE (Mainstream, S-6123) is apropos. The rotund comedienne's initial LP, recorded at the Riviera Hotel in Las Vegas, can't entirely be blamed on writers, either: She creates part of her own material.

From the old school of comedy that thinks it's always funny for ill-shaped or non-attractive comics to chide themselves, she spends most of her time talking about being fat. "I have the same measurements as Elizabeth Taylor—her living room is 9 by 12 and so is mine." But we've heard it all before, before, before, before. . . .

On the flip side of the disc, the Titanic Totie tries to sing (*that's* funny) and does a bit that women might regard as amusing, one concerning the difficulty of keeping taut the new type of stocking. To males, though, it's sheer nonsense.

* * *

A guy who looks like a loser (intentionally, for his bag is being stone-faced), talks like a loser (monotone is devastating), and jokes like a loser (all his barbs point at his purported inadequacies), must *be* a loser.

A one-man Joe Miller, Jackie Vernon offers THE DAY MY ROCKING HORSE DIED (United Artists, UAS 6679) for those who prefer their humor strained in sandboxes. Certainly the level never climbs above that of a primer for after-dinner speakers.

Vernon, whose voice seems to crack slightly every now and then, tells about his relative Attila Vernon, who attacked anything in a skirt (and then some); his childhood ("My mother used to park my carriage in tow-away zones"); and his being an unemployed shepherd (with some of the worst puns extant).

He's honest too. When concluding a segment on a fictional diary, he says: "That was two weeks in THE DULL LIFE OF JACKIE VERNON." Ah, well, another candidate for "Losers, Anonymous"!

What's the state of recorded comedy in general? From the recent offerings, all we can do is steal a line from old-time radio's Molly and say, "Tain't funny, McGee."

Spins & Needles

She's only 14 now and truly professional; what will a decade of seasoning bring? WILD AND WONDERFUL (MGM, SE-4607) is a departure for Julie Budd, whose first album was illuminated not only with her rich, full voice but songs with lyrics from her imaginative mind. Here she reaches into American musical history and comes up with some chestnuts that she revamps, without changing radically, so they seem fresh.

Rodgers & Hart's "Johnny One Note" starts it off, and Myles Chase's "A Very Special Person" is the curtain-dropper. Sandwiched between are Rodgers & Hammerstein's evergreen "My Favorite Things," Cole Porter's "Be a Clown" and Victor Young's "When I Fall in Love." Plus the recent Bacharach-David winner, "What the World Needs Now Is Love," softened just enough to eliminate the rock, and a pair by Lionel Bart from "Oliver" ("Where Is Love?" and "Who Will Buy?").

The only real up-tempo swinger is "Have Another Dream on Me," so the trend in youthful music toward a quieter outlook seems to be firmly tak-

ing hold. Ah, sweet mystery of life—or should we give thanks to Ralph Nader's declaration that rock damages eardrums. At any rate, Julie's a singer who shows she can be the best in either world. Listen; you'll be glad. She twinkles.

* * *

Bambi McCormick is a newcomer whose operatic training is well-hidden in her first LP. She rolls through 11 tunes that range from the unknown to the obscure, and the result is likely to be that she will remain in one of those pigeonholes. It could be a show business tragedy, for she *can* sing. But, then, talent was seldom the key factor in climbing to the footlights.

The blonde firecracker is backed by bouncy contemporary orchestration (not screaming, just toe-tapping), but it all misses, ever so slightly, being pert enough to capture the younger record buyers (and that's in whose hands fame lies, they tell us).

Still, we recommend at least one hearing of BAMBI McCORMICK (Metromedia, MD-1002)—for the future's sake. She'll probably be there, on top, especially if she chooses better material. On this one, pay particular attention to Jim Webb's "I Keep It Hid" (not as countrified as most Webb tunes), an extract from the Bacharach-David musical "Promises, Promises" ("Knowing When to Leave") and Hugo & Luigi's "Why Can't I Walk Away (from "Maggie Flynn").

* * *

Gary McFarland, like so many other musicians, swings from jazz to pop to jazz again. On his own Skye label, it's strictly contemporary jazz; on other labels it varies. Just to confuse things a bit more, there's a new-old album on the scene, SYMPATHETIC VIBRATIONS (Verve, V6-8786), a hip title covering antique but pleasant pop tunes (the LP had been issued previously under the "Soft Samba" name).

McFarland, leader of the swinging but subdued combo, arranged the 11 tunes and plays vibes. Giving the melodies their pop flavor is a vocal background group; giving them a slight jazz accent are artists of the caliber of trombonist Jimmy Cleveland, guitarist-composer Antonio Carlos Jobim, guitarist Kenny Burrell, and percussionist Willie Bobo.

Among the tunes are the Beatles' "A Hard Day's Night," "The Good Life," "More," "California, Here I Come," and "La Vie En Rose." There's not a bad one in the bunch, but there's not the zest of improvisational jazz either. *Æ*

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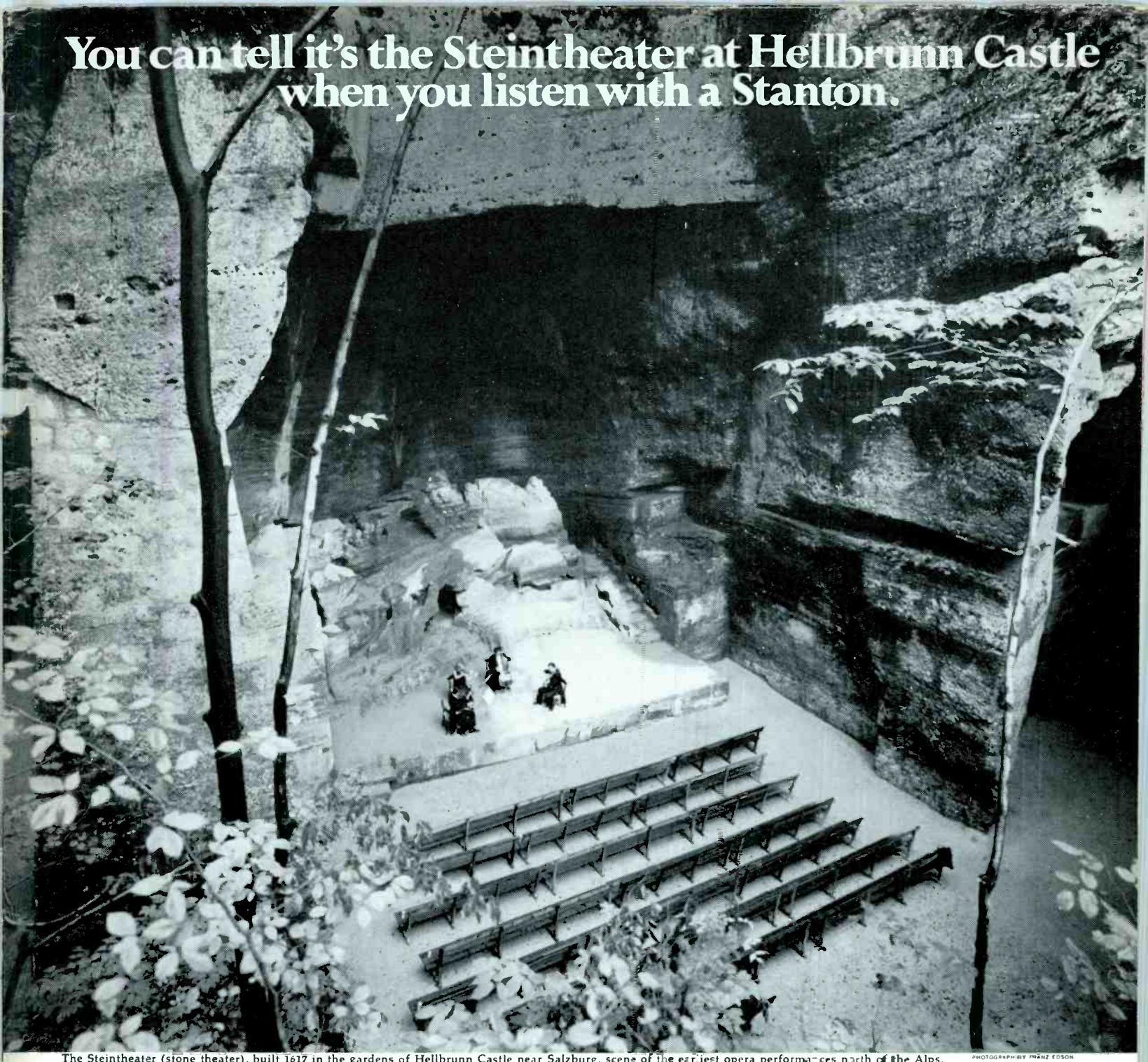

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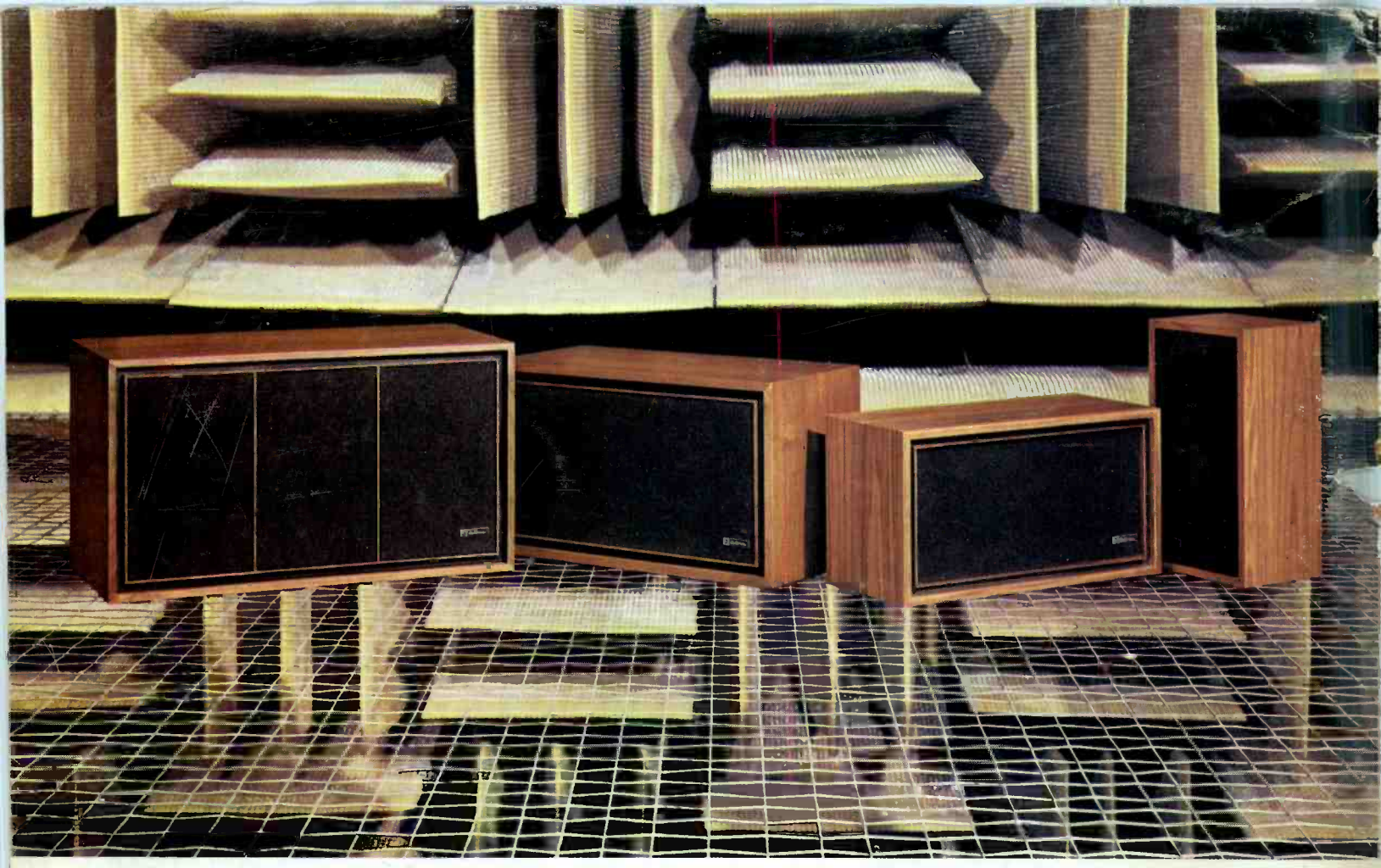

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